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Institut für
Computertechnik
Institute of
Computer Technology

Critical Research Areas Driven by Industry Transformations
Panel DATE 2015

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Critical Research Areas Driven by Industry Transformations - Questions

- What are (should be) key/emerging industry drivers of research?
  - Products (applications)
  - Features
  - Functionality
  - Technology
- Where is the path forward most challenging/obscure?
- Which research breakthroughs have the most promise of high impact?
- Where may industry have unrealistic expectations?
- Which popular research is of less relevance in industry?

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What are (should be) key/emerging industry drivers of research? **Applications**

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- **Autonomous, Artificial Subjects**
  - Robots
  - Drones
  - ...craft...
  - ...rafts
  - Vaccum cleaners
  - Lawn mowers
  -
  -
  -

- **Distributed Sensing, Processing and Control**
  - Surveillance s...
  - Smart h...
  - ...
  - ...monitoring
  - ...monitoring
  - ...monitoring and control
 - ...net monitoring and control

Navigating the physical space

...ating the ...nation space

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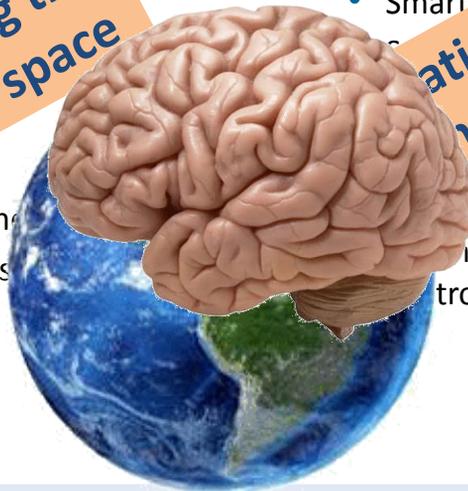
What are (should be) key/emerging industry drivers of research? Technology

- 3D Stacking
- 3D Transistors
- Phase Change RAM
- Spin Torque Transfer RAM
- Memristors
- Hybrid Memory Architectures
- Carbon Nano
- Graphene
- Organiy Electronics
- Functional Materials

Era of Heterogeneity

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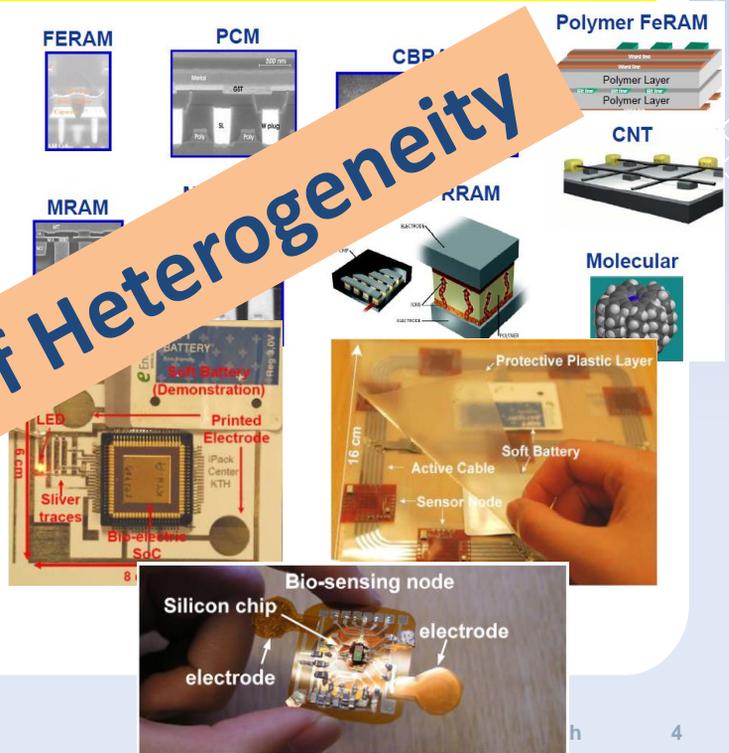
Which research breakthroughs have the most promise of high impact?

- Future Breakthroughs are unknown

- Composability of Subsystems
  (Functions, Performance, Correctness, Cost)

- Efficient on-line Learning and Adaptivity

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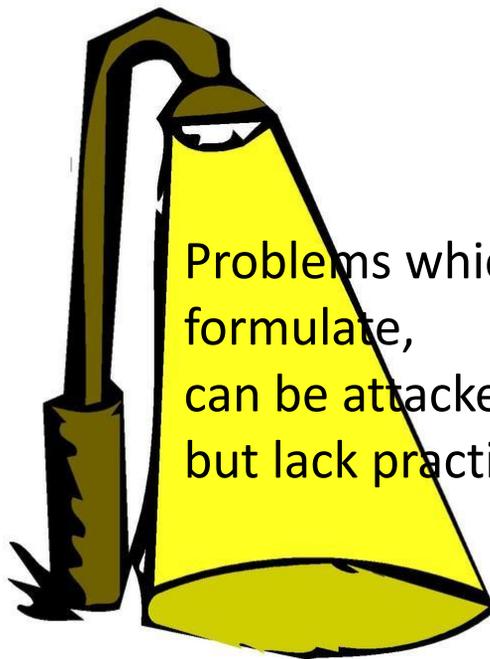# Where is the path forward most challenging / obscure?

- Pure top-down design (Specification -> Synthesis -> Product)
  is elusive
- Dynamic learning and adaptivity
- Interaction with users / integration with humans

- Where certifcation and legal issues dominate
- What do users expect and accept
- Interplay and integration of different domains and ecosysystems

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Where may industry have unrealistic expectations?

- Where it cannot formulate the problem

- Methodologies and design flows will not be revolutionized by academic research
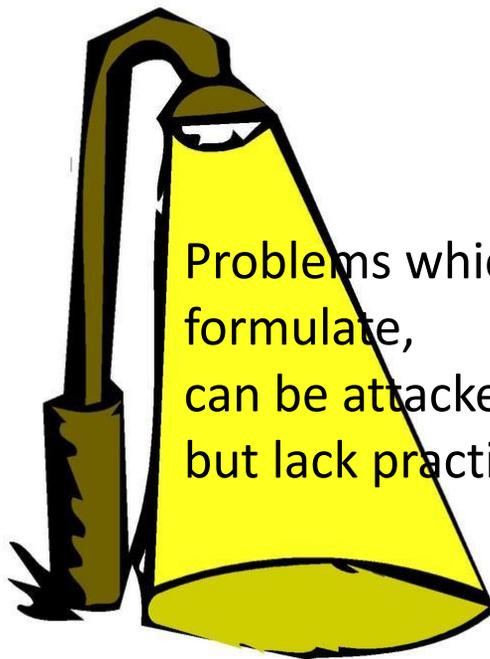
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Problems which are easy to formulate,
can be attacked by small groups,
but lack practical relevance

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