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Cover Story:

The Future is Digital

New Catalonian Digital Health Strategy: A Presentation

Summary: The Digital Health Strategy for Catalonia (Spain) is one of the current few ambitious initiatives of health information systems' transformation in Europe.

Similar to other developed countries around the world, the public health system of Catalonia is subject to tensions, challenges and opportunities that mainly result from an ageing population, rising operational costs, incorporation of new technologies and medical treatments, labour supply changes, the ever-increasing demand for high quality patient care, as well as a higher level of knowledge and demand on the part of citizens (Rossini and Marra 2014; Majchrzak et al. 2016). Within this scenario, a topic that emerges strongly is the transforming role of data management and information technologies (IT) for the empow-

(Kothari et al. 2011).

Locally, the Health Plan is the strategic, interdisciplinary and collaborative framework that guides the actions of all stakeholders within the Catalonian healthcare system in order to improve the quality of life and the wellbeing of the population, the access to and resolution of health services, and the efficiency and sustainability of the system as a whole.

The Digital Health Strategy for Catalonia (Departament de Salut 2017) is designed to achieve the goals as defined by the Health Plan (Directorate General for Health Plan-

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erment of the patient, improved healthcare practice and management, and better allocation of resources (Kudyba 2010).

Healthcare has been identified as one of the sectors with the greatest potential for the intelligent use of data. At the operational level, it allows clinicians to share patient health information throughout different healthcare stances. At the management level, it facilitates transparency and comparability reducing the variability of healthcare practice and increasing the quality and security of care, and enables regulators, insurance companies and service buyers to establish contracts and economic conditions. At the analytical level, it is an opportunity to research new treatments, services and products that fulfil the promise of personalised and predictive medicine. In all cases, it provides patients with access to their data and information and modifies their relationship with professionals and health system (Davenport and McNeill 2013). Healthcare is an information industry where information and knowledge play a key role

ning 2016). As a matter of fact, it is not just a technology update, but a framework for the management of the data and for architecture of the information systems that corresponds to and, in some cases, anticipates the changes taking place in the care model with regard to citizen relations with the health system, in the work processes and in the relationships between professionals. Hence, its approach is systemic, meaning it covers the exchange of data among the various healthcare services and even with other areas, such as social services, and consequently affects the tools used by the care providers. Also, for this reason it provides instruments to intensify collaboration between different actors, define semantic and technical standards and share and take advantage of technological innovation.

The design of the Digital Health Strategy for Catalonia, now being executed, was developed in the course of one year (March 2017 – February 2018) by executives and IT managers of the Catalonian Ministry of Health and care

providers, as well as clinicians and experts in health and care management and planning. The Digital Health Strategy was conceived as a comprehensive exercise with the aim of taking into account the opinions of all the stakeholders who form the Catalonian healthcare system. It was also enriched with an analysis of experiences from the international land-scape. In total, almost 300 people took part in the project through different mechanisms.

Current Situation

Spain has a statutory national health system (Beveridge model), which is characterised by universal coverage and funded by the government through tax payments. Services are largely provided free of charge at the point of care whereas most pharmaceuticals prescribed require a co-payment. There are 17 regional health ministries across Spain, each having political control and jurisdiction over the organisation and delivery of health services within their respective regions.

In Catalonia, the Department of Health is the ultimate authority for the definition and planning of healthcare services in Catalonia. The Catalan Service of Health acts as the purchaser of services and guarantees quality control. At the supply side, the Catalan healthcare system is ensured by an integrated multi-provider public network. Currently, this network comprises 71 hospitals, 369 primary care centres, 96 intermediate care centres, 41 mental health facilities and 422 resources of emergency transportation and other services (rehabilitation, community mental health centres, etc).

Even though healthcare providers are free to select their information systems and interoperability among different software, 98% of the primary care centres rely on the same system. Unfortunately, there are also some drawbacks,

such as the high heterogeneity of information systems in specialised care where 29 different systems coexist, which means substantial technical complexity is needed to achieve interoperability among them.

The Catalan healthcare system, from an IT point of view, successfully completed what could be considered as the first wave of digitalisation. This initial phase consisted of incorporating IT within the care providers with the aim of supporting the work of professionals, namely in clinical workstations and, in large part, nursing, both in primary care and in hospitals, some departmental systems and enter-prise infrastructure systems (ERP).

From an economic point of view, the current model has generated great diversity of systems that results in high maintenance, licencing and evolution costs, which impacts both transactional and departmental solutions. Local capacities of providers, especially during the recent economic recession, have also been seriously limited.

Therefore, it was necessary for the Catalonian health-care system to urgently advance its information services and technologies, both quantitatively and qualitatively, in order to build a person-centred information system. Such a system would facilitate the continuous tracking of citi-zens and patients and be compatible with the professional or the provider dealing with them at a specific time. This new model should offer all the actors common and mean-ingful information that is relevant and of quality, and easy to record, access and analyse if needed. The management of the data and the proposed technological scheme should make possible the extension of new care models, allow the automation of bureaucratic tasks, and facilitate patients' access to their information and interaction with the system.

Key Features of the New information System Model

The longitudinal Electronic Health Record (EHR) is the main feature of the Digital Health Strategy. It represents the functional and technical repository of all the relevant infor-mation on a certain citizen that must be recorded and shared throughout the healthcare system. It is a concep-tual and technological evolution of the medical records that are currently used in the systems of different service providers. A common health record scheme must take into account and align process components (how to make and register events and the route of a citizen through the health system), data components (a shared structure and nomen-clature) and a technological model (how data are recorded, stored and transmitted).

Sharing more and more quality data will make it possible to interrogate and analyse large volumes of information, compare risk factors and different practices and treat-ments, return the results to patients, professionals and
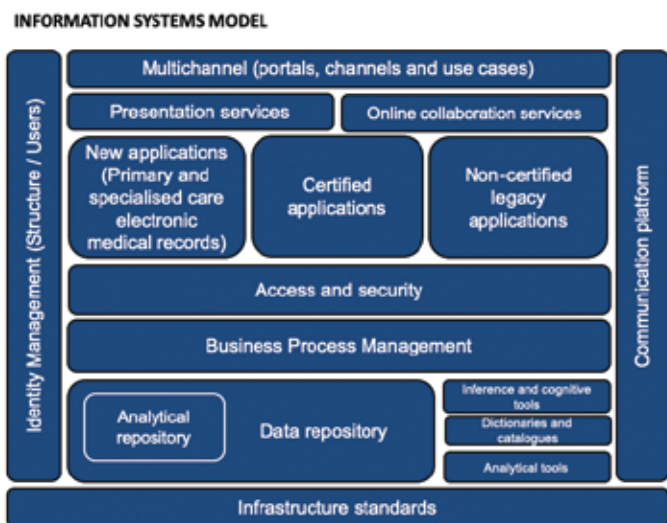

INFORMATION SYSTEMS MODEL

Figure 1. A Simplified View of the Electronic Health Record Model as Defined in the Digital Health Strategy for Catalonia.

healthcare managers, improve decision-making and further move towards predictive and personalised medicine. The strategic plan foresees the construction of an advanced analytical repository for the treatment of structured and unstructured data (text, image, electromedicine devices and wearables).

The EHR also has the potential to become an integral information system that may provide value-added services to the care providers that need or wish to evolve or transform their current systems. Some of the existing systems, such as the main primary care medical record, deserve a profound technological update exercise. This update is also a good opportunity to create an integrated citizen data model that considers the vision of the individual health status together with the logic of acute episodes, regardless of where they occur. In this way, the primary care database will become the nucleus of the central data repository, with which it will be integrated naturally.

This model ('coordinated' technologically and 'participated' in its governance) (Weill and Ross 2004) is well aligned with a health model that needs to share information and is integrating healthcare services in a region, while maintaining the institutional autonomy of service providers to design their organisational processes and structures. The new technological solutions present in the market, more modular and uncoupled and easier to integrate, facilitate these design options.

The introduction of the longitudinal EHR can be considered the second wave of digitalisation, similar to those being recently tackled by other international health systems, both vertically integrated (ie where the regulator and planner is also the owner of the service provider entities) and those where different types of providers coexist. In many cases, diversified systems facilitate greater adaptation to the way each entity works and encourage local

innovation. The healthcare sector, including the one of Catalonia, has been a pioneer in creation and application of digital transformation technologies, particularly in the field of telemedicine. Despite that, a set of factors have hampered the extension and generalisation of many valuable projects.

The strategic plan faces this status and facilitates a cooperative environment in order to foster, evaluate and extend innovation. The main objective is to provide the critical mass and the necessary economic dimension to allow the growth and use of innovation throughout the system, especially those technologies that help to redesign care processes, deploy new ones and develop the new EHR. This is the case with the Big Data initiatives, eHealth and mobility, the Internet of Things and Artificial Intelligence.

Governance

To guarantee the success of the Digital Health Strategy, a governance model of information systems is being implemented combining both executive and regulatory leadership with the participation and advice of the supplier entities, as well as the creation of communities of practice for the development of innovation.

The governance model is designed with ambition to position the Catalan health system at the level of the most advanced organisations in terms of management of data and technologies. These organisations acknowledge the strategic role of information systems in supporting and transforming their work processes and rely on data to make decisions all along the care continuum. Normally, this recognition is associated with a corporate governance of information systems, a stable and recognised management body, a top-level management role of its managers and adequate allocation of economic, technical and human resources.

Figure 2. The 15 Strategic Initiatives of the Digital Health Strategy for Catalonia Grouped in 5 Key Dimensions.

In order for the strategic plan to be effective and credible, a specific funding mechanism is being processed now at the government level. The financing of investments in technology will have to be sufficient to achieve the objectives of the plan, sustainable over time and include incentives that favour the renovation of the technology park and its alignment with the proposed information model.

For the implementation of the strategy, an ambitious, but flexible and realistic executive programme has been established with the aim to simultaneously work on strategic projects that leverage change and improvements in projects and current services to make them converge with the future model, and in immediate actions and decisions, including the removal of services and circuits that do not provide value. In the short term, the aim of construction and initial launch of the central data repository is to make the information from different sources, currently stored in the system, available to the community.

Conclusion

Today, more than ever, the so-called 'digital transformation' (Bharadwaj et al. 2013) means convergence between business and organisational strategies and technology strategy, where the contribution of information technology is clearer for the creation of value.

Information technologies enable different actors in the system to optimise processes and provide much more personalised and effective care. The fusion between healthcare and information technology is transforming the quality of the patient experience at a rate previously unthinkable.

Health systems are undergoing unprecedented changes that seek to improve quality of care and maintain costs while addressing the challenges of the ageing population and the subsequent increase in chronic diseases, global financial crises, the reduction in public spending and the increase in operational costs. In this environment, digital tools and services can help to solve these problems by offering more sustainable, patient-centred solutions. Changes are massive, and the only way to success is proper information systems' strategic planning and governance. ■

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✔ Key Points

- Strategic planning in the public sector is always complex. In the highly fragmented and politicised Catalonian landscape the effort is enormous.

- Multiple stakeholders (more than 300 managers, IT specialists and clinicians) took part in the design, through different mechanisms.

- Unlike other information systems' strategic plans, which are based on the automation of processes, this plan is fully data centric.

- The strategic plan aims to syntactically, semantically and technically unify the data model by building a single longitudinal Electronic Health Record.

- The plan aims to develop a common data repository and analytical services following a 'data lakehouse' approach.

- The Digital Health Strategy for Catalonia aims to set up a backbone to build upon advanced digital services, emerging technologies and innovation.

- Governance is crucial: find a balance between executive direction and industry involvement and participation.

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