

Don't Forget Clinical Reality

How Data-Driven Rehabilitation Can Enhance Therapy Today

Kim Kristin Peper

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Human
Studies

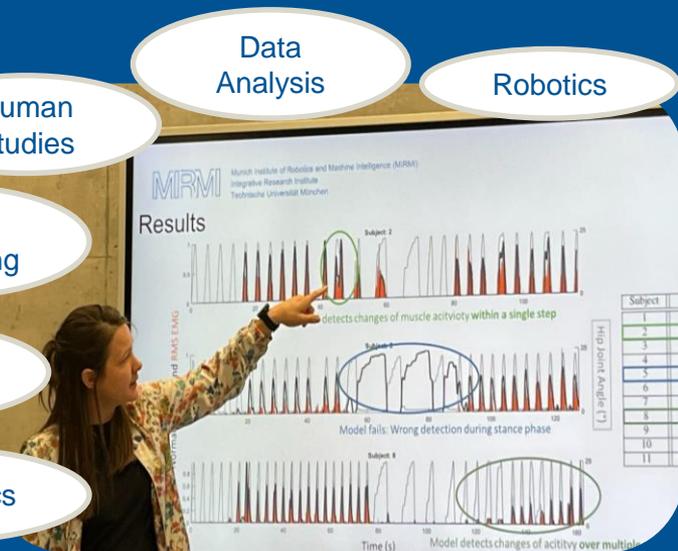
Data
Analysis

Robotics

Medical
Engineering

Sports
Engineering

Biomechanics



Contact Details

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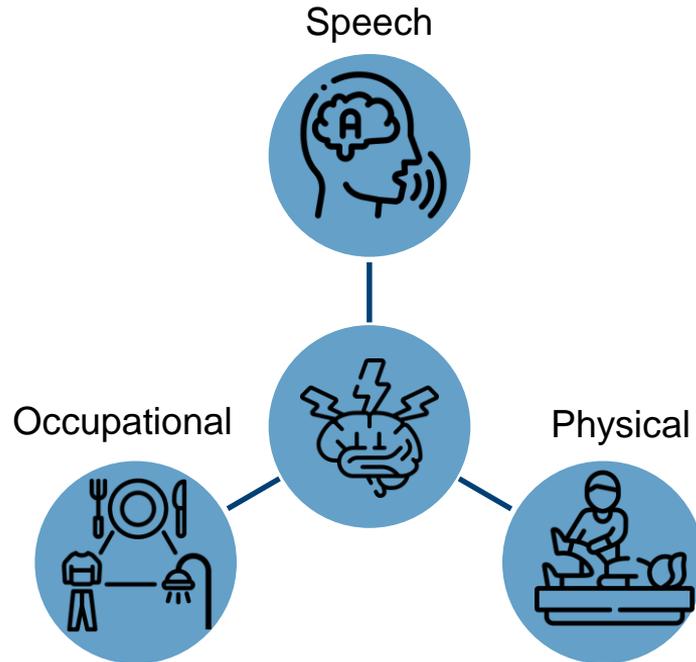
<https://scholar.google.de/citations?user=TkLy-XYAAAAJ&hl=de>

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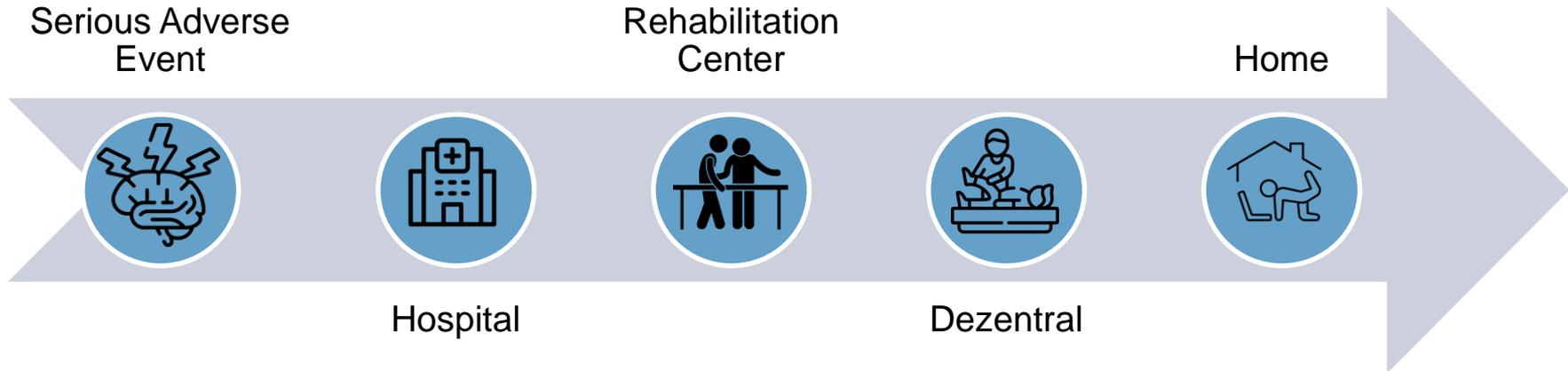
- 1 What exists? → Why are there not more devices?
- 2 How to overcome? → Success factors?
- 3 Our successtory to enhance early rehabilitation.
- 4 What brings the future? → Further Ideas to improve rehabilitation

Definition Rehabilitation



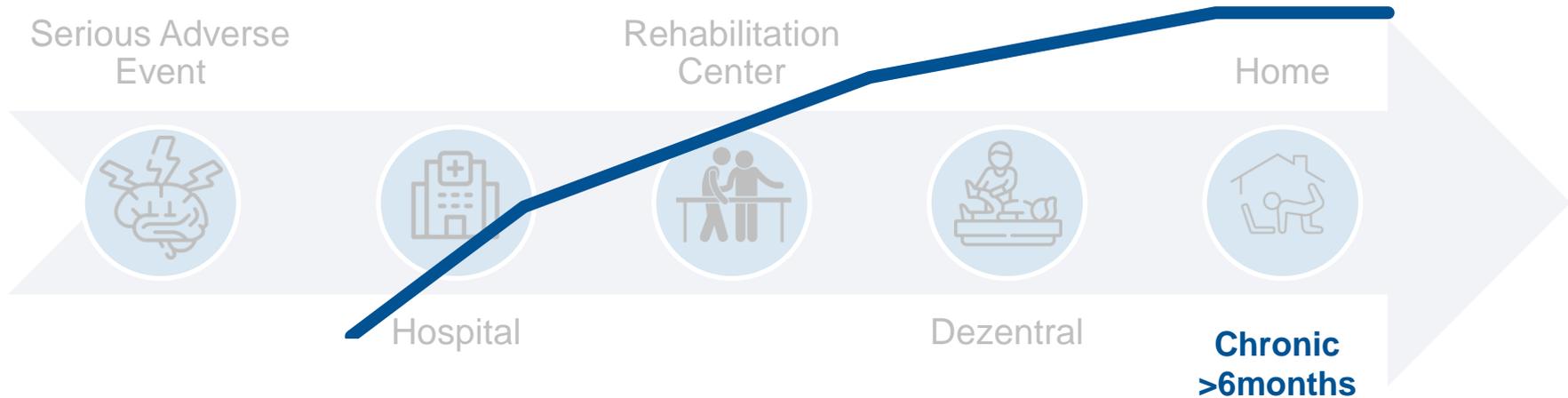
“interventions designed to **optimize functioning** and **reduce disability** in individuals with health conditions in interaction with their environment”
- WHO

Timeline of Rehabilitation



Timeline of Rehabilitation

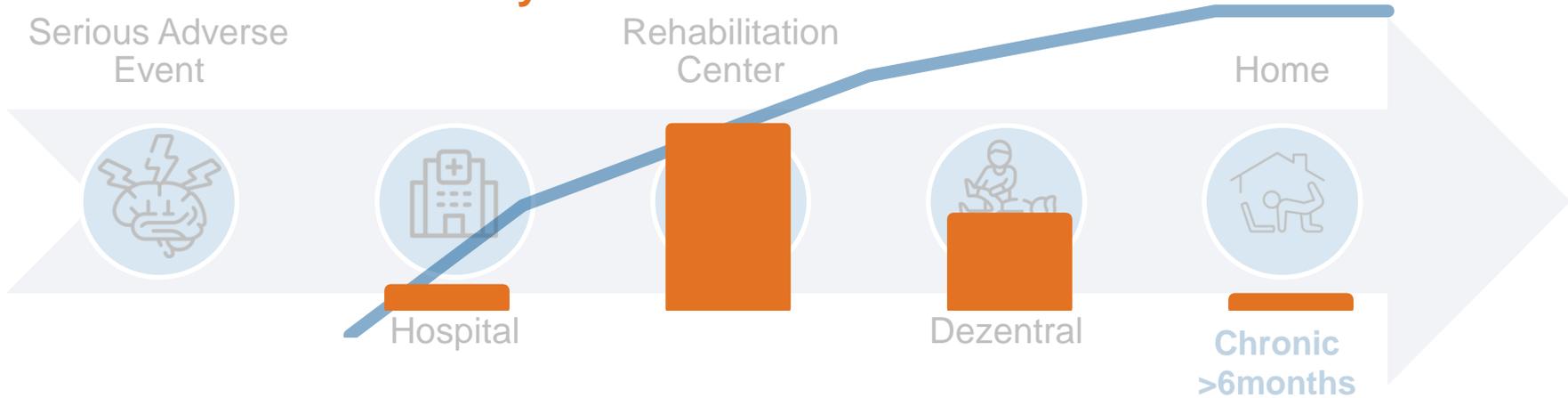
Today's Recovery Timeline



Timeline of Rehabilitation

Today's Recovery Timeline

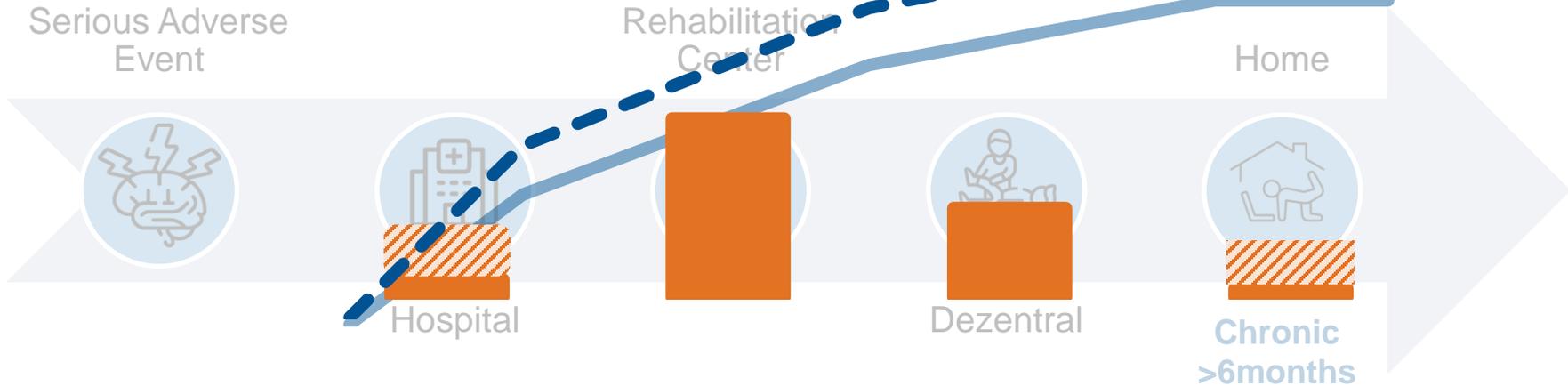
Today's # Rehabilitation Devices



Timeline of Rehabilitation

--- Potential for faster and higher recovery

▨ Potential for additional devices



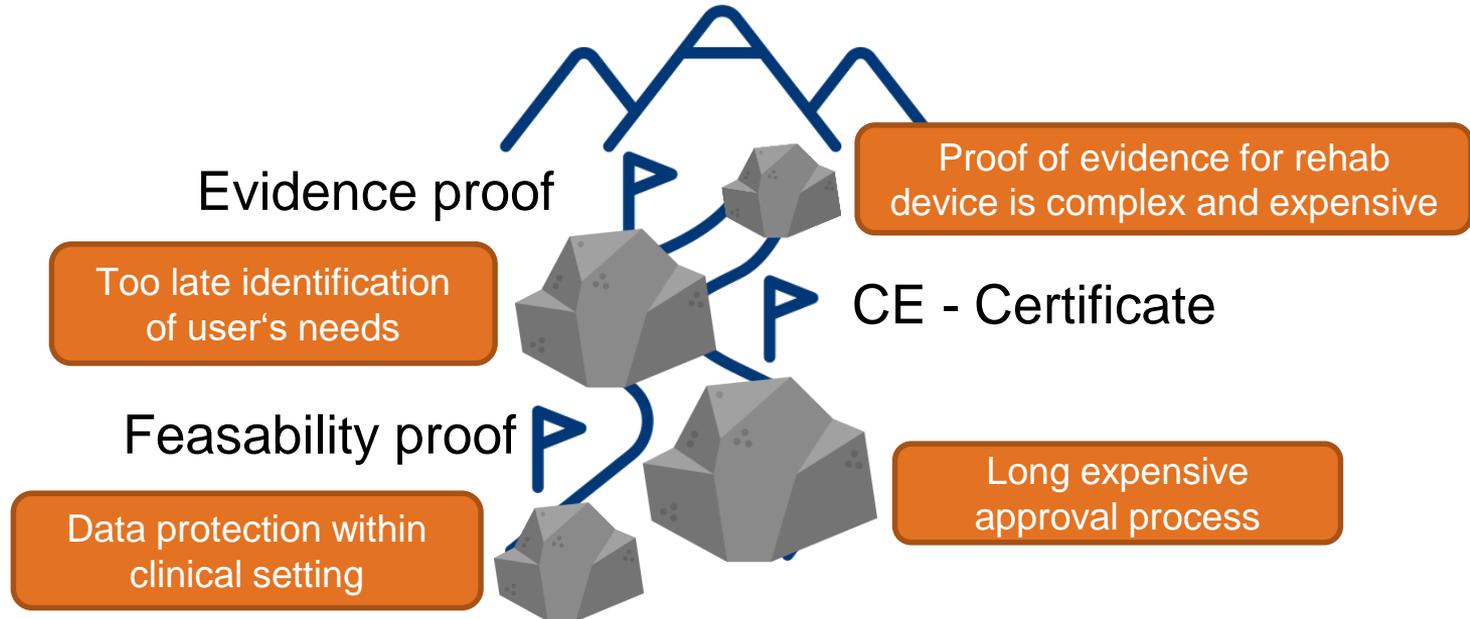
Additional devices during rehabilitation would support faster and higher recovery!

Why are there not more devices?



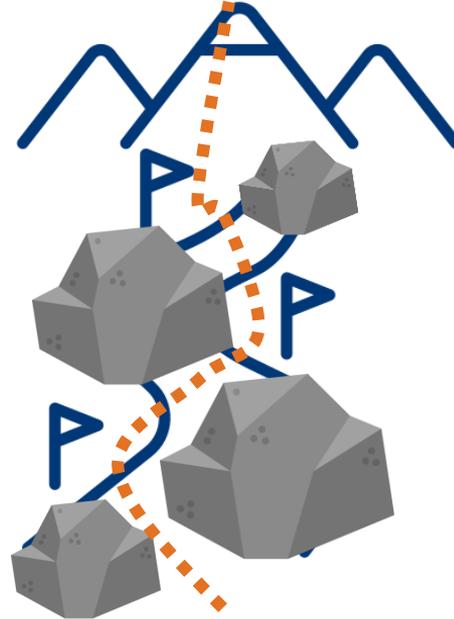
Why are there not more devices?

Goal: Accepted market product

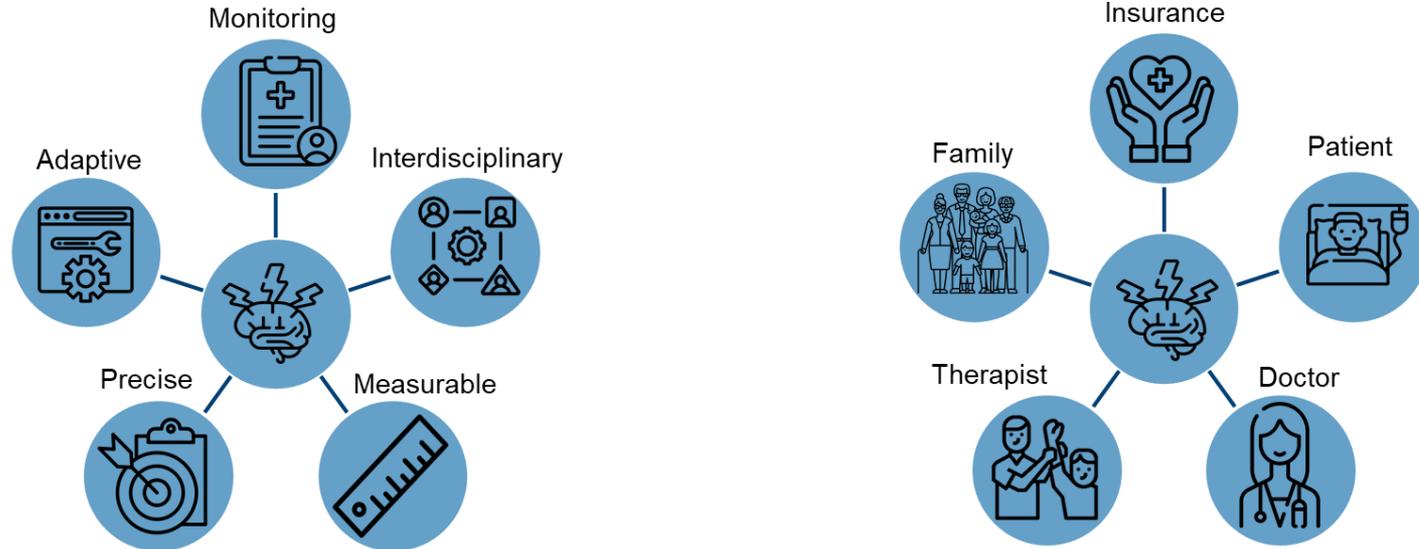


How to master the challenges?

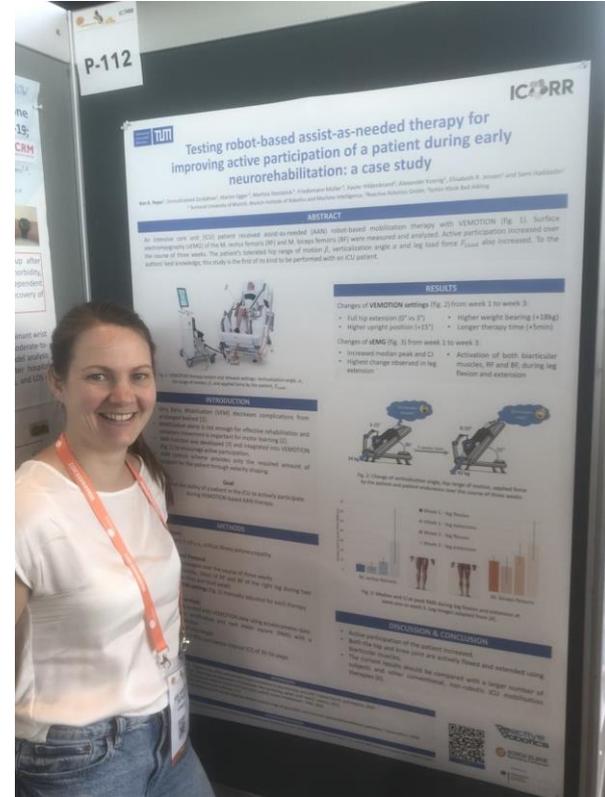
Goal: Accepted market product



Success factors for data-driven rehabilitation devices: What and whom do we need to consider?



„Assist-As-Needed“ rehabilitation as a successtory



Rehabweek 2022, Rotterdam

VEMOTION, Reactive Robotics GmbH



<https://www.youtube.com/watch?v=45dSWweCZGA>



The „Assist-As-Needed“ rehabilitation as a successtory

We took the VEMOTION System

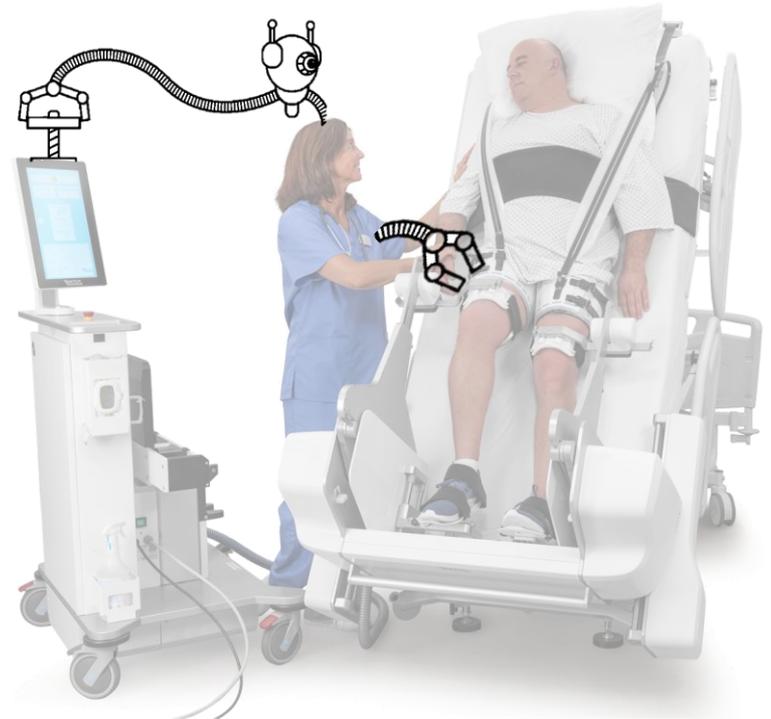


The „Assist-As-Needed“ rehabilitation as a success story

We took the VEMOTION System

and added

Assist-As-Needed,
a Data-Driven controller

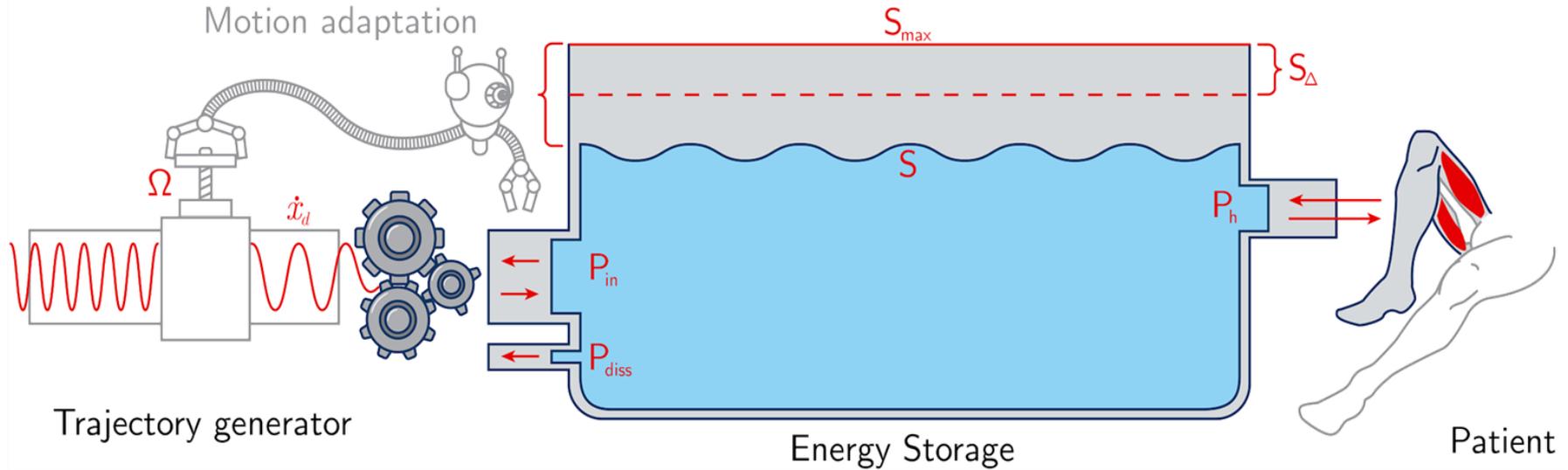


Assist-As-Needed

Idea

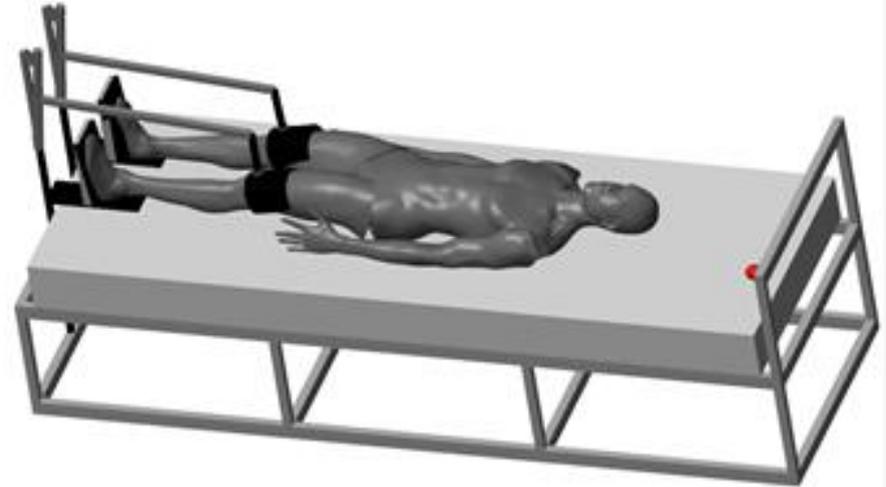
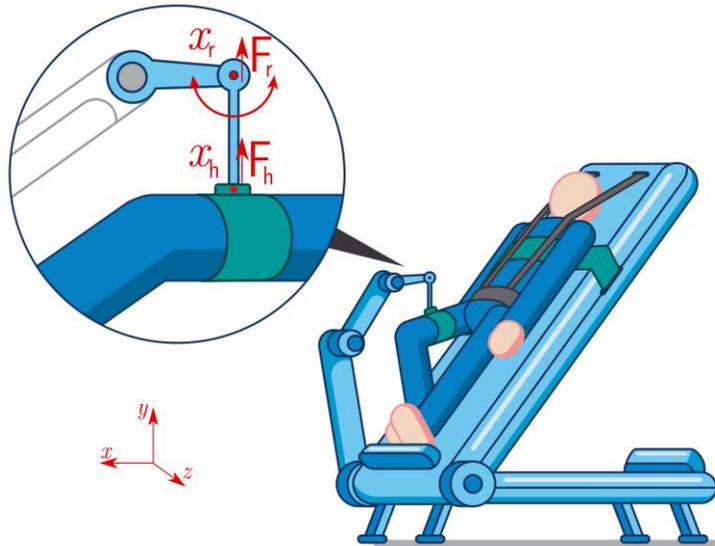


2018

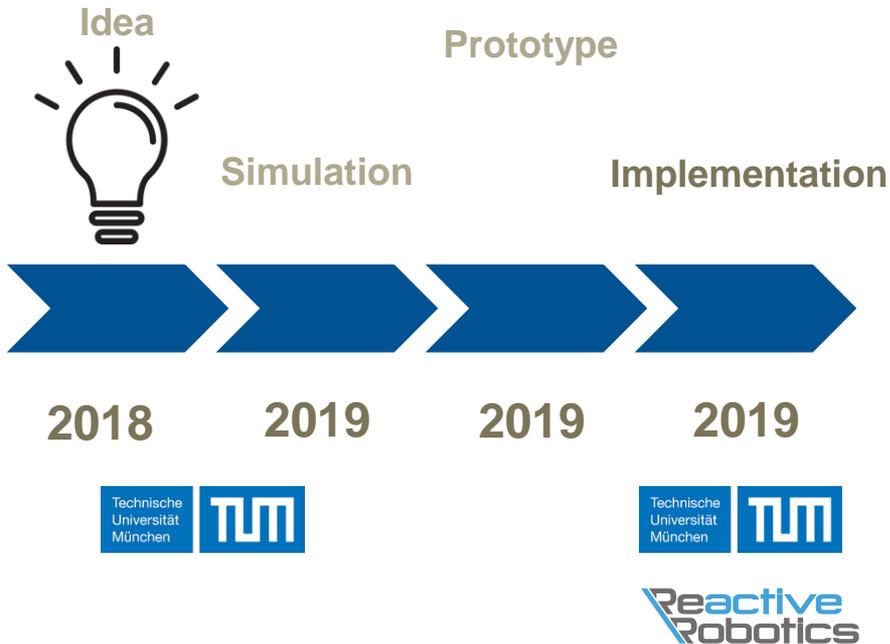


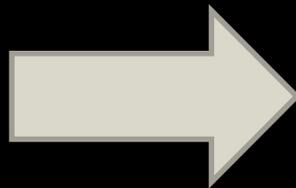
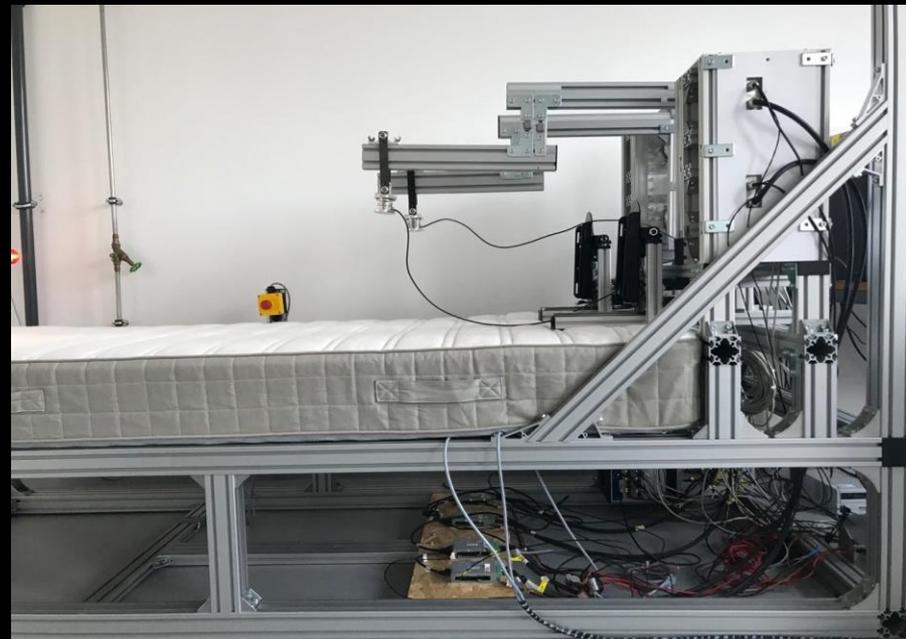
Assist-As-Needed



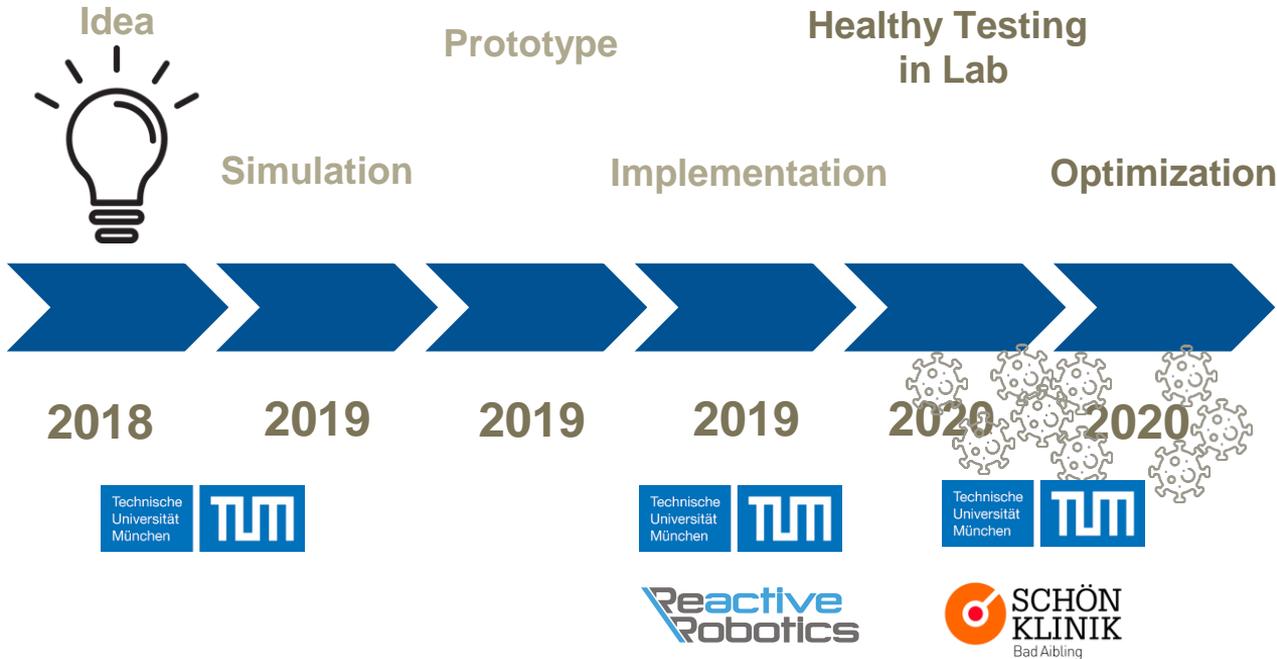


Assist-As-Needed





Assist-As-Needed

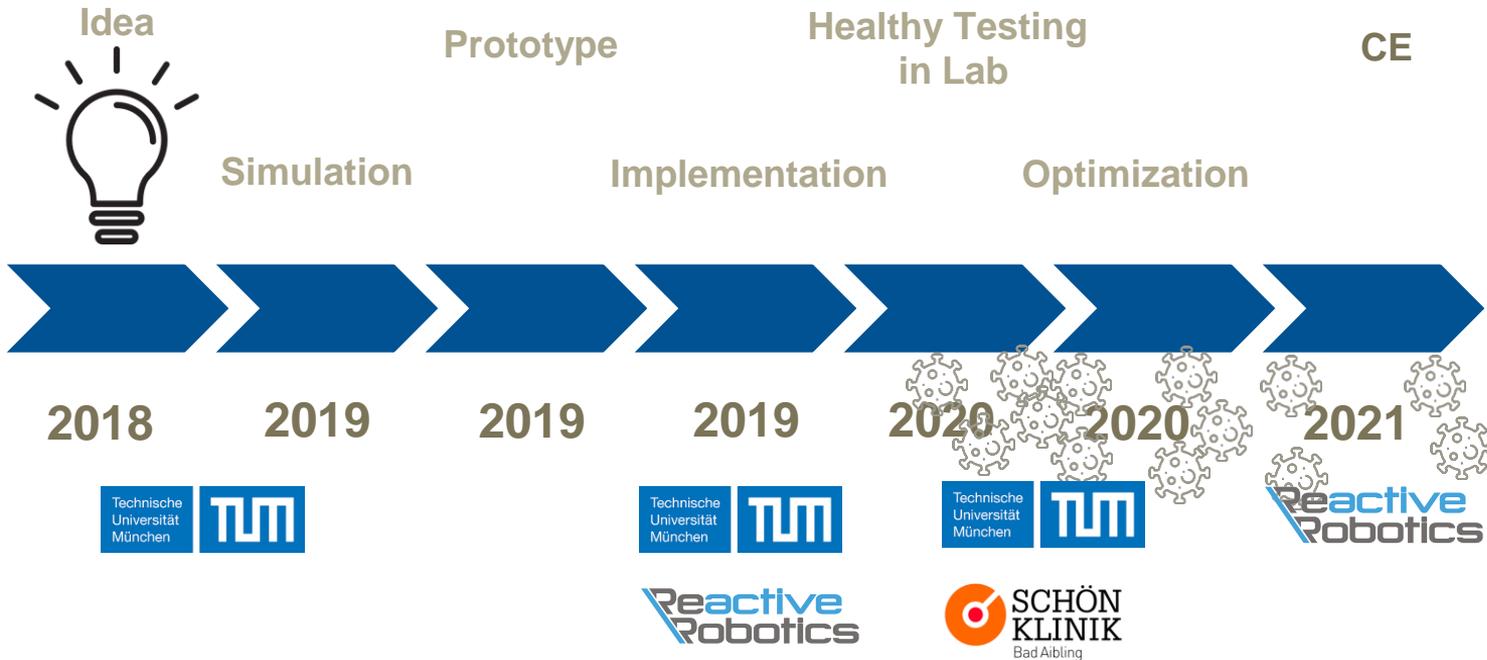




60+ Subjects
5+ Ba+Ma Thesis
 ∞ Data Points

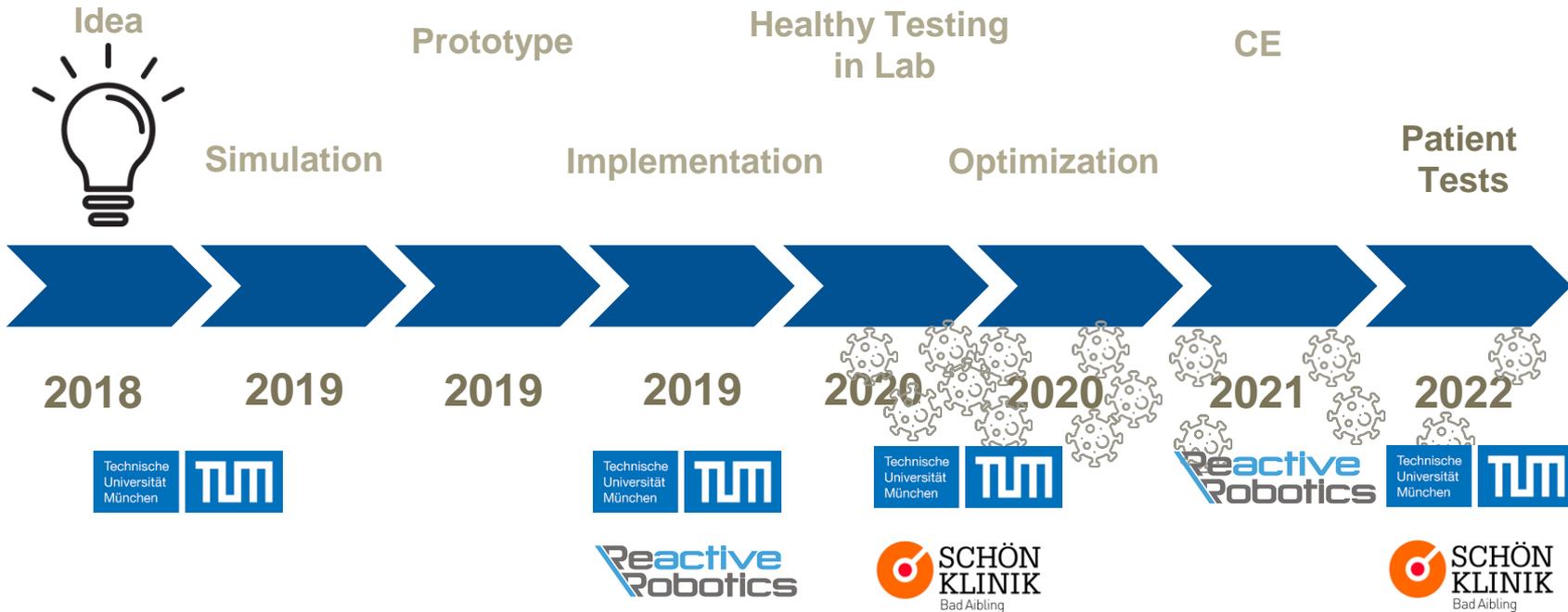


Assist-As-Needed



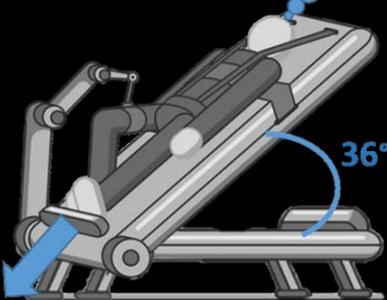


Assist-As-Needed



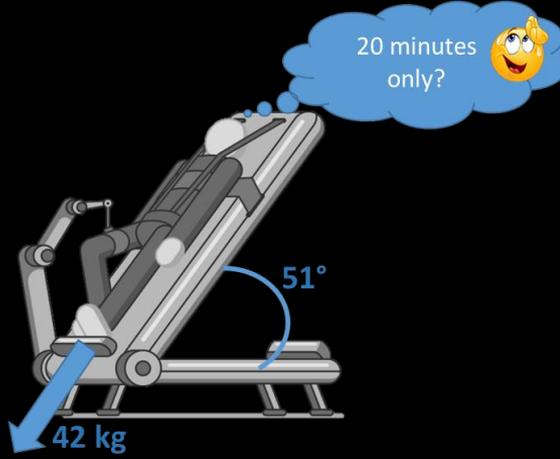


24 kg



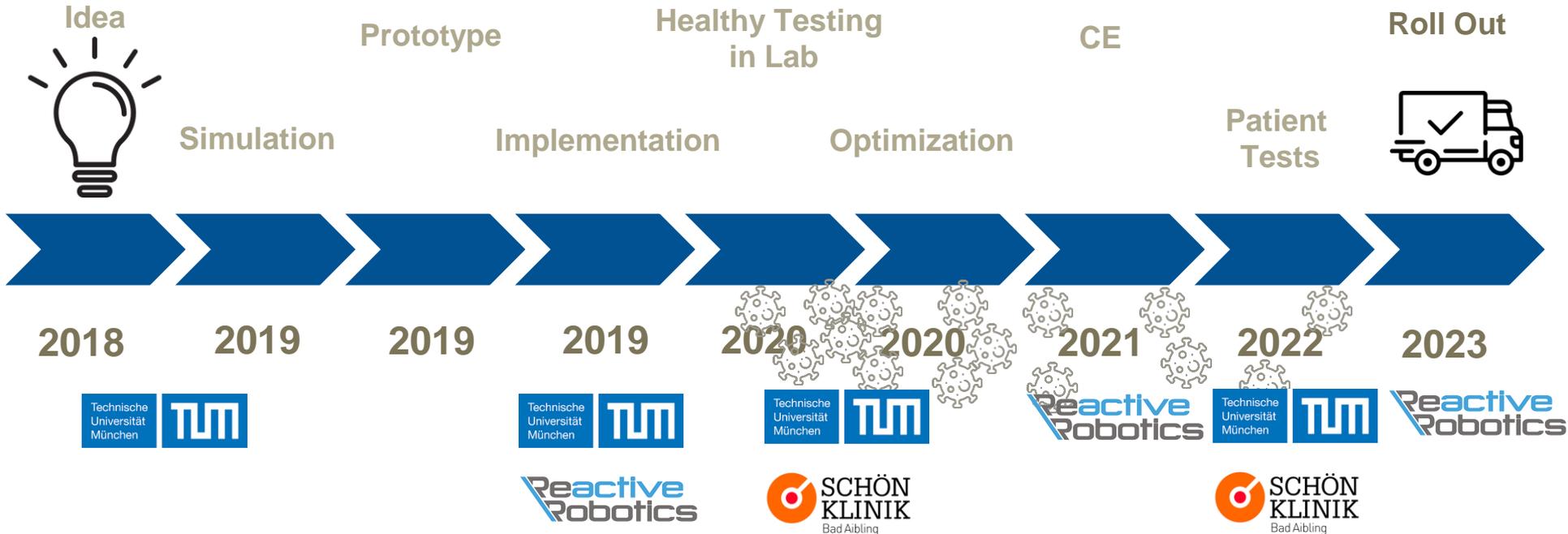
15 minutes already? 😓

... 3 weeks later



→ First step towards evidence proof

Assist-As-Needed



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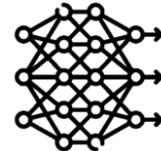
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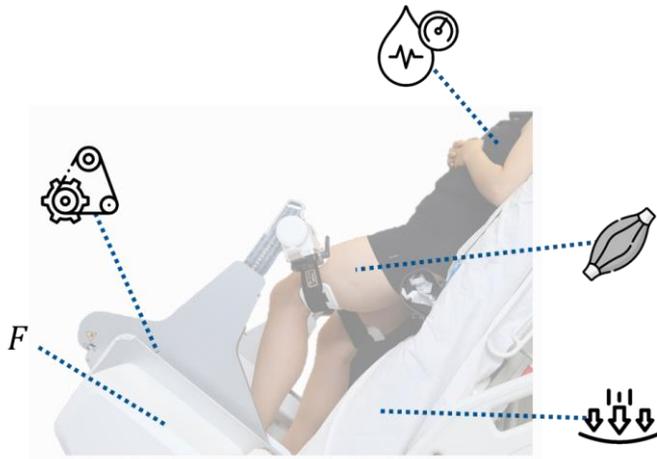


Our successtory to enhance early rehabilitation.

What brings the future? → Further Ideas to improve rehabilitation



What brings the future? → Further ideas to improve rehabilitation



Individualized treatments

Reinforcement learning
& Prediction



Unlocking the potential of data

Questions?

Reach out:

kim.peper@tum.de