Modern, health and sports related, ICT systems have the ability to acquire considerable amounts of real-time data from the human body on a 24/7 basis using technology that recently has become available and affordable. These personalized and context-aware technologies can help to provide new opportunities to improve people’s vitality, prevention, and sports performance. More research is needed and possible because a multi-perspective approach brings new interesting questions.
Quantified Self
DSCE RESEARCH PROGRAM

SCOPE

In the Quantified Self research program we research the role of personalized and context-aware technologies that help to:

- better understand relations between people’s vitality and their behavioral patterns in daily life (including but not restricted to sports);
- better understand relations between actual (sports) achievements and activity patterns before, during and after being physically active;
- better understand the contextual motives shaping active behavior, conditioned as this is by routines shaped by our social peer group and our physical everyday living environment.

This will not only provide new opportunities to improve people’s vitality, prevention, and sports performance but it will also enable early detection and slow down the impact of possible injuries and onset of (chronic) diseases. This can give people adequate information to gain control over their (potential) disorder and manage their personal health state with much greater effectiveness than previously and at a fraction of the cost of traditional, curative intramural care.

For researchers, policy makers, health professionals, planners and designers these personalized and context-aware technologies deliver real time, individual and big data on correlations between an active lifestyle and health outcomes contextualized for lifestyle groups and living environments. This provides invaluable information to understand these correlations, to develop intervention strategies and to monitor and evaluate their effectiveness to contribute to a more healthy and sustainable society, countering the nowadays health epidemics of our consumer society: obesity, burn-outs and dementia to mention a few.

VISION

The ambition is to establish, together with partners, a Vitality Academy. In this Virtual Research Centre wide ranges of active lifestyle, recreational sports- and vitality related data are collected to:

- Acquire on a 24/7 basis for groups of people requiring/appreciating this;
- Analyze using state-of-the-art data analytics;
- Integrate into a standardized framework;
- Use to design personalized support for sporters, coaches/trainers as well as for researchers, health professionals and designers active in the above fields.

The research program quantified self is also known as the research roadmap human vitality & technology. Please join our community and feel free to contact us for more information: vitality@tue.nl.

RESEARCH CHALLENGES

- The acquisition of activity related data from individual people in “everyday life” related to their health and wellbeing.
- The analysis of this data and translation into scientific models that provide insight in the underlying patterns.
- Develop concepts and models establishing the correlations between psychological, social and physical motives and conditions shaping an active lifestyle as well their impact on health outcomes, both physically and mentally
- The design and validation, in context, based upon these models, of new propositions that will improve the health and wellbeing of these people.
**PROJECT EXAMPLES**

**Heatlaps**
Vitality data demonstrator that brings a variety of data together (such as user generated (wearable) data, weather data, open urban data, etc.). Through data visualization understanding is raised about behavioral patterns and the influence of individual, social and environmental factors.

**Nano4Sports, Interreg V**
Use sensor technology to develop smart innovative solutions for better, safer and lifelong sports experiences for all.

**Smart cycling futures, NWO**
While smart cycling innovations promise to increase cycling’s modal share in the (peri-)urban transport system even further, little is understood of their impact or cost and benefit.

**Marathon Eindhoven**
Analyzing and supporting the behavior before, during and after the event especially for (starting) recreational runners.

**Philips-TU/e Flagship on Data Science**
‘Data-Driven Value Propositions’: Systems supporting customers and coaches’ addresses quantified self in a sports setting.

**Pride and Prejudice**
Tackling chronic disease prevention through real-life monitoring and context-aware intervention design.

**Open Machine Learning Platform**
(www.openml.org)
Share and find datasets and machine learning models from SportData Valley and other sources

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**FIELD LABS**

**Vitality Living Lab, OP Zuid**
Development of a sustainable ecosystem for data-driven innovation and business design in the field of sport & vitality

**Gennesper Parken (GP) ‘Sports & Vitality district’:**
promote physical activity by an interactive route for individual sporting through the GP greenbelt combining park design, intelligent probes and ICT technologies.

**Op Noord: Interactive running and walking path**
the use of led-technology for monitoring and coaching of recreational sports participants in the field lab Op Noord in the Eckart area Eindhoven.

**Smartness, Society, Stories:** continuing our work with the New Institute and Gemeente Eindhoven in the neighbourhoods of Woenselse Heide and Temple from 2016, we will explore existing community connectivity, neighbourhood tensions, and role of governance. The project questions how and where smart city initiatives are addressing the role of people, society, and needs in the city.

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**EXTERNAL COOPERATION**

Knowledge institutions: Fontys Hogescholen, University of Utrecht, Utrecht Academic Medical center, 4TU Alliance.
Other: #040Beweegt, Platform Gezond Ontwerp (“Healthy design”), city of Eindhoven, Cluster Sports & Technology, several field labs, and local sports clubs.
OTHER DSCE RESEARCH PROGRAMS

The research programs provide a meeting place for researchers to get together and have discussions, workshops or research meetings. The goal is to let novel ideas emerge and collaborations between researchers and external parties to be started or strengthened. Existing contacts can easily be shared to further increase collaboration.

CUSTOMER JOURNEY - Prof. Mykola Pechenizkiy
Informed and responsible analytics to understand and improve the customer journey

HEALTH ANALYTICS - Prof. Uzay Kaymak
Improving your health through data analytics

INTERNET OF DATA - Dr. George Exarchakos
Computational intelligence and network science for the Internet of Things

RESPONSIBLE DATA SCIENCE - Prof. Mykola Pechenizkiy & Dr. Philip Nickel
Ensuring fairness, accuracy, confidentiality & transparency by design

SMART MANUFACTURING & MAINTENANCE - Prof. Geert-Jan van Houtum
Exploit the full potential of your data to boost manufacturing and maintenance!

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