

27th May 2020, Online

The Future Hospital Sandpit session

Over 50 researchers and professionals from the alliance between TU Eindhoven (TU/e), Wageningen University & Research (WUR), Utrecht University (UU), and University Medical Centre Utrecht (UMCU), along with some other guests, participated in an online sandpit session to explore the opportunities to make our future hospitals more circular.

Context

The demand for resources has risen sharply in recent years, whereas the available supply is shrinking. A circular economy does not produce waste and keeps recycling raw materials. This allows us to unburden the environment by reducing demand for depletable resources. Circularity as a leading principle is attractive but yet abstract. How this principle translates to practical situations for citizens and companies is still not fully understood. The alliance between TU/e, WUR, UU and UMC Utrecht brings together complementary areas of expertise which together are needed to find safe, responsible ways of enhancing circular economy. The Working group Circular Society aims to do groundbreaking research relevant for practical solutions contributing to societal transitions towards circular Societies. The event also marked the starting point of building of a Network around the Circular Society Working Group.

The Healthcare sector is a major user of energy, water and raw materials and is therefore a significant polluter. In order to reduce CO₂ emissions from the healthcare sector and to promote a more circular way of working, sustainable alternatives must be found in various areas, such as energy consumption and the use of plastics. The necessary changes are not only technical in nature, but also, for example, legal and practical in the workplace itself. The Working Group Circular Society aims to take this up as their first challenge.

The goal for the pilot sandpit session was:

To identify potential research topics for future circular hospitals, where the knowledge and expertise of the four institutions in the alliance can make a difference.

Setup

The session was conducted online, facilitated by Wageningen Dialogue Centre. More than 50 researchers and other professionals from the four institutions of the alliance, a representative from RIVM and some other guests participated. Research ideas along the lines of following four topics were explored during the session: 1) Disposables and waste 2) Energy transition in healthcare 3) Reuse of pharmaceuticals to avoid waste 4) From ethics to solutions.

The event kicked off with an introduction to the goals of the Alliance and the Working Group, giving a short overview of different approaches to circularity (a.o. system design and the R-Ladder). This showed the complexity of the challenge goes well beyond recycling and re-use and made clear that the Transition to Circularity is not a sprint but a marathon. The approach to this sandpit was transdisciplinary: The case-owners were invited to present challenges they encounter in (daily) practice to kickstart the discussion from their perspective.

In a plenary session the “case owners”, who are professionals with experience in the respective four topics, presented their cases. This was followed by breakout sessions in which the participants worked in sub-groups on one topic of their choice. In the first round of discussions, the participants explored the trends in the given cases with insights from the case owner. In the second round, they

brainstormed on the potential research topics to tackle the respective cases. Each sub-group presented its top three research topics to the rest of the group in plenary.

Summary of discussions and research ideas for each of the four topics:

1) Disposables and waste

Dr. Redmer van Leeuwen, an eye surgeon at UMCU, presented this case, highlighting the large quantity of waste generated in hospitals due to the use of disposables. He called for rethinking of the materials used in healthcare. The case owner suggested more research on bio-based disposables, carbon-neutral sterilisation methods, recycling of disposables and self-cleaning reusable materials.

The key trends/challenges discussed in this sub-group were as follows:

- Waste audit and rethinking
 - To identify opportunities to shift from disposables to reusables waste audit is necessary
- Legal aspects
 - Legislation and liability issues can be a hindrance to suppliers as well as users as to what items can be reusable or disposable.
 - Product certifications can be a barrier for suppliers to innovate and replace disposables with reusables or bio-based materials.
- User perspective
 - Users are not willing to take a risk by reusing out of fear of consequences.
 - Crisis such as the ongoing pandemic further deter the use of reusables.
 - Cost-effectivity of reusables could be a concern

The most favoured research idea for the topic of disposables and waste was:

- ***Building a collaborative circular business model based on stakeholder analysis, waste auditing, safety and legal concerns.***

2) Energy transition in healthcare

Dr. Roberto Traversari from TNO, an energy specialist for hospitals, presented the case of energy transition in healthcare. Dr. Traversari highlighted the significance of ventilation systems in maintaining hospital buildings safe and comfortable, as well as the high consumption of energy involved in this. He emphasized the need for ventilation systems that use lesser fresh air, that are flexible to use and are resilient to crisis such Covid-19.

The key trends/challenges discussed in this sub-group were as follows:

- Rethinking the role of ventilation – New design paradigms
 - Is energy being wasted on over-control of pathogens/pollutants?
 - Decentralisation of ventilation systems to get improved control, flexibility and possibly more energy savings
 - Recirculating air after cleaning and using realtime pathogen/pollutant sensors to monitor
 - Inflexibility of existing systems
- Lack of awareness
 - patients and staff of hospitals should be more familiar with the problems and potential solutions

The main research ideas for the topic of energy transition in healthcare were:

- ***Inventory of unused energy saving potential in ventilation systems***
- ***Redesign of ventilation systems for more flexibility, decentralisation and circular operation***

3) Reuse of pharmaceuticals to avoid waste

Dr. Toine Egberts, a senior pharmacist and professor at UMCU, presented the case of pharmaceutical waste. Dr. Egberts informed that about 1/3rd of the medicines prescribed are never used by the patients. The value of drug waste in the Netherlands is at least €100 million/year. Apart from the monetary loss, this is a huge waste of resources. Dr. Egberts suggested research is required on how to safely reuse these unused drugs. It is also necessary to look into the ethical and legal concerns, as well as the implications for pharmaceutical and insurance sectors.

The key trends/challenges discussed in this sub-group were as follows:

- Effect of pharmaceutical pollutants on human health and environment
 - Disposal of unused pharmaceuticals and post-consumption release of pharmaceuticals can pollute food and water systems.
- Ensuring safety and value delivery while going towards circularity
- Moving from product to service delivery
 - Leasing medicines and returning when not used
 - Packaging and safety measures required for this

Three main research directions were identified for the topic of pharmaceutical waste:

- ***Categorizing pharmaceuticals based on their threat to the environment and requirement of scarce raw materials***
- ***Redesigning the pharmaceuticals value chain e.g., shifting the business model from owning to renting and returning unused pharmaceuticals***
- ***Recovery of pharmaceuticals from hospital and domestic wastewater***

4) From ethics to practical solutions

Dr. Peter Blankestijn, a Nephrologist at UMCU, presented the case ‘Integrate environmental and social impacts in daily practice: From ethics to practical solutions’. Dr. Blankestijn emphasized the ethical obligation to move towards circularity by evoking the fundamental principle for healthcare professionals: “*Primum non nocere*”, meaning “First, do no harm”. He encouraged everyone to challenge the status quo and argued that lack of awareness and knowledge are not tolerable anymore.

The key trends/challenges discussed in this sub-group were as follows:

- Ethics vs circularity conflict
- - Identify ethical dilemmas, policy hurdles (real and perceived), systems vs values conflict for professionals. Also taking into account initiatives by medical professionals, e.g. Greenlab.nl, groene zorgprofessional). Participants identified promising interdisciplinary connections to transitions research.
- Emphasis on sustainability and circularity in education
 - education on impacts of our actions for attitude change in professionals and motivation for students
- Need for policy support

- guidelines to towards circularity, standards for procurement by the Ministry

Following main research directions were identified for the topic Ethics to practical solutions:

- **Research on system and values conflict for medical professionals: how to drive change from within?**
- **Conduct environmental impact assessment of different product groups and create awareness**
- **Development of biobased materials for healthcare sector**

Research ideas from all 4 topics were put to vote to get a first understanding of the general preference of the group. Developing collaborative circular business models seems to be the most interesting topic. Indeed, this can be applied in context of disposables, pharmaceuticals and/or ventilation systems. The group also prefers more research on developing biobased materials for healthcare sector. To address the ethical dilemmas more research is deemed necessary on system and values conflicts. Also, to identify opportunities towards circularity, environmental impact assessment of different product groups is considered interesting by the group.

Participants suggested that involving more social scientists and perspective from transitions research could be valuable for this collaboration. It is noteworthy that a multidisciplinary group discovered similar underlying problems to achieve circularity in hospitals. Participants showed enthusiasm in collaborating across disciplinary boundaries to explore solutions to these problems.

What next?

This sandpit session will inform the Working Group on Circular Society on potential research towards realizing the circular hospital of the future. The commission is in the process of prioritizing promising research opportunities and -connections in order to arrive at a shortlist of selected projects open for funding in a next session.



