Monitoring physical activity in medical applications.
Wearable Healthcare
Digital health support tools for patient and doctor
**“Healthy” Activity**
- Sufficient activity level
- Frequent activity
- Good quality of movement
- Safe movement

**“Unhealthy” Activity**
- Falling
  - Long-lie after fall
- Increased fall risk:
  - Stumbling
  - Bad balance and coordination
  - Fall history
- Less daily activity
- No variation in activity

Positive influence

Negative influence
Anemnesis (analysis)
Investigation (measurement)
Treatment (advice)

Monitoring in healthcare
Medical development process

From concept to medically certified product
Intended use

TRL 1 – Conceptual ideas
Wearables dev kit

TRL 2 – Technological proof-of-concept
Pre-clinical testing

TRL 3 – Experimental validation
Prototype development

TRL 4 – Prototype development
Lab testing & validation
TRL 5 – Prototype validation in lab environment

References:
- Concurrent Validity of the MOX Activity Monitor Compared to the ActiGraph GT3X. Van der Weegen et al. (2015)
- Usability testing of a monitoring and feedback tool to stimulate physical activity. Van der Weegen et al. (2014)
Pilot study

TRL 6 - Prototype demonstration in pilot study
DFx -> Design for size, reliability, manufacturing, assembly, safety, testing, cost …

Production development
TRL 7 - Design for production
Effects

- Effective treatment
- Patient satisfaction
- Efficient compared to additional therapy
- Health improved for COPD

Medical activity monitoring
TRL 8 – Validation & certification
<table>
<thead>
<tr>
<th>Consumer product</th>
<th>Healthcare product</th>
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<tbody>
<tr>
<td>Cost of goods</td>
<td>Safe</td>
</tr>
<tr>
<td>Speed to market</td>
<td>Predictable - accurate</td>
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<tr>
<td>Features / values</td>
<td>Traceable</td>
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<tr>
<td>Marketing</td>
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<td>Design</td>
<td>Usable</td>
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<td>Logistics</td>
<td>Secure &amp; private</td>
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**Medical activity monitoring**

TRL 9 - Certified, validated, production-ready design