Marcel Verhoef

- TU Delft, Technische Informatica (Van Katwijk), 1993

- Strong background in Formal Methods and its industrial application. Active member of Formal Methods Europe (FME) and Formal Techniques Industrial Association (ForTIA)

- 10 years experience – commercial software development for mission critical and embedded systems: European Space Agency, Ministerie van Defensie, Bloemenveiling Aalsmeer, Oce and Siemens VDO Automotive

- “Back to academia” in 2003: started PhD research (KUN) within the BODERC project (“industry as our laboratory”)

Challenges in Industry (1)

• Important business drivers
  – **Time-to-market** (beat your competitor!)
  – **Product cost** (will consumer buy your product?)
  – **Production cost** (ensure a healthy profit margin!)
  – **Quality** (will a consumer buy your product again?)

• Depending on type of business
  – “*Once-off*” systems: flight management system scientific satellite
    typically: build once every 10 – 20 years, $$$$$$
  – “*Capital goods*”: high-volume copier / printer
    typically: build once every 5 – 7 years, $$$
  – “*Consumer electronics*”: in-car navigation system, game consoles
    typically: build once every 2 – 3 years, $
  – “*Mass-market electronics*”: mobile phones, graphics chipsets
    typically: build once every 3 - 6 months, “freebies”

• Challenge: how to reduce **TPP** while maintaining **Q**
Challenges in Industry (2)

• “but we have these exciting scientific results that will solve...”

• Acceptance of new technology in industry is a very SLOW process, because companies have to
  – invest money to buy tools – how does it fit the development cycle?
  – adapt their way of working – impact on CMM & ISO certification
  – train employees – it takes time to become productive

• Furthermore acceptance is also limited because of
  – Return on investment of the “previous step forward”
  – “Silver bullet” does not exist: often partial solutions are proposed
  – What to do with the legacy code and components - reuse
  – “go with the flow” – stick to industry standards to reduce overall risks (e.g. qualified staff, multi-vendor)
Challenges in Industry (3)

- Rapid innovations are always caused by “outside agencies”
  - a new successful competitor ("early adopter" – no legacy)
  - demanding customers (e.g. semiconductor foundries)
  - government regulations (obligatory compliance to a standard)
  - unforeseen market change (e.g. war)

- “Normal” innovation cycle is typically half of the development cycle rate – you have to be patient

- How To Introduce Academic Results in Industry?
  - teaching
  - “AMETIST” approach
  - “OMEGA” approach
  - “BODERC” approach

- Essential for success: **industrial strength tools!**