

INNOVATION, ENTREPRENEURSHIP, MANAGEMENT SERIES

HEALTH AND INNOVATION SET



Volume 6

The Hidden Faces of Innovation

Edited by

Patrick Gilbert

Martine Le Boulaire

Copyright ISTE 2026 / File for personal use of Martine Le Boulaire

ISTE

WILEY

The Hidden Faces
of Innovation

**Technological Changes and
Human Resources Set**

coordinated by
Patrick Gilbert

Volume 6

**The Hidden Faces
of Innovation**

Edited by

Patrick Gilbert
Martine Le Boulaire

ISTE

WILEY

First published 2026 in Great Britain and the United States by ISTE Ltd and John Wiley & Sons, Inc.

Apart from any fair dealing for the purposes of research or private study, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the publishers, or in the case of reprographic reproduction in accordance with the terms and licenses issued by the CLA. Enquiries concerning reproduction outside these terms should be sent to the publishers at the undermentioned address:

ISTE Ltd
27-37 St George's Road
London SW19 4EU
UK

www.iste.co.uk

John Wiley & Sons, Inc.
111 River Street
Hoboken, NJ 07030
USA

www.wiley.com

© ISTE Ltd 2026

The rights of Patrick Gilbert and Martine Le Boulaire to be identified as the authors of this work have been asserted by them in accordance with the Copyright, Designs and Patents Act 1988.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s), contributor(s) or editor(s) and do not necessarily reflect the views of ISTE Group.

Library of Congress Control Number: 2025950961

British Library Cataloguing-in-Publication Data
A CIP record for this book is available from the British Library
ISBN 978-1-83669-093-1

The manufacturer's authorized representative according to the EU General Product Safety Regulation is Wiley-VCH GmbH, Boschstr. 12, 69469 Weinheim, Germany, e-mail: Product_Safety@wiley.com.

Copyright ISTE 2026 / File for personal use of Martine Le Boulaire

Contents

Foreword	xi
Roberto RENIERO	
Introduction	xiii
Patrick GILBERT and Martine LE BOULAIRE	
Part 1. Managerial Dimensions of Creation and Innovation	1
Chapter 1. Creation's Unique Managerial Paradigm	3
Thomas PARIS	
1.1. Creation as an organized social activity	4
1.1.1. Creation: from the romantic myth to organizational reality	4
1.1.2. The unknown and incomplete mandates	6
1.1.3. Designing without benchmarks: a specific context	9
1.2. The organization... against creation	11
1.2.1. The structural opposition between organization and creation	12
1.2.2. The temptation of the market	15
1.2.3. The delicate equation for organizing creation	18
1.3. Organizing and managing creation	18
1.3.1. The creative processes	19
1.3.2. Management and creation schemes	22
1.3.3. The unique paradigm of creative organizations	24
1.4. Epilogue	26
1.5. References	27

Chapter 2. Manager Roles and Skills amid Transformation Dynamics . . .	31
Anne BASTIEN, Christian DEFÉLIX, Martine LE BOULAIRE, Camille LEDOUX and Thierry PICQ	
2.1. Prism for analyzing organizational transformations	32
2.1.1. Profound transformations, accelerated and accentuated by the health crisis	32
2.1.2. Human and organizational transformation phenomena according to the specialized literature	34
2.1.3. Contrasting transformation logics	37
2.1.4. Consequences of the drivers for managerial transformation	41
2.2. Manager roles and practices	41
2.2.1. Paradoxes identified and accepted by managers	41
2.2.2. Reported management practices	42
2.2.3. The lessons	44
2.3. Manager support provided by companies: various schemes	47
2.3.1. Promoting the transformation of corporate culture.	48
2.3.2. Nourishing to “equip” managers and collaborators	50
2.3.3. Bringing reassurance by acting on the organizational framework	52
2.4. Conclusion: the return of the manager	53
2.5. References	56
Chapter 3. Reconciling the Productivity and Well-being of Qualified Employees: The Managerial Challenge of Teleworking	59
Clotilde CORON, Patrick GILBERT and Simon PORCHER	
3.1. The relationship between teleworking and productivity: a blind spot in research.	61
3.1.1. The convergence of individual and organizational benefits: a widespread opinion tested by the facts.	61
3.1.2. Some effects are beneficial, others not	62
3.1.3. An association between performance and well-being under certain conditions	63
3.1.4. Individual effects and organizational effects: a complex relationship.	65
3.2. A questionnaire survey to gain further insight	66
3.2.1. The questionnaire and its administration	66
3.2.2. A first structuring of findings: descriptive statistics	67
3.2.3. A deeper analysis: a classification into four groups	69

3.3. Two major lessons	72
3.3.1. Teleworking: a situation leading to smaller changes than expected	72
3.3.2. Perception of teleworking contrary to the usual demographic segmentations	73
3.4. Guidance elements	74
3.4.1. Prioritizing diagnosis	74
3.4.2. Differentiated practical implications	76
3.5. Conclusion	77
3.6. References	78
Chapter 4. The Socio-organizational Conditions for Innovation: The Israeli Experience	81
Christian DEFÉLIX, Martine LE BOULAIRE and Thierry PICQ	
4.1. Israel, the unique case of a country managing innovation and talent	82
4.1.1. Non-transferable characteristics	82
4.1.2. Lessons for innovation management and human resources management.	84
4.2. Tips and inspiration for businesses.	92
4.2.1. Inspiration to better manage innovation.	92
4.2.2. Avenues to consider for better talent management.	95
4.3. Working on conditions propitiating innovation	96
4.3.1. The conditions required for the emergence of innovation.	97
4.3.2. Which management and HR management principles should be deployed to encourage emergence?.	98
4.3.3. Ways to manage talent differently.	99
4.4. References	100
Part 2. Organizational and Socio-material Dimensions of Innovation	101
Chapter 5. Digital Technologies and Work Transformations	103
Lise GASTALDI and Amandine PASCAL	
5.1. Digital technologies: reference points	106
5.1.1. Digital technologies: a history	106
5.1.2. Constantly evolving technologies	107
5.2. Analyzing changes in work in context through the prism of digital technologies	109
5.2.1. Professions in industry, maintenance and logistics.	109
5.2.2. Professions in human resources management	114

5.2.3. Lessons learned from exploring different professions	117
5.3. Supporting work transformations: a collective responsibility	119
5.4. Conclusion: towards countless empirical and theoretical projects	123
5.5. References	125
Chapter 6. The Influence of Atmospheres on R&D Creativity	129
Natalia BOBADILLA	
6.1. The links between space, atmosphere and creativity	130
6.1.1. Defining organizational space	130
6.1.2. Organizational atmosphere and creativity	132
6.1.3. Four case studies and field observations	134
6.2. The impact of atmospheres on creativity	135
6.2.1. Atmospheres interact with attention focus and attention levels	135
6.2.2. Various types of spaces and atmospheres to stimulate the creative process	137
6.3. Recommendations for practice	144
6.4. Conclusion	146
6.5. References	147
Chapter 7. The Expertise Factory: Shedding Light on a Blind Spot in Innovation Management	151
Lise GASTALDI, Patrick GILBERT, Martine LE BOULAIRE and Olivier MUSSEAU	
7.1. The production of expertise and its mysteries	152
7.1.1. “Expertise”, “experts”: a need for definition	153
7.1.2. An approach to expertise management that is still too confined	156
7.1.3. A growing need to understand the processes involved in building up expertise	160
7.2. A field survey to explore the question in depth	164
7.2.1. Selection and presentation of two cases: Galactica and Nucleosafe	164
7.2.2. Systematic data collection and analysis from semi-structured interviews	166
7.3. Diving into the heart of expertise production	168
7.3.1. Expertise, a construction that is both cognitive and relational	168
7.3.2. Management schemes with limited effects	170
7.3.3. The influence of business ecosystems.	172
7.3.4. In short: an interactional factory engaging individuals and structures.	174
7.4. Conclusion	174
7.5. References	177

Chapter 8. Managing Agility in an R&D Context: Practices and Challenges	181
Natalia BOBADILLA, Patrick GILBERT and Martine LE BOULAIRE	
8.1. A wealth of literature, but still unanswered questions	182
8.1.1. Implications and scope of organizational agility	182
8.1.2. Agility in R&D	184
8.2. Four case studies.	188
8.2.1. Methodology	188
8.2.2. AeroIndustry: in search of disruptive technologies	189
8.2.3. Constructor: accelerating the advent of product innovation	192
8.2.4. A-part: innovating in all business lines	194
8.2.5. Hydropalax: getting organized to promote innovation.	197
8.3. Cross-disciplinary lessons.	199
8.3.1. Contrasting representations of agility	199
8.3.2. The need for in-depth transformation	200
8.3.3. Interface management and internal cooperation: a difficult challenge	201
8.3.4. Openness to the environment and networking with the innovation ecosystem	201
8.4. Exploring avenues for agility in R&D: lessons learned and benchmarks for action	201
8.4.1. The need for coherent arrangements between practices	202
8.4.2. The profoundly paradoxical nature of agility.	202
8.5. Conclusion	203
8.6. References	204
List of Authors	207
Index	209

Foreword

Innovation's decisive role in the survival and success of any company is now well established. The extension of the concept to multiple areas of application (economic, social, political, environmental, etc.) might even be considered as "one of the most significant developments of the past fifty years"¹. In the business arena, innovation now has a positive connotation, often associated with progress in technology and creativity. So far, the study of its implementation has primarily focused on the technical and technological dimensions of the matter and on the strategic choices of R&D and innovation functions most likely to generate economic growth for the firm.

Despite seeming less directly visible and strategic in the eyes of companies, the conditions for successful innovation management – organizational choices, working practices, human resources policies, management methods and human relations within the firm – also require the careful attention of businesses wishing to auspiciously carry out their innovation projects. Yet, seldom do they receive the investment in study and research they deserve commensurate with the stakes they represent.

To a certain extent, these conditions constitute the "hidden aspects of innovation", those which, far from being the main focus of attention for business leaders eager to improve their innovative capacity, operate discreetly and account for the difficulties in implementing innovation management strategies and policies.

The present volume emerges as an amalgamation of ambition, conviction and necessity.

¹ Aggeri, F. (2023). *L'innovation, mais pour quoi faire ?* Le Seuil, Paris.

For the past 10 years, ambition has powered CIME Innovation, an association bringing together business leaders, HR directors, managers, researchers and practitioners to cooperate in the concrete management of innovation, namely through the production of actionable knowledge. This book capitalizes the production of knowledge that CIME Innovation has generated since its creation. It follows an inaugural book which, upon the creation of our association, addressed transformations in research and innovation².

The conviction shared by these actors of innovation is that there is a necessary complementarity between research work and a practical approach. It is our belief that in order to create and nurture an innovative environment within companies, it is necessary to provide them with the insights offered by research on the issues they face. In this regard, the contributions to this book by almost all members of the CIME Innovation scientific council demonstrate the interest raised by this approach in the management research community.

Finally, the book we are publishing today, the result of constant collaboration between researchers and practitioners within CIME Innovation, is necessary because it invites us to take into account aspects of innovation which are often overlooked in business. The concrete scenarios provided by the member companies of the CIME Innovation network, which served as a basis for the various chapters of this volume, represent a major contribution. They not only raise awareness among professionals but also among researchers and students (future professionals themselves) as to what is at stake behind these underestimated dimensions, paving the way for transformation practices likely to fuel their own reflections around a major topic for the corporate world.

Roberto RENIERO
President of CIME Innovation
Former Director at Nestlé R&D

² Gilbert, P., Bobadilla, N., Gastaldi, L., Le Boulaire, M., Lelebina, O. (2018). *Innovation, Research and Development Management*. ISTE Ltd, London and John Wiley and Sons, New York.

Introduction

Nowadays, innovation is essential for companies and organizations facing a rapidly changing environment. Rather than a simple driving force of competitiveness, it is deployed throughout a myriad of transformations which deeply modify organizational structures, working practices and managerial dynamics. Innovation cannot be reduced to a technological question. Quite the opposite: social, cultural, spatial and human elements are also at play.

This book explores the said diversity through a two-fold complementary approach. The first part analyzes the managerial tensions and dynamics that shape innovation, by examining the specificities of management in the creative industries, the skills required to support change and the new challenges of teleworking. It explores the factors driving adaptation and the transformations of working methods in response to the demands of innovation. The second part broadens the scope of the reflection to the structural, technological and cultural dynamics underlying innovation processes within firms. In particular, it analyzes the impact of digital technologies on the organization of work, the influence of workspaces and environments on creativity, the challenges related to the management of expertise and the tensions inherent in organizational agility.

This structure offers an analytical and critical perspective on innovation in business, combining theoretical approaches and empirical studies. Far from dwelling on prescriptive or purely technical discourses, this volume discloses the tensions, paradoxes and challenges that accompany these transformations.

Introduction written by Patrick GILBERT and Martine LE BOULAIRE.

I.1. General structure

The first part of the book focuses on the *human and strategic stakes* of innovation. While material and organizational conditions are essential, the administration of creativity, expertise and managerial skills constitutes another fundamental lever for transformation. This section explores the specificities of management in the creative industries, the role of managers in supporting change, talent management and the challenges posed by changing forms of work.

Chapter 1 opens the discussion by addressing the *specificities of management in the creative industries*. It emphasizes the tensions between freedom and supervision, between intuition and structuring, and explores the management styles specific to firms where innovation is based on the production of new ideas. This chapter invites the reader to step beyond the romantic vision of the isolated creative genius and to identify how organizational systems can support creativity without limiting it.

Chapter 2 takes a closer look at the key role of *managers dealing with organizational transformations*. It examines how their skills need to evolve to meet the demands of innovation and change, and highlights the tensions between leadership and autonomy, between control and flexibility. The chapter also delves into support systems for managers, identifying the levers that enable them to better navigate constantly changing environments.

Chapter 3 focuses on a major revolution in contemporary work: *teleworking*. It explores how companies may reconcile performance and well-being in a context where remote working became the norm after the Covid-19 crisis. Through an analysis of the effects of teleworking on team commitment and cohesion, the chapter offers a critical reflection on new forms of management adapted to such changes.

Chapter 4 expands on this discussion by turning the attention to the *socio-organizational conditions that favor innovation*. Studying the Israeli model, it analyzes the factors – public policies, financing structures, risk culture – which contribute to the emergence of a dynamic entrepreneurial ecosystem. This case raises questions about the conditions for replicating such models and identifies lessons that other firms and countries may emulate.

The following four chapters, grouped together in a second part, focus on the structural, technological and cultural dynamics that influence innovation processes in companies.

Chapter 5 focuses on *digital technologies and the transformations they bring about in the world of work*. Far from simply automating tasks, these innovations are profoundly transforming organizations, modifying production processes, redefining

occupations and blurring the lines between work and private lives. This chapter analyzes how tools such as artificial intelligence, blockchain technology or even augmented reality enrich and complicate organizational and management modes, while raising new challenges in terms of skills and adaptation.

Chapter 6 focuses on an often neglected aspect of innovation: *the influence of work atmospheres on creativity*. It examines the manner in which the design of places – open spaces, fab labs, incubators – shapes interactions, stimulates or hinders team creativity and conditions the dynamics of innovative processes. Backed by case studies, this chapter calls into question the idea that a well-designed space can be a driver of innovation, while emphasizing the limitations of standardized models for “creative offices”.

Innovation is underpinned by specific expertise which is not readily available on the job market. Chapter 7 questions *the processes for building expertise in business*, highlighting the conditions required for its development and the challenges related to its management. It reveals the paradox of management that values expertise but struggles to organize it effectively in contexts where fast innovation is a must.

Finally, Chapter 8 explores the notion of *organizational agility*, which has become an imperative in a world marked by uncertainty and the speed of technological changes. It examines how companies, especially those with significant R&D structures, adopt agile approaches to strengthen their responsiveness and innovation capabilities. However, it also shines a light on the tensions that this framework generates: between flexibility and structure, between team autonomy and the need for guidance, between process acceleration and quality requirements.

I.2. Towards a comprehensive understanding of innovation

Rather than a linear and uniform phenomenon, innovation is built in specific contexts, by means of heterogeneous and even paradoxical practices. By structuring this book into two complementary parts, the authors have sought to offer a global approach to innovative business.

The texts presented show that innovation is not exclusively related to technological breakthroughs: it also relies on subtle changes in practices, work environments and management styles. It requires in-depth consideration of the conditions that make it possible and the levers to effectively support it.

Instead of prescriptive or purely speculative discourses, this book draws upon the contributions of field researchers and practitioners, engaged in a detailed and documented observation of organizational realities. Through their practices and

in-depth analyses, they explore the conditions in which innovation emerges, is structured and deployed, taking into account the concrete constraints overcome by companies and organizations. Each of the authors is meticulously attentive to developments in the professional world, to transformations in working practices and to new managerial challenges, so as to shed light on the multiple dimensions of innovation based on tangible facts and experiences.

Innovation does not come down to a simple quest for technological breakthroughs or competitive differentiation. Most importantly, it is a collective process, situated and anchored in specific socio-organizational dynamics. It is underpinned by subtle changes in professional practices, by the reconfiguration of work environments and the emergence of new forms of management adapted to contemporary challenges. Understanding innovation requires stepping beyond a strictly technocentric vision and encompassing the complexity of human interactions, organizational structures and institutional contexts that shape it.

This book is aimed at decision-makers, researchers and students wishing to better grasp these transformations. By combining theoretical analyses and empirical studies, it offers a critical and pragmatic reading of the changes underway, helping us to better understand the levers that facilitate innovation, as well as the resistance and tensions it generates. Through its realistic approach, this book aims not only to shed light on academic and professional debates, but also to provide keys to understanding and action so as to effectively support changes in the world of work and organizations.

PART 1

Managerial Dimensions of Creation and Innovation

Creation's Unique Managerial Paradigm

Long deemed exotic by the managerial world – both by practitioners and researchers – organizations falling under what are currently known as the creative industries (Caves 2000) have received increasing interest since the beginning of the millennium (Benghozi 1995; Paris and Massé 2021). And for a good reason: while the imperative of innovation was becoming increasingly pressing and increasingly structuring for a growing number of firms (Benghozi et al. 2000), companies which commercialized “creation” seemed to demonstrate notable know-how in their ability to manage different problems related to such imperative: talent management, repeated innovation, disruptive innovation, risk and failure management, etc. To such an extent, in fact, that these companies (which operate in a context known for its significant risk) even seemed to have stifled it, if we think of the major actors in the luxury sector or Pixar.

If they have long seemed exotic, it is because these sectors remain shrouded in a romantic representation, according to which everything boils down to individual genius (Becker 1982). The relentless success of companies relying on anonymous creators, such as Pixar, has challenged this view and evidenced that organization and management could be accountable for their satisfying performance. What’s more, this pendulum swing may also have encouraged the emergence of another equally false representation of creation: the mechanistic vision. In this way, we tend to apply reading grids to this activity which end up being unsuitable. What actually happens is that firms thriving in the creative industries rely on organizations and management, but these managerial approaches are part of specific operating modes, which leads us to affirm the existence of a managerial paradigm specific to creation.

Chapter written by Thomas PARIS.

This chapter aims to present the characteristics of this paradigm. We do so first by attempting to define the challenges these organizations face. To create, of course! But what does this mean, namely in terms of management difficulties? We thoroughly explore the difficulties and challenges involved in organizing and managing creation. To conclude, we disclose the responses provided by organizations which consistently deploy creative expertise.

1.1. Creation as an organized social activity

“Please... draw me a sheep!”: this famous request could be a prompt issued to generative AI. Regardless of whether artificial intelligence is involved or not, the plea richly describes the context of creation, its reality and its challenges in terms of management. The narrator of the *Little Prince*, an aviator stranded in the desert, might as well retort something like “draw it yourself!”, especially considering that the rest of the episode shows how difficult it is to satisfy the little boy. The narrator could even ask for further explanations, insofar as the boy’s request is not perfectly explicit. This apostrophe, and the difficulties it brings, signals the entry of the organizational dimension into creation. In this section, we do our best to provide an actionable representation of creation.

1.1.1. Creation: from the romantic myth to organizational reality

Fiat lux and facta est lux! Let there be light, and there was light! It is remarkable that the first sentence spoken by God constitutes an act of creation. The creation of the world unfolded as an immediate act, whereby spirit (the mind of God?) imposes its conception over matter. Now, what is true in the Judeo-Christian cosmogony is also present in other cosmogonies. Among the Hindus, for example, the creation of the world took place in the blink of an eye.

Our societies have long supported a vision of creation similar to this first image. In our representations, creation results from a single, brilliant individual, who creates following an inspiration impossible to harness. The demiurgic dimension we often associate with this activity is found in a form of superiority – genius – creators are allegedly endowed with. It is also evidenced in the inspiration which turns the creator into the expressive vector of a higher force. According to this representation, there is no compromise: the creator creates whatever its genius dictates. There is no organization. As for matter, it is a perfectly malleable object over which the mind imposes a form, without much difficulty. Thus, the pangs of creation come down to material suffering (the genius hardly cares for comfort and is often misunderstood) and to the whims of inspiration. In a seminal book, the sociologist Howard Becker

showed how reality differs from this extremely widespread mythology (Becker 1982). We will return to this point.

Let us return to the early days of the world, not from a biblical perspective but an evolutionary one. The discovery of the Chauvet Cave in 1994 taught us that in 36,000 BCE, Paleolithic human beings were already creating. Although dance and pantomime developed in ancient times, some cave paintings seem to indicate that dance existed in prehistoric times. These early forms of artistic expression featured a sense of immediacy, akin to a divine act: nothing and no one stood between the desire to move our body and the execution of the action. Painting requires only – but still – the use of a tool and a material. “Still,” because as soon as the act of creation loses its immediacy, it can involve or require collaboration. The thousands of years that followed resulted in the multiplication of creation forms: the creative industries include painting and other plastic arts, drama and dance, music, publishing, cinema, video games, fashion, architecture, design, advertising, cooking, etc. The image of the creator on their own – alone with their body – has become marginalized. No longer is there any creation that does not require tools, materials or teams, and often, all three. Orson Welles pointed out the increasing complexity of the creative tool when he declared: “A writer needs a pen, an artist needs a brush, but a filmmaker needs an army.” Previously, Chaplin had been moved by the way in which the emergence of technology was transforming the work of the creator:

Cameras the size of a room lumbered about the stage like Juggernauts. Elaborate radio equipment was installed, involving thousands of electrical wires. Men geared like warriors from Mars, sat with earphones while the actors performed, with microphones hovering above them like fishing rods. It was all very complicated and depressing. How could anyone be creative with all that junk around them? (Chaplin 1964, p. 374)

These successive interjections of material, technological or human intermediaries between creator and production have effectively incorporated organization into creation, or more generally, an organizational arrangement (Girin 1995) bringing together individuals and objects. Just like in the *Little Prince*, as soon as the creator has to interact with a third party to create, it enters an organizational context. To such an extent, persons categorized as creators define themselves as organizers or managers. Vince Gilligan, showrunner of the *Breaking Bad* series, declared:

The worst thing the French ever gave us is the *auteur* theory. It's a load of horseshit. You don't make a movie by yourself, you certainly don't make a TV show by yourself. You invest people in their work. You make people feel comfortable in their jobs; you keep people talking. (Martin 2013)

The production of a series, even the most creative one, is built upon organization, labor division, routines or processes.

Over time, cooperation, technologies, tools and de facto organization have become part of various forms of creation. Today, different forms coexist, and the use of larger or smaller teams or labor division is essential for developing complex projects requiring multiple skills (video games, architecture, etc.) or a significant amount of work (series, animation, etc.) or when a creator or company wishes or needs to do more: bigger, more complex, more often, more numerous or faster. These days, architects can only be considered for the *Pritzker Prize*, the highest award in the field, provided that they are associated with a sufficiently substantial body of work, which is largely inaccessible to individuals working on their own. Organization, in this case, makes it possible for their work to be multiplied.

This also leads us to identify the three main organizational contexts for creation (Paris 2013). An organization can be built to catapult the vision of an individual and thus present itself as an extension of the said individual: this is the case of architectural firms that bear the name of an architect, such as Jean Nouvel or Renzo Piano; of restaurant groups such as Alain Ducasse or Anne-Sophie Pic; of animation companies such as Studio Ghibli, which established itself as Miyazaki's tool of expression; or in the performing arts, as shown by the troupes of Ariane Mnouchkine (Théâtre du Soleil) or the late Pina Bausch (Tanztheater Wuppertal).

It can be a production tool placed at the service of projects executed by various external creators: see, for example, the Cirque du Soleil, or the animation studio Illumination which is developing the series of animated films *Despicable Me*. It can finally be a breeding ground in which different creators develop various projects: see the case of Pixar or the video game studio Ubisoft.

1.1.2. The unknown and incomplete mandates

Let us now get back to our sheep. "Draw it yourself!" the aviator could have replied. Yes, but I don't know how to do it, I don't have all the skills, it's impossible for me to do it alone, the little boy could have replied, depending on the nature of the creation requested.

"What sheep?" could have been another reply. The context in which the creative industries operate requires some form of differentiation. We tend to consider that the creative industries are prototype industries, in which each product is new, unique. Caves (2000) drew attention to the property of Infinite Variety, emphasizing that these sectors promote the expression not of 60 shades of gray, but of thousands or even millions of shades in writings, sounds, images, etc. In his attempt to debunk

the myth of the romantic author, Howard Becker (1982) developed another representation of creation as a complex outcome of a chain of cooperation in a universe of mutually shared conventions, which he refers to as the art world. This representation has considerable consequences from a conceptual viewpoint: the value of a creation will be constructed through its encounter with a market, via the decisions that a critic may make to defend a particular work of art, a programmer to present it, a performer to lend their image or voice to it, a bookseller or record store to promote it, the public to adopt it, etc. This means that when a team or artist is working on a piece or has just completed it, the piece in itself has no objective value. It is difficult to admit this when confronted with works considered to be major in the history of humanity. To be persuaded of this, let us recall that Proust had the greatest difficulty in publishing his *Remembrance of Things Past* and that Van Gogh sold a total of one painting in his lifetime.

This state of affairs brings us back to a second misrepresentation, which can be described as mechanistic. After many years of creation being relegated by management theorists to a kind of extraterritoriality, the rise of the imperative of innovation (Benghozi et al. 2000) led them to take a closer interest in organizations which seemed to have found the perfect formula for managing talent, creation, innovation and failure. Successful cases were analyzed to draw lessons, which were often erroneous. The fascination exerted by Pixar led reputable publications as *The Independent* or the *Harvard Business Review* to make the following analysis of success:

Instead of putting the bathrooms (and café and mailboxes and gift shop) off to the side, Steve Jobs placed them in an atrium at the center of the workspace. And “although some were more than a little annoyed to have to traipse to the lobby every time they needed the loo, something remarkable started to happen” writes *The Independent's* Archie Bland. “Pixar’s employees started to bump into each other. They shot the breeze. Sometimes, the chatter would yield something useful, and one of the participants would head back to her desk with a new idea. (Gavett 2013)

This reasoning, which contributed to the buzz around convivial spaces in companies and coworking, is based on a false view of creation, according to which ideas are a scarce resource. Ed Catmull’s presentation (Catmull and Wallace 2014) of Pixar and his analysis of the best creative companies (Paris 2010) show, on the contrary, that these organizations produce ideas abundantly. The mechanistic representation is generally based on the belief in a pre-existing market, implying the fact that good ideas have a self-evident value. Following that, the challenge for these organizations is to foster creativity from which good ideas will naturally emerge. In this model, to create amounts to organizing creativity, in the sense of producing a

plethora of ideas. This conception seems to be at work in the lesson that Eric Schmidt, former CEO of Google, draws from the success of his company, and in particular, of Google's AdSense product:

Google's AdSense product, which developed into a multibillion-dollar business, was invented one day by a group of engineers from different teams who were playing pool in the office. Your partner or roommate is probably great, but the odds of the two of you coming up with a billion-dollar business during a coffee break at home are pretty small, even if you do have a pool table. Make your offices crowded and load them with amenities, then expect people to use them. (Schmidt and Rosenberg 2014)

This reasoning is tainted by biases and misrepresentations: the retrospective bias (reasoning as if the sequence of events was known) and the survivor bias (making a generalization from an event which is a statistical exception). The representation that accompanies these two biases implies that an idea has an inherent value. But this is not applicable to the field of creation, where we are invited to design without any indications on the value of the projects underway.

On the consumer's side, the act of choosing is made in the face of an unreadable supply, insofar as they can only appreciate the value attributed to a work of art after having consumed it (listened to the concert, watched the film, read the book, visited the exhibition, etc.). This makes the creative industries exemplary cases of what Lucien Karpik (2007) calls the economies of singularities. They require the use of different schemes to help consumers make choices: prizes (Goncourt, Oscar, etc.), rankings (charts, etc.) or actors who establish a preselection and who can be called prescribers (Benghozi and Paris 2003, 2007). Among the schemes shared by consumers to find their way through an overabundant supply, word of mouth plays a significant role in cultural activities: creations become all the more valuable because they are important to our loved ones, with whom we can discuss them later. In that sense, creative industries integrate network externalities.

The creative activity takes place in a context where, on the one hand, there is no notion of objective value, and, on the other hand, there is an urge to stand out to counter an abundant supply. So... which sheep? Well, a sheep that cannot look like all other sheep, and therefore a different sheep, a sheep that will stand out from the crowd, a sheep that will break the mold. A creative sheep, then? Let us pause for a moment on this imperative for creativity.

The creative industries are often associated with creativity. It is important to point out that this notion is not operational. "Draw me a creative sheep..." But creative how? The challenge behind this imperative for creativity is to offer

creations that will have the capacity to stand out amid a profuse supply, in a given context. Thus, making a film for luring an audience to a movie theater is not the same as making a film that will have to stand out on a subscription video-on-demand platform. While in the first case, consumers pay for a movie ticket based on their impression of a film, in the second case they have purchased a subscription and can “try out” a film. In short, it is not enough to simply stimulate the desire to buy, it is necessary to offer a film that attracts viewers and entices them to keep watching the film until the end.

Now this framework has been established, the question remains intact. What sheep? Original, no doubt. And quite interesting, depending on the consumption context. But what sheep? We are confronted with a management situation, as defined by Jacques Girin: “A management situation arises when participants are brought together and must carry out, within a given time, a collective action leading to a result subject to external judgment” (Girin 2016, p. 166). The mandate that governs the “draw me a sheep” relationship is confusing and complex: the mandator’s expectation is not explicit and the activity to accomplish it is made complex (for it to comply with differentiation).

The organizational context that frames the creative activity is highly specific: it involves producing together something we do not know how to define and whose value will only be determined by the encounter with the market, which implies that there is absolutely no benchmark to rely on.

1.1.3. Designing without benchmarks: a specific context

The organization of creation is accompanied by difficulties specific to this absence of benchmarks, which places it in a singular frame of reference: the famous managerial paradigm referred to in the title of this chapter. While the worlds of creation have long been kept separate from other design activities, giving them an exotic status, the real demarcation lies elsewhere: it opposes design contexts with benchmarks and design contexts without them (Paris and Massé 2021).

Let us take some examples: a team is brought together to make a sequel to a successful film such as *Star Wars*, for instance. There are certain benchmarks: we know the audience, its social characteristics, its reactions, we know what it likes. An engineer or designer shows up at an Apple executive committee meeting and suggests working on what will become the iPad, which cannot be defined other than as “a big phone that doesn’t make calls” (Caussy and Paris 2011). Is the iPad a good idea? Impossible to say a priori, because we don’t know what it is. And despite the aura Apple projected at that moment, no one knew how buyers would receive it. In that sense, the design context of the iPad was very similar to that of *Inside Out* by

Pixar, when a director suggested making a film about “the emotions in a young girl’s head”. In either case, there was no pre-existing market, and no benchmarks. When Apple was working on a new iPad version, its teams were in a position as if they were working on a new *Star Wars* film.

When we are dealing with creation, we find ourselves de facto in an unknown context, lacking benchmarks. In the field of marketing, the question comes down to offering new products and having them adopted by the market. Samuel Fischer, founder of S. Fischer Verlag, stated: “Being a publisher is about publishing books that the public doesn’t want.”

Now, picture Decathlon teams gathering to try to offer a solution to hikers who have walked all day, who arrive exhausted at their bivouac where they still have to pitch a tent, and sometimes, when they are unlucky, under challenging weather conditions. In the field of design or business creation, we speak of pain or irritants. The teams’ mission: to reduce or totally remove such irritants. For that, Decathlon invented the “two-second tent”. In this configuration, we can talk about creativity in the sense that the challenge falls under the scope of problem solving and that the proposed answers can be assessed objectively. In creation, not only are there no benchmarks, but the proposed solutions cannot be evaluated through objective criteria. Picasso used to say: “When I don’t have blue, I use red”, thereby emphasizing the absence of an obvious good reply: blue or red? It makes no difference.

The absence of benchmarks is a distinctive feature of creation aiming to be daring. The same happens with radical or disruptive innovation. It translates into particular conditions for design because, until the end of the process, there is nothing to ensure the success of the product that is going to be launched. Caves (2000) theorized this, emphasizing the structuring property of “nobody knows” in the creative industries. In the design process, this gives rise to a situation which triggers maximum anxiety. Jean-Claude Ellena, one of the greatest perfumers of his generation, expressed this idea regarding his “First” project, which was a bestseller:

The most crucial, the most difficult moment was when the CEO of Van Cleef and Arpels said to me: “I’m going to launch this perfume (First), I’m going to spend millions, are you sure?” The only certainty I had was that I had worked, that I was happy with the result, that was my sincerity.¹

This context, once assumed, poses specific management problems. A video game studio owned by a major publisher is relentlessly working on the development of a

¹ Ellena, J.-C. (2024). Le nez au vent. *À voix nue*. France Culture podcast.

new game, which has been proposed by the creative director. The man is passionate, he has the ability to fully engage teams. So, he has no great difficulty in getting them on board with his project, which has no other guarantee – as with Jean-Claude Ellena's perfume – than the conviction of its promoter. When the team presents the work in progress at the company headquarters, and receives a mixed reception as well as an invitation to correct the situation within two months, the artistic director wonders whether he will be able to rekindle the teams. Commitment is essential and fragile.

Brad Bird, director of the animated film *The Incredibles* for Pixar, describes the context of creation in similar terms, and insists:

Some of your things that you had the idea to do don't actually work, because it defeats this and this and this. And if you are ready to lose this one thing that originally was such a great part of your pitch that everyone laughed at or loved and you go like that and all these things click together, that's what you have to do. That's the organic part of the process, it's not a mechanical process. This is why businessmen hate the film business because when you're making a widget, you can measure it: here's the mold, it costs this much for ingredients, you put it on the line and you have to throw it out there. When you're doing a story, if you're really doing a story and not just repeating the last success, you're just "what the hell... I think this would be cool... I hope yeah... sounds great". I mean you're gambling, you're gambling².

A Pixar film involves several hundred people working around a director, such as Brad Bird, who describes his project as stemming from a confusing and complex mandate. In this case, he had invited his teams to work on the idea of the future as seen in the 1960s. The ability to develop a creative project in this context is actually a miracle, because while the organization is a necessity for an individual incapable of carrying out a project of such magnitude alone, it is also a permanent threat to creation.

1.2. The organization... against creation

With *Le Prince du Pacifique*, we made the mistake of producing a pale substitute for *Un Indien dans la ville* (*Little Indian, Big City*). The initial project was of a different nature, though, without Patrick Timsit and without children. Gradually, we imposed elements which should,

² "The Making of the Incredibles (Disney Pixar)", documentary short film.

in theory, enable us to achieve the same success as with *Un Indien dans la ville*. (Lhermitte 2009)

The confession is from famous French actor and director Thierry Lhermitte. After having made a film which was a great national success working with a small team (*Un indien dans la ville*), the team decided to work on a new, different project. The success of the previous film was such that it ended up imposing its recipes on the next project. Creating without benchmarks is uncomfortable. There is nothing to hold on to except our own conviction, our subjectivity. It is hard when you are alone. When you are involved in a collective project, you take on responsibility for an entire team. When you are not the creator, you must be willing to trust blindly. The story of *Heaven's Gate* by Michael Cimino is well known for having revolutionized the history of Hollywood (Bach 1999). Once Michael Cimino had spent his entire budget and was far from having finished the film, what grip could the producers have over him? How good was his production? To what extent was he trustworthy as a director?

Rarely do organizations accept the discomfort induced by the lack of benchmarks and blind trust. More or less consciously – as in the anecdote retold by Thierry Lhermitte – they tend to cling to benchmarks they artificially recreate. It is a natural temptation for individuals to conform to what they believe to be the recipes for past success. At an organizational scale, this temptation only multiplies.

1.2.1. The structural opposition between organization and creation

The founders of Bonne Pioche Productions sought to create feature-length films to be broadcast on the big screen. Understanding that it was a highly competitive environment, they waited until they had a project likely to stand out from the crowd. When the future director of *La Marche de l'Empereur* (*March of the Penguins*) proposed his idea to them, they immediately knew they had found their project: it told the extraordinary story of the reproductive cycle of emperor penguins on the Antarctic ice floes. It was the most universal story there is, that of parents fighting for their child's life, set against the backdrop of sumptuous scenery. They weren't going to make a wildlife documentary but would stand out from existing films by telling the story of two parents and their child. When they confidently presented their project to potential financial partners, the latter listened to their story before asking: What is the pitch? Who are the actors? The project was rejected by everyone and only survived because they were forced to persist, as they had already sent two members of the team onto the ice floe to shoot the film (Darondeau 2007).

This story, which ended well since the film was a great success and won Oscars, illustrates the almost structural opposition between creation and organization.

Creating means differentiating ourselves, and therefore challenging conventions, when the organization capitalizes on knowledge gained from experience. This capitalization is done more or less formally: it goes through processes or is part of the organization's culture. Years of experience in the film industry have taught companies operating in this sector that having a pitch – the ability to generate interest in a matter of seconds – is an important factor in a film's success, and that the presence of big-name stars gives an idea of the film's potential.

With the notion of mandate, we discussed labor division, another characteristic of organizations, but how can we divide work when we do not know how to express the result? The challenge of building a common vision is undoubtedly one of the most important in projects in the creative industries. In a book that recounts the progress of various game development projects, the video game journalist Jason Schreier focuses on the challenge of reaching a “unified direction”: “Because video games have so many granular moving pieces – sounds, user interface, visual effects, and so on – every department needs to have a strong, consistent idea of where the game is headed. The larger a team gets, the more important this concept becomes” (Schreier 2018, p. 205). If “draw me a sheep” was already complicated with only one speaker, then “hey you all, listen to me, please draw me a sheep” involves exponential difficulty.

Finally, organizations have fixed costs and reporting responsibilities which result in economic or financial constraints, and often in risk aversion. They cannot wait for inspiration to strike. A large organization could not do what Bonne Pioche did, wait for an extraordinary project to present itself: it must come up with varied proposals, sometimes at the cost of compromise, and even force inspiration.

An organization is a group of individuals brought together in order to reach a goal. Its essence is labor division and cooperation, which operate in different ways. Mintzberg (1980) proposed a categorization of organizations around different dimensions: its various components, coordination mechanisms and organizational flows. He identified different organizational configurations. The extreme cases are the simple structure, which corresponds to young organizations which operate around a highly centralized power and a reduced hierarchical line. It is the natural organization used by an entrepreneur or a creator who relies on limited teams. A creator who assembles a team for a particular creative project engages a “blank slate” organization, whereas by having the project carried out by an established organization, it gives the project different structural elements from the onset. The video game company SuperCell, a huge entrepreneurial success story with a turnover close to 2 billion euros in 2021, and successes such as the games *Clash of Clans* and *Clash Royale*, was built on this desire not to hinder creativity by means of processes. The company operated around small cells of experienced developers who were given complete freedom in choosing projects, starting them or stopping them,

without any obligation to report and without a decision-making process outside the cell:

The core beliefs upon which we founded the company are stronger than ever. We still believe in the power of extremely small and independent teams of passionate people. [...] Being small means you need less management and fewer processes, both of which just make it more fun to work.³

At the other end, we find mechanistic bureaucracy, which emphasizes standardized processes. When an organization expands, decision-making is decentralized out of necessity, which translates into the implementation of processes, routines and management tools. Now, both management processes and tools convey a representation of the world, often based on experience. Claude Riveline (1991) has described management tools as summaries of good and right. These various elements, which define the framework within which creativity can flourish, prove to be extremely structuring. In other words, organization is constitutive of the capacity for creation. We can illustrate this through three examples.

The first is that of Pixar. Back in 2005, when the company was still independent, it showed remarkable creative capacity. All projects were commercial and critical successes, and the company's ability to constantly renew itself was vastly admired (Paris 2015). At the same time, Walt Disney was having a tough time remaking convincing films, even if both firms relied on talents trained at the same schools. One of the many differences between the two companies was that Pixar's organization was far less hierarchical than Disney's (Susman 2007).

A second illuminative example relates to the history of the Romance label, created within Universal Music following an experimental logic. The aim was to innovate in the way artists were supported by following them across the three axes of their career – writing (publishing), recording (albums) and performing (live) – at a time when labels were focusing solely on albums. The label's founders also wanted to bring out talent off the beaten track and who needed more time to find their audience. This involved managing each artist's development on a case-by-case basis, following a quasi-artisanal approach. Initial Artist Services was launched in 2016 within Universal when it signed its five first artists, including Eddy de Pretto, Angèle and Clara Luciani. The resounding success of the first led them to become a true label within Universal, taking the name Romance. In six years, the label achieved remarkable results in terms of sales and streams, as well as professional accolades (gold records and other certifications, Victoires de la Musique awards).

³ See: <https://supercell.com/en/about-us>.

But after six years, the label's founders resigned, worn down by the constant tensions between their approach, their practices and the structure under which they operated: processes, reporting, evaluation, decision-making, etc. This example can be viewed through the lens of the classic opposition between exploration activities and exploitation activities, which by nature are difficult to reconcile within the same organization (March 1991).

The world of perfume provides a third example of this structural opposition, this time with a systemic logic. The mainstream perfume industry is made up of brands owned by large corporations, fragrance houses engaging perfumers to develop fragrances and compete with the ones created by other brands, a distribution system based on large specialty stores, and significant marketing efforts to support fragrance launches, often at a global scale. It is within this organizational context, comprising several levels, that creation must evolve. This system is incapable of offering innovative or bold fragrances, even though it relies on the most renowned creators in the world (Paris et al. 2020). These influences or restrictions on creation are based on multiple mechanisms, one of which is the use of market testing. This leads us to conclude that not all organizations involved in creation take a forward-thinking, daring, or innovative stance.

1.2.2. The temptation of the market

“Draw me a sheep.” If we expect a creative sheep, one with a chance of standing out in the immense flock of sheep drawn by aspiring creators, it will have to be distinctive, and challenge existing codes. But when we create and evolve in an environment devoid of benchmarks, there is a strong temptation to invent them. One of the qualities of creative profiles is their ability to accept this lack of benchmarks and to trust their own subjectivity, but this is a fragile position, especially within an organization where few of them share such ability to take risks. Organization tends to stifle creativity. One of the qualities of organizations that demonstrate sustained creativity is that they resist the strong temptation to respond to unlikely demand.

While creation occurs in the absence of pre-existing demand, many creative organizations see past successes as signals of demand. When *La Môme (Life in Pink)* triumphed in movie theaters, it kicked off a craze for biopics. The establishment of committees also aims to objectify decision-making and to harness risk in relation to a future market. If a manuscript convinces all members of a reading committee, this is an important indicator of its reception. Some organizations go even further by entrusting part of the decision to the market itself: this is what happens, for example, with talent detection programs, such as *Star Academy* or *The Voice*. By submitting artists to the public's judgment, we assure their future reception.

There is a strong temptation to take the path of least resistance in terms of risk limitation, by trying to comply with the supposed expectations of the market. Earlier, we mentioned the German publisher Samuel Fischer. Paul Gauguin recalled the alternative that tips the balance one way or the other: “Art is either revolution or plagiarism.” As regards innovation, Henry Ford observed: “If I had asked my customers what they wanted, they would have said a faster horse.” And Steve Jobs added: “We have a lot of customers, and we have a lot of research into our installed base. It’s really hard to design products by focus groups. A lot of times, people don’t know what they want until you show it to them.”

Ignoring people and offering them innovative products is easy to say! In real life, you have to imagine the situation. Agreeing to embark on a new project that could be not plagiarism, but a revolution, requires evolving without any benchmarks. For long and costly projects, this means that project leaders must remain committed to their vision; their teams must be fully engaged and confident; and those controlling the purse strings must also place their trust in them. For everyone, this implies accepting to evolve amid uncertainty, the very essence of creative work (Menger 2009). Marionette artist Jim Henson was determined to pursue a project he had tried unsuccessfully to sell to all the American networks for long. Although he was systematically told that puppets were for children, he persisted and finally found an English producer who agreed to test his idea. The result was *The Muppet Show*, a worldwide success, broadcast in more than 100 countries and seen by 235 million viewers. The artist described the difficulty of leading such a project:

When you’re running a whole several-hundred-person unit, you have to keep everybody else enthusiastic, you can’t really express great doubts, whether or not this whole thing is a good idea or not. (Jim Henson)

These creative situations are uncomfortable for all stakeholders. Despite the fact that the creator may well succeed in managing discomfort and gain the trust of creative teams, it is more difficult for management and finance managers to turn a blind eye and hope apprehension will disappear all by itself. Rare are the situations in which the creative process is cut off from the world until the release date. This happens in *haute couture*: the strong prescriptive power of brands and the attention generated by fashion shows allow them to present their collection without having tested the market, or having done so very little. Whether it be perfume, where market tests intervene throughout the process to manage the risk of release (Paris et al. 2019), or *haute couture*, many tools and schemes are implemented during projects or by organizations undertaking bold creations to ensure they remain connected to the market. One example is the concept car principle, which involves

presenting vehicle designs created with complete freedom to the public and observing their reactions. Nintendo's creative director, Shigeru Miyamoto, had a reputation for watching gamers play at trade shows to study their reactions. These approaches are close to *Design Thinking* methods (Brown 2008), which relies on observation and empathy to understand the latent needs of users.

Actually, Gauguin was wrong. Between plagiarism and revolution, there is another possibility: the failed revolution. A creative company may start out with an ambition for innovation, but this ambition comes up against the different elements of the organization: processes, risk reduction tools, temptation to reproduce existing patterns. The collaboration between Cirque du Soleil and its perfect production machine, the Lyric (Broadway's largest theater), and the creative French choreographer Philippe Decouflé was bound to be mind-blowing. The press release for *Paramour*, scheduled to premiere on May 25, 2016, stated:

The best of Broadway with Cirque du Soleil's signature style. Set in the glamorous world of Golden Age Hollywood, this groundbreaking event spins the tale of a beautiful young poet forced to choose between love and art. Featuring a cast that blends the best in circus arts and musical theater, *Paramour* will transport you to a world of sublime beauty and emotion as it walks the exhilarating tightrope of the heart. (Paramour Press Release)

The reality of production revealed the difficulty of committing to innovation. Against this backdrop, the theatre's operating costs, amounting to approximately \$800,000 per week, required a high and sustainable occupancy rate. This led company managers to put safeguards in place, more or less consciously. Thus, the course of production revealed the existence of beliefs or rules which structured production. These were related to public expectations:

I sell the tickets and know the typical audiences: primarily female, over fifty years old, affluent, well educated, and Caucasian. Without a story that is accessible to them, you can't last on Broadway. Artists express themselves, of course, but they must never be esoteric. (Scott Zeiger, head of the theater branch of Cirque du Soleil)⁴

They also translated into rules or procedures. At Cirque du Soleil, the quality of a show is measured by a wow factor: it must count a certain number of wow moments and a few super wow moments. And given the amount of money involved,

⁴ "On Broadway, the acrobatic assault of Philippe Decouflé and the Cirque du Soleil", *Télérama*, May 24, 2016.

the show is tested during previews, to monitor the audience's reactions and adjust the show.

Although the show got off to a good start, it was then torn apart by critics, suffered from underattendance, and was cancelled after a year. While this is a classic case of the inability to guarantee the success of a production in the creative industries (*nobody knows*), this story also shows the difficulty of maintaining a bold and ambitious approach. It would have been impossible to guarantee the project's success. On the other hand, the logic of compromise under which it was framed could have prevented the project's innovative dimension from being fully realized, while also undermining its coherence.

1.2.3. The delicate equation for organizing creation

Organization is necessary in order to create – or often is! Insofar as creation is not achieved on one's own, but involves multiple decision-makers, it is necessary to organize the work, frame it and articulate the decisions of each party. The organic model, a creator with a team, limits the constraints imposed by structured organizations, but not all the pitfalls of organized creation. This model is not the most common: project size and the temptation of renowned creators to exploit their know-how by delegating part of their activity and focusing on components with higher added value mechanically triggers processes, reflexes and routines. Every creative industry features productions and companies that create within a measured risk-taking framework, in what Gauguin would caricature as plagiarism, whereas others, even when not seeking to revolutionize their art, at least dare to be bold and assume that they have no benchmarks.

We have seen that this last position is not easy to maintain, given the numerous forces pulling the organization back towards the certain, the already accomplished, the known and the proven. When it is maintained, other issues arise. Crucial issues. What ideas should we commit to since we do not know their potential? How should we organize work? How will the process be followed? How can we limit the temptation to reproduce? In short, how can we create without recurring to benchmarks? Some organizations seem to succeed at this, so let us take a closer look at them!

1.3. Organizing and managing creation

Please draw me a sheep...

– Listen kid, I have an entire organization here that can draw you an original sheep, a sheep that might stand out among the countless sheep that are drawn every day and offered on the many channels that broadcast sheep. I'm not going to draw your sheep all by myself, immediately, in an inspired and brilliant gesture. I will spend time on it, engaging teams with varied and numerous talents, I will rely on a structured process.

Sorry if this imaginary dialogue has broken the poetry of the *Little Prince*; that was not the intention. The idea was simply to take a step back from the romantic representation and look past individual talent to the concrete functioning of the organizations that support creation, through their processes and labor division. We can do so in two stages: first, we focus on the processes, on their generic dimension; then, we highlight some of the characteristics observed in these organizations. We conclude by trying to focus on what makes these organizations unique.

1.3.1. The creative processes

Creative processes have been studied extensively at an individual level, either by observing the routines of artists and creators (Currey 2013), or by examining creativity processes (Lubart 2001). The first case implies placing ourselves in a romantic perspective and trying to draw lessons from how the great minds work, even when recognizing that everyone has their own way of functioning. In the second case, we note that creative activities involve different stages, but this applies on an individual level and in contexts which are not always those of the creative industries. The most common definition given to creativity in management research is that of Teresa Amabile: “Creativity is the production of novel and useful ideas by an individual or small group of individuals working together” (Amabile 1988). In the creative industries, we do not produce ideas, but productions embodied in objects or media in different forms, whose usefulness is undecidable.

Observation of how activities are organized in these entities reveals several patterns.

First, processes are most often collective, even when an individual is considered the creator. This creator plays a particular role, which presents certain similarities with that of the project manager in the innovation processes (Paris and Ben Mahmoud-Jouini 2019). Nevertheless, the creator relies on teams which are sometimes large, which can mobilize specific technical skills and are fully engaged in the creative process. Labor division is organized around four different tasks: inspiration, framing, formatting and validation.

Inspiration, or ideation, involves feeding the project with multiple ideas. One should not get obsessed with finding the right idea, but rather start with an initial idea, which can serve as the project's backbone, and work it out until reaching a final product in which a huge number of ideas have been injected. Thus, for a Pixar film, once the more or less developed concept has been validated (the story of a rat in a kitchen, the future as seen in the 1960s, the emotions in a young girl's head), the next step is to write the script in detail, draw the sets and characters, animate the characters, construct the scenes, etc. The initial idea is only a starting point, and the first version of the project is only a rough draft (Catmull and Wallace 2014). Inspiration engages different collaborators: in Renault's design department, under the direction of Patrick le Quément, several dozen designers contributed to fueling inspiration by proposing ideas for vehicles, and then for certain parts of the chosen silhouette. They also draw on a variety of schemes, such as inspirational trips, cooperation projects and studies of materials or technologies. When drones began to appear on the market, Cirque du Soleil partnered with the Technical University of Zurich to explore their possibilities. A team from the circus and a team from the university worked together and designed a prototype show lasting a few minutes. This prototype was then presented to the artistic teams working on a new Cirque du Soleil show, and Philippe Decouflé integrated it into his show *Paramour*.

Framing refers to specifying the project that the teams are involved in. The "future as seen in the 1960s" was the framework given to the teams working on Pixar's *The Incredibles* to enable them to work on the sets and characters. Architect Jean Nouvel guided his teams towards the idea of "a shower of light like in an oasis" for the Louvre Abu Dhabi project.

Formatting involves breaking down the process by creating numerous objects that will gradually give it shape. These are pitches, drawings, scripts, 2D models, 3D models, etc. In the processes studied, the speed of the back and forth between ideas and their implementation is key. This is similar to what has been popularized in innovation or the world of start-ups when they coined the notions of rapid prototyping (Ries 2011), intermediate objects (Jeantet 1998) and prototypes (Ben Mahmoud-Jouini and Midler 2020).

Validation refers to the process of evaluating the various elements produced by formatting in relation to the project: whether a particular intermediate product is heading in the right direction or not, whether a particular element is selected for inclusion in the final result or not, etc. It is this "sorting station" activity that constitutes the creator's prerogative. In short, it is this station that enshrines the creator. This may seem paradoxical and echo the unease we sometimes feel when we discover that a Renaissance painter relied on workshops, or that a renowned chef spends very little time in the kitchen. Actually, this assembly function is the most critical, because it ensures the project's consistency. When designer Patrick Jouin

was asked to redesign a chain of hotels, he instructed his teams to adopt a classic design method based on observation and empathy, while asserting a highly subjective approach for “designing solitude” and thus enabling guests to enjoy a very good night’s sleep with high-quality bedding. This represented a real compromise, due to the limited funding available for the project. In order to make ends meet, he was obliged to accept trade-offs in terms of budget allocation. Prioritizing bedding in a low-end hotel forces the company to find savings elsewhere (Jouin 2011). Another designer might consider that the guests of these hotels need, above all, to take their minds off their problems.

Since validation is not based on anything objective, but solely the creator’s conviction, as Jean-Claude Ellena expressed it, it is also the most difficult function to assume. So when Patrick Bertron, sous chef to famous French chef Bernard Loiseau, was offered the chance to take over from his mentor following his death, his track record showed that he had proven himself to have all the necessary qualities. It is said that he outperformed Bernard Loiseau himself, creating signature dishes, managing the kitchens, etc. However, he himself called into question his ability to rise to the challenge. The only activity he did not assume was validation, in other words, trusting his choices, in the absence of certainties and benchmarks, and assuming a responsibility that affected the entire company (Paris and Leroy 2014).

These four activities do not take place in a linear sequence. The reality of creative processes is that they articulate the world of ideas and the world of forms in an iterative manner. Studies on design management have brought to the fore the innovation funnel (Wheelwright and Clark 1992). The creative process resembles this funnel, alternating between phases of divergence and convergence, between a logic of openness (inspiration) and a logic of choice (validation). This balance would appear critical and can translate, for example, into the protection of development and maturation time for companies that are committed to creative ambition. Converging too quickly is detrimental to the project’s quality. But trying to be too creative could jeopardize its conclusion. Thus, the director who had brought the idea for what would become the film *Ratatouille*, brilliant in his vision of the film and his ideas, was withdrawn from the project due to his difficulty in making choices that would allow for convergence (Susman 2007).

Creation flourishes in a context of abundance. Not only an abundance of time to mature projects, but also an abundance of ideas injected into the process, many of which will not finally be put into practice. On the eve of an *haute couture* fashion show, for instance, the artistic director chooses which of the many garments and accessories that have been created will be presented on the runway.

This also refers to the abundance of initial ideas, among which only a few will be developed. At Pixar, directors are salaried employees and, when they are not

working on a film project, they have plenty of time to develop ideas for future projects. These ideas, developed in a comfortable environment by experienced filmmakers, will mostly remain just ideas, because the film production process at Pixar begins with a pitch to the Braintrust, which decides which projects to invest in (Catmull and Wallace 2014). The same initial selection is observed in publishing, where hundreds of manuscripts are submitted to publishing houses every month, or in architecture, where agencies, even the most prominent ones, invest enormous resources in responding to contests, which ultimately result in the selection of a single project.

This abundance is a necessity. Patrick le Quément, Renault's head of design, had all the studio's designers work on each new vehicle project (Le Quément 2005). This competition was a source of emulation, and particularly necessary in a context where quality is not objective in order to identify projects which had the capacity to stand out. Insofar as a creative project must stand out in a crowded market, it is deployed in processes according to a criterion of quality that is not absolute, but relative. The best projects are those that have the greatest ability to stand out in a highly competitive environment.

1.3.2. Management and creation schemes

When working with a creative enterprise, there is a strong temptation to look for easy keys to success or recipes. That is exactly what happened with Pixar. An analysis of Pixar's organization reveals a keen awareness of the nature of creation and sensitivity to management and organization, as well as to the challenges we described earlier in this chapter. At Pixar, collaborators understood that every decision made, from the smallest to the most structuring, could have an influence on the process and the result of creation (Catmull and Wallace 2014).

There is no absolute recipe, because no two contexts are identical. Creators are all unique, their teams evolve, as does each person's trajectory. The aspirations, constraints and challenges faced by individuals and organizations are not the same when it comes to asserting ourselves or gaining recognition, when a company is trying to establish itself in a market and when it is expected to deliver on each of its projects. The challenges of differentiation are not the same when consumers have to purchase a product or when they have access to it for free as part of a package deal. Creating is not the same when it comes to persuading a sponsor, such as a project owner or a streaming platform, or when it involves seeking out consumers one by one, whether in a B2B or B2C market.

Reflecting both the difficulty of this combination and the heterogeneity of situations, highly creative organizations develop numerous models, which involve

several dimensions, notably the integration of key resources, among which the most prominent is the creator (Paris 2013; Mainemelis et al. 2015; Paris and Massé 2021). In addition, other dimensions come into play, which can be linked to the structuring dimensions of organizational designs identified by Mintzberg (1980).

Regardless of this diversity, some regularities appear. We have discussed decision-making processes and the importance of validation as the keystone of a project's consistency. This means that the most daring projects, or the most creative ones if we adopt a point of view a posteriori, are based on a centralized decision in the hands of one individual. Pixar projects are entrusted to a director, when the primary temptation is to limit risk by engaging committees to make decisions.

Forms of organization which appear modern, such as the liberated company or participatory management, which is reflected in creative activities in notions such as co-creation, are the opposite of the forms of organization at work in the reality of creative organizations that produce unique works: the latter are structurally collective, but highlight an individual who plays a prominent role. These individuals assume validation, which entrusts them with significant power over production and the result produced. Scandals have erupted in recent years, emphasizing the excess of this power. It can be virtuous provided that it remains confined to the scope of the project and the production of a specific artwork. The underlying model is perhaps more humanistic, in most cases, than more democratic models (Paris 2017, 2018), even if this state of affairs is often described with negative terms such as “dictatorship” or “tyranny”:

A film director is one of the last dictatorial posts left in a world getting more and more democratic. (Francis Ford Coppola)⁵

Centralized decision-making also translates into short decision lines, for two main reasons. The first one, in line with the above, aims to limit the number of decision-makers on a project in which compromise is antonymic to innovation. The second one aims to maintain speed in the process, which seems crucial when handling bold, and therefore fragile, ideas.

Another remarkable element in creative organizations is the evaluation of projects during their development. The testimony of Jean-Claude Ellena recalled that such an evaluation was impossible at the end of the process. This is even more so during the process and at its beginning. Evaluation and control – reporting – are other structuring elements in organizations. Ambitious creative organizations accept this impossibility. Here, evaluation and control mainly concern the ability to meet

⁵ From the documentary *Heart of Darkness* (Fax Bahr, Georges Hickenlooper and Eleanor Coppola, 1991).

deadlines and not see costs explode. As for the rest, the choice of ideas to develop depends on our ability to stand out, and on our maturity. Cost accounting has no place in processes that will generate a lot of ideas and produce elements that will ultimately be abandoned:

Our approach to management is simple and pragmatic. For example, we have never practiced cost accounting. What matters is to make a profit and pay dividends at the end of the year. It doesn't matter whether we are in deficit on the small Ronchamp project or on the maintenance of the Pompidou Centre, as long as we are sufficiently in surplus on an American museum. (Goubet and Vincent 2011, managers at Renzo Piano's RPBW architecture firm)

Innovative projects in creation are not immediately accepted. The public does not want that, Samuel Fischer would say. These projects need time to find their audience and require support. As shown by the example of perfumery, support is not always available in cases where an innovative fragrance represents a major challenge (Paris et al. 2020). But when a company assumes creative ambition, it implies that it cannot evaluate the success of a project in the short term. When a new voice was broadcast at Radio Nova, a pioneering French radio station, the management accepted that the audience would drop for a few weeks (H'Limi 2006). The evaluation of a project once it is on the market must therefore take into account the long term for creative projects.

1.3.3. *The unique paradigm of creative organizations*

An organization often imposes itself as a necessity for creation. By nature, it will tend to restrict creation or innovation, as James March (1991) has shown. This is due to the nature of organizations, underpinned by the logics of labor division, processes, control and therefore risk limitation. An organization is a system geared towards achieving a goal, which is often part of a quest for efficiency. The history of modern organizations was written by Babbage, Fayol, Taylor, Weber and Ford, largely in the wake of the industrial revolution, in a context seeking efficiency in mass production. There have been, and still are, many voices advocating other forms of organization, but we must admit that, regardless of whether they are a legacy or the result of a natural structuring process, organizations remain deeply imbued with this history. Let us mention in particular individual goals, a direct legacy of Taylor's theories. A task can be defined, measured and controlled. Financial incentives will increase productivity. How can we measure a creator's work when 90% of what they produce will be thrown in the trash? How can we assess a creator's work when what they generate has no intrinsic value? The bureaucratic model, theorized by Max

Weber, has also informed organizations: it is based on processes that make decision-making objective and predictable.

By assuming the value of individual subjectivity, the possibility of failure, the absence of objective value, single truths or a pre-existing market, creative organizations distance themselves from these models. This translates into unique organizational forms, which recognize, for example, the black box. Creation is not a linear process that transforms inputs into outputs via a production line, along clearly identified and controllable stages. It is a process that feeds on a huge amount of inputs without being able to trace their use – and therefore their value – and produces outputs that will be sent to the market with a structurally high failure rate, without these failures being the sign of any dysfunction. Accepting this black box amounts to accepting failure, not being able to control the activity on a day-to-day basis, having confidence in an individual to whom we have entrusted the keys to decision-making. The difficulty for an organization to cope with these situations stems from the weight of traditional organizational culture: an individual understands the importance of letting go of a creative entity for which they are responsible. But they also know that if there is failure, it is likely that this will backfire on them. This is why ambitious creative entities are more protected, with a high-level reporting line: this limits the number of people who have to accept this uncomfortable situation. The *Guignols de l'info* (a French satirical TV show, broadcast daily with long-term success) and Renault design were both black boxes attached to the general management of their respective companies.

Ed Catmull, Pixar's technical director, probably understood the extreme fragility of organizations working in the creative sector when he declared:

That fundamentally successful companies are unstable. And where we have to operate is in that unstable place. (Catmull and Wallace 2014)

His role at Pixar was undoubtedly decisive. He was mainly in charge of ensuring that the conditions were met for creation to flourish, regardless of possible failure. This is an essential role that relies on keen awareness across the entire organization, and requires an ability to assume the vagueness imposed by creation.

Organizations capable of carrying out a bold creation must face considerable challenges, due to the quasi-structural opposition between organization and creation. Regularly, some stand out, drawing particular attention from many companies wishing to be inspired by them. Although they are based on different models, they all have identical keystones. They can limit the scope for processes and hierarchy. They may require a creative individual committed to key decisions all along the way, or a non-creative individual who demonstrates an ability to take on risk and

ensures that the organization maintains its fertility. Finally, many of them rely on an individual who emerges as a key person, someone who stands out from the crowd. A genius? The romantic model must still be banned. Nevertheless, creation does not rule out the need for talent, for exceptional individuals.

1.4. Epilogue

As the *Little Prince* narrative continues, the aviator finally grows tired of the little boy's dissatisfaction and draws a box, explaining that the sheep he has wished for is inside it. And the boy becomes surprisingly happy about it.

Perhaps, the boy suspects that drawing the box – the name sometimes given to companies⁶ – amounts to drawing the very possibility of a sheep. They sure come from another planet.

Please draw me a sheep...

– What kind of sheep?

– A sheep.

– Do you know what planet we are on? Because depending on the planet we are on, your sheep will not be the same. Your sheep will be the result of the planet it is born on. And on this planet, the best way for your sheep to surprise you, the best way for it to be successful, is to raise it in a box away from most of the inhabitants.

Finally, my patience at an end, as I was in a hurry to start dismantling my engine, I scribbled this drawing:

And I exclaimed:

– That's the box. The sheep you want is inside.

But I was very surprised to see my young critic's face light up:

– That's exactly how I wanted it!

(Saint-Exupéry 2015)

⁶ In French, the term *boîte* translates not only as box (rigid container) but also as company in informal speech.

1.5. References

- Amabile, T.M. (1988). A model of creativity and innovation in organizations. *Research in Organizational Behavior*, 10(1), 123–167.
- Bach, S. (1999). *Final Cut: Art, Money, and Ego in the Making of Heaven's Gate, the Film that Sank United Artists*. Newmarket Press, New York.
- Becker, H.S. (1982). *Art Worlds*. University of California Press, Berkeley.
- Ben Mahmoud-Jouini, S. and Midler, C. (2020). Unpacking the notion of prototype archetypes in the early phase of an innovation process. *Creativity and Innovation Management*, 29(1), 49–71.
- Benghozi, P.-J. (1995). Les sentiers de la gloire : savoir gérer pour savoir créer. In *Des savoirs en action. Contributions de la recherche en gestion*, Charue-Duboc, F. (ed.). L'Harmattan, Paris.
- Benghozi, P.-J. and Paris, T. (2003). De l'intermédiation à la prescription : le cas de la télévision. *Revue française de gestion*, 1, 205–227.
- Benghozi, P.-J. and Paris, T. (2007). The economics and business models of prescription in the Internet. In *Internet and Digital Economics: Principles, Methods and Applications*, Brousseau, E. and Curien, N. (eds). Cambridge University Press, Cambridge, 291–310.
- Benghozi, P.-J., Charue-Duboc, F., Midler, C. (eds) (2000). *Innovation-based Competition and Design Systems Dynamics: Lessons from French Innovative Firms and Organizational Issues for the Next Decade*. L'Harmattan, Paris.
- Brown, T. (2008). Design thinking. *Harvard Business Review*, 86(6), 84.
- Catmull, E. and Wallace, A. (2014). *Creativity, Inc.: Overcoming the Unseen Forces That Stand in the Way of True Inspiration*. Random House, New York.
- Caussy, R. and Paris, T. (2011). L'ipad et la guerre de la "maison numérique". *Gérer et Comprendre. Annales des Mines*, 103(1), 4–14.
- Caves, R.E. (2000). *Creative Industries: Contracts between Art and Commerce*. Harvard University Press, Cambridge.
- Chaplin, C. (1964). *My Autobiography*. Simon & Schuster, New York.
- Chaplin, C. (2002). *Histoire de ma vie*. Robert Laffont, Paris.
- Currey, M. (2013). *Daily Rituals: How Great Minds Make Time, Find Inspiration, and Get to Work*. Pan Macmillan, London.
- Darondeau, Y. (2007). C'est l'histoire des manchots sur la banquise... Report written by Elisa Révah. *Journal de l'École de Paris du management*, 71, 2008.
- Gavett, G. (2013). Think carefully about where you put the office bathroom. *Harvard Business Review*, July.

- Girin, J. (1995). Les agencements organisationnels. In *Des savoirs en action. Contributions de la recherche en gestion*, Charue-Duboc, F. (ed.). L'Harmattan, Paris, 233–279.
- Girin, J. (2016). *Langage, organisations, situations et agencements*. Presses de l'Université Laval, Québec.
- Goubet, P. and Vincent, A. (2011). Transmettre une entreprise de création – La démarche originale de Renzo Piano. Report written by Sophie Jacolin. *Journal de l'École de Paris du management*, 94, March–April.
- H'Limí, M. (2006). Déceler et révéler les talents de demain : le modèle de Radio Nova. Report written by Cédric Vilatte. *Journal de l'École de Paris du management*, 61, September–October.
- Jeantet, A. (1998). Les objets intermédiaires dans la conception. Éléments pour une sociologie des processus de conception. *Sociologie du travail*, 291–316.
- Jouin, P. (2011). L'apport du designer à la marque. Report written by Sophie Jacolin. *Journal de l'École de Paris du management*, 93.
- Karpik, L. (2007). *L'économie des singularités*. Gallimard, Paris.
- Le Quément, P. (2005). Créateurs d'automobiles : la gestion des designers chez Renault. Report written by Thomas Paris. *Journal de l'École de Paris du management*, 56, January–February.
- Lhermitte, T. (2009). Anatomie d'un film-culte. Report written by Sophie Jacolin. *Journal de l'École de Paris du management*, July–August.
- Lubart, T.I. (2001). Models of the creative process: Past, present and future. *Creativity Research Journal*, 13(3–4), 295–308.
- Mainemelis, B., Kark, R., Epitropaki, O. (2015). Creative leadership: A multi-context conceptualization. *Academy of Management Annals*, 9(1), 393–482.
- March, J.G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2(1), 71–87.
- Martin, B. (2013). *Difficult Men: From The Sopranos and The Wire to Mad Men and Breaking Bad*. Faber and Faber, London.
- Menger, P.M. (2009). *Le travail créateur. S'accomplir dans l'incertain*. Le Seuil/Gallimard, Paris.
- Mintzberg, H. (1980). Structure in 5's: A synthesis of the research on organization design. *Management Science*, 26(3), 322–341.
- Paris, T. (2010). *Manager la créativité. Innover en s'inspirant de Pixar, Ducasse, les Ateliers Jean Nouvel, Hermès...* Pearson Education France, Paris.
- Paris, T. (2013). Des mariages féconds ? Comprendre la diversité des modes d'organisation de la création. *Gérer et Comprendre*, 113.

- Paris, T. (2015). Le business model de la créativité de Pixar. In *Gestion de l'innovation – 12 études de cas*, Tellier, A. and Loilier, T. (eds). EMS, Paris, 212–229.
- Paris, T. (2017). La dimension laborieuse de la création. De la modernité d'un archaïsme. In *La créativité au travail*, Amado, G., Bouilloud, J.-P., Lhuillier, D., Ulmann, A.-L. (eds). Erès, Toulouse, 319–336.
- Paris, T. (2018). L'économie de la création : entre dictature et participation. In *Innovation et participation. Approches critiques*, Laurent, B., Baker, M., Beaudouin, V., Raulet-Croset, N. (eds). Presses des Mines, Paris, 169–184.
- Paris, T. and Ben Mahmoud-Jouini, S. (2019). The process of creation in creative industries. *Creativity and Innovation Management*, 28(3), 403–419.
- Paris, T. and Leroy, F. (2014). Managing transition in an artistic company with entrepreneurial management: A case study of Groupe Bernard Loiseau. *International Journal of Arts Management*, 16(2).
- Paris, T. and Massé, D. (2021). Le management des industries créatives : un paradigme spécifique et des configurations organisationnelles variées. *Revue française de gestion*, 47(3), 51–63.
- Paris, T., Lang, G., Massé, D. (2020). Polarized worlds and contextual creativity in creative industries: The case of creation processes in the perfume industry. *Management International*, 24(2), 12–26.
- Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*. Crown Business, New York.
- Riveline, C. (1991). Un point de vue d'ingénieur sur la gestion des Organisations. *Gérer et Comprendre, Annales des Mines*, 29, 50–61.
- de Saint-Exupéry, A. (1943). *Le Petit Prince*. Reynal & Hitchcock, New York.
- de Saint-Exupéry, A. (2015). *The Little Prince*. Alma Classics Ltd., Surrey. Translation by Gregory Norminton.
- Schmidt, E. and Rosenberg, J. (2014). *How Google Works*. Grand Central Publishing, New York.
- Schreier, J. (2017). *Blood, Sweat and Pixels*. Harper Paperbacks, New York.
- Schreier, J. (2018). *Du sang, des larmes et des pixels. De l'échec au chef-d'œuvre : les incroyables miraculés du jeu vidéo*. Mana Books, Paris.
- Susman, G. (2007). Dans les cuisines de Pixar. Report written by Noshua Watson. *Journal de l'École de Paris du management*.
- Wheelwright, S.C. and Clark, K.B. (1992). *Revolutionizing Product Development: Quantum Leaps in Speed, Efficiency, and Quality*. Simon & Schuster, New York.

Manager Roles and Skills amid Transformation Dynamics

This chapter is based on a study conducted between October 2019 and July 2021, largely informed by testimonies from managers, HR managers and business leaders.

This study was motivated by the observation of a permanent and growing need for transformation and innovation in businesses, on all fronts: technology, business models, organization, new performance paradigms, including social and environmental responsibility, human resources management, etc., in the context of an accelerated evolution of the relationship to work and the aspirations of employees to work differently. Organized action and the way it is conducted, the very concept of management, is no exception. It must also be shaped differently (Autissier et al. 2018b) given the fact that its traditional approach has shown certain limitations, in particular:

- “engaging” employees at a time when new relationships between “workers” and time, space, knowledge and authority are developing, when there is a need for interest in work, when there is a loss of loyalty towards the company and when the boundaries between private and professional lives are becoming increasingly blurred;

- breaking free from management constraints to bring out new innovation methods based on transversality, agility, complementary expertise, the ability to think and act outside the box while maintaining risk control for the company, the ability to cooperate or even to venture into the company’s ecosystem;

- making the managerial role more attractive, considering that its legitimacy can no longer be based on the aura and authority of a status, or on the supremacy of

Chapter written by Anne BASTIEN, Christian DEFÉLIX, Martine LE BOULAIRE, Camille LEDOUX and Thierry PICQ.

knowledge. And this without clearly substituting other motivational arguments, whether to help managers evolve in their new role or to inspire vocations.

Managers are over-solicited, challenged on how to yield immediate performance and at the same time create the conditions for innovation and transformation. This is a challenge that requires reviewing their roles and skills, once again!

For over 20 years, under the impetus of a management style with a distinct individualizing character, very common in English-speaking countries, the emphasis has been placed not only on technical skills, but also on managerial skills such as behavioral, soft skills and emotional intelligence, which are still very much present in managerial skill frameworks today. The Covid-19 crisis revealed constraints which, despite appearing as new, were already lurking beneath: while the vision of the manager of the future emphasized the skills needed to implement deliberate, planned and chosen transformation strategies, it is now also necessary to consider the managerial skills required in situations of imposed transformation or of a more emergent nature.

How are the roles and skills of managers evolving to integrate these new dimensions? And what support, guidance and learning mechanisms should companies develop in the future? This chapter attempts to provide answers to these questions, in three parts: to better understand the transformation context in which managers operate today, in this case a context exacerbated by tensions and paradoxes on a daily basis; to observe how certain managers adapt their practices so as not to be affected by these tensions, but turn them into creative input; and to analyze the strategies human resources departments are deploying to prepare and support managers as they adopt these new stances.

2.1. Prism for analyzing organizational transformations

The word “transformation” has been on everyone’s lips for a long time. But what does it really mean for us today? What can we learn from the abundance of articles in management science on the questions of transformation, change and management in relation to current challenges? And how do companies interpret them?

2.1.1. *Profound transformations, accelerated and accentuated by the health crisis*

It is now commonplace to note that the world of organizations is undergoing major transformations. Although the health crisis acted as a revealer and a concrete

accelerator for everyone, these transformations are part of much earlier dynamics, in different areas:

- globalization of markets, trade, financial and information flows, even if Covid-19 timidly relaunched the debate around subjects such as the relocation of certain activities or the importance of local services;
- digitalization at all levels: tools, services, occupations, processes and skills, among which generalized teleworking is only a visible part;
- emergence of new business models which change the rules of the competitive game and “disrupt” well-established “brick and mortar” industrial models in all sectors (Space X, Tesla, Airbnb, Deezer, Netflix, Uber, etc.);
- new aspirations on the part of employees, whose expectations towards the company no longer focus exclusively on working conditions and relate to contents and personal development, corporate social responsibility concerns and personal life–work balance.

In this constantly changing world, many firms have already taken steps to integrate these issues, in particular by thinking about the work of the future, by promoting collaboration, initiative, autonomy and the empowerment of their employees, or by experimenting with new organizational and managerial innovations such as liberated companies, sociocratic, holocratic, opal organizations, etc. All of this reflects a fundamental shift flattening the hierarchical structure and encouraging more participatory/collaborative facilitation styles, based on collective intelligence.

In addition to its role as a revealer and accelerator, the Covid-19 crisis meant that the underlying movement, at work for a long time, finally affected everyone, from executives to employees, from large to small businesses. Its consequences (abrupt cessation of activity, loss of reference points, massive teleworking, disruption of collective working methods, etc.) forced managers to improvise in order to cope. Many succeeded in instilling positive dynamics of adaptation, learning and innovation, of collective engagement, which many have capitalized on. This crisis also revealed that, contrary to the binary idea of a “world before” and a “world after”, it seems more important to be interested in the “world in between”, as it seems illusory to wish to cling to a future state that would once again be stable and predictable.

This world of the in-between and the transition dynamics that characterize it exacerbate the tensions which are otherwise inherent in organizations and the conduct of collective action, whose nature is subject to contradictory injunctions. Some tensions are known: the tug-of-war between strategic decisions and

operational constraints, between short-term and long-term goals, between economic performance and social development. But new sources of potential opposition seem to be gaining importance: concern for people's health and achieving performance, respect for procedures and adaptation to situations, new connections between remote and face-to-face work.

2.1.2. Human and organizational transformation phenomena according to the specialized literature

Here, in a summarized and therefore simplified form, we have chosen to include only the literature that can provide relevant, albeit non-exhaustive, insight into the data collected in the field.

2.1.2.1. The contribution of classic models of planned change

When it comes to classic models of planned change, organizational change phenomena are traditionally addressed using sequential models designed for executives and managers. Among the most widely used are Kurt Lewin's model (1947), which includes the phases of decrystallization, transition and recrystallization and which was enriched by Rosabeth Moss Kanter's "wheel model" (1984), as well as John Kotter's eight-step model applicable to any change (1996). In an unstable and complex environment, the linear and deterministic approach these models are based on appears unsuitable. These prescriptive models, which have a reproducible and universalist vocation, have been called into question due to their simplistic and reductive nature. In such a context where projections seem futile, strategic management is no longer limited to planning scenarios and leading change projects but requires organizing permanent adaptation. In our view, the classic models of change are largely outdated if we compare them with three approaches which seem more suitable. These will be discussed in the following sections on how to steer in a context of permanent transformation and the contributions of pragmatism and of paradox management.

2.1.2.2. From steering change management to steering in the context of transformation

The increase in the complexity, uncertainty and unpredictability of the organizational environment requires us to re-examine our mental frameworks, to consider the topic beyond the notion of management, and to choose steering instead when discussing the context of transformation. In light of this new approach, the very notion of change management should be called into question, because it implies an idea of planning which no longer responds to organizational reality. The challenge is to develop an intrinsic capacity in the organization and among employees to adapt, or even to anticipate. This is no longer a question of managers

guiding their employees through a series of identified stages, as postulated by the above-mentioned models. But the intention is to train them to take action.

It now appears more appropriate to use the term steering in the context of transformation (Autissier et al. 2018a), as the latter designates a permanent and continuous phenomenon. The question comes down to constantly managing threatened balances, creating the favorable conditions for regulation. Understanding organizational transformation in this way induces a state of mind, ways of being and acting. This approach places central importance on transitions and on the dynamics setting events in motion. Steering in the context of transformation refers to emerging dynamics, in which managers favor the bottom-up approach and invite the actors, along the way, to come up with the changes that will characterize the company of the future. The methodologies become much more experimental, adopting a “test and learn” perspective, with an injunction to in-depth learning. The idea is to give back the initiative to the actors on the field, not to develop their know-how and interpersonal skills, but their knowledge and ability to act so that they can carry out experiments, small pilot projects, which will allow them to learn lessons and think about the next stage of transformation. The organization must then recognize initiatives that contribute added value and anchor them in new routines (evolution of skills, organization, management systems, incentives, evaluation, etc.).

Research has evolved from prescriptive approaches regarding change management towards more open and pragmatic conceptualizations of complex, emergent, multidimensional and nonlinear dynamics in order to address collective action issues in unstable environments.

2.1.2.3. *Pragmatic approaches*

Originating in the late 19th century American philosophy, the pragmatist school has been a major source of inspiration for anti-Taylorist managerial thought. Its relevance is partly due to the inability of bureaucratic and technocratic management modes to cope with complexity and uncertainty. Such a context requires the use of exploratory approaches and experimentation, community participation, contending evaluations and dialogue. These approaches are at the heart of pragmatic thought, which develops them around different themes. Many modern research trends in management draw inspiration from this pragmatist philosophy. Among the most influential are:

- organizational learning, which brings together a diversity of models and approaches developed since the 1980s: acquisition and capitalization practices and sharing of knowledge and skills, which help individuals, teams and organizations to evolve more or less deeply and sustainably, in order to address problems and thrive in new situations;

– organizational resilience, defined as a social system’s ability to bounce back from an unexpected external disturbance and to get prepared to overcome others. Some approaches exceed resilience and claim being immune to fragility. They attempt to improve even in an unstable environment, allegedly emerging stronger from the shocks experienced;

– organizational improvisation, considered as a series of conceptualizations built around two metaphors:

- the DIY metaphor, using resources at hand to solve the problems encountered,

- the jazz orchestra metaphor, in which musicians no longer interpret a written score but create and imagine new variations, starting from a basic theme;

– effectuation, which originated in the research conducted by Saras Sarasvathy (2001) on how entrepreneurs think and act, and was then popularized in France by Philippe Silberzahn (2020). While the “causal mode” starts with a goal and aims to construct all the components of an optimal trajectory to achieve it, the “effectual mode” begins with the state of available resources and builds achievable goals from there;

– the so-called “on the go” strategy, whereby strategy is not an abstract, “above-ground” formulation, but the art of using information that arises during action, integrating it and formulating new courses of action.

2.1.2.4. *Managing paradoxes*

Tensions, described in the specialized literature as paradoxes, designate a lasting, even permanent, contradiction between elements which apparently exclude one another, but nonetheless coexist. There is an interdependence and a synergy between the contradictory elements which constitute the paradox.

Managing paradoxes can be considered from two perspectives. On the one hand, defensive reactions to paradoxes (such as denial, scapegoating, imposition through hierarchical legitimacy, etc.) entail the risk of providing only a short-term response and discouraging employee commitment. On the other hand, the virtuous management of paradoxes within organizations fosters a better capacity for learning and creativity, flexibility and resilience, while unleashing human potential.

Authors Smith and Lewis (2011) offer an analytical framework for actively addressing contradictions. They propose a dynamic mode to managing paradoxes. Rather than erasing or resolving paradoxes by adopting defensive strategies, actors are encouraged to actively approach them through three possible strategies:

– acceptance, which implies making these paradoxes coexist without compromise, in order to be able to bear them, by simply transmitting the paradoxical injunctions or by proposing compensation to make them acceptable: highlighting work meaning and usefulness, the interest of a mission, the attraction of perspectives or compensations;

– confrontation, letting the opposing poles express themselves for a better understanding of contradictions and to prevent actors from getting trapped in the paradox. This strategy can lead actors to oppose or transgress the rules;

– transcendence, which considers “the paradox poles as interdependent and non-divergent”, encouraging the actors to rely on contradictory tensions in order to evolve and find another path. Among other things, transcendence requires the actors involved to understand the contradictions, take into account daily and operational tasks, and develop a shared understanding of constraints.

All of these avenues are worth using, all are useful and one does not exclude the other. In our opinion, transcendence, the most difficult to implement and until now the least developed in companies, is taking an increasingly important place, as evidenced by the strong developments in teleworking: rather than accepting the tensions between professional and private lives, or organizing their confrontation through negotiation, many companies have recently transcended them by organizing a “new normal” regime seeking to balance remote and face-to-face work. We argue that although the amplification and generalization of tensions experienced during this recent period of crisis have profoundly disrupted the roles and skills of managers, the latter increasingly rely on the path of transcendence, recognizing the “creative potential” of such paradoxes.

2.1.3. *Contrasting transformation logics*

While most companies emphasize the need for transformation and converge on the necessity to develop manager roles and skills, they differ regarding the most effective ways and means to handle them. How do organizations and their actors (general management, support functions including human resources or transformation departments, etc.) approach these new transformation challenges? What is the resulting impact on management and its backing?

After having focused on the technical redesign of managerial schemes (management framework, assessment system, skill development schemes, etc.), the evolution of the management system (culture, processes and systems) presently exceeds the question of management tools and is at the core of a series of tensions fueled by the representations of the different actors in the company:

- between the perception that a framework has come to an end and the difficulty of defining a new one;
- between the need not to focus attention solely on “hard” skills (e.g. the occupation) and the challenge to formulate meaningful content for “soft” skills;
- between the need for stable benchmarks for action versus the belief that uncertainty becomes certainty;
- between the perception of the need to modernize human management versus the conviction that economic performance must remain under control;
- between the need to streamline approaches to professional development and the intuition of the value of experiential learning.

Behind these tensions, three institutional logics confront one another, guided by different conventions. The conventionalist approach of our choice, promoted by Luc Boltanski and Laurent Thévenot (1991), focuses on the justifications put forward by actors to legitimize their action. These justifications are based on conventions bringing together a set of benchmarks which reflect “greatness” or an ideal used for arguing and which serves as inspiration: for example, for the industrial world, “great” is that which is efficient and functional. Greatness unites individuals, and at the same time, sets them against those who claim to follow a different logic. Within an organization, these logics coexist, but their respective weight varies and they tend to maintain conflicting relationships between them.

Identified by their specific vocabulary, three logics emerge from company management speech: a management logic (opposing subjectivity, reducing gaps, using available potential), a market logic (seeking profit, accepting transparency, focusing on the short term, aiming for optimization) and an innovation logic (creating, inventing, accepting ambiguity, escaping repetition, committing to the long term to stand out from competitors).

2.1.3.1. Management logic

Managerial logic places efficiency and order at the center of its principles, and the key word is “efficiency” (alongside other terminologies such as performing, rational, functional, operational, reliable). Criticism is directed against anything deemed “ineffective,” “passive” or “subjective.” The means (tools, methods and plans) are highlighted, and the reasoning is expressed in terms of goals, standards, results and controls. In our analysis, this logic is mainly driven by the human resources function. It is illustrated by the nature of the majority of projects undertaken by the companies surveyed, projects which mostly share a deliberate nature, having been designed and implemented under the initiative of company management – including HR management – rather than having been imposed or

emerged spontaneously. These projects are more the result of the leaders' convictions, common sense, exchanges between collaborators and voluntary experiments. They rely on management tools considered essential to carry out the desired transformation: production of a "manager's vision" (Radio télévision suisse), definition of a "management skills framework" launched by the management committee (Egis), development of action principles through "management workshops" bringing together a representative sample of managers (Crédit Agricole Centre-Est).

The "greatness" that inspires this logic is based on the conviction that the challenges of performance have shifted "from the transformation of matter to the management of interfaces, coordination, and information flows in the field". The traditional management style based on "command and control" has become counterproductive in a complex and unpredictable environment. New practices need to be devised and codified to ensure that they are not too dissimilar and thus guarantee equal treatment for all employees.

In this logic, the preferred driver for managerial transformation is based on a structured and three-dimensional management style: occupation, project and hierarchical position (Egis until 2020).

2.1.3.2. *Market logic*

In this second logic, the need for managerial transformation is firstly based on the requirement for agility and responsiveness to enhance performance while trying to manage the tensions experienced by the company (whether internal to the organization or stemming from society). The question no longer comes down to implementing "changes" within a given timeframe but to accelerating the company's capacity to transform itself: "shifting from a battery of changes to a permanent transformation program" (Radio télévision suisse); developing "another way of managing" anchored in the values favored by the company (Ubisoft); developing the ability to face up to environmental upheaval and new challenges (Boeringher Ingelheim); spreading an agile mindset, based on collective intelligence, individual expression, accountability and entrepreneurship (Vinci Facilities).

According to this logic, "greatness" is based on the pursuit of profit and the importance of the market. What has monetary value is great, and transformation is only of interest provided that it has a measurable economic value. Organizations must be responsive, agile, learning and inventive in order to personalize their supply based on each customer's expectations and be in tune with changes in society. This logic will tend to favor the definition of a common operating mode (managerial signature) as a driver for managerial transformation to enrich the company's performance in all its projects (Crédit Agricole Centre-Est).

2.1.3.3. *Innovation logic*

Several companies contacted during our research described innovation as a key element for corporate strategy, materialized in various ways:

- the renewal of the service supply: for example, to differentiate itself from the competition (Vinci Facilities), or to respond to new consumption patterns (Radio télévision suisse);
- supporting the development of occupations and skills: for example, taking into account new environmental challenges (Egis);
- the implementation of specific schemes: for example, the “agile squads” at Schneider Electric (multidisciplinary and autonomous teams responsible for producing a product from A to Z), the “Agile core team” at Boehringer Ingelheim (a structure dedicated to supporting innovation within the entire company, born thanks to the initiative of a manager with an entrepreneurial spirit) or the “Innovation Lab” at Groupama;
- organizational resilience (working differently, reinventing the organization, optimizing interfaces and coordination), a dimension found in all companies.

Managerial innovation appears as a new competitiveness challenge, exceeding innovation in its technical and technological dimensions. The conviction of leaders is essential, as is the search for diversification of sources of inspiration for innovation (experimental, emerging innovation). The approaches implemented indirectly target managerial culture via different drivers:

- communication and support to encourage all forms of initiative and volunteering, leading to technical or customer service innovation (Boehringer Ingelheim);
- a new approach to performance: integration of social performance indicators into the managers’ dashboard; emphasis on collective performance and team feedback; increasing the well-being dimension at work by granting “symmetry of attention” not only to customers, but also employees (Vinci Facilities);
- a new perspective on managerial initiatives, in particular regarding managerial and organizational practices and experimentation: authorizing, observing, facilitating and making them known, while avoiding any prescriptions (Boehringer Ingelheim).

The central “greatness” involves creating, escaping from routine and proposing unique and creative work to stand out from competitors. This logic will tend to rely on a driver for managerial transformation which comes down to “letting the wild grasses grow”, inspiring and legitimizing the strategy, while encouraging emerging activities (Vinci Facilities).

2.1.4. Consequences of the drivers for managerial transformation

Managers are impacted by these dominant and sometimes contradictory visions, which accentuate the paradoxes they face. As such, they are at the frontline of complexity for guiding transformation.

Furthermore, the presence of these three logics within the discourses of actors within the same company makes managerial transformation less easy to conceive and implement than it seems. The expected results and performance are not the object of a single vision or consensus: managers must accept that there is no pure transformation “model”. Managerial transformation can only be the result of hybridization between different actors, each of whom holds in their hands and logic of action certain elements of a musical score which, like the metaphor of the jazz orchestra, allows for multiple variations without a target model and across several dimensions.

This observation reveals a new role for the HR function, not only in identifying the logics in tension regarding transformation, but above all in its way of reducing antagonism between these tensions to encourage cooperation and hybridization.

2.2. Manager roles and practices

2.2.1. Paradoxes identified and accepted by managers

Managers are on the frontline of the paradoxes and tensions produced by the transforming organization. Regulating them is a key issue: managing through trust without losing control, taking individual needs into account while boosting collective performance, reconciling strategic decisions and realities in the field, etc. The limited research devoted to the management of paradoxes shows that managers traditionally tend to weaken or remove them in order to reduce the pressure they are under, relying instead on hierarchy, avoidance and power relations logics. Most of them are not trained to think outside this prism.

Nevertheless, the managers we interviewed chose, consciously or unconsciously, to no longer suffer these tensions, rather turning them into management questions, regardless of whether they were influenced by the Covid-19 crisis (overnight lockdown, lack of information and direction from the company itself, overwhelmed, uncertainty about the future, etc.) or by another approach to their managing role (out of conviction: “I made sure with my superiors that I would be given enough leeway and I played the transparency card with my team by suggesting that they build together: to test, to experiment rather than to apply a top-down recipe”; out of constraint: “when I took the position, it was my first managerial experience and in a

field in which I did not have a lot of expertise. I had to position myself differently in relation to my team”).

These managers did not adopt a defensive stance towards paradox management, at the risk of finding themselves “stuck” at the center of inextricable tensions, but intuitively abandoned their stance as experts to steer performance and innovation, relying on the individual and collective commitment of each collaborator. They positioned themselves in a virtuous logic, one which, to bring the team on board, maintained the right level of tension: one that stimulated, that helped employees transform these tensions so that they could become creative; in other words, sources of initiative, cooperation, innovation and commitment. But how did the managers go about it?

2.2.2. Reported management practices

These practices were the direct result of manager initiatives, although their company’s role was significant in authorizing them to act differently. Management decisions involved setting up team meetings, organizing the overall activity and managing staff. Here are the most emblematic ones.

2.2.2.1. Renewed meeting methods

Managers reported meetings becoming better paced, shorter, less formal, structured, more participatory and therefore more engaging for employees than those they previously organized. They learned to use tricks to make them work:

I learned to use the blanks to encourage everyone to speak.

All this works because communication has gradually become constructive, thanks to the feedback technique and one team-building activity organized at the prompt of one of our team members.

Our weekly meetings are now structured around ten questions that guide awareness and behavior: promoting one’s own success, committing to one’s own goals, formalizing cohesive and solidary actions: Who did you help this week? Who helped you this week?

After a time of inclusion, everyone presents their topics and planned decisions based on the principle of interdependencies between projects (the others are informed and can react) for a final decision which remains in the hands of the leader; then the requests addressed to the team manager are discussed so that everyone can take a stand; the meeting ends with a period of collective intelligence to serve the

problems of each participant, following a co-development logic, but in a shorter format.

2.2.2.2. A different way of organizing activities

Managers also reviewed their way of organizing activity, a questioning particularly highlighted by the need to cope during the Covid-19 crisis, but which to a certain extent continued afterwards:

- positioning themselves differently in relation to their teams: “I was able to say without discomfort that neither I nor the Executive Committee had the solutions, that it was necessary to construct them collectively”; “we were led to contradict each other from one week to the next, without losing legitimacy”;

- going outside the usual framework: “we focused on the urgent and the important, the here and now, and on the means available, without giving in to cumbersome processes”; “we implemented local solutions which took precedence over the company’s usual recommendations”;

- changing their representations: “I reviewed my position regarding teleworking, which became far more positive than before”; “I realized that we could function without making so many business trips”; “I was able to rely on certain collaborators who were not predestined for the role, but who turned out to be pillars of support”;

- imagining new articulations between individual and collective performance: “Every six months, we define our team goals together, which are in line with the company’s objectives, as well as everyone’s contributions to achieving them. Not only does the monthly follow-up serve to monitor the missions’ progress but also the efforts and needs for mutual assistance to move forward. Everything is brought back to ‘our’ team goal, so that everyone feels involved and the objectives flow from that: those of the team take precedence over individual ones, without detracting from the value of each person’s contribution.”

2.2.2.3. Increasing attention towards individuals

The terminology proposed here is important, emphasizing the shift established by these managers, from individual management towards human support for each person in their team, based on new forms of proximity:

I organized an exchange with all my colleagues, one by one, to get to know them better. I adapted my follow-up to their needs and situations, even if it meant entering into the privacy of some, while others wanted to remain in the professional field.

I survey my colleagues by asking them to rate on a scale of 1 to 10 how satisfied they are with their week; this helps me intervene appropriately.

When I recruit a new employee to my team, I take great care to get to know them well and to clarify with them their strengths and aspirations, and therefore what they will be expected to do and what not. In this way, everyone knows their place within the team, leading to less competition and more complementarity and synergies within the collective.

My feedback is more about successes: the idea is not to learn from your mistakes, but to become aware of your strengths to encourage you to go further and enjoy your work.

With teleworking, it has become essential to organize face-to-face moments that are more convivial and more fun: monthly meetings, seminars twice a year, etc.

2.2.3. The lessons

Beyond the diversity of practices, all the managers we interviewed changed their stance and abandoned their usual frame of reference, without which they would not have been able to remain legitimate, would not have been able to draw the “creative potential” from the tensions they faced with their teams, something which illustrates the path of transcendence described by Smith and Lewis. In doing this, they were able to implement new managerial skills and more favorable organizational conditions. These practices highlight some points to consider for companies questioning their support systems.

2.2.3.1. Distance from the usual frame of reference

To delegate their leadership role during team meetings, facilitate activities combining individual and collective management, or empower their employees around certain topics towards which they are usually passive, managers seem to have relied on three drivers:

- adopted a learning stance, contrary to the usual, even expected, image of the manager. This change of stance and the associated reflexes are all the more difficult to acquire, for example, when managers think they have the right solution or want to intervene to accelerate the resolution process, or when this calls into question their ego or their vision of what a manager is;

- broke routines and acted following the mental models of their collaborators: this driver is just as difficult to activate, because it supposes that managers are able

to break their own representations before being able to change those of others, and sometimes to go against the company’s culture;

– proposed a new “empowering” framework, encouraging initiative, experimentation and deviations from the usual framework, rather than trying to convince or train employees: a framework which values individuals as such in the collective, which gives meaning and reassurance, plays on complementarities rather than competition, a framework which promotes authentic relationships and gives pleasure in working together, etc. In order to achieve this, a manager must know how to provide the right points of reference and the boundaries of the playing field, suggest methods rather than strict rules (use feedback communication, for example), exploit the three stages of a meeting, formulate questions to stimulate reflective capacity or collective intelligence, and rely on shared communication methods.

2.2.3.2. The need for new managerial skills

The context requires letting go of a simplistic classification between soft and hard skills and identifying registers of actions beyond the notion of skill to refer to abilities understood as professional aptitudes to be developed by managers in their activities. These abilities are largely cognitive; they enable the manager to interact with the environment. In addition, they are quite dynamic (not fixed in established reference systems). We have chosen to classify them into five families (Table 2.1).

Being on standby/deciphering and understanding
<p>Being on standby: being informed/self-training/having a critical and broad reading of the company’s ecosystem.</p> <p>Deciphering and understanding the signals/information/lessons, enabling one to take a step back from the activity, work, meaning, with a systemic logic (in and outside the company; professional/personal dimension of individuals).</p>
Being a proactive agent of change
<p>Transforming the lessons and information analyzed into a dream for the teams, for the company and society, and therefore into an innovative vision of what the organization, management and business models could potentially be.</p> <p>Having the desire and courage to act accordingly: being self-confident, positive and constructive, persevering, questioning ourselves to be able to adapt continuously, not being afraid to take risks, being resilient.</p> <p>Identifying the drivers for change: distinguishing between the imposed framework and the possible leeway to be able/know how to get out of the framework; measuring and anticipating risks; identifying allies, the conditions for success; grasping the basics of actor psychology to optimize motivation and the desire for action; devising an action strategy.</p> <p>Acting based on the values of the company and the collective, as well as on one’s own values/virtues (in the sense of Peterson and Seligman).</p>

Developing new proximities
<p>Practicing active listening with customers to gain insight into their operational and strategic needs and thus adapt business models accordingly; with employees to be able to understand what motivates them, both inside and outside of work.</p> <p>Communicating differently (with employees, customers, staff representative bodies): shorter and more frequent meetings, mixing telephone/video/face-to-face methods, using blank spaces and listening to silences (particularly in the absence of visual cues), taking into account the specific perceptions and needs of individuals, using different sensors such as QWL (Quality of Working Life) or REX (Return Experience) surveys.</p> <p>Rethinking conviviality in the company.</p> <p>Managing remotely (interpreting weak signals, developing emotional intelligence, building trust).</p>
Transforming by engaging in action
<p>Knowing how to “pitch” our vision/beliefs as well as questions: sharing to engage the collective in the emergence and/or adoption of solutions and/or their implementation.</p> <p>Discerning/focusing on what is essential (the important/the urgent) and taking it into account in our practices (management/decision/team facilitation): simplifying, arbitrating between participatory and authoritarian modes, promoting experimentation to accelerate the decision-making process, encouraging action and initiatives.</p> <p>Embracing all challenges (related to the company’s activities, customer needs, CSR, employees’ relationship to work, etc.): thinking about both new working methods and new business challenges, thinking about operational management while preparing for the future, deciding in a context of uncertainty and change.</p> <p>Being an educator: explaining actions/decisions, particularly when they call into question the organization, established routines, recent decisions; explaining our own managerial stance and expectations for the group and individuals.</p>
Developing collaborative behaviors
<p>Relying on the collective: remaining humble, relying on and expressing collective intelligence.</p> <p>Relying on the individual: identifying the action capabilities and potential of each employee in a situation to build trust/delegate/be inspired (identifying the pillars).</p> <p>Creating a favorable framework for action and solidarity, the development of trust and commitment, including in situations of crisis or change: encouraging speaking out/debate of ideas/experimentation; reassuring; acknowledging/valuing/thanking each individual in the group; being transparent and exemplary; personalizing monitoring/communication with colleagues; providing security.</p> <p>Developing a learning attitude in all situations: calling ourselves into question, organizing feedback, adopting and encouraging the adoption of a constructive attitude towards failure.</p>

Table 2.1. The five families of managerial skills

2.2.3.3. Some points of caution for companies

These points of caution seem essential at a time when companies are questioning the support schemes for managers.

First and foremost is the growing importance given to people, to enjoyment at work and to the pleasure of working together. People management enters the picture, incorporating not only what some call “emotional management” but also better coordination and dynamics between individual contributions and collective performance, and between professional and private lives.

Furthermore, these new practices require a significant effort on the part of managers, and even more so if they have learned their trade in a “command and control” type of environment. But even for new managers, those who a priori are already in the expected new managerial culture, the stance is hard to maintain: “I am frequently subject to doubts, influenced by the system and by the natural reflexes of my own colleagues who sometimes continue to seek me out like a traditional manager. There are many temptations to revert to a more top-down managerial approach. Staying on course requires acquiring new reflexes and being cautious not to go backwards, but above all feeling supported by the company and the system: not being an expert was ultimately a blessing. I had to take a different stance as a manager and I was transparent with my team. But above all, I made sure that I would be allowed to manage and experiment in accordance with my own values, my need for freedom of action and autonomy.” Not all managers are willing to “dare” or “to give themselves permission” if they do not feel supported.

Finally, there is a need for a broader, more systemic approach that does not focus exclusively on supporting managers: the burden does not rest solely on their shoulders. The persons being managed also have to be taken into account, together with the corporate culture, the organization and performance management systems. While the role of the manager is to establish an empowering environment for their team, the role of the company is also to provide an empowering environment for managers.

2.3. Manager support provided by companies: various schemes

While managers design, in a more or less explicit and formalized manner, new regulatory mechanisms and managerial practices, what do so-called “support” functions do in order to assist them in the face of unprecedented challenges? Our goal here is not to detail all the possible schemes, but to structure them and to highlight what, in our opinion, is decisive or innovative.

In this case, three logics of action seem to be at work:

- promoting the transformation of corporate culture;
- nourishing to “equip” managers and employees, so that they can take a step back from their role, find their bearings, adapt their practices;
- bringing reassurance by acting on the organizational framework: providing consistency and support, for example, by revisiting organizational charts and the performance evaluation system, or even the role and skills of the HR department.

These three logics can coexist, or be usefully intertwined, insofar as they reinforce their respective effects.

2.3.1. Promoting the transformation of corporate culture

The transformation of corporate culture, which aims to change the ways of thinking and representations of all employees and managers, is an essential part for supporting managers in their efforts to fulfill their new role.

The project, which explicitly displays the ambition to change the managerial culture, is the first driver for transformation that comes to mind: within the Hermès Textile Holding, all managers are involved in the co-construction along the way of a new managerial role, whereas at Horizon Sud, Radio télévision suisse or Crédit Agricole Centre-Est, management (or HR departments) submit a managerial framework developed upstream for adoption and translation into expected managerial and team behaviors.

But the project can focus on a subject other than managerial culture, a subject that, while challenging for both managers and employees, can become a powerful driver for cultural transformation, as long as it is designed to adopt new ways of working together: a shared challenge, the desire to collaborate, facilitation rather than top-down and directive approaches, freedom, the accomplishment and recognition of the work produced, etc. The project is not only used as a co-construction process, but also as a transformation and learning process.

Soitec is getting the whole company on board with the idea of quality of life at work, using QWL surveys to spot any management issues in teams and to help managers do their job better. The QWL dimension was reinforced by the creation of an ad hoc commission, while employee perception of QWL is one of the criteria for the CEO's variable remuneration, giving full legitimacy and importance to this object of managerial investment.

At Boeringher Ingelheim, the principles of collective intelligence and creativity and agility are now widespread in culture. After the Covid-19 crisis, the company strengthened its managerial transformation by initiating a reflection on the work of the future: *Working Modalities* (an office for doing what?), the *Meeting Culture* (time/place/audience, etc., to what end?), collaboration (what anchoring with agility, what communication methods and formats, what shared learning strategies?), *Business Travels* (what real needs?).

Lastly, at SThree, an international company with approximately 100 employees, the transformation process begins with a call to volunteer employees who are invited to work on issues with operational significance for them: How can customer relations be optimized? How can we review the remuneration system to motivate both individuals and the collective? How to better coordinate sales and corporate teams? The approach emphasizes authenticity and pragmatism: The recommendations made by the working groups must include criteria enabling objective decision-making (feasibility, expected benefits, etc.). The iterative process and the project group are there to help improve recommendations, and approved projects are implemented without delay. If the company's ambition is to put an end to micromanagement and develop accountability, the question of management is worked on in parallel, first with the Executive Committee, then in a cascade logic with the other managers.

Impulse can also be provided by disrupting routines and mental models. At Boeringher Ingelheim, the dissemination of "best practices" for closing a meeting helps develop reflective capacity and accountability. At the end of the meeting, using questions inspired by co-development techniques, everyone shares what they liked, what they learned, what surprised them and what they suggest. The person in charge of the subject retains control over what they remember from the roundtable discussion, without having to justify themselves.

At Germinal, a start-up and online training organization, workers cannot arrive two minutes late for a meeting: this everyday rule is stronger than the company's values, as concern for the collective and for each other's work has become part of the team's culture. Nothing is set in stone; rules can evolve, following an adaptation logic, but above all, a "cancel and replace" modality: "every time you grow, you break the processes of the past".

The mode of action is even more radical at Camif. In 2009, its new CEO invited a visual artist into residence for three months. She began by showing collaborators photographic diptychs, highlighting the similarities between a person's portrait and that of a room in their home. Eventually, employees played along and shared their own pictures, creating a new form of bonding and exchange that helped to initiate

more authentic relationships. On another occasion, she tagged all the parking spaces with the name of a contemporary artist without asking for management's permission, thus breaking with the existing culture: a source of astonishment among employees, as well as another message encouraging initiative and out-of-the-box thinking. Shortly after, she materialized each physical interaction between two collaborators with a pink strip stuck to the ground. Little by little, the network of pink bands that was formed proved to employees the importance of creating links between themselves and with customers and with suppliers, illustrating one of the CEO's visions: "the real wealth of a company is its ability to create links".

2.3.2. Nourishing to "equip" managers and collaborators

Training maintains a privileged place, but its face changes.

2.3.2.1. Leadership programs revisited

The elitist approach aimed only at high potentials is over. With à la carte modules, extended access and target audiences, the challenge is to provide managers with the elements they need, at the right time, in an Open Learning approach, by means of interactive teaching methods combining digital and face-to-face learning.

Schneider Electric thus supplemented its high-potential program with a schedule addressed at all managers: *Building great leaders*, which can be broken down into three levels:

- new manager (level 1);
- frontline manager (level 2, for operations managers with previous experience);
- middle manager (level 3, managing managers).

The deployment was global: contents were both digital and face-to-face. In parallel, mentoring or coaching support systems were set up and certain entities practiced co-development, on their own account.

2.3.2.2. New disciplines

In addition to agility methods and the principles of effectuation and creativity, which nourish innovation, other elements are becoming increasingly important and entering the training vocabulary: emotions (emotional intelligence, emotional management), stance and the quality of relationships are key factors in performance.

Over half of the companies observed in our panel have trained their managers, as well as their staff, in non-violent communication (NVC).

Other companies provide training in creativity or co-development techniques, with the idea that this type of skill can be internalized and carried out by dedicated people or by volunteer managers, if coaches are not trained.

2.3.2.3. Local support formats

In relation to these new disciplines, the formats are more workshop-like, bringing together colleagues in close proximity at work: manager workshops (such as co-development workshops), workshops between managers and their natural team, or even, but more rarely, managers within the same hierarchical line. Commitment from each participant (this type of workshop is not consumed, but experienced) and the facilitation conditions for these workshops are key factors for success that cannot be improvised.

Companies are increasingly using techniques such as coaching, co-development, mentoring, team building and creativity workshops (action learning, managing innovation, etc.). There is also a kind of professionalization of the exchange format, with an increasing number of manager cafés, communities and exchange groups with a good structure. At the same time, companies are drawing inspiration from, appropriating and customizing “classic” techniques: for example, co-development according to Champagne and Payette (Canadian school) is giving way to variations (the “Mentor” co-development applied at Crédit Agricole Centre-Est, or transposition for the purpose of meetings conducted at Boehringer Ingelheim). Coaching is no longer reserved for “top managers” as it was a few years ago, but is now offered to a wide range of target groups: new teams, when a new manager takes over, or at the request of a manager wishing to renew practices and re-examine the managing role.

2.3.2.4. Increasing space for openness

More and more schemes are being deployed to provide general culture and solid reading grids (anthropology, psychology, economics, philosophy, etc.) to decode the world on economic, societal, etc., levels.

It is not only a question of showing managers what “managing differently” could look like, but also of opening their minds to the company’s ecosystem, the challenges ahead in terms of the environment and social responsibility, health risks, teleworking, the contributions of neuroscience, etc. The formats are diverse: conferences on a variety of topics, learning expeditions, access to monitoring tools or teaming up with peers from other firms (alliance network, etc.).

For example, Camif organizes an annual seven-stage “Tour du Made in France”, bringing together volunteer Camif employees, staff from the “host” supplier for each stage and customers. Approximately 50 participants gather for a tour of the company in the morning, followed by creative workshops in the afternoon, led by volunteer facilitators from Camif. In addition to creating links, this tour optimizes customer/supplier relationships through a better understanding of each other’s businesses and enhances the interaction with customers.

2.3.3. Bringing reassurance by acting on the organizational framework

2.3.3.1. Smoothing work organization

Simplification is a first driver which allows us to gain in coherence and clarification. It can intervene:

- at a micro-level: the company clarifies the delegation system and formalizes the time spent on collective projects or on a cross-functional role performed by an employee;

- at a macro-level: for example, Egis is shifting its organization matrix by merging project responsibility and hierarchical responsibility, in order to enhance the status of local managers and give them more power of action;

- at an intermediate level: alongside the maintenance of traditional control and management systems, management legitimizes and makes possible local operation in agile mode, such as the “agile squad” initiatives set up by Schneider Electric to launch a new product.

Workspaces are another driver whose dual benefit includes adapting to uses that facilitate work, and directing work according to expectations. This is the case with developments designed as spaces for creativity. Groupama’s managers made no mistake when they decided to organize a team seminar in the Groupama Lab, co-hosted by one of its facilitators. Along the same lines, companies are creating more meeting places to encourage interaction, by moving transit areas, offices or gathering places to channel the right people towards the same location.

2.3.3.2. Proposing “support” structures

While the HR function is seeking to professionalize itself in order to fulfill this role, it is clear that it is often held by different profiles. At Egis, the creation of resource managers to support operations managers is motivated by the idea that when it comes to posture and a prospective vision of occupations, the manager is more relevant than the HR manager, and that the operations manager does not have enough time to play this role.

At Boeringher Ingelheim, the *Head of Agile Innovation Center of Excellence* is a structure of four persons directly attached to the presidency and responsible for leading the ongoing dissemination of agile culture. The team supports managers and teams at their request, and trains internal relays or ambassadors in agile methodology, who can themselves support teams in their transformation, if they so desire. The structure's objectives are not designed to exert pressure, but to provide a vision and legitimacy; in this case, training 90% of employees in France and developing breakthrough innovation every two years for the group's activity.

2.3.3.3. Adapting the management system and HR processes

The evaluation system implicitly influences behavior. At Germinal, the criteria used by employees to evaluate top managers have been designed and formulated to guide managerial behavior in a very concrete way:

- gives me actionable feedback;
- lets me do my job with autonomy;
- shows consideration for my work;
- when I make a mistake, it is easy for me to talk it out;
- allows me to focus on my priorities;
- the best thing I see in this person as a top manager is...

Consistency with expectations makes companies want to revisit the way they measure performance, but not always in phase with the progress of transformation.

2.4. Conclusion: the return of the manager

For several years, the question of the evolution of the managers' role and skills amid transformation dynamics has been on the agenda of companies. The requirement to address this question is based on several observations:

- a context of accelerated changes in work and its organization;
- a managerial role evolving from “actor in the transformation of work into performance” to that of regulator of organizational complexity;
- signs of a decline in the attractiveness of management positions at the first management levels, or even a malaise among those who occupy them;
- at a time when most companies are undertaking major transformations and are counting on their proximity managers to provide meaning (while ensuring the achievement of production and efficiency goals), managers themselves perceive

tensions generated by the existence of multiple paradoxes they must nonetheless manage to reconcile.

To complete the description of this increasingly complex context, the logics of action which pushes us to want to transform management are far from convergent. Whether it is a question of economic efficiency for some, an intangible differentiation strategy for others or a desire to rationalize management for others, combining the various justifications put forward by the company's actors is no easy task and requires an approach that favors the hybridization of the logics at work.

The in-depth collection of managers' practices in approximately 10 companies sheds light on the tensions and paradoxes that affect managers and the ways and means they are using today to try to overcome them and find solutions. By force of circumstance, the Covid-19 context encouraged intuition, self-organization, a DIY attitude and resourcefulness. The outlook of businesses has evolved in this direction, advocating pragmatism and giving greater importance to contingency and context. This is why some managers continued to experiment, to fumble, to invent with the approval of their hierarchy, etc., whereas their elders may have sought tried-and-tested models for action. In doing so, they consciously or unconsciously contributed to maintaining a form of creative tension within their teams while fostering commitment. The use of transcendence, understood as the ability to draw on contradictory tensions to invent new practices and evolve, has become a sought-after managerial ability.

These observations also show that the widespread belief in the 2000s, according to which companies would be able to do without managers by solely relying on self-management, horizontal structures or sociocratic and liberated models, has been widely called into question. Today, the importance of the local manager is reinforced. Not in the statutory role assigned to them in the past, but in a series of new support roles, such as resource managers, agile ambassadors, connector roles and liaison agents. The current period is ultimately that of the "return of the manager" in the sense that after a certain promotion of the "liberated company" and the end of management, businesses are rediscovering the importance of these managers who invent and tinker.

Companies, for their part, are led to envision renewed drivers for action in order to support their managers. Rather than a manager-centric support, they adopt a systemic view of their schemes: they attempt to drive the transformation of corporate culture by not limiting themselves to projects focusing solely on management and managers. They attempt to nourish them by providing them with reading grids of the reality of work and collective dynamics to encourage their reflexivity, to avoid a simplified representation of organizational reality and thus take a different stance, and this by giving increasing space to proven techniques such

as coaching, co-development or action learning. Finally, they attempt to bring reassurance by acting on the organizational framework, in particular by bringing consistency to the entire management and organizational system. It is in this area that companies appear to be the least advanced in the schemes they are experimenting with.

Hence, not all managerial shortcomings identified in a company are necessarily due to inadequate managers, who could simply be offered coaching or team facilitation. The management system may itself be failing, particularly in terms of organization (distribution of activities, processes and modes of collaboration). This “invisible technology”, comprising a variety of management systems and tools (reporting, processes, matrix organizations, etc.), determines human behavior within an organization, including managerial behavior. This complexity in turn creates paradoxes, accentuated by the difficulty of matching the pace of cultural transformation with that of the evolution of management tools. Not only does cultural change largely depend on the contexts created by the organization but also on the scope available for company members to call into question current values and the solutions adopted by business leaders so far. Changing the ways of doing or thinking of a company and its members therefore depends on the ability of leaders to give sufficient leeway to organization members, in this case managers. But this is still not enough. At the same time, they need to implement actions to make the management system consistent by revisiting performance evaluation systems, recognition, learning situations, etc.

Ultimately, while being a manager is and will continue to be a matter of knowing how to apply a wide range of technical skills and know-how (management, marketing, communication, finance, etc.), this study has shown that managing in a complex, fast-changing world is less a matter of codified knowledge and know-how than of the ability to act based on new, innovative ways of thinking. In our view, these capabilities fall within three interacting registers: the reflexive capacity in a complex world, collective and cross-functional operation fueled by innovation, and finally behavioral capabilities related to risk-taking, commitment and emotional support.

Only once managers are able to reflect upon themselves and get to know themselves better, together with their environment inside and outside the company, will they be able to get the team to act, by creating contexts conducive to the development and smooth functioning of their teams. A better understanding of how human beings work will provide managers with the resources to better create cooperation and performance conditions instead of the stringent application of management rules and standards. As one of the HR managers we met pointed out, “creative approaches [...] are too often limited to benchmarking, when we must first

think about the right question. This attempt to find the right wording, not to simplify at all costs, but to return to the complexity of things, for me, is much more virtuous”.

Companies wishing to design manager support schemes exploiting these three capability registers will have to be ready to call into question the traditional model in force which for many years has given priority to training initiatives for managers. If we are to believe the “70/20/10” learning model adopted by the most innovative companies in terms of skills development, 70% of this is based on experience, 20% on rather informal learning relationships (N+1, colleagues, etc.) and only 10% on formal development schemes (collective or individual, seminars, training sessions). Developing the role and skills of managers will undoubtedly require a strong innovative approach in teaching and resource management. This study has helped to identify several avenues already being explored: positive approaches relying on existing strengths, hybrid and increasingly “embedded” schemes in work situations, collective approaches, co-development, communities of managers, and individual training. This movement reflects the desire, at least among the companies analyzed, to adopt a systemic approach to bring about real change in a context that is specific to each of them rather than limiting themselves to imparting knowledge, including on management.

2.5. References

- Autissier, D., Johnson, K.J., Metais-Wiersch, E. (2018a). *Du changement à la transformation. Stratégie et pilotage de transformation*. Dunod, Paris.
- Autissier, D., Johnson, K.J., Moutot, J.-M. (2018b). *L'innovation managériale*. Eyrolles, Paris.
- Boltanski, L. and Thévenot, L. (1991). *De la justification. Les économies de la grandeur*. Gallimard, Paris.
- Boyer, F. (2020). *L'innovation managériale en action – 50 pratiques managériales innovantes. S'inspirer et apprendre des entreprises qui ont su concilier épanouissement individuel et performance collective*. Eyrolles, Paris.
- Brisebourg, J., Hannezo, C., Picq, T. (2021). *L'art de la performance*. Dunod, Paris.
- Gilbert, P. and Raulet-Croset, N. (2021). *Lire le management autrement*. EMS, Caen.
- Gilbert, P., Bobadilla, N., Gastaldi, L., Le Boulaire, M., Lelebina, O. (2018). *Innovation, Research and Development Management*. ISTE Ltd, London and John Wiley and Sons, New York.
- Karsenty, L. (2019). *Libérer l'entreprise, ça marche ?* Octarès, Toulouse.
- Kotter, J. (1996). *Leading Change*. Harvard Business Review Press, Boston.

- Laloux, F. (2015). *Reinventing Organizations – Vers des communautés de travail inspirées*. Diatino, Paris.
- Lewin, K. (2008). The mechanisms of change. In *Organization Change: A Comprehensive Reader*, Burke, W.W., Lake, D.G., Paine, J.W. (eds). John Wiley & Sons, New York [Original published 1947].
- Lorino, P. (2019). *Pragmatisme et étude des organisations*. Economica, Paris.
- Mercure, D. (2020). *Les transformations contemporaines du rapport au travail*. Presses de l'Université Laval, Quebec.
- Moss Kanter, R. (1984). *The Change Masters. Innovation and Entrepreneurship in the American Corporation*. Simon & Schuster, New York.
- Sarasvathy, S.D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *The Academy of Management Review*, 26(2), 243–263.
- Silberzahn, P. (2020). *Effectuation – Les principes de l'entrepreneuriat pour tous*. Pearson, Paris.
- Smith, W.K. and Lewis, M.W. (2011). Toward a theory of paradox: A dynamic equilibrium model of organizing. *Academy of Management Review*, 36(2), 381–403.
- Staune, J. (2021). *La Grande Mutation. Pourquoi votre futur sera extraordinaire*. Diatino, Paris.
- Taleb, N.N., Rimoldy, C., d'Azay, L. (2013). *Antifragile. Les bienfaits du désordre*. Les Belles Lettres, Paris.
- Vaujany, F.-X., Hussenot, A., Chanlat, J.-F. (eds) (2016). *Théories des organisations. Nouveaux tournants*. Economica, Paris.
- Weil, T. and Dubey, A.S. (2020). *Au-delà de l'entreprise libérée*. Presses des Mines, Paris.

Reconciling the Productivity and Well-being of Qualified Employees: The Managerial Challenge of Teleworking

This chapter addresses a topic that has fueled much writing and conversation since the Covid-19 health crisis. We will not dwell on the definition of teleworking, as it has been amply debated among specialists in the past. We will simply consider it as a professional activity carried out by an employee, in whole or in part, away from the premises of the employing company or from its customers. We will focus specifically on home-based teleworking, the best-known¹ form of teleworking, without ignoring the fact that there are others (nomadic teleworking or in a third location).

Teleworking is a recurring topic. However, researchers have periodically wondered whether there is a reality behind this notion. At the end of the 1980s, Steinle (1988) noted, not without irony, that there were more researchers working on the subject than teleworkers themselves! For a long time, researchers have wondered about the existence of this alleged “sea serpent”. However, the 2020 health crisis turned the tide, and teleworking becoming widespread and sometimes even compulsory in some countries. Our study focuses on the French case, which we believe is emblematic of this changeover: between March 2020 and May 2021, French workers experienced three periods of confinement: the first, very strict, from March 17 to May 11, 2020, with an almost total ban on leaving the home, and therefore compulsory teleworking for all employees able to telework (and a cessation of activity for employees in non-essential services unable to telework); a second wave, from October 30 to December 15, 2020, with mandatory teleworking,

Chapter written by Clotilde CORON, Patrick GILBERT and Simon PORCHER.

¹ The French National Institute for Research and Security reports the findings of a national survey estimating that 92% of teleworkers worked from home in 2018 (INRS 2020, p. 5).

but with derogation possibilities for employees unable to telework; and finally a third phase from April 3 to May 3, 2021, during which companies were strongly encouraged to use teleworking.

These different waves led to a strong generalization of teleworking, despite the fact that in France, in 2017, regular teleworking had been a marginal practice. According to a survey by the statistics services of the French Ministry of Labor (Hallépée and Mauroux 2019), only 3% of employees exerted it at least one day a week. Teleworkers were mostly managers (61%), and many worked in the IT and telecommunications sectors. On the contrary, in January and February 2021, slightly more than a quarter of French employees had worked remotely at least one day. By July 31, 2021, 22% of employees had worked in a company that still required at least one day of teleworking per week (DARES 2021). The large-scale deployment of teleworking raises many questions, considering that it could well shape the future of work (Canivenc and Cahier 2021).

For teleworking promoters, the advantages of this form of organization are numerous, both for businesses and for employees, as relayed on the website of the French Ministry of Economy and Finance². For the company, it could mean increased production, economies of scale for premises and running costs, improved quality of life for employees at work, greater motivation and involvement, and lower absenteeism. Better performance would therefore be an expected consequence of teleworking. For the employee, it could offer time savings (particularly transport time), better management of working time, greater autonomy in task management and enhanced concentration. Teleworking would thus have a direct impact on well-being, and there would be a convergence between productivity and well-being.

Now do the facts really support this thesis? Wouldn't combining quality of life and performance through teleworking constitute more of a management challenge than a ready-made answer? Should we not consider a diversity of possibilities in the relationship between these two needs?

To shed light on these questions, we first offer an overview of research publications. Afterwards, we present the findings of a questionnaire survey, which enables us to draw up a typology of home-based teleworking situations that combine productivity and well-being. This typology should allow us to break down heterogeneity and organize the findings according to defined criteria. We will then be in a position to advance our understanding of the effects of teleworking in the diversity of situations it comprises, and to suggest managerial recommendations adapted to this diversity.

² See: <https://www.economie.gouv.fr/entreprises/teletravail> [accessed July 22, 2024].

3.1. The relationship between teleworking and productivity: a blind spot in research

A review of French and international documentary databases shows that a number of studies are interested in the link between teleworking and well-being: occupational health, quality of working life (QWL) surveys, etc. But only a handful addresses the relationship between teleworking and productivity, and even fewer the teleworking/productivity/well-being articulation which constitutes the target of our study.

3.1.1. The convergence of individual and organizational benefits: a widespread opinion tested by the facts

The idea that teleworking leads to a convergence of increased performance and improved well-being (the convergence of benefits thesis) is widespread. We will see that more nuanced points of view emerge from the literature.

In support of this thesis, Kurkland and Bailey (1999) assert that teleworking is accompanied by greater productivity and provide some supporting illustrations (IBM, AT&T, etc.), evoking a link between employee well-being and productivity, although they do not empirically support this assertion: “From the organization’s perspective, home-based teleworking provides an opportunity to improve workplace productivity. Because teleworking employees experience greater schedule flexibility, they can work when they prefer, and thereby improve their productivity” (p. 57). Teleworking appears to be associated with greater productivity and a better work–life balance.

More recently, in a study conducted in a Chinese company with 16,000 employees, Bloom et al. (2015) found that when employees opted for teleworking policies, their productivity increased by 13%. They also noted that when, nine months later, these same workers were given the choice between staying at home and returning to the office, those who chose the first option further improved their productivity (+22%) compared to their performance before the experience. The improvement in productivity seems to be more significant when the teleworking situation is an option chosen by the employee.

This suggests that the relationship between teleworking and performance cannot be reasoned simply in terms of direct impact, but is influenced by a variety of factors. The beneficial effects of teleworking on performance are therefore conditional. In addition, it appears that teleworking may also have negative effects on employees.

3.1.2. Some effects are beneficial, others not

Emilie Vayre's recent literature review (2019, p. 8) reports beneficial effects of teleworking on professional activity: "Numerous studies have shown that teleworking reduces interruptions to professional activity, distractions, and the time needed to recover after work." The author notes that while teleworking is also associated with lower absenteeism, intention to leave and turnover, the effect of teleworking on the intention to leave is controversial.

But Vayre also mentions that the positive effects can be counteracted by a range of factors. Thus, only "formal" teleworking (at least recognized as part of a dedicated organizational scheme) is conducive to a good assessment of work by the supervisor (quality of work, number of errors made and satisfaction of expectations). Furthermore, "the positive effects of teleworking in terms of results (quantity and quality of work, meeting deadlines) [...] are most present when employees have support from their manager or supervisor, and when they perceive organizational support" (Vayre 2019, p. 9).

While Vayre (2019) does not point out any harmful effects of teleworking on performance, she nonetheless reports that the negative effects on well-being mentioned in the literature are numerous:

- intensification, densification, working time;
- exposure to physical and psycho-social risks, musculo-skeletal disorders, overwork, workaholism, professional stress, burnout;
- job dissatisfaction;
- feeling of loneliness, isolation, professional exclusion;
- social pressure, lack of understanding, mistrust, hostility from professional circles.

This inventory of disturbances shows that teleworking is associated with higher psychological costs than working on company premises. The study by Choudhury et al. (2020) particularly emphasizes this point and warns that managers should consider the strategies most likely to mitigate psychological costs. Employees who have made a radical shift to teleworking may not have enough time to fulfill their professional, social and family roles. Some workers may combine the positive effects (work-life balance) with the more negative effects of work intensification.

3.1.3. An association between performance and well-being under certain conditions

A review of research findings on the link between performance and well-being in teleworking situations reveals two groups of factors: work organization (pace, supervisory rules) and management (actor initiating teleworking, trust granted by the manager, employee autonomy).

3.1.3.1. The organization of teleworking

A research report from the Centre francophone d'informatisation des organisations (Tremblay and Le Bot 2001) addressed our question directly, presenting the findings of a questionnaire survey and case studies in large public and private organizations in Quebec. Few data illustrate the link between quality of life and performance, despite being the report's subject. Nevertheless, the authors noted that:

Savings are less significant for the organization when part-time teleworking is involved. In fact, equipment costs remain higher for the company since it does not really save in office space, unless it combines the part-time teleworking policy with an office sharing policy. (p. 66)

More recently, Mathieu et al. (2020) conducted a questionnaire survey among Michelin employees, in a period before the health crisis. The responses of 764 employees who took part in the survey showed that teleworkers have positive perceptions of their individual performance in teleworking scenarios (especially women). The regularity of teleworking has no impact on individual performance perceptions. The perception of QWL, which we associate with well-being, is influenced by the regular or occasional nature of teleworking. Regular teleworkers have the most positive perception of QWL.

According to Scaillerez and Tremblay (2016), the development of spatio-temporal flexibility at work is a strong expectation for companies, as well as for employees. It could therefore be a source of both performance and well-being, provided that work organization is rethought and rules are established to serve the interests of both businesses and employees.

3.1.3.2. The management of teleworking

Research on the link between work–life balance practices and organizational performance (Beauregard and Henry 2009; Beauregard 2011) shows a positive

association between teleworking and employee performance, as well as improved supervisor performance evaluations. However, a part of existing research has produced conflicting findings. The cause could be related to the actor who initiates teleworking: when the hierarchy is the only one to initiate teleworking, gains in productivity might be smaller (Beauregard and Henry 2009; Bloom et al. 2015).

Grant et al. (2013) explored the impact of teleworking in three areas: work–life balance, job effectiveness and well-being. Among the differentiating factors affecting teleworkers, they mentioned access to technology, the ability to work flexibly and individual skills. They also noted negative effects on well-being, due to work overload and lack of recovery time. The bottom line for these authors is that, among teleworkers, trust and management style appear as key factors in job effectiveness.

In an article discussing the challenges that managing teleworkers poses for managers, Taskin and Tremblay (2010) reported that by breaking the unity of time, place and action which characterizes traditional practices, teleworking creates a distance, both physical and psycho-sociological, which calls for appropriate managerial responses. They address a range of themes, including the question of performance and control, and suggest ways in which telework and teleworkers can be properly managed. But they do not directly discuss the impact of teleworking on performance, only the organization of performance control.

It is this question of control that Solís (2017) has explored in depth, showing that the positive influence of teleworking on the intra-role performance, proactivity and adaptability of teleworkers depends on the level of perceived control of their professional activity by the supervisor. The most successful teleworkers are those who are the least controlled by their superiors.

Along the same lines, Kim et al. (2021) empirically examined the role of supervision in managing and motivating teleworkers to improve organizational performance. The findings of their study suggest that supervision that includes result-based management and trust-building efforts improves the performance of organizations with teleworking policies.

Supervision is therefore a key element for the success of teleworking. Some workers may experience lower performance while teleworking, perhaps due to the lack of supervision, itself leading to more distraction for workers and a feeling of “longer days”.

3.1.4. Individual effects and organizational effects: a complex relationship

The specialized literature is not abundant regarding the convergence of individual and organizational benefits of teleworking. Some individuals seem to be more productive while teleworking, or have a heavier workload, and at the same time achieve a better work–life balance. This convergence is far from automatic; rather, it should be seen as a challenge organizations must address in order for it to manifest.

Some individuals may have lower productivity; others may not see any difference between working face-to-face work and teleworking. The positive effects of teleworking in the professional field can be thwarted by all kinds of factors (organizational, material, managerial, relational), just as it is possible to remedy certain negative effects. Table 3.1 summarizes the key points inspired in a rich body of research.

Moderators of positive effects	Teleworking formalization (formal vs. informal) Teleworking intensity or proportion Level of supervisory control Discussions and communication with family and friends about teleworking Physical arrangement of the home and technical and material support Organizational support and social support (manager, superior, colleagues)
Moderators of negative effects	Teleworking intensity (full-time vs. part-time home-based teleworking) Teleworking location (exclusively at home vs. dedicated professional spaces)

Table 3.1. *Moderating factors of teleworking effects in the professional field (Vayre 2019, p. 18)*

The effects of teleworking on productivity, and more broadly on individual performance (volume and quality of work), are generally recognized. On the other hand, the effects on well-being are not self-evident. They are subordinate to the organization of work, in particular to the employee’s initiative (choosing to telework) and the autonomy for managing the workload. Some remote workers can combine a better work–life balance with greater productivity, others may not.

Although abundant, the literature does not offer enough data to cover all the possible combinations between performance and well-being. Teleworking covers a large number of dimensions (workplaces, living time, technology, individual commitment, collective functioning, etc.) whose interactions are complex. Therefore, in most cases, only one aspect of the problem, only one dimension, is considered at once. While recognizing the significant contribution of one-dimensional research, and in order to avoid an overly global understanding of the phenomenon, it would seem appropriate to reason on typical situations conducive to appropriate diagnoses and actions.

3.2. A questionnaire survey to gain further insight

After an analysis of the literature, our study was structured around a questionnaire survey. A few exploratory interviews were initially conducted to define the questionnaire items. The interviews with teleworkers focused on the characteristics and working context, the equipment and tools used, the quality of life at work, relationships with colleagues and supervisors and work–life balance. The interviews with HR managers focused on the company’s context and teleworking policy, the support provided to teleworkers and the teleworking tools offered by the firm.

3.2.1. The questionnaire and its administration

Data were collected during the third lockdown phase in France, between April 17, 2021 and May 31, 2021. The questionnaire was administered via the online survey site SurveyMonkey. Respondents were recruited on social networks via a page created on the Fondation nationale pour l’enseignement de la gestion des entreprises (FNEGE) website and through the IAE France contact list, a network of French business administration institutions. Ultimately, there was a total of 1,631 respondents. In terms of teleworking status during the week of the survey, our sample comprised persons who alternated between teleworking and face-to-face work (45%), persons who teleworked only (41%), persons who worked face-to-face (11%) and a very small minority of people who were not working on that week (3%).

The questionnaire was divided into five parts. The first part was related to the worker’s status (teleworking, on site or alternating between the two). A second part of the questionnaire concerned the perception of teleworking. It covered not only the individual’s perceptions of productivity and work–life balance, but also their

perception of the control exerted by their supervisors, or of what the people around them thought about their teleworking. The third part of the questionnaire examined the teleworking practice, in particular the use of videoconferencing tools, as well as company policies implemented to facilitate teleworking. The fourth part of the questionnaire concerned on-site work, more specifically, the commuting time and the way in which this travel time was recycled. Finally, the last part of the questionnaire aimed to collect information on the respondent's identity (gender, age, business segment, function and region). The entire questionnaire was available online.

In terms of representativeness, our set of respondents granted a balance between women (54.7% of respondents) and men (45.3%). All sectors, professions and age groups were represented.

It is nonetheless possible to highlight some differences between our sample and the active French population: our respondents were relatively younger than the active French population (84.7% of workers under 50 years old and 67.3% under 40 years old); the population had a higher qualification level; the proportion of managers was greater; and our respondents lived in the major employment areas, essentially in Île-de-France.

3.2.2. A first structuring of findings: descriptive statistics

3.2.2.1. A better work–life balance, despite a sometimes increased workload

Figure 3.1 shows the descriptive statistics for the first five statements: “People around me think I’m not really working when I’m teleworking”, “I can achieve a better work–life balance by teleworking,” “I answer more emails outside working hours while teleworking,” “I accept more tasks while teleworking” and “I am more focused while teleworking.”

We see that a majority of respondents tend to disagree with the first statement, while a majority tend to agree with having a better work–life balance and answering more emails outside working hours. A small majority was seemingly better focused while teleworking, as well as willing to accept more tasks, even if more than a quarter of respondents declared neither agreeing nor disagreeing with these two statements. Despite the impression of responding to more emails outside working hours and a perception that the scope of tasks was relatively unchanged or had increased, the majority of respondents reported having a better work–life balance.

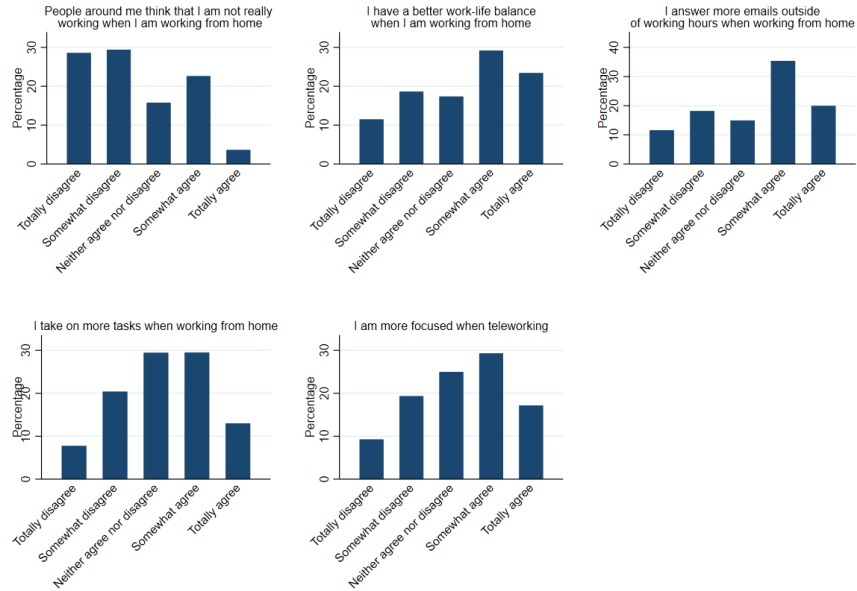


Figure 3.1. Part one of the questionnaire: “Do you agree or disagree with the following statements?”

3.2.2.2. Unchanged or increased workload, with mixed consequences on productivity

Figure 3.2 shows the descriptive statistics for the statements relating to changes in productivity, workload, working day length, hierarchical supervision and communication within the organization. Regarding productivity, workload and the working day length, a majority of respondents considered them to be unchanged or higher when teleworking. In terms of supervision, over 60% of respondents considered it to be unchanged when teleworking. Only communication with colleagues and management seemed to be affected by teleworking, with a majority of respondents considering it to be “lower” (less fluent) or “much lower” (far less fluent) when teleworking.

To sum up, despite a perceived unchanged or relatively higher workload, and unchanged or relatively higher working hours, productivity remained unchanged or was relatively higher.

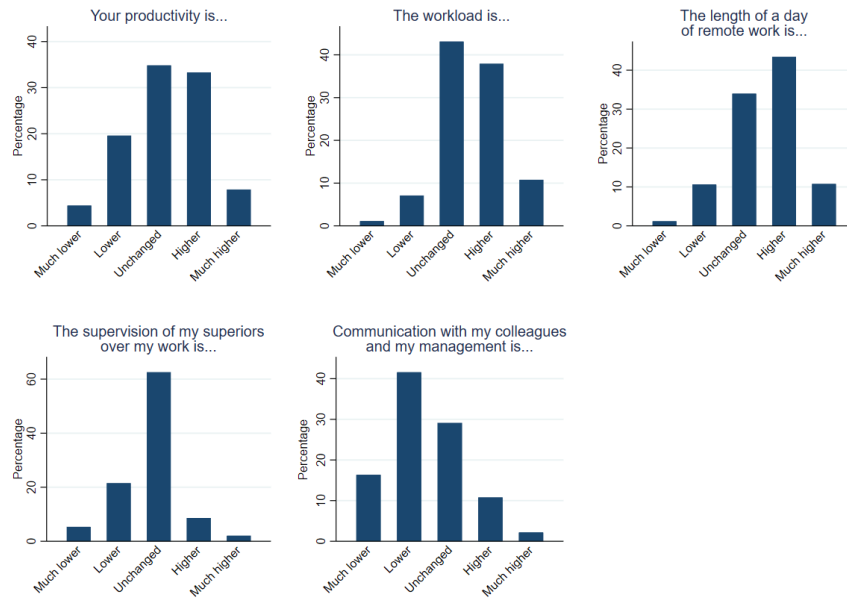


Figure 3.2. Part two of the questionnaire: “Would you say that when teleworking in the current situation, compared to the situation before the pandemic...?”

3.2.3. A deeper analysis: a classification into four groups

Our goal was to identify typical situations, which is why we resorted to a classification based on the dimensions of factor analysis. The ten active variables used for factor analysis concern the individuals’ perception of their well-being and their performance while teleworking (see section 3.6).

The first dimension that emerged from the analysis was centered on workload, contrasting individuals with a higher workload while teleworking (much longer duration of teleworking day, much higher workload while teleworking, etc.) to those with a lower workload while teleworking (shorter duration of teleworking day, lower workload, etc.).

The second dimension focused on productivity and time management, contrasting individuals who felt more productive and therefore achieved a better work–life balance while teleworking (much higher productivity, better concentration while teleworking) to those feeling less productive and having a poorer work–life balance while teleworking (lower productivity, less concentration while teleworking).

Finally, the third dimension focused on self-preservation in terms of work-related demands, contrasting individuals who succeeded in protecting themselves while teleworking (not accepting more tasks, not responding to more emails outside working hours) to those for whom teleworking meant accepting more tasks, working more frequently outside working hours, leading to a poorer work–life balance.

We were thus able to identify four groups of individuals with homogeneous perceptions of their well-being and their productivity while teleworking.

3.2.3.1. The indifferent (499 individuals or 32.7% of the sample)

The first class was made up of individuals who perceived little difference between face-to-face work and teleworking. More specifically, more of them (45% of the class vs. 43% of the overall sample) believed that their workload was “unchanged,” that the length of a teleworking day was the same as a day spent working face-to-face (36% of the class vs. 34% of the overall sample) and that their productivity was “unchanged” (37% of the class vs. 35% of the overall sample). As regards relationships with colleagues, they more frequently believed that communication with colleagues and management remained “unchanged” while teleworking (31% of the class vs. 29% of the overall sample), as was the case with supervision by their manager (64% of the class vs. 62% of the overall sample). Individuals in this class could therefore be described as “indifferent”, in the sense that they seemed to be little impacted by the situation (teleworking or face-to-face).

3.2.3.2. The productively adapted individuals (207 individuals or 13.56% of the sample)

The second class was made up of individuals who teleworked more, and believed that they gained in work–life balance when they teleworked. More specifically, many of them considered their workload to be “higher” (42% of the class vs. 38% of the overall sample) and that their teleworking day was more demanding (“higher” or much more demanding (“much higher”) than a face-to-face working day (57% of the class vs. 54% of the overall sample). At the same time, they were also more likely to “rather agree” or “strongly agree” with the statement “I can achieve a better work/life balance” while teleworking (56% of the class vs. 53% of the overall sample). Still, they were also more likely to consider that their productivity remained “unchanged” (36% of the class vs. 35% of the overall sample). One possible interpretation is that individuals in this class spent more time commuting than the overall sample, but the average time spent commuting in a face-to-face work situation was practically the same for all classes (average of approximately one hour per day).

Another remarkable element is that more of them reported being more focused while teleworking (“rather agree” and “strongly agree”: 52% of the class vs. 46% of

the overall sample), which enabled them to do more work without too much harm to their work–life balance. Individuals in this class could therefore be described as “productively adapted”, in the sense that they managed a higher workload and still found their balance while teleworking.

3.2.3.3. The efficient (571 individuals or 37.42% of the sample)

The third class was made up of individuals who felt they had a higher workload while teleworking, but who managed to maintain their work–life balance thanks to greater productivity. Most of them reported accepting more tasks while teleworking (46% of the class vs. 42% of the sample), and that their workload was “very high” or “much higher” while teleworking (50% of the class vs. 49% of the overall sample). On the other hand, their distribution regarding their work–life balance was globally the same as in the overall sample. This can be explained by the fact that they reported being more productive while teleworking (“higher” or “much higher” productivity): 44% of the class versus 41% of the overall sample. They were also more likely to consider themselves more focused while teleworking (“rather agree” or “strongly agree”: 49% of the class vs. 46% of the overall sample). Individuals in this class could therefore be described as “efficient”, in the sense that they managed a higher workload, but with higher productivity, which enabled them to maintain a work–life balance identical to the rest of the sample.

3.2.3.4. The less productively adapted (249 individuals or 16.32% of the sample)

Finally, members of the fourth class declared having lower productivity while teleworking (“lower” or “much lower” when teleworking: 29% of the class vs. 24% of the overall sample). However, they were also more numerous to declare that their workload remained unchanged (45% of the class vs. 43% of the overall sample), even if they did not accept more teleworking tasks (“I accept more teleworking tasks... Strongly disagree/Disagree”: 31% of the class vs. 28% of the sample). Finally, they also believed that their work–life balance was neither better nor worse while teleworking (“neither agree nor disagree”: 20% of the class vs. 17% of the overall sample) and that their work–life balance was not better while teleworking, even if their workload remained unchanged. Individuals in this class can therefore be described as the “less productively adapted”, insofar as they managed a lower workload but with lower productivity, which reduced the difference between teleworking and face-to-face situations in terms of work–life balance.

3.2.3.5. A distribution little influenced by sociodemographic variables

Perceptions of well-being and productivity while teleworking did not notoriously vary by gender, function, business segment or region. The only significant sociodemographic variable was age. The under-30s were over-represented in classes

three (best productivity) and four (worst productivity). On the other hand, the other classes were distributed more unequivocally: 30–39 year olds were over-represented among the individuals who drew a productivity gain from teleworking, 40–49 year olds among the individuals who perceived little difference between the two situations and 60 year olds+ among those who calculated working more from home.

Finally, quite surprisingly, the ideal frequency of teleworking did not vary so much from class to class. The most popular frequencies were two days (32%) and three days (30%); and the least popular were five days (7%) and 0 days (9%); one day and four days received 12% and 10% of the votes respectively.

3.3. Two major lessons

The analysis of teleworking reveals contrasting lessons, far from preconceived ideas about its effects. The first section emphasizes the fact that the transformations induced by teleworking are often more limited than expected. Contrary to some studies that insist on the positive or negative impact of teleworking, our findings show that a non-negligible portion of workers fail to perceive any notable changes, either in terms of productivity or work–life balance. The second section stresses that the perception of teleworking cannot easily be confined within classic demographic segmentations. Age, gender or function are not determining factors in the experience of teleworking, which calls into question certain traditional approaches to human resources and invites the adoption of typologies more adapted to the realities observed.

3.3.1. *Teleworking: a situation leading to smaller changes than expected*

In view of our findings, teleworking does not appear to be a truly negative factor for workers. A third of respondents did not perceive any determining change in their situation with regard to our two criteria (class one). This contradicts part of the existing literature on the subject which focuses mainly on the changes induced by teleworking, these being positive (Vayre 2019) or negative (Bentley et al. 2016), without focusing on situations where teleworking does not involve significant transformations (Mello 2007). What is more, teleworking does not seem to affect the work–life balance of the majority of respondents: none of the four classes really stood out due to a poor work–life balance, even when an increase in workload was felt (classes two and three). Descriptive statistics showed that the vast majority of respondents (70%) either agreed (or strongly agreed) with the idea that they could achieve a better work–life balance while teleworking (53%), or neither agreed nor

disagreed (17%) with such an idea, throwing light on situations in which teleworking does not significantly impact work–life balance. Still, 30% of respondents believed that teleworking harmed their work–life balance, but these were distributed across different classes and did not embody a separate category.

To sum up, the hypothesis according to which teleworking promotes convergence between increased productivity and improved well-being (Beauregard and Henry 2009) is far from proven. The different classes actually reveal a variety of situations and relationships between work–life balance and, more generally, well-being and productivity. Class four, for example, features lower productivity but unchanged balance, while class three features higher productivity but little impact on the work/life balance. The alleged positive association between teleworking and employee performance is therefore not supported.

Descriptive statistics also showed that only 24% of teleworkers believed that their productivity was lower while teleworking than face-to-face. The modality that received the greatest number of endorsements was “unchanged” productivity (35%). Two further points of discussion with the pre-existing literature regarding changes induced by teleworking can be mentioned. First of all, the vast majority of teleworkers (62%) believe that manager supervision remained unchanged while teleworking. This contradicts many studies that focus on changes in supervision related to teleworking (Taskin and Raone 2014), and shows that, in situations where teleworking is widespread, supervision is perceived by the majority as unchanged. Finally, the main point on which teleworking seems to have harmful effects is communication with colleagues and supervisors: 58% of respondents believed it was much lower or lower while teleworking than face-to-face, which corroborates previous studies stressing a form of isolation among teleworkers (Vayre 2019).

3.3.2. Perception of teleworking contrary to the usual demographic segmentations

While teleworking can produce overload effects, as noted by Grant et al. (2013), this was not true for our entire sample. These effects specifically affected the “productively adapted” and the “efficient” (less than 51% of the sample) and did not result in negative consequences for their well-being. The effects of teleworking must therefore be considered cautiously and in a differentiated manner, without prejudging negative effects.

As our typology shows, the perception of teleworking partially escaped the segmentations used in our questionnaire, which are also those generally used by

human resources departments. Our research thus challenges some preconceived ideas. In particular, gender and function do not introduce statistically significant differences. In our study, age did not appear to be a truly discriminating variable either. The under-39s were over-represented among the “efficient”; but we also noted an over-representation of those under-30 among the “less productively adapted”. For the under-30s, a proportion of whom were young recruits starting their first job, we can hypothesize with Taskin (2010) that despatialization represented a limitation to organizational socialization and that, by reducing exchanges with peers and hierarchy – as our findings showed – the youngest ones may have experienced negative effects on individual productivity.

We should also note that the segmentations usually used in surveys similar to the one we conducted ultimately prove to be of little relevance in differentiating perceptions of teleworking. We would like the categories used in our approach to reflect situated experiences and serve as a guide to action. This typology could prove even more useful and is therefore subject to further investigation. These reflections echo the concerns of the sociology of classifications resulting from more socially oriented research (Desrosières and Thévenot 1988).

3.4. Guidance elements

From a managerial perspective, this study makes several useful contributions. In particular, it shows that the link among teleworking, productivity and well-being is neither obvious nor uniform. It is expressed differently depending on individual situations. Our study identified four typical situations characterized by a specific link among teleworking, productivity and well-being.

These findings invite companies and managers to diagnose and identify typical situations present in their teams in order to think of solutions adapted to individual situations. In line with the findings of our survey, the idea is to base this diagnosis on the perceptions of employees who have teleworked. This constitutes actual “feedback”, and not an opinion on a hypothetical situation.

3.4.1. Prioritizing diagnosis

The first step seems to be to identify the different individual situations within the team and to associate them with the afore-mentioned four typical situations. To this end, companies will be able to offer employees a self-assessment tool. We suggest the framework in Table 3.2.

3.4.1.1. A self-administered questionnaire

The questionnaire was organized according to a five-point scale with two modalities: agreement (“strongly disagree”, “rather disagree”, “neither agree nor disagree”, “rather agree”, “strongly agree”) and intensity (“much lower”, “lower”, “unchanged”, “higher”, “much higher”). It aims to prepare the distribution of individuals into the four classes of our typology.

Instructions

We ask you to respond as spontaneously as possible to the following questionnaire which describes your teleworking experience. There are no right or wrong answers.

Questions	Response methods
People around me think I am not really working when I am teleworking.	Strongly disagree, [...], Strongly agree
I can achieve a better work–life balance by teleworking.	Strongly disagree, [...], Strongly agree
I answer more emails outside working hours while teleworking.	Strongly disagree, [...], Strongly agree
I accept more tasks while teleworking.	Strongly disagree, [...], Strongly agree
I am more focused while teleworking.	Strongly disagree, [...], Strongly agree
My productivity is...	Much lower, [...], Much higher
The workload is...	Much lower, [...], Much higher
A teleworking day length is...	Much lower (much shorter), [...], Much higher (much longer)
The supervision of my work is...	Much lower (much looser), [...], Much higher (much tighter)
Communication with my colleagues and supervisors is...	Much lower (far less fluent) [...], Much higher (far more fluent)

Table 3.2. Questionnaire for establishing individual diagnosis

3.4.1.2. Assigning individuals to one of four types

Based on the questionnaire’s findings, individuals can be assigned to classes according to Table 3.3.

Typical situations	Characteristics
Class one ("indifferent")	Unchanged workload while teleworking, teleworking day length identical to a face-to-face working day, unchanged productivity while teleworking, unchanged communication with colleagues and supervisors, unchanged manager supervision while teleworking.
Class two ("productively adapted")	Higher workload and longer working day while teleworking, but better work–life balance and unchanged productivity while teleworking, feeling of being more focused while teleworking.
Class three ("efficient")	Accepting more tasks while teleworking, higher workload while teleworking, as well as higher productivity and feeling of being more focused when teleworking.
Class four ("less productively adapted")	Lower productivity while teleworking, unchanged workload, does not accept more teleworking tasks, unchanged work–life balance.

Table 3.3. Grid for associating individuals with typical situations

3.4.2. Differentiated practical implications

This classification invites adapted approaches depending on the different profiles.

Class one probably does not require any particular action, considering that for these individuals teleworking does not differ so much from face-to-face work. Classes two to four, on the other hand, require specific measures.

For the "productively adapted" (class two), it is important to make sure that this does not become a transitional situation, after which employees find themselves suffering from overload, ultimately detrimental to their health and their efficiency. These employees take on a higher workload and report longer working days when teleworking, which in the long term could harm their health and balance.

For the "efficient" ones (class three), a qualitative study could show whether their situation is due to a few good practices, which could be replicated, or to other characteristics related to objective causes (quality of technological equipment, distance from the company, etc.), to interactional factors (type of supervisor leadership, quality of cooperation with colleagues, etc.) or to individual traits (skills, autonomy, motivations for teleworking, etc.). As with class two, it would be necessary to ensure that this favorable situation is not temporary and does not deteriorate, turning into a work overload scenario.

As for the “less productively adapted” (class four), the deterioration of their productivity clearly requires additional attention. The role of management is essential here. It is fundamental to understand what causes this degradation, which could not only be related to teleworking conditions, but also to a feeling of isolation or a loss of a sense of belonging, for example.

Our findings also showed the importance of communication in teleworking situations, particularly with colleagues, and the fact that teleworking is likely to become a permanent modality over time, with employees favoring a hybrid approach to work. This ultimately invites companies to accept teleworking as a working method that is part of employees’ daily lives, and as such, to implement policies to ensure that good teleworking conditions are maintained.

3.5. Conclusion

The aim of the study was to analyze the perceived effects of teleworking on the relationship between employee productivity and well-being through the use of a questionnaire survey. The survey findings suggest that teleworking, considered as a whole, is neither an element destabilizing the work–life balance nor a form of organization significantly affecting performance. These findings complement the results from other surveys, such as the one conducted in 2020, under comparable conditions by a team of psychologists from the University of Liège (Babic et al. 2021).

However, we assumed a diversity of situations at the interface of these two variables, which was confirmed and helped to reveal the complexity of this relationship. Our findings also show that the link between teleworking and productivity is far from simple and that we would be a mistake to see this mode of work organization as a source of definite advantages for the company. Finally, the two dimensions that emerge from our findings reveal different categories of teleworkers.

Despite the contributions made, caution is called for when using the results of this study. In addition to the classic limitations inherent in questionnaire surveys, we must admit other methodological limitations, specific to our study. First, the characteristics of our sample limit the transferability of the lessons learned. In fact, it was qualified staff who completed the questionnaire. Furthermore, the study was conducted during a period of confinement. Teleworking was amply widespread at that period, which could have affected the perception of teleworking: the experience of teleworking is not actually identical when teleworking is shared by others (colleagues, managers, in particular) or when, on the contrary, the teleworker’s team mainly works face-to-face. Secondly, the questionnaire did not include any

questions about the number of children. We can certainly imagine differences in the reception of teleworking depending on family responsibilities. Babic et al. (2021, p. 20) identified childcare guilt and associated fatigue as stressful situations. Finally, to advance our understanding of the phenomena studied, a qualitative study would undoubtedly be appropriate. The aforementioned limitations open up exciting avenues for future research.

3.6. References

- Babic, A., Leclercq, C., Miesse, F., Hansez, I. (2021). Confinement lié à la crise sanitaire Covid 19 : impact du télétravail contraint sur le bien-être et la performance. In *Les incidences psycho-sociales et socio-organisationnelles de la crise sanitaire COVID*, Bobillier Chaumon, M.E., Gangloff, B., Gilbert, P., Vonthron, A.-M. (eds). L'Harmattan, Paris, 13–26.
- Beauregard, T.A. (2011). Corporate work–life balance initiatives: Use and effectiveness. In *Creating Balance? International Perspectives on the Work–Life Integration of Professionals*, Kaiser, S., Ringlstetter, M.J., Pina e Cunha, M. (eds). Springer, Berlin/Heidelberg, 193–208.
- Beauregard, T.A. and Henry, L.C. (2009). Making the link between work–life balance practices and organizational performance. *Human Resource Management Review*, 19(1), 9–22.
- Bentley, T.A., Teo, S.T.T., McLeod, L., Tan, F., Bosua, R., Gloet, M. (2016). The role of organisational support in teleworker wellbeing: A socio-technical systems approach. *Applied Ergonomics*, 52, 207–215.
- Bloom, N., Liang, J., Roberts, J., Ying, Z.J. (2015). Does working from home work? Evidence from a Chinese experiment. *The Quarterly Journal of Economics*, 130(1), 165–218.
- Canivenc, S. and Cahier, M.-L. (2021). *Le travail à distance dessine-t-il le futur du travail ?* Presses des Mines, Paris.
- Choudhury, P., Koo, W.W., Li, X. (2020). Working (from home) during a crisis: Online social contributions by workers during the coronavirus shock. *Harvard Business School Technology & Operations Mgt*, 20–96.
- DARES (2021). Activité et conditions d'emploi de la main-d'œuvre pendant la crise sanitaire Covid-19 en décembre 2020. Flash Survey, ACEMO.
- Desrosières, A. and Thévenot, L. (1988). *Les catégories socioprofessionnelles*, 5th edition. La Découverte, Paris.
- Grant, C.A., Wallace, L.M., Spurgeon, P.C. (2013). An exploration of the psychological factors affecting remote e-worker's job effectiveness, well-being and work–life balance. *Employee Relations*, 35, 527–546.

- Hallépée, S. and Mauroux, A. (2019). Quels sont les salariés concernés par le télétravail ? Direction de l'animation de la recherche, des études et des statistiques. *Analyses*, 51, 1–11.
- INRS (2020). Télétravail. Quels risques ? Quelles pistes de prévention ? ED 6384.
- Kim, T., Mullins, L.B., Yoon, T. (2021). Supervision of telework: A key to organizational performance. *The American Review of Public Administration*, 51(4), 263–277.
- Kun, A.L., Sadun, R., Shaer, O., Teodorovitz, T. (2020). Where did the commute time go? *Harvard Business Review*, December.
- Kurkland, B. and Bailey, D.E. (1999). Telework: The advantage and challenge of working here, there, anywhere, and anytime. *Organizational Dynamics*, 28(2), 53–68.
- Mathieu, P., Habib, N., Soulie, J., Fiessinger, C. (2020). Les perceptions du télétravail chez Michelin : quels enseignements dans le contexte de la pandémie ? *RIMHE*, 3(3), 79–96.
- Mello, J.A. (2007). Managing telework programs effectively. *Employee Responsibilities and Rights Journal*, 19(4), 247–261.
- Neeley, T. (2021). *Remote Work Revolution*. Harper Collins, New York.
- Scaillerez, A. and Tremblay, D.G. (2016). Le télétravail, comme nouveau mode de régulation de la flexibilisation et de l'organisation du travail : analyse et impact du cadre légal européen et nord-américain. *Revue de l'organisation responsable*, 11(1), 21–31.
- Solís, M. (2017). Moderators of telework effects on the work–family conflict and on worker performance. *European Journal of Management and Business Economics*, 26(1), 21–34.
- Steinle, W.J. (1988). Telework: Opening remarks on an open debate. In *Telework: Present Situation and Future Development of a New Form of Work Organization*, Korte, W.B., Robinson, S., Steinle, W.J. (eds). Elsevier, Paris.
- Taskin, L. and Raone, J. (2014). Flexibilité et disciplinarisation : repenser le contrôle en situation de distanciation. *Économies et Sociétés*, 3(1), 35–69.
- Taskin, L. and Tremblay, D.-G. (2010). Comment gérer des télétravailleurs ? *Gestion*, 35(1), 88–96.
- Tremblay, D.-G. and Le Bot, I. (2001). Le télétravail : articuler qualité de vie et performance. Research Report, CEFRIQ, Quebec.
- Vayre, E. (2019). Les incidences du télétravail sur le travailleur dans les domaines professionnel, familial et social. *Le travail humain*, 82(1), 1–39.

The Socio-organizational Conditions for Innovation: The Israeli Experience

The analysis developed 20 years ago on the conditions that foster innovation in different territories is still relevant:

The comparative analysis of high-tech clusters shows that they all share some socio-organizational ingredients necessary to increase the chances of emergence (Picq 2003, p.15).

Since then, it has been widely adopted by public authorities in several countries, which have attempted to proactively incorporate these conditions into their industrial policies, echoing the example of French and Belgian competitiveness clusters.

Despite this now shared knowledge, innovation management and talent management still throw uneven results. One country in particular stands out, both for the singularity of its history and the strength of its technological innovation: Israel, which likes to describe itself as a start-up nation. This country was the subject of a *Learning Expedition* organized by CIME Innovation in 2022 for approximately 15 company representatives, with the aim of understanding the quality and quantity of factors explaining this dynamic. A remarkable observation struck them: while the Israeli case did not reveal any new principle at the service of innovation, it was impressive in its systematic and radical application of every known innovation factor.

In this chapter, we aim to summarize these factors and examine to what extent they can inspire French companies in their quest for innovation management and talent management. Rarely are comparisons justified, and there is no intention here

Chapter written by Christian DEFÉLIX, Martine LE BOULAIRE and Thierry PICQ.

to advocate the application to France of what is happening in Israel. But the feedback from this country can, in our opinion, be instructive on a company-wide scale, helping to review practices in this area in a critical and perhaps new way.

In the first part, we take a look at Israel's unique case in terms of innovation and talent management, before proposing, in a second part, the avenues and inspirations that an organization can draw from it. The third part offers companies a summary of the answers they can come up with in their own context.

4.1. Israel, the unique case of a country managing innovation and talent

Israel is a country that came into being in the 20th century (1947). Born in dramatic geostrategic and geopolitical conditions, it has experienced numerous conflicts with its neighbors since its creation, who dispute its very existence. Its very recent and troubled history has left its mark on the mindset of Israel's population, giving it a very specific way of communicating, working, looking to the future and embracing innovation. While Israel and its approach to innovation may constitute a case inviting further analysis, it is not an entirely transposable model for other countries seeking inspiration in this field.

4.1.1. Non-transferable characteristics

A few demographic traits immediately characterize Israel: this country has a population of nearly 9 million inhabitants, 6% of whom are over 60 (compared to 20% in France), over an area the size of a French department. It is therefore a young country concentrated in a modest-sized territory.

Compared to a country such as France, which has 67 million inhabitants, Israel is a country strongly oriented towards business creation and innovation: 7,000 highly specialized start-ups (*innovation is bubbling from start-ups*) in 2022, or one start-up for every 1,300 inhabitants, whereas France has 15,000 start-ups, that is, one start-up for every 4,500 inhabitants. For companies, being listed on the Nasdaq (technology stock exchange) is a condition for accessing the markets.

4.1.1.1. Multiple sociocultural factors

A first sociocultural factor that enters into Israel's equation is the great diversity of origins and cultures in a country built entirely on immigration, comprising over 70 different nationalities. The Israeli ecosystem benefited a lot from the influx of highly skilled immigrants from the former Soviet Union (1 million since the 1990s). They allegedly enabled the rapid development of high-tech activities such as cybersecurity. Innovation specialists such as Inbal Arieli, director of an innovation

consulting firm, attribute Israeli success in technology to the fact that the country is primarily a nation of immigrants, who saw entrepreneurship as a lever for integration.

In addition, Israel boasts an ecosystem of multiple actors organized to actively support innovation: a network of 22 incubators and 78 accelerators; approximately 100 venture capital funds (70 of which are Israeli), as well as almost 300 R&D centers set up by major global groups (Microsoft, IBM, Intel, Google, Apple, Cisco, Samsung, etc.); nine world-class universities, including three ranked in the top three for innovation (Technion in Haifa, the Hebrew University of Jerusalem, Tel Aviv University); and a highly structuring role for the army, which exposes youngsters to the acquisition of soft skills. The army has its own innovation system, Unit 8200. It is a Tsahal (Israel Defense Forces, IDF) intelligence unit responsible for signal intelligence and code breaking. It is considered one of Israel's elite army units, and promotes the creation of start-ups which are then transferable to the private sector (such as Waze).

The importance of the role of the army in skills development should be highlighted (military service lasts three years for men and two years for women). The army analyzes the potential of each individual and offers them an educational and professional path. Education focuses on the development of soft skills such as leadership, creativity and the ability to adapt in a permanent context of uncertainty and geopolitical unpredictability.

Added to this are other factors: a technological investment policy strongly supported by the government, based on the definition of an industrial policy and international funding (particularly American); the capacity of the country's human resources to change activity regularly (at present, on average, every three years), which leads to a high turnover in the workforce, as well as to a rapid skill renewal; and an education system based on the principle that *failure is a must-have step*: failure is not a mistake, but a positive and even necessary element.

4.1.1.2. *A high-tech-friendly ecosystem*

The country's capacity for innovation was born 50 years ago in fields as diverse as IT, telecommunications, agriculture and water technology, stemming from the country's need to find solutions to the challenges posed by its geostrategic position and a territory devoid of natural resources. Building on this capacity, Israel is today the leader in innovation in the automotive industry, fintech and military technologies; innovation is not intended for the domestic market (too small), but for global markets.

This capacity for innovation also relies on sustained R&D investment from the private sector, particularly venture capital (\$25 billion in 2021 from the USA, India,

etc.), and on the strong attractiveness that technology start-ups exert on large global groups (430 large global groups are present in Israel), who invest in them with a view to purchase (Waze by Google, Mobileye by Intel, etc.). The share devoted by the Israeli state to investment in R&D is approximately 4.5% of GDP, far exceeding many Western countries (in comparison, France devoted 2.2% of its GDP to it in 2022).

Finally, Israel is ranked second in the global cybersecurity industry, which already accounts for 20% of global sales. Declared a national priority by the government (predominantly in the fight against terrorism), the development of this industry relies on a network of 530 local companies working with some 20 global groups who have set up R&D centers there (Paypal, GE, Cisco, Lockheed Martin, etc.). In 2022, cybersecurity accounted for 50,000 jobs in Israel. Still, the high-tech job market is very tense: out of a working population of 4 million, and even when the sector uses 400,000 workers, there are still 15,000 unfilled positions.

4.1.1.3. *Conditions for success*

According to the various interviewees we came across during our learning trip, the main ingredients for Israeli success in innovation are based on:

- values such as commitment, creativity and flexibility integrated into the culture of a country which, since its creation, must constantly know how to adapt to the hazards it encounters, especially on the geopolitical level;
- the extreme diversity of the population and its culture;
- the need for innovation, simply because the country's survival depends on it. Working under pressure, in a disrupted and threatening world, develops a taste and know-how for finding immediate solutions to improve a situation and respond to repeated challenges.

4.1.2. *Lessons for innovation management and human resources management*

The analysis of innovation management methods, as presented to us, enabled us to identify several factors boosting its development.

4.1.2.1. *The need for an ecosystem encouraging innovation*

Innovation needs a favorable ecosystem that can nourish it. The concept of an ecosystem aims to bring together different stakeholders (universities, businesses, research centers, start-ups, etc.) with a view to generating interactions favorable to the pooling of ideas and resources. The challenge is to cultivate innovation or to foster its emergence, its development, the synergies between different actors, in a

dynamic which, on the one hand, accelerates its emergence process, and, on the other hand, contributes to its sustainability. In the case of Israel, the ecosystem can pre-exist or be constructed. Israel's ecosystem is the fruit of a high level of cultural diversity, individual accountability and out-of-the-box thinking, as well as strong cooperation between the public and private sectors, high-level educational infrastructure and a solid capacity to invest in innovation.

Two territorial ecosystems caught our attention: Kinneret Innovation Center (KIC) in the Jordan Valley in the north of the country, and the Innovation District of Beersheva in the Negev desert in the south.

As an example of the entrepreneurial spirit deeply rooted in Israel's DNA, the Kinneret Innovation Center chose to locate far from Tel Aviv ("the" city of start-ups in Israel), in a rural and rather poor region on the shores of Lake Tiberias. Promoting an innovation mindset in rural areas or traditional workshops has been a challenge, based on the principle: *innovation is a necessity*. For the region around KIC, innovation is the only way to protect and create jobs, bringing together the region's inhabitants so that they collaborate to improve their economic and social situation, creating multiple connections, sharing knowledge and finding new ideas. Not only does this innovation ecosystem influence agriculture, water and sustainable development, it also establishes bonds between universities and industrial and farming communities, enabling start-ups and key actors in companies in the sector to develop cutting-edge technological solutions. The process includes:

- a series of courses on entrepreneurship for youngsters (12–16 years old) in 20 schools with excursions to meet farmers, factories, kibbutzim, start-ups, etc. Although the course contents vary, they are entirely built around three criteria: impact of the action undertaken (principles derived from the army's values and methods, for whom innovation must be considered when it has an impact on action); project scale and financial return;
- start-up accelerators and incubators focusing on innovation for the region (currently 32 start-ups);
- workshops (approximately 100), whose performance KIC helps improve by leading them to connect and learn from one another, sharing best practices;
- a venture capital scheme from Israel, including from the regional kibbutz and abroad;
- a knowledge creation and management process in which students, start-ups and retired farmers work together on specific projects, combining new and traditional knowledge. In addition, KIC helps foreign companies in the agricultural sector to discover and benefit from its ecosystem, by proposing fresh ideas or solving specific

problems, mainly in the agricultural field, as was the case with Kubota, Orbia and Seetree;

- a KIC scheme which also relies on innovation leaders: an *innovation leader* is chosen from among the employees in KIC companies because they display a clear innovative attitude and mindset during meetings and their daily work and are passionate about embracing an innovative approach; they can come from any company department or level;

- an innovation leader will identify internal and external ideas with innovation potential, and develop them until they reach the suitable level of maturity to be implemented. Support for innovation leaders includes training schemes that help them to understand and develop the ecosystem and visiting and working with entrepreneurs, factories, kibbutzim, start-ups, etc. In addition, to help them succeed, they are sponsored and protected by senior company executives.

The Innovation District of Beersheva in Israel's southern Negev desert is more deliberate in its approach. Aware of the need to invest massively in the field of cybersecurity to ensure the country's protection against various forms of attacks, the Israeli government created from scratch a scientific and technical center declared "cybersecurity capital" in 2012, in an arid desert in the south of the country devoid of any resources.

By 2022, this "cyber innovation community", bringing together the innovation laboratories of global and Israeli companies (EY, Oracle, Rafael, etc.), universities, start-ups and the main innovation labs of the Israeli army, had already generated a turnover of \$8 billion. The hub's operations were organized around knowledge exchange platforms for start-ups, entrepreneurship programs, networking and professional meetings, as well as collaborative and leadership skills development programs. With a population of 1 million inhabitants in 2022, Beersheva concentrated a third of the country's unicorns (start-ups valued at least \$1 billion) and 3,000 employees in high technology, attracting nearly 41% of cybersecurity investments. The government's goal, which aims to double the country's population by 2048, is to make it a center of demographic growth and an opportunity for significant decentralization of technological innovation activities previously concentrated around Tel Aviv, which alone accounts for a third of jobs in the high-tech sector.

4.1.2.2. *A need for appropriate attitudes, values and methods*

In the Israeli world of innovation, creating a favorable human environment is considered a prerequisite for any technological innovation process.

According to the innovation specialists we met at Technion University in Haifa, innovation is not linear: it is made up of multiple feedback loops. It requires breaking down the organization's silos and fully grasping the way it works.

Professor Schlomo Maital, who teaches innovation management at the prestigious Samuel Naeman Institute, has been conducting research on this subject at this world-class university for many years, and suggests a series of observations for firms looking to innovate (Box 4.1).

– Comfort kills innovation, as does task division. In this sense, Israel is more of a failure nation than a start-up nation, because its model favors not only experimenting with innovation, but also making mistakes. Encouraging your most creative employees to leave benefits the ecosystem. The founder of RAD (a global Israeli communications network solutions company) often tells its employees: “pay attention to what is happening around us, because it may be a place where you could develop other ideas than here”.

– “The wolf will dwell with the lamb” (Isaiah 11:6). In this Bible prophecy, the wolf is the symbol of creativity and chaos, while the lamb symbolizes discipline and management. Companies must be able to distinguish between these two types of individuals, who are in constant conflict: “discoverers” and “developers”, because separating these activities and profiles is one of the paths to innovation. Creativity is the enemy of discipline and procedures. The Israelis are mostly wolves (therefore discoverers) and sell their brains (start-ups) to the United States.

– Rediscovering lost creativity: many workers develop creative activities outside of their work. We must focus on the transferability of these skills acquired elsewhere, which is essential for the company. It starts with proper knowledge of ourselves.

– Unless used, creativity is a concept that wears out. Very high at the age of 5, the child has lost 70% of it by the age of 10, because school kills creativity. By adulthood, an individual has retained at most 2% of their creativity, which makes innovation capabilities difficult to develop.

– Innovation is like a kindergarten: it develops in laughter and pleasure. Creatives need this atmosphere to rediscover their childlike soul.

– Innovation blooms when the windows are open and we look for our ideas elsewhere (serendipity).

– Finally, in the field of innovation management, technology comes last! In Israel, even when they stem from the initial education process, soft skills such as boldness, out-of-the-box thinking, critical and reflective thinking, risk-taking and autonomy or leadership can be developed in the company through renewed learning methods (mentoring, pairs, learning workshops, etc.).

Box 4.1. Some innovation management principles, according to Technion

To establish these principles on a foundation ready to accept them, critical thinking and autonomy should be cultivated from an early age. See the example in Box 4.2 which shows two distinct visions of education: one based on control and protection, and the other on learning through experience and guided discovery.

The approach is illustrated in a comparison proposed by Inbal Arieli, a former member of Unit 8200 and now head of an innovation consulting firm. Comparing two photos of kindergartens taken somewhere in Europe and Israel, the speaker points out that in the first situation, there is at least an apparent physical order in the arrangement of objects available to children; the speaker particularly focuses on the presence of numerous prohibition signs aimed at children and their caregivers (such as climbing upside down on a slide, climbing trees, bringing in unauthorized objects, etc.). The second photo shows a situation close to chaos (*balagan* in Hebrew), where used car tires sit alongside huge cooking pots and a whole series of objects that are unusual in such a place.

In fact, this apparent chaos is built on a pedagogical approach intended to help toddlers develop several abilities: carrying out real activities using genuine resources from their environment, without providing them with instructions; thinking for themselves and realizing that they do not live in a laboratory that protects them from the outside world; as well as cooperating to find solutions.

Box 4.2. *Balagan in kindergarten!*

This is part of the construction of Israeli culture, which is both centered on the individual and has a strong sense of community and group, as summarized in the expression: *There is an I in we*.

The principles of *Chutzpah* (which means insolence) are also omnipresent throughout society – audacity, critical thinking, questioning the obvious and received ideas – and are a specific way of communicating and acting which involves entering into a relationship with one’s interlocutor in a very direct, and sometimes harsh, way.

The Kibbutz Industries Association is an illustration of the Israeli culture of *Tacheles* (the importance of practice) and *Chutzpah* (committing to achieving results by accepting mistakes and learning from failure), which encourages finding concrete solutions to challenges, even when they seem impossible to overcome (Box 4.3).

The Kibbutz Industries Association, founded in 1962 by the Manufacturers Association of Israel, brings together over 272 industrial production companies, cooperatives and regional companies, scattered throughout the country (especially in the frontier areas).

Kibbutz Industries supports these companies to promote their acceleration in different fields – export, innovation, management – and also acts as a representative of this network with public and economic institutions. While 90% of start-ups are located in Tel Aviv, the association offers 100 “tier B” start-ups scattered outside Tel Aviv and sometimes isolated in rural areas the opportunity to be supported in a favorable ecosystem. The total revenue of these start-ups reached \$14 billion in 2021, all sectors included (commercial, food, defense, etc.).

The association develops and leads a community in which start-ups, universities, technological institutes and municipalities collaborate. The goal is to create innovative technologies for sustainable development, in order to improve manufacturing processes, reduce carbon footprints, develop innovation and promote the circular economy.

Coworking spaces are made available to start-ups to develop their projects with support from the association, in the community spirit of the Kibbutz. *Makers hackathon for Sustainability* events were organized, including amidst the Covid-19 pandemic, bringing together and connecting approximately 80 start-ups and companies from remote regions so that they could share knowledge and risks during their development, introduce themselves and find lasting partnerships to continue with their projects. The tool proved to be an important lever for game-based learning, training local actors to seize disruptive innovation opportunities (like pig farming!) in 3,000 fully digitalized farms. The managerial culture of the “roundtable” helps to encourage innovation. Everyone has the same right to speak. The youth (fresh minds) and the outsiders are invited by companies to engage in reflections around innovation.

Solutions have been found, and significant progress has been made in areas such as agro-technology, including improved recycling, reduced plastic use, and artificial intelligence-based livestock management per head (a technology already widely exported), and advanced drip irrigation technology to address water shortages in desert areas. This “desert tech” approach is also being proposed in cooperation with other desert regions such as Jordan, which is changing the game compared to traditional approaches.

Box 4.3. Kibbutz Industries Association and the practice of Chutzpah and Tacheles

4.1.2.3. Management and talent detection principles

The consequence of what we have just described can be observed in business, where we must prioritize the actors’ freedom of expression rather than best practices which say little about the quality of innovation. In a company such as Sentra, the president states his beliefs about the role and conduct of management in order to achieve performance (Box 4.4).

Founded in October 2021 in the field of Cloud-based cybersecurity with a disruptive approach and an international vocation, Sentra was founded by Asaf Kochan, ex-general and former head of Unit 8200, together with three comrades from the same unit.

Although product development is done in Israel, the company's market is mainly American. The average age of the staff is 30. The president of Sentra focuses on the management principles, which he uses with well-known concepts, but ones that were actually implemented in his previous military roles and which inspire his practices in his new company. According to him, creative teams are most often multicultural and innovation can only be born from diversity: diversity of cultures, personalities and skills.

Working with a sense of urgency and strong ambitions (such as wanting to become leader in your field) on specific innovation challenges is a condition that help develop the skills and expertise needed to provide concrete and immediate solutions to the problems at hand. The power of collaboration and sharing, as opposed to withholding information and isolation, is established within the company as an imperative managers must adhere to when leading their teams; this involves creating spaces where employees can express themselves and even criticize management's projects without taboos; the rule in force is that anything can be criticized as long as the criticism is constructive, in other words, accompanied by counter-proposals that are useful to the firm.

Asaf Kochan emphasizes that he himself does not hold the truth and that he sometimes discusses his doubts and weaknesses with his team. The manager emphasizes the need for intellectual exchange and human contact, including in the world of high technology: "more than just the tools, it is very important to bring people together". How? By using post-project debriefing; by developing mentoring; by enriching employees' knowledge through contributions outside their strictly professional sphere (conferences, meet-ups, etc.); and finally, by developing learning when the person needs it (on-the-job learning). Asked about the main roles of the leader in management, he insists on the fact that the practice of military command is a great opportunity to understand the dynamics of human management. This explains the importance of narrative (or storytelling) in the projects that managers propose to their teams: knowing where we are going together, why and how we are getting there is a prerequisite for developing team spirit, cohesion and commitment. Employee development, coaching, mentoring and training, as well as the ability to offer real professional challenges, also play an essential role for the manager. According to him, and regardless of the business segment, the manager must first know how to create and maintain a "healthy" environment within the company, that is, give employees the right means, the right environment and the right infrastructure to succeed in creating and maintaining a dynamic encouraging progress.

A good manager must also be able to challenge their employees regarding their glass ceiling (the barrier they feel in their work that prevents them from progressing) and their pain points or unresolved issues. According to Asaf Kochan, the question of remuneration and its fair level should only arise once all these aspects have been addressed by management.

Finally, when asked about the expectations of the younger generations at work, Asaf Kochan replied that in his opinion, the new generation of talents primarily needs role models, that is, people in the company who serve as inspiration; managers are well placed to play this role or identify actors in their environment who are likely to play it. They also need autonomy and trust and to be truly “appreciated” by their local manager. On a final note, nothing is impossible: there is no impossible challenge, only individuals or managers who do not accept such challenges.

Box 4.4. *Sentra: the power of collaboration and sharing*

As practiced in Israel, the aforementioned has very specific consequences on talent management. This comprises different aspects that concern society and business. Potential detection is a practice that begins at school from the age of 12 and continues until compulsory military service, which concerns both girls and boys (three years for boys, two years for girls). For Israeli society, the army plays a highly structuring role, setting up a process to assess potential over several days. It begins by enlisting young conscripts (17–18 years old) who have not yet embarked on an educational path nor determined their professional orientation. This is based not only on personality criteria (such as the ability to cooperate, work in a team, resist stress, develop resilience to failure) but also on intellectual and cognitive abilities, particularly in scientific fields (learning quickly: see one, do one, teach one). The approach is based on the assumption that “while everyone has potential, this does not necessarily lead to becoming talent”.

This process begins by offering every individual the chance of an educational and professional path. The next step is to identify those with high potential (on average 19% of a cohort of 150,000 young people) and very high potential (1%), who will be given the opportunity to pursue scientific studies. These studies are generally funded by the military to feed the pipeline of highly qualified scientific and technical staff that the country needs to maintain the innovation effort. The orientation process also takes into account gender diversity and impaired populations such as those with Asperger’s syndrome, which the army strives to integrate into its information system-related jobs.

This approach may seem very deterministic and elitist in its very purpose. But the Israelis interviewed are keen to stress that, lacking natural resources, the country must cultivate the only “capital” it possesses: the men and women living in the country. They must therefore assume the energy devoted to the maintenance and development of human capital while avoiding any “waste” of resources, as illustrated by a comparison Israelis often like to make with water management. In Israel, water is scarce and must be used wisely, which is why every drop of water is used twice: water treatment technology places the country among the most innovative nations.

The potential detection system also focuses on *late bloomers*, namely potentials that take time to blossom due to maturity reasons and which also need to be taken into consideration. Assessment sessions are organized for them later in the identification process. All of these detection processes aim to ensure that individuals possess or are capable of acquiring the “skills of the future” for Israeli society, skills which are based on the *Chutzpah* principles: analytical and innovative thinking; ability to learn and implement learning strategies; creativity, originality and initiative; solving complex problems; leadership and social influence; ideation; emotional intelligence; the ability to synthesize and evaluate situations; and critical thinking.

4.2. Tips and inspiration for businesses

Contingency factors applicable to the case of Israel are numerous, mainly owing to history and geopolitics. We will not make any mechanical transpositions here, but we propose to let ourselves be inspired by this unique experience. We believe that companies seeking innovation can benefit to a greater or lesser extent from the practices observed, both in terms of improving their innovation management and examining or enhancing their talent management practices.

4.2.1. Inspiration to better manage innovation

In light of Israel’s case, we believe that the relationship with time, storytelling and propitious environments are three sources of inspiration to consider in a company committed to an innovation policy. To demonstrate the relevance of this source of inspiration in concrete situations, we give some examples relating to French experiences.

4.2.1.1. *The relationship with time: using the sense of urgency with moderation*

The history of Israel, a state born less than 80 years ago and constantly facing geopolitical tensions, is very particular. The population is accustomed to this specific context and culturally accepts the tension and pressure resulting from it. It can be assumed that the ensuing sense of urgency, in this case at a very high level, directly leads to a significant deployment of technical and human resources to develop defensive or offensive solutions. Here, we find an old lesson on innovation. Far from being stifled by constraints, it develops all the more when there are obstacles: “in darkness, the imagination works more actively than in full light”, as Kant once put it.

Symmetrically, the experience of putting innovation dynamics into practice and the relentless pursuit of productivity have also revealed their limitations.

Organizational theory has long advocated for the rehabilitation of organizational *slack*, that is, the excess or superfluous elements in an organization: excess resources contribute to flexibility and innovation (Cyert and March 1963; David 2012). In a context characterized by a shortage of labor and a call for more sustainable management practices (Galindo 2021), management is increasingly aware of the need to avoid the excesses of total and permanent pressure.

Used to managing crises and states of emergency, even Israel experiences sequences of less criticality and respite. In that sense, innovation can greatly benefit from the Israeli experience and its fine-tuned management of time pressure, alternating more and less demanding periods.

A former microelectronics start-up, Toptek grew rapidly after exploiting a patent and early innovation in the processing of silicon wafers for the semiconductor industry. In ten years, its fast-paced growth made it evolve from an SME to a mid-sized company, with increasingly strong internal structuring and productivity imperatives. Approximately 15 years after its creation, it has nonetheless identified the limitations of this race for size and productivity. In order to revitalize innovation, it has acknowledged the need to place part of its workforce in an internal incubator scheme, with targets, but less time pressure.

Box 4.5. French example: Toptek
(source: Defélix et al. 2015)

4.2.1.2. *Storytelling: telling a new story*

Storytelling is constantly present: the long history of a people and a territory, the parable of the wolf who will dwell with the lamb, a start-up's success story, the narrative of what is to come with the expected doubling of the population within 20 years, etc. This resonates with the crossed links between innovation and storytelling that business circles and researchers have already pointed out (Chouteau et al. 2022).

The case of Israel invites us not to stick to one story or another, but to renew it permanently, and even to situate bifurcations within the same narrative, as in the case of the Kinneret Innovation Center, which has marked a "turning point" by establishing itself far from Tel Aviv. While we must certainly continue to stimulate and pace innovation through storytelling, we must also know how to bounce back from this narrative and tell a new story.

CROS is a company specializing in the sale, rental and maintenance of equipment for industry, communities and the building trade, using 65 workers near Grenoble. It is a family-run business, currently chaired and managed by two brothers who represent its seventh generation. The company dates back to 1785 and was originally a tannery; it was in 1953 that its first shift towards the compressor concession business took place. The family-owned company's narrative has been enriched and renewed since 2010, when management made a lasting turnaround in its style. This resulted in a renewal of internal decision-making methods, a shift towards products for use, and an expansion of ownership to employees outside the family. The company is now showcasing this story both on its website and its buildings, and is gearing up for a major renewal on the occasion of the 70th anniversary of the compressor business launch.

Box 4.6. *French example: CROS, a long-established company that tells the story of its forks in the road*

4.2.1.3. *Propitious environments for innovation: broadening contexts and schemes*

With the Innovation District of Beersheva in the Negev Desert, Israel, wishing to invest massively in the field of cybersecurity, created a scientific and technical center from scratch. This was declared “capital of cybersecurity” in 2012, set amid an arid desert in the south of the country devoid of any resources. This astounding reality calls into question our often fixed representations of contexts and schemes propitious for innovation; it invites us not to exclusively bet on a priori favorable contexts and entities, and not only to place our expectations in established schemes such as clusters, competitiveness clusters or innovation third places (Suire 2013). While there is always a need to encourage and welcome emerging innovation, there is also a need to induce, plan and manage new and bold locations and schemes. Ecosystems are shifting from the business stage to the “innovation” stage thanks to a diversity of actors and movements, and in particular middleground (Cohendet et al. 2021) which constitutes an open, heterogeneous and connecting space, where individuals can free themselves from constraints to explore new possibilities and stimulate innovation from the ingredients at hand: physical and virtual spaces, autonomy and trust, knowledge circulation.

Created in 1997 in Lyon Gerland, Ninkasi is a craft beer factory, as well as a network of bar restaurants located in the Auvergne-Rhône-Alpes region. For 20 years, it has sought to build “an ecosystem that resembles us and become a regenerative company”. To achieve this, it relies on ten ambassadors representing the company's various professions and departments. Diversity, proximity and conviviality are the key words of in-house or franchised breweries developing creativity to enhance the supply and the animation methods.

Box 4.7. *French example: the Ninkasi ecosystem*

4.2.2. Avenues to consider for better talent management

In the unique case of Israel, innovation management is inseparable from a certain conception of the talents on which the start-up nation must rely, and from a set of practices that are both cultural and managerial.

Without intending a systematic transposition, which would be in vain, we believe that there is scope to inspire talent management policies in companies facing the challenge of innovation, or even reinvention. This experience invites us to encourage diversity beyond recruitment, to diversify forms of learning and to bring back a festive spirit at the workplace.

4.2.2.1. Encouraging diversity beyond recruitment

There is no need to recall the central role of diversity in the factors favoring innovation. The Israeli nation and companies seem to have systematized this principle by resorting not only to a diversity of profiles, but also by taking into account neuronal diversity: “atypical talents” along the autism spectrum are identified and cherished. In France, some large companies have now begun to develop inclusive policies for these employees, but there is still a long road ahead to help managers to adapt their relationship to these collaborators (Martin et al. 2023).

The fact that diversity is identified and promoted in advance of corporate recruitment within the Israeli society also invites us to encourage diversity in areas other than recruitment. Schemes have already been put in place to “expose” employees to different and diversified profiles, and would benefit from developing further within our organizations: in addition to learning expeditions, we could consider project monitoring pairs, intergenerational mentorships or *shadow comex* (executive committees deliberately made up of younger, less experienced employees).

In his doctoral thesis on techno-creative innovation, Etienne Capron analyzes the conditions for the emergence of innovation combining artistic creation and the use of digital technologies. The thesis proposes the concept of “preferential circulation” to account for a collective innovation process, and is based on the case of video mapping, analyzed in Nantes and Montreal. It is the conjunction of three intermediation mechanisms (brokers, places, events) against a varied professional backdrop which forms a favorable structure for the blossoming of innovation communities in a given territory (Capron et al. 2021).

Box 4.8. French example: diversity at the service of techno-creative innovation

4.2.2.2. *Diversifying internal and external forms of learning*

The insistence of Israel's education system on the conditions and goals of apprenticeship from the earliest age, as well as the value placed on failure throughout this learning process, are of great interest to a country such as France. Truth be told, France still perpetuates the representation that any mistake along the way is to be avoided and has not finished with a certain kind of social reproduction. This discrepancy can be a source of inspiration in business, helping to diversify the forms of learning: on the one hand, by multiplying confrontations with the outside world (via, for example, the opportunity to lead projects in the ecosystem or with partners), and, on the other hand, by diversifying the very modes of learning. Learner workshops, co-development, individual or group coaching in work situations, and workshops using brick sets are all recent initiatives to be considered and multiplied.

How can knowledge be shared and developed across a global group such as Safran? The company traditionally uses knowledge management and has a network of knowledge managers, but not only that: the group has compiled a list of the 20 best practices in knowledge sharing (mentoring, tutoring) and translated them into off-the-shelf solutions that can be used by the business units. Safran has also invested in the field of social learning in order to connect knowledgeable people and learners in a very simple way. Furthermore, digital learning is expanding (100,000 hours available compared to 35,000 the previous year), and massive open online courses (MOOCs) are multiplying. All employees can freely consult the material offered by the company, part of which is designed directly by experts. Beyond that, Safran capitalizes on lessons drawn from neuroscience to ensure that training is as efficient as possible, prioritizes start-ups that develop technologies that facilitate learning and offer new educational formats, etc. In short, the initiatives taken are numerous and varied, but always implemented with a great concern for consistency.

Box 4.9. *French example: skills development at Safran*

4.3. Working on conditions propitiating innovation

The present chapter, taking the form of a trip report in Israel, a start-up nation, is rich in lessons on the conditions propitiating innovation and the deployment of talent towards this goal. It is not a question of copying and pasting practices from another cultural, political and economic context, but rather of calling into question our own practices, with the help of this "learning detour" in an inspiring and stimulating

environment. Rather than ready-made recipes, we offer readers a summary to inspire them to ask the right questions and come up with their own answers tailored to their context.

4.3.1. The conditions required for the emergence of innovation

Innovation cannot be prescribed or demanded: it is well known that the injunction “be innovative” causes more blockages than stimulation. The role of a business leader or manager who wishes to develop an innovative mindset and practices requires putting in place the conditions that will propitiate a favorable human dynamic.

Let us sum up the ingredients at play in the Israeli model:

- the diversity of the actors involved: universities and research centers, venture capital companies, large and small innovative companies, military units of excellence, strong public policy, a highly qualified workforce, a mix of nationalities and cultures by means of immigration;
- a large number of connections and interactions: employee rotation, skills mobility, porosity of boundaries among universities, incubators and venture capital, technological transfer from the army, exchange of information and experiences, working as a team in “commando” mode, cooperation, network operation, interchangeability;
- high density: density conveys the idea of concentration in a small area, which facilitates the exchange of information, meetings, interactions and mobility;
- high intensity: by intensity, we must understand the actors’ intrinsic motivation within a community of destiny, resulting not only from a context of permanent danger, constraints and risks but also a quest for identity and the creation of a common unifying project (becoming a nation amid a hostile context);
- an entrepreneurial mindset, cultivated since kindergarten through a significant emphasis on creativity, risk acceptance and the right to make mistakes. This mindset is built around a combination of skills and passion, which are socially valued;
- clear and targeted political orientations and strategic choices, which define long-term areas of excellence for everyone involved and are supported by funding and voluntary actions;
- a networked social structure: bonding during military service, highly developed interpersonal networks in a country where everyone knows each other, key role played by a global diaspora which opens access to international financing and markets.

4.3.2. Which management and HR management principles should be deployed to encourage emergence?

In our view, identifying the components that favor the emergence of innovation at a country's "macro"-level provides vast inspiration and food for thought for a company at the "micro"-level, and more specifically, at the management and the human resources management levels. When it comes to encouraging innovation, is there no fertile ground in terms of managerial and human management principles that could be cultivated at the core of organizations? How can we internally foster the spirit of innovation as found in Israel? Here, we propose a second level to our reading grid, which sets out certain management and HR management principles which stimulate the creation of an "Israel inside" dynamic:

- working in ecosystem mode: innovation develops within open systems bringing together different individuals, with strong and frequent interactions within networks and transversal work collectives which know how to cooperate;

- creating a sense of urgency (burning platform) to engage internal and external stakeholders around a meaningful and shared challenge, pressure being expressed at a stimulating level but without paralyzing;

- finely managing the relationship with time: the balance required for proactive behavior is found at the level of rhythm management, alternating between the short term and the long term, exploration and exploitation, innovation and productivity;

- building a unifying narrative: mobilize symbolic markers that punctuate the trajectory of a project that is meaningful for the company, drawing on its history, its past successes, its values and its emblematic figures and nourishing the energies to write the future chapters;

- promoting intra- and entrepreneurial behaviors, based on taking initiatives; questioning; accepting risk and error; developing accountability; engaging in simple, horizontal and direct communication (sometimes even without a filter); and encouraging alignment between "saying and doing";

- training in innovation methods and tools: obviously, the desired mindset and behaviors are all the more deployable when they are based on the mastery of methodologies specifically dedicated to innovation and which should be part of the fundamentals of training for all: ideation, design thinking, design fiction, innovation project management, etc.

Do the business leaders and managers of your organization act as "gardeners" to create this human soil from which the seeds of innovation can grow and flourish?

4.3.3. Ways to manage talent differently

Understanding the characteristics of an innovation ecosystem and establishing managerial and human principles propitious for its development: these are the first two levels of our reading grid. It is then necessary to translate these principles into concrete practices anchored in operational human resources and talent management systems. Below, we propose some courses of action, in light of observations made in Israeli companies:

- fostering diversity beyond recruitment. Sourcing the skills, experience and diverse profiles required by the organization, but above all engaging and expressing this potential wealth continuously, through practices and systems that create transversality (projects, pairings, mentoring, shadow comex, etc.);

- Detecting personal talent on an ongoing basis. It is impressive to see the talent detection and guidance system implemented at the youth level in Israel. In the company, taking a detailed interest in people beyond CVs and identifying expertise areas or sometimes unexpressed appetites can help us envision new functions, roles or organizational adjustments in which the added values of each person can be mobilized for the benefit of all;

- diversifying forms of learning. In some organizations, the discourse on recognition and valorization of errors is still often denied. In a world dominated by uncertainty, trial-and-error experimentation and the importance given to debriefings and feedback, peer-to-peer exchanges to encourage cross-learning, are concrete examples which, when repeated and valued, nurture a genuine collective learning culture;

- promoting nonlinear careers. Encouraging internal and even external mobilities to increase experiences and exchanges with different worlds and training employees in questioning and technical (acquisition of new skills) and mental agility (evolution of cognitive schemas and representations). The profiles of slashers (multi-activities) are also ways of bringing wealth from different environments;

- developing collective values through shared events. It is impressive to note the importance of collective work in Israeli companies, which stems from the “commando” teams of the military period. Solidarity, a sense of belonging and team spirit are at the heart of the success of projects and start-ups. The festive spirit (very present in Tel Aviv in particular, but which is also expressed in religious festivals) symbolizes the need to create shared moments, bearers of identity, of a sense of belonging in a hostile environment.

Dear reader, it is up to you to examine what concrete human resources practices exist in your firm – or could exist in the future – that follow these different leads, adapting them to the specificities of your own context.

4.4. References

- Allen, T.J. and Cohen, S. (1969). Information flow in R&D labs. *Administrative Science Quarterly*, 14, 12–19.
- Capron, E., Sagot-Duvouroux, D., Suire, R. (2021). Anatomy of a techno-creative community. The role of places and events in the emergence of videomapping in Nantes. *European Planning Studies*.
- Chouteau, M., Forest, J., Nguyen, C. (2022). Examen des liens croisés entre innovation et récit. *Artifact*, 16.
- Cohendet, P., Simon, L., Mehrouachi, C. (2021). From business ecosystems to ecosystems of innovation: The case of the video game industry in Montreal. *Industry and Innovation*, 28(8), 1046–1076.
- Cyert, R. and March, J. (1963). *A Behavioral Theory of the Firm*. Prentice Hall, Englewood Cliffs.
- David, G. (2012). Contribution à l'étude du slack organisationnel : le cas des dépenses d'investissements dans une grande entreprise industrielle. *Revue des sciences de gestion*, 2(254), 59–68.
- Defélix, C., Gosselin, A., Mazzilli, I. (2015). Articuler les politiques de GRH avec les stratégies d'innovation : des modèles à l'épreuve des faits. *Revue de gestion des ressources humaines*, 96, 60–72.
- Galindo, G. (2021). Et si la crise permettait à la GRH de devenir durable ? ESCP Impact Paper no. 2021-05-FR.
- Maital, S. and Seshadri, D.V.R. (2007). *Innovation Management: Strategies, Concepts and Tools for Growth and Profit*. Sage, New Delhi.
- Martin, V., Flanagan, T., Vogus, T., Chênevert, D. (2023). Sustainable employment depends on quality relationships between supervisors and their employees on the autism spectrum. *Disability and Rehabilitation*, 45(11), 1784–1795.
- Picq, T. (2003). Quelles sont les conditions RH propices à l'émergence d'innovations ? Réflexions à partir de l'analyse comparée de clusters de haute technologie. In *14th AGRH Congress*, Grenoble.
- Suire, R. (2013). Innovation, espaces de co-working et tiers-lieux : entre conformisme et créativité. Working Document, University of Rennes, Rennes.

PART 2

Organizational and Socio-material Dimensions of Innovation

Digital Technologies and Work Transformations

This chapter explores digital technologies, focusing on their widespread adoption and diversification leading up to generative artificial intelligence (GAI), which is currently a hot topic. Digital technologies, or digital tools – terms we use interchangeably – are the result of intentional innovation processes and include technological advances, some new, some recent and others older, which can be combined. The latest innovations (such as classical AI, generative AI, Cloud computing, Big Data, Blockchain and augmented reality) are becoming increasingly significant, fueling the rapid expansion of more traditional digital tools such as the Internet, email, smartphones, connected tablets, social networks, instant messaging, video conferencing, collaborative platforms and management software. The presence and influence of these tools are strong and continually growing, both in our personal and professional lives, blurring the boundaries between them.

Regarding work organizations, the adoption of digital tools at the workplace and the digital transformation of organizations have become major strategic developments over the past decade (Vial 2019). It is important to remember that digital tools, primarily technological innovations – at least when they were first developed – are now used to support, facilitate and enable change within organizations and their business models. Organizations are undergoing profound transformations, relying on digital technologies to drive more systemic innovations that redefine their structure, working methods, value propositions and ways they capture value.

The spread of digital tools – more numerous and sophisticated than ever – affects all organizations regardless of their field of activity or technological sector, status

Chapter written by Lise GASTALDI and Amandine PASCAL.

(public, private), size (start-ups, small and medium enterprises, mid-cap companies, multinational firms) or economic model (commercial, non-commercial). Whether it is an international bank, a car manufacturer, a construction SME or a public university, each experiences different realities in how they use digital tools – such as types, applications and integration into broader transformation projects. Nonetheless, all these organizations are increasingly adopting digital tools, which continue to evolve.

Within these organizations, various professions are engaged in intertwined trajectories and processes of dissemination and appropriation of digital tools and transformation of activities in terms of content, organizational methods and working conditions. While departments and teams responsible for information systems management are often at the forefront, digitalization also changes working methods in production, sales and marketing, supply chain management and purchasing, research and development (R&D), engineering, and in finance, accounting, management control and human resources. Although this list is not exhaustive – since the professions within an organization vary depending on its nature, activity and size – all are affected by increasing, and sometimes new, uses of digital tools, which populate organizations and transform work activities.

This chapter aims to explore the interactions between digital technologies and work activities, considering the diversity of both and seeking to understand these interactions in their complexity and context. These are the three main principles guiding our research. The first is to focus on work, not just employment, as many reports, studies and public statements try to predict the number of jobs that will be eliminated or replaced by digital technologies in a certain or likely way. Besides the approximate nature of these forecasts and estimates, which can cause anxiety and are often overly detailed, these macroeconomic analyses, presented as unavoidable, offer no basis for managerial or organizational action. Organizations have many responsibilities during transformation processes, and to act with full awareness, it is essential to analyze from a microeconomic or social perspective, focusing on work activities.

The second principle we embrace in this chapter focuses on the digital tools presently used, both in recent and emerging ways, as well as in more traditional and established manners. The empirical foundation of studies examining interactions between digital technologies and work in context is essential to prevent indulging in overly fanciful remarks, which can be tempting – especially concerning the most current and advanced technologies such as generative artificial intelligence. We will not venture into science fiction here, although such approaches can be valuable for strategic and technological foresight.

The third principle builds on the previous two, going further by aiming to understand how tools in use interact with diverse work activities, both in their variety and within the context of their social–organizational and institutional frameworks. It appears that neither technological nor social determinism solely explains how digital tools spread and are adopted. The influences they have on work are not straightforward or exclusive; rather, many studies (Benedetto-Meyer and Boboc 2021; Gastaldi and Pascal 2022) reveal their ambivalence. This ambivalence mainly stems from the importance of context and the agency of actors. This theoretical view of the interactions between digital tools and work is supported by empirical research that examines work and the tools in real scenarios to understand how they function in specific contexts. Being attentive to concrete work situations, their unique features and the complexity of the arrangements they create is crucial to avoid making overly broad claims about the impact of digital technology on work. These impacts are part of a largely unpredictable interaction between work situations – encompassing organizational and professional logics, norms and institutional factors – and digital tools, which have highly variable characteristics that need careful consideration.

The chapter is divided into three sections. The first explains what digital tools are, providing benchmarks to understand their variety and how recent times have seen sophisticated technologies and a surge in data production, collection and use. Due to the widespread use of digital tools and rapid technological innovation, the second section explores how work activities may evolve in this context by examining the fields of production, maintenance, logistics and human resources management (hereafter called HRM). By looking at different professional and organizational fields, it highlights the diversity and complexity of interactions between work and digital technology. The third section shifts from analyzing changes in work to discussing how to support these transformations. These change processes – driven, enabled and supported by digital technologies – can destabilize individuals and work groups, skills and career paths with varying impacts. They may weaken and alter professional identities, the meaning of work, individual employability and the future of occupations. Therefore, it is essential to develop and implement strategies and actions to manage these shifts in work, guided by digital tools. Many stakeholders hold significant responsibility, given the challenges and risks associated with changes in work caused by increasingly rapid and unpredictable technological progress, which have uncertain effects on activities, professions, organizations and more. The conclusion will emphasize the many areas still to be explored by both practitioners involved in these dynamics and researchers studying them.

5.1. Digital technologies: reference points

Digital technologies are central to the significant changes in our modern societies and are driving a new revolution – that is comparable to the print revolution because it impacts “the way in which our societies produce, share and use knowledge” (Cardon 2019, p. 5).

As Boullier (2019) notes, this new revolution is unique in its impact across all areas, as digital technology uses algorithms to turn “any type of logical problem, operational question, or knowledge question into something that can be exploited in a material and technical way”. As a result, the digital is all-pervasive (Nambisan et al. 2017; Boullier 2019), significantly permeating all our activities, whether professional or personal.

We begin this section by defining some key elements. Then, we highlight some reference points regarding these digital technologies, which, although rooted in previous technological developments, continue to evolve constantly. Recent innovations are becoming more sophisticated, fueled by an unprecedented increase in data. In this first section, to better understand the variety and history of these tools, we aim to provide an overview of the main digital tools that influence work activities.

5.1.1. Digital technologies: a history

Although digitization began as early as the 1930s, it was the invention of the transistor in 1947 that truly accelerated digital technologies. By enabling the miniaturization of electronic devices, transistors allowed for the development of smaller and more powerful computers, leading to this technological revolution.

In the 1950s and 1960s, computers steadily gained popularity. Companies such as IBM created machines capable of performing complex calculations in seconds. This technological development laid the groundwork for digitalization, allowing firms to streamline their operations and automate many tasks.

The 1990s marked a turning point with the rise of the Internet, which enabled the global connection of devices. This breakthrough not only revolutionized communication and information exchange but also accelerated business investment in IT. Digitalization then became essential, providing new opportunities to optimize processes, improve customer relationships and innovate products and services. These digital technologies have become the source of innovations called digital innovations because they allow “the creation, adoption and exploitation of an

intrinsically unlimited value-added novelty (e.g. a product, service, process or business model) through the integration of digital technologies” (Hund et al. 2021).

Finally, it is worth noting that companies’ investments in digital technologies vary and do not always result in significant transformations. The literature identifies three stages of transformation related to digital technologies. The first – digitalization – involves companies digitizing internal and external document processes, but without this changing value-creating activities. In the second stage, companies apply digital technologies to optimize existing processes by enabling more efficient coordination between them and/or creating added value for customers through an improved user experience. Ultimately, digital transformation involves companies developing a new business model to generate and capture value through the use of digital technologies. Although not all companies have reached the same level of IT adoption, the Covid-19 crisis significantly accelerated their investment in these technologies to ensure business continuity and meet new demands for flexibility and efficiency amidst remote work and supply chain disruptions. Since then, digitalization has expanded on an unprecedented scale.

5.1.2. Constantly evolving technologies

As previously noted, the digitization of activities is not a recent trend; it originated in the 1980s and 1990s, with the widespread adoption of personal computers and local area networks, which enabled companies to initiate their computerization process. They invested in management information systems designed to automate certain functions of major departments such as human resources management, finance, accounting and production, and to assist with management tasks (notably with DSS, decision support systems) (Arena 2018). This initial wave of computerization was quickly followed by a desire to improve coordination and integration among all company stakeholders – suppliers, distributors and customers – through the increasing use of integrated management systems such as enterprise resource planning (ERP), then customer relationship management (CRM) and supply chain management (SCM).

At the same time, the rise of the Internet and network technologies created opportunities for greater collaboration within companies and with their stakeholders, emphasizing communication tools (such as emails or instant messaging apps) and collaboration methods (such as real-time co-editing tools, collaborative platforms and dashboards).

Although these tools remain widely used in companies, recent technological breakthroughs such as Cloud computing and the Internet of Things have facilitated the development of new applications and innovative uses. Inspired by the writings of

Ciarli et al. (2021), Figure 5.1 shows some of the key digital technologies and applications, their dates of emergence and the volume of data they generate (along with the traffic they produce across a network). These technologies range from data-driven (intangible technologies), such as management information systems or Cloud computing, to those that are physically tangible, such as robots and drones.

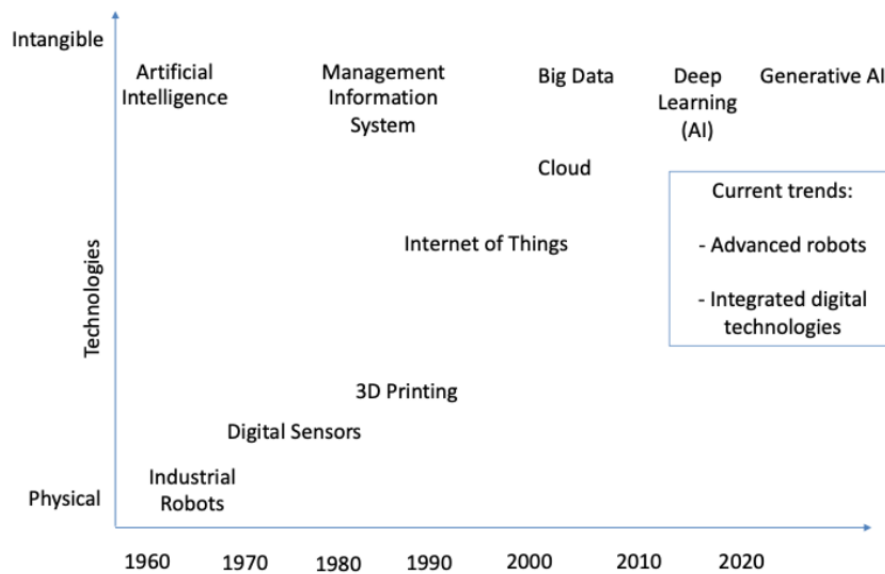


Figure 5.1. Evolution of digital technologies (Ciarli et al. 2021)

As Ciarli et al. (2021) have pointed out, the most data-intensive technologies are the fastest advancing (including the recent rise of generative AI) and enable other technological combinations: digital technologies themselves drive further innovation. An example is drones, whose capabilities have been enhanced by integrating AI, allowing these machines to process large amounts of data in real time, make decisions, and adapt to changing environments without direct human intervention.

We are living in an era defined by technological changes on an unprecedented scale, characterized by great diversity and swift dissemination. New technologies are emerging with capabilities once considered impossible, at least to the general public. Although unpredictable, these advancements occur so rapidly that it is difficult, if not impossible, to foresee all their effects. The disruptions they create greatly influence our societies, sometimes within just a few months (as seen with GAI, for example) and build upon existing tools. This acceleration brings significant

uncertainty, especially as it unfolds alongside other crises (climate, energy, geopolitics, etc.) that are equally sudden and unpredictable.

Finally, let us note that innovation does not always originate from technology itself, but from the changes it allows. Teleworking exemplifies an organizational (r)evolution made possible by existing technologies. What has transformed the world of work in this case is not the emergence of groundbreaking digital tools, but their increased accessibility and efficiency, along with their widespread adoption. Teleworking has shifted work away from the employer's premises, significantly changing proximity to colleagues, managers or partners. The health crisis played a key role in making this practice mainstream. Still, most employees use the same digital tools they had in the office. The breakthrough is more about the spread of teleworking and its structuring effects than about the technologies themselves.

This example shows how previously known technologies can, in a new context, lead to major changes and highlights the importance of carefully examining the mutual influence of digital technologies and work.

5.2. Analyzing changes in work in context through the prism of digital technologies

In this second section, we draw on empirical research conducted by management sciences and sociology of work scholars. These field-based surveys provide detailed, authentic insights into the complexity and uniqueness of work situations involving various digital technologies. The wide range of digital technologies, in both number and features, combined with the lack of determinism – whether technological or social – requires situated analyses, as making broad, generic claims about digital technology and work is neither meaningful nor consistent.

After examining professions in industry, maintenance and logistics (section 5.2.1), as well as human resources management (section 5.2.2), we draw some empirical and theoretical lessons from this exploration across these different professional and organizational worlds (section 5.2.3).

5.2.1. Professions in industry, maintenance and logistics

Although deploying digital tools in the industrial sector is not new, it has grown significantly and now relies on increasingly advanced technologies. Many terms and expressions are used to describe these deep transformations of industrial production units, where digital technologies are prioritized to maximize their technical potential and support rationalization efforts. There is such excitement about the industry of

the future, the Smart Factory, the fourth industrial revolution, factory or industry 4.0 (Nayernia et al. 2022), that progress and semantic inflation are inevitable, with much discussion about the concept of factory or industry 5.0. The industry of the future refers to “smart” factories where all processes and components are connected and integrated through instant communication devices, aiming to significantly improve efficiency and effectiveness. Not only is industry 4.0 systematically implemented in production, supply chain and logistics, but it also extends to quality and maintenance – also called 4.0¹. Technologies are rapidly evolving and consolidating, driven by manufacturers who design them and sell them to other companies when they do not develop them in-house. These include, but are not limited to, the Internet of Things (IoT), intelligent sensors that collect various data; interpret them and trigger autonomous, real-time actions; 3D vision for robots; virtual reality headsets for operators; cybersecurity systems; traceability tools; and more.

Beyond a strictly technocentric view, as some researchers suggest (Cicarelli et al. 2023), the term “factory 5.0” aims to highlight the design and management of industrial systems that support collaboration between humans and machines. Investments in cobots – collaborative robots – are part of this approach, which does not seek to replace humans with machines, at least not systematically, but to create processes where humans and cobots work together.

The variety of industrial jobs and their specific settings make it impossible to describe the changes in these environments with a simple or one-size-fits-all approach. Beyond what current robotic technologies can achieve, we see how companies make different trade-offs regarding the importance and role of humans versus machines in production processes. This is not about technological determinism; while some company leaders envision factories without humans, others aim to keep humans involved alongside increasingly advanced robots and “intelligent” machines.

To what extent does the power dynamic between workers and unions influence these decisions? They are concerned not only about the impact on work but also about the use of technologies capable of automating tasks, which could replace human labor with machines. These substitution effects evoke fears of job losses, even though the shift from operator roles to technician or engineer positions – people who design, supervise and maintain these technologies – only makes sense on a macroeconomic level. Even then, there are serious doubts about the balance between job destruction and the creation of new roles. On a micro-level, for individuals, these career changes would require significant ongoing training,

¹ It is interesting to see how industrial companies communicate and publicly present their digital transformation; see, for example, Arcelor Mittal’s *Digital Labs*. <https://france.arcelormittal.com/innovation/digitals-labs>.

long-term commitments and substantial financial investment. Even if organizations were willing to make this investment, it does not guarantee success in demanding, complex mid-career transitions nor the support of those affected. It is easy to understand why employees and trade unions cannot be satisfied with the idea of a certain (but still...) balance in employment now².

Regarding the impact of these digital technologies, especially the latest generation, on employment and work, we should highlight that their implementation in industrial companies is neither immediate nor uniform, varying from one company to another – particularly concerning the costs involved and the intentional or emerging uses of these technologies. For the factories involved, the workplace changes are significant. The term 4.0 then shifted from being about the factory itself to focusing on the operators, and the phrase “operators 4.0” became popular in France (Rayssac et al. 2024) and internationally (Ciccarelli et al. 2023). Research is examining how these technological shifts influence operators, considering how their work is transformed not only in terms of the physical and relational environments but also in its physical, cognitive and social aspects. Colin and Grasser (2023) explore how collaborative robotics challenge the organization of work in the factory of the future, particularly through the evolution of the prescription relationship. Rayssac et al. (2024), for their part, investigate the effects of these changes on the well-being of operators 4.0 at work. Additionally, the work of technicians, engineers and managers is being altered by the increasing presence of digital technologies, alongside the reorganization of work and changes in management and regulatory principles.

Recent PhD research in management sciences provides a detailed analysis of organizational contexts and work situations to better understand their diversity and complexity and the various effects that digital technologies have on work activities in these industrial environments. The reader may refer to Box 5.1, inspired by Pierre Quesson’s work (2024), and to Véronique Blanc-Brude’s work (2023) for a thorough examination of the profession of microelectronics production technician-operator within the framework of automation 4.0. In the company studied, which is relentlessly focused on profitability, automation has been pushed too far, with staff only intervening during flow disruptions, transforming work across its spatial, temporal, interpersonal and subjective dimensions.

² Doubts may also be expressed as to whether this process of “creative destruction”, to use Schumpeter’s famous expression (1942), is playing out at a global level, referring to horizons further afield than the national landscape. Indeed, we must question the existence of a geographical asymmetry between the areas where jobs are destroyed and those where jobs are created. This seems likely when we consider how certain countries – India, for example – offer both a skilled workforce in the fields of digital technologies and, in particular, wage costs that are much lower than those of Western countries.

Pierre Quesson's thesis focuses on the digital transformation of SNCF Réseau, the French railway infrastructure manager. The main goal of SNCF Réseau is to ensure the reliability of a complex and evolving railway infrastructure to meet the needs of passenger and freight transport companies. Its organization centers on the design, installation and maintenance of the network, while ensuring traffic safety and regularity. In response to institutional pressures and modernization challenges, SNCF Réseau launched its digital transformation in July 2018 with the *Nouvel'R* plan, "which aims to modernize the railway's infrastructure, structure, and organizational processes through a variety of new technologies to improve its historic industrial performance, while also gaining economic performance and enabling customers to have more trains available on the network".

Pierre Quesson examines careers in engineering (designing infrastructure components), operations (coordinating and managing rail traffic in contact with the transport client) and specifically maintenance (keeping infrastructure parts reliable for rail traffic). He offers a clear overview of these professions, the work of agents, and their perceptions and reactions to the increasing use of digital technologies. This analysis is supported by a year-long ethnography, along with 149 semi-structured interviews.

Regarding maintenance discussed in this section, Pierre Quesson describes a historically pyramidal organization, with centralized management in the Île-de-France region overseeing regionalized production through several hierarchical levels: regional departments, subregional units and maintenance sectors. Each sector combines different specialties that work directly on the railway infrastructure. The teams are managed by operations managers who plan the work, oversee its execution by agents and ensure monitoring and reporting to middle management. The agents carry out the activities and report to their operations managers. According to the author, this profession is built on two key pillars: a strong grounding in the field and a well-structured relational network, both among managers and agents, and between different specialties. These interactions support the coordination of operations and the sharing of skills, especially through the internal promotion of experienced agents into management roles.

At the time of analysis, maintenance relies on three "major digital programs": 1) a computerized maintenance management system (CMMS) provides tools for planning maintenance sites, managing material stocks and handling documentation of maintenance rules issued by engineering; this system should facilitate the implementation of predictive maintenance. 2) Digitizing procedures ensures the reliability, storage and traceability of documents necessary for the safe completion of work. 3) The "monitoring and supervision" component includes a range of remote monitoring and data collection tools for railway infrastructure, aimed at improving the understanding of infrastructure behavior – especially the aging of components – and generally allows for more accurate planning of maintenance activities through better detection of potential infrastructure issues.

Summarizing such a rich field study in a few sentences is challenging, but the main findings highlighted by the author regarding digital transformation focus on the profession becoming detached from the terrain and the introduction of mediations between its actors.

These changes weaken the strong interactions that existed before this “particular kind of sociality”. Pierre Quesson also shows that these significant shifts lead to strong emotional effects: 1) frustration when it feels impossible to perform the profession properly; 2) loss of purpose as the profession drifts away from its traditional role and its final form takes a long time to emerge; 3) anxiety about the eventual disappearance of the profession, even if this is not the company’s executives’ goal.

**Box 5.1. *The digital transformation of SNCF Réseau:
evolution of maintenance professions***

It becomes clear how digital innovations, their uses, their related goals and their impact on work are intertwined with managerial logics, models and ideologies. The objectives pursued by organizations that adopt digital technologies influence the socio-technical choices made, how they are conceptualized and how they are implemented. In worlds characterized by the historical divide – since the scientific management of work – between execution and design, it is not surprising that Cimini et al. (2020) lament the fact that operators are only minimally involved in decision-making processes, and their perspectives are insufficiently considered in organizational changes related to industry 4.0 technologies, which still impact them more than any other group. The negative effects on the relational environment can quickly become visible when we work with digital technologies and robots instead of human colleagues, leading to a loss of cohesion within the workgroup and a breakdown in social support, which is essential for preventing psychosocial risks (Johnson and Hall 1988).

In the field of logistics, David Gaborieau (2015, 2017) examines the effects of digital tools such as vocal picking on the work of order pickers, initially through an ethnographic study conducted during his sociology doctoral work in large retail warehouses. Using synthesized digital voice software to give instructions to operators with headsets and microphones, the latter confirm task completion one by one. These voice control devices direct and restrict operators in their tasks, which are broken into microtasks (“Aisle 13, Shelf B, Take box B13-25 and place it on the trolley”, “OK”, “Aisle 13, Shelf M...”, “OK”, etc.). Order pickers often feel isolated from their environment and other workers due to this constant dialogue with a digital supervisor, and they lose autonomy in performing their work.

Digital tools clearly promote a logic of rationalization and proceduralization of work, which allows for the extraction of workers’ know-how to better monitor the activity. They enable real-time tracking of actions and errors and are used to determine individualized productivity bonuses. While voice control technologies are not new – having been used for some time in these professions – in the current context – marked by economic crisis and intense international competition – they are acquiring a new significance. In fact, they are proving to be effective tools for

management policies aimed at increasing pressure on human activities, especially where these have not been replaced by automated systems and warehouse robots, some of which are fully autonomous.

Gaborieau explains how software prescribes work through algorithms that optimize movement in the warehouse, forcibly removing the workers' remaining leeway and reducing their autonomy to almost nothing. When working means simply obeying instructions without contributing anything of their own, there is no longer any reason to take pride in our work or to feel a sense of ownership. The author highlights the harmful effects of these managerial strategies, based on digital technologies, which increasingly deskill the work and turn it into routine tasks. Beyond the physical toll of terrible labor, the dehumanization of manual work also damages the mental health of individuals who are increasingly seen as or made to resemble robots (Gaborieau 2017)³.

5.2.2. Professions in human resources management

The HR function is important for several reasons. It supports all other organizational activities by providing human resources that meet their needs, both in terms of quantity (staff numbers) and quality (skills). The HR function must also focus on aligning needs and resources with a forward-looking approach, anticipating future changes in employment and work – especially concerning new digital tools – so they can prepare a workforce ready when needed. Therefore, the HR function is at the forefront of organizational efforts related to the evolution of work and the adaptation of workers, including their roles and skills (see section 5.3). At the same time, this function is undergoing digital transformation, as activities involving digital tools are changing the work of HR professionals in many ways.

All HR management areas are being affected by the increasing use of advanced tools, which have enabled the digitalization of staff management documents and HR procedures, as outlined in section 5.1.1. These tools provide greater reliability (compared to manual entries and re-entries, for example) and faster processing speeds (especially through remote validation and increased capacity). They facilitate easier access to HR data (such as via HR intranets and now also HR chatbots or conversational robots) and broaden their distribution at a lower cost. They support control and traceability, as well as integrated management by connecting tools and databases across various HR processes (recruitment, evaluation, time and leave

³ Some companies are still using exoskeleton-type devices, often still on an experimental basis, to reduce physical loads and strain and related musculoskeletal disorders. However, the INRS regularly warns of the risks that can arise from the use of this equipment (loss of balance, new awkward postures, heart problems, cognitive overload, etc.) and points out that the associated work reorganizations deserve to be studied in terms of their long-term impacts.

management, training, compensation, mobility, promotion, planning, departures, etc.). Although initially automating simple administrative tasks, today their scope is expanding towards more complex activities with higher added value – once believed to be solely the domain of human HR professionals. Tools such as Big Data enable providing detailed – and personalized – advice to employees on training and career development, as studied by Levy (2020) in his sociology thesis, which revealed resistance from HR professionals fearing replacement. Other digital tools aid HR decision-making – not (yet) by making decisions themselves but by analyzing and comparing candidates. Some tools also aim to enhance the “employee experience” or the “candidate experience” during recruitment, and improve the organization’s “employer brand”.

The following paragraphs specifically focus on the recruitment process. This is an interesting HR process to study because of the significant changes it has undergone over the past 20 years due to digital technologies. Four main phases of transformation in recruitment practices are generally identified, linked to the digital technologies that accompany them (Travers 2013; Black and Van Esch 2020). The first phase, known as analog recruitment, mainly involved manual and paper-based methods. Candidates had to search for vacancies in newspapers, trade magazines or company bulletin boards, and to apply, they had to physically visit the premises and collect and submit a paper application form. This recruitment approach greatly limited access to job postings and forced HR to choose between “reach” and “information richness”: a company could publish an ad in a national newspaper to maximize reach but with limited detail about the position. Alternatively, it could select a channel with more information (such as informal interviews through recommendations), though with a narrower scope.

In the 1990s, the rise of the Internet began to transform practices in recruitment 1.0. The digitization of job listings and platforms such as “Monster.com” enabled companies to publish online ads on a large scale and reach a wider audience. Candidates could now search for jobs instantly, filter them based on their own criteria and apply online, greatly reducing search costs and time. Recruitment 2.0 gradually took over, characterized by professional social networks such as LinkedIn, which facilitate direct contact between companies and candidates, and platforms such as Indeed that allow candidates to search for offers across multiple sites simultaneously without visiting each job board individually. Companies started posting their jobs directly on these platforms, reaching not only active candidates but also passive ones (those not actively seeking but open to opportunities). The advantages included improved matching quality through algorithms that analyze profiles and suggest relevant opportunities, access to expanded talent networks via professional connections and recommendations, and even lower costs compared to traditional methods – fewer recruitment fairs and reduced advertising expenses. However, this also introduced a new challenge:

managing the large volume of applications and the task of sorting resumes. Recently, recruitment has entered its 3.0 phase, driven by AI and machine learning, which are advancing recruitment processes towards further automation. Overall, AI impacts recruitment by triaging resumes and cover letters, using algorithms to analyze billions of data points from social networks and job boards to identify the best candidates, and using tools that evaluate candidates based on behavioral criteria and skills – cognitive tests and video interviews conducted by chatbot-like robots.

In short, digital tools have significantly transformed recruitment practices, driven by discourses promoting their ability to broaden access to talent, facilitate application management and enhance the connection between employers and candidates. The widespread adoption of standardized digital tools introduces a vision of an ideal, universal recruitment process and gradually leads to the standardization of practices. With the increase in digital traces and online documents, recruiters need to develop new skills to handle this vast amount of information and gain digital literacy (Corbillé et al. 2018). The challenge then becomes maintaining visibility on social media, both for candidates who must stand out from the crowd and for employers who manage their image online, often focusing on their employer brand. Recruitment now occurs in a broader digital space, which is complex and requires technical expertise, along with skills in strategy, sales, community management and even data science.

But beyond the rhetoric that advocates for more objective and less biased recruitment, these digital practices hide a less admirable reality. Digital recruitment also reduces candidates to numbers, as sourcing and automated assessment tools favor algorithmic matches based on structured data (keywords, scores, etc.) at the expense of a more qualitative assessment. Behind the necessary efforts to increase candidates' visibility, there is a race for reputation that benefits those who master digital codes, thereby reinforcing certain inequalities in access to opportunities (Bessy and Marchal 2006). Within the company, this same need for visibility is seen by employees as an obligation from the organization to self-promote digitally (Dumas 2018). While AI-based recruitment systems are often presented as a way to reduce discrimination by eliminating human biases, research indicates that the use of AI introduces new biases (Lacroux and Martin-Lacroux 2021): pre-existing biases linked to distorted data (such as when past data overvalues men over women), ongoing traditional recruitment biases and algorithmic biases or biases specific to the selection phase. In her work in management science, Agathe Fonsagrives examined HR software publishers and the work of algorithm designers used for recruitment. The author demonstrates that, beyond the stated discourse, the neutrality and objectivity of the matching between candidate and position performed by these tools are open to debate, as perceptions of match quality vary and evolve over time, especially due to interactions between designers and recruiters who use such tools (Fonsagrives 2025).

Finally, and without claiming to be exhaustive, we can also highlight the negative impact of the increasing use of automated tools, such as remote interviews, on considering the relational and subjective aspects essential to evaluating a candidate. The dehumanization of recruitment processes, like other areas of HRM, raises questions about the appropriateness of practices, not only in terms of decisions and pre-selection but also regarding social acceptability. When taken too far, dehumanization can alienate even younger generations, who are typically eager to adopt new technologies. This also affects recruiters' sense of purpose, as their role is diminished and their value is questioned.

Recruitment is just one example among many of HR processes transformed by new technologies, with no one – neither researchers interested in these professions, nor the teachers who provide training, nor the professionals practicing them – having a clear idea of how these careers might evolve in the medium term.

5.2.3. Lessons learned from exploring different professions

The earlier sections have taken us on a tour through different professional and organizational worlds, allowing us to reflect on the forms, diversity and challenges of work changes in light of the growing use of digital tools. Note that the professions discussed are not meant to be exhaustive⁴, and their selection was somewhat random. The large number of recent and influential studies on professions in industry, maintenance and logistics helped shape section 5.2.1, while our own interests as teachers and researchers led us to examine HR professions. These choices are not intended to be fully representative, especially since there is no clear “sense of history” within each profession, though we believe organizational contexts do influence how digital tools are used and how work is organized.

This is clearly the first lesson from this second part dedicated to analyzing, in context, changes in work through digital technologies: organization matters. The activity, sector, size, history and trajectory of the organization matter; they are not

⁴ We would have been able, if space permitted, to develop an analysis of the varied and ambivalent effects of digital technologies in the fields of innovation (R&D, industrial design, engineering) and creation (design, fashion, architecture, video games, culture, journalism, etc.). Marion Cina's work (2022) thus questioned to what extent, and under what conditions, digital tools can stimulate or hinder creativity in design activities. In terms of reception, some of the professionals concerned are very comfortable with technologies and have a strong appetite for novelty and experimentation (in R&D, for example, as noted by Quesson (2024)). On the other hand, certain activities seem very exposed to the risks of substitution by tools, in particular GAI which produces written content, images and sounds very easily, whereas for a long time, creative and intellectually intensive activities were thought to be out of reach and out of danger. The screenwriters' strike in the United States in 2023, which succeeded in imposing a framework for the use of AI, is emblematic here.

just a backdrop, such as a stage set, against which waves of technology with effects embedded in their DNA inevitably unfold. Let us emphasize: organization matters, and organization is about goals, ideologies and managerial practices. This view of the interactions between organization, work and technology moves us away from the idea that technologies impose their impact on work and its regulation modes unilaterally. Note that digital technologies are not uniform; some are very flexible or open in terms of their interpretation, design and use, while others are much more prescriptive, closed and almost coercive. However, given their role, it is crucial to include in the analysis of interactions between digital technologies and workplace changes other factors such as managerial intentions, the goals pursued by various organizational actors, power dynamics and symbolic dimensions. At the intersection of all these elements, which are dynamic and constantly evolving, lies the uniqueness of each organizational situation. It is important to understand the depth of these situations – beyond just a backdrop – in order to grasp what happens when digital technologies are used across different activities and professions, displacing traditional ways of work.

The procedural analysis of transformations related to digital technologies and work is also crucial. First, we should recognize that innovation paths and the spread of digital tools can vary widely in both speed and scale. The way these changes challenge work differs. Sometimes, the changes are so gradual and/or incremental that professionals may struggle to identify exactly what has shifted, due to fluid adoption that causes neither shock nor harm. Conversely, certain situations can feel like sudden, forceful invasions of digital tools into activities they undermine, professions they threaten, professionalism, autonomy and consistency, or even the very existence of these elements. The rapid or radical nature of these changes creates challenges for adaptation and adjustment, which can be destabilizing for the activities and the people involved.

Through empirical studies, including those mentioned here and others, it has become evident how digital technologies can alter the spatial and temporal aspects of work, as well as its material and relational environment, content, goals, modes of organization, regulation and even sense of purpose. These changes can range from minor to significant, often requiring adjustments to roles and skills – sometimes small, sometimes very substantial – for individuals, teams and professions involved. While the extent and nature of digital-driven work transformations vary, they are not neutral and demand serious consideration and attention from various stakeholders, mainly HR and management. The final section of this chapter addresses the challenge of supporting individuals and professional groups – whose work is being changed by digital technologies – calling for collective effort and responsibility in this area.

5.3. Supporting work transformations: a collective responsibility

Recognizing the need to support changes in the workplace and providing the necessary resources is crucial, especially when continuous innovations in digital technology challenge how we work and the nature of employment, bringing uncertainty, concern and risk.

The HR function is central to concerns about workplace changes related to the deployment of digital technologies. As shown in the professions examined in section 5.2, these technologies are likely to transform roles and professions, sometimes significantly, requiring changes in worker skills. They can result in a decrease in activities that are less strategic for the organization or are fully or partially automated, while increasing the importance of new roles and profiles. However, it is not always clear how to transfer employees internally from one activity to another.

Several challenges exist that impact the HR function, which aims to align human resources with the organization's evolving needs – such as staffing levels, qualifications, skills, roles and geographic locations – in order to support the organization's activities, strategy and performance. From an adequacy standpoint, HRM develops action plans utilizing various levers that are often combined based on strategic choices made by the organization: recruitment, training, mobility and career management, incentives, restructuring of positions and work organization, and more. However, their execution can be challenging, especially if it is not grounded in a forward-looking approach that aims to anticipate future developments in work, considering digital innovation trends and the organization's strategic directions.

Although it should generally be the focus of social dialogue, planning has nonetheless declined due to a lack of resources allocated by organizations for these efforts, with short-term thinking prevailing and difficulties in predicting changes in organizations, technologies, work and the broader environment. What was previously the responsibility of employers has now become a concern for workers, who seek to maintain their internal or external employability. However, a lack of foresight, insufficient resources dedicated to lifelong training and a conception of jobs that leaves little room for dynamic learning in the workplace create abrupt adjustment conditions for some employees, especially when technological changes lead to a devaluation of skills. Inequalities between individuals, even within the same profession, are growing, and some workers are falling behind. HR measures aimed at realigning the workforce with the needs arising from activity changes often involve poorly prepared retraining programs, forced transfers, layoffs – both individual and collective – as well as “sidelining” and loss of job substance. These

situations lead to a loss of purpose, the disintegration of professional identities and workgroups, and contribute to a rise in psychosocial risks in today's environment.

In short, HRM cannot be satisfied with a purely, and coldly, politically correct mission. Not only is the employer responsible for the health, including the mental health, of employees, but HR should also be at the forefront of this issue, even though its growing distance from the ground tends to minimize these challenges, which are more subtle as HR stays at a safe distance from the actual workplace, workers and their daily lives. The HR function must also focus on preserving the sense of purpose at work as it changes, and on employee engagement, which can be harmed in situations combining uncertainty and anxiety with adjustment measures that are sometimes sudden, potentially harsh, and not always well-supported.

Considering how technological advances impact organizations, workplace changes must address the anxiety these shifts cause among workers, especially since media coverage amplifies these concerns. Although this has been true for years, we are now observing a media frenzy around AI and GAI specifically. Echoing numerous reports, events and statements on this subject, the media either emphasize the incredible potential of new technologies or highlight the major risks for jobs, particularly for certain professions considered obsolete and likely to vanish in the short or medium term⁵. The tough economic climate, where each day brings news of restructuring and layoffs, certainly does not help, and ongoing and upcoming changes in work are occurring against an already tense backdrop.

Changes in the workplace and current challenges require a strong commitment from the HR function to adopt a broad, rather than purely instrumental, approach to supporting employees. The work mentioned in the second section highlights this, as does Blanc-Brude's work (2023) on HR's role in addressing work changes among production workers in microelectronics during the era of automation 4.0. However, the support employees depend on from HR professionals, which is vital and necessary, is being weakened by the diminished position of the HR function itself. This position is also impacted by the adoption of digital tools and doubts about the future of HRM professions. This dual stance of HR professionals – both as actors

⁵ We wrote these lines during the Third Summit for Action on Artificial Intelligence, organized by the French government in Paris, from February 6 to 14, 2025. Political leaders from around the world, scientists, the media and many economic players, including American AI giants, met with the aim of “massively developing AI technologies and uses”, ensuring “all opportunities from new technologies” and “enabling AI to realize its initial promise of progress and emancipation”. At the same time, a counter-AI summit was organized by scientists and trade unionists to shed much more critical light on the effects of GAI on the environment, on education and on work in different sectors, particularly those of culture and information, which are particularly threatened by the capacities of GAI in the fields of writing, image, sound and voice. See: <https://theatredelaconcorde.paris/evenements/contre-sommet-de-lia-pour-un-humanisme-de-notre-temps>.

and subjects of change – is not straightforward. But this is not the only challenge the function faces in fulfilling its role as an agent of change; Ulrich (1996) describes the varied and interconnected roles of the HR function.

Budget cuts also significantly impact HR management, which, as a support function whose profitability is rarely direct or easy to justify, is often one of the first areas targeted for cost reductions. Additionally, the digitalization of HR partly results from a desire to reduce costs and staff, through the automation of certain tasks and activities – which have become more sophisticated over time – and organizational restructuring facilitated by these technologies. An extreme example of this is the creation of shared service centers that consolidate professionals from remote entities away from the main operational sites, managing HR processes based on a highly specialized Taylorist work model, where each worker handles only a small part of an administrative process. This contrasts with the optimistic view of HR digitalization as a way to free employees from repetitive tasks, allowing them to focus on activities with greater human value, such as collaborating with senior executives and managers or supporting employees, their career development and change management. Currently, the HR function remains largely occupied with process-oriented, technical and instrumental activities, far from addressing the core challenges it should solve. According to the 2024 CEGOS survey on HR⁶, 61% of employees expect HR professionals to be more communicative, 52% want them to be more approachable and many see them more as process managers than as local HR representatives. Additionally, 47% believe HR is not strategic enough to influence organizational decisions. In the 2019 survey, half of the employees felt HR did not keep pace with technological changes such as profession transformation and digitalization. Regarding AI, only 21% of HR departments considered it a strategic asset in 2024, while 75% had yet to incorporate it into their practices.

Among other factors contributing to this situation, the HR function possesses limited authority and resources. Additionally, its increasing detachment from operational practice complicates its understanding of the critical issues related to work, despite the emphasis on specific contextual contingencies in the preceding section. This detachment diminishes HR's credibility and hampers its capacity to effectively respond. Nonetheless, the ongoing transformations in the workplace necessitate a robust commitment from HR, enabling it to act decisively and support changes in activities and employee development. This must be undertaken with a dual focus on enhancing organizational efficiency and ensuring the social sustainability of these demanding dynamics for all stakeholders.

⁶ The survey questioned 5,052 employees in several countries, including 1,001 in France, in public and private sector organizations with more than 50 employees.

While support from the organization's leaders is crucial, as is active involvement from managers⁷ to support work transformations, the authority to act within the HR function also requires other professional attitudes among those who hold that role. A key element is developing work analytical skills, which are too often missing from the syllabi and goals of both initial and ongoing HRM training. Therefore, Coron et al. (2024) emphasize the urgent need to reframe HRM training by focusing on work at the core of HR concerns. We need to create training programs for (future) HR professionals that treat "work" as the main subject of study and provide tools to analyze and understand work and its changes, especially through multidisciplinary approaches drawing from ergonomics, the sociology of work, the psychodynamics of work, and more. Regarding the challenges discussed so far, HR professionals must also enhance their skills in digital technologies – not just those that impact their own tasks.

An organization's ability to transform itself in the most "harmonious" way relies on the capacity for detailed and sensitive analysis of what is at stake in the new uses of digital technologies, while genuinely considering the variability of situations. Besides engaging external organizations that can offer valuable assistance, such as the French Agency for the Improvement of Working Conditions (ANACT, Agence Nationale pour l'Amélioration des Conditions de Travail), developing internal capabilities also appears to be essential. HR professionals have a significant role, but they work alongside all organizational actors involved in these vital challenges. Inclusive participation of all stakeholders through interactive approaches is necessary, supported by active social dialogue.

Executives, managers, staff representative bodies and employees share a collective responsibility when digital technologies raise questions about both the economic performance of the organization and the social sustainability of the changes brought about in terms of work, skills, career paths and employment. These issues concern many employees and their representatives. The latter often find themselves at a loss when faced with the increasingly technical nature of digital technologies, even though it is important for them to be able to express their opinions and challenge executives on their choices regarding investment and the

⁷ There is much to say about managers who are key players in the dynamics of work transformation, because they are in close proximity to workers, in a way that is not comparable to HR, and they have to deal with the top-down dynamics of deploying digital tools decided by management, but also with the more emerging uses coming from the employees themselves. Their management style is also questioned, called upon to evolve in multiple ways in connection with these digital technologies, from teleworking to changes in activities and their regulatory methods (prescription, control, etc.). Their own work is transformed by these tools, which contribute to an ongoing, and always changing, redefinition of their roles and skills, their place and their importance.

deployment of digital technologies⁸. It is therefore interesting to see how unions, at least some of them, are addressing the challenges posed by these technologies, inviting researchers to speak at union congresses, asking French Regional Labor Institutes (IRTs, Instituts Régionaux du Travail) for training on this subject, organizing events dedicated to AI and promoting union publications. There is a clear awareness of the issues involved and the need to develop skills in these critical and technical areas, especially when it comes to trade unions being able to influence organizational decisions or, depending on the level, the measures taken by public authorities – including regulations, employee protections and resources allocated to initial and ongoing training – to better support the individual and collective adjustments resulting from the use of these technologies.

The responsibility for changing work and digital technologies extends far beyond the boundaries of organizations. It involves not only the training system (initial and ongoing training institutions, secondary and higher education), but also public authorities (regulation; infrastructure; funding and legal frameworks for education, higher education, ongoing training and research; legal systems organizing social dialogue; and funding trade unions through joint management systems). All social actors must commit to facing macroeconomic and societal challenges, along with the multiple risks linked to the spread of digital technologies and workplace transformations. These risks include dropout rates, rising inequalities, unemployment, exclusion, job loss, mistrust and social isolation, as well as external dependence. Implicitly, what is at stake includes competitiveness, employment, inclusion, social cohesion and, more broadly, sovereignty, societal models and democracy.

5.4. Conclusion: towards countless empirical and theoretical projects

In a landscape of ongoing digital innovation, this chapter – rather than providing a final overview of the current state – raises new questions and explores new paths for research into the interconnected changes in digital technologies, work and organizations.

It is impossible to provide a complete overview of these questions, which are broad and constantly changing. Instead of presenting a specific perspective on the interactions between digital tools and work activities, this chapter aims to highlight their challenges and draw the reader's attention to the need for support within management organizations and beyond.

⁸ Within social dialogue bodies, particularly those dealing with health, safety and working condition issues.

This perspective takes into account the uniqueness of each empirical situation, which requires caution, especially when there is a strong temptation to suggest different interpretations or to offer definitive advice with a universal scope. We must conduct more field surveys, as close as possible to the workplace, to better understand the transformations and how they can disrupt individual and collective roles, skills, identities, workers' career paths, as well as the sense of purpose at work and the way society is organized. Since digital innovations are ongoing and do not always follow a continuous technological development or linear process of adoption by workers, it is essential to study them continuously. This involves recognizing both the temporary nature of analyses made at a specific time and their highly contingent character.

The educational and managerial value of this chapter lies more in the importance of examining work activities in enough detail to understand their components and how they change with digital tools, rather than in the misleading and potentially dangerous idea of making broad, universal statements or ready-made solutions. No one – neither researcher nor practitioner – can skip analyzing work situations to truly grasp what is at stake when work involves more intensive or different uses of (new) digital tools.

Methodological questions then arise about how to study how these digital technologies influence the activity system, transforming and distorting it simultaneously. These questions are not only relevant for researchers examining organizations; they also concern consultants – many of whom work in the field of information systems and support digital transformation – as well as the organizational actors themselves (business leaders, managers, HR professionals, staff representatives, etc.). A major challenge stems from the very nature of the newest digital technologies. They have become highly virtual, making them more intangible and elusive, whereas other artifacts, including digital ones, have historically had and still have more material presence. For example, consider a guide for conducting annual performance reviews, combined with skills frameworks available on the HR intranet. These resources offer much more than just their technical content; they embody a managerial philosophy and a simplified view of relationships (Hatchuel and Weil 1992) that can be analyzed and uncovered through study. However, this is no longer feasible with some of the current digital tools.

The diminishing material significance of some recent technologies (but not all, as in industry) is combined with their extreme complexity. This raises serious questions about workers' ability to adopt them: to master them cognitively, understand their benefits and limitations, detect flaws, etc. However, this high level of technicality also poses major challenges when analyzing these cutting-edge technologies. They often elude detailed understanding, even by experts in the field – which most management researchers are far from – just as most managers, HR

professionals and employee representatives are. The complexity and scale of these interconnected technological systems, along with the autonomy of their learning processes and resultant transformations, are largely beyond comprehension and control or regulation. The increasingly opaque, “black box” nature of these technologies – despite their potential to significantly influence work, employment, organizations, societies and political regimes – raises daunting challenges.

Taking these tough challenges into account, and without claiming to solve them, it seems important to consider how analyzing work/digital interactions must be approached collectively, involving all the organizational actors concerned, including workers and their representatives. This appears necessary if we want to succeed in creating nuanced and sensitive understandings of work situations and how digital tools in use or planned might influence or modify activities – by equipping, constraining or transforming them. Building a shared diagnosis is a crucial step that can also foster the learning of new collective skills for working together, which are essential for developing effective support strategies and approaches. Here, the issue of digital transformation challenges organizational democracy and calls for an investigative approach (Dewey 1939 [1988]) to engage the actors affected by these changes, primarily workers and their representative bodies.

Numerous projects can be undertaken, for researchers on a theoretical and methodological level, for practitioners in organizations and for public authorities (from local to supranational levels). These actors share a significant responsibility for regulating and supporting digital innovations and their spread and adoption, especially regarding the challenges of adapting individual, collective, organizational and sectoral skills, among other things. The stakes are enormous and go beyond economics: social cohesion, democracy and environmental preservation are also intertwined with this wave of accelerated digitalization of work, organizations and lives. In conclusion, this is a political issue in the purest sense, affecting companies and all their stakeholders.

5.5. References

- Arena, L. (2018). *Management des systèmes d'information et de la transformation digitale*. Economica, Paris.
- Benedetto-Meyer, M. and Boboc, A. (2021). *Sociologie du numérique au travail*. Armand Colin, Malakoff.
- Bessy, C. and Marchal, E. (2006). La mobilisation d'Internet pour recruter : aux limites de la sélection à distance. *Revue de l'IRES*, 3(52), 11–39.
- Black, J.S. and Van Esch, P. (2020). AI-enabled recruiting: What is it and how should a manager use it? *Business Horizons*, 63(2), 215–226.

- Blanc-Brude, V. (2023). Analyse clinique du métier de technicien opérateur de production en microélectronique à l'épreuve de l'automatisation 4.0. Lecture par la clinique de l'activité et enjeux de GRH. PhD Thesis, Grenoble Alpes University, Grenoble.
- Boullier, D. (2019). *Sociologie du numérique*, 2nd edition. Armand Colin, Malakoff.
- Cardon, D. (2019). *Culture numérique*. Presses de Sciences Po, Paris.
- Ciarli, T., Kenney, M., Massini, S., Piscitello, L. (2021). Digital technologies, innovation, and skills: Emerging trajectories and challenges. *Research Policy*, 50(7), 104289.
- Ciccarelli, M., Papetti, A., Germani, M. (2023). Exploring how new industrial paradigms affect the workforce: A literature review of Operator 4.0. *Journal of Manufacturing Systems*, 70, 464–483.
- Cimini, C., Boffelli, A., Lagorio, A., Kalchschmidt, M., Pinto, R. (2020). How do industry 4.0 technologies influence organisational change? An empirical analysis of Italian SMEs. *Journal of Manufacturing Technology Management*, 32(3), 695–721.
- Cina, M. (2022). L'institution imaginaire de l'organisation : le cas des significations imaginaires de la conception dans un bureau d'études en génie civil. PhD Thesis, Aix-Marseille University, Aix-en-Provence.
- Colin, T. and Grasser, B. (2023). Travailler avec des cobots dans l'usine du futur : vers une évolution du rapport de prescription ? *Gérer et Comprendre*, 153(3), 21–33.
- Corbillé, S., Foli, O., Tassel, J. (2018). Ce que les recruteurs font des outils numériques : pratiques, enjeux et paradoxes. *Communication et Organisation*, 53(1), 19–38.
- Coron, C., Gastaldi, L., Saint-Germes, E., Ventolini, S. (2024). *Gérer les ressources humaines au XXI^e siècle : nouveaux enjeux, nouvelles pratiques*. EMS, Caen.
- Dewey, J. (1939 [1988]). Theory of valuation. In *The Later Works of John Dewey, 1925–1953, vol. 13: 1938–1939*, Boydston, J.A. (ed.). Southern Illinois University Press, Carbondale.
- Dumas, A. (2018). Injonctions à la promotion numérique de soi et recrutement interne : logiques de responsabilisation du salarié et enjeux organisationnels. *Communication et Organisation*, 53, 91–103.
- Fonsagrives, A. (2025). Les qualités promises des opérations algorithmiques en GRH : morphologie de la convention de qualification de l'appariement candidat - poste. *@GRH*, 12-XXIV.
- Gaborieau, D. (2015). Travailler sous commande vocale dans les entrepôts de la grande distribution. In *Les risques du travail. Pour ne pas perdre sa vie à la gagner*, Thébaud-Mony, A., Davezies, P., Vogel, L., Volkoff, S. (eds). La Découverte, Paris.
- Gaborieau, D. (2017). Quand l'ouvrier devient robot. Représentations et pratiques ouvrières face aux stigmates de la déqualification. *L'Homme et la Société*, 205(3), 245–268.
- Gastaldi, L. and Pascal, A. (2022). Outils digitaux et innovations en situations de travail. In *La créativité en situations : des théories aux applications*, Bonnardel, N., Bonetto, E., Girandola, F., Lubart, T. (eds). Dunod, Paris.

- Hatchuel, A. and Weil, B. (1992). *L'expert et le système. Gestion des savoirs et métamorphose des acteurs dans l'entreprise industrielle*. Economica, Paris.
- Hund, A., Wagner, H.T., Beimborn, D., Weitzel, T. (2021). Digital innovation: Review and novel perspective. *The Journal of Strategic Information Systems*, 30(4), 101695, 1–39.
- Johnson, J.V. and Hall, E.M. (1988). Job strain, work place social support, and cardio-vascular disease: A cross-sectional study of a random sample of the Swedish working population. *American Journal Public Health*, 78(10), 1336–1342.
- Lacroux, A. and Martin-Lacroux, C. (2021). L'intelligence artificielle au service de la lutte contre les discriminations dans le recrutement : nouvelles promesses et nouveaux risques. *Management et Avenir*, 122(2), 121–142.
- Levy, C. (2020). Professionnels des ressources humaines et Big Data : sociologie d'une gestion quantifiée des carrières. PhD Thesis, Paris Sciences et Lettres University, Paris.
- Nambisan, S., Lyytinen, K., Majchrzak, A., Song, M. (2017). Digital innovation management. *MIS Quarterly*, 41(1), 223–238.
- Nayernia, H., Bahemia, H., Papagiannidis, S. (2022). A systematic review of the implementation of industry 4.0 from the organisational perspective. *International Journal of Production Research*, 60(14), 4365–4396.
- Quesson, P. (2024). La transformation digitale des entreprises industrielles : l'émergence d'une réalité organisationnelle numérique. PhD Thesis, Paris School of Mines, Paris.
- Rayssac, J., Dalmaso, C., Hooge, S. (2024). Le bien-être de l'artisan de Haute-Horlogerie face à la figure de l'opérateur 4.0 en atelier de production. In *XXXIIème Conférence de l'AIMS*, Montreal [Online]. Available at: https://www.strategie-aims.com/conferences/36-xxxiii-conference-de-l-aims/communications_by_author?author=Rayssac+Justine.
- Travers, C. (2013). *Du e-recrutement au recrutement 2.0*. Studyrama Vocatis, Paris.
- Ulrich, D. (1996). *Human Resources Champions: The Next Agenda for Adding Value and Delivering Results*. Harvard Business School Press, Boston.
- Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information System*, 28(2), 118–144.

The Influence of Atmospheres on R&D Creativity

The history of modern work, with the emergence of the factory and then the office from the 19th century, is marked by a transformation of working environments. With the increase in teleworking since the Covid-19 pandemic and the tendency to rationalize space, organizations are obliged to rethink the roles and uses of spaces. Furthermore, the “spatio-temporal” boundaries between private life and work are becoming increasingly blurred, thus affecting social ties and the way people work.

Today, partitions are replaced by footstools, laptops and smartphones allow people to work anywhere, and virtual meeting rooms connect employees with their colleagues abroad. Large, medium and small companies have started to rethink their workspace. In addition, employees now expect to have high-end designer furniture, nap areas and free coffee. Some workers even consider these benefits as a key factor in their decision to apply for (or “link to”) a job offer. It is therefore not surprising that many organizations are implementing so-called “creative spaces” of “creative atmospheres” to attract future talent, express their innovative corporate culture and increase communication and creativity among their workers.

As far as R&D is concerned, new spaces such as fablabs, makerspaces, open innovation labs, living labs, incubators and accelerators have been set up as responses to the challenges of innovation. Thus, over the years, R&D workspaces have been transformed with the aim of improving the creativity (individual and collective). However, the effects of these spatial transformations are not yet well identified, and research on the capacity of these spaces (conventional and experimental) to foster creativity and innovation shows mixed results. Moreover, the

Chapter written by Natalia BOBADILLA.

logic of acceleration and rationalization pushes for speed; ambitions often turn into clichés, where the reproduction of often standardized models of workspaces, sometimes unsuited to companies and to the very nature of research activity, tends to be prioritized, thus producing the opposite of the expected results.

The aim of this chapter is to analyze the impact of workspaces on the creative capacity of teams in R&D contexts. The chapter aims to understand:

- What types of spaces play the most crucial role in fostering creativity?
- How do atmospheres influence creative work processes in R&D contexts?

The chapter is structured into four main sections. The first section defines the key concepts of the chapter, emphasizing the strong connections between space and organization while showcasing the diversity of organizational spaces. It also highlights the limitations of existing research on the relationship between space and creativity, introducing the concept of atmospheres as a means to address this gap. The second section outlines the methodology and presents four case studies: Galaxie, Atom, Panter and SoundLab. For each case, an analytical framework is proposed, integrating both organizational and physical atmospheres. The third section discusses the key findings, and the fourth section offers several practical recommendations for R&D organizations.

6.1. The links between space, atmosphere and creativity

6.1.1. Defining organizational space

Discussing space is complex, as it involves various disciplines such as geography, psychology and architecture, as well as different scales such as territories, cities and organizations. This chapter focuses on organizational spaces, which are often examined without a clear theoretical framework. Key references include Henri Lefebvre's trilogy on space (1991) – conceived, perceived and lived space – and Doreen Massey's (2005) view of space as relational and shaped by multiple trajectories over time.

These frameworks highlight the relational and political nature of space, emphasizing that it is constantly produced through interactions and not merely a neutral container. This complexity makes it challenging for organizations to design and adapt spaces that meet workers' needs. Furthermore, organizational spaces have diversified, producing varied effects.

Weinfurtner and Seidl (2019) categorize literature on space and organizations in terms of spatial distribution, isolation, differentiation and intersection – each focusing on how space influences activities, relationships and identities (see Table 6.1 for an illustration of the different themes about organizational space applied in R&D).

	Practical issues
The distribution of positions in space	How does the change from individual offices to open space influence the exploration and exploitation of knowledge? What is the impact of the geographical proximity of R&D units?
Isolation of space	How does a <i>protected or isolated space</i> (i.e. an in-house fablab) foster creativity compared to other more traditional spaces?
Differentiation of space	How do workers in <i>flex office</i> mode recreate a space in response to their daily reality?
The intersection of distinct spaces	How do <i>open creative labs</i> (at the intersection between communities and organizations) influence innovation capacity?

Table 6.1. Summary of themes for research on space and organization applied to R&D

Recently, Thoring et al. (2020) have identified six main types of spaces important for creativity: (1) spaces for individual work (including personal space, concentration space, incubation space and reflection space); (2) spaces for collaborative work (including team and meeting spaces); (3) spaces for making (including experimentation spaces, analysis spaces, verification spaces and workshop spaces); (4) spaces for presentation (including conference spaces, as well as exhibition spaces); (5) preparation spaces that are not necessarily part of the usual work environment but are still integrated into the work process – for example, for conducting research (including exploration spaces and research spaces); and (6) spaces that are somewhat outside the usual work process, where people take a break or pass through.

Existing studies show the impact of different types of space in the creative process. For instance, Hatch (1990) has shown that open-plan offices lead to a decrease in communication compared to private offices, as well as a decrease in performance and motivation at work. In R&D teams, the distance and division of teams by discipline on each floor did not favor interaction. Allen (1977) conducted a number of investigations showing how communication and innovation in R&D-type organizations could be improved by office design that stimulates informal

interaction. He also found that the frequency of interaction between workers in an R&D complex decreased exponentially with the distance between their offices – an effect known as the *Allen curve*. Even when they were in the same building, researchers on different floors almost never interacted informally. He concluded that space may or may not encourage interaction depending on how well it balances three dimensions: proximity, intimacy and permission.

Fayard and Weeks (2011) expanded this view, arguing that informal interaction is influenced not only by physical attributes but also by traffic patterns shaped by social and psychological factors. In this vein, Bobadilla (2014) highlighted that poorly implemented downsizing operations (leading to spatial rationalizations) generate attention and fixation conflicts by breaking the possibilities of timelessness, to the point of becoming sources of work–life conflicts. In particular, the results suggest that the frequency of downsizings negatively affects creativity by disrupting the “temporal tranquility” and “cognitive availability” of creative teams.

Despite these insights, the relationship between atmospheres and R&D creativity remains underexplored. The modern “creative office” is often characterized by a playful atmosphere, flexibility and comfort to stimulate creativity. However, terms such as creative atmosphere, work climate and ambiance are frequently used interchangeably without precise definitions. Recent shifts in organizational studies embrace a relational ontology (Bradbury and Lichtenstein 2000), reconceptualizing creativity as a phenomenon that emerges from interactions between people and objects (Hjorth et al. 2018). This perspective connects with ideas of new aesthetics (Böhme 1993; Strati 1999), suggesting that creativity exists in the in-between spaces of relational dynamics.

The following section explores the interconnections between space, atmospheres and creativity, offering a nuanced understanding of how these elements interact in the context of R&D.

6.1.2. Organizational atmosphere and creativity

In the organizational and creativity literature, in the last 20 years, the focus has been given to the individual and social factors influencing employee creativity. Scholars have thoroughly explored creativity antecedents, creative processes and the nature of creative work (Harrison et al. 2022; Harvey and Berry 2022). The role of space in the creative process has also gained attention (Bobadilla 2014; De Molli and De Paoli 2020; Leclair 2022) but the role of atmospheres in enhancing knowledge workers’ creativity and innovation has not been examined.

From the beginning of the 19th century, the use of the word atmosphere was divided into two approaches: a first approach, meteorological, referring to a material use, qualifying the vaporous substance enveloping a planet; then a second, affective approach, linked to an immaterial form, appealing to the sensory, bodily, emotional and affective domain.

The 1970s saw the emergence of environmental psychology, closely linked to social psychology (Altman 1976). It has continued to develop ever since (Fisher 2011). It shows that the sensory experience of space (visual, auditory, olfactory, tactile, gustatory) counts as much as its physical characteristics when it comes to consequences on behavior. However, this approach in terms of individual cognition quickly evolved into a socio-cognitive perspective. Beyond the sensory experience of space, the idea gradually took hold in the social sciences, interesting scholars in a growing number of academic disciplines ranging from philosophies of atmosphere (Böhme 1995) to analyses of urban environments (Thibaud 2011).

Atmospheres, understood as sensory experiences, consider the whole range of perceptual behaviors that are not limited to physiological responses to external stimuli. This concept emphasizes the holistic experience of space, associating the physical characteristics of a place with perceptive and social behaviors. Nevertheless, existing research tends to isolate the physical or social dimensions of atmospheres.

For instance, Thoring et al. (2020) focus on the sensorial aspects of creative ambiances including light, colors, sounds and smells without reaching any consensus in this regard. Leclair (2022) through in-depth ethnographic work, highlights the significance of affective encounters and their associated atmospheres in collaborative design in a fashion studio. In terms of the social dimension of work environments, Amabile (1996)'s work on organizational climate for creativity marked an important milestone as it described the organizational and social dimensions affecting creativity: political problems, excessive criticism of new ideas, destructive competition, emphasis on maintaining the status quo and the pressure of urgency.

The emergence of atmospheres, however, depends not only on the design of an environment but also on the material, technical and social dynamics that unfold within it. Atmospheres are thus co-created through the interactions and social life of a place, rather than being solely the product of spatial design.

To address this complexity, we propose an integrated framework that unites the social, physical and affective dimensions of space, offering a comprehensive lens to better understand creative processes.

A CONCEPTUALIZATION OF ORGANIZATIONAL ATMOSPHERE.–

Physical atmosphere: all the factors that make up the spatial environment (light, touch, sound, colors, smells, materiality, etc.) and that stimulate the senses.

Social atmosphere: all the factors related to the perception of the culture, the work environment, the modes of control and management.

6.1.3. Four case studies and field observations

All the insights in this chapter are the results of fieldwork conducted between late 2020 and early 2022. The Covid-19 pandemic crisis, teleworking and health restrictions had a strong impact on our ability to access companies.

As our approach was exploratory, we used a mixed qualitative methodology consisting of four case studies and observations within four organizations of varying scales, each with a significant R&D component. For confidentiality reasons, we decided to anonymize the studies and use fictitious names. The four companies and their four sites formed the corpus of our investigation. Participants from each organization were mainly site managers and spatial planning project managers, as well as experts, scientists and technical staff from the R&D teams.

	SoundLab	Atom	Galaxy	Panter
Sector of activity	Electronic, telephony, computers, video games, music, cinema and audiovisual media	Energy, information and health	Aerospace	Telecoms, data processing, hosting, etc.
Number of people on site	40	6,500, of which 4,000 employees	3,000	100
Research activity	Applied and basic research	Applied and basic research	Basic and applied research	Applied research

Table 6.2. Presentation of the case studies

For each case study, we spent two to three days immersed on site, made numerous observations and conducted 15–20 individual interviews per field. In total,

51 interviews lasting between 45 minutes and 1 hour and 15 minutes were conducted. At the end of each immersion period, a summary report was given to the participants in the study.

Each interview was recorded in full and then coded. We used Nvivo 10 software to analyze the interviews. Each researcher carried out their coding separately, and we then discussed the results jointly to compare our respective results.

During the interviews, we asked the participants about the company culture and the organizational atmosphere as well as their perception of the spaces. In the same vein, we asked them to describe moments that they thought were more or less conducive to creativity.

ANALYTICAL GRID.—

We devised an analytical grid with the following elements:

- The organizational atmosphere:
 - all factors related to the perception of culture,
 - control and management methods.
- The physical environment:
 - the geography and the scale of the site and its activities;
 - the site with its external parts and the description of the spaces;
 - buildings and their interior parts.

6.2. The impact of atmospheres on creativity

6.2.1. Atmospheres interact with attention focus and attention levels

The relationship between atmospheres is not just about the spatial element or the quality of the organizational atmosphere. Rather, it is the relationship between these two atmospheres that is at the center of the link. Thus, the notion of atmosphere can be used to characterize the tangible aspects of a space, but it can also be used to characterize the richness of experience in an organization. The perception of both types of atmospheres influences the creative process in a positive or negative way.

Atmospheres play a stimulating role. Humans and non-humans are situated together in the same environment to produce positive or negative stimulation. This

stimulation interacts directly with the level of attention of individuals. The relationship between atmospheres and creativity is complex and depends on two key mechanisms: attentional focus and affect. Creativity stems from the ability to shift from a focused to a non-focused mode of thinking, and environments have the power to influence this mechanism.

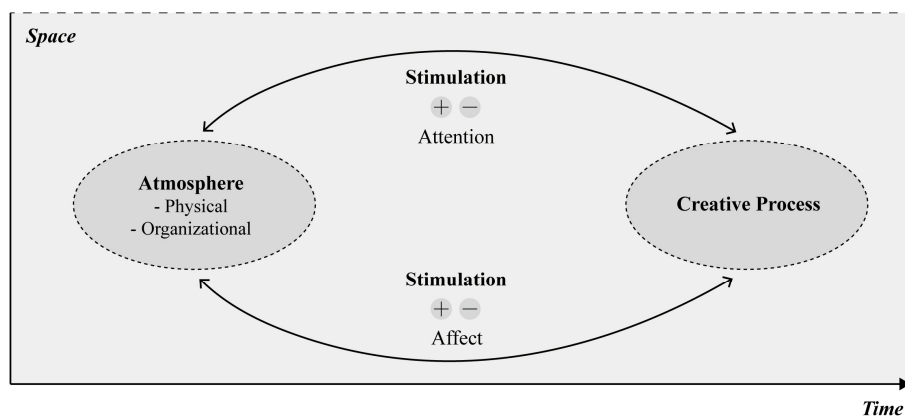


Figure 6.1. *The influence of atmospheres on the creative process*

Levels of attention: Some physical environments can be attention stealers. For example, exposure to repetitive noise and a daily environment with high levels of tension hinders imagination, both in individuals and in creative groups.

Organizational atmospheres, perceived as negative, lead to conflicts of attention and sometimes to fixation. Fixation refers to this impediment to the successful completion of various cognitive operations, including those involved in memory, problem solving and creative generation:

I have trouble paying attention to anything noisy, to people arguing; there's always something lingering in the back of my mind. (Researcher, SoundLab)

So I don't think there is the moment when there is the idea. It goes on in small steps. Even every day sometimes, if you have time to think about it. But it's also the opposite, sometimes you need not to think about it. Here it's good because if you need to stop thinking about it, you can change the subject, work with someone else for a while. There is the possibility of detaching yourself from what you are doing and I find that very useful for taking a step back. (Researcher, Panter)

Affect: Affective states are an important factor in determining creativity. More specifically, a positive affective state (feeling happy and enthusiastic) leads to high creativity. Even though atmospheres are described as difficult phenomena to describe, the affective tone of a place can contribute to personal well-being. For example, experiencing a stressful organizational atmosphere reduces the well-being of employees in these places. Our study shows the importance of the influence of atmospheres on feelings, on people's emotions, on the way employees collaborate and interact and, consequently, on the creative process:

It gives me a bit of peace, there's never any noise, it's very relaxing. There's not really any external pressure. (Researcher, SoundLab)

The atmosphere is good. I say this because I am of a certain age. I don't know how young people experience it. There is a little less pressure. We build things with less financial and managerial pressure. (Researcher, Galaxie)

6.2.2. Various types of spaces and atmospheres to stimulate the creative process

Our study highlights the importance of the variety of spaces and their corresponding atmospheres in stimulating individual and collective creativity (concentration spaces, ideation rooms, individual offices, relaxation spaces, dedicated dining areas, outdoor work and relaxation areas). The nature of R&D work is key in the design and implementation of spaces for each phase of the creative process (ideation, sharing, idea filtering, evaluation). A person's state changes according to their activity and influences the sensory experience as well as the ability to be affected. Furthermore, each activity itself contributes in a specific way to the emergence of the atmosphere of a place.

Companies seek to mimic atmospheres that resemble media representations of creative spaces. However, the experience of a place and its atmosphere must be thought through in relation to the activity. Considering the different user profiles in relation to the occupancy rates of spaces is also a determining variable. For example, there are scientists and experts who work mainly from a single workstation in the laboratory, those who move constantly from meeting to meeting, those who spend little time on the company premises and, finally, those who are on the move most of the time and occupy the premises only occasionally.

The time spent in meetings or video conferences is also an important criterion for designing spaces adapted to each usage profile. Indeed, the physical atmosphere has largely changed since the use of videoconferencing has become more widespread.

The ambient noise of remote discussions can cause conflicts of attention with other employees, as well as raises issues of information security and confidentiality:

I need silence. If there's silence, that's fine, but if there's not, I take the headphones and listen to music. When there are four people in your office, it's quite dense. If people have to have meetings in the office, if someone is talking loudly, I put on the headphones. But if everyone is doing their code, no. Normally we are respectful if someone is focused on their computer. (Researcher, SoundLab)

This also touches on the issue of organizational atmosphere, and the territorial frictions relating to certain acoustically isolated spaces. Similarly, the systematic and radical arrangement of flex offices can cause organizational tensions.

6.2.2.1. The individual office, an important space for concentration and expression of privacy

In the majority of the study areas, researchers like to work in a closed individual office. The office and individual spaces are seen as privileged places for creativity because it is possible to concentrate or isolate oneself to carry out activities requiring concentration (literature reviews, writing articles, designing prototypes, etc.).

At Galaxie and Atome, researchers have comfortable and spacious individual offices. Pride and belonging are represented by pictures, plans and artworks. The link between ownership of the space and seniority in the organization can be seen in the degree of personalization of the spaces and the amount of decoration. In contrast, at SoundLab, researchers share closed offices by activity area. Good understanding between the teams facilitates sharing. However, for acoustic isolation, the use of headphones is the norm to protect against ambient noise.

The type of office, its architectural and environmental qualities, influences concentration and focus of attention. A view of the outside and natural light are recurrently mentioned as contributing to concentration and a positive appreciation of the quality of the working environment. The possibility of having a view of the outside makes it possible to extract oneself or to distract one's attention for a given time, to take a step back from the task, thus having a favorable impact on creativity.

Poor sound insulation and ambient noise (conversations, machines, etc.) are factors that limit concentration because they act as attention grabbers. Artificial light, if deficient or too intense, is also a point that has been noted as being very irritating if it cannot be modulated at each workstation:

What I really like here is that it's not an open space. It's truly a space where everyone has their little corner to work. When I have something to do, I need to concentrate. I really need a space where I can do that. Not to isolate myself, but when I have something that requires focus, I like it to be like this. (Researcher, SoundLab)

All the brainstorming happens in the office. The well-known background tasks can involve processes for improving our procedures, quality processes, cross-functional projects like visiting institutions to discuss spatial topics, giving presentations, or working with industrial companies. (Head of research, Galaxie)

6.2.2.2. *Open spaces are detrimental for creativity*

In the open spaces observed at Panter and Atome, the surfaces are often large and sparse in terms of interior layout. Symbols of resistance to open space that apply to the entire space are visible. Half-height partitions are used for visual and acoustic isolation, and office furniture is arranged to create visual privacy and distance between researchers.

The personalization of space with objects belonging to employees shows a form of territorialization and redefinition of the rules of appropriation to make spaces that meet the needs of the inhabitants. Donis and Taskin (2017) also mention the personalization of spaces by some, allowing them to appropriate this space even if it contradicts the rules of the *flex office* and the *clean desk*¹. However, according to these authors, these forms of resistance do not necessarily go against the design project, but rather express a need for social symbolization associated with the idea of the closed office, a need not met by shared office spaces.

Cognitive overload is higher in traditional open spaces than in flexible working environments. Open space is particularly seen as negative, but it is the layout and density of the space that determines the quality of the space; an open space where everyone has a large desk well-spaced from the others may be more acceptable. It also depends on the activity carried out, the subject and the personality of the employees. It should be noted that common rooms adjacent to the open space allow for rapid isolation and contribute to the comfort of the space. A generous space can be used to isolate oneself by moving away, just as the provision of an outdoor space facilitates moving away from listening to others.

¹ Having only a work kit at the workstation and cleaning it up at the end of the day so as not to leave anything behind (personal or professional).

6.2.2.3. *Intermediary spaces are key for creativity but are often neglected*

Organizational space includes all the physical spaces dedicated directly to work (offices, meeting rooms), as well as intermediate spaces (lobbies, kitchen, cafeteria) and liminal spaces (toilets, cupboards). Their arrangement determines inclusion, interaction and power relations among stakeholders.

Intermediate (or interstitial) spaces are spaces with a use outside those typical of a standard office or dedicated workspace (a reception area, a park area, a bench, the canteen, etc.). These are spaces whose proper function is not necessarily for work, and which act as an intermediary between one or more spaces (such as the lobby of a building, a kitchen, etc.). Often, these spaces can be reappropriated and used for other purposes over different time frames.

Because interstitial spaces do not adhere to the norms (e.g. social customs and practices) that prevail in an unambiguously dominant space (Shortt 2015), they are potentially a source of both uncertainty and creativity. Furnari (2014) has shown that what he calls “interstitial spaces” affect creative activities by inviting individuals interacting in them to temporarily break free from existing institutions and collectively experiment with new activities and ideas. In the same vein, our research shows the importance of these spaces for creativity, thanks to their facilitation of interactions and collaboration, both of which are seen as important supports for individual or collective creativity.

In our study, despite the importance of this type of space for creativity, the quality and the place given to these spaces do not appear to be central. For example, kitchens and dining areas are places of ritual, important relational time-spaces of conviviality, but employees often criticize the poor conditions and lack of facilities.

6.2.2.4. *Creativity rooms, between real and fictional use*

The creativity room is often part of the company’s communication tool. The imaginary of this creativity room consists of a space where the body can be in play in several positions. It encourages grouping and teamwork. The computer equipment makes it possible to project and connect with ease. The furniture is modular and easy to move around. The choice of colors, which are often bright, is the result of the possibilities offered by furniture prescription catalogues. These are generic and represent for many a symbol of innovation. In practice, if people are not used to occupying this type of space and if management does not encourage teamwork, these spaces are rarely used.

The most important artifact in meeting rooms is the erasable marker board that allows one to quickly write their thoughts on the wall. The ability to visualize one’s

thoughts and share them is one of the things that often determine the quality of a creative space.

From an atmospheric point of view, we have observed that the potential of creative rooms is underestimated. Although meeting rooms exist in each of the study areas, they are generally located in dark places, without natural lighting or prior consideration of the materials or aesthetic ambience in which they are decorated. In a work context marked by the flex office and teleworking, when employees come to the office to seek “effective socialization”, it would be advisable to give a more central place to this type of space.

6.2.2.5. The influence of programmed or spontaneous differentiated spaces: permission and freedom in question

Several initiatives to create differentiated spaces have been observed (fablabs, creative labs, makerspaces). However, in most cases, the actual use of these spaces does not align with their intended objectives. Often, these spaces are used as showcases for the company, while the issues of sharing, experimentation and transversality prove challenging to implement. The time required for users to adapt to these new approaches and the way in which the spaces were introduced appear to be critical factors influencing their authentic and spontaneous utilization.

Even when the creation of such experimental spaces follows a top-down approach, it is crucial that their management and governance adopt a collaborative model. Spontaneity and informality are essential for fostering the dynamics and appropriation of these spaces as environments for creativity and exchange. While modular and flexible furniture facilitates freedom of posture and movement, this alone is insufficient. Interviews revealed that the key elements for maximizing the potential of these spaces are the ability to exchange techniques freely and the opportunity to break away from conventional paradigms.

Our study confirms the role of differentiated and protected spaces as places in which alternative ideas can emerge and flourish without individuals being subjected to early judgment or pressure to conform (Cartel et al. 2019; Bojovic et al. 2020). They also host communities, which makes the institutionalization of new discourses and practices possible (Poinsignon and Paris 2020). Nevertheless, our study highlights that other stiffenings emerge from these spaces, maintaining an environment where participants emotionally emancipate themselves from dominant models (Otto et al. 2021).

For example, at SoundLab, the identity of the laboratory as a space isolated and differentiated from the rest of the organization creates a tension in which one does not feel part of the company and does not identify with the “corporate” spirit of the parent company and its subsidiaries. In the context of creative work, distancing

oneself from a more regular organizational space allows for new practices and ideas. However, this context generates friction as actors have to navigate through the paradox that emerges from the exceptional status of the experimental space. By symbolically and physically distancing themselves from more conventional routines, users of experimental spaces reiterate their exceptional positions and induce new tensions. These results echo the work of De Molli and De Paoli (2020), who concluded that the aesthetic experiences of users of third places positively affect some of the dynamics of the creative process. However, they also provide contradictions, such as forced proximity, contributing to a sense of emotional closeness resulting in people feeling more like “friends” than “colleagues”.

On the other hand, regular animation of physical and virtual spaces, accompanied by programming adapted to the needs of users as well as access to additional services (self-service coffee and fruit, room reservations, etc.), is equally important. Here, the crucial role of the concierge is to ease the tension between the formal and the informal, the rules of life and freedom (Bobadilla et al. 2022). The rotation of this type of role among the different members of the organization can be an interesting lever to make these places of experimentation working tools rather than showcases.

6.2.2.6. *Teleworking as a hindrance to group creativity*

The impact of telework on researchers’ activities during the Covid-19 crisis highlights both opportunities and challenges:

Comfort and accessibility: working from home reveals varied levels of comfort, influenced by factors such as geography, socio-economic status and housing conditions. For instance, in densely populated areas such as the Paris region, limited living space often forces researchers to blend their workspace with their home. In contrast, larger, suburban sites benefit from remote work due to secure site access and geographic distance. Regardless, the need for occasional in-person gatherings persists for activities such as workshops or moments of social interaction.

Privacy and representation: video conferencing unveils employees’ personal environments, offering glimpses into their personality through the décor, lighting and sound captured on camera. While some individuals adapt their spaces for remote work, the desire for physical interaction remains strong, especially for idea-sharing and nuanced communication. As one researcher noted:

When it’s to share ideas, when you want to have someone’s opinion, when you need to exchange on something, it’s difficult if it’s not face-to-face... In person, you can see it by gestures. At a distance, it is more complicated to understand each other. (Researcher, Atom)

Challenges to creativity: remote work significantly impacts creativity, especially in ideation and project initiation phases. Researchers report a lack of spontaneity and fluidity in virtual interactions, which hampers trust, motivation and long-term collaboration. As stated by the R&D Director at SoundLab:

With Covid everything has changed. As a researcher, physical contact is very important. Not always, but in my experience, I have never started something new online.

Physical presence and embodiment: the absence of body language and non-verbal cues during video conferencing was frequently identified as a barrier to effective communication. Complex problem-solving and collaborative tasks benefit from the physical presence of team members, which fosters a collective sense of ownership and emotional connection. This embodied interaction is critical for creativity:

Telework for research is more time consuming... We were less efficient than all the brains would have been with two days in person.
(Researcher, Galaxie)

Attention and fatigue: long virtual sessions reduce attention and engagement, making remote work better suited for short collaborations. Participants highlighted challenges such as fatigue, distraction and body inertia, which negatively affect focus and creativity. The lack of an overall view of group dynamics further complicates collaboration during extended remote sessions.

Overall, while remote work offers flexibility, its limitations in fostering creativity, motivation and efficient collaboration emphasize the ongoing need for physical presence in research and development contexts.

6.2.2.7. *The role of artifacts as vectors of identity and distraction*

Latour (1983) demonstrated that a “fact” is never pure, but the result of a social negotiation. In addition to this interference of the social in scientific facts, he spoke of an oblivion of all the artifacts surrounding it.

In our study, we observed the importance and dependence of experts and researchers on R&D objects, which take on the role of real partners in the integration of their environment. R&D objects are thus mediators of complex knowledge, and tools shaping their own image and identity. Table 6.3 shows the different types of artifacts and their function.

Category	Examples
Identity and values	Logos, mythical prototypes, trophies, prizes, robots, customer posters, slogans on the walls
Decor	Artwork, photos of the activity, plants
Practice	Ideation boards, models, creativity rooms, books, 3D printer, simulation rooms

Table 6.3. *Observed artifacts*

6.3. Recommendations for practice

Creating spaces that are conducive to creativity requires an understanding of organizational and spatial atmospheres as assemblages. Space is a resource for the organization, and at the same time the organization is central to the constitution of social space (Dale and Burrell 2007). To work towards this, management styles and corporate culture must allow space to evolve, just as they must adapt to space. Indeed, it is not only the space that stimulates creativity, but also the capacity of individuals to appropriate it.

The myth of making so-called “creative” environments must therefore be replaced by the idea of encouraging and fostering the right conditions for creativity to emerge. Imposing rules or forcing employees to hold creativity meetings several times a week will, for example, not be very beneficial. On the other hand, offering organizational and spatial environments that are more open to interaction will pay off. Permission is an element of language that gives meaning to the space and provides a specific organizational style.

Our study has shown that to really consider space and atmosphere requires adapting them to the specific context of each company. It is therefore a question of working on them in a contextualized and reasoned manner in order to allow new relevant uses within these places.

To enable this adaptation, various courses of action were identified during the course of our study, which we describe below.

Key points and practical tips:

1. Understanding the interplay between space and organization

- Space serves as a resource for organizations, and the organizational structure shapes social space.

- Encourage creativity by allowing space to evolve and by fostering a flexible corporate culture. Rigid, structured attempts to enforce creativity (such as mandatory meetings) may be counterproductive.

2. Creating a network of decentralized workspaces

- Develop smaller, local workspaces that reduce travel time, facilitate telework and encourage community among employees. Such decentralized spaces support a relaxed and open atmosphere, aiding creativity and collaboration.

- This approach also promotes environmental sustainability by adapting existing spaces and limiting land expansion.

3. Teleworking and project phases

- Telework is valuable but should be balanced with face-to-face interactions during critical creative phases.

- Consider factors such as the employee's experience, project complexity and carbon footprint to tailor telework practices to specific needs.

4. Promoting multi-use spaces and flexibility

- Encourage reimagining underutilized areas (such as lobbies, kitchens, corridors) for diverse functions. Covid-19 adaptations revealed that spaces can have multiple roles (e.g. lobbies as meeting areas).

- Support employee-led initiatives to experiment with space, encouraging a culture of ownership and creativity.

5. Systematic usage diagnostics and experimentation

- Regularly assess how spaces are used to identify and adapt underutilized areas. This can include renting or reusing furniture for short-term experimentation, avoiding unnecessary construction.

- Engage experts to guide ergonomic adjustments and spatial reconfigurations.

6. Encouraging physical and organizational flexibility

- Enable a variety of postures and activities, such as sports or collective outdoor events, to stimulate creativity and well-being.

- Managers should lead by example, fostering a flexible environment where alternative uses of space are welcomed.

7. Enhancing reception and entrance areas

- Transform entry areas from purely functional to welcoming, interactive spaces, balancing accessibility and security. Offer services (e.g. coffee stations, Internet) to make these areas conducive to interaction and engagement.

8. Dynamic signage and mediation tools

- Implement evolving communication tools, such as interactive signage or site maps, to orient visitors and staff and encourage collaboration by showcasing ongoing projects.

9. Optimizing temperature, light and acoustics

- Adjust physical elements to promote comfort and concentration. Allow individual control over lighting, temperature and acoustics, catering to the changing needs of the day or season.

- Flexible, reversible technologies (such as movable lighting or temperature adjustments) offer practical, adaptable comfort.

10. Avoiding standardized, rigid technologies

- Automated systems such as blinds and lighting may disrupt natural usage; instead, opt for adaptable, user-centered solutions. Consider the long-term adaptability and maintenance implications when integrating technology into workspaces.

6.4. Conclusion

Workspaces and new ways of working are evolving, and this chapter highlights the critical interplay between physical and organizational atmospheres in fostering creativity. Organizational culture plays a central role in shaping the effectiveness of spaces, as physical changes without corresponding cultural shifts are insufficient.

Workspaces and office layouts represent only the surface of what lies beneath in terms of social interactions, organizational climate and culture (Bobadilla 2014). The organizational atmosphere takes precedence over the physical environment, as any spatial change is fundamentally a cultural shift. It is challenging to transform the physical atmosphere without addressing the underlying organizational culture and managerial practices. A company's culture and conventions either enable or restrict the ability of individuals to navigate and interact within the space. Likewise, the design of a space can either foster or hinder social interaction, depending on how well it aligns with factors such as proximity, permission and confidentiality.

Creative environments benefit from attention to sensory stimulation, freedom of movement and informal social spaces that support interaction and relaxation.

Differentiated spaces, such as fablabs and makerspaces, require participatory design and ongoing monitoring to address inherent tensions and unlock their full potential. The strategic planning of workspaces must prioritize user needs, align with organizational dynamics and incorporate sustainable practices, while avoiding mimicry or rigid standardization. Transforming work environments effectively necessitates cross-departmental collaboration, regular evaluations and adaptable design approaches. These spaces should actively stimulate creativity and engagement by balancing attentional focus and emotional resonance, supporting both individual and collective creativity.

In an era shaped by teleworking, our findings emphasize the critical role of physical workspaces and face-to-face interactions in fostering creativity and innovation. To mitigate the challenges of remote work, companies must prioritize the creation of social time-spaces that nurture identity, sociability and a sense of belonging. Rigid rationalization and formulaic approaches to workspace design exacerbate feelings of isolation and disconnection. Instead, workplaces should be designed as dynamic atmospheres that actively engage the senses and bring positive emotions, serving as “stimulators of affect and empowerment” and offering varying levels of attentional focus, rather than mere “passive containers” or distractions.

Our study underscores the pressing need to design spaces that engage the senses, support physical movement, enable action and encourage openness to diverse postures. We advocate for the differentiation and diversification of work environments over standardized, one-size-fits-all solutions. Central to this approach is providing users with the opportunity to reflect on and influence their working conditions, empowering them with the “right to do”. There is no universal blueprint for workspace design – neither a “Google-style” nor a “startup-style” approach fits all contexts. Effective creative spaces must align with the nature of the activities performed, foster a supportive organizational atmosphere and incorporate an aesthetic environment tailored to the needs of end-users, all while prioritizing the creative process.

6.5. References

- Allen, T.J. (1977). *Managing the Flow of Technology: Technology Transfer and the Dissemination of Technological Information within the R&D Organization*. MIT Press, Cambridge.
- Allen, T.D., Freeman, D.M., Russell, J.E., Reizenstein, R.C., Rentz, J.O. (2001). Survivor reactions to organizational downsizing: Does time ease the pain? *Journal of Occupational and Organizational Psychology*, 74, 145–164.
- Altman, I. (1976). Environmental psychology and social psychology. *Personality and Social Psychology Bulletin*, 2(2), 96–113.

- Amabile, T.M. (1996). *Creativity in Context*. Westview Press, Boulder.
- Bobadilla, N. (2014). A longitudinal study of the effects of slack reduction on creativity in R&D and creative teams. PhD Thesis, Panthéon Sorbonne University, Paris.
- Bobadilla, N. and Marchessau, O. (2022). Les espaces et les ambiances de travail pour la créativité : mythes et réalités. Report, CIME.
- Böhme, G. (1993). Atmosphere as the fundamental concept of a new aesthetics. *Thesis Eleven*, 36, 113–126.
- Böhme, G. (1995). *Atmosphäre*. Suhrkamp, Berlin.
- Bojovic, N., Sabatier, V., Coblenz, E. (2020). Becoming through doing: How experimental spaces enable organisational identity work. *Strategic Organisation*, 18(1), 20–49.
- Bradbury, H. and Lichtenstein, B.M.B. (2000). Relationality in organisational research: Exploring the space between. *Organization Science*, 11, 551–564.
- Cartel, M., Boxenbaum, E., Aggeri, F. (2019). Just for fun! How experimental spaces stimulate innovation in institutionalised fields. *Organization Studies*, 40(1), 65–92.
- Dale, K. and Burrell, G. (2007). *The Spaces of Organisation and the Organisation of Space: Power, Identity and Materiality at Work*. Palgrave Macmillan, London.
- De Molli, F., Mengis, J., van Marrewijk, A. (2020). The aestheticization of hybrid space: The atmosphere of the Locarno Film Festival. *Organization Studies*, 41(11), 1491–1512.
- Donis, C. and Taskin, L. (2017). Résistance par l'espace dans le contexte de mise en œuvre de bureaux partagés, une approche par la territorialité. *RIMHE: Revue interdisciplinaire management, homme et entreprise*, 26(6), 73–85.
- Fayard, A.-L. and Weeks, J. (2011). Who moved my cube? Creating workspaces that actually foster collaboration. *Harvard Business Review*, 89(7–8), 1–16.
- Furnari, S. (2014). Interstitial spaces: Microinteraction settings and the genesis of new practices between institutional fields. *Academy of Management Review*, 39(4), 439–462.
- Harrison, S.H., Rouse, E.D., Fisher, C.M., Amabile, T.M. (2022). The turn toward creative work. *Academy of Management Collections*, 1(1), 1–15.
- Harvey, S. and Berry, J. W. (2022). Toward a meta-theory of creativity forms: How novelty and usefulness shape creativity. *Academy of Management Review*, 48(3), 504–529.
- Hatch, M.J. (1990). The symbolics of office design. In *Symbols and Artifacts: Views of the Corporate Landscape*, Gagliardi, P. (ed.). Aldine de Gruyter, New York.
- Hjorth, D., Strati, A., Drakopoulou Dodd, S., Weik, E. (2018). Organizational creativity, play and entrepreneurship: Introduction and framing. *Organization Studies*, 39(2–3), 155–168.
- Latour, B. (1983). Give me a laboratory and I will raise the world. In *Science Observed: Perspectives on the Social Study of Science*, Knorr-Cetina, K. and Mulkay, M. (eds). Sage, London, 141–170.

- Leclair, M. (2022). The atmospherics of creativity: Affective and spatial materiality in a designer's studio. *Organization Studies*, 44(5), 129–146.
- Lefebvre, H. (1991). *The Production of Space*. Blackwell, Cambridge.
- Massey, D. (2005). *For Space*. Sage, London.
- Otto, B., Schübler, E., Zangerle, K. (2021). Greenhouses are made of glass: Tensions in experimental spaces for creative collaboration in front-end pharmaceutical research. In *Collaborative Spaces at Work: Innovation, Creativity and Relations*, Montanari, F., Mattarelli, E., Scapolan, A.C. (eds). Routledge, London, 238–251.
- Poinsignon, P. and Paris, T. (2020). A diachronic view of the role of collaborative spaces in the creative industries: The singular case of the French “atelier Nawak”. In *Collaborative Spaces at Work: Innovation, Creativity and Relations*, Montanari, F., Mattarelli, E., Scapolan, A.C. (eds). Routledge, London [Online]. Available at: <https://hal.archives-ouvertes.fr/hal-03097441>.
- Shortt, H. (2015). Liminality, space and the importance of “transitory dwelling places” at work. *Human Relations*, 68(4), 633–658.
- Strati, A. (1999). *Organization and Aesthetics*. Sage, London.
- Thibaud, J.-P. (2011). The sensory fabric of urban ambiances. *The Senses and Society*, 6(2), 203–215.
- Thoring, K., Mueller, R.M., Desmet, P., Badke-Schaub, P. (2020). Spatial design factors associated with creative work: A systematic literature review. *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, 34(3), 300–314.
- Weinfurter, T. and Seidl, D. (2019). Towards a spatial perspective: An integrative review of research on organisational space. *Scandinavian Journal of Management*, 35(2).

The Expertise Factory: Shedding Light on a Blind Spot in Innovation Management

In organizations in high-tech sectors, expertise is key in supporting not only operational activities but also innovation processes. To a large extent, expertise does not exist as something ready-made on the labor market. Partly specific to the organization's activities, its construction takes place largely within the organization itself. It requires stability, anchoring over the long term, over periods that can exceed 10 years, as well as supportive organizational conditions. Management practices such as research work essentially focus on policies and schemes that intervene in established expertise, leaving the patient and demanding development of this expertise in the shadows. How is this detrimental?

The issues surrounding expertise are multiple and generally well identified by companies and by the literature. They are both economic (having a strong skills base in distinctive scientific and technical fields) and socio-organizational (recognizing and retaining experts, identifying and capitalizing on expertise, getting them to work together, etc.). But everything happens as if it were a question of considering and managing existing expertise independently of the methods by which it was produced. Given the importance of expertise in innovation processes, and the current context of strong tension in the latter, it seems dangerous not to be more concerned with the way in which it is constructed and shaped, especially since the long time frame for its formation introduces formidable inertia effects. It is this blind spot in the management of technological innovation that this chapter focuses on.

Chapter written by Lise GASTALDI, Patrick GILBERT, Martine LE BOULAIRE and Olivier MUSSEAU.

Section 7.1 begins with a detailed overview of the subject, based on a review of the literature and observations made at various companies where (or with whom) the authors of this chapter have worked. What emerges is that the production of expertise remains shrouded in an aura of mystery, despite the shared conviction that there is a growing need to understand the processes involved in building up expertise.

In order to go a step further and gain a better understanding of the ingredients involved in the production of expertise, we explored two case studies whose characteristics are presented in section 7.2, followed by our findings in section 7.3. This questioning of the way in which expertise is built up comes at a time when the two organizations studied – like many others – are challenged in their ability to strengthen the strategic management of expertise in the light of renewed future challenges. The field survey highlights a number of organizational factors which, depending on the situation, can act as levers or obstacles to the development of individual and collective expertise. It also takes a closer look at current management policies and schemes, evaluating their role – limited – and their effectiveness – relative – in supporting expertise trajectories.

In the conclusion (section 7.4), we propose some avenues for reflection and action for scientific and technical (S&T) organizations, in order to ensure that expertise is effectively managed during its creation, and not in hindsight. Rather than focusing exclusively on creating new formal schemes from scratch, we suggest accompanying existing expertise-building processes, in a logic combining support and incentives, and engaging all the stakeholders concerned by expertise and its management.

7.1. The production of expertise and its mysteries

After taking a moment to discuss the notions of expertise and experts, which are still shrouded in a certain vagueness as to their definition and the profiles and roles they include, we discuss the organizational policies aimed at experts and/or expertise in itself. It appears that expertise management remains confined to that which has already been set up, thereby intervening on existing resources, without their constitution process being addressed or even really known by the organization. It was on these grounds – on the one hand, the obvious need for expertise, and, on the other, the blind spot that expertise production represents – that we decided to build our research project.

7.1.1. “Expertise”, “experts”: a need for definition

7.1.1.1. Obvious challenges, but a vague concept

It is easy to understand why it is vital for an organization to have experts at its disposal, especially in high-tech sectors. Researchers interested in these sectors do not dispute the key importance for the organization of having a strong skills base in distinctive S&T fields. According to the organizations, their competitiveness, sustainability and very mission lies in designing, developing, deploying, operating and maintaining technological innovations, and doing so repeatedly over time.

On the other hand, the need for expertise is as clear-cut as its definition is vague. The imprecision surrounding the terms “expertise” and “expert” stems from their predominant use in professional areas other than S&T professions. Without even mentioning the confusion introduced by the media’s all-out use of the term, which legitimizes the people to whom it is applied, companies indiscriminately refer to professionals in accountancy, law, insurance and security as “experts”. This often has no relation whatsoever with the professions really involved in the creation of new bodies of knowledge and technologies, whose expertise has little to do with the application and replication of stable knowledge and its rigorous use, in a spirit of conformity to rule, standard or procedure. In research and development (R&D), expertise-related professions are creative occupations in charge of expanding the frontier of knowledge and technical possibilities. In science (more so than in the art world, for example), creativity means that past knowledge and techniques are obsolete. Paradigm shifts (Kuhn 1962) that “turn the tables” are not that frequent, but some works contradict or nuance others that preceded them. And while the progress of science is not linear, a certain cumulative dimension of research calls for a permanent updating of knowledge. In contrast, we need to consider S&T experts in their own right, appraising the specific nature of their activities.

Despite the work undertaken to define the scope of scientific expertise (Fritsch 1985; Roqueplo 1997), the boundaries of this notion remain unclear. The same is true of the expert figure, as has often been pointed out, notably by Bootz and Schenk (2014, p. 79): “although the terms expert and expertise have entered everyday language, and despite the attention these notions have attracted in the academic world and among practitioners, there remains confusion as to their contours [...]”

7.1.1.2. The two dimensions of expertise: cognitive and relational

Bootz and Schenk (2014) highlight two dimensions of expertise that we will call cognitive and relational. Experts are highly qualified individuals, vastly specializing in a definite area of knowledge and skills (cognitive dimension), onto which they focus

in order to succeed in acquiring a high degree of socially recognized mastery (relational dimension).

The recognition of expertise, by peers at the very least, if not by management and the organization, formally or informally (with or without status and a title), constitutes the relational dimension. Experts are not so by self-declaration, but when others around them consider them to be so and solicit them and designate them as *the* person of reference in a given field of knowledge. This dimension is also emphasized by certain sociological studies (Trépos 1996), which stress the fact that the expert is someone who stands out from other professionals in the field, the recognition relationship thus becoming constitutive of the very definition of expert.

These two cognitive and relational dimensions leave open a vast field of possibilities regarding the figures of experts and the scope of the notion. In the empirical study of expertise management schemes, these questions are far from anecdotal:

- Do we narrow down the definition of expert or shall we leave its designation to the initiative of actors in the field, even if this means that they identify fairly heterogeneous expert figures?
- In the second case, does not this heterogeneity risk undermining the creation and affirmation of a status and identity for the expert?
- Are all professions eligible or is there any kind of restriction?
- What is the degree of elitism associated with the term “expert”?
- Should we base ourselves on levels established by the company, or even on quotas set by it? Or will the number of experts and their profiles result from a designation process?

The answers to these different questions can lead to relatively closed and exclusive programs, but ones which are well identified and based on clear definitions of the expert, sources of fairly strong recognition and visibility. Conversely, they can lead to more open and inclusive programs, but maintaining this vagueness of the expert’s identity, and sometimes generating a lower valuation of its figure. Here, we come across the same questions as those raised for talent management. As in the case of the latter, expert figures are not unique, and the literature has defined several types of experts, particularly in relation to the empirical variety of profiles and roles assumed by them.

7.1.1.3. *The expert: a plural expression, different roles*

First of all, we can profile in terms of depth and scope of expertise. These two classic characteristics normally evolve in opposite directions. Digging deeply into a

narrow field to master it as best as possible or, on the contrary, developing a broad spectrum of knowledge across several related fields appear as different strategies – or trajectories – all the more difficult to reconcile for the same individual or group, as they are both demanding and consume a time that is not infinite. And yet, companies identify and call for so-called T-shaped profiles, that is, people whose expertise simultaneously displays these two characteristics. Beyond the obvious difficulty in finding such profiles, the fact that the requirement here rests on individuals and not teams raises questions.

Experts also differ in the roles they assume, often voluntarily rather than as prescribed by the organization, in various fields. This may include student training, supervising doctoral or postdoctoral students, supporting new recruits or facilitating scientific activities within their unit or in a more transversal manner through participation in knowledge communities or seminars, within the company or beyond it. Experts can maintain external networks and get involved in projects with academic or industrial partners, activities that contribute to their influence (Fablet and Lacaze 2014) and grant access to important resources for the firm. Some experts act as company spokespeople and representatives in various spaces, from technical standardization bodies to the media.

Experts also take on multiple roles more directly related to the innovation process. Without these roles being exclusively held by experts, they can act as intrapreneurs by promoting their innovative ideas, as champions of innovation by supporting projects that can be initiated by others or even as boundary spanners or gatekeepers (these terms being equivalent, the vocabulary varying depending on the authors and their writings) (Allen and Cohen 1969; Haas 2015). Regarding this last role category, Katz and Tushman (1979) emphasize its demanding nature and its prominence in the success of development projects which, to reach their completion and satisfy multiple expectations, must articulate technical, industrial, logistical, commercial, marketing, economic and financial dimensions. Thanks to their skills, legitimacy and activism, boundary spanners position themselves at the edge of the project team and put team members into contact with the actors outside it. The latter can be members of the organization as well as other R&D teams, fulfill other roles or evolve in that environment. They are carriers of knowledge and resources determining to push the development projects towards the market in good conditions. According to Katz and Tushman (1979), these roles are less crucial in research projects, because researchers are “naturally” well connected to the scientific environment, especially because they have maintained links with the academic world since their studies. For research projects, it is important to “remain connected” to professional universes and spaces that are far more homogeneous than the ones in R&D settings.

Work has shed light (Charue-Duboc and Gastaldi 2023) on other roles adopted by actors, potentially experts, during the innovation process, by drawing a difference between opponents and devil's advocates. The latter, apparently transgressive, can be of great use in innovation processes by bringing about debates and controversies that can be constructive and healthy; for example, to re-examine the parameters of a project in a way that ultimately favors its adoption (Hauschildt 1999; Markham 2000).

Whether they act as intrapreneurs, champions, gatekeepers, opponents or devil's advocates, experts can use their reputation and credibility, and the resulting power, to influence innovation projects and R&D programs. This influential role can be expressed at different levels, ranging from the activities and internal arbitrations of the team to which the expert belongs, to the various strategic decision-making bodies (laboratory/department, project/program, scientific direction or even general management).

Moreover, many companies consider that an expert is someone who acts "as such", and that having high-level knowledge and skills is not enough if the expert is not involved. The commitment of experts in various specific roles – which go beyond the expected contributions related to their position – is shaped by interactions between individuals and the organization. Depending on its needs, the latter may formulate expectations in relation to experts and create schemes or opportunities to encourage their engagement. But the roles that experts actually take on also depend on how they perceive and invest in these roles, depending on their desires, resources and perception of their ability to act, or even their interest in getting involved. In all their variety, these roles go far beyond the strictly scientific and technical dimension. The expert is not just a "knowledgeable person", and many other skills are necessary so that "core business" knowledge is put to good use by the organization in different ways.

Beyond the definitional aspects, and emphasizing the diversity of expert profiles and roles, what has research contributed to S&T expertise management? And what can be said about management practices in these areas of expertise?

7.1.2. An approach to expertise management that is still too confined

7.1.2.1. Research and practice focus on the management of established expertise

Research on the management of S&T expertise focuses on a few dimensions, namely the identification and securing of strategic expertise, or the career management of S&T experts. A fairly transversal characteristic of this research work is that it addresses modes of expertise management, but rarely its construction.

Researchers are keen to study the managerial logic at work in companies that pursue numerous goals: identifying expertise, recognizing and building loyalty, putting expertise at the service of innovation processes, accompanying the development dynamics of expertise skills; for example, through communities of experts, etc.

For practitioners, this means first and foremost identifying, qualifying, mapping and weighing up the value of existing individual and/or collective expertise within the firm, when capturing expertise and making the organization attractive are the central concerns of externally oriented policies and practices. Once expertise has been identified, and depending on the configuration also integrated into the organization, management intervention aims to put to work, coordinate, “optimally” allocate and reinforce these expertise skills. At a more clearly individual level, it is also involved in fostering motivation, building loyalty and recognizing experts.

There is an overlap between the managerial approaches developed in companies and the dimensions studied by researchers, who focus on observables. Researchers consider the goals of management policies and their embodiment in schemes and, in some cases, what this actually produces. As it happens, these management schemes are not without their limitations, and sometimes fail to achieve their objectives, as studied by Gastaldi and Gilbert (2016), following Allen and Katz (1986), or Bailyn (1991), regarding the subject of dual expert/managerial career ladders. And yet, the ineffectiveness of these tools does not necessarily call their existence into question (Gastaldi and Gilbert 2016). In this way, management science research, such as business practice, focuses on expertise that has already been built up, leaving in the shadows the way in which it has been constructed.

7.1.2.2. Varied management intervention configurations over established expertise

Practices, such as research work, focus on several configurations requiring managerial intervention on existing expertise. This is not necessarily exhaustive, and it is important to note that an organization may display several configurations.

7.1.2.2.1. Configuration 1: recognizing and retaining in-house experts

The company possesses expertise, and the aim is to recognize, retain and motivate the experts who hold it. This is the dominant prism of questions and interventions regarding expertise in human resources management, and it is these challenges that mobilize HR function professionals, particularly around the design and facilitation of double or triple career ladder-type schemes, such as expert/manager/project manager pathways (Picque-Kiraly and Ottmann 2019). Facilitation can be reduced to little more than opening calls for applications and organizing the compilation of submitted files. The identification of experts is frequently the result of a tip-off from the individuals applying for these schemes,

rather than an active approach on the part of the organization. The university-style approach that characterizes most scientific profiles is not very distant, with individuals only advancing if they proactively put together applications. In most cases, managers have to validate these individual applications, and in some cases they have to introduce members of their own team.

7.1.2.2.2. Configuration 2: organizing collaboration between specialized experts

The company's expertise is specialized by nature, and by necessity when the complexity of the knowledge and skills to be mastered demands focusing on smaller areas. In such cases, the question is how to combine existing bodies of knowledge and to devise ways to make them work together effectively. This preoccupation is reflected by research on project management, with an emphasis on the concurrent engineering model and more recent papers on the differences between managing exploratory projects (whose outcome is unknown) and exploitation projects, whose implementation must be pursued until successful completion (Lenfle 2014). The increasing dispersion of the company's teams and expertise across its various establishments – spread all over the world – is addressed by research on the role of collaborative digital tools, whose uses burst with the health crisis and lockdown restrictions.

7.1.2.2.3. Configuration 3: spreading expertise at an internal level and protecting it

The company has a wealth of expertise built up over time, and this is a key resource that needs to be spread internally and protected. This is at the heart of the concerns of knowledge management (KM) work and practices. These focus on the ways in which knowledge is shared within the organization, beyond its initial holders, whether through clarification, codification and capitalization methods or through more social approaches to learning, notably around mentoring or communities of practice and knowledge. KM is also concerned with the organization's potential vulnerability to the risk of losing knowledge and expertise, due to significant changes in the lives of individuals: transfers/mobility, resignations, illnesses, retirements, etc. Expertise is acquired over a long period of time, and high-level experts are often well advanced in their careers. The problem of managing retirements is extremely serious, and all the more complex when recruitment opportunities are limited and sometimes unblocked at the last minute.

7.1.2.2.4. Configuration 4: establishing connections with external expertise

The company has expertise but cannot or does not necessarily have an interest – particularly for cost reasons – in holding all the expertise necessary for its innovation projects internally. Then, the question is how to tune in with the expertise present in

the environment, whether encapsulated in other organizations or held by individuals or extra-organizational communities. Here, we have the development of research on open innovation (Chesbrough 2003) and collaborative innovation, particularly in the field of strategic management. This body of research focuses on demonstrating the variety of open innovation practices, as well as their multiple interests for the company, which will be able to draw on external resources to complement its own. For example, Lee et al. (2019) study how open innovation plays a positive role in the resolution of complex problems by company experts, in the case of the development of new products in the pharmaceutical industry. Research also highlights the accompanying difficulties of open innovation practices, intellectual property protection issues being the most prominent. Important questions also seem to arise regarding the articulation of roles between in-house experts and external partners, and regarding the shifts, redefinitions and risks of destabilization of the former in the face of these, sometimes rapid, changes.

7.1.2.3. Depending on the perceived challenges: different, more or less coordinated actors

Recognizing, cherishing and retaining experts, identifying and capitalizing on experts, networking them, connecting them to the innovation process (Charue-Duboc and Gastaldi 2017) or even making them collaborate internally and externally constitute a plurality of well-identified goals which fall under the scope of management. Accordingly, the organizational actors who will take charge of this are not generally the same, and their actions are hardly coordinated. Each of them develops management policies and schemes to deal with the experts and/or expertise of those who are specifically concerned with them, while a plurality of other managerial interventions, which are also frequently disjointed, are more broadly aimed at activities, innovation projects, professionals, skills or R&D knowledge.

When it comes to support functions, human resource (HR) departments work along a fairly individual-centric axis, focusing on skills, while KM teams – where they exist – take a more collective and targeted approach to knowledge. Nevertheless, this should not be interpreted as a generality or fatality. In addition to expert evaluation and recognition mechanisms – sometimes along a dedicated career path – HR can also engage in the projected management of jobs and skills (GPEC, *gestion prévisionnelle des emplois et des compétences*) and skills mapping projects which, by identifying critical areas and implementing appropriate actions, share KM concerns. These initiatives can and should also engage scientific departments (or innovation departments, R&D departments, etc., depending on the company's choice of structure and terminology), which are clearly more concerned with expertise at a collective level. Sometimes, these actors work together, for example, in creating and supporting communities of experts – whose formal recognition is related to active participation in them – structured around strategic technological themes and mobilized to serve

innovation processes (Charue-Duboc et al. 2020). But working together in this way is not so common, and this is to be regretted, as it has many advantages.

S&T organizations are concerned about expertise, albeit with varying degrees of commitment from one organization to another, and according to varied management approaches. On the other hand, they share a common characteristic, focusing essentially on existing expertise. We become interested in experts when we have them; we invest in expertise when we identify it; retrospectively, once it is already set in place.

7.1.3. A growing need to understand the processes involved in building up expertise

7.1.3.1. The emergence and sustainability of S&T expertise: a challenge for research and management

The present project is built upon the following observation: research still has a long way to go to shed light on the processes for building individual and collective expertise in innovation-related S&T professions. Whatever the discipline, very few studies have sought to understand the construction of S&T expertise in all its specificities. In management science, a great deal of research has focused on skills, on how they are acquired and on the managerial practices needed to support their development, but very rarely in the case of creative R&D professions (for an exception, see Gastaldi (2006)), and even fewer on expertise specifically.

The specificities of expertise are due to its highly demanding nature. According to Ericsson et al. (1993), world-renowned specialists in the psychology of expertise, many characteristics once considered to reflect an innate talent turn out to be the result of intense practice carried out continuously for at least ten years. Thus, a deliberate and continuous commitment from the individual is necessary to become an expert.

This long temporality and these constant efforts are found in different professional spaces, such as top-level sport or so-called “traditional” fields (arts and crafts, heritage trades, certain artisanal, agricultural and culinary trades, etc.). Research is developing around the management of this particular and rare knowledge (Sunder 2007), which could prove useful for thinking about the management of S&T expertise. Like top-level sport, becoming an S&T expert and remaining one requires substantial work, both in intensity and duration, over a long period of time. In these worlds of science and technology, the stock of existing knowledge that must be mastered by the expert is significant and also evolving, constantly expanding under the permanent work of all specialists worldwide.

Expertise takes a long time to build. This duration – which may vary depending on the sector – is consubstantial with the creation and definition of the expert in business. To become an expert on a subject, durations of five to seven years, ten years for in-depth expertise, have been frequently mentioned in previously conducted research work (Gilbert et al. 2018). It should be noted that these durations relate to experience once in business, when these people already have particularly long studies behind them (see the case of graduates who have already devoted between three and five years to deepening their knowledge of an S&T field, and even more so in the case of postdoctoral contracts). In the expert recognition schemes implemented by S&T organizations, the criteria for awarding formal expert titles also recognize this need for a long time to develop the level and type of expertise required by the organization. As a result, access to expert channels is generally only possible after a certain number of years of seniority, and progression through the ranks, correlated with increasing age and seniority in the profession.

Not only does expertise take a long time to build, but it is also vulnerable, time-tested and never fully acquired. It requires constant efforts to “keep up to date”, and the risks of knowledge obsolescence and S&T experts dropping out are real, although more intense in certain highly evolving fields. We do not remain an expert in the worlds of cutting-edge science and technology if we stop working intensely, as also happens in top-level sport. Expertise is always fragile.

While practitioners and researchers have focused on considering these key resources once they have been established, largely leaving the question of their production in the shadows, many questions remain. How did the organization come to have these resources at its disposal? How did they come to be, and to what extent did they emerge spontaneously, or were they managed? What are the processes, factors and conditions that have favored, enabled and facilitated the emergence of current expertise and shaped its characteristics? To what extent is existing expertise congruent with the current and future needs of the organization? And in the case of a favorable alignment configuration, how was this created and arranged? How, if applicable, did expertise shift over time and how does it relate to the company’s activities and strategic orientations? We have little to offer in response to these questions, which are nonetheless critical for the innovation capacity of businesses.

7.1.3.2. The new challenges for building expertise in changing S&T organizations

This observation of less attention, if not the identification of a problematic blind spot surrounding the understanding of how expertise is constituted, coincides with the rise of new challenges that are impacting organizations in the technology sectors and calling into question the very creation of expertise. S&T expertise professions have been grappling with strong and rather destabilizing transformations, and this since the

beginning of the 21st century (Gastaldi and Gilbert 2006; Gilbert et al. 2018). Innovation processes, their management and organization methods, and professions and work in R&D are undergoing sometimes profound changes. This is the case with the almost systematic structuring of R&D and innovation activities in project mode, as well as the acceleration at all costs, notably supported by the increased use of digital design tools (Cina and Paraponaris 2022) and driven by pressure from markets and customers. R&D activities and actors are under pressure from new practices and control logics, tending towards a quest for operational performance (Berland and De Rongé 2016; Hooge and Stasia 2016) in a movement aiming to extend lean management to upstream professions. Furthermore, waves of rationalizations are reducing not only staff numbers, but also budgets, time and space available to R&D teams to work (Bobadilla 2014). The desire displayed by S&T organizations, particularly those of a certain size and age, to join the open innovation movement (Chesbrough 2003), hoping to benefit from the multiple advantages associated with it, also leads to a redefinition – sometimes still vague in its precise contours – of the expectations placed on internal R&D professions. All this against a backdrop of economic globalization which is challenging R&D and innovation management (Ben Mahmoud-Jouini et al. 2015).

These cumulative developments call into question contemporary R&D organizations as to whether they are conducive – or more so¹ – to the emergence of expertise. Considering that expertise is largely produced within companies, socio-organizational contexts are the breeding ground on which expertise can be built, but depending on their characteristics, they are more or less conducive to it. Skills and expertise are woven in a close relationship with work activity, which in this case is under considerable strain as a result of the above-mentioned transformations.

The question should not be phrased in a binary manner (whether current organizations are still capable of producing expertise or not). Contemporary developments also take into account fields and types of expertise, as well as expert profiles, which are shaped by/in these organizations and whose suitability to the current and future needs of organizations needs to be evaluated. Were we to summarize risks in a simplistic way, we would express multiple fears about not having enough experts, not having the right ones, not in the right fields, not capable of taking on the right roles, not ready to commit to what the company is becoming or aspires to become, etc.

Corporate and R&D transformations can destabilize the matrix that enabled the emergence of experts over the past period, calling into question their ability to renew expertise in the future. They can also test current expertise and experts by stretching the conditions of activity and challenging them in line with new organizational

1. Depending on whether we are studying emerging or established organizations.

expectations that require different profiles of experts in terms of roles and/or S&T fields. Changes in corporate strategies, linked to tough and volatile competitive contexts, often take place over short time frames, whereas expertise is marked by very long time frames and strong inertia. In a period marked by unprecedented challenges and rarely experienced levels of tension, as in R&D environments, the relative invisibility and lack of awareness associated with the upstream processes for building S&T expertise appear even more problematic.

This chapter now turns to the following question: How is expertise built up in the S&T professions engaged in innovation processes within large organizations in high-tech sectors?

7.1.3.3. The complexity of the production of S&T expertise: an interaction between actors, processes and context

To answer this question, it is essential to seriously focus on better understanding the ingredients of what we have chosen to call the “factory” of expertise. Echoing its use in several recent social science publications (Chambost et al. 2016), the term factory invites us to consider how certain phenomena, institutions and the functioning of our economic and social systems are not states of affairs, data, which exist by nature and whose influence, legitimacy or mechanisms should not be called into question. The use of the term factory is an invitation to enter what appears or is presented as a “black box”, from which we can deduce what goes in (inputs) and what comes out (outputs), but not what actually happens inside in terms of the processes, actors and internal dynamics. As to the factory of finance (Chambost et al. 2016), the authors explain how financial markets are neither “natural” nor arise from a spontaneous order but are social “constructs” whose agents, logic and mechanisms need to be understood, including in order to detect excesses and devise regulations.

Taking an interest in what happens in the “factory”, in this case of expertise, requires “bringing down” the gaze of both researcher and practitioner to the field level, where an overhanging perspective, distant from the terrain, shapes the image of a black box. The researcher’s gaze needs to focus at the level of activity, actors, practices and processes in progress. The challenge is to enter into the complexity of what enables, or hinders, what shapes and how, the skills in S&T professions, to the point of succeeding in forging individual and collective expertise. Complexity is always easier to grasp when we get closer to the object studied, whereas seen from above, it is easy to schematize its functioning, to reify individuals and relationships, and ultimately to lose sight of the details, the twists and turns, the liabilities and the consistency of reality, in this case, the actual work of ergonomists.

Our analytical framework is resolutely contingent and systemic. It is contingent in that it takes context seriously, apprehending its characteristics in a comprehensive

manner and in its irreducible singularity, inviting us to accept the relative nature of the observations and lessons drawn from our analysis. Far from claiming broad external validity, let alone universal validity, our observations aspire to a dual goal: internal validity and relevance for action, relying on solid means to achieve this ambition. The analytical framework adopted is also systemic and interactionist in that it jointly considers the embedded roles of individuals, collectives, socio-organizational work contexts, management tools and managerial regulations, as well as social norms and conventions, institutions and the environment.

This distances our research from other publications that overvalue the action of the individual, allegedly driven by interests independent of contexts, acting in a completely free manner to satisfy them. Those approaches give a prominent place to the profiles and psychological springs of individuals who deploy self-determined behaviors, and easily lapse into the valorization and quest for hypothetical “heroes” (as highlighted and criticized by Lelebina and Gand (2018)). On the other hand, in contrast, we also distance ourselves from papers that consider managerial policies as being both rational and structuring, necessarily producing what their “creator” expects from them in the face of a social void, when the organization’s actors are seen as having neither consistency nor power to act. We adopt an interactionist theoretical perspective, in the sense of the theory of social structuring developed by sociologist Anthony Giddens (1987), which moves away from deterministic readings, considering the complex dynamics of influence as something never determined a priori between the actors and the elements of structure².

7.2. A field survey to explore the question in depth

The problem presented so far was studied using a qualitative methodological approach based on two case studies, conducted on and with partner organizations where we interviewed approximately 40 respondents. We first describe the organizations we worked with, and then we explain the data collection and analysis methods chosen.

7.2.1. Selection and presentation of two cases: Galactica and Nucleosafe

The two organizations this study is based upon are Galactica and Nucleosafe. They are both public companies hiring several thousand employees, spread across several sites in France.

2. What is sometimes referred to as “structuration”, a set of organizing properties (rules and resources) which make the existence of similar social practices possible by framing action.

In both organizations, S&T activities are predominant and they are currently facing significant transformations in their organizational methods and/or their environment. Galactica and Nucleosafe work in areas of activity operating extremely complex systems. They must master many fields of scientific knowledge and cutting-edge technologies, knowing that “core business” expertise is not readily available on the market. Expertise is absolutely key to support current activities and to prepare the technologies and systems of the future.

These two organizations must constantly work to stay ahead of the curve in fields where science and technology are constantly evolving, but even more so to be able to stay ahead of them. This ability to keep up with S&T and to be recognized as credible actors in their sector, including in terms of technological innovation, is crucial for these organizations, their funders and the public authorities.

Galactica and Nucleosafe share significant similarities in several dimensions. These similarities encourage their discussion, since the purpose of this dual case study is not to make a point-by-point comparison but rather to bring our observations and analyses of these organizations into dialogue.

We also had to choose cases for which we had good knowledge of the context and high-quality contacts in the field, ensuring we could both conduct the interviews we desired and discuss the intermediate findings of this study. In each organization, we benefited from a privileged point of contact, with a well-identified correspondent, who allowed us to get in touch with the respondents and who set up a steering committee bringing together members of the organization directly concerned by the challenges in terms of managing experts and expertise.

A summary of the characteristics of these two organizations is available in Table 7.1.

	Nature, activities, size and numbers	Strategic and organizational context	Main challenges in terms of expertise
Galactica	Study and research organization under public supervision in the space sector Several sites in France Scientific fields: advanced electronics (radar, optics, device control) Workforce: 2,200 people, including 1,000 scientists Private contract employees and a quasi-lifetime employment model	Reduction of public budgets Increased competition with the arrival of innovative private actors Deep reorganization of structures and teams New missions: to provide technical communication to the general public and to accompany new entrants into the space sector	Adapting skills to meet new needs brought about by a strategic change Creating new team dynamics Ensuring that skills are maintained in a context of high retirement rates

Nucleosafe	Public research organization in the fields of energy Several sites in France Scientific fields: nuclear energy, renewable energies, material sciences Workforce: approximately 4,500 workers, including a high proportion of researchers, engineers and technicians Private contract employees and a quasi-lifetime employment model	Expansion of missions Achieving the balance between conceptual research and problem-solving activities Demonstrate credibility on core business-related topics to prove S&T expertise	Opening up the role of experts to address key future challenges Encouraging exchanges between upstream research and applied projects Ensuring the maintenance of skills in a context of demographic renewal of the expert population
-------------------	--	---	--

Table 7.1. *Synoptic presentation of the two cases studied*

The sense of urgency for the exhaustive reflection on the methods for constructing expertise which prompted our study is expressed in both companies. The following statement was uttered by a Nucleosafe manager; it could just as easily have been pronounced by a Galactica manager:

Today, our programs need to break new ground on new topics. We realize that there is a shortage of new thinkers on topics that have emerged in recent years. We need to build that capacity.

7.2.2. Systematic data collection and analysis from semi-structured interviews

We conducted 38 semi-structured interviews with three categories of actors: experts, managers and members exerting scientific or administrative support functions. We used the interview guide presented in Box 7.1. The interviews lasted between 1 hour 30 minutes and 2 hours; they were systematically conducted by two or three of the chapter's authors. They took place partly in person and partly by videoconference between April and June 2022.

- 1) Expertise scope (strategic challenges, professions, profiles, definitions, roles, criteria).
- 2) Expertise management policies and schemes (goals and methods, trajectory of policies and schemes, actors in charge of these, perception/reception/experience by S&T professionals).

- 3) Understanding the processes and mechanisms for maintaining and developing expertise.
- 4) Evaluation of the factors that facilitated or hindered the creation of past and current expertise (retrospective view).
- 5) Current organization of activities (professions, projects, communities) and perceived influence on the construction (or not) of current and future expertise (prospective view).
- 6) Management of expertise-building dynamics in relation to the strategic challenges of the future.
- 7) Areas for improvement, current and future projects and reflections.

Box 7.1. Interview guide

The collected material (the 38 interviews, recorded and fully transcribed) was subjected to a thematic analysis, in order to bring out an initial understanding of discourses. This was followed by a lexical analysis using the “Alceste” method (analysis of co-occurring lexemes in simple utterances), developed by Reinert (2007). In no way does this method replace the analysis of the thematic content, because interpretation by researchers remains essential. However, it constitutes an important support. We felt it was particularly appropriate for the present study, since our goal involved exploring the representations of respondents rather than describing the formal management schemes companies rely on to promote expertise. As we have previously shown (Gilbert et al. 2018), these schemes vary little from company to company.

The Alceste method aims to uncover the essential information contained in a text. By analyzing *corpus* contents, it is possible to statistically identify words as they are combined by speakers. The principle underpinning the said analysis comes down to counting words and verb forms as they appear in texts, and their co-occurrences. We believe that word associations are not purely coincidental, and that by taking note of words that come up with a certain proximity in sentences, we can identify the semantic themes of a text, its “lexical worlds”. Statistical measurement detects repeated segments and linguistic redundancies, interpreted as points of emphasis.

The software also identifies the text segments that, from a statistical point of view, are the most representative of a lexical world and that can be considered as abbreviations of the latter. These lexical worlds (or classes) are established by a descending hierarchical classification method constructed on the basis of a factorial analysis of correspondences. We organized the presentation of our findings on the basis of this analysis, without neglecting what was gained from an in-depth reading of the interview transcripts.

7.3. Diving into the heart of expertise production

The presentation of findings is organized around the themes resulting from the content analysis of the interviews conducted. The words³ in quotation marks below are the words identified by the statistical analysis as particularly representative of a lexical world (semantic theme).

7.3.1. *Expertise, a construction that is both cognitive and relational*

7.3.1.1. *Expertise, a long-term cognitive construction*

The word “time” dominates the entire corpus, particularly in the expert interviews. It appears in an ambivalent way, both in the form of a resource for building up the learning required to achieve expertise, and also as a constraint when it comes to providing an “answer” in an “efficient” way, to deal with situations where “problems” are “posed”.

In this respect, expertise appears as the product of an individual cognitive activity which is formed over time:

When you start a job, you have to respect the work of your predecessors, so you have to take the time to understand what has been done before, what has been put in place, why and how, before wishing to renovate everything and add your own touch. (Manager at Galactica)

In my opinion, the reflexes acquired over the years allow you to ask the right questions and become as efficient as possible, especially when time is of the essence. (Expert at Nucleosafe)

7.3.1.2. *Expertise as a relational activity*

While the previous theme is associated with a world dominated by reason, expertise also brings socio-affective concerns to the fore, leading to an intense communication activity. “Listening”, “expressing”, “explaining” and “understanding” constitute the pillars of expertise:

The scientific director has a director title, so we think he’s in charge. The spectrum of scientific and technical activities far exceeds my intellectual capacities [...]. There is an internal top-down communication scheme that allows experts to position themselves.

3. These are words or forms associated with their root (e.g. the terms “expert”, “experts”, “expertise”).

This will guide their actions; making them able to criticize, attack, amend, and challenge this strategy for future development. (Scientific Director at Nucleosafe)

It is not enough for the expert to offer an “answer”; they must also focus on what people “like” and take their “desires” into account:

I spend time with people to explain to them that they will be able to do things the way they like and with the method of their preference. (Expert at Galactica)

7.3.1.3. *Expertise in all its forms*

The dual cognitive and relational character of expertise corresponds to the widespread conception of expertise, both technical (based on strong S&T foundations) and social (importance of a consensus on the qualification of expert and recognition by the community). This invites a closer examination of how these dimensions are expressed and combined in real work. We thus note a great diversity of profiles. While the expert is a singular individual, in the sense that they stand apart from mere specialists, this can be the case in a variety of ways.

At Nucleosafe, we can clearly identify a “canonical expert” whose profile is almost academic (most of them hold a PhD degree, or a qualification to direct research), and for whom influence in the scientific world is a determining criterion. But the company also needs to distinguish in-house experts, those to whom we turn when we have a difficult problem to solve:

One of our difficulties for the [name of a division] is all those who work for the programs and who are not academics, or even those who work on sensitive activities and who will get some recognition [...]. If the director has a question on a subject, that is the one he will call [...]. (Support function)

At Galactica, we noted extremely varied expert profiles, which can be positioned along several descriptive axes:

- hyper-specialized, highly focused experts versus more cross-functional, system-oriented experts, integrators and architects;
- in-house-oriented experts versus externally oriented experts;
- upstream profiles, geared towards exploration and expansion, working with ease in undefined spaces (“pioneers”) versus downstream profiles, oriented towards development and problem solving, in cognitive spaces that are notably better structured and defined (problem solvers);

- expertise that is closely associated with the local context (expertise which could be described as more technical) versus another type of expertise, more easily “detached” from specific contexts (more generic);

- experts concerned with rationalization, formalization, capitalization of knowledge and other experts less engaged with such questions.

We can also identify original figures which arise out of sheer necessity (emerging in response to specific needs):

- the expert in complex technical problems;

- the expert in delicate situations: the one you call when no one else wants to go! In cases of technical problems, but not only (emergent missions, for example);

- an expert profile with more organizational or human skills than in S&T;

- the expert diplomat or multilingual translator: someone who knows how to create links between multiple actors – caught up in their problems and anchored in different universes – in order to organize the “cooperative debate”.

Logically, identifying a need for expertise cannot be reduced to formulating a level of requirement and a workforce for a specific S&T field.

7.3.2. Management schemes with limited effects

7.3.2.1. The presence of management schemes targeted at experts

In both cases, we find expert management schemes, and the actors’ comments refer to the stratification elements of the expertise sector (the different levels of expertise recognized in each of the companies), the way in which this stratification operates (“sector”, “mapping”, “file”, “review”, “opinion”) and its symbolic effects (“title”, “recognition”). These schemes are discussed in association with the actors concerned (“expert”, “HR”, “scientific director” and “manager”).

In both companies, these schemes are much more present in interviews with support functions (HR, technical services, quality) than among experts and managers. At Nucleosafe, a network of scientific assistants has been set up at each site to coordinate the network of experts, organize feedback to scientific management and structure various S&T activities.

7.3.2.2. Little-known and non-binding policies and schemes

In both companies, not all interviewees perceive the existence of a deliberate expert management strategy:

During the annual interviews, I was informed about the different levels of expertise, which remain a little unclear to me. (Expert at Nucleosafe)

I don't feel like there's an expert management system. (Manager at Galactica)

At Galactica, as at Nucleosafe, when the expert management system is known, it does not appear to be mandatory:

Today, there is little or no incentive. (Manager at Galactica)

It depends a lot on the units. The departments [...] have different aspirations and goals. We don't ask them the same thing. Depending on what we ask of them, they have different types of management, particularly expertise management. There is no unified way of viewing things. (Support function at Nucleosafe)

7.3.2.3. Individual management schemes, rather than expertise management

Expert management schemes are perceived as poorly formalized, aiming to identify/recognize experts, but rather lacking in expertise management, *stricto sensu*. Their consequences seem to be quite limited:

Senior Expert? A certain recognition, but it doesn't change your life or day-to-day activities. (Expert at Galactica)

Expertise is almost a bonus. The expert works, has his activity, his reports to be issued, his experiments to carry out, or his calculations to launch. Now, I wonder... once he attains the expert function, what will he gain? What will motivate him to become an expert? (Support functionary at Nucleosafe)

Management becomes vague when the attribution of the title of expert is associated, as in Galactica, with a certain position rather than a role.

While there are schemes for managing individuals, these do not play a role in building expertise, which is essentially the result of encounters between opportunities and motivated individuals, who take the risk of seizing said opportunities and learning from their experience:

The important thing is to know how to build on what you have already done; to know how to take a step back from your practices when faced with new problems; to learn by doing. (Expert at Galactica)

7.3.2.4. A production of expertise by individuals and manager-operators (with HR as facilitators)

The bottom line is that the creation of expertise remains not only in the hands of individuals, primarily (future) experts, but also many of their managers. Although recognized by few, HR plays a modest role in this concert, facilitating and gathering information:

It's good that HR is aware of our aspirations, when an opportunity arises with a manager, they will make sure to facilitate the process. (Expert at Galactica)

The role of HR is simply to gather information. (Support functionary at Nucleosafe)

7.3.3. The influence of business ecosystems

The identity of the company does not seem to have a significant influence on the generic modes of expertise production (emphasizing their cognitive and relational dimensions), nor on the perception of the boundaries of management schemes targeting expertise management. Nevertheless, content analysis highlights the specificity of contexts, of “business ecosystems” (Moore 1993; Iansiti and Levien 2004), attached to each of the two organizations⁴. The verbatim statements of the two companies come together around a common lexical base, marked by the figure of the expert and the activity to be carried out, which combines a relationship with equipment or data with human interactions. This activity takes place over a long period of time and its progress is organized in order to concretize or realize an idea. However, when we go into further detail, these two organizations differ in their conception of expertise and the fine-tuned ways in which it is built.

7.3.3.1. The nuclear ecosystem, a “reserved” research world

The vocabulary specific to Nucleosafe defines it as a scientific research organization, in which membership is asserted first in relation to academic disciplines, and secondarily, in terms of affiliation. It places a marked emphasis on

⁴ Business ecosystems include customers, main producers, competitors, partners, subcontractors and other stakeholders (institutions or organizations).

the world of research: “thesis”, “physics”, “school”, “university”, “research”, “postdoc” are words whose frequency is particularly high:

After a thesis in theoretical nuclear physics, I stayed for about fifteen years in another Nucleosafe entity, taking on responsibilities as lab manager with an expertise that was more theoretical physics relating to the description of the nucleus and part data evaluation when the laboratory expanded (Support function at Nucleosafe).

It is also a world where one is subject to the duty of confidentiality and an obligation of professional discretion, even secrecy. As a result, it can appear relatively closed or, according to the term chosen for the section heading, “reserved”. Exchanges with other actors in the ecosystem are important but limited to what is necessary for scientific production and exchanges.

7.3.3.2. The space ecosystem, a world of design and open technical qualification

Galactica is clearly a place where people identify with and belong. It is a world where technology and associated equipment, rather than science, take center stage.

The vocabulary specific to Galactica’s interlocutors highlights the roles of institutions and organizations in the European space sector (“space”, “Ariane”, “agency”, “European”, “ESA”), as well as the objects and instruments that characterize said activity (“observation”, “instrument”, “orbital”, “operation”, “flight”). These terms, omnipresent in the discourse of our respondents, are associated with the transformations underway:

Until now, all launch schemes have been built within the framework of the European Space Agency, ESA. Today, we are seeing strong centrifugal forces; we have a European launcher system somewhat challenged by national initiatives. (Manager at Galactica)

Galactica belongs to an ecosystem in which exchanges are numerous and cherished, with partners from the industrial world or the general public. The activity takes more concrete forms than at Nucleosafe, focused around physical objects (“launchers”, “satellites”).

The evolution of the strategic context introduces a high degree of uncertainty, giving the impression that we are at a pivotal period, which could lead to significant reassessments.

7.3.4. In short: an interactional factory engaging individuals and structures

The testimonies reported by the respondents incline us to think of the creation of expertise as a matter involving multiple causes, in which individual motivations, opportunities, managerial incentives and, to a lesser extent, formal management schemes confront and meet, more or less harmoniously, but always with a dose of randomness and chance. This observation is consistent with the lessons drawn from Bandura's Social Learning Theory (Bandura 1986)⁵, according to which environmental events, personal factors and behavior all act as interacting determinants of the development of effectiveness.

In such a framework, it is the individual themselves, through an interplay of feedback, who determine what they are aiming for, the means to achieve it and to what extent they will be able to succeed. This observation does not absolve companies of their responsibility in this matter.

The case studies also show the role played by managers, with varying degrees of support, encouragement and protection for the delicate process of building expertise; as well as the pressure exerted by projects, and the influence of organizational and strategic choices in structuring and directing R&D budgets and work. Companies are called to nurture the skills of S&T professionals, provide them with useful resources and "learning experiences", encourage them, etc., and leave plenty of leeway for their self-direction, so that they can achieve what they themselves want.

7.4. Conclusion

The goal of this chapter was to shed light on the methods building up expertise, a subject that remains mysterious, both for companies and for researchers in management sciences. To a large extent, expertise is forged according to complex, largely implicit processes, in which individuals, work groups and managers hold a central place, in relation to the business ecosystem in which their company is inserted. While management schemes specifically designed to spot experts or expertise can make their contribution, they still need to be more firmly rooted in the actual work in which expertise is developed, on a daily basis.

⁵ In a 2002 issue of the prestigious *General Review of Psychology*, Canadian psychologist Albert Bandura was ranked the fourth "most eminent psychologist of the 20th century", behind Burrhus Frederic Skinner, Jean Piaget and Sigmund Freud.

The creation of expertise appears as a multi-actor process whose actions must be orchestrated (see Figure 7.1), rather than having new instruments added, especially if these are merely supplementary and uncoordinated with existing ones.

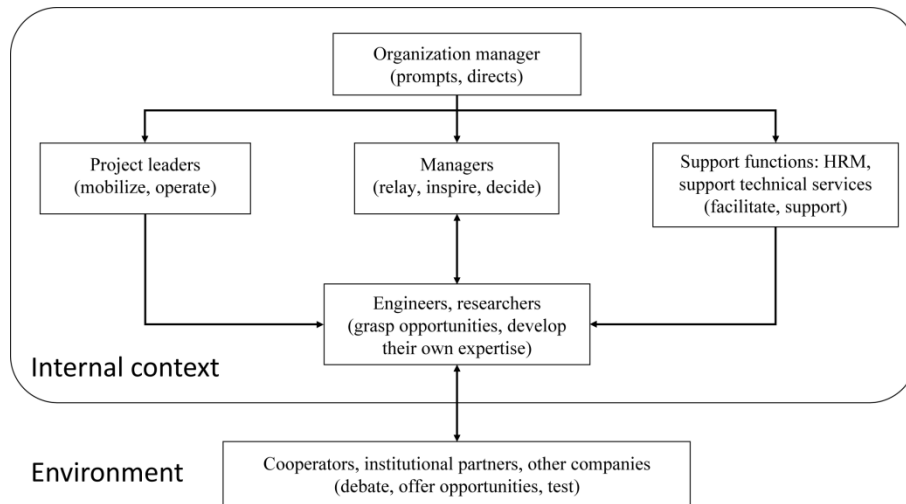


Figure 7.1. The creation of expertise: a multi-actor process

The priority is less to administer formal management schemes, too often oriented towards expertise once it has been established, than to facilitate the development of expertise from which the company's potential for innovation can be expressed, favoring the interaction between strategy and expertise.

This gives rise to a number of principles for action, summarized in Table 7.2. The first principle is of a slightly different nature from the following ones, being less action-oriented, but constituting a necessary introduction before considering the delicate question of management of S&T expertise.

While these principles are generally applicable, their implementation is always dependent on the context and the company. Without this being exhaustive, let us consider some determining contingency variables, such as company activities, strategy, organization and management methods, as well as more specifically the nature of the experts' work and the roles expected of them in relation to the organization's strategic challenges, previous experience in expert management and existing policies and schemes in this area, and also the characteristics, developments and challenges attached to the company's scientific and technological, economic, societal and institutional environments.

Principle	Justification
Acknowledging the dual unnatural and fragile nature of expertise and its creation	Expertise is neither natural nor spontaneous, but results from contextual factors and actors who engage in demanding long-term learning processes. Various pressures weaken these factors, making investment in long-term projects difficult. Companies must sustainably support the creation of expertise.
Thinking “flow” and not just “stocks”	“Stock” approaches manage existing expertise, whereas “flow” approaches take into account the dynamic and evolving nature of expertise. Expertise requires constant maintenance to avoid obsolescence and anticipatory and sustained management.
Taking into consideration the specificities of R&D professions and actual work	Expertise management must understand the specificities of R&D professions, characterized by high uncertainty and unpredictable processes. Professionals in these fields value autonomy, the content of their work and teamwork.
Not hesitating to invent, to tinker, while showing pragmatism	Classic management is often unsuitable for R&D. New managerial practices must be invented, deviating from norms and experimenting with innovative approaches in a pragmatic, non-dogmatic manner. Managerial innovation must be iterative and adaptable based on feedback from professionals.
Making the different actors in the organization work together	Expertise management requires the collaboration of various actors within the organization. It is essential to combine management approaches and consider the individual and collective dimensions of skills. The design and implementation of policies must be carried out by representative and therefore multi-actor groups.

Table 7.2. *Some managerial principles to support the dynamics for building and renewing S&T expertise*

Going further in specifying the measures to be undertaken and their prioritization requires a preliminary diagnosis to guide action. If we want this diagnosis to be useful, it must be widely shared, in its conduct as in its findings, so that it is then possible to consider the design of actions and their deployment, appropriation and regular reassessment in partnership with all the actors concerned within the organization, and even with certain external partners. It is useful here to draw inspiration from the work by Pichault et al. (2013) around the concept of polyphonic management of organizational change dynamics.

While this chapter has provided important answers to the initial mystery of the expertise factory, it also opens up many new questions, echoing the work carried out

around subjects key to technology companies, as well as to others, situated in complex, subtle, multidimensional and evolving environments.

7.5. References

- Allen, T.J. and Cohen, S. (1969). Information flow in R&D labs. *Administrative Science Quarterly*, 14, 12–19.
- Allen, T.J. and Katz, R. (1986). The dual ladder: Motivational solution or managerial delusion? *R&D Management*, 16(2), 185–197.
- Bailyn, L. (1991). The hybrid career: An exploratory study of career route in R&D. *Journal of Technology Management*, 8, 1–14.
- Bandura, A. (1986). *Social Foundations of Thought and Action*. Prentice Hall, Englewood Cliffs.
- Ben Mahmoud-Jouini, S., Charue-Duboc, F., Midler, C. (2015). *Management de l'innovation et globalisation. Enjeux et pratiques contemporaines*. Dunod, Paris.
- Berland, N. and De Rongé, Y. (2016). *Contrôle de gestion: perspectives stratégiques et managériales*. Pearson, London.
- Bobadilla, N. (2014). A longitudinal study of the effects of slack reduction on creativity in R&D and creative teams. PhD Thesis, Sorbonne University, Paris.
- Bootz, J.-P. and Schenk, E. (2014). L'expert en entreprise: proposition d'un modèle définitionnel et enjeux de gestion. *Management et Avenir*, 67, 80–102.
- Chambost, I., Lenglet, M., Tadjeddine, Y. (eds) (2016). *La fabrique de la finance. Pour une approche interdisciplinaire*. Éditions du Septentrion, Québec.
- Charue-Duboc, F. and Gastaldi, L. (2017). Le pilotage des processus d'innovation amont. Vers de nouvelles modalités de couplage entre technologies et usages. *Revue française de gestion*, 43(264), 23–42.
- Charue-Duboc, F. and Gastaldi, L. (2023). Ralph Katz: Gatekeepers, performance des équipes projets et carrières en R&D. In *Les grands auteurs en management de l'innovation et de la créativité, tome 2*, 2nd edition, Cohendet, P., Hussler, C., Burger-Helmchen, T. (eds). EMS, Caen, 41–59.
- Charue-Duboc, F., Gastaldi, L., Bertin, E. (2020). Des communautés d'experts internes comme facilitateur de l'innovation. *Revue française de gestion*, 46(287), 81–98.
- Chesbrough, H. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business School Press, Boston.
- Cina, M. and Paraponaris, C. (2022). Une créativité entravée ? Les techniques d'aide à la création selon l'approche organologique. *Management International*, 26(2), 31–46.
- Ericsson, K.A., Krampe, R.T., Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100(3), 363–406.

- Fablet, A. and Lacaze, D. (2014). Renouveler les pratiques de gestion des experts : une approche par le rayonnement. *Management et Prospective*, 31, 49–67.
- Fritsch, P. (1985). Situations d’expertise et “expert-système”. In *Actes du colloque Situations d’expertise et socialisation des savoirs*. CRESAL, Saint-Étienne, 15–48.
- Gastaldi, L. (2006). Dynamique des systèmes de gestion des compétences en recherche : le cas d’un groupe de chimie de spécialités. In *Nouveaux regards sur la gestion des compétences*, Defélix, C., Klarsfeld, A., Oiry, E. (eds). Vuibert, Paris, 93–121.
- Gastaldi, L. and Gilbert, P. (2006). Transformations du travail de recherche et GRH des chercheurs. *Revue de gestion des ressources humaines*, 61, 46–59.
- Gastaldi, L. and Gilbert, P. (2016). La prégnance de la double échelle de carrière experts/managers : une analyse à travers l’agence des outils de gestion. *@GRH*, 1(18), 11–37.
- Giddens, A. (1987). *La constitution de la société: éléments de la théorie de la structuration*. PUF, Paris.
- Gilbert, P., Bobadilla, N., Gastaldi, L., Le Boulaire, M., Lelebina, O. (2018). *Innovation, Research and Development Management*. ISTE Ltd, London and John Wiley and Sons, New York.
- Haas, A. (2015). Crowding at the frontier: Boundary spanners, gatekeepers and knowledge brokers. *Journal of Knowledge Management*, 19(5), 1029–1047.
- Hauschildt, J. (1999). Opposition to innovations – destructive or constructive? In *The Dynamics of Innovation*, Brockhoff, K., Chakrabarti, A.K., Hauschildt, J. (eds). Springer, Berlin/Heidelberg, 213–236.
- Hooge, S. and Stasia, R. (2016). *Performance de la R&D et de l’innovation*. Presses des Mines, Paris.
- Iansiti, M. and Levien, R. (2004). Strategy as ecology. *Harvard Business Review*, 82(3), 68–78.
- Katz, R. and Tushman, M.L. (1979). Communication patterns, project performance, and task characteristics: An empirical evaluation and integration in an R&D setting. *Organizational Behavior and Human Performance*, 23, 139–162.
- Kuhn, T. (1962). *The Structure of Scientific Revolutions*. University of Chicago Press, Chicago.
- Lee, Y., Fong, E., Barney, J.B., Hawk, A. (2019). Why do experts solve complex problems using open innovation? Evidence from the US pharmaceutical industry. *California Management Review*, 62(1), 144–166.
- Lelebina, O. and Gand, S. (2018). Beyond “hero-based” management: Revisiting HRM practices for managing collective expertise. *Relations industrielles/Industrial Relations*, 73(1), 39–66.

- Lenfle, S. (2014). Toward a genealogy of project management: Sidewinder and the management of exploratory projects. *International Journal of Project Management*, 32(6), 921–931.
- Markham, S.K. (2000). Corporate championing and antagonism as forms of political behavior: An R&D perspective. *Organization Science*, 11(4), 429–447.
- Moore, J.F. (1993). Predators and prey: A new ecology of competition. *Harvard Business Review*, 71(3), 75–86.
- Pichault, F., Chevalier, F., Castro, J.-L. (2013). *Gestion du changement : vers un management polyphonique*. De Boeck, Louvain-la-Neuve.
- Picque-Kiraly, C. and Ottmann, J.-Y. (2019). Organiser la reconnaissance des chercheurs dans les organisations et au-delà de leurs frontières. *Relations industrielles/Industrial relations*, 74(2), 266–292.
- Reinert, M. (2007). Contenu des discours et approche statistique. In *Analyse statistique de données textuelles en sciences de gestion*, Gauzente, C. and Peyrat-Guillard, D. (eds). EMS, Colombelles, 21–45.
- Roqueplo, P. (1997). *Entre savoir et décision, l'expertise scientifique*. Quæ, Versailles.
- Sunder, M. (2007). The invention of traditional knowledge. *Law and Contemporary Problems*, 70(99), 101–124.
- Trépos, J.-Y. (1996). *La sociologie de l'expertise*. PUF, Paris.

Managing Agility in an R&D Context: Practices and Challenges

Since its emergence in the early 1990s (Goldman et al. 1991; Goldman 1995), organizational agility, a multifaceted concept, has become synonymous with flexibility, fluidity, movement, lightness, responsiveness and freedom. Management literature presents it as the new source for value creation, the new key to thriving and surviving in a volatile, uncertain, complex and ambiguous environment (the famous “VUCA world”¹), whether for individuals, teams or companies as a whole. Organizations must therefore become agile, as must the projects and methods used to support these transformations. Leaders themselves are called upon to develop their agility so that the organizations that hire them can become agile.

Agility is often associated with acceleration, which is part of a more general movement affecting society as a whole: according to German sociologist Hartmut Rosa (2010), it is the major experience of modernity. The cult of urgency, and its corollary impatience, is spreading to all stakeholders in the company. “Right now and faster” is the motto of companies, subjecting everyone to the “cult of urgency” (Aubert 2003).

R&D is no exception to this overall trend. It has undergone profound changes in recent years. At the heart of these transformations, agility has become an urgent necessity for managers. It is particularly justified by the market’s increasingly pressing demand for innovation and is fueled by the real or perceived speed of competitors’ responses. Organizational agility, which reflects a company’s ability to sense and respond to market changes, has been widely regarded as the key capability

Chapter written by Natalia BOBADILLA, Patrick GILBERT and Martine LE BOULAIRE.

¹ Expression used since the late 1970s by leaders of a US Army military school (Army War College) to describe how they view the context in which the US operated after the Cold War. The term was introduced into business vocabulary in the early 2000s.

for quickly and properly adjusting product innovation activities to seize emerging opportunities (Pavlou and El Sawy 2006; Lu and Ramamurthy 2011). This agility makes companies responsive to timely and valuable market information for decision-making regarding product innovation (Sambamurthy et al. 2003). It also facilitates the effective execution of new innovation plans (Cooper and Kleinschmidt 2007; Chakravarty et al. 2013).

But while practices based on the concept of agility have obvious advantages, its real impact on innovation and the performance of R&D teams is a poorly understood and somewhat controversial subject. Doubting the very relevance of the concept of organizational agility, some researchers such as Wendler and Dresden (2014, p. 1197) go as far as to assert that “the management of an organization has to understand that the organization itself cannot be agile, but its employees can be”.

Without downplaying the interest of these debates, the aim of our study is, more modestly, to see how R&D work addresses agility requirements, to grasp which management practices meet said requirements, assess the difficulties for implementing them and outline practical courses of action.

8.1. A wealth of literature, but still unanswered questions

8.1.1. *Implications and scope of organizational agility*

Since Goldman’s pioneering writings, agility has been the subject of extensive study. The concept itself remains polysemic and, by way of definition, most often refers to the challenges that companies want to address, or the benefits they can expect to gain, rather than to clearly identifiable characteristics.

For most authors, agility is a question of responsiveness to market instability and unpredictability. Others emphasize the advantages of agility, which make it appear like a new panacea. According to Rigby et al. (2016):

- it increases team productivity and employee satisfaction;
- it minimizes the waste inherent in redundant meetings, repetitive planning, excessive documentation, quality defects and low-value product features;
- it improves customer engagement and satisfaction, bringing the most valuable products and features to market faster;
- it broadens organizational experience by building mutual trust and respect;
- it allows senior managers to devote themselves more fully to higher-value work.

Goldman et al. (1995, p. 55) provide us with a little more insight into the components of agility, albeit in fairly general terms. They emphasize four characteristics: delivering value to the customer, being ready for change, valuing human knowledge and skills, and establishing virtual partnerships.

With this in mind, Dyer and Shafer proposed an agile organizational capability model (see Figure 8.1). At the center is the inner core, assumed to be relatively stable, comprising a shared vision, shared values and common performance metrics. Gravitating around this core is a moving framework including four reconfigurable elements: structure, technology, processes and people.

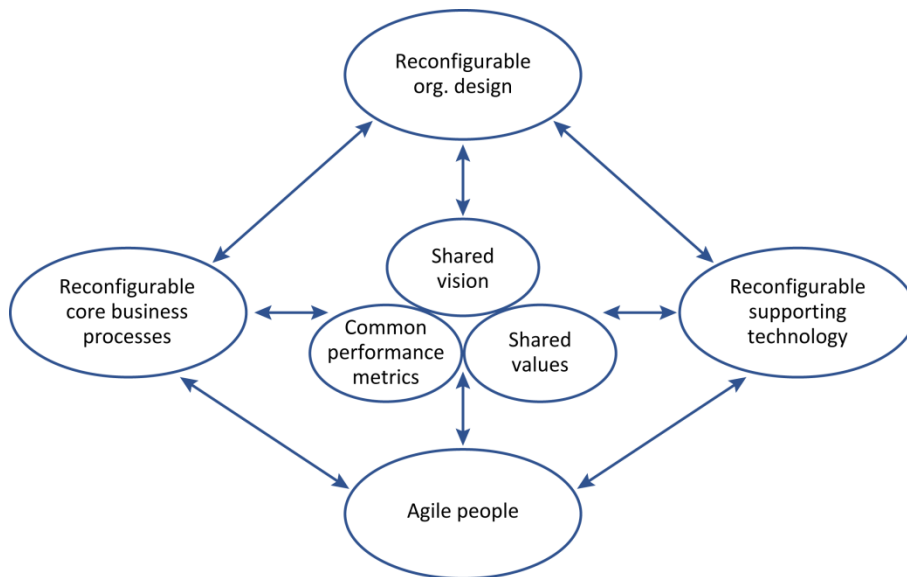


Figure 8.1. *Agile organizational model, adapted from Dyer and Shafer (1998)*

This model, which serves as a starting point, has been further developed to make it more actionable.

Recently, a group of researchers have undertaken a literature review. Zitkiene and Deksnys (2018) have proposed combining different approaches and perspectives on organizational agility to obtain a more coherent and comprehensive conceptual model, applicable to various industries. This conceptual model articulates agility drivers (what forces an organization to become agile), enablers (the entities change relies upon) and capabilities to adapt to necessary changes and practices (what the

company does to become agile). It is this last component, agile practices, that caught our attention.

Based on a literature review and a qualitative study of 22 senior executives from French companies, Charbonnier-Voirin (2011) proposed a scale for measuring the main practices that agile organizations use in their daily operations in order to achieve agility. She distinguishes four groups of practices:

1) practices directed towards mastering change (practices aimed at developing the organization's capabilities to respond to change and the actions undertaken to this end);

2) practices promoting the value of human resources (workforce empowerment practices, increasing participation in decision-making processes, tools aimed at developing skills and fostering creativity);

3) internal and external cooperative practices (practices designed to encourage internal cooperation and develop partnerships);

4) practices for creating value for customers (aimed at gaining knowledge of customer expectations and introducing innovative offerings).

These practices reflect the essence of the original spirit of the Agile Manifesto, which led to a shift in project management. The goal, in this area as in others, is to stay within budget and meet deadlines, while being able to adapt and integrate the changes that are bound to arise throughout the course of projects. This perspective leads to an emphasis on individuals and interactions (rather than processes and tools), emphasizing the importance of collaboration with customers and responsiveness to change.

8.1.2. Agility in R&D

8.1.2.1. The content of agility

How does agility translate into practice in R&D contexts? While there is a wealth of literature on strategy, manufacturing, IT, marketing, etc., there are fewer publications on design activities. Studies most often focus on a single level of agility (strategic, operational or individual). However, some contributions are worth mentioning.

To explain the ambivalence of the effects of information technology on organizational agility, Lu and Ramamurthy (2011) conceptualized two dimensions of agility based on product innovation:

– Market capitalization agility reflects the ability to capitalize on market changes and focuses on the initial planning of product innovation to effectively target customer preferences.

– Operational agility refers to the ability to respond to market changes physically and quickly by means of internal processes, and involves executing an innovation plan to bring new product designs to fruition.

8.1.2.2. *Expected benefits*

In the context of product innovation, organizational agility generates benefits for companies by detecting and responding to market changes. Agile companies have a solid market knowledge and are aware of current market trends (Overby et al. 2006; Roberts and Grover 2012). Companies thrive and improve when creative thinking about product innovation is aligned with current market changes (Richtner and Löfsten 2014). Agility also represents the ability to react quickly, which helps companies adjust their internal operations and take action based on market changes (Sambamurthy et al. 2003; Tallon 2008). Thanks to this ability, companies effectively adapt their product innovation processes to create and market new products in response to specific market disruptions or demands (Hock et al. 2016).

Despite the benefits being clear, companies are not yet sufficiently agile in the face of market changes (Huang et al. 2012; Wang et al. 2014). The study of agility is still rare in the literature on product innovation and only few studies integrate the different dimensions of agility and R&D specificities. While some practices are well described, implementation problems are not clearly identified, but focus on specific drivers.

8.1.2.3. *The drivers of agility*

Given the advantages and difficulties associated with developing agility, existing studies have made considerable efforts to examine its antecedents. Researchers have proposed the capability building perspective as a theoretical framework for analyzing the development of agility (Chakravarty et al. 2013; Lee et al. 2015). This perspective considers organizational agility as a higher-order capability which requires the support of fundamental capabilities (Teece et al. 1997).

Cai et al. (2019) note that knowledge management capability plays an important role in the relationship between IT capability and organizational agility. They studied how to exploit information technology capabilities to enhance organizational agility in the context of product innovation. According to the authors, information technology can be associated with agility in two ways. On the one hand, it contributes to agility by providing fundamental technical support for the effective deployment of knowledge resources. On the other hand, IT capability is also valuable

for directly improving agility by creating digital options. Despite the above-mentioned merits, IT capability has also been suspected of triggering rigidity and unexpected obstacles to agility (Lu and Ramamurthy 2011; Chakravarty et al. 2013). Although IT capability can improve a company's information processing capability, it can also lead to information overload for decision-makers, resulting in companies' inability to respond in a timely manner (Seo and La Paz 2008).

However, most research has a much broader scope, focusing less on technical means and more on innovation processes, in terms of managerial and social components.

Take the example of Kach et al. (2012), who focus on the development of high-novelty innovative aeronautical projects under a time-pressured schedule. Three factors seem to have a key impact on the success of such projects:

- the role played by the leader: visionary, determined leadership based on the engagement of managers provides better guidance by promoting a clearer understanding of the project;
- project momentum: when subject to time pressure, disruptive innovation will be more successful if project dynamics are strong, underpinned by solid member commitment, the ability to stay on track, an optimistic outlook and decision-making capabilities.
- team collaboration, which is facilitated by a common goal, trust between members, a creative work environment and the project's exceptional nature.

Along the same lines, Thamhain (2003) notes that, more than any other process, teamwork affects innovation and organizational performance. The data from his study also suggest that many performance variables lie outside the R&D organization. For example, leadership style, both at the R&D team level and at the management level, has a significant impact on creativity, which ultimately affects R&D performance.

The importance of collaboration within R&D teams, both internally and externally, is also emphasized by Blomqvist et al. (2004) in their study of a telecommunications company. According to these authors, collaboration is a meta-capability for innovation. In an approach they call "networked R&D management", they emphasize internal and external collaboration networks. They consider these networks to be essential for companies operating in a dynamic business environment.

Finally, from a process perspective, Frishammar et al. (2013) study the early stages of new product development as a starting point for learning more about process definitions. The authors argue that despite their potential for efficiency gains, these aspects have been insufficiently studied. In a longitudinal study of four large

companies, they reveal that companies proceed through iterative trial-and-error processes, in which experimentation, environmental analysis and activity planning are key methods for reducing development uncertainties.

8.1.2.4. *The search for agility through the internationalization of R&D*

The strategy of seeking agility in R&D in large companies is increasingly accompanied by a differentiation in innovation capability based on the internationalization of R&D. According to Ben Mahmoud-Jouini et al. (2015), the motivations pursued by companies when they internationalize R&D are: to increase their R&D potential; to acquire knowledge to adapt to local needs; to acquire new knowledge to make up for lost time; to benefit from the local innovation ecosystem; and finally, to reduce R&D costs. The choice to internationalize is clearly related to the search for greater agility than in the corporate structure, to seize new opportunities in local markets and streamline R&D activities globally.

8.1.2.5. *The strenuous trade-off between agility and risk control*

Agility brings with it a number of disruptions that lead companies to call into question some of their routines. However, breaking out of their most familiar modes of operation seems to be an unavoidable requirement. In a study empirically testing the role of variables related to organizational resilience in innovation capability and product performance, Akgün and Keskin (2014) note that “counter-intuitive agility”, or the ability to adopt responses that differ from the ones provided by the repertoire of organizational habits, profoundly contributes to organizational resilience, which in turn has a positive influence on innovation capability and the performance of companies’ products.

But how can we become agile and break with well-established processes without embarking on the path of indiscipline, which can cause disruption and problems? This question is the subject of heated debate in the product development community. On the one hand, there are those who favor relatively formal methods, punctuated by stages to limit risk-taking. On the other, there are those who prefer to break free from the constraints of formalization in order to operate more quickly and flexibly, but without a safety net. Boehm and Turner (2003) explore product development methodologies that aim to strike a balance between agility and discipline. The authors provide intermediate solutions that exploit the strengths of both approaches. Despite being specifically aimed at the software development community, their book can be valuable for a wider audience.

This book lifts a corner of the veil. However, many fundamental questions remain unanswered. Two of them will be the focus of this chapter: What practices are being implemented? What obstacles and challenges do they raise?

8.2. Four case studies

8.2.1. Methodology

We used a qualitative research methodology based on case studies. Eisenhardt (1989) noted that case studies are particularly well suited to new areas of research. A case study is an empirical investigation that examines a contemporary phenomenon in depth and in its real-world context, particularly when the boundaries between the phenomenon and the context are not clearly evident (Yin 2017). Case studies can facilitate in-depth analysis and our understanding of agility in R&D contexts, the practices implemented and implementation problems.

Four cases, herein referred to by fictitious names, constituted our research corpus:

1) AeroIndustry is a large European aerospace company. Listed on the French stock market CAC 40, it hires over 100,000 employees.

2) Constructor is a national defense shipbuilding company with a history dating back several centuries, whose major capital is held by the French state. It hires approximately 13,000 employees.

3) A-part is a family-owned industrial group with approximately 7,000 employees that manufactures and distributes products in the automotive sector.

4) Hydropalax is a medium-sized family business (2,500 employees) whose products are generally sold directly to the agriculture, construction and public works sectors.

The fieldwork was conducted between April 2019 and January 2020. In each company, data were collected through in-depth semi-structured interviews. The interview guide (Box 7.1) was based on a multidimensional concept of agility, resulting from an adaptation of the measurement scale established by Charbonnier-Voirin (2011) after various exploratory interviews.

The participants from each organization were mainly managers and team members (scientists, engineers, technical experts) belonging to R&D units. A total of 40 respondents were interviewed individually or in focus groups.

The interviews lasted between 45 minutes and 1 hour 15 minutes. They were recorded and transcribed. The transcripts were then coded using Nvivo 10 and analyzed separately by each researcher and discussed jointly. Beyond the similarities in the observed practices, we analyzed each organization's challenges and difficulties. Finally, a case study was written for each company. Triangulation of

sources was also used, combining consultation of secondary sources such as meeting and workshop minutes, internal reports and company reports.

Let us start by introducing each case, highlighting both the salient traits of practices and the perceived difficulties, before summarizing the main lessons drawn.

8.2.2. AeroIndustry: in search of disruptive technologies

With a global presence, AeroIndustry operates in the aerospace, space and defense sectors. Since a restructuring plan was implemented in the early 2010s, the group's organization has undergone significant changes, with a major consolidation of business units and an overall restructuring. The group's innovation policy is based on a long-term vision, supported by the regular launch of prototypes.

8.2.2.1. Change management

AeroIndustry has embarked on a major transformation and a massive R&D restructuring plan. Beyond a reduction in headcount, the strategy has fully evolved, and the project portfolio has been reduced and is currently better structured. The R&D strategy was defined early on and broken down into horizontal and vertical roadmaps, accompanied by competitive intelligence, as a manager explains:

Products are simply responses to needs. In these new missions, such as *Urban Air Mobility* or aircraft with a 50% reduction in CO₂ by 2050, the strategy has been broken down into defined and managed hierarchical levels. In our organization into roadmaps with technology push roadmaps, we have to analyze competition at the level of each technological building block. This gives us a clear picture of the competitive landscape. (Manager within the R&D team)

AeroIndustry has also implemented a new measurement system to replace the traditional TRL². Rather than maturity levels, new indicators measure technological performance. New organizations are being created to accelerate innovation, some of which are independent.

Despite these developments, managers express difficulties in translating strategy to different technical levels. In addition, the slowness of government clients and

² Technology readiness level (TRL) is a measurement system used in many fields to assess the maturity level of a technology (equipment, components, peripherals, etc.), to manage the technological risk of its programs and decide on R&D funding. There are nine TRLs, ranging from the lowest (1: basic principles observed and reported) to the highest (9: full commercial deployment granting successful operations).

dependence on funding from European Union programs are slowing down the strategy's implementation:

A large part of the budget is co-financed by governments or the European Union to a significant extent, and there are industrial relationships with other organizations negotiated on the basis of a large number of contractual conditions for a period of approximately three years. In every contract I have signed, there is always a stop clause. Our ability to change is largely limited by contractual frameworks [...]. This requires great alignment and ample agreement, so that when someone decides out of the sudden, "I want to change this", it is difficult to break. (Head of Operations and Technology Planning)

8.2.2.2. *Human resources development*

The new R&D organization is less hierarchical and encourages autonomy and accountability. The agile methods put in place allow for a greater level of empowerment within teams:

When implementing these methods, it is important for management to be aware that they are placing trust in their teams, particularly when it comes to decision-making. When someone is responsible for different activities, it is up to that person to make all the inherent decisions. (R&D Manager)

Workers are encouraged to take part in disruptive innovation projects and to gain independence, so as to get involved in exploration structures. Instead of undergoing external or internal training, R&D and R&T members develop their skills within projects, the idea being to learn through experience and trial and error. Programs assess risk earlier in order to stop or set up corrective actions quickly. From a performance assessment perspective, agility is part of the annual goals and therefore part of the evaluation made by managers:

This year, I've added agility to most people's goals. I want to encourage them and, through their objectives, give them the chance to do things differently, in a more agile way, both individually and within the team. (R&D Manager)

Even though things are changing, some people (more experienced workers or those with greater seniority), tend to be more reticent to welcome these new practices.

8.2.2.3. *Internal cooperation*

AeroIndustry has implemented agile practices and tools to improve the transition between R&T and R&D; for example, through the implementation of demonstrators and a common governance system between the two structures.

Monthly synchronization meetings across different departments and business lines are held on a regular basis:

We are directly linked to the strategy in two different ways. Our roadmaps are structured in such a way that Level 1 includes people from strategy, or those somehow linked to strategy. Product policy is transcribed into our technical roadmaps. There is a strong link between the CTO Office and the Strategy Office, which is managed from a governance perspective. They meet regularly to exchange ideas and get as much input from one another as possible, in real time. (Head of Technology and Portfolio Management)

These meetings are organized using a bottom-up approach, with the aim of proposing R&T projects that fit within these roadmaps, with feedback across business lines, programs and the project team. AeroIndustry emphasizes cross-functional work between R&T, R&D and the ecosystem. However, the organization finds it difficult to accelerate certain processes, especially purchasing. It is also difficult to bring projects to an end.

8.2.2.4. *External cooperation*

In its search for disruptive solutions, AeroIndustry has created several external innovation structures, such as “ExO Alpha”:

We are a subsidiary, dependent on AeroIndustry, but we are legally a separate entity. We are different in two main ways: first in terms of staff and secondly in terms of contracts. In relation to staff, our idea is to hire people for the project’s duration, whether from AeroIndustry or other industries. We do this to learn from people, but also to teach them how to introduce their technologies to the aerospace market. On the contractual side, we also have the freedom to partner with non-traditional partners. We apply the same logic here: we try to bring them into the aerospace world. (Chief Operating Officer)

The goal is to make decisions quickly and bring about disruptive innovations. These initiatives have a high sponsorship level. However, independent structures are perceived as fragile because they are highly dependent on sponsors. The group has

also created partnerships with suppliers and maintains strong ties with companies within and beyond the sector.

8.2.3. Constructor: accelerating the advent of product innovation

Constructor is a high-tech, international company with over 15,000 employees and a turnover of approximately €3.7 billion, 35% of which is generated internationally. It is a world-leading manufacturer engaged in the entire process of heavy vehicle project management (from design to withdrawal from active service). As a networked company, its skills portfolio features the expertise of in-house specialists spread across a dozen sites in France and, more recently, the know-how deployed by its network of partners.

The challenges are varied and many. On the technological front, the company aims to anticipate technological disruptions and develop high-value-added technological solutions. On a scientific level, it seeks to exploit recent work in the scientific research ecosystem in France and at an international scale. On an economic level, confronted with reduced public funding, it has expressed a strong desire to internationalize so as to ensure growth. These challenges have led it to maintain a network of experts in scientific fields and to acquire new expertise in a highly competitive job market.

8.2.3.1. Change management

Constructor has a long history of state ownership. It became a national company in 2000, then a private company with public capital in June 2003, before merging with a high-tech industrial group in 2007. This evolution led to a radical transformation of its operating methods. Product and process innovation has always been part of the company's DNA, dedicating €120 million to its technical innovation department. It has set up a sophisticated technology watch to stay at the forefront of innovation and participates in think tanks and programs in France and at the European level. The perception of the company's commitment to change is felt at the base, even among new entrants:

I'm happy that, despite the company's history, there is a willingness to change in R&D. That doesn't mean that everyone wants to change, but at the organizational level, there is a desire to improve, without any obstacles to change. (Artificial intelligence engineer)

Change management is mainly hindered by three factors. The weight of institutional sponsors slows down decision-making due to the formalism attached to contractualization: "we do a lot more paperwork than technical work, we have to comply with a lot of indicators and quality processes. All of this is difficult to accept for

the average person at Constructor” (R&D Engineer). Long innovation cycles are ill-suited to increasingly turbulent technologies. Finally, the technologies used are sensitive and there is a strong aversion to risk at all levels. As a result, project managers themselves are not very open to change:

The primary duty of a program manager is to reduce risk. When you introduce innovation, you inevitably introduce risk. (Technical Director)

8.2.3.2. *Human resources development*

The scientific and technical department is one of those entities where people feel responsible. In terms of day-to-day work, teams appreciate the autonomy they are given in carrying out their tasks:

There is a lot of latitude in our daily work. Paradoxically, I said that there are lots of indicators, but the bottom line is that we are quite free in our daily work; we don't have our boss breathing down our necks every five minutes. First of all, he doesn't have the time. In general, we know what we have to do, whether we're doing it well or not, whether we're on schedule or not, but overall we still have a good impression of the work to be done. (R&D Engineer)

Although it recruits highly qualified staff, the company invests in human resources development, devoting 6% of its payroll to training. In addition, for more than ten years, it has implemented an expert management division, building a specific career path for technical experts and ensuring their development to the highest qualification levels. A panel of experts ensures that the most critical scientific skills are maintained. The contribution of the HR department, which drives this development, is not always clearly perceived, but has helped to shake up a staff management system that was too focused on administrative aspects. In particular, the HR department has encouraged the promotion of young talent to positions where they were not naturally expected.

8.2.3.3. *Internal cooperation*

Under the impetus of the technical and innovation department, a technical network is able to mobilize around various projects. It stimulates technical innovation and identifies the areas of technical expertise necessary for the company's strategy. Cross-functional initiatives were developed (design of the expert management device, led by the technical department and HR, entrepreneurship hub where volunteers can develop projects).

Despite these initiatives, internal cooperation still needs to be strengthened, because the structure is quite vertical: “we tend to work in silos, which is not surprising given the company’s size. My job is to work cross-functionally. People are not opposed to this, but it takes a lot of energy. The person who works across departments has to answer to A, B, or C, but the boss is A, and it’s the boss who will evaluate the worker at the end of the year. So if he has a choice to make, he will go for A because it’s his boss who will do the annual evaluation” (Technical Director). In addition, business units find it difficult to imagine having projects in the pipeline without knowing the outcome beforehand. Another obstacle to cooperation is the significant cultural divide between the worlds of R&D and programs.

8.2.3.4. External cooperation

In order to ensure international growth, Constructor formed partnerships in response to calls for tenders. To accelerate the group’s innovation and stimulate creativity, an Open Innovation department was set up. In the long term, the company will strive to implement a collaborative system so as to pool expertise and industrial resources and thus accelerate the search for financing, while ensuring that the risks arising from openness are controlled. Collaborations are decided in a reasoned manner:

Every day lots of people approach to us. One of the challenges is knowing how to select the right partners and avoid wearing ourselves out looking for new collaborations at the expense of existing ones. We also need to know how to stabilize our ecosystem and define priorities (R&D Project Director).

However, openness to the environment is limited by the need to preserve the secrecy of some of its products. In this highly technical company, R&D managers and engineers lament the insufficient sharing of knowledge about customer expectations and perceptions:

At the industrial management and R&D levels, we get no feedback. We don’t know what they’re saying, what they want, what they’re asking for, or what they don’t want. (Technical Director)

8.2.4. A-part: innovating in all business lines

The company is a family-owned group founded over 150 years ago, capital having remained in the same family for five generations. It has 7,000 employees spread across 20 sites worldwide. Its revenue growth has been driven primarily by organic growth, though it has also expanded through alliances and acquisitions. Its

customers are mainly in the automotive manufacturing sector. In recent years, it has implemented a plan to radically transform its culture.

The aim is to ensure that innovation and technology are no longer confined to R&D, but extended to the entire organization. A-part, a technical center fully dedicated to innovation, is driving this transformation on a large scale. It is located on a 2,800 m² site and hires 35 workers (mostly young engineers or academics) from five different nationalities, dedicated to research and development and supported by five team leaders. The idea for the unit emerged in 2007, spurred by the CEO, with the goal of creating an entity that was neither linked to subsidiaries nor dedicated to day-to-day business. Prioritizing experimentation over planning, A-part can be described as an “experimental unit” with a global reach.

8.2.4.1. *Change management*

A-part has decided not to develop technology roadmaps based on the needs explicitly expressed by customers: “innovation is not defined in relation to customer requirements specifications”:

Customers are not necessarily our problem. We know they are there, we know that someone (the company’s marketing department) is monitoring them. We try to stay upstream of the process. (Advanced Business Development Team Executive)

Since then, the firm has been working on the basis of trends and opportunities, analyzing their potential and associated risks. It relies on a process prioritizing and monitoring projects, pipeline project management (avenues to explore, commercial value, feasibility), which includes a method for selecting disruptive projects with promising potential value. This type of operation, which deviates from the rational planning approaches commonly used in the industry, benefits from political support from senior management and corporate funding.

The difficulties for managing change among teams mainly stem from the multitude of changes that arise over time, a source of frustration and exhaustion for individuals:

When there are too many changes, we don’t have time to adapt, to really see, to get to the bottom of a process to see whether it was good or not. Sometimes we change it a little too often. (Test Engineer)

Another type of problem relates to the discomfort experienced at “having to kill” projects whose viability is too uncertain, due to the high level of personal commitment previously required. Members of the organization also note a strong tension between the short term and the long term.

8.2.4.2. *Human resources development*

Human resources are valued both through the organization of work and individual recognition. A-part benefits from a flat structure that practically leaves no room for hierarchical status. It does not formally assign projects, giving everyone the freedom to experiment with ideas and, if necessary, to fail. It promotes individual autonomy in the assignment of different activities and working hours. This way of operating is not unique to A-part; it extends to the entire company and strongly relies on communities of practice, as pointed out by this young researcher:

XXX has this mode of governance displaying fairly soft management. We seek to promote people's autonomy and to draw on technical expertise, with a view to promoting a communal aspect.

A transformation plan to promote a culture of innovation and intrapreneurship has been underway for several years. In addition, A-part has incorporated a bonus and patent incentive system.

Although it is a very stimulating work structure, the working frameworks are vague and difficult to assimilate. As a consequence, organizational socialization is a long process:

I found the learning curve very long compared to XXX (name of an automobile manufacturer). Before XXX, I worked at a much larger American aluminum company [...]. I worked for the building division and was responsible for the European innovation center, a small structure with ten workers. Innovation was less thorough [...]. On the other hand, the integration of people and skills recognition were much faster than at A-part. (An expert)

The company leaves it up to each individual to motivate themselves, which is far from self-evident. This results in risk-taking in individual decision-making, both at the member and entity levels. This type of structure does not allow for the setting of individual performance indicators, and bonuses can be perceived as arbitrary.

8.2.4.3. *Internal cooperation*

Cooperation is fluid within the entity. A communication campaign on the work done by A-part is being carried out in conjunction with other organizations to legitimize the activity of this experimental unit. Discussions about projects take place spontaneously and rely on several agile methods, such as the "Mom test" or "Design to value", an agile approach to product and service design focusing on individual innovation and customer value. The firm encourages a high level of internal role rotation, which opens up A-part to other company departments and helps

to spread the culture of innovation. Among the internal supports, we can mention the group's HR department, which was the company's first scrum master (coach, mediator, moderator, facilitator), and provided assistance, particularly in community management and creativity training.

It is nonetheless difficult for the rest of the organization to understand the work of this experimental unit. There is also a loss of agility when projects are transferred to headquarters. Finally, to A-part's regret, the customer remains the preserve of the sales force.

8.2.4.4. External cooperation

Despite the reluctance of sales representatives, A-part organizes regular meetings with end customers prior to mass production and works closely with network members. Non-disclosure agreements with partners have been concluded to encourage cooperation, while protecting intellectual property and silencing any internal criticism. To date, A-part does not see the point of opening up further to start-ups or similar open innovation forms, adopting the motto: "Why buy the cow when you can get the milk for free?"

8.2.5. Hydropalax: getting organized to promote innovation

Hydropalax is a medium-sized family business (2,500 employees) whose products are generally sold directly to the agriculture, construction and public work sectors. Hydropalax manufactures hydraulic transmission solutions. Although the last two years have been marked by a certain dynamism, that was not the case back in 2019.

8.2.5.1. Change management

The main operating mode is reactivity to events rather than anticipation, and the company's strategic vision for innovation is little known and hard to understand:

There are no new products. I don't know what we will do in the next five years. I have no idea what the flagship product will be in five years' time. I have a lot of questions about electrification. I don't see many synergies. I know that an electrical division has been opened, but it doesn't communicate much with the testing department.
(Testing Manager)

The product portfolio is broad, as is the variety of customers. Until now, the company has pursued an opportunistic strategy, seeking to grow by developing a wide range of customers. This makes it hard to define growth drivers and for teams to

understand the company's strategic positioning in terms of innovation. As one product manager explains:

Yes, today we're pulling in all directions. Our product portfolio is extremely broad, as is our range of customers. We're trying to embrace the entire market and all its applications at once. (Product Manager)

The lack of a shared vision among teams generates behaviors whereby each worker focuses solely on their own goals. Another problem is the different time lapses considered important by the various departments.

8.2.5.2. *Human resources development*

Globally, the company has extensive technical knowledge, and its innovation policy emphasizes excellence. However, there is little support for innovation managers through training, and collective recognition is less valued, as explained by the fab lab director:

Management methods at Hydropalax are rather old-fashioned: they specify the tasks you have to do, here is your list of activities, come and see me when you have finished the third activity on your list. Yes, boss, but the three tasks you have asked me to do, when I add up the days, don't fit into my working week [...]. (Fab Lab Director)

The teams mention that they have little autonomy in decision-making and are closely monitored at the operational level. Informal sharing initiatives are rare. The pursuit of technical excellence influences the ability to take risks. Besides, collective recognition practices are not an integral part of the HRM system.

8.2.5.3. *Internal cooperation*

An external unit has been set up, which operates in start-up mode using agile methods (short feedback loops; concurrent working; co-innovation with the customer). Resources are allocated in envelopes with objectives set by the product lines. There are few common goals across departments or product lines.

There is a lack of cross-functional collaboration and communication between teams. Work is organized in silos and focuses on formal procedures, while innovation support services (prototyping, testing) are driven by cumbersome indicators and procedures which hinder any attempt at agility:

When I joined the company, we would just make a simple little drawing on a piece of paper, the modeling workshop was here, we used to come in, talk to the manager, approach the machine to identify the

person who could make the part, and work something out. We made the part and things went relatively quickly. Today, the process for getting a part has become extremely burdensome, even complicated. Of course, we are able to make parts with much higher quality and fewer errors, but with an unreasonable timeframe. (Head of the Innovation and Creativity Division)

The company prioritizes flexible external innovation solutions (outsourcing prototypes or testing), rather than promoting inter-department cooperation. In this sense, a mini fab lab recently set up in the workshop is trying to promote a “quick and dirty” approach and get the innovation teams to work on an artifact.

8.2.5.4. External cooperation

The company prioritizes the confidentiality of projects vis-à-vis the outside world. After some unfortunate experiences, the firm is shifting towards greater control of information and less openness. External collaboration mainly takes place with universities:

I collaborate with various laboratories and universities on upstream topics. I've put together six or seven theses with different labs since I started at Hydropalax, working with external laboratories on topics that are a bit specialized in terms of comprehension or patterning, sometimes on new treatments or machining problems. It's important to understand that this takes time, and you have to accept the pace of the university. It doesn't work at the same rhythm, nor with the same constraints. (Director at Advanced Innovation)

The purpose of these collaborations is to produce doctoral theses aimed at understanding products and systems. R&D exchanges with customers are rare, with no direct feedback from customers nor from marketing.

8.3. Cross-disciplinary lessons

8.3.1. Contrasting representations of agility

The study of the four cases reveals contrasting representations. Regardless of the diversity of practices, which translates that of business sectors and the polysemy of the concept of agility, companies share a common understanding (Table 8.1). Still, there are differences related to the business sector, the specific challenges of each firm and its degree of progress on the path to agility.

Agile methods (scrum, lean development, etc.) are mentioned in three of the four cases. Interestingly, this concept of agility is absent from A-part, for whom agility is more a matter of corporate culture and mindset. Conversely, the mindset component is not emphasized by Hydropalax, for whom the path to agility in R&D is a very recent prospect. Let us also note that A-part stands out clearly with its radical vision of agility (flexibility, information exchange, emphasis on knowledge and individual commitment). This approach is linked to a distinctly organic structure.

	Challenges	Dominant representations
AeroIndustry	Seeking disruptive technologies enabling significant gains	Agile methods Acceleration Mindset
Constructor	To accelerate the advent of product innovation	Acceleration Flexibility Open innovation Agile methods Mindset
A-part	To profoundly transform the culture To innovate in all business lines	Anticipating market trends Mindset Learning faster Less planning Experimentation
Hydropalax	Getting organized to promote innovation	Anticipating technological developments Adapting to the environment Agile methods

Table 8.1. Representations of agility

8.3.2. The need for in-depth transformation

Beyond the specific representations of agility that dominate any given company, they all share the conviction that the requirement for agility cannot be met by marginally adopting a “best practice” or fashionable method. Making a strong commitment to agility requires significant changes, which are reflected at various levels:

- at the strategic level, leading to a different approach preparing for the future;
- operationally, in the way the project portfolio is structured;
- at a less visible level, both the evolution of organizational culture and employee mindset require a sustained effort over time.

Although these principles were not evenly raised by all the actors, they were present in the interviews with many of our respondents. This makes it clear that agility has come to stay.

8.3.3. Interface management and internal cooperation: a difficult challenge

Among “agile practices”, those concerning internal cooperation seem to be the most challenging. Managing interfaces across different research programs and R&D teams is often mentioned as problematic. Another factor that influences internal cooperation is the organizational climate. A compartmentalized work culture, focusing on formal procedures and constant questioning of the contributions of innovation structures and programs, is perceived as a barrier to agility. The use of demonstrators, internal projects designed to assess the feasibility of a technical innovation, appears to be a useful tool, as well as bringing to light the hitches of cooperation.

8.3.4. Openness to the environment and networking with the innovation ecosystem

The companies analyzed have created external structures to become more agile. Existing structural constraints are stimulating the creation of these types of structures, fostering more open management styles and propitiating improvisation. They are also exploring the avenues of open innovation linked to a regional and international sectoral environment.

Networking is multiplying, encouraging new relationships with competitors, suppliers, customers and universities. This involves a wide variety of practices: incubation initiatives with external partners, developing strong links with companies in the sector, workshops with suppliers and other forms of cooperation for setting up agile structures within the innovation ecosystem.

8.4. Exploring avenues for agility in R&D: lessons learned and benchmarks for action

At the beginning of this chapter, we asked how R&D work met the requirements of agility and what difficulties companies encountered in meeting said requirements. What have we learned?

Our literature review showed that while “agile practices” are well identified, the specific nature of R&D is relatively overlooked and the implementation of these practices hardly discussed. Thence, we tried to fill this gap with our observations. But, rather than simply identifying corporate practices and the pitfalls of their implementation, which are merely descriptive, our study offered two important insights: the first emphasizes the holistic nature of agility, and the second raises the question of the paradoxes faced by companies that embark on this path.

8.4.1. *The need for coherent arrangements between practices*

The analysis of company achievements shows that the agility of R&D organizations lies less in the adoption of a particular practice than in the way in which such practices are brought together under a coherent whole. The four dimensions of practices are interdependent. However, the first dimension, which concerns practices geared towards change management, seems to be decisive and to constitute the cornerstone of agility, particularly in its first item: the clarity of the strategic vision and how this is shared (Ahammad et al. 2020).

This point has often been raised, either as the main ingredient for change or as a source of trouble, mainly due to the difficulty in orchestrating the sharing of this vision at all organizational levels. This last observation highlights the need to closely articulate strategic agility and human resource management.

8.4.2. *The profoundly paradoxical nature of agility*

Agility appears to be a land of paradoxes, given the seemingly contradictory requirements it entails, which cover a range of tensions.

8.4.2.1. *Tension over time horizons*

Agility involves solving the well-known deep tensions between the past and the future (Miller et al. 2016, 2018), between the value of past plans and the value of real-time information or future expectations (Garud et al. 2014).

This temporal tension – how to stay relevant over time and maintain continuity while making rapid changes – is a fundamental question for strategic agility. However, one condition for managing this tension is that the actors embrace the organization’s strategic vision, which requires preliminary work on the part of top management to translate said vision.

8.4.2.2. *Tension over structural choices*

Although most of the companies in the study display “hybrid” forms of organization (Diefenbach and Sillince 2011), with members “outside” or “beyond” hierarchy, many of these teams and projects are organized following orthodox principles, that is, in a functional and hierarchical manner.

New structures echo the literature on space and organization, and more specifically studies on spaces isolated from the outside world, which explain why certain activities take place in a specific area. In general, these studies conclude that the isolation of a specific space allows for freedom from influences such as hegemonic powers (Rao and Dutta 2012). These isolated spaces offer actors a certain freedom from established norms and structures, enabling individuals to act and interact differently, creating an environment that promotes reflection and deep learning (Kolb and Kolb 2010).

8.4.2.3. *The pressure to take risks*

Innovation, as we know, is not without risk. How should we address this? Managing innovation while controlling the risks entailed is a strategic challenge for companies (Blondel and Gaultier-Gaillard 2006). There are many risks, both internal (employee commitment, return on investment, production capability, etc.) and external (market volatility, competition, partner reliability, etc.). These risks cannot always be assessed financially, even approximately, leaving decision-makers perplexed: How can we assess the risk of accepting a degree of positive transgression in employee behavior? And contrariwise, how can we assess the risk of hyper-conformity in behavior? To what extent should risk be externalized?

8.5. Conclusion

Although the topic of agility is seemingly hackneyed, its significance for R&D is not always clearly understood. There is little academic literature on the subject, and most of it does not focus on actual practices. To gain a deeper understanding, we needed to conduct a field study. We opted for a comprehensive approach based on four cases, rather than a survey of a larger number of companies, from which we would probably have learned little. The disadvantage, of course, is that we cannot generalize. However, this suffices for us to conclude that agility is contingent. To take just one point of comparison, the size of very large companies such as AeroIndustry and Constructor exacerbates the tension between rationalization and agility, making them structurally more difficult to handle than organizations such as A-part or Hydropalax. Beyond this obvious observation, due to their environment and strategy, not all companies require the same level of agility, nor do they have

the same drivers at their disposal. It is therefore up to each of them to ask the right questions and find the answers that are right for them.

8.6. References

- Ahammad, M.F., Glaister, K.W., Gomes, E. (2020). Strategic agility and human resource management. *Human Resource Management Review*, 30(1), 1–3.
- Akgün, A.E. and Keskin, H. (2014). Organisational resilience capability and firm product innovativeness and performance. *International Journal of Production Research*, 52(23), 6918–6937.
- Aubert, N. (2003). *Le culte de l'urgence : la société malade du temps*. Flammarion, Paris.
- Ben Mahmoud-Jouini, S., Charue-Duboc, F., Midler, C. (2015). *Management de l'innovation et globalisation. Enjeux et pratiques contemporains*. Dunod, Paris.
- Bennett, N. and Lemoine, G.J. (2014). What a difference a word makes: Understanding threats to performance in a VUCA world. *Business Horizons*, 57(3), 311–317.
- Blomqvist, K., Hara, V., Koivuniemi, J., Äijö, T. (2004). Towards networked R&D management: The R&D approach of Sonera Corporation as an example. *R&D Management*, 34(5), 591–603.
- Blondel, F. and Gaultier-Gaillard, S. (2006). Comment une entreprise peut-elle maîtriser les risques induits par l'innovation ? *Vie et sciences de l'entreprise*, 3, 10–23.
- Boehm, B. and Turner, R. (2003). *Balancing Agility and Discipline: A Guide for the Perplexed*. Addison Wesley, London.
- Cai, Z., Liu, H., Huang, Q., Liang, L. (2019). Developing organizational agility in product innovation: the roles of IT capability, KM capability, and innovative climate. *R&D Management*, 49(4), 421–438.
- Chakravarty, A., Grewal, R., Sambamurthy, V. (2013). Information technology competencies, organizational agility, and firm performance: enabling and facilitating roles. *Information Systems Research*, 24, 976–997.
- Charbonnier-Voirin, A. (2011). Développement et test partiel des propriétés psychométriques d'une échelle de mesure de l'agilité organisationnelle. *M@n@gement*, 14(2), 119–156.
- Cooper, R.G. and Kleinschmidt, E.J. (2007). Winning businesses in product development: The critical success factors. *Research Technology Management*, 50, 52–66.
- Diefenbach, T. and Sillince, J.A.A. (2011). Formal and informal hierarchy in different types of organization. *Organization Studies*, 32(11), 1515–1537.
- Dyer, L. and Shafer, R.A. (1998). From human resource strategy to organisational effectiveness: Lessons from research on organizational agility. Working Paper, Cornell University.

- Eisenhardt, K.M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532–550.
- Frishammar, J., Lichtenthaler, U., Richtnér, A. (2013). Managing process development: Key issues and dimensions in the front end. *R&D Management*, 43(3), 213–226.
- Garud, R., Schildt, H.A., Lant, T.K. (2014). Entrepreneurial storytelling, future expectations, and the paradox of legitimacy. *Organization Science*, 25(5), 1479–1492.
- Goldman, S.L. (1995). *Agile Competitors and Virtual Organizations: Strategies for Enriching the Customer*. Van Nostrand Reinhold, New York.
- Goldman, S.L., Preiss, K., Nagel, R.N., Dove, R. (1991). *21st Century Manufacturing Enterprise Strategy: An Industry Led View*. Lehigh University, Iacocca Institute, Bethlehem.
- Goldman, S.L., Nagel, R.N., Preiss, K. (1995). *Agile Competitors and Virtual Organizations: Strategies for Enriching the Customer*. Van Nostrand Reinhold, New York.
- Hock, M., Clauss, T., Schulz, E. (2016). The impact of organizational culture on a firm's capability to innovate the business model. *R&D Management*, 46, 433–450.
- Huang, P.Y., Ouyang, T.H., Pan, S.L., Chou, T.C. (2012). The role of IT in achieving operational agility: A case study of Haier, China. *International Journal of Information Management*, 32, 294–298.
- Kach, A., Azadegan, A., Dooley, K.J. (2012). Analyzing the successful development of a high-novelty innovation project under a time-pressured schedule. *R&D Management*, 42(5), 377–400.
- Kolb, A.Y. and Kolb, D.A. (2010). Learning to play, playing to learn: A case study of a ludic learning space. *Journal of Organizational Change Management*, 23(1), 26–50.
- Lee, O.-K., Sambamurthy, V., Lim, K.H., Wei, K.K. (2015). How does IT ambidexterity impact organizational agility? *Information Systems Research*, 26, 398–417.
- Lu, Y. and Ramamurthy, K. (2011). Understanding the link between information technology capability and organizational agility: An empirical examination. *MIS Quarterly*, 35, 931–954.
- Miller, K.D., Gomes, E., Lehman, D.W. (2016). Strategy restoration: Conceptualization and theory. *Annual Meeting of the Academy of Management*, Anaheim.
- Miller, K.D., Gomes, E., Lehman, D.W. (2018). Strategy restoration. *Long Range Planning*, 52(5).
- Overby, E., Bharadwaj, A., Sambamurthy, V. (2006). Enterprise agility and the enabling role of information technology. *European Journal of Information Systems*, 15, 120–131.
- Pavlou, P.A. and El Sawy, O.A. (2006). From IT leveraging competence to competitive advantage in turbulent environments: The case of new product development. *Information Systems Research*, 17, 198–227.

- Rao, H. and Dutta, S. (2012). Free spaces as organizational weapons of the weak: Religious festivals and regimental mutinies in the 1857 Bengal Native Army. *Administrative Science Quarterly*, 57(4), 625–668.
- Richtner, A. and Lofsten, H. (2014). Managing in turbulence: How the capability for resilience influences creativity. *R&D Management*, 44, 137–151.
- Rigby, D.K., Sutherland, J., Takeuchi, H. (2016). Embracing agile. *Harvard Business Review*, 94(5), 40–50.
- Roberts, N. and Grover, V. (2012). Leveraging information technology infrastructure to facilitate a firm's customer agility and competitive activity: An empirical investigation. *Journal of Management Information Systems*, 28, 231–269.
- Rosa, H. (2010). *Accélération. Une critique sociale du temps*. La Découverte, Paris.
- Sambamurthy, V., Bharadwaj, A., Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly*, 27, 237–263.
- Seo, D. and La Paz, A.I. (2008). Exploring the dark side of IS in achieving organizational agility. *Communications of the ACM*, 51, 136–139.
- Tallon, P.P. (2008). Inside the adaptive enterprise: An information technology capabilities perspective on business process agility. *Information Technology & Management*, 9, 21–36.
- Teece, D.J., Pisano, G., Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18, 509–533.
- Thamhain, H.J. (2003). Managing innovative R&D teams. *R&D Management*, 33(3), 297–311.
- Wang, Z., Pan, S.L., Ouyang, T.H., Chou, T.C. (2014). Achieving IT-enabled enterprise agility in China: An IT organizational identity perspective. *IEEE Transactions on Engineering Management*, 61, 182–195.
- Weinfurter, T. and Seidl, D. (2019). Towards a spatial perspective: An integrative review of research on organisational space. *Scandinavian Journal of Management*, 35(2), 1–30.
- Wendler, R. and Dresden, T. (2014). Development of the organizational agility maturity model. In *Proceedings of the 2014 Federated Conference on Computer Science and Information Systems*, 1197–1206.
- Yin, R.K. (2017). *Case Study Research and Applications: Design and Methods*. Sage, London.
- Zitkiene, R. and Deksnys, M. (2018). Organizational agility conceptual model. *Montenegrin Journal of Economics*, 14(2), 115–129.

List of Authors

Anne BASTIEN
CIME
Paris
France

Natalia BOBADILLA
Sorbonne Paris Nord University
France

Clotilde CORON
Paris-Saclay University
France

Christian DEFÉLIX
Grenoble IAE-INP
Grenoble Alpes University
France

Lise GASTALDI
LEST
Aix-Marseille University
France

Patrick GILBERT
IAE Paris Sorbonne Business School
France

Martine LE BOULAIRE
CIME
Paris
France

Camille LEDOUX
IAE Paris Sorbonne Business School
France

Olivier MUSSEAU
CEA
Paris
France

Thomas PARIS
GREGHEC/i3 CRG, CNRS
HEC Paris
France

Amandine PASCAL
LEST
Aix-Marseille University
France

Thierry PICQ
EMLyon
France

Simon PORCHER
Paris Dauphine University
France

Roberto RENIERO
CIME
Paris
France

Index

A, C

army, 83, 85, 86, 91, 97, 181
artificial intelligence, 4, 89, 103, 104, 192
atmosphere, 87, 130, 132–135, 137, 138,
141, 144–147
automation, 111, 116, 120, 121
autonomy, 33, 47, 60, 63, 65, 76, 87, 88,
91, 94, 113, 118, 125, 176, 190, 196,
198
collaboration, 33, 49, 55, 86, 90, 91, 107,
110, 121, 140, 143, 145–147, 158, 176,
184, 186, 199
collaborative model, 141
competitiveness, 40, 81, 94, 123, 153
conditions, 10, 25, 32, 33, 35, 44, 45, 51,
55, 63, 77, 81, 82, 84, 90, 95–97, 104,
119, 140, 142, 144, 147, 151, 155, 161,
162, 190
Covid-19, 32, 33, 41, 43, 49, 54, 59, 89,
107, 129, 134, 142, 145
creativity, 7, 8, 10, 13, 19, 36, 49–52, 83,
84, 87, 92, 94, 97, 129–133, 135–147,
153, 184, 186, 194, 197, 199
culture
of innovation, 196
organizational, 146, 200

D, E

digital tools, 103–106, 109, 113–115,
117, 123–125, 158
ecosystem(s), 31, 45, 51, 82–87, 89, 94,
96, 98, 99, 172–174, 187, 191, 192,
194, 201
business, 172
experimentation, 35, 40, 46, 131, 141,
142, 145, 195, 200
expertise, 42, 151–154, 156–158,
160–163, 165–176, 192, 196

F, H

flexibility, 36, 63, 84, 93, 107, 132, 143,
145, 181, 199, 200
hierarchical supervision, 68
high-tech, 83, 84
human and organizational transformation,
34

I, J, L

industries
creative, 3, 5, 6, 8, 10, 13, 18, 19
of the future, 110
information technologies, 184, 185

innovation,
 product, 182, 185
 technological, 81, 103, 105, 153, 165
job/employment/work, 67, 74, 104, 110,
 111, 114, 115, 119, 122, 123, 125, 129,
 163, 165, 166, 192
leadership, 50, 76, 83, 86, 87, 92, 186
long time frame/long temporality, 151,
 160, 172

M, O

management
 human resources, 31, 99, 104, 105,
 157, 202
 innovation, 81, 84, 87, 92, 95, 151, 162
 knowledge, 85, 158, 185
 paradox, 34, 36, 41, 42
 talent, 3, 81, 82, 92
managerial
 practices, 40, 42, 47, 118, 146, 176
 role, 31, 48
 skills, 44–46
organizational
 agility, 181–185
 change, 34, 176
 work, 52, 63, 65, 77, 111, 119

P, R

performance, 3, 31, 32, 34, 39–43, 47, 48,
 50, 53, 55, 60–66, 69, 77, 89, 112, 119,
 122, 162, 182, 183, 186, 187, 189, 190,
 196
 organizational, 63, 64, 186
process
 creative, 131–133, 135–137, 142, 147
 organizational, 112
productivity, 24, 59–61, 64–66, 68–77,
 93, 98, 113, 182
recognition, 22, 48, 55, 99, 154, 157, 159,
 161, 169–171, 196, 198
research and development, 104, 134, 153
responsiveness to change, 184

S, T, W

social dialogue, 119, 122, 123
soft skills, 32, 83, 87
talents, 7, 14, 15, 19, 26, 82, 89, 91, 95,
 96, 99, 115, 116, 129, 154, 193
telework(ing), 33, 37, 43, 44, 51, 59–77,
 109, 129, 134, 141–143, 145, 147
training, 49, 50, 56, 86, 90, 96, 98, 111,
 115, 119, 123, 155, 190, 193, 198
well-being, 40, 59–66, 69–71, 73, 74, 77,
 111, 137, 145

Other titles from

ISTE

in

Innovation, Entrepreneurship and Management

2025

CHABAUT Didier, EYNAUD Philippe, RAULET-CROSET Nathalie
Reinventing Territories through Solidarity
(*Solidarity-based Management and Organizations – Volume 1*)

DIMOTIKALIS Yannis, SKIADIS Christos H.
Data Analysis and Related Applications 5: Models, Methods and Techniques
(*Big Data, Artificial Intelligence and Data Analysis Set – Volume 13*)

GORIA Stéphane
Serious Games and Innovation Gains: Think Innovation through Games
(*Innovation in Engineering and Technology – Volume 9*)

GRENIER Corinne, FRANKLIN-JOHNSON Elizabeth,
CAJAIBA-SANTANA Giovany
*Promoting a More Inclusive Society for Dependent or Disabled People:
New Paradigms*
(*Health and Innovation – Volume 6*)

KLESZCZOWSKI Julien, RAULET-CROSET Nathalie
*Social Impact in Solidarity-based Organizations: Values and
Assessment Practices*
(*Solidarity-based Management and Organizations – Volume 2*)

2024

AÏT-EL-HADJ Smaïl
Environmental Transition and Technological Change
(*Smart Innovation – Volume 43*)

ALBERT-CROMARIAS Anne, ALBERTINI Thérèse, TERRAMORSI Patrice
*Collective Dynamics and Territories: 9 Issues for Competitive, Innovative
and Sustainable Territories*
(*Territorial Entrepreneurship and Innovation – Volume 3*)

BRASSEUR Martine, BARTOLI Annie, CHABAUD Didier, GROUIEZ Pascal,
ROUET Gilles
Inclusive Territories 2: Role of Institutions and Local Actors
(*Territorial Entrepreneurship and Innovation Set – Volume 2*)

COURIE-LEMEUR Aline
*Innovation, Collective Intelligence and Resiliency in Healthcare
Organizations*
(*Health and Innovation Set – Volume 4*)

DARTIGUEPEYROU Carine, SALOFF-COSTE Michel
*Futures in Action: Strategic Anticipations and Deployments in
Organizations Facing the Future*
(*Innovation and Technology Set – Volume 19*)

DELÉCOLLE Thierry, JACOB Florence, PRIM-ALLAZ Isabelle
*New Frontiers of Customer Strategy: Managing Sustainable, Environmental
and Ethical Transitions*

DIMOTIKALIS Yannis, SKIADIS Christos H.
*Data Analysis and Related Applications 3: Theory and Practice –
New Approaches*
(*Big Data, Artificial Intelligence and Data Analysis Set – Volume 11*)
Data Analysis and Related Applications 4: New Approaches
(*Big Data, Artificial Intelligence and Data Analysis Set – Volume 12*)

FLORA Luigi, GRENIER Corinne, PONISGNON Frédéric
Experience in Healthcare Innovation: Fad or New Paradigm?
(*Health and Innovation – Volume 5*)

MERLIN-BROGNIART Céline
*Functional Economy: Economic Models, Challenges and Innovation
Dynamics*
(*Smart Innovation – Volume 44*)

PARMENTIER Guy
*Organizational Creative Capabilities: Management Factors, Processes and
Devices*
(*Organizational Creativity Set – Volume 1*)

RUIZ Émilie
The Creative Capabilities of Open Organizations
(*Organizational Creativity Set – Volume 2*)

VERNIER Marie-France
Eco-Design and Ecological Transition: Questioning the Economic Model
(*Smart Innovation Set – Volume 42*)

2023

BOLLINGER Sophie
*Management Control and Creativity: Challenges of Managing
Innovation Processes*
(*Smart Innovation Set – Volume 41*)

BOUVIER-PATRON Paul
Frugal Innovation and Innovative Creation
(*Smart Innovation Set – Volume 40*)

BRASSEUR Martine, BARTOLI Annie, CHABAUD Didier, GROUIEZ Pascal,
ROUET Gilles

Inclusive Territories 1: Role of Enterprises and Organizations
(*Territorial Entrepreneurship and Innovation Set – Volume 1*)

CASADELLA Vanessa, UZUNIDIS Dimitri

*Agri-Innovations and Development Challenges: Engineering, Value Chains
and Socio-economic Models*
(*Innovation in Engineering and Technology Set – Volume 8*)

DARTIGUEPEYROU Carine, SALOFF-COSTE Michel

Futures: The Great Turn
(*Innovation and Technology Set – Volume 18*)

PEYROUX Élisabeth, RAIMOND Christine, VIEL Vincent, LAVIE Émilie
*Development and Territorial Restructuring in an Era of Global Change:
Theories, Approaches and Future Research Perspectives*

SAULAIS Pierre

*Knowledge and Ideation: Inventive Knowledge Analysis for Ideation
Stimulation*
(*Innovation and Technology Set – Volume 17*)

2022

AOUNAÏT Camille

Open Innovation Strategies
(*Smart Innovation Set – Volume 39*)

BOUCHÉ Geneviève

*Productive Economy, Contributory Economy: Governance Tools for the
Third Millennium*
(*Innovation and Technology Set – Volume 15*)

BRUYÈRE Christelle

*Caring Management in Health Organizations: A Lever for
Crisis Management*
(*Health and Innovation Set – Volume 3*)

ENJOLRAS Manon

Innovation and Export: The Joint Challenge of the Small Company
(Smart Innovation Set – Volume 37)

FLEURY Sylvain, RICHIR Simon

Immersive Technologies to Accelerate Innovation: How Virtual and Augmented Reality Enables the Co-Creation of Concepts
(Smart Innovation Set – Volume 38)

HELLER David

Valuation of the Liability Structure by Real Options
(Modern Finance, Management Innovation and Economic Growth Set – Volume 5)

MATHIEU Valérie

A Customer-oriented Manager for B2B Services: Principles and Implementation

MORALES Lucía, DZEVER Sam, TAYLOR Robert

Asia-Europe Industrial Connectivity in Times of Crisis
(Innovation and Technology Set – Volume 16)

NOËL Florent, SCHMIDT Géraldine

Employability and Industrial Mutations: Between Individual Trajectories and Organizational Strategic Planning
(Technological Changes and Human Resources Set – Volume 4)

DE SAINT JULIEN Odile

The Innovation Ecosystem as a Source of Value Creation: A Value Creation Lever for Open Innovation
(Diverse and Global Perspectives on Value Creation Set – Volume 4)

SALOFF-COSTE Michel

Innovation Ecosystems: The Future of Civilizations and the Civilization of the Future
(Innovation and Technology Set – Volume 14)

SOULÉ Bastien, HALLÉ Julie, VIGNAL Bénédicte, BOUTROY Éric,
NIER Olivier
Innovation in Sport: Innovation Trajectories and Process Optimization
(*Smart Innovation Set – Volume 35*)

VALLIER Estelle
*Innovation in Clusters: Science–Industry Relationships in the Face of
Forced Advancement*
(*Smart Innovation Set – Volume 36*)

VAYRE Emilie
Digitalization of Work: New Spaces and New Working Times
(*Technological Changes and Human Resources Set – Volume 5*)

ZAFEIRIS Konstantinos N, SKIADIS Christos H, DIMOTIKALIS Yannis,
KARAGRIGORIOU Alex, KARAGRIGORIOU-VONTA Christina
*Data Analysis and Related Applications 1: Computational, Algorithmic and
Applied Economic Data Analysis*
(*Big Data, Artificial Intelligence and Data Analysis Set – Volume 9*)
*Data Analysis and Related Applications 2: Multivariate, Health and
Demographic Data Analysis*
(*Big Data, Artificial Intelligence and Data Analysis Set – Volume 10*)

2021

ACH Yves-Alain, RMADI-SAÏD Sandra
*Financial Information and Brand Value: Reflections, Challenges and
Limitations*

ARCADE Jacques
Strategic Engineering
(*Innovation and Technology Set – Volume 11*)

BÉRANGER Jérôme, RIZOULIÈRES Roland
The Digital Revolution in Health
(*Health and Innovation Set – Volume 2*)

BOBILLIER CHAUMON Marc-Eric

Digital Transformations in the Challenge of Activity and Work:

Understanding and Supporting Technological Changes

(Technological Changes and Human Resources Set – Volume 3)

BUCLET Nicolas

Territorial Ecology and Socio-ecological Transition

(Smart Innovation Set – Volume 34)

DIMOTIKALIS Yannis, KARAGRIGORIOU Alex, PARPOULA Christina,

SKIADIS Christos H

*Applied Modeling Techniques and Data Analysis 1: Computational Data
Analysis Methods and Tools*

(Big Data, Artificial Intelligence and Data Analysis Set - Volume 7)

*Applied Modeling Techniques and Data Analysis 2: Financial,
Demographic, Stochastic and Statistical Models and Methods*

(Big Data, Artificial Intelligence and Data Analysis Set – Volume 8)

DISPAS Christophe, KAYANAKIS Georges, SERVEL Nicolas,

STRIUKOVA Ludmila

Innovation and Financial Markets

(Innovation between Risk and Reward Set – Volume 7)

GAUDIN Thierry, MAUREL Marie-Christine, POMEROL Jean-Charles

Chance, Calculation and Life

GASMI Nacer

*Corporate Innovation Strategies: Corporate Social Responsibility and
Shared Value Creation*

(Smart Innovation Set – Volume 33)

GIORGINI Pierre

The Contributory Revolution

(Innovation and Technology Set – Volume 13)

GOGLIN Christian

*Emotions and Values in Equity Crowdfunding Investment Choices 1:
Transdisciplinary Theoretical Approach*

*Emotions and Values in Equity Crowdfunding Investment Choices 2:
Modeling and Empirical Study*

GRENIER Corinne, OIRY Ewan

*Altering Frontiers: Organizational Innovations in Healthcare
(Health and Innovation Set – Volume 1)*

GUERRIER Claudine

*Security and Its Challenges in the 21st Century
(Innovation and Technology Set – Volume 12)*

HELLER David

*Performance of Valuation Methods in Financial Transactions
(Modern Finance, Management Innovation and Economic Growth Set –
Volume 4)*

LEHMANN Paul-Jacques

Liberalism and Capitalism Today

LIMA Marcos

*Entrepreneurship and Innovation Education: Frameworks and Tools
(Smart Innovation Set – Volume 32)*

MACHADO Carolina, DAVIM J. Paulo

Sustainable Management for Managers and Engineers

MEUNIER François-Xavier

*Dual Innovation Systems: Concepts, Tools and Methods
(Smart Innovation Set – Volume 31)*

UZUNIDIS Dimitri, KASMI Fedoua, ADATTO Laurent

*Innovation Economics, Engineering and Management Handbook 1:
Main Themes*

*Innovation Economics, Engineering and Management Handbook 2:
Special Themes*

2020

ANDREOSSO-O'CALLAGHAN Bernadette, DZEVER Sam, JAUSSAUD Jacques,
TAYLOR Robert

Sustainable Development and Energy Transition in Europe and Asia
(*Innovation and Technology Set – Volume 9*)

BEN SLIMANE Sonia, M'HENNI Hatem

Entrepreneurship and Development: Realities and Future Prospects
(*Smart Innovation Set – Volume 30*)

CHOUTEAU Marianne, FOREST Joëlle, NGUYEN Céline

Innovation for Society: The P.S.I. Approach
(*Smart Innovation Set – Volume 28*)

CORON Clotilde

Quantifying Human Resources: Uses and Analysis
(*Technological Changes and Human Resources Set – Volume 2*)

CORON Clotilde, GILBERT Patrick

Technological Change
(*Technological Changes and Human Resources Set – Volume 1*)

CERDIN Jean-Luc, PERETTI Jean-Marie

The Success of Apprenticeships: Views of Stakeholders on Training and Learning
(*Human Resources Management Set – Volume 3*)

DELCHET-COCHET Karen

Circular Economy: From Waste Reduction to Value Creation
(*Economic Growth Set – Volume 2*)

DIDAY Edwin, GUAN Rong, SAPORTA Gilbert, WANG Huiwen

Advances in Data Science
(*Big Data, Artificial Intelligence and Data Analysis Set – Volume 4*)

DOS SANTOS PAULINO Victor

Innovation Trends in the Space Industry
(*Smart Innovation Set – Volume 25*)

GUILHON Bernard

Venture Capital and the Financing of Innovation
(*Innovation Between Risk and Reward Set – Volume 6*)

JURCZENKO Emmanuel

Machine Learning for Asset Management: New Developments and Financial Applications

LATOUCHE Pascal

Open Innovation: Human Set-up
(*Innovation and Technology Set – Volume 10*)

MAKRIDES Andreas, KARAGRIGORIOU Alex, SKIADAS Christos H.

Data Analysis and Applications 3: Computational, Classification, Financial, Statistical and Stochastic Methods
(*Big Data, Artificial Intelligence and Data Analysis Set – Volume 5*)
Data Analysis and Applications 4: Financial Data Analysis and Methods
(*Big Data, Artificial Intelligence and Data Analysis Set – Volume 6*)

MASSOTTE Pierre, CORSI Patrick

Complex Decision-Making in Economy and Finance

MICHAUD Thomas

Science Fiction and Innovation Design
(*Innovation in Engineering and Technology Set – Volume 6*)

MONINO Jean-Louis

Data Control: Major Challenge for the Digital Society
(*Smart Innovation Set – Volume 29*)

MORLAT Clément

Sustainable Productive System: Eco-development versus Sustainable Development (*Smart Innovation Set – Volume 26*)

SAULAIS Pierre, ERMINE Jean-Louis

Knowledge Management in Innovative Companies 2: Understanding and Deploying a KM Plan within a Learning Organization
(*Smart Innovation Set – Volume 27*)

UZUNIDIS Dimitri

Systemic Innovation: Entrepreneurial Strategies and Market Dynamics

2019

AMENDOLA Mario, GAFFARD Jean-Luc

Disorder and Public Concern Around Globalization

BARBAROUX Pierre

Disruptive Technology and Defence Innovation Ecosystems

(Innovation in Engineering and Technology Set – Volume 5)

DOU Henri, JUILLET Alain, CLERC Philippe

Strategic Intelligence for the Future 1: A New Strategic and Operational Approach

Strategic Intelligence for the Future 2: A New Information Function Approach

FRIKHA Azza

Measurement in Marketing: Operationalization of Latent Constructs

FRIMOUSSE Soufyane

Innovation and Agility in the Digital Age

(Human Resources Management Set – Volume 2)

GAY Claudine, SZOSTAK Bérangère L.

Innovation and Creativity in SMEs: Challenges, Evolutions and Prospects

(Smart Innovation Set – Volume 21)

GORIA Stéphane, HUMBERT Pierre, ROUSSEL Benoît

Information, Knowledge and Agile Creativity

(Smart Innovation Set – Volume 22)

HELLER David

Investment Decision-making Using Optional Models

(Economic Growth Set – Volume 2)

HELLER David, DE CHADIRAC Sylvain, HALAOUI Lana, JOUVET Camille

The Emergence of Start-ups

(Economic Growth Set – Volume 1)

HÉRAUD Jean-Alain, KERR Fiona, BURGER-HELMCHEN Thierry

Creative Management of Complex Systems

(Smart Innovation Set – Volume 19)

LATOUCHE Pascal

Open Innovation: Corporate Incubator
(*Innovation and Technology Set – Volume 7*)

LEHMANN Paul-Jacques

The Future of the Euro Currency

LEIGNEL Jean-Louis, MÉNAGER Emmanuel, YABLONSKY Serge

Sustainable Enterprise Performance: A Comprehensive Evaluation Method

LIÈVRE Pascal, AUBRY Monique, GAREL Gilles

Management of Extreme Situations: From Polar Expeditions to Exploration-Oriented Organizations

MILLOT Michel

Embarrassment of Product Choices 2: Towards a Society of Well-being

N'GOALA Gilles, PEZ-PÉRARD Virginie, PRIM-ALLAZ Isabelle

Augmented Customer Strategy: CRM in the Digital Age

NIKOLOVA Blagovesta

The RRI Challenge: Responsibilization in a State of Tension with Market Regulation

(*Innovation and Responsibility Set – Volume 3*)

PELLEGRIN-BOUCHER Estelle, ROY Pierre

Innovation in the Cultural and Creative Industries

(*Innovation and Technology Set – Volume 8*)

PRIOLON Joël

Financial Markets for Commodities

QUINIOU Matthieu

Blockchain: The Advent of Disintermediation

RAVIX Joël-Thomas, DESCHAMPS Marc

Innovation and Industrial Policies

(*Innovation between Risk and Reward Set – Volume 5*)

ROGER Alain, VINOT Didier

Skills Management: New Applications, New Questions

(*Human Resources Management Set – Volume 1*)

SAULAIS Pierre, ERMINE Jean-Louis

Knowledge Management in Innovative Companies 1: Understanding and Deploying a KM Plan within a Learning Organization

(Smart Innovation Set – Volume 23)

SERVAJEAN-HILST Romaric

Co-innovation Dynamics: The Management of Client-Supplier Interactions for Open Innovation

(Smart Innovation Set – Volume 20)

SKIADAS Christos H., BOZEMAN James R.

Data Analysis and Applications 1: Clustering and Regression, Modeling-estimating, Forecasting and Data Mining

(Big Data, Artificial Intelligence and Data Analysis Set – Volume 2)

Data Analysis and Applications 2: Utilization of Results in Europe and Other Topics

(Big Data, Artificial Intelligence and Data Analysis Set – Volume 3)

VIGEZZI Michel

World Industrialization: Shared Inventions, Competitive Innovations and Social Dynamics

(Smart Innovation Set – Volume 24)

2018

BURKHARDT Kirsten

Private Equity Firms: Their Role in the Formation of Strategic Alliances

CALLENS Stéphane

Creative Globalization

(Smart Innovation Set – Volume 16)

CASADELLA Vanessa

Innovation Systems in Emerging Economies: MINT – Mexico, Indonesia, Nigeria, Turkey

(Smart Innovation Set – Volume 18)

CHOUTEAU Marianne, FOREST Joëlle, NGUYEN Céline
Science, Technology and Innovation Culture
(*Innovation in Engineering and Technology Set – Volume 3*)

CORLOSQUET-HABART Marine, JANSSEN Jacques
Big Data for Insurance Companies
(*Big Data, Artificial Intelligence and Data Analysis Set – Volume 1*)

CROS Françoise
Innovation and Society
(*Smart Innovation Set – Volume 15*)

DEBREF Romain
Environmental Innovation and Ecodesign: Certainties and Controversies
(*Smart Innovation Set – Volume 17*)

DOMINGUEZ Noémie
SME Internationalization Strategies: Innovation to Conquer New Markets

ERMINE Jean-Louis
Knowledge Management: The Creative Loop
(*Innovation and Technology Set – Volume 5*)

GAUDIN Thierry, LACROIX Dominique, MAUREL Marie-Christine,
POMEROL, Jean-Charles
Life Sciences, Information Sciences

GILBERT Patrick, BOBADILLA Natalia, GASTALDI Lise,
LE BOULAIRE Martine, LELEBINA Olga
Innovation, Research and Development Management

VAN HOOREBEKE Delphine
The Management of Living Beings or Emo-management

IBRAHIMI Mohammed
Mergers & Acquisitions: Theory, Strategy, Finance

LEMAÎTRE Denis
Training Engineers for Innovation

LÉVY Aldo, BEN BOUHENI Faten, AMMI Chantal

Financial Management: USGAAP and IFRS Standards

(Innovation and Technology Set – Volume 6)

LOISY Catherine, COULET Jean-Claude

Competence and Program-based Approach in Training: Tools for

Developing Responsible Activities

Innovation and Responsibility Set – Volume 1)

MILLOT Michel

Embarrassment of Product Choices 1: How to Consume Differently

PANSERA Mario, OWEN Richard

Innovation and Development: The Politics at the Bottom of the Pyramid

(Innovation and Responsibility Set – Volume 2)

RICHEZ Yves

Corporate Talent Detection and Development

SACHETTI Philippe, ZUPPINGER Thibaud

New Technologies and Branding

(Innovation and Technology Set – Volume 4)

SAMIER Henri

Intuition, Creativity, Innovation

TEMPLE Ludovic, COMPAORÉ SAWADOGO Eveline M.F.W.

Innovation Processes in Agro-Ecological Transitions in

Developing Countries

(Innovation in Engineering and Technology Set – Volume 2)

UZUNIDIS Dimitri

Collective Innovation Processes: Principles and Practices

(Innovation in Engineering and Technology Set – Volume 4)

2017

AÏT-EL-HADJ Smaïl

The Ongoing Technological System

(Smart Innovation Set – Volume 11)

D'ANDRIA Aude, GABARRET Inés
Building 21st Century Entrepreneurship
(*Innovation and Technology Set – Volume 2*)

BAUDRY Marc, DUMONT Béatrice
Patents: Prompting or Restricting Innovation?
(*Smart Innovation Set – Volume 12*)

BÉRARD Céline, TEYSSIER Christine
Risk Management: Lever for SME Development and Stakeholder Value Creation

CHALENÇON Ludivine
Location Strategies and Value Creation of International Mergers and Acquisitions

CHAUVEL Danièle, BORZILLO Stefano
The Innovative Company: An Ill-defined Object
(*Innovation between Risk and Reward Set – Volume 1*)

CORSI Patrick
Going Past Limits To Growth

DAIDJ Nabyla
Cooperation, Coopetition and Innovation
(*Innovation and Technology Set – Volume 3*)

FERNEZ-WALCH Sandrine
The Multiple Facets of Innovation Project Management
(*Innovation between Risk and Reward Set – Volume 4*)

FOREST Joëlle
Creative Rationality and Innovation
(*Smart Innovation Set – Volume 14*)

GUILHON Bernard
Innovation and Production Ecosystems
(*Innovation between Risk and Reward Set – Volume 2*)

HAMMOUDI Abdelhakim, DAIDJ Nabyla
Game Theory Approach to Managerial Strategies and Value Creation
(*Diverse and Global Perspectives on Value Creation Set – Volume 3*)

LALLEMENT Rémi
Intellectual Property and Innovation Protection: New Practices
and New Policy Issues
(*Innovation between Risk and Reward Set – Volume 3*)

LAPERCHE Blandine
Enterprise Knowledge Capital
(*Smart Innovation Set – Volume 13*)

LEBERT Didier, EL YOUNSI Hafida
International Specialization Dynamics
(*Smart Innovation Set – Volume 9*)

MAESSCHALCK Marc
Reflexive Governance for Research and Innovative Knowledge
(*Responsible Research and Innovation Set – Volume 6*)

MASSOTTE Pierre
Ethics in Social Networking and Business 1: Theory, Practice
and Current Recommendations
Ethics in Social Networking and Business 2: The Future and
Changing Paradigms

MASSOTTE Pierre, CORSI Patrick
Smart Decisions in Complex Systems

MEDINA Mercedes, HERRERO Mónica, URGELLÉS Alicia
Current and Emerging Issues in the Audiovisual Industry
(*Diverse and Global Perspectives on Value Creation Set – Volume 1*)

MICHAUD Thomas
Innovation, Between Science and Science Fiction
(*Smart Innovation Set – Volume 10*)

PELLÉ Sophie
Business, Innovation and Responsibility
(*Responsible Research and Innovation Set – Volume 7*)

SAVIGNAC Emmanuelle

The Gamification of Work: The Use of Games in the Workplace

SUGAHARA Satoshi, DAIDJ Nabyla, USHIO Sumitaka

*Value Creation in Management Accounting and Strategic Management:
An Integrated Approach*

(Diverse and Global Perspectives on Value Creation Set – Volume 2)

UZUNIDIS Dimitri, SAULAIS Pierre

Innovation Engines: Entrepreneurs and Enterprises in a Turbulent World

(Innovation in Engineering and Technology Set – Volume 1)

2016

BARBAROUX Pierre, ATTOUR Amel, SCHENK Eric

Knowledge Management and Innovation

(Smart Innovation Set – Volume 6)

BEN BOUHENI Faten, AMMI Chantal, LEVY Aldo

*Banking Governance, Performance And Risk-Taking: Conventional Banks
Vs Islamic Banks*

BOUTILLIER Sophie, CARRÉ Denis, LEVRATTO Nadine

Entrepreneurial Ecosystems

(Smart Innovation Set – Volume 2)

BOUTILLIER Sophie, UZUNIDIS Dimitri

The Entrepreneur

(Smart Innovation Set – Volume 8)

BOUVARD Patricia, SUZANNE Hervé

Collective Intelligence Development in Business

GALLAUD Delphine, LAPERCHÉ Blandine

Circular Economy, Industrial Ecology and Short Supply Chains

(Smart Innovation Set – Volume 4)

GUERRIER Claudine

Security and Privacy in the Digital Era

(Innovation and Technology Set – Volume 1)

MEGHOUAR Hicham
Corporate Takeover Targets

MONINO Jean-Louis, SEDKAOUI Soraya
Big Data, Open Data and Data Development
(Smart Innovation Set – Volume 3)

MOREL Laure, LE ROUX Serge
Fab Labs: Innovative User
(Smart Innovation Set – Volume 5)

PICARD Fabienne, TANGUY Corinne
Innovations and Techno-ecological Transition
(Smart Innovation Set – Volume 7)

2015

CASADELLA Vanessa, LIU Zeting, DIMITRI Uzunidis
Innovation Capabilities and Economic Development in Open Economies
(Smart Innovation Set – Volume 1)

CORLOSQUET-HABART Marine, GEHIN William, JANSSEN Jaques,
MANCA Raimondo
Asset and Liabilities Management for Banks and Insurance Companies

CORSI Patrick, MORIN Dominique
Sequencing Apple's DNA

CORSI Patrick, NEAU Erwan
Innovation Capability Maturity Model

FAIVRE-TAVIGNOT Bénédicte
Social Business and Base of the Pyramid

GODÉ Cécile
Team Coordination in Extreme Environments

MAILLARD Pierre
Competitive Quality and Innovation

MASSOTTE Pierre, CORSI Patrick
Operationalizing Sustainability

MASSOTTE Pierre, CORSI Patrick
Sustainability Calling

2014

DUBÉ Jean, LEGROS Diègo
Spatial Econometrics Using Microdata

LESCA Humbert, LESCA Nicolas
Strategic Decisions and Weak Signals

2013

HABART-CORLOSQUET Marine, JANSSEN Jacques, MANCA Raimondo
VaR Methodology for Non-Gaussian Finance

2012

POMEROL Jean-Charles
Decision-Making and Action

SZYLAR Christian
UCITS Handbook

2011

LESCA Nicolas
Environmental Scanning and Sustainable Development

LESCA Nicolas, LESCA Humbert
Weak Signals for Strategic Intelligence: Anticipation Tool for Managers

MERCIER-LAURENT Eunika
Innovation Ecosystems

2010

SZYLAR Christian
Risk Management under UCITS III/IV

2009

COHEN Corine
Business Intelligence

ZANINETTI Jean-Marc
Sustainable Development in the USA

2008

CORSI Patrick, DULIEU Mike
The Marketing of Technology Intensive Products and Services

DZEVER Sam, JAUSSAUD Jacques, ANDREOSSO Bernadette
Evolving Corporate Structures and Cultures in Asia: Impact of Globalization

2007

AMMI Chantal
Global Consumer Behavior

2006

BOUGHZALA Imed, ERMINE Jean-Louis
Trends in Enterprise Knowledge Management

CORSI Patrick, CHRISTOFOL Hervé, RICHIR Simon, SAMIER Henri
Innovation Engineering: the power of intangible networks

HEALTH AND INNOVATION SET

Coordinated by Corinne Grenier

Innovation is omnipresent, but its complexity is rarely examined in depth. Far from euphoric or strict technical approaches, this book offers a fresh perspective on innovation by exploring its underlying tensions, paradoxes and dynamics.

Adopting a dual approach, *The Hidden Faces of Innovation* combines a detailed analysis of the managerial dynamics at the heart of innovation processes with an in-depth reflection on the structural, technological and cultural dimensions that underpin them.

The first part of this book focuses on the concrete practices of innovation management: skills management, the specificities of creative industries, and the evolution of working methods in the age of remote working. The second part broadens the perspective by examining the effects of digital technologies, the role of work environments in stimulating creativity and the tensions generated by organizational agility initiatives.

Drawing on both empirical and theoretical work, the book highlights the often-invisible drivers of innovation and invites us to rethink the conditions for innovation, in line with the realities experienced in contemporary organizations.

Patrick Gilbert is Professor Emeritus at the IAE Paris (University of Paris 1 Panthéon-Sorbonne) and a member of the Mutations, Anticipations, Innovations Chair, France.

Martine Le Boulaire is the General Secretary of the CIME association, France.

ISTE
www.iste.co.uk

WILEY

