Department of Electrical Engineering

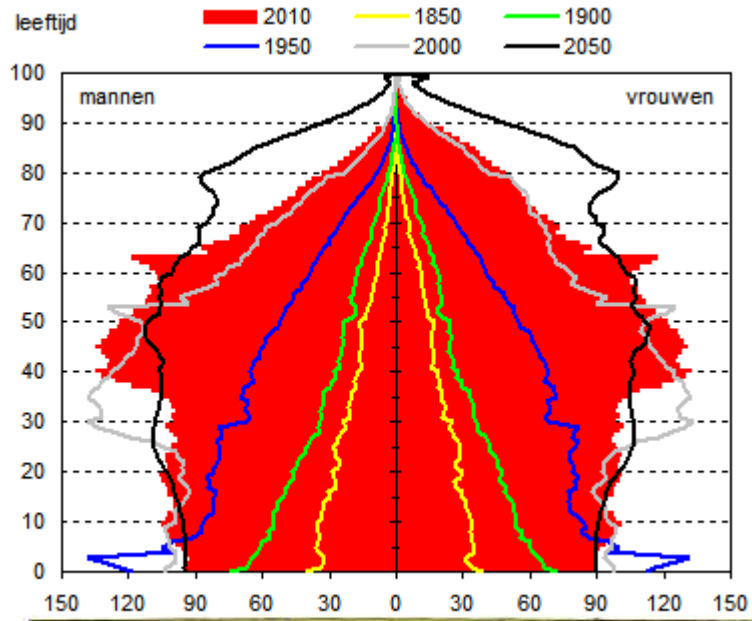
Master Track

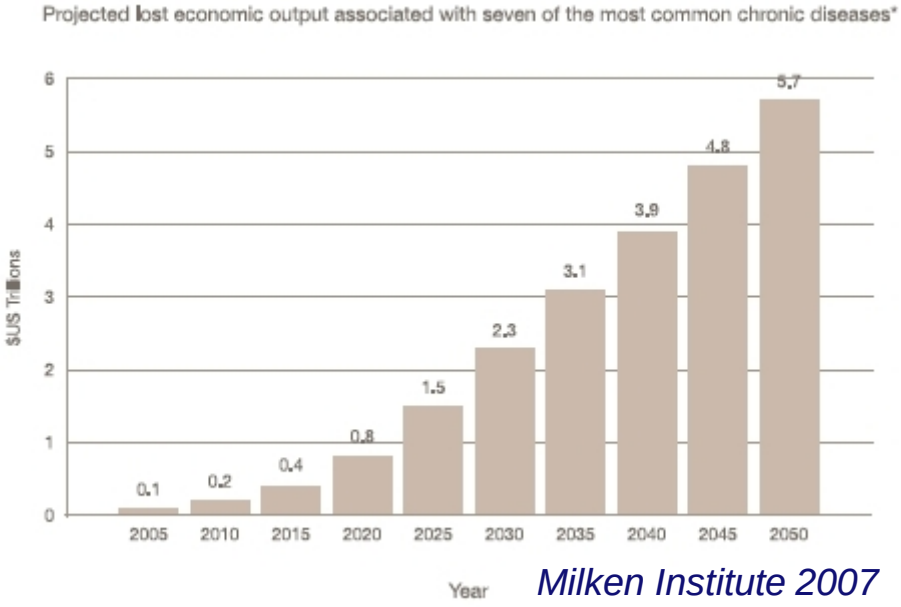
“EE for Care and Cure”

Technische Universiteit
Eindhoven
University of Technology

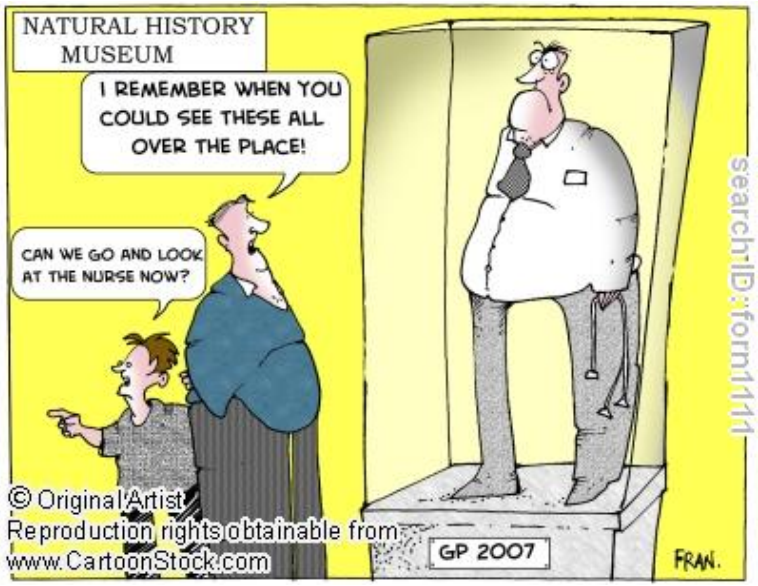
Where innovation starts

Chronic disease pandemic





Milken Institute 2007



New care delivery models urgently needed

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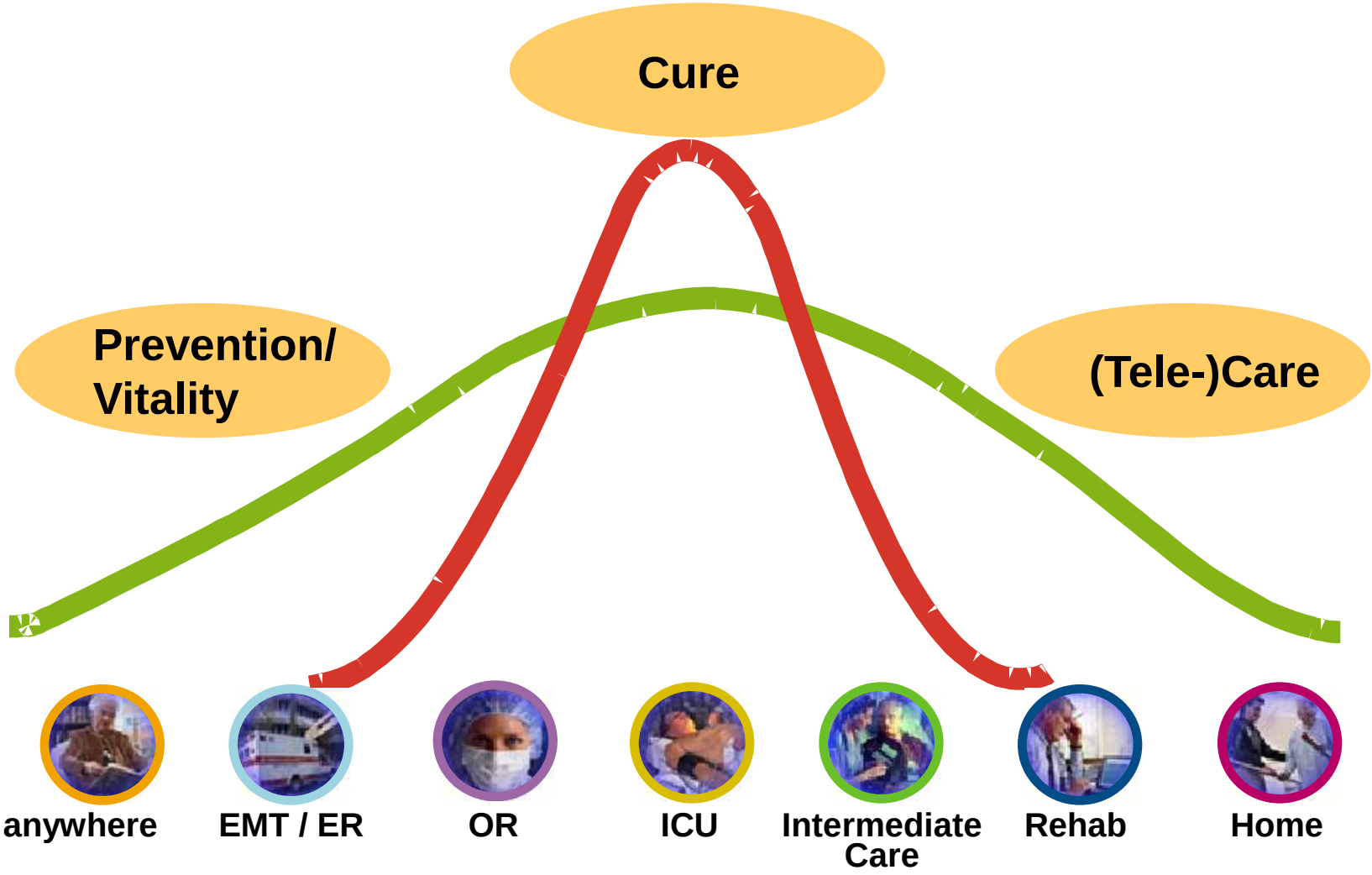
Patient-centric care

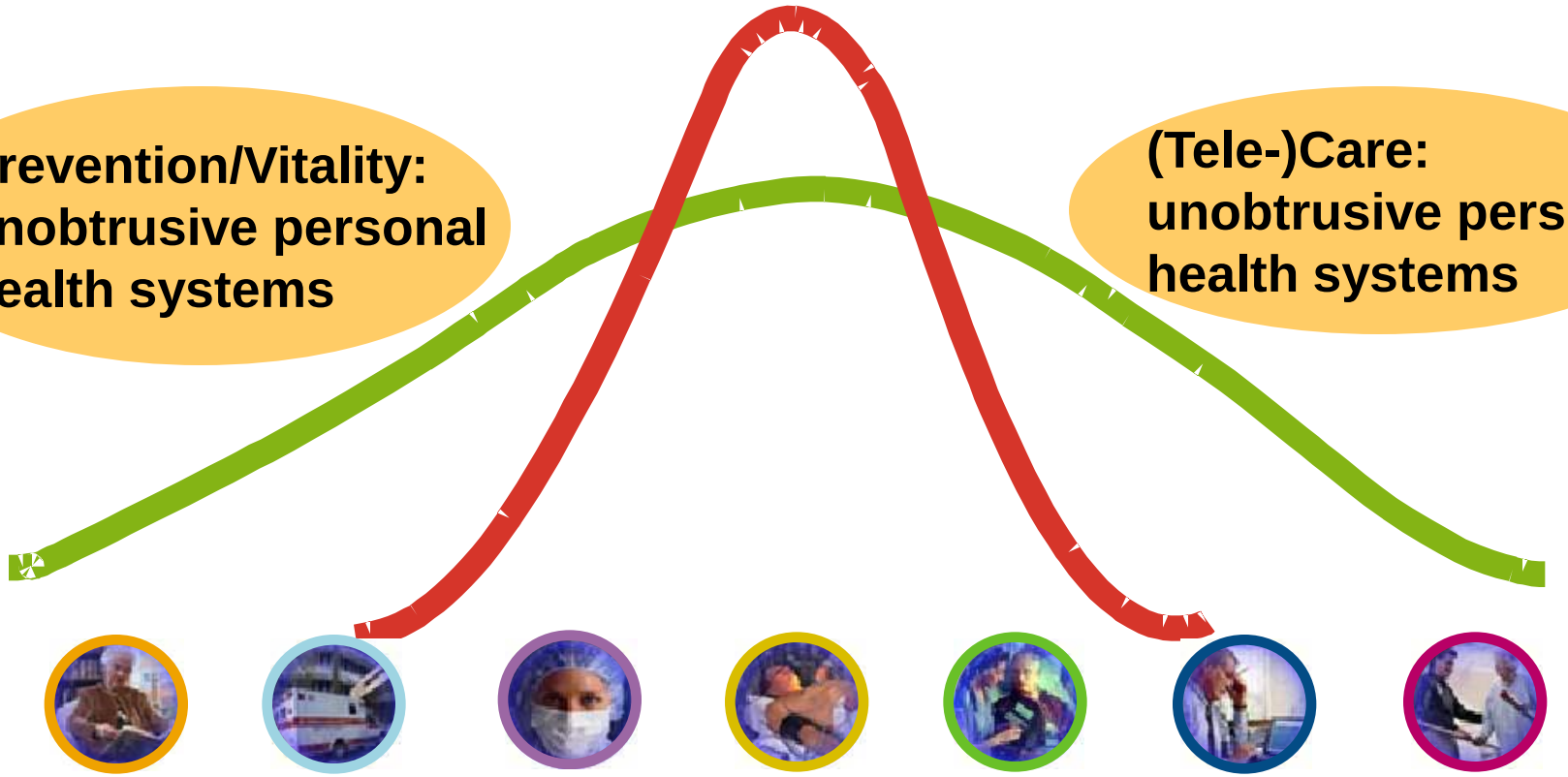


Care and Cure research focus

Cure:
•minimally obtrusive diagnostics and therapy
•medical ICT

Prevention/Vitality: unobtrusive personal health systems

(Tele-)Care: unobtrusive personal health systems



anywhere

EMT / ER

OR

ICU

Intermediate Care

Rehab

Home

C&C clinical collaborations

- **Catharina Hospital Eindhoven:**
  - Largest cardiovascular center in the Benelux.
  - Collaboration focus: cardiovascular diagnostics, medical ICT.
  - Part-time professor: Erik Korsten (SPS)

- **Maxima Medical Center Veldhoven:**
  - Top perinatal center.
  - Focus: pregnancy monitoring, medical simulation, neonatal monitoring.
  - Part-time professors: Guid Oei (SPS), Sidarto Bambang Oetomo (ID)

- **Kempenhaeghe Epilepsy Center Heeze:**
  - Leading care center for epilepsy, sleep, child neurocognitive disorders.
  - Collaboration focus: epilepsy and sleep monitoring, imaging, remote ICT.
  - Key clinicians: Johan Arends, Machiel Zwarts, Dirk Pevernagie.

- **AMC Amsterdam:**
  - Collaboration focus: prostate cancer diagnosis
  - Part-time professor: Hessel Wijkstra (SPS)

- **ErasmusMC Rotterdam:**
  - Collaboration focus: hyperthermia.
  - Key clinician: Gerard van Rhoon (EM)

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Minimally obtrusive diagnostics and therapy

- **Diagnostics: contrast ultrasonography** SPS
  - •Cardiovascular function analysis
  - •Cancer screening

Peripheral injection of ultrasound contrast agent

CATHARINA-ZIEKENHUIS

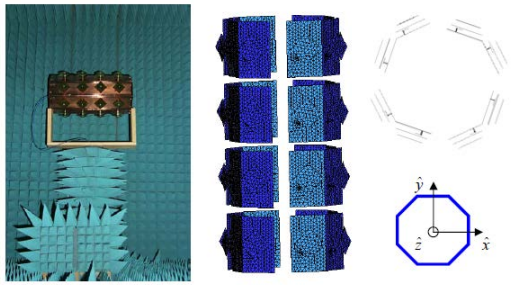
amc

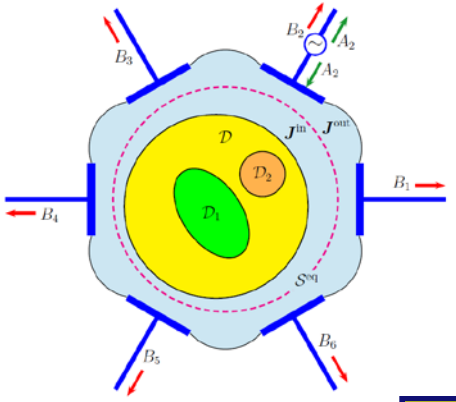
BRACCO

PHILIPS

Medtronic

- **•Therapy: RF cancer ablation** EM





Erasmus MC

Also: DC stimulation EM, plasma medicine EES

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Medical ICT

- **Clinical decision-support systems** SPS

CATHARINA-ZIEKENHUIS

[medecs]

ChipSoft

- **Remote ICT and sensor networks** ES

Kempenhaeghe

CATHARINA-ZIEKENHUIS

PHILIPS

VERKLIZAN

- **Medical simulation** SPS

máxima medisch centrum

medsim

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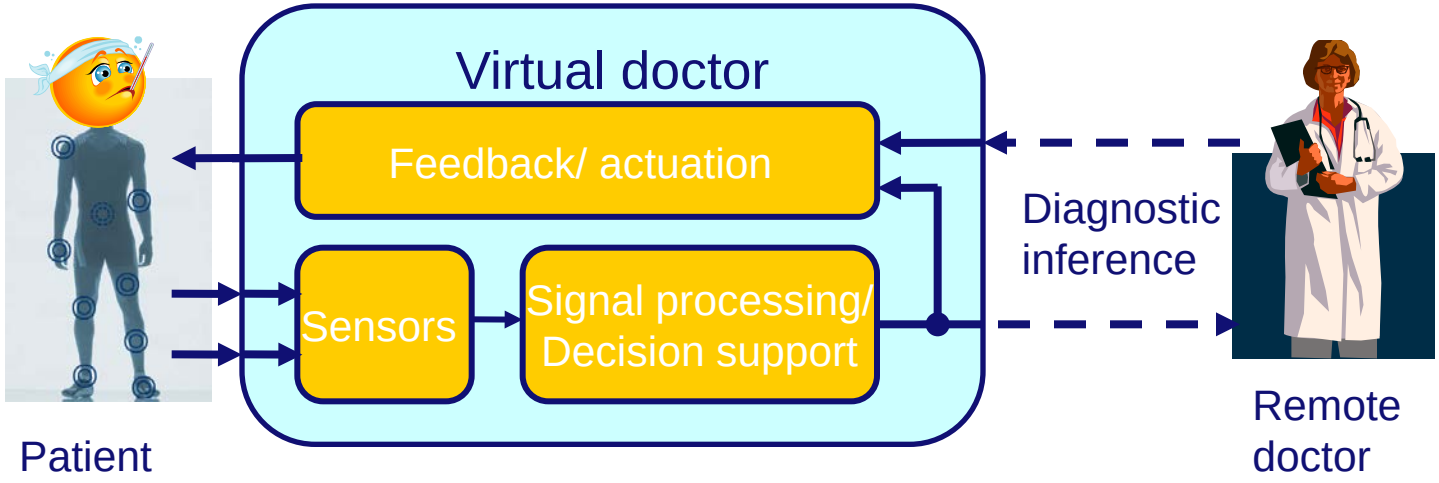
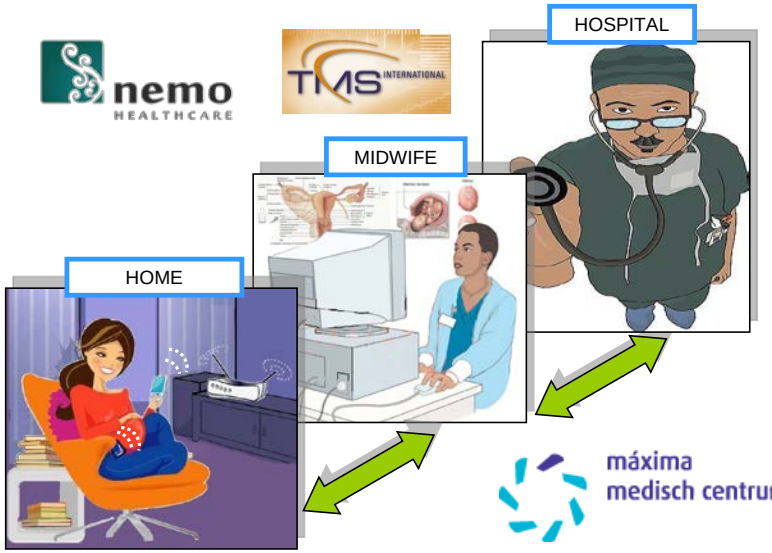
Personal health systems





Remote pregnancy management

Home sleep monitoring

PHILIPS

Fitness

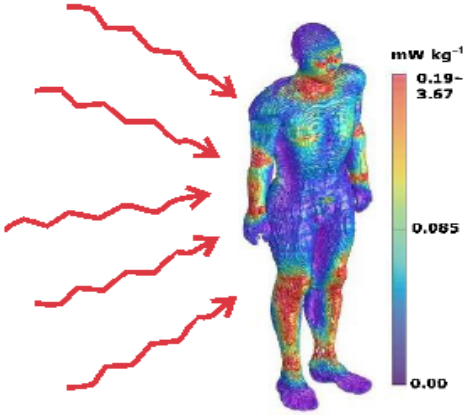
ETH

Models: Interaction of EM fields with human body

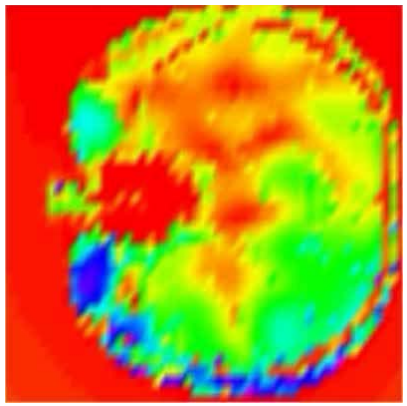
Applications - radiation hazards, hyperthermia, etc.

Anton Tijhuis

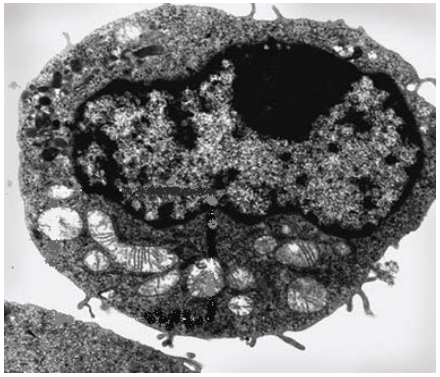
EM



Macroscopic Level
(body)



Macroscopic Level
(organs)



Microscopic Level
(cells)

immunent

Global lead in computational efficiency

TNO

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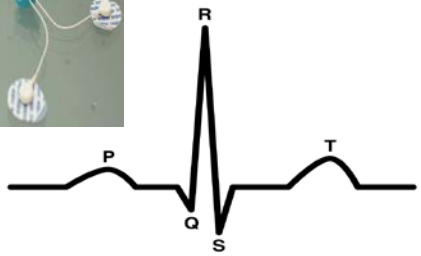
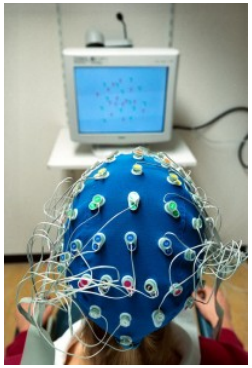
Unobtrusive on-body sensing

ExG





Jan Bergmans

SPS

Accelerometry, movement

Jean-Paul Linnartz
(Philips-TU/e)

Optical (SpO2)

GN ReSound

TMS INTERNATIONAL

Acoustic

A-N-T

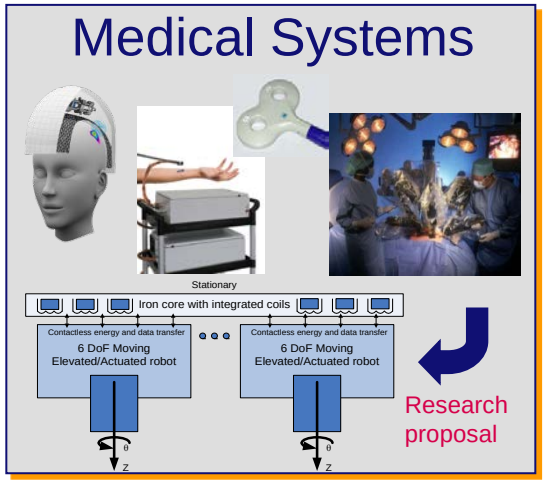
PHILIPS

Holst Centre
Open Innovation by IMEC-NL and TNO

Ronald Aarts
IEEE Fellow
(Philips-TU/e)

TU/e Technische Universiteit Eindhoven University of Technology

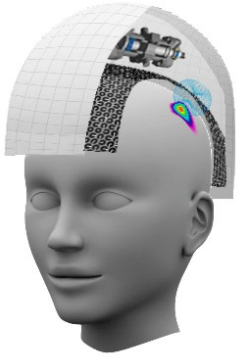
Actuation



Contactless energy transfer

Minimally-invasive surgery

Rehabilitation



Focused Transcranial Magnetic stimulation

Elena Lomonova

prodrive

FOCAL Meditech

EPE

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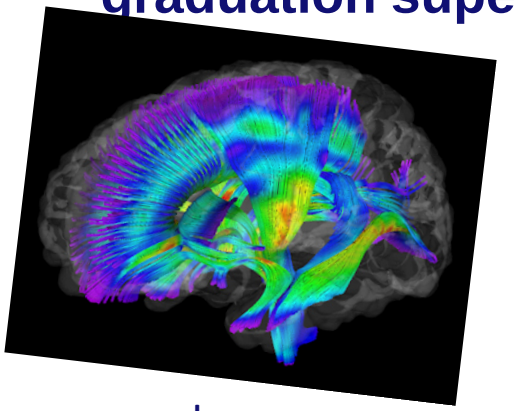
General overview EE master program

Curriculum component	# EC
Core courses	15
Professional development	10
Specialization path	10
Elective courses	30
Internship	15
Graduation project	40

Care & Cure

Rules

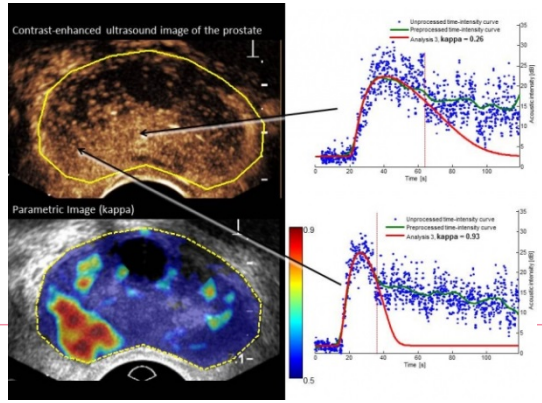
- **Choose specialization path (10 EC) in the groups EM, MSM, or SPS**
- **Specialization path and graduation project must have same C&C signature; see the 4 topics below**
- **The rule that 15 EC in the electives need approval from graduation supervisor s**



neurology

cardiology

perinatology



oncology

Short-list of courses

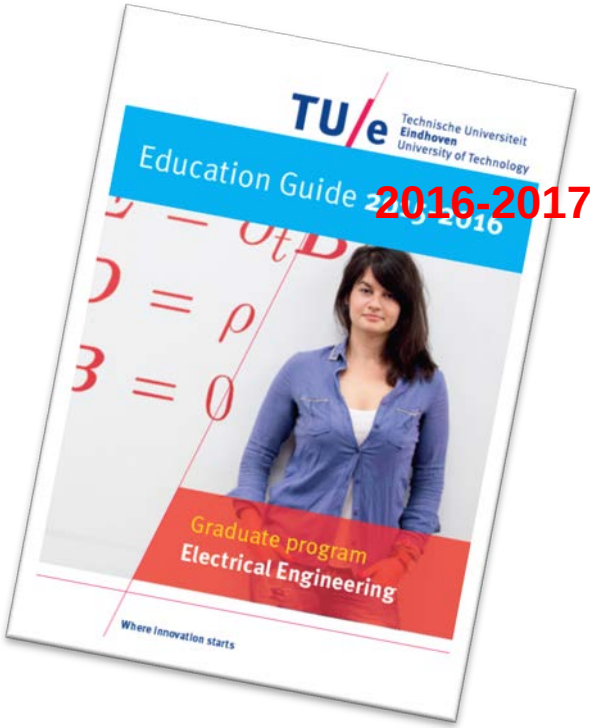
- Neuroengineering
  - 5LSG0 - Neuromonitoring,
  - 5LIL0 - Intelligent Architectures,
  - 5XSH0 - Cognitive neuroscience,
  - 5XSA0 - Introduction medical imaging processing
- Oncology
  - 5LMA0 - Model Reduction,
  - 5XSD0 - Medical ultrasound,
  - 5XSB0 - Signal analysis and estimation,
  - 5SFE0 - RF Transceivers 2: Design.
- Cardiology
  - 5LSB0 - Monitoring of Respiration and Circulation,
  - 5LSC0 - Biomedical Sensing Technology,
  - 5LFA0 - Low-power health electronics,
  - 5XSD0 - Medical ultrasound
- Perinatology
  - 5LSC0 - Biomedical Sensing Technology,
  - 5LFA0 - Low-power health electronics,
  - 5LSG0 - Neuromonitoring

This short-list is preliminary and may be extended

Some of these courses are level 3 bachelor courses; can only be chosen if not part of bachelor yet

More information?

- Master guide 2016-2017 (due end of May)
- René Besseling, r.m.h.besseling@tue.nl; Tjalling Tjalkens, T.J.Tjalkens@tue.nl
- C&C researchers at EM, MSM, SPS



2016-2017