Agenda

- Request
- Infrastructure
- Application level

- 10.30 **Welcome** (Joachim Pelka)
- 10.35 **Introduction and Motivation** (Joachim Pelka)
- 10.45 **Urban Processes** (Silke Cuno)
- 11.05 **ICT** (Silke Cuno)
- 11.25 **Energy** (Moritz Loske)
- 11.45 **Security** (Alain Merle)
- 12.05 **Smart House** (Andreas Wilde)
- 12.25 **Mobility** (Tobias Erlbacher)
- 12.45 **Production & Logistic** (Guido Dolmans)
- 13.05 **Summary & General Q&As** (Joachim Pelka / all)
- 13.25 **Closing Remarks** (Patrick Cogez)
- 13.30 Lunch

Semiconductor Technologies for Smart Cities

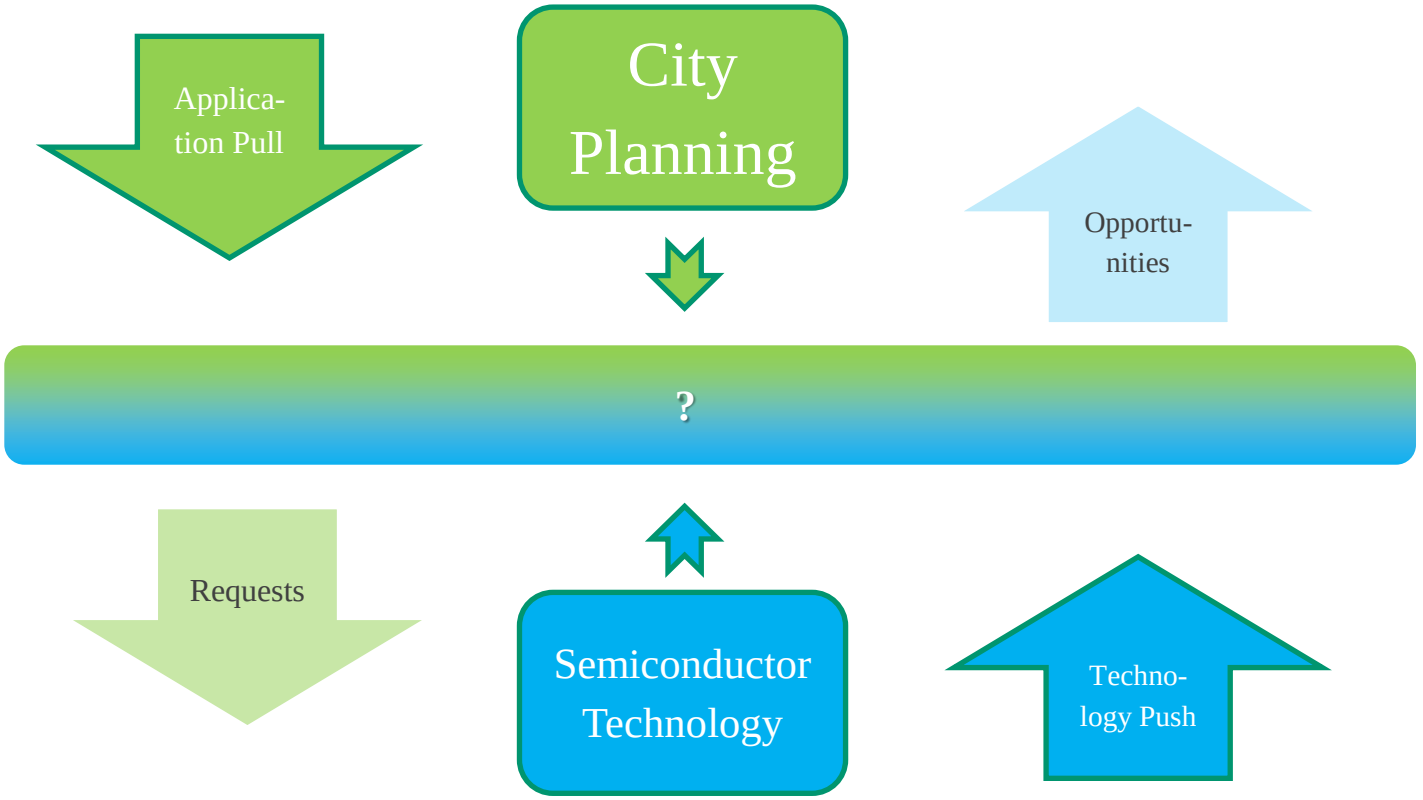
A study of the
CATRENE Scientific Committee

Summary

Summary: The Situation

- Application Pull and Technology Push do not yet really match at the Application & System Level
  - City planners today are thinking mainly in concrete, reconstruction, and energy saving (usually on the “building level”).
  - All Smart City relevant applications under discussion today request sensors and communication, but normally use what is coming „off the shelves“– no specific requirements up to now
  - First, more specific requests are starting to come from the Urban Processes:
    Sensors, Sensor Systems, Networks: Low Cost, Low Power, Security
- *Today, driving force for microelectronics development for Smart Cities is still technology! But there are a lot of new (application) ideas upcoming.*

Summary: The Situation



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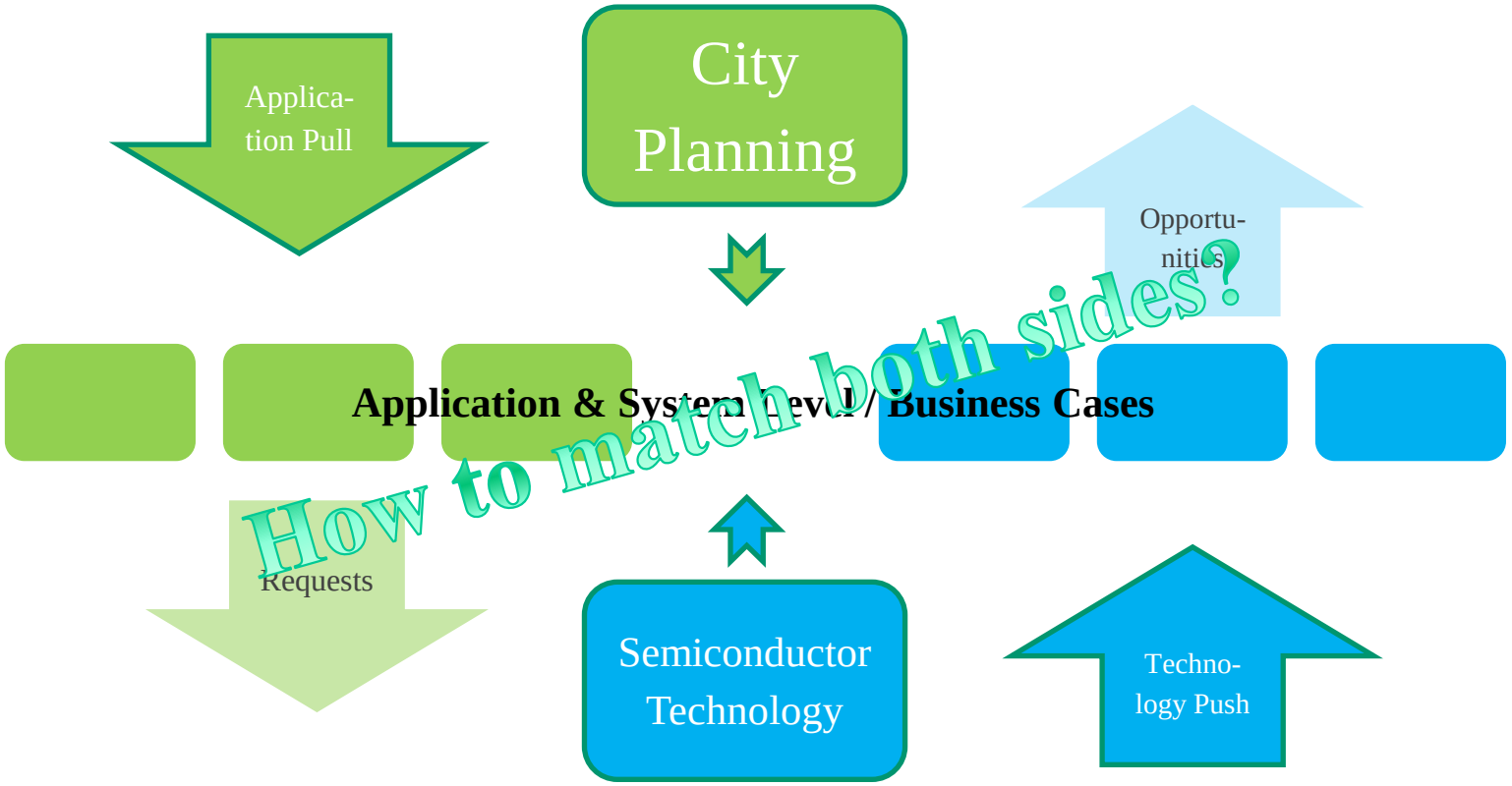
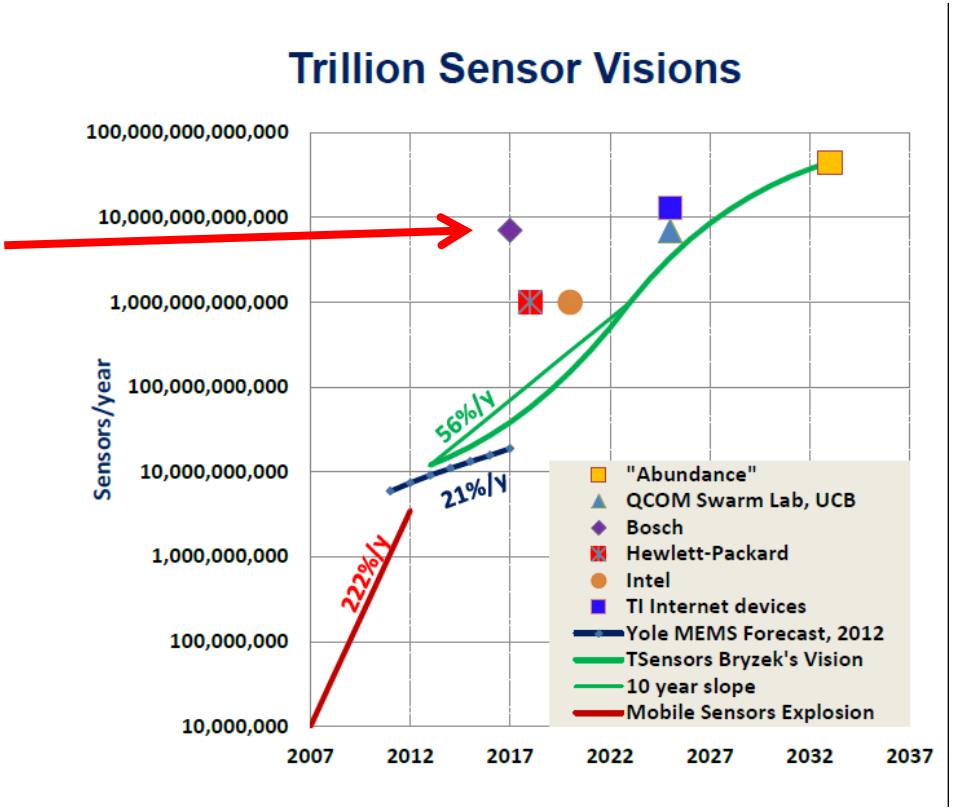


Application Pull and Technology Push do not yet match at the Application & System Level

Summary: Trillion Sensor Vision will show the way

- Having a glance at the IoT:
  - The Bosch Sensor Swarm approach expects 7 billion people served by the internet by 2017 @ 1000 linked sensors per person. Other expectations are in the same order of magnitude
  - Taking into account the expected number of sensors world wide ***power, RF bandwidth and secure communication*** will become the biggest issues in infrastructures like smart cities



J. Bryzek, Emergence of Trillion Sensor Opportunity, Semicon 2013, San Francisco

Summary: Trillion Sensor Vision will show the way

- This will require a three-pronged approach for Smart Cities:
  - Smart, energy efficient (autarkic) sensor systems (Cyber-Physical Systems) at low cost (*Instant Data*)
  - Highly efficient & secure communication infrastructures (networks & processing capabilities for the *Cloud / Big Data*)
  - Sufficient power supply to run this new infrastructure (*Energy Supply & Ultra Low / Zero Power Systems*)

Summary

- **Sensors / Cyber Physical Systems** (Instant Data)
  - Basis of a Smart City will be data generation by smart, distributed sensor networks for air quality, traffic, logistics, identification, authentication, …
- **Communication** (Cloud / Big data)
  - Communication will be an additional backbone of Smart Cities. As a new, public infrastructure, the information network will get a similar importance as the power grid or water supply
- **Energy** (Zero Power to Smart Grid)
  - The future figure of merit in semiconductor roadmapping will no longer be scaling but power consumption
  - Mobility, production & smart home aspects are closely related to the smart grid issues with respect to energy