



UNIVERSITÀ
DI TRENTO



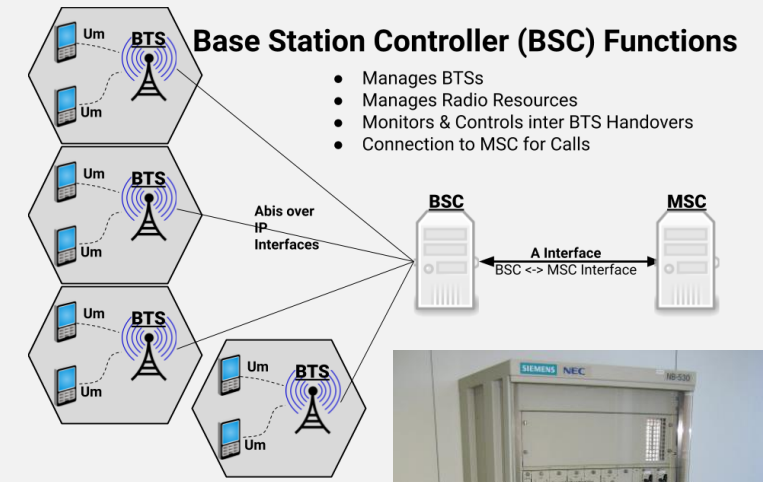
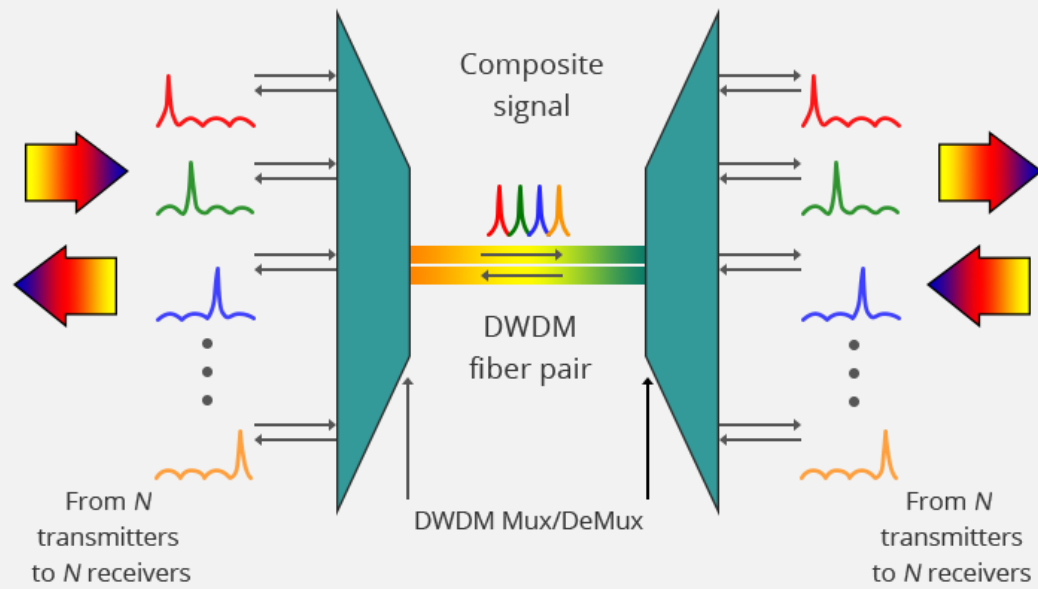
Seminario IBM su gestione dei requisiti

08/11/2024

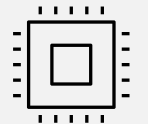
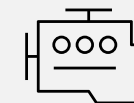
Gianluca Monticone

Sustainability Software Technical Specialist, IBM Technology Sales, IBM Italia

gianluca.monticone@it.ibm.com



Dense wavelength-division multiplexing (DWDM) is an optical fiber multiplexing technology that increases the bandwidth of fiber networks.



Agenda

Courtesy of Legolize



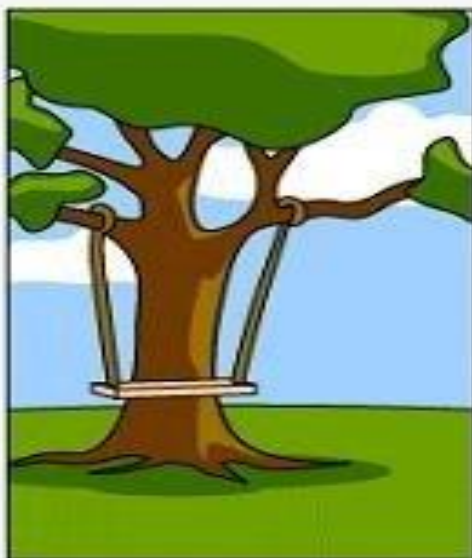
Exact Instructions Challenge



[Link](#)



How the customer explained it



How the Project Leader understood it



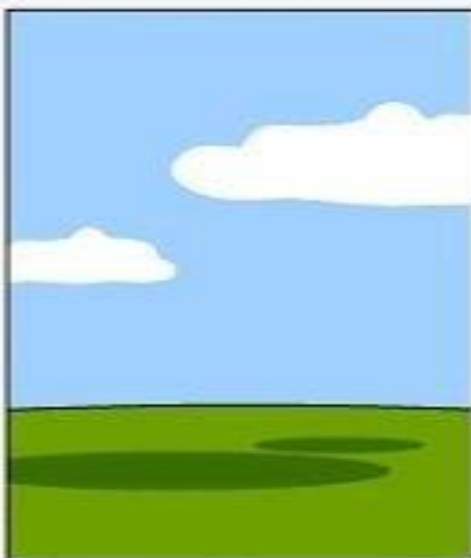
How the System Analyst designed it



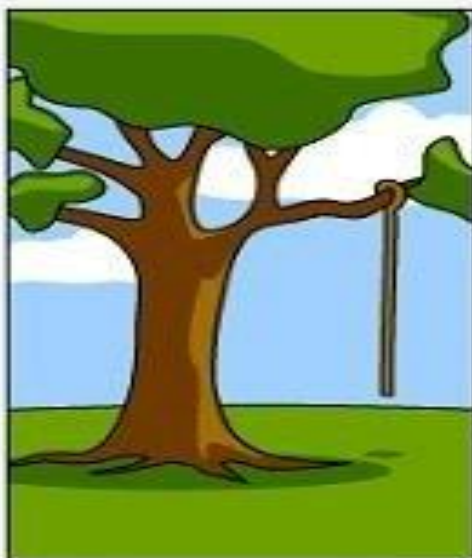
How the Programmer wrote it



How the Business Consultant described it



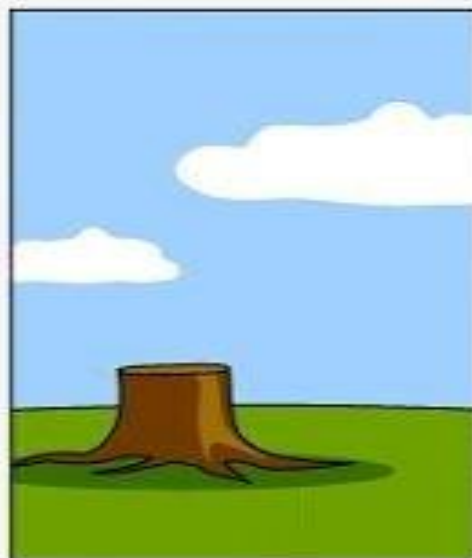
How the project was documented



What operations installed



How the customer was billed



How it was supported



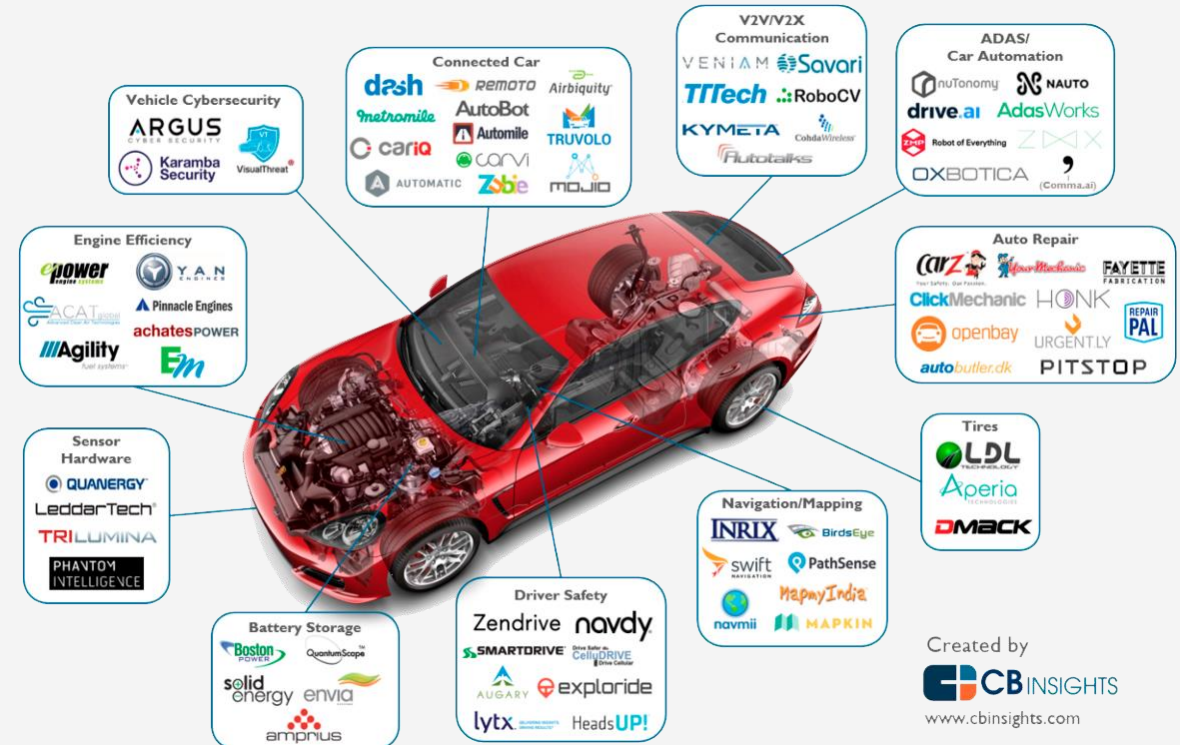
What the customer really needed

Companies already face the challenges of increasing complexity.....

News reports:

- **4.8M vehicles recalled** for cruise control issue fixed via software update
- **1.25M trucks recalled** for software malfunction of airbags
- **+200K cars recalled** for software malfunction of rear camera
- **68K SUV's recalled** for software malfunction of anti-lock & collision detection

Unbundling The Automobile



Systems-of-systems-of-systems.....
Software related recalls +15% in 2016

Companies already face the challenges of increasing complexity.....

News reports:

57 Medical Devices Recalled and Reported to the FDA in 2021 alone

Source: [Link](#)

Medical Devices have caused 80,000 deaths since 2009 for devices used for pain and other conditions

Source: [Link](#)

137 Class III Device Recalls in 2017-2018 Reported to the US Food and Drugs Administration for class III devices used to support or sustain human life

Source: [Link](#)



23% of recalls in 1Q2018 were software related....
driving an overall recall increase of 126%

Companies already face the challenges of increasing complexity.....

News reports:

F-35 Fighters will cost \$22B more than expected because 24 million lines of code proving difficult

189 People Killed in Lion Air Flight 610 caused by malfunctioning software and design issues

Airbus A220 engine blowouts suspected by Reuters sources as a software issue

Boeing Starliner spacecraft's software flaw curtails mission by depleting fuel preventing space station docking, inspection discovered potentially fatal software issues



Computer code in a typical plane has grown 40% in past decade

Companies already face the challenges of increasing complexity.....

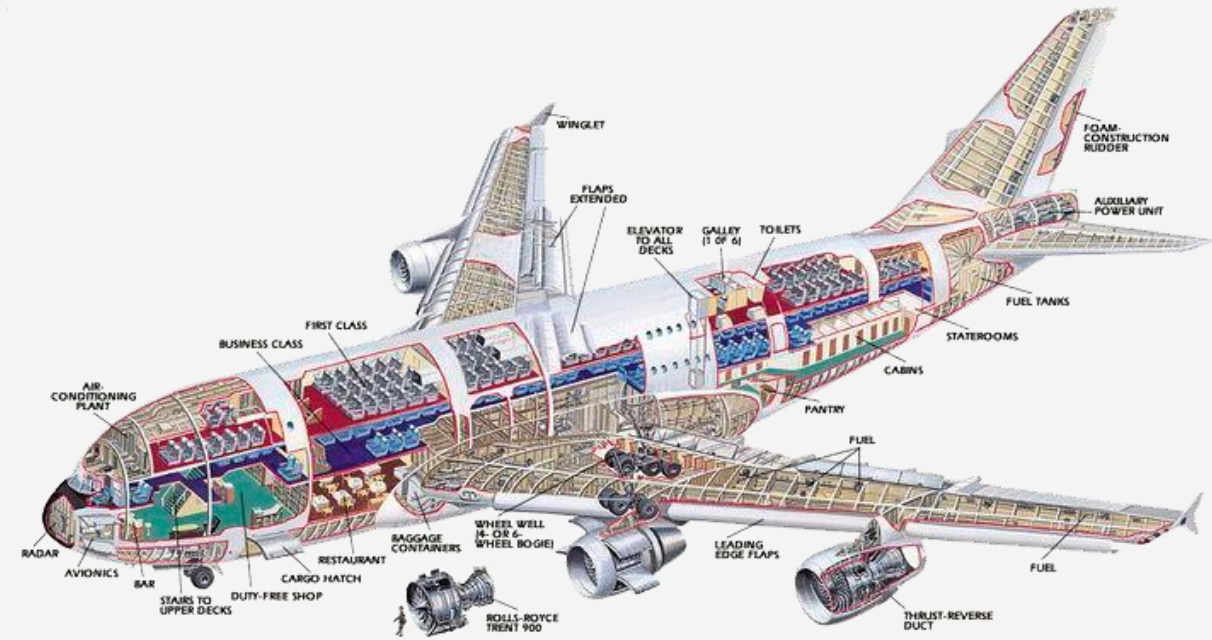
News reports:

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Computer code in a typical plane
has grown 40% in past decade

Companies already face the challenges of increasing complexity.....

Mind the Gap: New French Trains Too Wide for Many Platforms

PARIS—France's state-run railway system on Wednesday admitted failing to mind the gap, after realizing that a fleet of new trains it has ordered are too wide to fit many of the country's stations. It will cost about €50 million (\$68.5 million) to alter the platforms to fit the new trains by 2016, when they are delivered, SNCF and RFF said.



SOURCE: Wall Street Journal World, May 21, 2014

What is Requirements Management?

- **Requirements capture**
 - how to elicit, capture and express requirements in a clear, unambiguous way
- **Requirements specification**
 - how to organize and present sets of requirements as documents
- **Requirements analysis**
 - how to trace the effect and satisfaction of each requirement through the design layers
- **Change management**
 - how to understand the impact of changes up and down the levels of requirements
- **Configuration management**
 - how to manage the requirement sets relating to versions and variants of a system

What are Requirements?

- Requirements are the **TO-DO** list of the Project Team
- List of **WHAT** the users need
- List of **WHAT** the System must do to satisfy user and business needs
- List of **WHAT** components must be built
 - Application hardware / software
 - Database element changes
 - Maintenance procedures
- List of **WHAT** each component **MUST DO**, and **HOW** components will **INTERACT**

Therefore, requirements provide the map and compass



Characteristics of Need and Requirement Statements



Each individual requirement should be:

- NECESSARY
- APPROPRIATE
- UNAMBIGUOUS
- COMPLETE
- SINGULAR
- FEASIBLE
- VERIFIABLE
- CORRECT
- CONFORMING
- COMPLETE
- CONSISTENT
- FEASIBLE
- COMPREHENSIBLE
- ABLE TO BE VALIDATED

Characteristics of User Stories

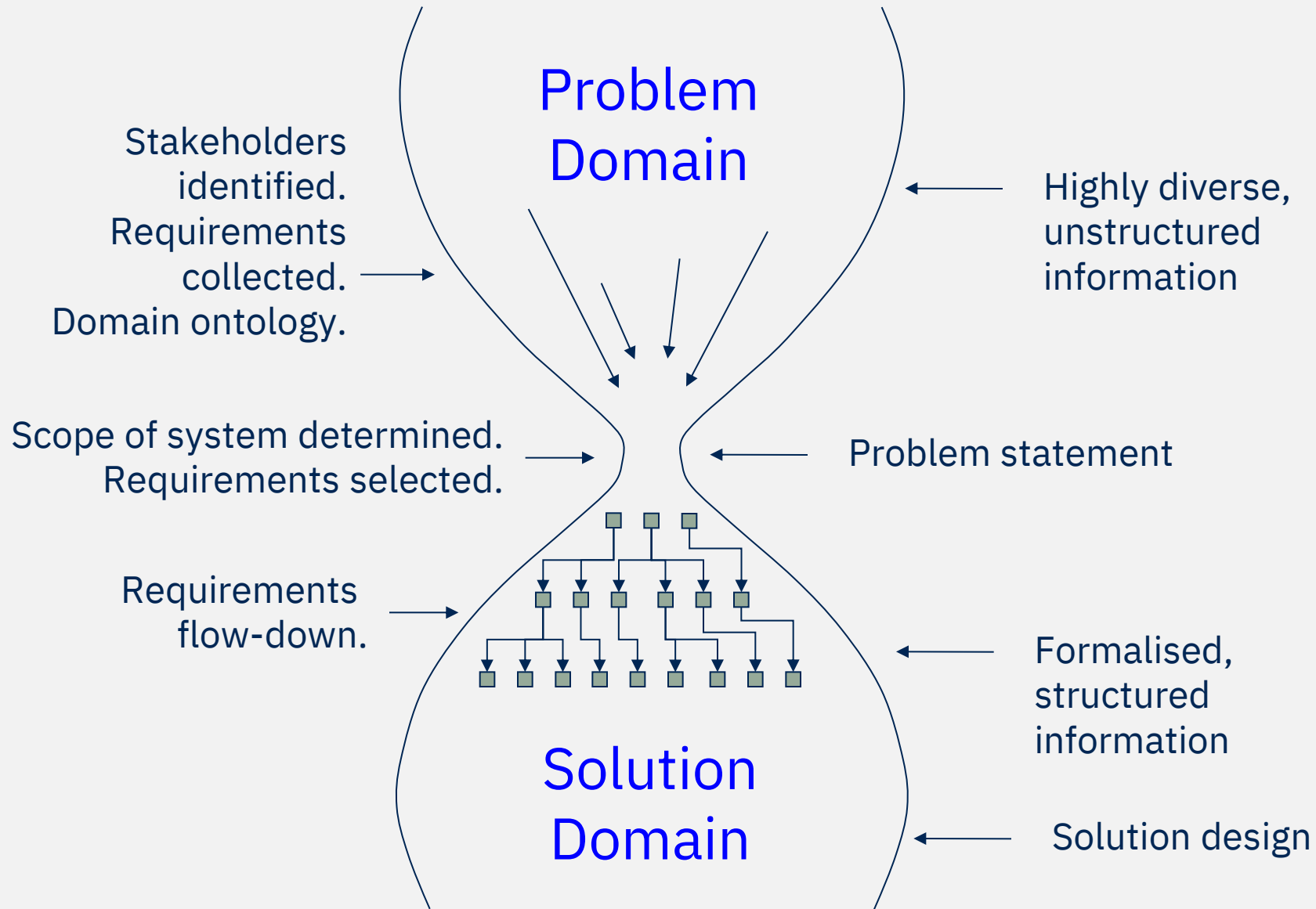
Requirements:

- Complete
- Testable
- Consistent
- Design-free
- Unambiguous

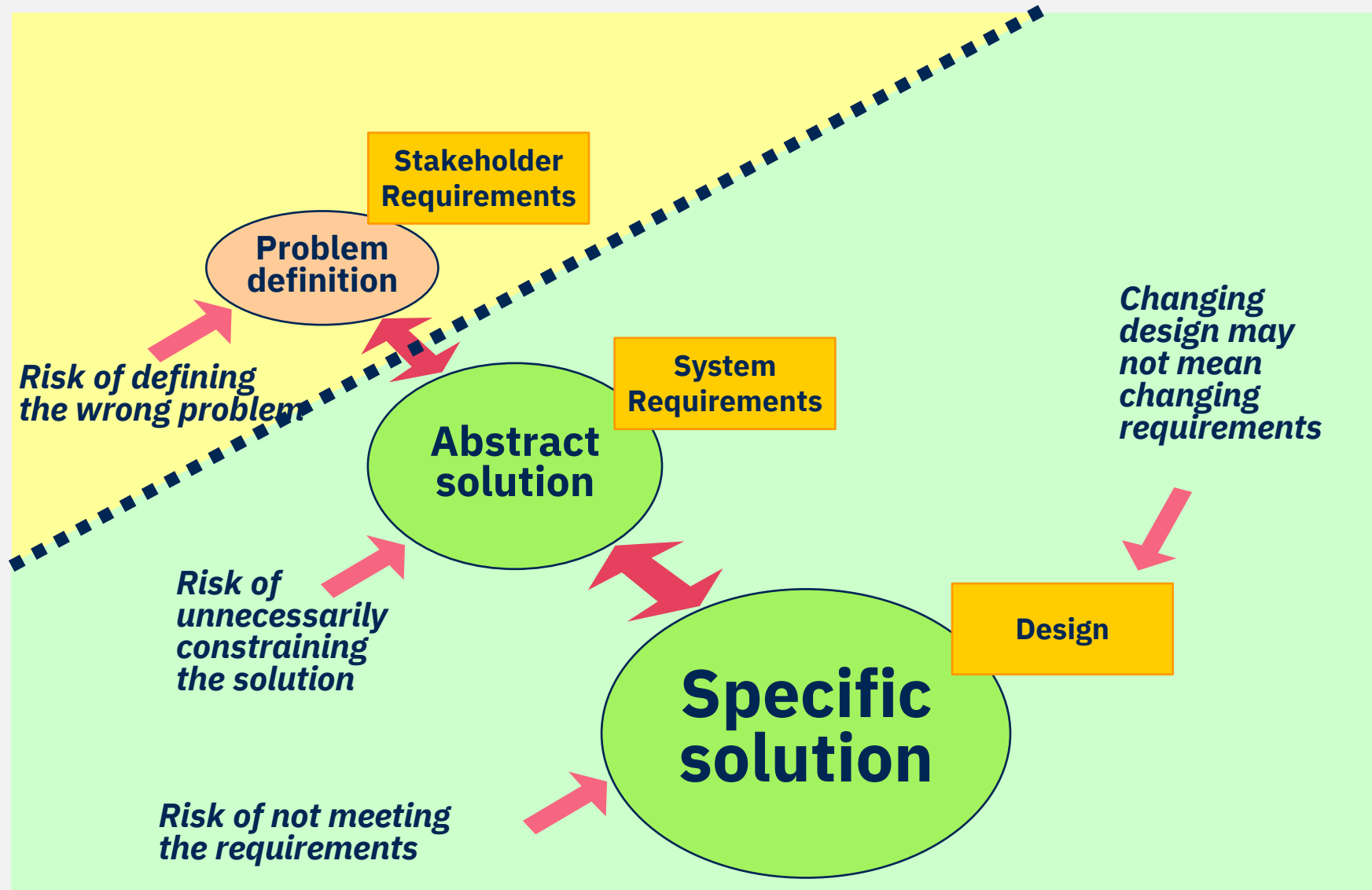
User Stories:



The Requirements “Hourglass”



Problem and Solution



Differentiating Problem and Solution

Problem

Stakeholder requirements

- A description of the problem and its context
- Results that stakeholders want from the system
- Do not define the solution, other than for environment
- Quality of results
- Owned by stakeholders or their representatives (e.g. marketing)

Solution

System requirements

- An *abstract* representation of the solution
- What the system does
- Do not define the design
- How well it does it
- Owned by systems engineers

“The user shall be able to”

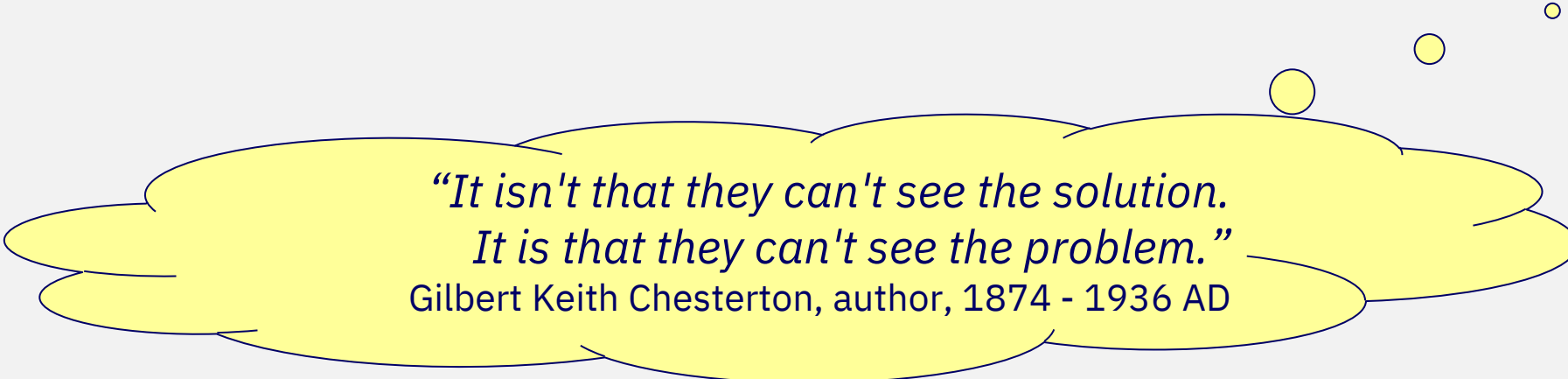
“The system shall do”

Results of mixing Problem and Solution

- Don't understand the problem
- Can't decide on functions
- Developers dominate
- Can't do acceptance
- User and system constraints muddled
- Unclear ownership



Effective Requirements Management

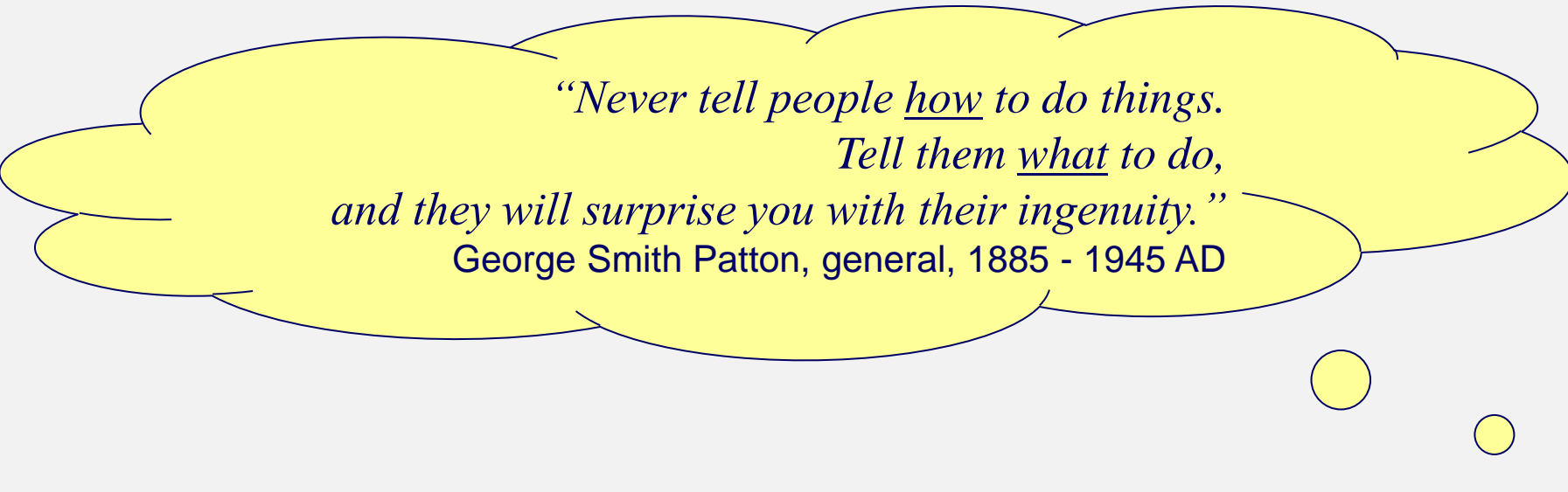


*“It isn't that they can't see the solution.
It is that they can't see the problem.”*

Gilbert Keith Chesterton, author, 1874 - 1936 AD

Requirements in the Problem Domain

Effective Requirements Management



*“Never tell people how to do things.
Tell them what to do,
and they will surprise you with their ingenuity.”*

George Smith Patton, general, 1885 - 1945 AD

Requirements in the Solution Domain

Benefits of Requirements Management

- **Traceability from highest level requirements to lowest level requirements**
 - Established via links through the database
- **Impact assessments of proposed changes**
 - Analysis tools let you see which other requirements, design elements, and tests will be affected by a change
- **Controlled access to current project information**
 - A **shared database** ensures that all users are working with current data
 - A **central repository** allows controlled access to essential information
- **Change control**
 - A Change Proposal System implements a controlled process for managing change

Change

Planned & unplanned

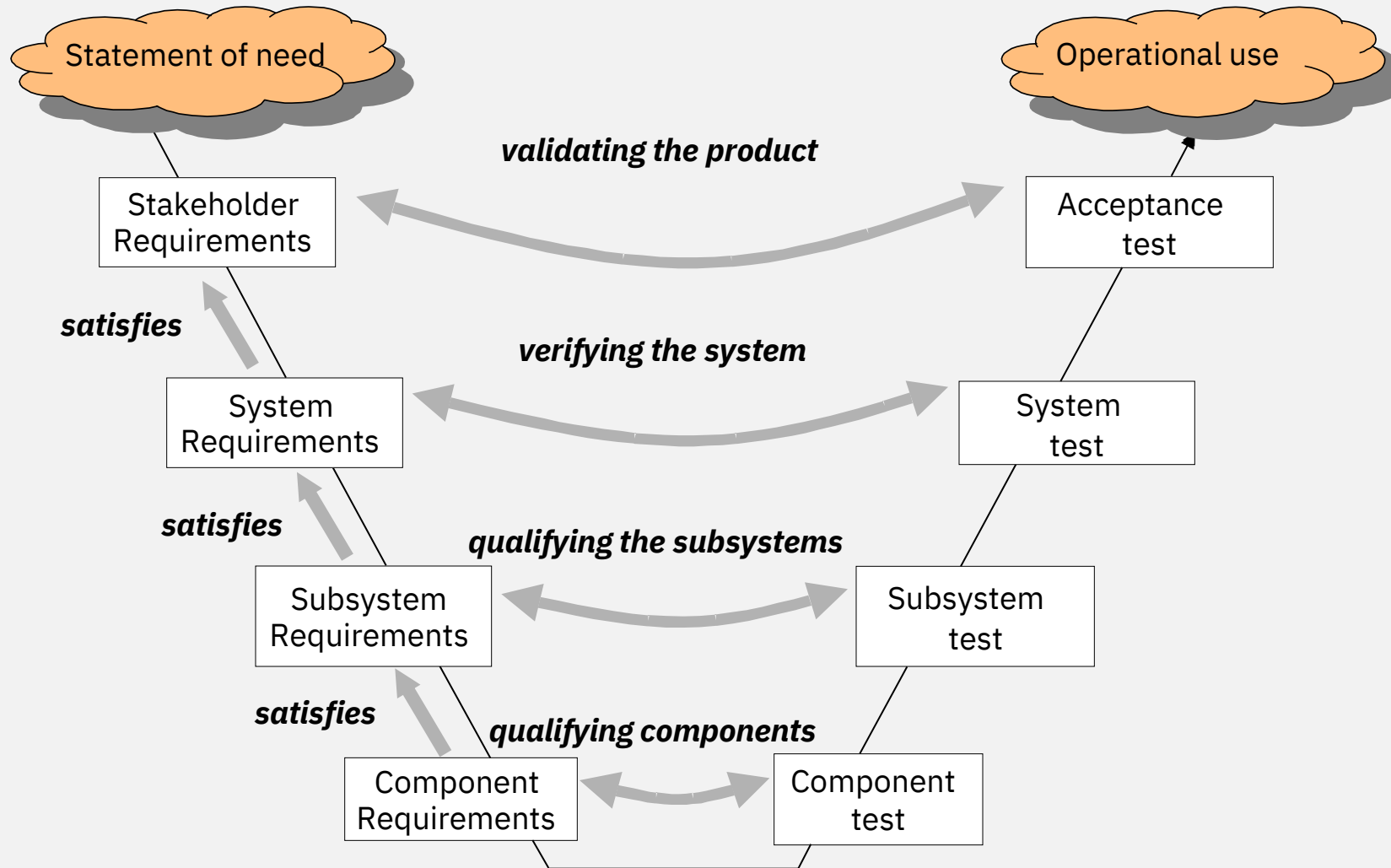
Expect it from above - stakeholders

Expect it from below - suppliers

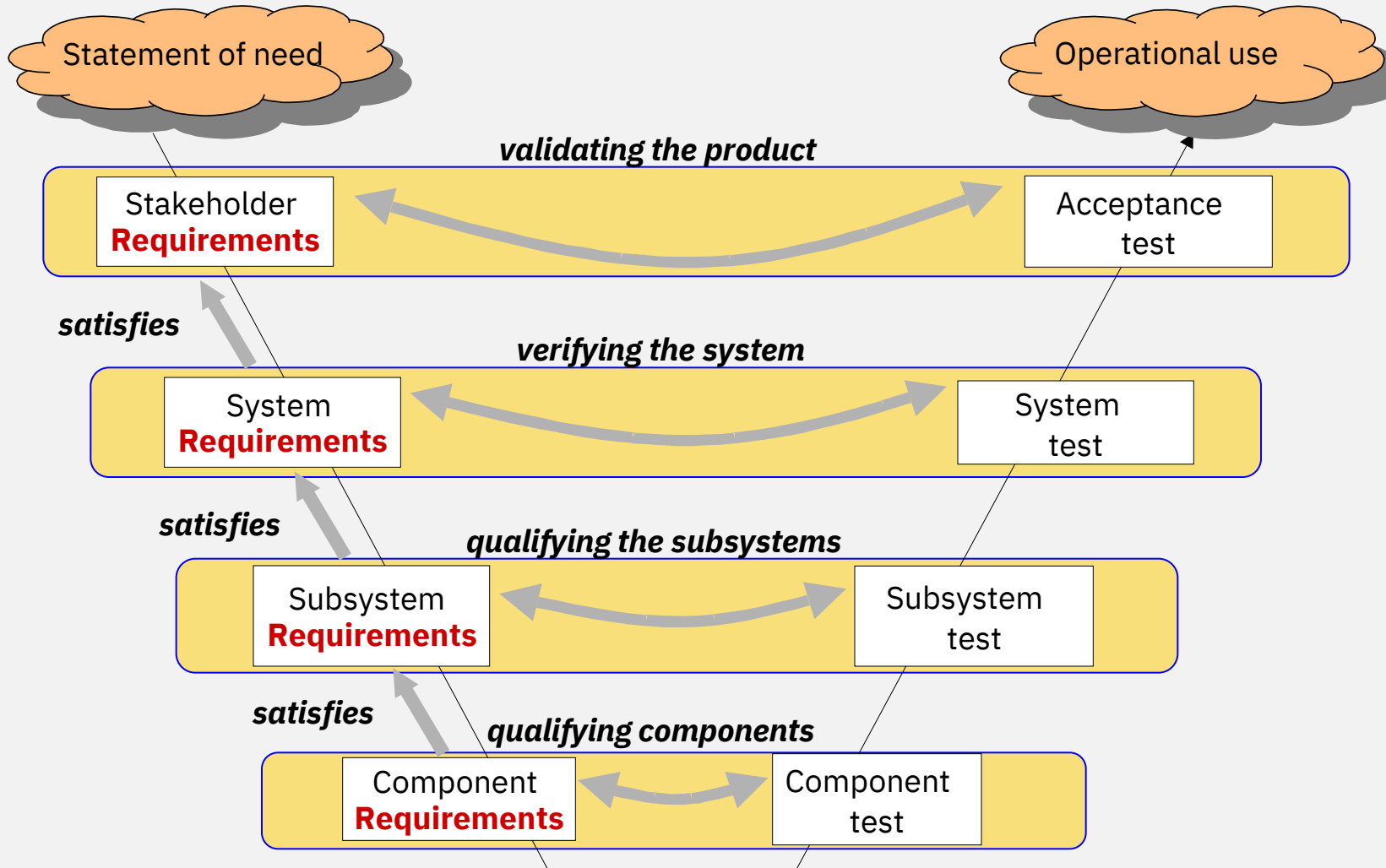
Expect it from your team colleagues

AND PREPARE FOR IT!

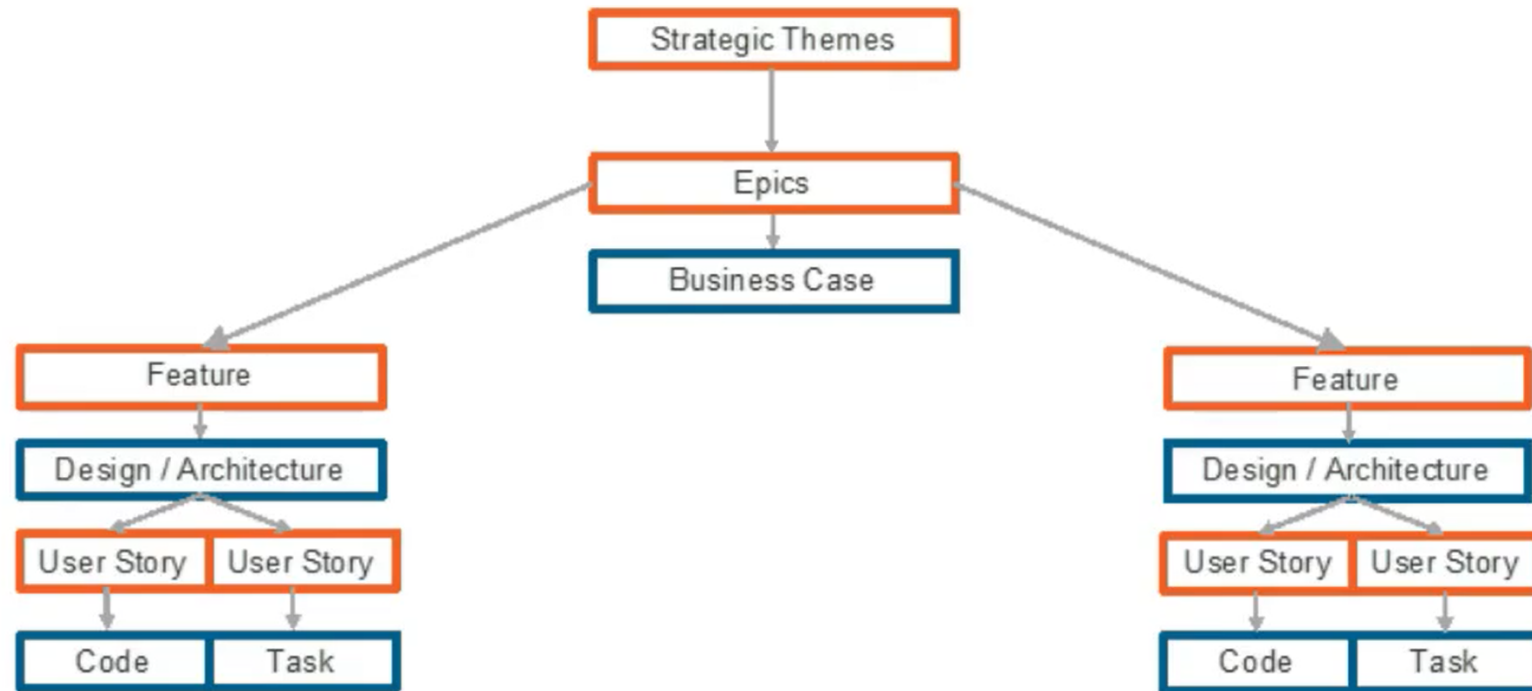
The V-Model



Requirements at every level



Requirements at every level



Definition of Traceability

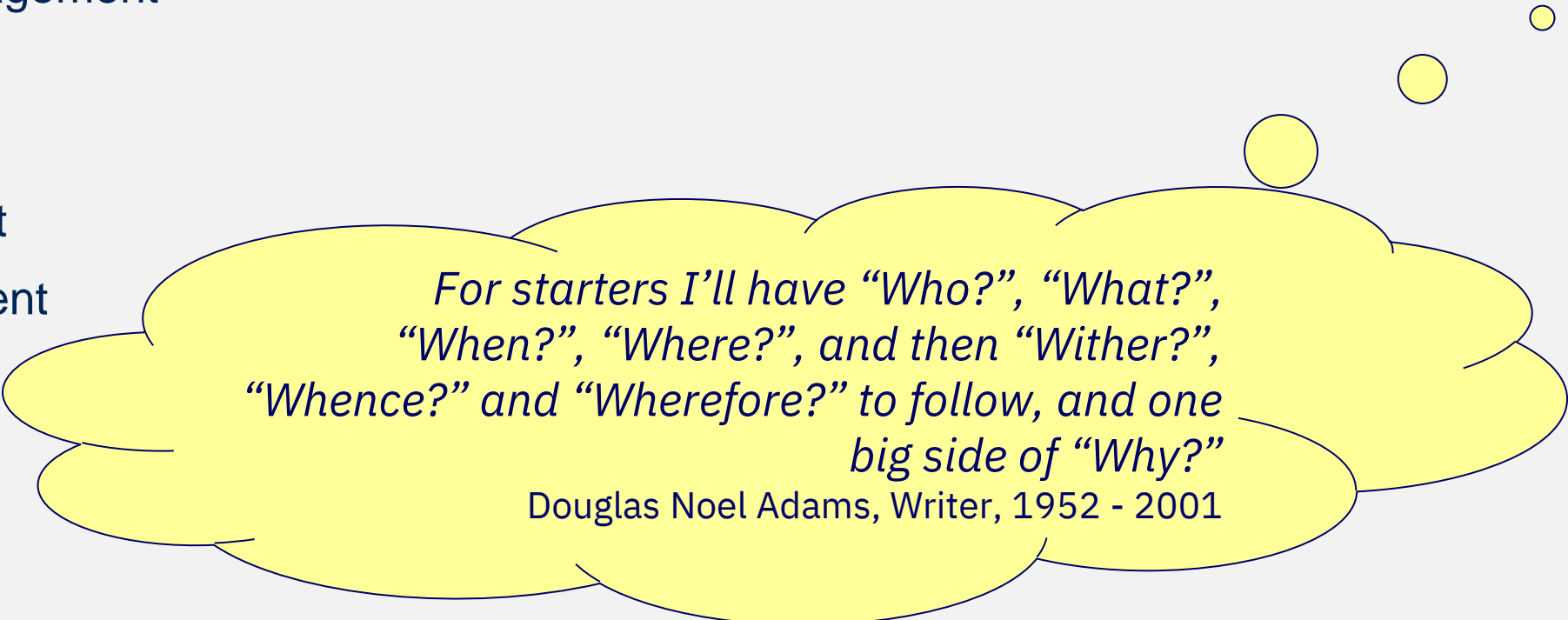
INFORMATION TRACEABILITY:

Understanding how information at a high-level is transformed into low-level.

Understanding how needs are satisfied and qualified

Principle underpinning:

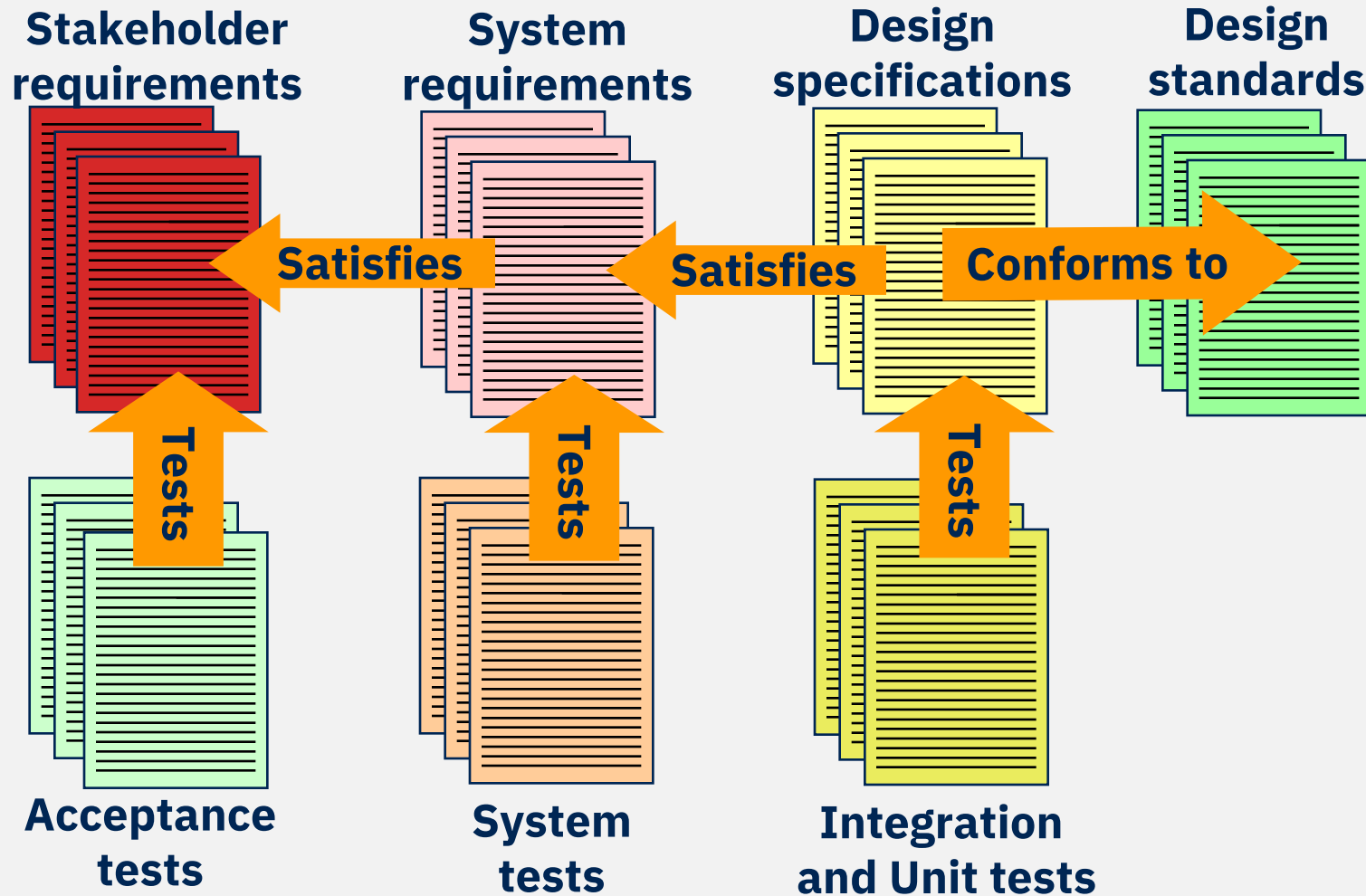
- Programme management
- Accountability
- Audit trails
- Risk management
- Safety management



*For starters I'll have "Who?", "What?",
"When?", "Where?", and then "Wither?",
"Whence?" and "Wherefore?" to follow, and one
big side of "Why?"*

Douglas Noel Adams, Writer, 1952 - 2001

Example of Traceability



Traceability allows analysis

impact

impact coverage

derivation

derivation coverage

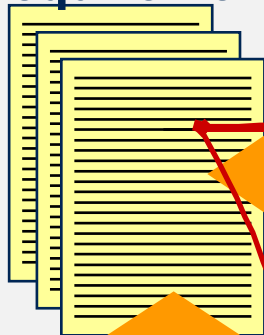
completeness

relevance

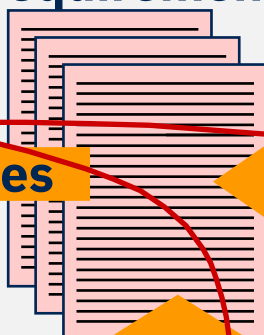
Impact analysis

What if ... ?

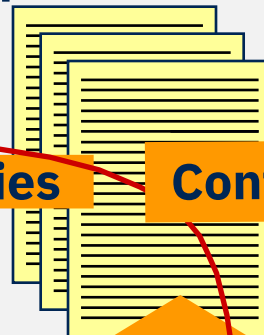
Stakeholder
requirements



System
requirements



Design
specifications



Design
standards



Satisfies

Satisfies

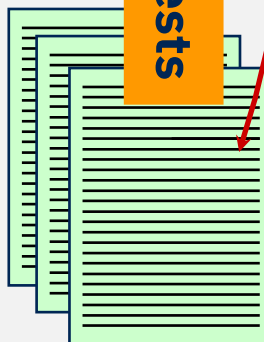
Conforms to

Tests

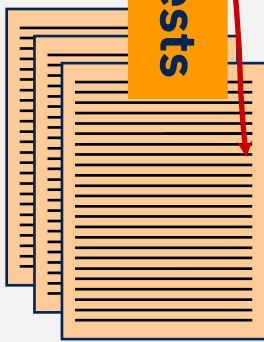
Tests

Tests

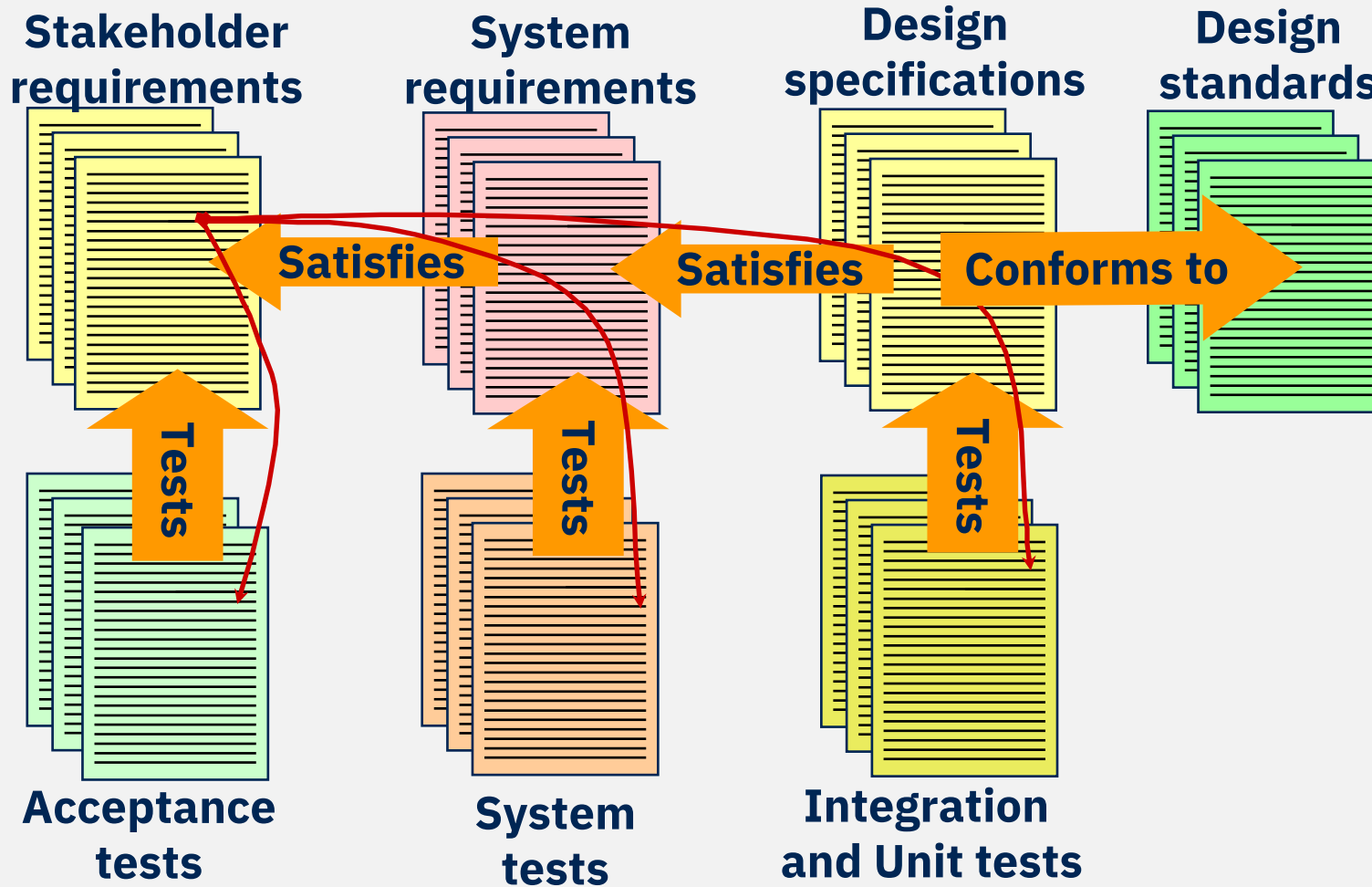
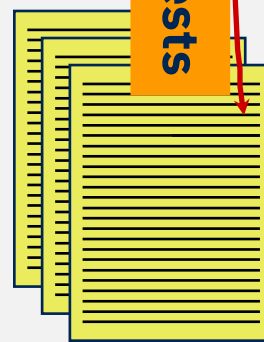
Acceptance
tests



System
tests

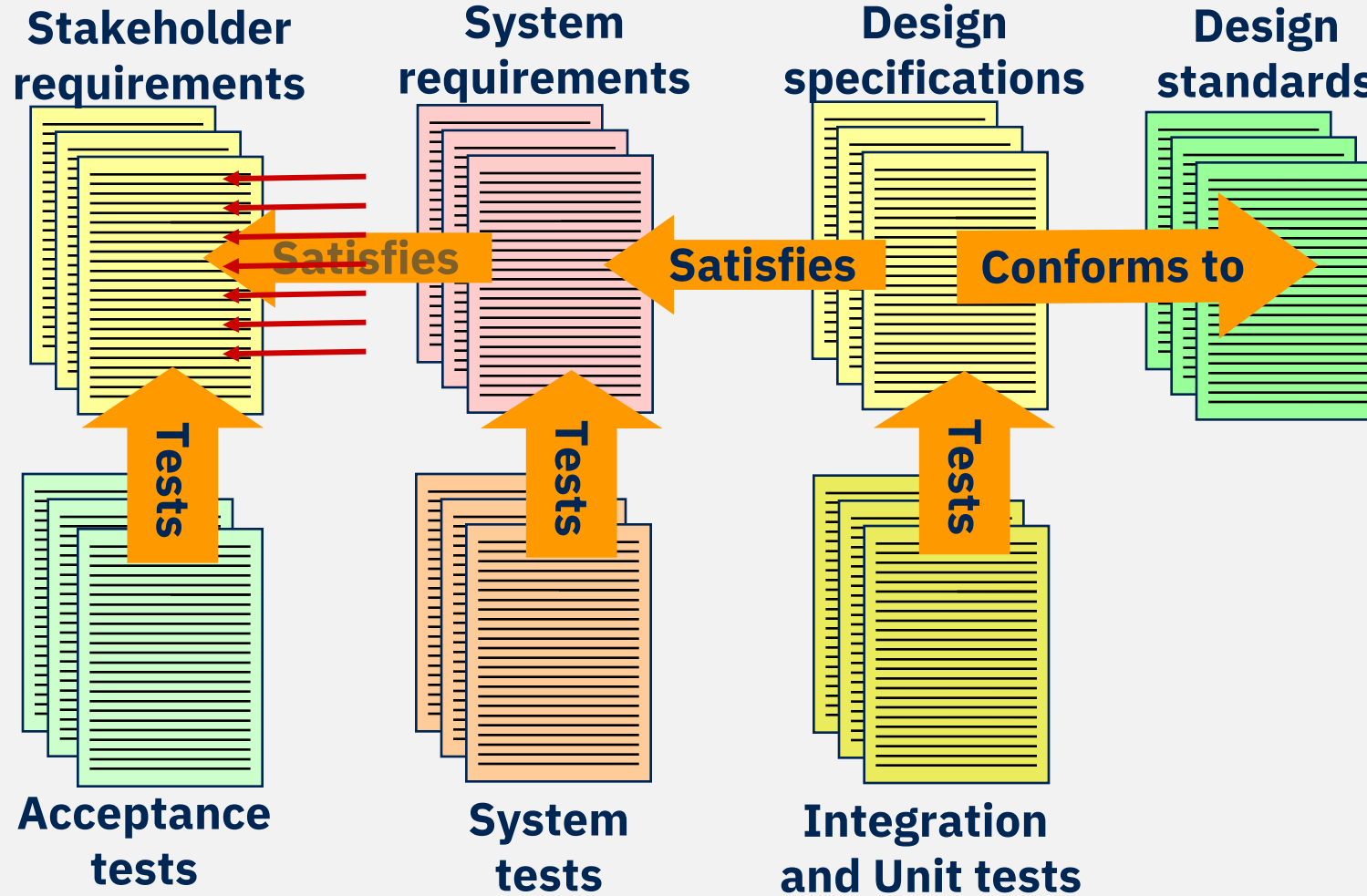


Integration
and Unit tests

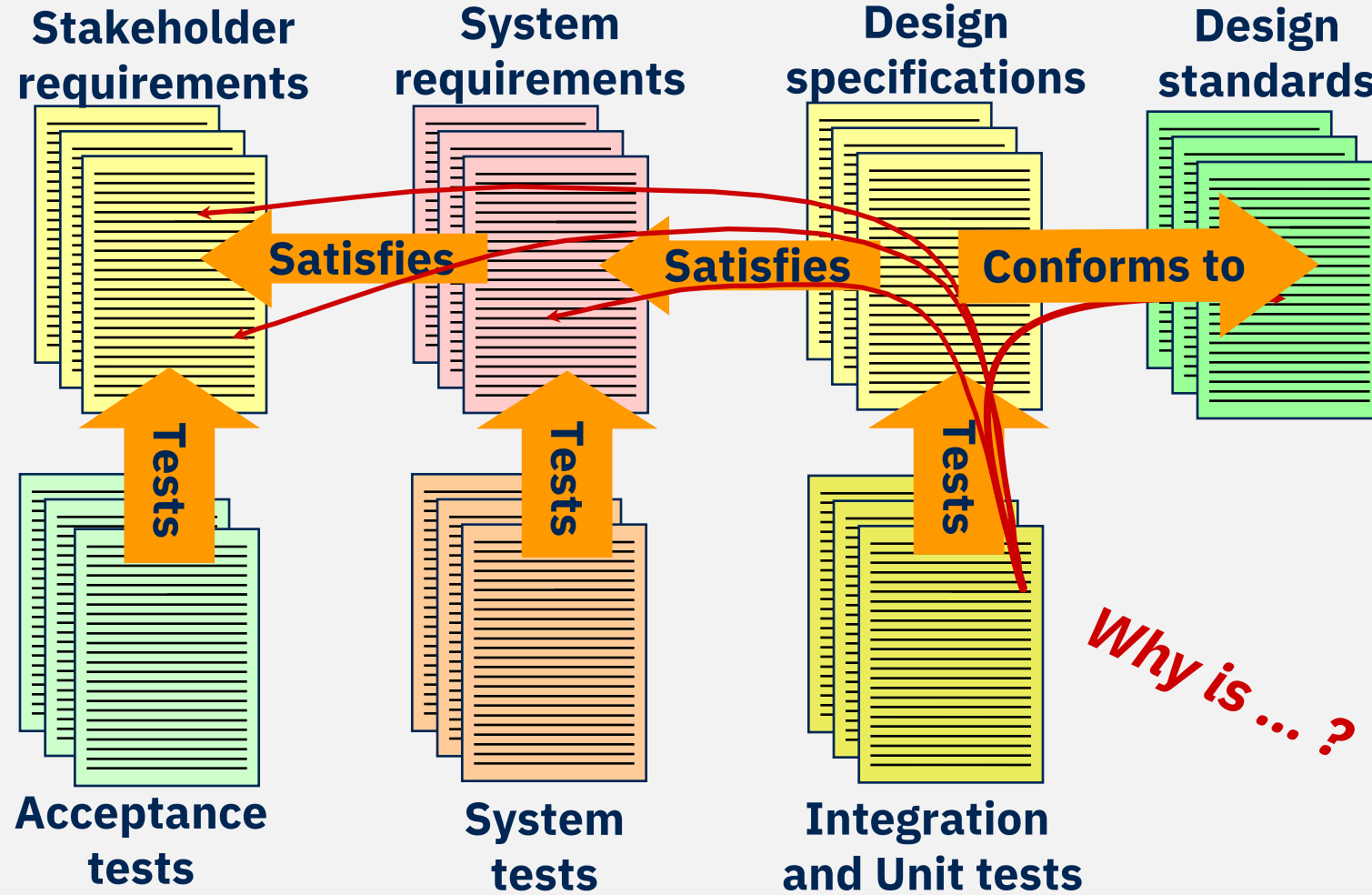


Impact coverage analysis

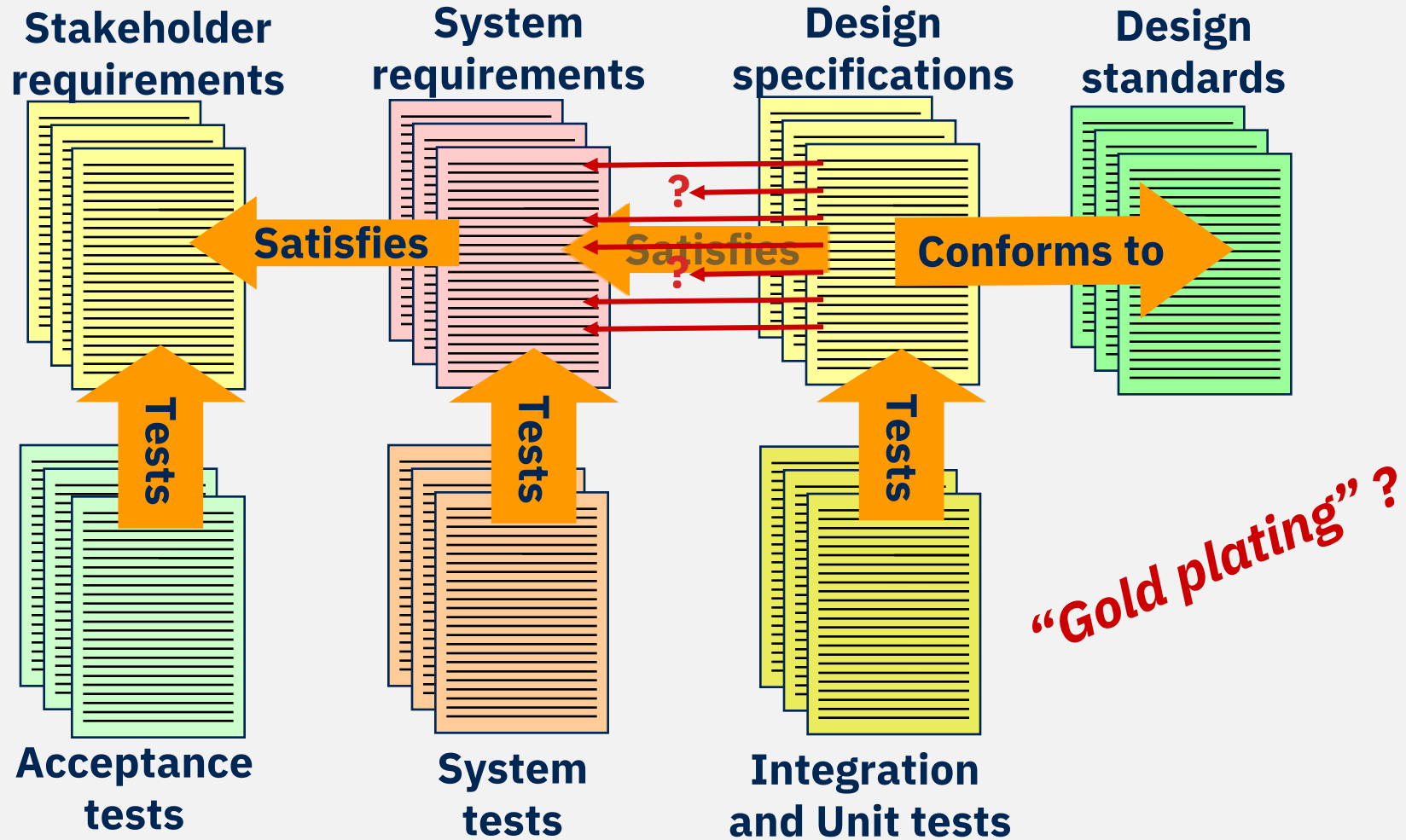
% Complete ... ?



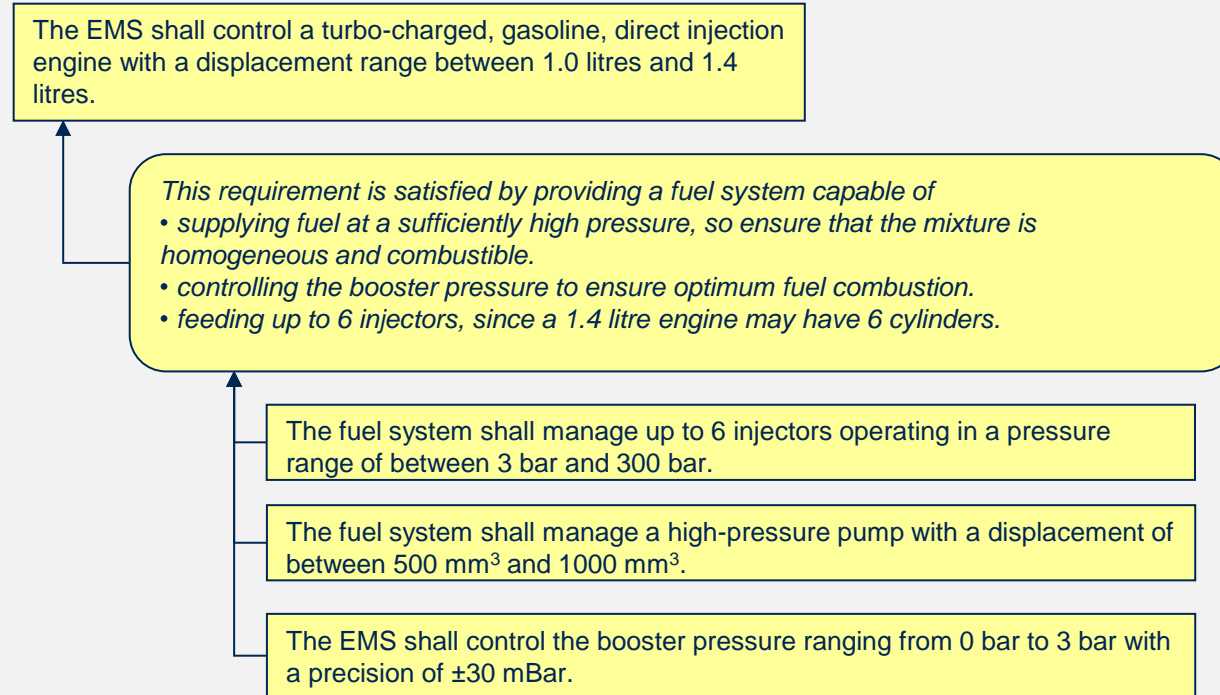
Derivation analysis



Derivation coverage analysis



Three Criteria for Reviewing Traceability



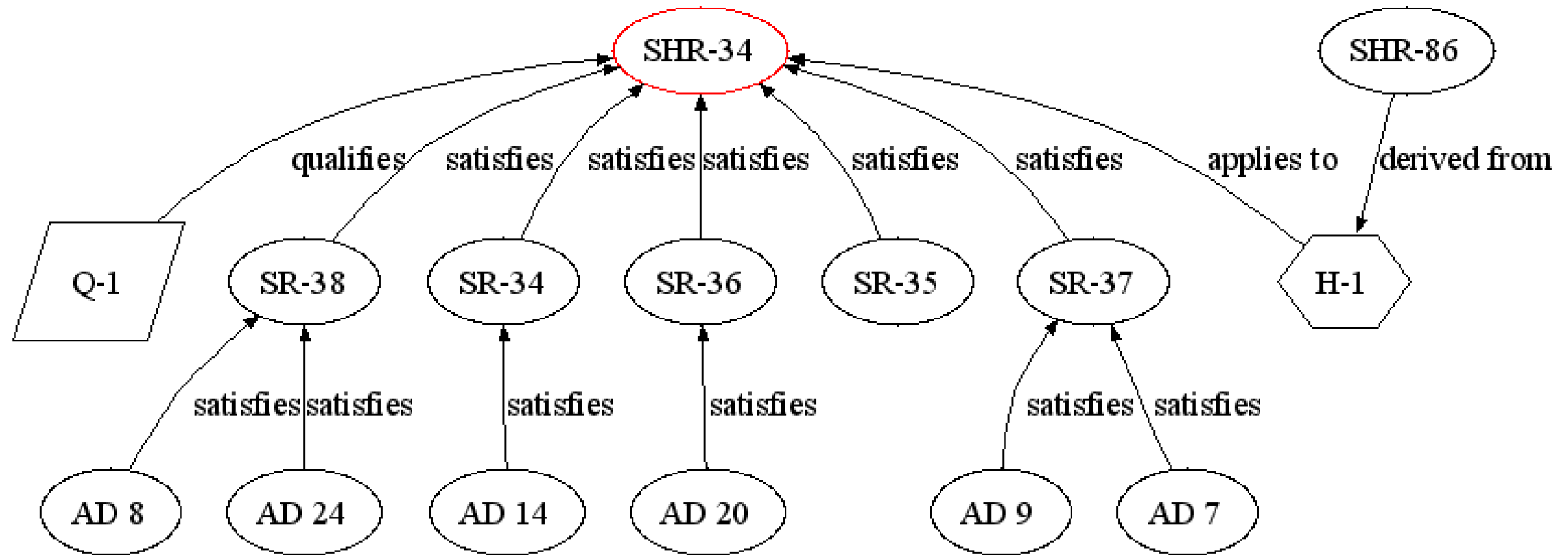
- 1. Coverage:** is every requirement traced?
- 2. Sufficiency:** are the traced lower-level requirements *sufficient* to satisfy the higher-level?
- 3. Necessity:** are all the traced lower-level requirements *necessary* to satisfy the higher-level?

Managing Change using Traceability

Steps to managing change:

- Identity a change
- Assess direct impact
- Calculate the impact graph
- Review the impact graph:
 - Prune those branches that do not change
 - Add new branches
- *Decide whether to go ahead*
- Define the change
- *Decide whether to go ahead*
- Apply the change

Impact Graphs



Depth 3, incoming links only



Using attributes

A requirement is more than just a textual statement.

- It has other attributes.

e.g.

- [SH234] The ambulance control system shall be able to handle up to 100 simultaneous emergency calls.
 - Source: R. Thomas
 - Priority: Mandatory
 - Release: 1
 - Review status: Accepted
 - Verifiable: Yes
 - Verification: By simulation, then by system test.

Clause management

The document

Additional attributes

	Clause No.	Priority	Acceptability
1 Introduction This document contains the requirements for a new passenger car. 1.1 Scope The car is to be sold into markets covering Europe, the US and Asia. It is a middle-of-the range family saloon. 1.2 Background Bread-and-butter rhubarb and everything else traditionally English and Victorian rubbish. This paragraph should go on and on until it looks quite substantial.			
2 Capability requirements 2.1 Carrying load The car shall be capable of carrying 5 passengers.	UR 1	Mandatory	Acceptable
The car shall be capable of carrying 12 cubic metres of luggage space without infringing on the passenger compartment.	UR 2	Desirable	To be reviewed
2.2 Speed			

Categories of Attribute

Attributes are used for:

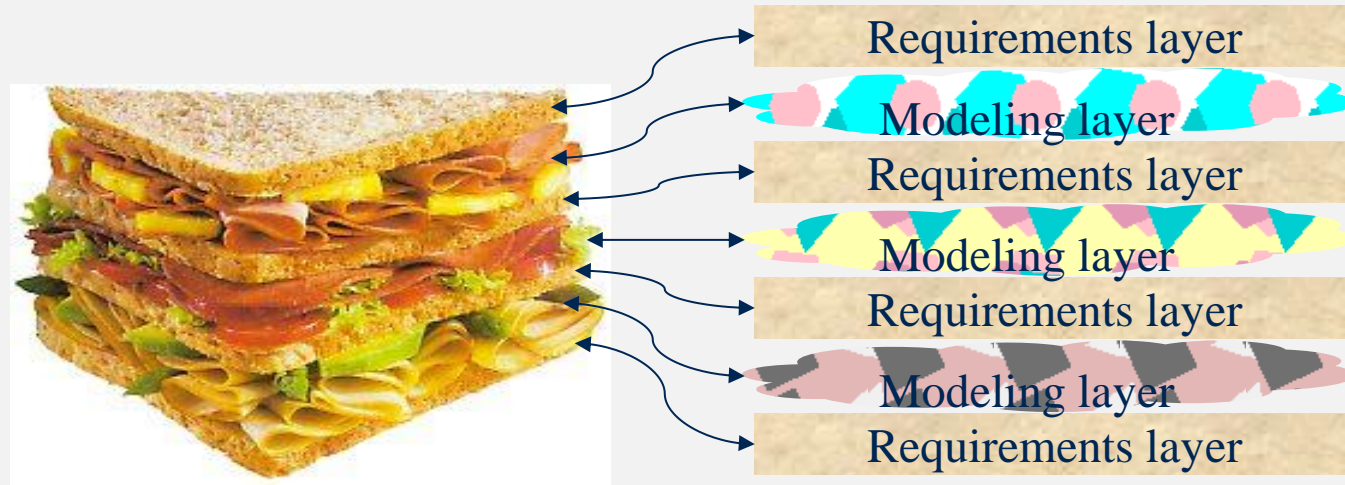
- Identifying, e.g.
 - Unique number or name
 - Source
- Classifying, e.g.
 - Type of requirement (operational/safety/performance)
 - Applicable phase (development/production/disposal)
 - Priority (mandatory/optional/desirable)
 - Type of object in document (Requirement, Descriptive, Heading)
- Recording status (processing), e.g.
 - Agreement status
 - Satisfaction status
- Abstracting Information
 - Time Constraints
 - Performance Measures



The Role of Models

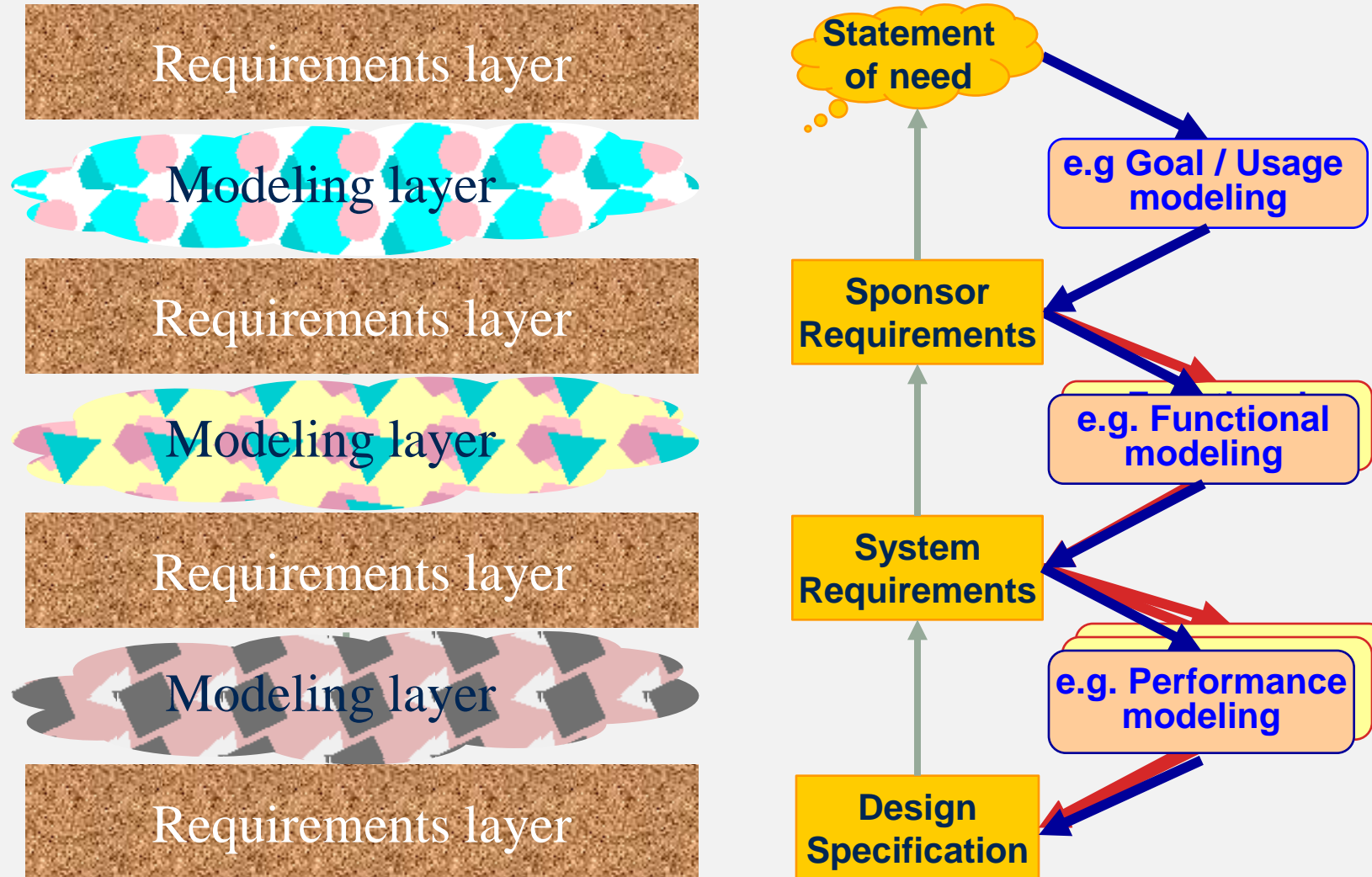
- Modelling is used to understand and analyse a problem
- Models provide a vital means of communication with stakeholders
- Modelling provides a basis for reasoning about:
 - a problem,
 - potential solutions, etc
- Modelling complements requirements engineering

Understand the role of modeling



- The requirements are the “bread and butter” of development.
- What is a sandwich without the bread?
- Requirements alone are a little dry.
- Modeling is what makes the whole rather more interesting.
- The filling holds the bread together.
- It is the bread and the filling together that make a sandwich.

Models Bridge Layers of Requirements



Complimentary techniques

Requirements management:

- capture of and traceability between individual textual requirements

Modelling:

- multiple views of structured information
- consistency can be checked across the system using the model data dictionary
- allows animation to be used as a validation technique

The model is ***not*** the requirement

- non-functional requirements are typically not captured in a model
- a graphical model is generally insufficient as a contractual basis

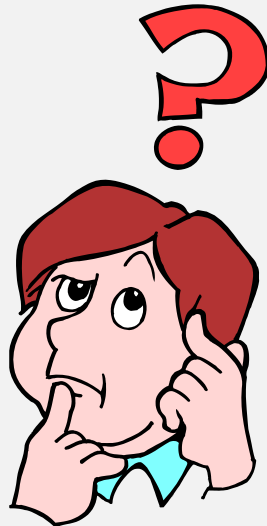
Engineer 1:

“Ok. That’s what we need to do:

System A will pass message X to System B and that will change B’s state to Running from what it was before which was Idle. When B changes to Running it will send back a message Y to A and then wait for 2 second and then go back to Idle. System A will have started in Idle also and will go to Running after B sends back event Z which happens after the 2 seconds before going to Idle. All this should happen in less then 5 seconds.”

Engineer 2:

“Huh ?”

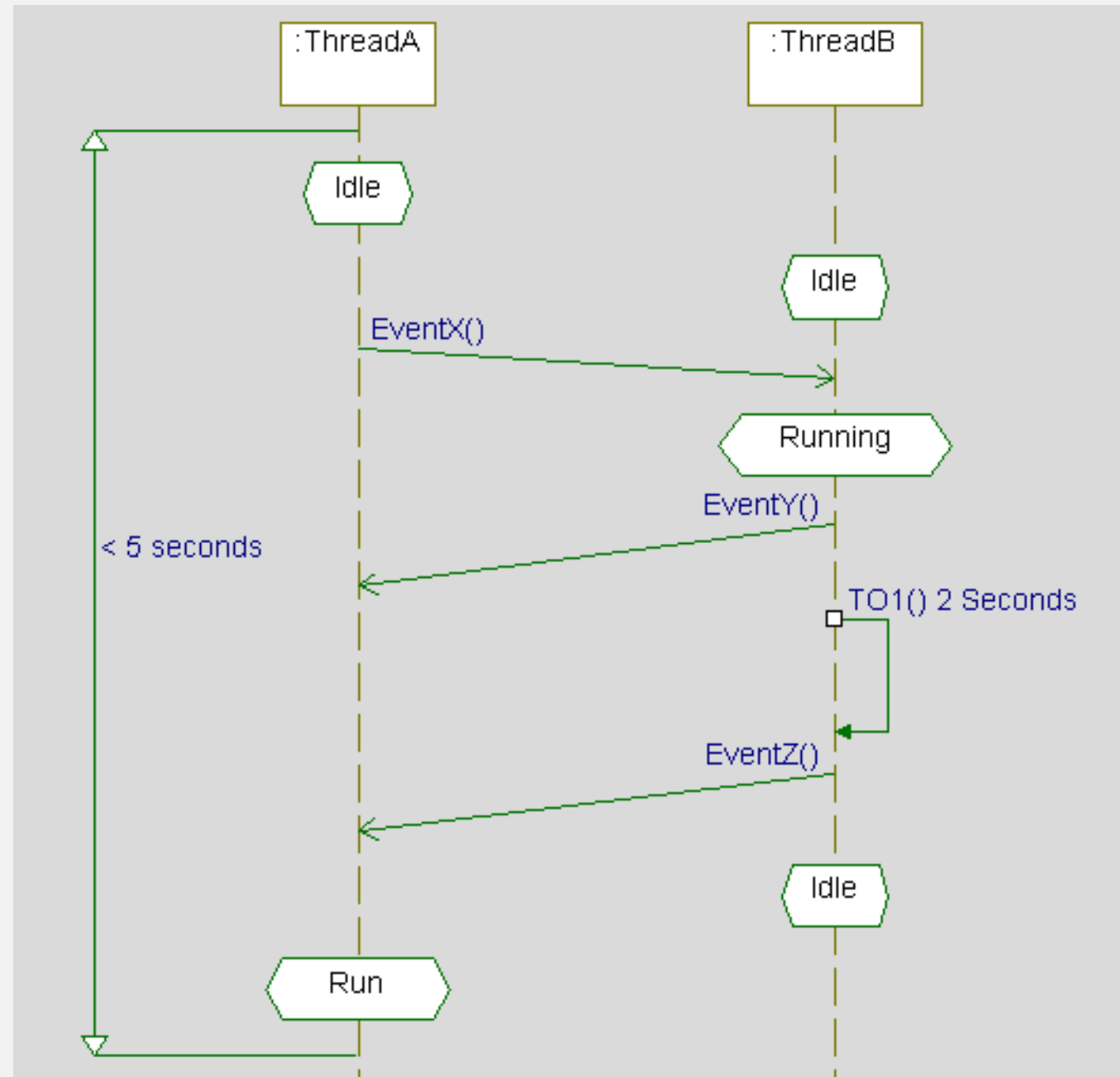


Engineer 1:

“Here look at this Sequence Diagram.”

Engineer 2:

“Ahhh, now I see!”



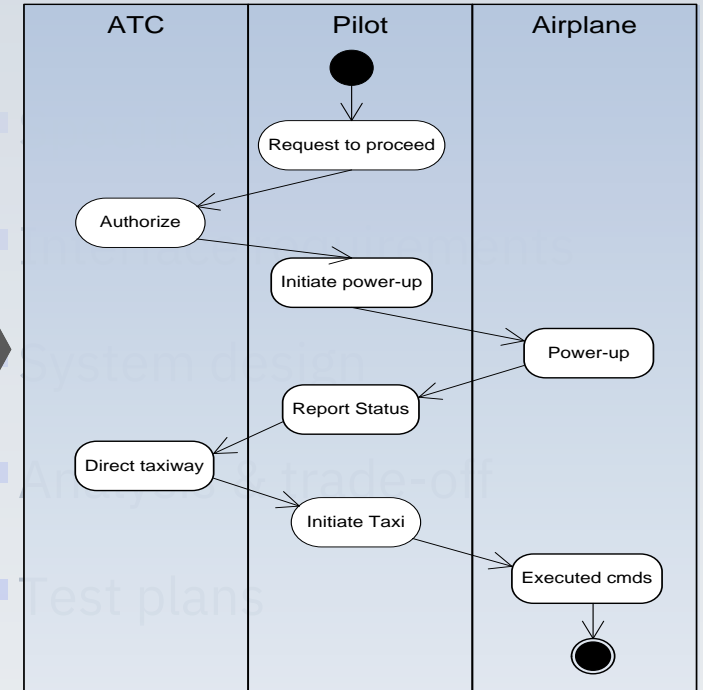


Modern approaches for describing systems are evolving

Past

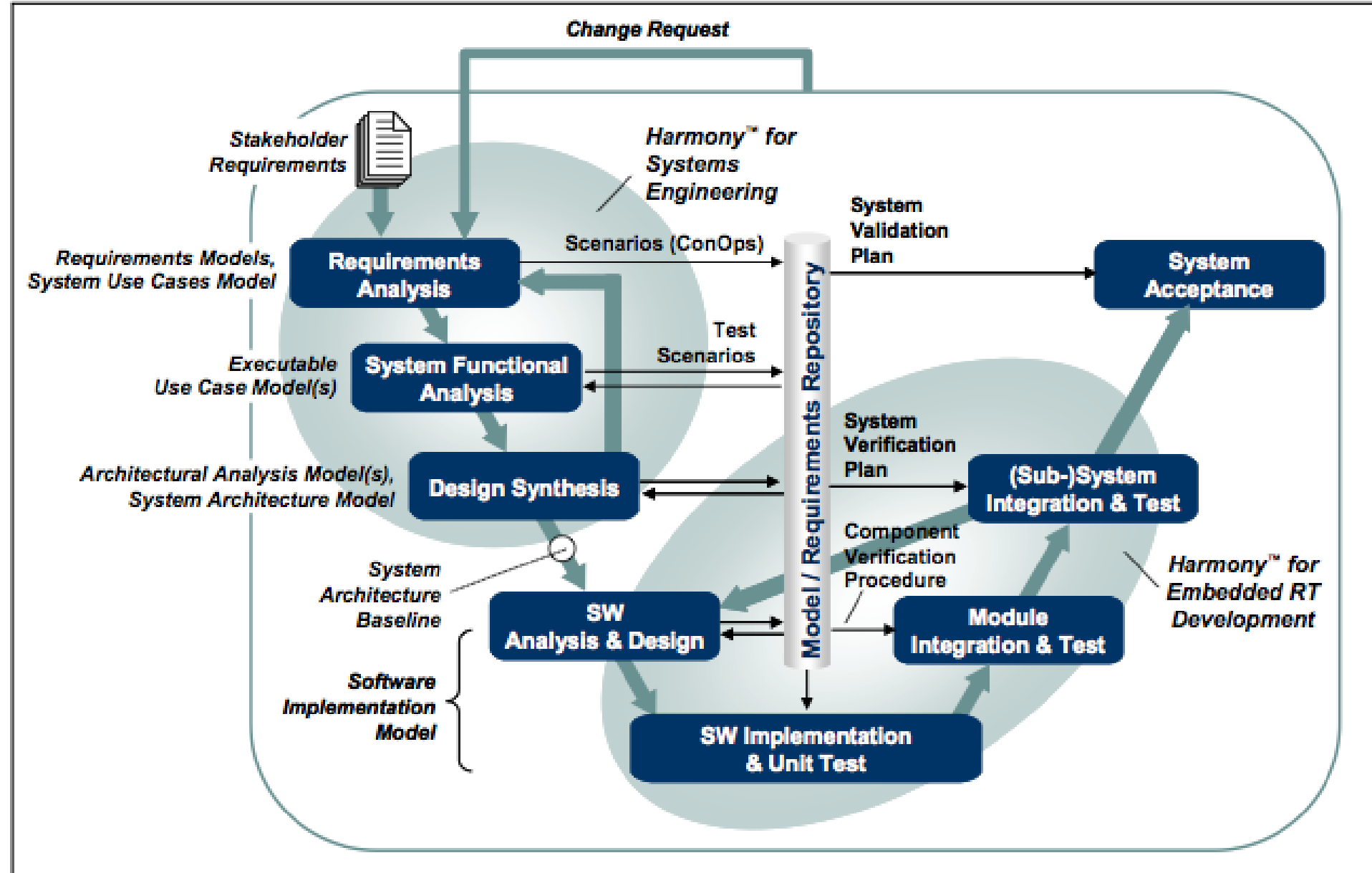


Future

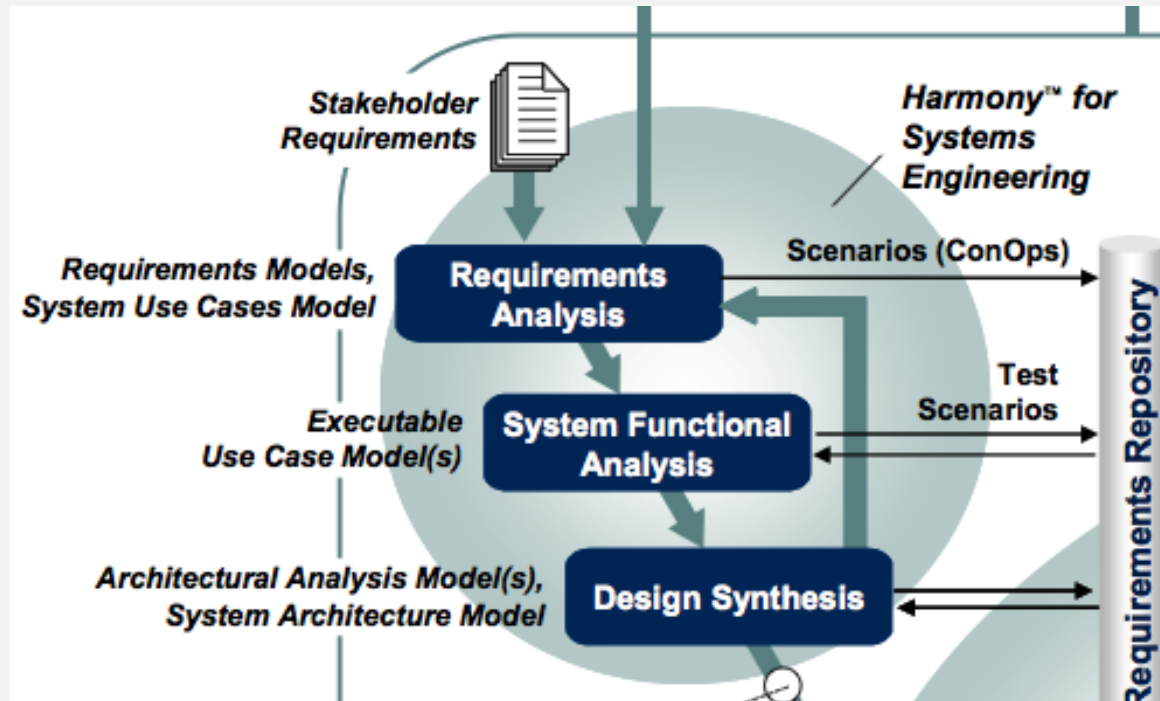


Moving from document-centric to model-centric

Integrated systems/software development workflow

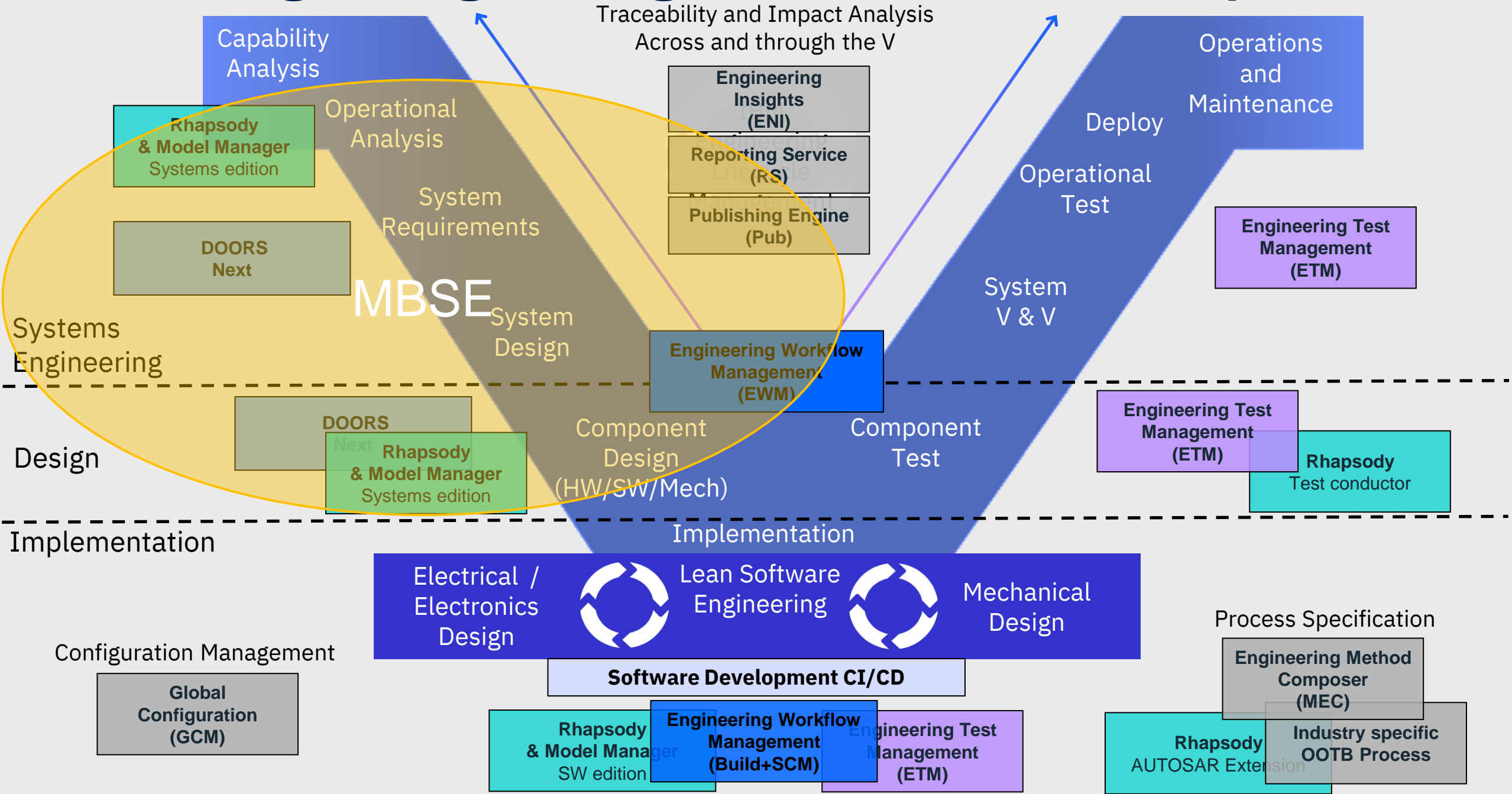


Systems engineering workflow - key objectives



- Identify / derive required system functionality
- Identify associated system modes and states
- Allocate system functionality / modes to a physical architecture
- Elaborate non-functional requirements

Holistic digital engineering based on the IBM ELM platform



Executable models

http://localhost:90/ - Windows Internet Explorer

http://localhost:90/

Links tgt Local Host Google Telelogic iNotion I-Logix

V71_RiCpp_BluetoothHeadset

Builder[0]

V71_RiCpp_BluetoothHeadset

Builder[0]

Bluetooth Headset

Nokia 6210

Local intranet 100%

Rhapsody in C++ by Telelogic - V71_RiCpp_BluetoothHeadset.rpy

File Edit View Code Layout Tools Window Help

HeadsetAndMobilePhoneWithGui VisualCpp_Debug

Agency FB 10

Entire Model View

- V71_RiCpp_BluetoothHeadset
 - Component Diagrams
 - Components
 - HeadsetAndMobilePhoneWithGui
 - Test
 - Hyperlinks
 - Presentation
 - http://localhost:90/Nokia6210.htm
 - http://localhost:92/Nokia6210.htm
 - http://localhost:90/BluetoothHeadset.h
 - Object Model Diagrams
 - Packages
 - AnalysisPkg
 - PresentationPkg
 - InterfacePkg
 - MobilePhonePkg
 - HeadsetPkg
 - Classes
 - Comments
 - Constraints
 - Dependencies
 - Events
 - «Web Managed» evPress()
 - evLongPress()
 - «Web Managed» evRelease()
 - evShortPress()
 - evFlash(int aCount,int aFrequer
 - evOn()
 - evOff()
 - «Web Managed» evInc()

Statechart of : Button - Builder[0]->itsHeadset->itsButton

```
stateDiagram-v2
    [*] --> idle
    idle --> debounce : evPress
    debounce --> idle : evRelease
    debounce --> pressed : tm(100)
    pressed --> idle : tm(3000)/ itsHeadset->GEN(evLongPress);
    idle --> idle : evRelease/ itsHeadset->GEN(evShortPress);
```

Statechart of : Headset - Builder[0]->itsHeadset

```
stateDiagram-v2
    [*] --> off
    off --> disconnected : evLongPress
    off --> disconnected : evLongPress/ itsLed.GEN(evOff);
    disconnected --> disconnected : itsLed.GEN(evFlash(1, 100...))
    disconnected --> disconnected : [press==3]
    disconnected --> connecting : tm(2000)
    disconnected --> connecting : evShortPress/ itsLed.GEN(evFlash(3, 1000)); times=1;
    connecting --> connected : evConnected/ itsLed.GEN(evOn);
    connecting --> connecting : itsLed.GEN(evFlash(3, 1000)); times=1;
    connected --> connected : evAlive
    connected --> disconnected : evInc(OPTION(blue)->GEN(evIn...); evDec(OPTION(blue)->GEN(evO...);
```

Call Stack

Event Queue

Build Check Model Configuration Management Animation Search Results

For Help, press F1

GE MODE

Fri, 2, Mar 2007 11:35 AM

IBM Engineering Lifecycle Management is the most comprehensive solution to work consistently across engineering domains

Engineering Requirements Management DOORS Next

Create and link requirements;
Version, baseline and manage change

Engineering Systems Design Rhapsody

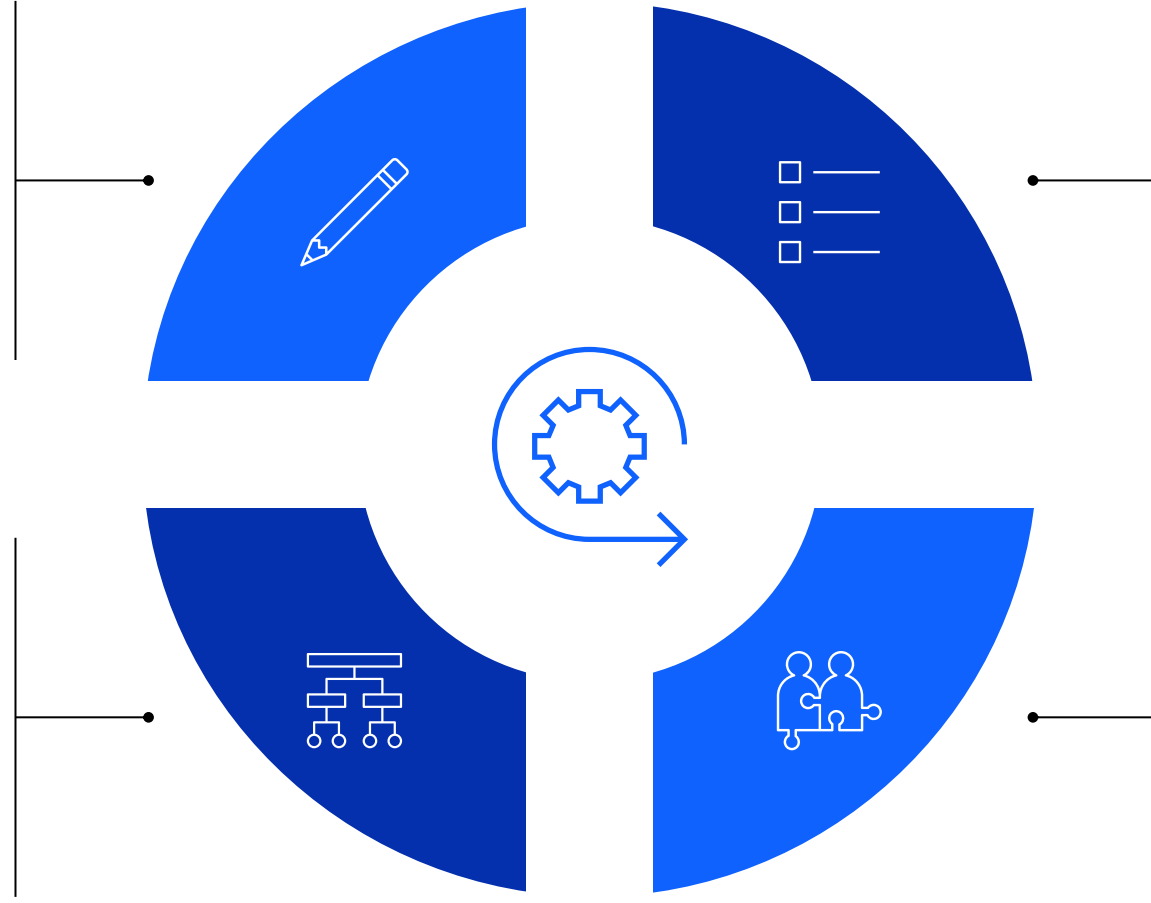
Model and execute software;
Visualize system architecture and behavior

Engineering Test Management

Create test plans, test cases, test scripts;
Execute manual or automated tests and track results

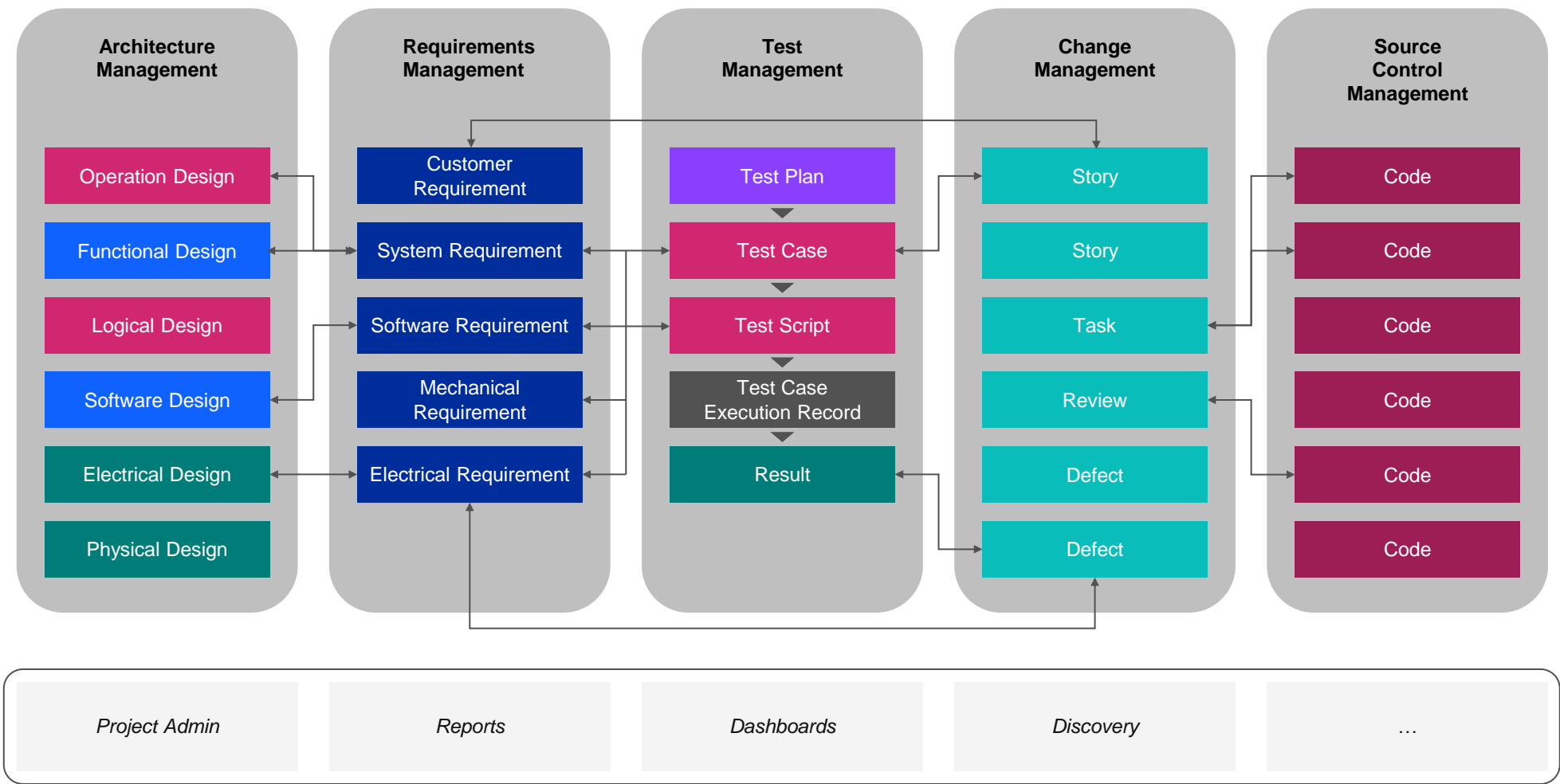
Engineering Workflow Management

Define and assign work, organize into plans and track execution;
Manage source code and builds

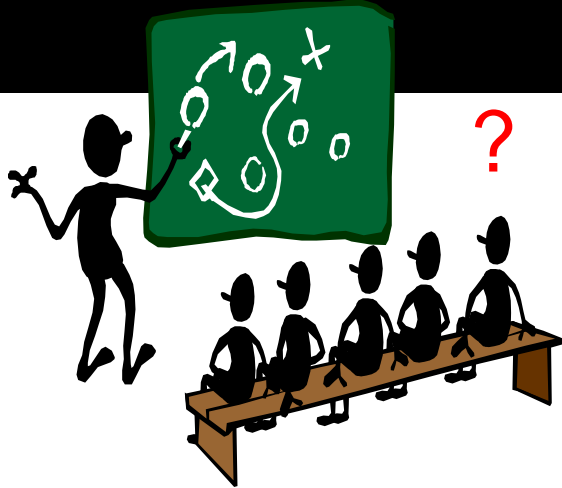


The multi-dimensional complexity challenge facing customers today

ELM manages the data elements and the dynamic relationships between the data elements



Requirements Management



Been left out of the loop!



Missed an important email!



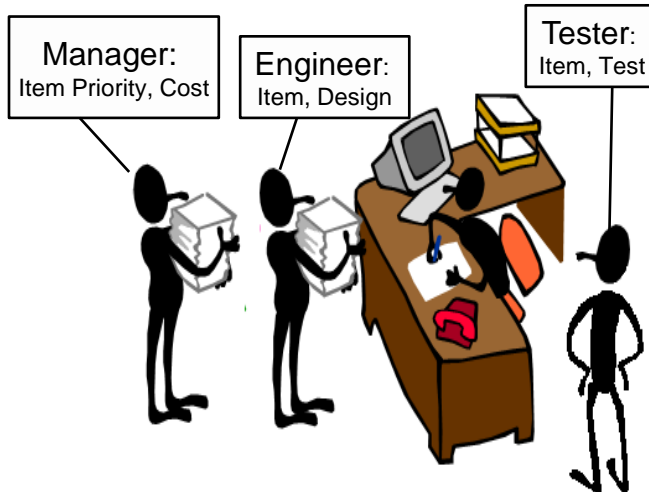
Confused by inconsistent format or terminology!



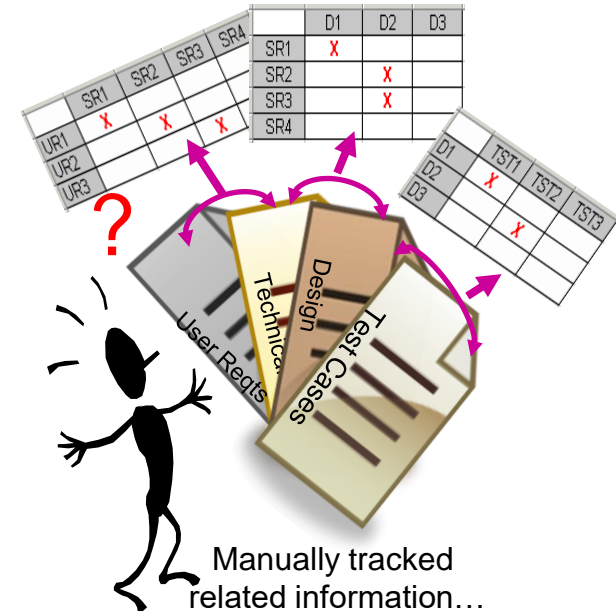
Reviewed the wrong version.



Incorporated feedback from multiple sources.

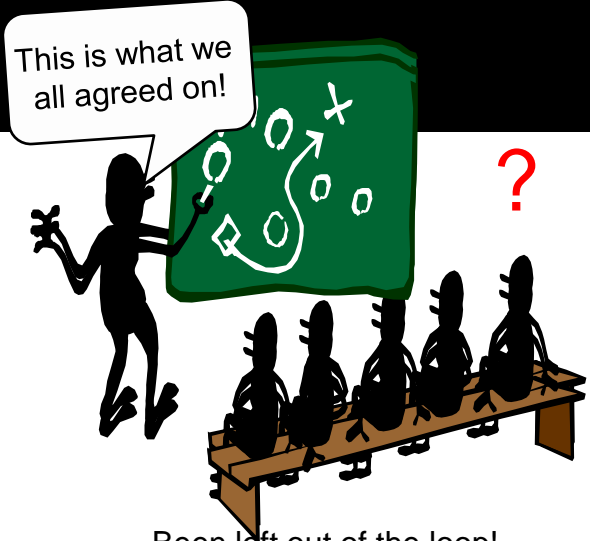


Created multiple perspectives of the same data.



Manually tracked related information...

Requirements Management



Been left out of the loop!
Work as a team



Missed an important email!
Ensure visibility



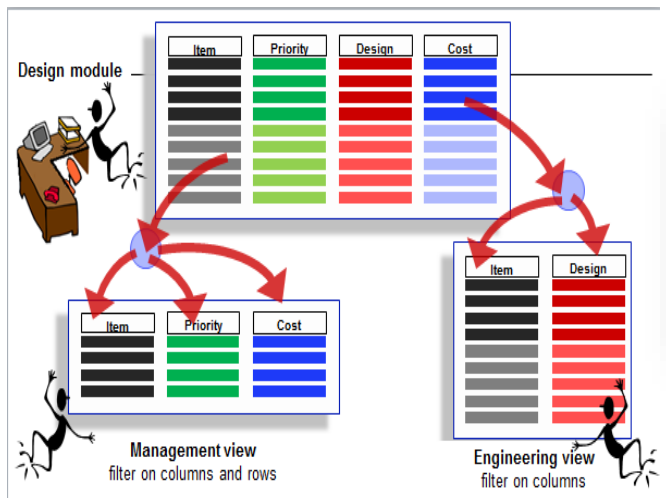
Keep information clear
Keep information clear



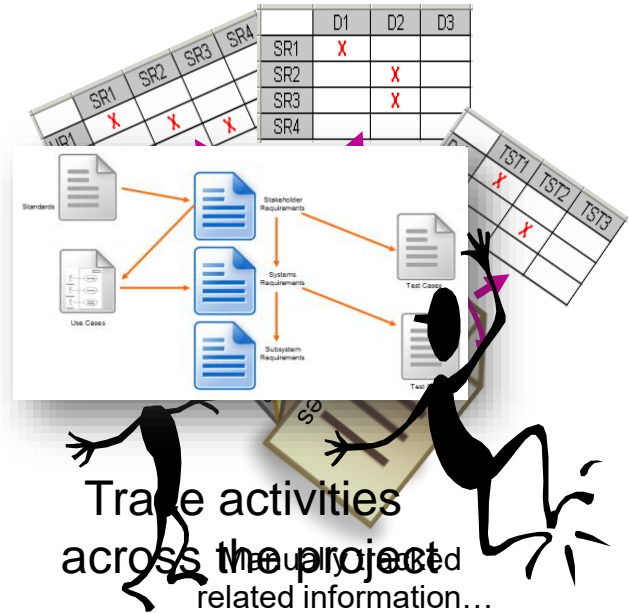
Access current information, baselines, and history



Concurrently edit and
Incorporated feedback
collect feedback
from multiple sources.



Created multiple perspectives
of the same data.
Easily switch
perspectives of the data.



Trace activities
across the project
related information...

Construcciones y Auxiliar de Ferrocarriles (CAF)

A holistic management of verification & validation activities within a typical rolling stock development program.



Business problem

CAF's rolling stock business is undergoing a major transformation towards business digitization, from document-based into Model-based. The core element of business digitization is the concept of product structure. The product structure is extensive and complex and needs to be managed by means of IT tools.

Solution

CAF achieved a holistic management of verification & validation activities within a typical rolling stock development program by implementing IBM ELM platform. Digitalization of actual V&V documents into IBM Engineering Test Management (ETM) tool reduced the use of excel files and helped to maintain a planification to protocols traceability in only one tool suite.

CAF developed workflow and data model in only one tool (ETM) to cover all product lifecycle, which allowed generating formal reports from information stored in ETM. With ETM, the client was able to significantly reduce non-quality costs as well as increase efficiency in V&V activities.

IBM Engineering

Outcome:

- Decrease in non-quality costs and reduced the time used for V&V activities
- Paperless management of V&V activities, assets & results
- Ease of executing V&V assets offline from locations without internet connection

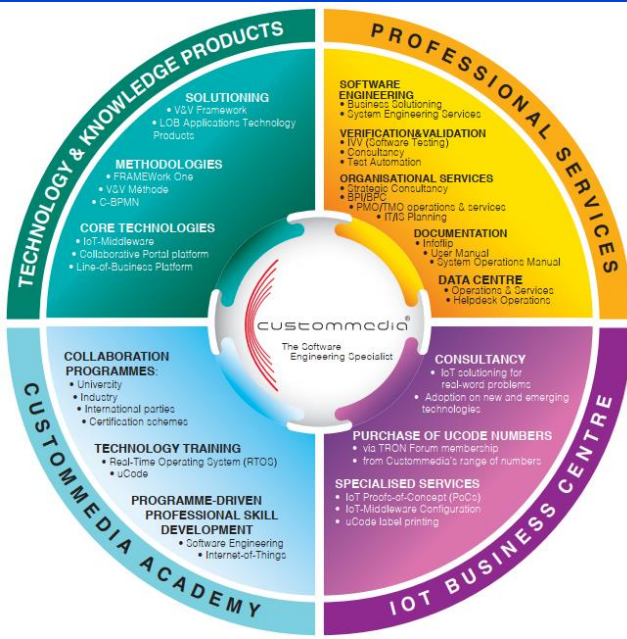
Solution components:

- IBM Engineering Workflow Management
- IBM Engineering Test Management





Malaysian ISV capitalises on IBM ELM to offer best-of-breed application lifecycle management value proposition to its clients



Client Background

Custommedia Sdn Bhd ("Custommedia") is an IT-based organisation with core competency in the software engineering discipline. Established in 1991, the company is **ISO 9001-certified** and was **among the earliest to obtain the MSC Malaysia-status endorsement**. Over the years, the company has accumulated a breadth of expertise and experience in developing and delivering industry-leading software engineering solutions **using multiple tools, system platforms and methodologies**.

Next Level Initiative

As the company embarked on more projects, it was in need of an advanced, highly-sophisticated platform to support its software development activities and increasing business velocity. **IBM Engineering Lifecycle Management (ELM) Suite** was selected to meet these objectives.

Results

By engaging IBM to implement the **IBM ELM** solution, Custommedia gained capability to manage agile and efficient continuous software integration within DevOps practices. They can now manage software requirements with **DOORS Next**. Work items, planning activities and tasks can be created and tracked in **Engineering Workflow Management**, which can also act as a source code repository. Finally, with **Engineering Test Management**, they can test the code developed, verify and validate the requirements with test cases as well as create lists of defects to be fixed. **All these are done under a single platform that promotes collaboration and enforces project governance across the board.**

IBM Engineering

Outcomes:

- Accelerate speed & improve efficiency of software development
- Manage project complexity
- Minimize risk of failure & costs of re-work
- Enable end-to-end traceability

Solution components:

- IBM ELM Suite (Requirements, Design, Workflow & Test Management)

"Collaborating with IBM has enabled us to enhance our digital capabilities while enabling us to continue developing innovative products and services for our clients. By implementing ELM, we have successfully accelerated the speed and efficiency of software development, minimized the cost of failure and re-work, and provided end-to-end project traceability for our customers across the industries."

Mastura Abu Samah
Managing Director
Custommedia



Deployment of a fully digital engineering lifecycle management solution

Business needs

- Minimize customizations reusing available standards implementation
- Paperless solution
- Digital and collaborative processes
- Remote work from different locations (a “must” because of Covid pandemic)
- Maximize reusability (from highest to lowest levels)

Solution

The ENYSE ELM environment has implemented the global configuration that allows them to reuse and map the entire lifecycle through componentization of systems. Requirements, Testing, Change Management and rhapsody architecture are defined and mapped in a hierarchical manner. Through the creation of Rational Publishing Engine templates for report generation, a standardized and common structure has been obtained for the requirements definition and validation documents, as well as for the architecture and design documents. Likewise, the generation of this information has been efficient, obtaining reports in minutes with updated information in real time.

Outcome:

Provide evidence of compliance including reporting and generation of audit information
Full traceability of requirements from its definition to its validation including tests evidence

The collaborative nature of the suite and its web environment, allows access from anywhere if access is allowed.

Solution components:

- IBM® Engineering Requirements Management, Workflow Management, Test Management, Insights, Engineering Publishing, Global configuration

[Read the full story](#)



KPIT

KPIT solutions
accelerate the
paradigm shift to
“**software defined
vehicles**” with a fully
integrated Systems
Engineering Platform



Client Background

KPIT Technologies is a global partner to the automotive and mobility ecosystem focused on making software-defined vehicles a reality. As a leading independent software development and integration partner their mission is helping mobility companies leapfrog towards a clean, smart, and safe future. With 10,000+ automobelievers across the globe, KPIT powers clients in the mobility ecosystem's largest paradigm shift towards “**software defined vehicles**”.

Business problem

KPIT's strategic business focus is to accelerate the journey towards software defined vehicles. Software enables these new business models and brings an integrated view across all CASE domains and beyond (**Connected, Autonomous, Shared, Electric**) . This transformational journey needs to be supported by an integrated Engineering Platform to more effectively tackle software integration challenges due to the growing software complexity, Autosar, FuSa and Cybersecurity compliance.

Solution

By adopting the **IBM Engineering Lifecycle Management solution**, KPIT gained complete lifecycle traceability and reporting capabilities across their engineering data, enabling much quicker and detailed impact analysis of changes. The IBM Engineering Platform covers holistic Requirements Management with de-composition to Design in SysML / UML which allows KPIT to generate executable, Autosar compliant source code right from the design. The platform furthermore provides configuration, change and project management alongside a holistic test management with all engineering artifacts being linked across the entire lifecycle to meet AUTOSAR compliance and reporting.

IBM Engineering

Outcome:

- Accelerates speed and efficiency of the product design lifecycle
- Manage complexity
- Minimizes cost of failure
- Streamline Compliance

Solution components:

- IBM Engineering Suite (Requirements, Design, Workflow and Test Management)

“The integrated Systems Engineering Platform of IBM has allowed our teams to be more efficient in their daily work, freeing up time spent with finding the right information. As an additional bonus this allows us to provide accurate reporting at any point in time.”

Samir Kulkarni
KPIT, AVP & Head-ISG

Rail Projects Victoria

Keeping Melbourne's most complex rail project on time and on track



Business problem

The Metro Tunnel Project will transform Melbourne's rail network. How can Rail Projects Victoria (RPV) manage the thousands of requirements of this AUD 11 billion initiative and deliver it on time and on budget?

Solution

To manage the complex requirements of the Metro Tunnel Project, RPV chose Engineering Requirements Management DOORS Next technology, a software as a service (SaaS)-based solution delivered through the IBM Cloud platform.

RPV gains a single, collaborative and security-rich environment that allows it to manage project requirements in real time across the project lifecycle.

In addition to increasing visibility and traceability across the project lifecycle, IBM technologies are helping RPV recognise and mitigate risks, delays and unwanted expenditures that can stem from unforeseen changes.

IBM Engineering

Outcome:

- Provides a collaborative, security-rich cloud environment
- Helps mitigate risks and delays stemming from changes
- Allows repeatability and consistency

Solution components:

- IBM® Cloud™
- IBM Engineering Lifecycle Optimization – Publishing
- IBM Engineering Requirements Management DOORS Next
- IBM Engineering Workflow Management Contributor SaaS

[Read the full story](#)





TUSAS chooses IBM Engineering Lifecycle Management as the preferred digital engineering platform



Client Background:

Turkish Aerospace Malaysia (TUSAS) is a new branch office of Turkish Aerospace and serves as its first engineering and design office in Southeast Asia. It focuses into unmanned aerial vehicles, jet trainers, helicopter projects and modernisation programmes for the global aviation ecosystem.

Business problem

With ambition of being in the top 10 aerospace companies by 2030, TUSAS realizes that it can no longer rely on emails, Word and Excel documents in its design and development processes. They needed a unified platform for the four teams - namely Systems, Software, Avionics and Projects Management - to collaborate efficiently especially now that they're hiring more engineers into their fold.

Solution

IBM Engineering Lifecycle Management (ELM) platform provides TUSAS with a powerful and integrated solution to optimize their engineering development processes.

The platform's robust and market-leading Requirements Management capabilities allow precise definition, tracking, and management of requirements, ensuring compliance with DO178 and DO254. Workflow Management with agile planning capabilities help foster collaboration among the various teams. For Model-based Design & Development, ELM facilitates seamless collaboration between Systems and Software engineers, streamlining the translation of models into code. Moreover, the Test Management capabilities accelerate test automation and improve defects tracking.

[Read the full story](#)

IBM Engineering

Outcome:

- Accelerate & optimize software development processes
- Improve team collaboration
- Ensure compliance with DO178 and DO254
- Achieve end-to-end traceability

Solution components:

- IBM ELM Suite
(Requirements, Design, Workflow & Test Management)

"IBM ELM has revolutionized our aerospace and defense engineering processes. Its robust tools for requirements management and collaborative workflows help boost our productivity, ensuring top-notch design and development outcomes. A game-changer!"

Mohd Shahiman Sulaiman
CEO

Turkish Aerospace Malaysia

Live Demo

The Aviary demonstration system

- The Aviary is a surveillance system of systems, based on:
 - A drone (UAV) - Hummingbird
 - A control unit – Bird Feeder
 - Viewer devices – Bird Watchers
- Hummingbird UAV supports manual and autonomous flight & allows control of a mounted camera that transmits a video stream
- A variant of the base system would also allow moving payload to a target area



Bird Feeder



Hummingbird



Bird Watchers

THANKS