
Contents

Author Biographies	xvii
Introduction	xxv
Camille AOUINAÏT and Dimitri UZUNIDIS	
Part 1. The Importance of Information, Digital Technology and Innovation	1
Chapter 1. Information Inflation and Digital Transformation: A Strategic Perspective	3
Jean-Louis MONINO	
1.1. Introduction	3
1.2. Inflation and digital technologies: the DIKW model for understanding and analysis.	9
1.2.1. Definition of information inflation	9
1.2.2. Impact of digital technologies on the quantity of available information	10
1.2.3. Presentation of the DIKW model as an analytical tool	10
1.2.4. The digital age and the data explosion	12
1.2.5. Statistics on digital data production	13
1.2.6. Examples of information-generating technologies.	13
1.2.7. Consequences of increased information accessibility	14
1.3. Understanding information inflation.	15
1.3.1. Analysis of the effects of information inflation on society	16
1.3.2. Associated risks: cognitive overload, disinformation, etc.	17
1.3.3. Importance of information management	18
1.3.4. The DIKW model as a management framework	18
1.3.5. Application of the model to information inflation	19

1.3.6. Advantages of the DIKW approach for information prioritization	19
1.4. Digital strategies against information inflation	19
1.4.1. Tools and methods for filtering and organizing information	19
1.4.2. Role of AI and algorithms	20
1.4.3. Media education and digital literacy	21
1.5. Case studies	22
1.5.1. Concrete examples of DIKW model application in various contexts	22
1.5.2. Analysis of results and benefits obtained	23
1.5.3. Feedback and best practices	24
1.6. Conclusion	25
1.6.1. Summary of the chapter's key points	25
1.6.2. Reflection on the importance of information management in the digital age	25
1.6.3. Future prospects and call to action	26
1.7. References	28
Chapter 2. Connectivity and Competitiveness: The Stakes of 5G for Organizations	33
Jean-Louis MONINO	
2.1. Introduction	33
2.2. From analog to mobile Internet.	35
2.2.1. The evolution of mobile networks: characteristic features	36
2.2.2. The debate between 4G and 4G+, the first steps toward 5G.	38
2.3. The deployment of 5G.	39
2.4. The diffusion of 5G and its potential for change	44
2.4.1. Entertainment	44
2.4.2. Autonomous vehicles.	44
2.4.3. Augmented reality, virtual reality and 5G	44
2.4.4. Health	45
2.4.5. Environment.	46
2.4.6. Industry	46
2.5. 5G: a global affair!.	48
2.5.1. 5G in Europe	51
2.6. 5G in France	54
2.7. 5G: meeting the challenges	55
2.7.1. The deployment of mobile Internet	57
2.7.2. The fifth generation: should we think of it as a "disruptive innovation"?	61
2.7.3. The future and mobile technology.	62

2.8. Conclusion	62
2.9. List of websites	66

Chapter 3. Challenges and Prospects for the Development of Quantum Technologies. 69

Laurent ADATTO

3.1. Introduction	69
3.1.1. Plan and methodology	69
3.2. Analysis of the core elements of quantum physics in quantum technologies	70
3.2.1. Quantum physics: the foundation of quantum technologies.	70
3.2.2. Quantum entanglement.	71
3.2.3. Pioneering inventions of quantum physics	71
3.2.4. Characteristic of quantum superposition	72
3.2.5. From quantum sciences to quantum computing	72
3.2.6. Analysis of the qubit concept	72
3.3. Structural differences between classical computers and quantum computers.	72
3.3.1. Progress in computing: toward ever-greater complexity and sophistication across ever-wider application domains	73
3.3.2. Quantum computing: hardware and software aspects	73
3.3.3. Quantum algorithms	73
3.3.4. On the path to quantum progress: the challenge of creating standards to facilitate research cooperation	74
3.3.5. Enabling technologies as necessary intermediates in quantum evolution	74
3.3.6. Cryogenics and extreme cooling enabling the operation of quantum devices	74
3.3.7. Quantum sensors and links to quantum physics	75
3.3.8. Quantum communication.	75
3.3.9. Quantum technologies and cybersecurity.	75
3.3.10. Differentiation between post-quantum cryptography and quantum cryptography.	75
3.3.11. Support for cybersecurity investments linked to quantum development	76
3.3.12. Quantum research: high complexity, multiple pathways and the imperative for long-term funding	76
3.4. Study of issues related to quantum investments.	76
3.4.1. Launch of the Plan Quantique	77
3.4.2. Objective and governance	77

3.4.3. Details of the financial provisioning	77
3.4.4. Quantum sensors, Thales as a French specialist	78
3.4.5. Plan Quantique and participation of private firms: the case of Atos	78
3.4.6. Promotion of the quantum-related ecosystem	78
3.4.7. Association with economic recovery policy	79
3.4.8. New applications based on quantum technologies even before the advent of the quantum era.	79
3.4.9. Plan Quantique and parallel with Plan Intelligence Artificielle.	79
3.4.10. Fundamental research at the heart of cooperation	79
3.4.11. Plan Quantique and interfacing with related industrial sectors	80
3.4.12. Issues of protecting patents funded by the Plan Quantique	80
3.4.13. Allocation of funds by specialties related to quantum technologies.	80
3.4.14. Clusters and French quantum ecosystems.	81
3.4.15. French firms at the heart of quantum technology interdisciplinarity	81
3.4.16. Hotbed of French start-ups in the field of quantum technologies	81
3.4.17. Synergies, interdisciplinarity and involvement of CNRS	81
3.4.18. Involved technological sectors and strategic rationale for funding	82
3.4.19. Quantum communication	82
3.4.20. Post-quantum cryptography	82
3.4.21. A French leader in enabling cryogenics technologies	82
3.4.22. Quantum simulators, transition tools toward quantum computers	83
3.4.23. Prometheus and the universal quantum computer	83
3.4.24. Prospects concerning a very high-level scientific sector	83
3.4.25. Noisy quantum computers as an illustration of an intermediate technology in quantum progress	83
3.4.26. CEA, a French asset in the race to realize the quantum computer.	84
3.4.27. Plan Quantique and ambition regarding business software	84
3.4.28. Digital giants and deep involvement in quantum technology development.	84
3.4.29. Google's quantum experiment, evidence of the means deployed by digital firms in the race for quantum supremacy	84
3.4.30. Gigantic computing power, associated risks and the need for safeguards and regulation	85
3.4.31. International investments related to quantum technologies	85
3.4.32. Strategy of the European Union and the quantum flagship	86
3.4.33. Conclusion: quantum technologies and the value of public investment for long-term research	87
3.5. Conclusion	87
3.6. References	88

Chapter 4. QuAI: Cognitive AI for Trust, Consensus, Sustainability and Security	91
Florin PAUN, Ingrid VAILEANU-PAUN, Crenguta LEAUA, Thomas O'NEAL, Alex JASO and Laurent CHAUDRON	
4.1. Introduction	91
4.2. How was the QuAI conceptualized as a response to Condorcet's paradox and Arrow's incompleteness theorem.	95
4.2.1. Research analysis of the interdependencies between the evolution of economic, innovation and qualification – valorization models as a source of conceptualization of QuAI: “demand comprehension”, “DRL-TRL”, “human factor and asymmetries” and “mangrove forest new distribution value”	95
4.2.2. QuAI at the heart of virtuous transformations in companies and economic models. QuAI and the impacts on micro-, meso- and macro-economy	103
4.2.3. The importance of highly inclusive third-party logics. QuAI to transform the digital world into an inclusive shared space	110
4.2.4. Contributions of mesology in the creation and understanding of QuAI as a space and means of “trajection – representation as something” (“ <i>etwas als etwas</i> ”)	112
4.3. Open qualification models and tools in alignment with the evolution of economic models: the example of the deeptech start-up Xvaluator, the first QuAI tool and its clients and personalized functionalities	115
4.3.1. Example of a customizable, generic and personalized QuAI tool: Xvaluator – augmented extra-financial open value and open qualification with Xvaluator	116
4.3.2. Value capture based on QuAI	120
4.4. Perceived impacts at the micro-, meso- and macro-economic levels of using QuAI approaches. Extra-financial value and the economic impact multiplier	121
4.4.1. The importance of the valorization process.	121
4.4.2. QuAI impacts at the core of virtuous digital and ecological transitions and the evolution of the digital business model	123
4.4.3. Impacts at the micro- and meso-economic levels: use cases and innovative functionalities of the QuAI Xvaluator. The role of QuAI in decision-making and stakeholder engagement	124
4.4.4. Successful experimentations with QuAI Xvaluator in France: pioneering use cases	124
4.4.5. Impacts of QuAI at macroeconomic level supporting evolutions toward a functional economy of data with valorization based on democratization of access to qualified data	128

4.5. Conclusion	130
4.5.1. New perspectives in quantum valorization research	131
4.6. References	133
Chapter 5. The Hackathon: A Catalyst for Collaborative Creativity to Innovate	139
Dave MOBHE BOKOKO	
5.1. Introduction	139
5.2. Creativity in the service of innovation	141
5.2.1. From creativity to innovation	141
5.2.2. Collaborative creativity as an innovation trigger.	147
5.3. Hackathon and collaborative creativity	149
5.3.1. Origin and emergence of Hackathons	150
5.3.2. The place of collaborative creativity in Hackathons	154
5.4. Critical discussion on Hackathon in practice	157
5.4.1. The Hackathon: a practice distinct from crowdsourcing.	157
5.4.2. The Hackathon: a source of development for future innovations in the AI era	159
5.5. Conclusion	160
5.6. References	161
Chapter 6. Kolòn-Inspired Platform for Making and Innovation in Communities of Practice	167
Valérie PAYEN JEAN BAPTISTE, Kalliopi BENETOS, Pierre SCHALLUM, Diane-Gabrielle TREMBLAY, Laurent MOCCOZET, Valéry PSYCHÉ, Jocelyne KISS and Giulia ORTOLEVA	
6.1. Introduction	167
6.1.1. The context of the design process	169
6.1.2. Research questions and objectives.	171
6.2. Methodological approaches.	171
6.3. Application of the results in the design of the digital platform	173
6.4. Alignment of results with the kolòn model and its contribution to innovation	177
6.4.1. Creation of a trust system based on a mentoring process and community management recognition.	178
6.4.2. Participation of actors with different areas of expertise in maintaining the community	178
6.4.3. Co-design model of projects	179
6.4.4. Documentation and knowledge management.	181
6.5. Limitations and perspectives	181
6.6. Conclusion	182
6.7. References	183

Chapter 7. Wargame: A Classic Serious Game, Vector of Innovation	187
Stéphane GORIA	
7.1. (Recent) history of wargaming and professional wargames	187
7.1.1. The early years and versions of wargaming	187
7.1.2. Specific disadvantages of hybrid forms	190
7.1.3. Examples of failures following the non-consideration of wargame session results	192
7.1.4. Evolution of practices and interactions with computing.	194
7.1.5. (Recent) history of wargames and civil wargaming	196
7.1.6. Particular case of computerized and hybrid wargames	199
7.2. Definitions and current implementations of wargames.	201
7.2.1. Distinctive features of wargames	201
7.2.2. Simulation games and serious games	202
7.2.3. Activity resembling wargaming	203
7.2.4. Game of learning, sharing and decision-making	206
7.2.5. Game of exploring possibilities and vector of innovation.	208
7.3. Qualification criteria, current uses and the future of wargames	210
7.4. References	211
Chapter 8. Generative AI: From Disruptive Innovation to Disruptive Risks	217
Vipin MOGHA and Arvind ASHTA	
8.1. Introduction	217
8.2. Literature review: innovation and risk	219
8.3. Case study: the risks introduced by AI.	220
8.3.1. Market risks and political economy	221
8.3.2. Managerial risks: who is responsible?	223
8.3.3. Operational risks: security and fraud	224
8.3.4. Data collection and processing and human rights risks	226
8.3.5. Risk in the labor market	227
8.3.6. Risks of other social cleavages	229
8.3.7. Risk of international competition: geopolitics	230
8.4. New risks introduced by GenAI	231
8.4.1. Hallucinations and fabricated realities	232
8.4.2. Adversarial prompt manipulation	233
8.4.3. Synthetic media proliferation	233
8.4.4. Training data exploitation	233
8.5. Copyright ambiguity.	234
8.6. Energy and computational costs	234
8.7. Dynamic system vulnerabilities	234
8.8. Discussion	235

8.9. Conclusion	237
8.10. References	238
Part 2. Real-World Applications: Achievements and Perspectives	247
Chapter 9. Cultivating Trust and Innovation in New Ways of Working	249
Sandrine VIRGILI, Frédéric BORNAREL and H��l��ne DELACOUR	
9.1. Introduction	249
9.2. Organizational distrust and RTO	251
9.2.1. Continuous decline in the use of remote working	251
9.2.2. Distrust, RTO and control	254
9.3. Remote work and the destruction of innovation potential	257
9.3.1. A current innovation model based on co-presence and affect-based trust	257
9.3.2. Maintaining social relations at a distance and new forms of trust	260
9.4. A new collaborative model for remote work – a new form of trust?	264
9.4.1. Evolution of collaborative work, trust and control	265
9.4.2. Ethics of trust and ethical trust	267
9.4.3. SRT for supporting hybrid work	268
9.5. Conclusion	270
9.6. References	271
Chapter 10. A Framework for Understanding Multiple Dimensions of Agility and Resilience in Industry 5.0	277
Marcos LIMA, Patricia BAUDIER, Marie HAIKEL-ELSABEH and Michel DALMAS	
10.1. Introduction	277
10.2. Theoretical background	280
10.2.1. Resilience and agility	280
10.2.2. The 8S model	281
10.2.3. From I4.0 to I5.0	284
10.3. Methodology	285
10.3.1. Hard-S-driven resilience and agility	286
10.3.2. Soft-S-driven resilience and agility	289
10.4. Results and discussion	290
10.5. Conclusions	292
10.5.1. Theoretical contributions	292
10.5.2. Managerial contributions	293
10.5.3. Limitations	293

10.5.4. AI as a transformational challenge to I5.0: a research agenda on resilience and agility impacts	294
10.6. Acknowledgments	295
10.7. References	296
Chapter 11. Pandemic-Driven Pharma Transformation Through Open Innovation Dynamics	301
Laurent ADATTO, Camille AOUNAÏT, Son Thi Kim LE and Michelle MONGO-DESAGE	
11.1. Introduction	301
11.2. Theoretical analyses of open innovation: concepts, typology, and drivers in Covid-19 vaccine development	303
11.2.1. Open innovation: definition and typology.	303
11.2.2. Open innovation drivers	305
11.3. Open innovation in the pharmaceutical industry.	306
11.3.1. The collaboration between Pfizer and BioNTech	308
11.3.2. Collaboration purposes	309
11.3.3. Different collaborations for multiple initiatives.	311
11.3.4. Theoretical and managerial implications	312
11.3.5. Combination of resources for open innovation success	313
11.4. Discussion.	314
11.4.1. Diverse collaborations for multiple objectives	314
11.4.2. The downside of open innovation	317
11.5. Conclusion	321
11.6. References	322
Chapter 12. AI and Defense Innovations: Theoretical Propositions and Illustrations	327
Pierre BARBAROUX	
12.1. Introduction.	327
12.2. AI-based innovation in aerospace and defense industries: dimensions and propositions	330
12.3. Research methodology and interpretive case studies	334
12.3.1. Project Maven (JAIC).	335
12.3.2. Skyborg (Leidos)	338
12.3.3. Tactical engagement analysis (TEA – Thales)	338
12.3.4. RoBattle (IAI)	338
12.3.5. Mini HARPY (IAI)	339
12.4. Results and empirical validity of the innovation model.	339
12.4.1. Duality and scientific intensity of knowledge (P1)	340
12.4.2. Sources of innovation (P2)	341

12.4.3. The influence of military user preferences and needs for innovation (P3)	341
12.5. Conclusion and future research	342
12.6. References	343
Chapter 13. Performativity and Science Fiction According to the French Army	347
Thomas MICHAUD	
13.1. Introduction	347
13.2. The public scenarios of the Red Team	349
13.3. Institutional science fiction, between utopia and dystopia	353
13.4. A speculative and strategic imaginary	358
13.5. The ideology of science fiction and prophetism	360
13.6. Dysperformative fictions	360
13.7. Innovism: a pragmatic imaginary in the service of innovation	362
13.8. Dysperformativity of the diegesis and performativity of the novum.	365
13.9. Conclusion: the Red Team, a group of paradoxical prophets?	367
13.10. References	369
Chapter 14. New Space: The Force Awakens	373
Christophe BÉNAROYA and Victor DOS SANTOS PAULINO	
14.1. Introduction	373
14.2. Characterization of New Space	375
14.3. The six constitutive disruptions of New Space	376
14.3.1. New entrants	376
14.3.2. New markets	376
14.3.3. New technologies and new processes	378
14.3.4. New regulations	380
14.3.5. New financing modes	381
14.4. From New Space disruptions to new challenges.	385
14.5. Conclusion	386
14.6. Acknowledgments	387
14.7. References	387
Chapter 15. The Imaginary of Space Capitalism in Science Fiction	391
Thomas MICHAUD	
15.1. Introduction	391
15.2. New Space in science fiction	392
15.3. <i>Space Truckers</i> (1996) and the interplanetary transport sector	396
15.4. <i>Space Sweepers</i> (2021) and the myth of the capitalist heavenly city	397

15.5. <i>Venom</i> (2018) and the myth of the post-humanist capitalist enterprise	399
15.6. Darius Tanz, New Space billionaire of the series <i>Salvation</i>	402
15.7. Spatial science fiction, an element of soft power	403
15.8. The imaginary in space capitalism	406
15.9. References	407
Chapter 16. Digitalization in Agriculture: Toward an Agroecological Transformation?	409
Eléonore SCHNEBELIN	
16.1. Introduction	409
16.2. What is digital agriculture?	411
16.2.1. A plurality of technical objects and functions.	411
16.2.2. Beyond the technical object	412
16.3. Conceptual and methodological approach	413
16.3.1. A systemic approach to innovation	413
16.3.2. Uses of digital technology integrated into a heterogeneous agricultural innovation system.	414
16.3.3. Empirical strategy	415
16.4. Uses of digital technology in farming systems.	416
16.4.1. Examples of digital technology use in farming activity	416
16.4.2. Usage profiles	418
16.4.3. Usage linked to productive models	419
16.5. Perceptions of digital technology and projects of sector organizations.	421
16.6. Digital technology and the agroecological transition	422
16.6.1. Digitalization trajectories linked to agricultural models	422
16.6.2. Digitalization as a continuation of the historical transformations of the agricultural sector	423
16.6.3. Oppositions, coexistences or combinations between digital technology and agroecology	424
16.7. Conclusion	425
16.8. References	426
Chapter 17. AI for Technological Innovation in Agriculture? A Revolution!	429
Didier LEBERT	
17.1. Introduction	429
17.2. Structural models of technological diffusion	430
17.3. Data and results	436

17.4. Conclusion	446
17.5. References	448
List of Authors	451
Index	455