

COM4506/6506: Testing and Verification in Safety Critical Systems

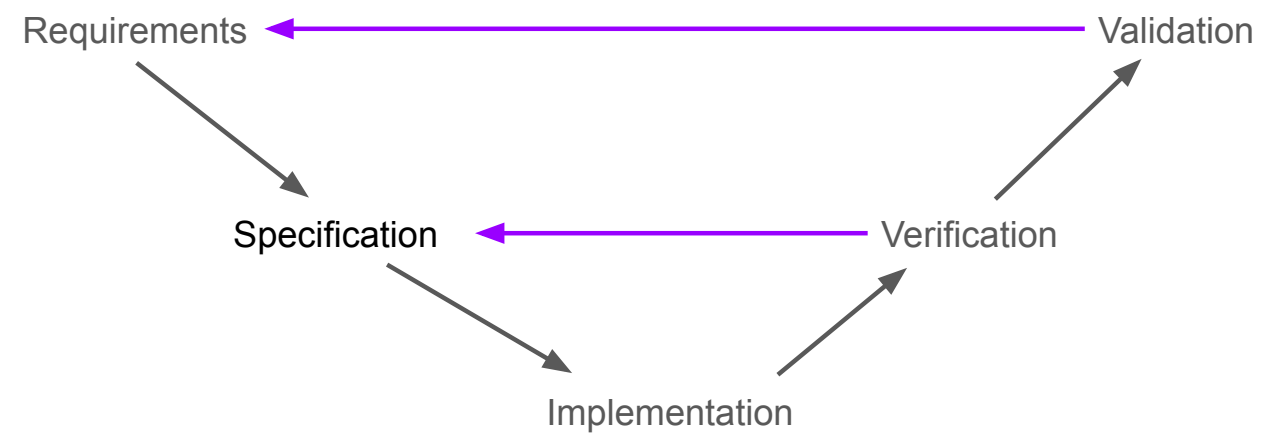
Dr Ramsay Taylor



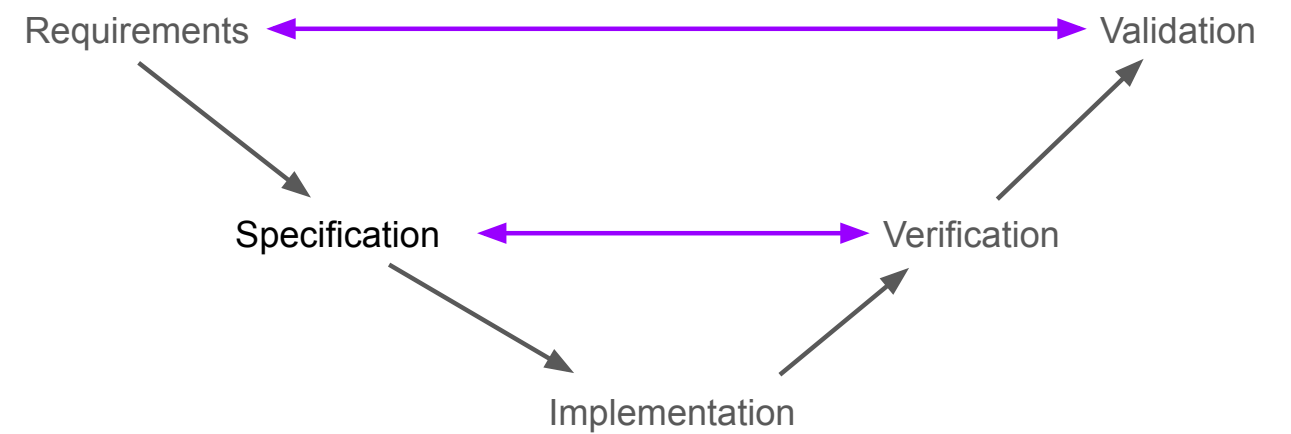
Contents

- Connecting things back to the requirements
- Standards requirements
- But also fun and profit!

The V model



The V model



Traceability

As the spec is developed, we want to keep track of *why* we are building it this way.

Not least, so that we don't change a Spec that is mitigating a hazard!

This will also help with *Validation* later.



Standards Requirements

11.21

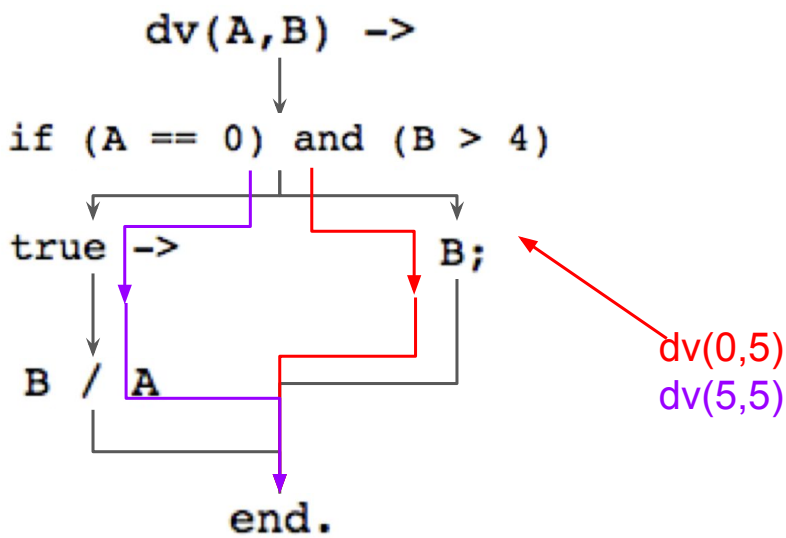
Trace Data

Trace Data establishes the associations between life cycle data items contents. Trace Data should be provided that demonstrates bi-directional associations between:

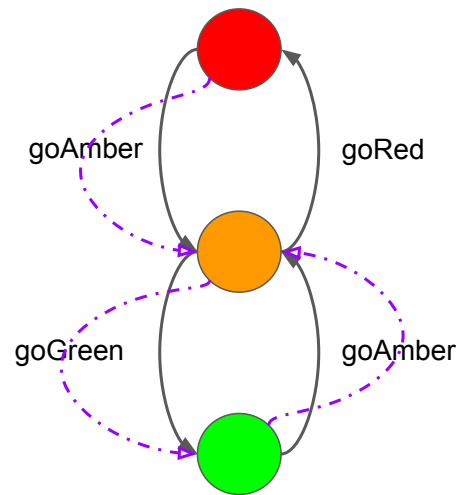
- a. System requirements allocated to software and high-level requirements.
- b. High-level requirements and low-level requirements.
- c. Low-level requirements and Source Code.
- d. Software Requirements and test cases.
- e. Test cases and test procedures.
- f. Test procedures and test results.

DO-178C

Unit Testing



Model Based testing



```
@Test
public void AGA() {
    tl.transition( line: "goAmber");
    tl.transition( line: "goGreen");
    tl.transition( line: "goAmber");
    assert(tl.getState() == TrafficLight.LightState.AMBER);
}
```

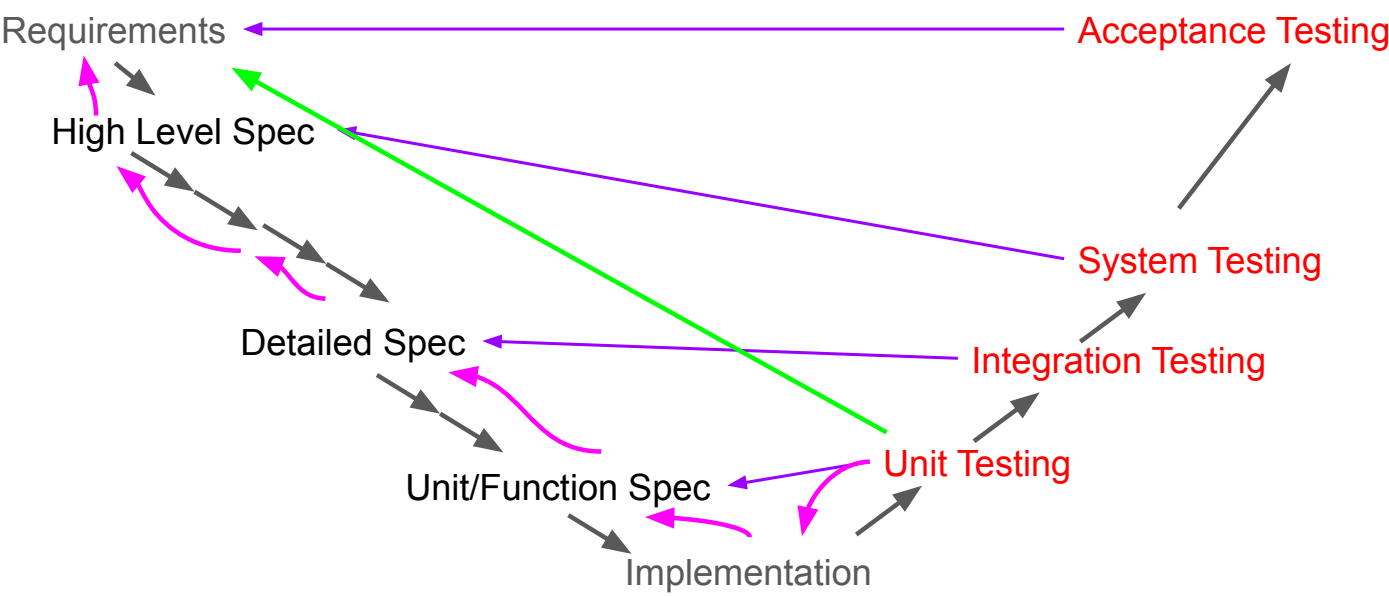
Model Based testing



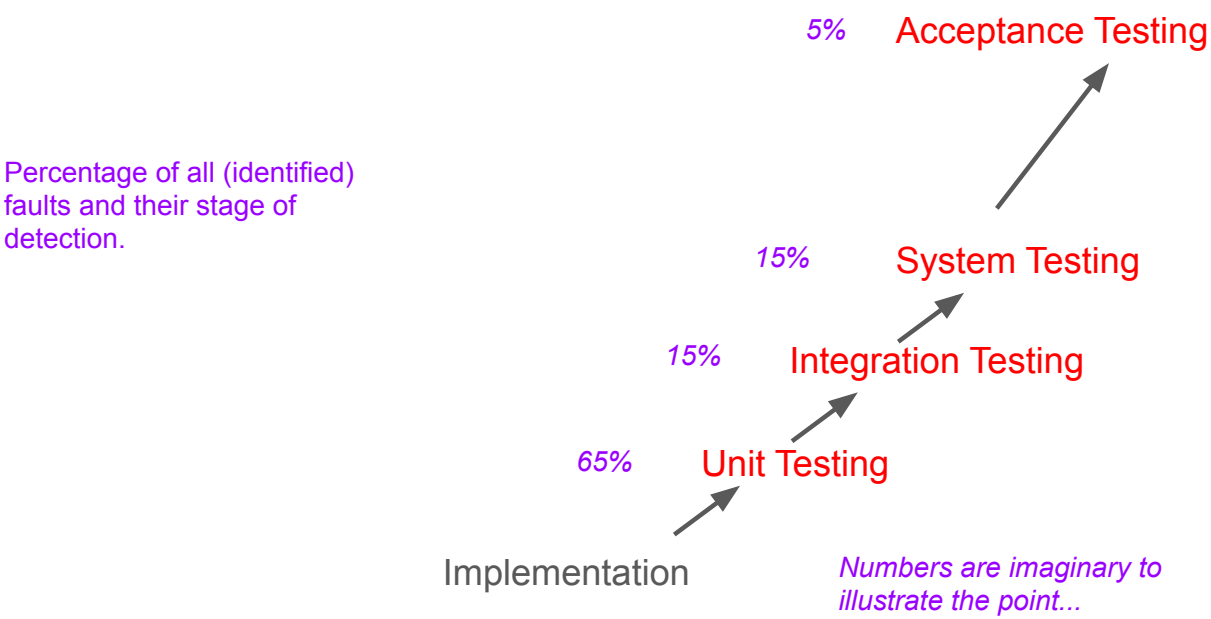
Requirements Traceability Matrix

REQUIREMENTS TRACEABILITY MATRIX					
Project Name: Online Flight Booking Application					
Business Requirements Document BRD		Functional Requirements Document FSD		Test Case Document	
Business Requirement ID#	Business Requirement / Business Use case	Functional Requirement ID#	Functional Requirement / Use Case	Priority	Test Case ID#
BR_1	Reservation Module	FR_1	One Way Ticket booking	High	TC#001 TC#002
		FR_2	Round Way Ticket		TC#003 TC#004
		FR_3	Multicity Ticket booking	High	TC#005 TC#006
BR_2	Payment Module	FR_4	By Credit Card	High	TC#007 TC#008
		FR_5	By Debit Card	High	TC#009
		FR_6	By Reward Points	Medium	TC#010 TC#011

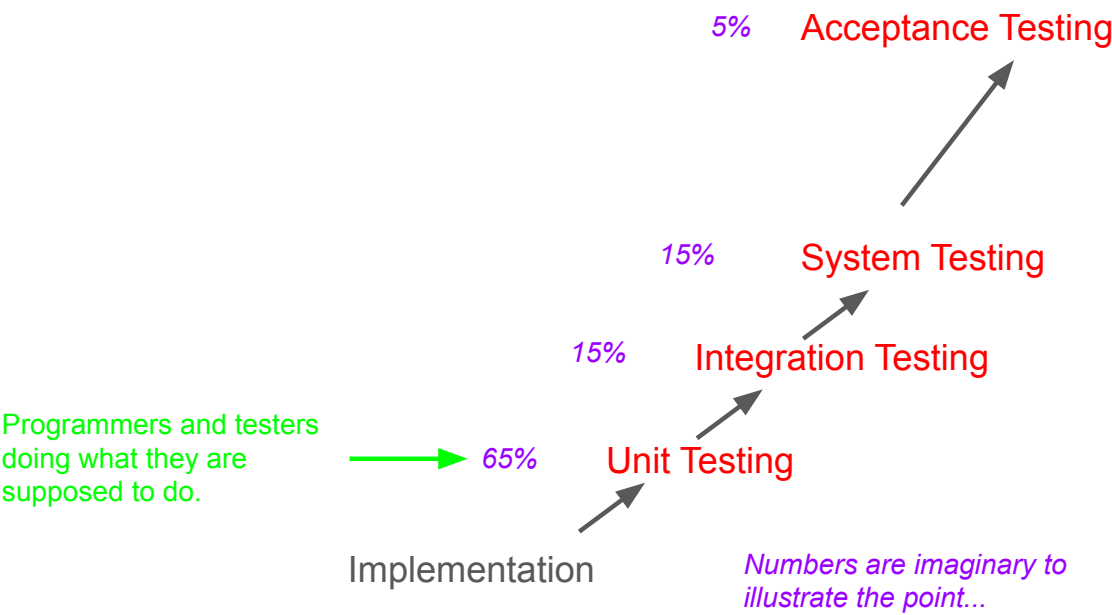
V Model Tracing



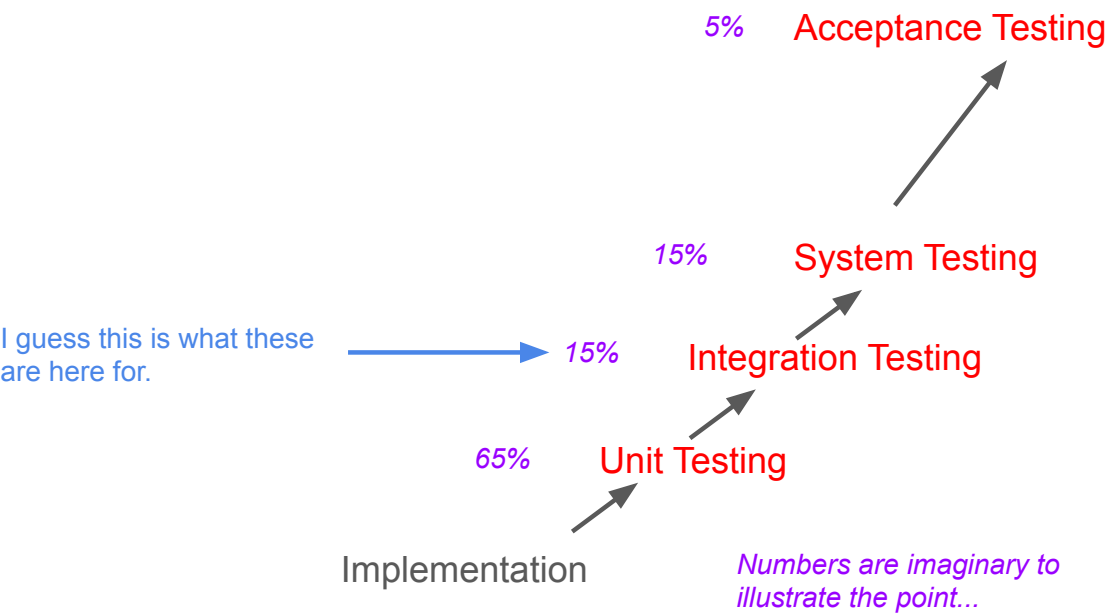
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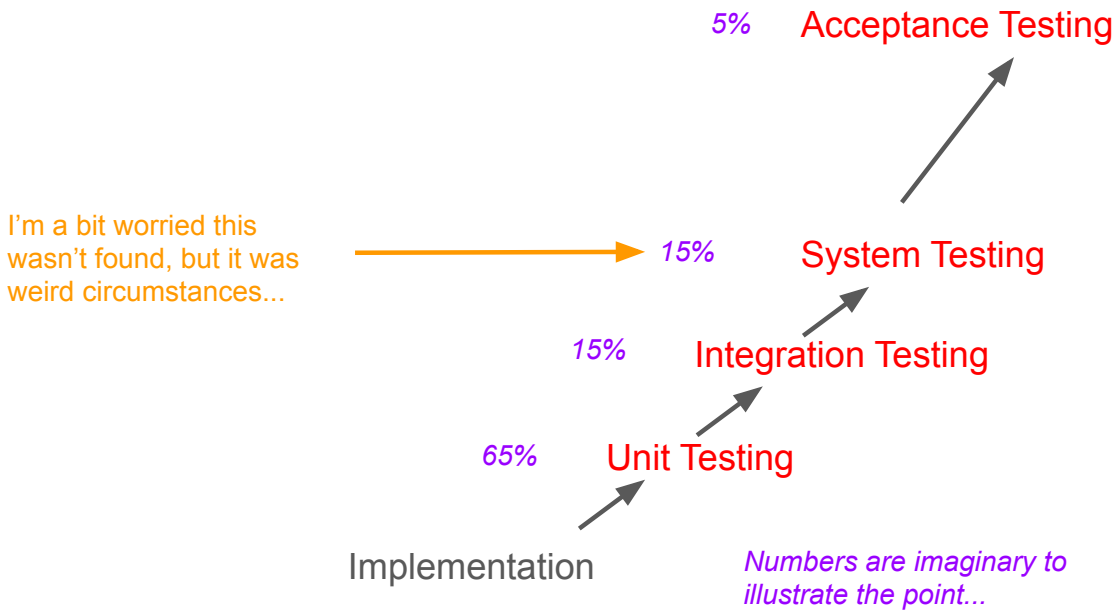
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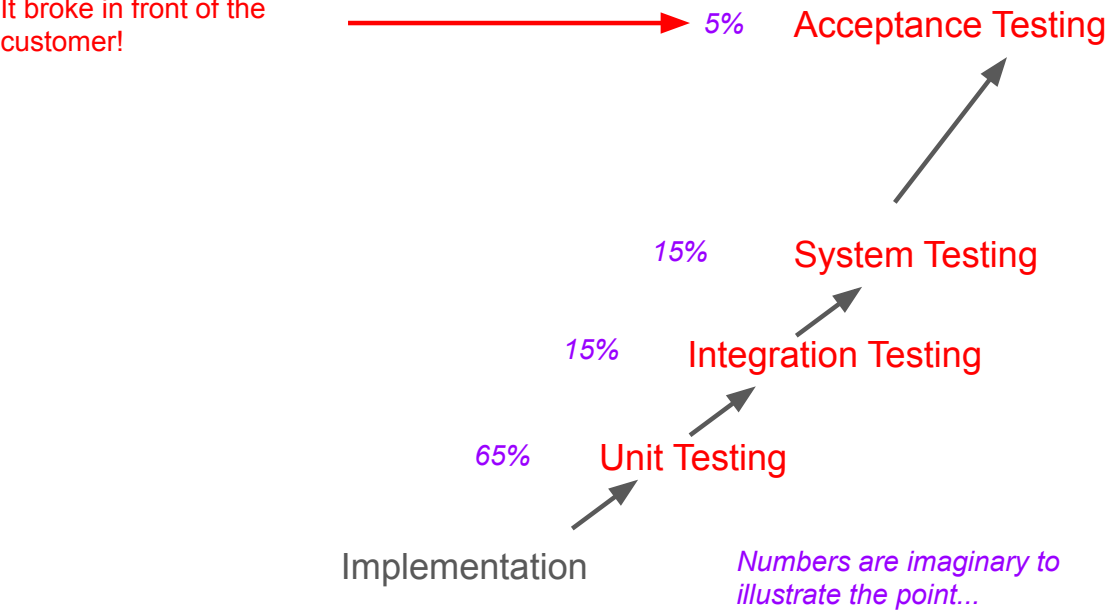
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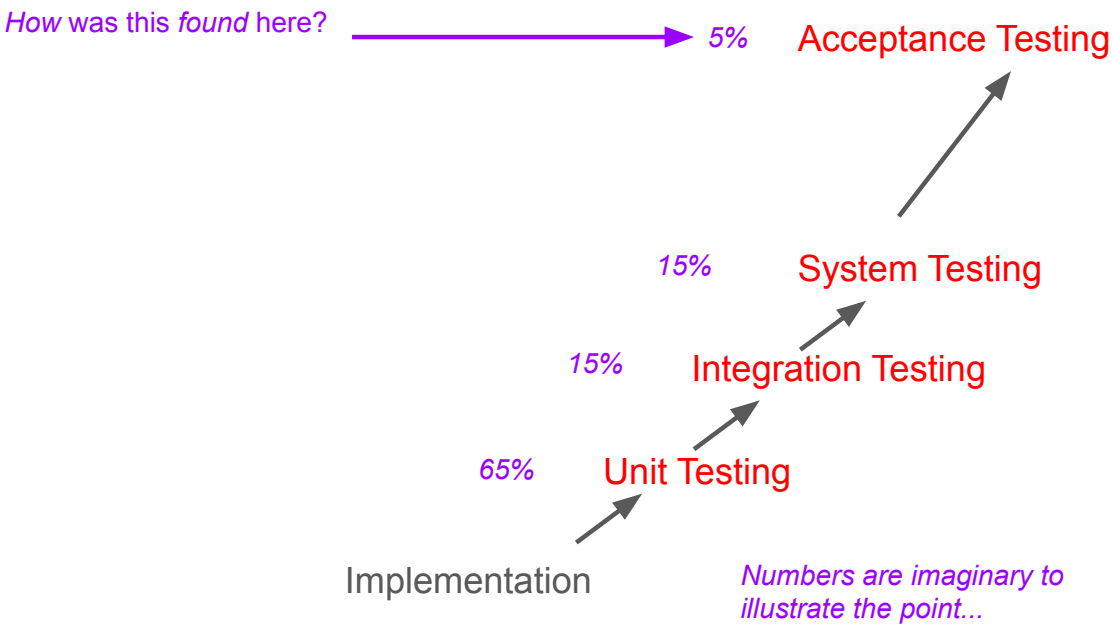
V Model Tracing



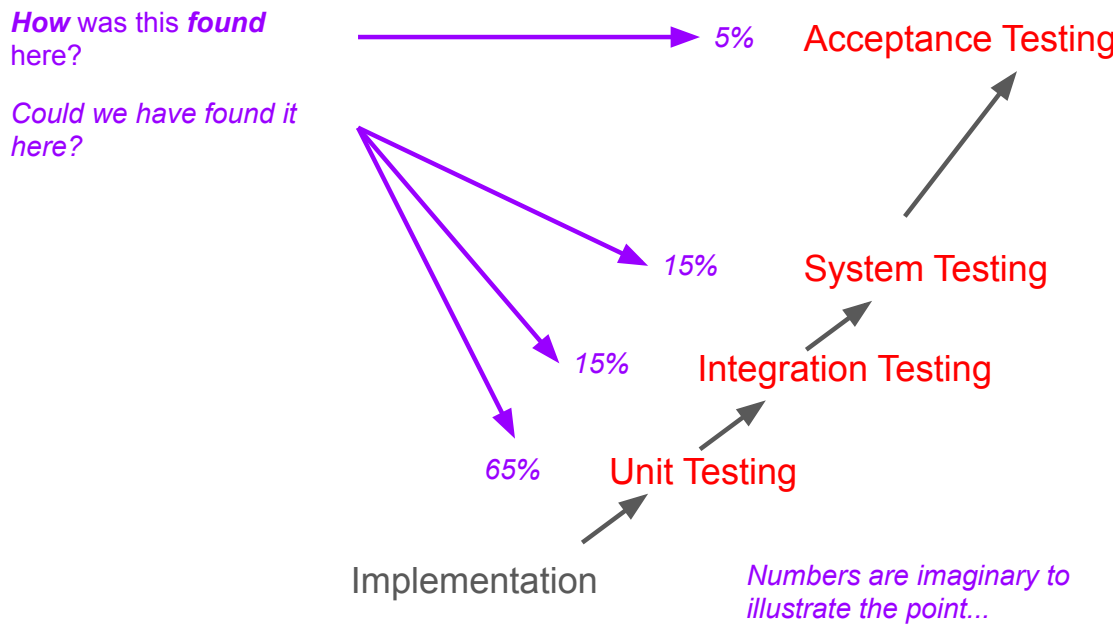
V Model Tracing



Making things better



Making things better



"You can't control what you can't measure"

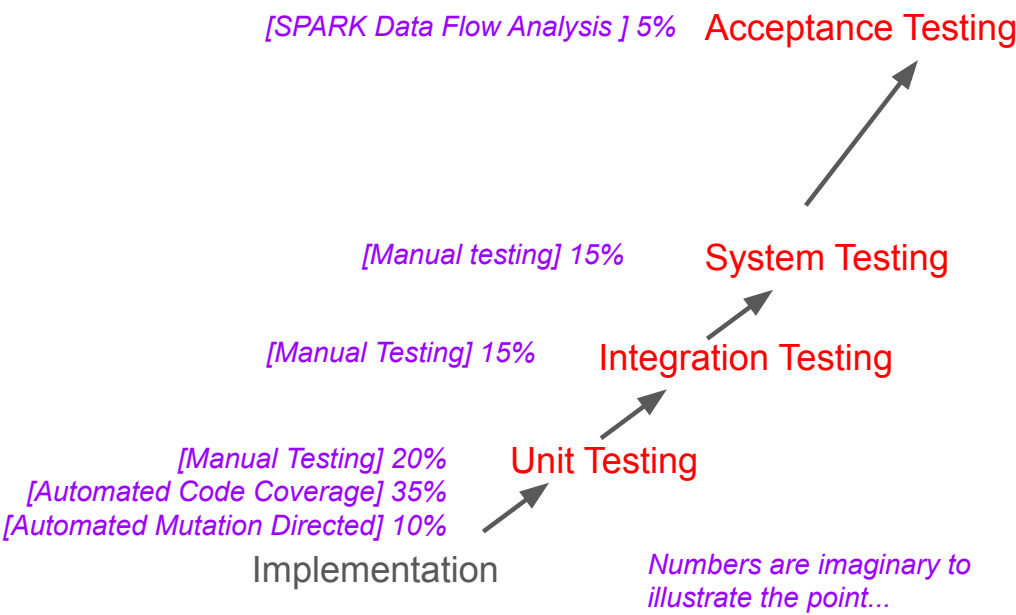
[probably not Paul Caseley]

"You can't control what you can't measure"

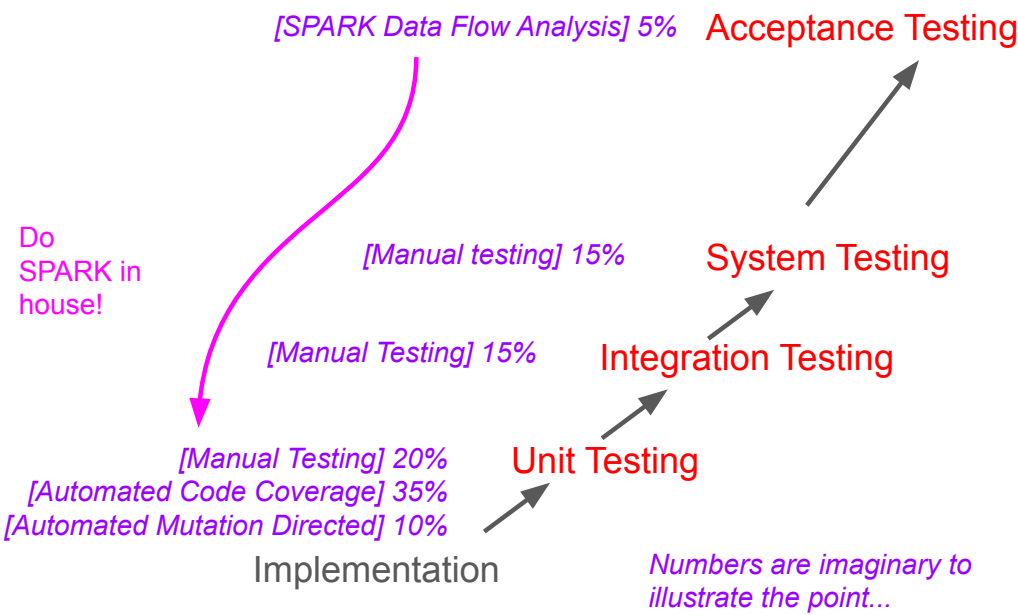
[probably not Paul Caseley]

Module:	TrafficLight
Test Case:	AGA
Generation Source:	Model Based Testing
Requirement:	...
Fault Details:	...

Making things better



Making things better



Summary

- Connecting our Tests to our Requirements is a *Good Thing*
- Its required by Standards
 - It shows Requirements “coverage”
- It also has the potential to improve *your process* and *your product*!