

Indoor-Lokalisierungstechnologien: Überblick und Anwendungsbeispiele aus dem Umfeld von Industrie 4.0

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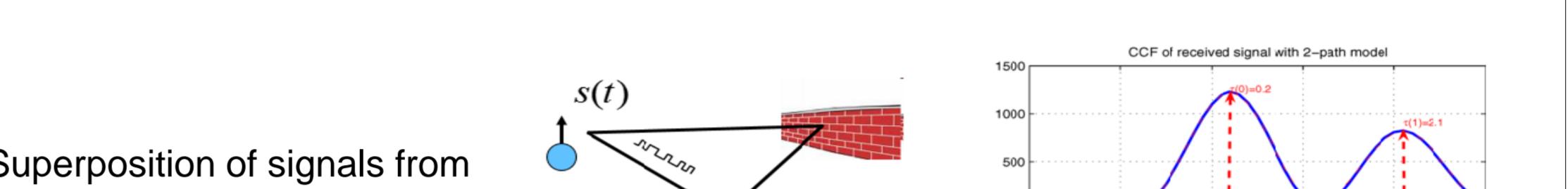
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Comparison of different real-time Indoor-localization technologies

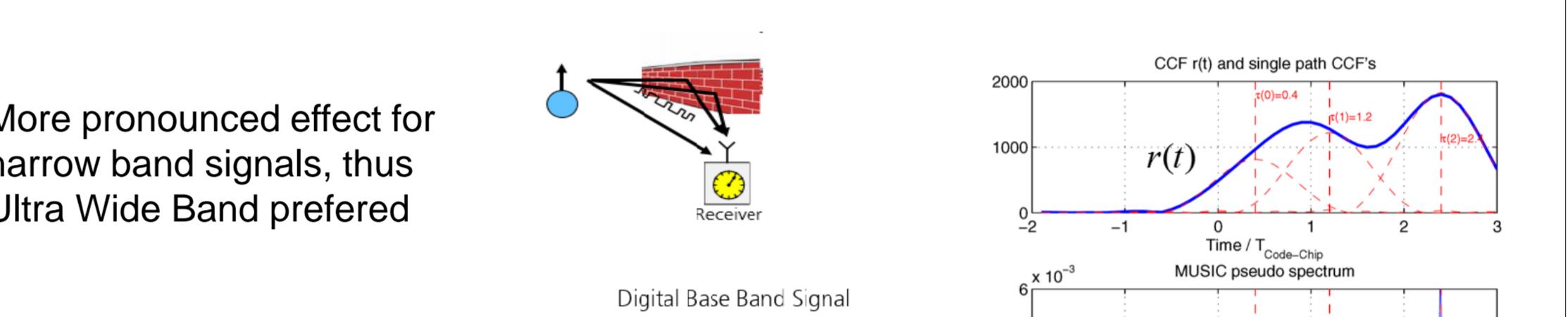
Technical Requirements	Precision	Reliability	Robustness & Security	Number of monitored objects	Low Costs	Form factor/weight of transmitter/receiver
Optical position sensing	High	Medium	Medium	Medium	Medium	Medium
Received signal strength indicators	Medium	High	Medium	Medium	Medium	Medium
Multi-sensor fusion and status monitoring	Medium	Medium	High	Medium	Medium	Medium
Global Navigation Satellite System – GNSS	High	High	High	Medium	Medium	Medium
Time-of-flight measurement	Medium	Medium	Medium	Medium	High	Medium
Inductive position sensing	Medium	Medium	Medium	Medium	Medium	High

Technological Challenges with Multiple Paths

Superposition of signals from multiple paths



More pronounced effect for narrow band signals, thus Ultra Wide Band preferred

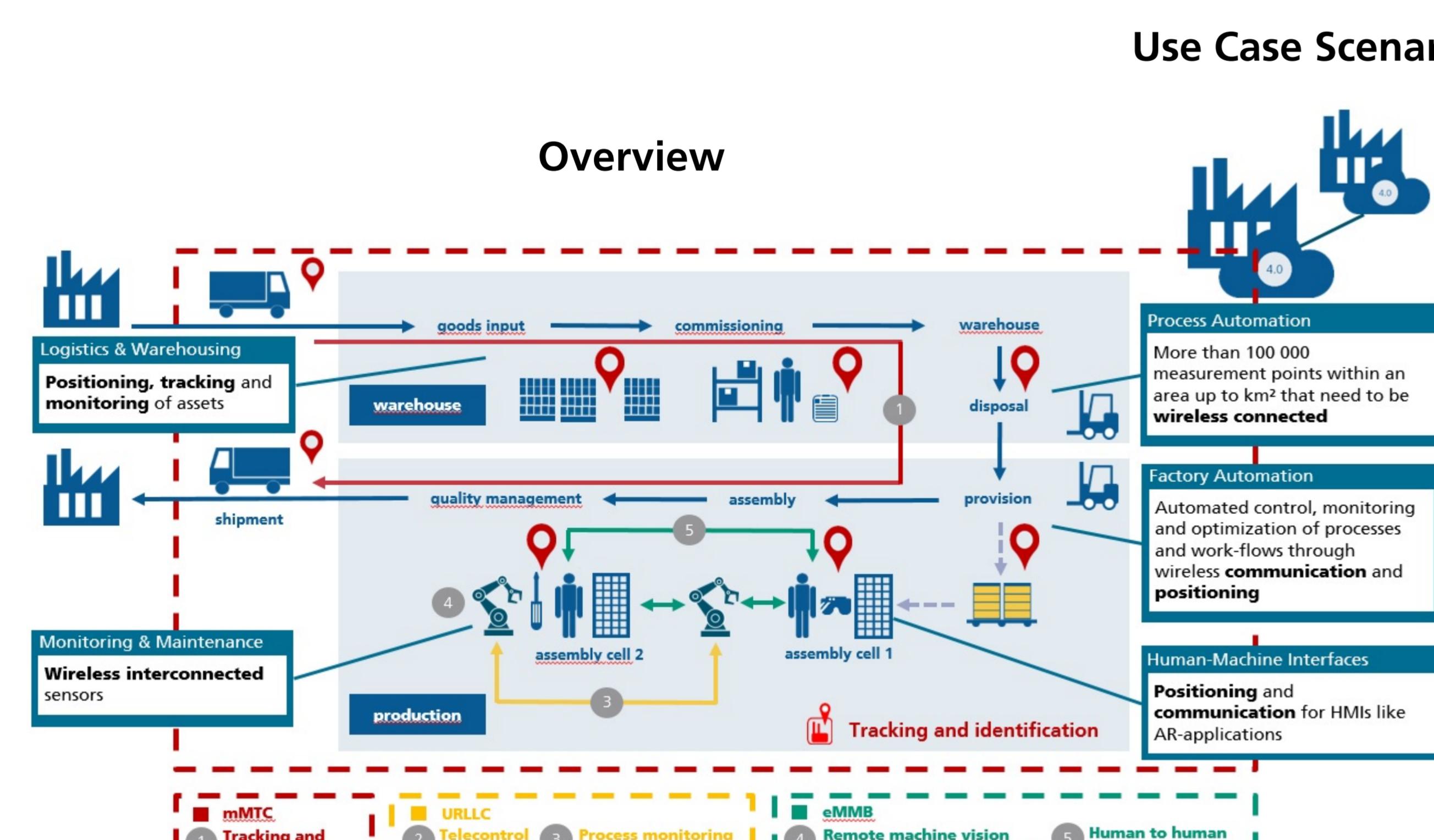


For high resolution use cross-correlation method to generate pseudo-spectrum

„Pseudospectrum“

Use Case Scenario Industrie 4.0

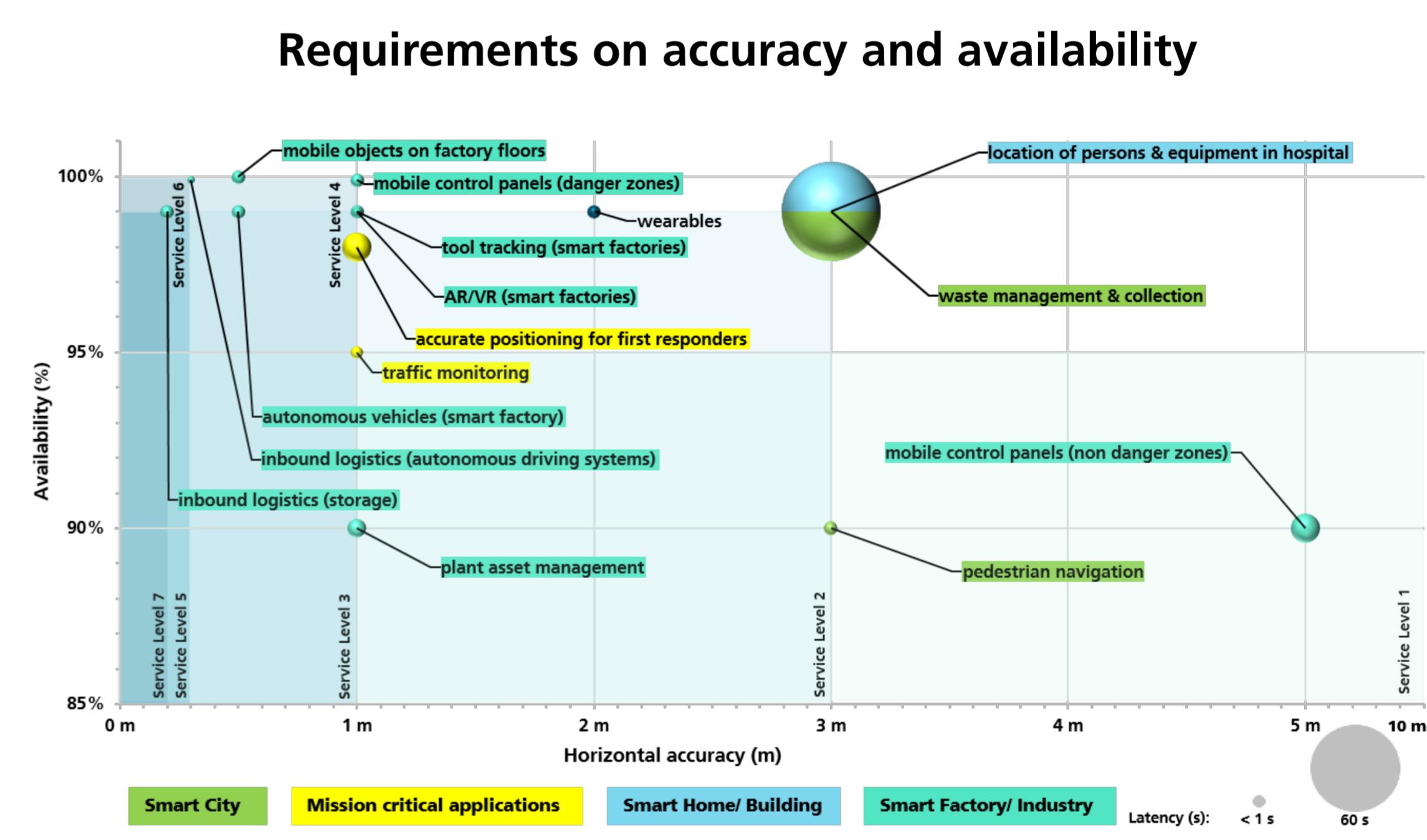
Overview



Added Value

- Reduced search times
- Cost reduction
- Error prevention
- Improved transparency and efficiency of industrial processes
- Controlling material flow and processes

Requirements on accuracy and availability



Real-Time Indoor-Localization Systems

TOF

- RedFIR® based on ultrawideband radio
- WiSmIt (Wireless Smart Items) 2.4 GHz, range 30m

Signal Strength

- awiloc® algorithm using existing networks

Inductive Positioning for smart shelving, picking, tool tracking etc.

- Using tools in the right spot and with the correct orientation
- Combination of real-time position data and status classification
- Resistant to interference

GNSS

- 5G Testbed for Indoor-Use
- S-net® algorithm using existing networks

THz-based Localization System Project MARIE

One Major Objective of MARIE is to generate a precise material map by using mobile robots

Approach: THz-radio-based system for autonomous positioning of mobile robots

- 3D-angles and distance between mobile robot and material-under-test is determined by a radar
- 3D-position of the mobile robot (reader) is determined by inexpensive, coordinate-defining infrastructure of compact, energy-autarchic, fixed chipless RFID tag landmarks

Test- and Application Center L.I.N.K.

- Locating, Identification & Navigation
- Communication Systems and Services

Characteristics:

- 1400 m² indoor hall & lab space
- 10.000 m² outdoor area & track
- Loading gates, staging area, truck transit
- Production & storage equipment

