Industry-as-Laboratory: a research format for high-tech industry?

Ed Brinksma
Embedded Systems Institute,
Eindhoven, NL

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Central Issue

What are suitable research formats for open-innovation research for the European high-tech industry?
Session Programme

Ed Brinksma (ESI, NL):
The Industry-as-Laboratory Concept for High-Tech Systems

Jozef Hooman (ESI, NL):
An Industry-as-Laboratory Project: TRADER

Kim Larsen (CISS, DK):
CISS - Interaction between Danish Industry and Research on Embedded Systems

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Ed Brinksma (ESI, NL):
The Industry-as-Laboratory Concept for High-Tech Systems

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Kim Larsen (CISS, DK):
Academic-Industrial Research in Denmark: The DaNES Project
The European Context

- Embedded systems & technology represent great economic and societal value for Europe
  - strong high-tech industry
  - source of new economic activities
  - enabling solutions for economic and societal challenges

- Strong organizational basis
  - national competence clusters
  - successes past programmes (EU IST, EUREKA ITEA, MEDEA)
  - new structures: ARTEMIS, ENIAC

- Need to grow productive European & national ecosystems
  - joint research agendas
  - sharing knowledge, resources, networks
  - developing open innovation models

High-tech ecosystem trends

- Growing complexity high-tech systems exceeds span of control of individual companies:
  multidisciplinarity, technology development by suppliers

- R&D expenditure under pressure
  - OEMs: global competition
  - SMEs: limited resources

- R&D shifts from individual companies to ecosystem (open innovation).
  - Unclarity about direction, financing, final responsibility, knowledge consolidation.
  - Great need for neutral entities with a coordinating and integrating role in knowledge creation and consolidation.
Validation & consolidation in ecosystem

ESI programme structure
ESI Research Collaboration (national funding)

2008: approx. 150 fte

Research cooperation with leading Dutch high-tech multinational industries & SME’s

Research cooperation with all Dutch universities with embedded systems research

Focus: high-tech system integration

Boundaries are vague:
- increasing openness: networked systems
- increasing miniturization: systems on chip
The productivity gaps

- Process technology: +58%/yr
- HW design productivity: +21%/yr
- SW productivity: +8%/yr

The design gap

- Somewhat covered
- Well covered
- Monodisciplinary methods
- Scientific foundation
- Design decisions
- System requirements
- System
Late integration problem

Current practice  
early partitioning

Advocated practice  
early integrated modeling  
late partitioning

System design tensions

Trade-offs between crucial cross-cutting design objectives:

- **Performance**
  quantified hard and soft real-time behaviour, use of resources, optimization of cost functions, etc.

- **Dependability**
  availability, reliability, safety, integrity, confidentiality

- **Evolvability**
  easy modification or extension by re-use of available design assets, product families, generic system components, etc.

- other -ilities
### A bewildering variety

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<th>Medical Systems</th>
<th>Mobile Phones</th>
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