

Responsible Research and Innovation in eHealth? Two contrasting case studies

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Information and communication technologies (ICT) are increasingly utilized to support health care practices. These so-called eHealth innovations embrace for instance complex communication platforms which facilitate the interaction between patients and various actors in the field of health care, or sensor environments that support healthy ageing and independent living of elderly or people with chronic diseases. These emerging innovations promise to increase the access, quality, and efficiency of health care. On the other hand, eHealth is expected to change existing roles and responsibilities between patients, their family members, doctors, health care providers and care personnel. One potential user group for eHealth innovations are elderly people – a group that is expected to increase significantly in the coming years.

The link between ICT, a sector which has brought forward technological and disruptive innovations, and the care sector, which has a clear human focus, is promising and challenging at the same time. The question can be raised how innovations in the field of eHealth can be responsibly developed and implemented, and how well new technologies align with the needs, values and expectations of society. Therefore, in our study we want to investigate **which factors stimulate or restrain Responsible Research and Innovation (RRI) in e-health applications?** A further question addresses, whether and how eHealth innovations are affected by regional structures. In the Dutch province Overijssel for example, a large number of health-related innovations are developed and numerous initiatives take place. Hence, in December 2016, Twente, as one region in Overijssel, has been awarded as one of 74 European exemplary regions for active and healthy aging. But **which regional specifics support or hinder responsible innovations for eHealth in Overijssel?**

Project: eHealth innovations in Overijssel

Our exploratory study is part of the Norwegian *Digitalize or Die*-project which addresses the question how ICT-based health innovations may contribute to new societal solutions in a responsible way. Additionally, our research is funded partly by the province of Overijssel. The duration of the project was from January - December 2017.

For this research, semi-structured interviews have been carried out with stakeholders along the innovation chain in each of the two cases. For the case of OZO, in total 7 different interviews were conducted, for the CC2U case 6 people were interviewed. Additionally, Dutch experts in the field of eHealth have been contacted for general information on the eHealth ecosystem in Overijssel.

In order to address these questions, we study two different innovations in the field of eHealth which both have strong links to the province Overijssel, but differ clearly in origin and project structures: OZOVerbindzorg and CloudCare2U. In these cases, we research which aspects of Responsible Research and Innovation are addressed in the innovation process. Additionally, we relate our results to characteristics of the regional innovation environment.

In this paper, first the technology and the process of innovation for each of the two cases are described below. Following, the aspects of Responsible Research and Innovation and regional specifics are mentioned. The results are discussed in terms of factors that are important for supporting innovation in a responsible way. Finally, the paper closes with suggestions and recommendations to foster responsible innovation in Overijssel.

Two eHealth innovations: problem-triggered vs. technology-driven

OZOVerbindzorg

The first case analyzes the innovation process of the eHealth product OZOVerbindzorg (OZO) developed by an independent foundation.¹ OZO, a digital communication platform, facilitates a network around the client, including family members, carers and caregivers. The platform promises to create trust and reassurance around the client by delivering person-centered care. Additionally, the use of OZO should support the carers and increase the efficiency of care while reducing its costs.

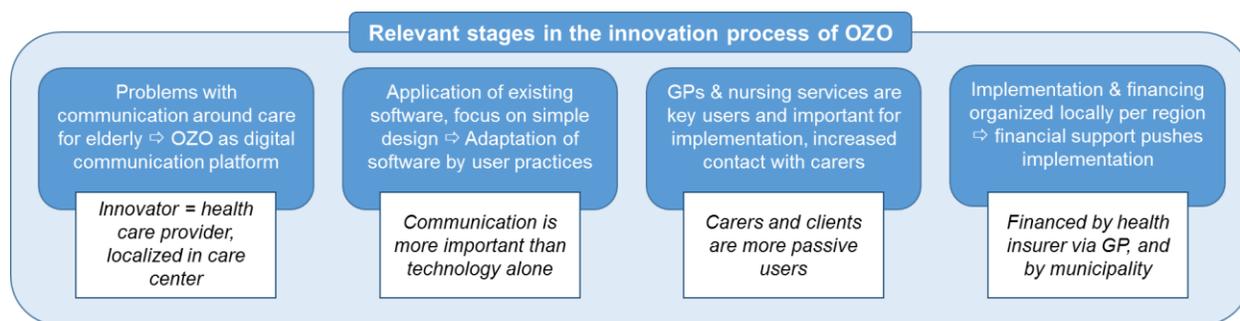


Figure 1. Important aspects and characteristics during the innovation process of the digital communication platform of OZO.

In 2013, changes in the Dutch national health care policy brought the care providers from a local center in the municipality Raalte together to discuss the resulting changes in the care around elderly. As a result, an independent foundation was born with the goal to develop a digital communication platform, to support exchange between care providers and to involve the carer. The platform had as main requirement to put the client central and to not provide ownership to the care providers. An existing software was tested in the field and adapted accordingly leading to a change in design of the software. The implementation is still

¹ <https://www.ozoverbindzorg.nl/>

organized locally per municipality or region while the willingness for collaboration and communication between the actors in the care is crucial. As an independent foundation the digital platform OZO is financed via the GPs, who are able to get reimbursements from the health care insurer, and via the municipality. Important aspects and characteristics of the innovation process are shown in Figure 1.

CloudCare2U

The second case describes the innovation CloudCare2U (CC2U), a digital home caring environment to support active and healthy ageing and independent living.² The platform mainly targets elderly and patients with chronic diseases, specifically patients with COPD (Chronic Obstructive Pulmonary Disease) and MCI (Mild Cognitive Impairment).

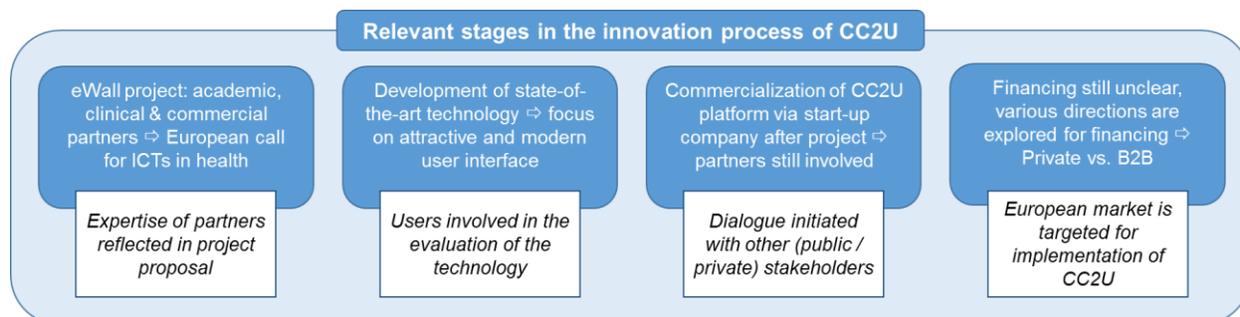


Figure 2. Relevant points and characteristics during the innovation process of the home caring environment CC2U.

CC2U originates from the European project eWall which started in 2013. The project was funded via a call on ICT for Ageing and Independent Living including 13 partners from 12 different European countries. A research institute in Enschede was strongly involved in the writing process of the proposal and had a leading role in the project as being responsible for the development of user requirements and system evaluation. Therefore, fictive users were created based on data from the literature and from experiences from earlier projects. A prototype of the system was tested by users in their home at the end of the project. Currently, a startup company with partners from the project exploits commercialization of CC2U into the European market. Relevant stages in the innovation process are shown in Figure 2.

Comparison of the two cases

Below, the two cases are discussed in terms of actor constellation (see Figure 3). Additionally, the characteristics of the innovation process are described, and the cases are

² <http://cloudcare2u.com/>

analyzed through the lens of Responsible Research and Innovation and by looking at a regional perspective. The key aspects are summarized in Figure 4.

Actor constellation

In the OZO case, the GPs and the nursing service are the most important actors for the implementation and use of the system. The use of the platform changes the relationship between the carer and the GP or the nursing service: the communication between care professional and carer increases and the carer is involved stronger in the care. Even though clients are central in OZO, their role is rather passive – in the system and during the implementation of OZO. The health care insurer and the municipality play an important role for the implementation by creating financial framework conditions. Knowledge providers play no visible role in the OZO case.

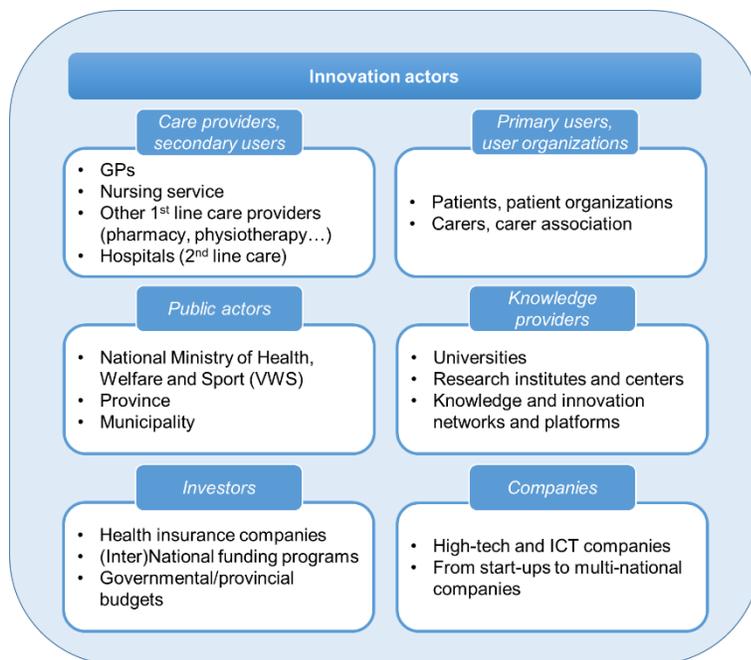


Figure 3. Actor constellation constructed from the OZO and CC2U cases.

In the CC2U case, knowledge providers are the main actors. The project consortium consists mainly of academic and clinical partners as well as high tech companies. Additionally, primary (clients / patients) and secondary (care providers) users are contacted during the project at a later stage. Carers and family members of the clients are however not involved and not particularly inscribed in the use of the technology. Similarly, the care network around the client is not involved. A change of the relationships between actors upon use of the CC2U platform is not yet visible due to the early commercialization phase. In contrast to OZO, the municipality and the health insurer are not envisioned as investors. Instead, the private sector is targeted for financial support.

Innovation process

The innovation processes of the two cases are different. OZO originated from an urgent problem in the health care sector and was initiated by users in this field. The process to develop and implement the digital communication platform in the OZO case is less structured and follows a hands-on, exploratory approach. Here, also the software itself is not the focus of the development. Rather an existing software is used and adapted according to

the needs of the field. CC2U on the other hand resulted from a European project which is mainly focusing on the development of state-of-the-art technology. The technology-driven project has a clear structure for the different development phases – as requested by European projects.

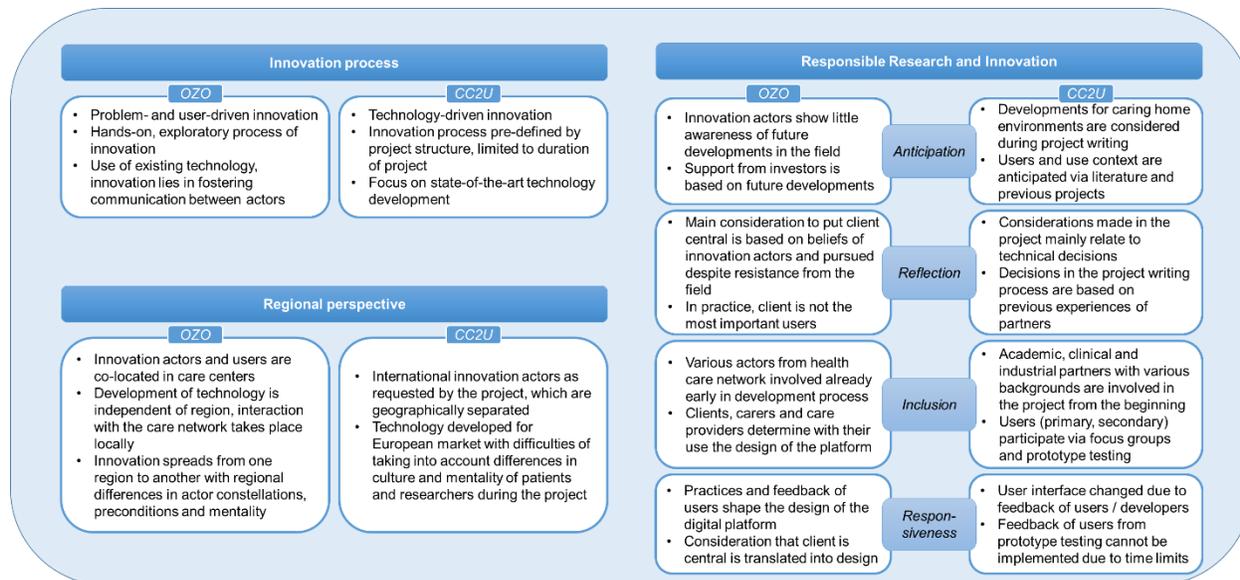


Figure 4. Comparison of the two cases OZO and CC2U in terms of innovation process, Responsible Research and Innovation and regional perspective.

Responsible Research and Innovation

Responsible Research and Innovation is a governance approach to stimulate the uptake of technological innovation by aligning the process with the needs and expectations of society.³ Additionally to the governance level, RRI has received much attention in the scientific literature, in funding programs and in practices at the workforce.⁴ To analyze the cases in terms of Responsible Research and Innovation, the four dimensions of Stilgoe et al. are taken into account: anticipation, reflection, inclusion and responsiveness.⁵ **Anticipation** describes whether potential impacts and developments are taken into account or whether systematic thinking and foresight methods are used. **Reflection** relates to the consideration of underlying motivations, values, code of conducts or standards for the decisions that play an important role in decision making. **Inclusion** refers to the continuous involvement of diverse stakeholders in the development process already at an early stage. **Responsiveness** defines whether the feedback is used to change the shape or direction of the design and the innovation process in responds to stakeholder values.

³ <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>

⁴ Schulze Greiving and Konrad (2017), Society is part of the equation. Nature Nanotechnology, 12: 184 - 184

⁵ Stilgoe et al. (2013), Research Policy, 42: 1568 – 1580

The four dimensions of Stilgoe et al. are taken here as framework to analyze the two cases. It becomes visible that Responsible Research and Innovation plays a different role in the two cases. In the case of OZO, the inclusion of stakeholders and the impact of user feedback on the design process (responsiveness) are key features, while anticipation is less visible. The last dimension, anticipation, is stronger in CC2U. The project is shaped by ongoing developments in the field of eHealth while users and use contexts are anticipated in a structured way during the project. Responsiveness is less obvious, also because the structured project leaves little room for implementing feedback of users.

Which factors stimulate or restrain RRI?

In the eWall project of the CC2U case **anticipatory** elements are clearly visible. For example, scenarios and fictive scripts are applied to anticipate future users of the technology and the use context of the platform. This anticipation is fostered by the structured and pre-defined set-up of the project. On the other hand, the pre-defined structure in the project leaves little room to implement changes in the design process. The development of the technology and its evaluation is limited to the 3 years of the project. After the 3 years a start-up further drives additional development and implementation but this also requires a re-orientation of the technology design and the intended users. The pre-structured character of projects makes it more difficult to implement feedback from users, especially due to the limited timeframe of the project and without follow-up funding leading to personnel changes and dilution of knowledge gathered in the project. **Responsiveness** is thus visible only to a small extend. The stakeholders involved in the eWall project are academic, clinical or commercial. Additionally, users are contacted at a later stage of the development. Although the **inclusion** of various stakeholders is stimulated by the European Commission and carried out by the eWall project, the involvement is not continuous and from the beginning of the project as characterized in the four dimensions of RRI.

In the OZO case, the innovation is led by care providers and future users of the platform (user-driven innovation). The process of innovation itself is rather open and exploratory, without clear steps but intertwined development and implementation phases which supports the **inclusion** of various stakeholders. These are already involved early in the process and continuously during development and implementation. Feedback of users also influences actively and strongly the design of the communication platform (**responsiveness**). **Anticipation** of ongoing developments is however barely visible in the OZO case. As mentioned during several interviews, this seems to be typical for the health care sector which has a more practical, hands-on mentality as opposed to more strategic approaches in other sectors (finance, ICT). The **reflection** to set the client central is a key success factor for OZO, both for the implementation of the platform and for raising funding. However, in reality clients are mainly using the system passively while care providers (GPs, nursing services) use the system more actively. Also the increased autonomy of clients that is envisioned by OZO is not yet achieved by the innovation.

Regional perspective

In the OZO case, the geographical proximity between the different actors plays an important role in supporting acceptance and implementation of the innovation. CC2U in contrast is based on a European project which requests to involve international partners who are often geographically separated.

Which regional specifics support or hinder innovation?

The foundation OZO has been initiated in the municipality Raalte where various care providers are located together in a care center. In the municipality Wijhe, one reason why the communication platform is taken up quickly is because the GPs are working closely together with the local nursing service in a care center. The **geographical proximity** of relevant stakeholders seems thus important for the implementation of the platform. Additionally, the software alone has not been successful on the market, only in combination with efforts to foster close collaboration and interaction of the involved users. The local character is also taken into account during the implementation of the platform in a new region: coordinators of the system are locals and are embedded in the regional health care network. Despite the involvement of local actors, the implementation of the platform is challenged by differences in regions in terms of health insurance (classification of care-groups (zorggroepen)) and health care (wmo) policy. Additionally, cultural differences in the regions have an impact on health care practices and relationships between clients and care providers. In the Twente and Overijssel region, the connection between patients and their GP is rather close. A GP often accompanies a whole family and for a long time while the relationship with the GP is less close in bigger cities (Randstad). These aspects should be taken into account for future implementation.

In the CC2U case international partners from various countries across Europe are involved as required for European projects. For the final product however, cultural and regional specifics play an important role and should be taken into account in the development process. This is done in the project, upon request of the review committee, by organizing focus groups with users in different countries and to discuss the requirements of the system with them.

In general, in Twente many networks, initiatives and projects are started in the field of eHealth and healthy ageing as mentioned during the interviews. Here, care providers have the mentality to communicate and collaborate with each other which is different in other regions of the country and a benefit for this region. However, there is no clear coordination visible between the many networks, initiatives and projects. The many initiatives and the increasing number of elderly people in the Twente area show that there is a need for digital technologies in the health care sector.

Recommendations

Various suggestions and recommendations are listed below based on the results of the case study.

- In order to stimulate the sustainability of innovation projects, policy makers could initiate follow-up activities to evaluate the status of the project and to eventually provide additional funding to increase the innovation success of promising technologies. Inclusion of stakeholders and room in the project to implement feedback are characteristics to stimulate responsible innovation.
- Actors in the health care sector are less aware of ongoing developments than in other fields such as ICT. On the other hand, ICT developers often are not experienced with the implementation of a new innovation in health care practices. Especially for the development of eHealth innovations, actors from both sectors need to work together and can learn from each other. Platforms for the exchange between actors in the health care and ICT sector will help to increase the awareness of strategic developments and practices.
- The willingness to collaborate and communicate with each other is an important characteristic in Twente. Fostering the exchange between care providers helps with the implementation of new innovations. In order to connect the numerous projects in Twente, more transparency and platforms are needed to foster links between the initiatives.
- Regional differences in the health care policy are challenging the implementation of new innovations. The province can facilitate the exchange of relevant actors in one region to find shared interests and strategies for standardization.