CHERRIES

RESPONSIBLE HEALTHCARE ECOSYSTEMS

Transformation through responsible, open and inclusive innovation: **the new CHERRIES Model**

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01. INTRODUCTION

The CHERRIES project implemented experiments for the development of healthcare innovations in three European regions – in the Republic of Cyprus, Murcia (Spain), and Örebro (Sweden). The experiments built upon a specific methodology – the CHERRIES model. The implementation of the model revealed the strengths of the model but also highlighted some critical issues that should be considered when applying the methodology. The following document aims at outlining these strengths and critical issues and subsequently offering reflections for how to address these aspects. Thus, a wider framework that is rooted in Transition Studies will amend the CHERRIES model, which itself is based on ideas and methodologies stemming from Responsible Research and Innovation (RRI) and Open Innovation.

The reasoning for this is that innovations in healthcare are not simple, stand-alone issues. Most of the time, they will have an affect on the interaction between patients and healthcare professionals – the practice of healthcare provision. These changes in practice often require changes in the way healthcare provision is organised and in the institutions that shape these systems. As these healthcare systems are complex, structured and ridged socio-technical (the sum of all technical and social elements used to provide healthcare services) systems, even successful new approaches and innovations often are not adopted. Thus, in order to adopt innovations within healthcare systems an orchestrated transformation on the levels of practice, organisations, and institutions is required for a successful implementation. This transformative change process, at its core, is a social process that aims at balancing the interests and constrains of different actors. The toolboxes of Sustainability Transition can be useful in the context.

In the following, the CHERRIES model and the experience from its adoption are presented and discussed. Based on this diagnostic, the considerations from Transition Studies are introduced and applied in the context of healthcare. The original CHERRIES model is amended by a Healthcare Innovation Hub and a fourth step in the methodology. These aspects are further illustrated by similar experiences in other contexts.

> *From a university perspective, CHERRIES is a great example of participatory action research: the mapping, the policy analysis, the impact evaluation, and the co-creation with the regional partners were really beneficial for us.*
>
> **Ingeborg Mejer, Senior Researcher at Centre for Science and Technology Studies, Leiden University**

> *We observed final important positive results and learnings from each of the regions involved in the experimentation on 1) how to apply, replicate and enhance the CHERRIES model also for the future in order to shape more open, transparent, inclusive governance and decision making systems at regional level; 2) how to co-design and co-develop responsible and sustainable innovative solutions in health; and also 3) how to build territorial multi-actor coalitions that work together beyond the end of the pilot projects.*
>
> **Claudia Colonnello, Social Researcher, K&I | CHERRIES Monitoring & Evaluation Leader**

02. LEARNING FROM THE CHERRIES EXPERIMENTS

THEORETICAL CONSIDERATIONS

The CHERRIES experiments combine two different logics of innovation policy making and thus are positioned on the crossroads of two different policy domains. First, they aim at increasing the economic competitiveness in a region through supporting the ecosystems in developing innovative approaches, products and services. Second, they aim at improving healthcare services by developing new practices that meet the needs of healthcare professionals and patients better than current practices. The healthcare sectors are facing numerous challenges and in the face of demographic change, these challenges are intensifying. The CHERRIES project responds to these challenges with approaches from demand-side innovation policy. It builds on the idea of RRI as a way of engaging in "Science with and for Society" processes. Thus, CHERRIES initiates collaborations of societal actors (researchers, citizens, policy makers, business, third sector organisations, etc.) that jointly contribute to better align the innovation processes and outcomes with the values, needs and expectations of society. Whereby the idea is that this will lead to both, better innovation outcomes as well as to more open and inclusive innovation systems.

Further, as CHERRIES aims to improve the way healthcare services are provided by developing innovative solutions to improve current healthcare practices, it contributes to the transformations and missions outlined at European policy level and translates them into regional processes. Thus, it engages in new paradigms to innovation that aim at transforming socio-technical systems through innovation and changes the roles of involved stakeholders to co-creators of value. This co-creation builds on an understanding of Open Innovation that includes societal actors in defining innovation needs and solutions and maximises the interfaces between societal spheres as a basis for creativity and a holistic perspective on the issue at hand. By linking these processes to localised challenges, the territorial level and territorial health and innovation policy become the arena in which stakeholders negotiate the future of healthcare services.

THE ORIGINAL MODEL

The CHERRIES model, as implemented in the regional experiments in the Republic of Cyprus, Murcia and Örebro, consists of three main steps that allow innovating in an open, responsible manner while addressing demands within a specific context. In each region, a central actor within the eco-system ran the process and engaged the regionally anchored quadruple helix (industry, research, administration, civil society) stakeholders. The steps of the CHERRIES model are as follows:

1. **Need identification.** The first step of the CHERRIES model is to identify a Need for innovation in a given context. This is a reflexive process that builds on engagement of stakeholders who can provide insights from their working and living realities. In the CHERRIES experiments, this process built on a Call for Needs. This open Call collected stakeholders' Needs in a structured way. The Call explained the context, regional scope, how to submit a Need, and included templates for structuring the required information. Hereby, the objective was to balance information needs and the burden of reporting a Need. This information has been widely disseminated within the regional ecosystems.

2. **Selection of Solution.** A regional Committee selected one of the identified Needs and subsequently the regional team transformed the Need into a Challenge. In this process, the Need was either enriched by technological and organisational requirements or multiple Needs were aggregated in order to address a shared underlying demand. This redefined Challenges represented the core of the Call for Solutions, a public open tendering process aimed at procuring an innovative Solution for the identified Need. Any company, start-up, Civil Society Organisation or the like could respond to the Call for Solutions with their ideas for improved healthcare services in the context of the Need.

3. **Co-Creation of Solution.** From the collected, eligible proposed solutions, the regional Committee selected one Solution per Need for funding. The regional process leader, the Solution Provider and the Need owners signed a co-creation agreement as well as a subsidy contract that outlines the objectives, processes, and milestones of the development and testing of the Solution. Based on this agreement, the co-creation process between Solution Provider, Need Owner, as well as other stakeholders has been implemented in order to guarantee the fit-for-purpose and -context of any Solution. Based on fixed criteria and scope, the developed Solution was tested in a real-life setting in order to assess its value in the clinical practice.

If the development process is successful, the outcome of the process is a new approach to address the identified Need better than current practices. However, it may still be on the level of a proof-of-concept, prototype, pilot etc. and thus require further development or, ideally, a lead-user that supports the maturing of the new practice.

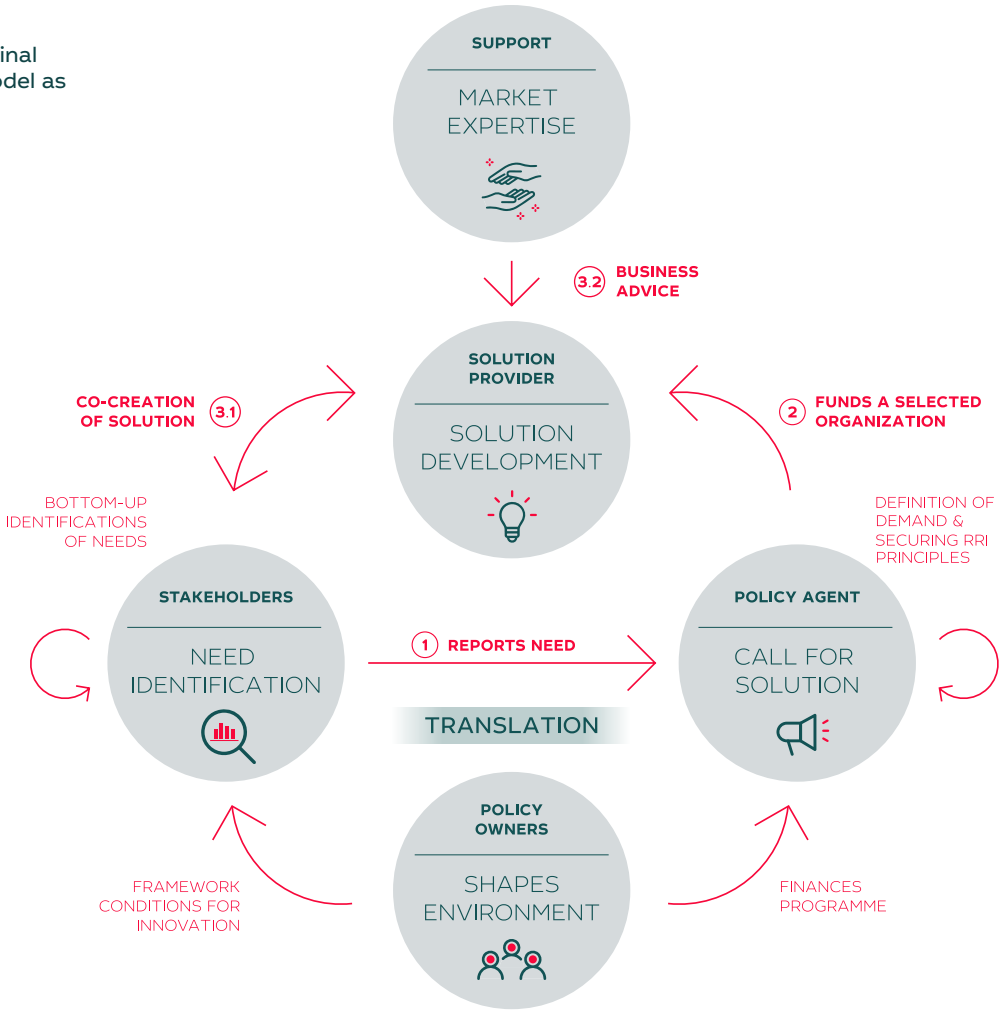


Figure 1: Original CHERRIES model as implemented

> *We have been working with the so-called Mirror Regions in order to share with them CHERRIES methodology and learnings. We have built a community of territories interested in co-creation approaches and transferred the CHERRIES methodology to other sectors beyond health, such as the housing sector in the Region of Burgos (Spain).*
>
> **Myriam Martin, International Project Manager, Ticbiomed**

STRENGTHS OF THE MODEL

The model has been implemented in the three CHERRIES regions1 and during these real-life experiments, the project team could gather evidence about the model's strengths. The regional processes have been coordinated by teams that are positioned at the centre of the regional healthcare and innovation systems, this is crucial for engaging a variety of actors and the successful identification of Needs and suitable Solutions. The details about the regionally identified Needs and the Co-Created Solutions are outlined in the regional profiles. The main positive aspects of the model are:

- **Speed:** The process from identifying a Need to testing a co-created Solution took approximately one year in all three regions. The rapid prototyping and testing provide benefits for all involved stakeholder, but especially for businesses providing Solutions, as they can quickly assess how their Solution is performing under real-life conditions. However, the prototype is only a first prove-of-concept and needs a more rigor testing and implementation.
- **Fit:** The demand-oriented approach and co-creation under the involvement of a broad set of stakeholders warrants that the solution is up to the requirements in a specific context. The fit-for-purpose and fit-for-context is built into the model and the Solution is developed for solving a specific issue in a given context. The co-creation aligns preferences and the testing identifies additional requirements and competences to improve the Solution.
- **Coalitions:** The CHERRIES model is an efficient way of building topical coalitions around a perceived problem. By applying the model, a specific Need is put at the centre of a wider public attention and signals future opportunities to market actors. The co-creation and testing process brings together the quadruple helix within a new and open network in a solution-oriented collaboration that supports the building of shared understandings, trust, and visions.
- **Flexibility:** The model, based on three sequential steps, proved to be very flexible. It can be adopted to varying contexts, and can and should be adjusted to regional cultural and institutional contexts in order to provide value-added to existing initiatives. Further, the model can be implemented with smaller and bigger financial support for Solution Providers, however, the available financial recourses must be taken into account when selecting a Need. In regards to Solutions, the model can be used for the development of singular product innovations, product-service organisational designs, as well as for social innovations.

With these value propositions, the CHERRIES model can be a great addition to the innovation toolboxes of actors aiming to change the way we deliver social functions like healthcare, energy, mobility etc., to modernise their services, find new solutions for systemic challenges, and to engage in open and responsible innovation processes. However, when replicating the model, the following lessons-learned from the CHERRIES experience should be taken into consideration.

CRITICAL ISSUES

The reflection of the CHERRIES experiments led to main aspects that need to be handled when implementing the model outside a clearly defined project like CHERRIES. These three issues are that the model needs an anchor through clear institutional ownership, the need for an arena for deliberations of sectoral developments and shared strategy development, and the need for a strategy for the sustainability of jointly developed pilots after the co-creation phase.

- **Institutional ownership:** The management of the CHERRIES model requires personal and financial resources. Thus, a central actor (e.g., the Public Healthcare Organisation) or a consortium of organisations needs to commit to owning and maintaining such an innovation process model as a part of their innovation management system, to build up the organisational capacities, internal and external networks, and commit resources to run the processes. Whereby, the example of Murcia shows that running these Open Innovation processes repeatedly is important for organisational learning and the consolidation of the involved ecosystem. With a long-term perspective, the resources invested in the experiments could be retrieved through efficiency gains or shared intellectual property rights of Solutions.

- **Arena for deliberation:** The CHERRIES model provides an efficient way of selecting a singular Need and targeting it with a Solution. However, the fit of the Solution within the bigger picture of transformations of healthcare provision is not guaranteed and neither does the model provide a clear indication on how to address organisational change in the context of a new practice or product. Ageing populations, chronic diseases, comorbidities and budgetary restrictions put the healthcare sectors under pressure to find ways of treating more patients more efficient. This requires a system transformation, that is socially contested and various actors have different interests, power and general capacity to engage in this process of change. A shared arena for deliberation of future healthcare provision can help to provide directionality for innovators, align Solutions and management objectives, and increase the overall acceptance of new approaches.

- **Sustainability after pilot:** The CHERRIES model provides a framework for developing and testing a pilot but stops there. The link between innovation and organisation is missing but essential for questions of adoption, implementation, or even scaling. However, the adoption of pilots and thus changing the current practice of healthcare delivery is the core objective of the innovation process. Without adoption, the process is a costly and frustrating exercise of what would be possible. While there should not be an automatism for purchasing a Solution after the co-creation phase, a fourth step in the model that allows for extended testing, evidence gathering, and maturing of the new approach in a shielded space might provide sustainability to the most promising outcomes of the CHERRIES model application.

> *“CHERRIES pilots in Örebro let us acknowledge the importance of creating regional platforms that contribute building coalitions around a perceived problem and co-creating and testing dedicated solutions, thus bringing together actors in a network of shared understanding, trust, and visions. Now, we want to include target groups very much earlier in the innovation processes for making good changes and working differently with innovations.”*
>
> **Lotta Karlsson-Andersson, CEO, Activa Foundation**

In order to maintain the strengths and mitigate the issues outlined above, a new model is suggested that combines the RRI and Open Innovation characteristics with approaches and reasoning from Strategic Management and Transition Studies. However, it should be stressed that the model needs to be adjusted to local realities and that everything that is suggested here should be reflected critically before implementation and further monitored and evaluated during and after the processes.

03. THE NEW CHERRIES MODEL

In order to improve the CHERRIES model and to address the identified issues, an improved "New CHERRIES model" is introduced based on the reflections of the original experiments. The additional conceptual building blocks, a Healthcare Innovation Hub, and an additional step in the experiment methodology amend the original approach.

CONCEPTUAL BUILDING BLOCKS

The traditional models of healthcare are undergoing a substantial transformation and will need to change further to meet the many emerging challenges that aging societies, chronic diseases, and comorbidities pose. It becomes imperative to adjust healthcare systems that are designed for prevention and cure, in a way that allows for a better integration of assistive and care services. Modern healthcare services should build on empowering approaches in which patients are no longer understood as recipients of treatments but are themselves co-producers of health services and co-creators of value. This transformation, thus, requires a horizontal System Innovation approach that mobilises technology, market mechanisms, regulations and social innovations to solve this complex societal problem in a set of interacting or interdependent components that form the "socio-technical system" of healthcare. This requires a long-term approach that brings together actors from all quadruple helices and that avoids pitfalls of transformative approaches as missing directionality, coordination, demand articulation, and reflexivity. The CHERRIES model provides dimensions that can facilitate this system innovation but needs to be enhanced to i) address the issues mentioned above and ii) to be able to overcome issues of missing directionality and coordination in a complex system. Thus, we suggest amending the theoretical pillars of **RRI** and **Open Innovation** with approaches steaming from **Sustainability Transition Studies.**

In Sustainability Transitions, transitions are non-linear, long-term and fundamental change processes towards sustainability that alter the way society is organised, operates and values services and amenities. Transition Studies provide three core elements that are useful for a future CHERRIES model: **strategic transition management, transition arenas, and niche management.** Transition management is the process of interactive and selective participatory search processes aimed at learning and experimenting and describes a governance form that empowers individuals and communities to shape a socio-technical system in their own environments. Transition arenas are an instrument of transition management. It offers space for actors to develop a shared direction and concrete initiatives for a transition as well as to form new coalitions, partnerships and movements. While niche management describes protected spaces that allow the experimentation with the co-evolution of technology, user practices, and regulatory structures for early innovations. The four core system innovation strategies in this literature are (i) establishing learning processes; (ii) building multi-stakeholder networks; (iii) sharing foresight visions; (iv) enhancing niche innovations. In order to manage these processes, a central change actor should coordinate these processes.

THE HEALTHCARE INNOVATION HUB

An essential aspect of the development of new practices and innovative approaches in healthcare is that these are not a singular phenomenon but rely on an implementation process into organisational and institutional contexts. This embedding relies on a co-evolutionary process that involves various actors and thus, these processes require time and continuous exchange. The involved actors might have different preferences or lack resources and competences to engage in this innovation journey. Thus, it is important to create stable relations between actors that are based on trust and shared objectives as a basis for developing shared visions and understandings of the general development trajectories of healthcare services in a given context. These structures

can be described as an Arena, Hub, Living Lab, Fora or in related concepts (see example boxes). These concepts provide the space for building these lasting relationships as a basis for developing of shared perspectives and joint projects. In the following, the idea of how such a space – calling it a Hub – could integrate change processes within regional healthcare systems, based on the learning of CHERRIES is introduced.

> *Uncertainty will become "the new normal". Innovation is necessary to meet today societal challenges to process the changes happening around us. Creating regional spaces for experimentation is today a must. As showed by EU|BIC CyRIC and CEEI Murcia in the CHERRIES experiments, EU|BICs as multidisciplinary organisations can act as catalysts for local ecosystems as they can connect the different stakeholders and facilitate on the ground the innovation process, by introducing and enabling new frameworks such as RRI and co-creation.*
>
> **Cristina Fanjul Alonso, European Business and Innovation Centre Network (EBN) President**

A Healthcare Innovation Hub and its institutionalised management functions act as a central management element within a regional healthcare innovation ecosystem. These ecosystems are loosely coupled as all members are independent from each other but still respond to joint challenges. Thus, the Hub and its management must engage in a process of community management and orchestration in order to facilitate an innovation ecosystem around joint value creation and further, create space for experimentation, implementation and strategic niche management. This orchestration is based on managing knowledge flows, the network stability, as well as the individual skills and organisational capabilities within the Hub. Further, in order to be able to engage in these processes in a meaningful and impactful way, the Hub needs to have a mandate to develop and test novel approaches with the clear objective of changing current practices through the implementation of these novel approaches. In order to achieve these objectives, the Hub should deliver four functions.

1. First, it provides an arena for deliberation that mobilises multi-actor networks and supports the structuring of the problems and trends the regional healthcare systems are facing. The problem structuration represents a joint problem diagnostic as a first step before any intervention into the system. This is a strategic intervention into the system, which provides the foundation for further actions.

2. Second, the Hub can coordinate the development of an agenda or transformation strategy that is shared and co-owned by the involved actors. This can be interpreted as strategy, that outlines the sectoral development goals, roadmaps and responsibilities. In order to achieve this agenda, the Hub implements activities that contribute to that agenda, aligns the interests, and needs of the involved actors. The Hub's activities are a means for efficient implementation of new services based on effective community management, building of networks, trust and joint understanding about potential barriers. These visions and transformation strategies can provide directionality and gather the regional ecosystem behind a common future for how healthcare services are provided. This is a central element for identifying innovation Needs, as the transformation agenda and the Needs, as basis for the experimentation, must be aligned in order to provide a precondition for later adoption of Solutions.

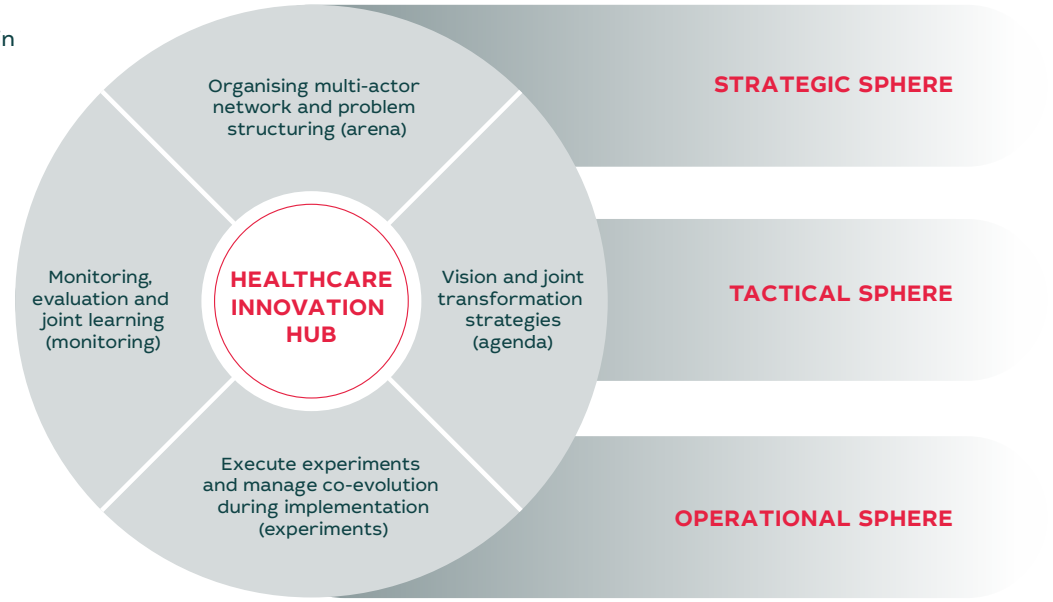
3. Third, the established regional networks, agendas or transformation strategies provide the context for experimentation. The experimentation should align with sectoral needs and visions, engage all relevant stakeholders in the development and

testing of novel approaches for healthcare services. The CHERRIES model provides a successful process methodology for developing responsible and open healthcare innovations. However, the experiments, from the outset, should pay attention to practical, organisational, and institutional aspects of the solutions and on the facilitation of the co-evolution of framework conditions as a basis for niche management. The CHERRIES Toolbox provides a broad set of RRI approaches and inspirations.

4. The experiments provide the possibility for joint reflecting and learning and thus, they need to be monitored and the learnings should again feed into the visioning and problem structuring processes. The overall reflexivity during the whole process and the anticipation of intended and unintended effects of new solutions on the system is critical for developing responsible solutions. These efforts need to be systematised and separated from personal experiences.

These four functions contribute to the overall objective of improving the provision of healthcare services, building on joint deliberation about desirable futures, experimental learning and innovation, as well as on supporting a co-evolution of practices, organisations, and institutions. The following illustration provides an overview of this Hub idea.

Figure 2: Hub interventions in three spheres



In order to initiate change, rather than develop pilots, two main preconditions for the Hub need to be met. First, the Hub needs to be legitimised with a mandate to change and modernise existing practices, processes and products of the healthcare system. Second, it needs to mobilise, connect and continuously engage a diverse range of actors in Hub activities and empower them to drive change.

The first aspect is central as innovation is not an end to itself but a means for better and more inclusive healthcare services. The provision of these services cannot be separated from innovation and the other way round. However, the way these services are structured and provided is a fundamental societal question, which is depending on political decisions, rules and regulations. Thus, the Hub needs the mandate, political backing as well as the involvement of decision makers to actually initiate this change. The questions should thus not be on how to get the decisions makers on board but how decision makers can use the Hub to initiate and manage the change processes that are envisioned on political level. In this context, the Hub can act as a central transformation

actor within a regional healthcare system. The Hub management should be taken over by a central healthcare organisation, e.g., the public healthcare provider, a hospital etc., in order to secure the viability and legitimacy of the process and, further, to provide credibility to the advocacy work that aims at gathering all stakeholders behind the visions and new solutions. The question of the political mandate is closely connected to questions of resources and scope for the transformation and innovation activities.

The second aspect is connected to people, process and expectation management. The foundation for transformation in complex systems like healthcare is the coordination between different parts of the system, which all are people aiming to achieve their function within the system as well as possible. The objective of the Hub is to identify and connect the people needed for transforming the healthcare services in the arena and joint agenda development. The Hub management is essential in this process as in needs to facilitate and lead this process at all stages. It needs to manage a diverse set of actors, bridging the divide between top-down and bottom-up processes, internal and external perspectives, short- and long-term objectives, etc. Thus, the Hub will require an open and responsible governance system while avoiding to build a too bureaucratic structure. In connection with this challenge, the Hub needs to identify and involve the right people at each step of the implementation of the functions and innovation experiments, including the top-decision makers and other hard to reach groups. Questions of expectation management, benefits of collaboration like e.g., access to data and users, roles and engagement rules need to be clearly defined in order to empower people to engage in the Hub processes in a meaningful way.

> *In CHERRIES project we have learned to include all the stakeholders in the innovation process, not only healthcare professionals, but also patients' associations and researchers. This is a more RRI-driven approach, and with this truly inclusive approach we are closer to successful results in healthcare.*
>
> **Gorka Sánchez, Head of Innovation, Murcia Health Service**

In order to define new practices, going beyond a single pilot, that can contribute to a sustainable transformation of healthcare services, the new approaches need to be understood in their contexts. The management of the Hub-based experiments, hence, aims to safeguard the co-evolution of practice, organisational and institutional routines and thereby orchestrate the envisioned change. The work is rooted in the principles of RRI by being inclusive, reflexive, anticipatory and responsive. An essential aspect of this work is being aware of power relations and being able to steer and negotiate change between actors with power-imbalances.

INSPIRING PRACTICE **Health Innovation Hub Ireland**

Health Innovation Hub Ireland supports innovation and connects hospitals and primary care centres with industry partners in Ireland. It offers pilot and innovation studies to companies and exposes the health care sector to new innovative products and services. Healthcare workers receive support to develop solutions to improve their work. For both industry actors and healthcare workers, HIH has an annual pitch competition, connecting ideas with funders and other innovation

actors. In addition, HIH matches clinical teams with industry partners to jointly develop solutions. A knowledge hub supports start-ups and other health care innovation actors, for example with workshops and skills trainings.

hih.ie

INSPIRING PRACTICE **Gérontopôle Nouvelle Aquitaine**

Gérontopôle Nouvelle Aquitaine is a research and innovation hub focused on improving the lives of people of older ages. The aim is to create an eco-system of mutual collaboration and to establish links between industry, science and professionals in the field of gerontology, as well as with local organisations and old people to create solutions for improving the quality of life for elderly people. The hub offers support for research and services for enterprises. They also promote uptake and facilitate training in occupations related to elderly people.

gerontopole-na.fr

THE EXPERIMENT DESIGN

Based on the establishment of a Healthcare Innovation Hub, a shared arena and a transformation agenda, the Hub can act as initiator and manager of CHERRIES-like experiments. A responsible, open and inclusive approach to transforming healthcare practices should build on an experimental approach with clearly defined objectives and processes. These kinds of experiments are a daring trial and a process whose outcome is uncertain due to a multitude of unpredictable parameters. They tend to be temporary and locally limited, risky and without a predetermined conclusion, and critical of the established system status. Thus, a priori definition of scope, objectives, and limits in terms of time and resources must guide the implementation. When the experiments follow the CHERRIES approach, it should be amended by a fourth step, whereby the methodology for each step can be adjusted to regional cultures and processes in order to make it work in a given context. However, the sequence of processes should be kept to provide clarity and space for reflection. Besides the three steps of the CHERRIES model of Need Identification, Solution Selection, and Co-Creation of Solution, the additional step of a Limited Demonstrator aims to facilitate the transition between prototyping and implementation. In the following the four steps of this new CHERRIES model are discussed:

First step, **Need Identification**:: In CHERRIES the Need Identification was facilitated through an open Call for Needs, where – depending on the region – every healthcare professional, institutional actor or even citizen could submit a perceived Need. The basic idea behind starting from a Need is, on the one hand, to open the innovation process to all stakeholders from the very beginning and thus increase the plurality of aspects to be addressed through innovation, and on the other hand, to deliberately take a step back and reflect

on the problem without directly jumping to the Solution. The objective is to understand the problem with all its dimensions. While this process proved to be a valuable moment of reflection and intelligence gathering, it also proved to be challenging for many involved actors. Alternative Need identification methods like stakeholder workshops, thus, might be deployed to complement this process. The Hub and the jointly developed agendas should guide the selection of the most relevant Needs, in order to safeguard an alignment between Needs and overarching strategic objectives.

Integrating CHERRIES and Cohesion Policy **A dual objective?**

The rationales of innovation policy are changing. While traditionally innovation was seen as a means for creating an economic competitive advantage and subsequently contribute to a favourable economic development, a recent "normative turn" has challenged this rationale. New generations of innovation policies aim to support innovations that contribute to addressing societal challenges, missions, or transformative sectoral objectives. In the context of regional policy, this is mostly visible in the transition from Smart Specialisation Strategies (S3) towards Smart Specialisation Strategies for Sustainability (S4) and the idea that innovation-oriented Cohesion Policy should contribute to the objectives of the Agenda 2030. However, innovations contributing to these objectives will not necessarily contribute to regional economic development. Thus, in order to reconcile these dual objectives, there is the difficulty to translate sectoral Needs into Challenges that meet both, the requirements of the sector as well as the economic capabilities of the regional innovation system (Challenge Target Space in illustration). This will require an increased strategic management capability for process managers. Opening the definition of Challenges within a Hub setting to include stakeholders from all quadruple helix actors might mitigate this challenge.

Second step, **Solution Selection**: In the CHERRIES model, the Solutions were selected via an open, competitive Call for Solutions. This process has features of a pre-commercial procurement for innovation approach. Thus, the assumption is that for the identified Need no ready-made solution exists yet and, therefore, needs to be developed in cooperation between Need Owner, Solution Provider, and other stakeholders. The core task is to translate the selected Need into a Challenge for the Call for Solutions. The Challenge informs about the problem

and its context and outlines requirements for Solutions without predefining what the Solution should be, in order to not hamper the creativity of potential Solution Providers. The Challenge defines the parameters for potential Solutions; aspects like the amount of funding available for Solution Providers, the duration of the development and testing, as well as the scope of these processes need to be defined and aligned with the Challenge. The process might lead to product, service, or social innovations and, within reasonable limits, the Challenge should allow for this variety and not determine the Solution's nature. Openness and creativity are essential elements of experimentation. The Challenge represents the core of the Call for Solutions, which is a public tendering process that should be widely disseminated in order to reach potential Solution Providers. The Solutions are assessed by a Selection Committee that makes sure that the Solutions are fit for the Challenge and well aligned with visions and transformation agendas of the Hub. If necessary, the Solution and Co-Creation process might be subject of a negotiation before the signing of contracts.

Third step, **Co-Creation of Solution**: After the successful selection of a Solution Provider and the contractual process the co-creation phase can start. This represents the core of the experiment and the stage where reflections and discussions lead to actions. In order to efficiently manage the process, a co-creation team is assembled that brings together participants with different roles and diverse insights, including, e.g., the Solution Provider, the Need Owner, the Hub management, healthcare professionals, specialist departments like IT or senior management. The actual co- creation is a series of interactive engagement formats between members of this group, aiming to shape the Solution and to collectively develop a holistic view on the new approach. Thus, the co- creation team is challenging each other's assumptions, and contributes to improving the functionality and usability of the Solution. The objective is to develop an approach that is fit-for-purpose as well as fit-for-context. Based on a first prototype, that could be a technological approach, algorithm, service design, protocol, organisational routine, etc., a limited test of the new practice is conducted. This test is trialling the new approach with future users and collaborators in order to assess the feasibility and effectiveness of the new approach during a limited period. This test will provide information on the added-value of the Solution and what potential next-steps could be..

Fourth step, **Limited Demonstrator of Solution**: The fourth step of the new CHERRIES model is an addition to the original model, based on the learning of the experimentation. The idea behind the fourth step is to create a bridge between the development of the prototype in step three and an implementation process via (public) procurement of the Solution. This step is necessary due to three factors. First, the result of the co-creation might not be mature enough for an application and will require an additional development process. Second, healthcare systems are shaped by an evidence system that stems from natural sciences. The level of evidence that healthcare professionals and managers might require in order to make an adoption decision go beyond assessment schemes that are feasible in the third step of the CHERRIES model. Third, even if the evidence for a new Solution is favourable, it might not get adopted because of the complexity of healthcare systems. The transformative implications of a Solution and the required changes on the level of healthcare practice, organisation, and institutions need to be assessed in order to effectively manage the co- evolution of these dimensions. Hence, there is the need for a limited demonstrator to create a Solution with the necessary maturity, gather evidence about clinical and economic impacts, as well as to understand the transformative requirements as a basis for the implementation process.

In order to address this issue, the fourth step of the CHERRIES experiments should aim to advance the Solution, create evidence, and reflect about co-evolutionary requirements of the healthcare system. This step, however, should not be an automatism but be treated as a follow-up project that is contingent on the successful development and a favourable assessment of the prototype developed during the co-creation phase. This follow-up project, as limited demonstrator of the new practice, should run as a trial with predefined duration and scope and the overall objective of testing and learning. After this demonstrator phase, the decision about starting the implementation process beyond the testing premises can be taken, grounded in a comprehensive evidence basis. By providing the opportunity of this second project, a protected niche for the further development of new practice is provided. The focus on anticipating the organisational and institutional changes, e.g., regulative, normative or cultural aspects, is a way of active niche and change management in order to support the development of desirable innovations. The clinical and economic evidence collected during this step provides a value proposition that can be deployed for aligning the interests of different actors involved in the new practice. The Hub, again, provides the strategic management capacity for steering this process and aligning the new Solutions and strategic visions as outlined in the transformation agenda.

After these four steps, a new Solution has been developed, tested and thoroughly assessed. Based on that, an informed adoption decision can be taken.

INSPIRING PRACTICE **Challenge-driven Innovation funding**

The Swedish innovation agency INNOVA is implementing a funding scheme – the Challenge- Driven Innovation programme – that aims to support projects, which work long-term to solve societal challenges to contribute to the Sustainable Development Goals in the Agenda 2030. The programme's collaborative projects develop innovative solutions at system level. Whereby, the idea is to meet societal challenges with a systems perspective. Projects need to be need-driven and have the potential to create sustainable growth and societal benefits by contributing to the Sustainable Development Goals. The project funding works in three steps, whereby during Step 1, the initiation, the focus is on developing the idea of innovation and planning for how it will be developed and used. In Step 2, the collaboration projects, collaboration projects prototype and test the innovative solutions. During Step 3, the implementation, the focus is on the testing and implementing of results on a larger scale. In order to apply for funding in the next step, a successful completion of the previous step is required. The number of funded projects deceases in each step, as does VINNOVA's co-financing rate. However, the project volumes are increasing over the three steps.

Reduced number of funded projects ▼	Vinnova's contribution increases in absolute terms ▼	Vinnova's contribution as a proportion of costs reduces ▼
STAGE 1 Initiation	**STAGE 1** Initiation Up to SEK 500k	**STAGE 1** Initiation Max 80%
STAGE 2 Collaborative projects	**STAGE 2** Collaborative projects Up to SEK 10m	**STAGE 2** Collaborative projects Max 50%
STAGE 3 Follow-up investment	**STAGE 3** Follow-up investment Approx. SEK 5-20m	**STAGE 3** Follow-up investment Approx. 25-40%

vinnova.se/en/m/challenge-driven-innovation/

Innovation is and remains a risky endeavour. In the end, this is a decision that depends on a plethora of factors, including various actors with probably conflicting interests, on organisational and institutional barriers. The alignment with overall strategies through the Hub's arena, agenda and activities, the demand-orientation, the co-creation process, as well as the reflection and learning on the new practice in its organisational and institutional context, will contribute to increasing the likelihood of a positive decision. The process provides a framework for addressing the healthcare sector's pressing issues through innovative solutions. These innovative solutions are developed and nurtured in an open, responsible and inclusive approach, which is aiming at transforming practices in order to increase the sector's sustainability and efficiency.

> *Being involved throughout the whole co-creation process – where a direct link between the actors with the real needs and the solution providers was established - for us (policy makers) it is very enriching as this can help us adapting the regional policies to the real needs of the citizens.*
>
> **Adrián Zittelli Ferrari, General Director, European Union Affairs for the Region of Murcia**

04. FACTSHEETS

CHERRIES Factsheet Region of Murcia

01 CALL FOR NEEDS

A

CHERRIES Murcia launched a call for needs focused on **eHealth as a regional culture on finding ICT-based solutions for healthcare related challenges and needs.**

The call addressed 3 main target groups: Healthcare professionals of Sistema Murciano de Salud (SMS); patients' associations; research groups of universities. The involvement of SMS healthcare professionals was mandatory.

B

The call received 8 applications: three were presented by healthcare professionals together with Patients' Associations and three with researchers from universities.

The following needs emerged as the most pressing ones:

- Improvement of administrative tools for clinicians.
- Improvement of the access to healthcare services for patients.
- Improvement of the coordination among different healthcare professionals.
- Management of the workload derived from the COVID-19 pandemic.

C

In Murcia, the **Early detection of progression in Multiple Sclerosis (PROGRESS)** has been identified as the best proposal. The objective was to develop an innovative technological solution using the Internet of Things (IoT) and the application of sensors to patients within a clinical trial to monitor this progression and inform the healthcare professional of the progression of the disease.

02 CALL FOR SOLUTIONS

A

CHERRIES Murcia launched the following call for solutions: **Develop and validate a system for the collection, analysis and monitoring of the movements of patients with Multiple Sclerosis (MS) during most of their daily activity using the Internet of things (IoT), to achieve the early detection of the progression in MS by applying sensors through smart wristbands to 30 patients during 5 months, beyond the current face to face consultations with neurologist and nurses.**

B

Assessed by a committee of 12 experts, 6 eligible applications were received from European SMEs – five Spanish companies and one Portuguese.

C

MS Care – Multiple Sclerosis Care (MS Progress) was the awarded solution proposed by Pulso Ediciones. The Spanish company had previous experience with IoT in the healthcare sector and with Multiple Sclerosis.

03 THE CO-CREATION PROCESS

A

Pulso Ediciones worked with the following co-creation team: EMACC (Association for Multiple Sclerosis of Cartagena), the Biomedical Engineering group from the Polytechnic University of Cartagena, the Neurology Service of Cartagena Hospital, SMS, Murcia Regional Government, EUBIC CEEIM and Ticbiomed.

B

After an initial training about co-creation in the healthcare sector, the team established a co-creation plan defining roles, agreements, timeline, deliverables, milestones, work methodology, monitoring framework, risk management, ethics and IPR.
They established a collaborative platform, run regular meetings (online and face-to-face), formal and informal exchanges, onsite visits, training with patients, focus groups.
Despite this, the pilot was interrupted due to technical issues during the testing phase of the IoT solution in real-life setting environment.

C

A culture of co-creation was established; the commitment of the team has lasted the whole process and the members worked collegially towards the same objective to deliver a sound innovative solution. Despite the technical difficulties met by the pilot testing in real environment, the application of CHERRIES model and the co-creation activities themselves between public and private actors showed positive results for the participating actors and their organizations.

04 CHALLENGES AND OPPORTUNITIES

CHALLENGES

- **Promote stakeholders' engagement at the different stages of the process** according to their expertise and maintain them involved along the process;
- **Find a common language and rhythm** for the success of the co-creation process considering the diversity of actors and their own daily schedule;
- **Keep the communication fluid** within the team in real-time and with the patients, especially if difficulties arise.

OPPORTUNITIES

- **Foster the dialogue between different essential actors** to the development of innovation in the healthcare sector and **ensure more acceptability and sustainability of the innovation;**
- Obtain **social and economic benefits for all parties** in terms of implementation of innovative processes;
- **Contribute to a change of practices, and creation of a culture of co-creation.**

05 KEY LEARNINGS

- Demanding processes that require **continuous mutual understanding and commitment** for long-term positive results;
- **Assignment of a facilitator organization** to ensure the implementation and follow-up of the whole process from the call for needs to the final results of the co-creation;
- **Organization of initial training** in co-creation methodology;
- **Investment in innovation and promotion of demand-driven** healthcare services;
- **Combination of societal unmet needs with regional R&I priorities;**
- **Benefits of working in co-creation** from the beginning of the innovation process to ensure the deployment of valid solutions and their future acceptation and use;
- **Engagement and Involvement** of stakeholders in the definition, conception and establishment of innovative solutions in healthcare.

06 KEY RECOMMENDATIONS
TO OTHER EU TERRITORIES WILLING TO ADOPT CHERRIES METHODOLOGY

- Promote dissemination channels and activities **to reach the widest audience and public engagement from the call for needs stage;**
- **Promote participation of the users/patients from the beginning of the process** (call for needs) and at all stages to ensure more acceptability at the end of the solution development and foster the exchanges among the patients of the study;
- Ensure the **inclusion of RRI principles as a transversal thread in the future innovation processes in healthcare.**

CONTACT

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CO-CREATION TEAM

CHERRIES Factsheet Örebro Region

01 CALL FOR NEEDS

A

CHERRIES Örebro launched a call for needs focused on the **mental health of the elderly.** This issue greatly affects the provision of healthcare services, but it is not specifically owned by healthcare actors. Therefore, a wide range of stakeholders was targeted by the call.

B

Identified target groups: civil society organisations, public institutions including healthcare organisations, and private citizens. To be open and inclusive towards all the targeted regional stakeholders the original CHERRIES form and the submission process have been simplified.

C

The need for social contacts among the elderly, the need for digital and technical skills, and the need to engage civil society in meeting societal needs, emerged as the most relevant ones in the region. **Involuntary loneliness came up as the most pressing one**.

02 CALL FOR SOLUTIONS

A

The objective of the call in Örebro was **to solve long-term loneliness risks leading to self-isolation of the elderly** from social contacts and society in general.

Many of the potential applicants for the Call for Solutions were CSOs and public service actors such as municipalities and health centres.

B

In Örebro, the **Selection Committee was composed of 9 members mostly from the Regional Örebro county departments**. 8 proposals were submitted: 7 were from Sweden and 1 from the Netherlands; 2 were proposed by SMEs, 2 by municipalities, 3 by CSOs and 1 by a university.

C

"Seniors leading seniors to a more meaningful everyday life in the municipality of Laxå" was the solution selected for the co-creation pilot.

03 THE CO-CREATION PROCESS

A

Planning and implementation of outreach activities, to reach out to and motivate lonely seniors to participate in the programme.

B

Further development of the outreach activities by adding both open and targeted activities for the end-users' group in collaboration with public actors and CSOs.

C

Initiation of an arena where the elderly can meet, and where several initiatives are designed and delivered to meet their needs and wishes.

04 CHALLENGES AND OPPORTUNITIES

CHALLENGES

- **To find/create common arenas** where stakeholders can meet for deliberation and co-creation.
- **To reach the target groups that are hard to get in touch with** – often the ones we most need to reach and involve are the hardest to reach.
- **To reach and involve potential partners** that are not the "usual suspects", i.e. organisations we usually approach for collaboration.

OPPORTUNITIES

- **To explore possible actors, resources, and collaborations in new ways**, keeping the same challenge and target group in focus – to find common ground from a new angle.
- **To get the target group involved early in the process**, and for real – not as e.g. reference group but as a stakeholder with genuine possibility to influence the process.
- **To explore complex challenges in a deeper way** than we usually do together with devoted and knowledgeable stakeholders.

05 KEY LEARNINGS

- **Adaptations and systematic support are needed through the innovation process.** This is especially important when we are approaching actors that might not be used to work this way – such as small, more practical actors that have e.g. access to or knowledge about the target group in question. We need to think of what we can do to support them and enable them to be part of the co-creation path.
- **Need identification is harder than we might think.** It requires time, patience, and training to explore the needs and not jump straight into a solution. We need to approach, listen to, and involve people outside the ordinary innovation system to really understand and get to the core of the need.
- **Novel discussions, deeper understanding and innovative solutions can happen when we come together – but we need arenas where we can meet.** To open up the process and invite actors beyond the ordinary innovation system is crucial.
- **Different actors have different incentives and prerequisites to partake in the co-creation process.** It is important that they all can participate in their own way, but it is equally important that the roles, responsibilities, and expectations of all actors are clear.
- **Identifying needs and defining solutions in collaboration with different actors should be an ongoing part of our development work**. When planning new projects, we should aim at involving stakeholders, participants and target groups early in the process. Implementation and upscaling plans need to be considered since the early stage of the whole process and addressed on the right level in the interested organisations.

06 KEY RECOMMENDATIONS

TO OTHER EU TERRITORIES WILLING TO ADOPT CHERRIES METHODOLOGY

- **Think ahead! What do you want to achieve (conceptually) and who do you need to involve, but still be open to new actors and approaches. There needs to be balance between having clear goals and expectations, and the possibility to influence the process.**
- **Think big! This is not only a project but a long-term idea of how to approach challenges. How can we incorporate this in the existing organisational structures? What could we gain if we do so?**
- **Support, coordination and leadership throughout the process is crucial. It needs to be done with respect for the innovation process – having an idea of where we are going but not always knowing what trails to take or with whom.**

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CO-CREATION TEAM

CHERRIES Factsheet Cyprus

01 CALL FOR NEEDS

A

Thematic focus:
A significant population of the Republic of Cyprus live in rural and remote areas across the island or/and away from the densely populated areas where the critical infrastructure is situated – including hospitals, healthcare professionals and other relevant services.

eHealth solutions were expected to contribute to increasing the service delivery quality of individual organisations and coordination between organisation involved in care as well as the patients alike.

B

Eight proposals were received through the duration of the Open call for needs; the classification of the applicants varies from Patient Associations, Healthcare providers and payors.

Based on the needs collected two main clusters were identified: the general need of telemedicine support, and the care services for patients with autism.

C

Selected need:
"Provision of medical services to the Cypriot citizens living in rural and remote areas with no easy access to healthcare services and prescribed medicines".

This need was broad enough to embracing the individual aspects expressed in the other submitted need proposals, and additionally provided the flexibility to potentially receive solutions that could be improved to meet those specific needs too.

02 CALL FOR SOLUTIONS

A

The purpose of this call was to engage eHealth solutions that provide accessibility and quality of medical services to the population of the communities and individuals with no easy access to medical canters and health professionals, without them having to travel long distances or cross checkpoint borders to gain access to healthcare services.

B

The call for solution received 12 submissions (all SMEs) from Cyprus (9), Netherlands, Greece and Spain. Top 3 applicants were invited to pitch their solutions and the selection committee selected the winner due to consensus. In Cyprus the selection committee was composed of 10 members reflecting a plurality of stakeholders' profiles to ensure the fair assessment of each proposal.

C

The selected solution was DoctorsHello, from Greece.
DoctorsHello is a peer-to-peer ecosystem, which provides innovative telemedicine services developed to support real-world healthcare based on real-time distributed data.

03 THE CO-CREATION PROCESS

A

Identification of key stakeholders and engagement.

B

Adaptation and alignment of the solution to the regional demand.

C

Actions for sustainability beyond pilot – future adaptation.

D

Constant feedback for adaptation of the solution to the regional need.

Adopting a large-scale solution like DoctorsHello to the very specific characteristics of the rural areas of Cyprus, required an accurate needs analysis in advance. Despite this analysis, real needs were practically identified through collaboration with healthcare professionals who work daily with the target group and have a good understanding of their real needs. For this reason, formal and informal communication was frequently pursued through phone, chats, video sessions and emails to better understand what customizations should be implemented.

Customization was based on the practice standards and technologies that healthcare professionals are acquainted with and based on the expected practices that end users are familiar with.

04 CHALLENGES AND OPPORTUNITIES

CHALLENGES

- **To convince people to participate in a Call for Needs;**
- **To convey the message and impact of demand driven approach;**
- **To align all stakeholders and keep them constantly engaged throughout the process.**

OPPORTUNITIES

- **Demand driven approach can validate a real need** (for Cyprus it identified the common denominator of the need behind the needs submitted – ehealth.);
- **To showcase a successful experiment and pilot to the policy makers** that could potentially adopt the methodology;
- **To educate and acknowledge the RRI concept throughout the process of innovation ecosystems** not only in healthcare.

05 KEY LEARNINGS

- **All stakeholders should be engaged in the beginning and throughout the process;** it is important determining the level of engagement of each actor;
- **Strong coordination** – importance of a leader for the process;
- Creating a set of **recommendations with measurable information;**
- Successfully conveying the **social values in RRI;**
- Bring in people from different knowledge and epistemological perspectives whenever needed.

06 KEY RECOMMENDATIONS
TO OTHER EU TERRITORIES WILLING TO ADOPT CHERRIES METHODOLOGY

- When choosing a solution make sure it is an **impactful and responsible** one;
- **Adopt the solution that can influence your local ecosystem;**
- **Constant involvement** of the healthcare stakeholders;
- **Choose a patient centric solution** that can actually increase welfare quality;
- **Always consider business continuity even post-pilot.**

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