



## Flagship Program Call 2021 – open invitation for pre-proposals

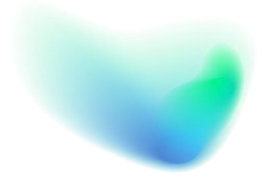
### Submission deadline

November 1<sup>st</sup> 2021 at 12.00 pm

### Submit pre-proposal

exclusively by email to: [preproposal@convergence.healthandtechnology.nl](mailto:preproposal@convergence.healthandtechnology.nl)

# Contents



## **1. Introduction**

- 1.1 Background
- 1.2 Convergence Health & Technology Themes
- 1.3 Convergence Health & Technology Flagship Programs
- 1.4 Two stage process
- 1.5 Aim of the open invitation for pre-proposals (pre-call)
- 1.6 Alignment with research agendas

## **2. Eligibility criteria**

- 2.1 Flagship programs
- 2.2 Consortium
- 2.3 Flagship Program timeline and budget

## **3. Evaluation criteria**

- 3.1 Evaluation criteria pre-call for Flagship programs
- 3.2 Evaluation criteria call for full proposal Flagship programs

## **4. Procedure and timeline**

- 4.1 Procedure and timeline pre-call for Flagship programs
- 4.2 Procedure and timeline call for Flagship programs
- 4.3 Contact

# 1. Introduction

## 1.1 Background

Novel scientific knowledge and the accelerating possibilities of technology hold great promises to address grand societal challenges. This is especially needed in the health domain. Increased life span, socioeconomic inequalities, novel diseases and the threat of rapidly increasing health care costs challenge the sustainability of our healthcare system. We face the challenge to improve health and well-being and societal participation for all. Convergence of a wide range of disciplines is called for: only by bringing together experts from the medical sciences, life sciences, technical sciences, socio-economic sciences, ethical sciences, and data sciences can we succeed in making our healthcare more proactive, precise, participatory and labor friendly. At the same time, developing innovative solutions for this transition and delivering them to the world represents an unprecedented economic opportunity.

### Convergence Defined

Convergence as applied to health is an approach to problem solving that integrates expertise from life sciences with physical, mathematical, and computational sciences, as well as engineering, design and social sciences, to form comprehensive frameworks that merge areas of knowledge from multiple fields to address specific challenges.

Convergence builds on fundamental progress made within individual disciplines AND cuts across disciplinary boundaries in these fields. While Convergence and interdisciplinary research are closely allied, Convergence is different because it goes beyond collaboration:

*Convergence is an approach to problem solving that cuts across disciplinary boundaries. It integrates knowledge, tools, and ways of thinking from life and health sciences, physical, mathematical, and computational sciences, engineering and design disciplines, social, economic and law disciplines to form a comprehensive synthetic framework for tackling scientific and societal challenges that exist at the interfaces of multiple fields. By merging these diverse areas of expertise in a network of partnerships, convergence stimulates innovation from basic science discovery to translational application.*

Source: National Research Council, Washington (DC); 2014 Jun 16.

Together, TU Delft, Erasmus MC and Erasmus University Rotterdam have what it takes to become a global leader in Health & Technology Convergence, shaping the future of health and healthcare in a transformative way. At the three institutions, over 500 principal investigators already cover the required range of disciplines. Moreover, Rotterdam and Delft offer an excellent ecosystem for health-tech research, innovation and economic activity. By truly converging our complementary expertise, we will be able to create a vibrant hub of over 30,000 researchers, students, clinicians and entrepreneurs, working together to improve health and societal participation for all.

In our joint mission, we aim for:

- Life-long health, from pre-birth to end of life
- Socio-economic equality in health(care)
- Prevention and early diagnostics to proactively maintain health
- Individual-tailored precise medical treatment for all

## 1.2 Convergence Health & Technology Themes

Via the open 'Convergence Health & Technology Flagship program call 2021' we intend to establish so-called 'Flagship programs' across the four central (and interrelated) Convergence Health & Technology themes: Fundamentals of Health & Disease, Human-centered technology and AI for Health, Improving Health Journeys, and Technology-based transitions in health(care).



### Fundamentals of Health & Disease

**Aim:** To understand the molecular basis of life and disease processes across the scales from molecule to patient and use this basic knowledge to develop revolutionary new molecular, instrumentation and data analysis methods for health applications.

**Outcomes:** Responding to challenges and opportunities identified in the other themes, this theme fuels the convergence knowledge pipeline, connecting basic research to new health(care) innovations in early detection, disease diagnosis, treatment monitoring, and precision molecular medicine. It will produce new knowledge and technology, and contribute to translation thereof into actionable diagnostic information, reliable therapeutic decisions, and ethically acceptable, societally supported solutions to healthcare challenges.

**Topics examples (but not extensive):** Molecular mechanisms of health and disease; Multi-modal multi-scale imaging; Neuromedicine; Regeneration & Repair; Synthetic cells.



### Improving Health Journeys

**Aim:** To promote individual health, implement effective prevention strategies, early disease detection, and more personalized treatment from the earliest moment of life and throughout life.

**Outcomes:** This theme will contribute to providing an optimal start of life, maintaining health throughout life, predicting disease, improving outcome of treatment, and optimizing recovery and (end-of-life) care. It will help transform the traditional health care system (a 'disease cure system') into a 'network' system that focuses on the entire health journey throughout life, effectively integrating various formal and informal health care systems with multi-layered data sources.

**Topics examples (but not extensive):** My DigitalTwin; Personalized health; City as Collaboratory.



### Human-centered technology and AI for Health

**Aim:** To develop novel technology, including, imaging technology, devices, and artificial intelligence tools, to facilitate new possibilities for prevention, diagnostics, cure and care.

**Outcomes:** This theme lays the foundations for a more proactive and personalized life course approach to health and health care. Personalization will result in improved accuracy of diagnosis, optimized treatments, and minimal side-effects, leading to enhanced resilience, faster resumption of daily life activities, and a longer time span of healthy and active living. A transition from reactivity to proactivity will empower and motivate citizens to be actively involved in their own health, which is key to improving health and quality of life, reducing the burden on the health care system, and addressing socioeconomic inequalities in health.

**Topics examples (but not extensive):** Novel clinical imaging technologies; Consultation room 2030; Operation theatre 2030; Critical care 2030; Rehabilitation room 2030.

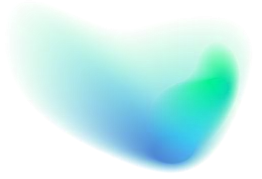


### Technology-based transitions in health(care)

**Aim:** To contribute to the creation of a data-driven, resilient, inclusive, value-based & affordable healthcare system by deploying smart digital and enabling health technologies.

**Outcomes:** This theme will unlock radically new models of care and new health technologies that promote and maintain health for all. The outcomes will guide the way towards the health care system of the future. Anchoring the development of the future health care system in engineering and design will increase the positive societal impact of health technology.

**Topics examples (but not extensive):** Transition from reactive to proactive care; Transition from group-based to personalized care; Transition from hospital to home.

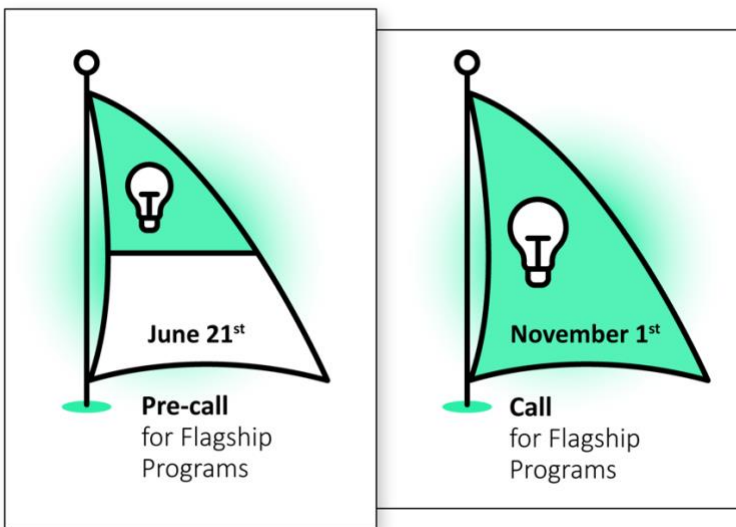


All Convergence Health & Technology themes have four pillars: (i) Research, (ii) Education, (iii) Facilities & Data infrastructure, and (iv) Fast-track innovation. This 'Convergence Health & Technology Flagship pre-proposal program call 2021' explicitly focuses on the *Research pillar*: ambitious research programs organized within (at least) one of the four themes.

### 1.3 Convergence Health & Technology Flagship programs

The 'Convergence Health & Technology Flagship programs' will be ambitious collaborative research and innovation programs, led by front-running convergence research clusters, that will give shape to (at least one of) the four central convergence themes, and thereby target major breakthroughs in health and science.

The Flagship program aligns with the Convergence Health & Technology mission. The Flagship program includes scientific ambitions, together with a five-year research strategy in which a range of research questions are addressed. The envisaged results of the program have the potential for a significant contribution to healthcare or scientific impact which can have long-term societal impact.



### 1.4 Two stage process

The call adopts a two-stage process:

#### First stage:

The **pre-proposal call** with a **check on** eligibility and **advise on fit** to the themes by the theme leads.

All pre-proposals will be discussed in the Program Board (consisting of the theme leads and the management board) to identify possibilities for connections between the proposals and to generate feedback to the submitting teams.

#### Second stage:

A final call with **evaluation** and **scoring** by an **external committee**. That process will be further explained in the final call text that will be published 1<sup>st</sup> November 2021.

### 1.5 Aim of the open invitation for pre-proposals (pre-call)

The aim of this **pre-call for Flagship programs** is an *open invitation* to encourage the research community of Convergence Health & Technology academic partners (TU Delft, Erasmus MC and Erasmus University Rotterdam) to submit preproposals for Flagship programs that align with the Convergence Health & Technology goals.

The aim of the invitation to submit preproposals is to identify the scientific ambitions in a more detailed way for a period five years, and for a more sustainable future after that period, in the cross-sectional research area of health & technology, by explicitly combining cross-disciplinary expertise from TU Delft, Erasmus MC and Erasmus University Rotterdam.

As a first stage in the evaluation procedure, all pre-proposals will be discussed in the Program Board (consisting of the theme leads and the management board) to evaluate the fit in one or more of the Convergence Health & Technology themes, and to identify possibilities for connections between the pre-proposals and to generate feedback to the submitting teams.

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**The pre-call programs that meet the eligible criteria will receive a maximum of 10k€ to develop the pre-proposal of the Flagship Program to submit for the second stage (a full proposal).**

#### **Preview to the Second stage call for Flagship Programs**

The final aim of the call for Flagship programs (including its pre-call) is to establish a Convergence Health & Technology scientific core-program and, in doing so, to develop and strengthen a scientific Convergence Health & Technology community.

The call provides an opportunity for ‘Convergence Health & Technology Flagship programs’, which will start no later than **July 1<sup>st</sup>, 2022**. Flagship programs will be evaluated and scored by an external jury according to the evaluation criteria which will be published 1<sup>st</sup> November in the call text. Convergence Health & Technology has allocated funding to fully develop research Flagship programs within a five-year period

Kick-started **with a maximum** of € 400.000 per year (as part of 50-50 external matching with external funding per year, so € 400.000 of external matching is matched with € 400.000) per Flagship Program (during 5 years), each Flagship should **grow to a team of more than 20** researchers and support staff, **and grow to an annual budget** of 1-2 million euro or more per year per Convergence Flagship program. This means a total 5-year budget of **minimal 4 million** euro per Convergence Flagship program.

The Flagship programs that will be selected and awarded will be evaluated by an external review board in 2025 (two and a half years after the start). Scientific progress, match with the Convergence Health & Technology mission, and success in additional funding will be evaluated.

The kick-start funding is mainly intended for temporary scientific staff with the aim to support, educate, and create researchers with explicit convergence skills. Since the aim of the program is to build **sustainable communities** also **a plan must be presented for sustainability of the flagship and community** (e.g. tenure-track positions). Staff has to be employed by TU Delft, Erasmus MC or Erasmus University Rotterdam. State-of-the art facilities and future-proof infrastructure which are necessary to successfully conduct these Flagship programs, are also eligible as part of the funding.

## 1.6 Alignment with research agendas

The Convergence Health & Technology Program Board will monitor the progress of the Flagship programs on a yearly basis and will encourage them to participate at the forefront of the international research field. Therefore, it is important that the programs **align with relevant research agendas**, including Gravitation Funding, the National Growth Fund (Nationale Groeifonds: o.a. MedTechNL), those of the Dutch National Research Agenda (Nationale Wetenschapsagenda: NWA), the Netherlands Federation of University Medical Centres (Nederlandse Federatie van Universitair Medische Centra: NFU), the high-tech systems and materials (HTSM), life sciences and health sectors, the European Research Area and the United Nations Sustainable Development Goals (SDGs).

### Estimated fit of themes to large funding streams

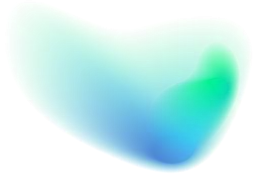
● Good fit   ● Moderate fit

### Themes

Funds available		Fundamentals of Health & Disease	Improving Health Journeys	Technology-based transitions in health(care)	Human-centered technology and AI for Health
Ca. 35 mln	<b>Groeifonds (MedTech NL)</b> Flagships closest to market, infrastructure and fast-track valorization	●	●	●	●
Ca. 20 mln	<b>Recovery &amp; Resilience Facility (RRF)</b> Funding	●	●	●	●
Ca. 20 mln	<b>Rotterdam Eneco funds</b> Infrastructure, fast-track valorization and (applied) flagships with physical component in Rotterdam	●	●	●	●
Ca. 40 mln	<b>Zwaartekracht</b> Flagships focused around fundamental research	●	●	●	●
	<b>NL AIC funding</b> Flagships with strong AI focus and partners	●	●	●	●
	<b>Health-RI regional node funding</b> Data infrastructure	●	●	●	●
Ca. 4 mln	<b>TKI toeslag LSH</b>	●	●	●	●
Ca. 40 mln	<b>Horizon Europe</b>	●	●	●	●

Figure 1. Examples of possible funding opportunities related to the themes.

## 2. Eligibility Criteria



### 2.1 Flagship programs

The Flagship program aligns with the Convergence Health & Technology mission. The Flagship program includes scientific ambitions, together with a five-year research strategy in which a range of research questions are addressed. The envisaged results of the program have the potential for a significant contribution to healthcare, society and/or scientific impact which has the potential for long-term societal impact.

The Flagship Programs have

- a base in fundamental ground-breaking science, and/or
- innovative technology with a great impact on health and/or wellbeing, or
- they are based on (fundamental) scientific impact with expected societal impact on the long term, or
- target a major technological innovation or scientific breakthrough in health(care) with great societal and/or economic potential, or
- develop and implement technologies to support transitions in healthcare from hospital to home, from reactive to pro-active or from group-based to person-centered

AND

- Play a leading role in strengthening the impact of Convergence Health & Technology in the region South Holland, the Netherlands and internationally, and/or
- Contribute to building a convergence community across at least two, but preferably the three research institutions, i.e., provide a basis for establishing new, joint, sustainable, leading research groups (thus new PIs positions that build a convergence faculty) between the institutes

AND (*Boundary Conditions*)

- Have a clear long-term work plan, including, if applicable, a specification of required facilities and a data- and infrastructure plan)
- Are driven and executed by a well-organized team of excellent scientists of at least 4 departments or faculties which are included in the program, connected to external partners in the ecosystem
- Create visibility, e.g. through field labs, and attract talents, partners and funding agencies



Furthermore, the program is aligned with relevant national and international agendas.

<p><b>Definition Convergence Health &amp; Technology Flagship Program</b></p> <p>Have a <b>base in fundamental ground-breaking science AND/OR innovative technology</b> with a great impact on health and/or wellbeing</p> <p><b>OR</b></p> <p>A (fundamental) scientific impact with expected societal impact on the long term</p> <p><b>OR</b></p> <p>Target a <b>major technological innovation or scientific breakthrough in health(care)</b> with great societal and/or economic potential</p> <p><b>OR</b></p> <p>Develop and implement technologies to support <b>transitions in healthcare</b> from hospital to home, from <b>reactive to pro-active</b> or from group based <b>to person-centered</b></p> <hr/> <p><b>AND</b></p> <p>Play a leading role in <b>strengthening the impact</b> of Convergence Health &amp; Technology in the region South Holland, the Netherlands and internationally</p> <p><b>AND/OR</b></p> <p>Contribute to building a convergence community across <b>at least two, but preferably the three research institutions</b>, i.e., provide a basis for establishing new, joint, sustainable, leading research groups (thus new PIs positions that build a convergence faculty) between the institutes</p> <hr/> <p><b>AND</b></p> <p>Have a clear long-term work plan, including, if applicable, a specification of required facilities and a data-and infrastructure plan)</p> <p><b>AND</b></p> <p>Are driven and executed by a well-organized team <b>of excellent scientists</b> of at <b>least 4 departments or faculties which are included</b> in the program, <b>connected to external partners</b> in the ecosystem</p> <p><b>AND</b></p> <p>Create visibility, e.g. through field labs, and attract talents, partners and funding agencies</p>
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Figure 2. Definition of Flagship Program

The **pre-proposals for Flagship programs** are described in no more than 6 pages and written according to the template attached with this document (appendix 1).

## 2.2 Consortium

The Flagship program is carried out by a consortium: a well-organized team of excellent scientists led by Flagship Leads. Each consortium has at least 2, but preferably 3 Flagship Leads with a tenured position at the 3 knowledge institutions (one Flagship lead from each knowledge institute: TU Delft, Erasmus MC and Erasmus University Rotterdam).

*At least* one of the Flagship Leads is from a medical discipline. The leads have paid employment at one of the founding organizations for at least the duration of the application process and the research period for which the grant is requested.

The consortium has at least 10 scientific staff members as consortium members (including the Flagship Leads). At least 4 departments or faculties are included in the Flagship program.

In addition, each Flagship program has to describe how they accelerate scientific and societal and/or economic impact.

In the pre-flagship call a short overview of contributions of (possible) consortium partners that account for covering program finances (in kind and in cash) should be included. In this pre-call there is **no need** for a letter of commitment of the partners.

### 2.3 Flagship program timeline and budget

Submitted proposals for this pre-call for Flagship programs **and that are selected** in the **second stage** (call for Flagship Programs) should start no later than **August 1<sup>st</sup>, 2022**. The typical size of a Flagship program can vary between 4- 10 million euro, to be spent over a period of 5 years. Proposals should be large in size, growing to a team of at least 20 researchers and support staff with an annual budget of 1-2 million euro per year per convergence Flagship program.

## 3. Evaluation Criteria

### 3.1 Evaluation criteria pre-proposal call for Flagship programs

The **pre-proposals** for Flagship programs will be assessed and evaluated along four axes:

- 1) fit to the overall Convergence Health and Technology strategy and themes
- 2) extent of convergence as in the above definition, *convergence is an approach to problem solving that cuts across disciplinary boundaries*
- 3) scientific quality and sustainability of the program after 5 years
- 4) societal impact (including both short-term immediate impact and long-term impact of fundamental science)

All pre-proposals will be discussed in the Program Board (consisting of the theme leads and the management board) to identify possibilities for connections between the proposals and to generate feedback to the submitting teams.

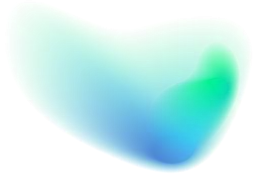
### 3.2 Evaluation criteria call for full proposal Flagship programs

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**The full proposals for Flagship program will be evaluated by an external committee according to the following criteria (might be subject to minor changes: definite version in the call text on 1<sup>st</sup> November 2021)**

#### Relevance

- The Flagship program contributes to the Convergence Health & Technology mission.
- The Flagship program fits with the overall Convergence Health and Technology strategy and themes
- The staff granted by this call actively brings together different disciplines within the program, including life sciences and / or social sciences.
- The Flagship Program receives an additional funding with a maximum matching of € 400.000 per year (as part of 50-50 matching, with external match funding per year).



### Quality of the Flagship program

- The Flagship program contributes to Convergence Health & Technology position at the forefront of international research.
- The Flagship program contains innovative and challenging aspects.
- The extra value of convergence is demonstrated.
- The aims and approach are clear.
- The Flagship program is feasible.

### Quality of the consortium

- Members of the consortium have a track record of excellence in academic research, translation of scientific results into clinical application, as well as economic and/or societal impact, i.e. translation of scientific results into private sector activities and fundraising.
- There is a demonstrable fit between the aims and objectives of the program and the expertise of the consortium members.
- End users (private and/or public sectors) are involved.
- Governance is organized in such a way that it facilitates collaboration and optimally makes use of the expertise of all participants.

### Potential impact

- The envisioned results of the Flagship program have the potential for a significant contribution to healthcare, society and/or scientific impact which has the potential for long-term societal impact.
- The proposal defines the pathway of how this contribution can be realized (during or after the duration of the Flagship program). The pathway includes concrete research and/or impact pathway (societal and/or economical) valorization strategies.

## 4. Procedure and Timeline

### 4.1 Procedure pre-call for Flagship programs

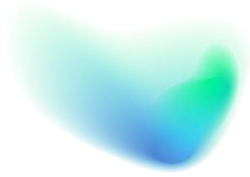
Internal review committee (Program Board (consisting of the theme leads and the management board)):

- Open invitation for pre-proposals: **June 21<sup>st</sup> 2021**
- To clarify the call, a meeting is organized on **June 28<sup>th</sup> & 29<sup>th</sup>**
- Deadline for proposal submissions: **November 1, 2021**

### 4.2 Procedure Call for Flagship programs

External review committee: (international experts, including a national chair)

- Interview sessions with the review panel are part of the procedure
- Final advice to the Program Committee of the Flagship programs
- Decision by the Management Board



## 1.2 Timeline

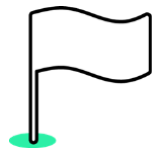
The timeline from publication of this pre-call for Flagship programs to the start date of the programs can be summarized as follows:

### First stage: Pre-call for Flagship programs



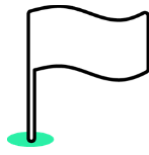
**June 21<sup>st</sup>**

Publication of the pre-call for Flagship programs



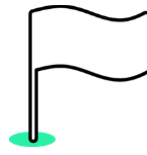
**June 28<sup>th</sup> & 29<sup>th</sup>**

Meeting to clarify the pre-call for Flagship programs



**November 1<sup>st</sup>**

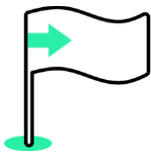
Deadline of submitting pre-proposals



**Mid november**

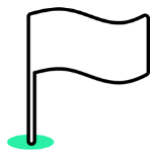
eligible flagship programs and advise on pre-proposals in order to submit a full proposal

### Second stage: Full call for Flagship programs



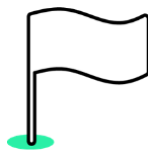
**November 1<sup>st</sup>**

Publication of Call for full proposals Flagship Programs



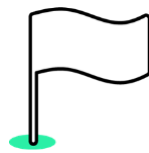
**February 1<sup>st</sup> 2022**

Deadline of submitting a full proposal



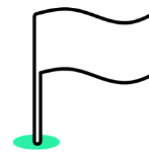
**Feb – May 2022**

Review process, including interviews



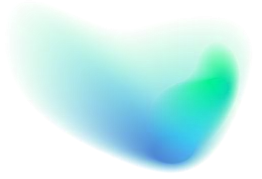
**June 1<sup>st</sup> 2022**

Formal award letter



**No later than August 1<sup>st</sup> 2022**

Start date of the project



#### 4.4 Contact

Fundamentals of Health & Disease	Joost Gribnau Saša Kenjereš	<a href="mailto:J.Gribnau@erasmusmc.nl">J. Gribnau &lt;j.gribnau@erasmusmc.nl&gt;</a> <a href="mailto:S.Kenjeres@tudelft.nl">S.Kenjeres@tudelft.nl</a>
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Technology supported transition in healthcare	Valentijn Visch Manon Hillegers Albert Wagemans	<a href="mailto:V.T.Visch@tudelft.nl">V.T.Visch@tudelft.nl</a> <a href="mailto:m.hillegers@erasmusmc.nl">m.hillegers@erasmusmc.nl</a> <a href="mailto:wagemans@ese.eur.nl">wagemans@ese.eur.nl</a>
Human-Centered technology & AI for Health	Wiro Niessen Jaap Harlaar	<a href="mailto:w.niessen@erasmusmc.nl">w.niessen@erasmusmc.nl</a> <a href="mailto:J.Harlaar@tudelft.nl">J.Harlaar@tudelft.nl</a>