Parasoft ADP solutions

Automated Defects Prevention
for
Embedded Systems Software Development

by Wiktor Grodowski

Observations on Software Testing

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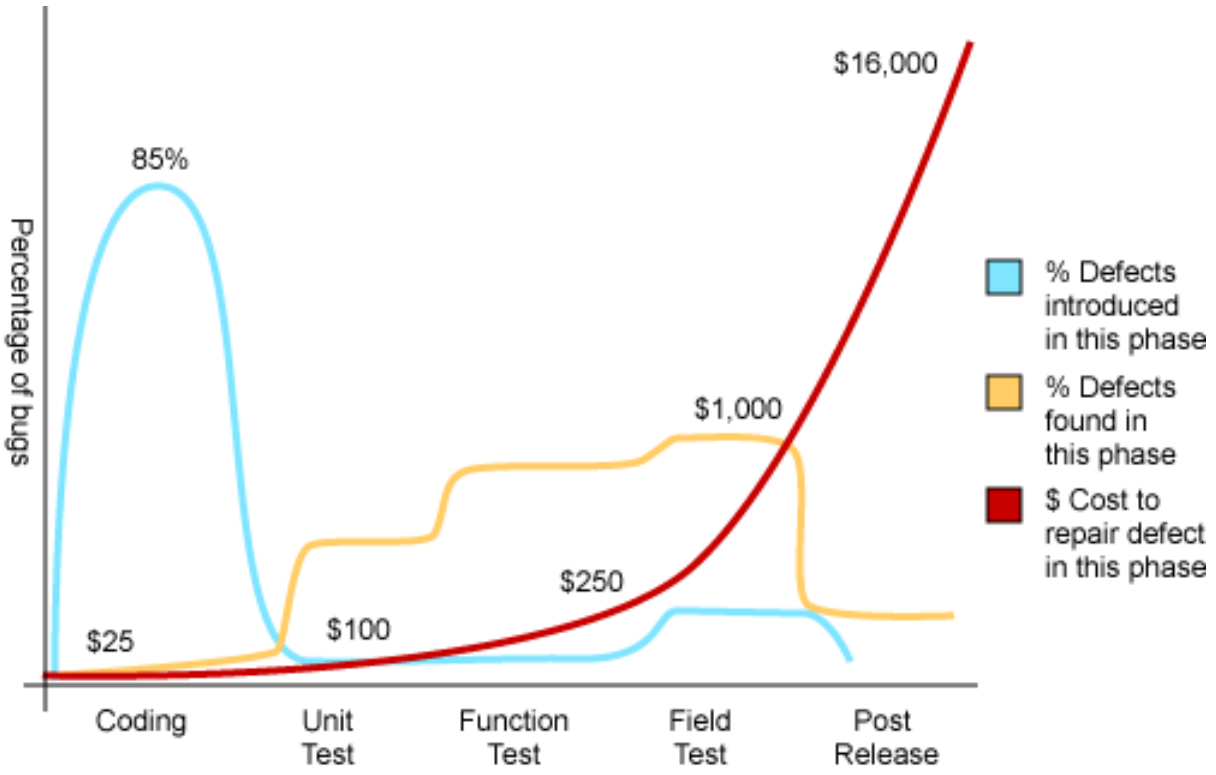
- ***Mostly focuses on Functional Testing tied back to Requirements***
- ***Design – Code – "Integration and Test"***
- ***Early Testing is minimal and short-lived***
- ***Testing efforts are focused on the isolation and subsequent fixing of "bugs" – Error Detection***
- ***"Failure to Communicate" between Development, Test and Quality Assurance (QA)***

.. Not much has changed in 25 years ..

The Cost of Waiting



Source: Applied Software Measurement, Capers Jones, 1996

What is ADP all about?

- ***ADP = Automated Defects Prevention***
- ***Defects Prevention != Error Detection***
- ***ADP = Defects Prevention + Automation***
- ***ADP is not a replacement for CMM / CMMI and alike. It is a change in a software development approach.***
- ***ADP is practical, flexible, down to earth, based on over 20 years of experience***
- ***http://www.adpqb.org***

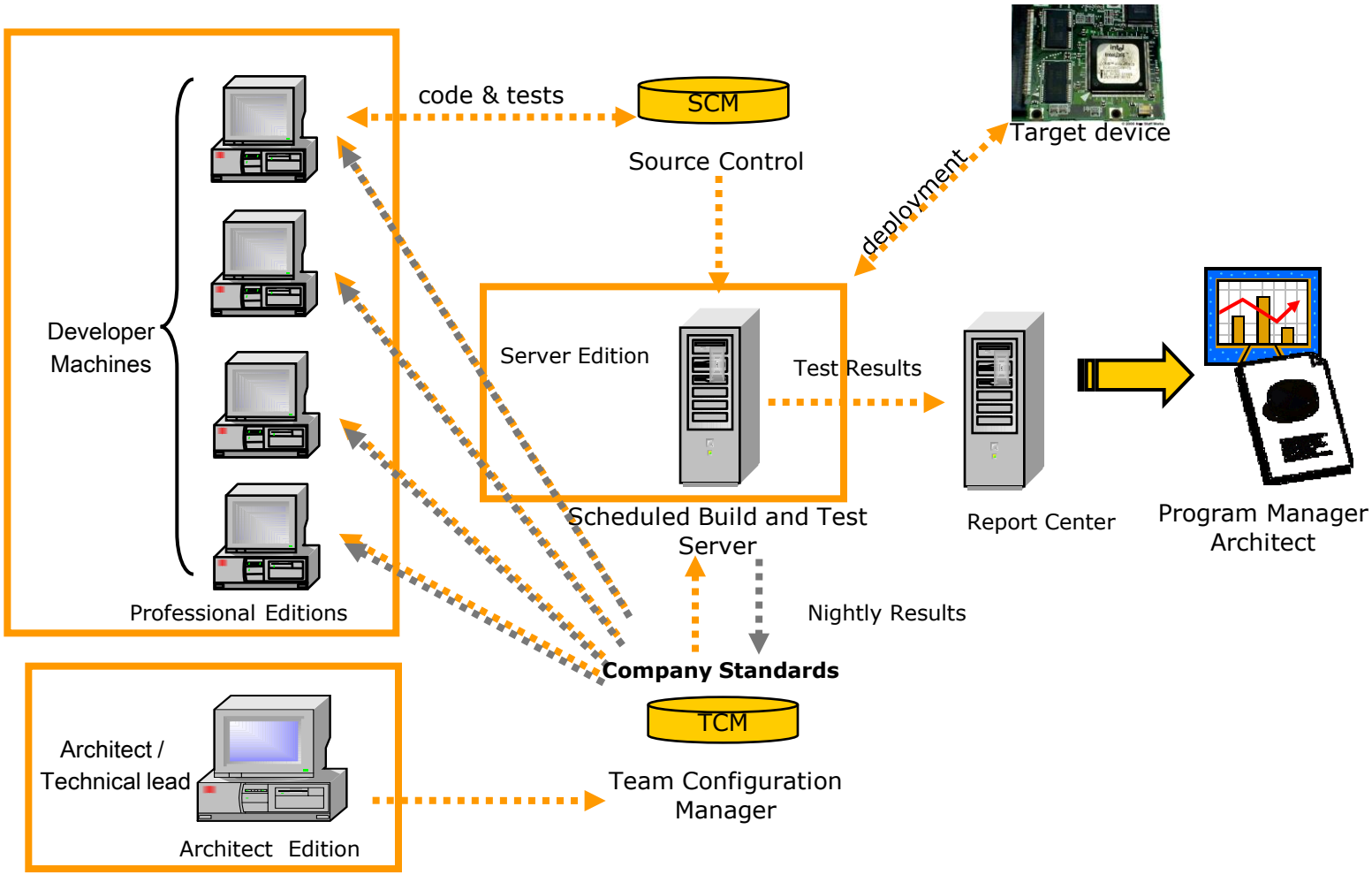
ADP principles

- **Principle 1: Establishment of Infrastructure**
  - ***Build a strong foundation through integration of people and technology***
- **Principle 2: Application of General Best Practices**
  - ***Learn from others' mistakes***
  - ***MISRA, JSF, other coding standards***
- **Principle 3: Customization of Best Practices**
  - ***Learn from your own mistakes***
- **Principle 4: Measurement and Tracking of Project Status**
  - ***Understand the past and present to make decisions about the future***
- **Principle 5: Automation**
  - ***Let the computer do it!***
- **Principle 6: Incremental Implementation of ADP's Practices and Policies**

Why Automation is Important !

- **Code reviews are time-intensive and human-intensive**
  - ***Review process can be done with a "static analysis" tool***
- **Quality focus is typically NOT built into product schedules so there is typically little time to do proper testing.**
  - ***Automation is required to leverage these precious cycles***
- **Developers write more testing procedures/code than the code they are developing for delivery!**
  - ***Parasoft "automates" much of the driver, stubs and infrastructure creation as well as provide metrics, like code coverage***
- **Developers typically do NOT like testing.**
  - ***Some problems will never be solved!***

Parasoft ADP Deployment

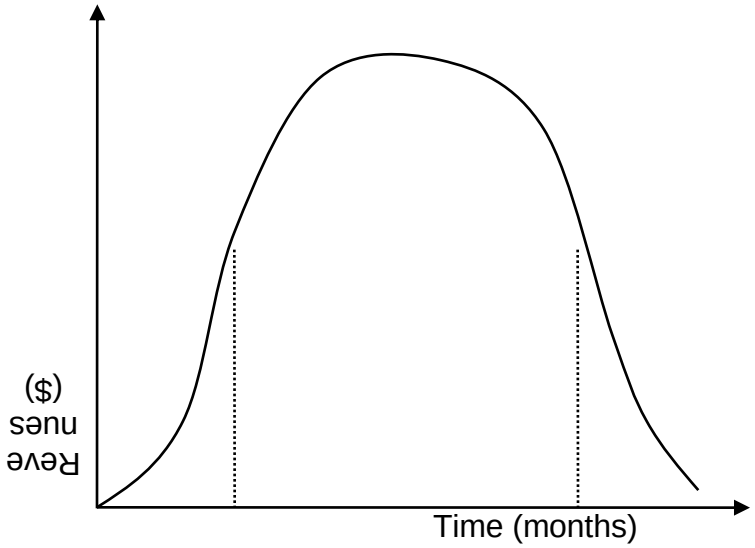


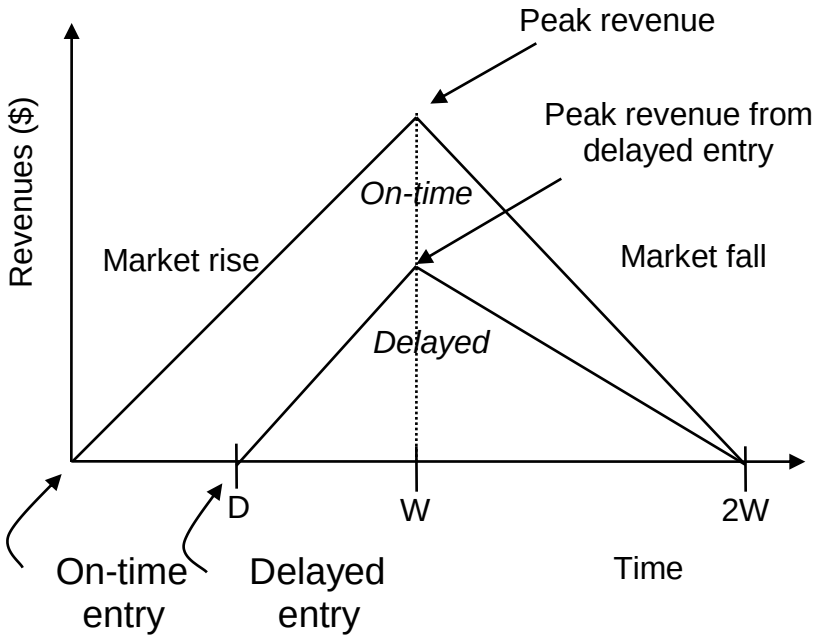
Relation to Embedded Systems

- **High costs of defects**
  - ***Number of defects in a final product must be kept at minimal due to a high recall cost***
  - ***Possibility of having human life or human safety at stake, dependent on a stability of an embedded device***
- **Important time to market**
  - ***Late product = lost money***
- **Mandatory compliance**
  - ***MISRA, JSF, DO-178B, others***
  - ***Contractor's internal standards***

Is it worth it?

- **Exemplary ROI**
  - ***Unit testing caused drop in residual errors almost by a factor of 2.***



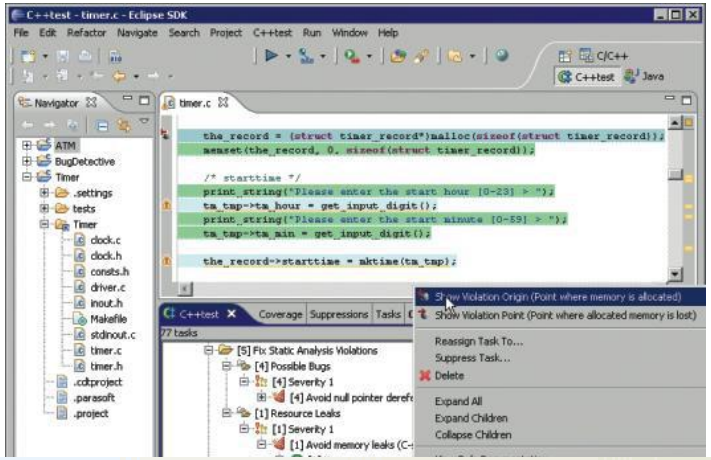


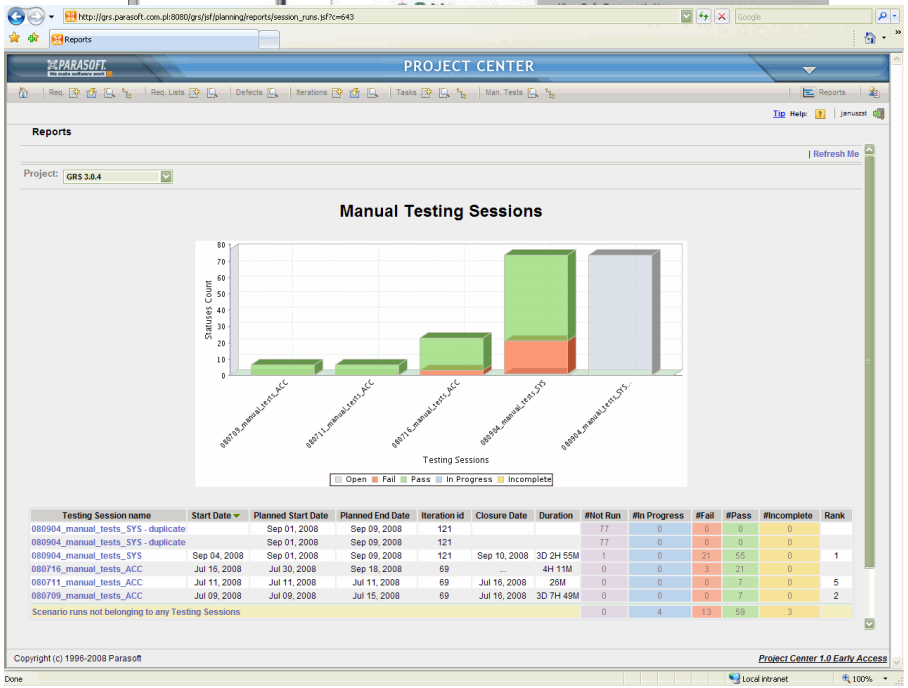
Is it really worth it?

Design **Development** **Testing**

Parasoft Tools supporting ADP

- **C++Test**
  - *Coding Standards analysis*
  - *Flow Analysis*
  - *Unit Testing - Coverage analysis*
  - *Code Review*
  - *Authoring and Automation*
- **Concerto**
  - *Reporting*
  - *Data correlation*
  - *Process Visibility*
- **Insure++**
  - *Runtime memory analysis*





Benefits of ADP

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Benefits	Testing	ADP
Find Errors	X	X
Uses testing results to fix errors	X	X
Uses testing results to fix the development process		X
Reduces probability of errors reoccurring		X
Addresses the critical roles in creating software		X
Learns from test results and improves processes and prevents future errors		X
Uses testing as a process measurement technique		X
Understands and anticipates common coding mistakes that can lead to poor software quality		X
Provides tools and processes to keep team members code at same level		X

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Questions & Answers

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