

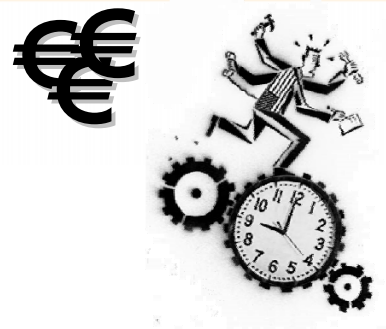
Open Research Challenges in WSN&CO

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WSNs and Cooperating Objects
Concertation Meeting
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WSNs: where are we now?

- A variety of solutions exist
 - motes
 - OSs
 - Development platforms



But...

- Large-scale issues not really addressed
 - Programming
 - Deployment
 - Management
 - Reprogramming
 - Disposal
- Neither is Heterogeneity...
- Nor Cooperation

- Applications still very much ad hoc



Expectations Reality

- WSNs just work
- Deploy them and they just appear in the network

D'nP

- Drop them and forget them
- Deploy them and they will use them!
- Gimme data
- **Just do it!**
- **WSNs for ALL!**

- WSNs eventually work...
- Deploy them and eventually some show up

D'nP

- Drop them... and you can forget about them
- No one knows how to handle them!
- What does it all mean?
- **No trust, No play!**
- **WSNs for Geeks!**

Real Applications or mere Showcases?

Not simply a question of perspective!

Agriculture
Animal farming
Energy Efficient Buildings/
Home automation
AAL
Healthcare
Infrastructure monitoring
Wireless Vehicle
Environmental monitoring
Habitat/Wildlife monitoring
Emergency and Crisis Management

...
WASP, HYDRA
HYDRA, POBICOS,
GreenerBuildings
SM4All
WASP, HYDRA
WIDE, *GENESI*
EMMA, CHoSEN
ANWIRE, *CLAM*
PLANET
IPAC

Not forgetting the Military!

Next steps in WSN&CO research

- We have been aiming at
 - Addressing challenges and barriers, operational and otherwise, and in particular at **large-scale, heterogeneous deployments** and **non-expert users**
 - Gathering information with a purpose: sensing, modelling, understanding, simulation and eventually “control”
- Focus will move more towards **real-world applications**, sensors/actuators in the loop.

What are we missing?

- But this without the benefit of the enabling technologies (tools, platforms) that would make things easier, hindering trust and thus progress and penetration
- This will result in
 - Ad hoc solutions
 - Reinventing the wheel

WSNs: where are we now?

- A few quotes:

“We are [still] in the Middles Ages of WSNs” - Eduardo F. Nakamura, Center of Research and Technological Innovation (FUCAPI), Brazil

“CPS is necessarily based on intensive Sensing” - T. Znati, NSF



The way to go

Before we can control/adjust, we need to

1. Sense/monitor intelligently
 - Compressed sensing/importance sampling
 - Making sense of “all that data”/Data fusion
2. Understand thoroughly
 - Parameter estimation/identification
 - Visualisation
3. Model/simulate/predict
4. Act/react
5. Close the loop
 - Feedback
6. ADAPT/EVOLVE

All of this on a process-by-process basis

