150 SOLUTIONS OF E-HEALTH

METHODOLOGICAL NOTE

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NOVEMBER 2022

150 Solutions of eHealth
Methodological Note

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Date of publication:
November 2022
Version : 2.1

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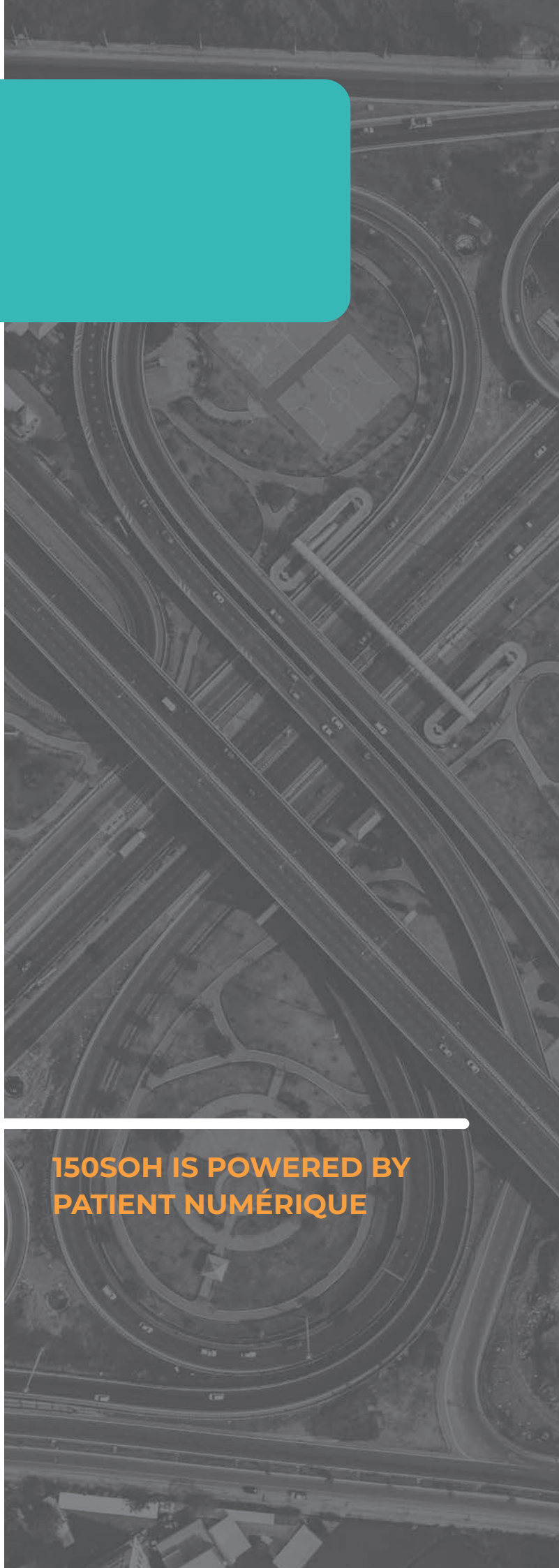


150SOH IS POWERED BY PATIENT NUMÉRIQUE

Préambule

This methodology was launched in 2018 and applied from 2020 by researchers and consultants from the Belgian company OZCONSULTING, then gradually by associated experts.

Our initial idea was to build a normative framework for formally analysing the disruptive potential of digital healthcare solutions (in order to identify their market potential) and to enable them to expand outside their domestic market through our network of associate consultants.

This reference framework is the basic tool that presents the scoring method in the broader context of e-Health. It forms an integral part of the training for 150SoH scoring experts.

It took a great deal of research, synthesis and analysis to develop this method, the related technological tools and the algorithm that calculates the final score obtained by the scored solution. It is presented on the 150soh.com platform. Even more important is the effort that has gone into developing the B2B community to which 150SoH experts and consultants belong. This reference group is set to grow as we expand our geographical horizons and the markets in which we operate.

Enjoy your reading and welcome to the 150SoH team.

Dr. Thierry C. Vermeeren

Where we go

With a network under development in six countries, we expect to reach around 13 countries at cruising speed, both inside and outside Europe, in order to achieve the broadest possible coverage of e-Health.

The 150SoH method will continue to develop so as to become the benchmark for support in the development of digital healthcare solutions. Ultimately, we intend to support professionals in the sector, from the construction of a usage scenario, to the financing of the development of use cases, right through to digital transformation in the countries served by the Community.

Chapter 1 Contextualization

Healthcare is under pressure. This reality is no longer in doubt for any citizen of Belgium, Europe or even the world. Every country is doing its best to contain the proportion of GDP devoted to healthcare spending (see appendix 1), while at the same time facing a series of increasingly significant challenges. One of these major challenges is the ageing of the population [1], which is jeopardising the viability of healthcare systems and inevitably increasing the consumption of long-term care [2].

At the same time, life expectancy has been rising steadily overall for several decades (on average it is 78 years for men and 83.4 years for women in OECD countries), but healthy life expectancy at age 65 is 9.6 years for women and 9.4 years for men [3].

It should also be noted that the decline in life expectancy as a result of the pandemic is 0.6 (OECD average - change in 2019-2020).

Social security systems as a whole must therefore reinvent themselves in order to cope with a significant increase in demand for care. Care provision is becoming increasingly complex, with more and more chronic pathologies and polypathological patients. However, healthcare funding systems are struggling to adapt, and remain largely based on the quantity rather than the quality of care delivered.

However, the logic of networked healthcare is developing little by little, with initiatives such as hospital-territory groupings (GHT) and mutualist clinics in France, healthcare networks in Belgium, private hospital groupings in the USA, and 'hospital franchises' such as the one at the Cleveland Clinic in Abu Dhabi. As a direct consequence, hospital-centrism and cure-oriented thinking are being called into question, and the perspective is being opened up to all players along the healthcare continuum [4].

The healthcare continuum as we understand it is shown in Figure 1 below:

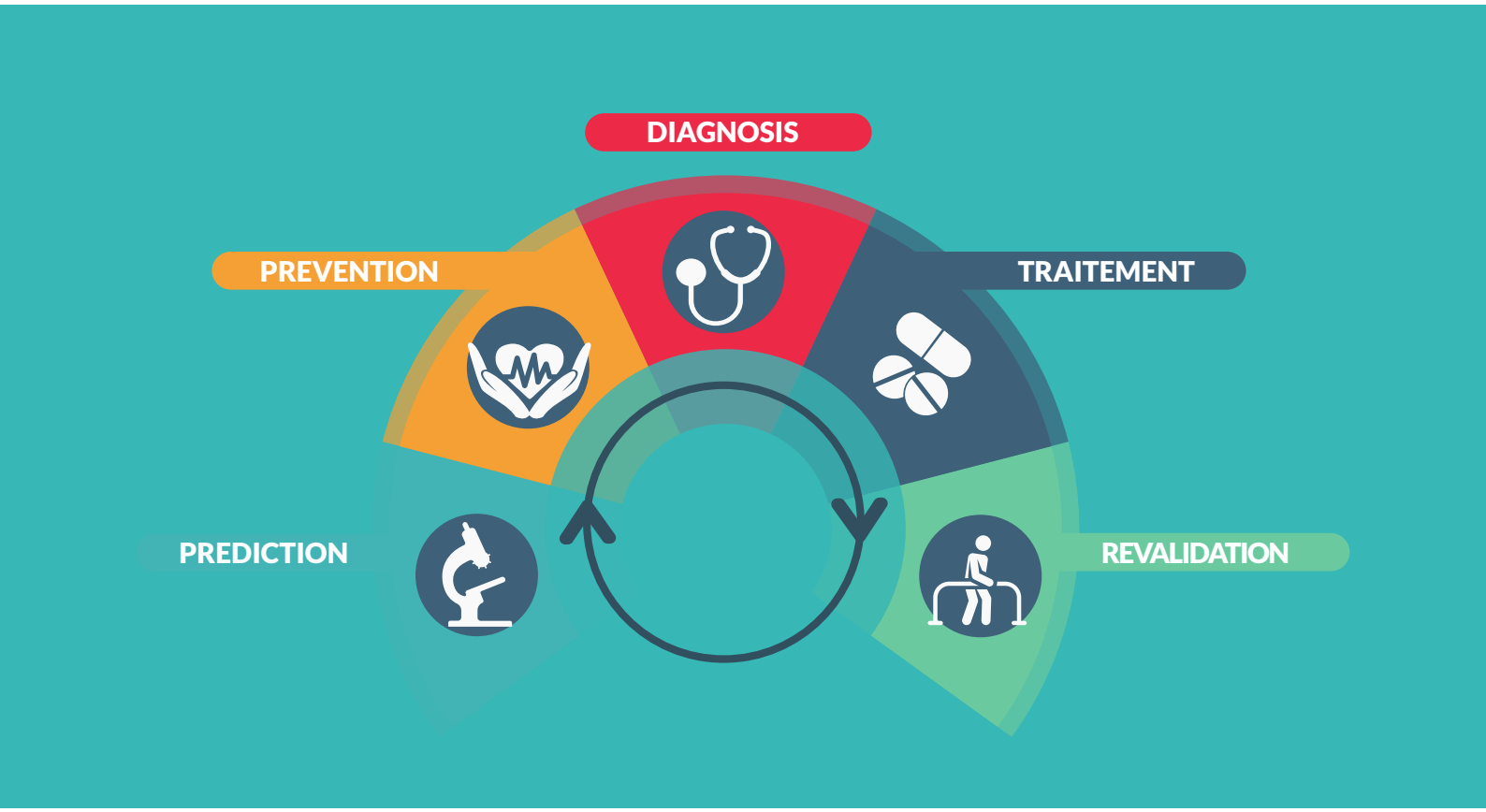


Figure 1 : The health continuum

1. NTIC, NBIC, AI and others

discovering a new vocabulary

NBICs (nanotechnologies, biotechnologies, computer and cognitive sciences) are enabling us to shift our focus to other activities linked to disease prediction and prevention, for example [5]. Today, it's a question of changing the paradigm by moving from population-based medicine to a personalised approach to each patient considered in all aspects of his or her life in society (eating habits, well-being at work, environmental determinants influencing health, etc.).

New technologies open up an enormous range of possibilities in the field of preventive, predictive, participative, personalised and relevant medicine (known as the «5Ps») [1]. Quite simply, NICTs (or NBICs) have had a meteoric rise in our day-to-day activities, from playing sport to managing household administration and finances, from listening to music to managing heating and lighting in the home.

In 2020, not owning a smartphone, not watching a series on Netflix or not consulting Airbnb when going on holiday is almost the exception.

In the field of healthcare, we are seeing an impressive number of technological innovations [7]. In the first quarter of 2020, there were around 53,979 mobile health apps on the App Store and 53,054 on Google Play worldwide [8], according to Artezio [9]. In addition to mobile applications, there are also a growing number of connected objects such as activity bracelets, blood pressure monitors, scales, etc., which are opening the way to completely new remote monitoring methods for patients. The e-Health market is gigantic, and will be worth around $234.5 billion by 2023 according to Frost & Sullivan. Artificial intelligence (AI) is now the talk of the town and is developing at breakneck speed [10]. Between January 2010 and March 2020, 29 technologies were considered by the FDA (Food and Drug Administration) as using artificial intelligence, with the majority of clinical applications in radiology (72%) and cardiology (14%). The train is on the move and is not about to stop...

2. The e-Health as a Religion

discovering a new paradigm

e-Health, defined as «the use of information and communications technology in support of health and health-related fields» by the WHO [11], is a field that encompasses mobile health (or m-health), telemedicine, telemonitoring and so on. The term «digital health» or «virtual health» is used as a generic term to designate both e-Health and other «emerging disciplines, such as the use of advanced computer sciences in «big data», genomics and artificial intelligence» [12][13]. We can see that the sector is very broad, and the semantic richness that characterises it is likely to reinforce its presence in discourse, particularly in the media.

We would like to introduce another semantic discussion concerning e-Health. In the field, we often see confusion between digital health and 'life sciences'. However, it is essential to make a distinction between the biotech and pharma sectors and e-Health.

These are very different economic players who do not offer the same products/services and who do not have the same needs. The pharma sector is looking for distributors to market medicines, while the biotech sector is looking for partnerships with laboratories to carry out new developments. The e-Health sector, on the other hand, is looking to reach out to hospitals, care institutions and patients, and to create partnerships with integrators who will be able to carry out the installation, parameterisation and change management associated with a new technological solution. In our view, the WHO's definition of e-Health is too broad and fails to take account of this distinction, which is essential to a better understanding of reality and a more precise identification of needs.

Whatever concept is used to refer to digital health, the notion of data production and exploitation is at the heart of the issue. The idea is increasingly widespread that data is the new black gold («data is the new oil» or «data is the new blood»). Our society has entered a new era, that of the data-driven economy [14]. Health data in particular represents an extremely high market value, hence the increased interest of the GAFAs and the business world in general in investing in digital health. The massive financial investment by the GAFAs in the sector is also likely to arouse curiosity, if not anxiety, particularly as regards the question of the exploitation of health data by these giants. Across Europe, thousands of start-ups are offering applications, connected objects, biotechnologies and nanotechnologies to the globalised healthcare market. Obviously, not all of these value propositions are qualitatively equivalent. So how do you sort them out? How can we identify the players best placed to add value to techniques, healthcare services and their organisation when we now have access to technologies developed in the four corners of the world?

It's a difficult exercise, given the sheer number of players involved and the accelerating pace of innovation. It is all the more difficult because the trend is to evangelise these new technologies, which are seen as inherently positive because they promise to significantly improve the quality of care while reducing costs. We are witnessing a huge paradox between technology in discourse and technology in reality. On the one hand, there is talk of transhumanism, cutting-edge biotechnologies and augmented intelligence, while on the other, we are struggling to implement a computerised patient file in a hospital. It's good to dream, but ideally we should keep our feet on the ground. Rather than being tempted to explore the very latest trends positioned on Gartner's Hype cycle (see appendix 3), why not try to identify the innovative technologies that will really meet the needs of the healthcare sector today and tomorrow?

3. E-Health: a given but not much evidence

in search of clinical proof

One point about digital health that really needs our attention is the lack of clinical evidence for «digital interventions» highlighted by the WHO in its very recent recommendations [15]. The e-Health movement has been completely evangelised, but there is no benchmark, no guide for choosing to implement a particular technology. As a result, healthcare players are asking themselves a huge number of questions that have few answers. These questions are not only technological, but also legal, ethical and organisational in nature. The key issue is not the technical aspect of the technology, but its implementation: the crucial moment when the technological device comes up against the reality of healthcare professionals and patients.

At the moment, the players involved have no reference points. On the one hand, the hospital world and healthcare professionals in general are not very aware of the dynamics of innovation in the economic world.

On the other hand, these economic players generally have little understanding of the issues faced by hospitals and their carers. The hospital and these companies are organised in the same way, in silos, by product. But today's hospital is evolving towards a care chain and more cross-functionality. Tomorrow's hospital will also be a centre of excellence, linked to other players in a care network. It will therefore need a portfolio of products that are easy to integrate, so as to create a coherent technological environment. One of the major challenges of digital health in the short and medium term is to ensure the interoperability of systems, and therefore the definition and use of technological standards and the structuring of health data. The idea is really to break down silos and promote integration.

We had the opportunity to meet members of the European Commission [16] who identified a major gap in technology assessment. In fact, there are a number of studies, organisations and networks at national, European and international level, which compile libraries or lists of relevant technologies for a given field, disease or type of population [17]. The technology is studied for its own sake, but there is little or no interest in the care practice or the context in which it is to be integrated. Yet this is the fundamental challenge of digital health: how can these technologies be structurally integrated into the healthcare system and how can their adoption by healthcare providers and patients be encouraged? To do this, economic, technological and healthcare players need to be able to identify best practice and learn from unsuccessful projects. In our globalised world, there is no point in reinventing the wheel in every corner of the planet. On the contrary, it is far more relevant to draw inspiration from existing technological use cases that have been the subject of a meticulous study that takes into account the needs of the sector and technological developments.

Given the contextual elements raised, the challenges identified, the lack of evidence for the use of digital health services, the difficulty of thinking in terms of an ecosystem and benefiting from benchmarks in this technological ocean, we formulated the following question: «How can we construct a composite index evaluating the disruption of digital solutions on everyday healthcare practices?» The answer is the 150SoH index.

Chapter 2 The Philosophy of 150SoH

According to the literature, the disruptive nature of a technology can be identified and analysed a posteriori, once the disruption has occurred [18]. In other words, a technology can only be defined as disruptive once it has effectively displaced a well-established player on a market on a massive scale. So while we cannot strictly ‘measure’ the disruption or disruptive potential of a technology, at the risk of basing our thinking on suppositions, or even predictions, we can provide a methodologically constructed view of the transformative potential of technological solutions for healthcare practice.

More than just a catalogue of interesting solutions, we need to describe and analyse the way in which they are integrated into the day-to-day lives of healthcare providers and patients, by focusing on use cases.

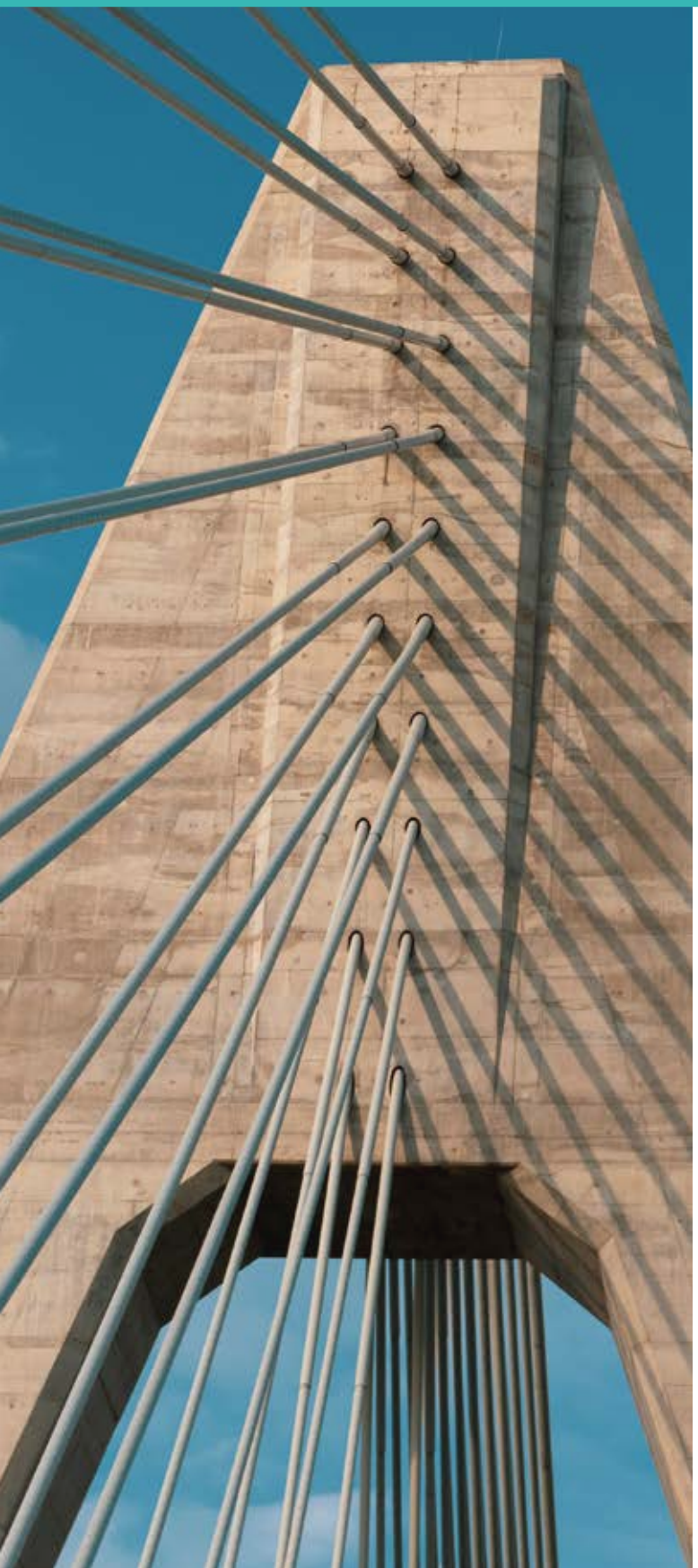
The aim is also to provide accessible, readable and relevant benchmarks for decision-makers in hospitals, businesses, healthcare providers and organisations who want to reduce uncertainty about the digital solution that could meet their needs.
Based on the idea that hospital-centricity is outdated, 150SoH is interested in all stages of the healthcare continuum, i.e. technological use cases relating to disease prediction and prevention, diagnosis, treatment and rehabilitation. In order to identify technological solutions with high disruptive potential, we naturally focused on start-ups and scale-ups, which are particularly fertile breeding grounds for innovation. According to Fridenson [19], to qualify as a start-up, it must meet three conditions:

(1) the prospect of strong growth,
(2) the use of a new technology and
(3) the need for massive financing (by raising funds). The OECD defines a scale-up as a high-growth company [20].

Our exploration then takes us to Israel, where innovation is particularly rich and stimulated by the authorities' massive investment. Biotechnology and e-health occupy pride of place. The culture surrounding innovation is particularly interesting. It involves, on the one hand, tolerance of failure and, on the other, an innovation model where the innovation hub is directly integrated into the hospital. This means that ideas initiated by clinicians can be put into practice and the hospital can benefit from the return on investment. In this context, the hospital is able to finance itself to a large extent. Finally, the density of start-ups is impressive: more than 6,000 for just over 9 million inhabitants and a surface area of 22,000km2.

In addition, China, an immense territory undergoing rapid international development, has decided to give Hainan Province the role of «digital health paradise». According to the OECD, «In China, the proportion of the population aged over 65 will increase much faster than in OECD countries, rising from 10.6% in 2017 to 26.3% in 2050. The proportion of the population aged over 80 will increase even more sharply, more than tripling from 1.8% in 2017 to 8.1% in 2050 [21]. How will the country cope with this reality? What technologies will be developed there? Is it possible to envisage technology transfer? These questions led us to include it in our panel. The fact that the Walloon Export Agency (AWEX) has identified China as a priority target for trade further reinforces the importance of its presence in 150SoH.

150SOH SCORES THE DISRUPTIVE POTENTIAL OF DIGITAL SOLUTIONS IN THE FOLLOWING COUNTRIES: BELGIUM, FRANCE, NETHERLANDS, GERMANY, ITALY, DENMARK, SPAIN, ESTONIA, SWEDEN, FINLAND, ISRAEL, CANADA, CHINA



Across the Atlantic, Canada is also one of the countries identified by AWEX as offering strong potential for business development. We decided to include it in the list of countries studied, mainly because of Canada's socio-cultural proximity to Europe. The first edition of 150SoH did not include the USA in the panel of countries represented, as the latter was already developing a series of studies on its own technological ecosystem [22].

1. Identify Profiles

In search of the missing link

The strategy developed to identify start-ups with the potential to change the practices of healthcare providers in different countries is twofold. The first was to conduct a technology watch, exploiting the potential of social networks and various medical and technological information websites to identify interesting profiles. The second was to contact digital health experts who could identify key players to contact in each of the countries identified. We contacted the embassies of the various countries in Belgium and members of export agencies, including AWEX staff based abroad.

Following certain contacts, several interviews were held. Discussions were held with Business France, the eHealth Task Force (Ned), the German embassy, the Italian, Estonian, Israeli and Canadian embassies. We also met representatives of Flanders Invest and members of the European Commission based in Luxembourg.

Use cases and scenarios

In the 150SoH project, we distinguish the notion of technological use case from that of technological use scenario. We define them as follows:

The technological use case consists of analysing a case of implementation and use of the technological solution in a real situation. It is a retrospective approach that offers the opportunity to learn from experience and is based on the point of view of the company and/or the end user.

The technological usage scenario consists of creating a narrative describing a technological solution in a fictitious environment. It is a forward-looking approach that enables lessons to be learned from a theoretical case study.

In addition, the Spanish and Danish embassies did not wish to organise interviews, but sent us information directly about various players worth contacting in the country (professional associations, clusters, networks). Finally, the team took part in three economic missions: the eHealth mission to Sweden and Finland, the eHealth mission to Israel and the princely mission to China. In Belgium, the activities of OZCONSULTING and the Communauté du Patient Numérique, as well as our links with Digital Wallonia and Digital Attraxion, enable us to activate a network of contacts to highlight the most interesting projects and technologies.

The panel of technological solutions is selected by the 150SoH team [23], but applications are free. The identification and choice of these profiles is based on the technology watch we are setting up, on trusted organisations that provide us with lists of technology companies, on the identification of profiles that present differentiating elements compared with their competitors and, overall, on the desire to identify and score technological use cases throughout the care continuum. We do not exclude from our panel projects that are at an early stage, with no direct link to the market. If it is not yet possible to identify a technological use case for these projects, we will then construct a use scenario based on our knowledge of the needs of the healthcare sector. The aim is to build a panel of 150 technological use cases and scenarios.

We have also built a simplified evaluation tool that interested start-ups can use to self-assess and call on OZCONSULTING's advice to help them evolve.

2. Build Technological Use Cases

THE singularity of 150SoH

We drew up an interview guide covering a number of themes: general information about the company, key elements in its history, a focus on a particular product or service that the company wishes to highlight, a full description of the company (from a technical and user point of view) and its future development strategy.

Thanks to these interviews (and to our participation in economic missions), we were able to identify a series of opportunities: meetings with start-ups, public bodies dedicated to connected health, members of ministries active in the health sector, business clusters, and so on.

To carry out all the interviews, the 150SoH team favours on-site visits.

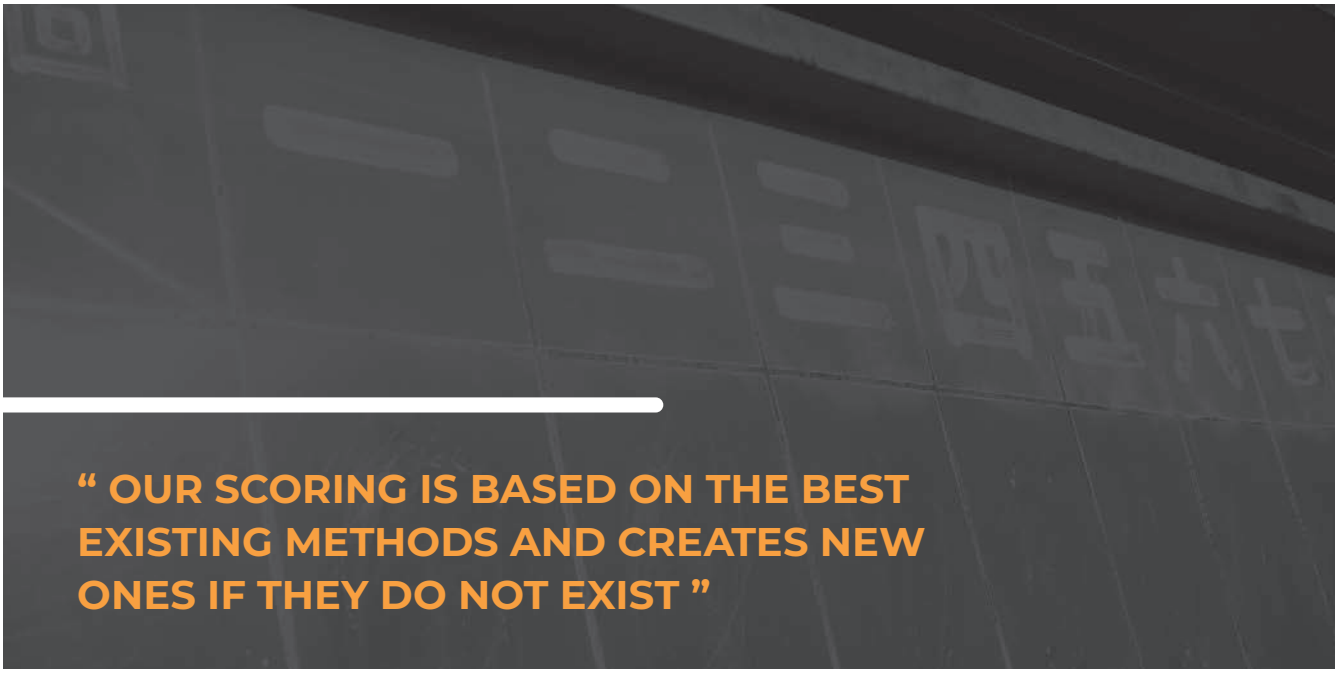
Unfortunately, the COVID context led us to organise most of the interviews by videoconference. As far as the people we interview are concerned, we work with the company's CEO, CIO or business developer, or with the project team, the healthcare professional in charge or the patient, for a detailed analysis of the use case.

Figure 2 : The scope of data collection

For reasons of feasibility, it is not possible to systematically interview all the end users of the technological solutions or all the stakeholders in a project.

In addition to analysing technological use cases, we want to pay particular attention to the national or regional context in which these projects are being deployed. It is very important to understand, for example, the rationale behind hospital purchasing in France, the role of the regions in Sweden or the rationale behind innovation hubs in Israeli hospitals, in order to assimilate the lessons to be learned from the use case or the positive/negative points of the technological solution in the light of the particular context in which it takes place. This enables us to better appreciate the relevance of a technology transfer and the specific features or adaptations that need to be put in place to encourage adoption by end users.

Chapter 3 The scoring method



“ OUR SCORING IS BASED ON THE BEST EXISTING METHODS AND CREATES NEW ONES IF THEY DO NOT EXIST ”

The originality of the 150SoH project lies in the creation of a composite index of disruption in technological solutions through the study of use cases. This makes it possible to create a frame of reference and a common language, even though the focus is international. We have created the index in such a way as to be able to collect generic data, available - in the vast majority of cases - for all technological use cases. The aim is to be methodologically rigorous and to create a tool that is clear, easy to read and simple to use, and which can reflect the complexity and interdependence of the various dimensions and indicators.

The tool we have built is based on the principles of the Balanced Scorecard (BSC) [24]. This managerial tool is initially designed to describe and evaluate a company’s activity along four dimensions, as shown in Figure 4. The aim is then to define a strategy to improve the company’s performance on each of the four dimensions.

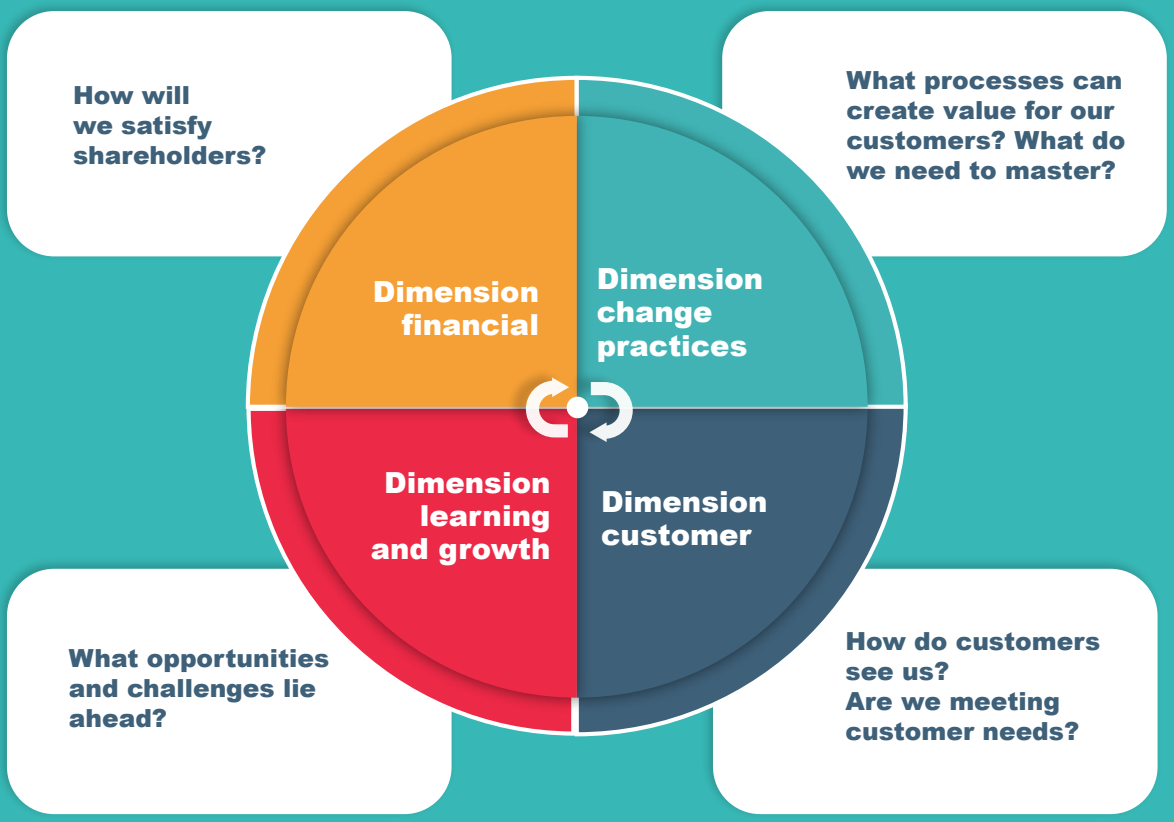


Figure 4 : The TBP tool

Given our objectives, we decided to transform the four basic perspectives, adapting the title of the «learning and growth» perspective to «innovation and growth» and transforming the questions and definitions to adapt them to our project. Finally, given that the customers of a technological solution can be either patients or healthcare providers, or both, we have chosen to divide the customer perspective into two sub-dimensions: the patient perspective and the healthcare professional perspective. If the customer is exclusively a patient or a healthcare provider, we will adapt our scoring by multiplying the score obtained by the dimension by 2.

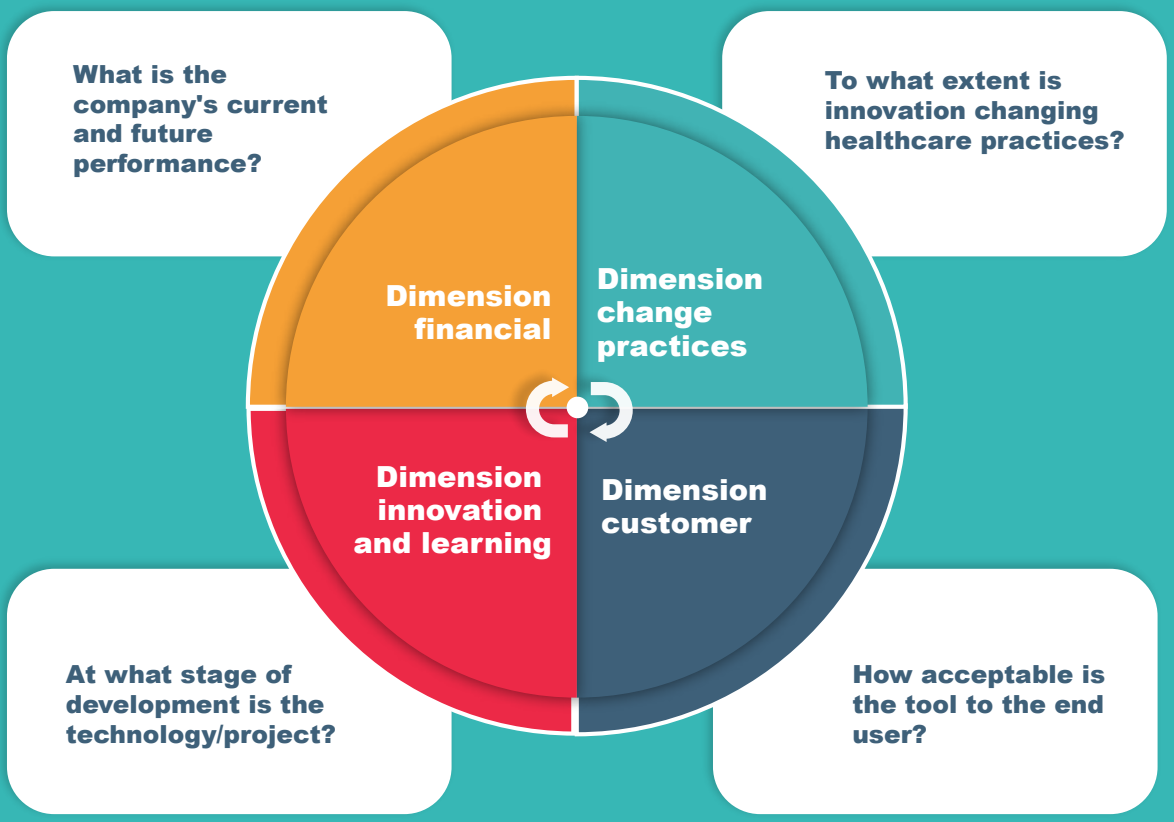


Figure 5 : The TBP tool adapted to the 150SoH project

Each dimension was then broken down into indicators. For each indicator, we have detailed its definition and the associated measure. Aggregating the score given to each indicator then enables us to create an overall score for each of the 5 dimensions (expressed as a percentage). Finally, balancing the 5 dimensions gives us a composite index of the degree of disruption of technology solutions, also expressed as a percentage.

Figure 6 shows the iterative way in which the index has been built up over several improvement loops.

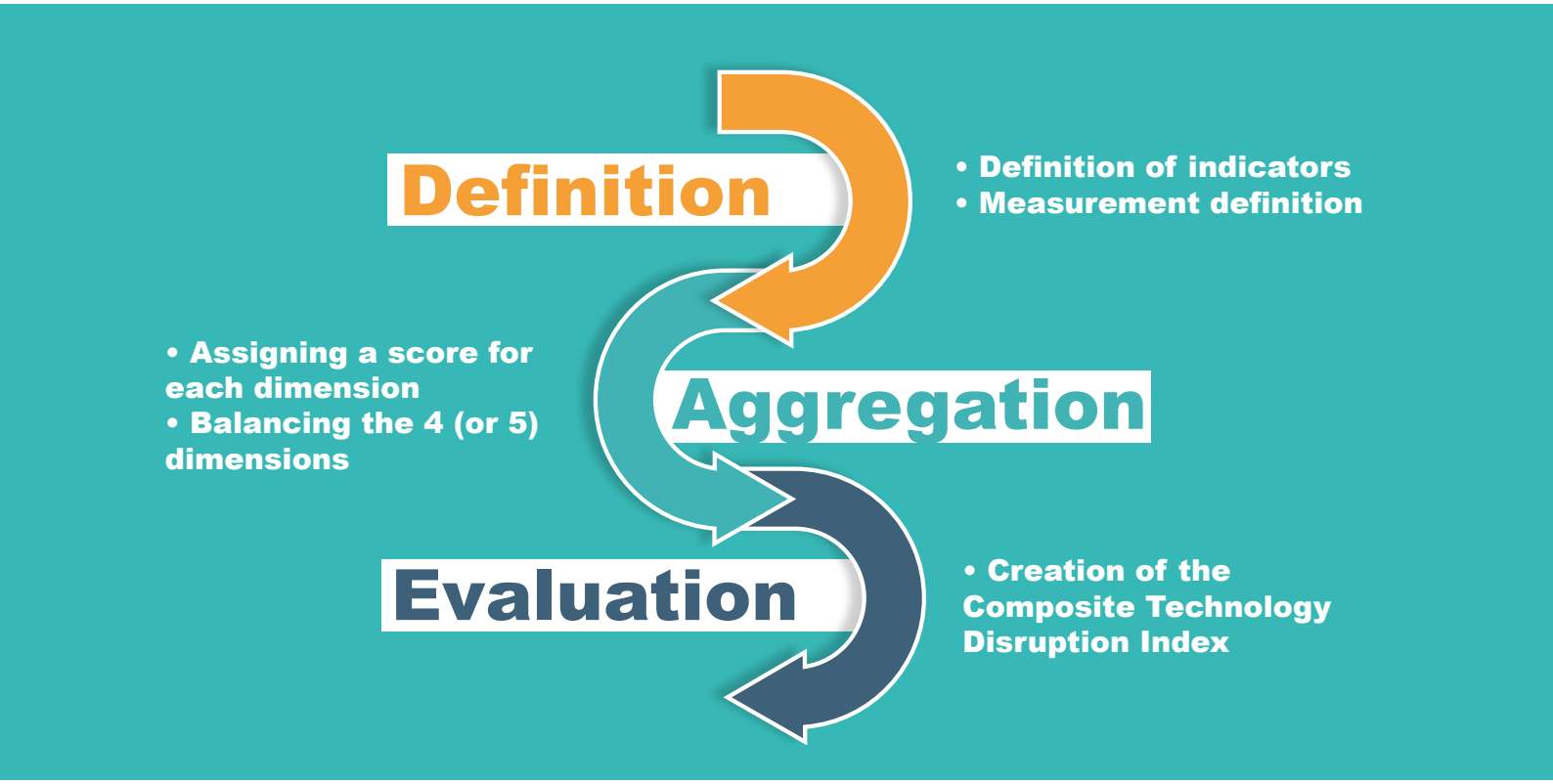


Figure 6: Stages in the construction of the composite technology disruption index

Of course, it's important to be cautious and to remember that every project and every technology implemented never produces all the expected effects as planned, and sometimes gives rise to unexpected effects, whether positive or negative. We have emphasized the importance of context and the whole process of integration in the field. The technological use case analyzed does not prejudge the positive or negative outcome of transferring this technology to an institution X or a care network Y, or for use by a patient, for example.

1. Economic dimension

Profitability potential at a glance

This perspective concerns the company's current and future financial performance. It is based on figures that can be gathered from the publication of companies' annual accounts, and which then enable us to calculate accounting ratios. These figures are normally available for both Belgian and foreign companies. If the information is unavailable for various reasons, we will question the company on these different indicators. In the latter case, we will have to rely on the word of the startup's representative. In addition to calculating ratios, we have defined the presence of a fund-raising round as a positive indicator, assessed the nature of investments and analyzed the «commercial readiness level». Finally, access to the company's sales figures is a bonus.

2. Change in practices dimension

The need for transformation at a glance

It addresses the issue of changing healthcare provider practices, which is essential to any technological transformation project. It assesses the way in which technology induces a transformation process that substantially impacts the functioning of an organization and/or an individual (healthcare professional or patient). The scoring of this perspective includes the question of access to data by healthcare professionals; data quality and reliability; data exploitation; continuity of care defined by the WHO (March 3, 2022) as «the ability to organize the care provided to a specific patient, without interruption either in time or between actors, as well as the ability to cover the entire course of the disease. This indicator necessarily implies inter-professional communication. We also assess the impact on the evolution of medical technology, effectiveness, efficiency, flexibility, data structuring, decision support and automation. We have also included in this dimension the question of standards, interoperability and security of the technological environment.

3. Innovation and growth dimension

Beyond TRL...

It reflects the level of development of the technological use case at a point in time « T ». The score attributed to this perspective is based on the Technology Readiness Level (TRL) tool, used by the Wallonia eHealth Living Lab (WeLL) to determine a project's potential. It positions the project on a matrix, allowing us to situate its level of maturity. In addition, we look at the design process, and how far it has involved the end-users of the solution. Finally, we look at the scientific validation of the solution, including any clinical studies carried out to demonstrate its relevance in practice, PROMS (Patient Reported Outcomes Measures), which measure patient outcomes in terms of overall life, quality of life or more specific dimensions, and PREMS (Patient Reported Experience Measures), which look at how the patient experiences the solution.

4./5. the customer dimension (patient and carer)

A double aspect always downplayed

The customer perspective has been divided in two, depending on whether the focus is on the patient and/or the caregiver. Some technologies are intended for the healthcare provider only, and do not require any particular action on the part of the patient (a state-of-the-art surgical robot or patient sorting software upstream of the emergency department, for example).

Other technologies (e.g. mobile applications) can be used by patients, without any particular intervention by healthcare professionals. In this case, the perspective score is multiplied by two to give the customer perspective score.

It should be noted that the definition of these two profiles makes it possible to include as many different scenarios as possible. Generally speaking, the customer perspective focuses on the notion of technology acceptability [25].

On the caregiver side, the emphasis is on coordination, training and support, parameterization and a secure technological environment as criteria favoring acceptability.

As far as patients are concerned, the criteria are compliance, follow-up, accessibility of data by the patient, product/service reimbursement or benefits, training and support, secure digital environment and ergonomics.

6. The composite Index of digital solutions disruption

The real potential of a digital solution

Finally, thanks to the study of five dimensions, each subdivided into indicators, we have a global view of the technological solution. We are interested in the viability of the company producing the solution, the changes in practices brought about by the solution, the solution's level of maturity and its degree of acceptability to patients and healthcare professionals.

In our view, a technological solution that is both economically viable, for which the path of transformation to be followed is clearly identified, that is relatively mature and scientifically validated, and that presents a high degree of acceptability for healthcare professionals and/or patients, is a solution that will have a much higher potential for disruption than one that presents none or only some of these characteristics.

Figure 7 defines the concept of disruption according to the 150SoH methodology.

“With a composite index that assesses the transformational value of using a digital solution on daily healthcare practice.”

Figure 7: Definition of the 150SoH disruption concept

Incidentally, price is also an important disruptive factor in the literature [26]. Authors often point to the "cheaper" but "less qualitative" nature of products that initially prove to be disruptive. Based on the principle that a company's commercial interest may regularly lead it not to reveal its price offer, we have deliberately left this question out of our indicators. Instead, we have focused on the notion of reimbursement or benefit(s) granted to the patient for the use of a digital product or service.

7. The presentation of results

What grade will I get on my report card after the whole exercise?

Thanks to the scoring of a large number of technological solutions, the project is making it possible to draw up a theoretical portfolio of a coherent digital healthcare offering that a hospital, for example, can seize upon, with solutions dedicated to the hospital's internal activities and others devoted to telemonitoring or home hospitalization, in particular.

This coherent set of results will be made available through premium access on the 150SoH website (http://150soh.com). The data presented there will reflect both the research work carried out in the national or regional context under consideration, and the approach taken to gathering data from companies and users.

We hope to make available information on the company's history, activity, flagship product/service, future development projects, main customers and partners. At the company's request, we can also carry out a complete analysis of a use case that reflects how the technology is used in practice, or that represents an interesting usage scenario.

Figure 8 shows an example of scoring presented on the 150soh.com platform.

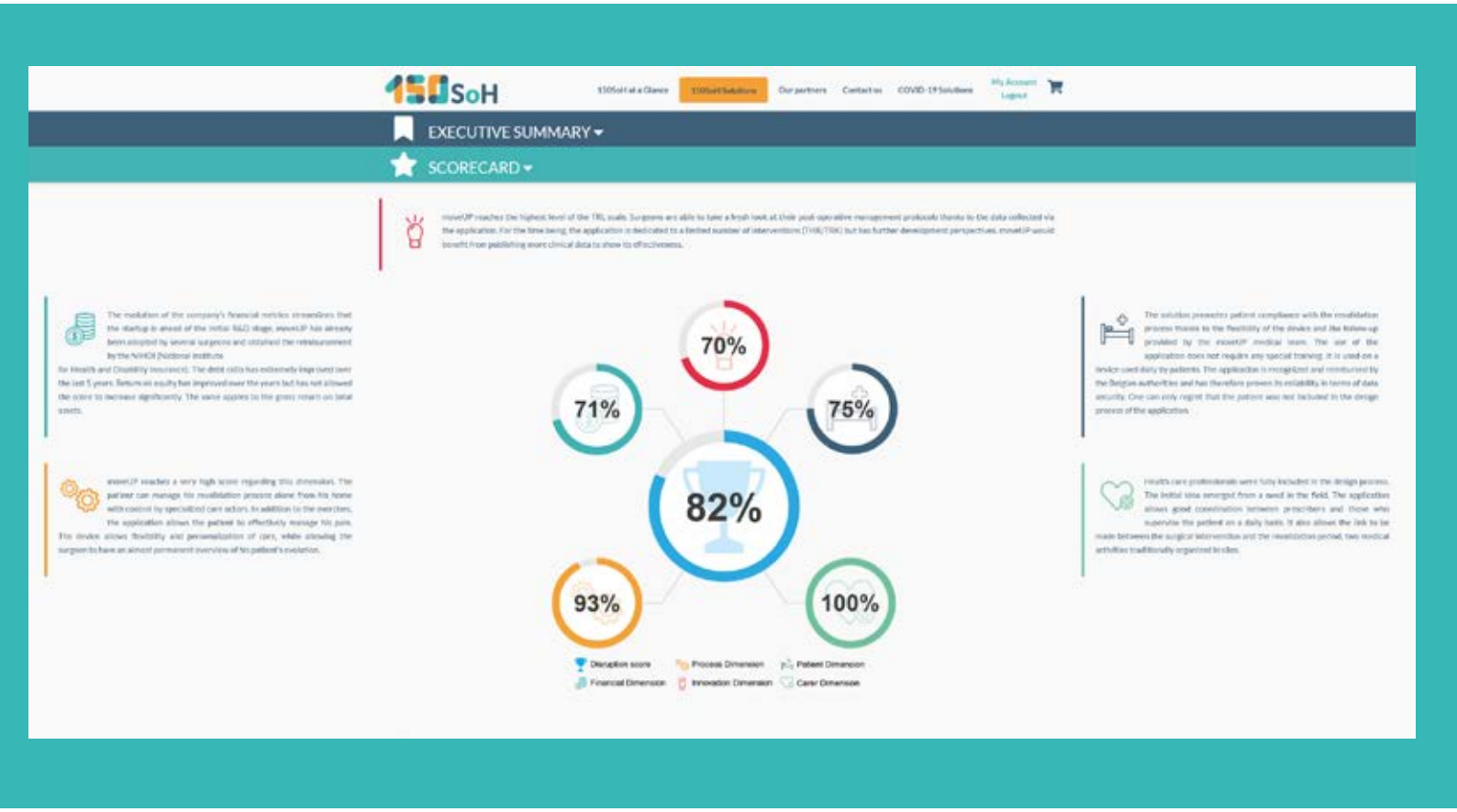


Figure 8: Presentation of a 150SoH scoring result

In this way, the presentation of results can be divided into two main sections:

- The « Scorecard » ;
- The detailed use case study;

The Scorecard presents the results of the disruption score, with the overall score and the score attributed to each dimension, accompanied by a commentary.

The detailed use case study, which presents the detailed results of our interviews and documentary research into the company and its solution. The interviews relate both the company's ambitions and the point of view of the end-users we were able to interview. It will be the subject of a white paper (part of the advanced consultant training course).

8. Notes

Find out more

[1] « On average, the proportion of the population aged 65 and over in OECD countries has almost doubled in recent decades. » (OCDE, 2019).

[2] OCDE. (2019). Health at a Glance 2019 : OECD Indicators. OECD Publishing.

[3] The graph in Appendix 2 shows the proportion of the population aged 65 who report their health as "average", "poor" or "very poor".

[4] The healthcare continuum refers to the different stages of care. We have chosen to focus on prediction, prevention, diagnosis, treatment and rehabilitation.

[5]Élodie Giroux, « Médecine de précision et Evidence-Based Medicine : quelle articulation ? », Lato Sensu: Revue de la Société de philosophie des sciences, vol. 4, no 2, 2017. URL : https://ojs.uclouvain.be/index.php/latosensu/article/view/3353.

[6] Nicola Luigi Bragazzi, « From P0 to P6 medicine, a model of highly participatory, narrative, interactive and “augmented” medicine: some considerations on Salvatore Iaconesi’s clinical story », Patient Preference and Adherence, vol. 7, 2013, p. 353-359.

[7] Philippe Coucke's book is particularly interesting from this point of view, Philippe Coucke, La médecine du futur. Ces technologies qui nous sauvent déjà, [s.l.] : Mardaga, 2019 (Santé en soi). URL : https://www.decitre.fr/livres/la-medecine-du-futur-9782804707064.html.

[9] The two reference app stores.

[9] https://www.artezio.com/pressroom/blog/mobile-industry-forecast/

[10] Nevertheless, Luc Julia, co-founder of Siri and Director of R&D at Samsung, points out that «l'intelligence artificielle n'existe pas». A machine, an algorithm, can never compare with the intelligence of the human brain. (Julia, 2019).

[11] WHO guideline, URL : http://www.ncbi.nlm.nih.gov/books/NBK541902/.

[12] Our translation

[13] World Health Organization, op. cit.(note 11), p. 1.

[14] This was one of the themes addressed at the last conference organized by HIMSS in Helsinki in 2019. The ESPON conference, also in 2019, addressed the issue of evidence-based public policy in the era of data-driven healthcare.

[15] World Health Organization, op. cit.(note 11).

[16] Details of all the interviews will be provided below.

[17] The European Commission, for example, has published a catalog of European digital health projects funded by the EU.

DG CNECT - European Commission, Research and Innovation in the field of ICT for Health, Wellbeing & Ageing Well: an overview, Luxembourg : European Commission, 2019. URL : https://ec.europa.eu/information_society/newsroom/image/document/2019-33/health_ageing_projects_list_2019_6BC92EFF-90F3-8A94-09FBFA3C4DFD150E_61321.pdf.

[18] Clayton M. Christensen, Rory McDonald, Elizabeth J. Altman et Jonathan E. Palmer, « Disruptive Innovation: An Intellectual History and Directions for Future Research », Journal of Management Studies, vol. 55, no 7, 2018, p. 1043-1078 ; Simone Corsi et Alberto Di Minin, Disruptive Innovation ... in Reverse: Adding a Geographical Dimension to Disruptive Innovation Theory, Rochester, NY : Social Science Research Network, 1 mars 2014. URL : https://papers.ssrn.com/abstract=2395548 ; Christian Hopp, David Antons, Jermain Kaminski et Torsten Oliver Salge, « Disruptive Innovation: Conceptual Foundations, Empirical Evidence, and Research Opportunities in the Digital Age », in , [s.n.], 2018.

[19] Patrick Friedeson is a business historian and member of the EHESS. He gave a definition of a startup in 2015 in the media « Le Capital » : https://www.capital.fr/entreprises-marches/au-fait-c-est-quoi-une-start-up-1063221

[20]The OECD describes high-growth companies as "enterprises with an average annualised growth greater than 20% a year, over a 3-year period, and with 10 or more employees at the beginning of the observation period". OECD, Enabling SMEs to Scale Up, Mexico city : OECD, 2018. URL : https://www.oecd-ilibrary.org/industry-and-services/strengthening-smes-and-entrepreneurship-for-productivity-and-inclusive-growth_7fb3ae20-en.

[21] OCDE, op. cit. (note 1), p. 220.

[22] We're not ruling out the possibility of adding the USA to the panel in the next few years.

[23] It's important to note that companies can submit their technological use cases via our website. There is no cost to the company for inclusion in the panel of selected profiles.

[24] Robert Kaplan et David Norton, « Transforming the balanced scorecard from performance measurement to strategic management: Part I », Accounting Horizons, vol. 15, no 1, 2001, p. 87–104 ; Robert Kaplan et David Norton, « Transforming the balanced scorecard from performance measurement to strategic management: Part II », Accounting Horizons, vol. 15, no 2, 2001, p. 147–160 ; Robert S. Kaplan, The balanced scorecard: translating strategy into action, Boston : Harvard Business School Press, 1996, 322 p.

[25] Based on the article by Dubois and Bobiller-Chaumon, acceptability can be defined as "sufficient adequacy with the user. This adequacy raises the question of the system's compatibility with the practices, resources and objectives of potential users and their situation". The authors also state: "To be acceptable, the system must also have a utility that meets users' requirements in terms of expected functionalities, but also in terms of professions, etc. It corresponds to the satisfaction of functional needs. This corresponds to the satisfaction of functional and operational needs. To be acceptable, a system must be both useful and usable. Michel Dubois and Marc-Éric Bobillier-Chaumon, « L'acceptabilité des technologies : bilans et nouvelles perspectives », Le travail humain, Vol. 72, no 4, 2009, p. 305-310.

[26] Corsi et Di Minin, op. cit. (note 18) ; Christensen et al., op. cit. (note 18) ; Hopp et al., op. cit. (note 18).

[27] OCDE, « Ressources pour la santé - Dépenses de santé - OCDE Data », OCDE, 2020. URL : http://data.oecd.org/fr/healthres/depenses-de-sante.htm.

[28] OCDE, op. cit. (note 1), p. 225.

[29] Gartner, « 5 Trends Appear on the Gartner Hype Cycle for Emerging Technologies, 2019 », 2019. URL : //www.gartner.com/smarterwithgartner/5-trends-appear-on-the-gartner-hype-cycle-for-emerging-technologies-2019/..

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Find out more

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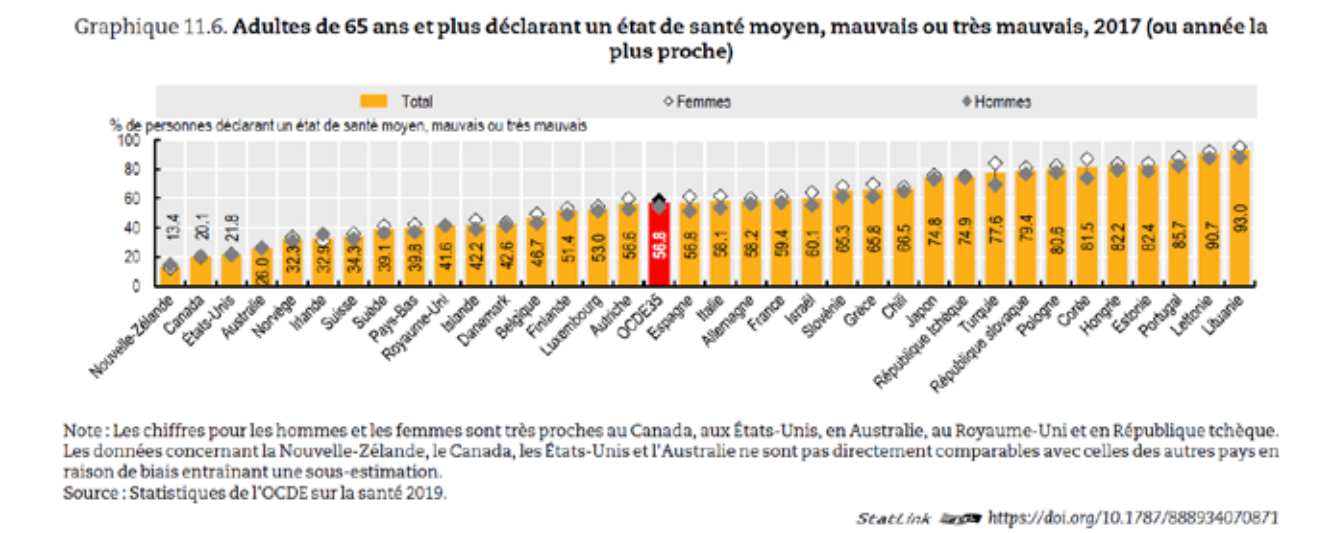
World Health Organization, WHO guideline., [s.l.] : [s.n.], 2019. URL : http://www.ncbi.nlm.nih.gov/books/NBK541902/.

Annexes

In this section, you'll find a number of seminal documents that set the context for digital healthcare.



Note : Les chiffres pour les hommes et les femmes sont très proches au Canada, aux États-Unis, en Australie, au Royaume-Uni et en République tchèque. Les données concernant la Nouvelle-Zélande, le Canada, les États-Unis et l'Australie ne sont pas directement comparables avec celles des autres pays en raison de biais entraînant une sous-estimation.
Source : Statistiques de l'OCDE sur la santé 2019.

StatLink https://doi.org/10.1787/888934070871

Figure 10: Percentage of GDP devoted to healthcare expenditure

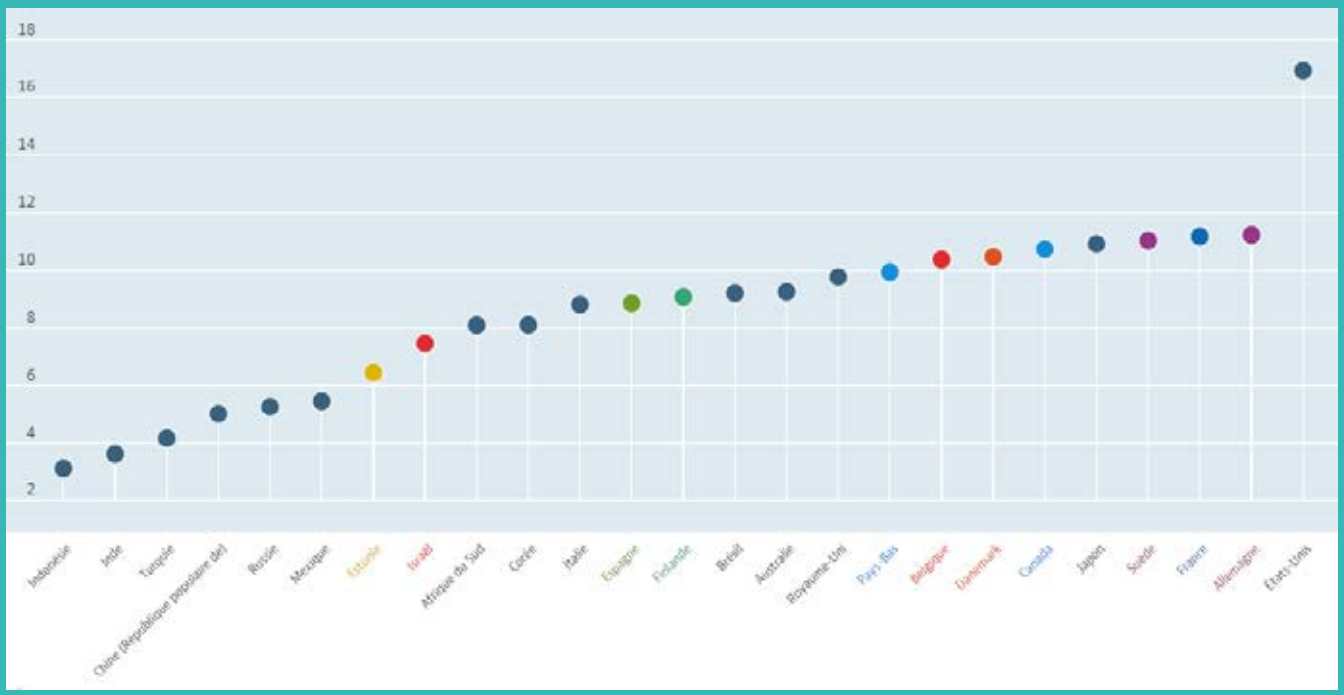


Figure 9: Percentage of GDP devoted to healthcare expenditure

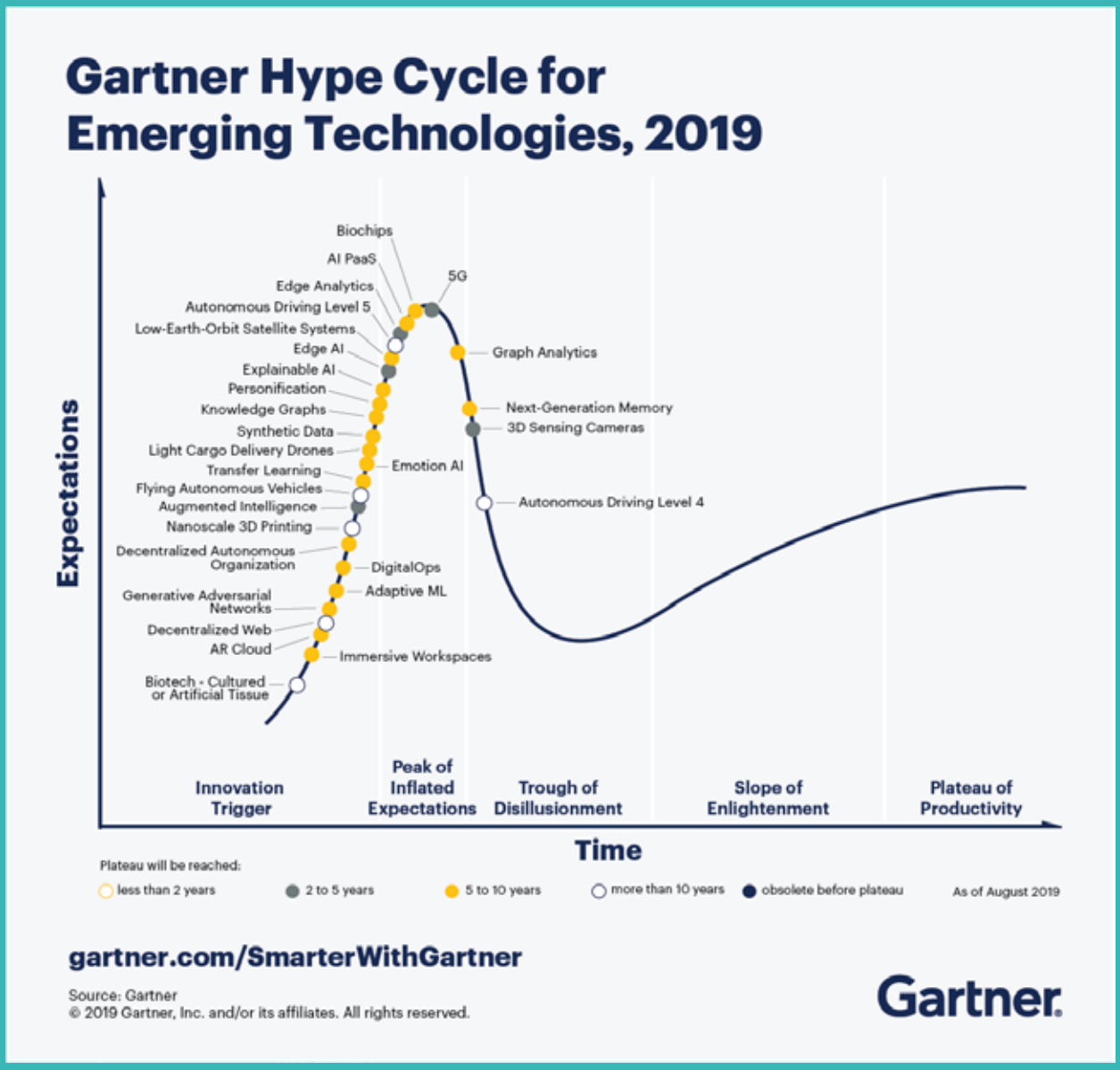


Figure 11 : Hype cycle Gartner 2019,

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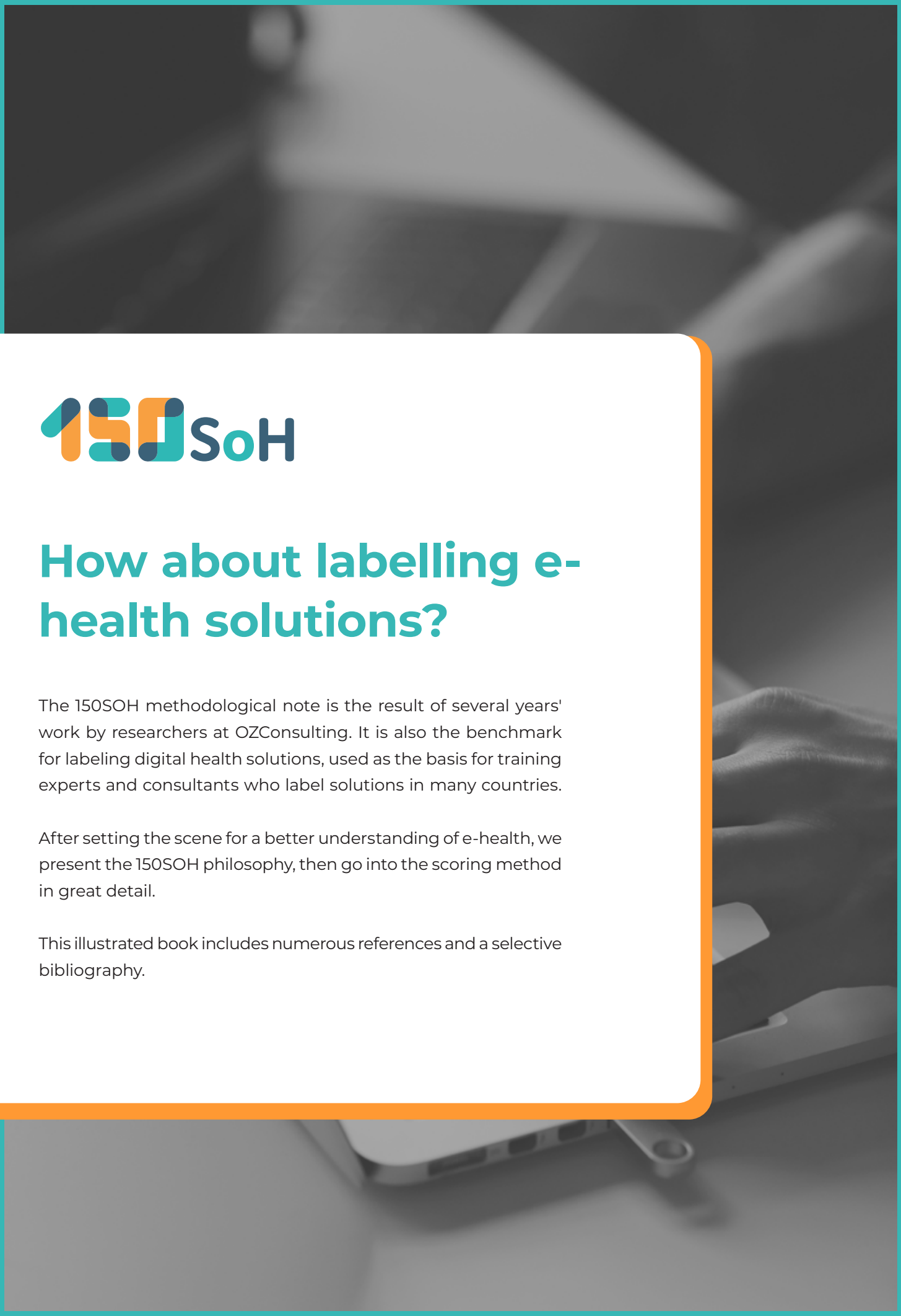

How about labelling e-health solutions?

The 150SOH methodological note is the result of several years' work by researchers at OZConsulting. It is also the benchmark for labeling digital health solutions, used as the basis for training experts and consultants who label solutions in many countries.

After setting the scene for a better understanding of e-health, we present the 150SOH philosophy, then go into the scoring method in great detail.

This illustrated book includes numerous references and a selective bibliography.