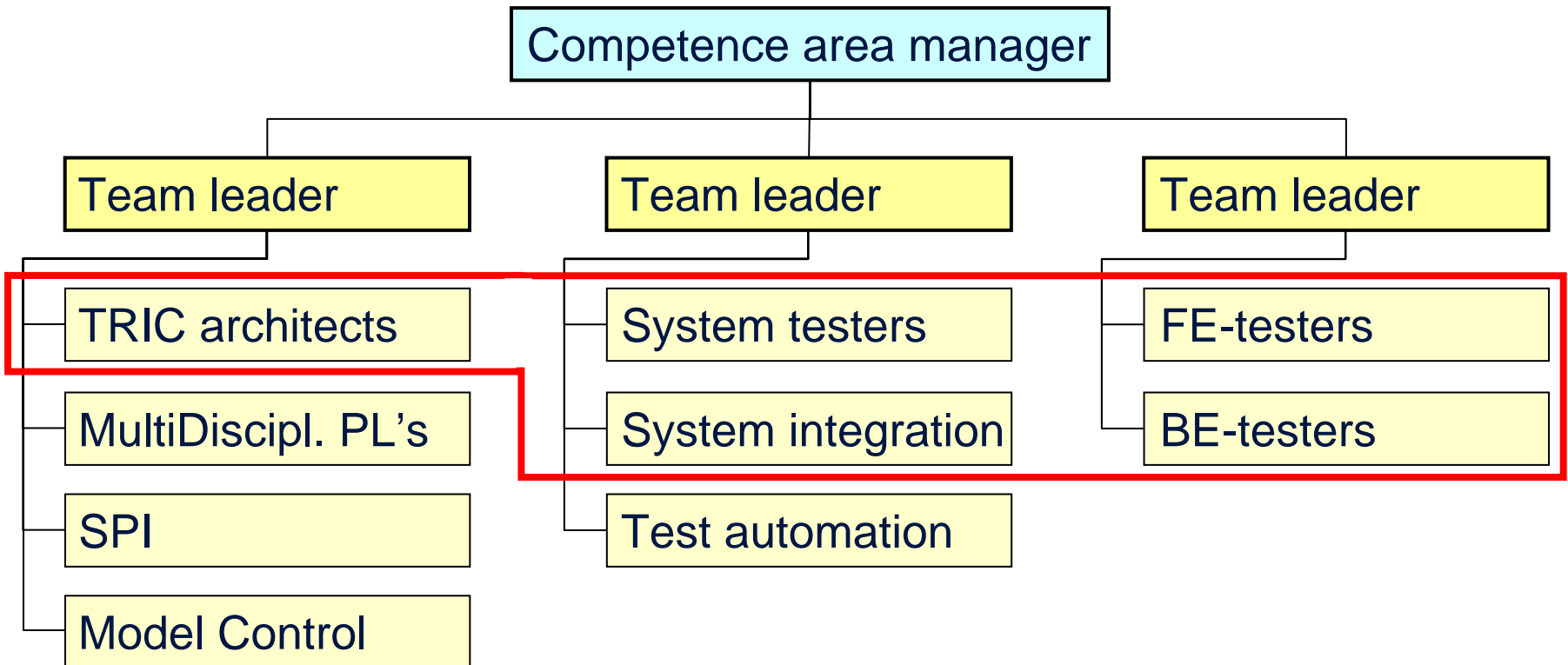# The road to product release

Wim van Rooij
TRIC - architect
System Integration & Test
TestNet Event
11 December 2007

Agenda

- Test organization

- Test policy & strategy

- The road to product release

- Facts and figures

I&T Organization Diagram

```
                        ┌─────────────────────────────┐
                        │   Competence area manager   │
                        └─────────────────────────────┘
          ┌───────────────────────┼───────────────────────┐
  ┌───────────────┐       ┌───────────────┐       ┌───────────────┐
  │  Team leader  │       │  Team leader  │       │  Team leader  │
  └───────────────┘       └───────────────┘       └───────────────┘
```

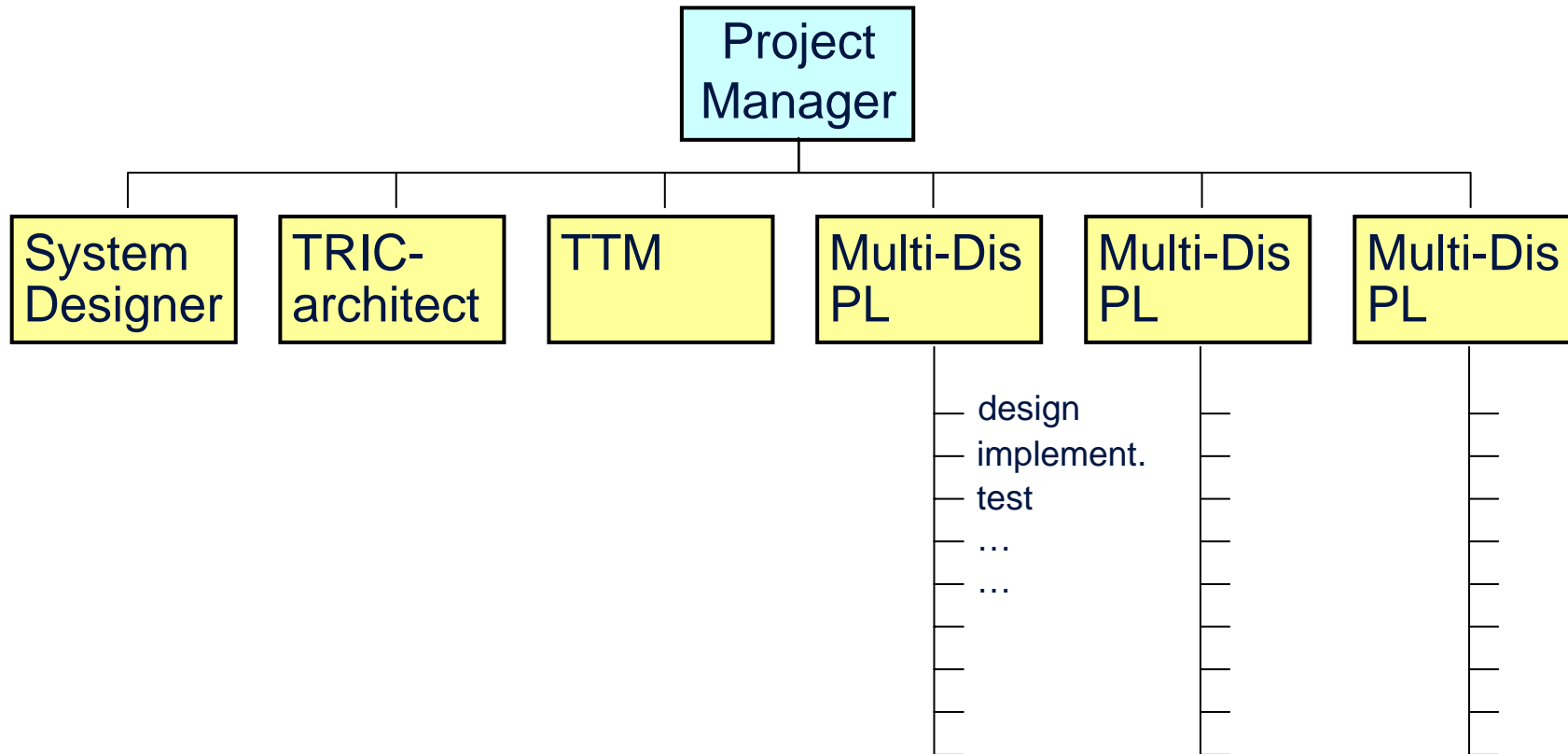| Team leader	Team leader	Team leader
TRIC architects	System testers	FE-testers
MultiDiscipl. PL's	System integration	BE-testers
SPI	Test automation	
Model Control		

TRIC architect

- Test, Release, Integration & Configuration architect

- Product risk analysis & Test strategy

- Test decomposition

- MTRP, MIP & MTEP

- Quality criteria supplier deliverables

- 'Lower level test coverage'

- Quality insight

- Overall release evidence, SRT

Project organization

```
                    ┌─────────────┐
                    │   Project   │
                    │   Manager   │
                    └──────┬──────┘
     ┌────────┬────────┬───┼────────┬──────────┐
┌─────────┐┌─────────┐┌─────┐┌──────────┐┌──────────┐┌──────────┐
│ System  ││ TRIC-   ││ TTM ││ Multi-Dis││ Multi-Dis││ Multi-Dis│
│Designer ││architect││     ││ PL       ││ PL       ││ PL       │
└─────────┘└─────────┘└─────┘└──────────┘└──────────┘└──────────┘
```

— design
— implement.
— test
— …
— …

Profession knowledge

- ISTQB foundation

- ISEB practitioner

- training

- workshops

- work instructions / guidelines / templates

- congresses

ISTQB®
Certified Tester
Foundation Level

Product knowledge

- Factory installation

- Design requirements

- Instructions For Use

- Training Philips Holst Center

- System Designers

- Colleagues

Domain knowledge

Field
- Hospital visits
- Field monitoring
- Flying squad

In-house
- Application
- Operational profiles

Operational Profiles

Agenda

- Test organization

- Test policy & strategy

- The road to product release

- Facts and figures

PHILIPS

Test Policy

Mission

To <u>release</u> products with <u>proven quality insight</u> that enables the BL-CV to be the recognized leader of X-ray centered, minimally invasive solutions, designed around patient and clinician, excelling in clinical outcome & workflow efficiency

Test Policy

Level	Purpose
SIT	
FAT	
SAT	
SRT	

Vision on Integration, Testing and Release

- **Early validation**:
- **Risk based testing**:
- **Release evidence**:
- **Supplier quality evidence**:
- **Exit- and entry criteria**:
- **Quality attributes**:

Policy Translated to values for operation

Test Strategy

	Development Tests	Functional Acceptance Test (FAT)	System Acceptance Test (SAT)	System Release Test (SRT)
Objective				
Responsible (Task, Responsible, Accountable, Consulted)				
Entry Criteria				
Exit Criteria				
Deliverables				
Techniques				
Applicable Procedures				
Non-functional Tests				

test phase

operational definition

Agenda

- Test organization

- Test policy & strategy

- **The road to product release**

- Facts and figures

BL-CV projects & products

<u>Xper Allura</u>

FD10

FD10/10

FD20

FD20/10

FD20/20

PHILIPS

BL-CV projects & products

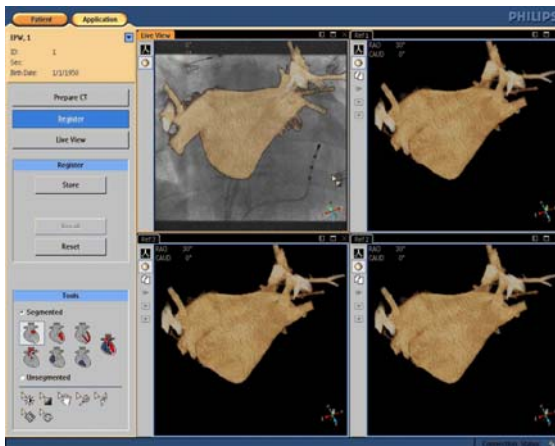## StereoTaxis

Electro Physiology

XtraVision
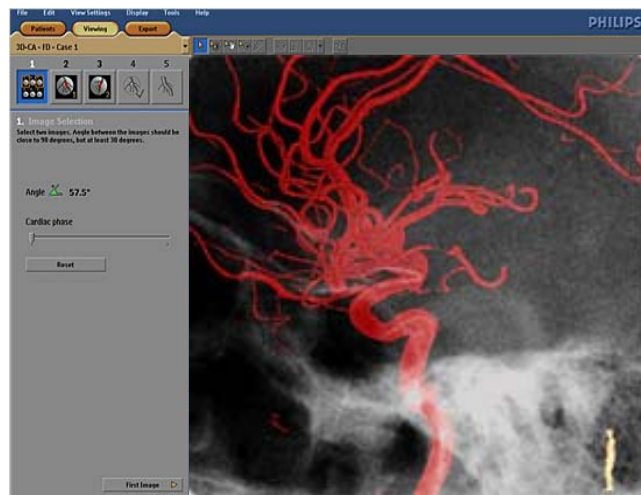
BL-CV projects & products
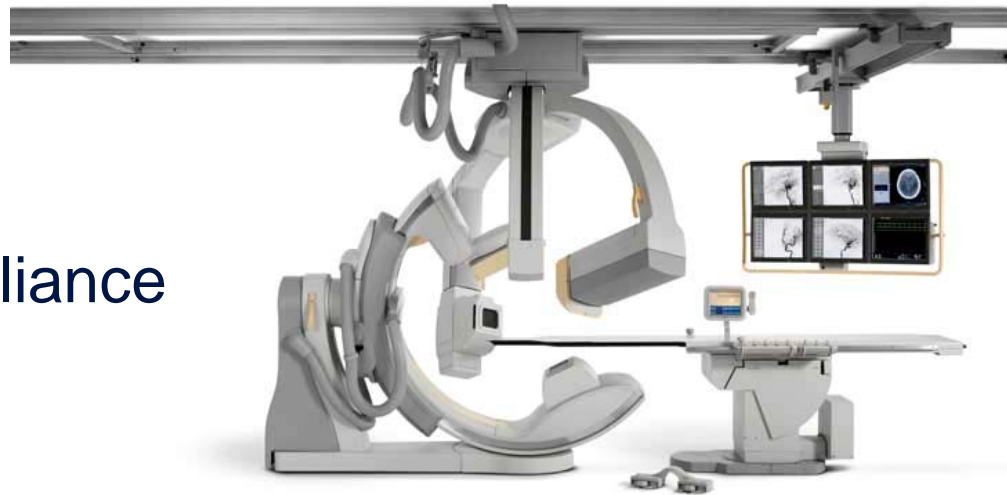
Heamo

EP Navigator

Integrated Cathlab
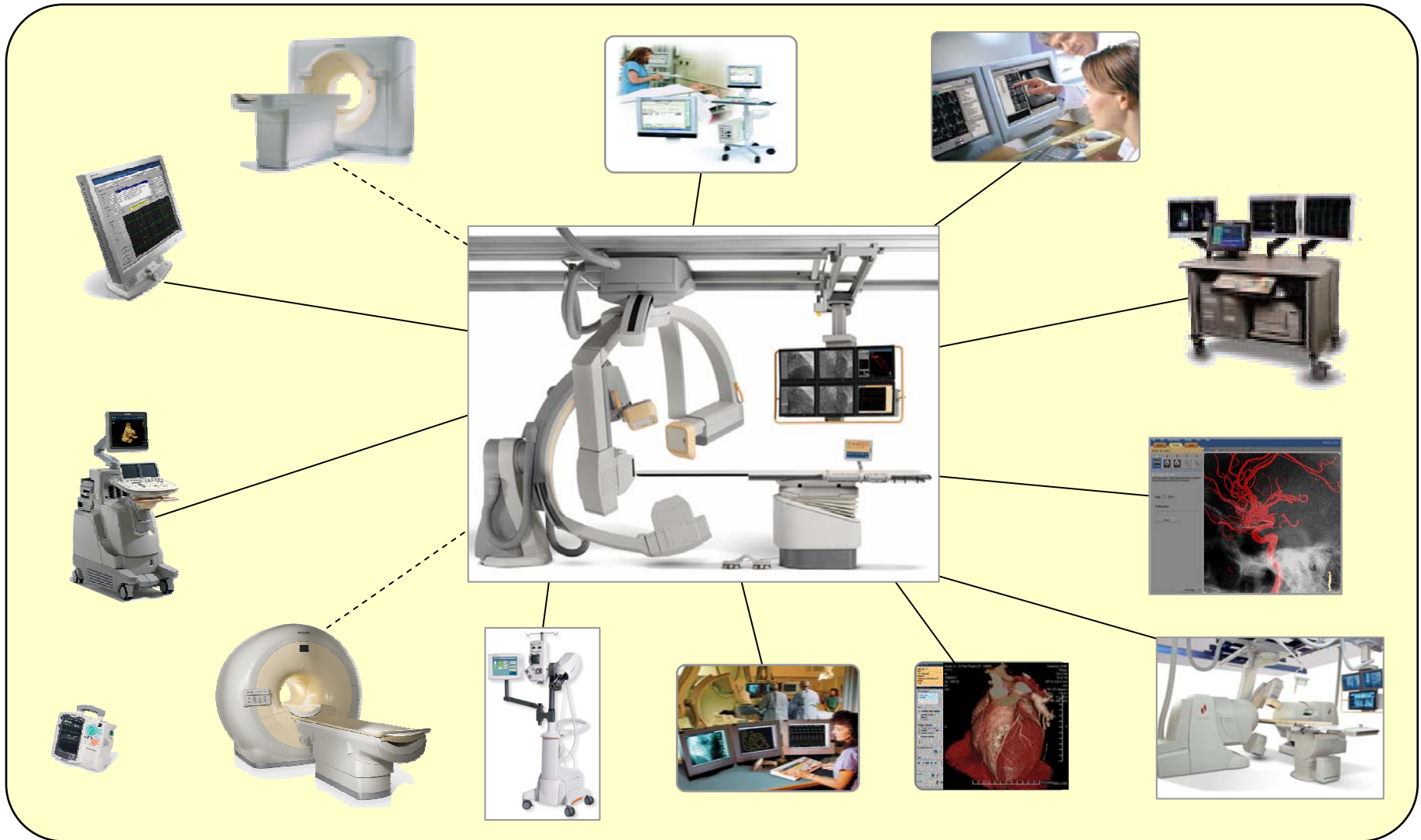
Test areas

Functional

Interoperability's

Norm Compliance

Image Quality

Non-functional

Hazards

Road to release - milestones

| Concept Release | Specification Commitment | Project Plan Commitment | Release for Ordering | Release for Verification & Validation | Release for Acquisition | Release for Clinical Evaluation | End of Verification & Validation | First Commercial Shipment | Release for Limited Delivery | Release for Volume Delivery |
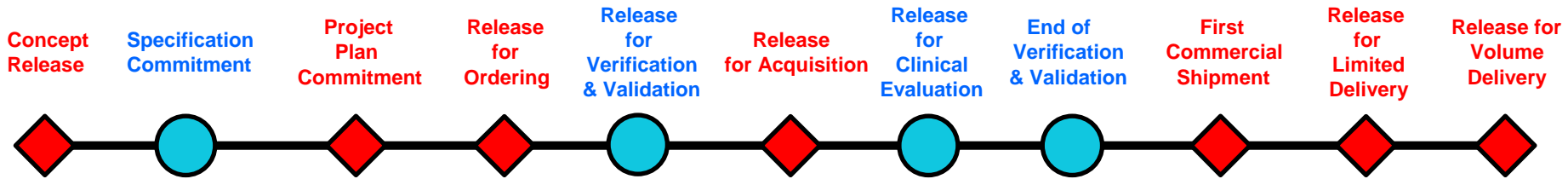
◆ Project milestones

● Internal milestones

Product Realization Process

**Concept
Release**

**Concept
Release**

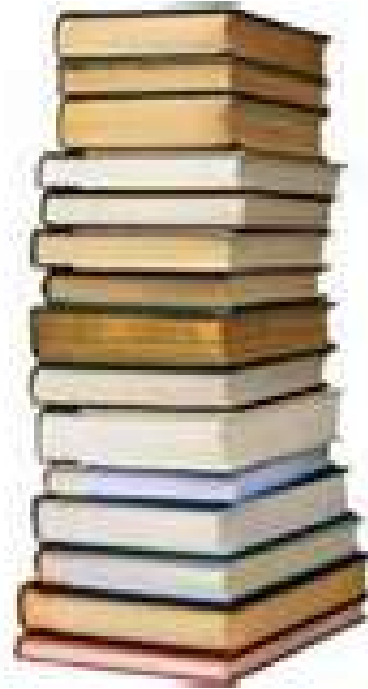# Product Realization Process

Concept
Release

◆

- Testability

- 0 level estimation

- Project approach

Product Realization Process

Concept
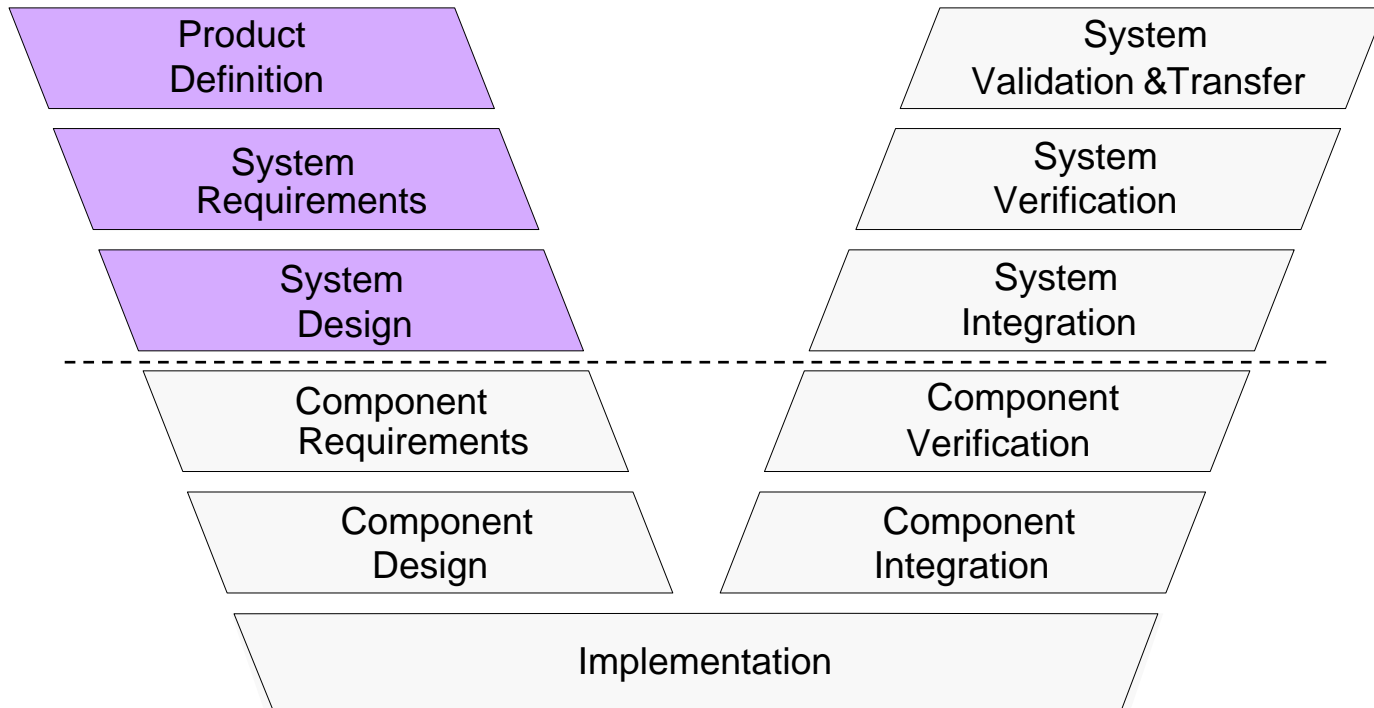Release

Specification
Commitment

Specification
Commitment

PHILIPS

Product Realization Process

Concept **Specification**
Release **Commitment**

V-model

Product Definition	System Validation &Transfer
System Requirements	System Verification
System Design	System Integration
Component Requirements	Component Verification
Component Design	Component Integration
Implementation	

Product Realization Process

Concept Release   Specification Commitment

- MIP proposal

- specification reviews

PHILIPS

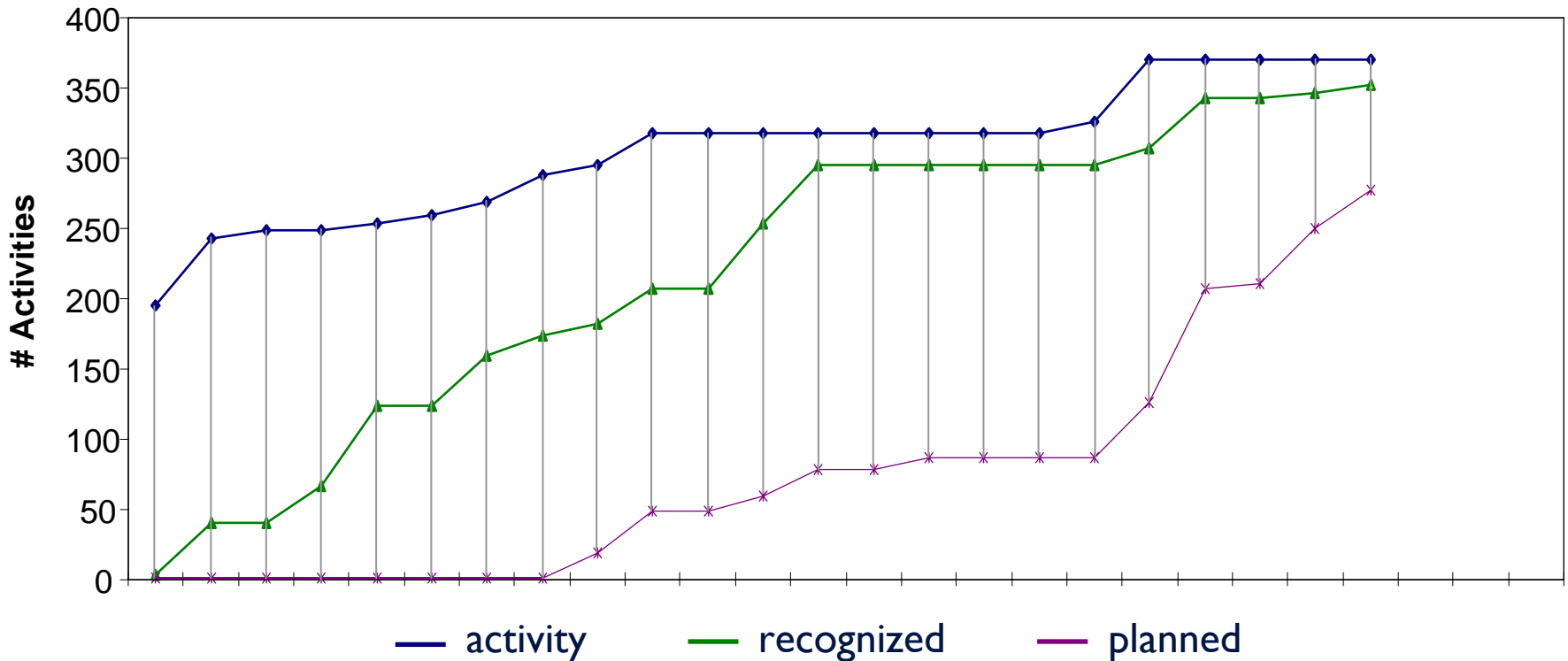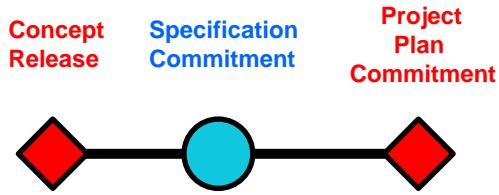# **Product Realization Process**

Concept
Release

Specification
Commitment

MIP approach

 # Activities

| 400 |
| 350 |
| 300 |
| 250 |
| 200 |
| 150 |
| 100 |
| 50 |
| 0 |

— activity   — recognized   — planned

Product Realization Process

Concept Release   **Specification Commitment**   **Project Plan Commitment**

Project Plan Commitment

Product Realization Process

Concept Release **Specification Commitment** **Project Plan Commitment**
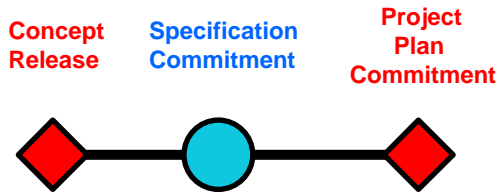
- MTRP

- Risk matrix

- Test allocation

- MIP

- 1st level estimate

Product Realization Process

**Concept
Release**

**Specification
Commitment**

**Project
Plan
Commitment**

Master test & release plan

SRT plan

SAT plan

ART plan

| FAT plan | FAT plan | FAT plan | FAT plan |

Product Realization Process

Concept Release   **Specification Commitment**   **Project Plan Commitment**
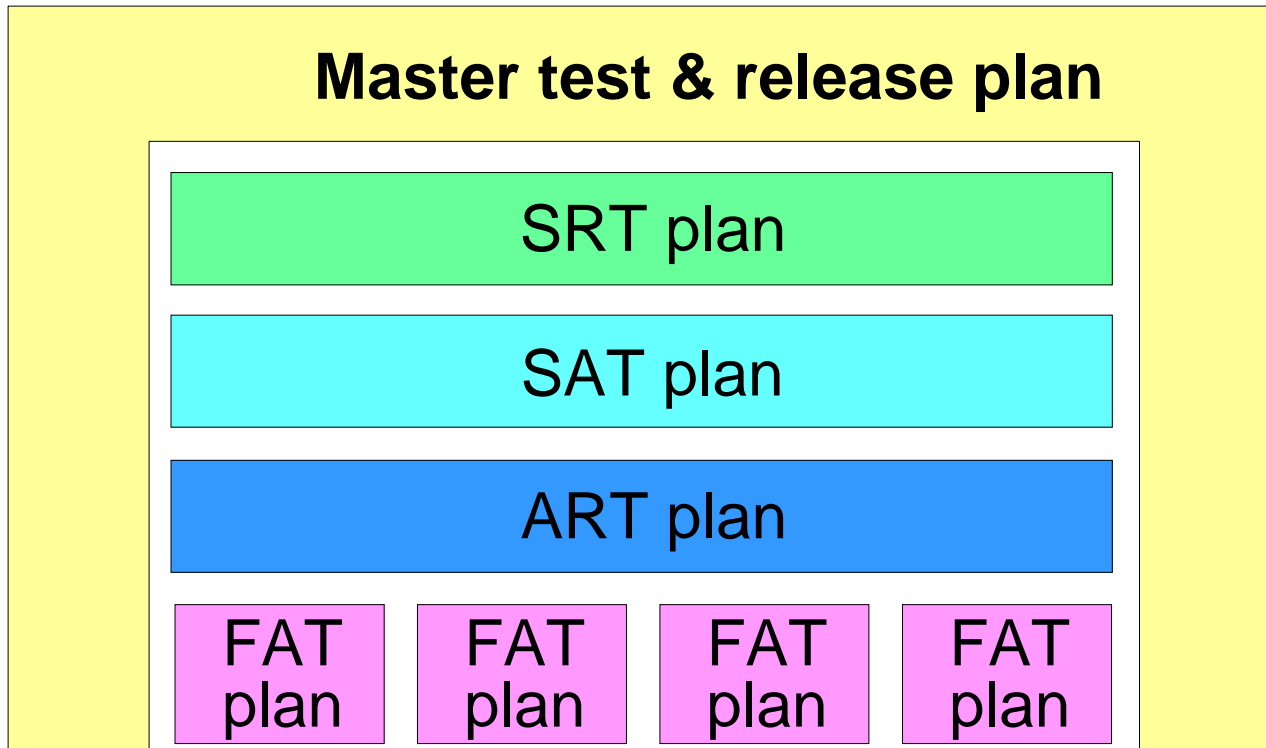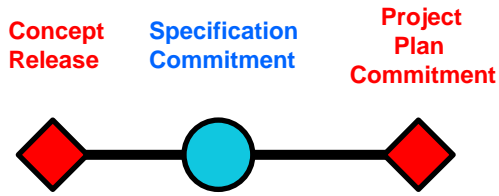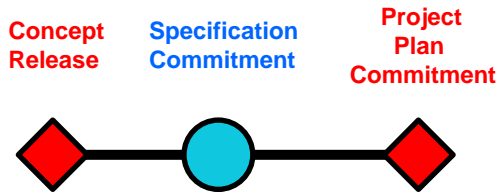
MTRP contents

Assignment

- Product to be released

- Items covered

- Items not tested

Test strategy

- Risk analysis

- Approach for new functionality

- Regression testing

- Quality characteristics

Product Realization Process

Concept Release   **Specification Commitment**   **Project Plan Commitment**
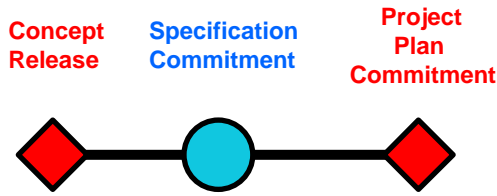
MTRP contents

Test and release decomposition

- Functional Acceptance Test (FAT)

- Single Release Test (SR)

- System Acceptance Test (SAT)

- System Release Test (SRT)

Test agreements

- Supplier projects

- Supporting specialists

Product Realization Process

Concept
Release

Specification
Commitment

Project
Plan
Commitment
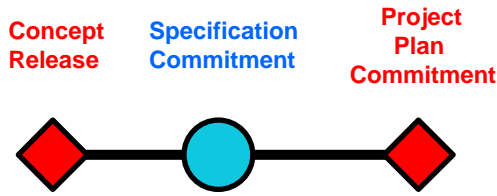
MTRP contents

Test organization

- Organization structure

- Roles, tasks and responsibilities

- Specific project skill needs

- Communication and reporting

- Test environment

Test risks

Effort and planning

Entry / exit criteria

Product Realization Process

Risk Based Testing

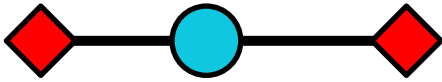| Technical Risk						Business Risk				
Complexity	Degree of change	Immaturity of previous release	Degree of interaction			Selling item	Frequency of use	Impact		
3	3	2	4	50		5	5	5	100	II
2	3	3	2	38		3	3	3	50	IV
1	3	2	2	25		4	4	3	67	II
1	2	2	2	19		1	1	1	0	IV
3	2	4	4	56		1	2	2	17	III
4	2	4	4	63		4	4	5	83	I
3	3	4	3	56		1	3	5	50	III
2	3	2	2	31		4	4	3	67	II
2	2	2	2	25		2	2	1	17	IV
2	2	3	3	38		3	3	4	58	II
1	2	2	2	19		1	2	4	33	IV
4	5	2	2	56		4	4	2	58	I
4	5	2	2	56		4	4	2	58	I
4	5	2	2	56		5	4	2	67	I

PHILIPS

Product Realization Process

Concept
Release

Specification
Commitment

Project
Plan
Commitment

Risk Based Testing

business risk

business risk

technical risk

II

I

IV

III

technical risk

Product Realization Process

Concept Release **Specification Commitment** **Project Plan Commitment** **Release for Ordering**
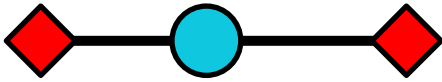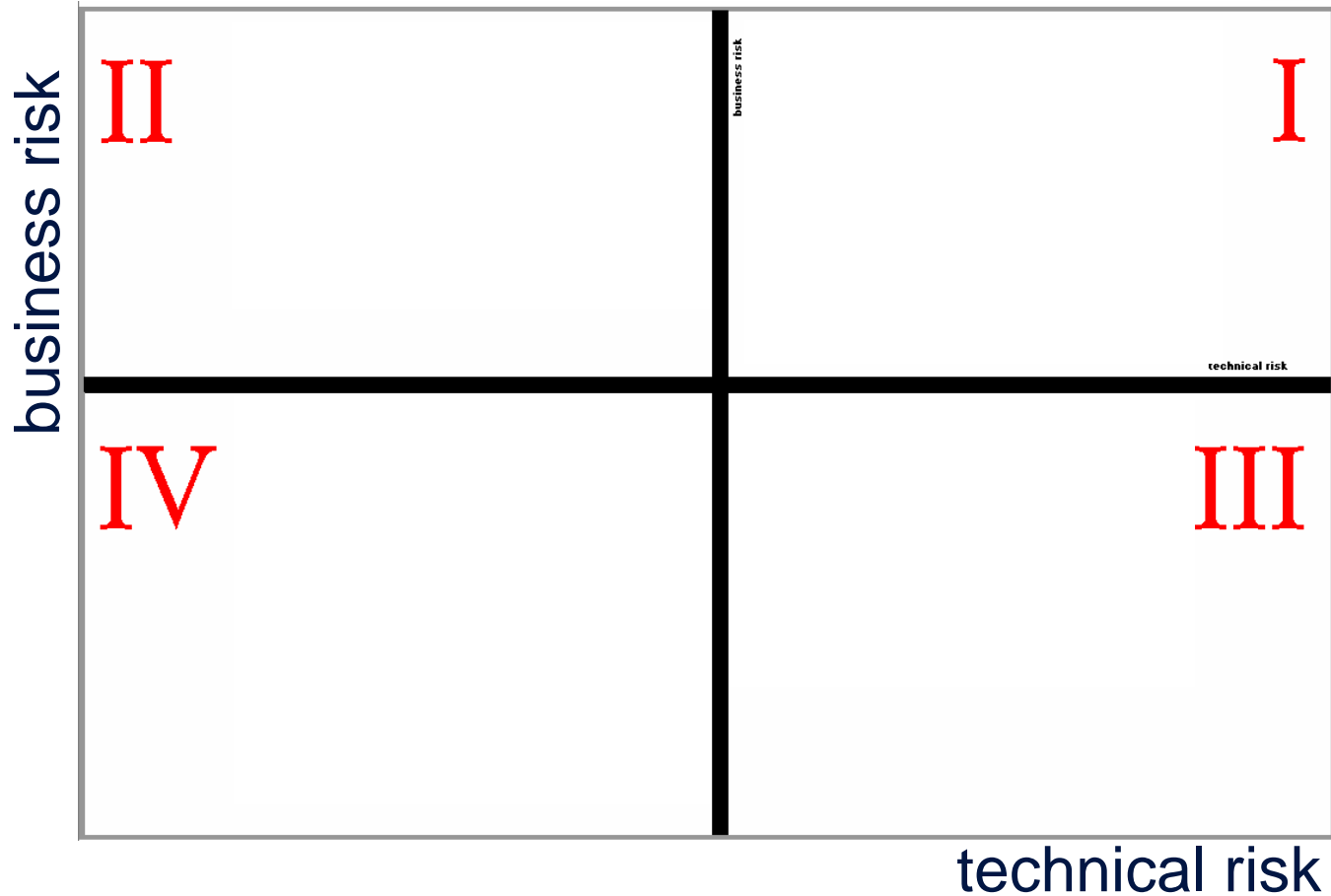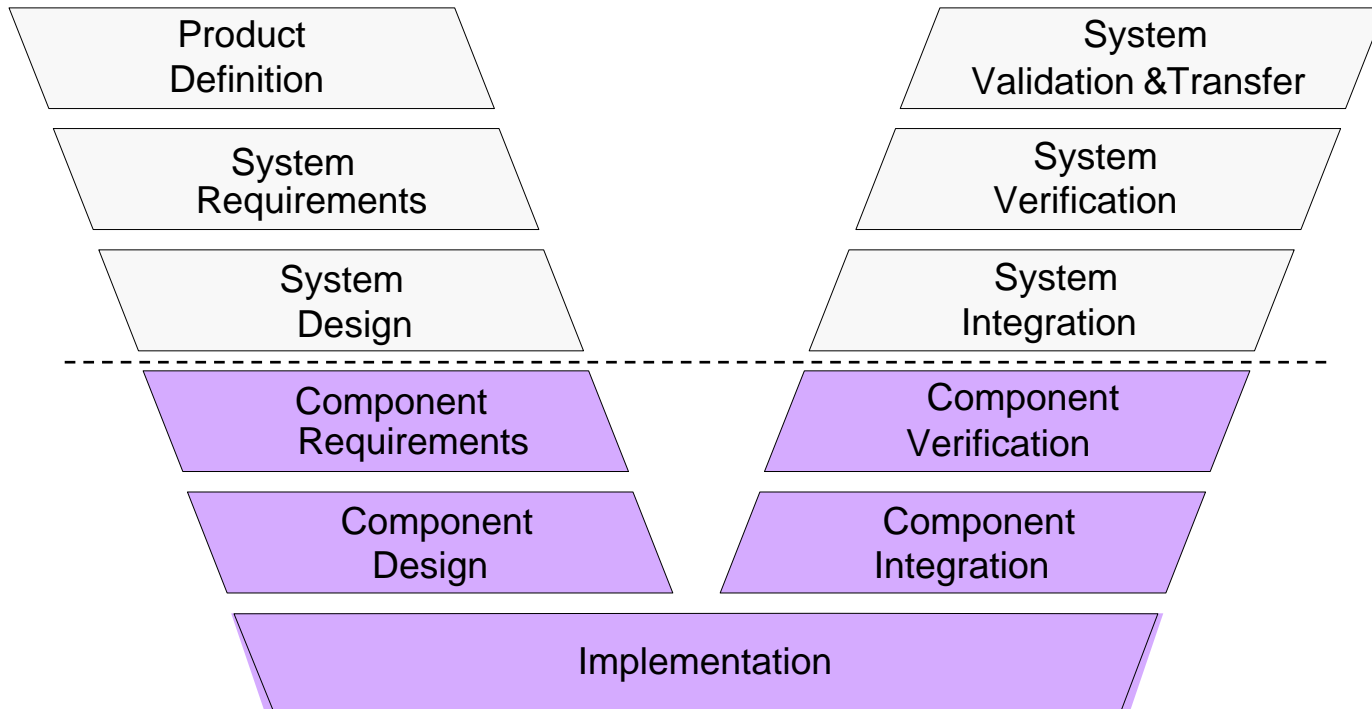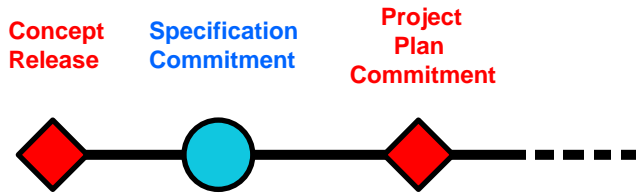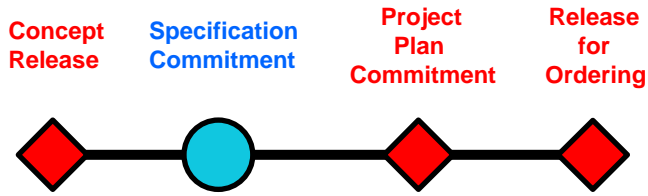
Release for Ordering

Product Realization Process

Concept Release — **Specification Commitment** — **Project Plan Commitment** — **Release for Ordering** — **Release for Verification & Validation**

Release for Verification & Validation

Product Realization Process

Product Realization Process

| Concept Release | Specification Commitment | Project Plan Commitment | Release for Ordering | Release for Verification & Validation |
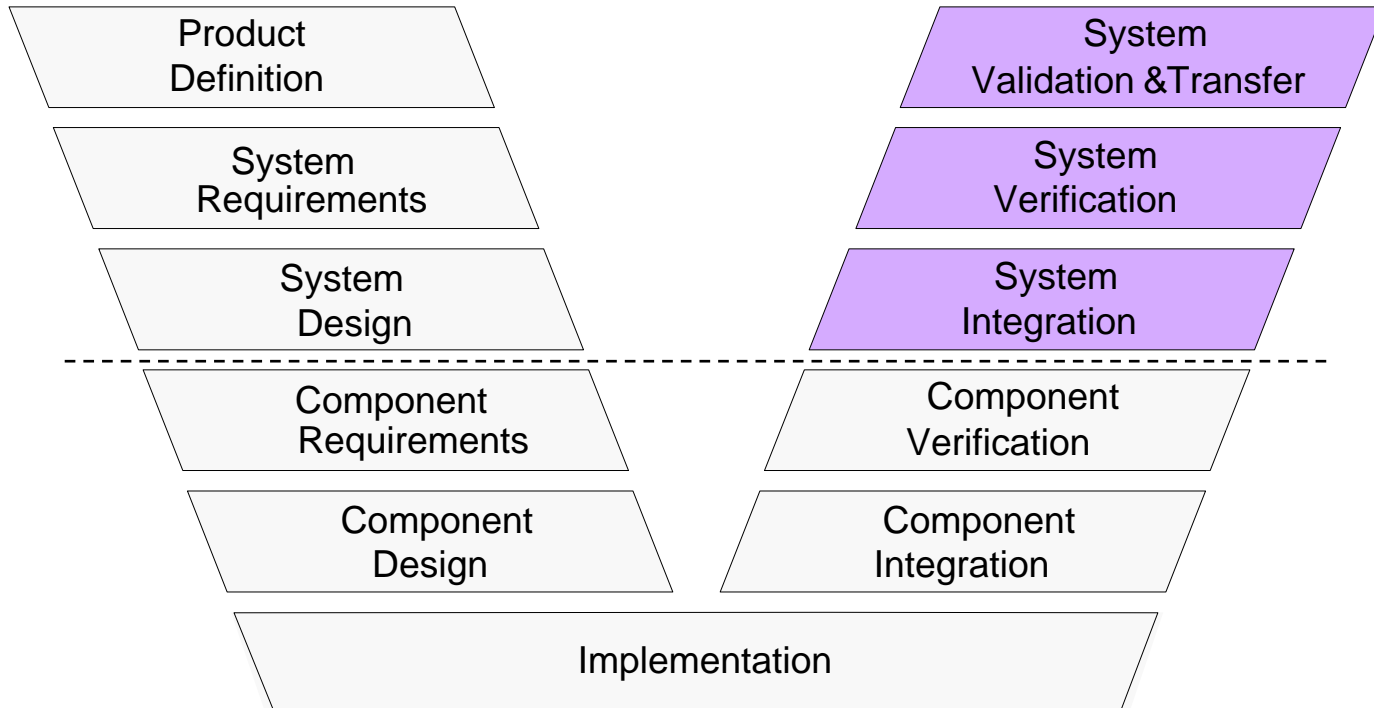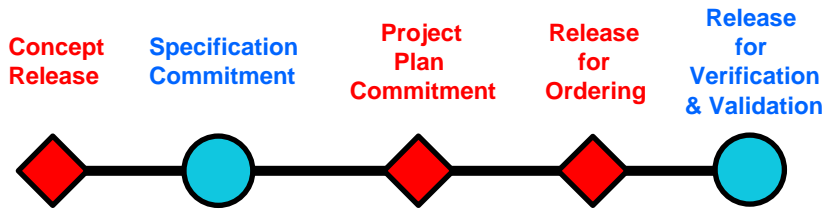
- Level test plan

- Test designs

- Test cases

- Transfer meeting

- Progress monitoring

Product Realization Process

Concept Release   **Specification Commitment**   **Project Plan Commitment**   **Release for Ordering**   **Release for Verification & Validation**

Test techniques

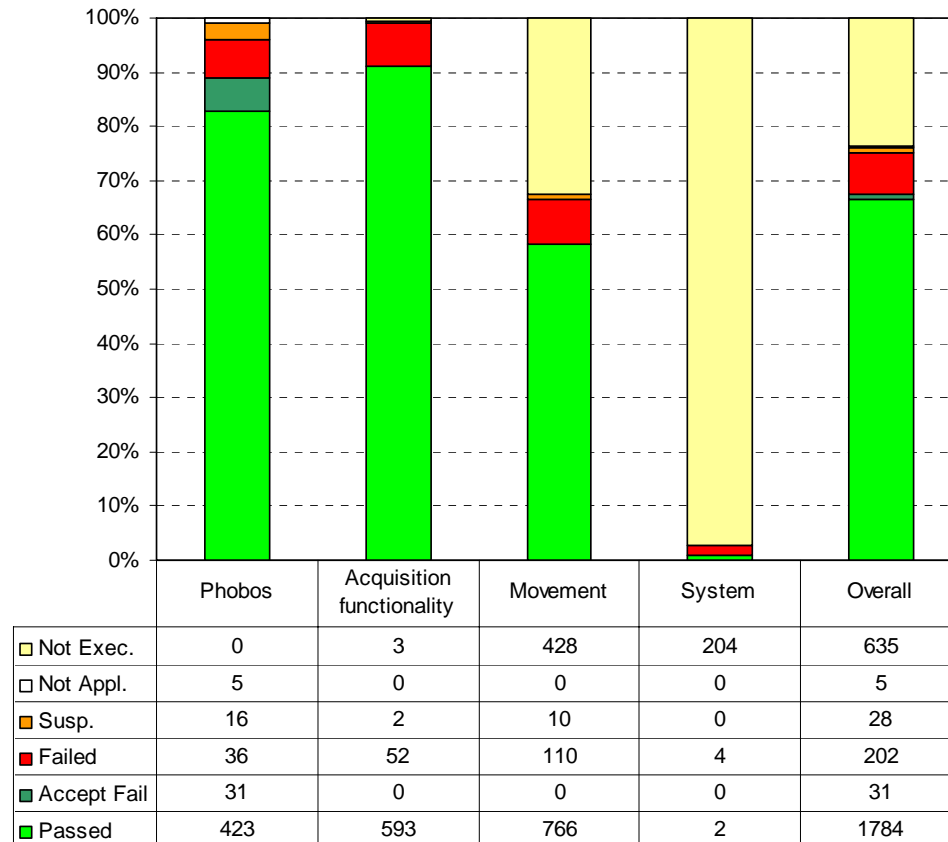| Quality attribute	I	II	III	IV
Functionality	Equivalence Partitioning Boundary Value Analysis Cause Effect Graphing Elementary Comparison Test State Transition Test (1 switch) Process Cycle Test (2 test m.) Use cases	Equivalence Partitioning Process Cycle Test (1 test m.) Use cases Exploratory test	Equivalence Part Boundary Value Analysis State Transition Test (0 switch) Use cases Real-Life Test Exploratory test	Use cases Real-Life Test Syntax Test Error Guessing Exploratory test
Reliability	Real-Life Test	Real-Life Test Exploratory test	Real-Life Test Exploratory test	Syntax Test Real-Life Test Error Guessing Exploratory test
Image quality	Equivalence Partitioning Use cases Real-Life Test	Equivalence Partitioning Use cases Real-Life Test	Equivalence Partitioning Use cases Real-Life Test	Use cases Real-Life Test
Interoperability	Equivalence Partitioning Use cases	Equivalence Partitioning Use cases Exploratory test	Equivalence Partitioning Use cases Exploratory test	Use cases Syntax Test Error Guessing Exploratory test
Usability	Process Cycle Test (2 test m.) Use cases	Process Cycle Test (1 test m.) Use cases Exploratory test	Use cases Exploratory test	Use cases Syntax Test Error Guessing Exploratory test
Safety & norm compliance	Elementary Comparison Test Process Cycle Test (2 test m.) Use cases	<not applicable>	<not applicable>	<not applicable>
Serviceability	Real-Life Test	Real-Life Test	Real-Life Test	Real-Life Test
Manufacturability	Real-Life Test	Real-Life Test	Real-Life Test	Real-Life Test
Security	Process Cycle Test (2 test m.)	Process Cycle Test(1 test m.) Exploratory test	Exploratory test	Error Guessing Exploratory test

Product Realization Process

**Concept
Release**

**Specification
Commitment**

**Project
Plan
Commitment**

**Release
for
Ordering**

**Release
for
Verification
& Validation**

Progress
Monitoring

	Phobos	Acquisition functionality	Movement	System	Overall
☐ Not Exec.	0	3	428	204	635
☐ Not Appl.	5	0	0	0	5
■ Susp.	16	2	10	0	28
■ Failed	36	52	110	4	202
■ Accept Fail	31	0	0	0	31
■ Passed	423	593	766	2	1784

42

Product Realization Process

Product Realization Process

Concept Release **Specification Commitment** **Project Plan Commitment** **Release for Ordering** **Release for Verification & Validation**

Incident distribution

Quality Monitoring

Image quality 12%

Norm compliance 4%

Usability, 5%

Serviceability 10%

Reliability, 8%

Performance 7%

Not applicable, 14%

Interoperability, 2%

Hazards, 3%

Functionality 35%

Product Realization Process

| Concept Release | Specification Commitment | Project Plan Commitment | Release for Ordering | Release for Verification & Validation | Release for Acquisition |

Release for Acquisition

Product Realization Process

| Concept Release | Specification Commitment | Project Plan Commitment | Release for Ordering | Release for Verification & Validation | Release for Acquisition | Release for Clinical Evaluation |
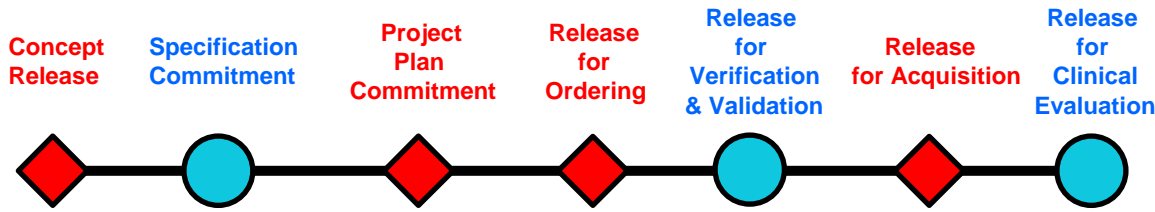
Release for Clinical Evaluation

Product Realization Process

Concept Release	Specification Commitment	Project Plan Commitment	Release for Ordering	Release for Verification & Validation	Release for Acquisition	Release for Clinical Evaluation

- Test plan

- Test designs

- Test cases

- Test report

Product Realization Process

Concept Release · Specification Commitment · Project Plan Commitment · Release for Ordering · Release for Verification & Validation · Release for Acquisition · Release for Clinical Evaluation · End of Verification & Validation

End of Verification & Validation

Product Realization Process

| Concept Release | Specification Commitment | Project Plan Commitment | Release for Ordering | Release for Verification & Validation | Release for Acquisition | Release for Clinical Evaluation | End of Verification & Validation |

- Final test report

- Release advice

Product Realization Process

| Concept Release | Specification Commitment | Project Plan Commitment | Release for Ordering | Release for Verification & Validation | Release for Acquisition | Release for Clinical Evaluation | End of Verification & Validation | First Commercial Shipment |

First Commercial Shipment

PHILIPS

Product Realization Process

Concept Release · Specification Commitment · Project Plan Commitment · Release for Ordering · Release for Verification & Validation · Release for Acquisition · Release for Clinical Evaluation · End of Verification & Validation · First Commercial Shipment

Product Definition

System Requirements

System Design

Component Requirements

Component Design

Implementation

System Validation &Transfer

System Verification

System Integration

Component Verification

Component Integration

PHILIPS

Product Realization Process

Concept Release	Specification Commitment	Project Plan Commitment	Release for Ordering	Release for Verification & Validation	Release for Acquisition	Release for Clinical Evaluation	End of Verification & Validation	First Commercial Shipment

- Logistic validation

- System release checklist

Product Realization Process

Concept Release — Specification Commitment — Project Plan Commitment — Release for Ordering — Release for Verification & Validation — Release for Acquisition — Release for Clinical Evaluation — End of Verification & Validation — First Commercial Shipment — Release for Limited Delivery — Release for Volume Delivery
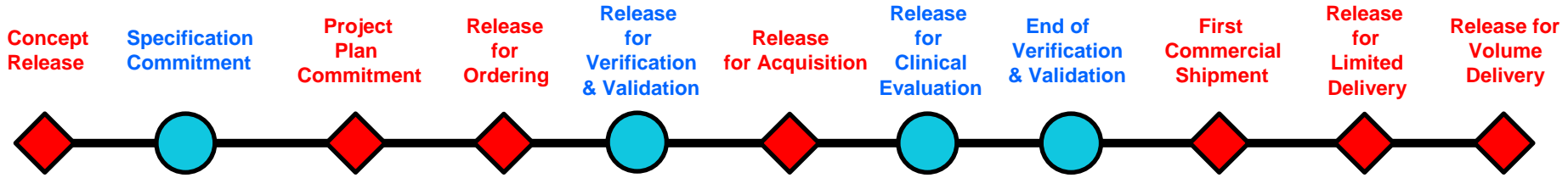
Release for Limited Delivery

Release for Volume Delivery

Product Realization Process

| Concept Release	Specification Commitment	Project Plan Commitment	Release for Ordering	Release for Verification & Validation	Release for Acquisition	Release for Clinical Evaluation	End of Verification & Validation	First Commercial Shipment	Release for Limited Delivery	Release for Volume Delivery
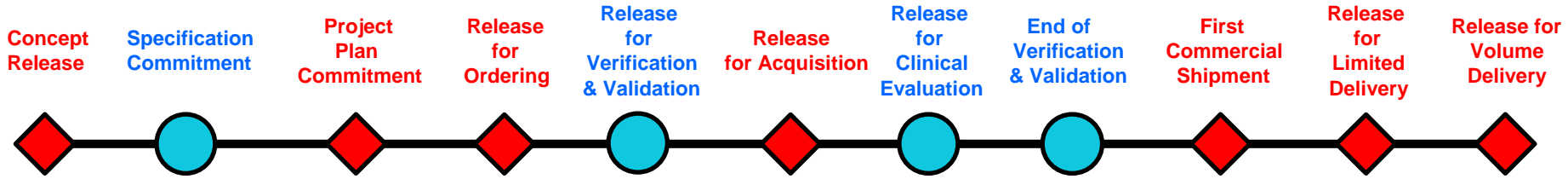
System Release Report

Agenda

- Test organization

- Test policy & strategy

- The road to product release

- **Facts and figures**
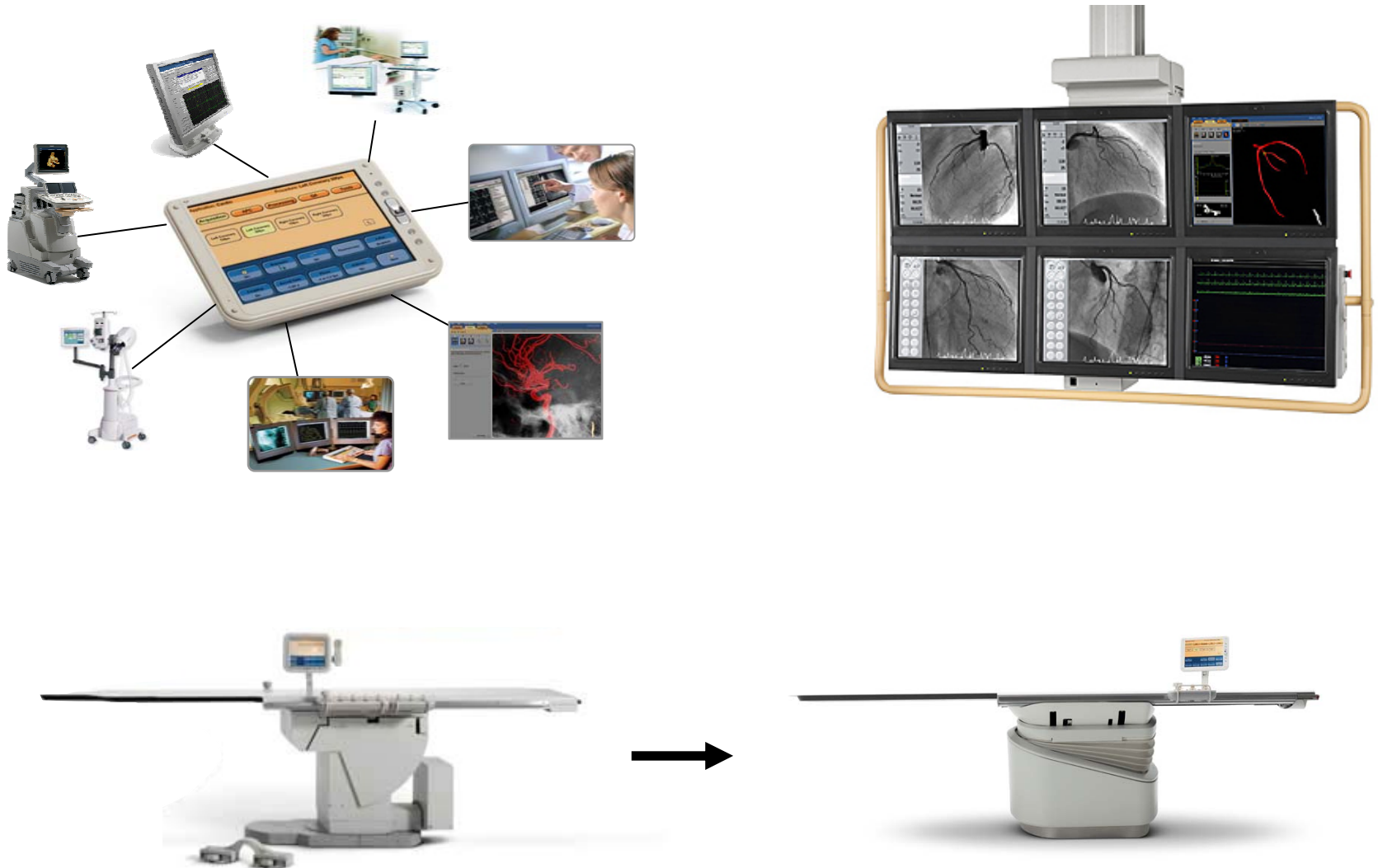
Latest Xper family release
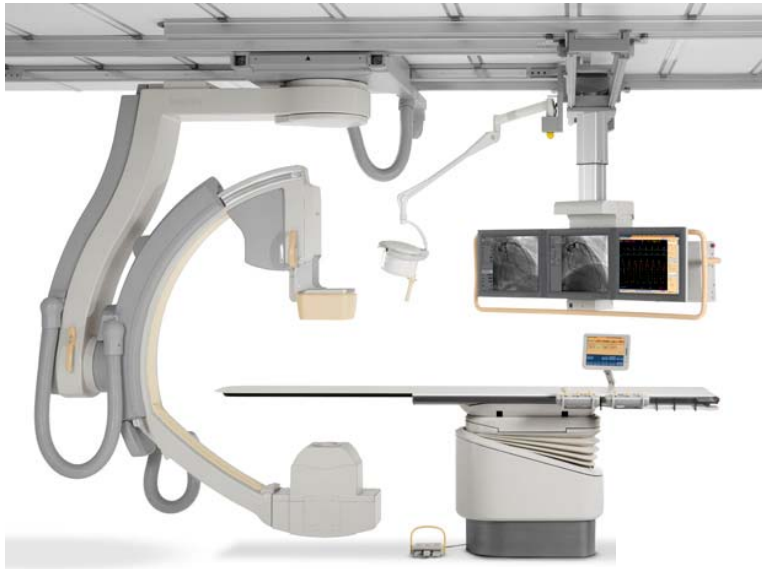
FD10 monoplane

FD10/10 biplane

New development

Test effort distribution