FLANDERS MAKE

DRIVING INNOVATION IN MANUFACTURING

TECHNOLOGICAL RESEARCH & INNOVATION FOR A COMPETITIVE manufacturing INDUSTRY

Ergonomics as a strategic advantage

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Strategic Research Centers (SOCs) in Flanders

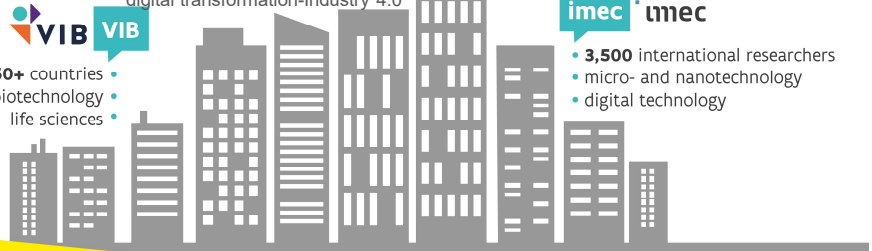
HOW FLANDERS' 4 STRATEGIC RESEARCH CENTERS KICK-START YOUR R&D SUCCESS

VITO
- **750** experts
- the **world's largest** multidisciplinary research center
- energy, materials, environment

Flanders Make
ca **750** full-time researchers
- product and production technology and processes
- digital transformation-Industry 4.0

VIB
1,470 scientists from **60+** countries
- biotechnology
- life sciences

imec
- **3,500** international researchers
- micro- and nanotechnology
- digital technology



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THE FLEMISH INDUSTRY

Motor of the economy

FLANDERS MAKE

11.280
companies

41,4 billion
added value

16,6%
of GDP Flanders

80%
of Flemish export

340.422
direct jobs

300.000
indirect jobs

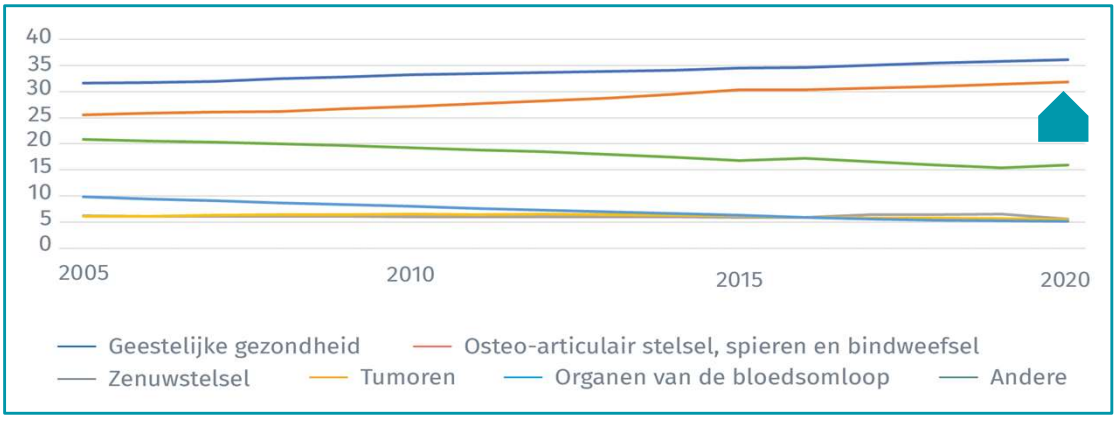
Key figures in the Flemish manufacturing industry – Agoria

3

Cost of ergonomics

OESO '22 – estimates 5,3% BBP related to long-term inability to work

Long-term inability to work – distribution (%)



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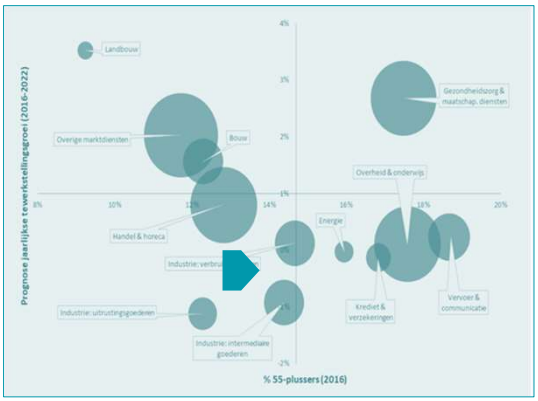
Ergonomics in manufacturing industry – a strategic advantage

Evolution – labor demographics



labor shortage

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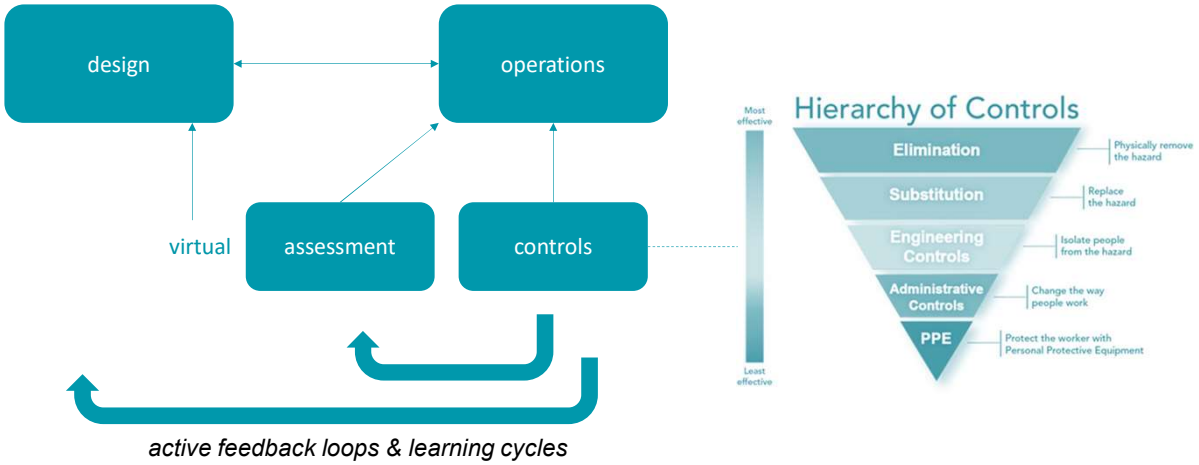
Active feedback loops – driven by digitalisation

A technology driven approach to ergonomics



active feedback loops & learning cycles

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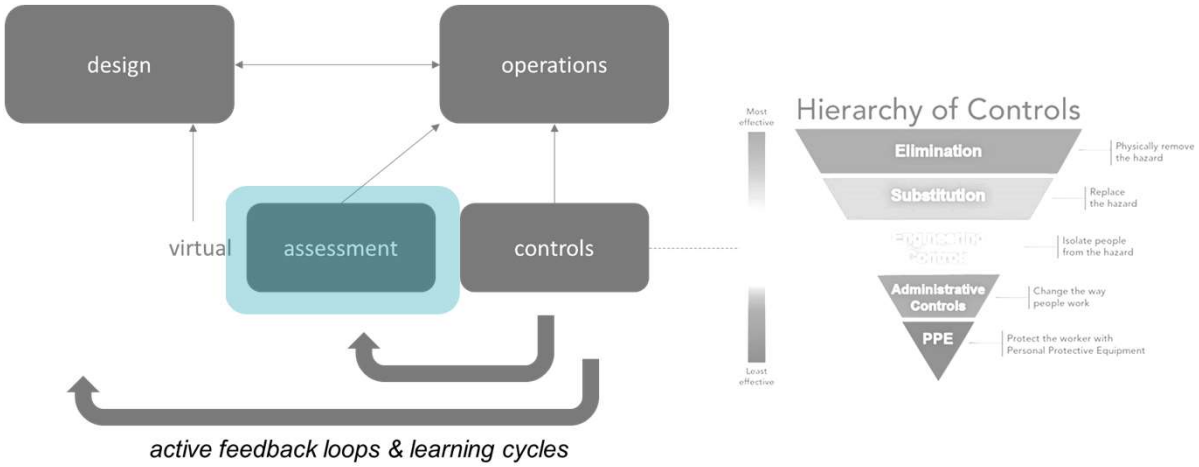
Example – automatic assessment



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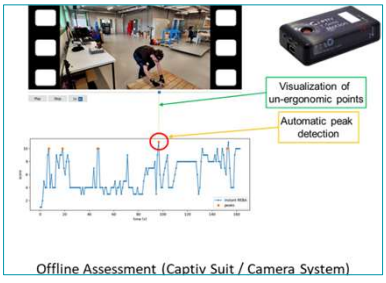
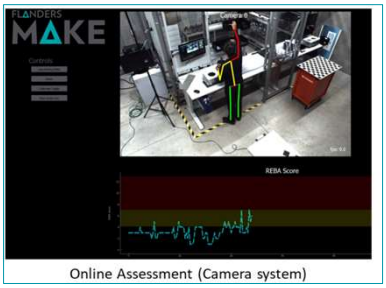
Assessment

Offline versus online assessment



Offline Assessment (Captiv Suit / Camera System)



Online Assessment (Camera system)

offline assessment – detailed analysis – lab -
online assessment tool – objective – secure – privacy – continuous assessment of ergonomic load

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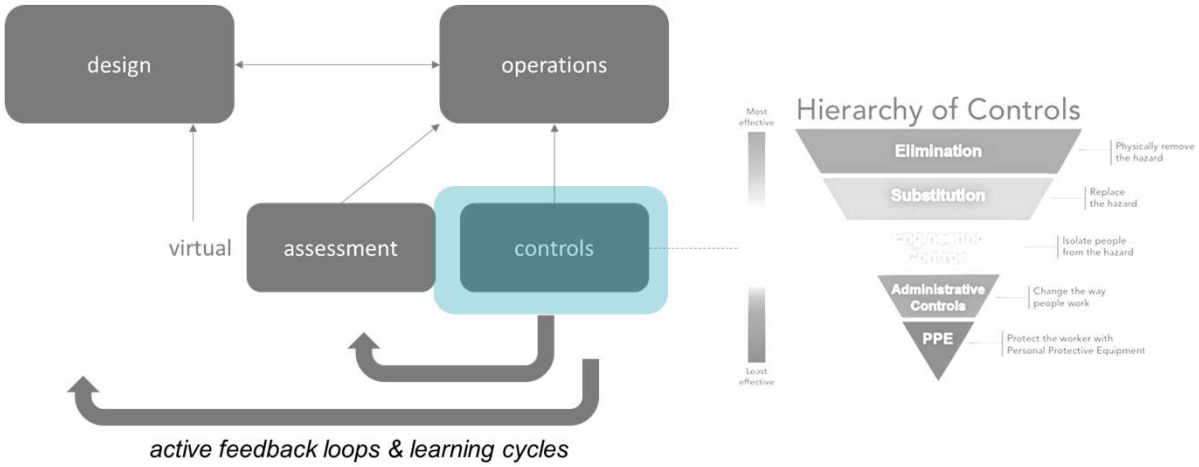
Example – active controls



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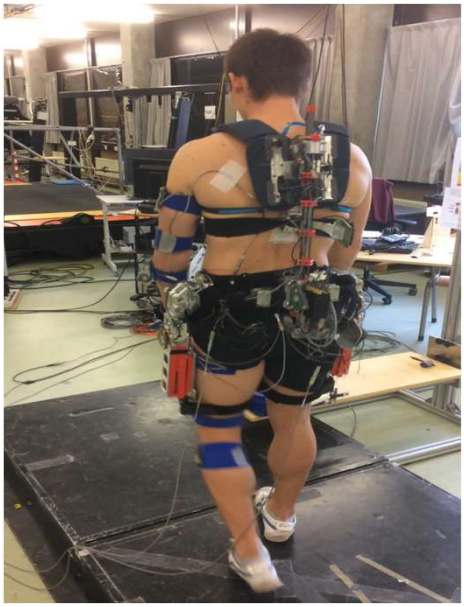
Exoskeletons



Passive vs. active skeletons
Different musco-skeleton functions
Cost
Weight
Battery lifetime

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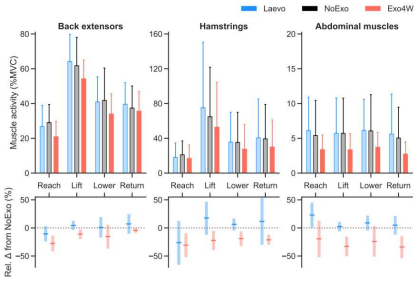
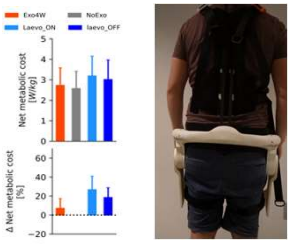
Exoskeletons (example of a passive exoskeleton)

- **Exoskeletons allowing for support during more dynamic work**

- **Description of result:** A new generation of occupational exoskeletons reducing loads on back and shoulders while being less invasive than other exoskeleton solutions on the market.
  - Back exoskeleton allowing for unhindered walking and minimal reduction in range of motion – TRL 5 – demonstrated in relevant environment
  - Shoulder exoskeleton allowing for wider variety of tasks – TRL 4 – lab prototype showing first results



Results showing ↘ muscle activation and ↗ range of motion



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Smart handlers

ergonomic know-how build in overhead cranes

Overhead hoist systems

2D -3D

Safety

Speed

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Support via cobot

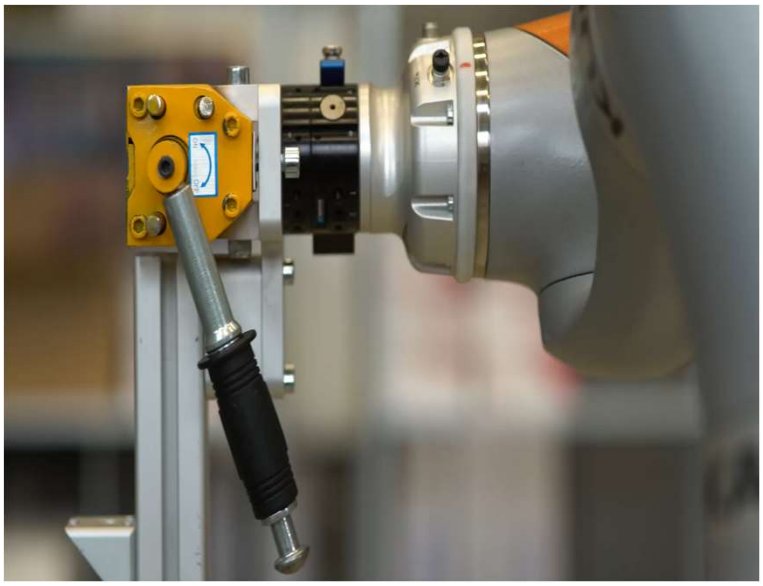
“Third hand”

Smart cobot system

Support in ergonomically difficult task

Cost savings (1 in stead of 2 persons)

Easy programming



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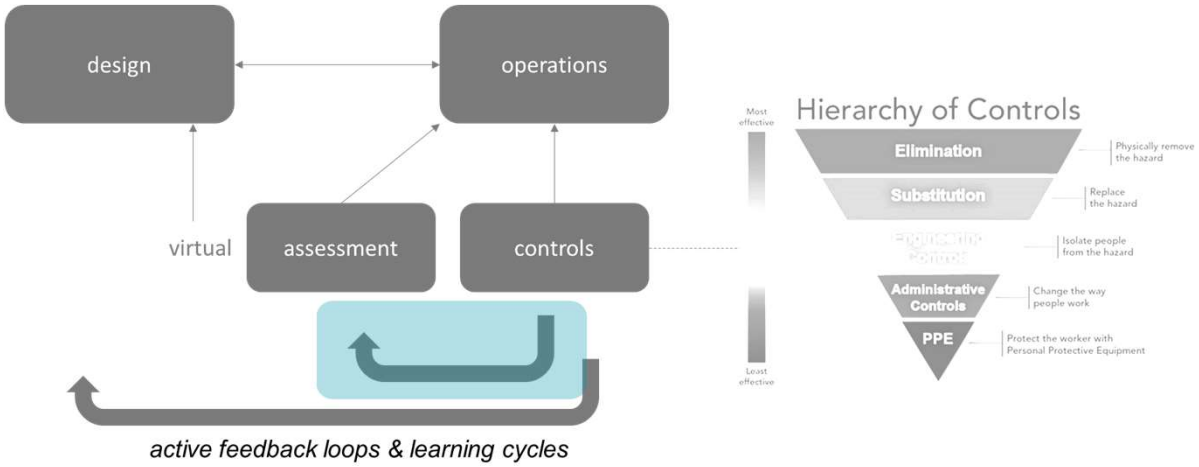
Example – automatic assesment



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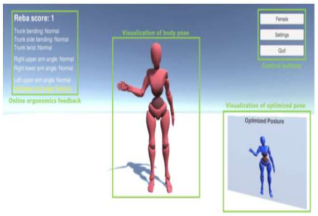
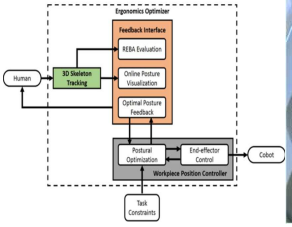
Realtime cobots systems for ergonomic work

Realtime Cobot system that performs postural optimization based on the virtual element method:

- **Workpiece position controller:** The module computes the optimal body pose by taking into account task constraints and adjusts the workpiece position to bring the user to an ergonomic posture.
- **Feedback interface:** The current human pose is displayed using an animated 3D character as well as ergonomic scores and the proposed improved posture





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Active feedback

Feedback system
- Positioning of assembly
- Active feedback during task
- Active feedback to operator via gamefication

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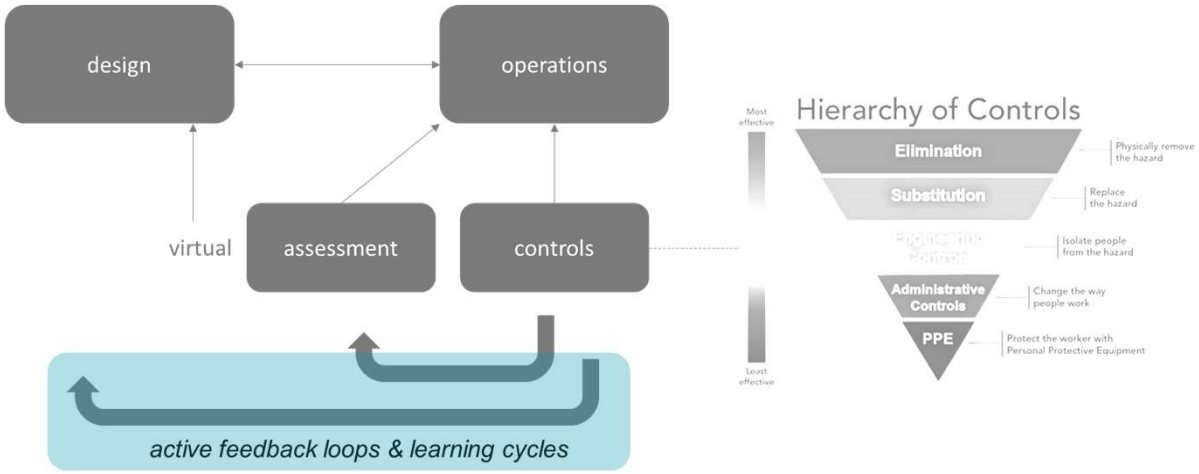
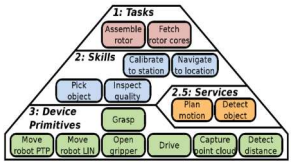
Example – automatic assesment



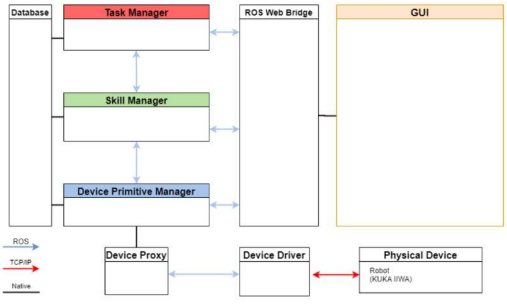
Fast & easy robot programming framework

Flexible to changes in product & production system

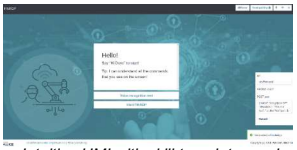


Hardware-independent parametric skills (pick, place, trajectory motion, insert, change tool) hardware-specific device primitives

Automatic task planning for variable object location



Off-line programming by non-experts



Intuitive HMI with skill templates and voice recognition

Teach by demonstration

Single framework for multi-vendor robot hardware

Interoperability through DDS communication (ROS2)

Bridge to ROS & Orocos

Modular implementation in containers

VR-based programming

Proeftuin Tech4WW start

- Identificeren noden en persona naar meer werkbaar werk
- Mapping noden en persona naar Industrie 4.0 oplossingen
- Validatie van Industrie 4.0 oplossingen in industriele pilots
- Disseminatie van geleerde inzichten

➔ Samen naar meer werkbaar werk in de maakindustrie

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More info

Over 200 research engineers helping you on production
On site – Flanders Make Lab

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