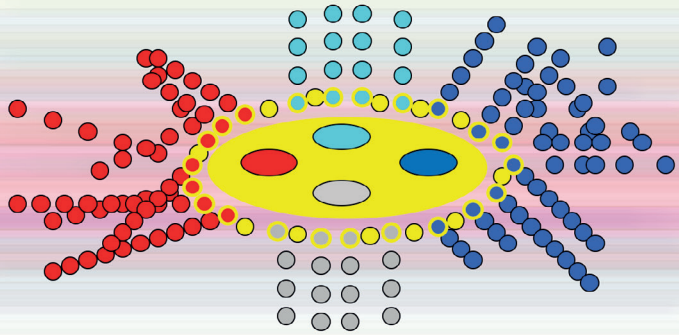

Informational Lights from Service Science for the progression of Society

Michel Léonard

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That the Age of Enlightenment of the 17th and 18th centuries, the spirit of reason, science, humanism and progress, as opposed to obscurantism, has led to the emergence of scientific, disruptive knowledge, even regarding the foundations of Society, is indisputable to anyone using their reason. Thus, were brought about great transformations of Society, which took place.

In our time, digital technologies, through enabling observations of otherwise invisible phenomena, induce also a multitude of disruptive practices. As this effect and its inevitable implications continue to accelerate into the future, their integration into the progression of Society and enterprise is now absolutely imperative.

The intention of this book is to bring out the intelligence of the progression of Society or of enterprise by enabling the intelligence of living together (Human Sciences), the intelligence of solutions (Natural Sciences) and the intelligence of the artificial (Sciences of Engineering, including the Digital), to connect together through the informational intelligence of services. Such a connection is established thanks to Service Science. It forms the base for the Informational Lights.

Michel Léonard *is a professor at the University of Geneva since 1977 in Information Systems and Service Science. He has been the initiator of numerous courses and curricula including the Franco-Swiss European DEA MATIS, and of the IESS (International Conference on Exploring Service Science) series of international scientific conferences. His research has focused on the one hand on methods for the design and evolution of information systems, and on the other hand on the creation of database management systems in accordance with these methods. They now focus on Service Science by adding the informational dimension.*

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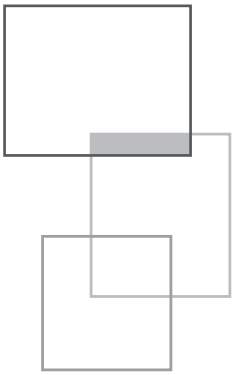

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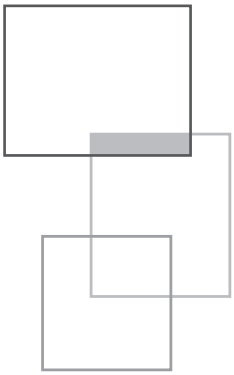


Intention

Everyone using digital systems has more efficient access to their *informational space* with the resultant benefit of a vast potential for inventiveness. The informational space consists of all the information indispensable for their activities and all the information provided by them.

The potential for inventiveness is revealed by beacons which illuminate the informational space. As it is throughout the scientific domain, such beacons of Enlightenment or **Informational Lights** may be seen only by those who know they are there and who know how to see them. For such people, these Informational Lights illuminate their inventive processes, allowing them to build activities, to forge new creations; to contribute to the **progression of Society**.

In order to let people, who are knowledgeable about Informational Lights, manifest their creative talents, Society needs to accept, facilitate and take seriously their inventive activities. Society should particularly realise their **value** and, therefore, their importance for the progression of Society.

The intention of this book is to bring out the vital role of the Informational Lights in the progression of Society.

1. Situations

This intention of this book is designed around four generic situations in order to introduce and present the challenges for the progression of Society.

The first situation concerns the vivid global interest in the intense creativity that digital technology has generated over the decades and which is reflected in a continuous stream of digital innovations. Such innovations, made using digital systems and technologies, play the role of the **propulsors** of Society and are part of

the progression of Society. They must be inserted into subsequent **propulsions,** in charge of exploring, designing and developing the profound transformations to be induced in all sectors of Society.

The second reference situation concerns the progressions of Society in the general sense, *i.e.* Society whose propulsors may not be digital. An example of such a situation can be projects related to big infrastructures. As a result, it leads to the design and implementation of one or more propulsions. Generally, these propulsions require multi-disciplinary, multi-institutional or multinational competences and responsibilities, as well as the establishment of places of negotiation, design, regulation, arbitration. To be efficient and resilient, such propulsions of Society must incorporate propulsions, which were established thanks to the previous digital propulsors.

The third reference situation states that digital propulsors do not only have pragmatic impacts on Society by making their users more efficient in their activities. They also have an impact on the intelligence of the situations encountered by Society: these situations have to be taken into account by **actors** who assume the responsibilities of creating, developing or managing propulsions thanks to digital propulsors. Their intelligence must meet the intelligence of the creators of digital propulsors. Precisely, **Service Science** enables the emergence of a **world of information and knowledge** with strong and mutual connections through a cognitive continuum, both with the world of activities and the digital world. This world has been updated according to all the works in engineering of information systems.

The fourth reference situation concerns the continual great influence of the **classical approach**, which takes the Digital into account in the progression of Society (whereas this approach is already outdated as will be further shown in this book). This classical approach considers the Digital to be able to solve problems that Society would or might have. These problems are described as visions leading to understandable and ambitious goals. It explicitly drives the strategic level of Society to align its digital policy with the policy of its development. Tacitly, it aligns the operational activities, especially professional and/or business activities, with the chosen digital solution. For the classical approach, such alignments are indispensable for establishing a bridge over the gap between the world of activities of Society and the digital world. Thus, it is believed that the Digital of Society can be managed according to the standard management procedures, as for example, the implementation of master plans or projects with their opportunity assessments and returns on investment.

2. The challenge

The challenge of this book is to propose a new approach to the progression of Society, called the **informational quantum approach**. It is based on Service Science. According to this approach, at the centre of any progression of Society there are informational spaces, which are concretised in the form of information services, empowered by digital systems. Thus, Informational Lights become released

and can radiate the process of designing the progression of Society by having a central role in it. The quantum approach considers the progression of Society in multi-disciplinary, multi-institutional, multinational spaces and takes into account all dimensions of the activities and all the domains of Society, such as engineering, organisational, institutional, economic, social, legal and regulatory aspects, as well as its public and private aspects.

This quantum approach considerably expands the domains of investigation of the progression of Society, in comparison with the classical approach. It allows Society to find liberation from the cognitive straitjacket, in which the classical approach chains it. This classical approach remains valid only in very limited situations.

This book presents the informational quantum approach and the foundations of its value in the context of the progression of Society.

1. This book begins by differentiating **propulsions** of propulsors in the context of the progression of Society. A propulsor can be a new law, a political or strategic will, a new technology like a digital system. The propulsions of Society integrate propulsors into the activities of Society in the form of information services. The intelligence of the propulsion is enriched by Service Science, having information as a central concept, known to all persons contributing to a propulsion.

   In the heart of the strategy of any progression of Society is the strategy of various related propulsions, but not the strategy of propulsors.

2. This book describes the different facets of an information service. It presents the intent and the value proposition of a service. Throughout its construction process, they are refined to ultimately provide the **sense** of a service.

   In its generality, an information service makes it possible to apprehend multi-disciplinary, multi-institutional, multinational situations of the progression of Society. They require contributions from persons of different disciplines and responsibilities to explore and build services together.

   Service Science allows contributors of various disciplines to have a common language built on the information. In this way, it makes it possible for them to understand each other.

3. This book defines the foundations of functioning of the progression of Society, which integrates in its heart the digital potentialities using the informational quantum approach. It proposes the concept of **information common goods**, which are formed from information services, in order to establish bases of the progression of Society by means of information services. It highlights the risk of tragedy of the commons of information and advocates the organisation of information common goods in the form of **informational commons**, in order to avoid this risk of tragedy. This book therefore introduces the basics of a service economy.

4. This book explores the foundations of the **administration of propulsions** by taking into account informational commons. It provides a framework of the missions of this administration by returning to the fundamentals of a democratic Society. It adapts the motto of the French revolutionaries of 1789 – “Liberty,

Equality, Fraternity" – to the information services, so that they are in agreement with the type of society envisaged in this book and so that their constructors share the same cognitive unity. This book introduces **contributory** information services, which are democratic, responsible and inclusive.

By designing an information service, their builders help to emerge its **sense**. The cumulative sense of services, which form the progression, is reflected in the sense of the progression itself, making it more accessible to all actors.

This book explores the foundations of an information policy, so that the State could exercise its responsibilities in a public space considerably expanded by propulsions.

5. Finally, this book introduces several facets of the **intelligence of services** into the progression of Society.

The first concerns any scientific domain or any profession that must ensure a place for the logic of service, so that its specialists can take a consequent and indispensable role in propulsions. These are not simple additions to their corpus of knowledge. It is about a real reconstruction. This book proposes a generic approach.

Another facet concerns the multitude of activities that revolve around the services ensuring the progression of Society. This multitude of activities consists of real symphonies of activities that take into account the potential of services. Their management is unknown in the classical world of the administration of Society. This book explores their different forms based on the foundations of the logic of services.

Another facet is related to the **intelligence of the artificial**, which explores how the scopes of individual intelligence and collective intelligence – obviously human! – are expanded by immersing information services in activities and responsibilities.

Another facet focuses on professions and education, including the emergence of the profession of a **service scientist**.

The last presented facet concerns the intelligence of the emergence of the informational quantum approach in Society, as well as the intelligence of explorations.

3. The issues for Society

The issues for Society of the informational quantum approach join those of the Enlightenment that Immanuel Kant (1784) presented in his title text: "Answering the Question What is Enlightenment?". Although written in 1784, this text, once adapted to our time and the domain of this book, appears as a breaking news. This paragraph presents the first five points, the phrases in italic come from the text of Kant.

1. What are Informational Lights?

   It is the *emergence* of a society from its informational and cognitive *self-imposed immaturity* by the classical approach. This immaturity comes from *lack of*

informational *understanding,* as well as *resolve and courage* to conceive tomorrow *without guidance from another*.

2. *Laziness and cowardice are the reasons why so great a proportion* of societies, *long after released from alien guidance, nonetheless gladly remain in lifelong* infantile stage, by preferring to be colonised in the informational or cognitive context. They explain how societies are so easily encapsulated by *others* in an informational bubble.

   It is so easy to remain infantile, within the classical approach.

   With the superficialities well thought out, the doctrines and the visions of the classical approach which take place of informational understanding and give good conscience, one *need not exert* oneself to design at the informational level *if only* one *can pay: others will readily undertake the irksome work.*

   *If the far greatest part of S*ocieties' *regard taking the step to* informational maturity *as very dangerous*, these are *the guardians* of the classical approach *who have so benevolently taken over* their *supervision have carefully seen to it*.

   Now this danger is not actually so great, for after falling a few times they would in the end certainly learn to walk; but an example of this kind makes men timid and usually frightens them out of all further attempts.

3. *Thus, it is difficult for any* society *to work* itself *out of the* informational *immaturity that has all but become* its normal *nature.* It *has even become fond of this state and for the time being is actually incapable of using* its *own* informational *understanding, for no one has ever allowed* it *to attempt it.* Doctrines in the form of algorithms, automation or black boxes of so-called "artificial intelligence", *those mechanical aids to the rational use, or rather misuse, of natural* informational talents*, are the shackles of a permanent* infantilisation.

   The society which *threw them off would still make only an uncertain leap* of the classical approach *over the smallest ditch, since* it *is unaccustomed to this kind of free movement. Consequently, only a few* societies *have succeeded, by cultivating their own minds, in freeing themselves from immaturity and pursuing a secure course.*

4. *But that the public should enlighten itself is more likely; indeed, if it is only allowed freedom, enlightenment is almost inevitable. For even among the entrenched guardians of the great masses, a few* persons *will always think for themselves, a few who, after having themselves thrown off the yoke of* infantilism*, will spread the* informational *spirit of a rational appreciation for both their own worth and for each person's calling to think for himself.*

   This is one of the foundations of the informational quantum approach.

   A public can only attain informational *enlightenment slowly. Perhaps revolution can overthrow* cognitive *autocratic despotism and profiteering or power-grabbing oppression* of the supporters of the classical approach*, but it can never truly reform a manner of thinking* of informational spaces*. Instead, new prejudices, just like the old ones they replace, will serve as a leash for the great unthinking mass.*

5. *Nothing is required for this* informational *enlightenment, however, except freedom; and the freedom in question is the least harmful of all, namely, the freedom to use reason publicly in all matters.*

   But on all sides: "Do not argue!" The informational executive *says, "Do not argue,* apply*!" The manager says, "Do not argue,* use*!" The* digital responsible *says, "Do not argue,* code*!" The strategic responsible says, "Do not argue,* buy*!"*

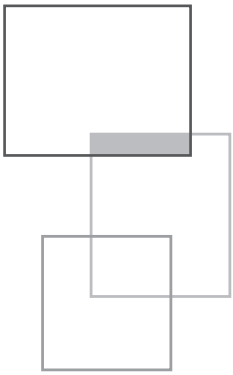
   Where is the place in the world where they say: "*Argue*, explore and design *as much as you want and about what you want!*")

   Third Place for Service (TPS) introduced in this book will be precisely such places in the informational quantum approach.

4. Contribution of this book

The motto of the Informational Lights, which is inspired by the motto of Kant for the Enlightenment, is as follows: Have the courage to use your own informational understanding! Dare! Design!

The intention of this book is precisely to provide bold individuals and societies with a resilient scientific platform for tomorrow's successful exploration.



Notes

The following main concepts used in this book are defined as follows.

Enterprise has its usual meaning: private or public enterprise, but also a more general meaning, considering any institution, organisation, association, company.

Society has its usual meaning, but also a more general meaning considering any State, Country, Region, Commune, Enterprise (as in the previous case).

Societal has its usual meaning: it focuses on the organisational and administrative aspects of the social life of individuals and enterprises with the meaning given above.

Digital is anything related to all the developed systems based on informatics, mixtures of technologies and software: such as information technologies, Internet, Web, nanotechnology, mobile technologies, robots, agents, artificial intelligence in the strict meaning given in computer science.

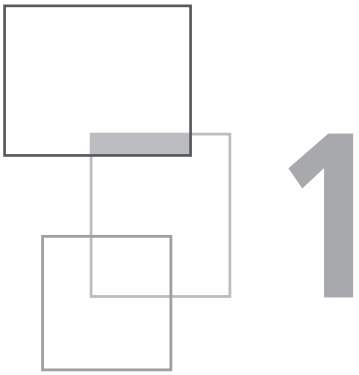
Activity is always human.

Intelligence is always human, except in the term "artificial intelligence", which designates the Digital of a specific part of computer science.

Tomorrow has a special meaning. It designates what is possible to prepare, design or build now for the future and for the new generations. It is always related to innovation, creation, or progression.

Tomorrow is for the future, but is not the future.

Notably, by contrast with *tomorrow*, the future is the domain of foresight and forecasts, or even oracles, wishes or visions.



1

Informational propulsion of Society

We are witnessing a huge push of the Digital in all areas of human activities. It reverses many practices and plunges all sectors of Society into deep questioning of their governance and even of their raison d'être. Thus, the macroeconomic sector is asking how to maintain full employment at a time when many reports announce the elimination of a large number of jobs due to the automation of tasks, which is induced by the massive deployment of the Digital. Should not the validity of the concept of "full employment" be revised in our times of the Digital?

The classical models of the challenges and effects of the Digital on Society are based on strategies fogged by fascinating visions, which have been raising expectations of immediate, almost infantile satisfaction of the usages that became possible thanks to the Digital. However, such frameworks have become obsolete to implement responsible strategies, due to the enormous push of the Digital.

Now it is the time to deploy both the Digital World together with explicit conscience of its societal environment and the Societal World together with a conscience responsible for its digital environment. This is the time of the Information World.

In the world of information, societal and digital responsibilities intermingle consciously and explicitly. It now becomes obvious that a common base is required that would allow comprehension between societal responsibilities and digital responsibilities. Moreover, it now seems to be inevitable that deeper explorations are necessary to deal with critical situations of questioning and analysing societal processes

and to (re-)construct societal foundations. Indeed, these are not only the practices that the Information World seeks to reexamine in depth. It is more than anything the way of observing Society. The Information World encourages us to return to the foundations.

By taking into consideration the issues of a democratic Society, the approach suggested in this book shares the spirit of the Enlightenment. It offers to the parties involved in the refoundation processes to become real contributors to the extent of their talents, in a context where each one proves their critical thinking. They will require a common cognitive base to appreciate the contributions of others and to be pertinent, in order to co-construct the practices that should be consequently exercised through digital means. It is the purpose of this chapter to present such a base: the **informational base**.

1.1 Classical approaches of the Digital World and the Societal World

The Digital pushes significantly change existing practices by making them more efficient and more reliable, for example by automating administrative tasks. Moreover, they induce new practices, which extend the scope of social cohesion, in particular their legislative or regulatory aspects. Such situations become even more numerous under the unstoppable flood of digital pushes. This leads to profound transformations of enterprises, not only from the point of view of their organisation and their decision-making processes, but also by re-thinking their reasons for being, their principles of management, their rules and regulations, and even laws at the level of the whole Society. How will the Digital World and the Societal World face these new challenges?

1.1.1 *Classical approach of the Digital World*

The classical approach of the Digital World consists in continuously offering new digital pushes, in form of systems consisting of a mixture of technologies and software. It reveals a technical complexity that perhaps has no equivalent in any other engineering sector. However, beyond the purely technical aspects, this approach also asks a question regarding the future of the Digital in Society. It is thus essential to make a meeting in Society where a created system must be so useful for Society, that it will immediately assimilate this system. Moreover, such a meeting should allow and invite new generation of digital pushes, which would create new digital pushes, and so on.

If it is observed from inside the Digital, the development of the Information World might seem independent of Society. It is constructed brick by brick with high

cognitive continuity enlightened with occasional breakthroughs. It is a continuous work of exploration, both meticulous and technical.

Yet, one should also take in consideration the social utility, promised at such meetings. Indeed, it is this utility that creates the legitimacy of the Digital for Society. Since this utility is only a potential, as it is not positioned as a prototype or a product, it is the task for digital demiurges to show evidence and even its inevitable effect for the progression of Society. This is how the Digital sells this utility for Society, in order to obtain budget for its development projects. Society, in its turn, buys it for its strategic reasons.

1.1.2 *Classical approach of the Societal World*

The classical approach of the Societal World only acknowledges digital pushes and their effects. It fumbles in its societal implementations. It tries to avoid its difficulties and responsibilities by sharing the visions of digital demiurges. The classical approach of the Societal World highlights the ethical aspects by denouncing digital-based consequences of any and all kinds. Such consequences include for example – those concerning the protection of the private sphere and effects on production line work by automation of cognitively coercive tasks. This classical approach denounces such serious consequences such as job losses because of the Digital; it denounces the loss of status, the general feeling of people that they are being superseded in the ability to meet their responsibilities and their concerns about the sustainability of employment.

This classical approach highly encourages one to challenge these issues. It attempts to legislate for this but is aware of the fragility of its proposals. Major digital projects are launched without their sustainability in value creation being ensured. This approach will always surrender to digital pushes and react to them while there is a general feeling that it always suffers from being unable to guide digital pushes.

1.1.3 *Facing profound transformations induced by digital pushes*

Even if it actually faces profound transformations induced by digital pushes in Society, the classical approach of the Digital does not feel concerned by them for at least three reasons:

– for each digital push, the digital approach also provides a system, the usefulness of which is perceived by Society as obvious, sometimes even inevitable. This approach is not concerned in implementation of this utility for Society. It does not want to get involved in proving this utility, but only observes it and improves its offer;

– each ICT push is considered as independent from other ICT pushes. Thus, from its viewpoint, the Internet is just a network of computers which communicate with one another. Nevertheless, from the point of view of the Societal World, the Internet has a global perspective that connected computers are located worldwide. As far as the Digital is concerned, this fact is nothing else than just an opportunity to address and solve exciting problems, such as reliability, security and performance;
– digital works are of a technical nature and strive to find the most optimal solution. Since the most optimal solution for a problem represents a significant contribution to Society, the Digital considers that its social mission is accomplished.

Facing the same profound transformations, the classical approach of the Societal World does not have a sufficient background to integrate them as part of the politics of the progression of Society. It is helpless to evaluate what exactly is right and sustainable in transformations induced by digital pushes. The obvious visions of utility, which are presented by the Digital, can not serve it to develop a consistent position at the level of Society.

It feels constantly disempowered to deal with the continuous digital pushes.

This approach can only note which habits and practices have been installed in Society by using a digital system. If – at some point – it realises that some of its usages are contrary to the public interest, it must oppose them by using principles transcribed as laws, regulations or rules. In the Digital, however, it faces two forces: the force of accomplished facts of those habits and the force typical to the Digital, the digital pervasiveness, which was introduced by Lawrence Lessig (2000) in a magisterial way in the context of cyberspace.

And here is an example to illustrate this. Briefly, if Society, through its managers, wants to counter the effects of a digital system perceived as harmful, it must impose rules not only on citizens, but also on the Digital itself. It must require the Digital to integrate them in their digital systems. The stakes are high: if the rules are embedded in the systems, they can not be transgressed. *However*, in order to embed the rules into the system, the Digital must transform them into digital rules – which are not always possible – because they are the ones that will be programmed in the system, to ensure their validation. To do this, it will be necessary to change the code of the system, sometimes very significantly, – and this can even be unrealisable, unless it is completely redone by scratch. So no wonder the ICT decision-making persons are not very enthusiastic. They can take delaying positions, knowing that the strength of accomplished facts plays in their favour to bury these rules.

1.1.4 *Risks of these approaches*

These approaches, which are taken by the Digital World and the Societal World, are foreign to one another. They are walled in mutual indifference. Yet, it is crucial for the progression of Society to overcome this obstacle.

1.1.4.1 Dominant attitudes

In both worlds, these approaches promote dominant, accepted as a reference, attitudes of the following types:

- to ignore the importance of the Digital in social development, by limiting the vision of the Digital to a simple *tool*, oriented to humans, of course;
- to consider the rising role of the Digital as a secondary factor of progression: it does not actually create wealth, it only automates processes;
- to consider the rising role of the Digital as a simple place of power where it seems enough to have fascinating digital visions and promises for Society, to be well able to speak about them, *without* being concerned with complex challenges to overcome, their impacts on Society, on its sustainability and employment politics, as well as on its real added value;
- to adopt the infantile attitude of consuming the Digital, of searching one's needs to be simply satisfied or even to expect oneself to be continuously amazed by the Digital.

These attitudes can be found in all sectors of Society. They contribute to lead the whole Society to potential failures of understanding, losing basic notions and meanings, lacking in sense, becoming profoundly destabilised by digital pushes, which are otherwise noted with fascination, having its members demobilised individually and collectively, by feeling outdated and afraid of being swept away by a cognitive tsunami.

1.1.4.2 Cracks in the wall of indifference

In its own development, the Digital confronts the need of a dialogue with the Societal World and does communicate with it in a very specific context. Some time ago, it was considered that its customers were nothing other than simple users of its systems. Thus, it was easy for the Digital to stand aside from occasional vulnerabilities of its systems that could even cause significant damages to customers: customers were obliged to sign a contract in which it was stipulated that the digital providers were exempt from any liability for errors caused by their systems!

Nowadays, however, the Digital puts its users in situations where other people, who initially have no commitment with it, are concerned by the use of its systems. These situations can be critical in the event of incidents or accidents: for example, when such situations are caused by a drone, an automatically driven car, a surgeon-robot, etc. These situations are so new, that they have not yet been the subject of laws, regulations or rules. Thus, because of its digital pushes, the Digital clashes with its own social non-legitimacy. Now it requires its own legal protection and – subsequently – its own political recognition that its ICT advances are of the public. It can only obtain the above by cooperating with the world of Society, which is the only legitimate instance to legislate it.

The Societal World must be prepared to assume this responsibility on behalf of the public interest. Before any negotiations, two important things should be considered.

From one side, the Digital knows the future towards which it is leading. From another side, it is absolutely impossible to determine the entire multitude of social and societal situations induced by digital pushes. Therefore, the Societal World must retain the option to change the laws or regulations in response to changing situations that arise from usages and – if necessary – to impose them afterwards on the Digital.

1.1.4.3 Enlightenment

These approaches of digital pushes do not significantly consider a multitude of signals following opening of new businesses created thanks to the Digital, as well as new forms of interactions, exchanges, sharing, transactions, collaborations, co-designs, co-innovation between different individuals or legal entities in all sectors. Yet, there is an increasing number of people who are enthusiastically involved in them.

The same is true for many information systems in enterprises: the Digital seized them for budget reasons but it considered that it was only the application of the Digital. It wanted to impose its ways of doing, by transforming an information system into a solution! But it is a deadlock! However, there are certain information systems which are truly successful: their decision-making persons both from the digital side and the management side have successfully dissolved this wall of indifference.

For classical approaches of digital pushes, all these Enlightenment beacons are the result of the *invisible hand* and are therefore insignificant for the progression of Society. In fact, they are very fragile; their sustainability is not ensured whilst they construct the continuity of Society by endogenising the Digital. This invisible hand that has illuminated all these successes actually hides the great intelligence in the social digital engagement of talented people. Their success was without the voluntary knowledge of classical worlds: the Societal World and the Digital World.

1.1.4.4 Conclusion

These classical approaches of the Societal World and the Digital World have built a wall of indifference between them: they communicate only through visions, budgets and relations of power. Very often, they even appear as antagonists. This was a response to initial pushes of informatics in Society. Given the importance gained by the Digital in the progression of Society and in the face of even more digital discoveries, this response can no longer assume a consequent social development without deeply re-questioning it. This is the time to make visible this *invisible hand*!

1.2 Informational approach

These digital pushes have impacts on societal practices and, consequently, on the progression of Society. They arise in a dispersed manner, in different areas of Society. They appear in a disruptive manner, with soft impacts on Society.

Given the risks and challenges, Society needs to transform these ICT pushes into real digital propulsions for the progression of Society. It is necessary that people with responsibility in the Societal World and the Digital World intermingle. It is indispensable to have an approach that recognizes this intermingling at its very heart, unlike previous classical approaches.

1.2.1 *Information World*

The specialists of the Societal World and the Digital World must collaborate to take on consequent responsibilities related to propulsion. However, these worlds have very different spaces of knowledge and methods of reasoning, as well as their challenges in the context of Society. It is nevertheless impossible to ask specialists from one of the two worlds to become specialists in the other, like for example ask managers to become IT specialists, or the other way around. By taking into account the challenges of Society, it is impossible to acrobatically juggle on the bridge over the gap that exists between these two worlds.

In fact, between these two worlds, there is the **world of Information**: it is a world of knowledge with its own knowledge and methods, unknown in the World of Society and the Digital World. It is focused on information. This concept of information is certainly shared by both worlds, but both typically only use it, without really paying attention to it. Moreover, the concept of information as such is not taught in most management and computer science programs. This concept has been highlighted as the conceptual model by researchers in engineering of information systems. Their research is published notably in the scientific conferences, such as INFORSID[1] for French-speaking scientific audience and CAiSE[2] at the international level.

The proposed **informational approach** makes the concepts of the Information world more visible, essential and inevitable. It considers that, in the context of the Information world, important decisions related to technological pushes regarding the propulsion of Society must be made. According to the informational approach, the Information World does not only serve as intermediary between the World of Society and the Digital World. The information takes the key role at the heart of development of multiple propulsions and provides their **informational base**. This informational base consists of a multitude of information models in the precise language of the Information World, all oriented towards the design and implementation of propulsions.

This informational approach proposes to build **information services** from its informational base. The **builders** of information services should be aware of the existence of the informational enlightenment introduced in the intention of this book and presented throughout the book. These builders must be inventive and critical.

1. http:// www.inforsid.fr.
2. https://www.caise19.it/.

This informational base imports the knowledge, which is described in informational terms coming from all the domains concerned by the information service, in particular, from the Digital. This knowledge is essential for the designers of the informational base, so that their decisions regarding the informational base can be accurately passed on by the people responsible for the digital implementation and by the people responsible on the organisational level, who are in charge of activities that will be undertaken through information services. This knowledge is imported into the informational base according to the principles described below. The informational base is thus composed of four parts:

– the digital informational kernel. It includes all the knowledge of digital possibilities and difficulties, in particular those relating to the security of access to information, to the evolution of the informational base. This knowledge is the basis of informational models. For example, the conceptual models used in information systems come from the schema models used in technologies related to database management systems;
– the societal informational kernel. It contains essential knowledge to determine the activities and responsibilities induced by the information service, as well as the necessary skills and the principles of their organisation. It contains the model of activities and the related economical model, as well as the exhaustive list of activities and contributors;
– the informational regulatory kernel. It concerns generic knowledge, such as scientific and technical knowledge, standards, laws and regulations;
– the informational kernel. It concerns all informational models. It is in the informational kernel where all the knowledge is combined, in order to construct informational base.

The informational base is represented in the figure 1.1. by the yellow ellipse. The societal part is represented by the red ellipse, whilst the digital and the regulatory parts are depicted as blue and grey ellipses correspondingly. The other ellipses are related to the more general context of Societal, Digital, Regulatory and Society.

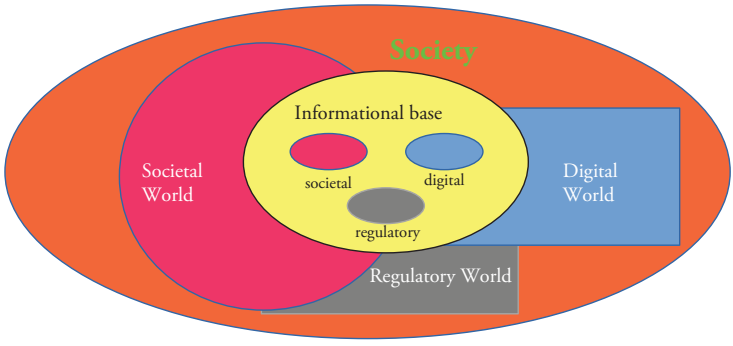


Figure 1.1. *Informational base.*

The informational base is the steering place of the entire **informational infrastructure**, which has been developed to support an information service. This informational infrastructure includes of course the informational base, as well as all the digital and organisational implementations that have been put in place, in order to make operational this information service.

1.2.2 *Digital push of the Information World*

The Digital is always oriented towards the future. It only proposes rendezvous in the future to both enterprises and individuals by creating new digital technologies; the fact that both enterprises and individuals are present at these rendezvous by buying them, ensures the expansion of the Digital in all sectors of activities. It pushes the Societal World to also become oriented towards tomorrow, by putting the societal innovation in the centre of its missions and by being involved in innovation processes, in order to create, in its turn, new meetings in the future.

The consistent future of the Society with the Digital is not a hypothetical future. It is built very precisely, with an attention to informational detail, which does not really have an equivalent in the Societal World with such a wide extent. This special future is called **tomorrow** in this book. This is the informational construction that leads to a digital implementation: everything must be detailed, since, of course, no invisible hand can repair conceptual errors or approximations. It requires the underlying rigour of digital technologies. The Information World will push the Societal World to comply with this informational rigour: no mistake can be made, no vagueness is permitted. This is the world of the **informational design** which builds informational models.

The Information World uses the informational models entangled with each other to construct digital implementations. It pushes the Societal Information World to apprehend them, to participate in their construction, to make decisions in the choices of informational models, which all have their implication on the opportunities for actors working with the future system. It pushes the Societal World to enter into the world of informational models, where little by little meetings offered to tomorrow actors of the system are being formed. In order to overcome many difficulties, the methods of exploration of situations are required, which would allow to subdue their complexity by designing informational models.

In order to be efficient, the Information World requires that the phases of creative tension of design and implementation have to be protected, because they can last forever, given the amount of information that explorators must manage. In particular, the Information World pushes to avoid any undue delay in the decisions that are imperative for the development of the information service.

The Information World also pushes the Societal World to adopt a management approach, which gives a central place to the informational innovation. It also should take into account that the success of an information service requires many people to be involved into the process of design and implementation. The situations to overcome

are so diverse and numerous. All the details have an important, sometimes even crucial, role. It is thus impossible that only one person controls or manages the entire process.

The Information World can not be embedded in the objectives, to which they should provide solutions. These meetings, which it sets tomorrow for individuals or enterprises, are expressed in terms of openness to discover the need in terms of creation and consolidation of activities. The Digital Information World pushes the Societal Information World to explore digital pushes and not to consume them. In addition, it pushes the Societal Information World to consider every informational implementation as still in the process of development and not as an end in itself or a final solution.

1.2.3 *Societal contra-push in the Information World*

In the context of the Information World, the digital push in the Societal World generates a societal contra-push in the Digital World. It might take multiple forms.

Facing the digital pushes, the Societal Information World has the responsibility vis-à-vis Society, to manage and direct the evolution of information services or services that are supported in particular by the systems of these pushes. So, it pushes the Digital to provide it with the knowledge necessary to assume these responsibilities.

It also pushes it to provide interoperable systems, since the information, even if it is taken into account by different digital systems, nevertheless belongs to the same information service.

The Societal Information World pushes the Digital to provide evolutive systems that would enable it to carry out the necessary evolutions of the information service in response to continual explorations and continual adjustments to the evolution of the environment.

While, a digital push is primarily concerned with its system and its usefulness, particularly the satisfaction of generic users, the Societal Information World considers people who exercise their activities in the form of responsibilities or tasks. These are the **actors**. The responsibility of the Societal Information World lies in ensuring that they continue to exercise their activities within the information service efficiently. The situations intrinsic to their activities must be found in the information service available to them. It pushes the Information World to reason in terms of situations and to explore, design, achieve, evolve the interfaces between the actors and the information services.

Faced with a given situation, these actors need to have confidence in the information obtained from the system by having access to its source and evaluating its relevance. They need to have confidence that the information service faithfully reflects their actions. The Societal Information World pushes the Digital to be able to enrich all information with its provenance and its relevance, and to enrich each and every operation with the circumstances of its processing and with its effects.

While the Digital normally considers users to be isolated from each other in their intentions, the Societal Information World, on the contrary, takes into account the

actors as participating in a collective activity to which everyone contributes. They share activities and information with people in the same enterprise or other enterprises. They need to have confidence in their knowledge of how exactly the other actors execute their activities through this information service. Thus, access operations offered by the Digital are not sufficient for the Societal Information World. It pushes the Digital to introduce the concept of the **informational space** for each actor: a list of different types of information and information treatments to which an actor has an access. Since actors are not isolated from each other, the informational space of an actor has a non-empty intersection with the informational spaces of several other actors. These informational overlaps should be viewed as objects of protocols governing the activities of each actor, in order to ensure consistency of the collective activity in which all these actors participate. In this way, the Societal Information World pushes the Digital to enable the implementation of these protocols of informational overlaps.

The Digital provides generic means of security at the level of each of its systems. The Societal Information World pushes the Digital to consider the level of informational security based on the relevant informational spaces. As the informational space of one actor can be supported by several systems, it also pushes the Digital to consider that informational security should be defined by multiple systems.

The Digital makes available generic consistency rules which it inherently validates. The Societal Information World has the responsibility of the regulatory kernel of the information service. It is composed of management rules of an enterprise, rules regarding the overlap protocols, norms, societal rules, various regulations and legislations. It has the responsibility to ensure compliance of information services with all these rules. Not all of them can be implemented in an information service. Therefore, their validation becomes the responsibility of actors. For other rules, the Societal Information World should develop their implementation within the system, as well as it should ensure a possibility for eventual modifications. It pushes the Digital to develop a real regulatory space allowing, on the one hand, to implement all these integrity rules and, on the other hand, to facilitate the evolution of their implementation in response of the evolution of the regulatory rules, in order to maintain compliance of these information services.

Finally, the Societal Information World pushes the establishment of methods of development and management of information services. These methods take into account not only digital pushes, but also the regulatory space, situations, evolutions and explorations, and deviate from linear methods, which start from goals to get solutions, which are practiced in the context of the indifference between the Societal World and the Digital World (§ 1.1.4.1).

1.2.4 *Societal push in the informational context*

Society continually faces common situations and emerging situations. The answers to common situations are objects of standards and references that allow

implementation and monitoring of societal operational practices, and would use these standards to respond to common situations. In contrast, emerging situations come from the aspirations of their members, unexpected events of all kinds, complexities, which have never been met before, information and relevant knowledge, which have not been accessible previously. There is no reference of societal practices to deal with them. Persons with responsibility often find themselves in the situations when their decision making would have consequent impacts on the future of Society, such as launching a legislative process.

All these situations lead to implement societal processes. The Digital has proven, however, that it can increase the efficiency of its own implementation. In this way, the classical approach advocates making decisions in the Societal World, without worrying about the Digital, and then turn to the Digital, in order to seek solution there. If one manages to destroy the wall of indifference between these two worlds, one would give an opportunity for the digital contra-push to take place, especially in emerging situations. Thus, instead of placing persons with responsibilities into risky situations to take important decisions, it puts them in position to lead a process of exploration, focusing on each step to implement societal processes, which are enriched thanks to the Digital. For this approach, it is necessary to establish the following chain of responsibilities:

$$\text{Society} \Leftrightarrow \text{Societal} \Leftrightarrow \text{Information} \Leftrightarrow \text{Digital}.$$

An example of such an approach is restructuring of an enterprise. Instead of planning restructuring an enterprise without taking into consideration all information services, which are already implemented in this enterprise, an exploratory approach (Opprecht and Léonard, 2014; Ralyté *et al.*, 2016) considers their conceptual models and suggests how the conceptual models should evolve according to each step of the exploration of restructuring. In the exploratory approach, persons with responsibility are much closer to immediate impacts of restructuring and have more opportunities to refine their restructuring decisions in real time.

Another example is provided in the book of Fred Turner (2006), which presents the entanglement of aspirations in the Societal World and the Digital World. This entanglement is based on "the first key of the digital utopia", where the information has a central role for everything. When these two worlds intermingle, pushes and contra-pushes come in fusion to propel Society.

1.2.5 *Informational propulsion of Society*

Fred Turner describes the connivance of social and digital aspirations. They are intertwined to form meetings between actors of Society, and digital creators. The social aspirations of the actors of Society come in line with the digital aspirations of digital creators. The actors of Society seem to give sense to digital creativity; digital

creators seem to make actors' aspirations concrete and realisable. Their intermingling starts playing the role of propulsion for the development of the Californian society.

The Information World has different amplitude. It does not only have its interest in digital enterprises. It focuses on Society in all its complexity and all its components. The Information World also suggests to intermingle the Societal World and the Digital World, but its purpose is to form informational propulsion in the very heart of Society.

1.2.5.1 The force of the Information World

The force of the Information World is to provide a framework helping to entangle digital pushes and social pushes. It is based on information and design. Information plays a central role. In the Digital, it describes anything that can be put in a binary form. In the Societal World, it holds an obvious essential place among all actors. It is in the centre of the Societal, in particular when it transcribes social aspiration at the societal level. The Information World gives it many forms: data, knowledge, information, rule, procedure, communication, as well as processes that allow establishing precise digital and societal designs.

The Information World channels the force typical to the Digital, which was previously presented (§ 1.1.3), by mastering informational models, which make it possible to take the measure of this force on the Societal World. Once embedded in one or more digital systems, design models define the code[3] which would induce dominant effects on the Societal World. Since this code has significant effects on Society, it is desirable to place its conception in a democratic context. The Information World allows it: by allowing the co-design and co-responsibility of the models at the informational level, it allows to establish coherent debates between actors of the Digital Information World and the Societal Information World, based on the accuracy of the informational models regarding the Societal World.

Thus, the Information World contributes to the legitimacy of information services supporting societal activities. This legitimacy has two facets:

– the first one, "**true**", concerns digital implementations of informational models from the point of view of its engineering dimensions, such as reliability, performance and security;
– the second one, "**right**", concerns societal implementations based on informational models in their organisational, managerial and efficiency dimensions to enable the actors to face the situations, which they encounter within the framework of their activities, within the framework of the corresponding laws, rules, norms, ethical codes, etc.

3. In reference to the article "Code is Law" previously cited (Lessig, 2000).

1.2.5.2 A vast space of innovations

The Information World provides a vast space for informational innovations, since it concerns all sectors of Society. These innovations relate to all levels of Society, the strategic and tactical levels, the operational level and the level of regulations. Such innovations can not be only to descendant or ascendant, they can not be only reserved for experts to innovate, and they can not be reduced to a single domain, unless they hinder the progression of Society. Coming from everywhere, innovations are multi-sectoral, multi-disciplinary, and sometimes multi-national. All of them have an important obligation: to create value, manage information services, which are both *true* and *right*, and to support the societal changes they induce.

Everyone who is involved in the co-creation of information services is also involved in co-creation of informational models. However, by doing so, people are required to search for the **sense** of the information service. They may even find several senses. They detail and concretise the sense during the progress of works of co-creation, and then share it with more people, even outside of the co-creation team. Each of co-creators has the sense of contributing to the progression of Society.

1.2.5.3 Risks of exclusion

The other side of this vast space for informational innovations is the risk of informational exclusion: *i.e.* the inability of a person to capture one of these senses and connect to it. Such a person finds herself completely disoriented with this information service and has no cognitive references to ensure her responsibilities. This can lead a person to a panic situation. This informational exclusion is even deeper than digital exclusion, which concerns the impossibility to access the Digital or the impossibility to comprehend the principles of its usages.

There is even a more insidious and extensive form than informational exclusion on the level of Society. It is the informational exclusion of potential creators who are being robbed of informational innovation by others (probably more influential persons) that have the power to impose their solutions.

The persons with responsibility who do not understand the importance of the Information World in the progression of Society do not have an argument against it. They simply are not aware that if one reduces informational innovation to simple digital innovation, one can not take into consideration the societal innovation, which has an outstanding importance for the progression of their Society and is characterised by an important added value, including the economic one. They are not aware that the "solution" constructed in this way is built in a societal context of a different Society, thus such a "solution" just implicitly introduces this societal context in their Society.

The fight against informational exclusion is very difficult. It is the informational approach that enables to highlight it and helps to overcome it by creating informational commons.

1.2.5.4 Information common goods

This situation closely resembles the so called "tragedy of the commons" (Hardin, 1968) in the context of the management of natural common goods, such as fisheries, forests, water sources. In this domain, the valuable research by Elinor Ostrom (1990) earned her the Nobel Prize in economics in 2009. It is important to build, nurture and continuously enrich the information common goods. Given the multitude of informational resources to inventory, their management can only be done through the contributory management, where each contributor should feel recognised both economically and socially. These information common goods create the base of all the digital economy.

1.2.5.5 From cognitive disruption to cognitive continuity

Under the leadership of the Information World, Society is expanding. It introduces a dimension of innovation that is related to a wide range of actors, not just researchers and R&D departments of enterprises as in the case of product innovation.

This Information World takes into account in an explicit way both common situations and emerging situations. The first ones, even if they are faced with unforeseen circumstances, nevertheless remain in a known conceptual framework, certainly being a subject to continuous improvements. The conceptual framework of the second ones is either incomplete, or unknown, or both. In this case, a process of exploration is initially required.

Obviously, the Information World takes into account the common situations, however, it is best known for taking into consideration these emerging situations. For people who are engaged in co-creation of a new information service, such situations seem to be disruptive. Not only do they seem to be disruptive – they are actually disruptive. However, in the societal framework and consequently in the social framework, it is essential that these situations reach sufficient maturity to be presented as a continuity, particularly to avoid informational exclusions. This is the responsibility of the Societal Information World to ensure this continuity, definitely not just through simple communication such as marketing on presenting a new product, but based on the sense, which served as a keystone for co-creators.

The Information World must thus manage concomitance of activities, facing both common and emerging situations. And whilst the management and economics of common situations give the impression of being well known, the management and economics of emerging situations still remain to be explored, especially to discover new activities allowing value creation and their implementation in Society.

1.2.6 *Properties of the informational approach: a vast space of explorations*

In conclusion, the Information World allows maintaining a coherent conversation between the Societal World and the Digital World. It does not have a simple role of

intermediation between these two worlds. It is the Information World that governs the Digital of Society through its component of the Digital Information World. It is the Information World that governs the Societal World through its component of the Societal Information World. It is the Information World that has the responsibility of the sense of the progression of Society induced by its informational propulsions. It is also the responsibility of the Information World to ensure the cognitive cohesion between all its actors.

It offers a vast space of responsible informational innovations with *true* and *right* information services, which explicitly bring their value to Society. This vast area of innovations requires a significant number of contributors from diverse professional and social backgrounds who would participate in all activities of exploration and informational co-creation.

It contributes to provide legitimacy of the democratic nature to informational implementations, to fight against informational exclusion of any kind, by taking into account both the common situations and emerging situations, to clarify responsibilities between the areas of Society, the Societal World, the Digital World and the Information World.

Therefore, thanks to digital pushes and social pushes, as well as the corresponding contra-pushes induced by them, the Information World becomes a real booster of the progression of Society.

1.3 Conclusion: towards information intelligence

Classical approaches of the Societal World and the Digital World turn out outdated and unable to meet the enormous potential of the Digital to ensure the social development. These approaches even offer strategic alignment of these two worlds, meaning that the Digital World should probably align with the Societal World. This alignment – *i.e.* this disposition of different things placed one next to another one in a straight line – can only hinder the progression of Society by inhibiting the informational development. Moreover, it reduces the role of the members of Society as simple consumers of the Digital (sometimes even by infantilising them) or just digital developers. They are all excluded from the informational innovation. However, in its turn, Society itself deviates from the societal innovation and must consume the innovation developed by others. Such approaches can only identify the situations of digital exclusions, without even being able to detect informational exclusions. They can not claim they can achieve any of the properties of the informational approach, which were previously described.

In particular, facing digital pushes that continue to open new potentialities of activities in Society, the informational approach ensures Society avoids falling into the trap to "regulate everything *vs.* let everything go on its on". Indeed, it offers no obstacle to digital creativity. In contrast, the informational approach focuses on the

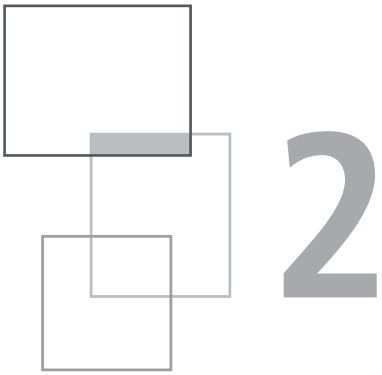
digital endogenisation in societal activities by taking into consideration digital ICT pushes, as well as societal contra-pushes.

It is a real information intelligence, which should be developed to provide cognitive references to all the people – and there are many such people – who are concerned by the Information World on its various levels. It can not follow solely pragmatic approaches, because the Information World gives pushes not only on the level of actions, events, organisations, or practices. It is not even only for management and economics. The foundations of Society, which were built without the Information World, should be reconsidered. For example, what is a University in an informationally expanded Society? What is a hospital in such a Society? It is for the information intelligence to suggest exploratory approaches by respecting democratic principles. In this way, the motto of the French Revolution "Liberty, Equality, Fraternity" takes a critical and concrete dimension to (re-)build societal foundations. This motto will serve again to establish a common basis of collective understanding of all refoundings to explore and implement. Thus, an extension of universal Human Rights in the informationally expanded world becomes particularly relevant and essential.

This information intelligence is based on scientific knowledge, some of it coming from hard sciences and some from humanities. This information intelligence takes into account multi-sectoral, multi-institutional, multi-disciplinary situations, in order to form perennial information common goods from which various information services can be constructed. It is the management of reticular responsibilities, the economy of contribution, the management of contribution that must be put in place to meet the challenges of informational potentialities available to Society, and especially the challenges of many initiatives of contributors, who are eager to participate in the progression of Society.

Moreover, information intelligence is interested in the distribution of responsibilities between the powers of Society – such as executive, legislative, judicial powers for a democratic state – extended now to include the informational power. It is information intelligence that allows one to govern the societal informational propulsion for the benefit of the progression of Society.

Finally, this information intelligence is particularly essential to the works of co-design around the Information World, the only place that allows one to engage real responsibilities in the informational progression of Society.



2 Information service

2.1 Raison d'être of information services

The information intelligence (§ 1.3) encourages rethinking the approach to overcome the challenges of the progression of Society. This approach should be suitable for teams of people to enable them to explore and to construct information services by building consensus, and sharing responsibilities, in order to face these challenges. All these teams are **heterogeneous** in the sense that the people, who compose them, have different profiles concerning their professions and their responsibilities inside different institutions in various public, private, associative or international sectors. Thus, the concerned services, in the most general sense, are **trans-services**: they are trans-disciplinary, trans-institutional and even sometimes trans-national because of the heterogeneity of their contributors. Indeed, they do not exclusively belong to any of the contributory disciplines, institutions or nations, but nevertheless they contribute themselves to the propulsion of each of these disciplines, institutions or even nations.

Information intelligence welcomes the challenge of expanding the field of activities of Society by suggesting informational propulsions. This approach offers a heterogeneous team a cognitive cohesion that has never been known before: a cognitive cohesion around **information services**. It leads the members of the team to consider that their activities must essentially be information innovations, in order to be consistent with the challenges they face. In this way, their work turns out to be the work on co-creation and co-design of information services. In this requirement, they form a framework of cognitive cohesion, which is conducive to their efficiency. Their conclusions are then expressed in terms of information services as first results. These results are not just visions or reports. They are actionable (Argyris, 1996) in

the sense that actors, even those who have not participated in these explorations, can manipulate them, not only understand, but activate their contribution to their own activities, criticise them knowing that their criticisms will be debated.

The investigations then enter into another phase of taking into account such critics. This is how they could support the evolution of information services. On one hand, they support actors in their exploitation of such services. On the other hand, they will have to help to serenely organise the expansion of the activities, which are resulting from the exploitation of these services in different institutions, different professions and disciplines, as well as in different countries.

This informational approach considers that information services have the potential to offer much larger activities than traditional services of public or private worlds, such customer or public services, or the digital world, such as web services. It positions them in the context of informational propulsions (§ 1.2.5). In the heart of their design, there are two main components. First, in contrast to traditional management services, it is their **digital component**. Second, in contrast to a usual digital service, it is their **value proposition** for Society.

However, what makes information services essential for informational propulsions is the central place, which is taken by the information in any information service. An information service contains **an information base** with informational models (§ 1.2.1) of societal and activity knowledge, of digital and regulatory knowledge. Moreover, once the information service is put into operation, its Implementation constitutes its **informational infrastructure** in Society with its digital, technical and organisational aspects.

This approach is constructed in the way to allow talented people in the domain of information intelligence to be critical, to feel free to express themselves, to create information services with a strong impact on expansions of activities, and, consequently, to actively contribute to the informational propulsion of Society.

2.2 Intention of an information service

Builders of an information service have an **intention** to contribute to overcoming a critical **situation** of the progression of Society, which concerns several sectors of Society.

They outline the **issues** concerning their institutions, their enterprises, their professions, as well as the education related to their professions, their management and decision-making processes. This list of issues serves as a continual reference throughout the construction of the information service.

They propose **explorations** aiming to build an informational base with its infrastructure. This base allows emergence of service activities, which help to overcome the situations described in the intention.

They define a **value proposition**, which explains how the service will contribute to the expansion of the activities of Society, and thereby add value to Society. This value proposition also presents an estimate of the chances and risks to be avoided in the exploration and implementation of the information service. It explores the models of all these activities.

Therefore, this **intention** provides a benchmark to all the contributors of the services and thus facilitates their cognitive unity. It is also the way to represent the cognitive identity of the service to external partners. It is in the heart of determining the sense of the service. The intention, with the targeted situation, its proposal of values and its issues, is explored and refined through its exploration, discoveries, as well as throughout the whole process of the construction of the information service.

2.3 Canvas of activities around an information service

All the people carrying out their activities through an information service find information there and, at the same time, they bring new information to this service, modify the existing one or make it obsolete if required. They **contribute** to the information service by benefiting from it and by providing information to the information service. In particular cases, contributors hold only one of the two roles, either beneficiary or provider, as in the case of usual services.

The **contributors** of an information service carry out activities of two types: exogenous or endogenous activities of the information service. Exogenous activities allow contributors to fulfil responsibilities or carry out activities in the domain of Society. They are called **actors** of the service. Endogenous activities directly concern the information service in all phases of its life cycle, such as creation, design, implementation, operationalisation, maintenance, evolution. Contributors who carry out these activities are called **builders**. The same person can be both an actor and a builder.

2.3.1 *Reference framework for contributors*

Every information service establishes a kind of new city built on digital technology with new challenges, new usages and new forms of human relations between all contributors, builders and actors. It requires certain reference in these new situations to adopt fluid attitudes and behaviours in agreement with other contributors and to build sustainable relations of confidence and trust with others.

These references are formalised in the form of **protocols**: a set of rules and practices to be respected in their relations with other contributors through the information service. These rules and practices concern, for example, the modes of sharing the

information, coordination, co-creation of service extensions and even co-creation of new services. They may have legal, regulatory or ethical bases.

These protocols apply to all activities related to the service. Among these protocols, there are those which govern the **informational overlaps** between various activities. Such information overlaps result from the fact that these activities not only share information between them, but also update it, in particular for endogenous and exogenous activities. These protocols are intended to determine the roles of each of the related activities, in order to maintain the informational coherence of the information service.

The reference framework for contributors of an information service is composed of all these protocols.

2.3.2 *Administration of an information service*

The administration of an information service concerns the respect of this reference framework to enable the proper functioning of the information service. It shall take appropriate operational measures. In this way, it ensures that contributors comply with the protocols and that the information provided by contributors complies with the regulatory elements of the service. It also takes all measures to ensure or improve the proper functioning of the service, such as those to improve service usability, or to increase performance, or to make changes to protocols for exchanges, access to information, and coordination between contributors.

It also ensures all the activities of supplying the service with information necessary for the proper functioning of the exogenous activities of the service, such as regulatory information, by keeping it up-to-date. It also controls the conformity of exogenous activities with the regulatory world of the service.

2.3.3 *Steering an information service*

Steering an information service deals with tomorrow of the service, its creation and progression. It is supervised by a steering committee. Steering activities are carried out by service builders.

2.3.3.1 Watchfulness

Steering an information service requires information concerning the situations in which the contributors of the service, either they are actors or builders, carry out their activities. This also relates to the transformations of the service environment itself, such as regulatory texts, and exogenous activities. These are activities of **watchfulness** that collect this information.

Thus, in the activities of contributors, watchfulness activities might detect cognitive weaknesses such as lack of information, cognitive overloads, poor performances, or other difficulties encountered by contributors, for instance, in the processes of their exchanges and coordination. They analyse the origins of such weaknesses and make decisions to remedy them, according to tomorrow of the service. Examples of such remedies can be the establishment of a new educational environment or a new learning space, requirements of changes or the necessity to reconsider the evolution of the service.

Other activities examine the environment of the information service and its exogenous activities, in order to detect opportunities to feed the service with new information, to expand the scope of the existing activities of contributors or to create new ones, to open this service to other contributors. After such investigations, these activities lead to decisions for refinements or even changes in the intention of the service, its value proposition or its sense. These decisions may even open the door to explorations of tomorrow of this information service.

The watchfulness activities of an information service also concern the exchanges between the contributors. They take into account the relational difficulties which can arise, both in exchanges or – on the contrary – in the absence of exchanges, aim to find the origins of such difficulties, either they come from the service itself or are the consequences of its administration, and take the appropriate measures accordingly. These activities might appear as a mixture of activities of concierge, reception and animation and they should merge smoothly with the activities of contributors and become indispensable for them.

2.3.3.2 Creation and progression of an information service

The steering activities concern the creation or progression of an information service. In particular, they provide answers to the situations raised by the situations highlighted by the previous activities.

Service builders put in place the models of the informational base of a service. They integrate into these models realisation activities to make this service operational. They entrust the activities of feeding the service with the constitution of all the regulatory information. They establish the intention of the service, including the value proposition, and the reference framework of service for contributors.

The structure of a service is not inert; it has to move forward, for example, to meet new expectations of contributors, to integrate new information technologies, to reflect legal changes. It is again the builders who drive this progression. They do the same kind of work as before, but unlike in the situations of initial creation, they have to take into account that the service is already active and that its contributors carry out their activities with it and generally can not stop any of these activities by waiting for a new version of a service.

With the cooperation of the involved contributors, they advance the service by evolving the models, by enriching the intention of the service and the reference

framework for the contributors, and ultimately by proposing a new version of the service. They participate in the final decision with the steering committee. In case of a positive response, they make the new version of the service operational and disable the previous one that becomes obsolete.

2.3.4 *The history of a service*

Activities related to the history of a service are carried out by builders having a special role: they do not play an active role in the creation and progression of an information service, but are an integral part of the team of builders who lead the explorations. The mission of their activities is to capture the history of the service as long as the explorations and implementations are carried out. In particular, they are in charge of the preservation of all the different versions of the fundamental documents of the builders, such as the intention and the reference framework, for the contributors. They must keep up to date the **roll of recognition of the service**, which includes the roll of honour of the contributors, where they record their contributions to the service and the significant events of service progression. They must be the **guardians of the sense** of the service. Their role is essential to keep the cognitive unity and cognitive identity of all service contributors and to educate new contributors.

2.3.5 *Synthesis of activities around an information service*

The figure 2.1 synthesizes all the activities.

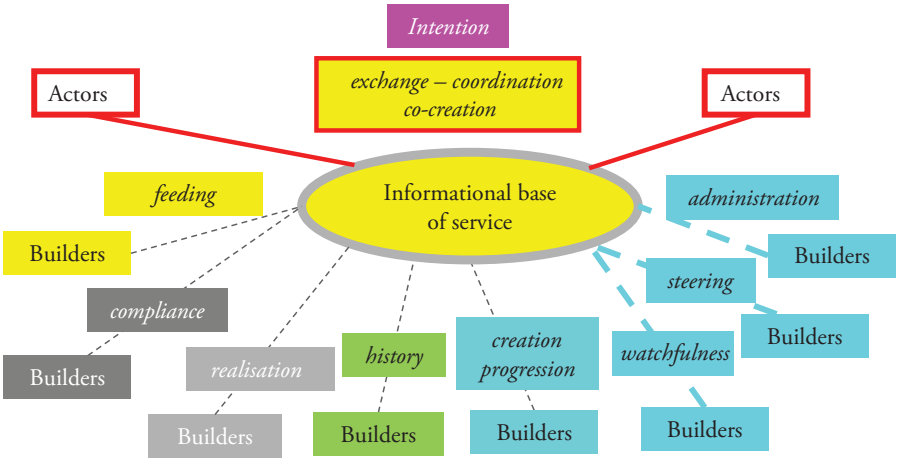


Figure 2.1. *Activities around an information service.*

2.3.6 *Canvas of the information service*

The canvas of an information service has six dimensions (figure 2.2.):

– intention;
– reference framework for contributors;
– informational base;
– history;
– informational infrastructure;
– operational space.

The first four dimensions are presented above.

The dimension of informational infrastructure concerns all the digital, technical, and organisational aspects of service implementation in the Society, for instance all the digital systems used to build the digital part of the service, all the equipment to fulfil certain exogenous activities, the possible reorganization of the offices.

The dimension of the operational space concerns ongoing activities for the creation or progression of the information service. It describes the endogenous or exogenous operational activities in the form of canvas having the same frame as the canvas of the information service. It describes the proceeding of ongoing explorations.

This operational space is very dependent on the management of the creation or progression of the service. It is constantly in the background of all the activities around the service, notably in the case of the complex information service presented in the next paragraph.

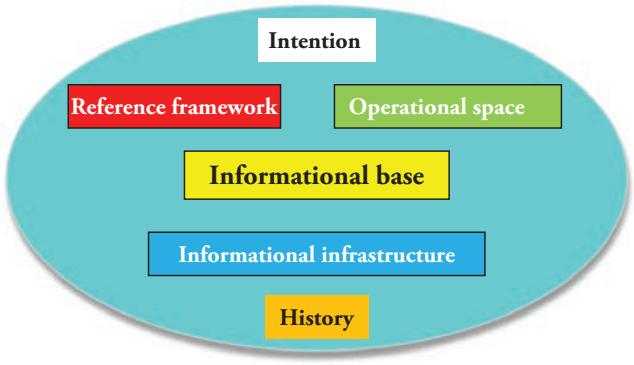


Figure 2.2. *Canvas of a service.*

The canvas of an information service is refined throughout the process of creation and implementation.

2.4 Complex information service

The informational propulsion requires more than a simple set of dispersed services. It requires service systems. A service system can be described as "a dynamic value co-creation configuration of resources, including people, organizations, shared information (language, laws, measures, methods), and technology, all connected internally and externally to other service systems by value propositions" (Maglio *et al.*, 2009). This domain of service systems is extremely complex, since there are many entanglements between different perspectives.

A **complex information service** is first and foremost a service system, whose basic services are all information services. Furthermore, it is an information service itself obtained by the composition of its basic services.

This composition concerns the relations between the own canvas of the complex information service and the canvases of its basic information services.

2.4.1 *Basic principles of service composition*

A complex service is a composition of services, so its canvas must be established as a composition of canvases of basic services. This composition clarifies the relationships between the complex service and its basic services. It highlights a set of generic, crucial and determinant situations, which might be encountered throughout the process of service construction:

- generic situations do not depend on a particular domain;
- crucial situations require irreversible decision on design;
- determinant situations have important consequences. They may not be taken into account in decisions, for example by ignorance of their existence, so inevitably the extent of their consequences coming out of the invisible hand (§ 1.1.4.3) can not be investigated.

2.4.2 *Types of alliance in a complex service*

A complex service is an alliance between itself and its basic services. This paragraph presents five types of such an alliance. Each one is related to a mode of the composition of the canvases of basic services, in order to form the canvas of the corresponding complex service. This has consequences on the modes of functioning of basic services and the roles of their contributors.

2.4.2.1 Integration

All basic services are integrated into the complex service. Their intentions no longer exist. On the other hand, the intention of the complex service must consider them

all, by taking into account the new dimension, which is taken by this alliance, in order to respond to societal challenges.

The actors of all basic services become actors of the complex service: they continue to conduct their exogenous activities under identical informational conditions.

All steering and administration activities carried out at the level of basic services are fully performed at the level of the complex service. Reference frameworks for contributors of basic services have no reason to exist any longer.

The informational base, the informational infrastructure and the operational space of the complex service engulf those of the basic services.

The history of the basic services stops, the history of the complex service begins.

2.4.2.2 Centralisation

All steering activities of the basic services are centralised at the level of the complex service. The informational base, the informational infrastructure and the operational space of the complex service engulf those of the basic services.

All basic services retain their intention, their actors and their reference framework, which concern only their administration as well as the administration of exogenous activities. Their builders only deal with the administration. Their operational space is limited to their exogenous activities. Their story continues.

2.4.2.3 Orchestration

All steering activities of the basic services are approved and supervised at the level of the complex service. A basic service retains all its endogenous and exogenous activities, its builders and its actors, its reference framework for contributors, its informational base, its informational infrastructure, its operational space. Its story continues.

However, it is now a subject to transversal activities decided at the level of the complex service. These transversal activities are carried out on several basic services by actors of the complex service. Their builders are contributors of the complex service. They must rely on the cooperation of the builders of the basic service, in order to advance their service and enable transversal activities to operate on the informational infrastructures of the basic services. The reference framework of a basic service must be extended to take into account builders and actors of transversal activities.

For the complex system, the intention refers to the intentions of the basic services, but it mainly focuses on transversal activities and their value proposition.

The reference framework includes a protocol for managing transversal activities: it concerns the relationships between the steering committees of the complex and the basic services regarding the exploration phase. It must manage the relationships between the builders and actors of the complex system and the builders and

actors of the related basic services. It must establish information collection protocols between different basic services come across by traversal activities.

The informational base contains all the information necessary for the administration and management of the complex service. Moreover, taking into account transversal activities, it is extended to the entire informational space of transversal activities, *i.e.* all the information and processing they access (§ 1.2.3), including in the informational bases of the basic services. The same happens to the informational infrastructure.

The operational space and the history, in addition to their usual role, take into account important events that occur in the services of the orchestration, such as launching an exploration of the extension of a basic service, which has been approved.

2.4.2.4 Choreography

All the steering activities of the basic services of a choreography are submitted to the steering committee of the complex service not only for their approval and further supervision, but also to guarantee to the other parties of the choreography their compliance with the spirit of choreography.

This spirit of choreography expresses itself in the intention of the various basic services to constitute a choreography, to be able to create transversal activities and to have decided ways of settling cognitive divergences concerning the progression of one of them or the progression of a transversal activity, in general. These differences are debated at the choreography level. Nevertheless, it is not at the level of the choreography where decisions to explore a transversal activity, to implement it, to make it operational, are made. Such responsibilities are ensured by the steering committees of basic services. The builders of these transversal activities are builders of the related basic services. The same happens to their actors.

The complex service is defined by its intention, its reference framework, which is the kernel of the reference frameworks of the services of choreography and its operational space for transversal activities.

2.4.2.5 Farandole

The builders of a farandole are builders of information services that will compose it. They intend to create a common basis for all their activities concerning their identity and cognitive unity to facilitate the establishment of cooperation agreements. These agreements concern, for example, the extension of an activity from one service to another service, regarding the way this activity will be able to process information from the other service. A cooperation agreement does not necessarily concern all the services that create the farandole.

The canvas of the complex service formed from a farandole contains only the intention and the reference framework for the contributors of the basic services. Its

intention is the intention of the builders of the farandole. The reference framework specifies the common base which is found in the canvases of all the services of the farandole. Therefore, the reference framework of any service of the farandole must contain a protocol to establish cooperation with other services of the farandole.

The transversal activities, which are mentioned in the case of the orchestration and the choreography, are also taken into account in farandole, but in a different way. A transversal activity is established by cooperation agreements, remaining only at the level of basic services and not at the level of the complex service.

2.4.2.6 Crucial and determinant situation of the choice of the type of alliance

The differences between these five types of alliance, which emerge from the principles of their functioning, lead to very different repercussions on the canvases of basic services. The situation of the choice of the type of alliance is crucial and determinant for the construction of the complex service, because it determines the evolutions required for the canvases of the basic services.

It is necessary to explore the different types of alliance and evaluate the possible consequences, as well as to maintain the continued operation of exogenous activities of basic services. Once the choice is made, it will be difficult to question it afterwards.

This exploration should not be limited to solely managerial or digital considerations. Above all, it must carefully analyse the informational bases of the various basic services and focus on their informational overlaps.

Two services have an informational overlap (§ 1.2.3), if they have information from the same phenomenon – such as, for example, regulations or laws. This situation of informational overlap leads to a situation of informational redundancy, which is particularly significant in times of updates, to ensure their synchronisation. This overlap situation is, in fact, inherent in the formation of an alliance between information services. Indeed, in the general case, information services were built separately and operate independently of one another; moreover, they inevitably have informational overlaps with each other. It is, no doubt, some reasons for the intention to form an alliance.

However, the situation of overlap is not simple. Indeed, an informational overlap between two services induces a situation of information redundancy. If they are part of the same alliance, then it is essential to synchronise the updates so that, for example, a third service of the alliance gets the same answer, either it addresses to one service or another. In this case, it is necessary to establish the full protocol of overlap. The difficulty of putting it in place depends heavily on the implementation of the informational parts of the overlap in the two informational infrastructures, both at the digital and organisational levels. Since informational infrastructures have been constructed separately, the difficulty is usually high, sometimes even impossible!

This situation of overlap is crucial and determinant in the choice of the type of alliance. It is crucial, because it conditions the digital and organisational methods

aiming to implement it in the alliance and ensure its synchronisation. It is determinant, because if it is not known, it can only be ignored: the challenges of the implementation of overlaps can not be answered and, consequently, the possible digital impossibilities and possible organisational conflicts can thus remain unknown.

2.4.3 *Extension of the definition of a service*

For the moment, an information service has a framework defined on itself. Its activities are internal, based entirely on its informational base and exercised through its informational infrastructure. The challenge of its reference framework is the cognitive identity and unity of all its contributors. Explorations regarding its tomorrow concern only its activities.

This framework is, however, too narrow for complex services. It is like considering a city only for its inhabitants and their activities inside the city, even though they all are a part of a larger network with transversal activities, like post services. It is thus important to consider also that these persons, fulfilling these transversal activities, even if they are not inhabitants of the city.

It is necessary to extend the framework of thinking about a service. Alliance between services, in the frame of a complex service, lead to two types of extension of the definition of a service and, finally, to an extension of the exogenous activities.

2.4.3.1 Extension induced by transversality

An alliance of type orchestration, choreography or farandole, allows transversal activities. A transversal activity concerning a basic service relies on its informational infrastructure, but also on informational infrastructures of other basic services. Actors of this transversal activity conduct their activities thanks to the basic service, but they do it intermittently, without being involved in the whole service. The reference framework of the service must be extended to these intermittent actors and to their activities. It is necessary to define the framework of the exchanges between the intermittent actors and the permanent actors who have been the only actors taken into account before the extension. This extension has repercussions on the informational base and informational infrastructure, both digitally and organisationally, for example to ensure informational safety and security. It also affects the operational space of the basic service: the explorations must take into account transversal activities.

2.4.3.2 Extension induced by informational overlaps

The situation of informational overlap is practically inevitable between two or more services, which have been built independently of each other and that encourage transversal activities in alliances. The difficulties to be overcome have been presented previously (§ 2.4.2.6). In particular, they concern informational redundancy

and the synchronisation of updates between all the concerned services. One possibility to overcome this difficulty is to build a new service, a service of overlap, whose informational base is formed from the information overlap. The updates of overlaps are added to the service of overlap, as well as to the other concerned services, which might have direct consequences from such updates.

The services concerned must then form an alliance between them and with this service of overlap of the type of choreography or farandole. Their informational base then consists of two parts: the informational base corresponding to their initial base and the virtual informational base corresponding to the service of overlap. The same happens with their informational infrastructure. Thus, the informational base of services is extended to informational parts of another service. Consequently, the informational space of their activities concerned by overlap is also extended. Their canvases must conform to this extension.

For its part, the service of overlap must admit as intermittent actors all the actors of the exogenous activities concerned by overlap.

2.4.3.3 Extension of exogenous activities

The previous extensions of a service open a luminous possibility to any exogenous activity. They allow extending its informational space to information, which is managed in other services. It thus becomes an exogenous activity extended to these other services. It is enough that all these services belong to the same alliance, in order to solve all the situations caused by such an extension. For example, the actors of the exogenous activity of a service also become intermittent actors of the services concerned by its extension.

This possibility of extending the informational space of an exogenous activity of an information service is only relevant, if it allows the exogenous activity to enrich its value proposition. This means that the builders of an exogenous activity must explore evolutions not only by considering the interior of its service, but also by considering the other services belonging to the same alliance.

However, it is the value proposition of the alliance itself which is enriched, since it allows these extensions of exogenous activities of the services that compose it.

This is a situation that must be carefully analysed when choosing the type of alliance between information services. Which alliance allows the highest level of agility for such innovation processes, by taking into account all levels of the canvases of the concerned services?

This is a crucial situation. Once decided and implemented, it will be practically impossible to question it. This is a determinant situation. It can be ignored as the result of the lack of knowledge of its importance on the possibilities of further innovations.

Generally, and without taking other factors into account, the alliance of the type of farandole appears the most agile. To a lesser extent, this applies to the alliance of the type of choreography.

2.4.4 *Transforming a service into a complex service*

Previous paragraphs have shown how it is possible to build a complex service through the composition of existing services. This is an essential situation encountered in the propulsions of Society. However, there is another equally essential situation, which is the opposite of the previous situation: the decomposition of a service into several services.

Indeed, a propulsion can lead an information service to become more and more imposing within evolutions, which can be caused by the success of its exogenous activities. Its management, in its turn, can become heavy, less and less efficient, and above all, there are fewer and fewer builders who would propose and conduct explorations allowing the construction of tomorrow of the service. Such a service can become too big, imbued with cognitive sterility, more and more a burden for the progression of Society.

One possibility is to consider this service as forming a complex system integrated into a single service. It is a question of decomposing it into several services whose alliance makes it possible to reconstitute it by composition. Decomposition is the reverse operation of the composition, which is presented above.

To carry out this decomposition, it is necessary to choose as soon as possible the type of alliance between centralisation, orchestration, choreography and farandole. The choice must be made by giving a central place to the decomposition of the informational base and its informational infrastructure with a particular intention to informational overlaps.

The decomposition of the initial service thus leads to transforming it into a complex service whose basic services are the services obtained by the decomposition. The canvases of these services must be able to form the canvas of the complex service by composition.

Such decomposition makes it possible to find agility in particular by restoring possibilities of exploration at the level of the services obtained by the decomposition.

2.5 Cognitive cohesion: cross-pollination space

In the informational approach, it is around the information services where cognitive cohesion or cognitive confusion takes place between the people concerned by the propulsion (§ 1.2.6). Cognitive cohesion can not be imposed on them. It can be neither a result, nor a solution. The actors simply experience it through the fluidity of their activities.

Therefore, the process of the construction of an information service proposed by the informational approach leads to avoiding important situations that are likely to induce cognitive confusion between the contributors and, thus, to facilitating the implementation of the cognitive cohesion.

In general, the builders of an information service form a group heterogeneous from the point of view of their professions, their responsibilities, their institutions, in order to build a trans-service: a service of trans-disciplinary, trans-institutional and even sometimes trans-national information (§ 2.1).

Even if they speak the same mother tongue, the builders will not necessarily understand each other. In fact, everyone speaks the language of their profession or their responsibilities, conducts reasoning typical to their profession or their institution, and thus dismays others by the use of certain terms and incomprehensible professional expressions, which pushes them into cognitive confusion.

So, it is not enough to gather the concerned people around a table to allow them to co-create a trans-service. The informational approach offers them a common language, the information language.

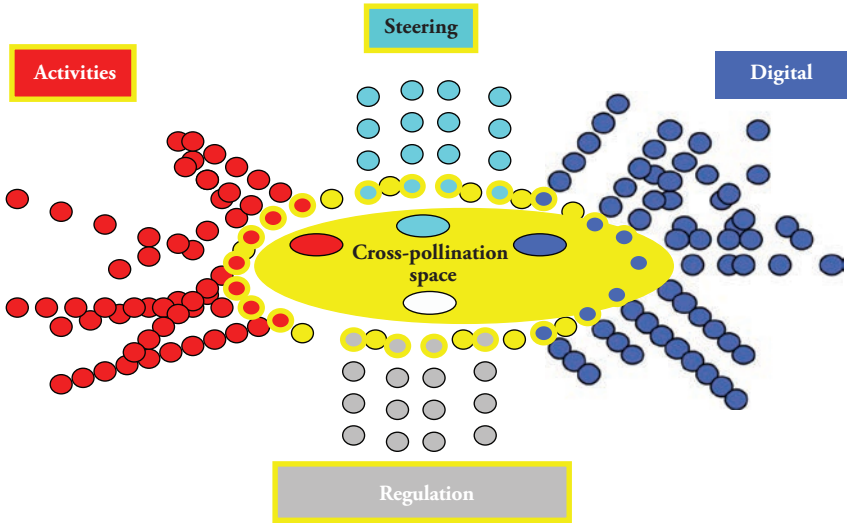


Figure 2.3. *Cross-pollination space.*

In the figure 2.3, the red circles symbolise people who carry out activities (professions, responsibilities, tasks). Circles in cyan, blue and grey refer to people whose activities concern strategy or steering, ICT and regulation (knowledge, laws, standards, etc.). The yellow circles correspond to the members of the team who gather around the table by speaking the information language.

It is in this information language that all models of service design are established and thus they can be understood, discussed, and improved by all builders. It is thanks to the information language that the results of the explorations are expressed and that they are made actionable (§ 2.1).

It is thanks to the information language that some builders can propose evolutions whose interest can be shared, criticised, developed by the others. It is thanks to the

information language that certain innovations from builders in certain domains can lead to innovations in other domains.

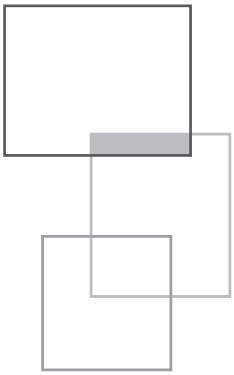
It is the information language that allows avoiding situations where some builders would impose their solution by hiding their intentions and which would cause confusion in the evolution of the service. The information language occupies a central place in the informational approach, so that a cognitive cohesion is established between the builders.

This cross-pollination space is also very interesting for actors of the service, because it allows them to better understand the interlacing of their activities and receive the help they can expect from the service, while conducting their activities (Yurchyshyna *et al.*, 2011). It takes a central place in their cognitive cohesion.

Finally, this space also works for the cognitive cohesion between builders and actors of a service. It provides a space for exchanges between them, especially around the actionable results implemented by the builders. It facilitates the passage of the cognitive disruption of the activities caused by the builders by creating and implementing the service, to the cognitive continuity essential to the actors, in order to serenely assure their activities (§ 1.2.5.5).

2.6 Conclusion

In the informational approach, information services, which main features are presented in this chapter, are the pillars of information propulsion. Now it is important to explain how to put them into action within informational propulsion in order to ensure the progression of Society. This is described in chapter 4 "Administration of information propulsion". Chapter 5 focuses on identifying the first principles of service intelligence, which ensures the progression of Society. However, before addressing these two essential areas, it is crucial to present a concept, which is central in enabling information services and putting them into action within informational propulsions. This is a concept of informational commons: the object of the next chapter.



3

Informational Commons

Information common goods include information services considered as real pillars to ensure informational propulsions of Society (§ 1.2.5.4). This chapter introduces them, shows their relevance and presents their organisation in terms of **informational commons**.

It is inspired by the fundamental works on common goods, by Elinor Ostrom (1990). Thus, it seems obvious to consider pastures as a natural common good used to raise livestock. It seems obvious to understand that their misuse can end up impoverishing them. It seems even likely to think that some conditions may lead the breeders into greed, even destruction, and cause them to fail into the trap called the "tragedy of the commons" (Hardin, 1968). It seems intuitively relevant to consider that the organisation of a common good, called a common, has an important influence on the occurrence of such traps. On the other hand, it is really surprising that there are certain populations in the world who have succeeded in organising their common goods in such a way that this allows them to avoid the traps of this tragedy and to ensure their sustainability. This is the merit of the work of Elinor Ostrom who has deeply analysed them to comprehend their success.

This chapter follows the approach of Elinor Ostrom. It begins by introducing the notion of an information common good and by presenting its raison d'être in the informational propulsion of Society, which actually relies on a multitude of information common goods. However, whilst the common goods studied by Elinor Ostrom, such as pastures and forests, are natural common goods, in the sense that their basic resource is of natural origin, the basic resource of the information common goods is artificial: data, information or knowledge. This intrinsic difference makes it impossible to automatically apply the results obtained for natural common goods to information common goods, without justifications or adaptations. In addition, while the natural common goods have been the subject of careful

observation, analysis and synthesis by Elinor Ostrom, the information common goods are in the exploration stage.

This chapter shows that information common goods can also lead to some forms of the "tragedy of the commons". It shows that certain forms of organisation of information common goods, called informational commons, can allow to avoid these tragedies, notably by relying on the informational approach (§ 1.2). Finally, it presents the notion of a contributory informational common that leads to the emergence of the economy of information services, built on the economy of contribution and the market economy.

3.1 Emergence of information common goods in Society

In Society, there is no obviousness of the importance of information common goods. It is a question of establishing it. Moreover, there is nothing natural in information common goods, everything is artificial. Finally, the very notion of information common goods is unknown in the current dominant informational approaches (§ 1.1.4.1) of Society, which are solely based on the Digital.

Informational space is propitious to a propulsion of the progression of Society in a democratic context, which expands human activities and allows a large number of people to contribute to it, whilst the whole society could benefit from it. This is a great opportunity for the progression of Society. Moreover, the whole population adheres to digital services. In this sense, the informational space resembles a common good, like a common good of fresh water that allows irrigating fields, harvesting and feeding the entire population. The intention of an information common good is precisely to irrigate with information a whole set of activities in Society and to feed the whole population of its contributors, builders as well as actors.

It is then a multitude of multidisciplinary informational spaces that emerge in many areas of Society for the creation of myriad information services that ensure the informational propulsions of Society.

Then, the builders of these services find themselves in a position well known in informatics, which would lead them to "reinvent the wheel", in other words, to redo the work already done under similar conditions for another part of Society: not only the work on exploration, design, implementation, but also the work on setting up information bases, registers of regulatory elements, organisational architectures of activities enabled by services, management architectures of services themselves. Service builders have no time to lose because they are motivated to bring value to activities of all kinds. They need a working environment that allows them to be fluid and effective in facing directly the domain of their innovations without having to overcome situations to which others have already provided consistent answers.

This is the purpose of any information common good, made up of a set of information services (Yurchyshyna, 2015).

3.2 Dilemma of information common goods

The natural common goods induce the situation of the tragedy of the commons (Hardin, 1968), which can be synthesised as follows: "Ruin is the destination toward which all people rush, each pursuing their own best interest in a society that believes in the freedom of the commons." Elinor Ostrom (1990) found that this phenomenon, which she called the dilemma of commons, can lead individuals to be "helpless" and "caught in an inexorable process of destroying their own resources", especially by exhausting their common good.

Such a phenomenon also occurs in informational propulsions. Then, it is a question of understanding who are these persons, where they are "rushing" and what they are likely to exhaust.

A lot of actors of Society are "rushing" towards innovations, which were made possible thanks to digital pushes, the first ones to benefit from the opportunities offered by digital pushes to carry out their professional or private activities, the second ones to contribute to the construction of services.

The first ones massively adhere to the principle of digital services, as evidenced by, for instance, the craze for smartphones. However, they are often considered with great apprehension, concern, even oppression, for example when it comes to automation of tasks that would inevitably replace jobs by robots, or Big Data that would insidiously harvest all the data relating to the everyday life of everyone. They are losing their meaning, their bearings, their own cognitive resources.

The second ones are real contributors to the progression of Society and thus are very motivated. They wish to continue to contribute to it and, in this way, to be recognised and to find their place in Society. However, despite of their motivation, most of actors become disillusioned. They are faced with the task of finding a "sense" of their contribution, in order to share it with other people in Society (§ 1.2.5.2) and to belong to a robust eco-system. They run into a kind of cognitive wall.

All of them are stopped by cognitive barriers built by the dominant approaches, which are prevalent in the Digital World (§ 1.1.1), as well as in the World of Society (§ 1.1.2), and are not capable to fully take digital pushes of Society into consideration. These approaches bury the informational space in technical and internal stages, considered as having no societal scope. Therefore, they bury the "sense". The connections between the Digital World and the World of Society are limited: from one hand, by visions and fuzzy objectives, and from the other one, by reactions to the impacts of digital pushes. There is no other sense to share. Dominant approaches reserve this sense only for powerful actors who are private, public or governmental and they impose it through the code (Lessig, 2000).

Then many persons are now reduced, in order to survive inside these cognitive barriers, to finding solutions to problems that they are asked to solve, to bearing the cognitive stress, which is caused by these ill-posed problems, to supporting the pressure of fanciful delays, or to fulfilling their responsibilities with systems not adapted to the situations they encounter.

These dominant approaches push the builders of information common goods to produce more digital goods, and even faster, and the actors to consume more digital goods, and even faster. In this way, they colonise the cognitive world and consequently the potentialities of informational innovations, and, therefore, of societal innovations, and ultimately exhaust the fruitful sources of the progression of Society.

The Society is faced with the dilemma of information common goods:

– it remains entirely inside the cognitive barriers of dominant approaches;
– it explicitly integrates the information common goods into its progression, following the informational approach (§ 1.2) in order not to exhaust the Society's potential for informational innovation and progression.

3.3 Emergence of informational commons

It is now important to constitute information common goods in an institutional form of an **informational common**, in order to determine their essential place in Society as pillars of the informational propulsion of Society. An informational common can integrate one or more information common goods that will share the same organisational framework.

Elinor Ostrom wonders about the differences between the commons that have broken the chains of tragedy of the commons. "The differences may have to do with factors internal to a given group. The participants may simply have no capacity to communicate with one another, no way to develop trust, and no sense that they must share a common future".

Since – information – the origin of an information common good is artificial, it is necessary to specify the intention (§ 2.2) of every information common good, whereas it is obvious for a natural common good. Then service explorers, who prepare tomorrow by designing the information services of tomorrow, are not isolated. On the contrary, they are led to participate in cross-pollination spaces, in order to co-construct information services (§ 2.5). They can gain confidence and receive help not only from other explorers, but also from all people who (even if they do not have the talent or the availability for exploration) wish to contribute to their success in exploration and, thus, to the progression of Society.

An information common good is a meeting place that allows its contributors not only to connect themselves with the sense of services, and beyond that, to the sense of the progression of Society, but also to connect to this sense other people, interested by the information common good. Thus, intrinsically, an information

common good respects the property of the common defined by Elinor Ostrom, which is necessary to avoid the situation of the tragedy of the commons. It is already a good start.

Elinor Ostrom continues her analysis of the differences: "The differences between those who have and those who have not extricated themselves from commons dilemmas may also have to do with factors outside the domain of those affected. Some participants do not have the autonomy to change their own institutional structures and are prevented from making constructive changes by external authorities who are indifferent to the perversities of the commons dilemma, or may even stand to gain from it".

The external authorities of an information common good are those who pretend or are ought to manage or regulate it without information knowledge. But as external, they cannot be aware of all the information and knowledge needed to manage its progression. They can only slow down or more often block any constructive change indispensable to informational social innovation and generally can not even realise their responsibilities in the tragedy of the common they induce. They are even legitimated by the dominant approaches, which have been already denounced! On the other hand, the informational approach allows them to avoid causing the tragedy of the commons, notably by considering the exploration process inside cross-pollination spaces.

Finally, Elinor Ostrom warns that: "However, as long as analysts presume that individuals cannot change such situations themselves, they do not ask what internal or external variables can enhance or impede the efforts of communities of individuals to deal creatively and constructively with perverse problems such as the tragedy of the commons". She notes that: "But until a theoretical explanation – based on human choice – for self-organized and self-governed enterprises is fully developed and accepted, major policy decisions will continue to be undertaken with a presumption that individuals cannot organize themselves and always need to be organized by external authorities".

These remarks regarding the natural common goods have an even greater resonance in the case of information common goods. In fact, they apply not only to functioning of an information common good as in the case of a natural common good, but also to its source, which is artificial and is created from information. But this source is still in a boil. Persons who have the responsibility must always be attentive, creative and constructive, in order to continually enrich the information common good. This is essential for the resilience and sustainability of the common good. If this creativity is weakened and inhibited, as in the case of the tragedy of the commons, the construction of services to ensure the propulsion for the progression of Society will be restrained, in some cases stopped, or even never undertaken.

In conclusion, in order to be clearly identified in Society as one of the pillars of informational propulsion of Society, an informational common includes information common goods, that are constructed using the informational approach allowing them to avoid as many situations of the tragedy of the commons, as possible,

and whose organisation of activities is based on principles of self-organisation, to ensure maximum resilience and efficiency of these activities.

3.4 Contributory informational common

This exploratory basis of an informational common must be immediately enriched with an essential characteristic of informational commons. They are formed by *actionable* information services (§ 2.5) described as **endogenous**, from which other services described as **exogenous** can be built by enterprises for their market (§ 2.2.3.6). Thus, these enterprises and the informational common share a cognitive unity, the cognitive unity of endogenous information services.

In the case of a natural common, the situation is different: there is a cognitive discontinuity between the activities inside a common and activities built from its information common goods to add value: irrigation and agriculture, grazing and rearing, schools of fish and fishing, forestry and woodwork.

On the other hand, in the case of an informational common, its cognitive unity induces new possibilities of its organisation.

3.4.1 *Classical position supplier-client*

The classical position in the domain of services considers exchanges within the well-known framework of the supplier-client relationship. According to it, the informational common should sell its endogenous services to the enterprises that would need it.

However, this position does not take into account the essential characteristic of the cognitive continuity between the endogenous services and the exogenous services. It is in line with the classical dominant positions to take into account the digital pushes at the level of Society. It leads to the same wall of indifference between the activities inside the information common and the activities of enterprises that build exogenous services, denounced previously (§ 1.1.4.2).

With this wall, there is a break in the chain of senses between the senses of endogenous services and senses of exogenous services. It is necessary to compensate this break by efforts of promotion, diffusion, education, which necessarily will not be centred at understanding, at societal and economic issues, at responsibilities to be taken.

This position surreptitiously leads informational commons to situations of the tragedy of the commons. It should be rejected.

3.4.2 *Position of the informational contribution*

Another position, the position of the informational contribution, disintegrates this wall of indifference by focusing on the continuous informational propulsion of Society. The innovation of new endogenous services of an informational common comes from multiple talents, and Society does not have to be hindered in its progression by archaic organisations that padlock the talents.

The position of the informational contribution creates a place for these talents by focusing on the activities around an endogenous service of an informational common. There are several types of activities (§ 2.3):

- establishment and progression of the intention of the information service;
- establishment and progression of its informational space;
- generation of new services from existing services;
- its implementation and its deployment, both digital and organisational;
- its progression;
- its informational feeding;
- its watchfulness;
- its conformity;
- its establishment and progression of framework of its activities.

All these activities are in a context of innovation and are turned towards tomorrow of which they form a base. It is from this base that exogenous services forming tomorrow are built.

Given the issues of Society discussed at the time of the creation of an endogenous service and then its progression, the risk of divergences and even conflicts between contributors is important. So, when such situations arise, it is only the quality of the group of contributors which can overcome them. Nevertheless, there are organisations of commons, conducive to their emergence, that maintain them and inevitably lead to the tragedy of the commons. In the case of natural commons, however, Elinor Ostrom has shown that some natural commons allow this quality of the group of contributors to express themselves, either by dissolving such induced situations or by allowing them to be overcome, as soon as they appear.

It is in this spirit that the contributory position puts forward three propositions of the organisation of informational commons:

- the first proposition is related to the informational consensus (§ 2.5). It is essential that contributors know this characteristic, in particular to dissolve apparent antagonisms in complementary points of view in the processes of co-construction of services. In the context of freedom, the information can not be padlocked, on the contrary it admits several facets;
- the second proposition is related to the intellectual property: it is important for the progression of Society that there should be a mix of innovative and creative ideas between people from very heterogeneous businesses, occupations and

responsibilities. Therefore, there are several consistent ideas that will emerge and be embedded in the service architecture, together with other consistent ideas. Attributing the paternity of a certain idea to a certain person in terms of the intellectual property is to simply open the door for inextricable conflicts, because this paternity will be then difficult or impossible to demonstrate. The contributory position places all work done in an informational common under free licenses for the intellectual property, as for example the GNU-GPL[4] for the Digital, Creative-Common[5] for documents;

– the third proposition of the contributory position is related to the choreography or farandole steering of activities in a common (§ 2.4.2). Centralised or orchestrated steering risk to discreetly, slyly and ultimately inevitably lead towards situations of conflict inside the informational common, even without people realising it. On one hand, this is due to the highly innovative context of activities inside an informational common; but also, and above all, it is related to a major characteristic of information services: informational overlaps between different parties. They must be controlled, and precisely, the choreographed approach allows making them explicit, whilst other approaches (centralised or orchestrated) are more inclined to think they are in control, because of centralisation or orchestration (§ 2.4.4).

3.4.3 *Towards the economy of information service*

The position of informational contribution is focused exclusively on endogenous services of informational commons. However, the raison d'être of these services, which form information common goods, is to allow the construction of exogenous services that are able not only to incorporate them, but also to use them while bringing value to Society and, therefore, contributing to its informational propulsion. As such, these exogenous services are part of a cognitive continuity with respect to endogenous services. In order not to reconstruct the wall of indifference described previously, the informational common must enable this fluid cognitive continuity between contributors of the endogenous services, on one hand, and builders of endogenous services, on the other hand. Indeed, whilst contributors of the endogenous services act in the framework of informational contribution, builders of endogenous services act in the framework of the market economy. This is symbolised in the figure 3.1 by the abbreviations of copyleft and copyright respectively[6].

4. https://en.wikipedia.org/wiki/GNU_General_Public_License.
5. https://en.wikipedia.org/wiki/Creative_Commons.
6. Lionel Lourdin, Contributory Economy: how to perpetuate a technological and informational heritage based on free software and Open Hardware? Alumni MBA Conference, Lausanne, March 16, 2014.

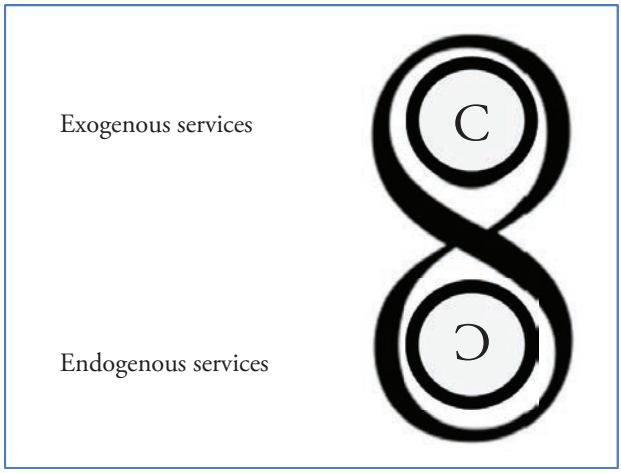


Figure 3.1. *Endogenous and exogenous services.*

These two groups are not disjoint: enterprises that have contributed to the construction of endogenous services can also create exogenous services and launch them into the market – in the case of start-ups – or continue to develop their offers on their markets. However, with respect to free licenses that govern endogenous services, it now becomes possible for those enterprises, which have not contributed to endogenous services, to build exogenous services from endogenous services. It should be specifically underlined that in the domain of information services, contributing enterprises have an advantage over other non-contributing enterprises. First, they control information services. Second, they have deep knowledge on information services – even, and particularly, at the level of detail, because the detail is often essential to build exogenous services. Third, they are able to anticipate the completion of endogenous services to start building their exogenous services. As the result, contributing enterprises are ready to enter the market faster and more efficiently, in comparison to those that do not contribute to the construction of endogenous services.

To maintain this fluidity in the cognitive continuity, an informational common must maintain the cross-pollination table (§ 2.5) which serves as a basis for the co-construction of endogenous services, beyond their opening to exogenous services. The executive committee of the cross-pollination table meets around this table to ensure the sustainability of the informational common. This is done, on one hand, by offering its endogenous services to new enterprises, and on the other hand, by ensuring the progression of these endogenous services by facilitating the creation of new ones. Moreover, this process must continually interweave the economy of contribution and the market economy. It is the backbone of the economy of information services that consists of the economy of contribution and the market economy. It consolidates the intrinsic link between all the enterprises of exogenous services of the same informational common. Indeed, all these enterprises and start-ups share

not only the endogenous services of commons, but also a whole set of related skills and corresponding know-how. Thus, they de facto form a swarm of enterprises around the informational common. The figure 3.2 synthesizes all these interwoven aspects.

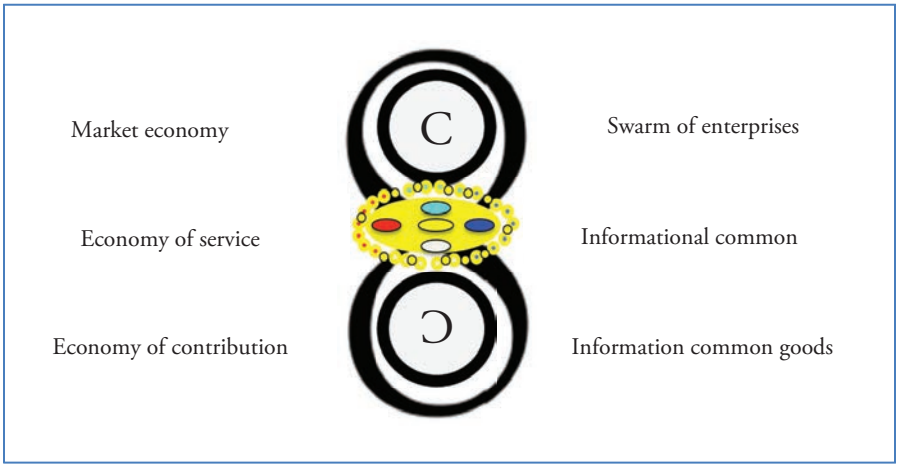


Figure 3.2. *Economy of service.*

3.5 Conclusions

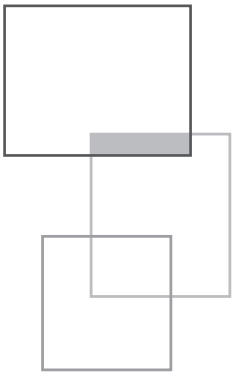
Information common goods consisting of information services and their informational commons provide the foundations of the informational propulsion of the progression of Society. They are the unprecedented place of cooperation between different sectors of Society, between people from different enterprises, different responsibilities and skills, gathered around a cross-pollination table to construct these bases indispensable for the implementation of a myriad of information services that will support the progression of Society.

Thus, this situation has many similarities with the situation of common goods and commons studied by Elinor Ostrom. She has been interested in analysing and understanding the characteristics of common goods, which have managed to sustainably avoid the tragedy of the commons. Inspired by this work and based on the essential characteristic of an informational common – the cognitive continuity – the contributory proposition for informational commons rejects the traditional proposition of exchanges between a provider, an informational common, and a client, an enterprise, which seeks to implement the exogenous services of a common.

In fact, it must face in addition to conflicts identified and analysed by Elinor Ostrom, which may lead to the "tragedy of the commons", conflicts of a different

nature, because of the innovative context that predominates in both: in an informational common, as well as in societal challenges. This is how it promotes the informational approach for design and implementation of information services, which requires the control of informational consensus by contributors, which promotes free licenses to avoid the traps of the intellectual property in the domain of information services, and which puts in place a choreographic or farandole steering of activities in common, particularly valuable in the case of complex information services.

This position, centred of the contribution, induces new explorations related to the forms of management of the informational contribution in Society that are conducive to its emergence and its sustainability. It leads to the economy of service that intertwines the economy of contribution and the market economy to ensure the progression of Society thanks to informational propulsions.



4

Administration of informational propulsion

The administration of an informational propulsion of Society concerns the activities around its information services and its informational commons. Its task is extremely delicate, since it faces three crucial situations:

- the great heterogeneity (§ 2.1) of their builders;
- a plethora of potential situations of cognitive confusion among the contributors of many different facets and dimensions of the informational domain (§ 2.3.1);
- the concordance of informational propulsions inducing the progression of Society.

This chapter begins by introducing the general framework of the missions of the administration of an informational propulsion. It continues with presenting a protected place adapted to co-construction of information services, called Third Place for Service (TPS). This administration of an informational propulsion is consecutively placed within the framework of an informational policy, which requires the establishment of the Informational Authority. Finally, an institutional instrument of the administration of informational propulsions, called People-Public-Private Partnerships for Services (4PS), is presented.

4.1 Mission of the administration of the informational propulsion

The main mission of the administration of the informational propulsion is to continually maintain the cognitive unity of the informational propulsion among its contributors, despite their heterogeneity, as well as to ensure its cognitive identity within Society, despite its disruptive aspects. It has a valuable asset – the sense of any informational propulsion (§ 1.2.5.2), which is essential to all works regarding co-creation of services and of information common goods.

On the other hand, this mission confronts the threat of a primary thought that defines dominant attitudes (§ 1.1.4.1). Although obsolete, this primary thought remains present and cognitively inviting by its tempting fascination: indeed, it invites actors, who are responsible for informational propulsion and for the progression of Society, to ignore multiple complexities, by engaging themselves instead in fascinating perspectives, which perfectly sweeten a bitter taste of these complexities! Of course, the complexities inevitably arise sooner or later, during different phases of the progression of Society. However, there is an enormous difference for responsible persons, who have now received a real cognitive luxury – not to be considered responsible!

4.1.1 *General framework of the mission*

The administration of the informational propulsion has the mission of writing a declaration aiming to present the **intention** to overcome **situations** that could lead to impasses in the progression of Society. This intention is part of the perspectives or **challenges** of Society. It provides a common reference for all persons involved in propulsion: contributors to information services, persons responsible for the progression of Society, or ordinary citizens. It must enable them to define the sense of the informational propulsion. It must also operate as a ferment of cognitive cohesion.

This intention must be built on basic principles understandable throughout Society, so that Society could adhere to the explorations of informational propulsions that will be conducted and then implemented. However, these informational propulsions deeply question functioning of Society and, consequently, its regime. These basic principles must be at the height of the stakes of these upheavals to maintain cognitive cohesion at the level of the whole Society.

The French Revolution of 1789 found itself faced with a cognitive situation of the same nature, even if its circumstances are totally different from those of informational propulsions. It needed a cognitive framework to maintain a cognitive cohesion of a multitude of propulsive activities in all sectors of Society, to profoundly transform the existing regime and create a new one (§ 1). Its motto "Liberty, Equality, Fraternity" served as a common cognitive rally to all these propulsions.

A comparable cognitive framework is needed for informational propulsions to ensure cognitive unity in Society despite disruptions in the functioning of Society and even its regime. Here is the proposed framework. All informational propulsions must be **contributory**. This means that all information services that comprise it, especially belonging to its information common goods, must be contributory: **democratic**, **responsible** and **inclusive**:

– an information service of the informational propulsion is of a **democratic** nature: it must be criticisable and revisable, its sense should be accessible to all concerned persons, as well as its informational models, its digital code and its knowledge, in order to allow consistent debates and requests revisions for changes, evolutions or expansions;
– an information service is **responsible**: it is developed to ensure its resilience to all kinds of changes in its environment, including regulatory ones; it is sustainable and for this purpose designed and developed to ensure its permanence and growth in the form of evolution and even expansion, in all the levels: digital, informational and activity ones; it is reliable and secure; it is efficient and inspire confidence; it admits components dedicated to the cognitive continuity of its actors from the design phases; it puts its contributors in a resilient and sustainable cognitive situation;
– an information service is **inclusive**, in order to allow all concerned persons to master its sense and all its critical elements, to access to processes of co-exploration, to encourage their commitment to eventual processes of revision, evolution or expansion, to smooth its insertion into Society. Notably, its initial cognitive disruption must be converted into cognitive continuity (§ 1.2.5.5).

It is the responsibility of the administration of informational propulsion to guarantee that the informational propulsion is contributory.

4.1.2 *Different missions*

The administration of the informational propulsion fulfils the following missions:

Regarding Society:

– to fight the primary approach with its "solutions", which divides Society into two parts. From one side, these are the digital inventors and their advocates. From the other side, they are the actors whom it considers as mere "users" within Society. This refers to fighting its confinement tendencies that guarantee the inventors a certain luxury not to need to worry about "users", by reducing the role of actors as simple digital consumers or simple guards of all kinds of robots[7], or by even simply excluding them;
– to fight cognitive exclusion (§ 1.2.5.3);

7. As for example cashiers, surgeons, captains of boats, planes, cars.

– to ensure the legitimacy of the informational propulsion regarding Society, particularly in terms of law, regulations, standards.

Regarding actors:

– to ensure that all actors, at any level of Society, can continue to be aware of the progression of Society thanks to the direction of the informational propulsion, from persons having the highest level of responsibility to "people below";
– to manage processes of informational innovations, either societal or digital, by guaranteeing actors maximum cognitive serenity, especially by encouraging the implementation of cognitive continuity processes, even in apparent situations of cognitive disruption.

Regarding builders:

– to welcome and manage persons who construct information services by taking into account their heterogeneity; to lead them to reach the corresponding informational level so that they could clearly identify their agreements and disagreements;
– to fight all tendencies preventing from reaching this informational level, especially the tendencies of the primary thought;
– to detect talents.

Regarding the informational propulsion:

– to lead the process of co-construction of information services, ensuring that their sense is clarified and the basic principles – democratic, responsible, inclusive – are respected;
– to organise information common goods into informational commons;
– to watch digital and societal pushes and contra-pushes (§ 1.2).

4.2 Place of Propulsion

Information common goods are the foundations of the informational propulsion of Society (§ 3.1). They are formed of information services related to multiple institutions, professions, responsibilities, disciplines. It is thus essential to find and encourage people who are creators of tomorrow of Society, who can imagine, conceive, implement them, in a word – build them, by mixing various aspects of engineering and exact sciences with aspects of law, management, human sciences, and by continually conducting explorations.

These people will need a protected place, outside of their own institutions, where they can face their differences, sometimes even their divergences, by focusing on research of the informational consensus (§ 2.5). A possible candidate for such a protected place is the **Third Place for Service**.

4.2.1 *Third Place for Service: concept*

The first Third Place allowing heterogeneous people (§ 2.1) to undertake innovative approaches that are part of the progression of the Region opened in Saint-Étienne in 2010. It was described notably in (Burret, 2015). A lot of such other places have been further created. Conceptually, such a Third Place is "*a social configuration where the encounter between individual entities intentionally engages in the conception of common representations*" (Burret, 2017).

This social configuration is an open place that allows co-creation processes involving heterogeneous people. It is sufficient to adapt it to the characteristics of informational propulsions and information common goods, in order to make it the place of their construction under the name of **Third Place for Service (TPS)**: the TPS configuration is a social configuration between different entities whose encounter intentionally engages them in the conception of common informational representations, expressed by means of informational models, in order to construct information services assembling in an information common good.

4.2.2 *Third Place for Service: intention*

TPS initiators propose an **action** corresponding to an informational propulsion of Society. It is multi-disciplinary, multi-institutional, or multi-national. It is described by a pursued **intention**, with the **sense**, which it gives to the subsequent progression of Society. It also describes **situations** to overcome and societal issues of the informational propulsion.

The main generic activities of TPS are to:

- launch an **action** within the framework of an informational propulsion of Society: this action is of trans-disciplinary, trans-institutional, or even transnational nature;
- promote the creation of a network of heterogenous contributors, who are eager to get involved into processes of exploration of these situations and to contribute to overcome the corresponding issues, by co-constructing information services thanks to digital platforms;
- allow explorations whose results are actionable, because they are expressed thanks to information services, eventually complex, with their **value proposition**. It is from these results that the action of the TPS takes the form of exploration of the informational propulsion of Society (§ 1.2);
- continually explain the **sense** of the informational propulsion induced by information services under construction;
- maintain the action within the framework of the original intention and the basic informational principles: democratic, responsible, inclusive.

4.2.3 *Third Place for Service: value*

The TPS generic intention is to place heterogeneous contributors in an environment beyond their disciplines, institutions or nations to carry out explorations to make discoveries that are realised by means of information trans-services (§ 2.1). This is how they contribute to the progression of Society, as well as to their own disciplines and institutions.

TPS provides them with a framework for all their activities in TPS: the cross-pollination space (§ 2.5). Despite their heterogeneity, they therefore have a common language, the language of the cross-pollination space, which is the language of the Information World (§ 2.5.3). They can understand each other. They know how to benefit from discoveries, in order to conceive informational models essential for the implementation of information trans-services. They even know how to criticise and refine them. They know how to lead to the necessary informational consensus (§ 3.3.2) between different perspectives to avoid the failure of exploration. Then they invest themselves into explorations of multidisciplinary, multi-institutional or multinational spaces by emerging the points of view that are not usual in their own activities, throughout the process of establishing informational models. They can even lead to the evolution of the TPS intention during such discoveries.

These information trans-services bring the generic value of TPS to the progression of Society. They form the foundation for information common goods and informational commons implemented in TPS.

4.2.4 *Third Place for Service: contributory properties*

In a generic way, TPS is a social configuration that allows all contributors to have access to informational models of the information service. They can therefore criticise these models. They can make proposals for modifications or even progressions. They can give them the sense in the context of the progression of Society.

However, these possibilities are wider if TPS activities follow the informational approach. In this case, all these informational models form the informational base (§ 1.2.1) of the information service. The informational base is the place of steering of all the informational infrastructure of the information service. Thus contributors, depending on their roles in TPS, have access to steering of the information service in all phases of its life cycle, including creation, design, digital and organisational implementation, insertion in various activities, exploitation, evolution.

In this way, TPS provides a framework conducive to the construction of contributory – democratic, responsible and inclusive – information services.

4.2.5 *Third Place for Service: organisation*

TPS sessions can take many forms, such as face-to-face or virtual meetings, or a combination of these forms. They are all facilitated by a digital platform dedicated to TPS.

In all these sessions, there are many innovative ideas that come up and are exploited. There is no time to slow down or even simply stifle the innovation process with intellectual property issues. TPS takes place under a free license adapted to the constitution of information services and information common goods, following the example of software projects governed by free licenses like the GNU-GPL[8].

Thus, all TPS contributors must sign an identical agreement, which provides a clear ethical basis for their interactions, as well as offers a free license for information services. According to this convention, during the sessions, they engage themselves to have behaviors adapted to the collective processes of exploration and co-creation; they must be involved, share expertise, knowledge and discoveries resulting from explorations, avoid obstructing the emergence of innovations and new ideas, to ensure other contributors could discover and learn from them listening to their presentations and propositions.

In order to ensure smooth TPS functioning in co-construction of services, in particular to guarantee balanced discussions and efficient decision-making, TPS recognizes the following roles of contributors (Ralyté and Léonard, 2020):

- initiators: they propose TPS with its intention, its situations and its stakes. They invite contributors to propose exploration processes and take initiatives in the context of TPS. After discussions with other contributors, the initiators are the ones who make the final decisions throughout TPS;
- builders: they participate in processes of co-construction of information services, information common goods or informational commons;
- developers: they develop a service both at the digital and organisational levels. They must act within the defined framework for the creation of information services, in particular allowing their evolution and their interoperability with other information services;
- regulators: they ensure the conformity of the envisaged information services with the elements of their regulatory space (§ 1.2.1);
- moderators: they take care of the process of TPS functioning, in other words, "neutral" actors who guide discussions towards the concretisation of initiatives; moderators have good skills in informational modelling;
- observers: they attend the discussions but do not actively participate in them. Observers may pursue goals of gaining experience or knowledge (*e.g.* students, researchers, teachers, etc.) or simply share the general interest of the intention of TPS, without wanting to participate in explorations;

8. https://en.wikipedia.org/wiki/GNU_General_Public_License.

– historians: they play a supporting role. Thus, they ensure that the sense of co-created services and the TPS intention continue to become more and more explicit, more deepened, more refined; they record the continual improvements of services and the salient elements of discussions and contributions, they introduce essential information, especially of the regulatory level, to the process of services co-construction, they keep being attentive and respectful to the agreed planning;
– concierges[9]: they manage the reception and animation processes of TPS. They connect the contributors and let them share skills, knowledge, experience and talents.

4.2.6 *Third Place for Service: conclusion*

Given the multifaceted perspectives of the informational propulsion of Society and its multiple stakes, TPS characteristics make it a privileged place to conduct the informational propulsion in terms of construction of contributory information services.

TPS are prosperous places to create democratic, responsible and inclusive information common goods or informational commons, since they allow gathering conditions indispensable for their construction: to open up skills, to concentrate efforts in order to overcome complex situations, by bringing together institutions, including teaching and academic research, private and public enterprises, government institutions, NGOs, etc.

The TPS motto inspired by Kant (1784) is a place *encouraging*: Reason, explore, design *as much as you like and on the subjects that you like but ensure the informational sustainability!*

4.3 Informational Policy and Informational Authority

The State plays a special role in the informational propulsion as a guarantor of the general interest in the public spaces of Society. In fact, thanks to information services, an informational propulsion brings out numerous informational public spaces conducive to exchanges and activities that take forms, which were previously unknown. So this continual **expansion** of the public space leads to redefining the role of the State as a guarantor of the general interest, while preserving the fundamental democratic principles that govern it. At the same time, the particularities of the informational expansion of the public space are also taken into account. The object of this paragraph is to introduce their basic principles.

9. http://movilab.org/ notably from Johann Duriaux.

Throughout this paragraph, the term **Society** describes a democratic society whose citizens follow an implicit charter of this type: they do not tolerate arbitrariness, they accept the authority recognised as legitimate by law for well-defined areas and exercised by people chosen by procedures; they respect decisions regarding the organisation of Society and societal practices, as long as they have been debated and amended correspondingly. Finally, to reflect the democratic context of Society, only democratic, responsible and inclusive information services are considered.

The first part of this paragraph presents the role of the State based on the characteristics of the informational propulsion. It establishes a general framework of the **informational policy** by observing the progression of Society from a **quantum** point of view enabling it to take into account the effects of information services, whilst the traditional point of view, called **gravitational**, does not allow it.

The second part concerns the conduct of the informational policy. It determines the responsibilities to be assumed in the quantum space of informational propulsions to guarantee the general interest in the public space. It highlights the importance of an **Informational Authority.**

4.3.1 *Informational policy*

An informational policy of Society is at the centre of the issues of its progression. Firstly, the informational propulsion is a decisive asset to overcome these issues. Secondly, some issues originate from the potentialities of informational propulsions themselves, of creation of values, activities, jobs, and from formations to observe the Society with the informational point of view. Thirdly, some issues are related to the continual digital pushes that Society can assimilate for its progression in a consistent way only by integrating them into informational propulsions.

An informational policy concerns the implementations of informational propulsions and the expansions of the public space that they induce. It takes care to preserve social progressions in terms of liberty, equality and fraternity, and to respect the previous implicit charter followed by all the actors of Society. It strives to maintain a cognitive serenity in its expanded public space and to fight against the cognitive exclusion of people, enterprises, communities and even Society itself.

An informational policy considers not only of the profound transformations of societal practices, but also of their consequences on functioning of Society itself. It can not ignore the usual tendencies to carry out these transformations in perilous forms: for example, a revolution with the lax illusion to sweep clean all the existing ones to build a completely new Society, or, on the contrary, to bury them by abdicating in front of the difficulties and by imposing the illusion of so-called good old time without digital.

It is about introducing the foundations of the informational policy that transforms without revolution and without abdication, and supports the development of

multitudes of information services and information common goods, by guaranteeing the general interest in the expanded public space.

This is how the informational propulsion becomes a chance for Society.

4.3.1.1 About Society

By taking into consideration the depth of transformations induced by informational propulsions, it is important to start by questioning the very notion of Society with all its attributes: State, government, fundamental missions, such as education, justice and law, health and medicine, police and army.

Such questioning may seem unreasonable. Yet, there are visions where activities such as justice, banking, notary, medical diagnosis, medical operation, police, army, even government, are controlled by supra-intelligences, with the help of qualified intelligent machines. In this way, citizens are led to accept the authority of the actions and decisions of these supra-intelligences not because they are *right* but because they are *true* at the level of the world: and everyone knows that truth is beyond everything! Thus, there is no longer a need for the State, the nations become obsolete, wars can no longer exist, and all people have enough of goods to nourish themselves, to clothe themselves, to heal themselves, to take shelter at good temperatures, to amuse themselves in the freedom provided by cognitive ghettos!

Such visions impose their future, they colonise it. Their propagation in Society is facilitated by the reduction of an informational policy to a simple digital policy, which is centred on technologies and their usages in Society. Such an attitude induces the conditioning of minds to accept, for example, that intelligence could be artificial, that no one is responsible for the cognitive puzzles produced by informatisation, that the only responsible one is the *system*.

Such visions are absolutely revolting for anyone who is enamoured of humanity. Of course, we can oppose a whole set of knowledge amassed over the course of Humanity. Of course, one can unmask their intellectual embezzlement by noting that these supra-intelligences are designed, directed and maintained by people who will obviously never be in cognitive ghettos. It is possible that these visionaries do not believe in their own visions, but simply seek to take advantage of the credulity of those who listen to them. However, all these oppositions, even being right, become outmoded, outdated, and even archaic under the pressure of the cognitive scroll of these visions.

Why? Because all these oppositions leave aside a crucial and essential element of the progression of Society and the digital pushes. The digital pushes are those that feed these visions. And everyone knows the importance: oppositions act in the way as if these digital pushes are only a detail related to the fundamentals of Society. However, many people do not find in these oppositions any explanation of the events they experience in many different ways, such as cognitive exhaustion, insecurities, stress, creative employment, improvements in their living conditions.

It is time to put in place the informational policy of Society, in order to capture the chance offered by informational propulsions and to stifle these apocalyptic visions to prevent them from sealing this chance from Society.

4.3.1.2 An informational policy to seize the chance of informational propulsions

To meet the issues of the progression of Society with the help of informational propulsions, it is important to note that it is impossible to simply decree how to meet them, how to bring lasting solutions for anyone of us: leaders, MPs, researchers, experts, etc. It is a question of exploring how to capture wealth that up to now has been unattainable or even unknown, by means of informational propulsions. This exploration requires knowledge of several disciplines, cooperation between several companies or institutions. This exploration requires thinking about tomorrow. Tomorrow is not just the future. Tomorrow is the time of service design; it prepares activities for the future that will be carried out through the provided services. The future is to be discovered, it will be what people will do with these information services all around the world.

In order to capture these potentialities, the informational policy hosts exploration activities, aiming to prepare tomorrow of Society. These exploration activities constitute the **quantum** space of Society, with its requirements, its rigour, its own knowledge which distinguishes them from the usual activities of Society, constituting its **gravitational** space.

These two terms refer to quantum physics and gravitational physics. Physics has expanded with the discovery of quantum physics, but gravitational knowledge is still useful: a person sitting under an apple tree is still likely to receive an apple on their head! It is the same at the level of Society: it is expanded by the quantum activities, whilst gravitational activities are still essential.

4.3.1.3 Position of the State in relation to informational propulsions

The administration of quantum activities takes other forms than the administration of gravitational activities. This difference in administration between these activities comes from their different characteristics.

In the gravitational space, the *time* is the present, the gravitational activities mainly ensure the functioning of Society. Some of them can lead to incremental innovations that improve the efficiency of activities. Others can be implemented in frameworks of projects organised in the gravitational mode with objectives to be reached and returns on investment to be achieved. If they exceed the budgets, if they fail to meet the objectives and to obtain the expected returns on investment, if eventually they are abandoned, then probably they should have been considered from the start in the quantum space. In the gravitational space, even the projects are in present: the objectives, as well as the returns on investment, will be achieved, the deadlines will be respected, and potential hazards will be considered. Even if the project must

end in a year, the strategic level seems to have the impression to know what will happen, it expects no surprises (no doubt, any surprise will be unwelcome), it has already assimilated in present this project as a successful one.

On the other hand, the *time* in the quantum space is the tomorrow: Future Perfect and not Future Indefinite. Its exploratory activities are focused on building sustainable eco-systems of activities around information services under construction. The exploration space is multi-disciplinary, multi-institutional, even multi-national, enabling to build information trans-services that will be trans-disciplinary, trans-institutional, trans-national (§ 2.1). The potential of the quantum space is to take into account fields of exploration of Society that are invisible or even considered impossible from the gravitational viewpoint.

The domain of the quantum space is the domain of cognitive disruption to ensure tomorrow. It is the domain of the gravitational space and the cognitive continuity to secure the present. Both have their raison d'être and both are essential: the quality of their concordance defines the consistency of the progression of Society.

4.3.1.4 Informational policy and quantum space

The quantum space where tomorrow of informational propulsions, and consequently tomorrow of a large part of the progression of Society, are decided, gives space to talents and skills to co-construct their information services. As such, it becomes necessary for both quantum and gravitational spaces of Society to set up new forms of skills, training, jobs and responsibilities, rewards, solidarities, regulations, partnerships, justice, etc. In a democratic Society, the State, as a guarantor of the general interest in the public space, has the responsibility to conduct their constitution. In particular, it is up to the State to extend the rule of law to take into account generic conflict-generating situations in this expanded public space. It is the State and the only the State that has the legitimacy.

As the result, the quantum space of informational propulsions allows the responsible persons of the State not only to be able to anticipate the events these propulsions induce in Society, but above all to be immersed in their co-construction processes and thus to be in the heart of explorations, in order to be ready to defend the general interest and citizens in the expanded public space in the best possible way. On the other hand, the gravitational space, alone, leads the responsible persons of the State to always have to react to events without any hindsight, by enabling the policy centred on the digital and its usages.

The informational policy must be established in the quantum space.

In this way, it can take care of the concordance of quantum and gravitational activities. It focuses on facilitating the enrichment of activities, responsibilities and gravitational missions through information services in the quantum space. It ensures the transformation of the quantum cognitive disruption into the gravitational cognitive continuity, so that gravitational activities continue to be efficient through the information services available to them.

The informational policy requires in-depth understandings of the domains of Society coming from quantum approaches. They not only re-analyse these domains, in a way which is unthinkable with gravitational approaches, but also make concrete suggestions through information services.

For example, the initiatives of the progression of Society, which are placed in the quantum space, give rise to an informational propulsion whose contributory information services allow responsible activities carrying social and economic values. This makes such initiatives of progression consistent and responsible. Reaching such a level requires that these processes of co-construction of information services are conducted by heterogenous persons (§ 2.1). As the result, progression initiatives are no longer limited to predefined circles of persons.

Informational policy focuses on facilitating the enrichment of activities, responsibilities and gravitational missions arising from quantum repercussions.

However, it is important that it is accompanied by an institutional framework allowing officials to stay in touch with quantum-based explorations and to be kept informed of their discoveries, as well as the subsequent debates in the decision-making processes of service design. Thus, they can participate in efforts to transform the explored cognitive disruption, conceptually investigated in the quantum space, into the necessary cognitive continuity at the gravitational level, in order to ensure the continuity of activities of Society.

TPS provide a particularly suitable place to explore and implement all the quantum activities of creation and construction of informational propulsions but also, more broadly, of informational policies.

It is now important to present such institutional framework aiming to conduct the informational policy.

4.3.2 *Conduct of an informational policy*

The conduct of an informational policy is entrusted to an **Informational Authority**, whose mission is to guarantee, in the name of the State, the general interest in the expanded public space and to oversee the progression of Society through information services and information common goods.

The Informational Authority is not of the advisory nature, but of the decision-making type, because it engages the responsibility of the State. It is responsible for the informational heritage of Society. Its institutional concretisation is specific to each State and depends on the culture of its Society. It may be is spread out into the executive, legislative and judicial powers, as in the case of the Judicial Authority. Although spread out, it has intrinsic properties to fulfil its role in any informational propulsion, as well as to exercise its responsibilities.

To fulfill its mission, the Informational Authority must be at the heart of all informational propulsions and, therefore, focus on their information common goods and their organisation in informational commons. This is the reason that leads the

Informational Authority to be a stakeholder in informational commons. However, its responsibilities, its role in the informational propulsion and the scope of its mission should be clarified. These are the topics of the next paragraphs.

4.3.2.1 Responsibilities of the Informational Authority

Informational commons are the nerve centres of any informational propulsion. Since the Informational Authority is at the heart of their activities, it is able to take its responsibilities.

In fact, it is in the informational commons that design decisions regarding the information services of information common goods are made. With access to it, the Information Authority takes into consideration the issues of the informational propulsion in the progression of Society, and ensures the general interest in the expanded public space. So it can take full responsibility to legitimise or not this informational propulsion and to launch the necessary adjustments in various State institutions, out of the informational commons, to keep them in tune with the ongoing informational propulsion.

On the other hand, informational commons are bases on which the ecosystems of enterprises and institutions that create services contributing to the progression of Society and the expansion of its public space are developed. The Informational Authority is thus at the center of the entanglement of the activities of construction and development of information common goods, and of the activities of service creation. The former are carried out within the framework of the economy of contribution, the latter are within the scope of the market economy. The Informational Authority is present at the emergence of new activities and new markets induced by the informational propulsion. It must ensure that they comply with the rules in force of Society.

It is the Informational Authority that validates the conformity of any informational common, especially its institutional form, whether public or private or mixed, so that the general interest is preserved, in particular regarding the access to information and free competition, so that the progression of Society is not hindered. It takes steps to promote the sustainable and consistent integration of the informational common into Society: to maintain, enrich and evolve it as long as it is developing.

The Informational Authority therefore enables the State not only to anticipate the effects of the informational propulsion, but above all to be a stakeholder in its design and implementation. The Informational Authority thus prevents the State from always being in a position to notice the effects of the informational propulsion on Society and to be obliged to react to the effects that seem prejudicial to the general interest. These reactions require a lot of investments in budget and time of competent persons to untangle the complications, solve cognitive crises, find solutions to restrain these damaging effects, without any guarantee to succeed.

The Informational Authority prevents Society from desperate and futile conflict situations that emerge in the case of a gravitational approach. Such situations leave

the possibility for information common goods, which belong to the expanded public space, to become the property of private interests. Thus, there is a risk that they limit their developments to their own interests and do not take into account other interests related to the progression of Society. They then grant themselves with this already mentioned supra intelligence with all the already mentioned excesses.

The progression of Society may be considerably weakened as it is based on these information common goods. A State would then be dispossessed of them. If it could open its eyes to the prejudice suffered by the general interest, it would face a very difficult task to recover its legitimacy on these information common goods.

4.3.2.2 Role of the Informational Authority in the informational propulsion

Being a stakeholder in the informational propulsion, particularly on the level of design of information common goods, the Informational Authority becomes aware of the inconsistency of certain laws or regulations, which are enacted when there was no informational propulsion. Some of these laws or regulations might be blocking developments without anyone understanding why; the others are lacking rigour in the situations, which are generated by informational propulsions; others, quite simply, are not able to face situations unthinkable by the legislators of the time and coming from the creators of the Digital, for whom everything, which is not explicitly prohibited by law, is legal.

The Informational Authority, which has the mission to facilitate the progression through information services, is thus responsible for the legislative information process, in order to advance the legal framework and ensure legal and legislative responsiveness. It must implement it with the various concerned powers – executive, legislative, judicial – and have it recognised as a democratic process. This requires it to be clearly identified and instituted.

This process is subject to time pressure.

This time pressure does not come from the Authority. It is intrinsic to the processes of co-creation. To understand it, one must remember the important role played by the legislative and regulatory frameworks for the co-construction of information services (§ 2.2). Any uncertainty related to them de-stabilises a team of contributors in full co-creation, as one should wait for the uncertainty to be removed without knowing the delay. This situation may lead to stops in the co-creation process: it will then be very difficult to restart the work afterwards, to reconstitute the team or to form another team, since talented people who are not so numerous as one might think.

Of course, there are losses of time, money, budget. But, there is another critical situation: a propulsion is stopped and, consequently, ongoing activities will not be finalised. Certainly, at the level of the State, there are many other situations that are much more critical in other areas.

But, this situation is critical for the Informational Authority. As a matter of fact, the Informational Authority faces risks to lose the trust of contributors who work on informational propulsions. In addition, their ability to facilitate the progression of Society through services is likely to be weakened not only within contributors but also within political circles of the State. It is the entire progression of Society that can suffer unfortunate consequences, including the loss of activities and, therefore, jobs.

Therefore, the Informational Authority must assume their responsibilities facing this time pressure and trigger the legislative informational process, by taking into account not only this time pressure, but also the necessary delays in reflections of the legislative power for amending an existing law and/or for creating a new law.

In a gravitational approach, such interventions with the executive, legislative and judicial branches will most often be interpreted as a form of pressure coming from certain interests. Consequently, either they will not be undertaken, or they will only have very random results.

On the other hand, in the quantum approach, the Informational Authority, as representative of the State, is legitimate to exercise these interventions to guarantee the respect of the general interest in the informational expansion of the public space and to allow the progression of Society.

4.3.2.3 Scope of the mission of the Informational Authority

Although the Informational Authority is a stakeholder in processes of construction of information common goods in the heart of informational propulsions, it has no other power over these processes than to legitimise them by considering only the general interest in the expanded public space. It ensures that information services, either they are under construction or have already been implemented, are contributory. Their contents are under the responsibility of their creators. Creators must be allowed to express themselves in terms of information services and conduct exploratory processes following the informational approach. In this quantum space, the Informational Authority should always keep an eye on the progress without exercising any control over finalised or ongoing works.

It participates in all TPS organised for the construction of information services only with the role of regulator (§ 4.2.5).

If the Informational Authority had the power to master the construction process, it would fall back into the throes of the gravitational approach: it would need to establish master plans and apply them through top-down or bottom-up methods, in correspondence to the objectives, which should be achieved. In this case, however, it will be virtually impossible to escape disciplinary or institutional traps, to achieve a contributory progression of Society. And above all, it will be almost impossible to face the issues of Society that come in multi-disciplinary, multi-institutional and even multi-national forms, as, for example, the issue of an habitable Region or

projects of Smart(er) City when they are reduced to the digital predominance inside the design process.

4.3.3 *Informational Policy: conclusion*

Facing multiple issues of the progression of Society and their trans-disciplinary, trans-institutional, trans-sectoral, trans-professional, even trans-national characteristics, the State must fulfil its role of being responsible for the public space, which is considerably expanded by informational propulsions. It needs an institutional tool, which would help, on one hand, to consistently allow and support the contributions to the multitude of innovations and constructions of information services, and on the other hand, to empower the Informational Authority who would guarantee its citizens that all these information services in this public space are contributory. This institutional instrument should enable the progression of Society, which is induced by informational propulsions formed around contributory information services. This is the subject of the next paragraph.

4.4 Institutional instrument of informational propulsions: 4PS

It is necessary to have an institutional instrument for elaborating and conducting an information policy of Society as and when it is progressively driven by informational propulsions. This instrument is designed in the way that all contributors for propulsions can operate efficiently and fully fulfil their responsibilities. In particular, it allows the Informational Authority to fully exercise their responsibilities. It is also designed in the way to allow reticular processes of exploration and construction.

Given the multiplicity of activities and responsibilities concerned by any informational propulsion, this instrument makes it possible to form the necessary partnerships between all physical and legal persons, the world of private or public enterprises, public administrations, associations, national or international organisations, research and training centres interested in contributing to the co-construction of one or another information service of an informational propulsion. It is called the People-Public-Private Partnership for Services (4PS).

It is essential to constitute the generic framework of 4PS and to define their raison d'être, expressed in terms of intention, confronted crucial situations and stakes for Society. Then it is a matter of considering their implementation in Society by proposing accompanying measures in Society to facilitate their growth in the progression of Society.

4.4.1 *Framework of 4PS*

The generic framework of 4PS is based on the informational approach (§ 1.2). 4PS proposes to explore a **domain** of Society by means of information services. All information services of 4PS are contributory, *i.e.* democratic, responsible and inclusive (§ 4.1.1).

4.4.1.1 Raison d'être of 4PS

The **raison d'être** of 4PS is to enable a progression of Society in this domain through information services, which can not be considered without information services.

Its raison d'être provides the context to determine the overall intention of the informational propulsions to be explored inside 4PS with the help of contributory information services.

Its raison d'être must show its importance in the progression of Society by describing the overall **situations** to overcome.

Its raison d'être provides its relevance by highlighting the overall **issues** to the progression of Society in terms of values. They concern their feasibility in terms of democracy, responsibility and inclusion. They concern the risks to be circumscribed, the first of them of not undertaking 4PS.

4.4.1.2 Actions of 4PS

The activities of 4PS are divided into several 4PS actions, which themselves have their own domain and their own raison d'être – intention, situation, issues – that must conform with the ones of 4PS.

The activities of an action of 4PS aim at constructing information services intended to constitute the endogenous services of common goods of information. The contributors work in the contributory framework of Third Place for Service (TPS). All this work is done using informational models (§ 1.2.1). These models are the basis of all debates around cross-pollination spaces (§ 2.5) and all decisions relating to the construction of information services, in all their stages, such as exploration, design, implementation.

4.4.1.3 Informational commons

For each information common good, each 4PS action must constitute the informational common, which organises all the activities around it. Several information common goods can be organised by the same informational common.

Thus, each 4PS action must develop management rules specific to its domain, as a part of the generic proposals for the organisation of informational commons described above (§ 3.3.2). These rules concern the endogenous services of information common goods built as a part of the economy of contribution, and the

exogenous services developed within the framework of the market economy. They must also concern the sustainability of the information common goods, which serve as a basis for exogenous services, and thus concern their supply of new endogenous services or information, their administration, their maintenance, their evolution, their budget and their institutional position in Society. All these rules are dependent on the related sectors of activity, as well as the culture of Society.

4.4.1.4 Informational overlap

The informational space (§ 2.2) of an information common good is formed by the union of the informational spaces of the endogenous services that compose it.

The constitution of an information common good is independent of the composition of another common good of the same 4PS action, as long as they are managed to ensure their informational overlap (§ 2.5), *i.e.* the common parts of their informational spaces.

In the same way, two actions of the same 4PS are independent as long as their informational overlap is managed jointly, in other words, the common parts of their informational spaces formed respectively by the union of informational spaces of their information common goods.

4.4.1.5 Exploration and construction

4PS is focused on tomorrow of Society. Its intention is to generate one or more informational propulsions to contribute to the progression of Society. The character of 4PS comes from the very nature of its exploration and construction activities.

An exploratory activity can not be locked into a project; it is of a quantum nature (§ 4.3), whereas a project is of a gravitational nature. The project world requires management composed of investments, objectives to be achieved, solutions to be found using digital systems, deadlines to be respected, budgets not to be exceeded, start and end dates, returns on investment, inspections of finished work. The world of 4PS is turning away from this world of project which it uses only in circumstances circumscribed in budget, deadlines, objectives to be reached, etc. The world of 4PS is built around explorers, creators of activity spaces using information services, cognitive passers between the worlds of quantum cognitive disruption and the worlds of gravitational cognitive continuity (§ 2.2.5.5).

Not knowing the basics of the construction of information common goods limits the possibilities of creation and construction of exogenous services. This construction is highly dependent on the digital systems which are being used. And they conform to societal contra-pushes (§ 2.2.3).

The contributors of 4PS can not invest in it only in a perspective of return on investment. They are in another dimension. They commit to tomorrow of their own activities. They contribute to the creation of information common goods of 4PS and then enter the market emerged by 4PS to create exogenous services of these

information common goods from the endogenous services. Without 4PS, there is no market. Without contributing to it from the very beginning, there is a crucial risk of not being able to enter the market, in particular because of the lack of know-how with the endogenous services.

Every contributor to 4PS knows that other contributors to 4PS share the same spirit.

4.4.1.6 Legitimacy

4PS induces informational propulsions that lead to the expansion of the public space. It is the Informational Authority (§ 4.3.2.1) that has the responsibility to legitimise them or not. The Informational Authority has a special place in 4PS: to be in current of all advancements by participating in cross-pollination tables while respecting the scope of its raison d'être. They must make sure they avoid the situations leading to not legitimising an informational propulsion induced by 4PS, by giving warnings to responsible persons regarding the conduct of 4PS activities, by taking into account the legislations, the regulations or the opinions of law.

The Informational Authority must also be a partner of 4PS in the case when current laws or regulations are not adapted, even inapplicable, or simply non-existent for the situations emerged from the informational propulsion, which is induced by 4PS. In this way, it is the responsibility of the legislative informational process to advance the legal framework and ensure legal and legislative responsiveness.

New regulatory or legislative frameworks can be developed. But then, nothing guarantees their sustainability, in regard of the usages of information services. It is the responsibility of service providers to prepare them for these possible changes, especially at the digital level. This is what is required for an information service to obtain the quality of responsibility.

4.4.1.7 Domain of 4PS

The domain of 4PS must have the scale allowing its intention to confront complex – multi-institutional, multi-sectoral, multi-professional, even multi-national – situations of the progression of Society. The underlying issues of the progression of Society must attract enterprises, in the broadest sense: private, public, associative, people working in these enterprises, as well as citizens, because they see their own tomorrow by committing to contribute to 4PS activities, with their know-how, knowledge and talents. This area must be so important to its own tomorrow that some of them find a clear interest in launching an initiative of a 4PS action.

All these people contribute to bringing value to the progression of Society. They can only commit if, from the very beginning of 4PS, its conduct ensures sustainability of the activities generated by 4PS around informational commons, information common goods, endogenous and exogenous services.

In particular, the Informational Authority must be specifically interested in the 4PS success, because among all the governmental authorities, it is the best placed to understand how much the information common goods of 4PS enrich the public information heritage, ensure the emergence of value-adding activities that could not exist without endogenous and exogenous services, and make a substantial contribution to the progression of Society. It must promote it within all relevant government authorities. It must be particularly attentive to ensuring the resilience of informational commons to transformations in their environment, as – for example – changes of political majority.

4.4.2 *Overall intention of 4PS*

The overall intention of 4PS provides a first framework for the exploration and construction of contributory information services that are pursued. This overall intention is decomposed into several intentions which provide the main thrust of informational propulsions to be explored and triggered as part of the progression of Society.

The raison d'être of 4PS provides the context for the overall **intention** of 4PS, which provides a first framework for the exploration and construction of information services that will be pursued. This overall intention is decomposed into several intentions which provide the main thrust of informational propulsions to be explored and triggered as part of the progression of Society. All these intentions must be described in such a way that once 4PS actions have begun to build promising future foundations, they can be re-examined, criticised, refined and possibly modified or even transformed, depending on these results. They are at the centre of the cognitive cohesion of all 4PS contributors. They must enable them to find a cognitive unity respecting their differences by allowing them to bring value from their talents and knowledge and to establish informational consensus between them. These intentions must also allow 4PS and, consequently, all its contributors and all activities carried out within it, to have a cognitive identity clearly identified in Society. This cognitive identity will be forged throughout the activities of 4PS, by continually enriching the sense of the constructed information services.

Then these intentions describe the **critical situations** for the progression of Society, which 4PS intends to face. These situations must be extensive given the wealth and variety of knowledge, experiences, know-how of all 4PS contributors. These situations must be crucial: 4PS activities must allow Society to pass a large-scale cognitive threshold and not only the specialists must be able to overcome it, but also all the concerned people.

Finally, these intentions describe the **issues** of its activities. These issues make it possible to determine the factors of success. All these issues concern activities around information common goods, as well as their endogenous and exogenous information services. They depend on their relevance to overcome the critical situations faced by 4PS using the created information services. An important issue concerns

the institutionalisation of the informational commons of 4PS, in order to make these activities sustainable and make information common goods accessible and sustainable.

In conclusion, these intentions of 4PS do not contain any promise about the future. Nor are they visions of the future. They envision the creation of tomorrow by letting a whole space of activities emerge.

4.4.2.1 4PS intentions

It is essential to explore institutional frameworks at the international level to establish 4PS, considering that not only information services, but also many other domains pursue the same type of intention of progression of Society.

4.4.2.1.1 Approach of Public-Private Partnerships

The classical institutional instrument of the State to manage the relations between the private and public sectors is that of the public procurement inserted into a legal framework governing calls for tenders from the public sector, tenders from the private sector, the selection of the retained tender, the establishment of the contract and the contractual relations between the concerned parties. This legal framework tends to guarantee or enforce values such as fairness between parties, as well as probity and sincerity.

Under the leadership of the United Nations with its Economic Commission for Europe (UNECE)[10] and other international organisations such as the World Bank, the Organisation for Economic Co-operation and Development (OECD), this traditional approach has been renewed by the introduction of a new instrument of public-private relations, known as public-private partnerships (PPPs), to take into account situations for which the previous approaches have not been taken into account. Generally, PPPs consider partnerships over long periods, sometimes decades, and in more complex domains, such as infrastructure and public services, in all kinds of sectors such as roads, railways, bridges, hospitals, schools, cultural or sports facilities, communication infrastructures, national security facilities. Often, several public sectors and several private sectors are simultaneously involved. Facing these new situations, PPPs intend to be more efficient and effective than classical approaches of the public market.

There are three main types of PPPs widespread in many countries of all the continents.

– the first-generation PPP, based on the UK Private Finance Initiative (PFI), adopted in 1992, is intended to improve the quality and efficiency of the use of tax funds for the acquisition of public services;

10. United Nations Economic Commission for Europe (UNECE) http://www.unece.org/info/ece-homepage.html.

– the second-generation PPP, based on the concession mechanism introduced in France for more than a century, aims to promote healthy economic and social development in a regional context by developing societal infrastructures and having them financed at least partially by users;
– the third-generation PPP considers the framework of previous PPPs as too narrow, as soon as the intention of the PPP is not limited to optimising the allocation of tax funds (on the efficiency of fiscal fund allocation) and to respect principles and frameworks of operational achievements, but – on the contrary – concerns broad issues of development of Society. UNECE has launched third-generation PPPs known as People-first-Public-Private-Partnerships (PfPPP), with the major intention to place in the centre of activities the needs of the population within the framework of the 17 Sustainable Development Goals (SDGs) proposed in the United Nations Programme for 2030[11], which has already been accepted by the international community.

4.4.2.1.2 Position of 4PS

All of these previous instruments, the classical instrument of public markets and first- and second-generation PPPs, require well-defined objectives, precise deliverables, clear criteria for success, risk allocation, and precise budgeting plans, deadlines, required technical qualities. This framework is inappropriate for dealing with the issues of the progression of Society through informational propulsions: it would probably be adequate if these propulsions were conducted with gravitational approaches, but this would be very harmful to informational propulsions, particularly in their essential exploration process.

In fact, the overall intention of 4PS and that of PfPP are very close, although 4PS partnerships are not necessarily concerned by the SDGs.

Then, the institutional basic principles of 4PS and of PfPPP are similar.

4.4.2.1.3 Generic 4PS intentions

Since 4PS concerns informational propulsions, the global intention includes particular generic intentions that relate to the different facets of the informational propulsion. Thus, there is the generic intention to:

1. allow emerging activities, markets, responsibilities;
2. accelerate the adoption of technologies, methods, principles in the context of contributory services;
3. interest the private sectors to contribute to 4PS to advance their methods and technologies, to gain experience, skills and know-how in explorations, to be present at the opening of the market constructed by the activities of 4PS, to have a fluid relationship with the State, to have a guarantee of legitimacy;

11. https://sustainabledevelopment.un.org.

4. engage the public sectors to contribute to 4PS to construct contributory information services and information common goods that are essential for Society;
5. have an instrument of informational commons to govern emerging markets, the administration of information common goods, the economy of activities of contribution and the economy of those operating in emerging markets, the relations between public and private sectors and the State around information common goods;
6. place the Informational Authority in clear situations so that they can exercise their responsibilities with consistency in regards to executive and legislative powers and in regards to 4PS contributors;
7. disseminate cognitive serenity in Society with respect to digital pushes and accompanying visions;
8. provide the sense to the progression of Society induced by 4PS, drive the progression of Society resulting from 4PS in cognitive serenity;
9. prepare Society for the emergence of the informational infrastructure resulting from 4PS.

4.4.2.2 Crucial 4PS situations

The situations that TPS propose to overcome are not only to improve already existing societal practices by means of information services, but to let emerge the activities, observations, exchanges of values, unattainable without information services.

The following crucial situations are generic and responsible persons and contributors of 4PS must face them.

1. trans-disciplinary situation:

   The co-construction of trans-disciplinary services is not known in traditional approaches. It is more demanding than the construction of interdisciplinary processes;

2. quantum situation:

   The quantum situation concerns all 4PS activities related to the processes of exploration, construction and progression of information services. It is not taken into account in traditional approaches that are gravitational by nature. It asks not to think in terms of a solution that would be sufficient to achieve from the objectives. On the contrary, it requires a demanding attitude of exploration and construction and to assume the responsibilities;

3. situation of cognitive atony:

   People involved in the domain of 4PS, including people with responsibilities, do not feel concerned by the future of construction proposed in 4PS: they are discouraged by the magnitude of the transformations they imagine, induced by 4PS, and often experience a great weariness by all these perspectives, scalded by

all the broken promises of the digital. This cognitive atony is not only for individuals, it can also exist at the collective level;

4. situation of the cognitive ankylosis of the State:

   The situation of cognitive ankylosis of the State is reflected in the domains addressed by 4PS by a lack or an absence of consistent and sustained effort over time. It comes from several factors including lack of budget resources and lack of expertise. But basically, the ankylosis comes from the fact that the State puts itself in the position of overcoming a single critical situation of Society, which should be the subject of 4PS. Even if the responsible persons place orders for services to the private sector to obtain digital solutions in specific settings, they are cognitively ankylosed, since the response to the crucial situation of Society demands answers of a different scale in comparison to those they can imagine or implement alone, as markets emerge from the construction of information common goods and their informational commons. It is the Informational Authority that can combat this cognitive ankylosis by setting up 4PS partnerships and thus prevent the progression of Society from being considerably slowed down and even hindered;

5. situation of famine or greed in the private sector:

   In contrast to the previous situation, the private sector alone can seize a crucial situation that should be the subject of 4PS. It provides solutions, which, even relevant, are quickly confronted by their limitations in relation to the magnitude of the situations and can not rely on the legitimacy that could give them the Informational Authority in the framework of 4PS. The private sector faces thus two extreme positions.

   The first position, famine, no longer allows it to integrate its customers and partners in its innovations, can not guarantee their legitimacy. It can no longer go forward, it is in famine, it can only survive by delaying its abandonment as long as possible.

   The second position, greed, leads it to create its own societal legitimacy by attracting a maximum of users and customers around its products and relying on the importance of the digital (§ 1.1.1.3). In this case, it privatises the information common goods to ensure its economic survival and, as a result, it destroys the possibilities of creating services different from its own ones. It puts its competitors in famine. Driven by its success and its concern to survive, it can only pursue its innovations to finally reach the limits of its societal legitimacy, despite a possible phenomenal audience: it would have to be the master of the country to obtain it by passing the necessary laws.

   These two extreme positions, with all the intermediate positions, are very close to those evoked by the tragedy of the commons (§ 3.2);

6. situation of exploration:

   The exploration is an indispensable phase of the informational approach (§ 1.2.6). It is an essential element of the quantum space (§ 4.3.1.4). It clashes

with classical gravitational approaches that assume that there are always specialists who know everything, that it is just enough to put in place solutions, that they already know the problems they have helped to emerge.

4.4.2.3 4PS issues at stake

The 4PS issues at stake concern all the sectors of Society involved by the informational propulsions built inside 4PS. Here are some significant ones.

4.4.2.3.1 Issue at stake vis-à-vis Society

4PS is not in the domain of research where the essential is to discover new knowledge without worrying about its usage in Society. It is focused on Society itself and its contributors are responsible for their inputs in Society. This social responsibility concerns information services of informational propulsion of 4PS. It is huge, given the societal importance of digital implementations (§ 1.1.1.3), which are the information services: it is not a simple digital product. It is about activities, relationships between people both in their professional and private domains, enterprises in all their aspects, human lives tossed from one cognitive space to another. This is a dynamic progression where a management error can quickly lead people to no longer understand each other in their activities, to feel obsolete despite their still useful skills, to feel controlled and finally enslaved by increasing level of data at the information level, to feel servile or helpless, or both.

A progression requires a progress. But a progress is always questionable: what a progress is for some people is not always a progress for others. Precisely, democracy has emerged to make decisions and ensure the inevitable progression of Society. The Humanity knows that it works, despite all its weaknesses and even deviations, in countries of several million inhabitants. Responsibility for decisions is assumed globally by the Assembly of Deputies and the executive power.

This democratic aspect is intrinsic to 4PS: all the important decisions regarding the construction of information services are taken by the contributors according to their responsibilities under the supervision of the Informational Authority, that is responsible for the cognitive serenity of the expansion of the public space in preparation. In this case, it is crucial to ensure the access to the design schemas, to the history of the design of services, to the understanding of the choices made to approve them, to discuss them, to modify them or to reject them. One needs to have access to the sense that the contributors wanted to print in the information service. It is this democratic aspect that makes the term of the **progression of Society** more consistent than the development of Society, where decisions regarding design are in most cases of a centralised nature.

A critical factor of success is the establishment of this democracy in the administration of informational propulsions. Of course, the form it takes in the context of 4PS is not that well known to the legislative power. It needs to be invented, according

to situations and cultures. It is facilitated by the inclusion of concerned people who are willing to get involved in 4PS, as contributors.

A democratic decision in 4PS is not final because of the continual exploration of the 4PS domain, which brings new possibilities. It can be refined, even challenged. The information services must be able to evolve and the builders have the responsibility to enable these evolutions and to lead them.

Another critical success factor is the establishment of markets and activities around the endogenous and exogenous information services of the information common goods and the creation of values they bring to Society.

4.4.2.3.2 Issue at stake of the informational exploration in the progression of Society

The Information World plays a crucial role in decisions concerning informational propulsions, between the World of Society and the Digital World: in particular, it allows meaningful discussions between their specialists (§ 1.2.1).

One of the facets of this intermediation role concerns innovations, the foundations of informational propulsions. They no longer emerge from previous visions transformed into objectives to be achieved, as in the case of a gravitational approach. In a quantum approach, they emerge from an informational exploration conducted within the framework of the raison d'être with consequent consultations between all the contributors.

An important issue at stake is that of digital pushes. With a gravitational approach, on one hand, the promoters of a digital push must convince everyone while being able to express themselves only in terms of visions, and, on the other hand, those responsible for an informational propulsion take their decision only according to their conviction. This way of deciding prevents any relevant argument from having its place, even for the promoters of digital pushes who refuse to convince with fantastic visions, but who simply want to show and demonstrate the value brought by their digital innovation. On the other hand, the informational exploration of a quantum approach precisely demonstrates its relevance in the decision-making process. It even makes it possible to enrich it with the emergence of the societal contra-push directed towards this digital offer (§ 1.1.3). The final decision of people responsible for informational propulsion is then assumed in conscience and not only by conviction or connivance.

This informational exploration leads to the construction of the sense of informational propulsion (§ 1.2.5.2) and a cognitive context suitable to its assimilation by all those who are concerned by the informational propulsion. It is another issue at stake of this informational exploration, that of accelerating not only the adoption and the diffusion of digital or societal innovations, but especially their insertion in Society.

4.4.2.3.3 Issue at stake of cognitive continuity

The context of cognitive continuity concerns the passage from the disruptive aspects of an information service experienced by its contributors who create previously unknown spaces of activity into a necessary cognitive continuity for the actors who will be exercising their activities through these services. It is necessary to arrange this passage in 4PS. This development requires presenting to the concerned actors, the sense that the contributors have given to the service, as well as the aspects of their activities that have not changed. It must also provide them with benchmarks such as knowing how to evaluate themselves, knowing the evaluation criteria of their activities, knowing how to appreciate the way in which their colleagues carry out their activities, to be able to help each other, etc. It is for this purpose that the information services of 4PS are contributory. Contributors who will also be relevant actors have an important role to play: to disseminate the sense of the information service and, more broadly, the sense of the informational propulsion, to all their colleagues.

The issues at stake of cognitive continuity in 4PS are that Society is ready for the emergence of markets and activities that result from 4PS, adopts its information services and appropriates the brought opportunities.

Their critical success factor concerns the position of all persons involved in 4PS facing the progression of Society, not only proposed, but also implemented through 4PS.

4.4.2.3.4 Issues at stake of informational commons

The issue at stake of informational commons is to avoid the situations of famine and greed described above. An informational common is the link between the economy of contribution, in which the information common goods are built with their endogenous services, and the market economy, in which the exogenous information services of the information common goods are built.

The markets, in which the exogenous services bring economic value, depend on these informational commons. On them also depend the constitution of the informational infrastructure of Society, which provides the framework for innovative companies with all their freedom to undertake the creation of information services to enlarge the markets for the benefit of the progression of Society.

A critical factor in the success of this issue at stake is the interest that 4PS evokes in public and private sectors, which are concerned by the 4PS domain.

4.4.2.4 Cognitive frame of 4PS

The raison d'être of 4PS, its intentions, its crucial situations and its issues at stake, form the cognitive framework of 4PS. As the explorations progress, it is refined, enriched and even reoriented. But at any time of construction of its information common goods, it serves as a breeding ground for determining the sense of each of the information services that create the common goods of 4PS. It is the basis of the

cognitive unity between all its contributors of 4PS and the cognitive identity of its information common goods with their informational commons vis-à-vis Society.

4.4.3 *4PS in Society*

The institutional instrument of People-Public-Private Partnerships for Services (4PS) appears to be indispensable for the implementation of a long-term informational policy. It provides an institutional framework for the administration of informational propulsions, so that they can play their role in the progression of Society. It enables themes that require long-term efforts, such as public security assisted by a set of information services (Drăgoicea *et al.*, 2019). In particular, it enables the Informational Authority to fully exercise their responsibilities of guaranteeing the general interest in the informational expansion of the public space induced by informational propulsions.

Inserted into the informational approach, 4PS allows to construct information common goods composed of contributory information services, *i.e.* democratic, responsible and inclusive. They make it possible to organise them as informational commons, so that they can sustainably enable the creation of values through exogenous services built from them. These informational commons tend to avoid situations of the tragedy of the commons, such as famine and greed. They govern the interpenetration of economies, on one hand, the economy of contribution encouraging the creation of information common goods with their endogenous services, and on the other hand, the market economy of enabling the creation of the exogenous services of common goods.

The enterprises that create these exogenous services thus bring value to Society and contribute to its progression. All of these enterprises share 4PS common goods and in such a way, they are not isolated, as in the usual case of start-ups. They constitute a swarm of enterprises (§ 3.4.3) supported by informational commons. Moreover, 4PS allows them to considerably reduce the uncertainty regarding the acceptance by the State of their societal innovations based on the exogenous services they have created: the Informational Authority provides the social legitimacy of the information common goods by completely comprehending their sense, which consequently makes them and their exogenous services well positioned to be appreciated in the scope of Society.

Finally, all 4PS are built on the inclusion of people concerned by this domain. It contributes to give sense to the progression of Society that it induces on one hand, by its raison d'être to be continually enriched as long as the explorations are being conducted and their discoveries are being found, and on the other hand, by the sense of each of these information services provided by its manufacturers. These senses are conducive to providing benchmarks for all concerned persons and/or persons who are simply interested in understanding the induced progression of Society.

4.5 Administration of informational propulsions: conclusion

Facing the profound transformations engendered by informational propulsions, the classical approach of the world of Society does not have the necessary perspective to integrate the informational propulsions as part of the policies of the progression of Society. It is distraught to estimate what is right and sustainable in these transformations. The visions of utility presented as obvious by the Digital does not help it to develop a consistent position at the level of Society. The classical approach drives Society to undergo digital pushes.

The administration of informational propulsions is clearly different from the gravitational approaches proposed to the leaders of the State or enterprises, which ignore or do not appreciate the importance of the quantum approach. Indeed, these approaches can not avoid the trap of the top-down approach that requires project proposals submitted to experts who give their opinion and, ultimately, often make a final decision. But how can experts evaluate proposals that are intrinsically disruptive, because most of them are not familiar with their new paradigms and challenges? Unless being colleagues of disruptors who are very few in Society! Unless evaluating not proposals but visions! Unless ignoring the effects of disruptions proposed for Society!

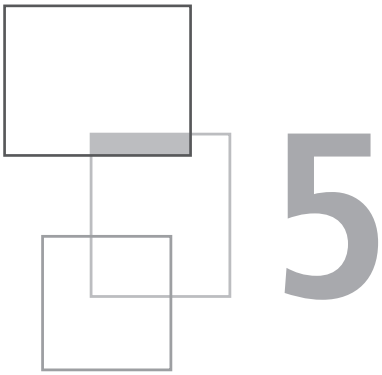
The administration of informational propulsions is based on the observation that does not place the experts in a clairvoyant position with a gravitational approach. It is built on this observation and proposes to avoid this trap, which ultimately can only lead to situations of famine and greed. The world of information no longer serves only as a mediator between the world of Society and the Digital. It becomes the important meeting place for the decisions regarding informational infrastructure.

Since the leaders of Society and/or enterprises do not have time to participate in the exploration and design process, it is the Informational Authority that will take the lead to guarantee on behalf of the State and/or enterprises the social legitimacy of information common goods under construction. The initiators of informational propulsions are not part of the Informational Authority. They propose their initiative with its raison d'être expressed in terms of intentions of the progression, crucial situations that they intend to face and issues at stakes for Society with a first plan of explorations to lead. They must conform to the informational approach by constructing information common goods in the economy of contribution, in order to create markets with the help of information services built from information common goods in the market economy. And all these information services must be democratic, responsible and inclusive, so they become essential for the progression of Society. This is how disruptors are invited without dogmatic hindrance to contribute to the progression of Society. They will have societal success, as soon as their value-generating disruption is transformed into a cognitive continuity for the persons who will continue to assume the responsibilities and the tasks through the services that they have helped to construct and make emerge. And it is the

Informational Authority who has the responsibility of legitimising this cognitive continuity.

This form of the administration of informational propulsions takes into account the quantum world and also the gravitational world. With a very simple rule: what should be administered in the quantum world can not be done in the gravitational world. Quantum disruptions can only be legitimate at the social level, if they lead to cognitive continuities in the necessary gravitational world of Society.

All this administration of informational propulsions avoids great visions; it makes it possible to return to the foundations of the Digital: everything is a construction which takes time but which advances serenely, unless brutalised by visionaries. The initiators of informational propulsions have nothing to promise: they are here simply to present a sustainable way of construction.



5

Intelligence of service

5.1 Introduction: the emergence of intelligence of service

The previous chapters presented the information services and the foundations of their deployment in Society. They have shown the complexity of the necessary concordance between the worlds of activities and the digital worlds, as well as the essential role that the informational and regulatory worlds play in first establishing this concordance and second maintaining it in spite of all the disruptions that occur in the worlds of activities and in the digital worlds.

These disruptions, triggered, for example, by the establishment of new legislation, a major scientific discovery or the development of a new digital system, are propulsors for the progression of Society. It is a question of answering it by building services to ensure the propulsion of Society by means of these propulsors. The societal challenges of these services concern the endogenisation of these propulsors in Society, the dilution of their cognitive disruption in a cognitive continuity by providing cognitive references to all those directly or indirectly affected by these propulsions, in order to serenely carry out their activities. The proposed informational approach makes it possible to face all these challenges. However, it also has other ambitions related to the progression of Society. The purpose of this chapter is to introduce them.

5.1.1 *Roles of the informational approach in the progression*

The informational approach has as its primary role to allow the concordance between the worlds of activities and the digital worlds through the cross-pollination space (§ 2.5).

This space is the place for all the work of co-construction of information services that explore the challenges of the progression of Society and allow offering value. All these works are works of transdisciplinary, transinstitutional or transnational innovation. This is how the informational approach plays a central role in service innovation.

And finally, the previous roles lead to a new role of a completely different scale. It is the concordance between, on the one hand, the gravitational worlds of actors of services, which are the places of cognitive continuity where operational activities are exercised, and, on the other hand, the quantum worlds of service builders, which are the places of cognitive disruption where the services are constructed.

Thus, as the informational approach is at the centre of the informational propulsions (§ 1.2), this implies that every domain consists of a gravitational part and a quantum part.

5.1.2 *Quantum part of a domain*

The quantum part of a domain, which is intrinsically linked to the innovation in the domain from informational propulsions, is most often ignored or left in the shadow of the unspoken. In the domain of products, the builders or creators are grouped in research and development departments. However, the processes of building information services face situations so much broader than the classical R&D logic is too limited to deal with them. Therefore, in the logic of information services, it is important that the actors who have quantum talent, are part of the teams of builders, not only because they have knowledge of the situations they face while exercising their responsibilities, but also because they want to contribute to the progression, they want to be heard and to have their contributions recognised. They wish to participate in the creation, in the construction, to have access to the sense of the induced progression (§ 1.1.4.1). They are indispensable to ensure the transmutation of cognitive disruption into cognitive continuity (§ 1.2.5.5), because they know their domain and their profession. While being actors of the gravitational part of the domain, they also exercise their activities of builders in the quantum part of the domain.

5.1.3 *Situation to overcome*

Persons responsible for the progression of Society are faced with uncertainties regarding the direction to take, in order to ensure the future of activities, their resilience and even their sustainability. Everywhere, traditional modes of organisation seem ineffective and inconsistent. To remedy this, they give way to grandiose visions or strategies of pragmatic actions, reduced in short term. Both, the ones and the others, lead to stifling and even desperate cognitive impasses. Sometimes the responsible persons are even reduced to impose them to actors, at the cost of cognitive constraints.

5.1.4 *Intention*

The intention of the service logic is to bring out **quantum knowledge**, the consistent knowledge for constructing and steering informational propulsions responsibly at the level of Society. With this intention, the service logic is not limited to the construction, implementation, execution and progression of information services, but also takes into account their place in the strategic thinking of the progression of Society, for all its domains. It is allowing their lights to emerge, so that responsible persons can operate intelligently and avoid falling into the false solutions of visions or solely pragmatic solutions, and so that they can serenely exercise their quantum activities.

5.1.5 *Plan of the chapter*

This chapter is devoted to the emergence of quantum parts in the different domains that leads to the expansion of their knowledge. It presents the pioneering example of the domain of marketing that led to the introduction of the Service Dominant (S-D) logic and describes a framework of re-foundation of a domain. It applies this framework to the domain of the Digital, which allows the Service Digital logic (SD-L) to emerge. It highlights the need to organise the quantum space of an enterprise, to ensure its progression thanks to informational propulsions, and proposes the quantum logic of organisation (Q-O). Finally, it shows how these three logics are connected to each other by a cognitive continuum that contributes to the unity of Service Science despite its many facets.

5.2 Expansion of a domain

The emblematic space of the quantum part of a domain is the cross-pollination space of essential for the construction of an information service (§ 2.5). It is the space where the builders bring all the knowledge of their domain, indispensable

for the construction of the service, in order to ensure its relevance in Society. The absence of some of this knowledge might lead the newly built service to suffer from deficiencies. This knowledge will be difficult to integrate afterwards, in particular because of the powerful force of the digital implementation of the service (§ 1.2.5.1). Thus, it becomes very important to explore the position of builders in this cross-pollination space for the construction of a trans-service (§ 2.1).

5.2.1 *Cognitive cohesion of contributors*

The essential question is to overcome the heterogeneity of the knowledge, the disciplinary languages of the builders to ensure their cognitive cohesion. Several factors favour the installation of this cognitive cohesion. They are: (i) the informational approach that provides the informational language (§ 2.3.5) as a common language to specify all the activities around the service; (ii) Third Place for Service (§ 4.2) that serves as a place conducive to exploratory and innovative approaches; (iii) the framework of contributing services, namely democratic, responsible and inclusive (§ 4.1.1); (iv) the reference framework for contributors (§ 2.3.1).

Nevertheless, all these factors are not sufficient to ensure cognitive cohesion. It is important to focus on the heterogeneity of knowledge between the builders of the service, because all these types of knowledge must be entangled to build the service despite their heterogeneity.

5.2.2 *Quantum knowledge of a domain*

A builder is responsible for the knowledge of their domain useful for building the service in the cross-pollination space. This is special knowledge because it must be able to be integrated into informational models, then be activated by the future actors of the service and become indispensable to their activities. This knowledge must also become actionable (Argyris, 1996) by the other builders, so that they can incorporate it in their reasoning, especially around informational models of the service.

The simplest situation for a builder is to face a situation where the knowledge of his domain is sufficient. A builder presents this knowledge to the builders of other domains with the help of informational models, by showing the importance of this knowledge for the construction and operation of the service. Such a presentation must allow the other builders to decide in a responsible way, either to integrate it or not into the service and, therefore, into the corresponding informational models.

On the other hand, there is a much more difficult situation for a builder: when a builder is confronted with situations still unknown in their own domain. However, thanks to their own knowledge, a builder tries to create new knowledge of their domain to deal with the situation. A builder then introduces it to the builders of

other domains. At the same time, this increases the space of knowledge of their domain.

Finally, there is in an extreme situation for a builder: a builder understands that the cognitive framework itself of their domain is insufficient to take into account the encountered situation. The relevance of this situation was never recognised before. A builder would have to rethink the foundations of their domain. A builder is not in a position to undertake this re-foundation only by themselves, as it requires a lot of time and a lot of intellectual effort, as the following paragraphs will show. The entire team of builders must explore the situation in another way.

The **quantum knowledge** of a domain for a service is the domain knowledge retained for the construction of the service, notably the domain knowledge described in the information models. The **knowledge space of a service** consists of the quantum knowledge of all the domains concerned by the service. It provides the framework of knowledge, within which the sense of the service is embedded (§ 4.1).

5.2.3 *Context of the re-foundation of a domain*

This situation of re-foundation of a domain is not exceptional. On the contrary, it is *a priori* the most common, since generally the foundations of a domain were elaborated well before the introduction of digital propulsors and, consequently, informational propulsions. They do not take into account informational opportunities that make information much more accessible to more people.

The examination of this situation is crucial to dissolve the cognitive blockages of persons who remain in the usual cognitive framework of principles, knowledge and procedures. In fact, they find themselves in a cognitive impasse, and consequently the activities for which they are responsible are restricted, too. This observation is all the more damaging for Society, considering that many of these persons are aware of the gaps and the total inadequacy of the cognitive framework to deal with situations in a concrete way. They want to change it, but they do not have any other cognitive framework to take a different position and bring the activities they are responsible for into new perspectives. Above all, they feel no legitimacy to start building another cognitive framework just by themselves. Yet, they have an intimate conviction: a new cognitive framework must be built, moreover, it is essential to deeply question activities not only in their practices, but especially in their raison d'être. They are ready to collaborate in such re-founding enterprises, they are even willing to do so, as long as they do not remain at the superficial level of the major visions or solutions, which are obtained by the simple application of digital technologies.

It is time to explore the foundations of the domains of Society to bring out knowledge in line with the perspectives offered by the informational propulsions of Society nowadays. It is not a question of making a clean sweep of the current foundations on which Society is based, but of analysing them, of deconstructing some parts and of rebuilding others in order to allow Society to have a consistent, sustainable and liberating progression. It is also a question of expanding the domains.

5.2.4 *Situation of the foundations of a domain*

It is about detecting the foundations whose resilience or sustainability is questioned by the considerable expansion of activities following informational propulsions.

The resilience of a foundation concerns its principles and knowledge. Its analysis evaluates whether they should be challenged to incorporate quantum knowledge.

The sustainability of a foundation concerns the institutions and procedures implemented as part of its principles and knowledge. Its analysis focuses on their ability not to impede the processes of service exploration relevant to the progression of Society.

There are two crude answers for this situation: the pragmatic answer and the visionary answer. The pragmatic answer consists in simply changing the procedures by keeping intact the principles and knowledge of the domain. It is a response of procrastination: it saves Society from questioning that often leads to thorny transmutations while exercising responsibilities at all levels. This answer blocks the opening innovation spaces of activities and people feel the responsibilities to escape them. It tacitly postpones in the future the necessary questioning of the principles, thereby depriving Society of all the values, which would normally be provided by the activities it has blocked. As for the visionary response, it consists in formulating promises, which Society made much better by digital propulsors, without worrying about the transmutations of the domains and considering that the brought values are inherent to the propulsors, and even, that they are real gold mines!

On the contrary, a consistent response to this situation leads to a re-examination of the raison d'être of the domains. It deconstructs the fundamentals challenged by informational propulsions and reconstructs them on resilient and sustainable bases including quantum knowledge. It highlights the corresponding generated activities and their values. It thus reshapes their raison d'être with their principles and their knowledge.

An example of such a re-foundation is the responsibility of the State in the management of the public space to preserve the general interest. This public space is considerably expanded by informational propulsions induced by digital propulsors. After analysing the foundations of Society as its democratic nature, as well as the characteristics of the informational approach, like the information common goods, the exploration suggests an Informational Authority (§ 4.3.2). The Informational Authority aims to make the role of the state resilient in the face of informational propulsions: the mission of the Authority is to guarantee, in the name of the state, the general interest in the public space expanded by informational propulsions.

5.2.5 *Re-foundation of a domain*

Re-foundation of a domain requires extensive work to establish new, resilient and sustainable foundations. Stephen L. Vargo and Robert F. Lusch, the founders of the

Service Dominant Logic approach (S-D) (Vargo and Lusch, 2004a) have faced such a situation in the marketing arena. Their work of re-founding marketing (Vargo and Lusch, 2004b) is a pioneering example and provides a solid background to the canvas of re-foundation of a domain presented below.

5.2.5.1 Re-foundation of marketing

Stephen L. Vargo and Robert F. Lusch note how the thought framework, called Goods Dominant Logic (G-D), reduces human potentialities. It relies on the tangible reality of goods to establish their cognitive authority over marketing. And even services built around goods in the G-D framework do not change the nature of the G-D cognitive hold on marketing.

Indeed, this G-D framework, centred on goods, masks much more powerful phenomena that can only be observed with the help of intelligence. To pierce this G-D grip, and thus bring down the masks, the S-D founders return to the fundamentals of marketing, namely the exchanges between an enterprise and its clients around its products, without limiting themselves only to commercialisation. They are returning to the foundations of political economy as described in the work of Adam Smith (1776) on the one hand to establish the S-D fundamentals and on the other hand to unmask the G-D restrictive nature.

Vargo and Akaka (2009) note: "The foundation for G-D logic is rooted in economic philosophy and economic science, as they developed from the work of Smith (1776). At the onset, Smith built his political-economic views on the proposition of the efficiency of division of labor and the related idea of the necessity of exchange. He initially established real value in terms of the labor required to achieve a benefit or 'value-in-use.' Labor, for Smith, did not mean so much physical labor, as it did the development of specialized knowledge and skills that could be applied for benefit and thus used in exchange." The exchanges are the foundations of the economy and they are formed of specialised knowledge and skills. Also, the S-D founders define (Vargo and Lusch, 2004a) the service "as the application of specialized competences for the benefit of another entity or the entity itself" and consider (Vargo and Lusch, 2008a) the service as "the fundamental basis of exchange". The S-D approach then leads to considering any market exchange as a process between entities putting their specialised knowledge to the benefit of others, within the framework of mutual service provision.

However, as Stephen L. Vargo and Melissa A. Akaka recall, the context of the eighteenth century did not allow to put into practice this perspective of Adam Smith. On the one hand, such exchanges of knowledge and specialised skills were almost impossible except through personal journeys, which were inevitably slow and inefficient, unless they were encapsulated in manufactured objects. At the beginning of the Industrial Revolution, another concept of value, called "exchange value", becomes dominant: it is centred on the price paid on the market for something. It is reinforced by the desire of economists to make economics a legitimate science in the Newtonian tradition thanks to products, with their encapsulated utility, represented

by prices: the framework of the G-D thought sets itself up to become the dominant framework of thought of all the disciplines of the enterprise.

5.2.5.2 Canvas of the re-foundation of a domain

All stages of a process of the re-foundation of a discipline are illustrated by the previously cited works in the domain of marketing:

- they returned to the basics of marketing and economics based on the groundbreaking work of Adam Smith. They showed that there were two possible paths: the framework of S-D thought and the framework of G-D thought;
- they analysed the reasons that led to the dominance of the G-D framework taking into account the circumstances of the 18th century;
- they have redesigned the domain of marketing by establishing the framework of the Service Dominant Logic (Vargo and Lusch, 2015) in the form of 5 axioms and 11 propositions;
- they gave the S-D framework a prominent role in marketing over the G-D framework;
- they have re-positioned the utility of the G-D framework: this re-foundation does not lead to a clean slate of the G-D framework. They state that market intermediaries, goods, money and organisations, which are central to the G-D framework, retain important roles in the S-D framework. This is to overpower the dominant importance of G-D concepts in marketing and embed in the S-D framework all G-D concepts that remain relevant.

As a result, the S-D framework outperforms G-D in the context of the progression of Society.

5.2.6 *Importance of the re-foundation of a domain*

The emergence of Service Science makes it possible to explain the knowledge relating to cognitive disruptions that arise in the progression of Society. Generally, these disruptions require conceptual challenges of the areas concerned, which can reach the levels of their raison d'être. They lead to expansions of these areas in their responsibilities and activities. These are explorations aiming to discover the quantum knowledge of the domain and thus allowing their specialists to participate in the process of creation and construction of services. All areas are concerned, such as business models (Osterwalder and Pigneur, 2010) and finance (Ho, 2011).

This was the case of the domain of the State administration in providing an informational policy (§ 4.3) for the progression of Society. This informational policy is based on the informational propulsions triggered by initiatives under the supervision of an Informational Authority. It is based on the quantum spaces of propulsions. In particular, it enables to place the responsible persons into situations of anticipation and not into situations of simple reaction, as it is in the case of the

gravitational policy centred on the digital and its usages. The conceptual core of the informational policy, which is discovered within the framework of Society, is also applicable within the framework of an enterprise.

The following paragraph presents an example of the re-foundation of the domain of the Digital.

5.3 Re-foundation of the domain of the Digital

Since the beginning of the creation of tabulating machines and computers, the domain of the Digital has continued to be a proliferation of creations fueled by avant-garde societal visions and leading to achievements with societal consequences that had never been previously designed. It is developed, according to a logic called here the Technology Digital Logic (TD-L). This logic is no longer sufficient to deal with the progression of Society. It now becomes a matter of re-founding the logic of the development of the domain of the Digital with another type of logic, called the Service Digital Logic (SD-L). This paragraph introduces it by following the previous outline of re-foundation.

5.3.1 *Returning to the essence of the Digital*

The Digital has been continuously developing systems that bring together the most diverse knowledge of technologies, software engineering, and many disciplines and trades from all sectors. Such constructions have always required levels of detail, accuracy, rigour and complexity of exceptional finesse and completeness, which are essential for the system to function properly in all the interactions of its various hardware and software components. Contributors to the construction of such systems must show great team spirit, especially to cope with many misunderstandings or cognitive errors leading to the search for their causes and their corrections, all in a multidimensional context.

To ensure their cognitive cohesion, the contributors to the creation of a system had to develop between them a common language to forge their cognitive unity. With this language they can understand each other in, for example, situations where the system architecture should be decided. This common language comes from their previous experiences, listed methods, their spirit of innovation. Moreover, this cognitive cohesion also concerns the cognitive identity of the team vis-à-vis Society. Since the beginning, the Digital has been seeking to be at the heart of the progression of Society by triggering it. Therefore, it must be able to take the central place in the concerns of the actors of Society. For this purpose, the team of creators of a system must share the same intention to propose an appointment in the future with the actors to join them: the system under construction must immerse into the activities of these actors.

The Digital has always been aiming tomorrow of Society: **tomorrow** is not the future, it is only what is possible to prepare and build now for the future and for the new generations. This is how the Digital is a continual exploration of Society. It is always a part of a movement of innovation and creation: one system is barely developed, and another is already preparing either to improve it or to build another radically different one with a different perspective.

This spirit is common to the Technology Digital Logic and the Service Digital Logic.

5.3.2 *Reasons of the dominance of the Technology Digital Logic*

The Technology Digital Logic has seized the Digital from its beginning. At that time the innovations were technological, the created systems were of almost exclusively technological nature, their creators had to be very competent in the concerned technologies. The tomorrow of Society which they envisaged was entirely turned towards very technical trades, like, for example, the computation in physics or the storage and sorting of massive data in the population census. They brought solutions to people in these trades, indisputably more efficiently, more reliably in comparison to everything which was known before. Some of these people immediately adhered to the intention of such a system. Consequently, they formed the aridity of the interfaces of the time, in order to master how to exercise their trades using these systems. They were united in teams to maintain the work necessary to produce results. They were considered as simple users for both – the persons responsible for these systems and the persons responsible for their institutions. They were never in a position of actors who are likely to have significant exchanges aiming tomorrow, neither with the creators of systems nor with the persons strategically responsible for their society.

This Technology Digital Logic leads to the construction of a wall of indifference (§ 1.1.4) between the creators of the system and the persons responsible for the progression of Society or an enterprise. It seems then sufficient to set problems in the form of objectives and then find the solutions simply by applying the systems and their performance.

This wall of indifference set up by the Technology Digital Logic has remained in place even after the enrichment of the Digital by many software components of all kinds, especially in the form of algorithms in the part of the Digital called “artificial intelligence”, in the form of new digital architectures built in the TD-L framework, such as web services, service-oriented architectures. Even “data scientists” in the face of “big data” remain institutionally cognitively enclave vis-à-vis the creators of the systems they use or improve. All these enhancements of the Digital do not change anything to the cognitive dominance of TD-L on the Digital.

5.3.3 *Re-foundation of the Digital: Service Digital Logic*

The digital interfaces between the creators of the systems and the users have become much more semantic than those of the beginnings of the digital world whose aridity limited the access of the systems only to those creators and users, who had managed to become familiar with this aridity. Thanks to them, the creators have domesticated much greater technical complexities leading to much larger systems and potentially much more conducive to human activities. Thanks to them, users have been able to explore their own activities, trades or disciplines and better understand their efficiency.

In addition, more and more people in all sectors of Society, at all levels of responsibility, have acquired digital knowledge and most of them have found that they require more of the digital to support the progression of Society. Many of them start feeling that they are capable to contribute to the progression of Society with their digital talents. They have a desire for **tomorrow**, they want to contribute to the processes of innovation and value creation.

Moreover, many of them are aware of the serious situations facing Society and enterprises, like for example those that are at the origin of the 17 Sustainable Development Goals of the United Nations[12]. They are convinced that the Digital has an essential role in the progression of Society and they are aware of the need to work in a multidisciplinary team.

It becomes essential to have a conceptual base for this multitude of innovations and co-creation situations to provide resilient and sustainable perspectives of exchanges and activities, in order to ensure a consistent progression of Society. This is how Chesbrough, Spohrer, Maglio, and Kwan (Chesbrough and Spohrer, 2006; Maglio and Spohrer, 2008; Spohrer and Maglio, 2008; Spohrer and Kwan, 2009) lay the foundation for Service Science, with in particular ten main concepts (Spohrer and Maglio, 2009) including that of ecology considered as its major concept: "At the highest level, service system ecology is the population of all types of service system entities that interact over time to create outcomes. Types of service system entities include individuals (people) and collectives (organizations). History is the trace of all outcomes over time for all entities that interact." It is the Service Digital Logic that takes into account the concepts of Service Science and especially its major concept of ecology (while the TD-L does not allow it), in order to give the Digital being a leading role in the processes of creating and constructing services.

12. https://www.un.org/sustainabledevelopment/sustainable-development-goals/.

5.3.4 *Predominant role of the Service Digital Logic*

Whilst the Digital is a leading actor in co-creation processes, it also becomes a leading actor in the responsibilities for the impacts of the progression of Society induced by the created services. Since all these impacts are impossible to predict before services are implemented in Society, SD-L leads to the need for an exploratory approach involving all contributors to co-creation. Thus SD-L concerns the levels of design and implementation of services additionally to those, which were previously known in the TD-L framework: the co-creators of services should agree on the practices of exchanges that will be supported by the Digital.

It is no longer a question of applying the Digital to domains of activity, nor of finding solutions to problems using Digital, nor even of identifying problems, as they are induced by TD-L. It is a question of finding situations of creation of values starting from the digital potentialities and of making emerge a cognitive unit between all the co-creators of services. It means that specialists of the Digital should participate in co-creation work in the cross-pollination space (§ 2.5). It also means that SD-L contains all informational knowledge (§ 1.2).

SD-L is explicitly centered on the progression of Society with its informational propulsions whereas the TD-L only considers it implicitly. This is how SD-L outperforms TD-L regarding the progression of Society.

5.3.5 *Re-positioning of TD-L*

The intention of SD-L is to position the Digital in the progression of Society, which would allow it to take a creative and responsible position. SD-L takes into account many more situations in a consistent and responsible way than TD-L could do. It asks the Digital to provide systems that are resilient and sustainable, not only in relation to the aspects of performance, reliability, security and safety, which are well known in TD-L, but also in relation to aspects of information services that are implemented thanks to these systems: they must meet the requirements of the societal contra-push (§ 1.2.3) and they must take into account that their main partners are the builders and the persons responsible for information services.

Therefore, the systems are needed, which provide complete possibilities of evolution such as (Al-Jadir *et al.*, 1995) in the domain of database management systems, supporting rich semantics such as specialisation (Junet *et al.*, 1986), normalization and decomposition of classes (Delobel, 1978), hyperclasses, *i.e.* composition of classes, (Turki and Léonard, 2002), concepts adapted to the regulatory world (Khadraoui *et al.*, 2011; Falquet *et al.*, 1993), information system components (Arni-Bloch *et al.*, 2006).

They must enable implementing information modelling fluidly and responsibly, as in the cases of (Rolland *et al.*, 1979; Léonard and Luong, 1981; Bodart *et al.*, 1985; Estier *et al.*, 1991; Léonard and Prince, 1992), managing activities of security and of evolution of information systems, as in (Le Dinh and Léonard, 2007), to ensure

the conformity of information systems with the regulatory world, as in (Khadraoui *et al.*, 2006; Khadraoui *et al.*, 2009).

This is how the SD-L re-positions TD-L so that it remains relevant to the progression of Society.

5.4 Quantum logic of organisation

Informational propulsions constructed with the help of information services play a major role in the progression of an enterprise. Most activities are carried out through these services. Their organisation must be re-organised to take into account the situations generated by the services. It must give way to new responsibilities, such as creating new services, supporting the evolution of others, deconstructing some practices and reconstructing others. It requires establishing new forms of organisation of activities and new forms of coordination between actors, new activities and, therefore, new responsibilities in their functioning.

5.4.1 *Foundations of the quantum logic of organisation*

The quantum logic of organisation (Q-O) concerns the organisation of the quantum space (§ 4.3.1.4) of informational propulsions, concerning the builders of information services and their quantum activities. These are activities of exploration, creation and construction of information services that require builders to continually adapt the existing methodological benchmarks and often invent their own methods to face the encountered situations. All these activities are poorly codified. The skills required by quantum activities are not specifically listed. Of course, they include knowledge related to the trade of the enterprise, but this professional knowledge is insufficient: more knowledge about informational propulsions and their endogenisation in progressions of the enterprise is indispensable.

Thus, the builders should demonstrate the intelligence of the artificial. When they model an information service, they actually model the informational base of the service and the informational spaces of the activities of the future actors, not the activities themselves. They have to demonstrate their intelligence concerning the **discrepancy** between the artificial that they build in the services and the activities that the actors will exercise through the information services. In their turn, the actors themselves have to acquire the intelligence to exercise these activities efficiently in this new environment. An example of such discrepancy is between builders of a decision-support service and decision-makers using this service: they do not assume the same responsibilities!

A major cause of uncertainty in the success of an information service is based on the adequacy of the situations encountered by the actors carrying out their

responsibilities and the possibilities offered by the information services the builders construct. In order to reduce this uncertainty, it is necessary that the team of builders include actors, who know precisely the situations they face.

It is these builders with their intelligence of information (§ 1.3), who face the cognitive disruption by creating and constructing information services, because these services will transform not only the practices of the actors of the enterprise, but also their ways of understanding the situations by taking into account the help that information services can bring them.

The builders must continue their exploration to transmute this cognitive discontinuity into a cognitive continuity for the actors of the enterprise (§ 1.2.5.5). They do it with the involvement of the actors belonging to the team of builders and with the sense of information service that has served as a guideline for their construction. This task is essential to fight against cognitive exclusion (§ 1.2.5.3) and to facilitate the adhesion to the information services of the actors of the enterprise.

5.4.2 *Quantum steering committee*

The Q-O logic advocates a quantum steering committee to supervise all the quantum activities of the enterprise. It is constructed in a similar way as the Informational Authority (§ 4.3.2) at the level of the State. Its institutional implementation is specific to each enterprise.

It is in charge of the informational policy of the enterprise and the progression of the enterprise by means of services and information common goods, which it organises into informational commons.

It is responsible for the concordance of the progression of the enterprise, induced by informational propulsions, with the strategy of the enterprise.

It is responsible for the informational heritage of the enterprise.

5.4.3 *Organisation of quantum activities*

Even though the quantum steering committee is involved in the process of constructing information services and informational commons at the heart of informational propulsions, it has no other power over these processes than to legitimise them by considering only the general interest of the enterprise. It ensures that information services are contributory – democratic, responsible and inclusive. It supervises the constitution of their canvas (§ 2.3.6) and ensures their legal, regulatory and ethical compliance. It supervises the processes of transmutation of cognitive discontinuity into cognitive continuity for the actors of the enterprise.

It is a team of builders who takes the initiative of an informational propulsion or an information service by presenting the intention (§ 2.2). It must necessarily include specialists of the informational approach (§ 1.2). Most often, it leads

to the construction of complex services. The quantum steering committee ratifies it or not within the framework of its responsibilities. Once approved, the initiative is launched with an organisation as choreography (§ 2.4.2.4) or as farandole (§ 2.4.2.5), according to its intention.

The builders of services and informational commons have the freedom and the responsibility of the explorations and constructions of services from the informational approach (§ 1.2).

In this quantum space, the quantum steering committee keeps in current with innovations without exercising control over the work, either already accomplished or being underway, notably by participating in the Third Places for Service (TLS) (§ 4.2) organised by the builders, with the role of regulator.

5.4.4 *Quantum logic and gravitational logic of organisation*

The gravitational logic of organisation G-O is the usual logic of organisation. It concerns **gravitational** activities. Primarily, they are recurring, daily or ongoing activities. They obey codified procedures. The mode of evaluation of their results concerns the performances, the reliability, the obtained quality, the robustness in the event of degraded circumstances. Other gravitational activities concern incremental innovations, *i.e.* innovations that improve the performance of activities without bringing them cognitive disruptions: their actors remain in the same cognitive space. The skills required to perform gravitational activities are listed. Others are the subject of projects amenable to gravitational logic with objectives and returns on investment.

Services built in the quantum space are subjected to the process of transmutation of their disruptive character in a cognitive continuity so that the actors can continue to carry out their activities through them with serenity. These services can therefore remain in the quantum space if new explorations are planned to extend them or be entrusted to the gravitational space where they will be organised according to the G-O logic.

The Q-O quantum logic of organisation outclasses the G-O gravitational logic of organisation.

Thus, the Q-O quantum logic makes it possible to place the management of an enterprise in a position of responsibility vis-à-vis informational propulsions, while being kept informed by the quantum steering committee of the progress of the explorations. This makes it free from the cognitive straitjacket of the G-O gravitational logic that requires it to establish master plans, set goals to be achieved in the context of development projects and align digital policy with the enterprise policy.

On the contrary, the Q-O quantum logic allows explorations of new disruptive digital technologies in terms of information services and propulsions for an enterprise. Such explorations provide the management through the quantum steering

committee with consistent information for the progression of an enterprise: the management is now in a position of responsibility vis-à-vis the progression of an enterprise. Moreover, the Q-O quantum logic also allows the creation of complex services, including inter-institutional services, which become important for the progression of Society and which are potential carriers of values for an enterprise which contributes to their construction.

5.5 Cognitive continuum in Service Science

The objective of this paragraph is to ensure a cognitive continuum between these three logics: Service Dominant logic (S-D), Service Digital Logic (SD-L) and Quantum logic of Organisation (Q-O).

These three logics have different areas of interest: marketing for S-D logic, information services for Q-O logic, digital for SD-L logic. On the other hand, all three share the same interest in services. All three are built by outclassing, in their domain, previous logics: respectively the G-D logic of goods, the G-O gravitational logic of organisation and the TD-L technology digital logic. This outclassing represents cognitive bases for conducting consistent progressions of Society.

The progressions of an enterprise can only be built on the exchanges between the different internal and external stakeholders and these exchanges are based on shared knowledge between the actors of the exchange: Service is the fundamental basis of exchange (the first S-D axiom) (Vargo and Lusch, 2015). This shared knowledge is in fact generic and denotes a true knowledge, in the abstract sense, as information or even data, according to the context in which it is understood by the actors of the exchange. In the terminology of information services, it is called information. In addition, for information services, these exchanges and thus its information are sources of activities.

Therefore, information services are the basis of activities of an enterprise, which means that any activity of an enterprise is susceptible to be supported by an information service. Information services are at the base of the progression of an enterprise.

Given this importance and the multitude of services to be built, as well as their complexity, it is essential to facilitate their creation and construction, and to organise them according to the Q-O quantum logic.

However, then it is necessary that the Digital takes the leading role in rendez-vous related to the progression of an enterprise: it must be placed within the SD-L framework, so that the digital systems developed within the TD-L framework take into account that their users are first and foremost the builders and administrators of information services and not the end users, that they must be inter-operable and agile to enable the actors of the progression of an enterprise to continually be resource integrators (third S-D axiom), especially by co-constructing complex information services (§ 2.4).

These information services of the Q-O logic provide the right and consistent places to face complex situations of the progression of an enterprise at all levels. They are even more valuable if exogenous actors are part of their builders to guide the architectures of these services so that they can then create value themselves through the service. Indeed, if the value of an information service is co-created by its builders, including beneficiaries (second axiom S-D), it is always strongly dependent on the values of the exogenous activities that the service allows, which corresponds to the fourth axiom of the S-D logic: value is always uniquely and phenomenally determined by the beneficiary.

The ecology (Spohrer and Maglio, 2009) (§ 5.3.3) and the co-creation of value of an information service, in particular a complex one which involves generally several enterprises, are coordinated according to the structure of the information service (§ 2.3.6) of the Q-O logic, which has been established in the institutional frameworks of endogenous and exogenous activities of enterprises, including their regulatory frameworks. They lead an information service to be institutionalised in the sense that its disruptive characteristics during its co-creation are assimilated by its endogenous and exogenous actors into a cognitive continuity (§ 1.2.5.5). The Q-O logic is thus at the centre of the fifth S-D axiom: value co-creation is coordinated through actors-generated Institutions and Institutional Arrangements. It is also at the centre of the perspectives of eco-systems of services.

Therefore, the foundations of these three logics are intrinsically intertwined and thus constitute the foundations of Service Science.

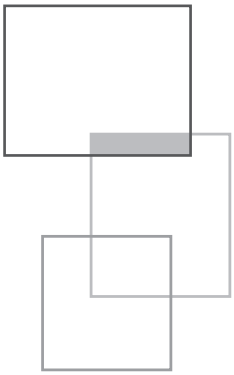
5.6 Intelligence of service: conclusions

Service Science leads all scientific disciplines to meet together, in order to intermingle their knowledge for constructing trans-disciplinary services that are at the heart of informational propulsions and, therefore, of the progression of enterprises and – more generally – of the whole Society. Service Science asks each discipline to highlight their quantum knowledge and for this purpose to enrich their foundations. This chapter shows examples related to marketing, digital, and organisation.

Service Science offers them fields of exploration of their own knowledge. It provides a unique place where experts in the exact sciences, humanities and engineering come together to form a team of service builders. It shows the need for cooperation between disciplines, institutions or nations to ensure the progression of Society.

It shows the need to develop jobs and education for **service scientists** (Spohrer and Maglio, 2008). These service scientists can come from all disciplines by acquiring more or less extensive knowledge of Service Science, according to the responsibilities they consider to be able to take in the progression of an enterprise or Society and in the exploration of knowledge to face the comprehension of trans-disciplinary, trans-institutional and even trans-national phenomena.

These service scientists are not limited to being scientists of data, information or knowledge. Even if a service is built on an informational base, it is in line with the activities carried out through this service and provides a contribution to the added value. Thanks to this, it holds an important place in the ecosystem of the activities, and especially in its creation phase, it actually builds tomorrow of activities. Service scientists consequently can assume these responsibilities for tomorrow.



6

Response to initial intention

This book intends to contribute to the deepening of Service Science, its emergence and the assimilation of its substantial contribution in the context of the progression of Society or an enterprise. It has conducted explorations around four generic reference situations concerning the intense creativity generated by the Digital, the progression of Society, the nature of the contribution of the Digital to Society, and the classic approach of the Digital regarding Society. These explorations lead to a generic answer that goes beyond the only framework of the preceding situations.

This answer was built around Informational Lights. It shows that Service Science is of great importance considering all the scientific and valuable disciplines, concerning the very heart of any progression of Society or an enterprise. It helps to better understand Service Science and its place in Society.

Service Science is a trans-disciplinary science; it allows all other sciences to enrich themselves by exploring their own domains in order to discover their quantum knowledge. This quantum knowledge is necessary on the one hand to continue to explore the Universe and loosen the constraints of the human condition, and on the other hand to build scientific corpus adapted to their specialists to enable them to be part of the builders of contributory information services, which are democratic, responsible and inclusive.

It brings to intelligence cognitive freedom and cognitive serenity through knowledge from different sciences that makes it actionable in information services.

It makes the contribution of all other sciences, especially the Digital, even more fundamentally efficient for the progression of Society or an enterprise. In particular, it allows Society to take advantage of their discoveries, considering them as cognitive

disruptions, from which the service intelligence can build contributory informational propulsions.

This is the place of the Informational Lights.

It unmasks the gravitational approach that encloses their potentialities in authoritarian intentions, which are summed up in finding solutions to problems and which inevitably leads to situations of the tragedy of information common goods.

It provides the foundations for quantum spaces, enabling their specialists to be builders of contributory information services by co-creating them with builders of other sciences.

It makes it possible to ensure the assimilation of the cognitive disruption of these information services by actors of Society or an enterprise, by taking into account the necessary processes of cognitive continuity adapted to these actors.

It allows positioning the executive roles of a State or an enterprise to face informational propulsions. It sets up a quantum organisation that includes specific quantum spaces and gravitational spaces, especially for operational activities, with an informational authority responsible for the management of informational commons, the legitimacy of the explored information services and the concordance between the policy decided by the executives and the information policy resulting from informational propulsions.

However, Service Science does not intervene in the determination of the policies of the executives. For example, if a government of a state considers that global warming is not important, no one can argue against it as a service scientist.

It is in this sense that Service Science is not the Science of Life!

On the other hand, if another government considers the ecological transition as essential in its policy, then Service Science can make a substantial contribution to the implementation of such a policy, by exploring the informational propulsions that can be envisaged to facilitate the design of the measures to be implemented, and then to ensure by efficient processes the concretisation and the follow-up of these measures.

The Science of Service is by no means a meta-science or Science of Sciences.

It simply makes activities efficient that would otherwise have no cognitive foundations ensuring their resilience and sustainability, while they are essential to the progression of Society. It outperforms the approaches of the development of Society or an enterprise, which reduce the progression of Society or an enterprise to simple projects.

Service Science takes time to prevail, because it requires the discovery of quantum knowledge, the establishment of quantum spaces and globally it needs to extricate the dominant gravitational approach that imposes its cognitive straitjacket. However, given the gravitational merciless pervasiveness, it is possible to nourish an interrogation similar to Kant (1784): *Would a society of* executives *not be justified in binding itself by oath to a certain unalterable* informational corpus *in order to secure a*

constant guardianship over each of its members and through them over the people, and this for all time?

And the response to the gravitational pervasiveness is of the same nature as the response provided by Kant: *this is wholly impossible. Such a contract, whose intention is to preclude forever all further enlightenment of the human race, is absolutely null and void, even if it should be ratified by the supreme power, by parliaments, and by the most solemn peace treaties. One age cannot bind itself, and thus conspire, to place a succeeding one in a condition whereby it would be impossible for the later age to expand its knowledge (particularly where it is so very important), to rid itself of errors, and generally to increase its enlightenment. That would be a crime against human nature, whose essential destiny lies precisely in such progress; subsequent generations are thus completely justified in dismissing such agreements as unauthorized and criminal.*

Service Science opens up consistent perspectives of progressions in Society using informational propulsions. It requires many heterogeneous service scientists working in quantum spaces to build democratic, responsible and inclusive information services.

Have the courage for your informational understanding! Dare! Design!

Sapere aude! Dare to know! (Kant)

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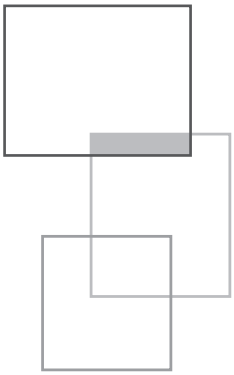

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13. In French: « Tiers-Lieux... et plus si affinités ».
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