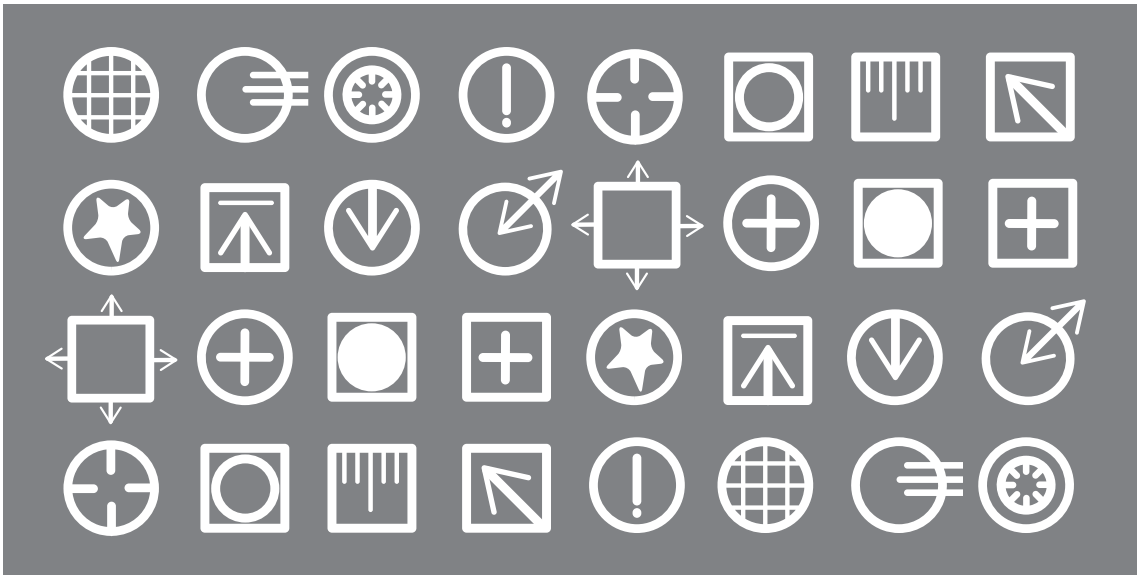

InnPACT

Healthcare Innovation Impact Study

JAUME RIBERA / MAGDA ROSENMÖLLER / PABLO BORRÁS

IESE Business School
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High performance. Delivered.

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The Center for Research in Healthcare Innovation Management (CRHIM), an IESE–Accenture collaboration, brings together different partners from the field of innovation in healthcare to build on IESE's extensive health management-related activities and Accenture's wide-ranging experience in the field. The CRHIM has positioned itself as a center of reference and excellence in research into innovation management in healthcare. By providing an institutional basis for health-related research activities at IESE, it will foster the exchange of expertise, knowledge and experience of different faculty members and partners, enhance the body of knowledge, provide visibility and allow for greater capitalization of opportunities. It boasts an excellent faculty, as well as experts from a large network of different institutions and actors in public and private sectors at global and local levels and from developed and developing countries.

This document is a summarized version of an extensive research document that presents a more detailed description of the conceptual InnPACT framework, with a review of the background literature used in its development, and its application to the four selected innovation projects. Visit the CRHIM web site (http://www.iese.edu/en/faculty-research/research-centers/chrim/) for further information on the center and to request a copy of the extended research paper.

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Summary

Innovation and Entrepreneurship

One of the differentiating aspects of high-performance organizations—whether these be private companies or public institutions—is a culture of innovation. Society as a whole also needs innovation to be part of its culture if it wishes to continuously improve its social and economic results.

The IESE Center for Research in Healthcare Innovation Management (CRHIM), in collaboration with Accenture, aims to promote an exchange of knowledge and experience to improve efficiency and take better advantage of opportunities in healthcare innovation.

Healthcare systems in most developed countries are currently facing significant challenges, in part because of the uneven development of innovation in different areas of the healthcare sector. On the one hand, constant scientific and technological innovation in patient treatment has steadily increased life expectancy and quality of life. At the same time, healthcare systems have not managed to evolve towards models that incorporate these innovations within the context of economic conditions that require balancing limited resources while maintaining levels of service.

To address these social and economic challenges, innovative solutions are called for that, in addition, can become drivers of social progress and economic growth. This need is evident and was recognized years ago in some advanced economies, prompting the launch of numerous transformation initiatives in their healthcare systems. In the U.S. for example, the Accountable Care Organization (ACO) model is generating new approaches to collaboration between the different agents involved in providing healthcare services and new purchasing/billing models.

At the moment, almost all healthcare providers in Spain are also considering significant changes to their healthcare systems. In some cases, particularly in Catalonia and Valencia, innovative management models have been in place for some time. For example, Valencia's "Alzira Model," the public-private collaboration model based on capitative financing started in 1999, is known internationally. Unfortunately, these innovations have not been accompanied by a rigorous evaluation of results that would allow meaningful comparison between different models.

Spain is facing major challenges in the area of innovation. It is known that Spain's overall R&D investment is low compared to other countries: investment in technology R&D is 1.3% of GDP while the average for the EU-27 is 1.8%, with leaders like Germany dedicating 2.5%. Less well known is the fact that Spain's investment also produces more modest results: while Spanish R&D spending represents 6.8% of the total for the EU-27, only 1.6% of patents are Spanish. (OECD data for 2007. Source: "Cotec Report 2010.")

This data illustrates the transformation Spain requires in general, and in healthcare specifically, if it aspires to achieve better results from its available resources, skills and knowledge, which are in many cases quite considerable. If one considers the ecosystem of healthcare innovation, Spain has some internationally prominent agents, for example clinicians who are leaders in their fields and top-rated research institutions and business schools in international rankings.

Fortunately, Spain's weaknesses when it comes to converting research into innovation and results with a social and/or economic impact have been identified and initiatives for promoting and professionalizing innovation management are starting to be launched. For example, in recent years the managerial figures associated with innovation have started to appear in healthcare. These professionals, who in some cases come from private industry, are starting to produce results at the level

of public health systems, hospitals and medical associations.

Even so, there is still a long way to go. The role of government institutions is crucial in promoting and facilitating innovation, particularly in the context of healthcare in Spain, which is mostly public. These public sector agents' ability to influence is varied and can be expressed through their procurement and regulatory capacity.

Among the multiple challenges facing governments is to develop the capacity for mobilizing the assets and creative energy of companies and citizens to promote social and economic welfare. Governments are seeking models and tools that will help them focus their efforts and combine the forces of all agents in a way that produces innovation and, ultimately, social and economic growth.

Mobilization of the public sector is essential. A change in mindset is necessary to make it a leading agent in creating economic growth. This means taking on the role of facilitator or promoter, instead of occupying a merely regulatory or supervisory position; using an approach that facilitates initiatives at all levels by allowing flexibility and autonomy on the part of the agents closest to patient care delivery and innovation itself; assuming risks, without which innovation and above all entrepreneurship, are impossible; showing patience by taking a medium- to long-term perspective that is free of the constraints and pressing issues inherent in the complicated task of day-to-day management. In this context, increasing the awareness of society is also important. Public opinion must recognize of the importance of innovation and entrepreneurship in society.

This study aims to contribute to this needed transformation in the healthcare sector and its approach to innovation. It draws on previous research by IESE CRHIM and Accenture, an analysis of publications and studies by other organizations and benefited from the invaluable contributions of professionals from various collaborating healthcare organizations.

Introduction to the InnPact Study

The CRHIM InnPact study presents a conceptual framework for the evaluation of health innovation and its application in four innovation projects recently implemented in Spain. This framework provides a standardized way to describe, evaluate and compare health innovation with a 360 assessment framework view that includes all health sector stakeholders.

Experience in healthcare innovation reveals that successful innovation projects depend on both the impact on patients — as the final service receptors — and on other health sector stakeholders: clinicians; administrative staff; service buyers; managers; service providers; employers and other collaborating agencies.

Thus, while the impact of innovation in health outcomes can be difficult to define and measure — and usually only surfaces in the medium term — this evaluation framework is applicable to innovations that are in the planning stage, underway, or already completed, and is aimed at facilitating the analysis, the comparison of initiatives and learning from the innovation experiences.

The health sector is a highly innovative industry, with many initiatives spearheaded by managers and clinicians. However, all this innovation poses a challenge for the sector, as most institutions are more interested in looking ahead and launching another innovation (always one more) than looking to the past to learn from their own experience in previous innovations or draw on the experiences of other institutions.

Mounting pressure for health organizations to do more with less implies a great effort to maintain — or enhance, in some cases — the quality of existing health services. It also encourages managers and executives using the tools they need to facilitate the evaluation of health innovation efforts in a systematic way and with a scientific approach.

A framework developed for the assessment of healthcare innovation

One of the challenges of healthcare innovation is the lack of a commonly accepted set of measures in health for gauging innovation performance.

The results, in terms of impact on health, are usually obtained in the medium to long term, while short-term economic cost impact is easier to measure.

Therefore, this evaluation framework provides a set of categories, attributes and criteria for measuring the incremental value of healthcare innovation.

There is a wealth of literature on innovation management available, and a significant part applies to the healthcare environment. Most books and articles devote a section to defining the concept of innovation, so there are al-

WHAT IS INNOVATION?

"The introduction of something new. A new idea, method or device" / MERRIAM WEBSTER DICTIONARY

"Change that creates a new dimension of performance" / PETER DRUCKER

"The introduction of new goods (...), new methods of production (...), the opening of new markets (...), the conquest of new sources of supply (...) and the carrying out of a new organization of any industry" / JOSEPH SCHUMPETER, 1934.

"Innovation is the intentional introduction and application within a role, group, or organization, of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, or wider society" / WEST, 1990

"Innovation is the successful implementation of a novel idea in a way that creates compelling value for some or all of the stakeholders" / VARKEY, ET AL., 2008

"Innovation in healthcare is a medical technology, treatment procedure, or administrative system that is relatively new to the overall sector and newly adopted by a hospital in a particular market area" / GOES AND PARK, 1997

"Healthcare innovation can be defined as the introduction of a new concept, idea, service, process, or product aimed at improving treatment, diagnosis, education, outreach, prevention and research, and with the long term goals of improving quality, safety, outcomes, efficiency and costs" / OMACHONU AND EINSPRUCH, 2010

most as many definitions as experts (see Table: What is innovation?).

This study considers innovation as an institution offering a product or service better or different from what it offered so far (in that institution), or offering this product or service through a process different from or better than the current one.

The concept of *different* or *better* is subjective, depending on the perception of various players. Therefore, a conceptual framework is suggested that assesses agents' perceptions regarding innovation; for example, to what extent innovation covers their needs and to what extent the development and application of innovation requires their contribution (effort).

The scope of the term *healthcare innovation* is also varied. It can be far-reaching, such as a new reimbursement system for services for chronic patients, or very limited, such as the establishment of a new triage system in a hospital ER department.

Traditional models usually analyze the performance of an innovation or a company by focusing on the needs of two major stakeholders: shareholders and customers. For example, the Kaplan and Norton Balanced Scorecard (1996) mainly isolates the perspectives of these two agents in terms of financial results, performance, customer relations, internal processes and growth.

Some assessment frameworks for the public sector, such as the Accenture Public Service Value Framework (Cole and Parston, 2006), look at results primarily from the citizen's perspective and in terms of cost-effectiveness for the organization. In some specific cases, they extend the model to include other innovation actors.

The Service Profit Chain framework (Heskett, Sasser and Schlesinger, 2002) introduces employees as stakeholders. Other self-assessment models, such as the Malcolm Baldrige[1] or EFQM European Quality Award[2], include more stakeholders, such as society, suppliers and alliances.

However, experience in healthcare innovation reveals that to increase the chances of innovation success in the health sector, the impact and perception of all those involved should be considered, since certain groups or agents of the health system can easily become innovation facilitators or blockers.

For many healthcare innovations, the agent list must be broad enough to also consider the impact on patients, brokers, regulators, employees, suppliers, lobbyists, etc.

Thus, this framework is based on a 360º view, keeping the list of stakeholders involved open in order to consider those that are relevant to each project, and considering multiple criteria linked to perceptions about the impact of innovation.

1 http://www.nist.gov/baldrige/
2 http://www.efqm.org/en/tabid/132/default.aspx

Assessment Framework Benefits

The framework aims to be applied as a tool for innovation evaluation, comparison, prioritization, analysis and facilitation, with the following benefits:

1. It provides a standardized way of describing innovations with their positive and negative aspects, as perceived by the various stakeholders, which facilitates comparison.

2. It takes into account all key players, allowing innovation assessment from different perspectives.

3. It determines the indicators that must be measured at baseline, to be measured again later to assess the degree of improvement.

4. It facilitates the application of a scientific principle, i.e. it considers innovation as a hypothesis to be proven, with assumptions and expected outcomes. In this way, when the innovation project is completed, either the hypothesis holds, or it must be changed, thus facilitating learning.

5. It can be applied to innovations already carried out to better understand what has already been tried and the causes of eventual success or failure.

AN EVALUATION FRAMEWORK, NOT A RANKING

The conceptual framework is not meant to be a ranking of innovation that could lead to the perception that a particular innovation is better than another. A ranking such as this would involve building a sliding scale into the attributes and parameters under evaluation.

In fact, to build such a classification, users of the conceptual framework should weigh the innovation attributes. Depending it depends on the preferences of each organization and the purpose for which they wish to use the evaluation framework. The framework as such does not provide any weighting of the different innovation attributes..

A SCALABLE AND DYNAMIC FRAMEWORK

The InnPact framework is dynamic. CRHIM intends to incorporate new aspects in its application, as they are discovered, thus extending its value and benefits in collaboration with users.

A COMPLEMENT FOR INNOVATION AGENCIES

For agencies and organizations that maintain large inventories of health innovation projects, this evaluation framework can be useful as a complement to their existing management tools.

The 360º assessment framework aims to go beyond the creation of an innovation repository (e.g., AHQR Innovation Exchange[3], the Innovative Care Models initiative[4], or the Innova Salut Map[5]) to supplement them with a standardized way of describing, classifying and evaluating innovation in terms of impact on stakeholders. The effects would be analyzed in terms of preliminary impact expected during the proposed innovation and impacts realized after implementation.

3 http://www.innovations.ahrq.gov/

4 http://www.innovativecaremodels.com/

5 http://www.gencat.cat/salut/ticsalut/innovasalut/

Assessment framework components

The InnPACT assessment framework consists of the following three components:

a) A descriptive **fact sheet** about the innovation, defining the initiative based on 14 elements, including: Mission, Objectives, Scope, Deliverables, Risk, Success Criteria, etc.

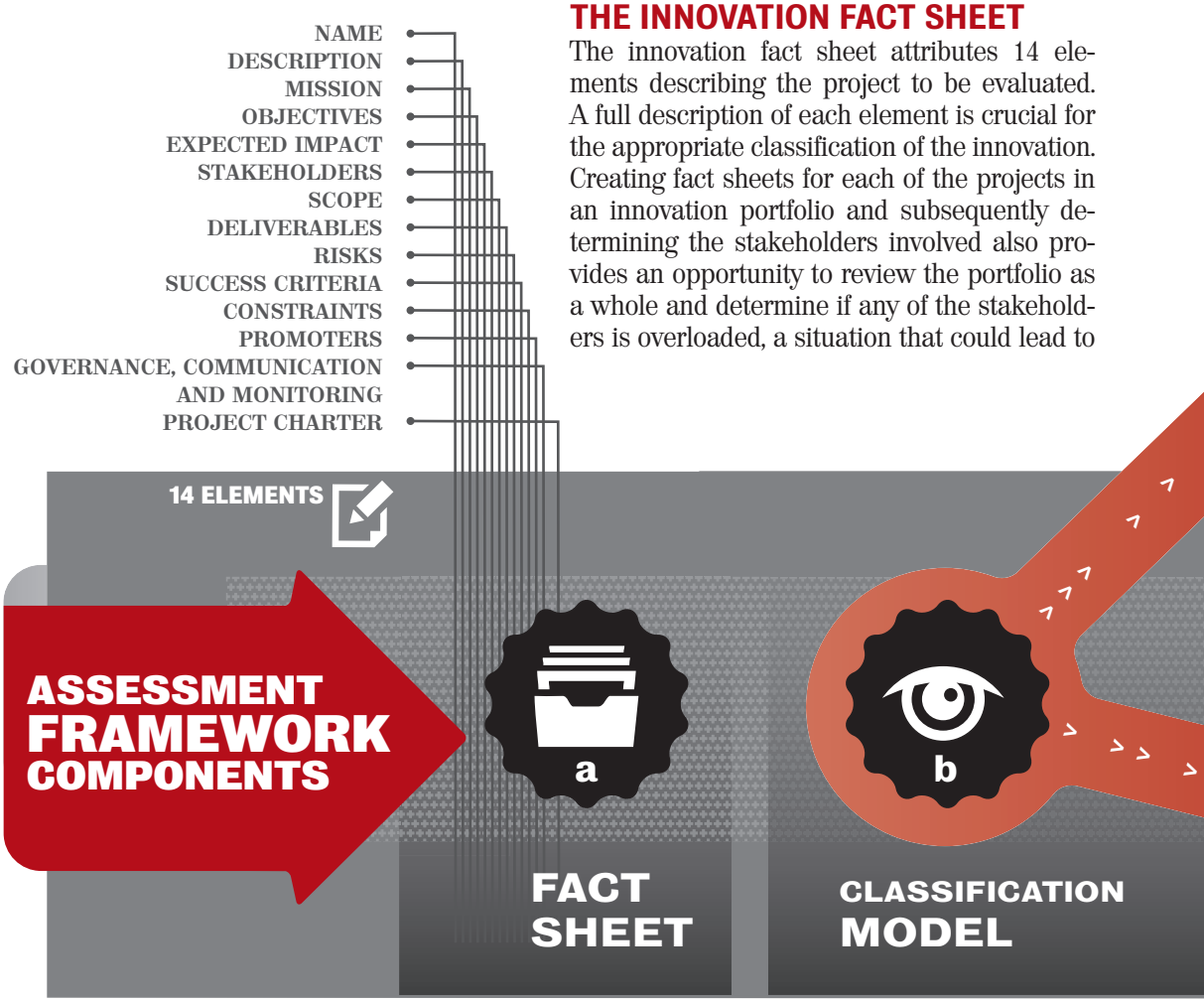
b) A **classification model** for the innovation initiative, based on one **objective** and 16 **classification attributes**:

- An objective, defined by 5 categories according to the main innovation focus.
- Nine dimension attributes: to estimate the scale of innovation.
- Seven facilitation attributes: to estimate the forces that will aid (drivers) or block (barriers) innovation.

c) A **360º evaluation diagram outlining stakeholder impact** based on **eight criteria** that explore the perceived impact on each and every one of the innovation stakeholders: contribution, processes, channels, capabilities, relationships, value, strategies and context.

THE INNOVATION FACT SHEET

The innovation fact sheet attributes 14 elements describing the project to be evaluated. A full description of each element is crucial for the appropriate classification of the innovation. Creating fact sheets for each of the projects in an innovation portfolio and subsequently determining the stakeholders involved also provides an opportunity to review the portfolio as a whole and determine if any of the stakeholders is overloaded, a situation that could lead to



saturation and subsequent resistance to innovations. (See page 14)

CLASSIFICATION MODEL

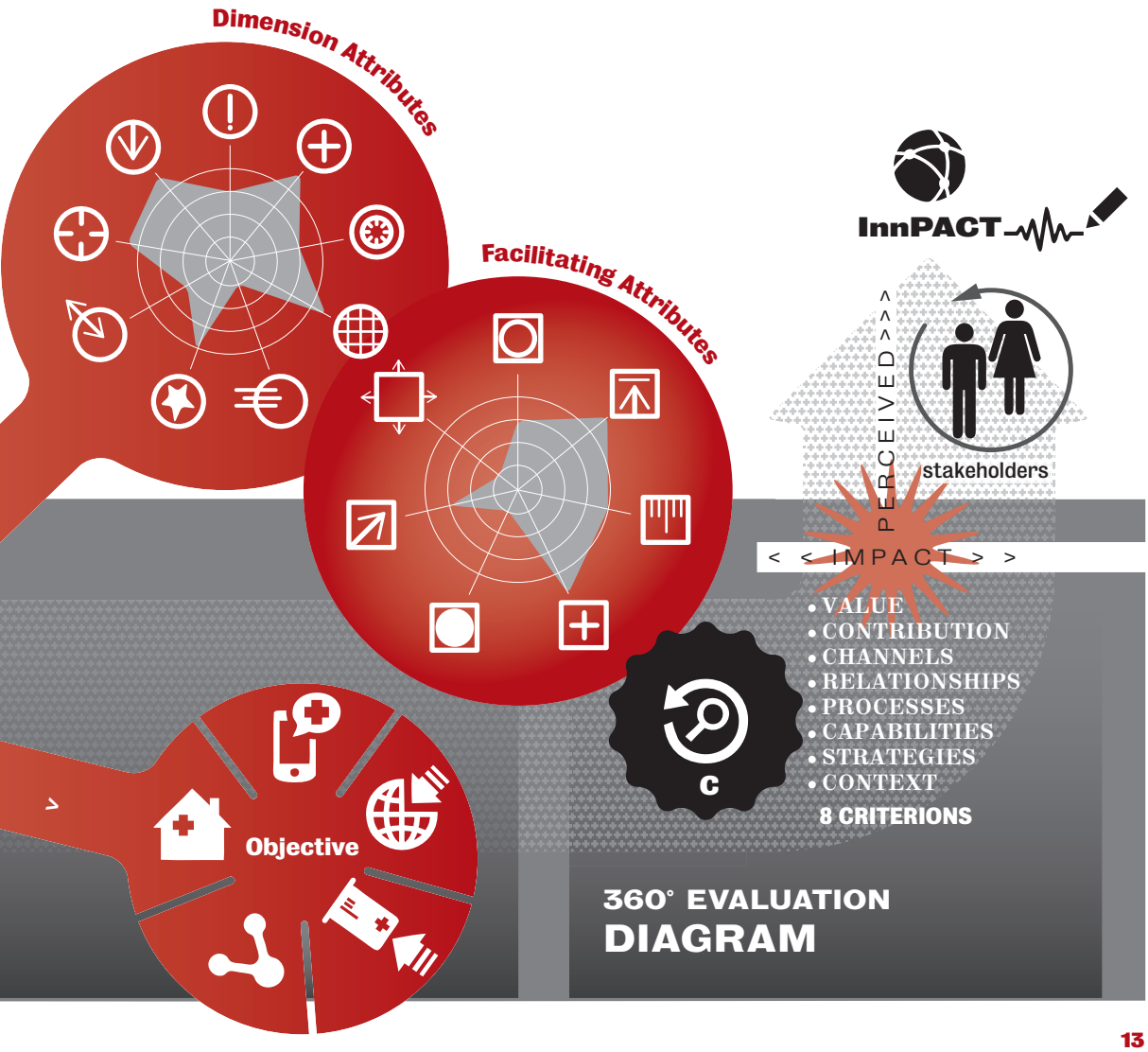
This model is designed to facilitate the evaluation of an innovation project by classifying the innovation and the innovation attributes.

The health innovation model proposes, first, to determine the object of innovation and classifying it into one of five categories: product or service; market; process; marketing; or organizational. Secondly, the model aims to assign a level to each of the 16 innovation attributes.

The Object of the Innovation Initiative

An innovation project can have different goals for the various categories listed. However, the classification of the object of innovation must consider the main objective.

For example, home care units are an example of service innovation offered in some cases where previously only conventional hospital care was available. Although home care units also involve significant improvement in organization and processes, this project can be classified under the category of service innovation when its main goal is to offer a new service that best suits the patient's needs.



1 NAME	Name typically used to refer to this specific innovation.
2 DESCRIPTION	Brief and concise description of the innovation, in answer to the question "What is this innovation?".
3 MISSION	The mission focuses on the problem or opportunity that sparked the idea for the innovation and answers the questions "Why are we doing it?", "What need are we covering?".
4 OBJECTIVES	More detailed and measurable information about the innovation's mission.
5 EXPECTED IMPACT	Description of the impact which the innovation is expected to achieve and how it can be measured. Includes the main beneficiaries, indicating how many there are currently and expected future trends, highlighting the value that the innovation would bring them.
6 STAKEHOLDERS	Stakeholders are individuals or groups who are affected by or can affect the development of an innovation. *The 360° assessment diagram describes the approach of innovation stakeholders in detail.*
7 SCOPE	The scope of innovation involves setting the limits of the project and prevents scope creep, which involves excessive growth of what the innovation encompasses to the point that the project is not feasible with the resources available.
8 DELIVERABLES	These are elements that the innovation is supposed to produce — its tangible and intangible results.
9 RISKS	It is useful to explore the main risks threatening the innovation (and those who promote it), studying its sustainability and possible obsolescence. A common practice is to review a checklist or a series of areas presenting the main risks.
10 SUCCESS CRITERIA	Usually the objectives and success criteria of different groups of stakeholders are different and at times can even clash. The innovation manager must transform success criteria and make them align with the stakeholders in such a way that they are consistent with objectives and vice versa.
11 CONSTRAINTS	Description of the innovation limitations: budget, available resources, time of completion, start date, etc.
12 PROMOTERS	Identification of the innovation leader and key team members.
13 GOVERNANCE, COMMUNICATION & MONITORING	Governance structure of the innovation project, write-up and content of a communication plan and a monitoring plan specifying how project monitoring will be done and who will receive updates.
14 PROJECT CHARTER	Existence and content of the document that can be referred to as statute or charter of the innovation project, which is a kind of contract or agreement between all players involved.

INNOVATION FACT SHEET

The object of healthcare innovation can be classified into five categories:

1. INNOVATION OF PRODUCT OR SERVICE, when focusing on a tangible product, a service or an experience and an effort is made to create or improve the existing product or service. This would include, for example, the creation of geriatric emergency units or new monitoring devices to monitor patients at home.

2. MARKET INNOVATION, when focusing on opening or expanding a market. For example, some Indian hospitals have developed a new medical tourism market to attract American patients for hip replacement surgery.

3. PROCESS INNOVATION, when focusing on the creation or improvement (cost, flexibility, agility, speed, etc.) of a production process or service. For example, the roll-out of electronic prescriptions is an innovation in the process of prescribing and dispensing medicines. Another example is the definition of new protocols for care of chronic illnesses and aging.

4. MARKETING INNOVATION, when focusing on marketing areas (branding, channels, service unbundling, promotions, etc.). Examples include online appointments or health service web pages and hospitals that provide healthy lifestyle advice to patients.

5. ORGANIZATIONAL INNOVATION, when focusing on new structures, business models, integration, networking, partnerships, etc. For example, new models that integrate the management of different levels of care: primary, specialized, mental health and emergencies.

As described above, although an innovation may have different aims, by overlapping the categories mentioned (e.g., service, organizational and process at the same time), the assessment must try to determine the main object of innovation, corresponding to the main motivation of the innovation promoter.

Classification Attributes

The classification model provides a list of 16 attributes that serve to evaluate the various health innovation properties.

These 16 classification attributes are divided into two groups: Nine *dimension* attributes, to understand the magnitude, complexity or challenge of the innovation, and seven *facilitator* attributes, to estimate the driving forces and barriers for the implementation or expansion of innovation.

For each attribute, the model defines the different possible levels and the meaning of each level. For example, levels for the *Uncertainty* attribute can be *Safe, Normal* or *Risky*.

Based on this classification model, assessment of an innovation consists of assigning a level to each of the 16 attributes. This assignment of levels helps measure the different attributes of an innovation and compare various initiatives.

In assessing many attributes, the selected level depends on the perception of stakeholders. For example, the "technology" attribute measures not only how modern technology is applied in the innovation, but the perception of involved stakeholders about the technology: is it familiar, common, known or unknown to users, etc.? The result is a classification model aligned with the 360º assessment of the conceptual framework.

Dimension Attributes

Dimension attributes are a set of innovation aspects that facilitate the understanding of magnitude, difficulty, complexity or challenge involved in an innovation.

Nine Dimension Attributes

Dimension attributes are a set of innovation aspects that facilitate the understanding of magnitude, difficulty, complexity or challenge involved in an innovation.

	The main levels for assessing ● Low Level
NOVELTY This attribute describes the degree of novelty of the innovation, used to determine if it is a revision or upgrade of an existing service or process — or a revolution.	**Derivative.** Usually a review of an offer already in existence, with the goal of pursuing marginal service or marginal efficiencies.
IMPROVEMENT This attribute determines the degree to which the innovation is perceived as better than the baseline condition.	**Minor.** When perceived as a slight improvement to existing conditions.
TECHNOLOGY This attribute considers the stakeholders' perception of the level of technology required; it therefore considers whether stakeholders are familiar with the technology proposed by the innovation.	**Low-tech.** When the innovation uses known basic technology or some new technology (for the environment) in a non crucial area.
COMPLEXITY This attribute assesses the number and difficulty of products, institutions, processes and systems to be linked or integrated into the innovation.	**Assembly.** Innovations with a low degree of complexity given that their components, already in existence, were designed to be incorporated.
PACE This attribute refers to the urgency of the innovation project compared to what would be considered a normal time frame that most managers would accept as reasonable.	**Normal.** When the innovation has a reasonable schedule for its development and start-up.
UNCERTAINTY This attribute focuses on the variability and the risks the innovation project faces, taking into account the impact these can have on the people involved.	**Safe.** When the innovation does not pose any risk for those developing, implementing or using it.
ORIGINALITY This attribute analyzes the source of the innovation from the organizational point of view; it can be an organization's internal innovation or an adaptation of an external innovation.	**Borrowed.** When the innovation is based on existing practices with few modifications.
PURPOSE This attribute refers to the main objective of improving the innovation, which can be related to care, support or administrative tasks.	**Administrative.** Innovations directed at the institution's organizational structure and administrative processes.
DISCRETIONALITY This attribute describes the level of discretion in the implementation of innovation, which can be optional, by collective agreement or a hierarchical or authoritarian decision.	**Optional.** When the choice of adopting the innovation is made by an individual or a unit, with the option of maintaining existing conditions.

CLASSIFICATION ATTRIBUTES

each innovation feature parameter

●● Medium Level	●●● High Level
Platform. Creating a new generation of services or processes.	**Breakthrough.** Creating a new service that may revolutionize the industry.
Significant. Perceived by the majority of the stakeholders as an improvement worthy of adoption.	**Major.** The perception of the level of improvement is great and the main stakeholders will adopt it immediately if given the opportunity.
Medium-tech. Innovation that requires the use of new technology not routinely used in the environment of the innovation.	**High-tech.** When it is necessary to develop new technology, not yet in existence, that will be crucial to be used in the innovation.
System. Innovations which include elements and subsystems that carry out diverse functions and must work together in the innovation.	**Array.** Innovations that incorporate a collection of systems or dispersed organizations that is necessary to coordinate in order to attain shared goals.
Time-critical. When a deadline must be met in order for the project to be successful, and a delay represents a significant failure of the innovation.	**Extreme.** When the innovation deals with a crisis situation with extremely urgent deadlines.
Normal. If the innovation involves some known risks that the team considers under control and there is a high probability of success.	**Risky.** When the innovation is perceived as having few chances of succeeding or when failure involves significant reputation, health or financial risks to those involved in it.
Adapted. When the innovation has been built around an existing practice, but with significant modifications.	**Original.** When the innovation has been wholly developed within the institution.
Support. Innovations not directly aimed at medical activities but with a significant impact on them.	**Clinical.** Innovations directly related to primarily medical activities (diagnosis, treatment, prevention,...)
Collective. When the choice of adopting the innovation is made by consensus amongst the different units of each organization.	**Authority.** When the decision is made in a hierarchical way and the units do not have a say on the adoption of the innovation.

Seven Facilitating Attributes

This set of attributes includes aspects that can facilitate or complicate the development, deployment and diffusion of the innovation.

ADAPTABILITY
The extent to which innovation can be adapted to the specific needs of each unit or institution.

TRIALABILITY
The degree to which the innovation can be tested in a pilot program before deploying it throughout the entire unit.

OBSERVABILITY
The degree to which the results of the innovation are visible to others and can be measured.

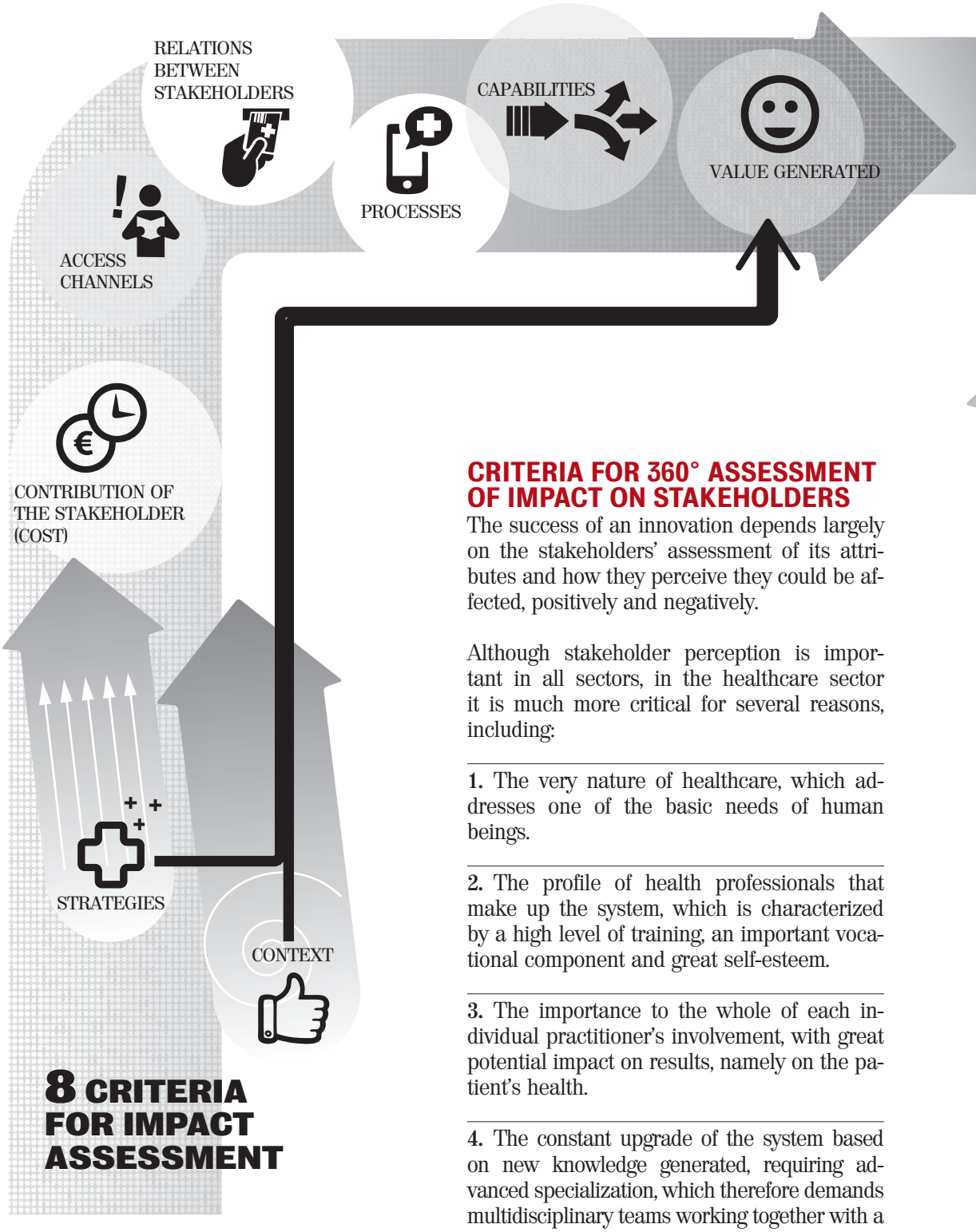
REPUTATION
The extent to which the innovation, if successful, can improve personal and group reputation.

COMPATIBILITY
The degree to which the innovation is perceived as consistent with past practice and routines currently in place.

EFFECTIVENESS
The extent to which the innovation is perceived as capable of solving the original problems or enhancing identified opportunities.

SCALABILITY
The extent to which the innovation can be shared, upgraded and replicated in other departments and institutions.

The levels for evaluating the Facilitating Attributes of innovation are always the same: Very Low, Low, Medium, High, Very High



CRITERIA FOR 360° ASSESSMENT OF IMPACT ON STAKEHOLDERS

The success of an innovation depends largely on the stakeholders' assessment of its attributes and how they perceive they could be affected, positively and negatively.

Although stakeholder perception is important in all sectors, in the healthcare sector it is much more critical for several reasons, including:

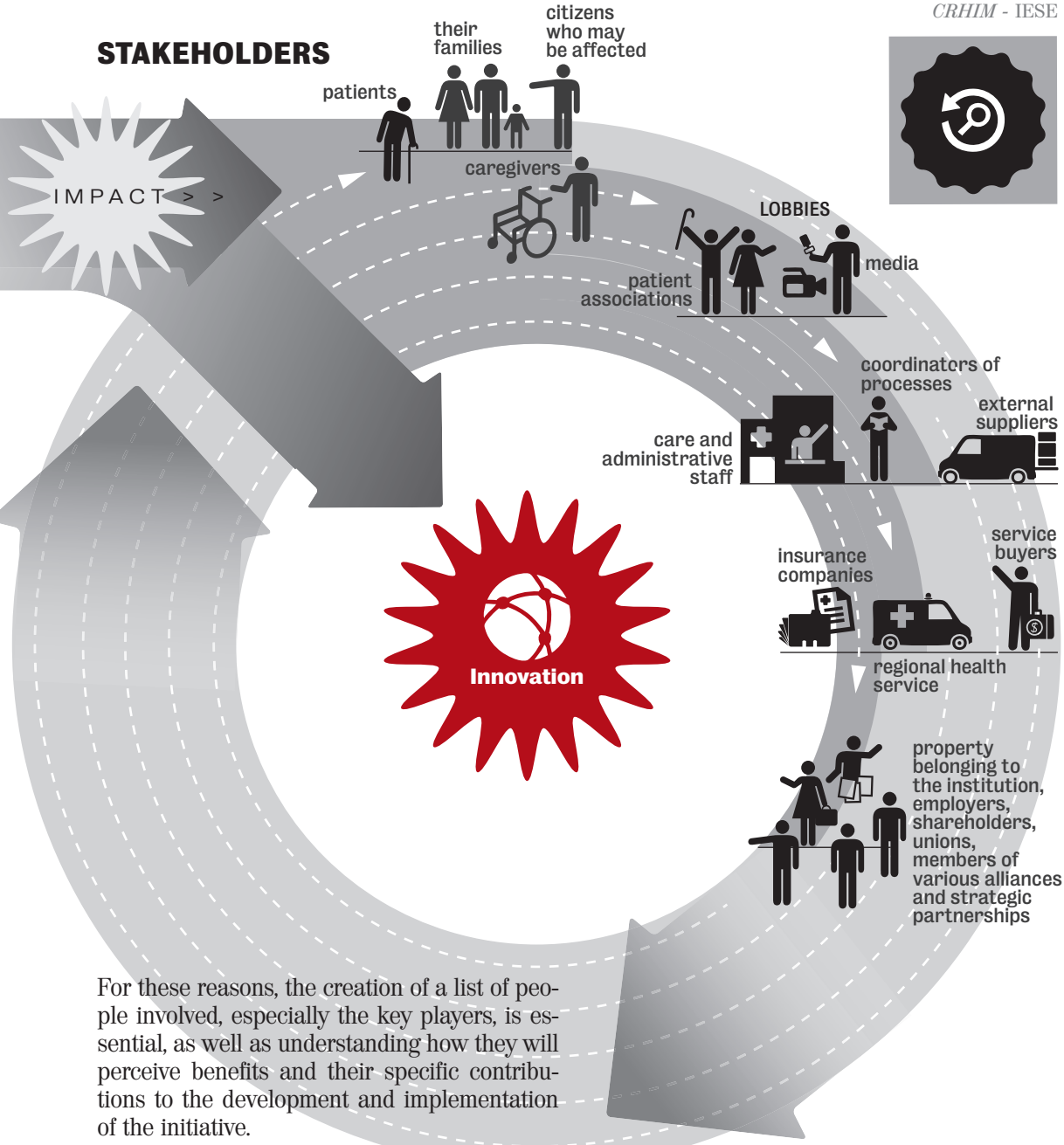
1. The very nature of healthcare, which addresses one of the basic needs of human beings.

2. The profile of health professionals that make up the system, which is characterized by a high level of training, an important vocational component and great self-esteem.

3. The importance to the whole of each individual practitioner's involvement, with great potential impact on results, namely on the patient's health.

4. The constant upgrade of the system based on new knowledge generated, requiring advanced specialization, which therefore demands multidisciplinary teams working together with a high degree of interdependence, etc.

STAKEHOLDERS



For these reasons, the creation of a list of people involved, especially the key players, is essential, as well as understanding how they will perceive benefits and their specific contributions to the development and implementation of the initiative.

In preparing this list, it might be useful to consider:

- Patients and their different needs: prevention, diagnosis, treatment, disease control, recovery, etc. as well as their families and caregivers and citizens who may be affected because of the externalities of health care.

- Lobbies, media, patient associations, etc.

- Care and administrative staff in centers, coordinators of processes that are going to be altered, support departments, other pre- or post-service units, external suppliers.

- Service buyers, insurance companies, regional health service, etc.

- Employers, shareholders, unions, members of various alliances and strategic partnerships.

Once the key roles are identified, the innovation analyst must assess the size of the population of each type of stakeholder and the group´s future evolution, seeing innovation from each group´s perspective.

Impact assessment criteria

The 360º assessment involves determining the impact of the innovation by each of the individual stakeholders. Eight criteria have been stipulated to analyze this impact.

CRITERION 1.
VALUE GENERATED

Innovation changes the value proposition for the stakeholder, so this criterion asks what the innovation results are for this agent, what problems it solves, if it lets the stakeholder do something new or just the same thing differently, how the agent regards the new or different element, or if the innovation can generate (or help to create) revenue streams.

For example, this criterion poses the difference in perception in the value of chronic care programs; while for a primary care physician one of the change's assets is acquiring new knowledge and tools for the treatment of chronic patients, for the specialists the main advantage is to be able to delegate and work together with family doctors.

CRITERION 2.
CONTRIBUTION OF THE STAKEHOLDER (COST)

This criterion focuses on what the innovation will cost each stakeholder, including investments, financial cost, time and effort, as well as reputation.

For example, the implementation of a new clinical protocol may require a variable level of effort which depends on the professional group being considered (physicians, nurses, managers, patients, etc.).

CRITERION 3.
ACCESS CHANNELS

This criterion asks, from the perspective of each stakeholder, which channels (in a broader sense) are used to trigger interest in the innovation, to facilitate its assessment, to improve its access, to develop a new value proposition, to facilitate its implementation and to support its use.

For example, the creation of simulators that could be used by physicians to get a first-hand experience on how a proposed diagnostic and monitoring tool could be easily integrated into their medical practice, could be an attractive channel to encourage the innovation adoption.

CRITERION 4.
RELATIONS BETWEEN STAKEHOLDERS

This criterion examines the changes that innovation produces in relations among the various system stakeholders, i.e., what new relationships are created, which are removed, and if there is a change in the type of relationship (co-creation, exclusive dedication, personal or community relationship, automation, etc.).

The increasing availability of technological solutions that allow access to all patient clinical data, regardless of who or where they were generated (EHRs) is changing the relationship between health professionals and patients. This is because, until this innovation was implemented, patients were in charge of carrying their own medical records with them when visiting a specialist in a different location. Now patients can rely on the system to offer easy access to their records to all professionals involved in their care. The relationship among practitioners also changes, since in the past, they had to be in frequent contact in order to share information about the progress of a patient and had to discuss issues directly; EHRs eliminate the need for this direct dialog.

CRITERION 5.
PROCESSES

This criterion looks at changes in the processes in which stakeholders are involved or should be involved, actively or passively. It also focuses on how processes improve (or not) from their perspective (quality, capacity, flexibility, efficiency, effective time management, ease of use, environmental cost, need for repetition, etc.).

For example, the process of monitoring chronically ill patients varies with the innovation of tracking parameters that patients themselves obtain with a device connected to their smart phone. Practitioners must change the process so as to review data received from patients at frequent intervals, instead of waiting for their next visit.

CRITERION 6.
CAPABILITIES

This criterion explores, from the perspective of each stakeholder, the changes required by the innovation on capabilities, including tangible resources (talent, hardware, infrastructure) and intangible resources (brand, technology, knowledge, practical expertise), both internal to the institution and provided by key suppliers, partners, allies, etc.

For example, the constant innovation in health technology often requires healthcare professionals to develop new capabilities in clinical practice.

Thus, when monitoring patients with inflammatory bowel disease (IBD), an innovation involved creating the post of a nurse specialized in IBD. This required the recruitment and training of this person, who is the first point of contact to resolve patients' questions and issues.

CRITERION 7.
STRATEGIES

This criterion examines the alignment of innovation with strategies of the organizations themselves and how they dovetail to meet the wishes and needs of the stakeholder.

For example, incentives and career development models for health professionals have a great impact on innovation because they are a relevant factor in providing motivation and driving change initiatives.

Also, for a hospital whose strategy includes increasing the level of critical care of patients to be treated and the creation of specialized institutes, an innovation to delegate the care of chronic patients at home by teams of primary care physicians is clearly aligned with the hospital's strategy, and the hospital would regard it positively.

CRITERION 8.
CONTEXT

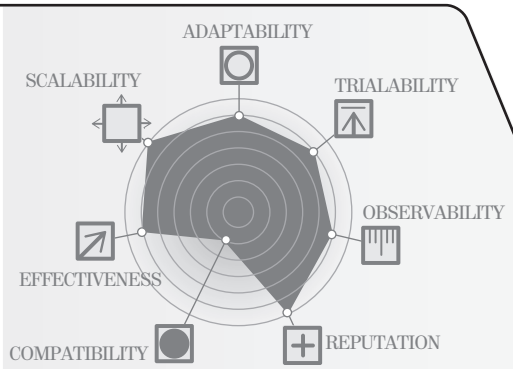
This criterion examines what factors in the organization's context make innovation more or less attractive to the stakeholder and easier or harder to implement.

Probably one of the most significant context elements is public opinion, which plays a prominent role in health service privatization approaches, among other things.

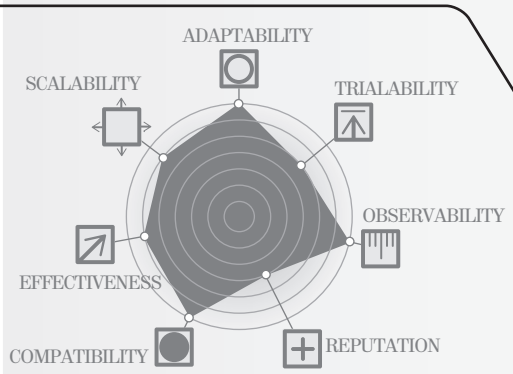
Another example of this criterion can be found in some health innovations related to chronic patients which have been hampered by the existing funding context, which imposes payment per activity models on organizations. Although a new approach to a healthcare activity may be profitable in terms of cost effectiveness, the lack of recognition of this activity in established reimbursement models makes its implementation difficult.

Summary of diagrams showing classification attributes for

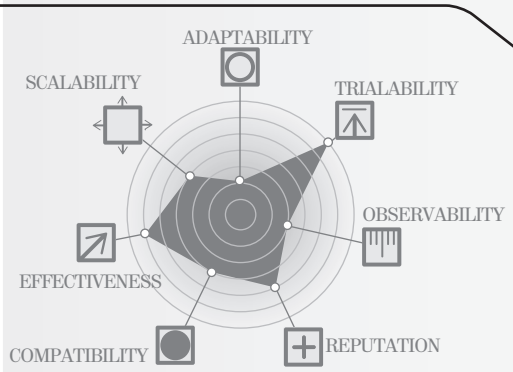
AISBE Emergency Services



HORUS Electronic Health Record



Integrated Supply Unit



Mobile Nursing Workstations

Dimension Attributes Facilitating Attributes

the four innovation projects evaluated in the InnPact study

Evaluation of four innovation projects based on the conceptual framework

The InnPact study includes the application of the assessment framework to four health innovations considered in the industry as success stories over the past years.

1. **AISBE Emergency Project:** restructuring of emergency services in an area of Barcelona, led by the Hospital Clínic of Barcelona.

2. **HORUS Project:** Shared medical history of the Community of Madrid, led by the Madrid Healthcare Service.

3. **UAI Project:** created by the Procurement Unit of the Murcia Healthcare Service.

4. **Mobile Nursing Workstation Project:** design and implementation of a new mobile nursing cart at the La Fe Polytechnic and University Hospital in Valencia.

The evaluation of these four initiatives was carried out through various interviews with innovation promoters and some of the stakeholders involved in each initiative.

The AISBE and UAI Emergencies projects involve process and organizational changes. The La Fe Hospital Mobile Nursing Workstation Project involves product innovation. And the Community of Madrid Horus system serves as an example of process innovation.

Every innovation project has been completed with a fact sheet, classification model and impact criteria diagram to survey the perceptions of key players and to assess the impact and scope of innovation with a 360º vision.

Below is a summary of the results obtained in the application of the framework to the four innovations mentioned.

The following radar chart shows the results of the dimension attributes in the four innovation projects, comparing the area and outstanding attributes of each innovation.

The graphs show the significant difference among the various innovations considered both in dimension and facilitator attributes. The attributes where the innovation value is highest should be those to which the innovation promoter should pay closest attention, since these are the attributes that could lead to further difficulties (for example, discretionality in the AISBE project or originality in the Horus project). Similarly, a high rating in facilitator attributes indicates that they are elements which the innovation promoter can stress to convince the various stakeholders of the benefits of the innovation. This is the case of the testability for the UAI and Mobile Stations projects

PROJECT 1

Emergency Services of the Barcelona Esquerra Health Area, (AISBE)

HOSPITAL CLÍNIC OF BARCELONA

CLÍNIC BARCELONA Hospital Universitari

The **Hospital Clínic of Barcelona** (H.Clínic) is a leading provider of healthcare and the sponsor of the AISBE project.

Hospital Clínic is a university hospital founded in 1906. It belongs to the network of public hospitals in Catalonia and acts as a community hospital in its area and as a tertiary, advanced care hospital for patients in Catalonia, Spain and internationally.

The hospital has a long tradition of research and innovation that make it a benchmark institution both domestically and abroad.

Àrea Integral de Salut Barcelona Esquerra

The Barcelona Esquerra Health Area (AISBE) aims to improve healthcare in the Barcelona Esquerra area through collaboration among its healthcare providers through various programs.

The AISBE Emergency Services (ES) innovation project involved the restructuring of facilities and healthcare resources aimed at addressing emergencies in the Barcelona Esquerra Health Area (AISBE), and changing patient flows in accordance with these resources, with the aim that each case be treated at the most appropriate center.

The Barcelona Esquerra area covers a population of 540,000 inhabitants with three hospitals and 19 primary health care centers.

The AISBE ES project has been successful in having 35% of emergencies treated in non-hospital centers, where cost per activity is lower than in hospitals.

This reorganization of ES processes in AISBE has also freed availability of ER services at the Hospital Clínic by lowering its inpatient volume by 10% and by reducing the arrival of non-critical patients by 25%. This has allowed them to focus on more complex cases.

"The project made it possible to optimize the use of health resources when treating patients in the Barcelona Esquerra area. The application of the InnPact model to the AISBE project has clarified the value that the innovation generates for each stakeholder, and has taught the innovation team important lessons that should be applied to all future innovation projects" says Dr. David Font, Director of Strategy and Planning at the

1 NAME	AISBE ER
2 DESCRIPTION	Restructuring of devices and healthcare resources aimed at addressing emergencies in the Barcelona Esquerra Comprehensive Health Area (AISBE), and changing patient flows in accordance with these resources, with the aim that each case be treated at the most appropriate center.
3 MISSION	By optimizing the use of existing health resources, the project solved a situation where emergency services were overwhelmed by the demand and the diversity of cases.
4 OBJECTIVES	• Reduce emergency response times. • Better distribution and resolution based on patient complexity level. • Cost savings for AISBE ER services at the systemic level (as a whole).
5 EXPECTED IMPACT	The impact of the project focuses on all emergencies treated within AISBE area, regardless of where they are handled and if they are addressed through SEM (Emergency Medical Service) or not, improving access, service quality, and response time.
6 STAKEHOLDERS	SEM practitioners and managers; ER managers and practitioners at the Hospital Clínic of Barcelona; ER managers and practitioners of Hospital Cor Sagrat; ER managers and practitioners of Hospital Plató; Physicians of the primary healthcare centers in the AISBE area and the Manso center; and Dpt. of Health and CatSalut managers
7 SCOPE	The scope of the project consists of AISBE area emergencies including the Clínic, Sagrat Cor and Plató hospitals, the Manso center and the Emergency Medical Service (SEM) ambulances.
8 DELIVERABLES	• Adaptation of facilities and devices in the area. • Implementation of a territorial ER governance system based on coordination among providers. • Tools for sharing information on the ER situation in the various units.
9 RISKS	• Risk of decreased care quality by referring to less efficient providers. • Provider strategies can be vastly different from the innovation's aim. • Possible changes in CatSalut policies affecting recruitment and management of AISBE resources.
10 SUCCESS CRITERIA	• Development and consolidation of a coordinated emergency system in the AISBE area. • Buy-in and involvement from practitioners. • Improved response times in the emergency system.
11 CONSTRAINTS	The innovation involved no additional resources in the participants' centers.
12 PROMOTERS	• **David Font** (Hospital Clínic). Director of Strategy and Planning at the Hospital Clínic. Member of the Barcelona Esquerra Standing Committee. • **Xavier Altimiras**, Director Barcelona Esquerra CatSalut. • **Mónica Gómez**, Head Technical Office, AISBE.
13 GOVERNANCE, COMMUNICATION & MONITORING	There was no plan for reporting and monitoring from the beginning of the innovation project.
14 PROJECT CHARTER	There was none.

Hospital Clínic and member of the Barcelona Esquerra Standing Committee.

The AISBE ES innovation project has improved coordination among emergency response units in this area of Barcelona, i.e. Clínic, Sagrat Cor and Plató hospitals, and new Emergency Center in the Manso Street Primary Care Center (CUAP Manso), created within the project. These units play a more active role and helped free up some needed capacity at the Hospital Clínic ER.

The AISBE ES project has created a clinical group that has developed protocols for application throughout the Barcelona Esquerra area, promoting the implementation agreements for these protocols with the various emergency service providers. The role of the Emergency Medical Service (SEM) has been critical in this process. It has given the ambulance services the ability to detetermine the destination of each patient, depending on the complexity of the case and the status of the emergency rooms in the area.

This innovative project has been developed since 2006. In 2012 it was rolled out as part of the Barcelona emergency restructuring plan. The strategic vision of Hospital Clínic for healthcare in the area has resulted in it having a very active role, in recent years (together with proposals from CatSalut and the Catalonian Department of Health), in the promotion of various innovation projects in Barcelona Esquerra, such as this ES redevelopment project in AISBE.

CASSSIFICATION OF THE AISBE EMERGENCY SERVICES INNOVATION

This project's **innovation object** is classified as a process innovation, as the innovation alters the flow of patients, making it more flexible to adjust to each center's capacity and situation, facilitating patient admission. It is also an organizational innovation due to the creation of a new structure, the MANSO Primary Care Emergency Center (CUAP, as abbreviated in Spanish), and horizontal integration has been achieved through coordination committees and other network creation instruments.

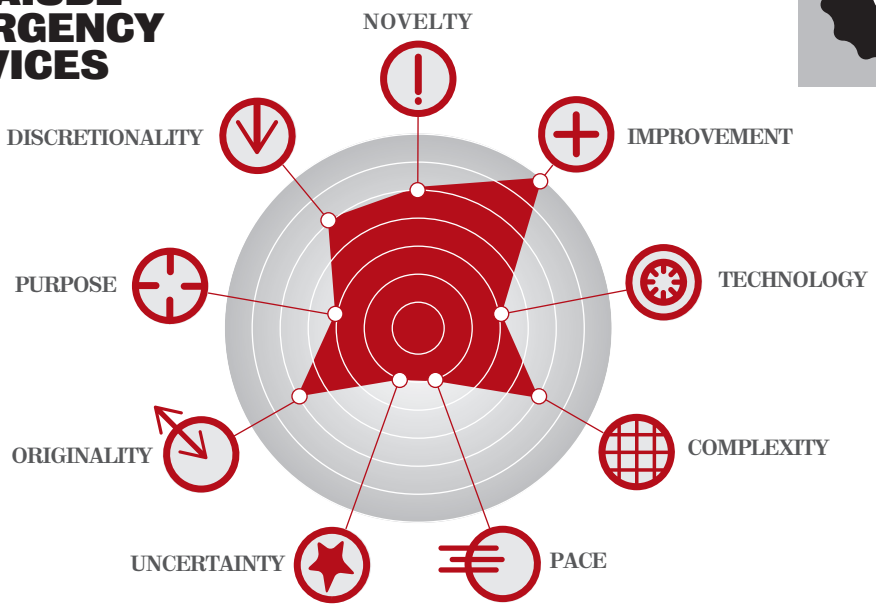
The dimension attributes pertaining to the AISBE innovation are:

NOVELTY
Platform.
Different providers join together to offer the same product to the end user, but in a way that combines new operational elements that allow care quality to be improved.

IMPROVEMENT
Major
In all of the organizations involved, professionals perceived it as an improvement in the use of existing resources. From patients´ perspective, they receive better care that is more focused on their needs and with fewer delays.

TECHNOLOGY
Low-tech.
The project only requires implementation of a platform to share information.

DIMENSION ATTRIBUTES ASSESSMENT FOR AISBE EMERGENCY SERVICES



COMPLEXITY
System

The project requires aligning the strategies of providers with different objectives and cultures.

PACE
Normal

The project has been consolidated in stages. It began by the development of the new model, followed by deploying the new tools, and making them available to the agents. At the time of the assessment, the results are being evaluated.

UNCERTAINTY
Safe

It seems unlikely that the redistribution of emergency demand pressure will cause adverse effects. The greatest risk is simply losing the continuity of the innovation. Sustainability and obsolescence risks are minimal.

ORIGINALITY
Adapted

The innovation has been constructed using some original components of existing practices, and adapting them to the context of the AISBE and Catalan healthcare systems.

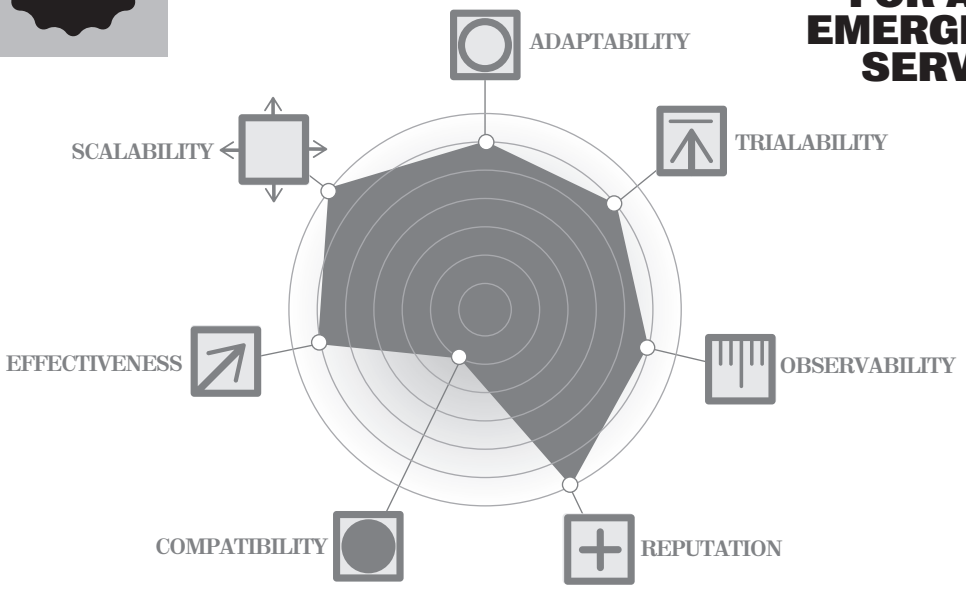
PURPOSE
Administrative

Basically consists of an innovation in patient flow and center organization, although the positive impact on medical care received by patients must be recognized.

DISCRETIONALITY
Collective

Organizational involvement was optional, and within the centers it has also been managed from the bottom up.

FACILITATING ATTRIBUTES ASSESSMENT FOR AISBE EMERGENCY SERVICES



The facilitating attributes pertaining to the AISBE innovation are:

ADAPTABILITY
High
This innovation was constructed based on the mechanisms of coordination, establishing principles and protocols that guided patient flow, and which could be adjusted according to the objectives of different organizations while maintaining a consistent systematic strategy.

TRIALABILITY
High
This innovation is applicable using a lower level of coordination, which can later be increased, or a lower number of institutions with the aim of including others later on.

OBSERVABILITY
Very High
The changes are visible in the flow of patients, the specialization of clinical personnel, the response times and the ambulance waiting times.

REPUTATION
High
Organizational reputations improve with increased effectiveness and the reduction of waiting times, and professionals are recognized for their experience in the treatment of the most complex cases.

COMPATIBILITY
Low
The innovation requires changes in the habitual practices of the medical and managerial professionals involved, and creates a new role for the emergency services.

EFFECTIVENESS
High
The innovation is perceived to be capable of satisfying its initial objectives, but, at the same time, has opened up new opportunities that need to be explored, such as changing the location of care for chronic patients, improving emergency protocols and controlling walk-in patients.

SCALABILITY
Very High
This innovation is applicable in emergency systems with a wide reach. It has been used as a role model for the management of emergencies[6] in Barcelona and other urban areas in Catalonia.

IMPACT ON AGENTS IN THE AISBE EMERGENCY SERVICES INNOVATION

It must be mentioned that the expected value differs based on the agent analyzed: for CatSalut, this value focuses on cost reductions through the creation of CUAPs. CUAP MANSO, as a new agent, and an organic dependent of the Catalan Institute of Health (ICS, as abbreviated in Spanish), provides care to non-critical patients with basic diagnostics (laboratory and radiology) on a continuous basis. This care costs more than primary care, but this is much less than emergency care in a third-party hospital.

At the same time, hospitals have different interests: Platón Hospital and Sagrat Cor Hospital wish to increase patient flow. Clinic Hospital, on the other hand, wishes to reduce the flow of non-critical patients while better positioning itself in the long run as a critical care center, improving productivity and reducing waiting times.

In turn, the innovation provides Emergency Medical Services (SEM) with improved efficiency of resource use.

Finally, another group of agents affected by the innovation are the local Primary Care Centers (CAPs). With the innovation, these centers see emergency patients cared for more quickly. They are also more effective at detecting the needs of chronic patients, allowing new initiatives to be launched to identify those at risk within the community.

The **contribution** of these agents in most cases focused on training, coordination tasks, and personnel reorganization. The greatest contribution was the creation of the CUAP facilities and the integration of systems to share medical histories.

The innovation has placed special emphasis on working different **channels** to convince agents of the need for the innovation, from CUAP MANSO's effort to educate its patients not to go to Clinic Hospital in non-emergency cases, to training physicians at the different CAPs to channel patients appropriately.

The **relationship** among agents has changed to one of collaborators, but some agents lack incentives to consolidate these relationships.

The innovation means a **change in processes**, or a change in the activities performed, including those beyond the scope of each institution, placing emphasis on the interlinked emergency system as a network of AISBE service providers.

The process changes have required **new management capabilities** in some organizations such as SEM, where management posi-

6 Balance of Emergencies Ordering Plan for 2008-2012 in the city of Barcelona. CatSalut / CSB. February 2012.

tions have been created to incorporate technical skills (care-related) or skills necessary for the innovation; for example, Platón Hospital developed new emergency care capabilities. Clinic Hospital trained nursing personnel for varying degrees of critical injuries and physicians specialized in A&E.

The new CUAP MANSO required urgent care physicians with transversal training similar to family and community care physicians, but also with the ability to think and act rapidly in serious cases, similar to emergency care specialists.

Regarding **strategies**, the different agents have worked to adapt the innovation in various ways. Sagrat Cor and Plató Hospitals have taken advantage of the innovation project to focus on providing better care to patients with public insurance coverage in the Barcelona area. Meanwhile, Clinic Hospital's strategy is to reduce the arrival of non-critical cases, focusing on quality care for complex cases.

These strategies fit with CatSalut and CSB strategies involving the reorganization of emergencies. Likewise, the strategy at the new CUAP fits with the innovation's focus on better coordination between hospital centers and primary care coordination.

The **context** of economic crisis acts both as a facilitator and a barrier to change: it facilitates the changes in mentality required by professionals to implement new processes. However, the payment system associated with emergencies complicates the innovation's development. This is because each center has incentives to increase its activity with all types of patients, which presents a barrier to the use of the appropriate flows based on patient complexity characteristics, a basic characteristic of this innovation.

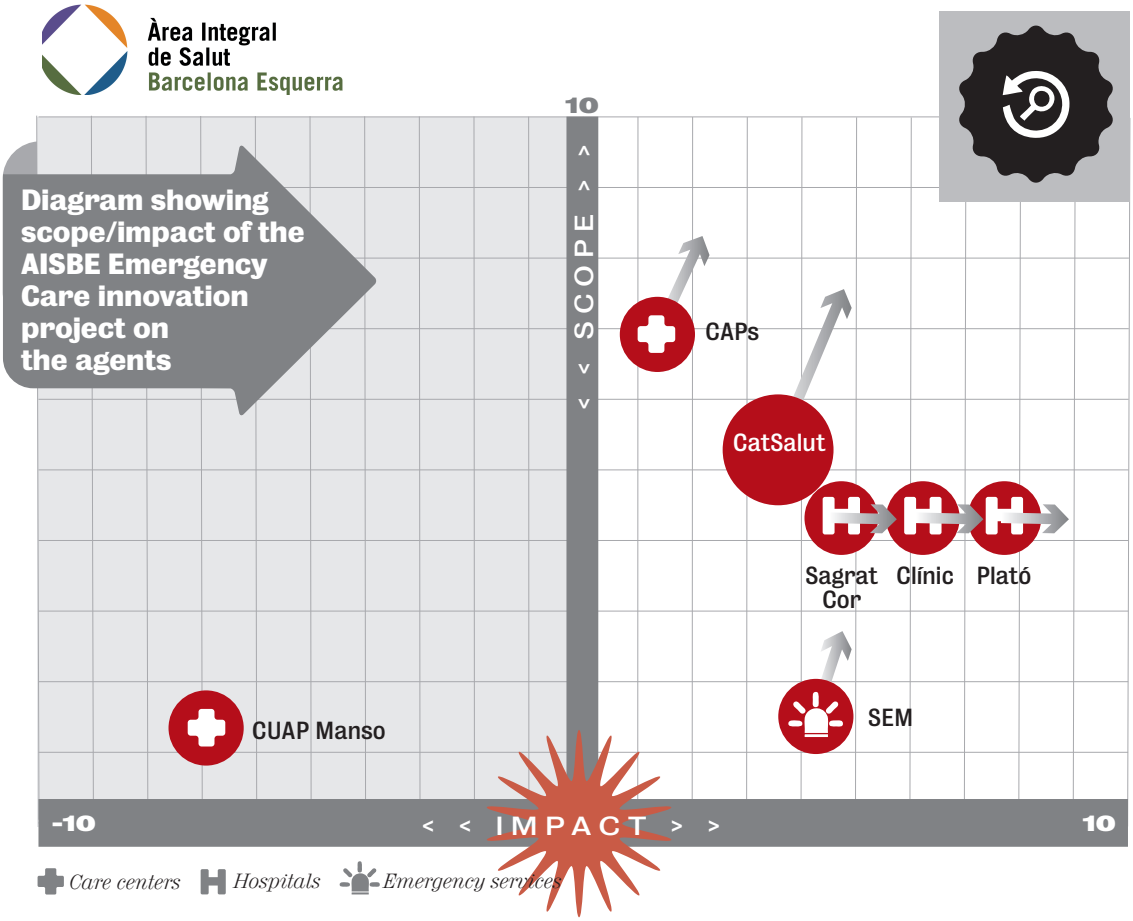
IMPACT ASSESSMENT OF THE AISBE EMERGENCY SERVICES INNOVATION

The following graph displays our assessment of the innovation impact on each stakeholder group. The vertical axis shows the magnitude of the impact according to the numbers affected, while the horizontal axis shows the intensity of the impact, either positive or negative (the net effect considering both the value and the contribution from the stakeholder's perspective). Each arrow indicates the trend that the impact could achieve if the innovation were scaled up.

The three hospitals that participated in the project reported a positive impact, but for different reasons. As explained earlier, they managed to restructure their activity according to individualized strategic criteria. The scope is low if we consider them as individual entities, but since they have an impact on more than 540,000 patients, the scope is significant. If this were a larger scaled project, benefits would be more significant due to improved efficiency on a systematic level.

For CatSalut, the Catalan National Health Service, the innovation involved a better allocation of resources available to the system, which resulted in a positive impact. At present this is restricted to a very specific territory and the magnitude is reduced accordingly. However, this has the possibility of increasing if it is decided to scale the innovation.

With respect to SEM, a global benefit is seen because they carry out a more prevalent role. The positive impact along with the magnitude would increase if the innovation were scaled, mainly because it would be more efficient in



Catalonia, and would possibly benefit from economies of scale.

There are many Primary Care Centers (CAPS) in the Barcelona Esquerra area and their results were positive due to the efficiency of the emergency system, which, in turn, has created more confidence in the system itself.

Lastly, the CUAP Manso is a new stakeholder in the project and had large implementation costs. This is reflected in the chart as a negative impact, mainly due to its creation and operational cost, which are new to the system.

PROJECT 2

HORUS, Electronic Health Record

MADRID HEALTHCARE SERVICE

The **Madrid Healthcare Service** (SERMAS, as abbreviated in Spanish) is the organization responsible for the public healthcare provision system in the Madrid Community and provides healthcare services to more than six million citizens. SERMAS has more than 75,000 professionals who work to provide healthcare services in Madrid.

SERMAS provides healthcare through its network of 36 hospitals and 400 primary care centers. In addition, SERMAS is involved in research and innovation through partnerships with various research institutes.

The HORUS project is the Electronic Health Record of the Madrid Community. It originated as a necessary element for patients to freely select primary and specialized care professionals in the Madrid Community.

Under the concept, "One Citizen, One Clinical History," Madrid's electronic clinical history integrates information from 36 hospitals and more than 400 primary care centers. In addition, HORUS is integrated into the National Healthcare System's Digital Clinical History (HCDSNS, as abbreviated in Spanish) and at the European level (epSOS project).

HORUS integrates 100% of primary care clinical histories and has been used in more than 3.5 million consultations by more than 27,000 users, with more than 1 million accesses.

"The HORUS innovation not only focuses on making tools available for sharing clinical information among professionals to ensure that the patient receives integrated medical care and to avoid duplicating patient tests. It has also fostered a cultural change inside the organization, moving it towards an integration of different care stages, facilitating the application of global processes. In this respect, it has become a key element in the development of the Madrid community health system" Zaida Sampedro Préstamo, General Manager of Health Information Systems, Madrid Healthcare Service.

HORUS is a professional collaboration tool for sharing medical information. It does this through an innovative system that enables

1 NAME	HORUS, computerized viewer for the Madrid Healthcare Service (SERMAS, as abbreviated in Spanish).
2 DESCRIPTION	System to access clinical and care information for all centers in the Madrid Healthcare Service (SERMAS, as abbreviated in Spanish), implemented as an integrated viewer in all clinical work stations at the centers.
3 MISSION	To facilitate immediate access to clinical and care information between centers, encourage continuity in care between Primary and Specialized Care, and encourage collaboration.
4 OBJECTIVES	To ensure integrated patient care / To avoid duplicated testing on patients / To share knowledge among professionals / To access clinical histories from any point in the healthcare network / To digitalize of clinical histories.
5 EXPECTED IMPACT	The expected impact of online availability of clinical and administrative information for all systems consists of improving: the system's administrative efficiency; clinical efficiency, by making patient information available immediately; care quality by avoiding repeated tests; and care quality as perceived by the patient.
6 STAKEHOLDERS	Patients, Specialized Care Physicians, Primary Care Physicians, Emergency Medical Services (SUMMA), CAP (Primary care centers) Management and Administration, Hospital Management and Administration, SMS Epidemiologists and SMS Management.
7 SCOPE	Organizationally, all SERMAS centers participate in providing information. Functionally, the scope has evolved throughout the development of the HORUS system to include complete integration of primary care information and specialized care reports.
8 DELIVERABLES	• The computer system with its different components, principally the viewer. • The implementation of processes for obtaining information in the centers. • The integration and initialization of the viewer at the different clinical work stations.
9 RISKS	The main risk is technological and is related to achieving the adoption of the proposed system in a diverse clinical management context, with existing technology in the care centers within the Madrid Community.
10 SUCCESS CRITERIA	Not defined a priori, the criteria used to evaluate the project include: • Viewer use: number of users, use frequency, volume of information accessed. • Impact on care quality or system efficiency, for example, duplicate diagnostic tests avoided.
11 CONSTRAINTS	Time frames were left open at the beginning of the project. Regarding budget, the project will cover the effort required to implement the processes for obtaining information in the centers.
12 PROMOTERS	**Zaida Sampedro**, General Manager of Healthcare Information Systems in the Madrid Community / **Jesús Castellano**, Assistant General Manager of Planning, Architecture, and Technological Innovation / **Paco García Lombardía**, Area Manager of Innovation, Processes and Strategic Projects.
13 GOVERNANCE, COMMUNICATION & MONITORING	There is no plan for initialization, nor for communication and monitoring.
14 PROJECT CHARTER	There is no character shared with all innovation participants.

the online integration of Primary Care and hospital systems, as well as connection with the Digital Clinical History Center and the Unambiguous Patient Identification System (CIBELES, as abbreviated in Spanish).

The essential element of the innovation project is an IT application (viewer) for SMS professionals, which is integrated into their clinical workstations and allows them to securely access their patients' electronic clinical history in any of the centers within the Madrid Healthcare Service.

HORUS contains a central repository of data to store references to the documents and information collected in healthcare institution and primary care systems.

The project was initiated in September 2009 and consists of three phases:

1. Initial analysis and launch of the system with basic functionality (integration of information from primary care and main hospital centers).

2. Expansion to include all hospitals in the Madrid Community.

3. Incorporation of radiology images and the corresponding reports (PACS/RIS, as abbreviated in Spanish).

At the end of 2012, HORUS had integrated the Madrid region hospitals (with different computer systems) with the region primary care centers and 22 archiving systems (PACS, as abbreviated in Spanish) to integrate image diagnostics, allowing access to 100% of primary care clinical histories and to more than 107 million episodes, more than 23 million episodes with reports, and 6.8 million imaging episodes.

The information accessible in HORUS includes specialized care reports such as Discharge Reports, Monitoring Reports, Hospital Discharge Care Reports, Laboratory Reports, Preanesthetic Reports, Radiodiagnostic Reports, etc.

The HORUS project has facilitated the free selection of specialists, family physicians, nurses, and pediatricians by facilitating access to clinical histories when patients change professionals or centers.

CLASSIFICATION OF THE HORUS INNOVATION

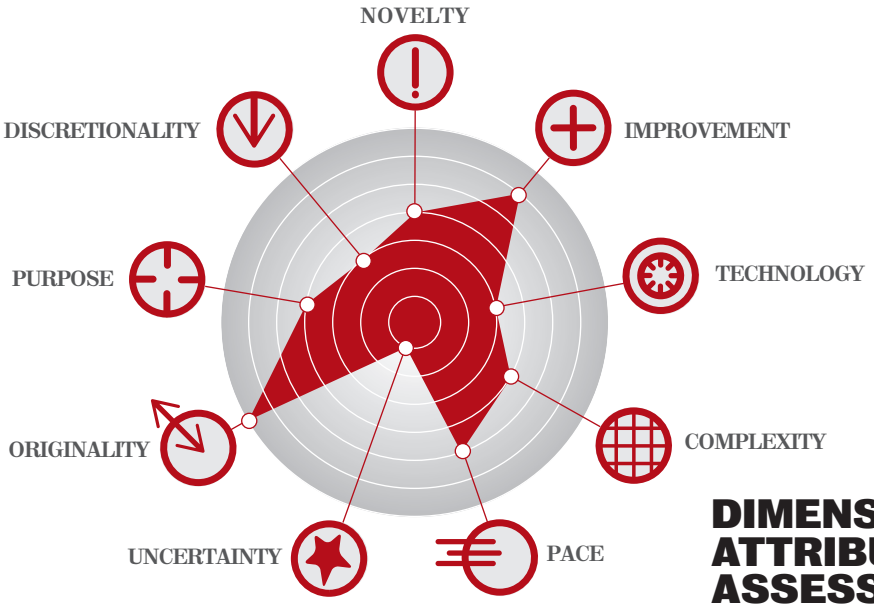
HORUS's innovation object consists mainly of a process innovation, as it changes the process of sharing information among centers without important organizational modifications.

The dimension attributes pertaining to this innovation are:

NOVELTY
Platform
The innovation involves the participation of a group of central SMS services for functional technological project leadership, but requires the participation of all organizations to provide information to HORUS and integrate the HORUS viewer into the existing information systems in each center.

IMPROVEMENT
Major
The innovation provides an important improvement because of the immediacy and ease of access.

TECHNOLOGY
Low-tech
The innovation uses existing, readily-used technology in professional practice.



DIMENSION ATTRIBUTES ASSESSMENT FOR HORUS ELECTRONIC HEALTH RECORD

COMPLEXITY

System.
The main element of the innovation, the HORUS viewer, complements the functions of the clinical workstations in each organization, which are already used regularly by professionals.

PACE

Extreme.
The project initiation pace can be considered extreme due to the pressure to initiate "free selection." This was initiated as a pilot, but it was suddenly decided to broaden the project's application to be able to move forward to launch patients´ choice of providers in a few months.

UNCERTAINTY

Safe
Innovation with few inherent risk elements. The greatest uncertainty in this innovation is its scope, as this includes the needs inherent to broadening system use to other areas.

ORIGINALITY

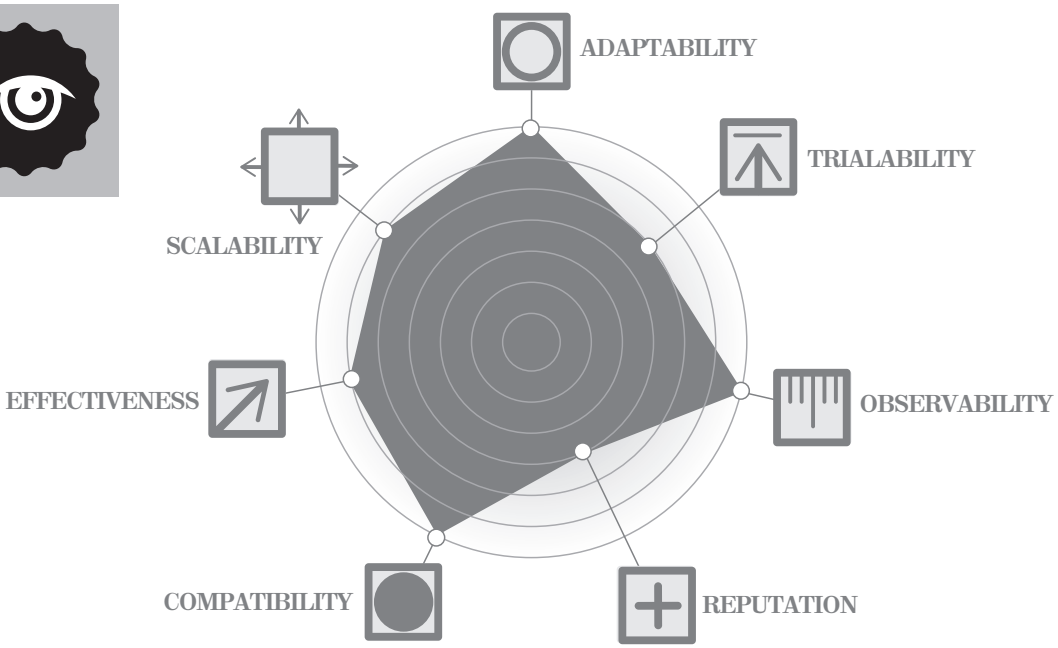
Original
This is an original innovation, developed completely within SMS.

PURPOSE

Support
HORUS is a support innovation for physicians, with no direct impact on medical activities, although it may have a strong impact on the efficiency of professionals.

DISCRETIONALITY

Optional
The HORUS system is optional for centers and professionals. Center participation in the project as information contributors is mandatory, and is related to the initiation of the right to free selection.



FACILITATING ATTRIBUTES ASSESSMENT FOR HORUS ELECTRONIC HEALTH RECORD

The facilitating attributes pertaining to the HORUS innovation are:

ADAPTABILITY
Very High

Completely compatible within the technological and organizational context of different organizations, HORUS has demonstrated its adaptability in its evolution from the initial concept to the time of the study.

TRIALABILITY
High

The innovation can be tested using some centers and services, but to be able to demonstrate its true value, it is necessary for many centers to initiate the innovation and enter their available information into HORUS.

OBSERVABILITY
Very High

All healthcare system professionals have (optional) access to HORUS, and everything incorporated is visible to everyone.

REPUTATION
Medium

The innovation can enhance the healthcare system's reputation by improving its effectiveness. It can do this by replacing the several days that report requests take when they are sent between centers with direct immediate access.

COMPATIBILITY
Very High
The innovation is perfectly compatible with the way the centers work and is incorporated almost seamlessly into the centers' computer applications.

EFFECTIVENESS
High-Very High
The innovation has met initial expectations, but the groups of users and their expectations are growing, and most of them are being met.

SCALABILITY
Very High
The HORUS innovation has been extended to services that were not initially considered, such as epidemiology, and can be extended to others. The innovation can also be expanded geographically, as this innovation can be considered a possible solution to the National Healthcare System's Digital Clinical History.

IMPACT ON AGENTS IN THE HORUS INNOVATION

The proposed **value** is similarly perceived by the majority of healthcare system agents, who consider HORUS an essential element in the continuity of care. For some professionals, the value is less than that expected, as the innovation does not yet contain information such as analytical and radiology tests, which are important to them.

For public health professionals, the project provides greater value than that expected at the beginning, as it allows them to locate all of a patient's information.

For patients, the value is positive as it facilitates changing professionals (free selection) and avoids the task of transferring their patient history. From their perspective, the innovation is a great improvement.

The innovation's cost (**contribution**) has been greater for information services than for professionals. For physicians, the effort required by this innovation is minimal, consisting of training in the new viewer and small changes in habitual care practices. At the administrative process level, the need to transfer physical clinical histories among centers has disappeared and, in some cases, has been converted into requests for the digitalization of clinical histories from centers that do not have yet computerized clinical histories.

Communication **channels** concerning the HORUS innovation have been the usual information systems channels.

Patients have been informed of this innovation in various ways, including the Madrid Community Healthcare Portal, through an entry in the FAQs that explains that the HORUS system is a system that supports changing physicians.

The implementation of this innovation has altered **relationships among agents** (health professionals) because much information that had to be obtained through phone calls or spe-

cific requests is now available via Horus. This has significantly reduced the amount of direct communication between professionals based at different centers. The innovation has been implemented in three stages.

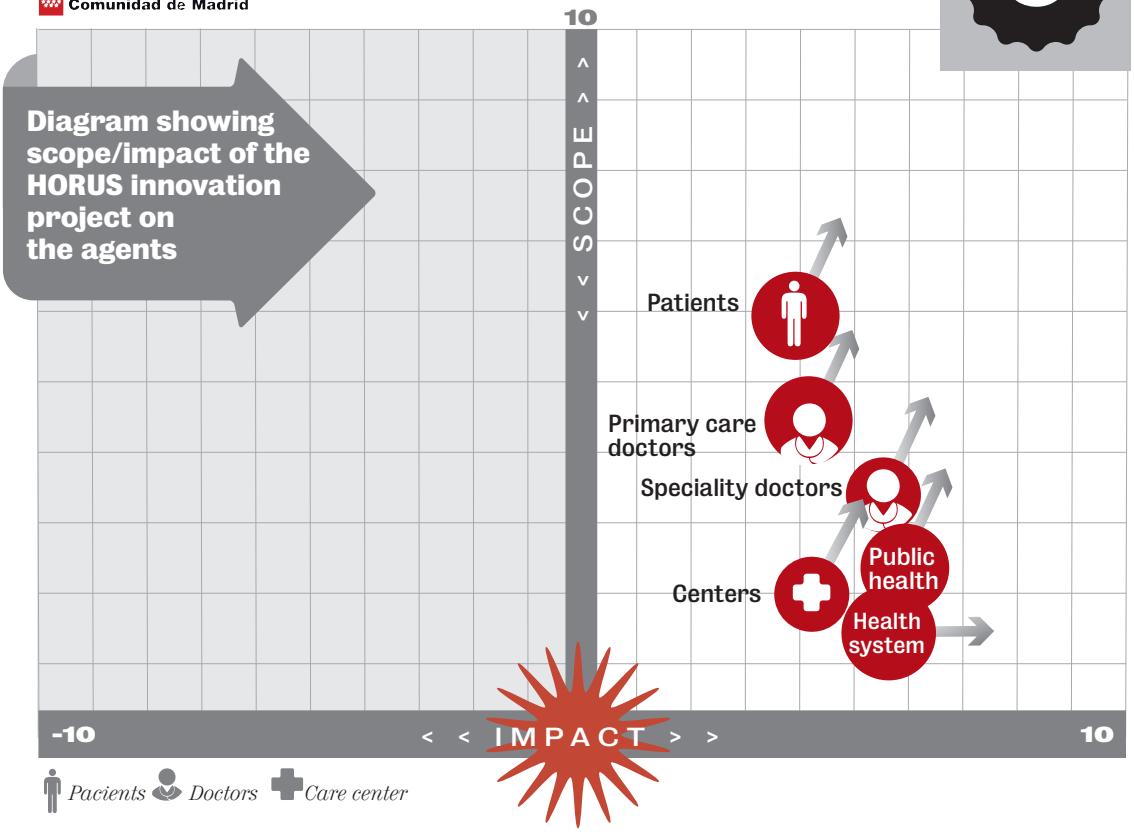
The **access channels** to and from those involved has depended on the stage of their incorporation into the project: the participation of professionals in functional groups (phase 1), the establishment of user groups and collection of feedback by email (phase 2) and a communication campaign directed at all professionals (phase 3).

The effect of the innovation on key **clinical processes** is very limited, as it only facilitates the obtaining of information. It has greatly facilitated the **administrative processes** of requesting information, which, with HORUS, has largely disappeared.

The changes have not required professionals to develop new **capabilities**. However, as it is required of organizations, it has resulted in the creation of the clinical history digitalization center, providing an integrated solution for paper histories.

The innovation is perfectly aligned with SERMAS **strategie**s, and, in particular, the need for HORUS was generated from the free choice strategy.

The economic **context** was significant at the time of development. Likewise, the technological **context** is important, as the innovation is based on the capability of organizations to integrate the viewer into their clinical management systems.



IMPACT ASSESSMENT OF THE HORUS INNOVATION

The graph shows the value and cost assessment of the innovation described above and the subsequent results for the individual stakeholders.

All of the participants received benefits from the project, as the discretion to use or not use HORUS is high, and the costs of the development and usage are minimal.

The patients are the ones benefitting from the biggest impact as they can change doctors without having to carry around their own health records. Patients also benefit from the fact that their medical information is always available to their chosen doctor.

This is also beneficial to doctors, both Primary Care Physicians and Specialists. Specialists find this system especially useful because of their need to consult more external information.

As another benefit of this system, the wide availability of information leads to less work and effort in terms of the information circulating among professionals and medical centers. This is a major reason why clinics and healthcare systems in general truly benefit from this project.

Additionally, public health professionals and consequently, the general population, will benefit from the availability of information in HORUS.

PROJECT 3

Integrated Supply Unit Project

MURCIAN HEALTHCARE SERVICE

The **Murcian Healthcare Service** (SMS, as abbreviated in Spanish) is the organization responsible for the public healthcare provision system in the Autonomous Community of Murcia and has 11 hospitals assisting a population of nearly 1.5 million inhabitants.

Innovations are developed and implemented in cooperation with the Murcian Regional Healthcare Research and Training Foundation, whose fundamental goals are the management of knowledge, research, and innovation project management in the biomedical field.

The Integrated Supply Unit Project (UAI in Spanish) for the Murcian Healthcare Service (SMS, as abbreviated in Spanish) is a project involving innovation in the SMS supply chain with the objective of improving efficiency and reducing SMS supply costs.

The supply chain begins with the request for new material in hospitals and ends with the daily delivery to more than 1200 consumption points shared by the entire Murcia Region, going through restocking planning, inventory control, contracting, and purchasing through centralized tenders.

Up to December of 2012, this innovation had brought savings of €16 million and an inventory reduction of healthcare materials of more than €4 million.

"The essential or most innovative aspects of our project are: first, that it integrates all aspects of the supply chain; second, our relationship with the logistical operator changes, being managed through an Open Book; and, finally, the creation of technical committees, which act as a filter and help to rationalize the materials catalog and define the technical criteria within the bidding process." Vicente Fernández, Head of the SMS Integrated Supply Unit.

1 NAME	Integrated Supply Unit (ISU)
2 DESCRIPTION	Restructuring of the entire SMS supply chain through the establishment of the ISU as a logistical operator that centralizes the management of purchases, storage, and supplies right to the point of consumption. The logistical operator is outsourced due to their greater knowledge and experience in logistics.
3 MISSION	The mission of ISU is to take advantage of improvements throughout the entire supply chain, reducing supplies through knowledge of real consumption, and negotiating more competitive prices with providers.
4 OBJECTIVES	• To reduce total SMS supply provision costs. • To simplify the supply process, unifying and reducing the product catalog. • To reduce inventories.
5 EXPECTED IMPACT	The expected impact is a reduction in costs through the unification of catalogs, and a simplification or elimination of logistical tasks completed mainly by nurses and administrative personnel, who can therefore devote themselves entirely to those activities in which they provide the greatest value.
6 STAKEHOLDERS	Nursing personnel, physicians, and porters; Supply services, contracting, and hospital management; Central SMS services; and Providers.
7 SCOPE	All SMS healthcare institutions using non-pharmaceutical supplies. The project's reach has varied since the beginning, but expansions have been proposed, such as inter-hospital transport or extending the Kanban system to primary care centers (CAPs, as abbreviated in Spanish).
8 DELIVERABLES	• Logistical platform that includes an information system, double packing crate and radio frequency equipment. • Customized catalog tool. • Computerized ordering application. • Centralized purchasing procedures.
9 RISKS	The context of the economic crisis causes providers and professionals to be more willing to collaborate and save on purchases, but cannot ensure that the investment translates to a reduction in purchase prices.
10 SUCCESS CRITERIA	Project initiators consider repayment of the investment and savings produced criteria for success.
11 CONSTRAINTS	Initial limitations to the innovation project's development have not been specified.
12 PROMOTERS	**Vicente Fernández**, Head of the Integrated Supply Unit. **Diego Fernández**, General Technical Secretary. **Encarnación Zamora**, Contracting and Project Services Manager.
13 GOVERNANCE, COMMUNICATION & MONITORING	The ISU project plan includes a communications outline consisting of a management committee and work groups for communication with management and warehouse managers.
14 PROJECT CHARTER	A *Business Case* with a 10 year payback through savings in bidding processes, inventory management, and improved logistical control was developed.

UAI INNOVATION

The main beneficiaries of this innovation are Murcia citizens, who will have a more efficient and less expensive healthcare system.

This innovation involves the creation of a logistics center, managed by an external logistical operator, to take advantage of the provider's knowledge and experience in logistics management.

More than 1 million requests are managed annually through the new central warehouse, the sole warehouse for the region's 11 hospitals.

At the end of 2012, the project had resulted in the simplification of the catalog, eliminating 25% of the 70,000 total references in the initial catalog of different products consumed in the SMS.

The redesign of supply processes has allowed the simplification or direct elimination of supply management tasks that were previously performed by nurses, physicians, ward staff, and administrative personnel at the hospitals.

By the end of 2012, more than 30 centralized tenders had been carried out for healthcare materials, which represent an average savings of 19%.

CLASSIFICATION OF UAI INNOVATION

The UAI project may be classified as an organizational innovation, as it creates new organizational structures (like the UAI Center itself) with coordination mechanisms (technical commissions) that consolidate a network of professionals and institutions that must adapt their work methodologies to achieve greater coordination. At the same time, logistics centralization entails process efficiency improvement so UAI can also be partly considered as process innovation.

The dimension attributes of this innovation consist of:

NOVELTY
Breakthrough
This represents innovation that is not only about making changes to existing processes, but designing some new processes that have profound financial and organizational implications. While there are other similar practices in the industry, they are not as wide, they do not reorganize all the stages of the supply chain, nor do they introduce "open book" payment systems, which are completely new within the industry.

IMPROVEMENT
Significant
The systemic benefits consist of financial savings. The innovation also frees up staff time, which may then be devoted to higher value-added tasks.

TECHNOLOGY
Medium-tech
The innovation requires the integration of information systems, the installation of kanbans and smart closets. Some of these elements are not widely used in the industry and are unknown to some users.

COMPLEXITY
System
Innovation deals with a large number of organizations that must be coordinated in various dimensions: unification of the catalog; purchasing; and logistics processes.

DIMENSION ATTRIBUTES ASSESSMENT FOR UAI

PACE
Normal
Project with a reasonable timeframe, it has a different degree of consolidation at SMS hospital centers.

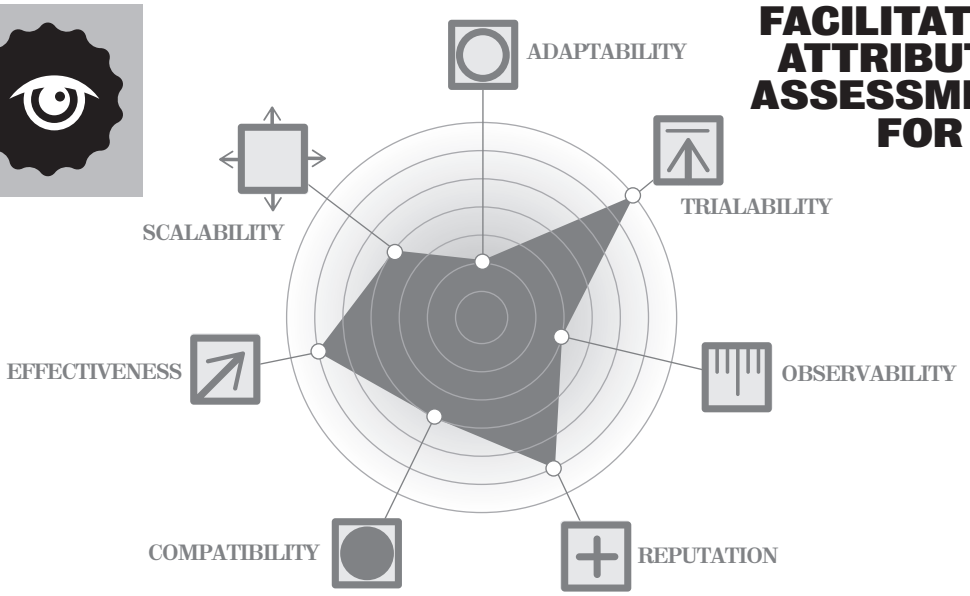
UNCERTAINTY
Normal
Initially with a high degree of uncertainty because of the serious consequences that errors could pose for the logistics system in critical areas of patient safety. However, the project began with success in the Hospital Universitario Virgen de Arrixaca area and was later extended to the rest of the SMS.

ORIGINALITY
Adapted
The innovation has been developed within the SMS but the components are not new; they have been incorporated from other practices through adaptation and integration into the SMS.

PURPOSE
Administrative
The main processes modified by the innovation are not clinical nor are they directly related to patient care, although they manage materials that are used in the medical practice.

DISCRETIONALITY
Authority
The innovation project decision is made from central services and the different units do not have the option of not introducing it into their fields of activity.

FACILITATING ATTRIBUTES ASSESSMENT FOR UAI



The facilitating attributes of UAI innovation of the SMS are:

ADAPTABILITY
Low

The philosophy of centralized decisions and the principles of logistics management cannot be altered in each unit, but it is possible to modify the catalogue in accordance with the needs and wishes of the different interest groups (patients, physicians, nursing staff) as well as regarding product requests. From a logistics viewpoint the requests can be adapted to each center's stock levels.

TRIALABILITY
Very High

The innovation can be tried in a pilot area before implementing it throughout the entire health system. This is, in fact, what has been done. At the time of the study, the innovation was already consolidated in some centers while in others the logistics part had not been implemented.

OBSERVABILITY
Medium

The innovation is very visible in the changes to personnel's modus operandi, but at the time of the evaluation, it was considered that results would not be easy to measure. At the closing of the report, some of the results had actually been measured.

REPUTATION
Medium

Different groups of people, such as orderlies, the nursing and administrative staff, will be able to perform their tasks better which will contribute to a better reputation.

COMPATIBILITY
Medium

The innovation completely changes administrative and medical personnel's work routines related to the acquisition of materials. In spite of this, the innovation is accepted since it does not interfere with personnel's critical activities. However, physicians may perceive it as a loss of freedom to choose their preferred products.

EFFECTIVENESS
High
At the time of the project evaluation it was perceived that innovation could meet the initial goals regarding quality improvement and workload reduction.

SCALABILITY
Medium
For political reasons it is difficult to expand the innovation, but it would be easy to replicate in other communities' health services. Pharmacy products have not been included, but it could be done easily, with the incorporation of more closets and "kanbans" systems.

IMPACT OF THE UAI INNOVATION ON STAKEHOLDERS

For the SMS managers, the value of the innovation is wide and includes financial savings, order and regularity of services and a reduction of work for the healthcare professionals. At the same time, it frees up hospital space and saving on personnel.

Financial management will highlight savings in purchases, personnel, increases in the stock supply frequency, service guarantees and the near elimination of its own warehouses.

The logistics operator and hospital centers emphasize as **value** the security that automation provides and the supply frequency (which offset stock reductions) as well as the availability of management information and control that allows for better decision-making and compliance with the ratios established with the SMS.

For suppliers, the UAI value consists of streamlining the logistics by delivering orders to a single location, as well as simplifying administrative management and concentrating marketing efforts and managerial expectations.

The group of hospital centers that perceive a greater value in the innovation are the nursing managers, given that automatic restocking means a reduction in their administrative tasks, although they maintain supervisory roles. Like other professional groups, such as unit supervisors, nursing managers also benefit in the same manner and they also appreciate the greater availability of information regarding the supply and order status.

Suppliers have had to make an initial effort that has lasted over a year and a half, consistent with activity and price organization (there used to be different pricing scales depending on purchase capability).

Nursing staff's **contribution** is minor given that the new work procedures are simple and learning is easy. But there are additional costs for products that are not routinely used and that are not automated, given that the orders must be carried out using the new system and some nurses initially perceived the supply process as less flexible in responding to urgent orders.

At the level of medical staff, the main cost of the innovation has been the loss of autonomy in product choice. Some physicians feel that in the past it was easier to introduce new products and choosing the suppliers of the materials from the same center was considered more flexible.

At the beginning of the project, there were considerable costs for administrative personnel who performed the unification of codes and cataloguing of products.

The act of working with the open book methodology has allowed the **relationship** between SMS and the logistics platform to be a mutually trusting one. Open book is based on sharing the same accounting. This allows not only an

identical language to be shared and facilitates mutual visualization and access to information, but also correctly aligns the interests of both stakeholders, so that what were efficiencies for one would also be so for the other, generating a mutual understanding.

The UAI centralizes the **relationships** with the various SMS suppliers, modifying existing relationships. While it is true that there are some materials that fall outside the centralization process platform, the UAI becomes the most important partner for the suppliers.

In order to communicate and support the innovation, several channels have been created. Regarding suppliers, the UAI (the SMS and the logistics operator) has established an open and continued dialogue with suppliers in order to reach a consensus with them about the new processes and mechanisms.

The UAI platform has created some new **channels** to support and manage the innovation through the figure of the Hospital Coordinator at each hospital. Coordinators are in direct contact with the nursing supervisors to deal with requests, suggestions, etc. This innovation has sought to avoid conflict and to generate approval that is respectful of the centers' own products. It has done this in order to create a unification consensus later on, in a slow but continuous change implementation process. Technical innovations, such as the double drawer, and the resulting reduction in administrative chores, play an important role in the acceptance of change. There has been no salary investment to motivate personnel, or any other type of incentives.

Regarding processes, the perceptions of the UAI innovation stakeholders vary. For the new logistics operator, the processes are more stable and reliable, although not always faster. For suppliers, the processes are an improvement because they facilitate deliveries by centralizing them and the corresponding communications to a single location.

According to nursing supervisors, the processes are now clearer and better known, and they make reference to the purchasing side as well as to the supply side.

On the other hand, professionals believe that the processes are more bureaucratic as more people intervene and the resolutions are less immediate. From the management teams, it is perceived that the material requisition process to request non-routinely used materials is too complicated and involves too many people.

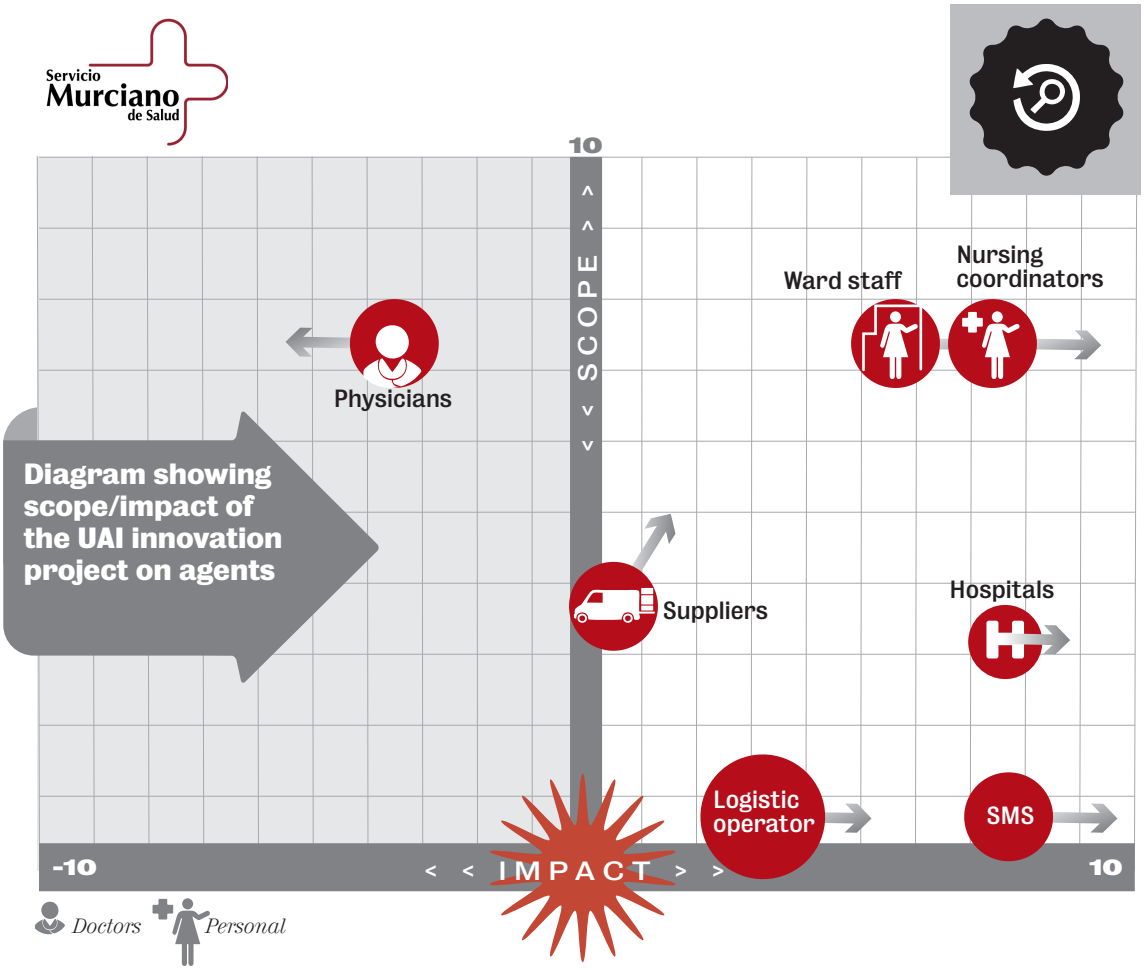
Regarding the **capabilities**, the different stakeholders have required training on the new processes and tools. The platform has staff members assigned to each hospital who currently monitor and supervise adopted procedures.

All the stakeholders believe that the UAI project is coherent within the strategies of the Community, the SMS and the different organizations that comprise it, and they frame it within the strategies for expense containment and visibility.

The selection of materials to be included in the catalog has allowed different parties to participate in the decisions made by the purchasing headquarters and to feel represented.

For suppliers, innovation has implied a change in strategy: while before they were previously centered on adapting to many diverse clients, now they are focused on cost savings and offering more competitive prices to the entire SMS.

The stakeholders interviewed by the different agents involved consider that the **context** of the economic crisis has eased innovation project adoption. With regards to organizational culture, it is believed that these changes require a time period for adaptation.



IMPACT ASSESSMENT OF THE INNOVATION UAI

The assessment of the value analysis and the costs of the innovation show a strong positive impact for the SMS through financial savings, workload reduction of medical personnel and increased hospital space. In addition, more information is available to assist the decision-making process. The arrow indicates that including pharmaceuticals will further increase the positive impact.

The assessment of the providers is neutral thanks to the neutralization between costs and benefits. Despite the reduction of prices, they have unified interfaces, delivery points and commercial management.

The healthcare personnel are the only collective with a (perceived) negative impact as they see a reduction in their power to decide on product purchasing. This impact (perceived by the agent) may be greater with the inclusion of pharmaceutical products.

The impact on nursing management is positive because workers are free from administrative tasks. This could improve with the incorporation of pharmaceutical products in the project.

For the logistics operator (Hefame), the innovation project involves an opportunity, which is why its current position is considered positive.

PROJECT 4

Mobile Nursing Workstations

HOSPITAL UNIVERSITARIO Y POLITÉCNICO LA FE

Valencia's Hospital Universitario y Politécnico La Fe provides healthcare coverage to a population over 210,000 inhabitants within their healthcare area (department) and it is also a referral hospital for other areas within the Valencia Community. Hospital La Fe has more than 1,000 beds, more than 6,000 professionals (among which there are over 2,000 nursing professionals). Its activity includes approximately 50,000 annual hospital discharges and 700 daily emergencies.

Hospital La Fe in Valencia has been a research and innovation pioneering center since its inception, with its own Healthcare Research Institute.

The project consists of designing and introducing a new work tool for hospital unit nursing professionals that provides the devices needed to carry out care plans.

The Mobile Nursing Workstations are carts that combine medication storage and healthcare materials, a computer with clinical history, bar code readers as well as RFID readers, and vital signs monitoring devices.

At the end of 2012, there were 72 working mobile stations in the hospital, with a total of 600 nursing professionals using them. The expected savings from these stations amount to one million euros per year. Half of these savings correspond to the reduction of nursing time in registering vital signs for patients, while the other half is from a reduction in the length of stay due to an improvement in medication safety and shorter time to diagnosis, as well as greater reliability in treatment and monitoring. In the future, the mobile workstations will also house the module for medication delivery integrated with the HIS, which is expected to generate more than 300,000 euros of additional savings in each of the hospital wards.

"The project main objective is to achieve zero errors in medication and in the collection of clinical measurement from patients, and facilitating the work of nursing professionals, eliminating non value-adding tasks from the current care process". Bernardo Valdivieso, Planning Director at Hospital La Fe.

1 NAME	Mobile Nursing Workstations.
2 DESCRIPTION	The mobile nursing stations are carts for use in hospital in-patient floors that integrate different devices such as a bar code reader, a computer with wireless access to the patient's clinical story, measuring devices and automatic entry of vital signs, a medications bar code reader and cabinet capable of storing healthcare materials.
3 MISSION	The mission is to equip nursing professionals with modern tools for providing care to hospitalized patients, thus improving the quality and safety of such care.
4 OBJECTIVES	Improving efficiency, staff will have all necessary information and tools available at the foot of the bed / Reducing trip times and the duration of some activities such as the taking of vital signs / Improving safety through a reduction in drug administration errors.
5 EXPECTED IMPACT	The impact is two-fold: improvement in quality of care and reduction in medication dispensation errors. It is expected that this will affect the population admitted to Hospital La Fe.
6 STAKEHOLDERS	Patients, Nursing Staff, Nursing Supervisors, Hospital La Fe and Valencia Healthcare System.
7 SCOPE	The scope includes Hospital La Fe's inpatient areas in Valencia. The innovation mainly affects nursing care, allowing nurses to have access to all the work devices in the cart. The medical prescription module is not available yet, but it is being taken into account in the innovation.
8 DELIVERABLES	Carts with medication drawers, perishables, a touch-screen, a bar code reader, and a monitor for taking vital signs, Wi-Fi connection and radio frequency. / The proper installation to keep the system in working order (wireless Wi-Fi network, active radio frequency network). / Adaptation of information systems application: clinical histories for mobile touch-screen.
9 RISKS	The average age of Hospital La Fe's nursing professionals is over 55. Thus, they are not accustomed to using information technologies and for many years have been working with paper clinical histories and following very established procedures.
10 SUCCESS CRITERIA	The driving forces considered success criteria: improvements in patient medication safety; higher nursing efficiency and increased nursing professionals' satisfaction with the new tool.
11 CONSTRAINTS	No initial limitations were specified during the development of the innovation project.
12 PROMOTERS	**Bernardo Valdivieso**, Head of the Planning Department, Hospital La Fe / **Marisa Correcher**, Subdirector of the Systems Department, Hospital La Fe / **María José Saura**, Head of Nursing, Hospital La Fe. / **Jesús Delgado Ochando**, Nursing Assistant Head, Care and Education areas, Hospital La Fe.
13 GOVERNANCE, COMMUNICATION & MONITORING	The project was communicated to the different groups of nurses and to other involved professionals by hospital management.
14 PROJECT CHARTER	An initial cost-benefit estimate is developed which results in savings in personnel costs due to the implementation of this innovation.

The Mobile Nursing Workstations project was started in 2009 with a pilot run at the former Hospital La Fe. In 2010 it was extended to more hospital units and in March 2011, with the opening of the new Hospital La Fe, this innovation was rolled out throughout the entire organization, comprising 72 mobile nursing workstations with approximately 3 carts for each nursing staff unit.

The Mobile Nursing Workstations are information system carts with some drawers to store healthcare materials and medications, a touch-screen to consult and to enter a patient's clinical information in the electronic clinical history, a RFID reader for patient identification and a bar code reader for medication management.

The carts also include a monitor for the measuring and entering of vital signs, such as blood oxygen saturation levels, temperature, blood pressure and heart rate levels that automatically sends the data collected to the Hospital's Electronic Medical Record (HCE, Spanish acronym).

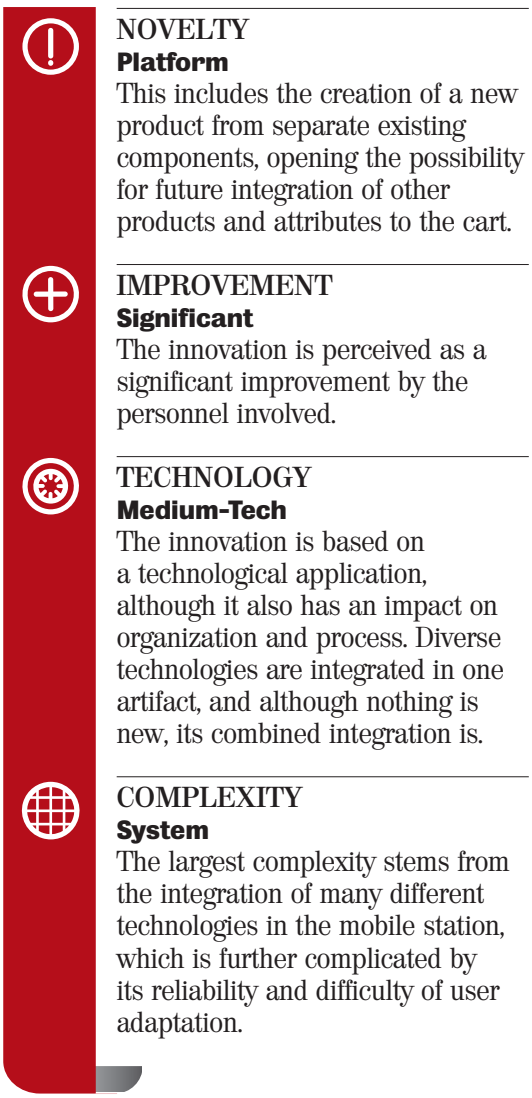
These mobile workstations combine novelties in mobile platform design regarding safety, usability and ergonomics, as well as technological advances to place the necessary tools at the location of care.

This innovation is geared towards improving the quality of nursing care plans within the hospitalization process and, therefore, improving the quality of care provided at Hospital La Fe.

CLASSIFICATION OF THE MOBILE NURSING WORKSTATIONS INNOVATION

The Mobile Nursing Workstations Project can be classified as a product innovation, which focuses on the design, building and deployment processes of the Mobile Nursing Workstations. This innovation also modifies the nursing process in hospitalized patients without the need to modify the organization.

The dimension attributes of this innovation are:

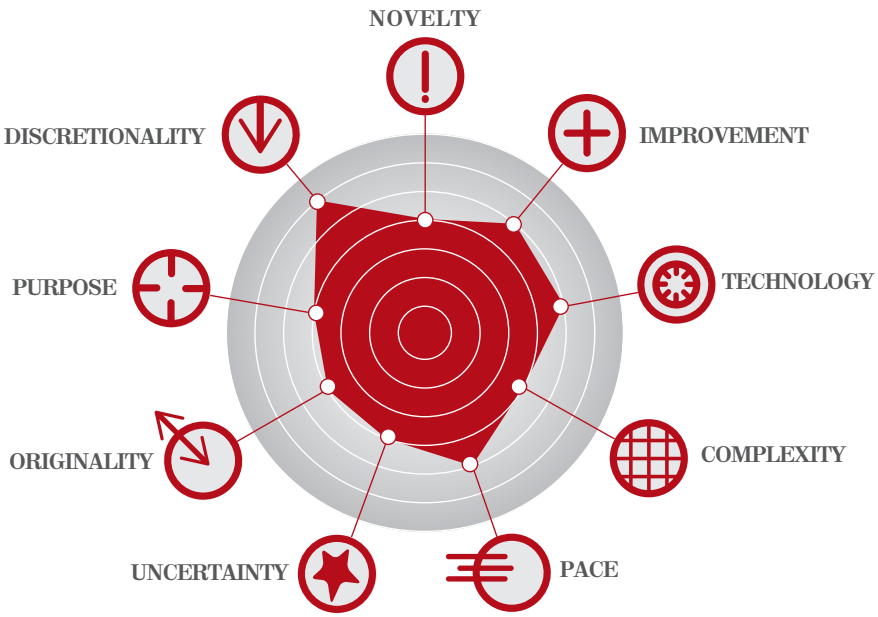


NOVELTY
Platform
This includes the creation of a new product from separate existing components, opening the possibility for future integration of other products and attributes to the cart.

IMPROVEMENT
Significant
The innovation is perceived as a significant improvement by the personnel involved.

TECHNOLOGY
Medium-Tech
The innovation is based on a technological application, although it also has an impact on organization and process. Diverse technologies are integrated in one artifact, and although nothing is new, its combined integration is.

COMPLEXITY
System
The largest complexity stems from the integration of many different technologies in the mobile station, which is further complicated by its reliability and difficulty of user adaptation.



DIMENSION ATTRIBUTES ASSESSMENT FOR MOBILE NURSING WORKSTATIONS

PACE
Critical to Normal

The pilot experiment took place in an old hospital and was rolled out in the new Hospital La Fe without time to completely test the new technology in the new setting. Afterwards, the program had a normal pace.

UNCERTAINTY
Normal

Even though the technology was not completely reliable, in the case of failure it was possible to use the previous existing system. It has always been believed that the project's implementation would be successful.

ORIGINALITY
Adapted

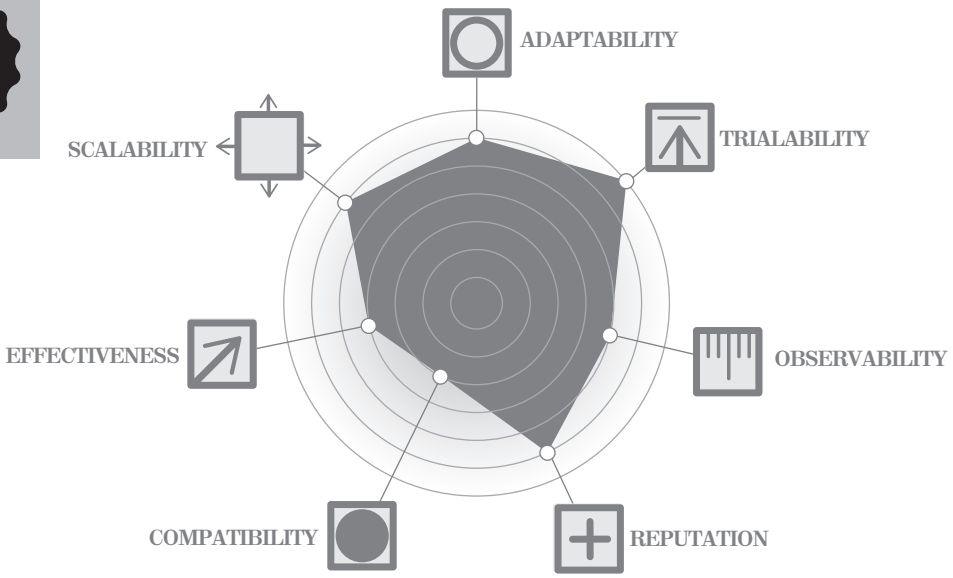
Mobile workstations at the point of care (in this case, at the foot of the bed) are not a novelty; the cart supplier had previously provided similar solutions for other hospitals. However, this design is original and incorporates instruments for the constant observation of vital signs and medicine dispensation, both synchronized with electronic medical records.

PURPOSE
Supporting

The innovation changes the nurses' work method through task systematization and improved security. Because it does not significantly change the attention given to patients, it is considered a supporting innovation.

DISCRETIONALITY
Authority

The innovation project was a decision made by hospital management.



FACILITATING ATTRIBUTES ASSESSMENT FOR MOBILE NURSING WORKSTATIONS

The innovation's facilitating attributes in the Valencia La Fe Hospital are:

ADAPTABILITY
High

The innovation can be adapted to fulfill any work that must be done at the point of patient care. Also, it is possible to incorporate other tools in order to extend the innovation to other personnel, for example, a doctor's PDA or tablet connected to the same network.

TRIALABILITY
Very High

An experimental pilot test was done before its deployment to the entire organization.

OBSERVABILITY
Medium- High

The innovation is visible since the nursing staff members are already using the new cart. The results are not yet fully measurable because the project is still at its initial stage and technical problems are still being addressed.

REPUTATION
High

Nursing professionals are improving their reputations for being more efficient in administrative work, follow-up, and checking vital signs of inpatients.

COMPATIBILITY
Low
Due to the fact that the nursing staff have traditionally worked with paper health records, the capacity and willingness of the personnel to work with better information technology is low. Tasks such as follow-up and registration in electronic format involve a departure from previous procedures.

EFFECTIVENESS
Medium
The innovation can reach its initial objectives, but the process is complicated by some technological difficulties in its implementation.

SCALABILITY
High
This innovation is easy to scale up to other areas of the hospital that already work with electronic health records. It is adaptable to other hospitals in the Valencia Community because they have the same system of medical records (Hospital Information System, HIS) which is adaptable to the mobile application. Broadening the use of the innovation into other areas, such as doctors or surgeons, would require adaptation of the cart.

IMPACT OF THE MOBILE NURSING WORKSTATIONS INNOVATION ON AGENTS

Most of the agents interviewed state that the principal **value** of the innovation is the resulting improvement in medical security and quality of care.

The nursing staff and managers value the availability of information and the materials and tools that work at the point of care. Similarily, the integration of the machines that measure vital signs with electronic medical records saves time and avoids errors, which subsequently leads to more confidence when making decisions.

The patients value the tool and the work process, and consider the project to be a step towards improving the quality of care.

The innovation involves significant **costs** in terms of nurse training and adaptation. On the one hand, there is a cultural change in favor of the use of information technologies, which is not easy for some, especially taking into account the average age of the nurses. Alternatively, the remaining nurses report that there are problems with the base technology (slow information downloads, lost Wi-Fi connection, short battery life) that require additional effort to resolve.

The experimental innovation took place in a pilot room in order to generate confidence, recognition and prestige, which in turn, helped to communicate and motivate the innovation on the other floors of the hospital.

The training department supported the innovation initiative, repeatedly visiting and anwering questions on all of the hospital floors, along with proper training for the professionals using the carts.

To facilitate the access **channel** to the innovation, a simulated environment was created on a hospital floor. Five hundred nurses learned how to operate the mobile stations by recreating the complete patient care circuit on this simulated environment, with different carts and hospital rooms.

The innovation principally modifies two types of **relationships among agents:** One between the nurses and the patients, and one amongthe nurses themselves. The cart allows the nurses more time to communicate with patients. However, some patients, the chronically ill for example, felt that the treament was distant and that the dialogue during the taking of vital signs had been reduced because of the automation. In respect to the relationships among the nurses, they previously had more contact because they had to check into the nursing stations more frequently, which is no longer the case.

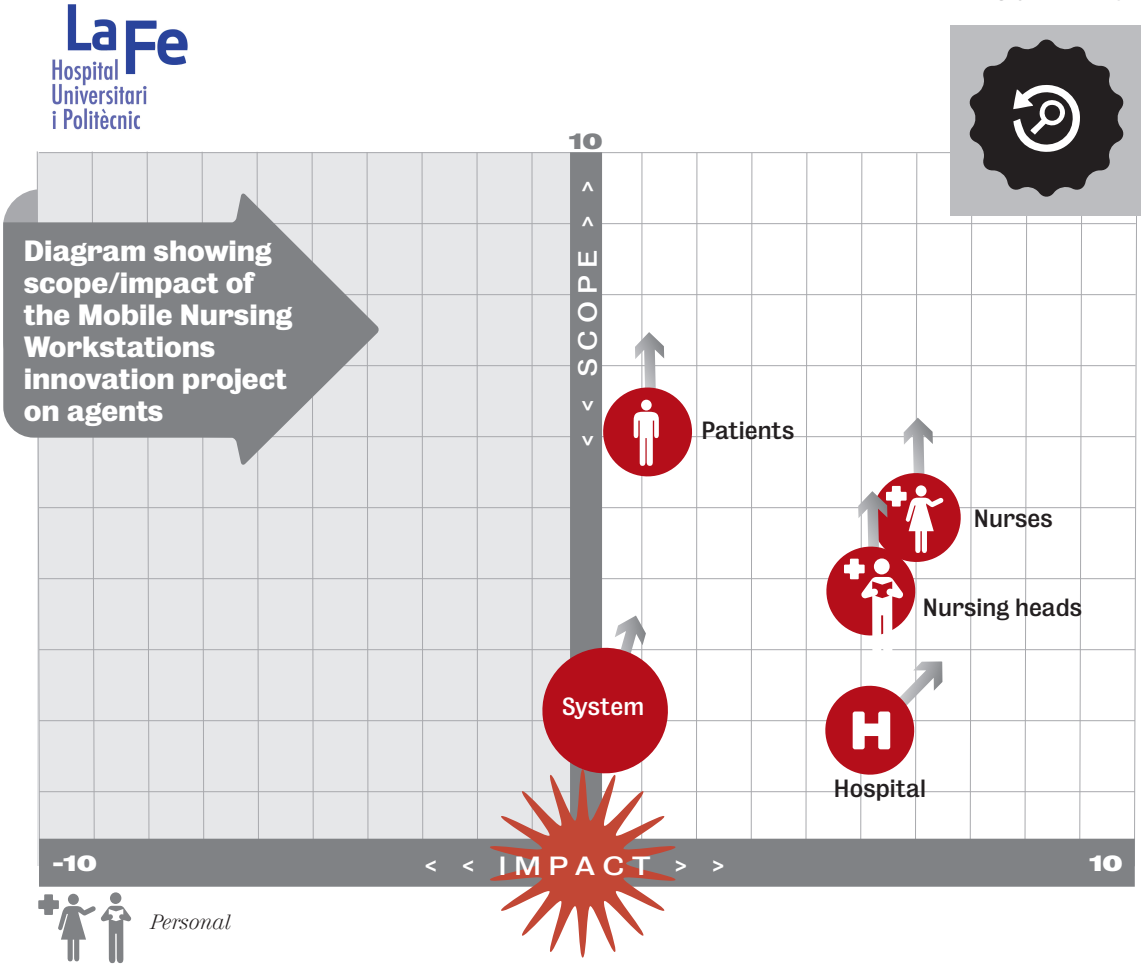
The innovation of the Mobile Nursing Workstations was simultaneous to the introduction of the Electronic Medical Records in the hospital. These two initiatives allow the staff to consolidate some **process** changes to patient care that were already implemented in recent years, such as the nurse-to-patient assignment model and a protocolization of the care plan model. The innovation facilitates these changes by giving the nurses greater autonomy.

The implemented changes require new **capabilities** in the user, mainly in training in the new application and testing of the instruments to gain confidence. This training was led by the company that supplies the carts.

This innovation is aligned with the hospital's strategy of implementing Electronic Medical Records in order to improve the quality of patient care. It is also in line with the sustainability and environmental plan because it eliminates the use of paper.

The innovation project took place during the hospital's relocation process. The new hospital floors have characteristics that promote the use of these mobile stations. The hospital hallways have more space between the rooms and there are more patients in the hospital area as well as more individual rooms for patients. The hospital also took advantage of the move to make some organizational changes. As a consequence, there were also some dificulties with the implementation of the innovation due to these new installations and practices which were not consolidated at the time.

La Fe
Hospital Universitari i Politècnic



IMPACT ASSESSMENT OF THE INNOVATION OF THE MOBILE NURSING WORKSTATIONS

The value and cost assessment of the innovation shows that the nurses benefit most from the innovation.

The innovation's impact on the nursing management is also very positive since they have more information about the performance of the team thanks to a new software application and work standardization.

For the patients, the innovation also has a positive impact because they benefit from better and safer medical care.

The project benefits to patients, nurses and managers could be extended if the innovation were complemented with other attributes and scaled up.

The Hospital La Fe, in addition to getting an improved quality of service, has also obtained financial savings and better time management in its employees. Similarly, improved efficiency is accompanied by an increase in information availability, which leads to better decisions.

Finally, as a global agent, the Valencia healthcare system has improved because of the prestige that comes with such an innovative project, as well as the experience and the knowledge gained by the project. Scaling up this innovation will be beneficial to other hospitals and to the recipients of the healthcare system itself.