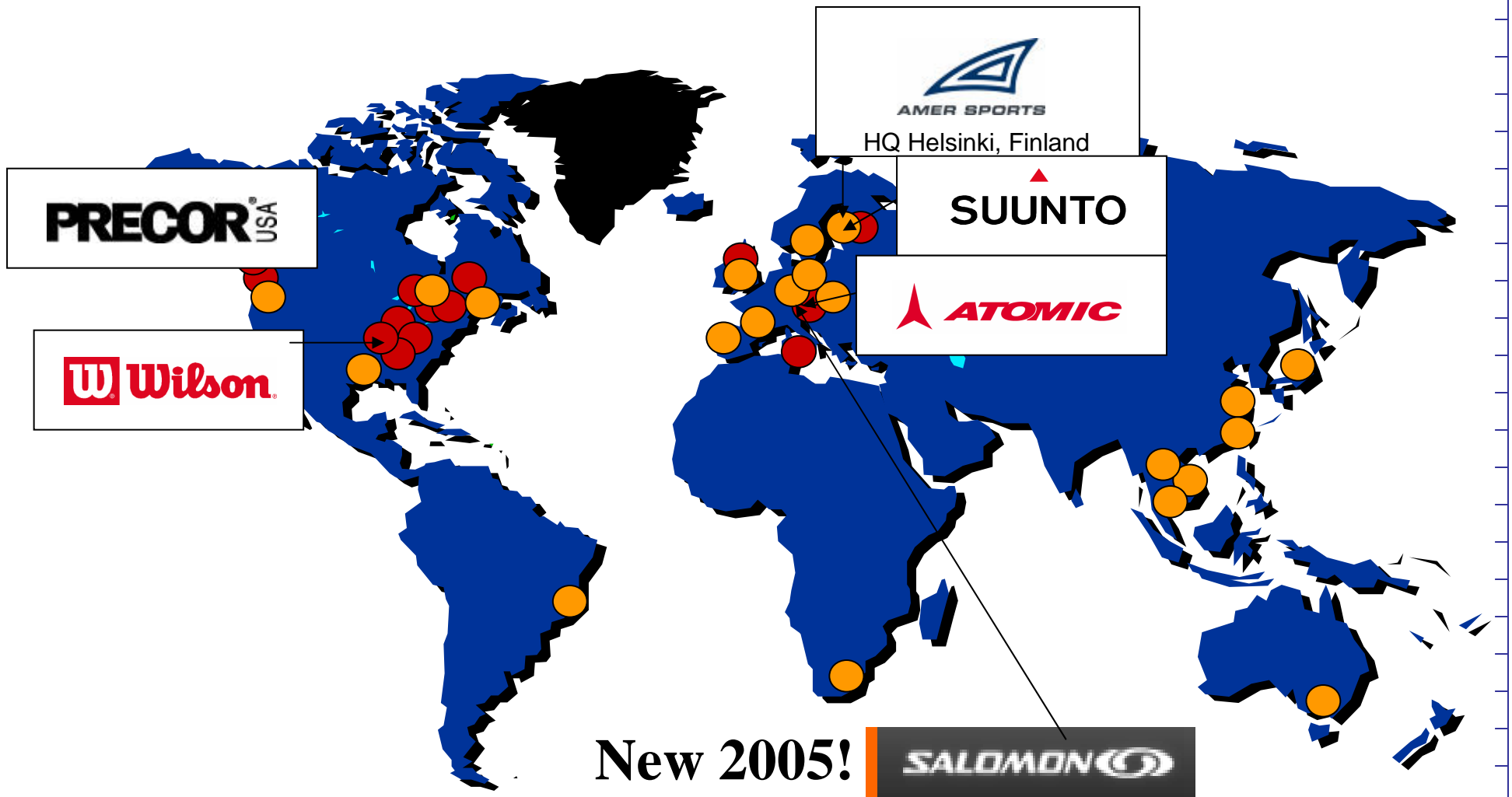



SUUNTO

Eero Punkka

30.11.2006

AMER SPORTS: Largest Sports Equipment Company in the World



It's all about making measurements

Year
1936



1970



1980



1990



2000



Analog
Compassing

Analog tilt

Analog
Water
Pressure

Electronic
Water
Pressure

Electronic
Compassing

Barometric
Pressure

Heart Rate

Acceleration

Distance

Position

Speed

Calories

Training effect

Mechanical Engineering

Electrical Engineering

Software Engineering

RF Engineering

Contents

- Mobile sports electronics
- Sports systems approach
- Wireless sports network

Mobile sports electronics

Requirements for Mobile Sports Electronics

- Small (non-disturbing)
- High visual value (lifestyle image)
- High perceived functional value (= useful)
- Low-cost
- Ultra-low power
- Context-aware
- Easy-to-read
- Simple UI logic (KIDS)
- Wireless connectivity (if needed)

Sports sensor categories

PHYSIOLOGICAL:

Heart rate
Heart rate variability
Temperature
Calories
Muscle activity
Body weight
Body fat
Blood pressure
Blood glucose
Blood salts
Blood cholesterol
Pulse oxymeters
etc



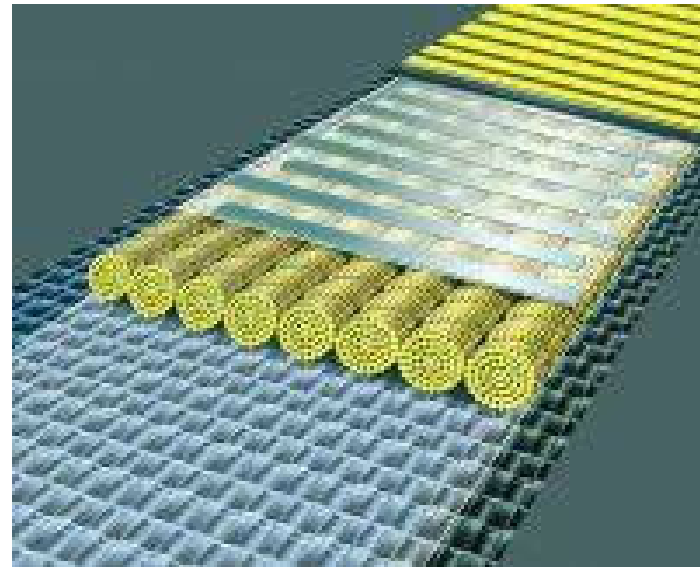
ENVIRONMENTAL:

Barometer
Temperature
Humidity
Wind speed
UV intensity
Pollution
etc

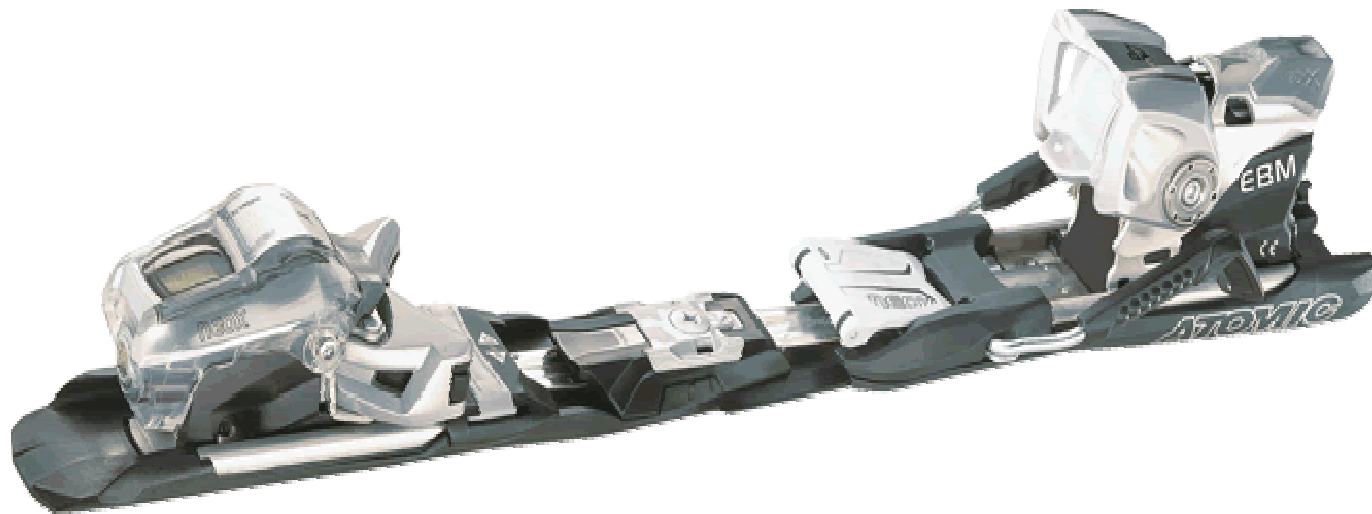
MOTION:

Inertial
GPS
Altimeter
Compass
Depth
Doppler radar
Ultrasonic
etc

Intellifibre dynamic ski/racket torsion control (Head)



Electronic binding management (Atomic)



Intelligent cushioning shoe (Adidas)





Electronic casting reel (Shimano)



**Eliminates reel backlash
Self-energizing - no battery!**

Suunto approach: Example of an algorithm-intensive Sports Instrument, Suunto G6

- Measure on the wrist
 - **Tempo**: time from take off to impact (Example: 1.24 seconds)
 - **Rhythm**: ratio of downswing compared to tempo (24.6 %)
 - **Backswing Length**: angle between take off and highest point of your wrist (175°)
 - **Speed**: estimated club head speed (104 mph/ 167 km/h)
- Test the consistency (10 shots):
 - Consistency range: 0 – 100
 - Lower index = less variation = better accuracy



Conclusions on current trends in Mobile Sports Electronics

- Big brands using electronic sports gear as show-off items
- Performance enhancement usually the marketing promise
- Real user benefits lack in most cases
- High prices a major barrier in consumer acceptance
- Patent jungle slows down the progress
- Developing electronic systems is expensive and time-consuming

Sports Systems



**Speed/distance +
heart rate
(Polar/Adidas)**



GPS + heart rate (Timex)



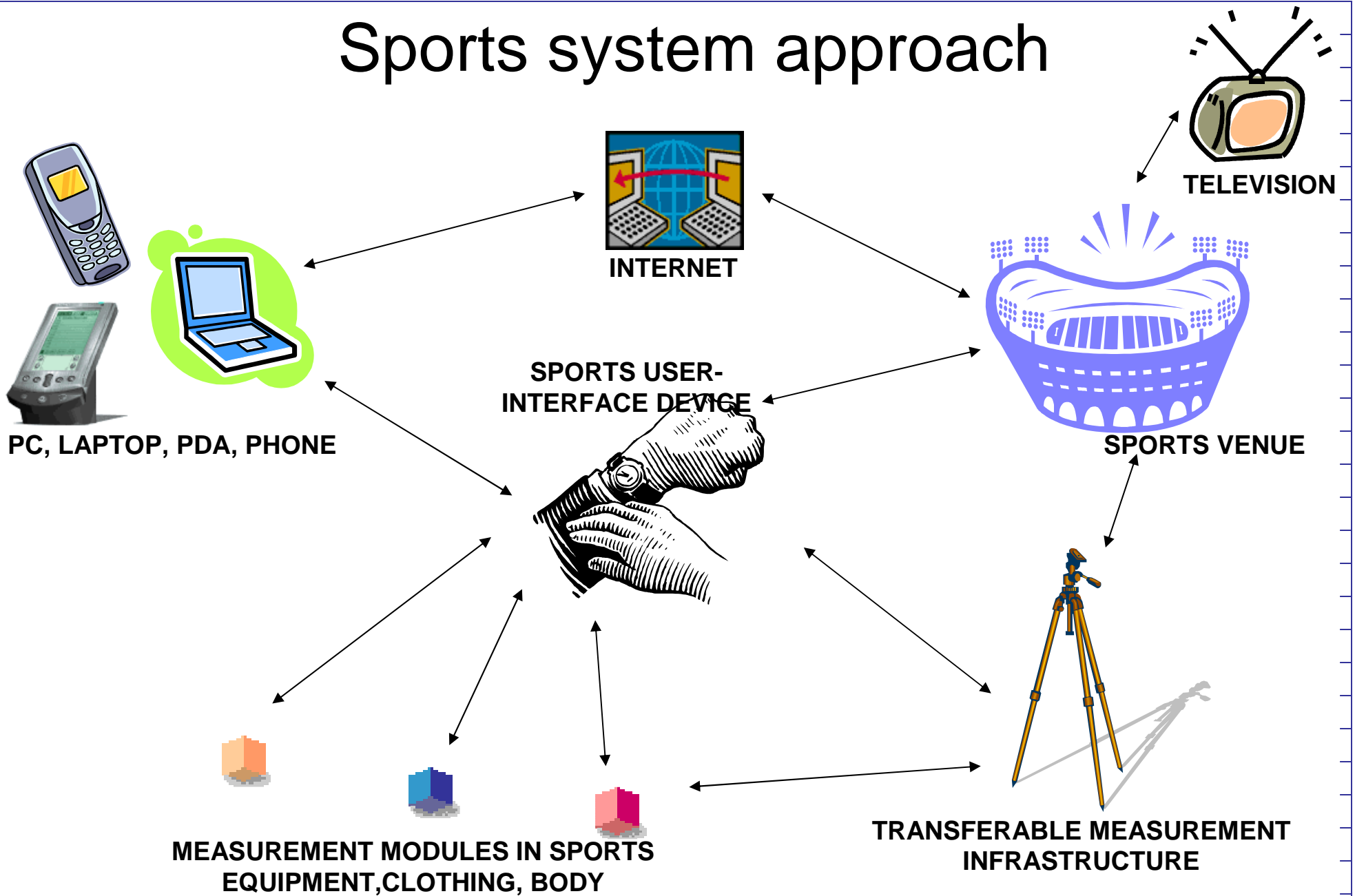
**GPS + heart rate +
cadence (Garmin)**



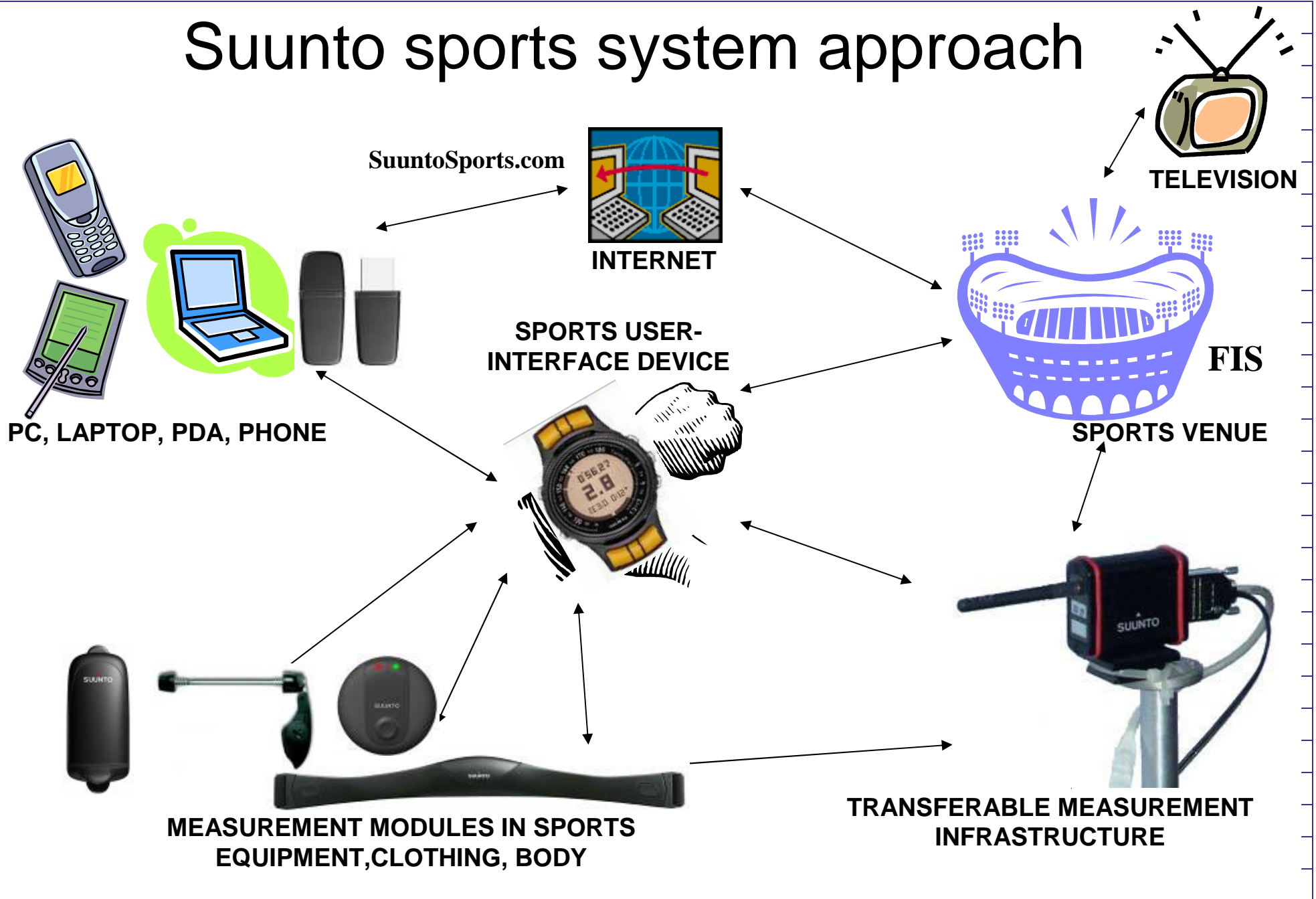
**MP3 + speed/distance
(Philips/Nike)**

New: iPod + Nike shoe !

Sports system approach



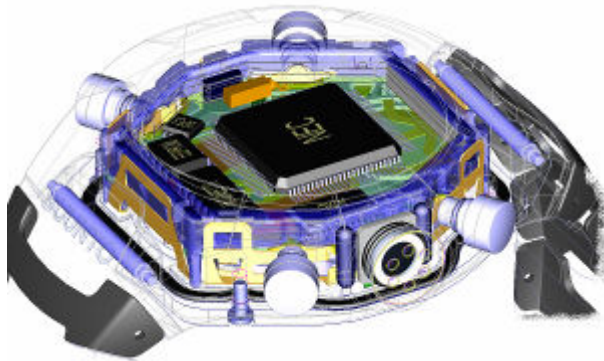
Suunto sports system approach



Wireless sports network

Stand-alone

- Preferred usually (+)
- Not all measurements possible (-)
- Weight and size (-)
- Often too complex (-)



System

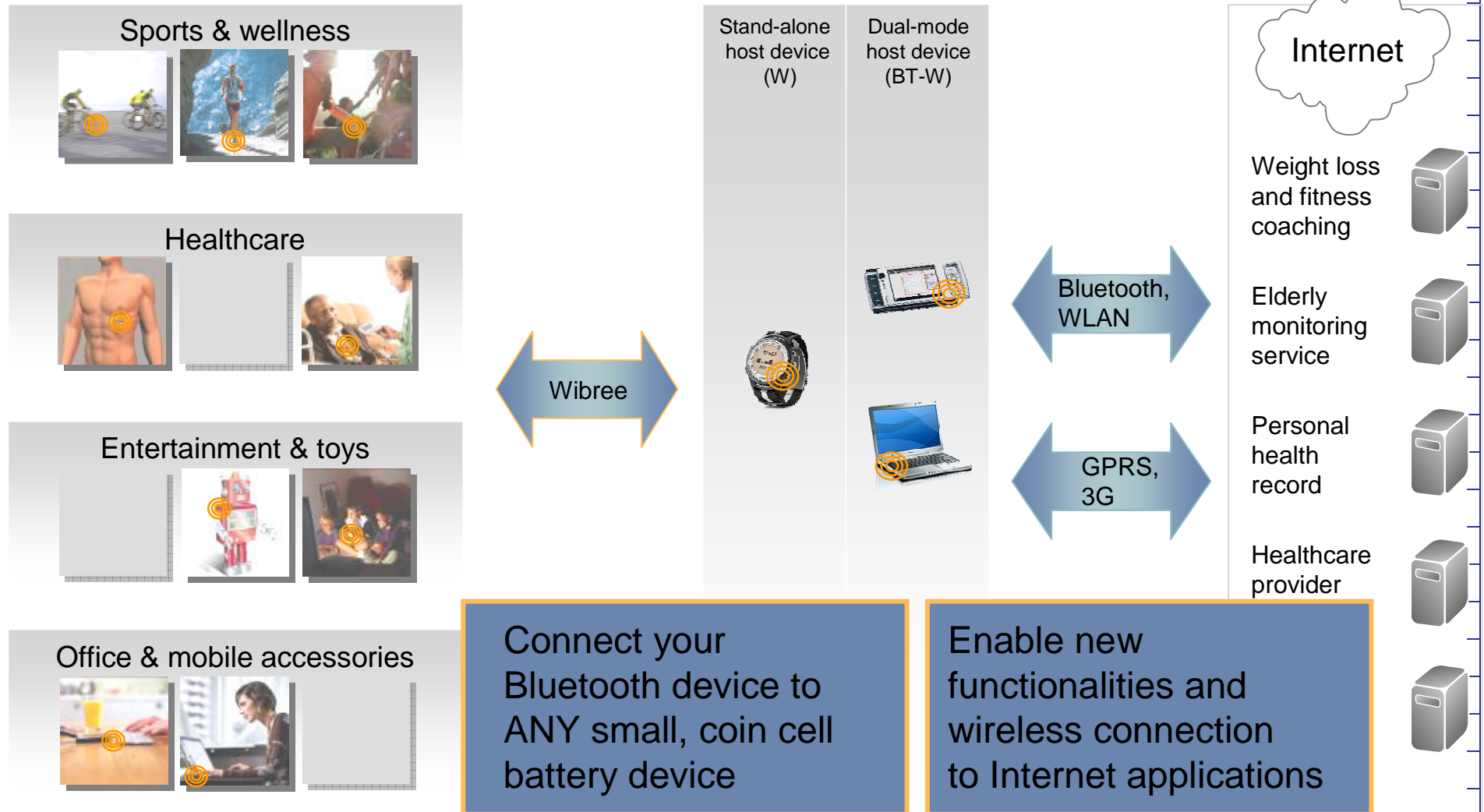
- The pain of pairing (-)
- Connectivity adds cost and complexity (-)
- Line-of-sight for wireless RF (-)
- Measurement modules in more optimum positions (+)
- Mix and match (+)

ANT (Area Network Tiny)



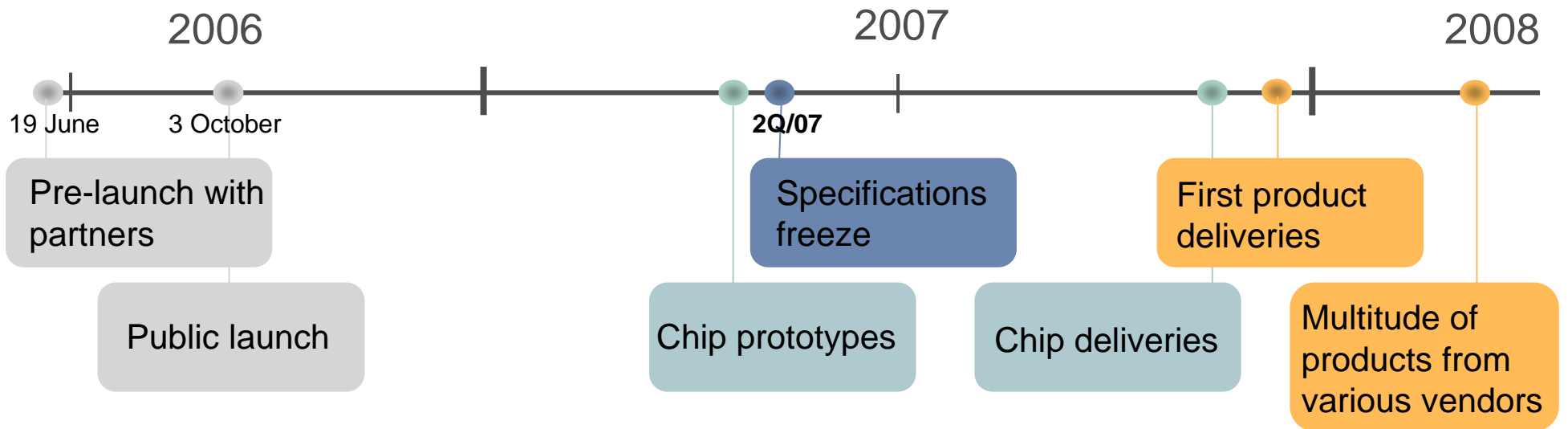
- Coin cell battery powered
- Ultra low peak power (<30 mW)
- Low average power consumption (HR monitor application: 1 year battery change interval)
- Low market price of components
- Supports various personal-area-network topologies
- Drawback: No connection to other mainstream mobile electronic devices

Wibree: wireless connectivity for small devices



Wibree implementation schedule

- Launch 2006
- First products 2007
- Mass shipments 2008



Future of Sports Instrumentation



- System approach will continue but users may get tired of device pairing
- Wireless, small and comfortable to use
- Systems will become embedded in sports equipment and clothing. Implants for top athletes.
- Connections to mobile devices (phone, game, camera, music/video)
- The most beneficial applications based on motion and physiology measurements
- Applications based on what is useful – not only on what is possible!