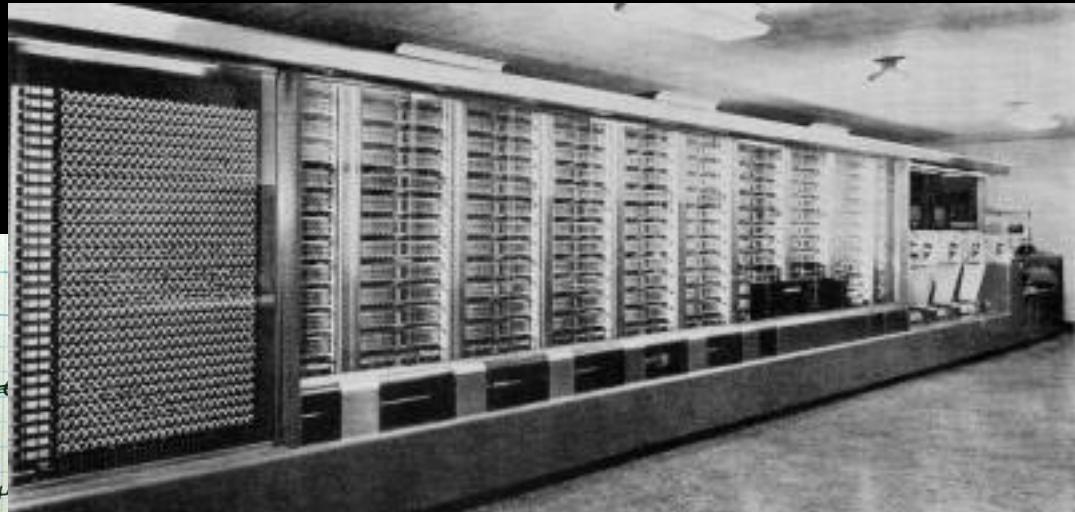
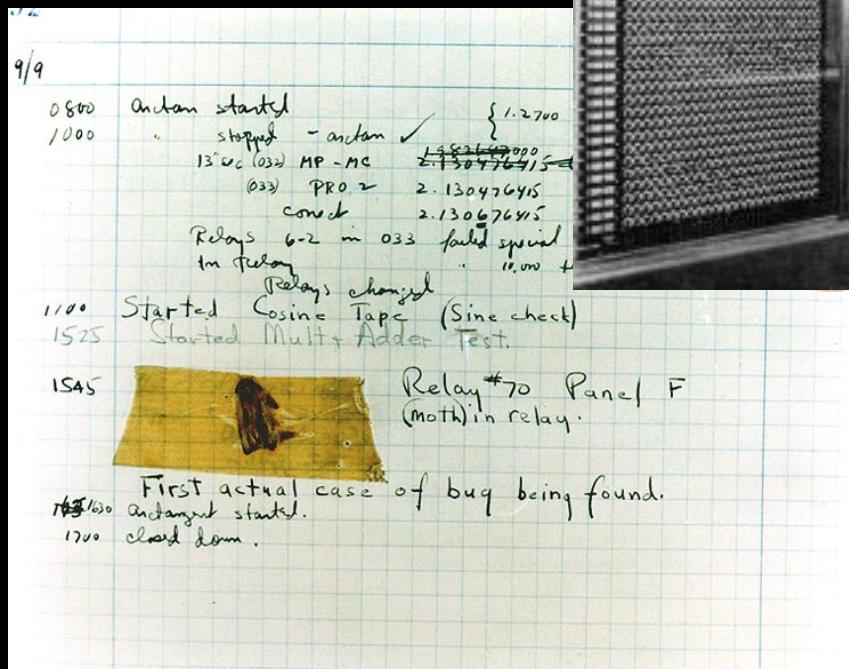


# SOFTWARE PROJECT MANAGEMENT



# TODAY

## SPECIFYING SOFTWARE TESTING SOFTWARE PROJECT

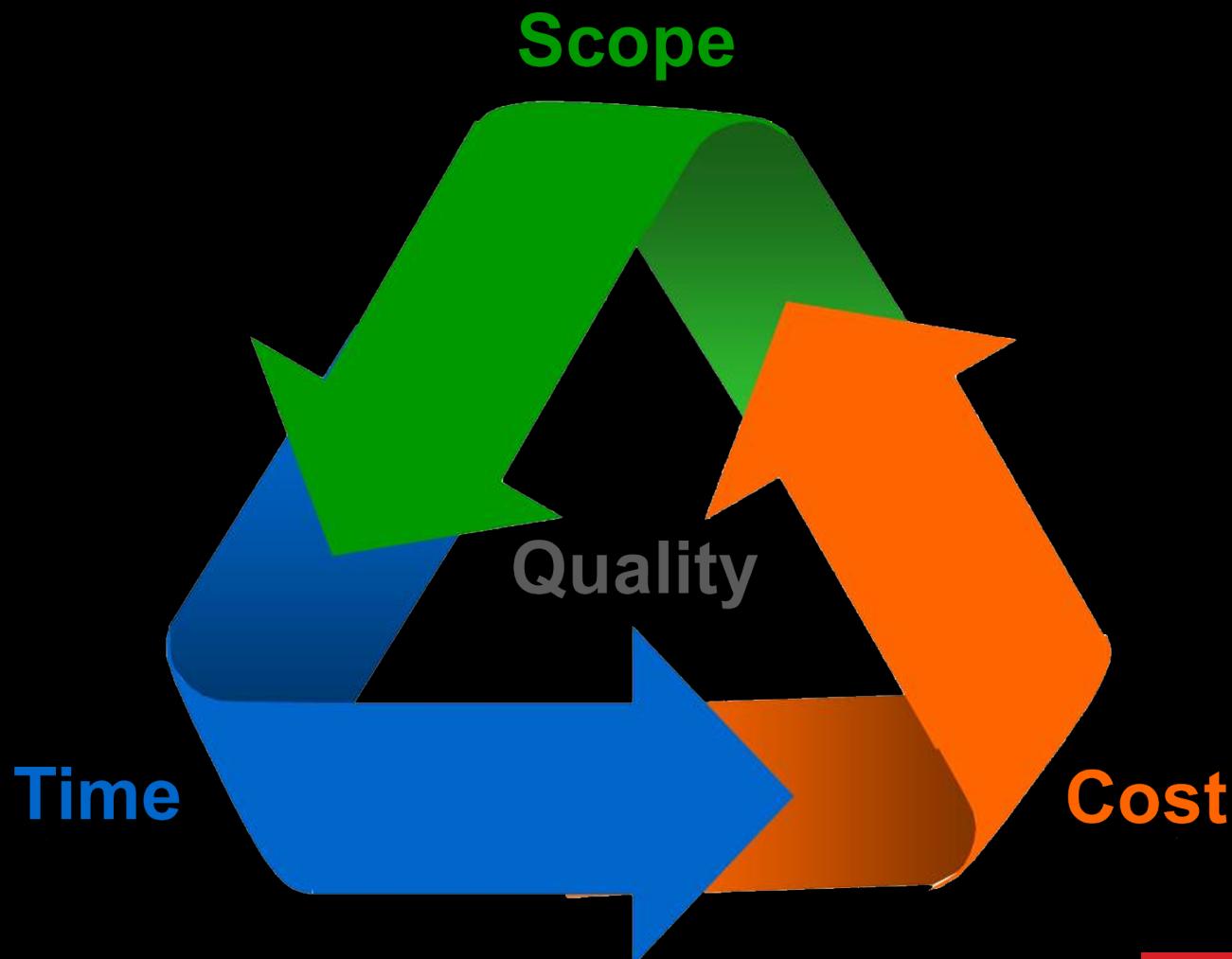
# OTHER COURSES

TDA567 TESTING, DEBUGGING & VERIFICATION  
DAT260 MODEL-BASED TESTING

TDA293 SOFTWARE ENGINEERING USING FORMAL  
METHODS

DIT276 REQUIREMENTS ENGINEERING  
TDA593 MODEL-DRIVEN SOFTWARE DEVELOPMENT

# PROJECT MANAGEMENT



# SCOPE

**Quantity**

**# functions**

**# views**

**# LOC**

**# ...**

**Quality**

**??**

**??**

**??**

**??**

# QUALITY ATTRIBUTES

1. FUNCTIONAL SUITABILITY
2. COMPATABILITY
3. PERFORMANCE EFFICIENCY
4. USABILITY
5. RELIABILITY
6. SECURITY
7. MAINTAINABILITY
8. PORTABILITY

ISO/IEC 25010:2011

ISO/IEC 25010

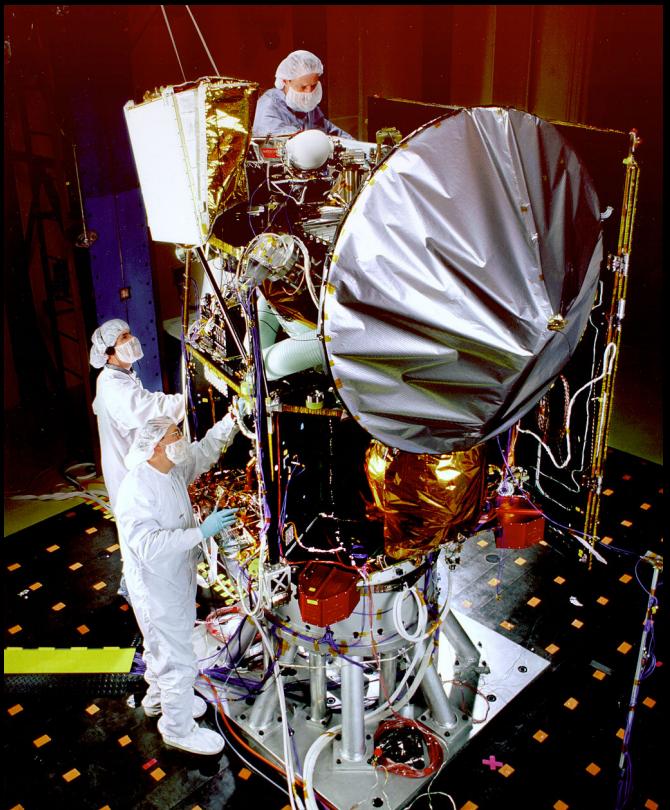
# TESTING

## VALIDATION

Are we building the  
right software?

## VERIFICATION

Are we building the  
software right?



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by Peter A. Lawrence

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# Google

# TESTING IS NOT EASY

THE SPECIFICATIONS WILL CHANGE OVER TIME  
IT'S IMPOSSIBLE TO COMPLETELY TEST A PROGRAM  
TESTING CAN'T SHOW THAT A PROGRAM IS BUG-FREE  
ALL FOUND BUGS CAN'T BE FIXED  
DIFFICULT TO DECIDE IF IT'S A BUG OR NOT

# WHAT IS THE COST OF BUGS?

# NO REASON TO GIVE UP



PROVE IT  
MODEL IT  
TEST IT

# PROVE IT



# MODEL IT

TEST ON AN ABSTRACTION OF THE PROGRAM

WHAT HAS TO BE MODELLED?

WHAT CAN BE IGNORED?

WHAT IS ASSUMED?



# TEST IT

STATIC

READ

INSPECT

DYNAMIC

BUILD

RUN

# STATIC TESTING

LOOP CONDITIONS  
ARRAY INDECES  
VARIABLE INITIALISATION  
ARGUMENT ORDER  
NAMES

# DYNAMIC TESTING

TEST-TO-PASS / TEST-TO-FAIL  
WHITE / GREY / BLACK  
AUTOMATIC / MANUAL

# EXAMPLES



> java MyTest "1"  
> java MyTest "2"  
> java MyTest "3"  
> java MyTe|

# SPECIFICATION & TESTING

VISION/USER STORIES    ACCEPTANCE TEST

DESIGN    SYSTEM TEST

INTEGRATION TEST

IMPLEMENTATION    UNIT TEST

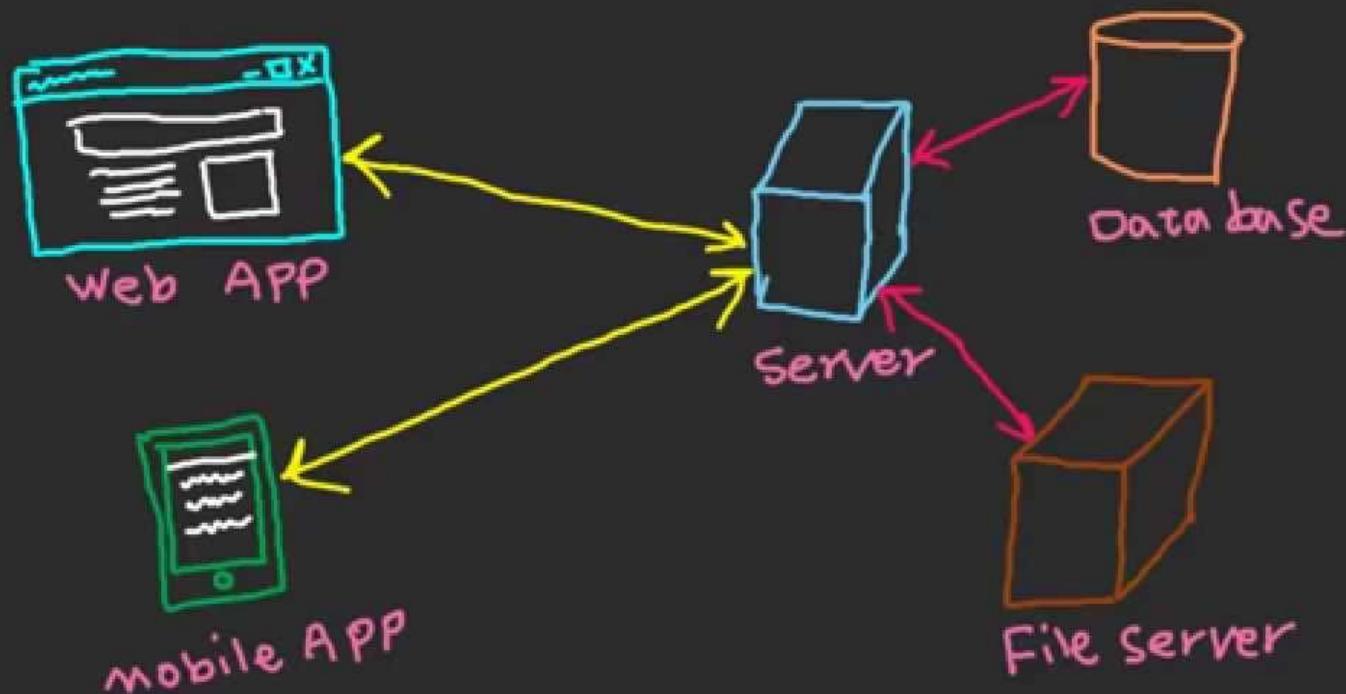
# ACCEPTANCE TEST

USER EXPERIENCE  
A / B TESTS  
MULTI-VARIATE  
BETA-RELEASE



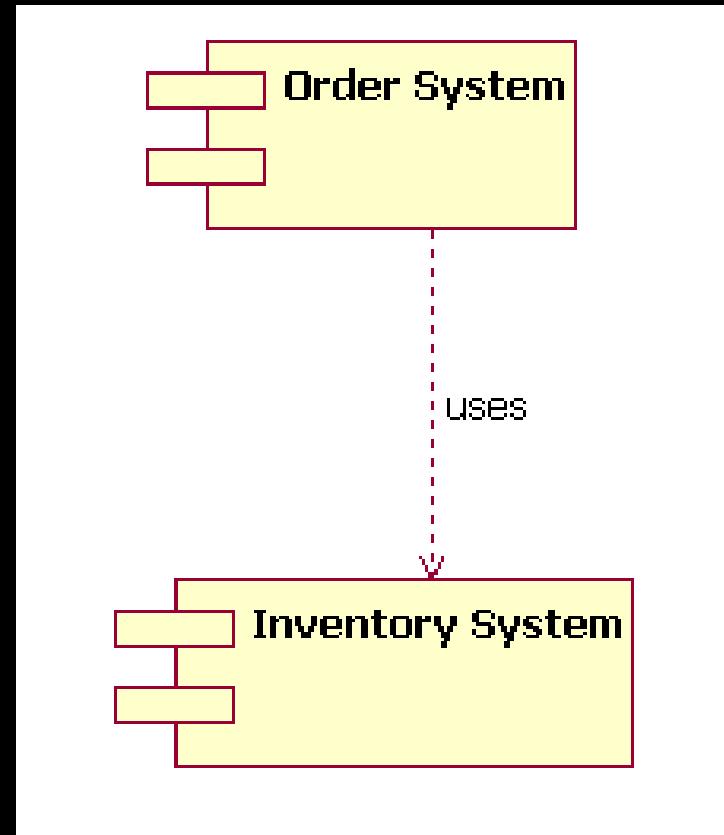
# SYSTEM TEST

Front-End / Back-End



# INTEGRATION TEST

GIVEN THAT ORDER  
SYSTEM AND  
INVENTORY SYSTEM  
PERFORM AS  
EXPECTED, WILL THEY  
PERFORM AS  
EXPECTED WHEN  
INTEGRATED?



# UNIT TEST

```
private static final String NUMBER_24 = "2 4 ENTER";
private static final String NUMBER_74 = "7 4 ENTER";
private static final String ADD_RESULT = "98";

public void testAddValues() {
    sendKeys(NUMBER_24);
    sendKeys(NUMBER_74);
    sendKeys("ENTER");

    String mathResult = result.getText().toString();
    assertTrue("The result should be 98",
        mathResult.equals(ADD_RESULT));
}
```

<http://code.tutsplus.com/tutorials/android-sdk-unit-testing-with-the-junit-testing-framework--mobile-421>

# TEST COVERAGE

QUALITY ATTRIBUTES USING METRICS  
LINES OF CODE EXECUTED  
EXHAUSTING ALL POSSIBILITIES  
CORNER TESTING

# CORNER TESTING

WHICH ARE THE CORNERS TO TEST?



# REGRESSION TESTING

SUITABLE FOR EVOLVING PROJECTS

EVERYTIME YOU FIX A BUG  
YOU RUN THE TEST SUITE  
TO MAKE SURE THAT  
NOTHING IS BROKEN

# TEST-DRIVEN DEVELOPMENT

ADD A NEW TEST  
RUN ALL TESTS  
ADD SOME CODE  
RUN ALL TESTS  
REFACTOR

# TEST-DRIVEN DEVELOPMENT

ADD A NEW TEST  
RUN ALL TESTS  
ADD SOME CODE  
RUN ALL TESTS  
REFACTOR

# POSSIBLE DELIVERABLES

USER EXPERIENCE    ACCEPTANCE TEST

IMPLEMENTATION    SYSTEM TEST  
                          INTEGRATION TEST  
                          UNIT TEST

PROCESS    WHEN?  
                          WHO?

# WHAT'S NEXT?

SEP 13<sup>th</sup> 10.00 – 11.45:  
LAST TOOL SUPERVISION  
5215

SEP 14<sup>th</sup> 13.00 – 17.00  
INTRODUCTION TO CHALLENGE  
INTRODUCTION TO SUPERVISION  
SUPERVISION (15-17)  
OPEN ARENA @ LINDHOLMEN

# REMEMBER

MERGE-MERGE-MERGE  
CHALLENGE YOUR ASSUMPTIONS  
SELF-ORGANISATION & RESPONSIBILITY  
COLLABORATION



# QUESTIONS?

'Questions don't have to make sense, Vincent', said Miss Susan.

'But answers do'

*Terry Pratchett  
Thief of Time, 2001*