

# Why healthcare transitions stimulate Convergence research

## White Paper

5 September 2023

### Why this white paper?

The convergence between EUR, Erasmus MC and TU Delft has already led to many collaborations. Now is the time to look at where the added value of the convergence actually lies for healthcare issues. This white paper has been developed from the Health & Tech convergence programme and provides a theoretical framework on health transitions. In addition to this document, a *Convergence Interactive Research Map* has also been created with an overview of specific programmes, research projects and researchers. In an open, interactive format, the white paper and interactive map depict convergence research hotspots, suggest future research opportunities, aid communication within and beyond the convergence community, and encourage transdisciplinary collaborations in health.

### Healthcare is in transition

The world is changing and healthcare is changing with it. Large-scale developments in society such as the aging population and climate change have major consequences for the healthcare system. These changes go beyond minor tweaks. There is broad consensus that we are moving towards a completely different healthcare system. That does not happen overnight, but constitutes a long-term, step-by-step process that we are already in the middle of. Although it is impossible to know what the healthcare system will look like in 50 years' time, the healthcare transition already offers major opportunities and challenges for science today. Because this, partly unavoidable, transition is already underway, we as scientists cannot ignore it as it appeals to the societal value of our research.

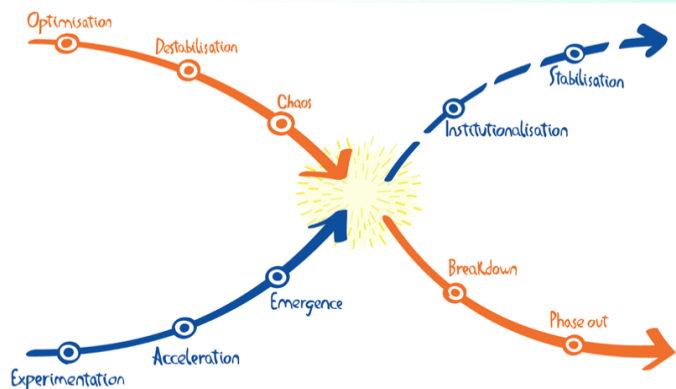
### Definition and course of transitions

A transition can be defined as a *long-term, far-reaching and fundamental change in the culture, structure and practice of a social domain*. A major transition at system level is accompanied by smaller transitions. For example, the major transition from reactive care to proactive care goes hand in hand with various smaller and more specific transitions, such as that from general practitioner to eHealth-supported self-care.

**Culture:** the entire set of values, norms, perspectives and paradigms;

**Structure:** the physical, economic and institutional infrastructure (including rules, regulations and collective actors);

**Practice:** routines, behaviours, manners and implementation at the individual level (including self-reflection and reflexive dialogue).



In general, transitions follow a similar pattern: the old becomes destabilised and falls into chaos, while the new, through careful experimentation, is amplified and accelerated, embedded and eventually completely replaces the old.

What makes dealing with a radical transition so complicated is that the exact outcome cannot be predicted. Healthcare is so intertwined with all areas of our society that a change can have unpredictable effects. As a result, we don't know where we will end up in 50 years. We also want to minimise the destabilisation and chaos that are normally part of a transition. In short, we can only dream of possible endpoints, and work on experiments in the right direction, which together hopefully will develop into the dream health system. To prevent all of our experiments going in different directions, it is essential to coordinate them from a shared vision of the future.

### Transitions call for convergence

Healthcare transitions are fundamental in nature, affecting our entire society. That is why it is crucial to involve all relevant parties and disciplines. The societal importance and the complexity of the transitions require a transdisciplinary (network) approach. Only together can a sustainable system change be achieved and a valuable response to the current transitions. The convergence currently mainly involves doctors, designers, technologists and policy makers, but is just as much the domain of behavioural scientists, philosophers, sociologists, psychologists, environmental experts, labour participation experts, health economists, legal experts, health insurers, media experts and the arts. Convergence as an organisation offers a network and supports cross-connections, for example through matchmaking, collaboration, education or access to practice or technology. It brings together knowledge and propagates a systems perspective, including people and behaviour. It therefore offers excellent opportunities to respond meaningfully to healthcare transitions.

### Drivers

The transitions in healthcare are driven by large-scale developments that we are in the middle of. The main drivers are:

| Scarcity  | Health inequality  | Glocal health risks   | Emerging science   |
|---|--|---|--|
| Due to the aging population, inflation and increased expectations, there is a shortage of personnel, money and resources to provide the desired care. | Growing inequality in many areas translates into unsustainable differences in health and access to healthcare. | Global developments such as climate change and pandemics require changes at the level of local health care. | Developments in various fields, such as artificial intelligence, may offer unexpected opportunities for tomorrow's healthcare. |

Typical convergence projects are in a playing field with these drivers at the four corners. For example, a project that aims to reduce care inequality may exacerbate the climate challenge,

or vice versa. See Appendix 1 for an example of the placement of the larger convergence clusters within this playing field. The *Convergence Interactive Research Map* provides a real-time overview of the researchers involved and the more specific projects.

### Examples of transitions

Convergence Delft-Rotterdam is working on transitions such as:

**From hospital to home:** The patient does not have to go to an (expensive) hospital for all care. Thanks to (technical) innovations, more can be done at home.

**From reactive to proactive:** Prevention is the best cure: we are increasingly aware that the care demand can be lowered a great deal through prevention and early diagnosis.

**From group-based to personalised:** Every person is different, and the most effective care is tailored to the individual patient. Thanks to developments in the areas of technology, data and care types, this personalisation is increasingly possible.

**From public to ppp:** While care is now mainly the responsibility of governments, in the future it will be much more a collaboration between government (public), companies (private) and citizens (people).

**From mono to multi:** Innovation requires collaboration. Scientific research has been multidisciplinary from an increasingly earlier stage.

This list is not exhaustive and will evolve with social developments. The *Convergence Interactive Research Map* provides an up-to-date view of the drivers and transitions being addressed by the convergence community. Appendix 2 gives an impression of transitions addressed by the Health&Tech cluster.

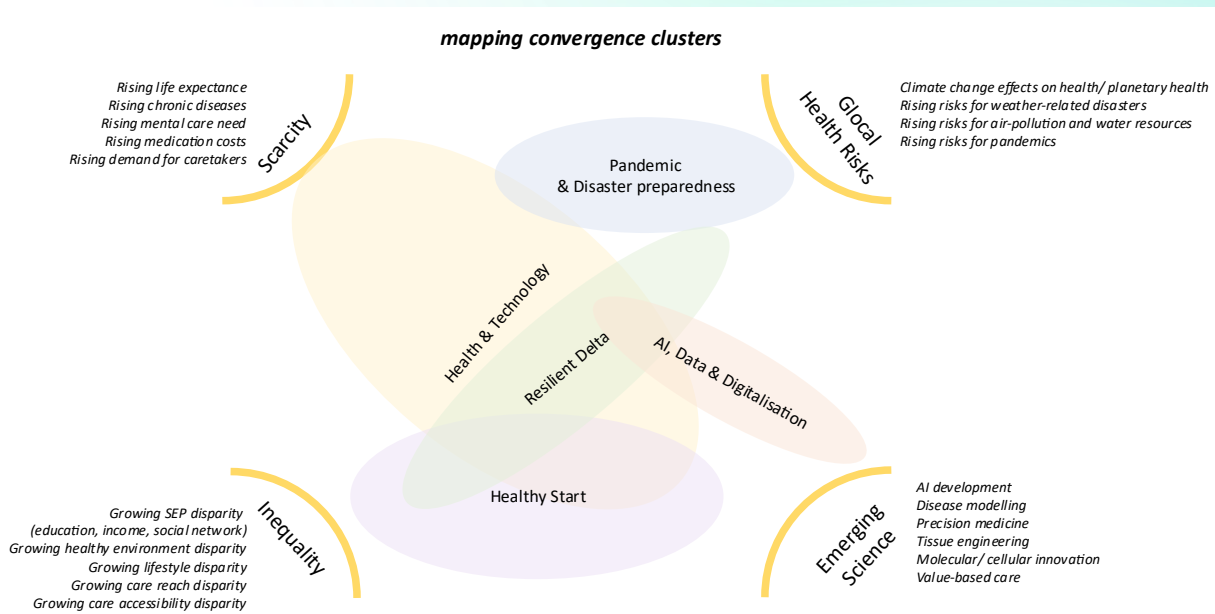
### Role of technology

The role of technology in healthcare transitions involves not only technical R&D but also fundamental research into the healthcare system of the future, the development of methods to evaluate the impact of technology, and the design of new healthcare models. By embedding technology and design in the development of a sustainable healthcare system, the positive societal impact of technology will increase. Breaking down the barriers between technology and the societal sciences is an important point of attention. Major challenges include aligning technology with end-users and vice versa, establishing a more rigorous evidence base for the benefit of technology to society, shortening the time-to-market, achieving faster adoption, stimulating wider implementation and more sustainable embedding of technologies in healthcare.

### Colophon

This white paper was initiated by Valentijn Visch (convergence H&T) and Françoise Johansen (research institute DRIFT), supported by DBAR science editing (dbar.nl).

## Appendix 1: Example of the convergence clusters in the *Convergence Interactive Research Map*



## Appendix 2: Drivers and transitions of the H&T transitions theme

A first overview of the drivers and transitions addressed by the convergence community. The contents of these tables are based on interviews with 13 researchers within the Health & Tech cluster. When the *Convergence Interactive Research Map* becomes alive, these tables will be expanded and become visible in the *Map*.

| Scarcity as driver for current changes in health(care) |  |  |  |
|--|--|--|--|
| Macro-level (landscape)                                | <ul style="list-style-type: none"> <li><i>Rising life expectancy</i></li> <li><i>Rising chronic diseases</i></li> <li><i>Rising mental care need</i></li> <li><i>Rising medication costs</i></li> <li><i>Rising demand for caretakers</i></li> </ul>   |  |  |
| Transition themes                                      | <i>Changing the dominant way of thinking, organising and doing</i>   |  |  |
|  |  | <b>From:</b>   | <b>To:</b>   |
|  | <b>Culture:</b>  | <ul style="list-style-type: none"> <li>-Reactive care</li> <li>-Medical rationality (diagnosing and prescribing treatment)</li> <li>-Consuming provided medical care</li> </ul>  | <ul style="list-style-type: none"> <li>-Proactive care</li> <li>-Social domain &amp; health paradigm (e.g. positive health, combined lifestyle intervention)</li> <li>-Self-organised care</li> </ul>  |
|  | <b>Structure:</b>  | <ul style="list-style-type: none"> <li>-Broad arrange of specialised care and treatment in the hospital</li> <li>-Compartmentalisation</li> <li>-Fee-per-treatment</li> </ul>  | <ul style="list-style-type: none"> <li>-Only complex or acute care in the hospital</li> <li>-Interdisciplinary approach across domains: network building between first and second echelon</li> <li>-Population-based financing with room for prevention; blended care paths</li> </ul> |
|  | <b>Practices:</b>  | <ul style="list-style-type: none"> <li>-Human interventions (treatment)</li> <li>-Visits to hospital for intake, screening, pre-operative care, check-up, monitoring, etc.</li> <li>-Medical specialist decides on intervention</li> </ul> | <ul style="list-style-type: none"> <li>-Digital/ Blended interventions</li> <li>-Reduced hospital visits through digital health technologies (remote care).</li> <li>-Supported decision making &amp; use of data in decision making</li> </ul>  |
| Innovations, prototypes, product service systems       | <ul style="list-style-type: none"> <li>-Grow It app</li> <li>-Virtual operating room</li> <li>-Telemonitoring</li> <li>-Organ incubator</li> <li>-Life style care centre</li> </ul>  |  |  |
| Challenges   | <ul style="list-style-type: none"> <li>-Data exchange (e.g. safety, connecting infrastructures)</li> <li>-Digital skills and acceptance amongst healthcare professionals</li> <li>-Not just shifting work pressure from hospital to home (primary care)</li> <li>-Prevention paradox</li> <li>-Fragmentation and compartmentalisation in healthcare</li> <li>-Redesign of the logistic process</li> <li>-Effective use of data for supported decision making</li> <li>-Scalability of interventions/ innovations</li> <li>-Sustainable deployment of (care) personnel</li> </ul> |  |  |

| Inequalities as driver for current changes in health(care) |  |   |   |
|--|--|---|---|
|  |  |   |   |
|  |  |   |   |
| Transition themes  | <i>Changing the dominant way of thinking, organising and doing</i>   |   |   |
|  |  | <b>From:</b>  | <b>To:</b>  |
|  | <b>Culture:</b>  | -Group-based universal care<br>-Patient journey<br>-Treatment-based top-down care | -Personalised care<br>-Life health journey<br>-Empathic co-creative care                    |
|  | <b>Structure:</b>  | -Medical domain   | -Other domains: social, education, economic, living environment, lifestyle, health literacy |
|  | <b>Practices:</b>  | -Focus on treatment and prescription of medication                                | -Investing more in triage and diagnosis and a different dialogue with patients              |
|  |  |   |   |
| Innovations, prototypes, product service systems           | <ul style="list-style-type: none"> <li>-Digital twin</li> <li>-Life health journey coach</li> <li>-Digital Health Technologies (Consultation Room 2030)</li> <li>-Healthy Storytelling</li> </ul>                        |   |   |
| Challenges   | <ul style="list-style-type: none"> <li>-Digital skills</li> <li>-Language barriers</li> <li>-Motivation</li> <li>-Fragmentation and compartmentalisation in healthcare</li> <li>-Reach and sustainable uptake</li> </ul> |   |   |

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
| Macro-level (landscape)                          |  |  |  |
|  |  |  |  |
| Transition themes                                | <i>Changing the dominant way of thinking, organising and doing</i>   |  |  |
|  |  | <b>From:</b>   | <b>To:</b>   |
|  | <b>Culture:</b>  | <ul style="list-style-type: none"> <li>-Not my domain-thinking</li> <li>-Safety paradigm (use of disposables to eliminate risk of infection)</li> <li>-Climate effect on environment</li> </ul>  | <ul style="list-style-type: none"> <li>-Sustainability is societal problem, so also in healthcare</li> <li>-Risk accepting paradigm: balancing risk and environmental footprint</li> <li>- Climate effect on nature including humans</li> </ul>  |
|  | <b>Structure:</b>  | <ul style="list-style-type: none"> <li>-No governance or regulative structure for supporting green healthcare.</li> <li>-Hardly any research into the effects of climate change on population health on the local/ regional level</li> <li>-Individual health effects (e.g. heat stress, air pollution, water pollution, allergies, UV radiation)</li> </ul> | <ul style="list-style-type: none"> <li>-Sustainable procurement</li> <li>-Connecting to society: knowledge institutes, universities and colleges, businesses</li> <li>-Integrated climate related health effects.</li> </ul>   |
|  | <b>Practices:</b>  | <ul style="list-style-type: none"> <li>-Use of disposable materials (for hygienic/ safety purposes)</li> <li>-Pollution through travel movements</li> <li>-General healthcare</li> </ul>   | <ul style="list-style-type: none"> <li>-Circularity/R-ladder (reduce, reuse, recycle)</li> <li>-CO2 reduction interventions</li> <li>-Telemonitoring and e-health solutions</li> <li>-Climate specific healthcare as to seasons (e.g. heat) and context (e.g. nursing homes).</li> </ul> |
|  |  |  |  |
| Innovations, prototypes, product service systems | <ul style="list-style-type: none"> <li>-Sustainable Hospital (flagship proposal not granted)</li> <li>-Material flow analysis</li> </ul>     |  |  |
| Challenges                                       | <ul style="list-style-type: none"> <li>-Uncharted territory (lack of knowledge/ awareness and coping)</li> <li>-Long-term effects</li> </ul> |  |  |

| Emerging Science as driver for current changes in health(care) |  |  |
|--|--|--|
| Macro-level (landscape)  | <i>AI development</i><br><i>Disease modelling</i><br><i>Precision medicine</i><br><i>Tissue engineering</i><br><i>Molecular/ cellular innovation</i><br><i>Value-based care</i>  |  |
| Transition themes  | <i>Changing the dominant way of thinking, organising and doing</i>   |  |
|  |  |  |
|  | <b>Culture:</b><br>-Optimisation (how to do things better/ with more precision)<br>-Group-based medicine<br>-Slow development  | ity<br>(increasing productivity without loss of quality = smarter technology)<br>-Personalised medicine<br>-Fast development                       |
|  | <b>Structure:</b><br>-Monodisciplinary (lab)   | -Multidisciplinary (a.o. software developments)  |
|  | <b>Practices:</b><br>-Human decision making and interventions (treatment)<br>-Visits to hospital for intake, screening, pre-operative care, check-up, monitoring, etc.   | -Use of data for decision making and digital/blended interventions<br>-Reducing hospital visits through digital health technologies (remote care). |
| Innovations, prototypes, product service systems               | -Digital Health Technologies<br>-Organ incubator<br>-Utilising micro- and nanotechnology to reveal cellular information<br>-Digital twin at cellular level   |  |
| Challenges   | -Cost of research (multidisciplinary, clinical trials using technological innovation) can be extremely high; unbalance between personalised medicine and cost per person)<br>-Regulations and policy are often restricting and usually lagging behind by a few years<br>-Business model & related ethics (making money from technological innovation can be unwanted in healthcare/medical research)<br>-Data exchange (e.g., safety, connecting infrastructures)<br>-Digital skills and acceptance amongst healthcare professionals<br>-Fragmentation and compartmentalisation in healthcare<br>-Redesign of the logistic process<br>-Effective use of data for supported decision making<br>-Scalability of interventions / innovations (traversing the valley of death) |  |