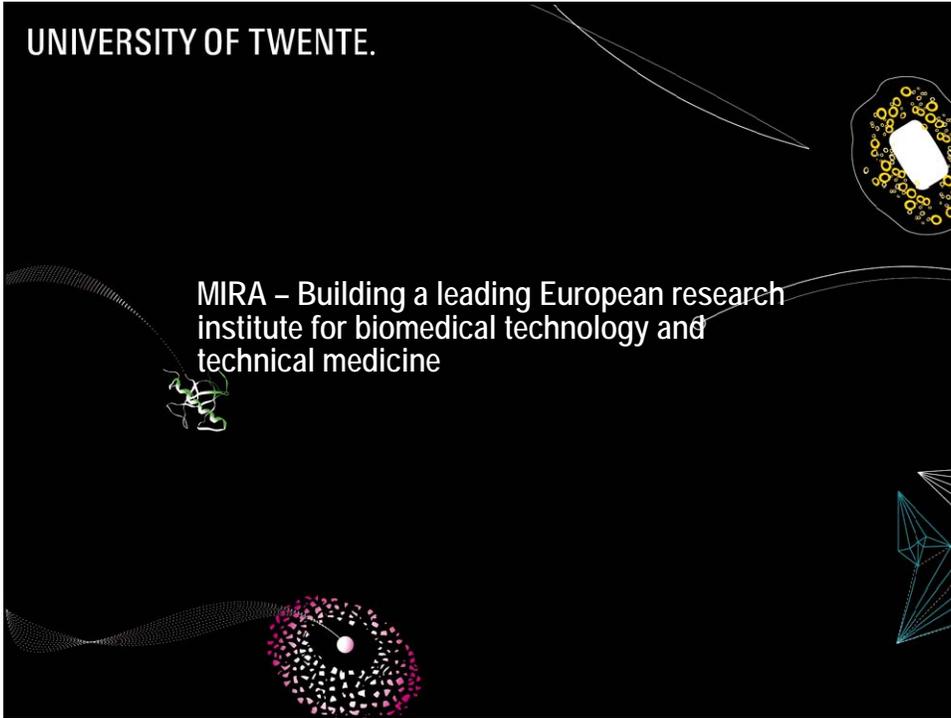


UNIVERSITY OF TWENTE.

MIRA – Building a leading European research  
institute for biomedical technology and  
technical medicine



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## Ambition

**Integrating BMTI and ITM research activities presents a unique opportunity to build a leading European research institute**

The unique opportunity

**ITM**

- Initial research areas defined with strong clinical focus
- Many clinicians involved in the education curriculum
- Strategic partnerships with clinics

**MIRA**

A unique opportunity to build a leading European research institute for **biomedical technology** and **technical medicine**

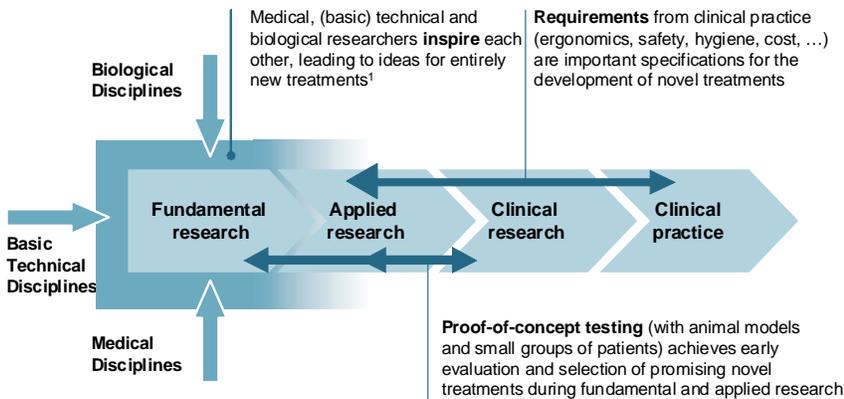
**BMTI**

- Established, very successful biomedical technical research
- Strong partnerships with large industry and spin-out companies
- Co-operation with clinics



## Ambition

Biomedical technical R&D value chain – Cooperation ILLUSTRATIVE



**Biological Disciplines** (top): Medical, (basic) technical and biological researchers **inspire** each other, leading to ideas for entirely new treatments!

**Basic Technical Disciplines** (left): Input into Fundamental research.

**Medical Disciplines** (bottom): Input into Fundamental research.

**Requirements** from clinical practice (ergonomics, safety, hygiene, cost, ...) are important specifications for the development of novel treatments

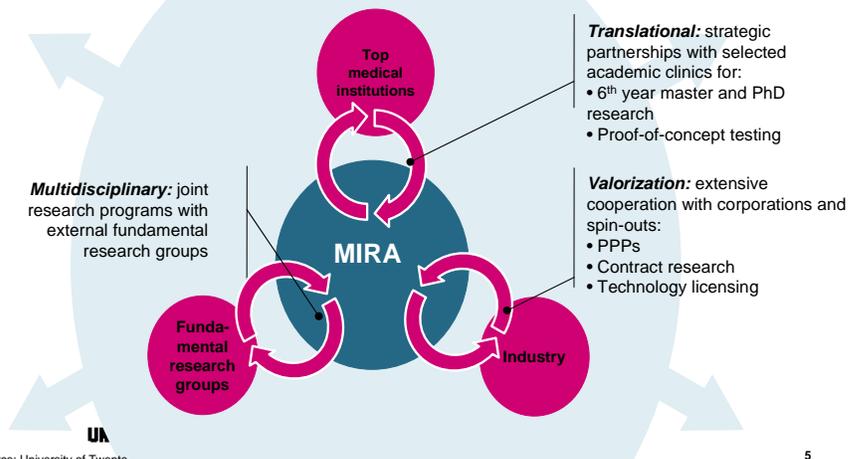
**Proof-of-concept testing** (with animal models and small groups of patients) achieves early evaluation and selection of promising novel treatments during fundamental and applied research



1 AMBITION

MIRA will achieve its ambitions through intensive strategic partnerships with the most excellent external parties

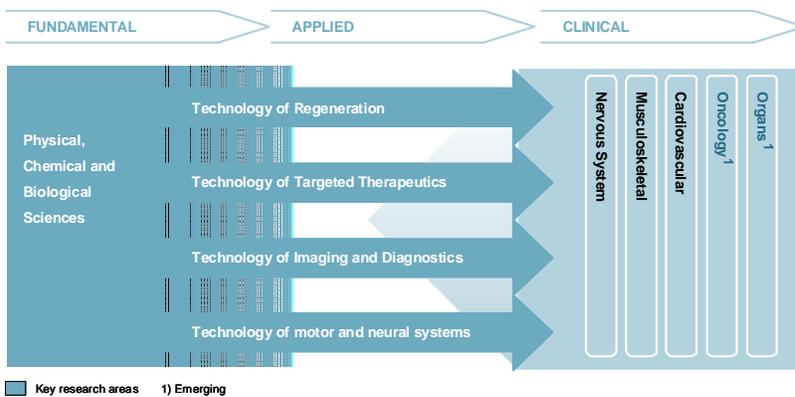
MIRA's network of partnerships [TOMORROW]



## 4 strategic research orientations

MIRA Strategic Research Orientations

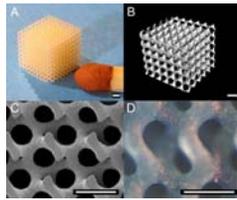
ILLUSTRATIVE



## Some examples...

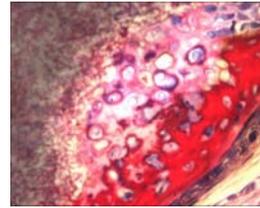
### Tissue Regeneration

- Biodegradable stereolithography of tissue engineering scaffolds



### Tissue Regeneration

- Bone generation from embryonic stem cells



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## Some examples...

### Diagnostics and imaging

- Prix Galien USA for spin-off Veridex
- Detection of circulating cancer cells
- Faster evaluation of the effect of cancer treatment



### Motor and neural systems

- 'Intelligent shoe'
- Detection of walking patterns



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## Value creation

> 40 fte  
MMS  
IsoTis  
Xsens



> 10 fte  
Ssens  
ANT  
Baat Medical  
Progentix  
CellCoTEc  
Zebra Bioscience



< 10 fte  
Ambroise  
Medisse  
PoroGen  
Mobihealth  
Ostendum  
Senzair  
...



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## Talent scouting

145 vacancies

- 13 chairs
  - 5 full
  - 4 clinical
  - 4 entrepreneurial
- 13 tenure tracks
- 39 vacancies from internal funding
- 80 vacancies from external funding

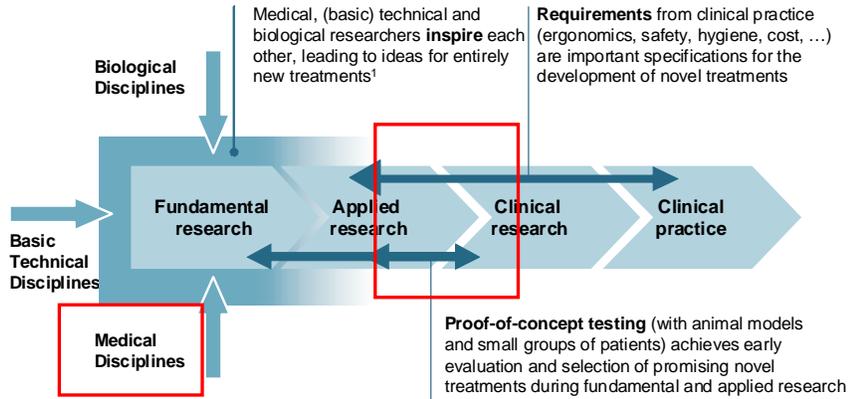
Growth of 250 (in 2009) people to 400 (in 2014)

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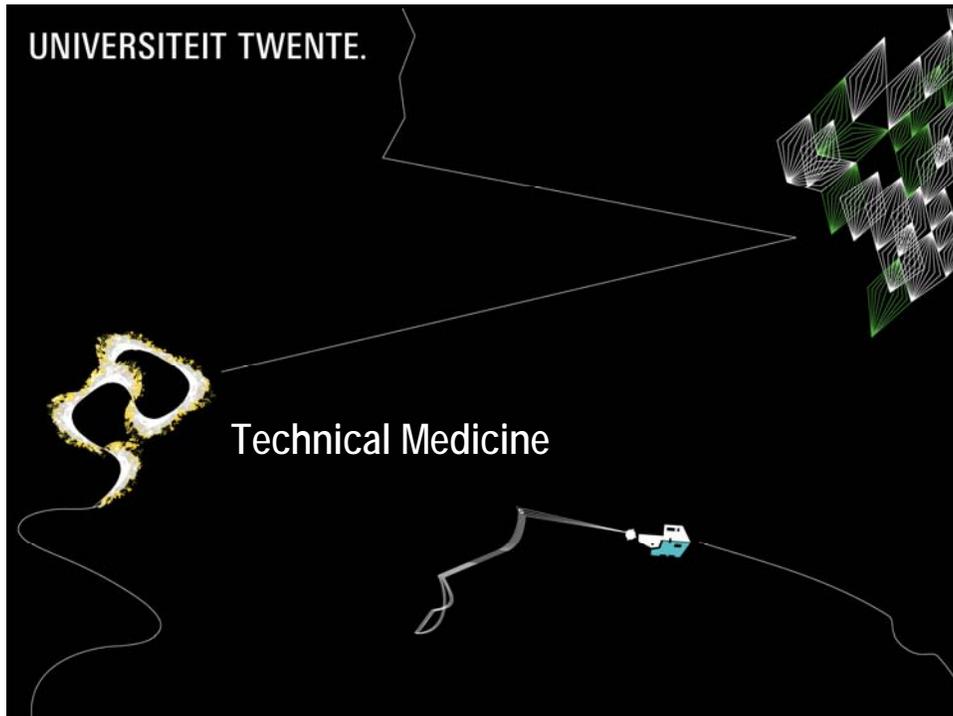
## Technology and Medicine: communication areas

Biomedical technical R&D value chain – Cooperation

ILLUSTRATIVE



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## The Start

- Start: September 2003
- Maximal 100 students per year
- 3 year bachelor
- 3 year master
- First graduated MSc in 2009

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## Professional Profile

Based on a thorough insight and understanding in the functioning of the human body and relevant technology, a Technical Physician will:

- Perform and optimize complex technical medical interventions
- Design and develop new diagnostic and therapeutic possibilities by use of technology

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## Theoretical education

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- The human body is considered as a system that consists of several interacting subsystems. From each subsystem, students learn about the:
  - Anatomy
  - Physiology
  - Pathophysiological core concepts
  - Essence of the technology that is used in diagnosis and therapy
- Longitudinal education as foundation and support:
  - Mathematics, Statistics, Epidemiology, MTA
  - Communication & Professional Behaviour, Medical Law, Medical Ethics

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## Practical Education

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Experimental Centre for  
Technical Medicine  
(ECTM)

An environment that  
stimulates the student  
to integrate knowledge,  
skills and attitudes.



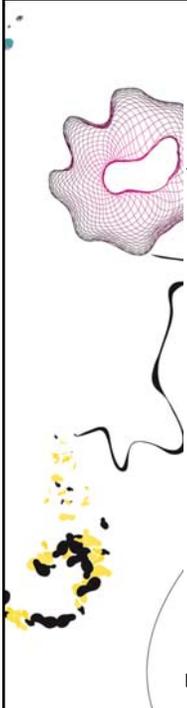
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 Mastertracks

1. Robotics & Imaging
2. Medical Signaling
3. Reconstructive Medicine

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## My involvement in TM education

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Bachelor course *Cardiovascular System*

- Physics of ultrasound imaging and Doppler
- Ultrasound imaging
- Doppler ultrasound
- Laser Doppler flowmetry

Bachelor course *Digestive System*

- Geometrical and physical optics
- Technology of endoscopy
- Confocal microscopy

Bachelor course *The Senses*

- Laser-tissue interactions
- Interference/interferometry/optical coherence tomography
- Optics of the eye

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## Cooperating Centres – educational program

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University Medical Centre Nijmegen University Medical Centre Utrecht Leiden University Medical Centre University Medical Centre Groningen University Medical Centre Maastricht Nijmegen Centre for Neural Sciences Medisch Spectrum Twente Canisius Wilhelmina Ziekenhuis Nijmegen Sint Maartens Kliniek Nijmegen FC Donders Centre for Cognitive Neuroimaging Antonie van Leeuwenhoek Ziekenhuis / NKI Amsterdams Medisch Centrum AMC	Medisch Centrum Leeuwarden Ziekenhuisgroep Twente - Almelo en Hengelo Revalidatiecentrum het Roessingh – Enschede Deventer Ziekenhuizen Isala Klinieken - Zwolle Streekziekenhuis Coevorden / Hardenberg Streekziekenhuis Koningin Beatrix - Winterswijk Slingelandziekenhuis - Doetinchem Gezondheidscentrum te Apeldoorn en Zutphen Meander ziekenhuis te Amersfoort Alysia Zorggroep: Rijnsstate ziekenhuis - Arnhem Reinier de Graaf Groep - Delft
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## Ambition

Mission – 2014

**A leading European research institute for  
biomedical technology and technical medicine**

**MIRA**

### **HIGH SOCIAL & MEDICAL IMPACT**

Worldwide top contributor of clinical proof-of-concepts and implementation in biomedical technology to reduce time from "Bench to Bed"

### **BREAKTHROUGH SCIENTIFIC ACHIEVEMENTS**

European front-runner in the annual number of fundamental and applied biomedical technology publications in leading journals and peer references  
(300 publications per year with an average impact score of 3.0)

### **LEADING ECONOMIC VALUE CREATION**

- At least 15 patents granted annually
- At least 3 successful spin-out businesses (> 15 FTE within 5 years)

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