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Siemens Core Learning Program

Value of Testing

Author:
Peter Zimmerer, CT

Testing is not easy …

If you can't test it, don't build it.
If you don't test it, rip it out.

Boris Beizer, 1990

Testing is a skill.
While this may come as a surprise
to some people, it is a simple fact.

Mark Fewster, Dorothy Graham, 1999

Understand testing … and quality …

and architects

Programmers are responsible for software quality – quality in their own work, quality in the products that incorporate their work, and quality at the interfaces between components. Quality has never been and will never be tested in. The responsibility is both moral and professional.

Boris Beizer, 1990

Testing by itself does not improve software quality.
Test results are an indicator of quality,
but in and of themselves, they don't improve it.

Steve McConnell, 1993

Value of testing

Learning objectives

- Get to know different missions of testing
- Understand the value of testing
- Understand the business impact of testing

Value of Testing

Agenda

What? Why?

Cost of Quality

Summary

Some *old* definitions of *Testing*

IEEE Standard 610.12–1990
The process of operating a system or component under specified conditions, observing or recording the results, and making an evaluation of some aspect of the system or component.

IEEE Standard 829–1998
The process of analyzing a software item to detect the differences between existing and required conditions (that is, bugs) and to evaluate the features of the software item.

BCS SIGIST Testing Standards Working Party
(http://www.testingstandards.co.uk/living_glossary.htm)
The process of exercising software to verify that it satisfies specified requirements and to detect errors.

Why do we test? Dimensions of testing

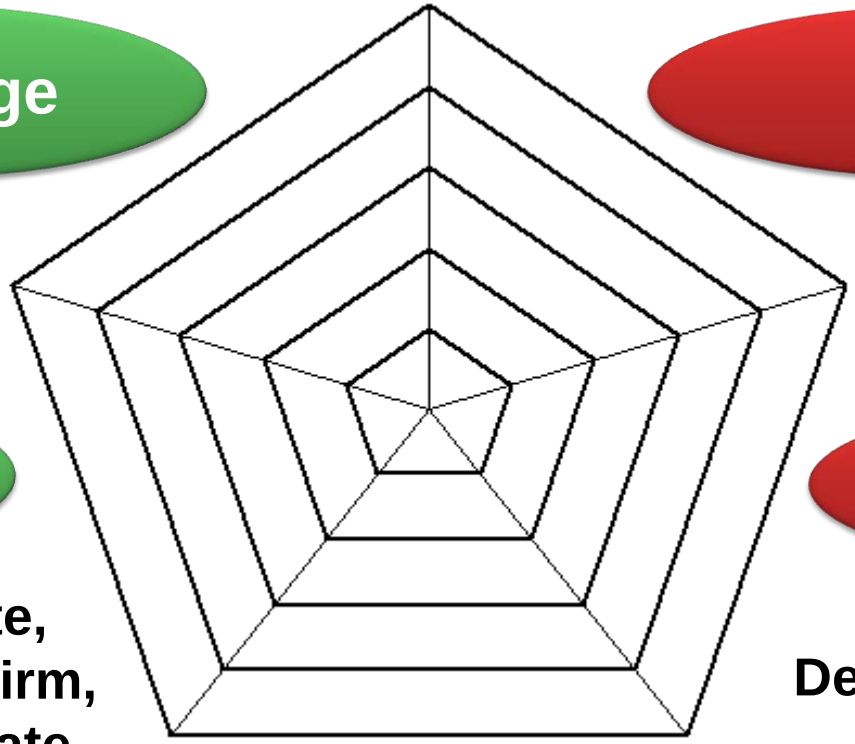
**Prevent, protect, respond,
control, influence, enable, and drive quality,
support, drive, and speed up development**

Coverage

**Measure, assess,
evaluate, predict**

Risks

**Mitigate, reduce risks,
investigate, explore**



Goals

**Demonstrate,
check, confirm,
verify, validate**

Defects
Isolation & Diagnosis

Detect, search

Reference: Peter Zimmerer, "The Value of Testing in 5 Dimensions", *Testing Experience*, September 2010

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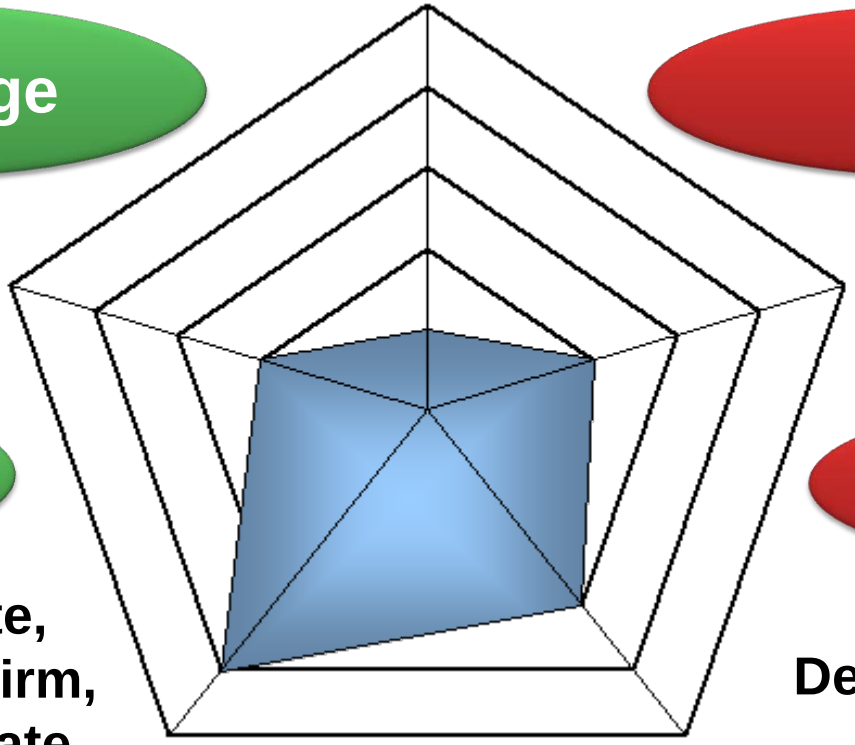

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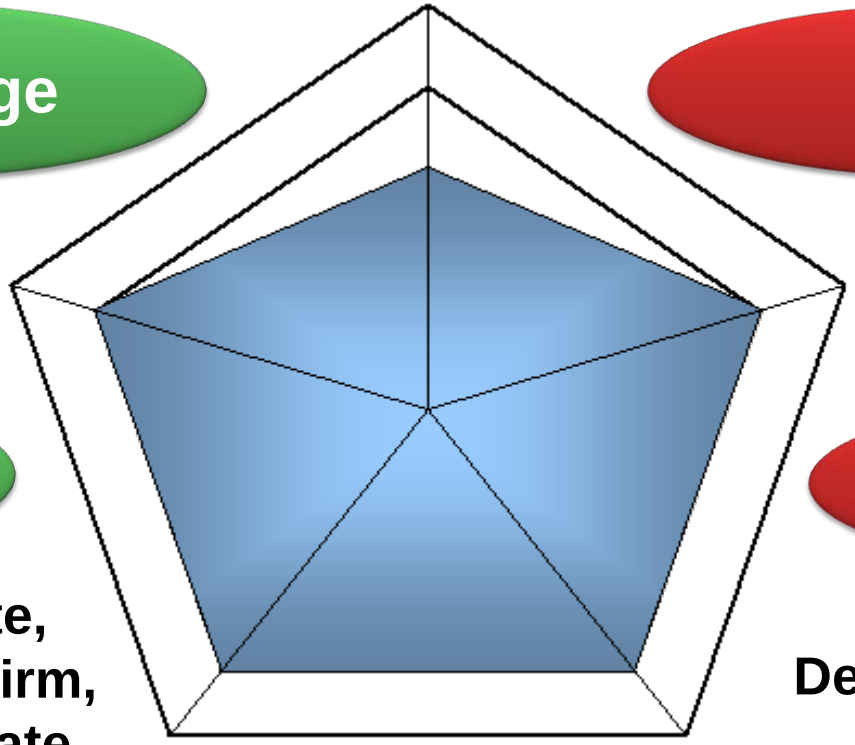

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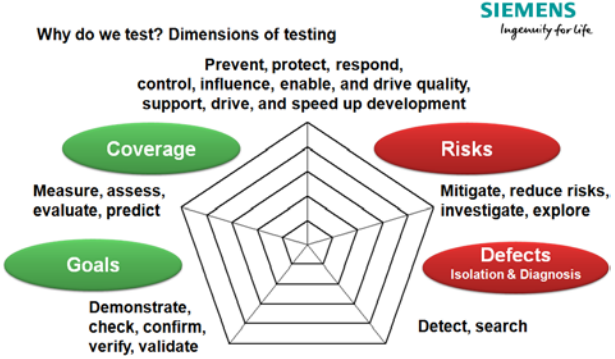
Why do we test?



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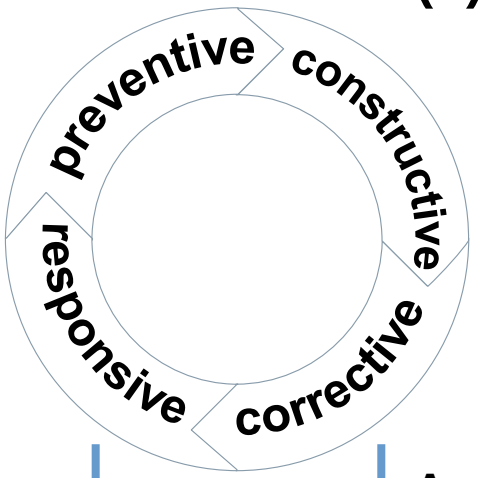
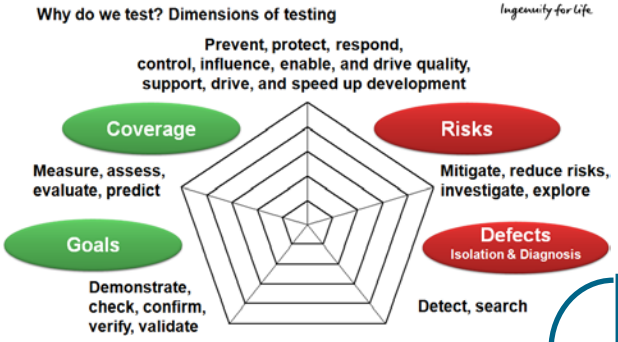
Historical and future (?) view



History consists of a series of accumulated imaginative inventions.
Voltaire, 1694–1778

Show it works	Find defects	Assess quality Evaluation Measure quality	Influence quality Control quality	Investigate Explore Learn	Speed up Protect Respond
Demonstration	***Detection***	***Prediction***	***Prevention***	***Exploration***	***Productivity***
1950s view	**1975s view**	**1980s view**	**1990s view**	**2000s view**	**2010s view**

Why do we test?
What is the *value* of testing?



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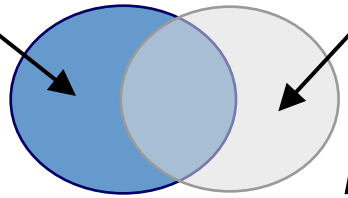
Empirical technical investigation of the product / system / artifact / service under test conducted to provide stakeholders with information about the quality.

Cem Kaner

Intended Behavior

Actual Behavior



... to improve the ...

Product
- *fit for use*
- *coverage*
- *detect & fix bugs*

Decisions → right, fast, early
- *reduce risks*
- *predictability*

Process & Delivery
- *analyze & fix root causes & waste*
- *transparency*
- *flexibility & speed*

User impact
- *respond&adapt*

If this information is effectively used, then we create real value for the business, i.e. the business value of testing lies in the savings that the organization can achieve from improvements based on the information that is provided by testing.

More / better testing means more / better information and evidence!

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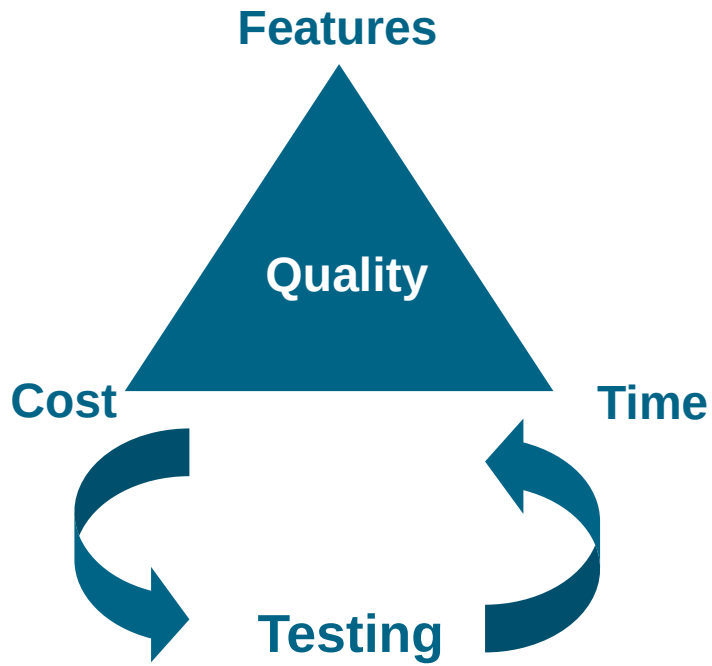
Why do we test? What is the *value* of testing?

We do testing
to provide *information* and *evidence*

The value of *information* and *evidence*
is for stakeholders to decide

Features, cost, and time are inputs only
→ Only testing can measure achievement in a project and provide forecasts
→ Testing is the ONLY source of *information* and the ONLY source of *evidence* we have to make sensible decisions on availability and readiness
→ Testing is aimed at determining how well prevention works



I ensure you, in case your project is heading into the wrong direction, I will be the first to tell you, loud and clear!

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Some *better* definitions of *Testing*

ISTQB Glossary (http://www.istqb.org/)

The process consisting of all life cycle activities, both static and dynamic, concerned with planning, preparation and evaluation of software products and related work products to determine that they satisfy specified requirements, to demonstrate that they are fit for purpose and to detect defects.

ISO/IEC/IEEE 29119-1

Set of activities conducted to facilitate discovery and/or evaluation of properties of one or more test items.

Cem Kaner

Empirical technical investigation of the product / system / service under test conducted to provide stakeholders with information about the quality.

Software Quality Engineering (SQE)

All lifecycle activities concerned with checking software and software-related work products. Testing is an activity aimed at evaluating an attribute or capability of a program or system and determining that it meets its required results. Testing includes all activities associated with the planning, preparation, execution, and reporting of tests.

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Testing is *critical* because …

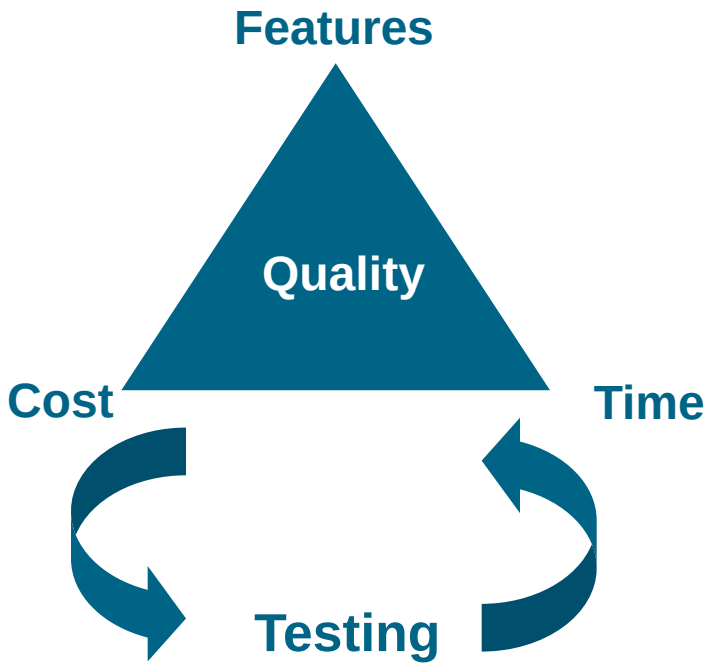
A major part of development and maintenance costs (> 50%) is invested in testing activities

Many testing activities are often repeated again and again: Regression testing, bug reporting, etc.

A failure in testing could lead to serious and possibly lasting negative outcomes: For example, missing important areas to be tested

Deficits in effectiveness

- Bugs detected too late
- Test automation
- Maintenance of tests



Current software projects spend about 40 to 50 percent of their effort on avoidable rework.

Barry Boehm, Victor R. Basili

Reference: Software Defect Reduction Top 10 List, IEEE Computer, January 2001

Value of Testing

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Cost of Quality

Summary

Overall cost & effort – Technical debt

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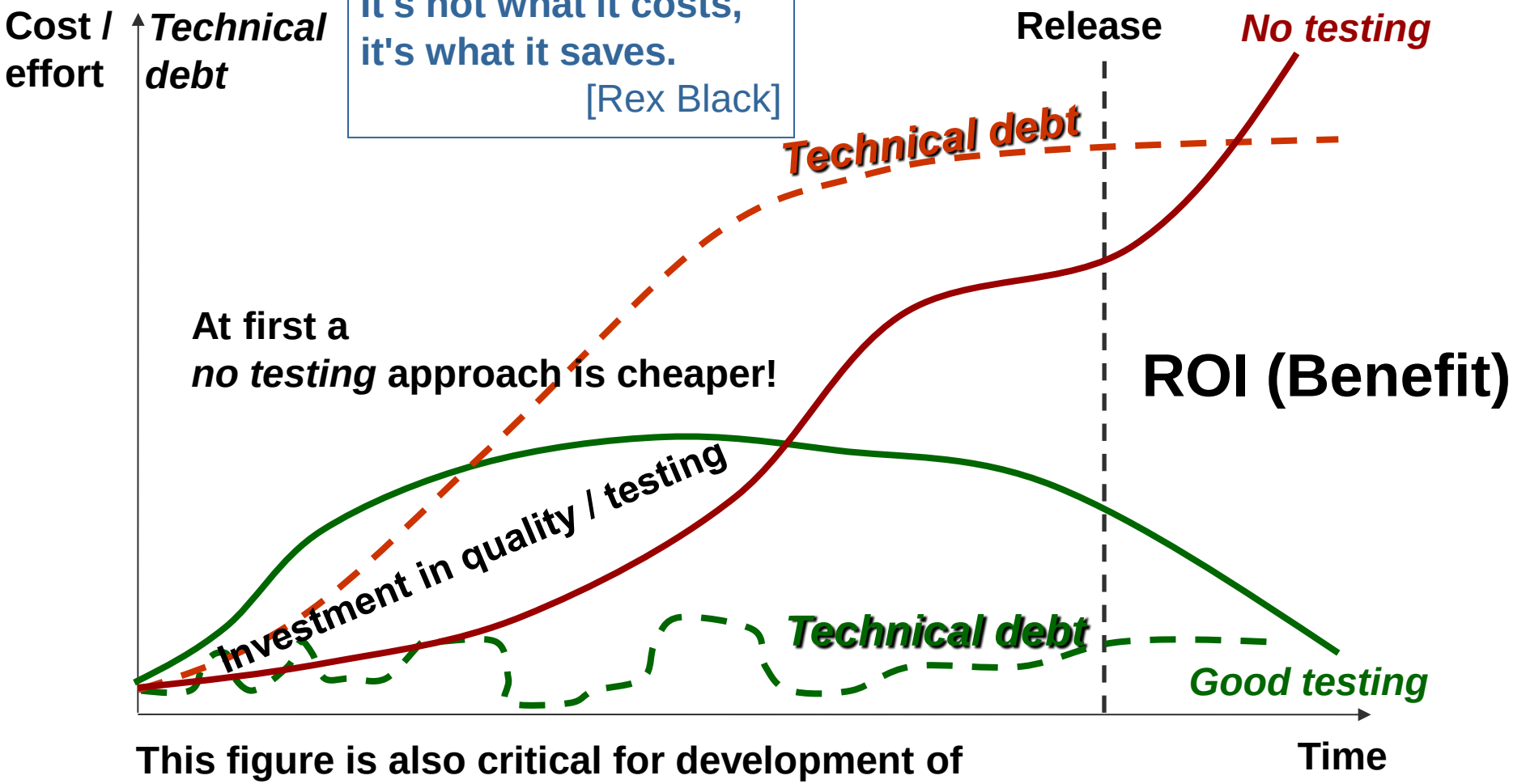
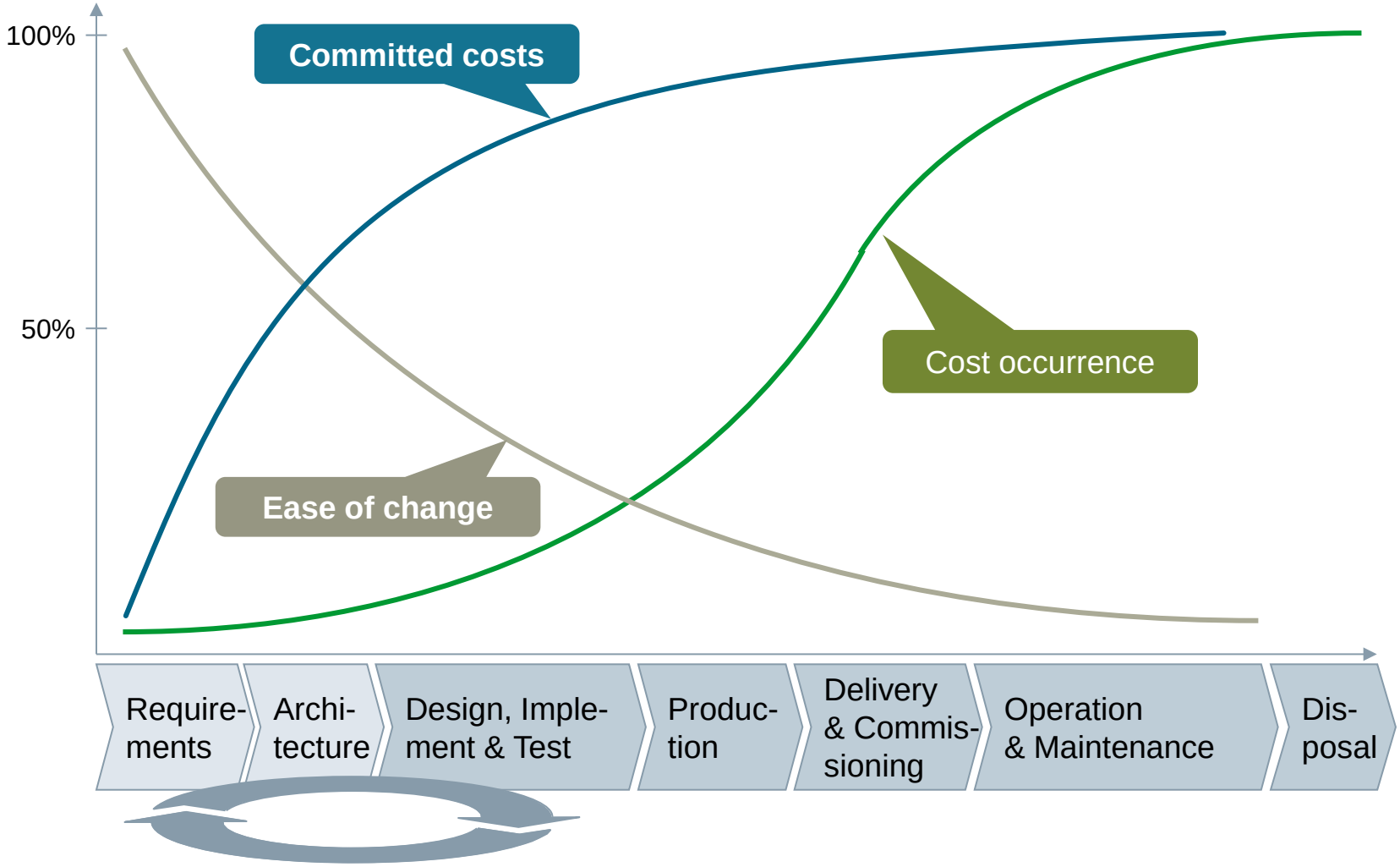
It's not what it costs,
it's what it saves.
[Rex Black]

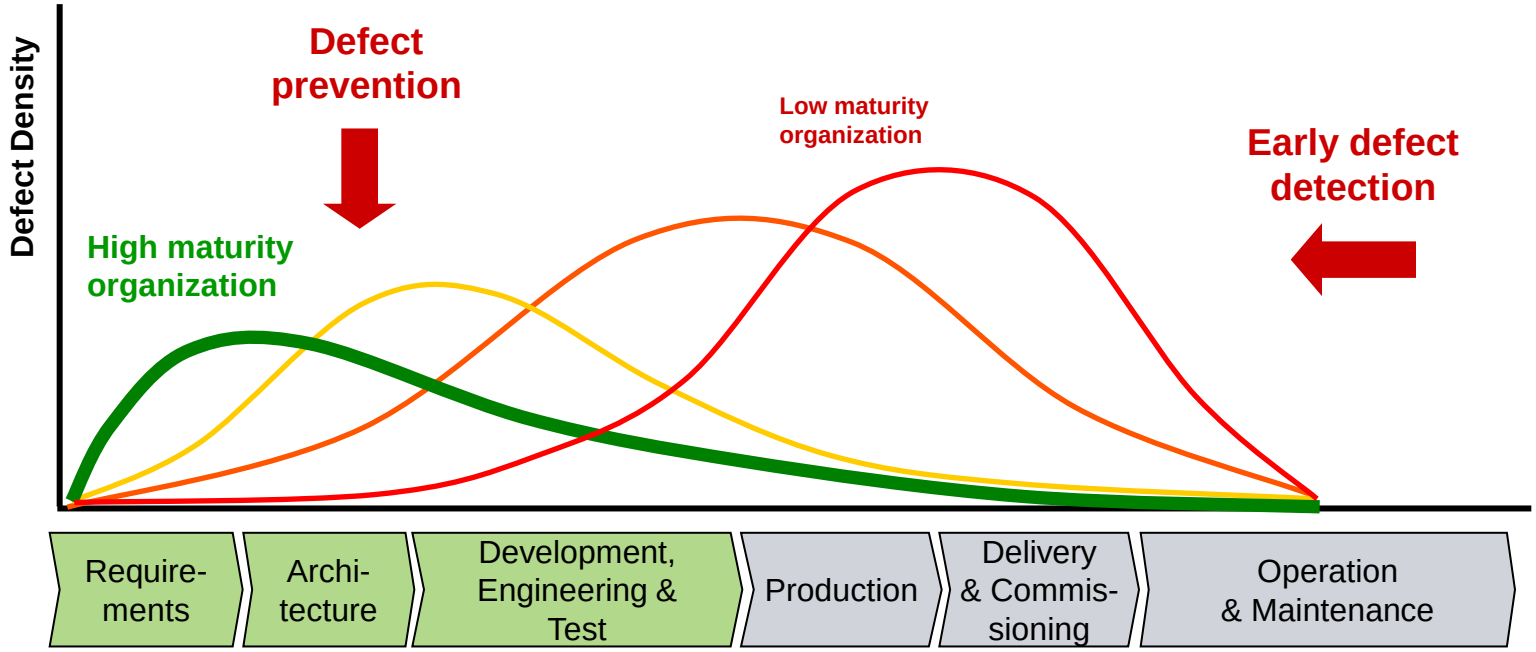


This figure is also critical for development of frameworks, platforms, product lines, ecosystems!

Effective and efficient testing (1)



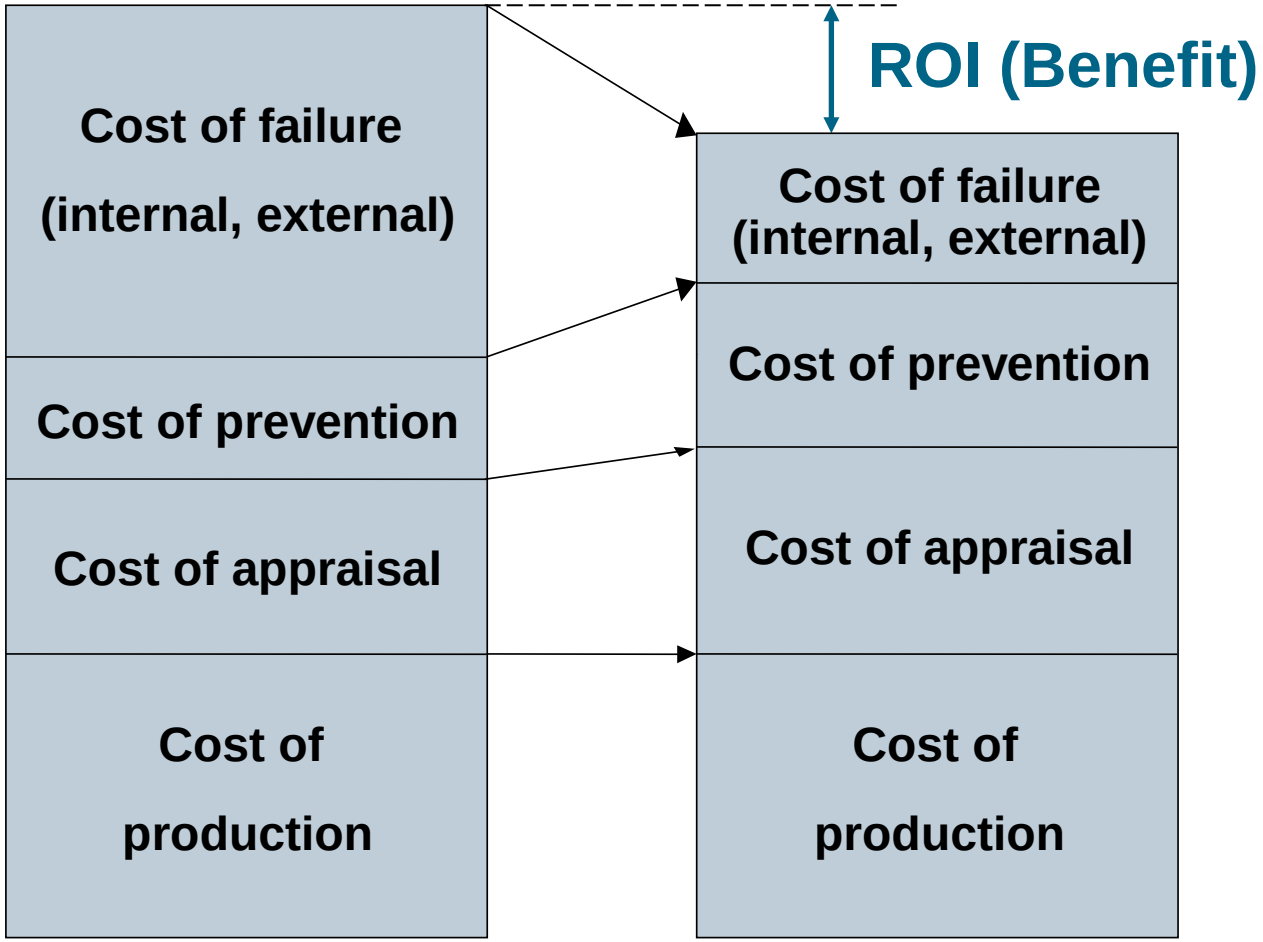
Effective and efficient testing (2)



Levers for effective & efficient testing:

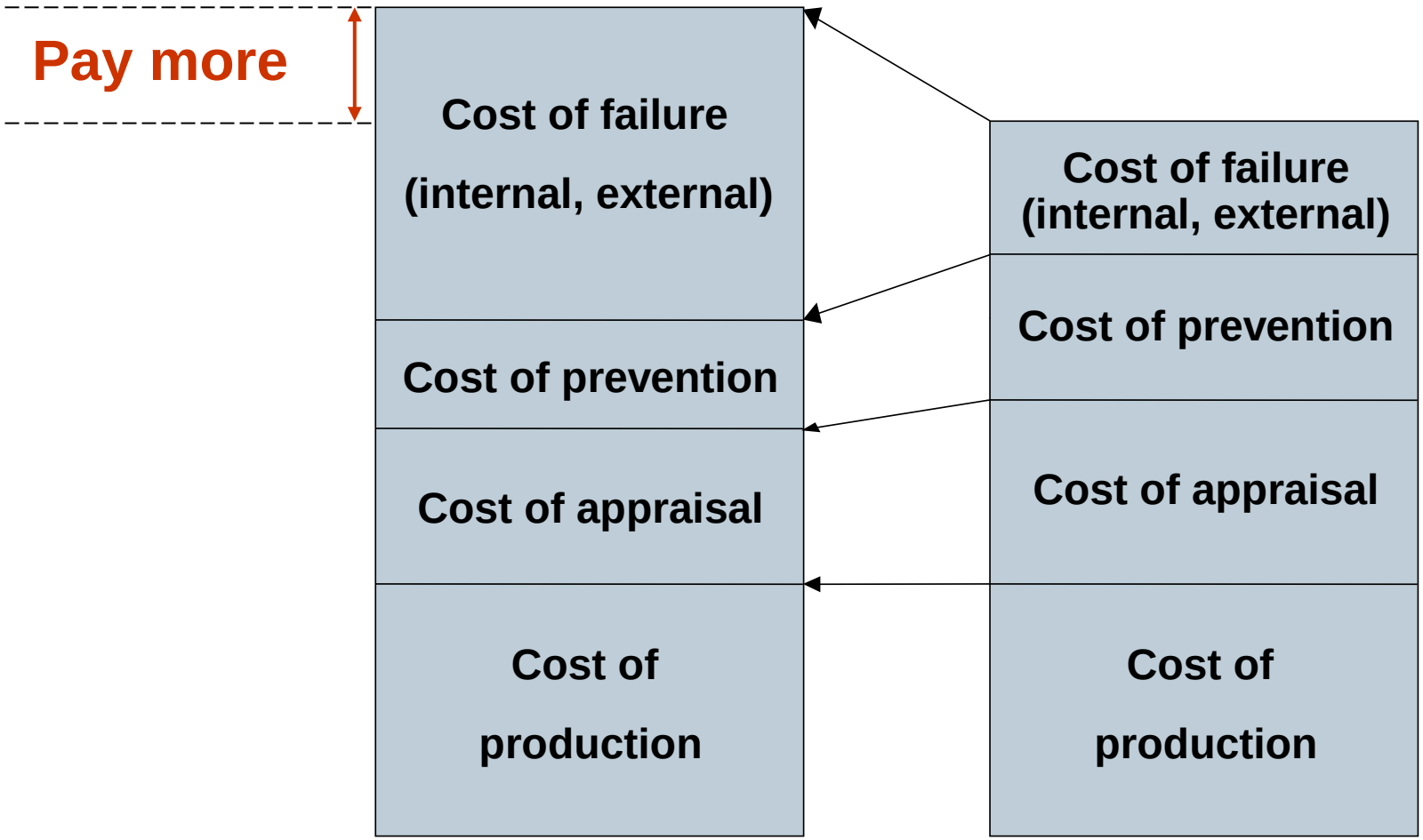
- Identify and mitigate product risks
- Prevent errors from the beginning
- Detect errors as early and efficiently as possible
- Quality-oriented development process

Cost of quality



References: Armand Vallin Feigenbaum (1956), Joseph Moses Juran (1951), Philip B. Crosby (1979)

Cost of quality – Reversed



One truth about software testing and quality

You can pay now,
or you can pay a lot more later.

It‘s up to you.

Value of Testing

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Summary

What we have learned

Testing is not only about bug detection; it has various missions and different dimensions.

Testing provides information and evidence based on observation.

Testing in itself does not improve quality; test results are just an indicator for quality.

The business value of testing lies in the savings that the organization can achieve from improvements based on the information the testing provides.

Defect prevention and early defect detection are important for effective and efficient testing.

Further readings

Use the SSA Wiki :
https://wiki.ct.siemens.de/x/fReTBQ

and check the “Reading recommendations”:
https://wiki.ct.siemens.de/x/-pRgBg

- Architect's Resources:
  - Competence related content
  - Technology related content
  - Design Essays
  - Collection of How-To articles
  - Tools and Templates
  - Reading recommendations
  - Job Profiles for architects
  - External Trainings
  - ... more resources