Bringing AGILE into Embedded Systems

Work <u>smarter</u>, not harder.

MECHANICS
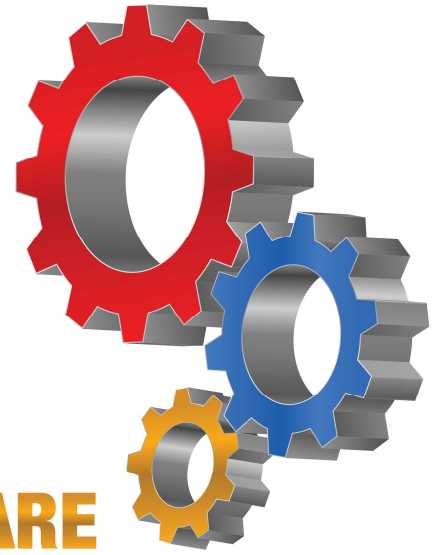
SOFTWARE

HARDWARE

Challenges

- Embedded systems – complex systems consisting of
  - Software (drivers, UI...)
  - Hardware (electronics, IC...)
  - Mechanics.

Development

- Multiple teams with different characteristics, restrictions and backgrounds working in close collaboration.
- Coping with changing requirements under tight schedules.
- From waterfall to iterative and incremental development style.
- Tools to support agile processes.

Collaboration

- Communication between developers, teams, partners and stakeholders.
- Customer collaboration
  - Recognition and prediction of user needs.
  - Reaction to user feedback.

Well-being at Work

- Irregular work loads – strain increases towards project deadlines.
- Changing requirements and interdependences between teams increase the amount of work.

Background: Agile Methods

- Agile methods have gained considerable popularity in the field of software engineering.
- Practices behind the methods have molded in the software companies throughout the years in their every day work.
- Agile values and practices are collected into *Agile Manifesto*, the cornerstone of agile software development.
- Agile methods, such as *Scrum* or *Extreme Programming*, cannot be straightly adopted in embedded systems and integrated circuits development.

Agile Manifesto

- *Individuals and interactions over processes and tools*
- *Working software over comprehensive documentation*
- *Customer collaboration over contract negotiation*
- *Responding to change over following a plan*
- *That is, while there is value in the items on the right, we value the items on the left more.*

Source: www.agilemanifesto.org

Objectives and Results

- The main objectives are to
  - Improve efficiency of embedded systems development while maintaining the developers' well-being at work.
  - Improve customer collaboration.
  - Shorten embedded systems development cycles.

Toolbox

- Requirements
- Feedback
- Testing
- Communication
- Collaboration
- Customer interface
- etc.

Toolbox of Practices

- Collection of agile practices suitable for utilization in the development of embedded systems and integrated circuits.
- Practices, answering to different challenges, can be picked up and adopted as a part of embedded system and integrated circuit product development processes.

embedded.utu.fi

Project: AgiES

Agile and Lean Product Development Methods for Embedded ICT Systems
- Developing agile methods for embedded systems development taking into account the efficiency and well-being at work issues. Implemented in close collaboration with research and industry partners.
- Funded by TEKES – the Finnish Funding Agency for Technology and Innovation.
- Lasting from May 2012 to August 2014.

Project: ALDES

Agile and Lean Development of Embedded Systems
- Safety-critical issues in agile and lean development.
- Recognition of the actual user needs.
- Management and measurement of technical debt.
- Orchestrating multi-cultural and distributed collaboration.
- Planned for 2014–2016.

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