Sustainable healthcare services through digitalinnovation (part 1)

June 14, 2015

An ageing world in a major economic global crisis

Our world is facing social and demographics evolution which might compromise the sustainability of current healthcare service organization in developed countries. As shown below, the world is ageing, which is mostly true for developed countries with lower fertility rates. In this ageing world, the prevalence of cancers, and neurodegenerative diseases (Alzheimer, Parkinson) will be on sharp rise. Furthermore, due to totally unbalanced nutrition, metabolic syndrome leading to diabetes, heart diseases is the current/next pandemic. Diabetes only, accounts for 11% to 18% of health spending of developed countries while health spending accounts for 6% to 8% average of GDP in developed countries.

Demographics of Healthcare professionals also involves with aspirations to a more balanced work/life balance, but due to high workload, night shifts, etc.. some medical specialties do not attract medical students anymore (surgery, anesthetics…), and medicine itself does not attract students anymore. So organizational evolutions are also mandatory in that field including medical education patterns to boost job's attractiveness while Generation Y has new legitimate aspirations for their living standards.

Additionally, there is an unprecedented global economic crisis occurring, which might be the symptom of a structural shift. Some economists (Larry Summers and IMF) think the world should get used to secular stagnation of low GDP growth, mostly caused by demographics, and to the “third industrial revolution” (IT revolution), which destroys more jobs than it creates. These lead to pauperization of population, budget cuts and perfect competition between healthcare providers to reduce costs. Healthcare payers will select the best service quality/price ratio for a specific medical procedure and will align their reimbursement levels accordingly: best in class healthcare service providers will still make money, while others will be forced to align their cost structure on best in class providers (with no cash to invest).

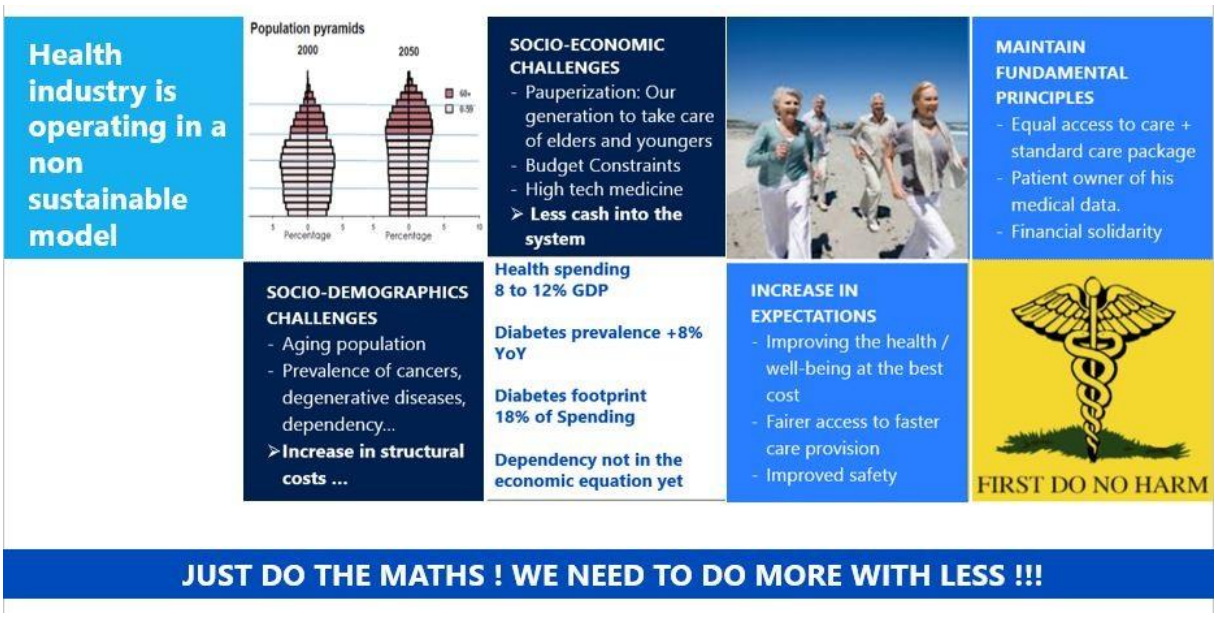
Meanwhile, population’s expectations are on the rise. People want better health and, beyond health, they want well-being. They also want fair and quick access to safer healthcare services due to a zero risk culture. Eventually, governments want to enforce foundamental “principles” such as equal access to healthcare services, minimal healthcare protection (Medicare in the US, CMU in France), and clear patient-ownership of her/his health data.

Last but not least, healthcare is more and more high tech and, hence, expensive. New treatments are very expensive, like: HarvoniTM (Gilead) to cure Hepatitis C (~$75k per patient); bone marrow grafting (above $500k all-up for the first year) etc. Due to zero-risk

culture, a lot of laboratory tests are done to discard differential diagnosis, while their marginal costs are high.

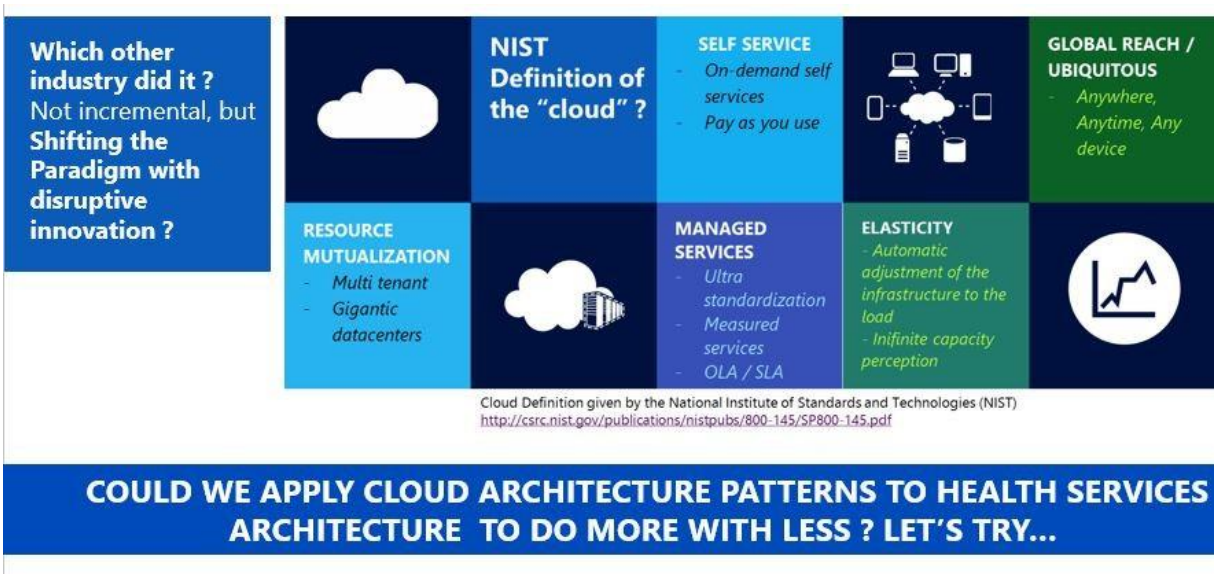
In that context, the supply of high quality healthcare service to our population is less and less sustainable and, for the first time in history, the next generation will experience scarcer access to healthcare services with degrading average quality.

Tough, society choices are ahead: shall we pay for a 3rd chemotherapy line when the two first failed? How many Medically Assisted Procreation should we reimburse (when so many children could be adopted)? Should we pay for neonatal healthcare procedures below 800 grams? Should we pay for drugs which clinical efficiency is uncertain (~25% at least of drugs on the market)?



In that scenario, the questions that raises are: how could we possibly maintain good quality healthcare services with fair, equal access, and improved safety, while reducing the global budget of healthcare in developed countries? What is needed to preserve the sustainability of our healthcare system? **How could we "Do More With Less"** (both budget and human resources)?

While most of industries address fierce competition by incremental improvements of their costs structure, a very few has addressed it with a disruptive innovation, a major game changer, but the IT industry, with the dawn of cloud services. Cloud services have been specifically designed to address this paradoxical issue, to do more with less. I suggest that embracing the architectural patterns[1] of cloud solutions, and applying this to the healthcare services architecture might bring up some new perspective in this industry.

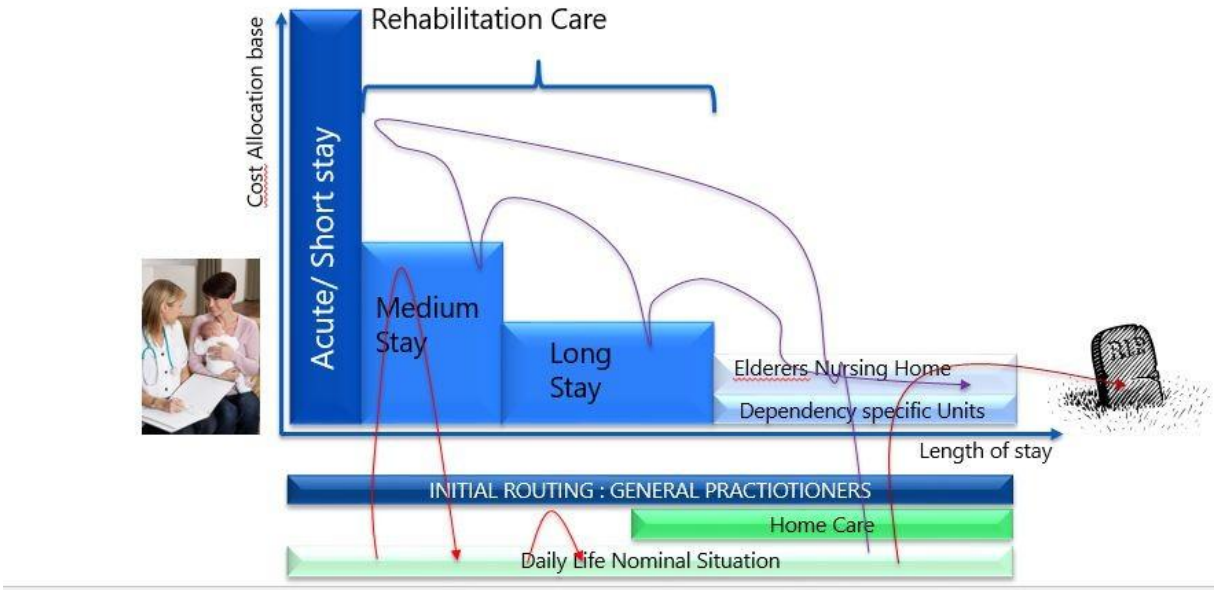


[1] It is not about using IT cloud services to address healthcare service providers issues (although it might be part of the solution), but really to embrace cloud services architectural patterns in an attempt to zero marginal costs of healthcare service providers.

Healthcare Service Provider legacy business architecture

As shown below, most of people go to their **General Practitioner** (GP) when they are sick. They are, then, routed within a complex structure of health service providers ranging from the **Acute/Short stay units** (General/University Hospitals; Private clinics) with high costs per "bed" per day, to **Rehabilitation/Medium stay units**, to **Long Stay units**. The base allocation (price per bed/day) is decreasing along the way, but the length of the stay increases which might have a huge impact on the total costs. Patients with neurological casualties (mostly strokes) in coma might stay for a long time in "Long Stay Units", with still quite a high daily bed price due to the assistance machinery and medical staff required.

The Macro-legacy: Complex healthcare trajectory not fully integrated, not automatically coordinated, not fully rationalized



Organization of acute care is centered on specialization or even hyper-specialization in some domains which require high level skills (surgery): This enables economy of scale as surgeons can reach a critical mass of specific procedures to maintain their expertise and relevancy. From a supply chain management perspective, this hyper specialization reduces the variability of Healthcare Services SKU and hence boosts the economic performance of the system.

However, as the population is ageing, it is rare that someone suffers from one “single crystal clear clinical presentation”, but rather a combination of diseases, a syndrome… While services such as “Internal Medicine” and “Geriatrics” are used to have a systemic approach, most of acute care services are very analytic and focused: they treat their piece of the puzzle and they are done. The patient breaking down into simple clinical units to be treated by medical specialties reaches its limits with medical syndromes (such as the metabolic syndrome) for which integrated care and prophylaxis are the solution with a multi-disciplinary team who addresses the patient as a whole, into a specific social and economic context. Being able to have an accurate big picture of “mega trends” in public health, would enable governments to invest more in prophylactic approaches to change the trends (Michele Obama’s campaign against children obesity) rather than in spending billions to address the symptoms and consequences on their population health.

A lot of time and energy is also spent on finding downstream beds: from acute to rehabilitation, from rehabilitation to long stay. Even in a general hospital, once the patient is out of the emergency services, it takes time to find an acute care bed which is relevant to the considered pathology which generates a lot of overhead in the cost

structure due to patient routing “errors” or absence of appropriate downstream structure (in quality and number):

- Highly skilled professional are doing administrative work to find out most appropriate downstream structure to welcome their patient,
- Patient turnover is slowed down, as a result patients stay in high daily costs beds while they do not need them anymore (from an added value medical service perspective: a longer stay in these beds will not improve their clinical conditions), but need less “technical”, cheaper beds which could improve their clinical conditions due to more appropriate SKU provided there (rehabilitation services).
- Ultimately, at the end of the stream, patients for whom no additional medical service can be delivered (because it would be useless), “embolize“ long stay bed for hospitality services only (~150€/day) while social services should redirect them to more appropriate ultimate downstream structure, *i.e.* specific apartments (~1000€/months) with possibly some medical watch around.

Healthcare safety is also a question of integrated planning. There is a need of a balance between the number of procedures done by healthcare professionals (so they can maintain their expertise and even improve their proficiency) which rationale leads to consolidation: organize healthcare services on major hospitals and close small ones. However, on the other hand, especially for emergency care, the more distant you are from an emergency care unit (ECU), the less chance you have to fully recover from a heart attack, a stroke or even a complicated pregnancy. Therefore, an integrated planning should reflect this mandatory balance, and find solutions to:

- Concentrate people and medical platforms for efficiency (proficiency + economy of scale),
- Distribute, or even “project” (in its military signification) expertize/commands locally where a crisis might require highly skilled task forces,

It is a matter of organization of mobile emergency care units (mobile ECU) with high-tech mobile medical platform. This enables ECU team to stabilize the clinical distress of the patient to transfer her/him to the appropriate Intensive Care Unit (ICU). It is also a matter of Big and possibly Open data, about demographics, healthcare requirements, trends, at the local, regional and national scale with proper data consolidation for accurate insights.

However, despite all the investments and incentives to improve the use of IT, healthcare industry is still far behind other industries because of cultural, organizational and economic reasons:

- Healthcare providers are very complex ecosystems – with an extreme diversity of people, jobs, expertize – which has to collaborate to provide the best healthcare

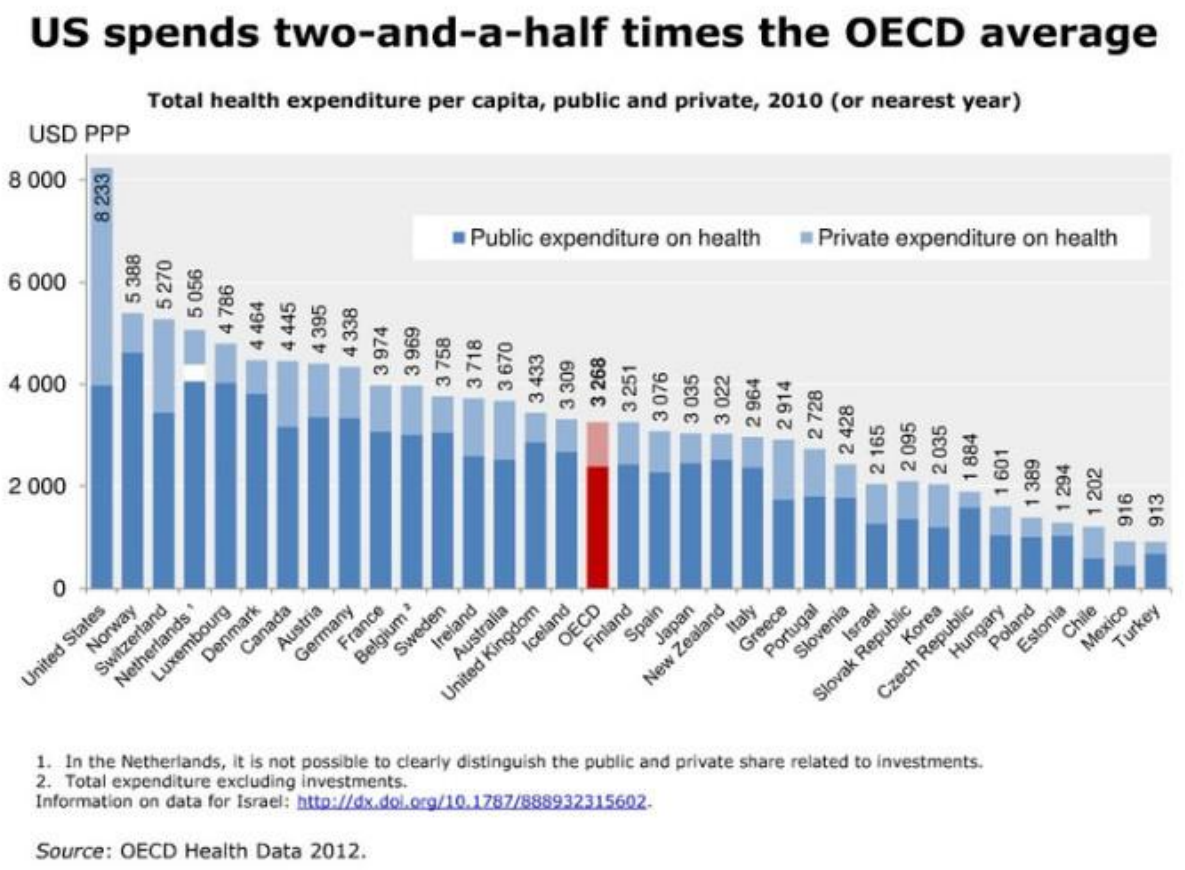
service to the patient, in a rather narrow space, and sometimes in a very short time (emergency case);

- There's a cultural strong legacy of hierarchal top down relationships which do not favor cross team collaboration and innovation;
- Economically, the once half-gods of the hospital, *i.e.* the Chief of Medical Service Professor, are not half-god anymore but just expert resources who need to be managed to deliver expected cash flows;
- Last but not least, historically, healthcare was mostly in the Public Sector and mostly under-budgeted, meaning not very good payers or clients. Therefore, major software vendors are not doing much into that space because it is not as lucrative as some other industries. As an example of their appetite for those customers, a CEO of a major software editor once referred to the industry with: "*Those guys have high expectations for sure… but they never pay, forget it!*"

Hence the market is "atomic", a lot of small to medium vendors (revenues < hundreds millions), with very low interoperability (proprietary platforms to increase the switching costs and create entry/exit barriers), and rather low relevancy (IT guys do not understand the complex healthcare provider ecosystem).

Internally, scarce IT budget are focused on running and maintaining and not on innovation. Most of hospital CIOs have hard times to define a development program / blue print as they cannot have any service disruption while transforming their thousands IT layers stratigraphic "architecture".

Furthermore, a major initiative is coming from the healthcare service payers based on a liberal approach of healthcare services: it aims to create a perfect competition in the healthcare service provider market. Initially, it started in the USA where it destroyed the public healthcare system in favor of private practices, with the results exhibited in appendix 2, *i.e.* the USA spend 2.5 times more than the OECD average (appendix 2) with no additional benefit for their population.



1. In the Netherlands, it is not possible to clearly distinguish the public and private share related to investments.
2. Total expenditure excluding investments.
Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

Source: OECD Health Data 2012.

The sustainability of the healthcare services should leverage other initiatives than a pure economic competition between providers, to get the most lucrative patients and the safer procedures while others will be redirected to public healthcare services with chronic acute budget deficit. Those initiatives should leverage the pervasive digital revolution for a better collaboration to zero the marginal costs of the healthcare services through ecosystem optimization and rationalization.