



# Wireless Sensor Networks

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A sensor network is a set of small autonomous systems, called sensor nodes which cooperate to solve at least one common application. Their tasks include some kind of perception of physical parameters.

[Haenselmann, 2006]

# Applications

## Monitoring space

- Environmental habitat monitoring
- Precision agriculture
- Indoor climate control
- Surveillance
- Intelligent alarms

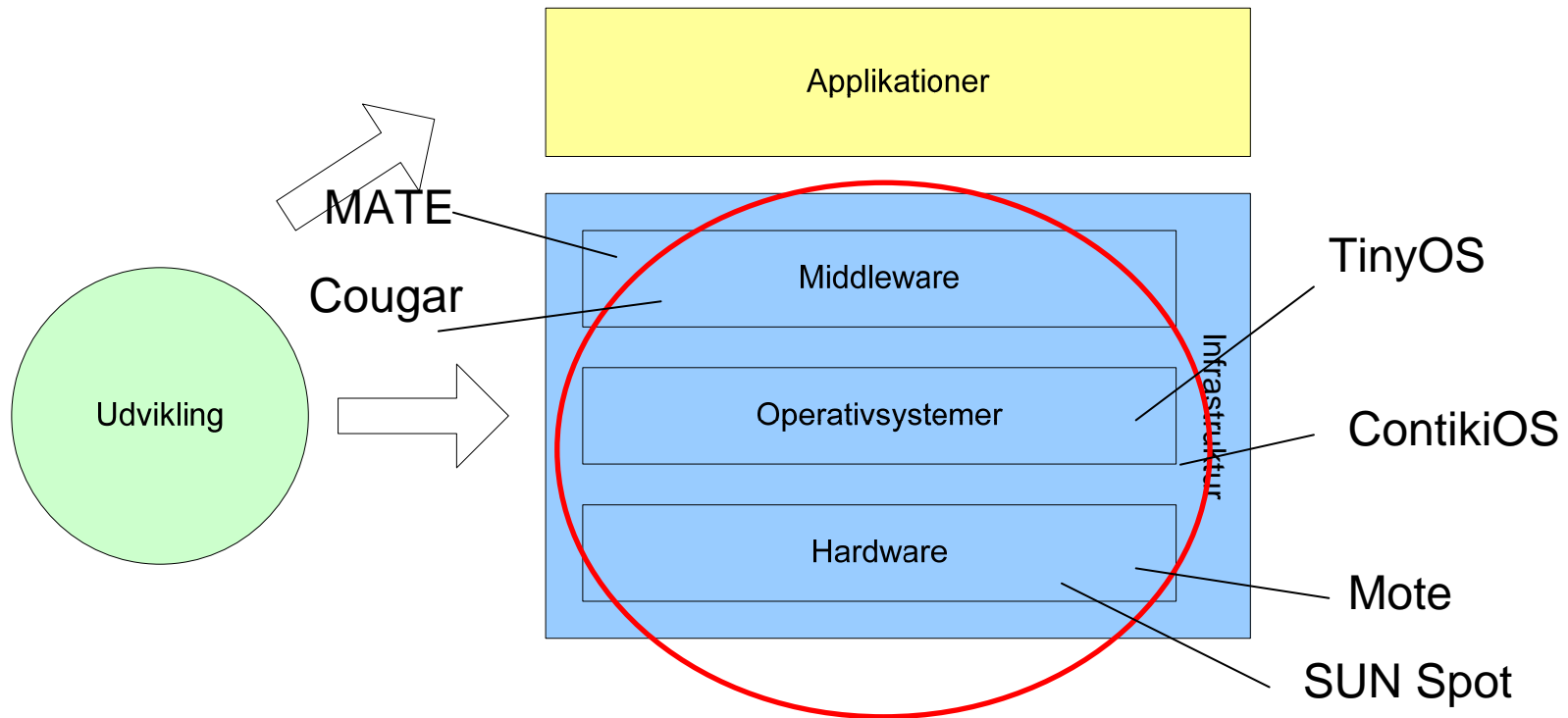
## Monitoring things

- Structural monitoring
- Ecophysiology
- Condition-based equipment maintenance
- Medical diagnostics

## Monitoring interaction space/things

- Disaster management
- Emergency response
- Ubiquitous computing environments,
- Asset tracking
- Healthcare
- Manufacturing process flow



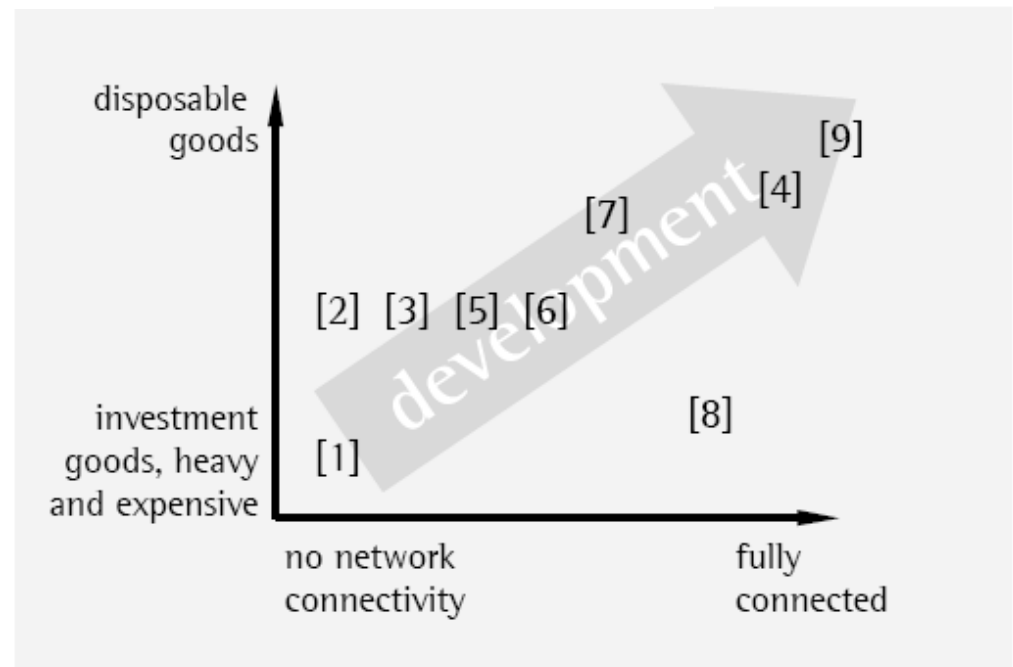


# History



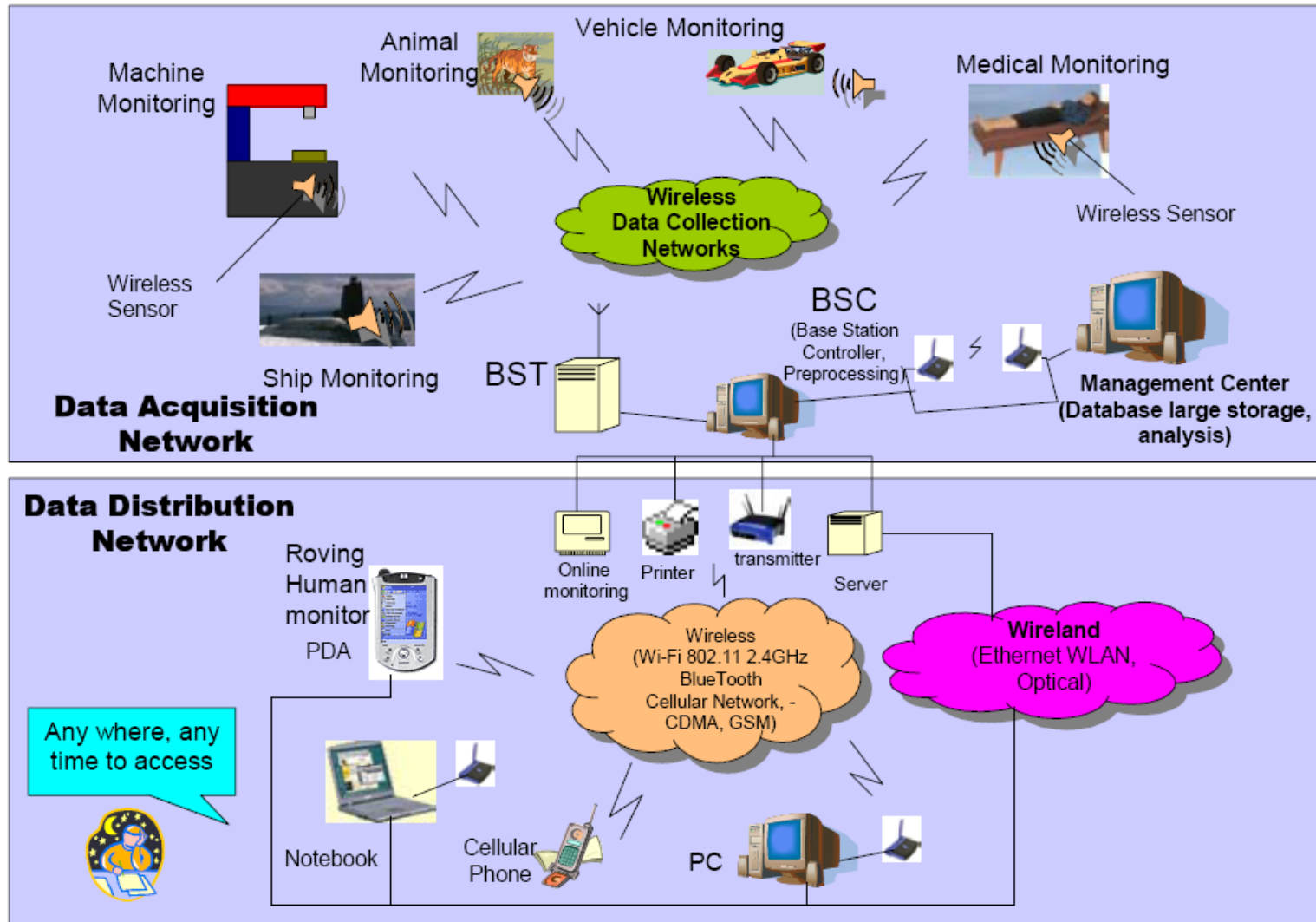
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- [1] IBM S 3/60 (1960)
- [2] Apple II (running VisiCalc)/IBM PC/C 64 (1980)
- [3] 486er PC, Amiga and modem, acoustic coupler, BTX (minitel in France) (mid 80ies)
- [4] Cell phones become bulk article (end of 80ies, beginning of 90ies)
- [5] Pentium class PCs, Datex-J, soon replaced by Internet (90ies)
- [6] Boring PC-era (getting smaller, faster), increasingly „always-on“ (mid 90ies)
- [7] GPRS capable PDAs, vanishing borders between PDA and cell phone (late 90ies)
- [8] Connected car
- [9] Smart Dust



[Haenselmann, 2006]

# Architecture





# Design Space

## Deployment

- random, vs. manual
- one-time vs. iterative

## Mobility

- immobile vs. partly vs. all
- occasional vs. continuous;
- active vs. passive.

## Cost, size, resources, and energy

- brick vs. matchbox vs. grain vs. dust

## Heterogeneity

- homogeneous vs. heterogeneous

## Communication modality

- radio vs. light vs. inductive vs. capacitive vs. sound

## Infrastructure

- infrastructure vs. ad hoc

## Network topology

- single-hop vs. star vs. networked stars vs. tree vs. graph

## Coverage

- sparse vs. dense vs. redundant

## Connectivity

- connected vs. intermittent vs. sporadic

## Network size

## Lifetime

[Römer and Matting, 2004]



# More Information

Haenselmann, T. (2006) *Sensornetworks*

- [http://www.informatik.uni-mannheim.de/~haensel/sn\\_book/](http://www.informatik.uni-mannheim.de/~haensel/sn_book/)
- Free (GNU) textbook on sensor networks