ITERATIVE WATERFALL MODEL

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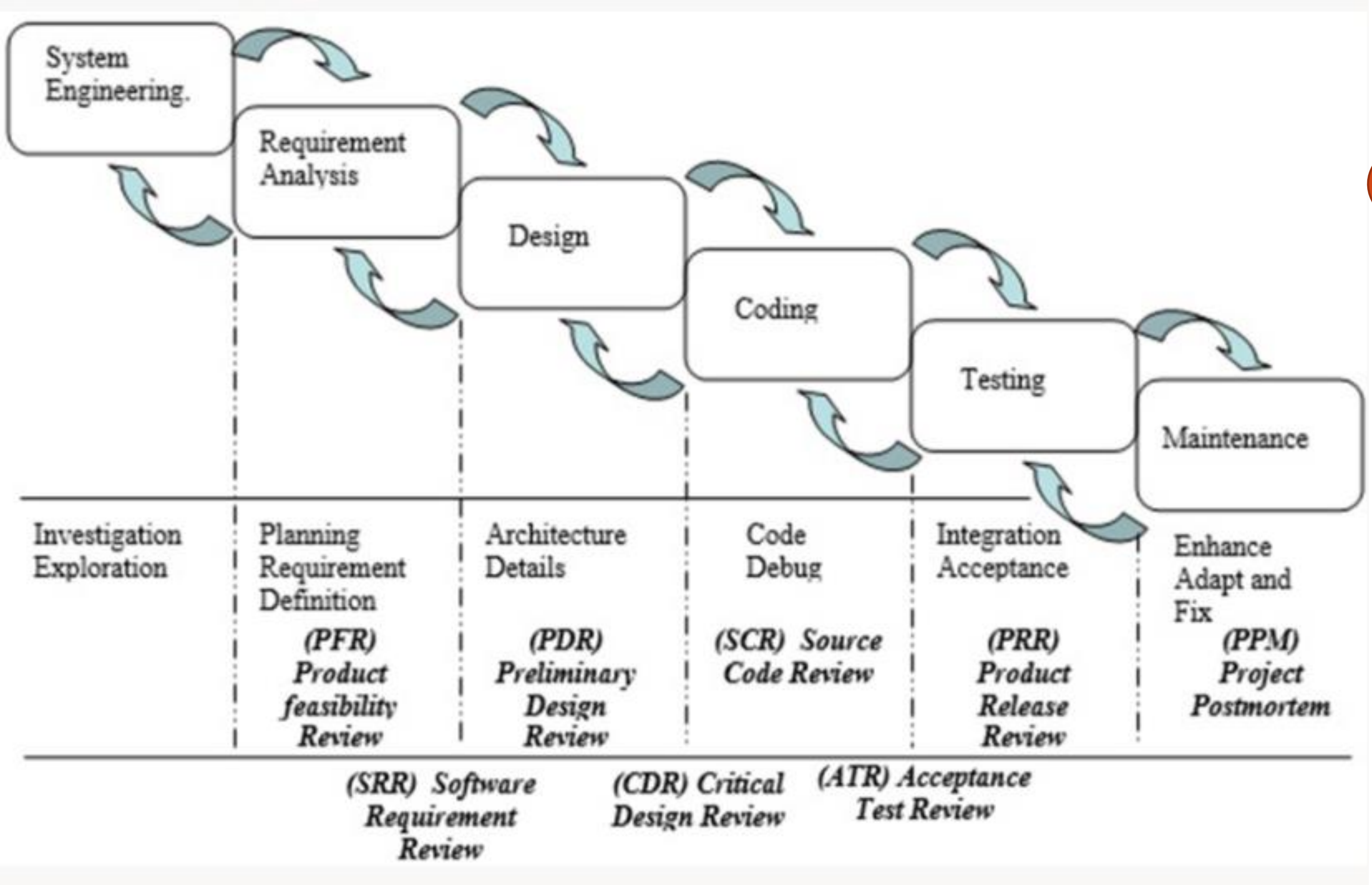
THE NEED OF ITERATIVE WATERFALL MODEL.

- What was missing in water-fall model?
- Feedback, testing at an earlier stage.
- It was a rigid approach with linear rules leaving little room for flexibility.
- How can we improvise on the traditional waterfall model?


System Engineering.
Requirement Analysis
Design
Coding
Testing
Maintenance
Investigation Exploration
Planning Requirement Definition
(PFR) Product feasibility Review
Architecture Details
(PDR) Preliminary Design Review
Code Debug
(SCR) Source Code Review
Integration Acceptance
(PRR) Product Release Review
Enhance Adapt and Fix
(PPM) Project Postmortem
(SRR) Software Requirement Review
(CDR) Critical Design Review
(ATR) Acceptance Test Review

A later stage might reveal the need for some extra work at an earlier stage.

But this should be an exception rather than a rule.

Why??

What is the basic fact about waterfall?

Waterfall should flow downwards with little possibility of splashing back.

What are the costs associated with repeated iterations to an earlier stage in the software development?

Going back and re-working on the tasks you thought you had completed reflects poorly on planning the software development process, and is taxing.

Mess up with the project completion dates.

HOW TO PREVENT MAKING MISTAKES AT A LATER STAGE?

- Feasibility study.
  - The initial study before the system analysis and design is started.
  - You need to answer three key questions in your feasibility study.
  - **Is there a new and better way to do the job that will benefit the user?**
  - **What are the costs and benefits of the alternatives?**
  - **What is recommended?**
- Feasibility study summarizes what is known and what is going to be done. It consists of:
  - Statement of the problem.
  - Summary of finding and recommendations.
  - Details of findings.
  - Recommendations and conclusions.

REQUIREMENTS ANALYSIS AND DEFINITION

- Consult your system users/clients/stakeholders to establish the **system's services, constraints, and goals.**
- Later define them in detail so as to serve as system specification.
- Analysis is a detailed study of the various operations performed by the system.
- "what must be done to solve the problem".
- Once the analysis is complete the system analyst has a firm understanding of what is to be done in the next phase.

SYSTEM AND SOFTWARE DESIGN

- System design partitions the requirements into either hardware or software.
- Overall system architecture is established.
- You identify and describe the fundamental software system abstractions and their relationships.
- Interface for input/output of data, data processing are designed and tested to meet the system objective.

IMPLEMENTATION AND UNIT TESTING

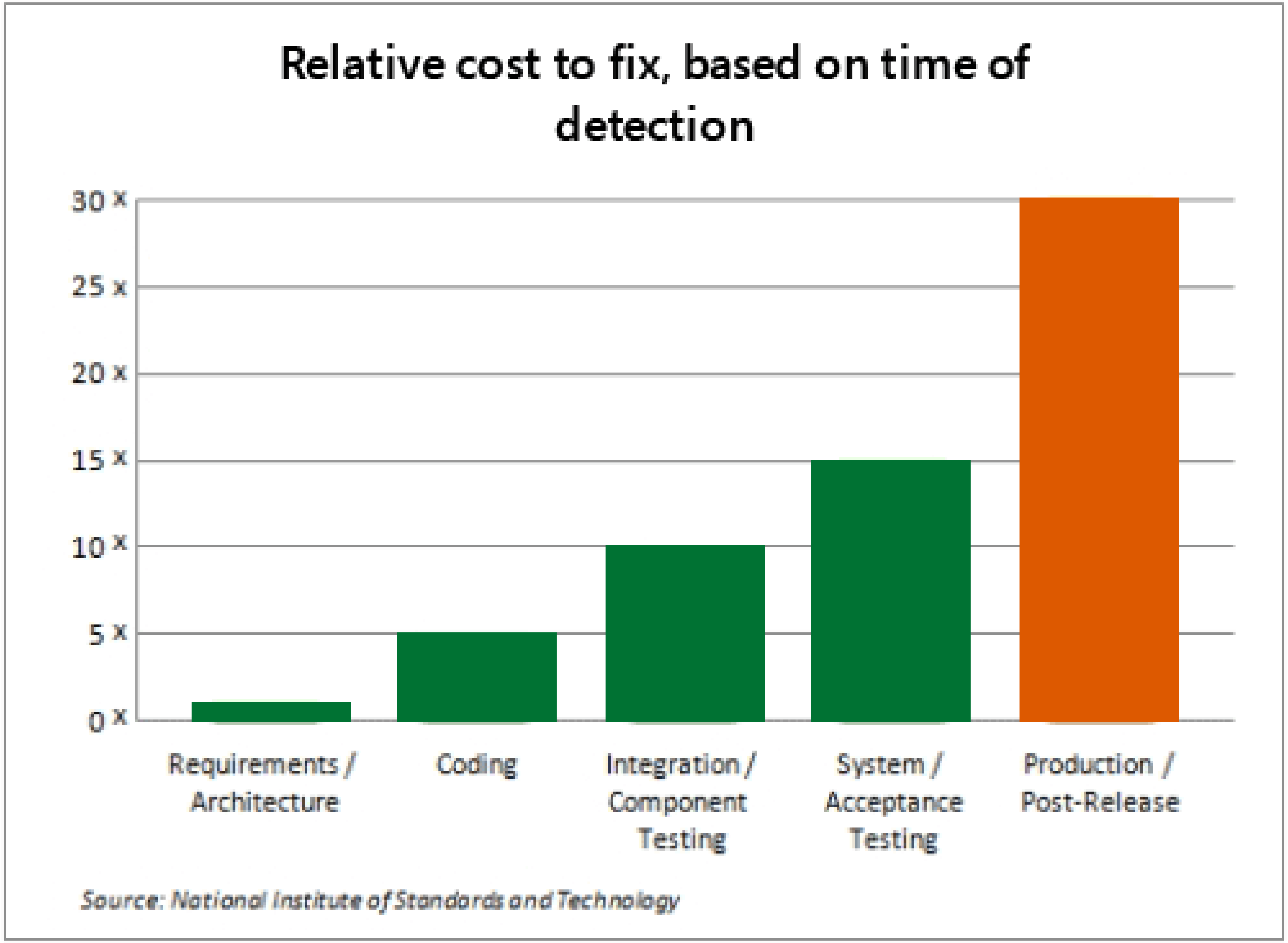
- Software design is realized as a set of programs or program units.
- For unit testing, verify that each unit meets its specifications.

INTEGRATION AND SYSTEM TESTING

- Individual program units are integrated and tested as a complete system to ensure that the software requirements have been met.
- System testing checks the readiness and accuracy of the system.
- Software delivered to the customer post testing.

OPERATION AND MAINTENANCE

- Normally the longest lifecycle phase.
- System installed and put into practical use.
- Maintenance involves correcting errors not discovered in the earlier stage of the life cycle, improving the implementation of system units, and enhancing systems services as new requirements are discovered.
- Importance of maintenance is to bring new systems to standards.



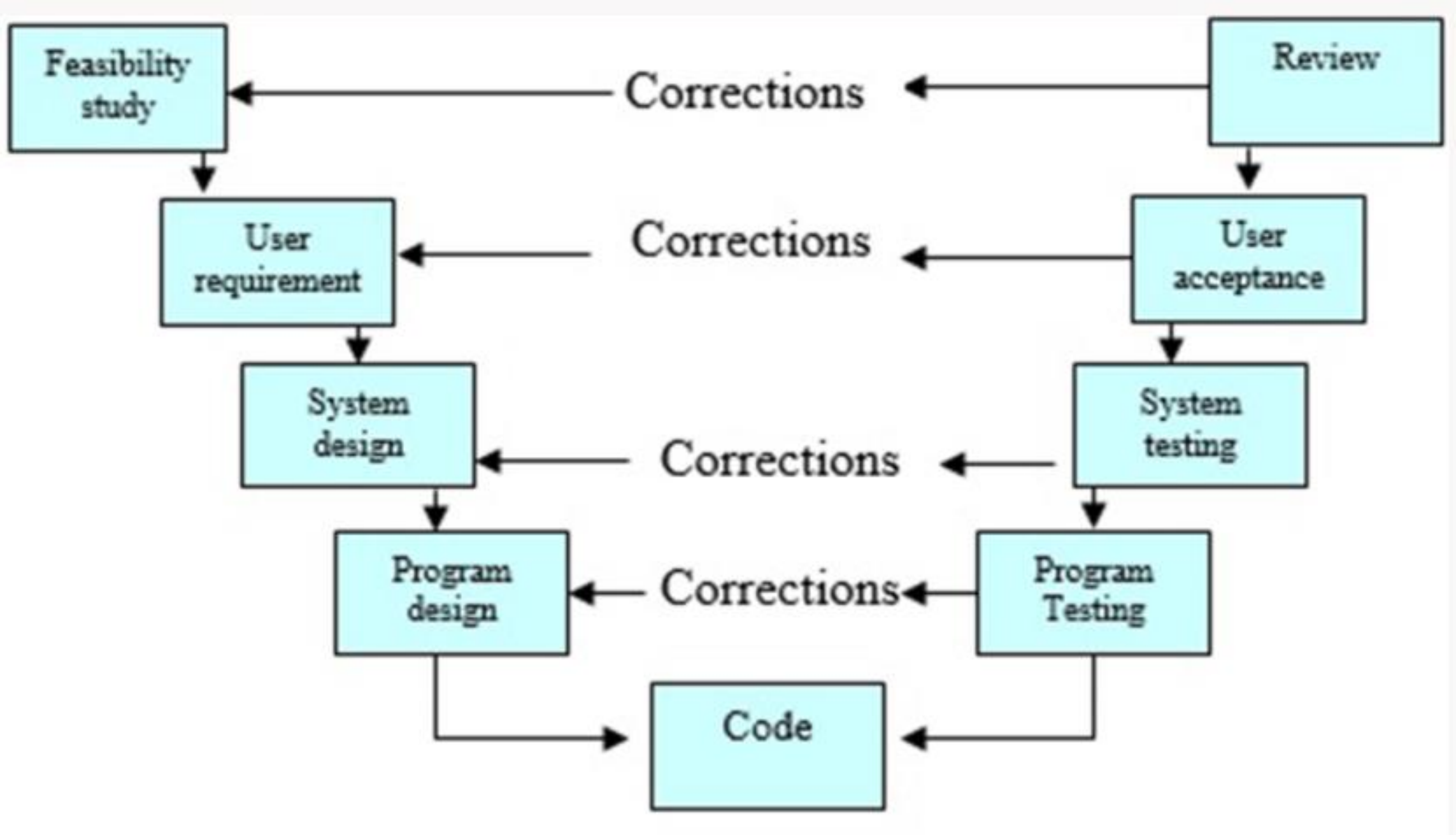
Relative cost to fix, based on time of detection

Source: National Institute of Standards and Technology

IMAGINE…..

- You are working on a large project.
- The system is complex.
- It is easy to miss out on the details in the requirement phase itself.
- Danger?
- An entirely wrong product provided to the client.

V-SHAPE MODEL



DETAILS OF V-MODEL

- Elaboration of the Waterfall model.
- Stresses the necessity of the validation activities that match the activities which create the product.
- Each step has a matching validation process that can, where loops are found causes a loopback to the corresponding development stage and a reworking of the succeeding steps.
- Condition for feedback : Discrepancy is found between the specifications in the stage and what was found in the next lower stage.

EXAMPLE

- A system designer specifies a particular calculation to be carried out in a certain way.
- The person who structured the software expected to fulfil this design happens to misunderstand the requirement of the design.
- Later the system designer tests the software, but discovers the program designers misreading of the document.
- In this situation, only corrections should be fed back.

ADVANTAGES OF V-MODEL

- Suited for restricted projects. Stringent nature of the V-model and its linear design, it is suitable wherein project length and scope are well-defined. Eg. Think of Medical Device Industry.
- In situations wherein technology is stable, and documentation and design specifications are clear, the V-model can be used.
- Well-suited for projects that must maintain a strict deadline and meet key milestone deadlines throughout the project.

DISADVANTAGES OF V-MODEL

- Lack of adaptability. An overlooked issue within fundamental system design, discovered during the implementation stage, can cost man-hours and increased costs.
- Timeline restrictions. What is the drawback of testing in the final stages? (Although not applicable to V-model)
- Ill-suited to lengthy lifecycles. V-model, like waterfall is a linear model. Poorly suited to long-term projects which may require many versions or constant updates/patches.
- There is a debate that V-model tends to emphasize a development cycle befitting managers and users, rather than developers and designers. What do you think?

CONCLUSION

- Development model selected for a project depends on the aims and goals of a project.
- In any model, testing should be performed at all levels, i.e. right from requirements until maintenance.