

# *Innovation Management: Development of a Services Readiness Levels Stage Model*

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Innovation – particularly service innovation – is becoming an increasingly popular area of investigation. This briefing paper places this interest in the context of European-related research. It focuses on the eight-stage service readiness levels model that the European Health Telematics Association (EHTEL) Innovation Initiative (the ‘initiative’) has produced as a result of a three-year study. The model provides an alternative to the current focus on models of technology readiness levels. Alongside its accompanying template, the model was designed for use by health and care innovators and other organisations e.g., as a roadmap for planning the scaling-up of innovative services. In this briefing paper, the use of the model and template is illustrated by three example local digital health developments in different fields: a hospital; cardiac and lung disease in a primary care setting; and community social and health care support. The initiative is keen to further validate this template. It plans to do so by involving a wider range of organisations and stakeholders, such as innovation incubators, users of services or health and care systems, and representatives or members of regional associations.

## 1. Horizon 2020 and Innovation: An Introduction

Horizon 2020 is a European Union programme of activities that aims at improving innovation in Europe. It covers a wide area of both research and innovation across a large number of disciplinary areas. Among its prime concerns are the targeting of excellent science, industrial leadership, and societal challenges. These challenges include health, demographic change, and wellbeing – incorporating the fields of public health, and technological support in relation to health, care, and active and healthy ageing.

Formulated in 2014 and due to run until 2020, the European Commission describes Horizon 2020 as “the biggest [European Union] Research and Innovation on programme ever with nearly €80 billions of [public] funding available over 7 years.”<sup>1</sup> The programme supports one of the seven flagship endeavours of the European Union, known as the Innovation Union, in which innovation is described as:

provid[ing] real benefits for us as citizens, consumers, and workers. [Innovation] speeds up and improves the way we conceive, develop, produce and access new products, industrial processes and services. It is the key not only to creating more jobs, building a greener society and improving our quality of life, but also to maintaining [European] competitiveness in the global market.<sup>2</sup>

<sup>1</sup> <https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>, last accessed 14 July 2017.

<sup>2</sup> [http://ec.europa.eu/research/innovation-union/index\\_en.cfm?pg=action-points](http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=action-points), last accessed 14 July 2017.

As examples of the underpinning drivers of Horizon 2020-oriented activities, in its first work programme (dating from 2014-2015), the European Commission drew attention to several difficulties experienced by governments in the European Union. The challenges that they encountered – and indeed, continue to face to this day – were “an urgent need to control healthcare and other public expenditures, while meeting [the] increasing demands from their citizens” ([1]European Commission, 2014, p6).

By bringing together both research and innovation under a single programme, Horizon 2020 aims to assist growth in innovation through placing an “emphasis on excellent science, industrial leadership and tackling societal challenges” [1] particularly in terms of the production of world-class science, the removal of barriers to innovation, and the facilitation of both public and private sectors to work together on the delivery of innovation. [1]

The intention was that stronger support “would be given to the market take-up of innovation, including by the public sector” ([2] European Commission, 2011, p8). Among the chief concerns underpinning the programme’s broad approach to innovation ([2] European Commission, 2011, p8-9) is that it would not be “limited to bringing new products to the market, but also cover[s] processes, systems or other approaches, including by recognising European strengths in design, creativity, services and the importance of social innovation.” [our emboldening] ([2] European Commission, 2011, p8).

Ultimately, the European Innovation Partnerships, which form a part of the work of Horizon 2020 and of which the first was on Active and Healthy Ageing, would be “tasked with tackling technical, legal and operational barriers to innovation in Europe, hereby establishing solid links between supply and demand side measures” ([2] European Commission, 2011, p8). Indeed, the Guidance for evaluators of Horizon 2020 proposals suggests that the programme should maintain a balanced approach to both research and innovation. Its concept should involve aspects “such as the use of existing technologies in novel applications, continuous improvement and non-technological and social innovation”<sup>3</sup> (p1) and not only be based on scientific and technological breakthroughs. Although service innovation is not mentioned specifically in this guidance document, which deals with frequently asked questions, it can be conceived as forming a component of such innovation. Innovation in services, however, is mentioned in relation to several of the different types of projects supported by the programme: they include research and innovation actions, innovation actions, and the public procurement of innovative solutions.

Like Horizon 2020, in its work to date, the EHTEL Innovation Initiative has concentrated on fields like the tackling of social and societal challenges, health care and social care (“integrated care”) ([3] Kodner and Spreeuwenberg, 2002), innovation (particularly on the part of the public sector such as in health care authorities), technologies in the provision of care ([4] Guldmond and Hercheui, 2012), and services in general (including service innovation) ([5] Witell et al, 2016). These orientations have led the initiative to concentrate especially on the notion of service readiness in the field of service innovation.

## 2. A Comparison of Technology Readiness and Service Readiness

Technology readiness is a concept that has increasingly permeated technological research thinking over the past 40 years. It has become steadily apparent that service readiness forms a complement to the original notion of technology readiness.

The notion of technology readiness emerged from work undertaken in the United States of America (USA). It originally became prominent in the mid-1970s in the work of the National Aeronautics and Space

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<sup>3</sup> [http://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/pse/h2020-evaluation-faq\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-evaluation-faq_en.pdf) last accessed 14 July 2017.

Administration (NASA), and was eventually formalised as a concept in the late 1980s. As a model, it has been used over the past 30-40 years in various other North American institutions such as the United States (US) Department of Defense, the US Department of Energy, the US Federal Aviation Administration, the US Army and the US Air Force, and the country's oil and gas industries. A similar definition of technology readiness has been used by the European Space Agency.<sup>4</sup> Based on the International Organization for Standardization (ISO) standard 16290,<sup>5</sup> technology readiness levels are illustrated by a form of "ladder". The steps on that ladder lead from the origination of a scientific or technological concept and materialise ultimately in a (space) flight that experiences "successful mission operation[s]". Clearly, the aim of the concept was to support the ambition of reaching into space!

A similar, yet simplified, list of technology readiness levels<sup>6</sup> has been adopted by the European Commission.<sup>7</sup> The Commission removed from the definition any direct reference to space with one exception (which remains in TRL 9). Instead, it concentrated on environments that were industrial in orientation. The Commission documentation cites technology readiness levels as being "indicators of the maturity level of particular technologies".<sup>[7]</sup> These levels are therefore seen as providing "a common understanding of technology status" and addressing "the entire innovation chain".<sup>[7]</sup>

The use of technology readiness levels is encouraged by the Commission, as a concept, in proposal-writing for the Horizon 2020 programme. It is therefore recommended to be used by project proposers in relation to all the appropriate and relevant topics in the programme, in projects that are co-financed. Tacitly, the Commission expects these co-financed technology-related projects to operate by moving systematically from one relevant readiness level to the next.

The readiness levels are cited in Annex G of Horizon 2020, Work Programme 2014-2015,<sup>[[6]<sup>[7]</sup></sup> and were originally extracted from Part 19 - Commission Decision C(2014)4995 ([6]) (see Table 1).

**Table 1: Technology Readiness Levels cited by the European Commission**

- TRL 1 – basic principles observed
- TRL 2 – technology concept formulated
- TRL 3 – experimental proof of concept
- TRL 4 – technology validated in lab
- TRL 5 – technology validated in relevant environment  
(industrially relevant environment in the case of key enabling technologies)
- TRL 6 – technology demonstrated in relevant environment  
(industrially relevant environment in the case of key enabling technologies)
- TRL 7 – system prototype demonstration in operational environment
- TRL 8 – system complete and qualified
- TRL 9 – actual system proven in operational environment  
(competitive manufacturing in the case of key enabling technologies; or in space).

<sup>4</sup> <http://sci.esa.int/sci-ft/50124-technology-readiness-level/>, last accessed 14 July 2017.

<sup>5</sup> <https://www.iso.org/standard/56064.html>, last accessed 14 July 2017.

<sup>6</sup> These are often referred to as TRLs or, in the case of the European Commission – simply TRL.

<sup>7</sup> <https://ec.europa.eu/research/participants/portal/desktop/en/support/faqs/faq-2890.html>, last accessed 14 July 2017.

On examining this technology readiness level model, the initiative members made certain criticisms of it. They observed that: the model is implicitly and inherently scientific or technological in its orientation; it focuses on industry; it does not refer to social innovation or service innovation; it contains no reference to the involvement of people and, therefore, it fails to match the needs either of service personnel or wider groups of people; it is also purely sequential in its ordering. In addition, particularly in the health and care sectors, the model mixes together two concepts – technology and innovation – that cannot be considered in a one-to-one relationship. In these sectors, the process of technology development does not translate directly into the use of new technologies until a service transformation occurs.

As a result of this comparison, the initiative focused on designing a service-oriented model that could provide a complementary mechanism to the notion of technology readiness levels. The focus of the resulting services readiness levels stage model (see Table 2) is on service readiness rather than technology readiness. It was intended to orientate the usage of service levels readiness towards real-life settings instead of research or study. While the model was not designed to be limited to use in Horizon 2020 proposals or projects it could, however, obviously be used in this way.

Increasing emphasis is being placed on innovation management and service development in new fields: these incorporate integrated care, in its widest possible definition [7], [8], [9]. These developments are clearly worth more intensive investigation in the future.

### 3. The EHTEL Innovation Initiative and its Methods

The European Health Telematics Association (EHTEL) was the association behind the innovation initiative described in this briefing paper.<sup>8</sup> EHTEL was the original European multi-stakeholder platform, which has continued to strengthen the combined collaboration among a wide range of stakeholders, latterly with a focus on a combination of digital health and care.

Over the past four years, it became increasingly clear to EHTEL's board and members that innovation and change management are key issues in all digital health-related projects. EHTEL has held several dedicated sessions and events on these two challenges. In early 2014, EHTEL launched a dedicated working group – called the EHTEL Innovation Initiative ('the initiative') – to focus on these two activities, which are essential to the success of digital health ecosystems.

The initiative's aims are to:

- Provide a platform for 'innovation entities' to learn from each other's experiences, and work together in a multi-stakeholder environment.
- Support the uptake of innovative digital health solutions by healthcare providers and users.

Priority topics concentrated on by the initiative include a collective focus on innovation governance, and the scaling-up of innovation as well as its integration in the health and care system. As a result, the initiative has been closely involved in assessing prospects for change, chiefly around innovative ways of collaborating on health and care delivery; partnership-building, peer networking and peer reviewing; and informing participants about suitable means of financing their activities, such as structural and regional funds, pre-procurement and public procurement, investment, and public-private partnerships.

The initiative's members are either organisations that are already members of EHTEL or that want to become members. The term 'innovation entities' is used by the initiative to describe its participants. These entities include institutions that categorise themselves as 'innovation incubators' as well as other

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<sup>8</sup> <http://www.ehtel.eu>, last accessed 14 July 2017.

innovation-oriented organisations. The incubators work chiefly in the fields of either health care or social care in diverse regions or countries of Europe, and they often support the provision of integrated care; they are often also backed or supported by health providers or care providers. Many of these innovation-related organisations have sites that are developing and applying innovative new integrated care services.

The initiative has conducted a programme of activity – a form of study or action research – which has lasted for three years, and took place largely during 2014-2016. In the immediate future (2017-2018), physical meetings are likely to be held on innovation-exploring sites throughout Europe.

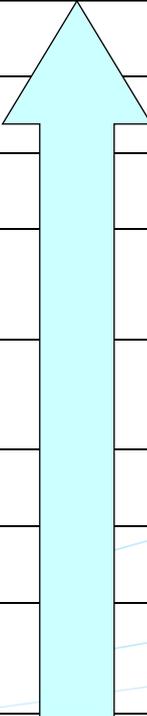
As a result of launching an investigation of technology readiness levels (described in Section 2 of this briefing paper), the initiative detected a specific need: the importance of managing innovation throughout the whole lifecycle of service-related initiatives. The initiative has therefore concentrated its work on service innovation and service readiness, and created a suitable model to represent this notion.

The model on which the initiative has worked brings together both innovation management and service readiness (see Table 2). It was developed in several iterations. A range of sites and examples were selected to test the usability and workability of the model. The model, and its associated template, form a roadmap that covers the stages from the origin of an innovation proposal, throughout its scaling-up, so that integration of the innovation is achieved in a health care system or service(s).

#### 4. The Service Readiness Model

The service readiness levels model is a stage-based model. It was designed to provide a complementary mechanism to the notion of technology readiness levels (TRLs). The main purpose of the model, and its associated template, is to focus on the processes involved in scaling-up service innovation in either health care or in social care (also referred to as ‘integrated care’).

**Table 2: Service Readiness Levels Stage Model**

<p><b>SRL 8. Service roll-out:</b> The service has been rolled out to its target population.</p>	
<p><b>SRL 7. Organisational change:</b> The organisation supporting the services has been adapted as appropriate.</p>	
<p><b>SRL 6. Wide-scale adoption:</b> The service (with its technology solution) has been adopted by its users and non-users.</p>	
<p><b>SRL 5. Significant evidence:</b> Evidence of the benefits of the service has been assessed with a statistically significant number of users and non-users.</p>	
<p><b>SRL 4. Prototype / small-scale solution:</b> A prototype of a redesigned service has been developed, tested and validated with a small group of users.</p>	
<p><b>SRL 3. Technological solution(s):</b> A technology solution has been identified as an enabler for the desired change.</p>	
<p><b>SRL 2. User readiness/needs detection:</b> User readiness to change a process / create a new process.</p>	
<p><b>SRL 1. Scoping change:</b> Capturing drivers for change and scoping area for change.</p>	

As can be seen in Table 2, the model incorporates eight separate stages. The stages in the model indicate incremental service readiness. They can be read numerically from either bottom-to-top (1 to 8) or top-to-bottom (8 to 1).

Reading the stages systematically and numerically, from service readiness level (SRL) 1 through to 8 (i.e., from SRL 1 to SRL 8), the phases run bottom-to-top of the table. In this sequence, they are displayed from the scoping of change to identifying user readiness; identifying technological solution(s); developing, testing, or validating prototypes of small-scale solutions; providing significant evidence of the benefits of the service; shifting towards wide-scale adoption of the service; supporting the modified service through appropriate organisational change; and, last but not least, service roll-out to a specific target population. In this sense, the model, and its associated template, can be interpreted in terms of the stages through which a service-related site progresses from the least well developed to the most mature.

In contrast, if the progress of a site needs to be read historically – i.e., backwards in terms of time, from the state in which the site or application exists currently to the status at which it first started – the model should then be read top-down i.e., from SRL 8. 'Service roll-out' to SRL 1. 'Scoping change'.

As a result, the model can be viewed as a form of roadmap. Any roadmap for innovation in health and care institutions must be managed systematically and appropriately. Roadmaps rely on a well-defined framework of activities and understanding that can be shared by all the relevant stakeholders. The need for transformation and change in health and care is so pressing that these kinds of frameworks will need to be used, not only by experienced institutions but also by those organisations that are starting out on a journey of change or are making preliminary steps towards change.

A service readiness levels stage-based model, such as the one developed by the initiative – based on innovation governance and change management concepts – can be used to support important activities such as: decision-making; risk identification and management; and the identification of expected impacts at each stage. As a result, services, systems and institutions will be able to achieve the most effective and impactful results from their investments in terms of both finance and human capital.

#### **4.1 Template accompanying the model**

The service readiness model is accompanied by a template, which service innovators complete.

Service innovators – that is, innovation incubators or innovation-oriented organisations – can fill in the template themselves (see Table 3). Among the example respondents to date have been: academics, policy-makers or decision-makers, project managers, representatives of stakeholder organisations, and systems' designers. While the data can be completed by an individual, it is often provided more effectively by a group of people whose members are gathered together in a team. Hence, the team's members' knowledge enables a span of the different kinds of information needed in various parts of the template and, ultimately, in all those fields needed to effect change in service innovation.

Respondents fill in the template by providing data on a particular site, good practice or use case relating to a service innovation. They are encouraged to supply details on each service readiness level (each level includes a description of the intrinsic and extrinsic enablers and barriers that have either facilitated the development of the service or, conversely, inhibited or delayed progress). They are also stimulated to offer information with regard to key performance indicators, artefacts, and financing.

Respondents are asked, when completing a template, to give details about the generic name of the innovation, its acronym, the project manager of the innovation and/or their own name, email address and telephone number (see Table 4).

The template is accompanied by a short, but complete, set of instructions (see Table 5).

**Table 3: Template for the Service Readiness Levels Stage Model**

[SRL]	[use-case specific description of the level]		
	Drivers	Barriers	Key Performance Indicators
	Intrinsic		
	Extrinsic		
			Artefacts
			Financing

**Table 4: Details of the Respondent to the Service Readiness Levels Stage Model**

<b>Details relating to the person completing the template</b>
<b>Full name of the innovation initiative:</b> Please give the full name of the innovation.
<b>Acronym of the innovation initiative:</b> Please give the acronym or “short name” of the innovation.
<b>Date of completion of the template:</b> Note the date (day/month/year) on which you are completing the template.
<b>Name of the innovation initiative project manager:</b> Note the name of the innovation project manager.
<b>Name of the person completing the template:</b> Give the full name (first name, family name) of the person completing the template.
<b>Contact email and telephone numbers:</b> Give all the relevant coordinates of the person completing the template.

**Table 5: Set of Instructions for Completing the Template**

**Question 1: Stages of innovation/service readiness**

What stages were or are needed to bring your innovation to fruition? Examples might include e.g., “Research”, “Pilot”, “Commissioned Service”.

**Question 2: Intrinsic drivers and barriers (i.e., *inside* the initiative)**

At each stage you identified above, what were the key barriers and drivers within the initiative that ensured delivery (i.e., intrinsic barriers and drivers)? Barriers could include e.g., “lack of clear leadership” or “conflict between individuals”. Drivers could include e.g., “influential champion”, “dedicated in-house service team” or “strong multi-organisation collaboration”.

**Question 3: Extrinsic drivers and barriers (i.e., *outside* the initiative)**

At each stage you identified above, what were the key barriers and drivers outside the initiative that ensured delivery (i.e., extrinsic barriers and drivers)? Examples could include e.g., “lack of engagement”, “lack of delegated mandate”, “good fit with existing services” or “influential external steering group”.

**Question 4: Measures of success e.g., key performance indicators**

At each stage you identified above, how was success measured? Were there key performance indicators or other ‘hard’ measures of success, or were other softer measures used (e.g., “there were no hard metrics, but the funder built up a favourable impression”)? Were objectives chosen at each stage, or was there an overall strategy (i.e. vertical steering)?

**Question 5: Financing of the initiative**

At each stage you identified above, how and from where was the innovation financed?

**Question 6: Overall process or evolution**

How did you move from one stage to another? Was it a gradual evolution, or a step-like process? When intrinsic and extrinsic barriers and drivers changed from one stage to another, did this cause difficulties or resolve them?

## 5. Example Services that have used the Model and Template

A number of sites have explored the use of the model, and the accompanying template, chiefly throughout 2015-2016; others continued to use it in 2017.

Three sites and their activities, which have used the model and the template to describe their own good practice as an innovation incubator and the work on which they have concentrated, have been selected for description in this article.

The three sites that reported on their service readiness are listed here in alphabetic order. Each service innovation has taken place in a different European region. Each dealt with a different form of innovation. The innovations have covered the secondary care sector (hospitals), the primary care sector (general practices), and a wider domain that encompassed health care, social care, and voluntary care.

### 5.1 Galicia

The intention of the Galician Health Service, in the autonomous region of Galicia, Spain, was to acquire an expert information technology (IT) system that helped with the detection and management of hospital-acquired infections. The aim was to provide a panel of indicators to measure the overall behaviour related to reducing hospital-acquired infections in a particular hospital over the timeline needed.

A case-based reasoning system (an 'expert system') was developed for the automatic surveillance and diagnosis of healthcare-associated infections. The system was 'trained' by using more than 2,500 samples obtained from 1,800 patients over a period of more than 10 consecutive months. The resulting system makes use of different machine learning techniques. It extracts evidence from different types of data automatically, incorporates other information provided by infection preventionists, and generates new knowledge and explanations about system decisions dynamically.

Collaboration was developed between the University of Vigo and Ourense University Public Hospital [10]. Deployment of the expert system occurred in a public hospital, Ourense, that forms part of the Spanish National Health System. Financing took place at early stages of the exercise through funding schemes related to research and development.

The activities took place systematically, starting from SRL 1 – scoping change and moved through to SRL 6 – wider-scale adoption. As a result, the new process and technical solution were defined and described completely. Top-down policies are also in place in the region; standard technical support is available; procedures for maintenance have been set; and communication with end-users is ready.

In mid-2017, this Galician initiative started a new stage of activity that is aimed at moving towards a full deployment of the system in the hospitals belonging to the Galician Health Services (i.e., SERGAS). This effort will permit a shift from SRL6 to SRL8.

### 5.2 Hull

Hull, a city in the United Kingdom, began its work on scoping change in 1999. Initial work was concentrated only on patients with heart failure, and was supported by the European financing then available through the TEN-Telecom programme (which later became the eTEN programme,<sup>9</sup> and eventually underwent a further modification in its name). Hull's stages of development concentrate on stages 1, 4, 6 and 8 of the service readiness levels model.

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<sup>9</sup> <https://ec.europa.eu/digital-single-market/en/news/eten-programme>, last accessed 14 July 2017.

In terms of current intrinsic drivers for the change, primary care in the area needed to reduce admissions and provide management of long-term conditions. The service is now at the level of service roll-out, and includes both heart failure and chronic obstructive pulmonary disease (COPD).

Mainstreaming took place from 2012 onwards, with the original innovation (heart failure telehealth) becoming a key component in a new community service (community heart failure). With the replacement of Primary Care Trusts (PCTs) in England by Clinical Commissioning Groups<sup>10</sup>(CCGs), there has also been a strategic drive provided by the relevant community health provider, the City Health Care Partnership<sup>11</sup>; as a result, the activities have become part of the local culture. City Health Care Partnership holds contracts for both the community cardiology and the community respiratory service<sup>12</sup> of the Hull CCG (formerly NHS Hull PCT<sup>13</sup>): this has further embedded and aligned the innovation into the practice.

### 5.3 Kent County Council

Kent County Council ('Kent'), a county in the south of the United Kingdom has used the opportunity to scale up its work and combine it in a single innovation centre that includes four other centres. It has extended its activities from coverage of a community of a population of 65,000 people to one of 220,000. It will potentially eventually cover up to 1.5 million people.

Kent has used the concept of innovation labs to enable the integration of three sectors – health, social care and the voluntary sector – to meet the changing needs of the county's citizens, especially for those people with increasingly complex needs. The planning of care is now done considerably differently from in the past. The authorities have begun to use technology in the most effective way to empower independent living.

Various sources of funding were used to augment the activities undertaken: they included local, national, and international sources of funding, such as the European InterReg IVC programme supported by the European Regional Development Fund (and, more specifically, its CASA project,<sup>14</sup> which focused on Regions for Smart Living). Key performance indicators that covered a wide range of types were also put into place. A progressive shift occurred from elementary stages of service readiness level to more mature levels.

The Kent example shows a set of activities that focused largely on SRL 1 – scoping change, SRL 4 – formation of a prototype or small-scale solution, SRL 5 – the collation of significant evidence (chiefly through local activities, but also as a result of England's national 5 year forward view (5yfv)).<sup>15</sup> Similarly to the Galician example, the Kent-based innovation lab calculates that it is now at SRL 6, i.e., wide-scale adoption, supported by seven different forms of financing.

## 6. Experience of Use of the Model and Template

While the types of sites and services that have used the model and template were varied, they show reasonably similar observations in terms of their usage.

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<sup>10</sup> <http://www.nhsc.org/ccgs/>, last accessed 14 July 2017.

<sup>11</sup> <http://www.chcpcic.org.uk>, last accessed 14 July 2017

<sup>12</sup> <http://www.hullccg.nhs.uk/pages/community-cardiology-services>, last accessed 14 July 2017.

<sup>13</sup> <https://www.hey.nhs.uk>, last accessed 14 July 2017.

<sup>14</sup> <http://www.casa-europe.eu>, last accessed 14 July 2017. (Website is no longer available.)

<sup>15</sup> <https://www.england.nhs.uk/ourwork/futurenhs/nhs-five-year-forward-view-web-version/5yfv-exec-sum/>, last accessed 14 July 2017.

In terms of the variety among the three sites, and their experiences, it is possible to make several observations – mostly relating to the stages at which the three sites are and the types of services they concentrate on. Some sites have already progressed to real-life applications / actions, while others remain at an earlier stage of development (e.g., SRL 4). Some regions have presented information about the development of their actual innovation centres; others have presented work about different forms of collaboration or service (e.g., co-development of an infection control system). The three regions involved have displayed a range of different types of services in their work (e.g., primary and secondary health / care; housing; social care; general healthcare practices; wide ranges of stakeholder types).

In relation to the support documentation provided: Some regions presented longer, more detailed information whereas others provided shorter bullet-based texts. In particular, three categories highlighted in the template – key performance indicators, artefacts, and financing – were not necessarily completed in detail.

The initiative members generally found, however, that the model and its accompanying template were easy to understand and “intuitive” to complete.

Completing the template exercise led to a number of outcomes. Ultimately, the team or group filling in the template was able to:

- Describe its own innovative good practice(s) effectively.
- Outline the main activities that the organisation had needed to conduct in order to make in-house progress.
- Obtain from other partners (in other institutions or on other sites) further examples of service innovation that will be useful to them or, likewise, share their own good practice more widely.

Overall, the sites which used the template reported that it can be used mainly in three ways. It can act a means of providing:

- **A reporting mechanism:** The template offers sites a report on the successes that they have achieved in the past. It enables them to describe successful initiatives and to make public announcements that they have arrived at a particular level of service innovation.
- **Useful background materials:** The template can offer sites useful or helpful information or examples of actionable key performance indicators; “artefacts”, such as technologies; and various types of financing. Each of these is a component of the current variant of the template (see Table 3).
- **Planning for the next steps in a scaling-up process:** The template can be used by sites to plan activities that are due to take place in the future. Thus, it can point towards a future map (or roadmap) for sites that are just starting out on their service innovation journey.

Initiative members believe that the model is ready, and the template is mature enough as a tool, for many more sites to use it.

## 7. Discussion and Conclusions

This innovation study has shown that the Service Readiness Levels Stage Model, and the template accompanying it, can already be used in their current state by sites that are preparing or are involved in service innovation scaling-up processes.

At present, the initiative is keen to further validate the template. It wishes to do so by involving a wider range of organisations, such as innovation incubators, users of services or health and care systems, and

representatives or members of regional associations. It also wishes to enhance and enlarge the sample of sites and projects in its database.

As a result, the initiative is prepared to consider and investigate the testing of the model and template, first, in terms of its sequencing and, second, on an even larger volume of innovative good practices in service innovation, including ones that work under a wider variety of health and care systems. For example, while the model is currently linear or sequential in its ordering, it is anticipated that it is feasible to use it in a more flexible manner that would show that service innovation initiatives can leap between stages or levels. In terms of context, to date, all the innovation incubators operate under Beveridge-style health and social care authorities.<sup>16</sup> So too, the sites involved in completing the templates until this point are all very much in line with their national health and care priorities, and many have acted as types of vanguard sites for the region (or the nation as a whole) in terms of their experimentation. As an even more ambitious or challenging possibility, this model / template could be used in other forms of service innovation (either within public administration as a whole or in private sector settings).

The initiative members designed the model's eight levels to be displayed in an order that permits the model to be examined similarly to the approach of the Electronic Medical Record Adoption Model (EMRAM). EMRAM was developed by the Healthcare Information and Management Systems Society (HIMSS) in the USA.<sup>17</sup> The two instruments are similar insofar as they are both stage-based models. In fact, it is the "look-and-feel" of the two instruments which can be compared, even though the actual content of each stage in the two models is quite different. Indeed, the two instruments might form part, ultimately, of a group of tools that together can be used to facilitate service innovation in diverse fields.

Scaling-up of service innovation and service development can be undertaken through the support of a minimum of three types of activities. The activities include: twinning, coaching, and self-assessment. In the first two activities, the model and tool could be used more as a form of teaching or learning aid. In the third approach to self-assessment, it is clearly feasible to work in the simple and straightforward (handwritten or typed) way used by the initiative members to date. In the future, however, the activity will probably need to involve a complementary electronic support mechanism or platform.

Each of these types of activities to support scaling-up is becoming increasingly popular. The first two in particular are being supported by a variety of European Commission co-financed activities, through studies such as ScaleAHA<sup>18</sup> and projects like SCIROCCO<sup>19</sup> and ACT@Scale.<sup>20</sup> The third activity deserves greater attention. Ultimately, for example, it is anticipated that this model could be displayed using a more interactive, attractive visual format e.g., online.

The initiative members believe that further elaboration of the actual tool would permit the creation of several instruments:

- **A useful, simple tool:** Such a tool could be used to evaluate service innovation initiatives in health and care. For example, the tool could constitute a component of a user-friendly online course that would be composed of a teaching set of accessible documents, to be used to introduce and teach the basics of the framework/model.

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<sup>16</sup> See for background, e.g., [https://en.wikipedia.org/wiki/Welfare\\_state](https://en.wikipedia.org/wiki/Welfare_state), accessed 14 July 2017.

<sup>17</sup> <http://www.himss.eu/healthcare-providers/emram>, last accessed 14 July 2017.

<sup>18</sup> <http://scale-aha.eu/>, last accessed 14 July 2017.

<sup>19</sup> <http://www.scirocco-project.eu/>, last accessed 14 July 2017.

<sup>20</sup> The Act@Scale website is no longer available. It was last accessed on 14 July 2017.

- **A form of roadmap:** Such a tool could facilitate a site's movement towards further applied innovative actions.  
For example, the tool could enable a site's own understanding of how to progress stage-by-stage on a service innovation journey.
- **A compendium:** Such a tool could permit the collation of descriptions of good practice service innovation experiences. The examples would provide accessible and easy-to-use case studies. This collection could serve as a set of sample initiatives from different countries to be used as a point of reference for innovation management in health care.

There is considerable potential complementarity between this specific tool and several others identified by the initiative. This tool can be seen as one among several that could form a toolkit to be used by sites wishing to make innovative shifts in their service provision.

Last but not least, while the focus of further work is on the use of the model as a tool, it is clear that more investigation could take place on its use in much wider areas of innovation management and service development [7],[8],[9].

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## References

- [1] European Commission. *Horizon 2020. Work Programme 2014-2015* (revised). European Commission Decision C (2014)4995 of 22 July 2014; 2014.  
[http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014\\_2015/main/h2020-wp1415-intro\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/main/h2020-wp1415-intro_en.pdf)
- [2] European Commission, *Horizon 2020 - The Framework Programme for Research and Innovation*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2011) 808 final, Brussels 30.11.2011. Brussels: European Commission; 2011.
- [3] Kodner, DL & Spreeuwenberg, C. Integrated care: meaning, logic, applications, and implications – a discussion paper. *International Journal of Integrated Care*, Vol. 2, 4. Nov. 2002; 2002.
- [4] Guldmond N & Hercheui, MD. The Role of Technology in the Provision of Care for Patients with Chronic Conditions: the Chronic Care Model as a Framework for the Integration of ICT. In M.D. Hercheui, D. Whitehouse, W.J. McIver Jnr. & J. Phahlamohlaka (editors) (2012). *ICT Critical Infrastructures and Society*. HCC10 2012. IFIP AICT 386. IFIP International Federation for Information Processing. Springer-Verlag: Heidelberg and Berlin, pp124-134; 2012.
- [5] Witell, L, Snyder, H, Gustafsson, A, Fombelle, P, and Kristensson, P. Defining service innovation: A review and synthesis. *Journal of Business Research*. Vol. 69, 8. Aug. 2016, 2863-2872; 2016.
- [6] European Commission. Commission Implementing Decision of 22.7.2014 amending Implementing Decision C(2013)8631 adopting the 2014-2015 work programme in the framework of the Specific

Programme Implementing Horizon 2020 – The Framework Programme for Research and Innovation (2014-2020); 2014. [http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014\\_2015/annexes/h2020-wp1415-annex-ga\\_v2.1\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-ga_v2.1_en.pdf)

[7] Joiner, KA and Lusch, RF. Evolving to a new service-dominant logic for health care. *Innovation and Entrepreneurship in Health*. 2016:3 25-33; 2016.

[8] Mori, AR, Contenti M, and Albano V. Completeness Layers towards Integrated Care enabled by Technology (CLICT). *Global Telemedicine and eHealth Updates: Knowledge Resources*, Vol. 8, 2015, pp13-16; 2015.

[9] Wise, CG, Alexander JA, Green LA, Cohen GR, and Koster CR. Journey toward a Patient-Centered Medical Home: Readiness for Change in Primary Care Practices, *The Milbank Quarterly*, Vol. 89, No. 3, 2011 (pp. 399–424); 2011.

[10] Gómez-Vallejo HJ, Uriel-Latorre B, Sande-Meijide M et al. Case-based reasoning for aiding detection and classification of nosocomial diseases. *Decision Support Systems*. Vol. 84. April 2016, 14-116; 2016. <https://dl.acm.org/doi/10.1016/j.dss.2016.02.005>