# Cybersecurity

## Component Development



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# Security Tree Example



What the customer explaint



What the project leader understood



What the architect designed



What the developers implemented



How documentation looks like



What the marketing presented



What the customer really needed

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# Cybersecurity on Component Level

## Agenda

1. Cybersecurity: what are you thinking about?
2. Cybersecurity matters before starting projects
3. Threat Analysis and Risk Assessment – Why can the risk help us?
4. Cybersecurity – Traceability, Coding Rules, Static Code Analysis, Unit-Testing
5. Security Documentation



# Cybersecurity

## what are you thinking?

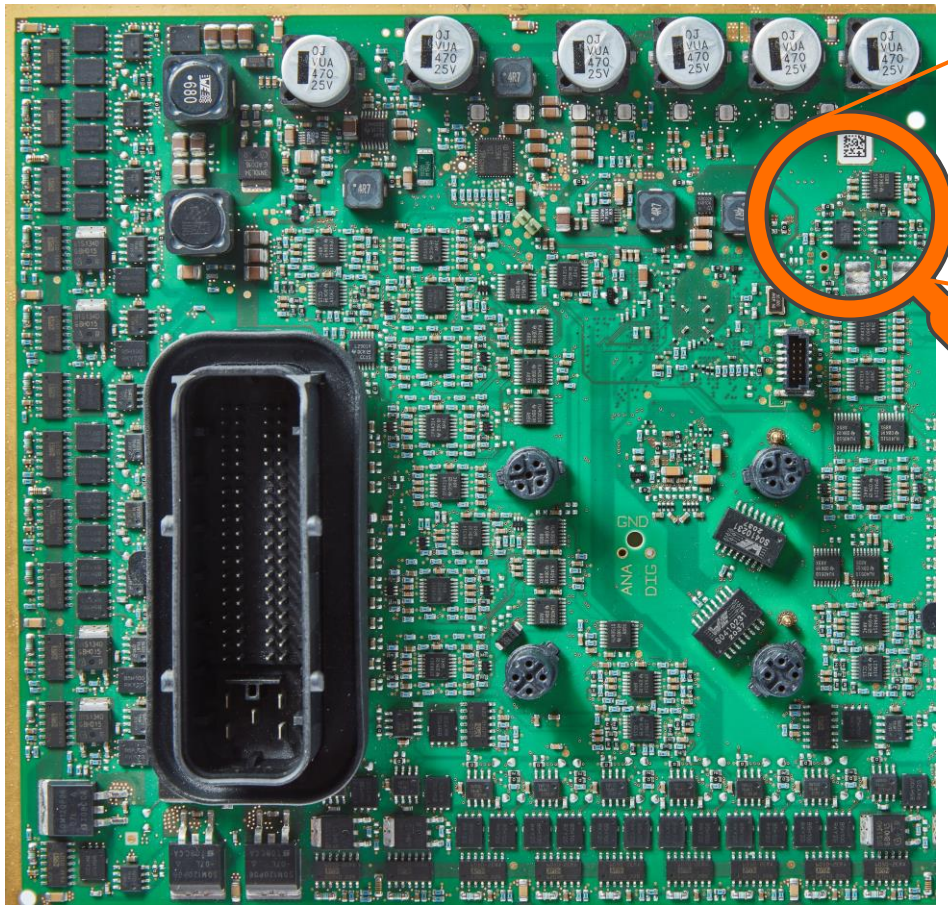


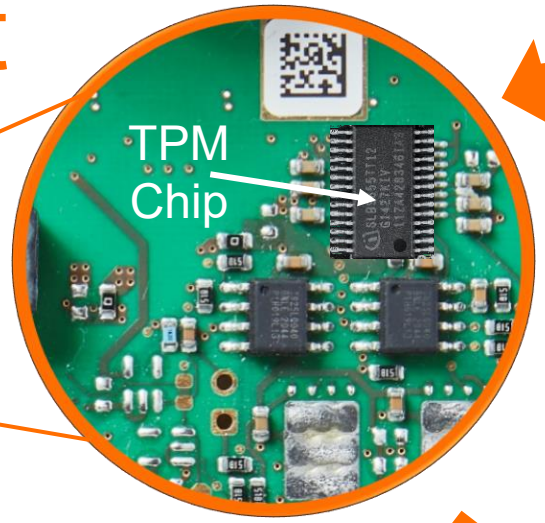
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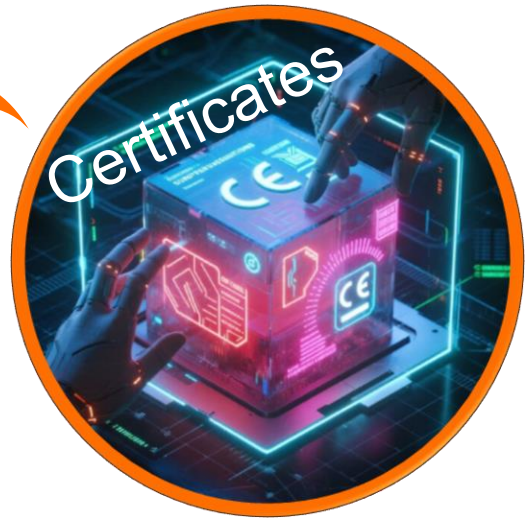
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Cybersecurity: what are the terms you thinking about?

# Buzzword-Development











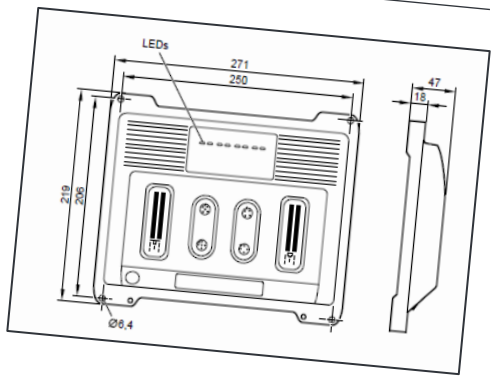
# Datasheet

ecomatController/124

Safety SIL 2, PLd

***Super Secure***

fits every machine




- **TPM-Chip**
  Ensures hardware trustworthiness
- **Certificates**
  Used for authentication and data integrity
- **Private Keys**
  Protect critical access and ensure encryption
- **Secure Boot Processes**
  Ensure the integrity of the control software




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Buzwords

# Cybersecurity – Buzzword Development

## Certificates / Keys

+ Verify identity
+ Ensure data integrity
+ Trustworthiness
+ Well known in the IT World



## Responsibilities

- Certificate Management
- Revocation in case of compromise
- Periodic Certificate Renewal



*“Get in contact with your IT department - they have the experience”*

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# Cybersecurity

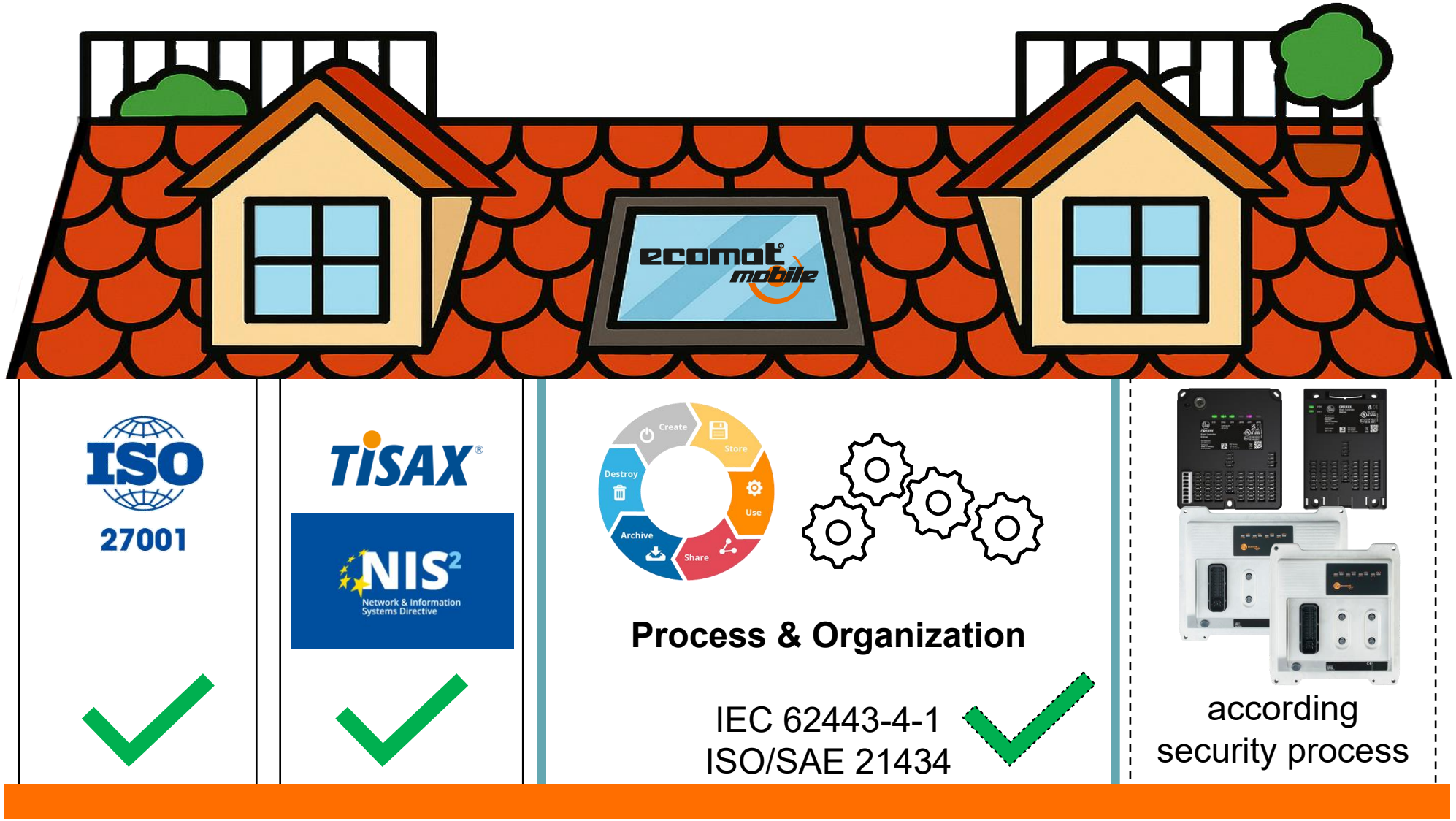
## … matters before starting projects




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# Process & Organization Assessment




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Cybersecurity matters before starting projects

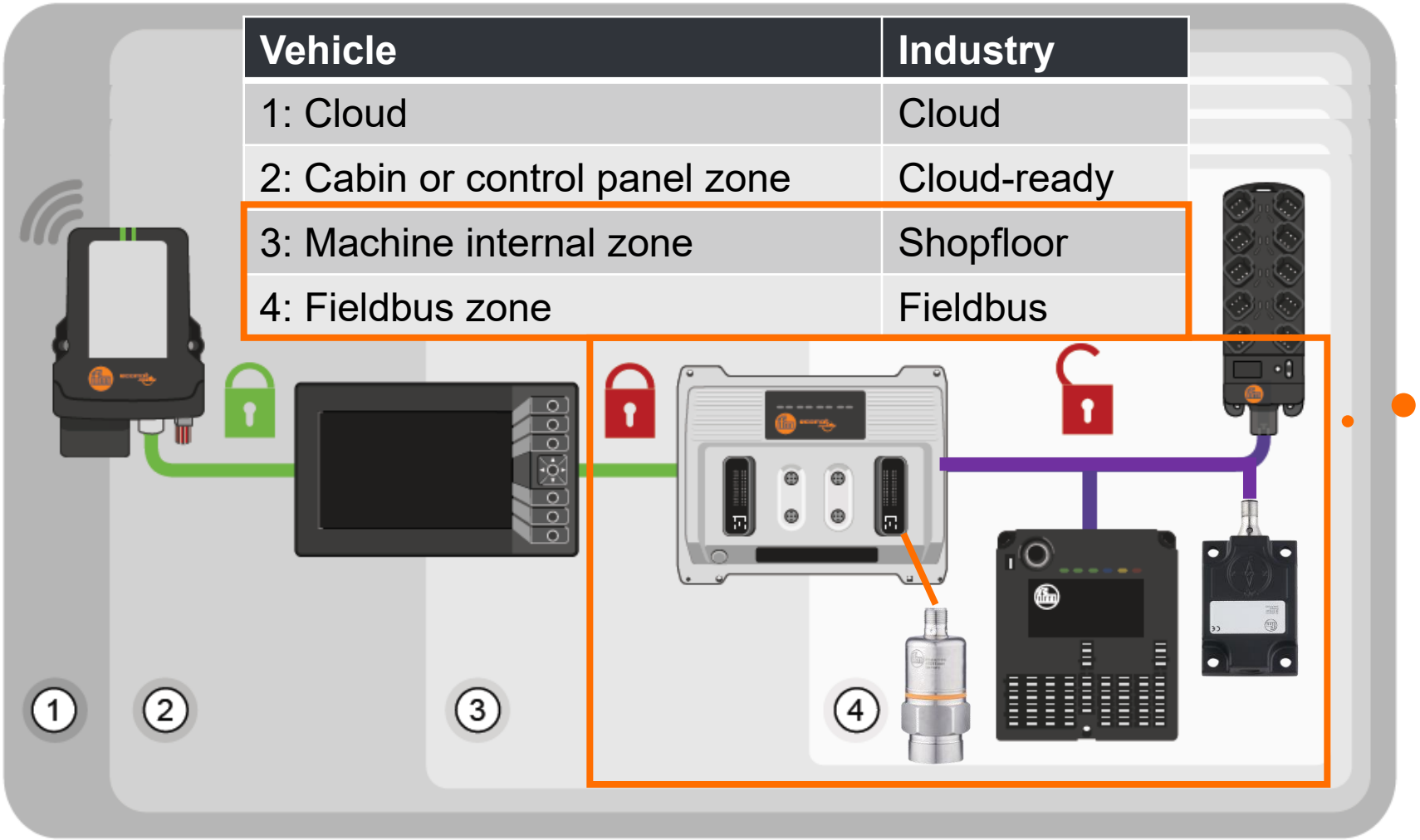
# Project idea?




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# Zones

| Vehicle | Industry |
|---|---|
| 1: Cloud | Cloud |
| 2: Cabin or control panel zone | Cloud-ready |
| 3: Machine internal zone | Shopfloor |
| 4: Fieldbus zone | Fieldbus |




Define Zones

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# TARA

## Why can the risk help us?



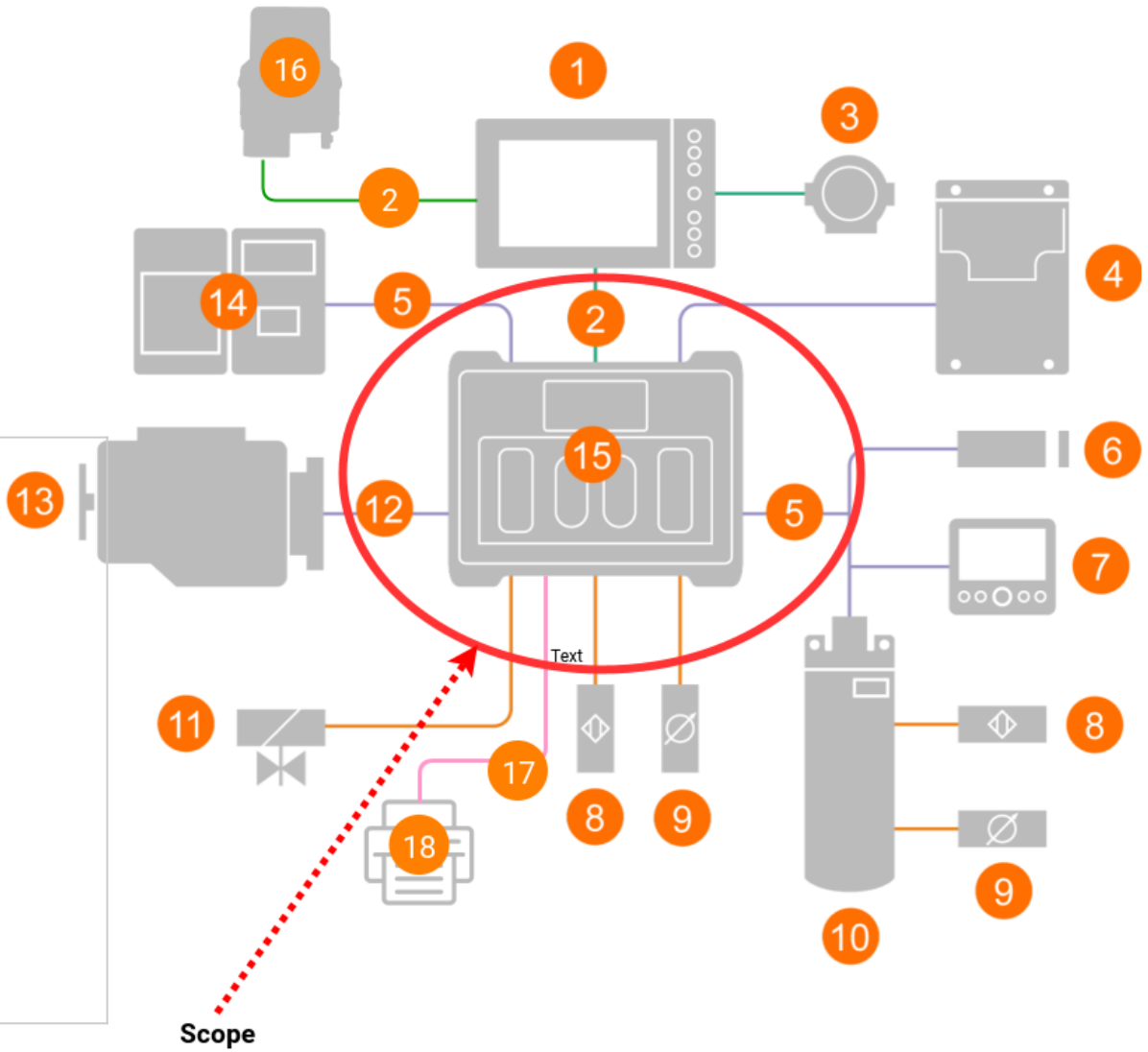

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TARA - Why can the risk help us?

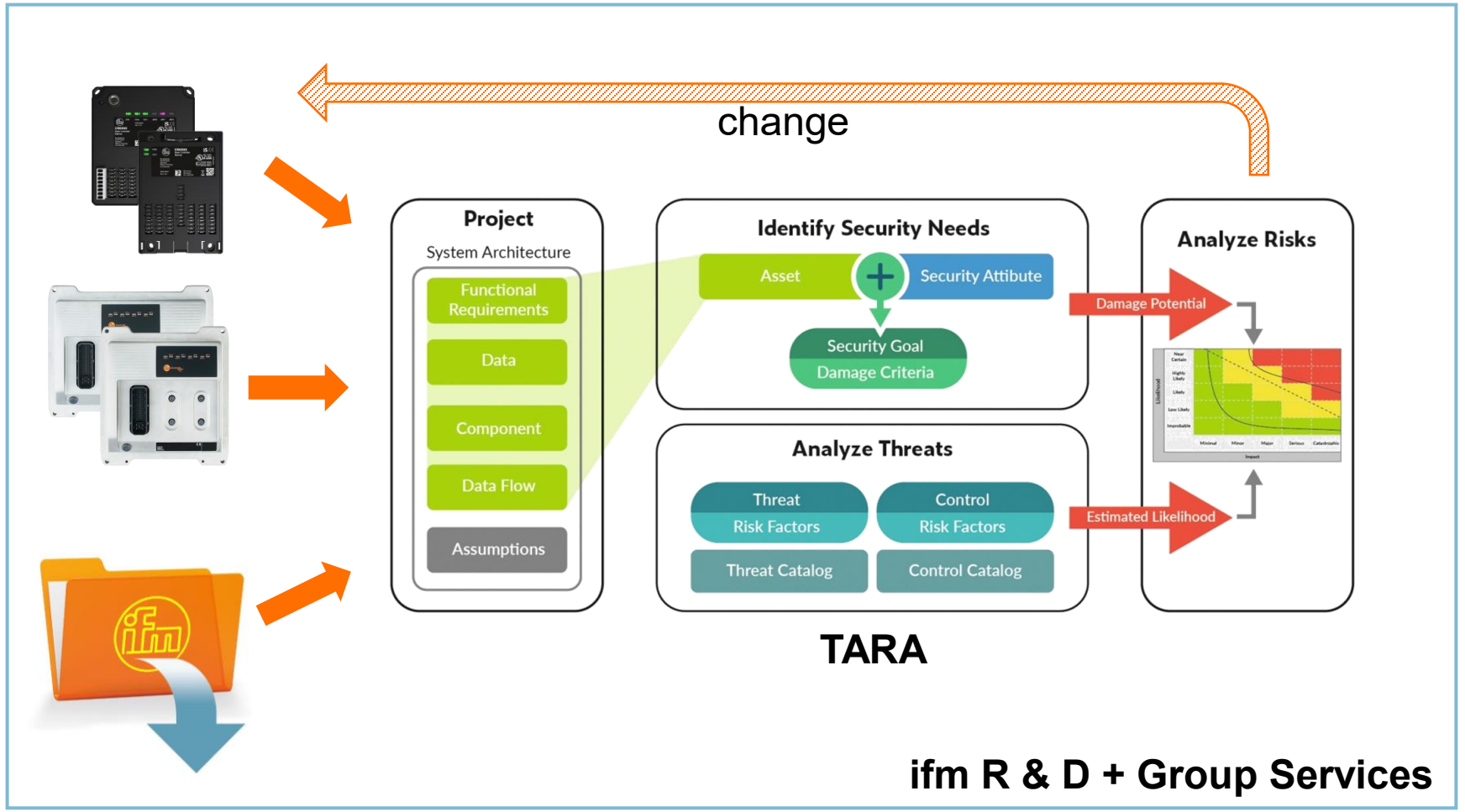
# Define Scope

| | |
|---|---|
| 1.ecomatDisplay<br>2.Ethernet<br>3.Camera<br>4.BasicController<br>5.CAN<br>6.RFID system<br>7.BasicDisplay<br>8.Sensor (digital)<br>9.Analogue sensor | 10. ioControl<br>11.Valve<br>12.CAN/J1939<br>13.Truck Engine<br>14.3D camera system<br>15. ecomatController / ecomatBasic<br>16.Gateway<br>17.RS232 Serial Interface<br>18.mobile Printer |



TARA - Why can the risk help us?

# Devices - Threat Analysis and Risk Assessment



Threat Analysis and Risk Assessment

# TARA Example

## Assets, Risks and Mitigations

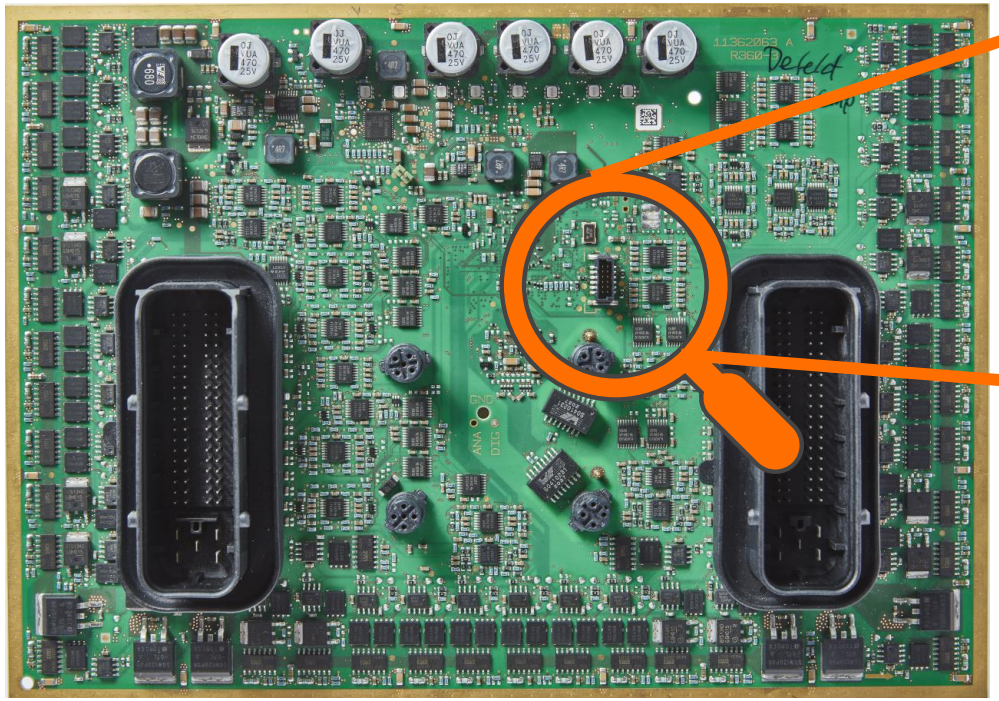
| Asset | Attack | Mitigation |
|---|---|---|
| User Application | Manipulate App | User Authentication |
| | Copy App | User Authentication |
| | Memory Dump | Housing |
| Controller | SRAM-Manipulation | SRAM Safety Protection / Monitoring |
| | … | … |

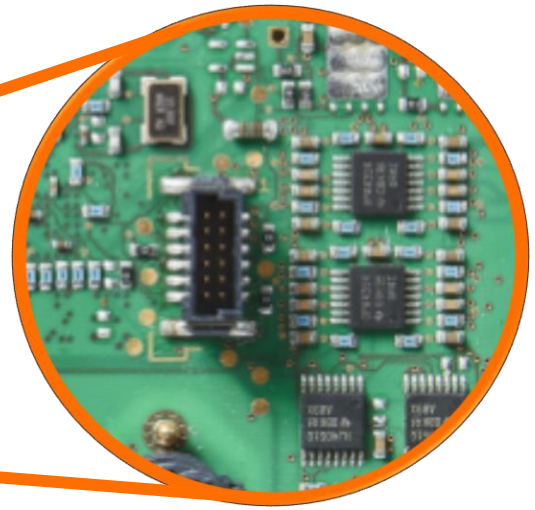


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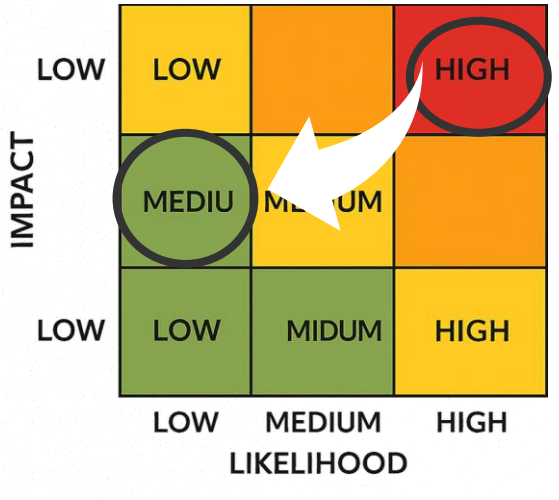
Threat Analysis and Risk Assessment – Why can the risk help us?

# TARA







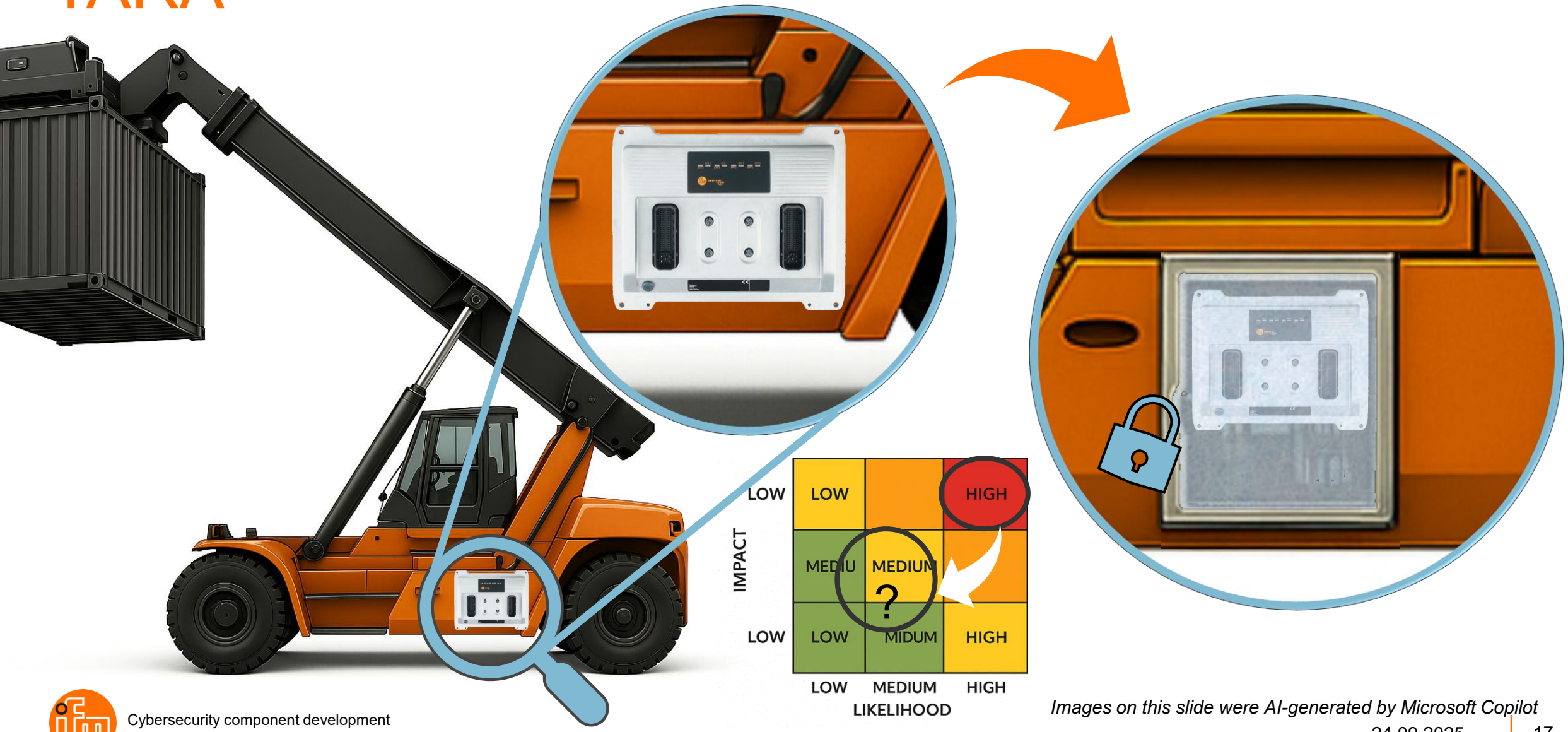






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Threat Analysis and Risk Assessment – Why can the risk help us?

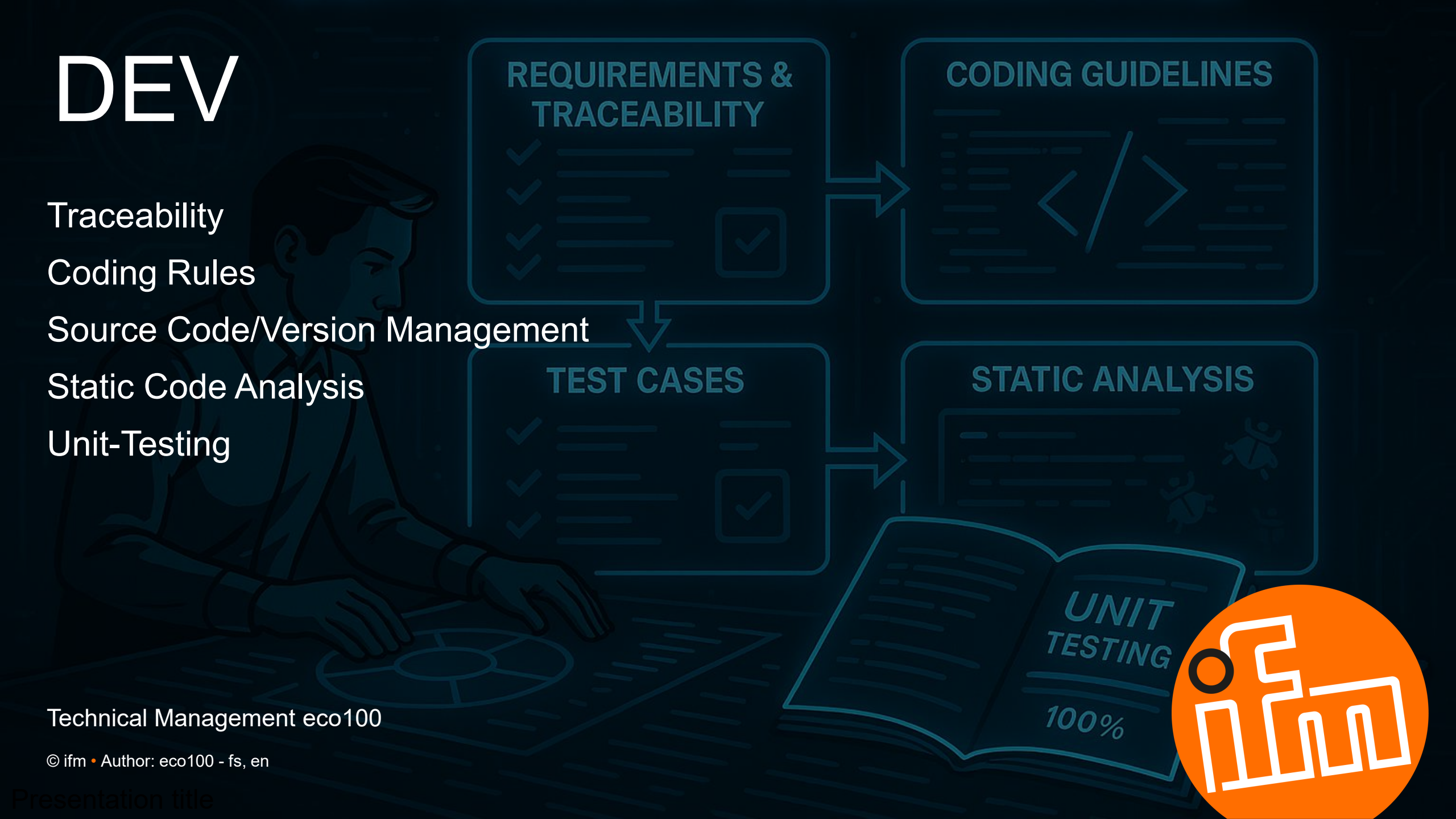
# TARA




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# DEV

- Traceability
- Coding Rules
- Source Code/Version Management
- Static Code Analysis
- Unit-Testing



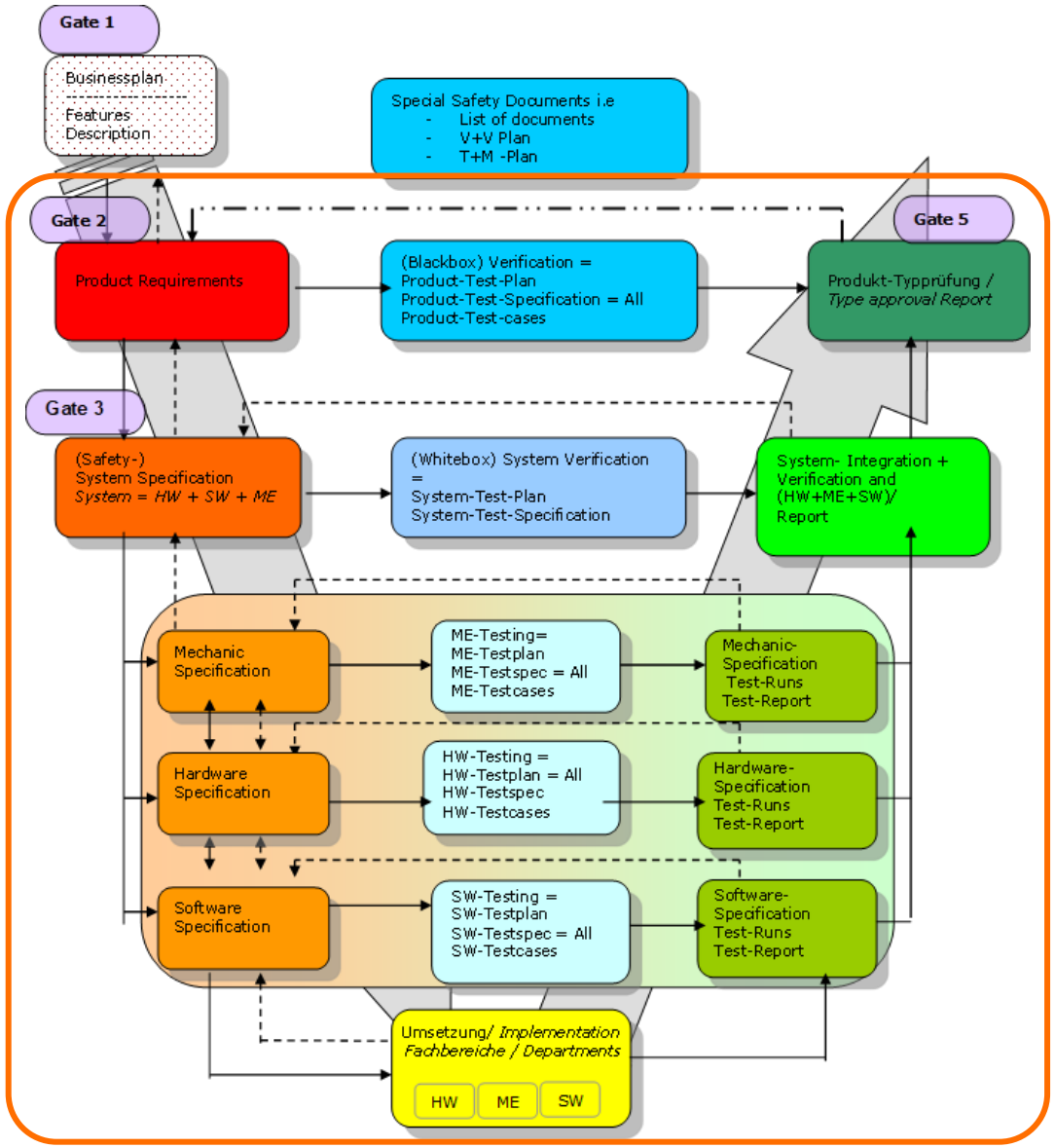

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# Development Process

## V-Model and Documents

- System Requirement Specification
  - Traceability to the Testcases
  - Traceability to the TARA
  - Traceability to the Detailed Requirements
- Testcases against requirements
  - Testcases were executed → Testreport



# Coding Rules Example

**Set Secure Default Values**

**Rule**: In case of errors or invalid inputs, secure default values should be used.

**Reason**: To avoid unpredictable behavior.

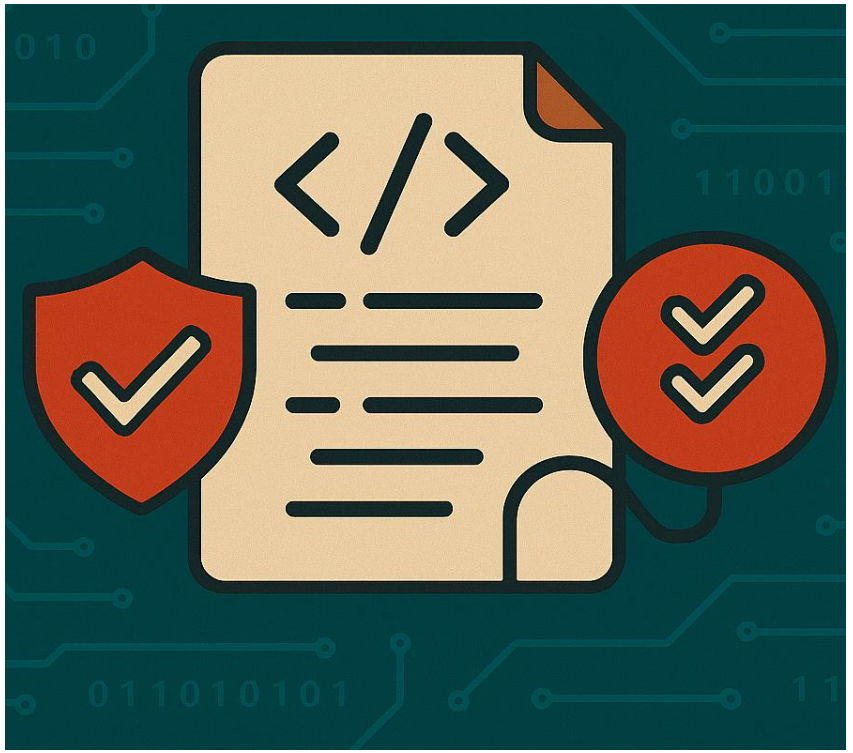
❌ **Unsecure:**

```
// No Checks
EngineSpeed := HMI_Input;
```

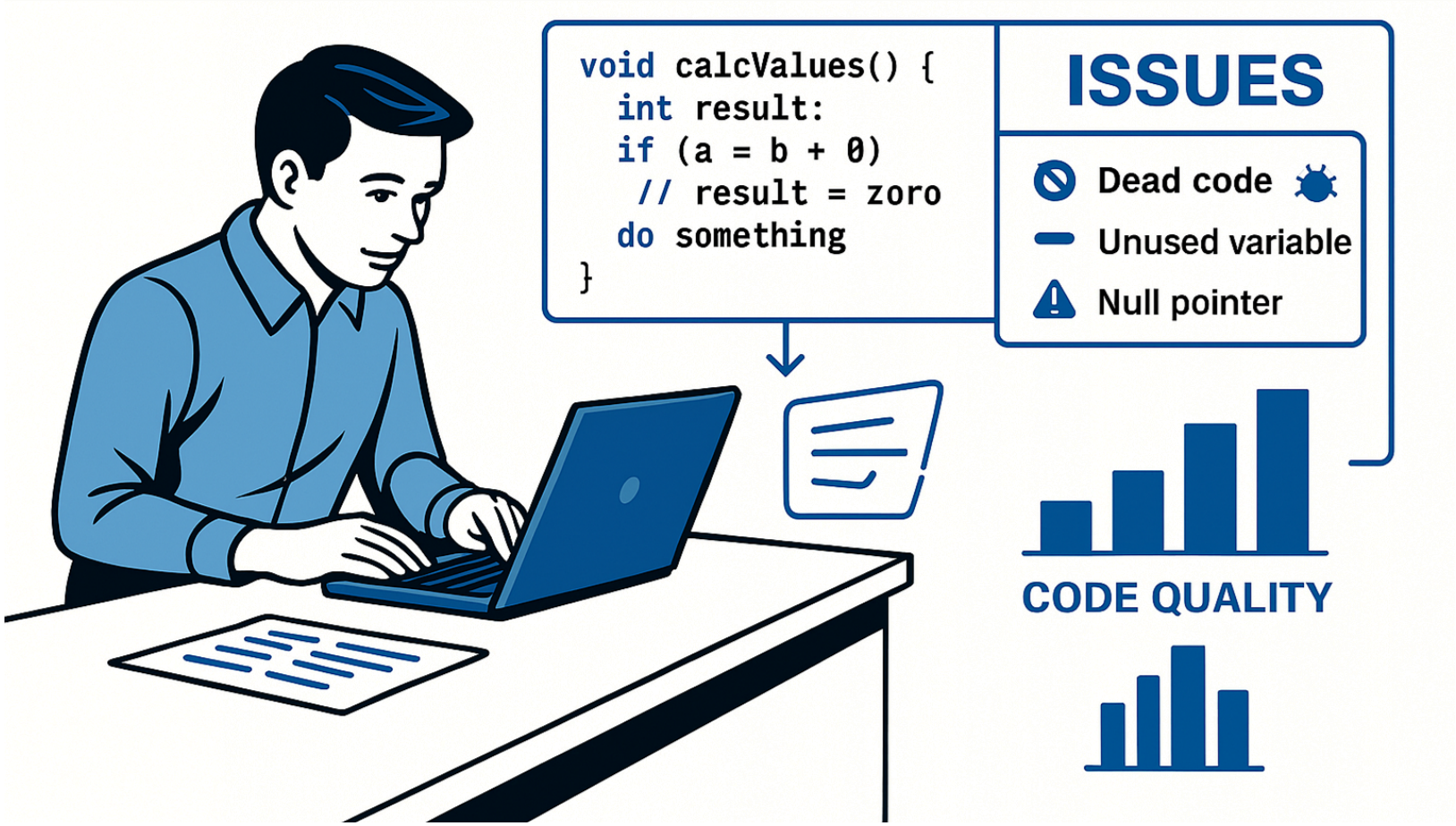
✅ **Secure:**

```
IF (HMI_Input >= 0) AND (HMI_Input <= MaxSpeed)

THEN
    EngineSpeed := HMI_Input;
ELSE
     EngineSpeed := 0; // Secure & Safe default
END_IF;
```



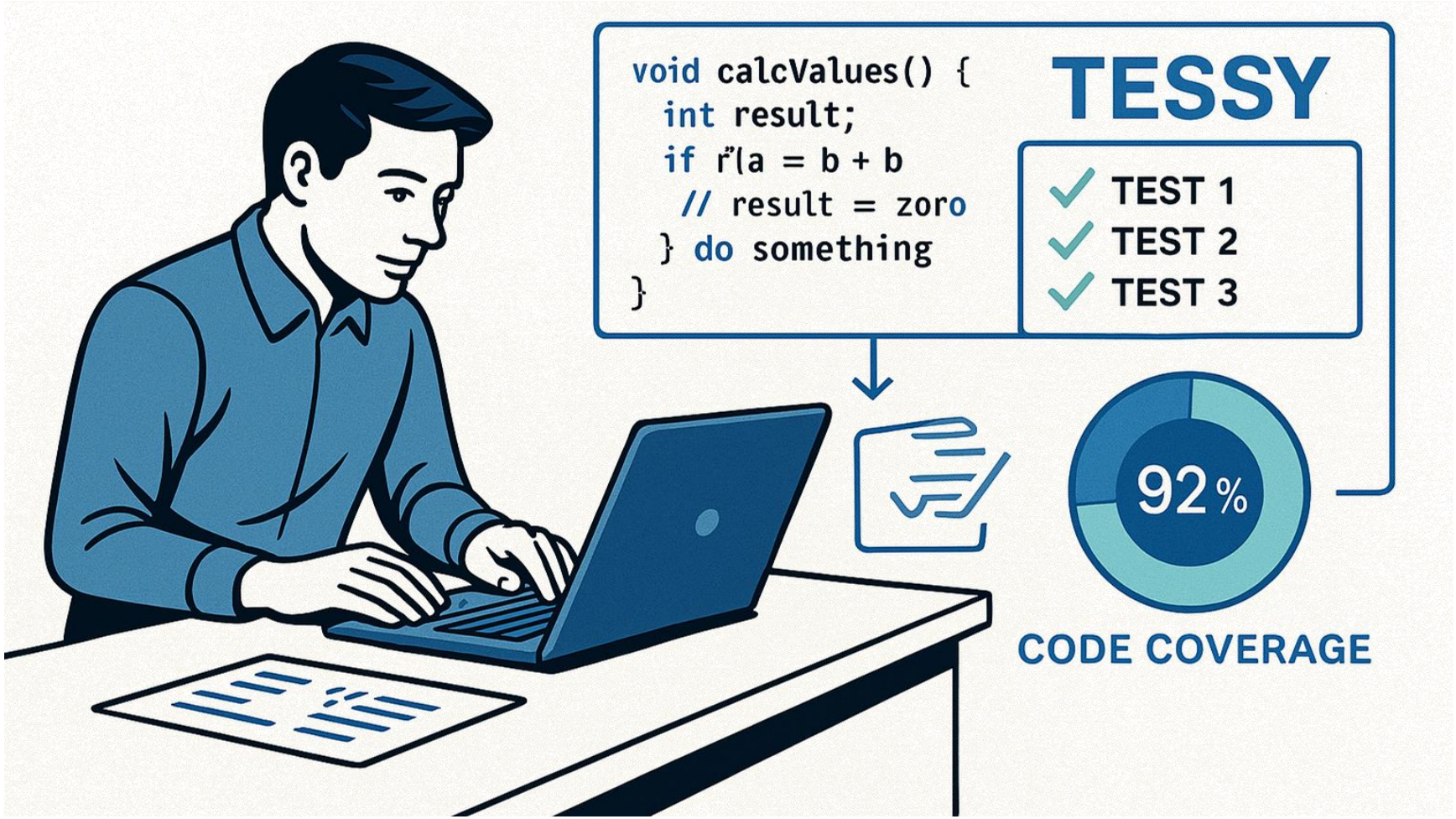
# Static Code Analysis




- Detecting Dead Code
- Violation of Coding Guideline
- Syntax and Structure Issues
- Security Vulnerabilities
- Memory and Resource Issues
- Complexity Issues

Cybersecurity Development

# Unit-Testing




- Code Coverage
- Branch Coverage
- Logical Issues
- Attribute Issues

# Security by obscurity

…don‘t tell anyone!

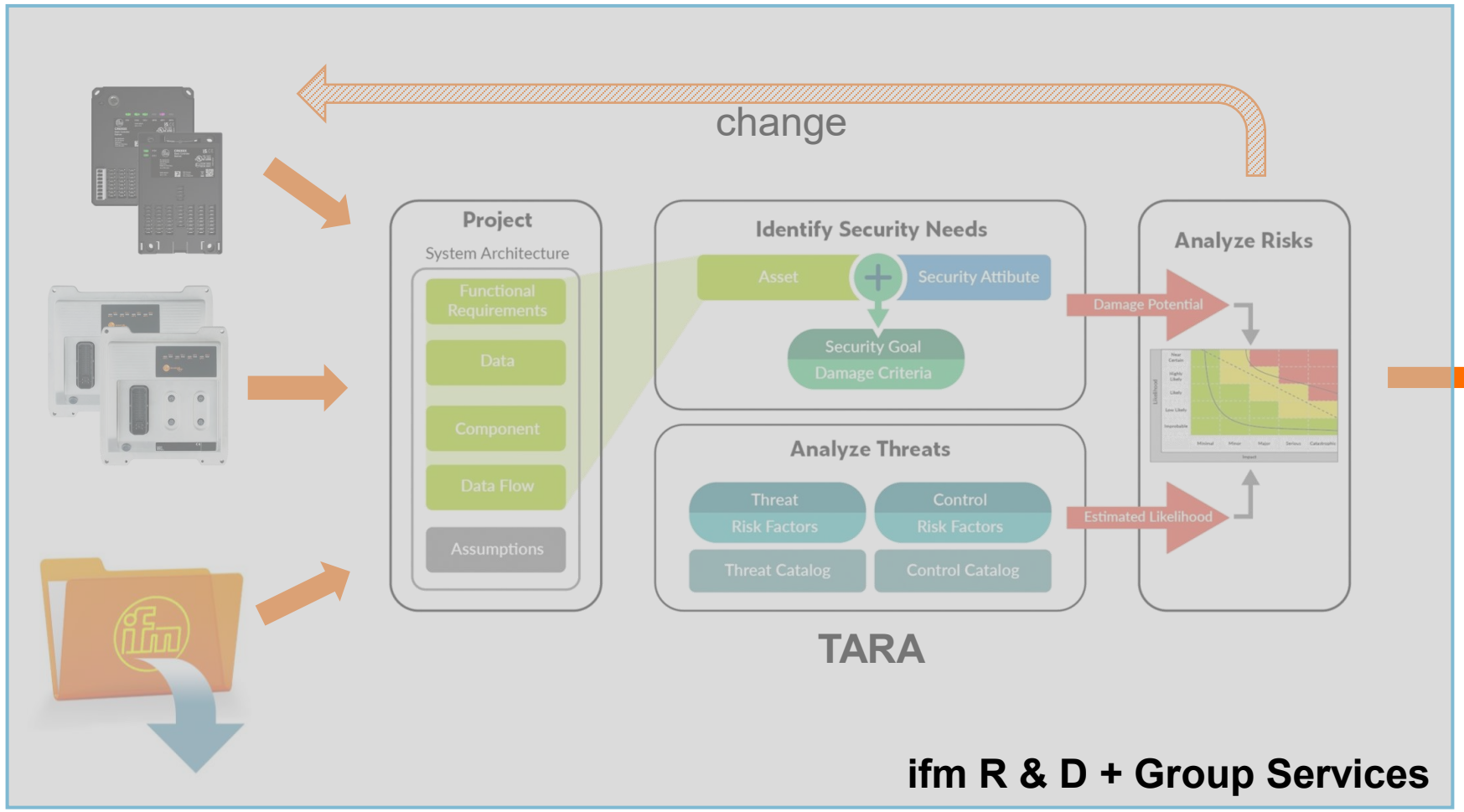



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Cybersecurity component

# Devices - Threat Analysis and Risk Assessment






Documentation

# Cybersecurity Manual






# Thank you

Stay secure!



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