

# De essentiële rol van Embedded Software in het productontwikkelp proces

Software componenten als onderdeel van de stuklijst.

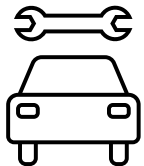
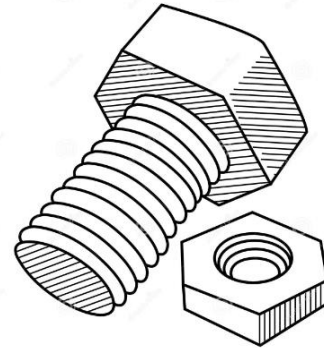
specificeren, ontwikkelen en beheren van softwarecomponenten

van R&D naar productie ?

# Software organiseren zoals andere onderdelen van een systeem ?



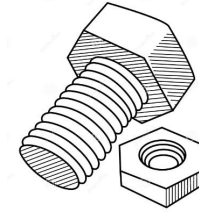
code





code

# Waarom ?



- Beschrijving
- Naam
- Return Type
- Parameters
- Toegangsmodificator
- Functieafhankelijkheden
- Complexiteit

- Diameter
- Lengte
- Kopstijl
- Materiaal
- Schroefdraad type (M8x1.25 )
- Schroefdraadlengte
- Hoofddiameter

# Problemen

- Complexiteit en Verwarring
- Onderhoud
- Schaalbaarheid
- Samenwerkings
- Kwaliteitsverlies
- Moeilijke Onboarding
- Langere Ontwikkeltijd
- Gebrek aan Documentatie
- Moeilijkheden bij Testen

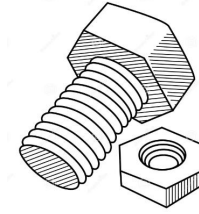
- Technische Schuld





code

Hoe ?



Organiseren van software op een consistente en gestructureerde manier, vergelijkbaar met hoe andere onderdelen van een systeem worden georganiseerd.

# Hoe creëer je een georganiseerde structuur?

**Bevorder Productiviteit**  
**Communicatie & Efficiëntie**  
**Definieer duidelijke doelen (SMART)**  
**Taken en verantwoordelijkheden**  
**Communicatielijnen**  
**Technologie en tools**

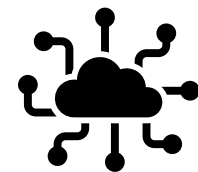
**Processen & procedures**



code

# Voordelen van Consistente SW Processen

1. Samenwerking
2. Onderhoud
3. Herbruikbaar
4. Schaalbaar
5. Documentatie en Training
6. Foutopsporing
7. Uniformiteit



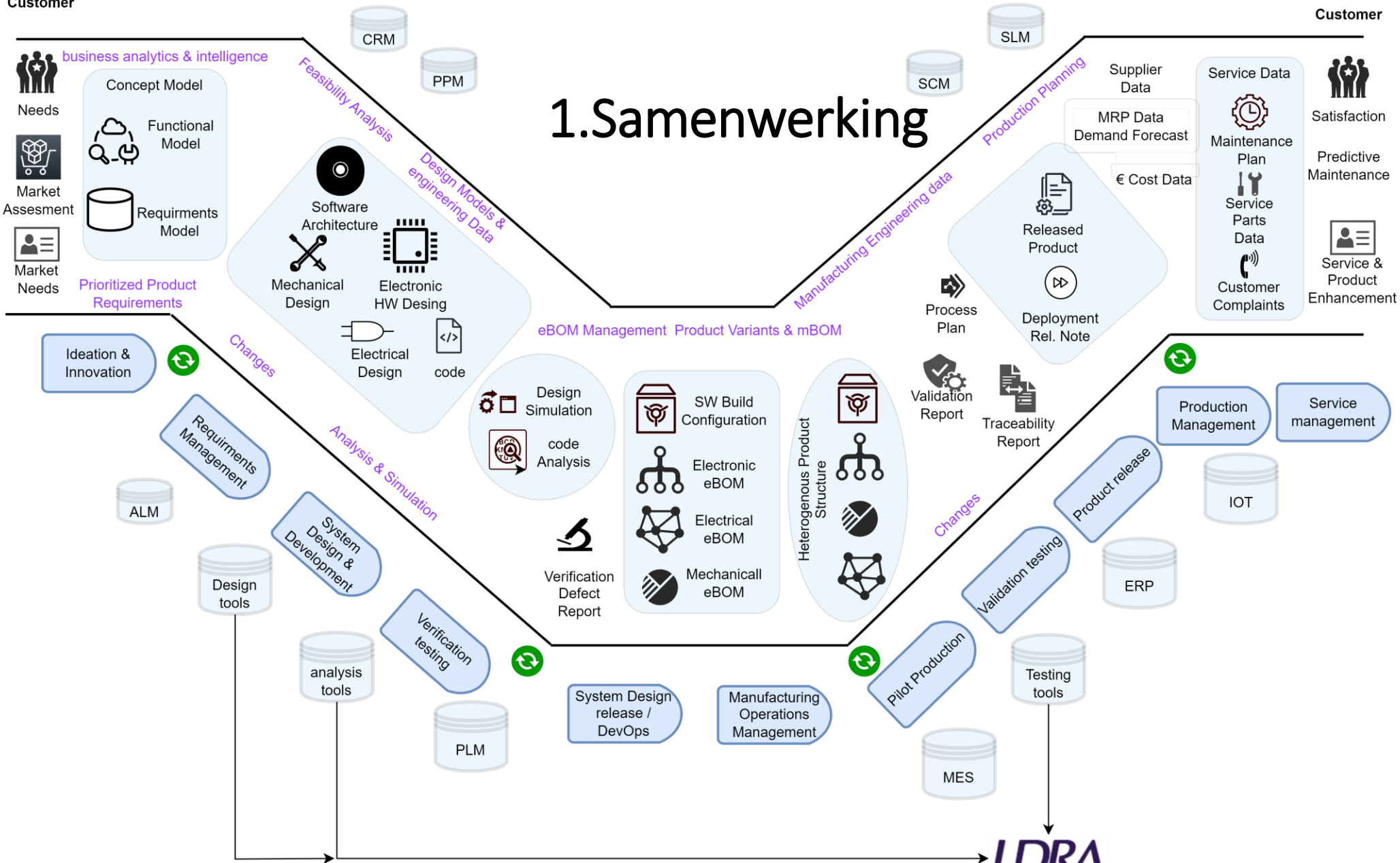
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Customer

Customer

# 1. Samenwerking



LDRA





# 2. Onderhoud

## Overall Results - Percentage of Metrics Passing

+/-

### Set Results

Set	All Metrics	Clarity	Maintainability	Testability
Keil_UV5_ARMCM0_Dice	89%	71%	100%	100%

### File Results

File	All Metrics	Clarity	Maintainability	Testability
dice.c	85%	57%	100%	100%
main.c	94%	86%	100%	100%

## System Results

+/-

### Metrics Results for System Keil\_UV5\_ARMCM0\_Dice

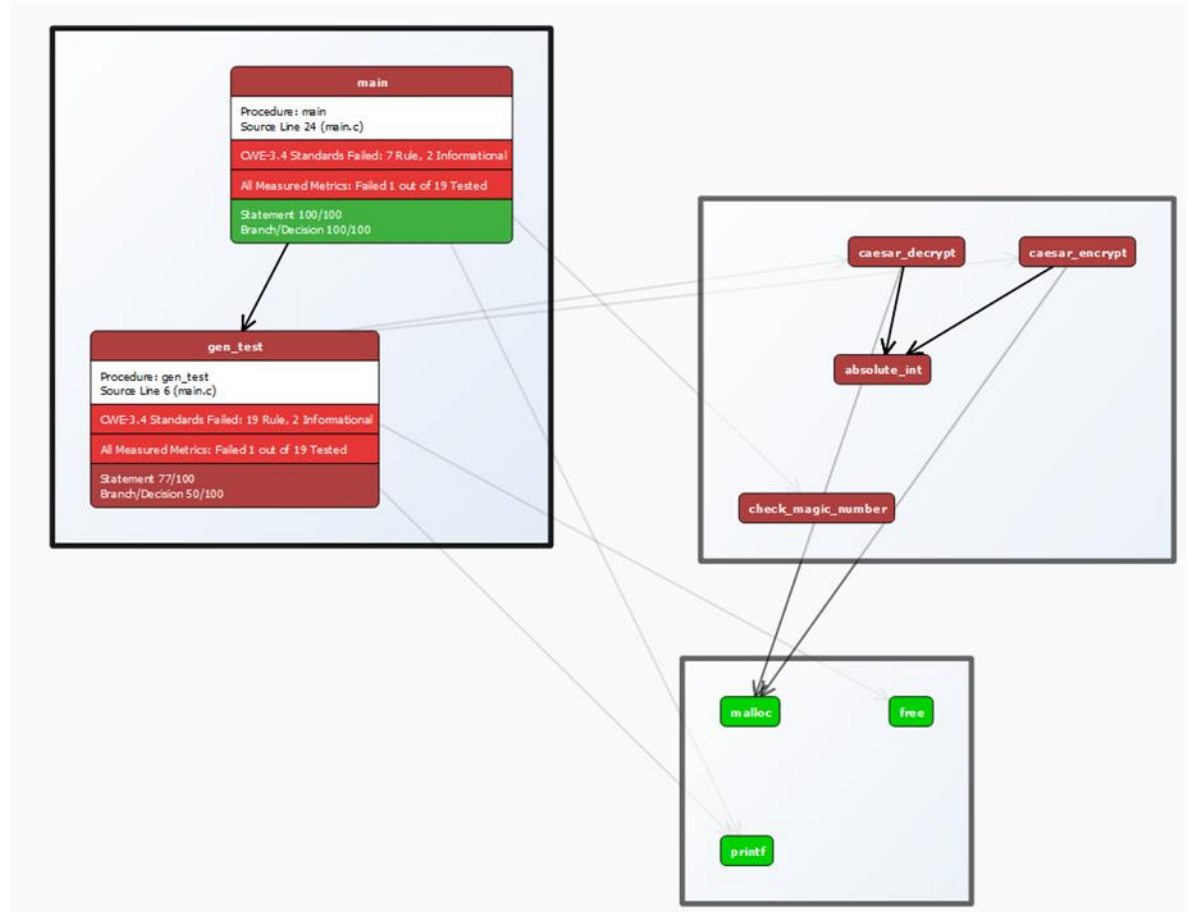
Metric	Value
Executable Lines in System	99
Cyclomatic Complexity	10
Knots	4
Essential Cyclomatic Complexity	1
Essential Knots	0



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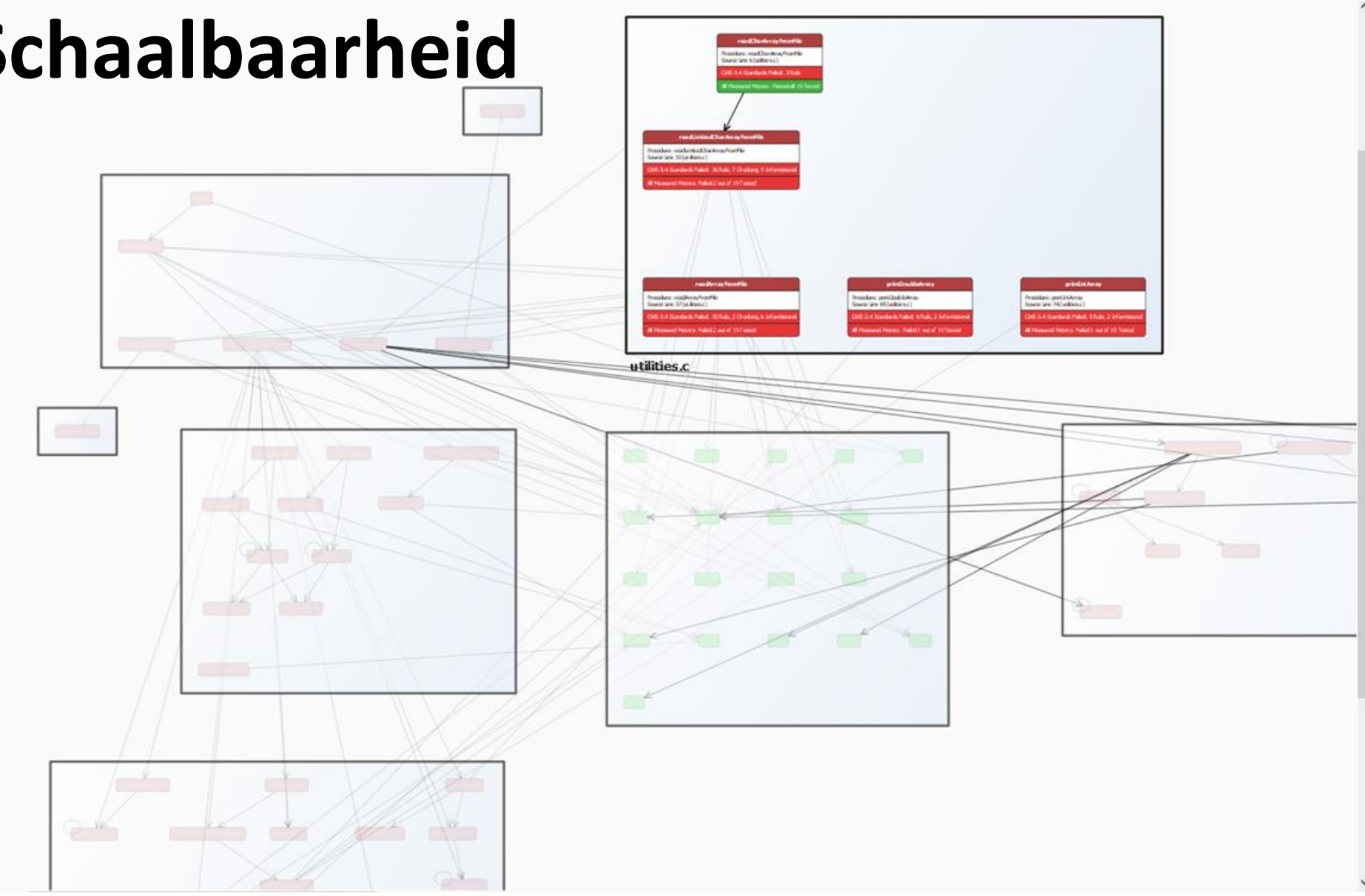
# 3. Herbruikbaarheid

▼ Clarity	100% Metrics Successful		
Expansion Factor	1.76%	0.5%	10%
Executable ref. Lines	40	0	2000
Depth of Loop Nesting	0	0	3
Total LCSAJs	11	0	1000
Unique Operands	10	0	300
Average Length of Basic Blocks	5%	1%	32%
Comments in Headers	8	2	2000
▼ Maintainability	100% Metrics Successful		
Number of Procedures	2	0	40
Unreachable Branches	0	0	20
Unreachable Lines	0	0	10
Maximum LCSAJ Density	3	0	50
Unreachable LCSAJs	0	0	10
Total LCSAJs	11	0	1000
Vocabulary	17	0	340
Cyclomatic Complexity	3	1	49
Knots	2	0	200
Essential Cyclomatic Complexity	1	1	1
Essential Knots	0	0	2
▼ Testability	93% Metrics Successful		
Fan Out	7	0	20
File Fan in	2	0	20
Number of Procedures	2	0	40
Procedure Exit Points	3 : (Fail)	0	1
Number of Loops	0	0	8
Unreachable Branches	0	0	20
Unreachable Lines	0	0	10
Maximum LCSAJ Density	3	0	50
Unreachable LCSAJs	0	0	10
Total LCSAJs	11	0	1000
Total Operands	38	0	1500
Number of Basic Blocks	8	0	60



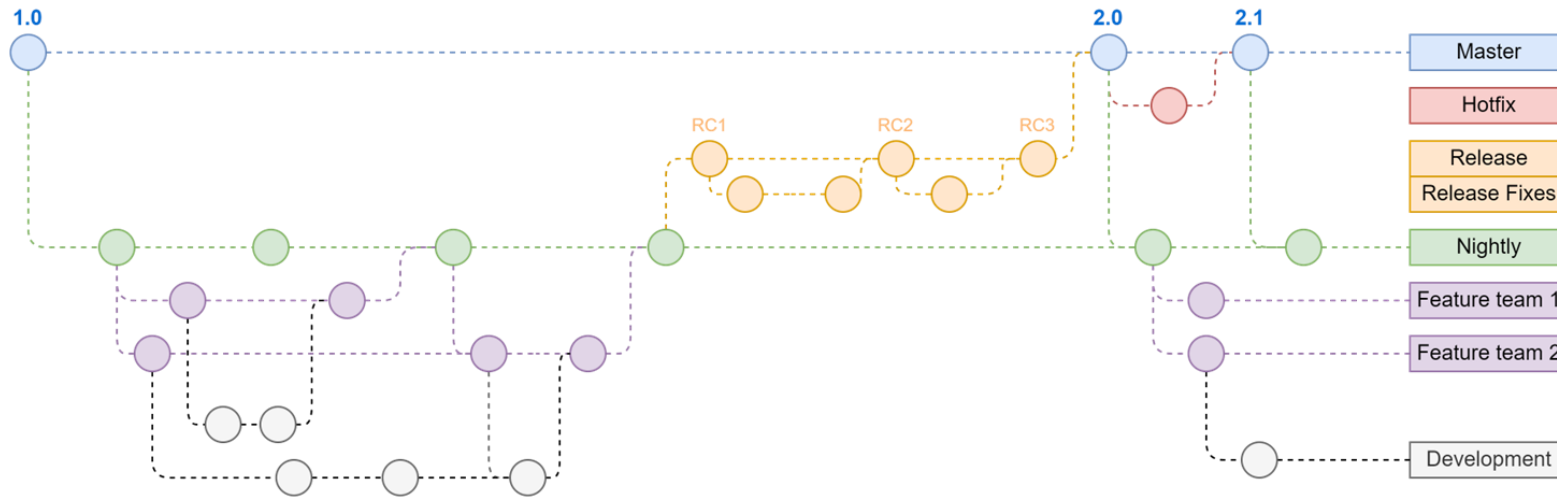
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# 4. Schaalbarkeit



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# 5. Uniformiteit



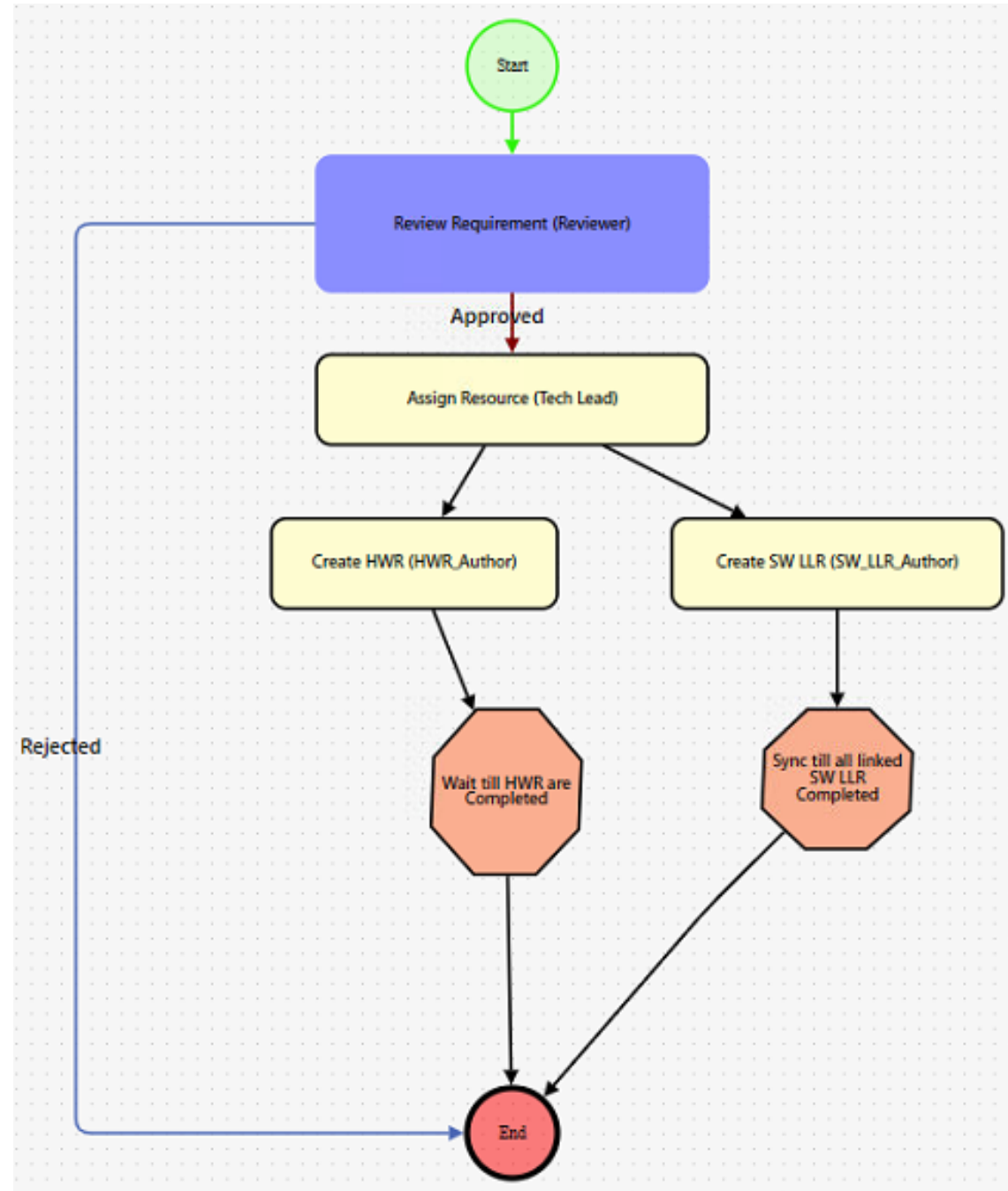
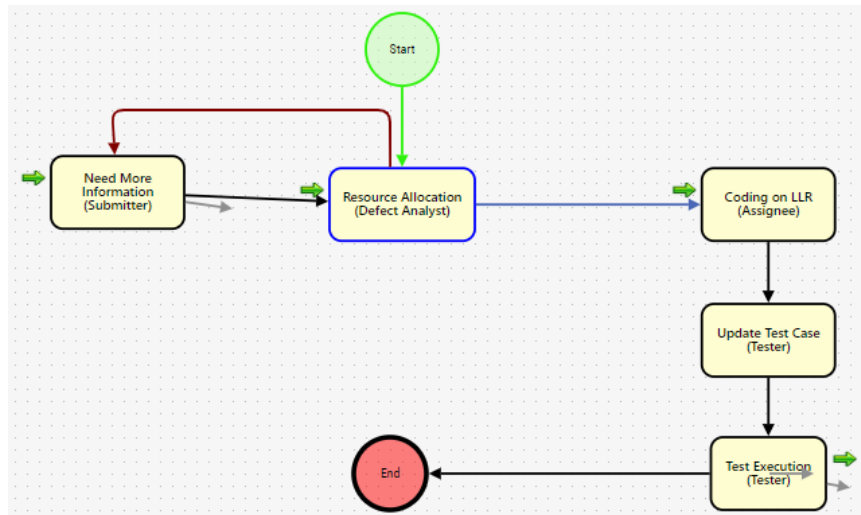
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	Project Management	▼
	HARA	▼
	Safety Management	▼
	Release Management	▼
	Requirements Man ...	▼
	Architecture Man ...	▼
	Design Management	▼
	Code Management	▼
	Test Management	▼
	Defect Management	▼
	Change Management	▼
	FMEA	▼
	Task Management	▼
	Reports and Dash ...	▼

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# 6. Foutopsporing



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# 7. Documentatie en Training



## Voorbeelden uit de praktijk:

- Apple:

- iOS-besturingssysteem
- macOS
- App Store
- iCloud
- Apple Retail Stores

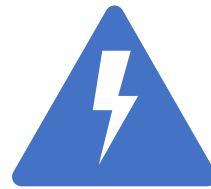
- Google:

- Android -besturingssysteem
- G-Suite
- Google Cloud Platform
- Advertentieplatforms

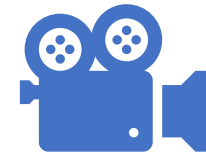
# MKB:Use Case Van Deurbel naar Toegangscontrole



**Bel**



**Bedrading**

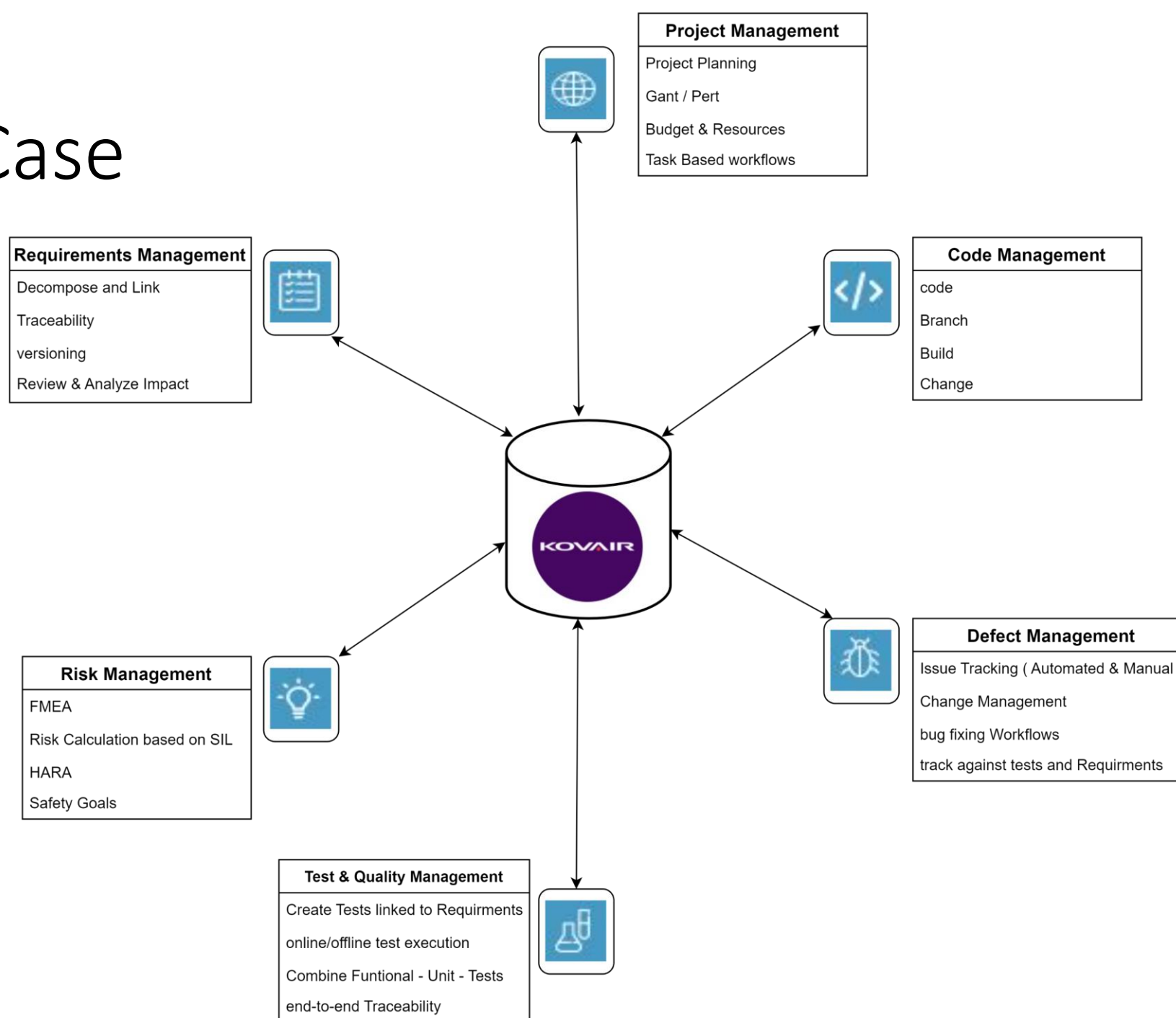


**Biometrics / Video / IP**

NextGen

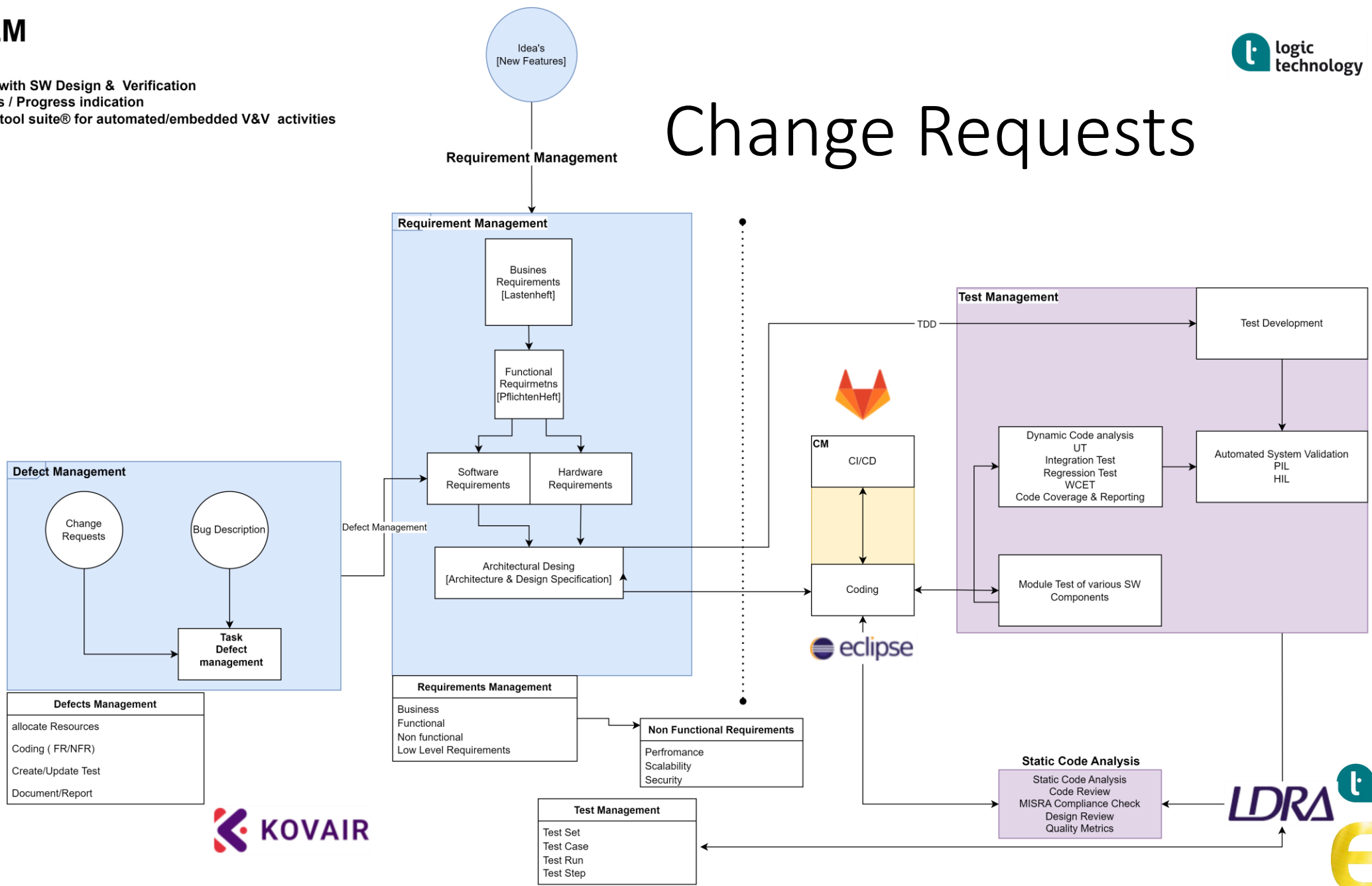


# Use Case

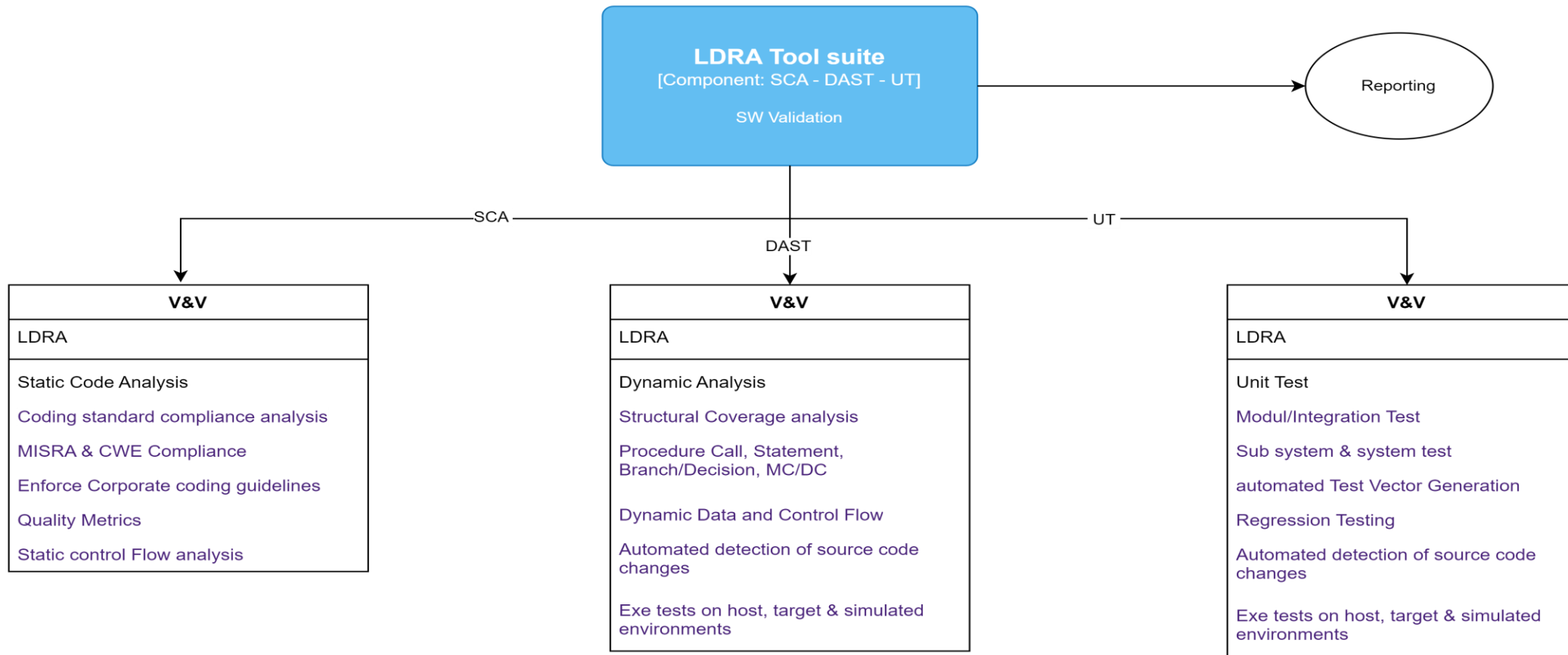


SDLC  
 DevOps environment with SW Design & Verification  
 Task Based Workflows / Progress indication  
 Integated with LDRA tool suite® for automated/embedded V&V activities

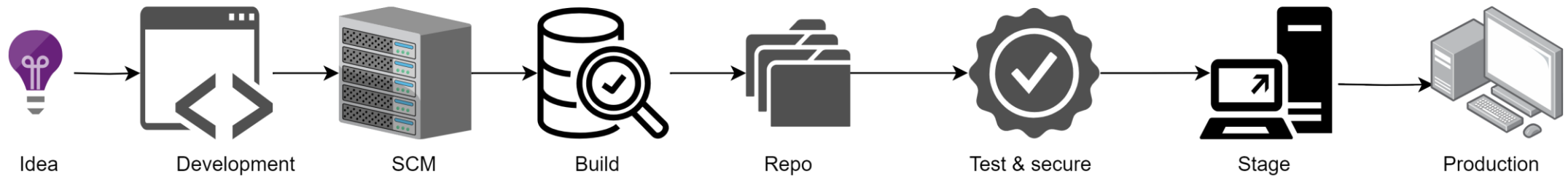
# Change Requests



# Combineer & Integreer Technologie



# Cloud /On Premise



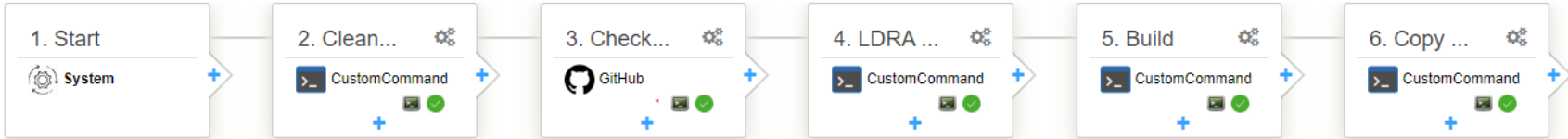
DevSecOps



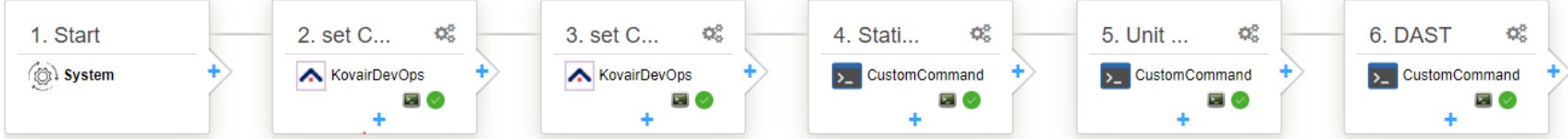
# DevOps Software

Pipeline-Caesar    Release : Caesar-Demo    + Project : LDRA TS          RUN : Pipeli...#7647         

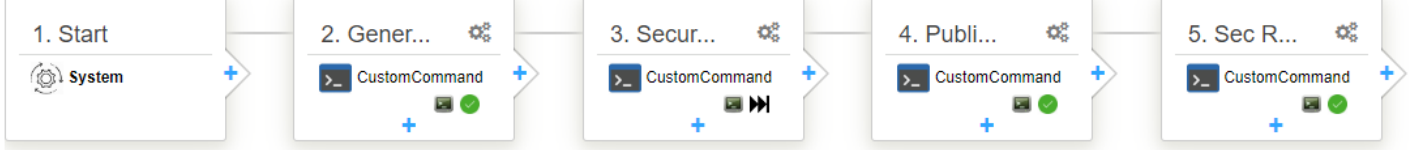
Stage 1    6 Task(s)



Auto Test    6 Task(s)



results    5 Task(s)



# Multiplatform Pipelines

QuickSync

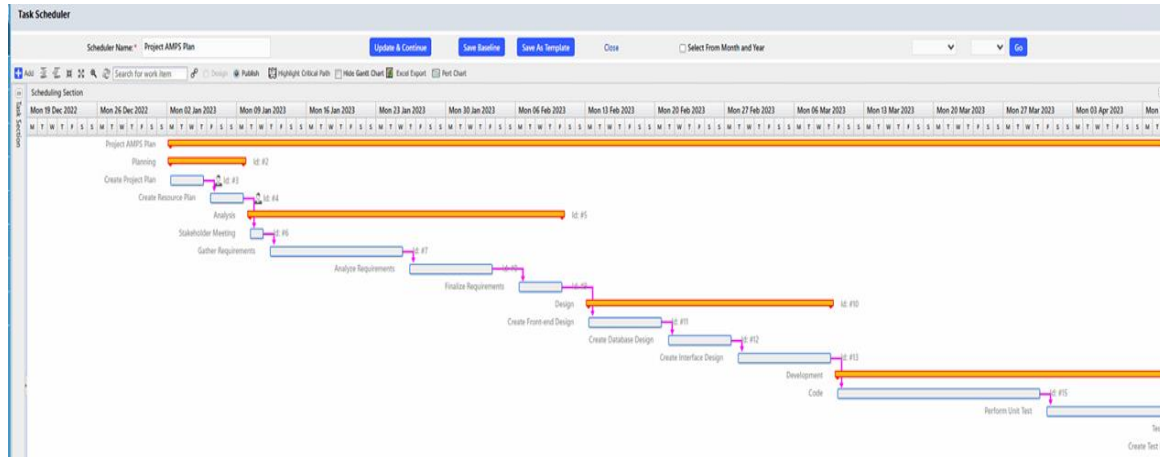
ALM

DevSecOps



Omnibus

# BOM = eBOM + sBOM



## Gestructureerde Aanpak



1 Specificatie ✓

2 Ontwikkeling ✓

3 Documentatie ✓

4 Beheer ✓

5 Test ✓

6 Overdracht ✓

7 Onderhoud ✓

# SW Processen en procedures

- **SW Processen & procedures**
- Planning
- Beheer Budgetten & Resources
- Product Varianten
- HW Test
- Niet functionele Requirements etc.
  
- Bezoek ons op Stand #7E096





# Advies : Structureer & Integreer SW componenten zoals een stuklijst

Stand : #7E096

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