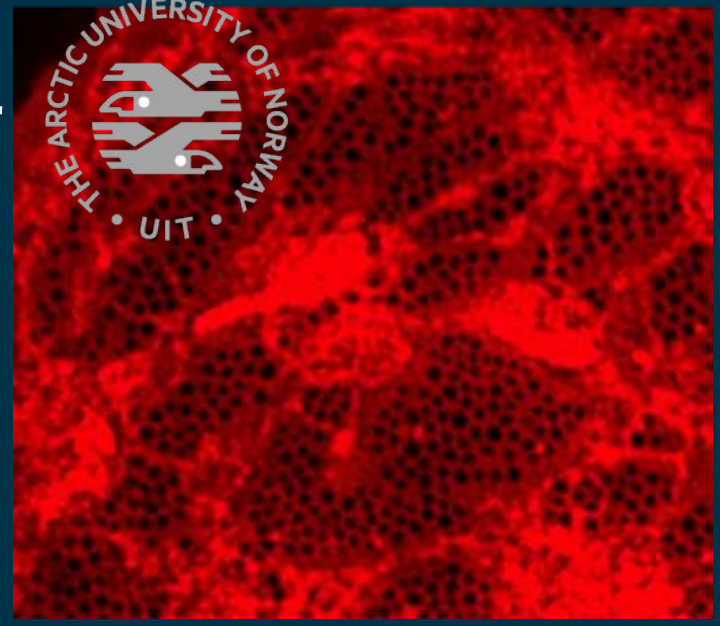
OrganVision
Nanoscopic window into the life of heart

AI4 Future - Viterbo

Horizon 2020 FET-Open RIA Project

Krishna Agarwal,
Professor, UiT The Arctic University of Norway

Nanoscopy@UiT



Optical nanoscopy?

Super-resolution optical microscopy

The ultimate curse of an instrument
it shows a projection of reality – not the reality itself

The ultimate goal of a scientist
to estimate reality better than the instrument supports

Fluorescent molecules labeling a structure (100-200 nm apart)

Microscope

Image: Blurred object

2014 Nobel Prize in Chemistry for the *"development of super-resolved fluorescence microscopy"*

Eric Betzig, William Moerner and Stefan W Hell. Photo: AP

Tromsø, Norway, 69.6492° N, 18.9553° E

Nanoscopy@UiT


Balpreet


Krishna


Florian

Engg./Ad. 4

Postdocs 8

Phds 5 (+3)

29
32

Master 4

Visiting 4

Adjunct 2

12 nationalities, 6 disciplines

ORGANVISION

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Funding

- EU ERC STG (2013, 1.5 Million Euros)
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- EU FET Open RIA (2021, 3.7 Million Euros)
- EU MSCA-ITN (2017, 0.5 Million Euros)
- EU MSCA-IF: (2017, 2019, 2022 0.8 Million Euros)
- UiT Strategic/Thematic Funding (2015, 2018, 2019, 2020 10 Million Euros)
- RCN *Nano2021*: 2019 (1.2 Million Euros)
- RCN FriPro Young Talent (2019, 2021 2 Million Euros)

- **Pre-commercialization projects (**7.6 Million Euros**):**
  - *EU EIC Transition*
  - EU ERC PoC: 2018, 2020
  - *RCN-FORNY*: 2015
  - *RCN-BioTek2021*: 2019
  - DLN Innovation Pilot

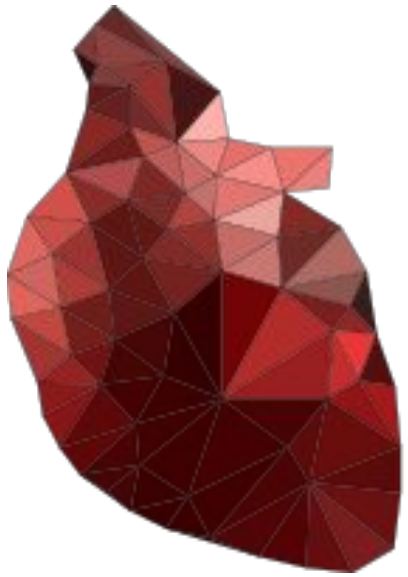
Infrastructure and support

- 200+ sqm labspace
- 11 Optical Tables

- **SIM + TIRF + BF + DIC + SLM micro/nanoscope (~ 1 Million Euros)**
- **4Ch DIC + BF + Epi microscope (0.25 Million Euros)**
- **Label-free HT + Flurescence nanoscope (0.1 Million Euros)**
- **Label-free HT + Flurescence microscope (2.5 Million Euros)**

- Computation Server (0.1 Million Euros)
- Data Server (40 TB +15 TB/year)
- Clean room of 100 sqm being built

- A variety of mentoring and career development programs
- Great support for conference and scientific meeting travels
- Opportunities of co-supervision (formal)



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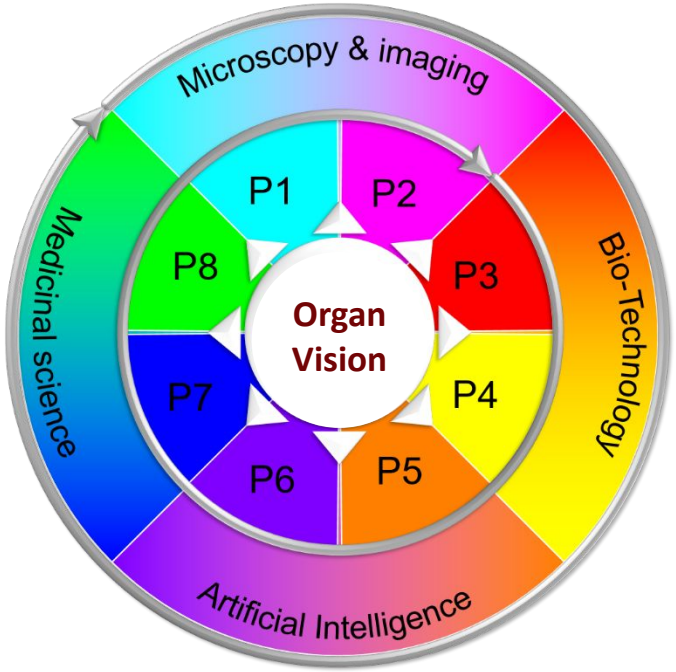
FET Open RIA project

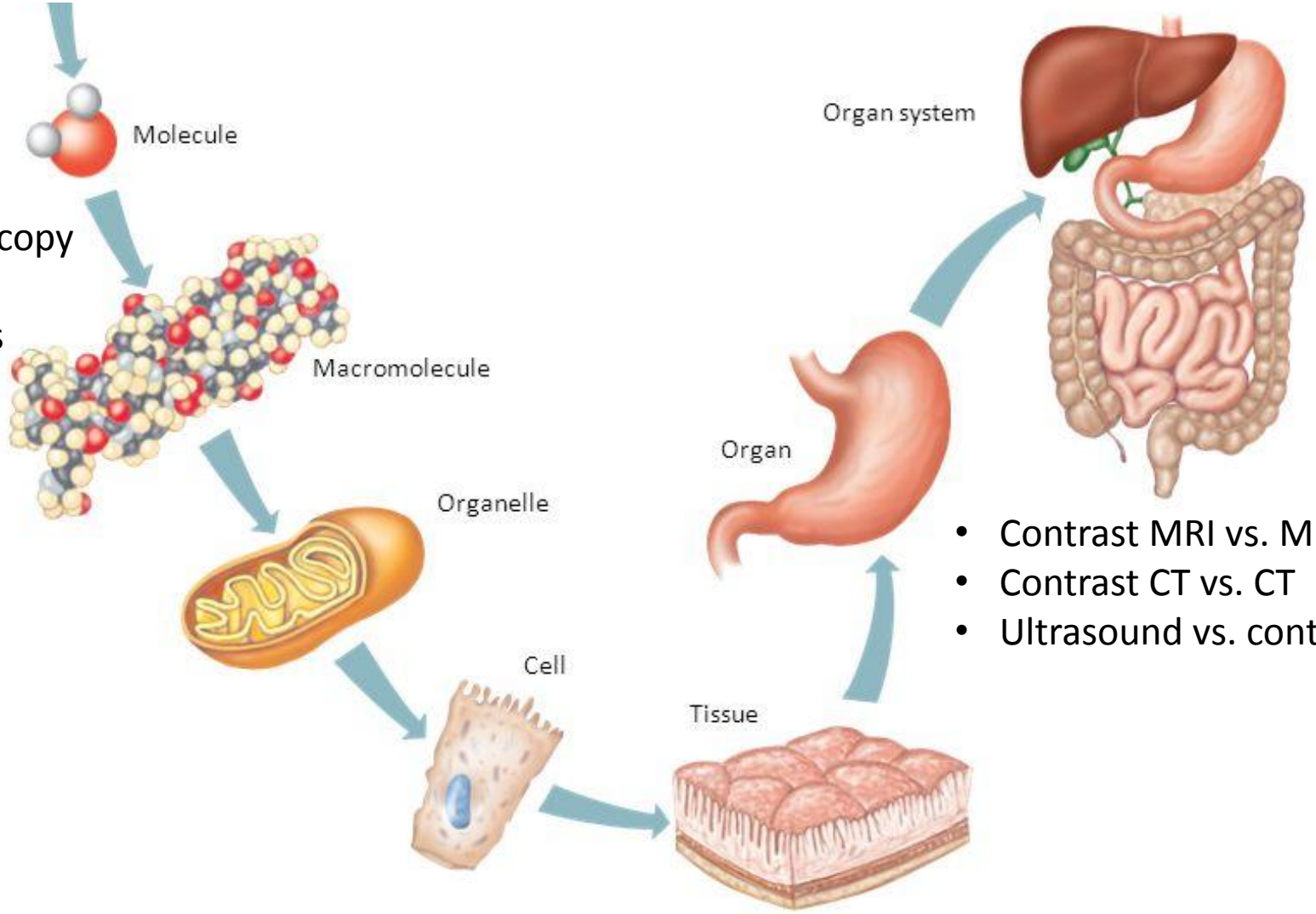
- July 2021 – June 2025
- € 3. 69 Million
- 43 person years of effort

- 7 partner institutions across Europe



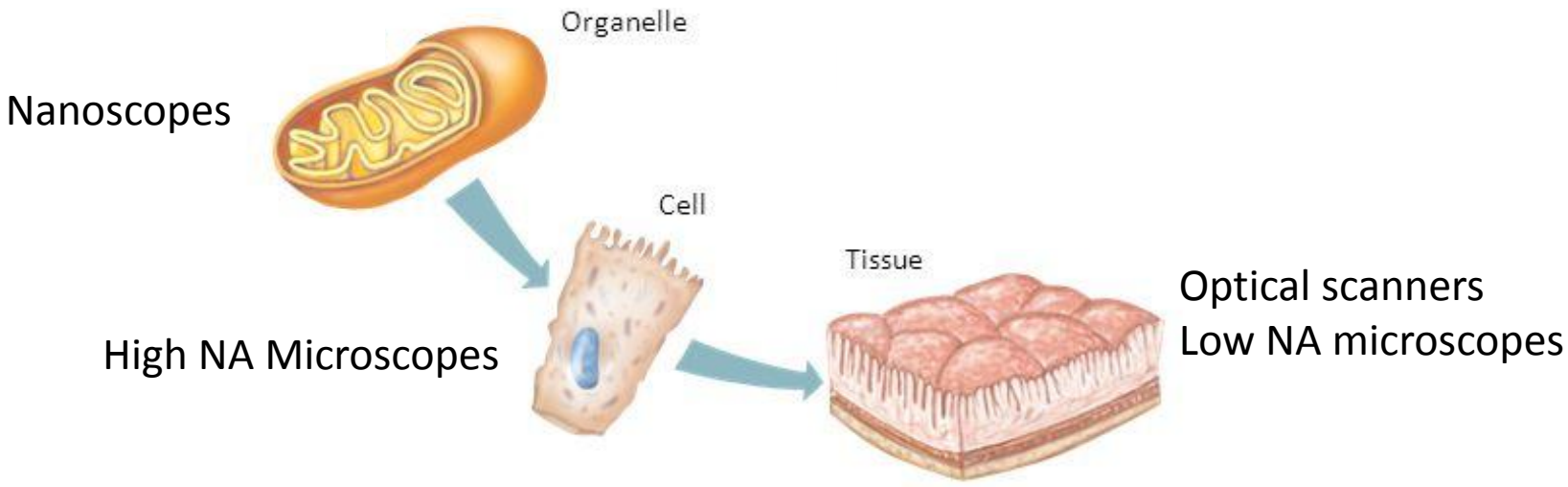
Body functions at different scales

- Electron microscopy
- Spectroscopy
- Chemical assays



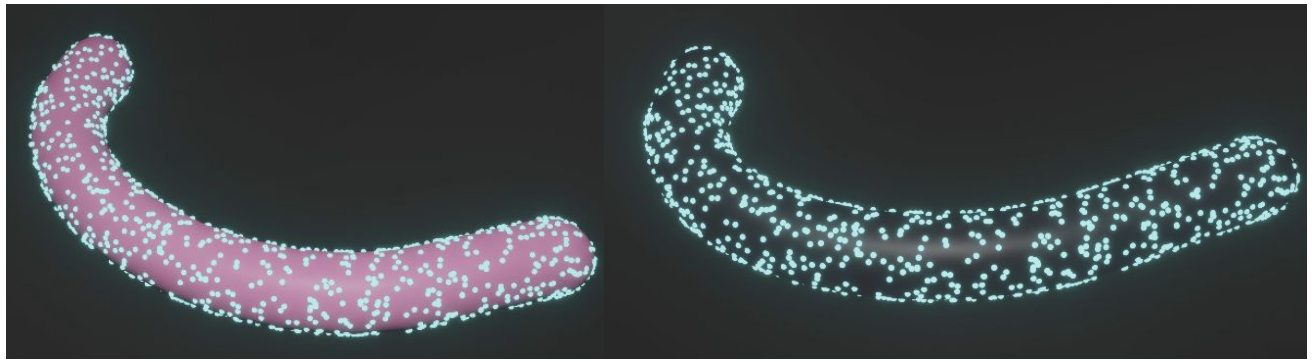
- Contrast MRI vs. MRI
- Contrast CT vs. CT
- Ultrasound vs. contrast enhanced

Body functions at different scales

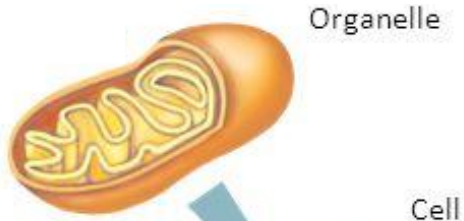


Body functions at different scales

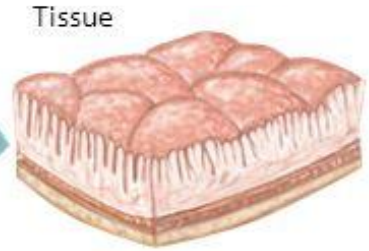
No unifying microscope
Label-driven solutions



Nanoscopes



High NA Microscopes



Optical scanners
Low NA microscopes

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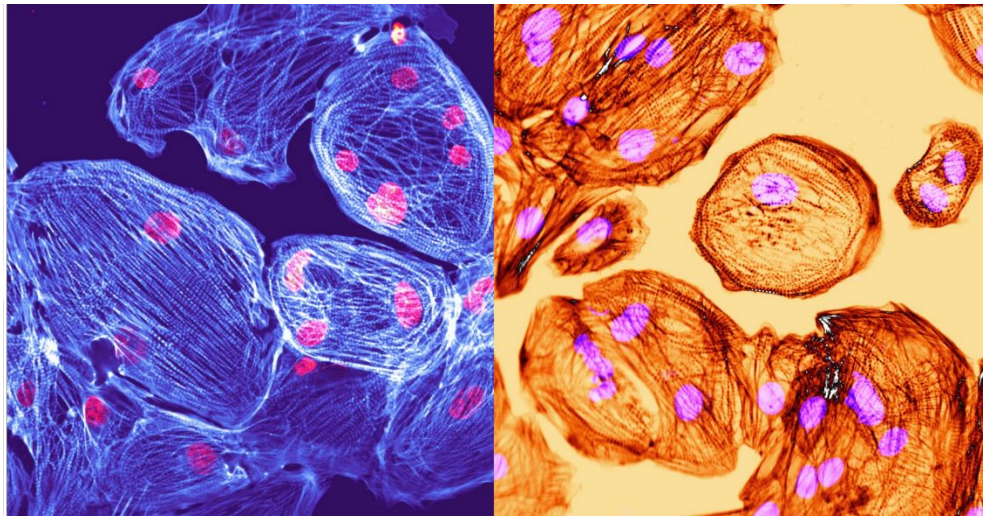

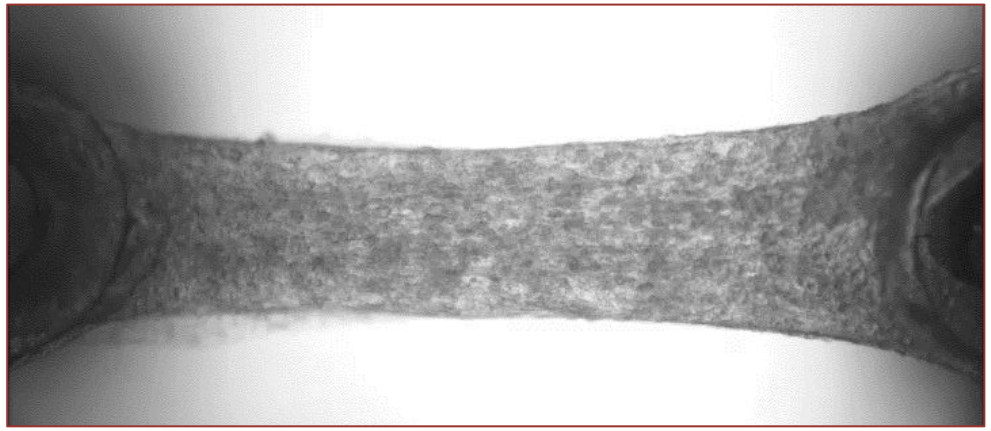

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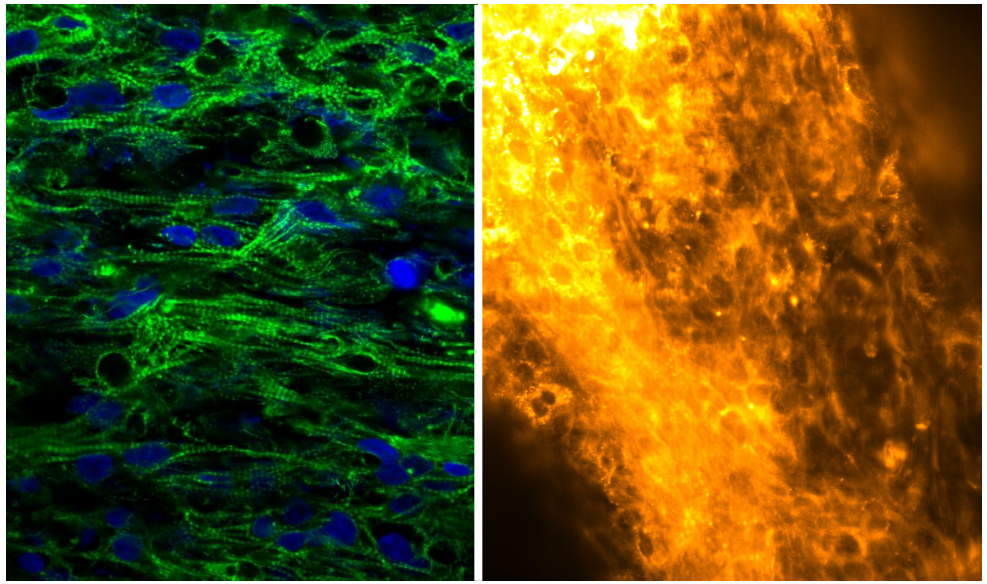

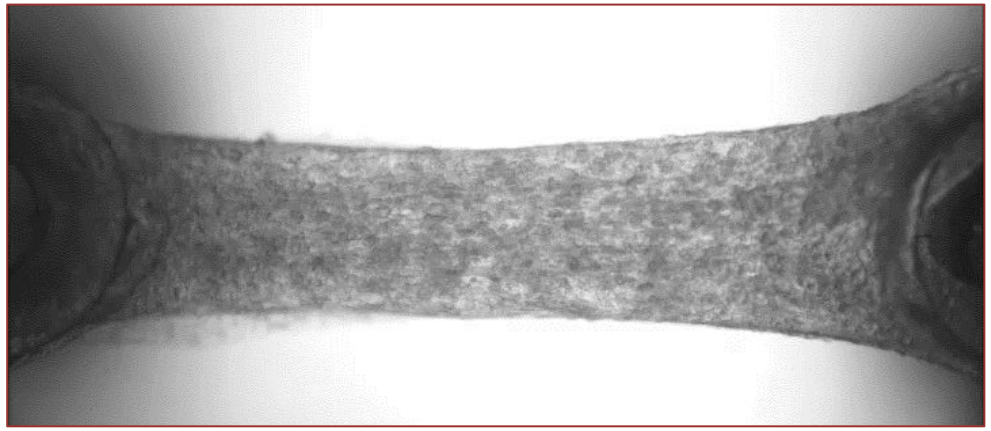

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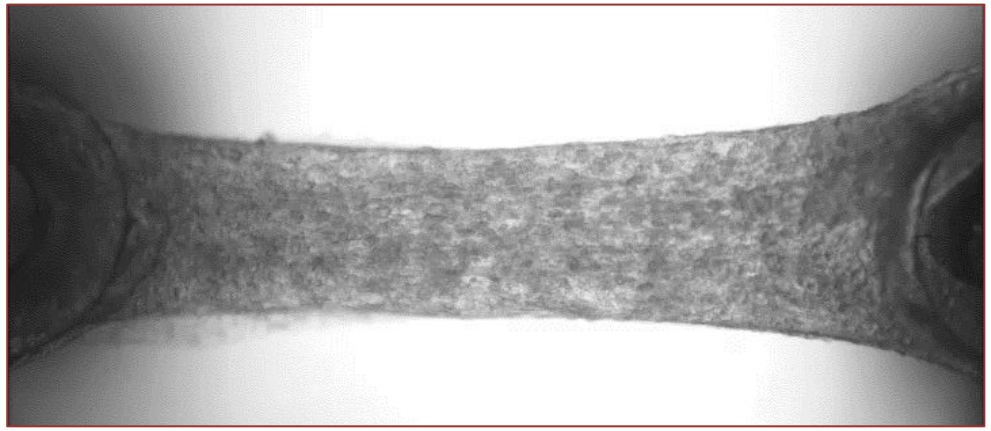
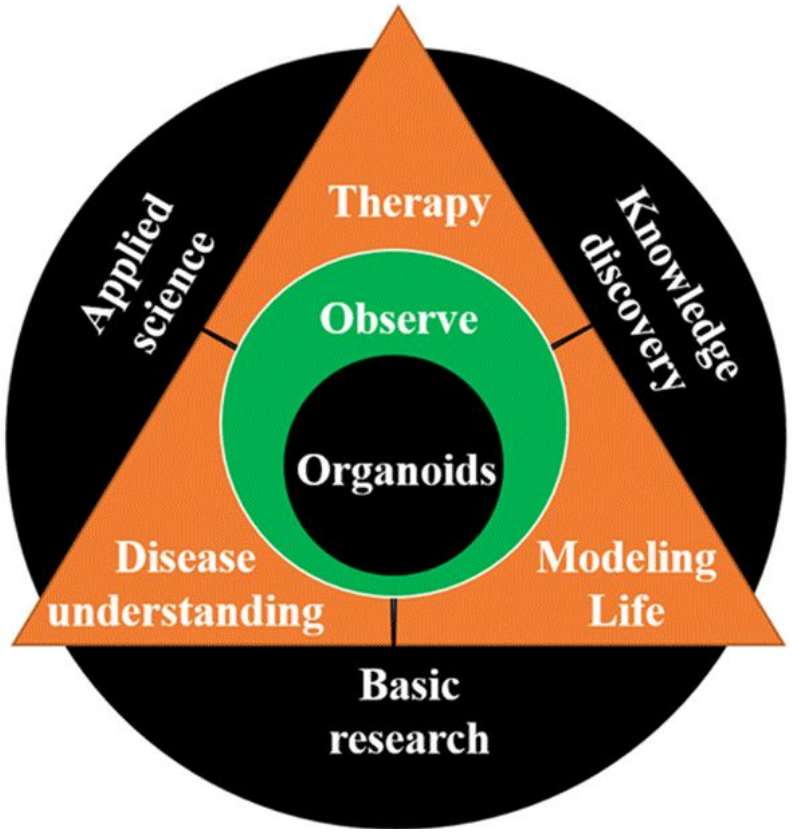
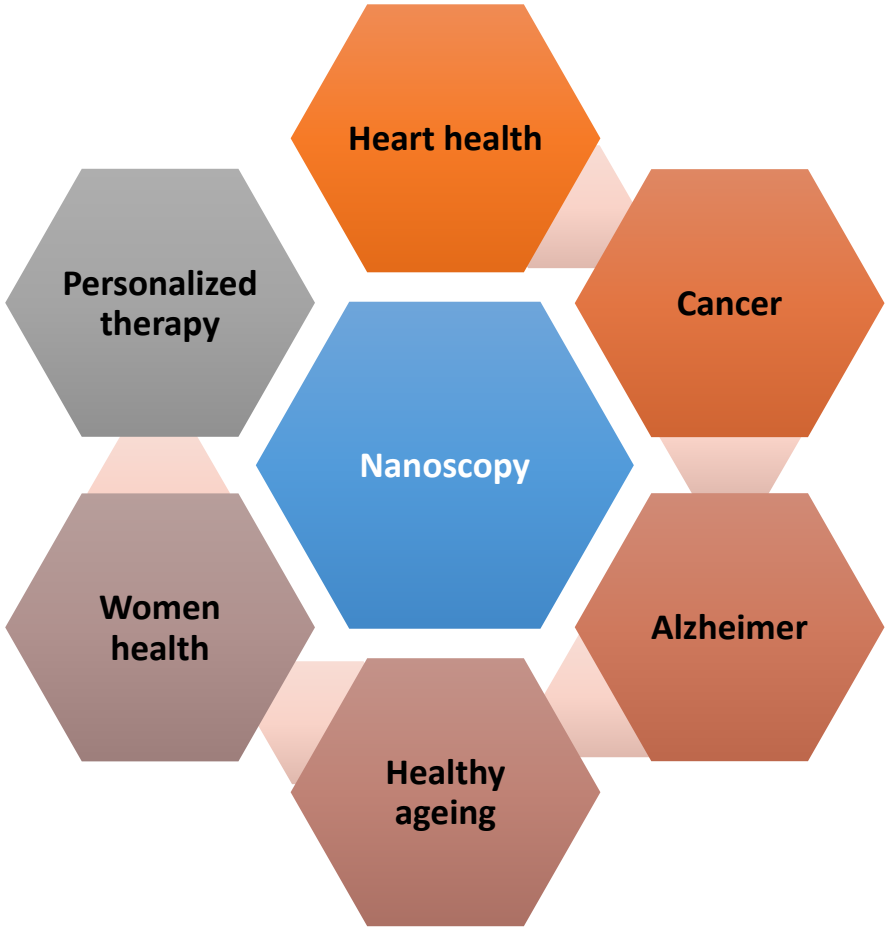
Scientific objectives

- *A novel multi-scale label-free imaging technology*
- *A novel stimulation and nurturing platform*
- *A novel artificial intelligence engine to model dynamic life processes*
- *Clinical and fundamental cardiovascular biology*

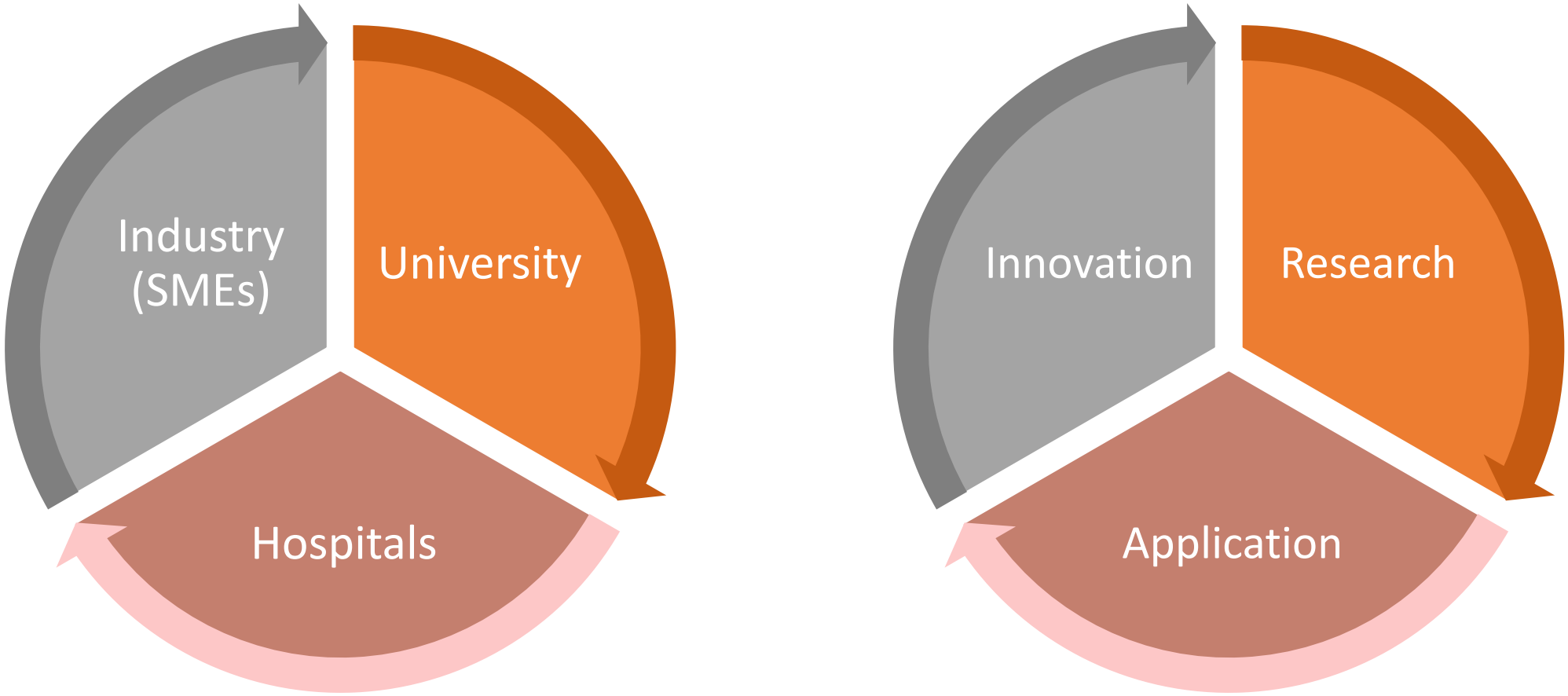


Long term vision

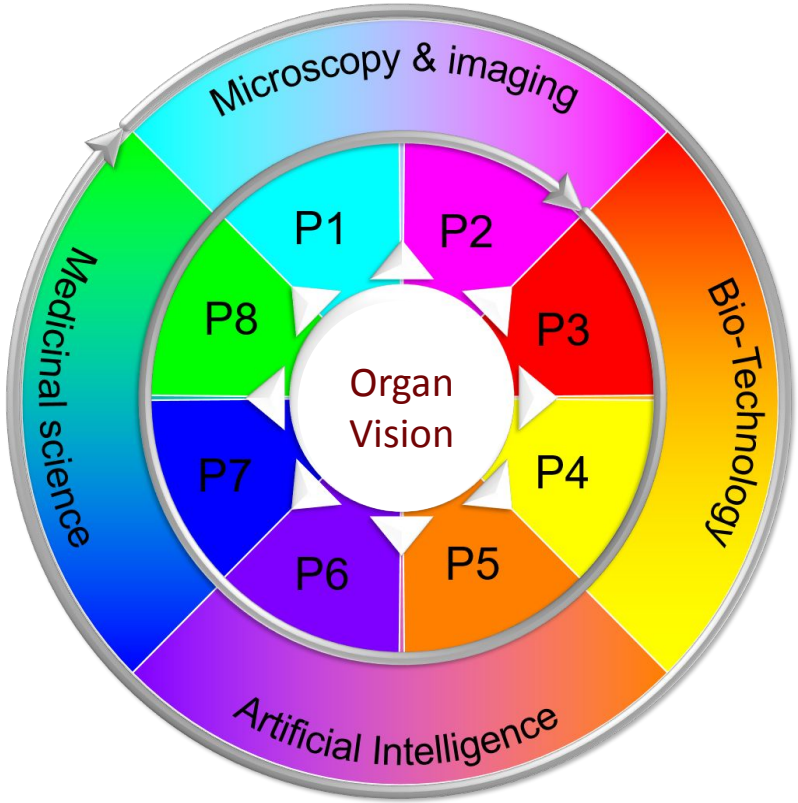




Unique opportunities



What keeps our heart beating!



Computational microscopy

Krishna Agarwal

Applied AI

Matteo Bergonzio

Interpretable AI

Dilip K. Prasad

Biotechnology & bioimaging

Dipanjan Bhattacharya

Cardiovascular cell

Åsa B. Birgisdottir

Technology prototyping

Aisada Koenig

Ultra-fast microscopy

Marti Duocastella

EHT repair & regeneration

Florian Weinberger