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A Frugal Approach to Novelty: Patient-oriented Digital Health Initiatives Shaped by Affordable Losses and Alliances

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A FRUGAL APPROACH TO NOVELTY: PATIENT-ORIENTED DIGITAL HEALTH INITIATIVES SHAPED BY AFFORDABLE LOSSES AND ALLIANCES

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Abstract

In this article, the concept of effectuation is introduced to address the question of how innovations in health service organisations arise, in what circumstances, and what mix of factors tends to produce adoptable innovations. Our case study investigates an ongoing initiative to introduce patient-oriented web-based services in hospital settings. In the analysis of the case we point to the relation between the technologies employed and the tactics identified. Our analysis emphasises (1) the role of thinking in terms of affordable losses, (2) the role of alliance building (3) the role of flexible web-based technologies. Building on these core aspects we thematise frugal approaches to novelty and we propose that the concept of effectuation can be useful for exploring change dynamics that transcend the organic/planned and grassroots/top-down divides.

Keywords: patient-centeredness, digital health, effectuation, web-technologies, affordable losses, alliances

1 Introduction

More than a decade ago Greenhalgh and colleagues (2004) published a seminal article that collated large and diverse literature on the diffusion of innovation in health service organisations; the article proposed a unifying model "*illuminating the problem and raising areas to consider*". They identified areas that are well-researched (e.g. the attributes of innovations that promote their adoption, patterns of adoption by individuals, structural determinants of innovativeness in healthcare organisations) and gaps for which they suggested more research. One of the questions they proposed for further research is: "*How innovations in health service organisations arise, and in what circumstances? What mix of factors tends to produce adoptable innovations?*". In our article we address this question by building upon theoretical concepts related to effectuation tactics from recent literature on innovation and entrepreneurship (Sarasvathy, 2008). We apply the concepts in examining the trajectory of a digital health service initiative. To define innovation in health services we adopt the OECD definition of process innovation: "*a process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software*"(OECD, 2005). Consequently, we do not reserve the term only for radical breakthroughs but for all changes that entail moving outside existing health service paradigms.

We report from a longitudinal case study on the development of a web-based application suite for patient-hospital interactions in Norway. We conceptualise this initiative as an instance of technology-enabled innovation that makes possible new types of health services based on participation and shared data (O'Reilly, 2007). For our analysis we build upon the effectuation concept (Sarasvathy, 2008) found in the innovation and entrepreneurship literature from business studies. We identify that contemporary lightweight web technologies can contribute to the instigation and sustainment of digital health initiatives when combined with tactics based on the logics of "affordable losses" and "alliances". Our analysis has a dual focus and covers both entrepreneurial manoeuvres and technologies in use. This synthetic view allows us to examine issues at the intersection of information technology, service design, and innovation.

Specifically, we find that the nature of technology matters for change tactics. Contemporary flexible and lightweight technologies allow experimentation and probing not only within exploratory or research-funded projects but also within regular projects that take place within public sector healthcare organisations with limited resources. As technology makes possible more frugal approaches to novelty it is now thinkable to initiate projects by scoping them only at a high level. Then, they can become gradually concretised with the contribution and involvement of multiple actors from within healthcare organisations. In an era where the organic/planned and grassroots/top-down divides are being blurred, we propose that it is timely and germane for our field to appropriate new concepts from business studies in order to better describe the emerging new rhythms of change (Huy and Mintzberg, 2003).

The article is structured as follows. First, we lay out the theoretical background, then, we provide an overview of the empirical setting and we describe the method used to collect and analyse empirical data. Subsequently, we describe and present our analysis and interpretation. Finally, we conclude by discussing insights from our analysis, pointing also to the limitations of our work and to possible directions for further research.

2 An effectuation perspective on novelty and change

Novelty and change can be the outcome of orderly methodical processes (systematic change), bold initiatives of powerful actors (dramatic change), unruly emergence (organic change) or combinations of these archetypes (Huy and Mintzberg, 2003). It is indeed the combination of all three that seems to be the most fruitful: "*neither dramatic nor systematic nor organic change works well in isolation, (…) they have to be sequenced and paced, creating a rhythm of change*" (idem).

When discussing information technology-enabled change in organisations a great part of research is devoted to analysing efforts of systematic change which entails clear goals, planning and technique (for example, the Journal of Information Technology published a Special Issue in 2007 devoted to the mega programme for the digitisation of UK National Health Service –NpfIT). Systematic change has been central in the traditional change management literature (Lewin, 1947b, Lewin, 1947a, Kotter, 1995) and is epitomised in project and programme management (Avison and Torkzadeh, 2009, Pellegrinelli, 1997).

Interestingly, a stream of information systems' researchers has shifted the focus to organic change (Benbya and McKelvey, 2006, Majchrzak et al., 2000, Orlikowski and Hoffman, 1997, Ciborra and Hanseth, 1998, Germonprez et al., 2007). This research literature is straying away from systematic change by emphasising contingencies, surprises and strategies of cultivation of an existing base: "the concept of cultivation focuses on the limits of rational, human control" (Ciborra and Hanseth, 1998). Cultivation refers to human initiated processes to get some effects, but also to dynamic processes in the material itself. The "material" that needs to be cultivated includes existing technological configurations, professional norms and practices, social conventions, organisational structures, economic arrangements, legal frameworks: the whole heterogeneous sociotechnical assemblage that can be found in any actual organisational setting. The organic view fits a perspective where new

components are never isolated and univocal, but embedded in an intricate web of technologies, practices, routines, to which they relate in specific ways and in specific situations of use (Star, 1999).

Not all scholars downplay the impact of purposeful human initiated processes. A stream of literature originating from organisational studies is contrasting to the cultivation approach and emphasises powerful human agency changing existing arrangements. This literature relates well with dramatic change and discusses "institutional entrepreneurship" i.e. "*activities of actors who have an interest in particular institutional arrangements and who leverage resources to create institutions or to transform existing ones*"(Maguire et al., 2004). Institutional entrepreneurship is a concept that points to the role of interests and power for change in organisations. This is not only a viewpoint different from the one proposed by the cultivation advocates, it is also an alternative to the rational actor assumptions of systematic change, it is a theory of action which emphasizes social skill and tactics (Fligstein, 1997).

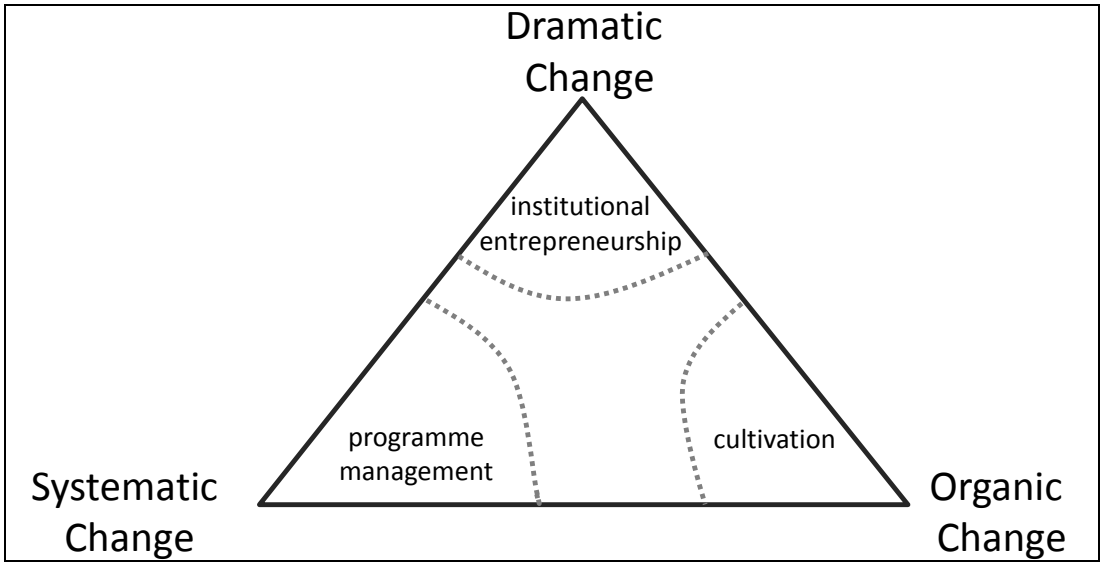

Figure 1. Relative positioning of literature streams related to change

Figure 1 positions the three streams of literature briefly outlined in the previous paragraphs in an adaptation of the "triangle of change" proposed by Huy and Mintzberg (2003). Obviously, the different streams of literature outlined do acknowledge the manifold nature of change and deliberately emphasise the aspects that fit better specific situations researched. Nevertheless, as technology-enabled novelty in organisations frequently happens through dramatic-systematic-organic rounds, having a theoretical conceptualisation that does not privilege one of the modes is essential.

The study of entrepreneurial activity has brought into surface three key elements of the problem spaces of entrepreneurs: a) uncertainty on the future consequences of today's actions, b) goal ambiguity – absence of clear goals, c) reciprocal relationship with an environment that can be enacted in different ways and it is not clear what elements to pay attention and what to ignore (Sarasvathy, 2008). These three elements explain the limitations of predictive thinking (as the probability of effects is not given and immutable), teleological thinking (as goals and preferences are not to be acknowledged as pre-existent and unchangeable), and adaptive thinking (as the existence of an independent selection mechanism that emerges in the environment is questioned). Hence, approaches at the three extremes of systematic, dramatic, and organic change are challenged. Sarasvathy (2001) proposed instead a set of hybrid tactics labelled as "effectuation". This set of tactics goes beyond the three change archetypes but still acknowledges the need for actors intentionality, planning - control, and overhauling activities over a dynamic heterogeneous base. Figure 2 summarises the dynamics of "effectuation" (Sarasvathy, 2001, Sarasvathy, 2008).

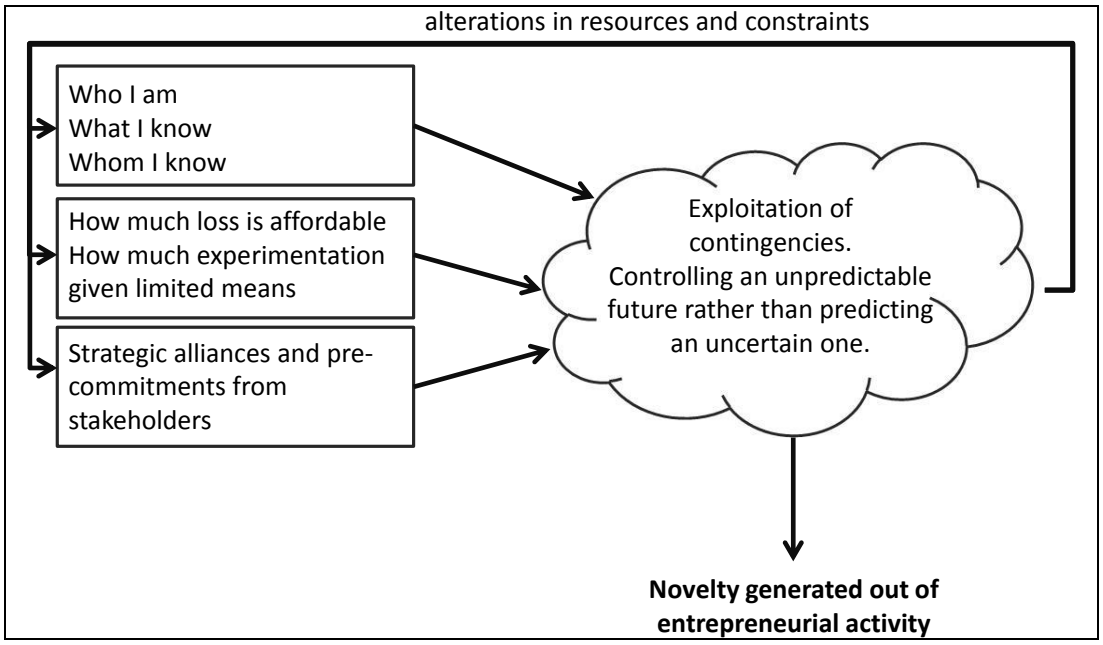

Figure 2. Effectuation dynamics

Effectuation addresses situations where: "*the environment does not independently influence outcomes or even rules of the game (Weick, 1979), the future is truly unpredictable (Knight, 1921), and the decision maker is unsure of his/her own preferences (March, 1982)*" (excerpt from a presentation on "Effectuation, near-decomposability, and the creation and growth of entrepreneurial firms" by Sarasvathy and Simon in year 2000 as cited in Sarasvathy, 2008). The concept has commonalities with the notion of "bricolage" - the ability to make do with whatever is to hand (Garud and Karnøe, 2003, Brown and Duguid, 1991, Ciborra, 1992) in the sense that actions are directed by the means available, there is a socialised view of actors and the creation of new options through the recombination and transformation of existing resources. What is added by effectuation is an emphasis to control and the conceptualisation of affordable losses. Likewise, it has commonalities with what is described as "mindful deviation": "*Mindful deviations to create new futures (…) new landscapes emerge in the very act of "trying" something (…) being mindful of when to persist and when to desist (…) keep as small as possible to avoid an escalation of commitment yet large enough to gain meaningful feedback.*" (Garud and Karnøe, 2001). Overall, although effectuation does not bring in the extant literature totally new insights, it is a useful concept because it puts together in a balanced way multiple aspects of change dynamics.

3 Empirical Setting and Method

3.1 Changing Health Services in Norway

Norway has a well-developed national healthcare system. This is the result of decades of efforts at the national level (regulating, orienting reform efforts, and investing in technological capabilities) and at the level of healthcare organisations, research institutions, private companies and inter-organisational alliances that implemented numerous projects. This patchwork of initiatives has brought the country to the current level of maturity in conventional provider-centred information management capabilities (Electronic Patient Records, message exchange, and information access) and has prepared the ground for moving towards a new era in healthcare delivery. Information and Communication Technology (ICT) has been used in the country to support healthcare information management for more than three

decades. The earliest use of electronic documentation of patient information in health services dates back to the 1970s while the first implementations of applications for entire hospital coverage started in the 1980s (Norwegian Center for Electronic Patient Records, 2009, Doupi et al., 2010).

The widespread use of technology has contributed to the development of "an impressive and comprehensive health system"(OECD, 2014) but has not been sufficient for ensuring the overall system's efficiency. During the past decade there are recurring discussions about the need for system reconfigurations in order to ensure its long term sustainability. The average public spending for health and long term care during the 2006-2010 period was 7.2 % of the Norwegian GDP (while the average for OECD countries during the same period was 6.2%), projection scenarios for the year 2060 indicate a probable increase up to 14.3% (de la Maisonneuve and Oliveira Martins, 2013). Rising medical costs, an ageing population and increasing public expectations are challenging the current healthcare system. Driven by quality and cost issues, the government has been aiming during the last 15 years to transform healthcare delivery reconfiguring the relations between hospitals, the primary healthcare sector, and the patients (Norwegian Ministry of Health and Care Services, 2009). In the envisioned future, healthcare resources will be re-arranged to support streamlined patient journeys. This entails introducing novel patient-centric logics in an environment dominated by provider-centric ones.

A patient-centric logic not only spans the whole spectrum of patients' needs from preventive healthcare, to treatments and long term care but also presumes a more active patient role. Patients can contribute in varying degrees, e.g. through information sharing, self-service, and assisting healthcare staff acting as resource integrators (McColl-Kennedy et al., 2012). Task redistribution between actors creates new collaboration and coordination requirements and poses novel challenges for information management. Patients need to be able to access, manipulate and contribute information in order to fulfil their new roles. In this transformation, patient-oriented ICTs, utilising mobile and/or web access play a major role (Steinhubl et al., 2013, Caridà et al., 2014). However, the lack of innovation culture in Norwegian health trusts hampers the maturing and diffusion of information technology innovations (Norwegian Ministry of Health and Care Services, 2014), hence, research on past and ongoing innovative initiatives that have been sustained and propagated within Norwegian healthcare is timely.

3.2 Method

The impetus for our study comes from our involvement in an ongoing research project on the interplay between new ICTs and existing modes of organising within Norwegian healthcare. Within this project we study new patient-oriented, web-based technologies in the context where they are designed and developed and in the context where they are implemented and used. Further, we map and study the current IT landscape in the Norwegian healthcare context at large, including policy documents, law and regulations on the use of health information, standards for IT in healthcare, and documents related to ongoing relevant initiatives. Following this research approach we examine how "things change over time" (Pettigrew, 1997) employing multiple methods of data collection including observations, interviews and document analysis (Benbasat et al., 1987). As one of the research activities in this project, we have studied the conceptualisation and realisation of a simple web-based technological solution (named MyRec) that brought novelty in patient-healthcare provider communication within Norwegian Hospitals. We have conducted a longitudinal case study on the trajectory followed by MyRec which covers its conceptualisation, development, launching and spreading-out. Data on the case were collected in three stages (September 2010 - September 2011, March 2012 - December 2012, March 2014 – June 2014) and cover an overall period of almost a decade (2005-2014). Data collection entailed interviews with hospital personnel, observation sessions of design workshops with users, and document analysis (internal reports, presentation material for various audiences, policy documents, laws, and articles from specialised Norwegian journals). In summary, the research reported is based on data collected using a combination of fieldwork and documents' analysis (Table 1).

Source	Description
Interviews	15 semi-structured interviews
Attendance of workshops	Attendance of three design workshops
Document analysis	Norwegian Healthcare Strategic Planning Documents; Policy, Regulation and Standards Documents; MyRec presentations to different audiences; system analysis documents; articles from specialised journals

Table 1. Data sources for this article

Our research is designed as an interpretive case study (Walsham, 1993, Klein and Myers, 1999). In particular, this study has focused on taking stock of how innovations in health service delivery have arisen and what made them to be adopted and propagated (Greenhalgh et al., 2004). In previous articles we have reported from the same case having a focus on information infrastructures architecture, analysing different types of infrastructural dynamics and exploring to the impact of generative capacity, robustness and standardisation (Grisot and Vassilakopoulou, 2013, Grisot et al., 2014).

4 Analysis

In the next paragraphs we analyse the trajectory of the initiative by looking at its instigators' tactics related to: a) experimenting with web services for patient orientation and b) building alliances. Then, we explore the relation between the tactics identified and the technologies employed. The trajectory is followed by extracting information from documents and recollections by the core team for MyRec which includes three persons that work for the hospital's IT department.

4.1 Experimenting with services for patient orientation – affordable losses

The conceptualisation of MyRec started more than twenty years ago within a major Norwegian hospital. "*It started in 1993. (...) I had this idea to have a training program for nurses in the department with computers and give nurses access to computers and internet. (…) We started having discussion among neurosurgery nurses in night shifts on how to use computers, and how to give patients access to information on computers"* (MyRec team member). But, at that time patient oriented web-based services from hospitals were not deemed appropriate. "*I remember discussing patient services over the internet and the reasons why we could not do it. And the main reason was equality, if you made a service it should not be just for some patients so if you made an IT based service for patients, you should also make a non-IT based which was just as good. And that changed in few years because of banks*" (MyRec team member). The concept remained only an abstract idea for years. Then, a new Chief Information Officer (CIO) was appointed in 1998 with a vision to bring the hospital at the forefront nationally and internationally when it comes to use of IT in healthcare. "*Develop the hospital based on a digital information platform including patient care production, patient communication and services, collaboration, research and education.*" (excerpt from a presentation by the CIO-at the time). The idea of web-based health services started being investigated. "*In 2000 we started looking at portal technologies; we had a long trip to US. We surveyed existing portal solutions, but were not good enough, they only gave the possibility to access old systems. Did not have web-based health services. (…) In 2001 we took a trip to hospital Y, Denmark, looking at the portal there.*" (MyRec team member). In 2002, the initial sketches started being drawn and by summer 2003 a list of possible services was ready. *"But, by then the focus of the IT department was the Clinical Portal, so not until 2005 we started development … A reason was also the reorganisation of the IT department: it was split into 5-6 sections. One of the new sections was given the responsibility for patient services".* (MyRec team member).

The actual initiation of MyRec's development was related to the overall ongoing transformation of Norwegian Healthcare. In 2002, the state implemented a hospital reform and replaced county governance of hospitals with a number of state-owned and regionally managed health trusts (helseforetak). Before 2002 counties allocated funds to hospitals but after the creation of trusts financing was sourced directly from the state through a combination of block grants, specific grants and activity based financing. Furthermore, national policy was already promoting a more active role for the patients: the Patient Right Act (1999) regulates patient involvement and information exchange; the Specialised Health Care Act (1999) regulates specialist healthcare services and stipulates an obligation to include patients in planning and decisions regarding their treatment. "*It was the same period of the helseforetakene creation. (…) It was necessary to gain a foothold, and to have same showpieces (…) That is why MyRec got funded."* (MyRec team member).

The idea of shifting healthcare towards patient centeredness was present in policy documents but it was not detailed or specific. There are multiple rationales for developing patient-oriented web-based health services (e.g. to improve the efficiency, or the quality, or the inclusiveness of health services). Furthermore, there are multiple possible modes of orienting services to the patients (viewing them as recipients/customers, co-creators, or full owners of service). The team for MyRec started experimenting with all possibilities. In the initial version of the solution, on the main screen a right and a left set of icons appear. On the left side the team positioned a set of services for which the hospital is responsible (as for example access to clinical systems) and on the right side they positioned another set for which patients are responsible (as for example a medicaments list and a personal diary). A team member said: *"the right hand side is for the patients. We provide a framework but the patient is in control if they want to use it, how they want to use it, for example, the diary is placed on the right side, and is designed in a way that we don't have access to it."* Table 2 gives an overview of services that the team experimented with over the years. The services have been organised in different categories by the authors of this article to exemplify their diversity. The services that were eventually abandoned are marked with an "x".

		Envisioned Role for Patients		
		To Patients (recipients/consumers)	**With** Patients (co-creation)	**For** Patients (own support)
Main Rationale	Efficiency	✓ Appointments booking ✓ Records access ✓ Electronic forms	✓ Exchange of messages	✓ MyMedications (user maintained) ✓ Diabetes self-support
	Quality	× Tailored and quality assured information	✓ Exchange of monitoring information for specific diseases	✓ Anonymous ordering (e.g. chlamydia, tests) × Diary
	Civil Society	✓ Interfaces for ordering hearing implants	× Carespecialists	× Patient Forums

Table 2. Experimentation with services for MyRec (abandoned services marked with x)

Some services proved to be very successful. Providing means for secure message exchange was especially welcomed because regular email exchange between patients and healthcare institutions was outlawed for security purposes: "*it was illegal to use email in the communication with patients, and what everybody knew is that this was quite common, and the was a big case with an email from the hospital ending up at the media. We knew that some departments had extensive email communication with their patients, it was a ticking bomb. So the secure communication part was seen as the most important service, and the main reason why managers supported MyRec*" (MyRec team member). Another service that quickly took off was the one related to online appointments booking because it

solved the problem of annoying lengthy call-waiting during peak times (e.g. lunch breaks when many patients would try to contact the hospitals). Also, services aiming to support patient groups living with chronic conditions were well-received. In such cases, on the clinical side there is the need to collect information in a systematic, meaningful way over long periods, monitor progress and inform patients without disrupting the usual day-to-day work practices in the clinics.

As one can observe in Table 2, some of the services had to be eventually abandoned. For instance, the functionality that allowed patients to keep a personal diary online had to be removed: the envisioned patient ownership of the information collided with the regulations that stipulate that all personal health data treatment in hospital systems has to be closely monitored by the hospital's privacy ombudsman. Also, the Discussion Forum had to be taken away because as a project member explains: "*There are already better alternatives out there. Not as safe of course, and not moderated by nurses or doctors, but they are better because they are established, and there are a lot of people there and a lot of information. It just did not hit. So to have to remove it was not a big deal because there was not a lot of information that got lost, but it is a big deal for us because we also want to start there as well".* Similarly, the idea of "carespecialists"; an experimental concept for digitally enabled communities of patients and healthcare providers that was not aiming to solve any particular hospital problem did not survive: "*We have been toying with this community idea (…) you can create different levels of privacy and define who participates in the network, and different levels of proximity (…) you can update something across the whole network or only to your closest part of it."* (MyRec team member). Actually, services that were designed with a civil society rational for enabling patients to take an active role in decision-making were in general less successful than other types of services. Although the health strategy documents instruct hospitals to include patients more actively in planning and decisions regarding their treatment this is not an easy endeavour as it is incongruent with the current professional nature of healthcare delivery. As MyRec kept evolving, the categorisation of services in two distinct groups (left and right sides of the screen indicating hospital vs patient responsibility) did not make a lot of sense and was abandoned.

Finally, the idea of quality assured personalised content for patients although it was well justified and covered a specific and important need had to be abandoned because it required a lot of work by time-deprived clinicians. This was one the services where the team focused its efforts initially because content management technologies provide good means for solving the information problem: "*If you look at heart disease, there are "millions" of similar but not completely the same diagnoses with different treatments. So, if you go to the internet to search, it is extremely hard to know if the thing that you are reading is really relevant to you. This is a big problem and a source of many patient questions and uncertainty on "what is going on?" People can get scared with something that they read but this may not apply to them because they do not have exactly the same condition. (…) The aim of MyRec was to be able to tailor the content down at the individual level (…) What we have done there is that the architecture and the design are made (…) But this is a feature that is not used today. (…) Because the idea was that every department e.g. the Heart Department would put their patients into groups: this kind of diagnosis, this age, etc. you could use as many tags as you needed. Then, they could publish tagged information. For example, if you had this type of heart surgery, they could publish information only for the people that had this type of heart surgery."* (MyRec team member).

MyRec's team was able to easily adapt the solution because they had decided to keep it separate from existing hospital systems and they were able to flexibly adjust it. This decision was influenced by their experience with the risks and complexity of the clinical portal which was under development at the time and was gradually becoming tightly connected with most other systems. A team member from MyRec said: "*MyRec was built to be a solitary system in many ways. This was a strategic choice we took very early on, the clinical portal is so interconnected with absolutely everything (…) And differently from the portal, one of the first things we did was to seek partners."*

4.2 Building alliances to deal with financing and user-uptake uncertainties

As the initiative started from within a hospital, MyRec team members had good access to clinicians and started working closely with them to stimulate their interest and ensure their sponsorship. Unlike to other information systems, MyRec is not presented and promoted as predefined solution that has to be used by all relevant departments. Units and groups independently take the decision to adopt it. The adoption decision initiates a tailoring process where already existing functionalities can be selected and new ones can be developed. The project team did not address clinics in a random way, they made a conscious effort to pick the ones that were more probable to be interested: "*We asked the rheumatologists who have patients who have been through 30 or 40 surgeries, so we thought that they might be interested ... Then based on previous knowledge, we looked at those that have high volume emails, and Audiology is one of them. When implants stop working they cannot use the phone and they use mail a lot, and they also have ideas on what they need. And it is not only about communication but also about ordering spare parts. So now the web shop is implemented*" (MyRec team member). Soon the criticality of building strong alliances and having sponsors within the clinics became apparent: "*For each clinical department we need at least one, preferably more, champion! Champions that really want to do it and think it is a splendid idea (…) we are comparing a success story in clinic X with clinic Y where everything stopped. Because the origin of both initiatives was very similar, it was the head of the department that approached us, they had a very well defined need, and for both cases we developed functionality especially for them (…) similar process at the beginning but the outcome was very different so we want to look at that. (…) One difference is that at clinic Y we lost the champions along the process (…) it was the head doctor, who left on sick leave and there was this woman physiologist that was so supportive and she left, she moved so the rest of the team inherited the thing from her and they were like: what is this ?*" (MyRec team member). One team member got the specific task of building relationships with the clinics *"was recruited specifically for that purpose and the role was to be partly as an "evangelist". To recruit new departments and help them to keep going"* (MyRec team member).

However, approaching the hospital departments was not always unproblematic. A team member talks about their experience with the patients' learning centre of the hospital: "*I was talking so much about the centre. I think it is also in the law somewhere that all hospitals have to have this. They have responsibility towards educating and informing patients. We tried to work with them because they often collaborate with groups of patients. (…) when we first approached them within our hospital we realised that they are still very much within the paperworld. So doing that with IT was sort of…they were thinking of creating brochures, having these classes…Because they have classes, if you have heart surgery, we offer you a class together with 20-30 patients that had the same type of surgery and you have to go there let's say every Wednesday evening.*" (MyRec team member). What seemed at first as an obvious alliance did not work out as expected and collaboration was not achieved.

Alliances were not only pursued at the hospital level but also within the wider informatics' community including both industry and academia. The initiative was actively promoted by the team in professional and academic fora, was awarded two prizes for its innovativeness (in 2008 and 2010) and attracted funding not only from the hospital but also from a number of national and European research projects. This wide embracement of MyRec allowed the team to keep developing the solution and made it sustainable although end-user uptake was relatively slow. The problem of slow uptake has been plaguing most electronic initiatives for the past decades from banking to tax services (for example, e-banking adoption after years of efforts was still less than 10% in Germany and less than 30% in Norway 2002, it was only after 10 more years that reached almost 50% in Germany and 90% in Norway (OECD, 2012)). These prior experiences indicated that the survival and continuation of the initiative could not rely on creating a large user base and other types of support had to be attained. More recently, the initiative was officially endorsed by the region that now promotes MyRec to all

hospitals as a standard solution for patient-hospital communication. Figure 3 presents key milestones in the trajectory of MyRec.

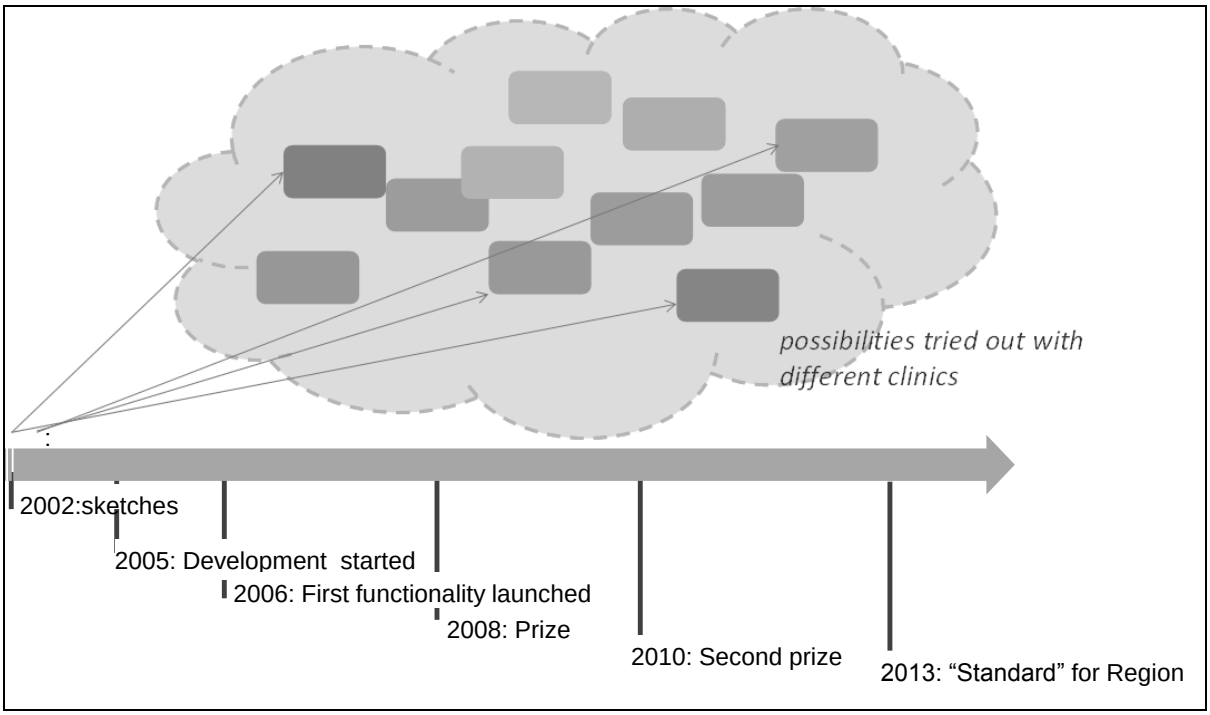

Figure 3. Key milestones in MyRec's evolution

4.3 The relationship between tactics and technology in use

The tactics followed by MyRec team throughout its trajectory resonate well with the effectuation tactics described by Sarasvathy (2008) for successful entrepreneurs. In table 3 we link MyRec's trajectory to effectuation.

Trajectory Part	Effectuation Tactics
Initial big visions and ambitious ideas: patient orientation, access to records, a tool for sharing information before, during and after hospitalisation. A symmetric relationship between patients and providers.	*Effectuators see the world as open, still in the making- a science of the artificial… They work to fabricate as well as recognise and discover opportunities (Sarasvathy, 2008)*
Specific services developed (entailing various levels of patients' involvement). Some success, some failures. Abandonment of the symmetric relationship idea.	*Effectuators do not seek to avoid failure, they seek to make success happen (Sarasvathy, 2008)*
Expanding to different clinics and hospitals with the messaging and appointments' services. Adjusting to clinics' needs. Cultivating relationships with multiple interest groups including industry and academia.	*Markets are more likely made than found; a variety of stakeholders including customers are partners in an adventure of their own making (Sarasvathy, 2008)*

Table 3. Effectuation tactics for MyRec

The account of MyRec's trajectory can be more informative about digital novelty initiation and sustainment if we include in the analysis the specifics of the technology used for MyRec's realisation. MyRec is built on simple flexible technology (a database server and a content management system). The communication with other systems is mainly based on web services. The content management

system provides an environment for web pages design that includes templates and a number of easy customisation facilities as well as mechanisms for integration with external systems. The underlying technologies made the effectuation tactics a feasible option for the team that is behind the initiative. It was easy to develop multiple different services and it was also easy to discontinue them without harming the integrity of the suite. All modules within MyRec are loosely coupled with each other and with external applications. The use of contemporary technology made losses affordable and wide experimentation possible. Moreover, it allowed the tailoring of functionality to specific clinics' needs in a swift and cost-effective way and this facilitated the building of alliances within the hospital.

It is interesting to note that MyRec's instigators were able to envision a wide space of functional possibilities but at the same time they managed to demarcate its role and identity within the healthcare environment. The identity of MyRec was developed by embracing the "patient centeredness" vision. As shown in the previous section (Table 2), the role for patients within this vision has been usefully ambiguous. It was concrete enough to mobilise the interest of third parties and sufficiently malleable to allow the development of alliances with a wide variety of actors. Ambiguity was "used strategically to foster agreement on abstractions without limiting specific interpretations" (Eisenberg, 1984). The attractiveness of the identity of the initiative was reinforced by the fact that it was built upon a content management system that combined Web 2.0 technologies and elements of social media providing a basis for users to network, share knowledge, perform tasks and communicate with others. The vision of pursuing an "architecture of participation" ideal (in which the service acts primarily as an intelligent broker, connecting the edges to each other and harnessing the power of the users themselves (O'Reilly, 2007)) resonates well with the general aim for patient centeredness. The correspondence between technology and visions helped the initiative to gain traction especially among ICT industry and academia. The solution that was put in place is indeed largely based on an "architecture of participation" connecting the edges (healthcare providers and patients) via relatively simple services that enable users' contribution. However, as shown in section 4.1 functionalities for unstructured users' exchanges directly influenced by social media (e.g. the forum) did not manage to take off.

5 Discussion and Conclusions

5.1 Discussion

Our analysis was built upon the concept of effectuation which Sarasvathy (2001, 2008) introduced in the innovation literature. According to Sarasvathy (2008), effectuators see the world as still in the making not only recognising and discovering opportunities but fabricating them as well. This implies that the sociotechnical arrangements in place (e.g. pre-existing information systems, work practices, organisational arrangements, regulatory frameworks) do not signify only an enabling or constraining backdrop but also an arena full of potentialities. Being prepared to try multiple alternatives and to abandon early those that do not prove productive is pivotal for effectuation. Consequently, effectuators' initiatives are planned with affordable losses in mind. Effectuation has commonalities with the notion of "bricolage" (Garud and Karnøe, 2003, Brown and Duguid, 1991, Ciborra, 1992) in the sense that actions are seen as directed by the means available, there is a socialised view of actors, and new options are created through the recombination and transformation of existing resources. Going beyond bricolage, effectuation emphasises also tactics of acting with affordable losses in mind. This implies avoiding big investments during initial stages by espousing a frugal approach to novelty and aiming for early trials. New flexible, easily re-combinable, and easily deployable technologies provide the means for practically pursuing such tactics.

However, the minimisation of sunk costs that makes the losses affordable also makes the initiatives themselves vulnerable. Large-scale investments can help the anchoring of innovative projects; without them it is important to seek other types of support to prevent being wiped-out before being able to deliver benefits. Especially in the case of eHealth initiatives the specific vulnerability of slow uptake

has to be addressed. Such initiatives cannot count on the prospect of attaining a significant user base in the short term and it is important that a good network of supporters will ensure their continuation. Building a wide spectrum of alliances to hedge against the risk of being prematurely discontinued is a necessary complement to building solutions that can be affordably abandoned.

5.2 Conclusions

This paper introduces frugal novelty as a two faced concept which is both about starting from thrifty but evolvable solutions that allow affordable losses and about strategic alliances and pre-commitments from stakeholders. This is a new perspective on technology-enabled change that transcends the organic/planned and grassroots/top-down divides for change dynamics. As contemporary technology makes possible new frugal approaches to novelty it is now conceivable to initiate projects by scoping them only at a high level leaving room for concretisation as the projects evolve. This concretisation can be achieved with the involvement of a varied set of actors ranging from end users to high level decision makers orchestrated by change agents that employ effectuation tactics. Such an orchestrated collective shaping can contribute to more adoptable innovations.

The flexibility provided by frugal novelty is especially appropriate for situations where there is a lot of ambiguity. The vision of patient-centeredness in healthcare is characterised by such ambiguity since pre-existing practices and sociotechnical arrangements have to be challenged and renegotiated. By aiming for frugal novelty through affordable losses and alliances, different options can be tried-out probing into the future. The ones that do not prove to be workable can be abandoned. Efforts of building information systems for healthcare have proved to be dramatically challenging (Currie and Guah, 2007, Greenhalgh et al., 2010, Westbrook and Braithwaite, 2010, Berner et al., 2005). Building information systems for patient-centeredness brings additional challenges. In the current flux and transitional situation, a way to go is to aim for radical change with incremental steps starting from thrifty but evolvable solutions and building alliances to ensure continuance.

Following a frugal novelty approach makes possible to have the overall direction of change dictated by specific objectives (imposed in a top-down manner) while allowing the detailing to be shaped by a wide spectrum of participants (similarly to a grassroots initiative). Hence, while the general orientation and the purpose of novelty can come out of specific strategic plans, its realisation can come out of gradual organic change processes. In the extant literature of health informatics an approach that balances between bottom-up and top-down approaches has been proposed and labelled as "middle-out" (Coiera, 2009). This was described as a situation where governments provide guidelines, incentives and support that encourage healthcare providers to acquire systems technically or functionally compliant to guidelines, and to pursue innovations that keep their systems compliant over time. What we have found analysing our case has some similarities to this middle-out approach and compliance with national policies has significantly influenced the trajectory of the initiative. Nevertheless, in our case extensive experimentation and building of alliances within and outside the hospital have been pivotal and these two aspects are not emphasised in the middle-out proposition.

This study reinforces the view that effective change follows a multifaceted rhythm and is rarely purely systematic, dramatic or organic (Huy and Mintzberg, 2003). Still, what we have observed in this case is related to the specificities of the environment where the new digital initiative was deployed and this is a significant limitation of our study. Moreover, we cannot be sure about how the initiative will evolve further and if the solution built will spread to most hospitals in the country (as anticipated by its proponents) or not. Future research may proceed in two general directions. The first one is related to extending our analysis over time by following the specific initiative's trajectory. A second future research direction can be towards the comparative analysis of similar "frugal initiatives" within healthcare. By following this direction it would be possible to draw more comprehensive results related to the potential of contemporary flexible information technologies to facilitate new types of change processes suitable for complex healthcare settings.

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