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Enriched Media-Experience of Sport Events

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Introduction

- Internet-enabled sensor technology
- Detecting, storing, distributing, and presenting context
  - Position
  - Pulse
  - Speed
  - Altitude
- Deployed during the world's largest skiing event – Vasaloppet
  - Cross-country skiing
  - 90 km contest

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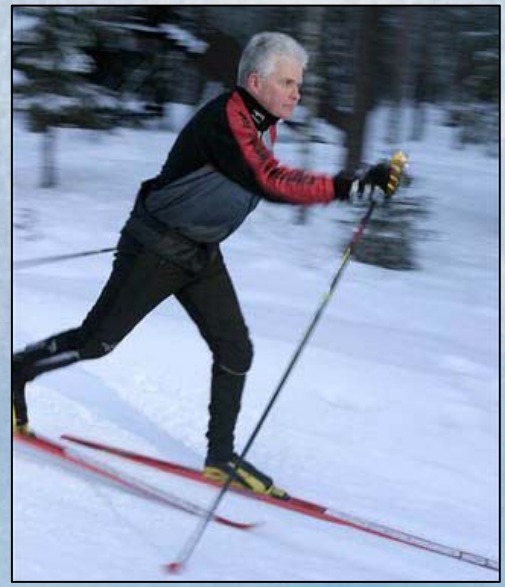
Why would we do such a thing?



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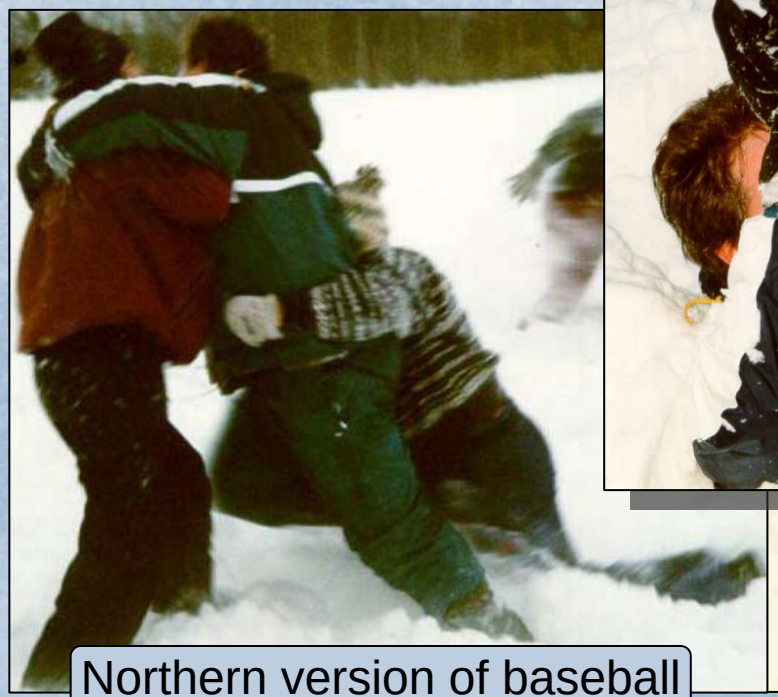
Because we like playing around in the snow?



Northern version of baseball

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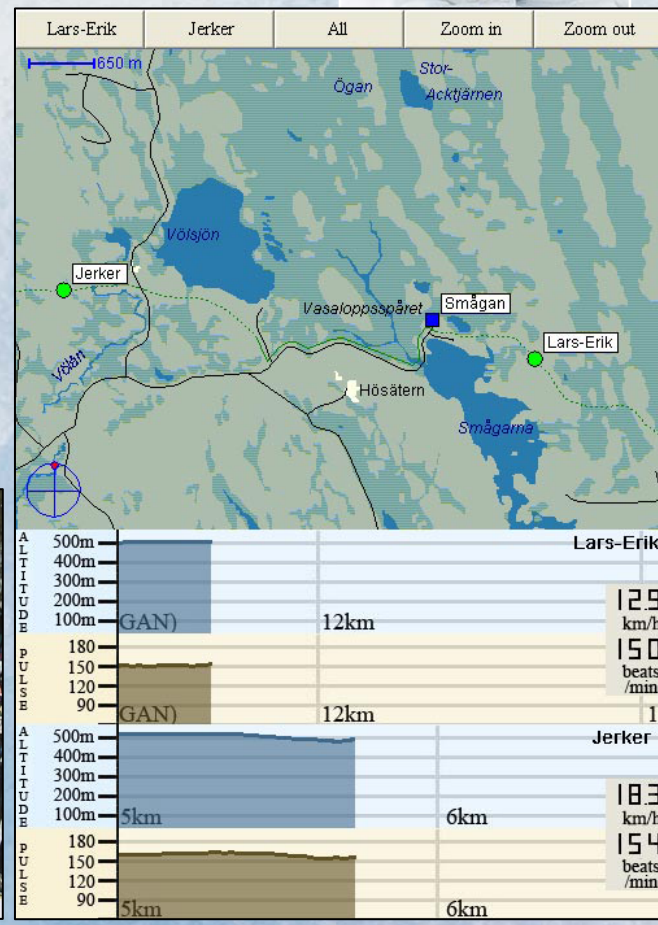
Or because we wanted to enrich the spectator experience?

More information = enriched media-experience?



A spectator can:

- pinpoint where their friends are
- compare friends to each other
- get a better feeling for what their friends are going through

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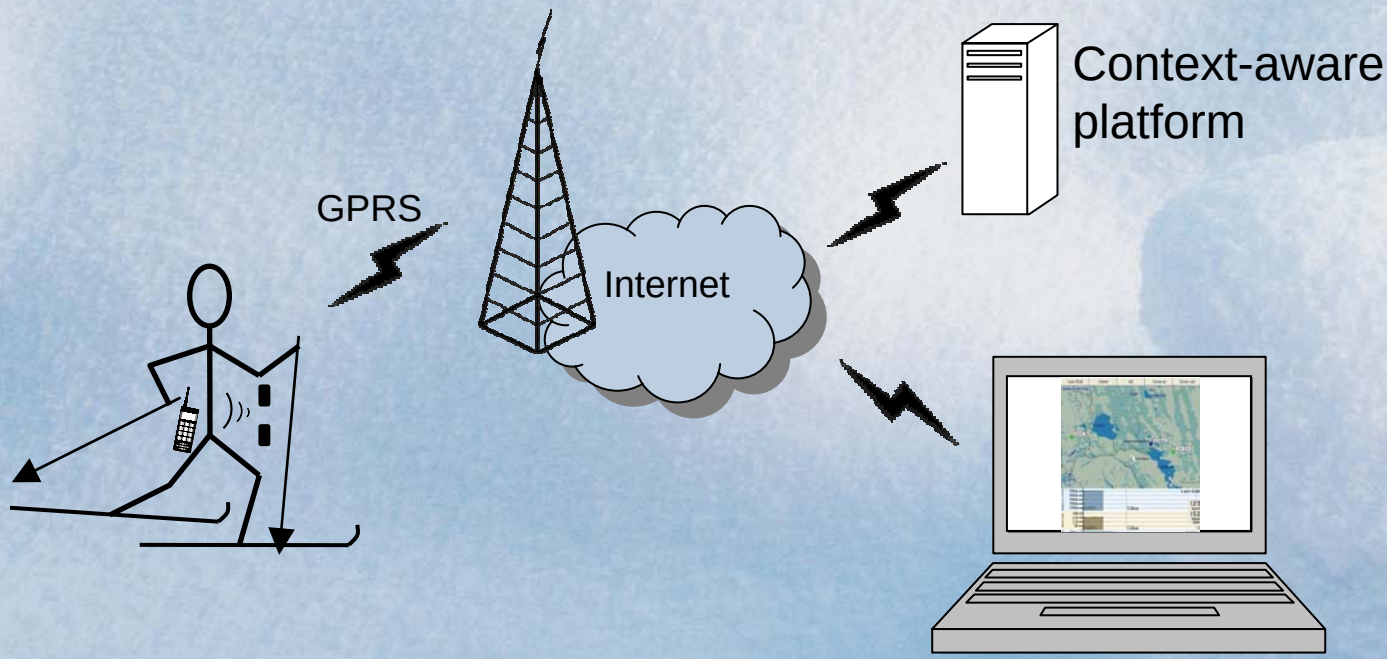
System overview



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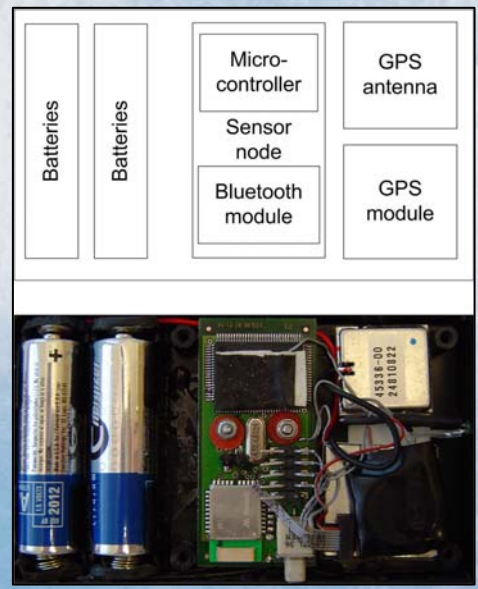
Sensors

- Easy to use system
  - Turn on mobile phone
  - Switch on sensors
- Belt worn around the chest with pulse sensor
- Two boxes (11 x 5.6 x 2 cm)
  - GPS Sensor + Bluetooth module, 145 g
  - Bluetooth module for pulse sensor, 130 g
- Boxes communicate with Internet via a bluetooth enabled mobile phone with GPRS connection



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Context-aware platform

- The context-aware platform Alipes
  - Originally for location-awareness
  - GPS-, Bluetooth-, WLAN-, IrDA-, and MPS-positioning
  - Ongoing development (in the direction of Situation Awareness)

- Functionality used in this project
  - Store context-data from skiers in a database
  - Distribute context-data to spectators
  - Handle estimation in case of sensor or connection failure

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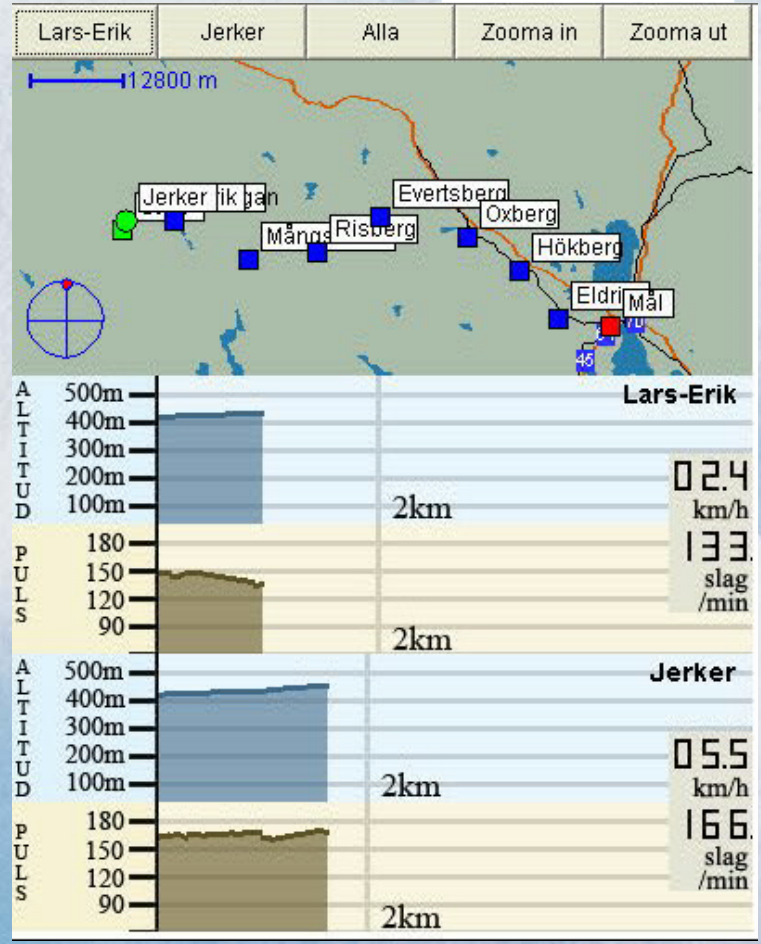
Viewer applet

- New data is fetched from the database every 10 seconds
- User is in control of the map
- The altitude graph show if the skier is going up or down a hill
- Technique and fitness might be possible to determine by combining altitude, pulse, and speed information



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Viewer evaluations

- A total of 2100 people used the application during the main event
- Questionnaire sent to Test-bed Botnia
  - Sweden's first and largest open Living Lab for mobile services
- 89 members of Test-bed Botnia tried the application and answered our questionnaire
  - Age between 12 and 57 (average 31)
  - 37 of the participants visited the webpage for more than 15 min
- User interested or very interested in:
  - only sport 2%
  - only new technology 28%
  - both sport and new technology 66%
- **84% thought that the added information enriched their experience**
- **The map was considered especially helpful**

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Skier evaluations

- Skiers thought the sensors were simple to wear and handle
- The mobile phone was the device with least battery-life (roughly 1 day)
- The obtained data was very interesting for the skiers who could evaluate their own performance after the race
- One skier got a call during the race with comments on position, speed, and heart rate
- Privacy not considered during this test

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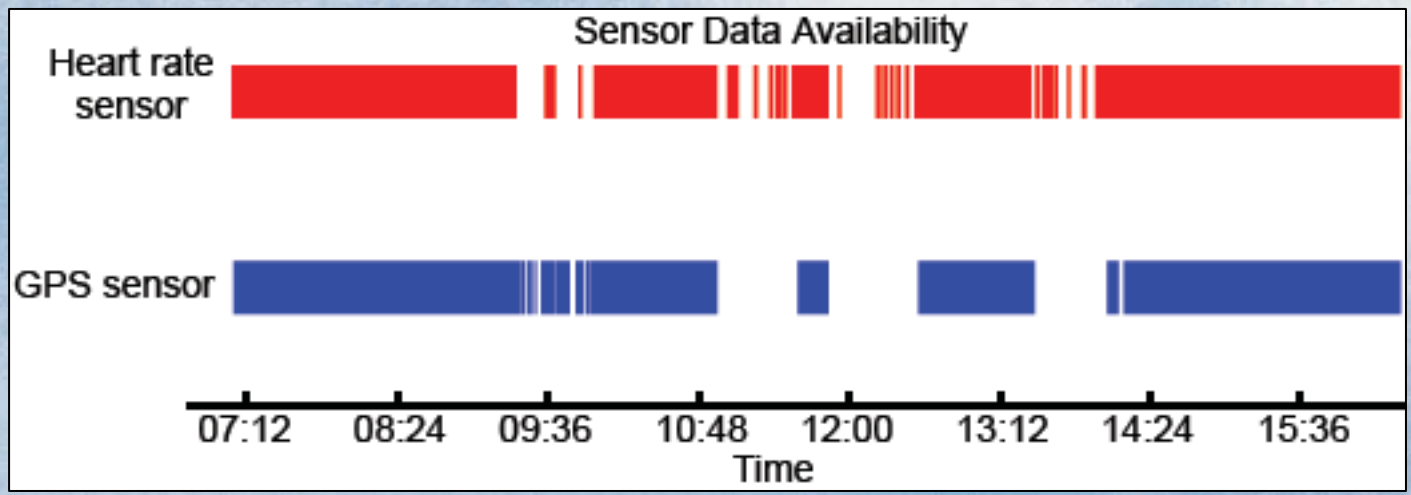
Performance

- Major difference in reliability between the different races
  - More people using the cell station during the real race?
- During the trial event the sensor data availability was very good



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Problems and Solutions

- Scalability
  - Problem: few GPRS timeslots
    - Solution: deploy WiMAX or WLAN throughout the track
  - Problem: heavy load on the map-server
    - Solution: provide a few different predefined views that users can select from
    - Solution: limit the number of map-requests per minute and return closest larger match when limit is reached
    - Solution: download a large map-image beforehand
    - Solution: download the vector-based map-data instead of a map-image

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Problems and Solutions continued

- Slow system
  - Problem: Applet and map was loading very slow
    - Solution: develop a system that does not rely on a Java applet, for instance use JPEG push to show the map
      - Makes is harder to personalize
    - Solution: load-balance several mirror-servers
    - Solution: decrease the load on the map-server

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Problems and Solutions continued

- Sensor data availability
  - Problem: during the main event the sensor data availability was very limited at times
    - Solution: make sure pulse-sensor has close contact with the skin
    - Solution: make use of other positioning technique (like WLAN positioning if WLAN base stations are deployed throughout the track)
    - Solution: deploy other means of communication to ensure a reliable connection

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Conclusions

- Spectators did indeed find that the added context information enriched their media experience
- We consider this to be a successful first trial in the area of enriched sport events
- Some bottlenecks needed to be addressed have been identified
- We believe that context-enriched and personalized sport events will become popular and commonly used in the future

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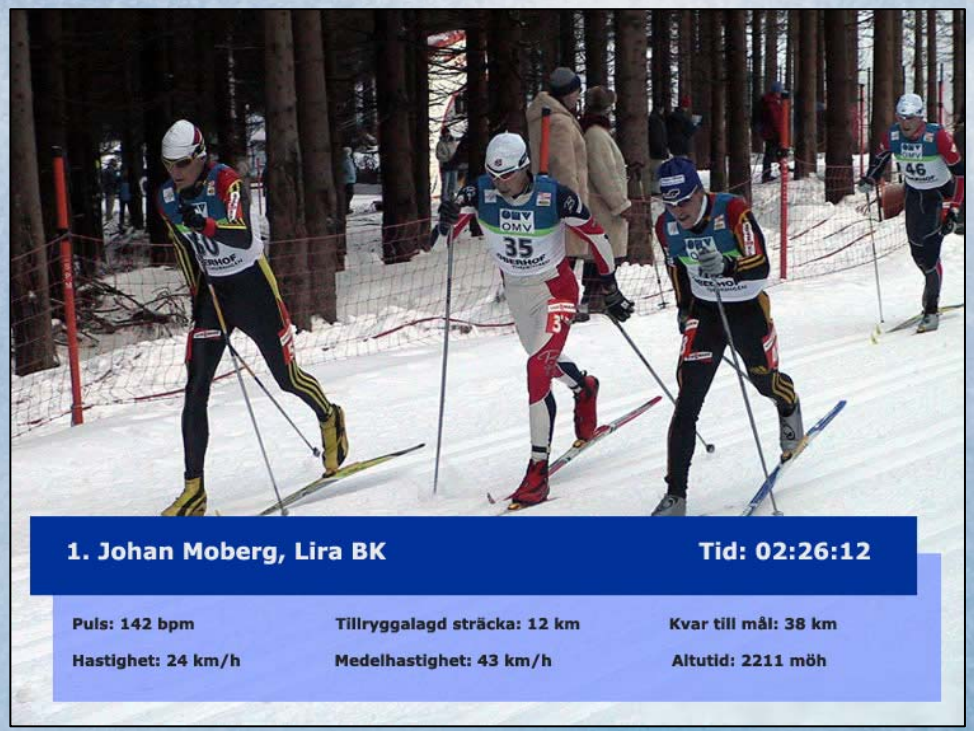
Visions and future work

- Deployment in television
- Possibility of personalizing a program
  - Deploy several cameras throughout the track
  - Show a certain skier to the spectator as the skier passes a camera



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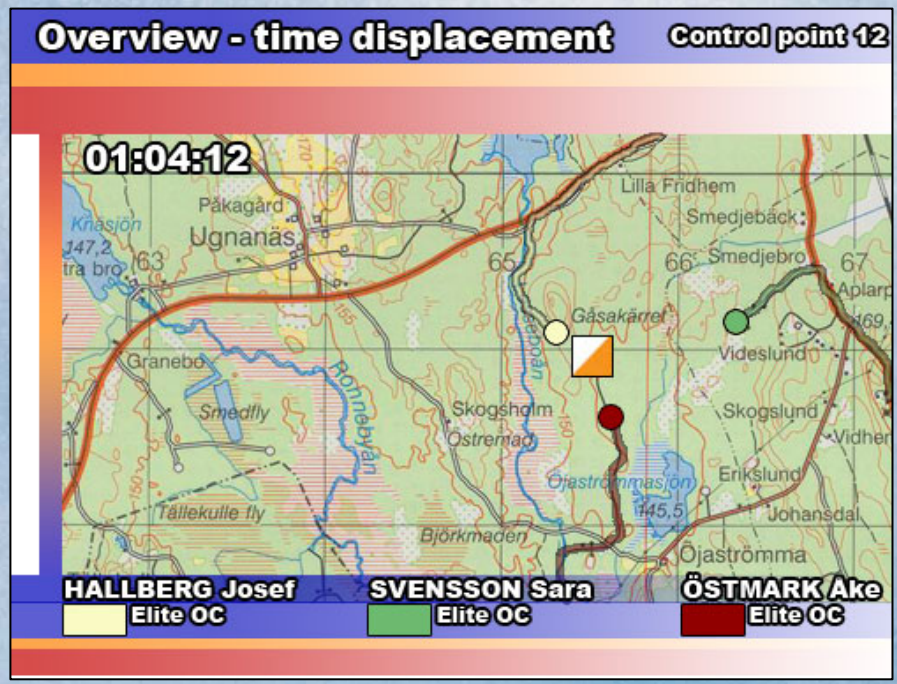
Visions and future work continued

- Time displacement for sports with different starting times



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Thank you for listening!

Any Questions?

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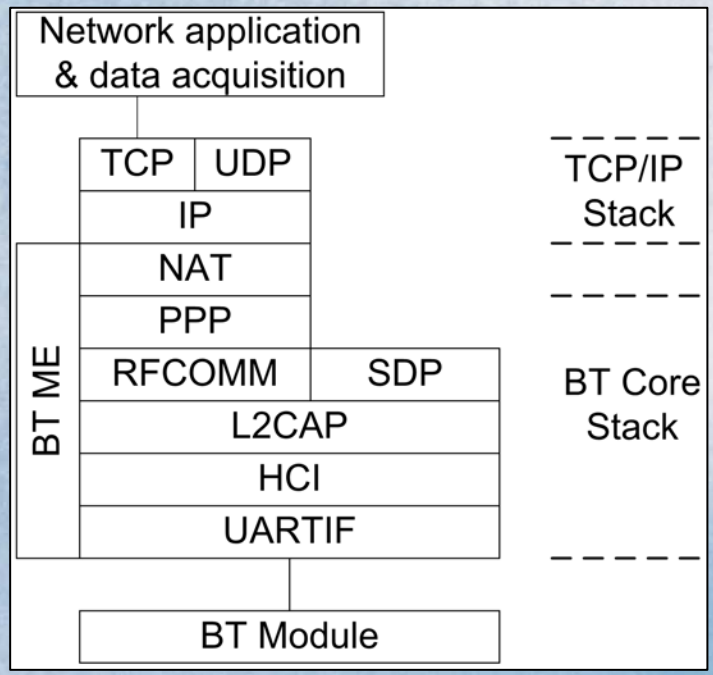
Sensor stack



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