Technology with Vision

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Steering the transformation process – IIoT applications in the automotive supplier industry

4th International Conference Industry 4.0

Hammerström, Kaunas, 20th of March 2019

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Expectations in regards of the 4th industrial revolution

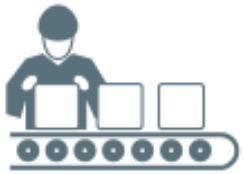
1st Revolution

Mechanization

Mechanized production equipment with steam- and waterpower

1775 – 1825

2nd Revolution



Electrification

a) Electrotechnology, chemical industry
b) Scientific management (Taylorism, Fordism) with mass production

1850 – 1900

3rd Revolution

Automatization

Electronics and IT

1925 – 1975

4th Revolution

Inter-connectedness

a) Digital business models
b) Cyberphysical systems
   a) Smart manufacturing
   b) Digital end-to-end supply chain
   c) Big Data & Analytics

2000 – 2050

- Rationalization (~18%)
- Productivity (+12…30%)
- Reduction in non-quality-expenses (-0.5…8%)
- Shorter lead-times (-4…12%)
- New business models
- Increase in turnover (2…6%)

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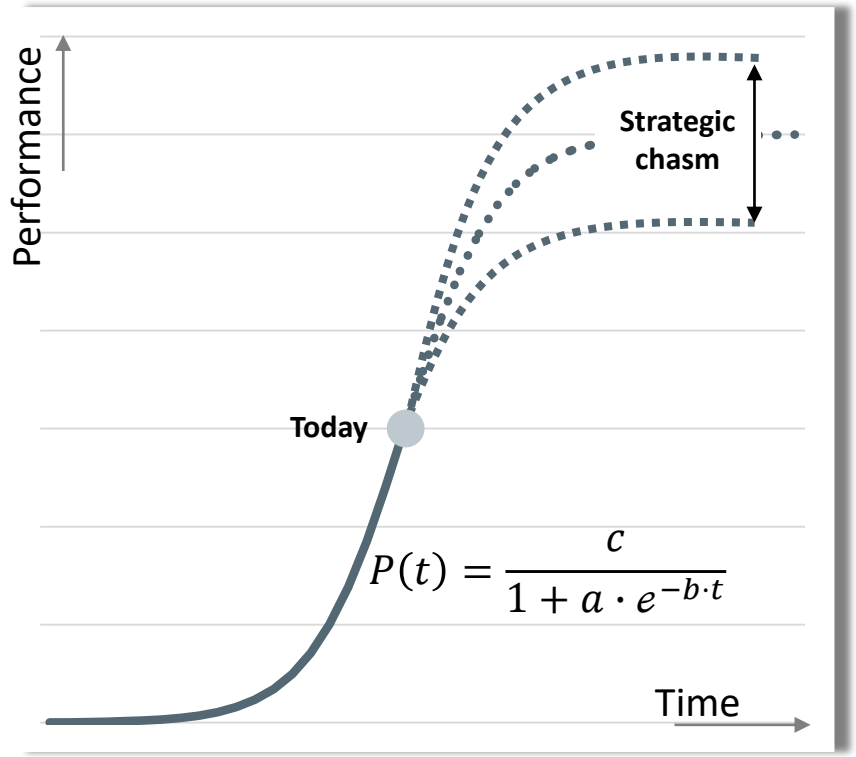
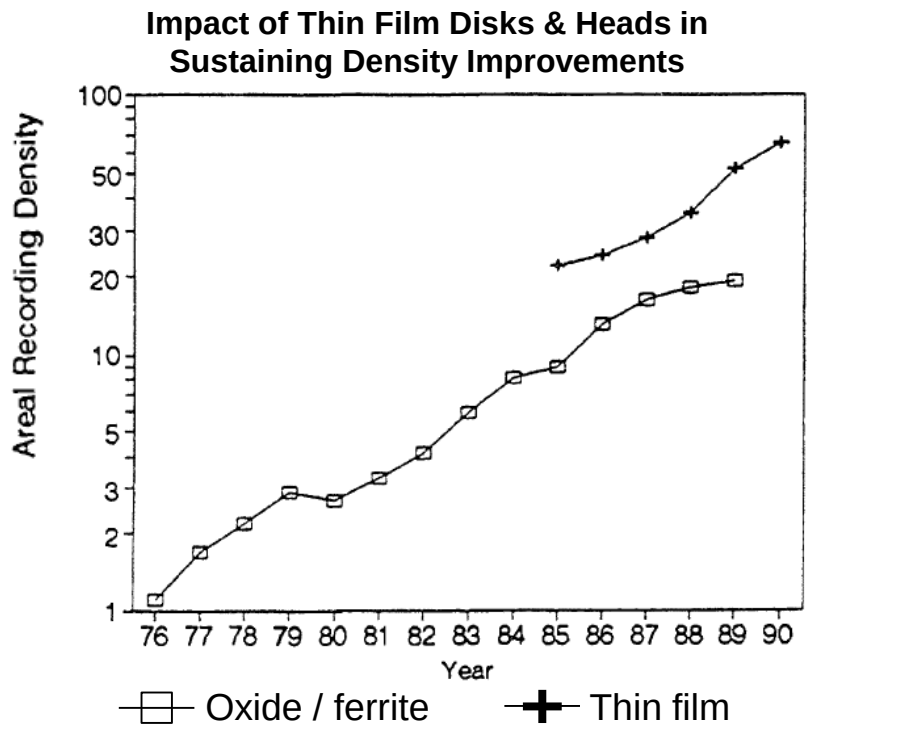
Why shall we invest in a certain technology…?

Theoretical Model



Practical Experience



Business History Review, 1993, pp. 557

…because our growth model might be endangered, our profitability might decrease from a mid- and long-term perspective and our abilities to differentiate from competitors will be destructed.

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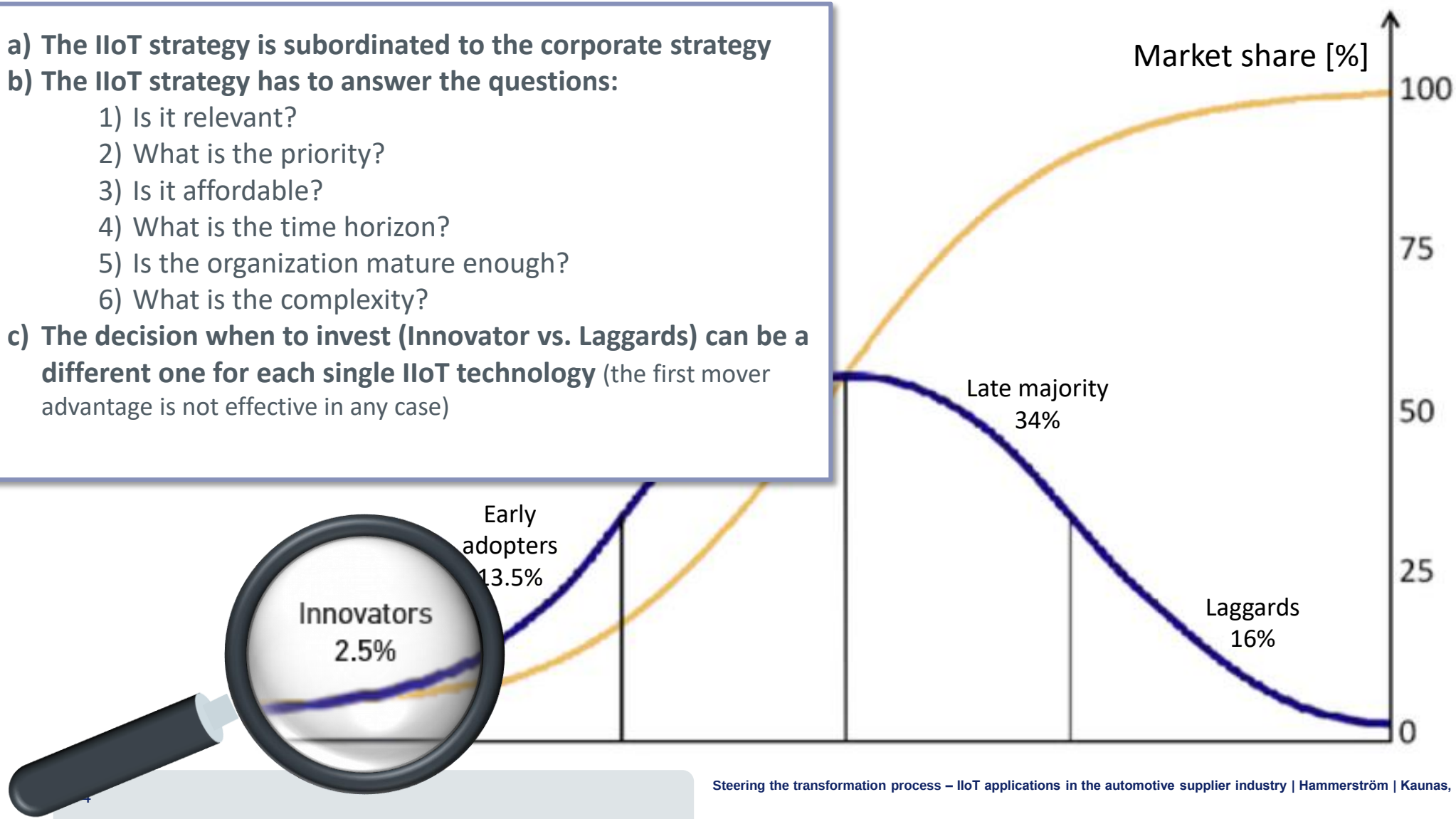
Hypotheses for investing in the transformation process

a) **The IIoT strategy is subordinated to the corporate strategy**
b) **The IIoT strategy has to answer the questions:**
    1) Is it relevant?
    2) What is the priority?
    3) Is it affordable?
    4) What is the time horizon?
    5) Is the organization mature enough?
    6) What is the complexity?
c) **The decision when to invest (Innovator vs. Laggards) can be a different one for each single IIoT technology** (the first mover advantage is not effective in any case)



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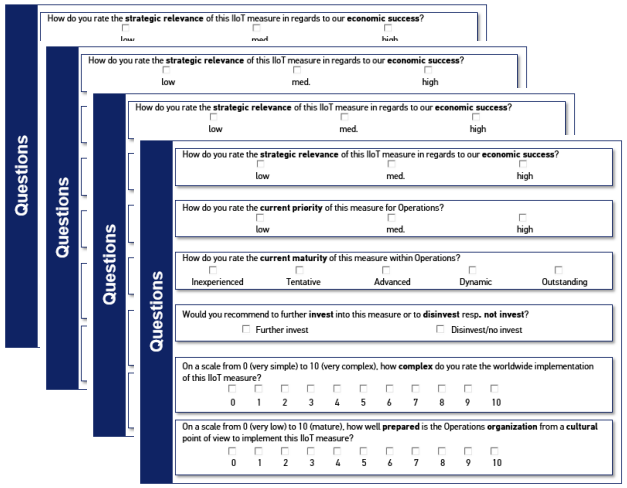
Subtitle

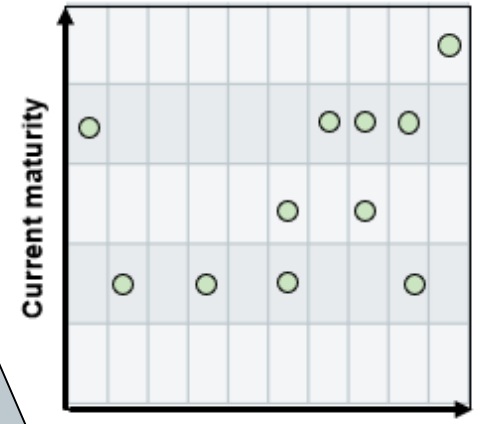
Questionnaire

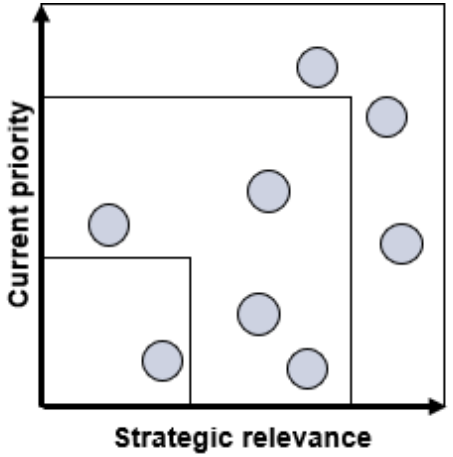


Focus on:

- Operations
- Logistics
- Program Management

Building clusters





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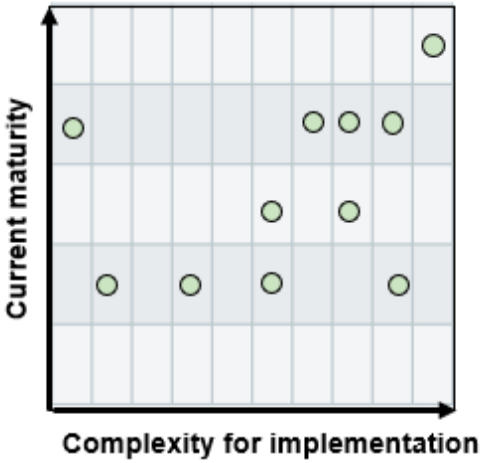
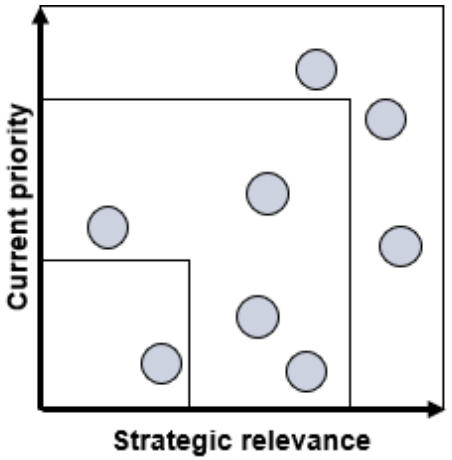
Release process within the business division Electronics





METHODOLOGY

- Common decision (steering committee)
- Business Case and project brief as a precondition
- Target setting (smart) and reviews
- Regular reviews and feedback meetings
- Alignment and exchange of results between business divisions

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Top Focus Projects

Focus Projects	Benefits
Smart glasses for remote services (Hololens Gen. 2)	• Reduced travel expenses (flight, hotel and manhours) • Steeper learning curve • Shorter downtime of machine and testers
Intelligent guided vehicle	• Improved schedule, higher degree of utilization • Higher flexibility • Improved prioritization of transportation orders
Advanced planning and scheduling	• Improved production schedule • Reduced manual effort for ordering and booking of material and semi-finished products • Less work in progress, shorter lead time
M2M communication (printer, SPI and AOI/X-RAY)	• Online adjustment within PCB population • Skipping of erroneous boards within the population process • Optimization based on real-life date (e.g. after first soldering process)

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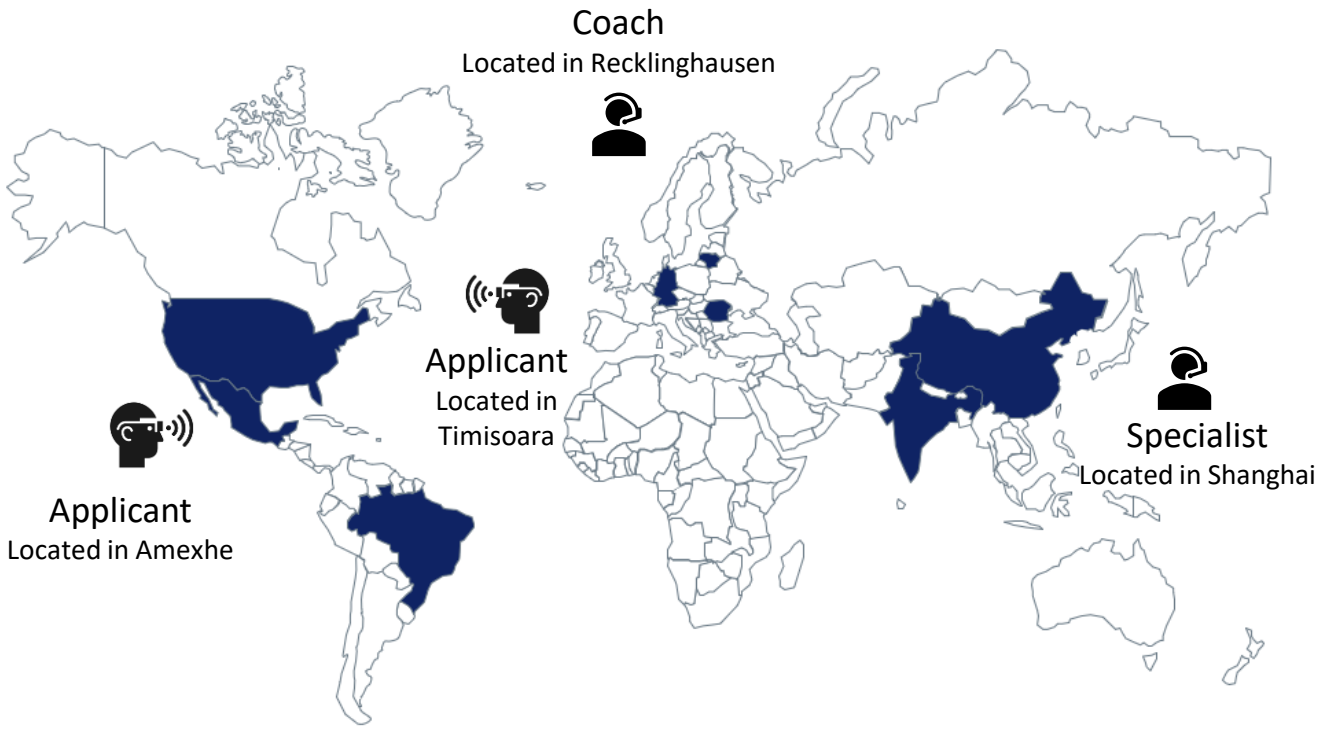
Example: MS HoloLens from Microsoft for remote services in maintenance and testing

Example

smart glasses (MS HoloLens) for remote services



Implementation of IIoT technologies

1. Selection of IIoT technology based on matrices (priority, maturity, complexity, relevance)
2. Definition of a business applications together with a business case
3. Set up of IIoT specific structures (experts, coach, applicants, sounding board)
4. Training and introduction of the device
5. Field test (currently running)
6. Evaluation of results
7. “Go” or “No Go” decision

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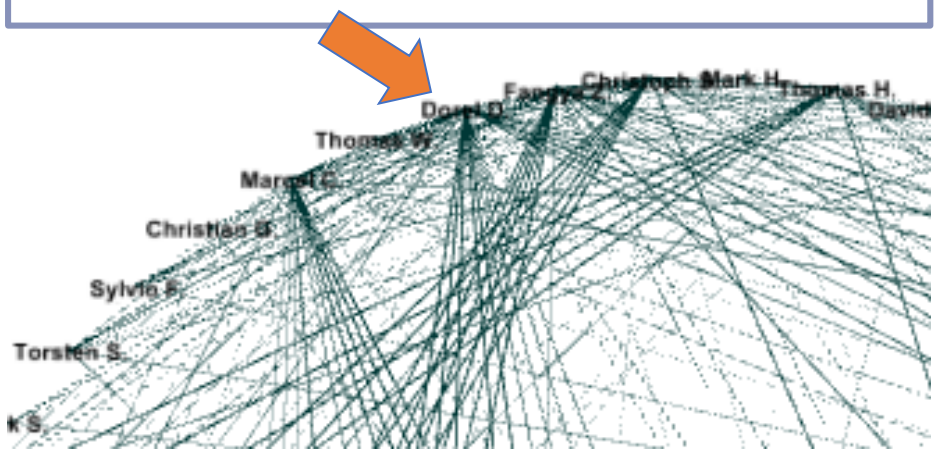
Measurement of the improvements (strength of the network, with Gephi)

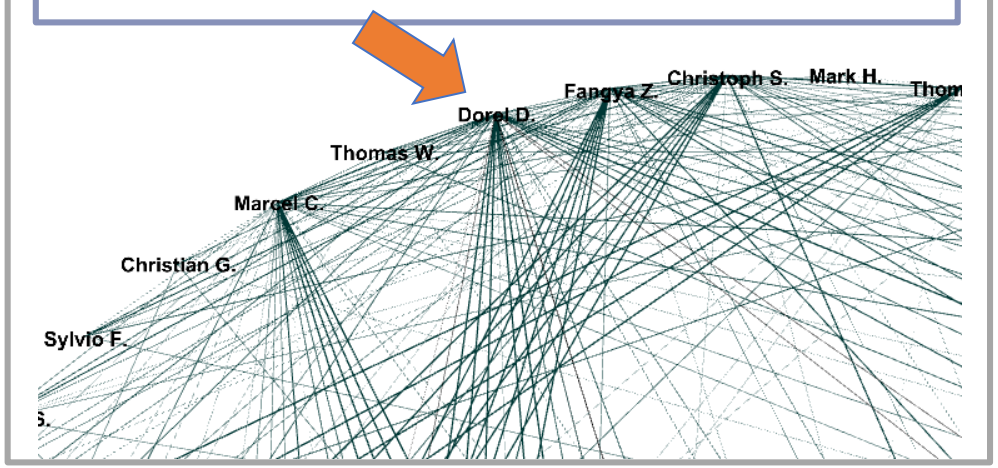
Before

Average degree:	8.912
Average weighted degree:	44.421
Betweenness centrality distribution	
Diameter:	4
Average path length	1.9987
Density of edges:	0.159



After

Average degree:	9.123
Average weighted degree:	45.193
Betweenness centrality distribution	
Diameter:	4
Average path length	1.9816
Density of edges:	0.163



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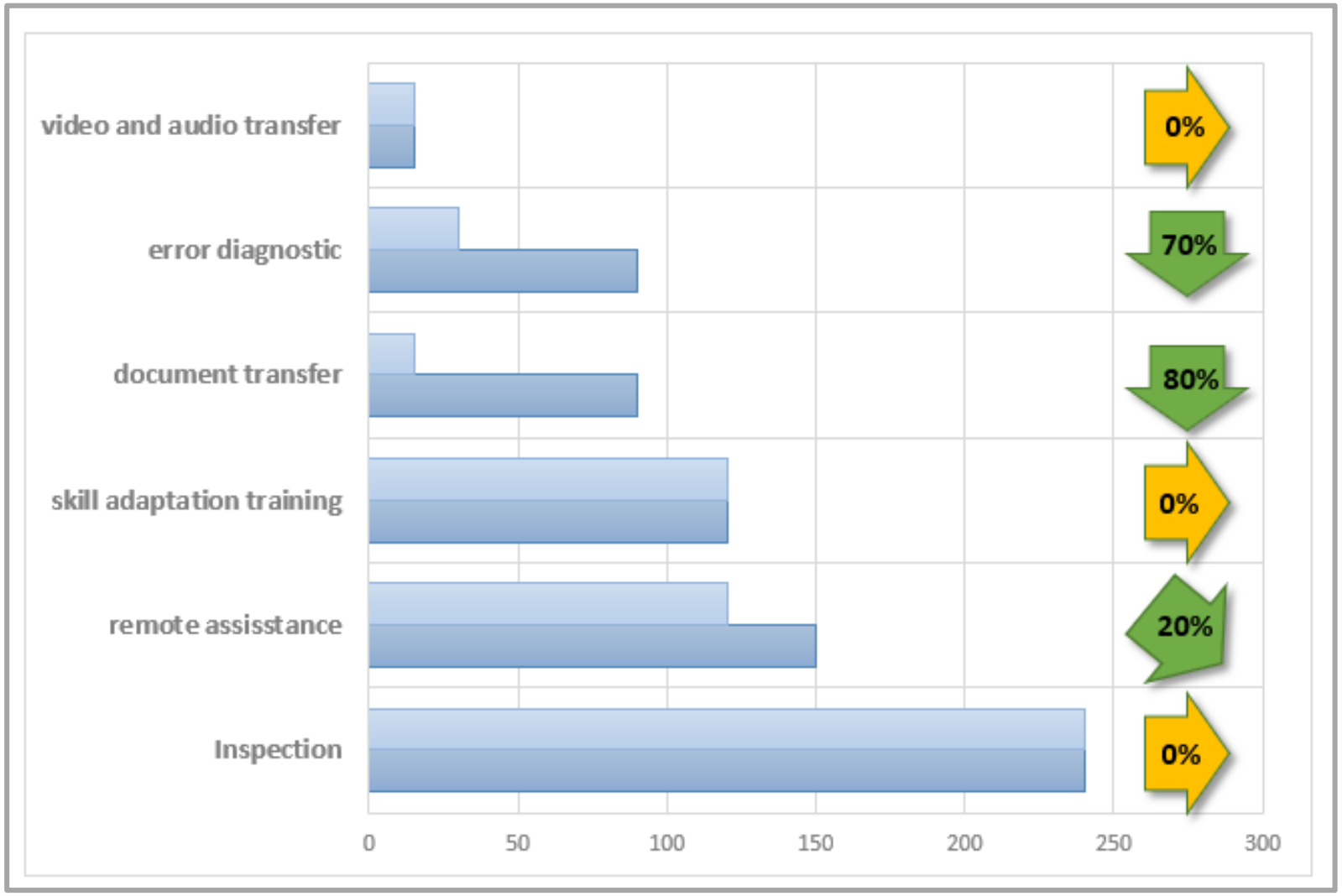
Impact of the improvements – reduction in minutes



We experienced savings in several fields but not in all expected areas of application.

The IIoT device will be investigated further in the upcoming month, a decision for a worldwide rollout will be taken by the steering committee.

Technology with Vision

Thank you for your attention!