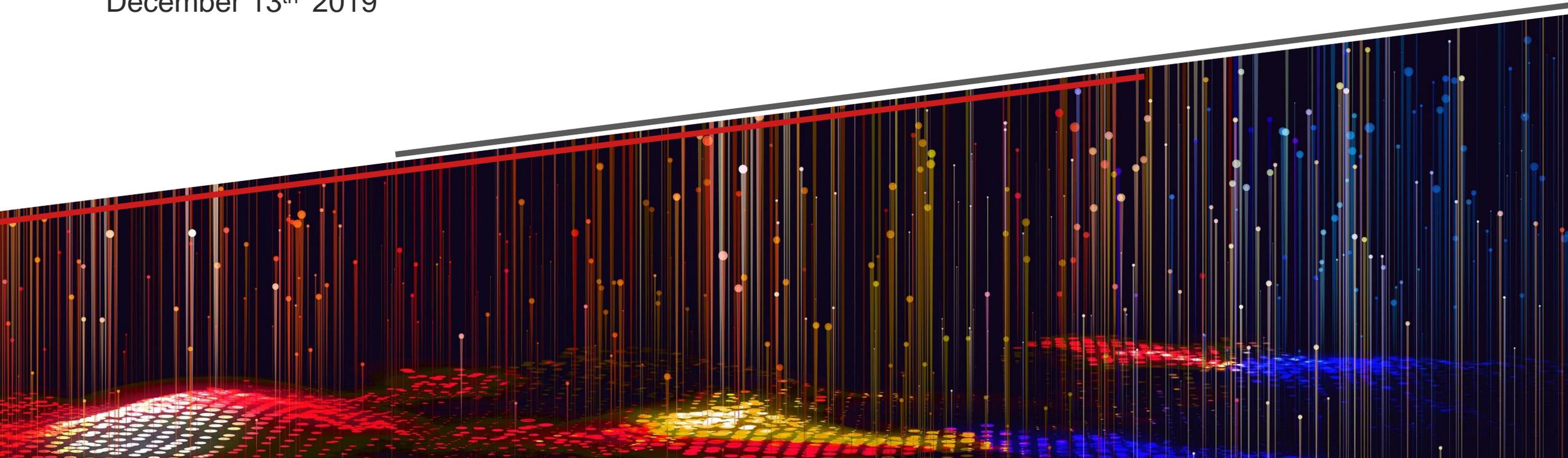




# Enterprise IT Architecture for Modeling Systems of Systems CSD&M, Paris

Dr. Michael Pfenning

December 13<sup>th</sup> 2019

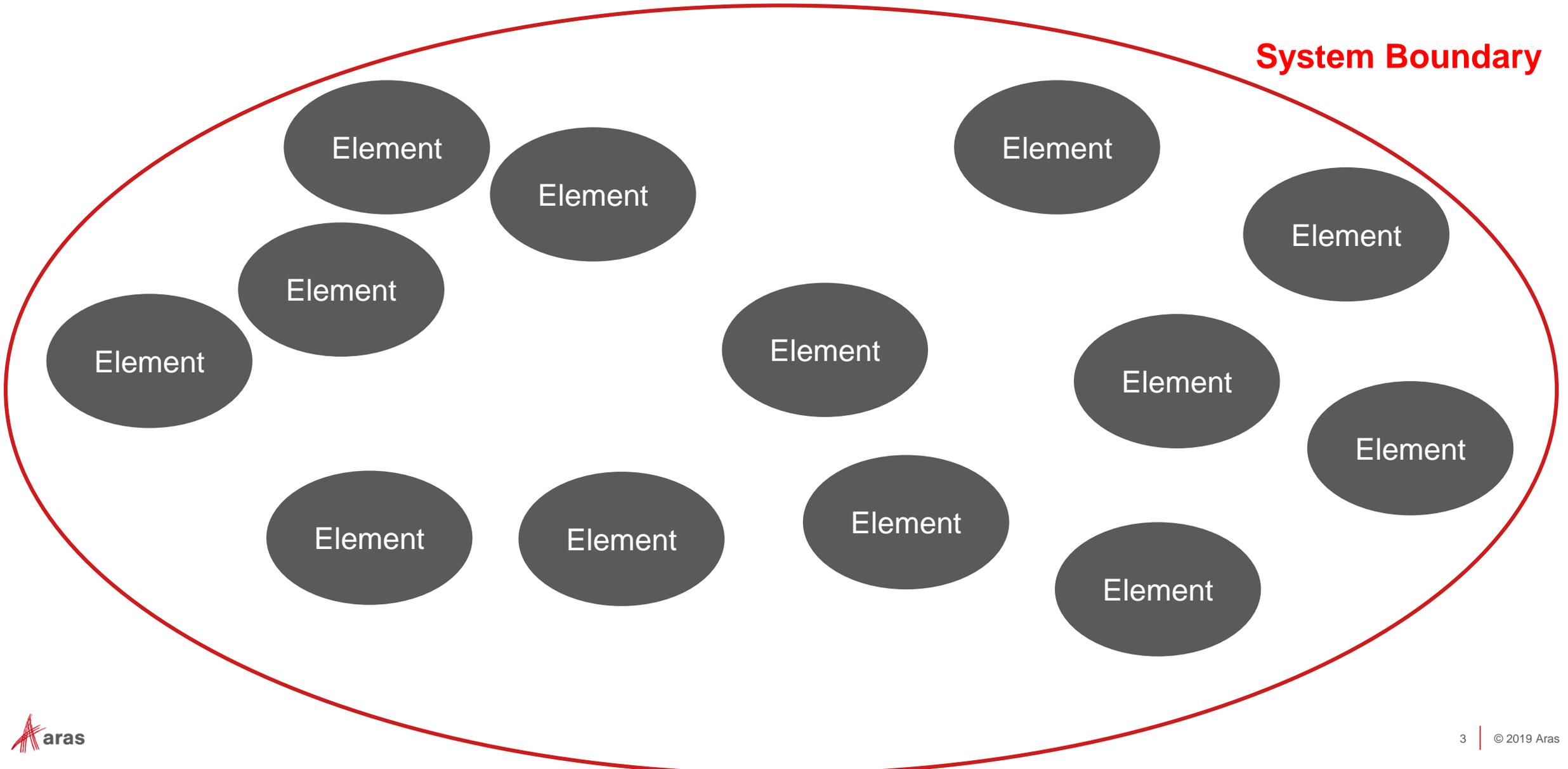


# System of Systems

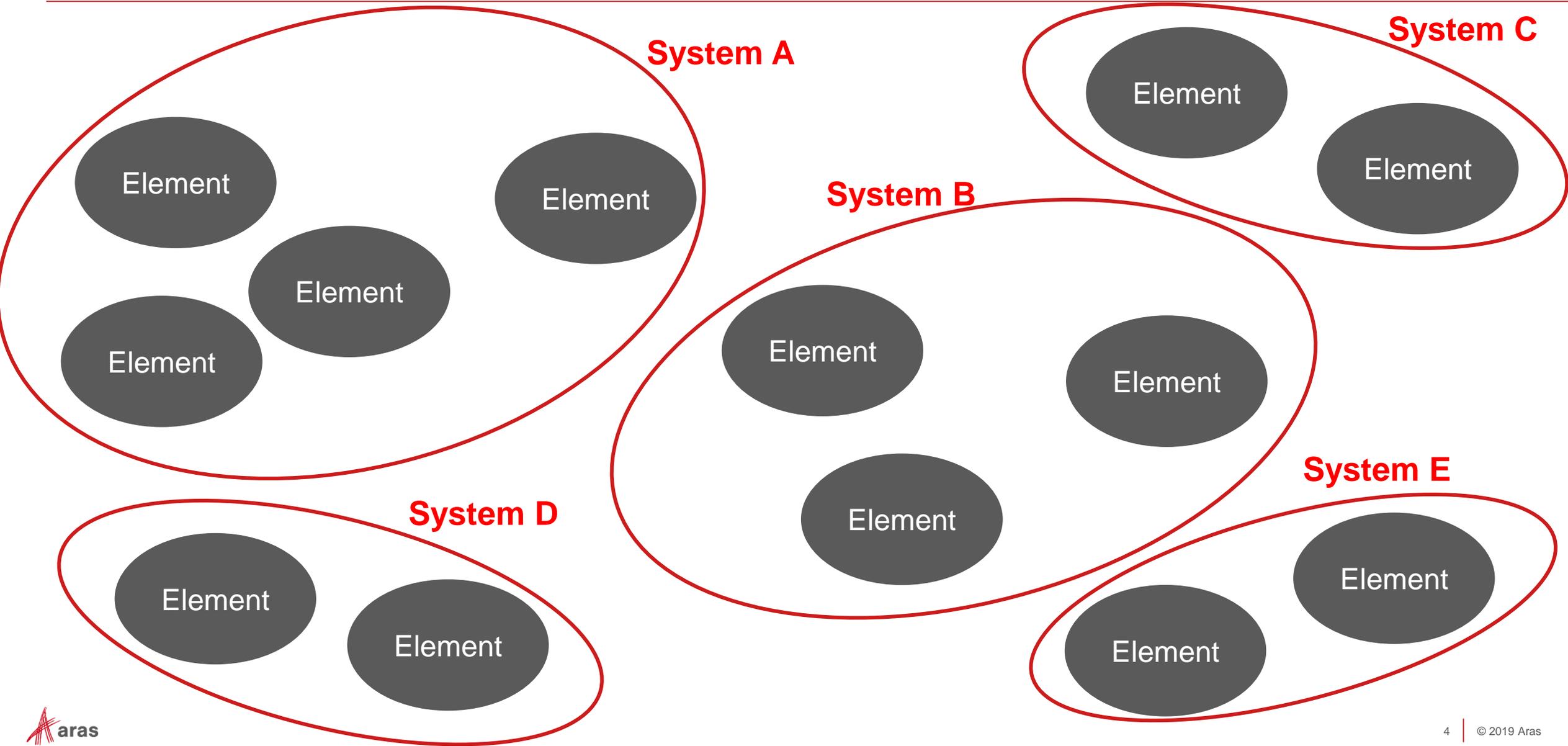
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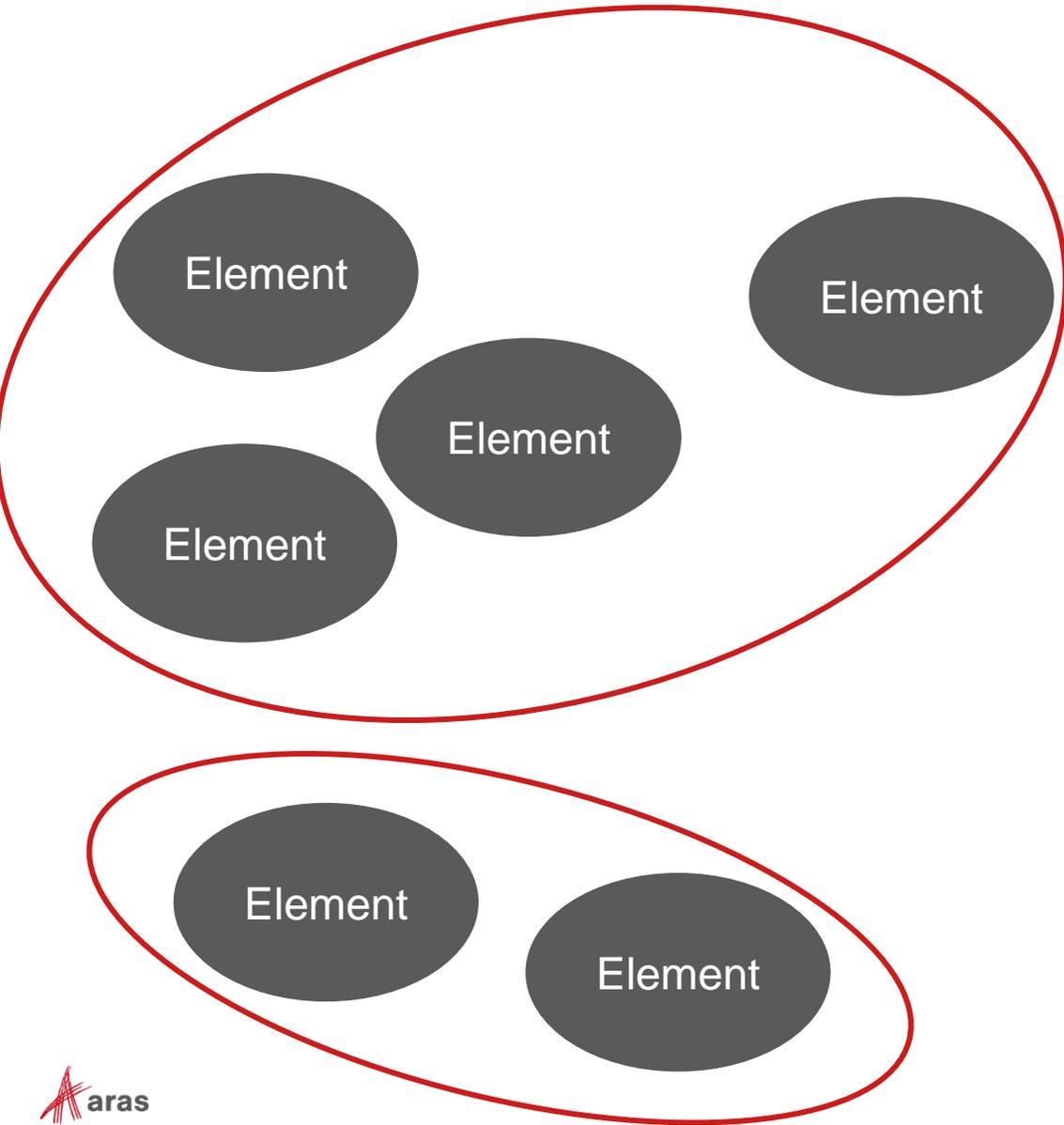
# System vs. System of Systems



# System vs. System of Systems



# System vs. System of Systems



1. Operational Independence
2. Independent Management
3. Evolutional Development
4. Emergent Behaviour
5. Geographical Distribution

# What is the challenge for IT?

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**Product**

**System**

# The zoo of models



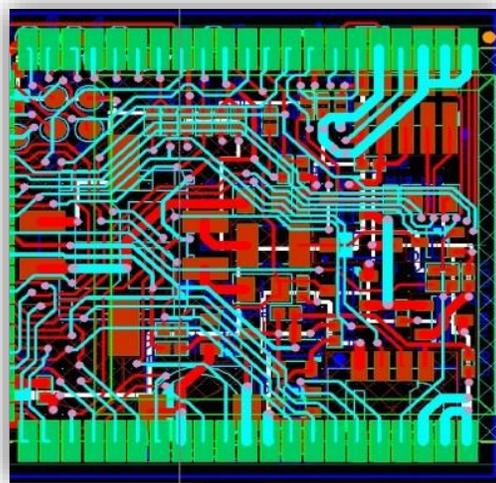
# What is the challenge?

---

**Product**

**System**

# The zoo of models



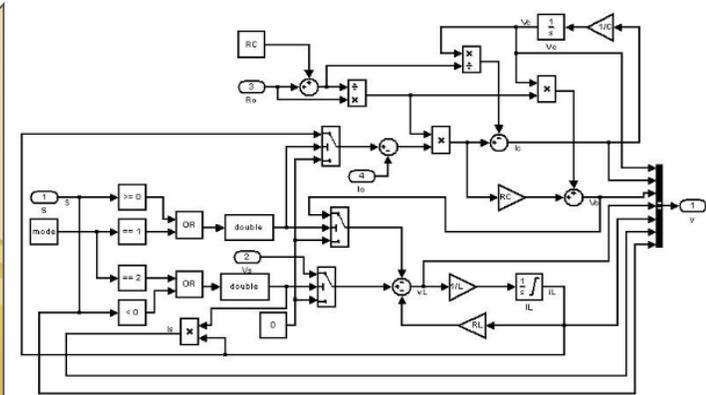
E/E

```
import lejos.nxt.*;

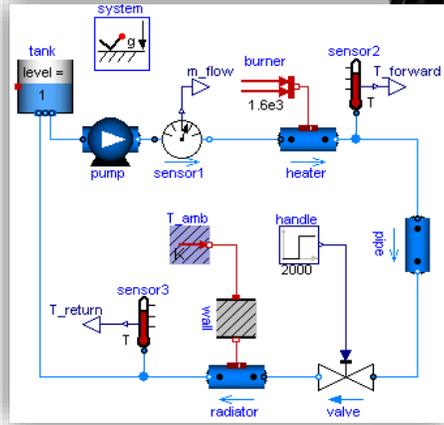
public class Hello
{
    /**
     * The main method is where your program starts
     */
    public static void main(String[] args) throws Exception
    {
        // makes a buzzing sound
        Sound.buzz();
        // shows text on column 3, row 4 of the LCD
        LCD.drawString("I am alive !!", 3, 4);
        // pauses 2000 ms (= 2sec)
        Thread.sleep(2000);
        // makes another buzzing sound
        Sound.buzz();
        // end of program
    }
}
```

Sourcecode

Control  
Flow  
Simulation



System  
Architecture  
Model

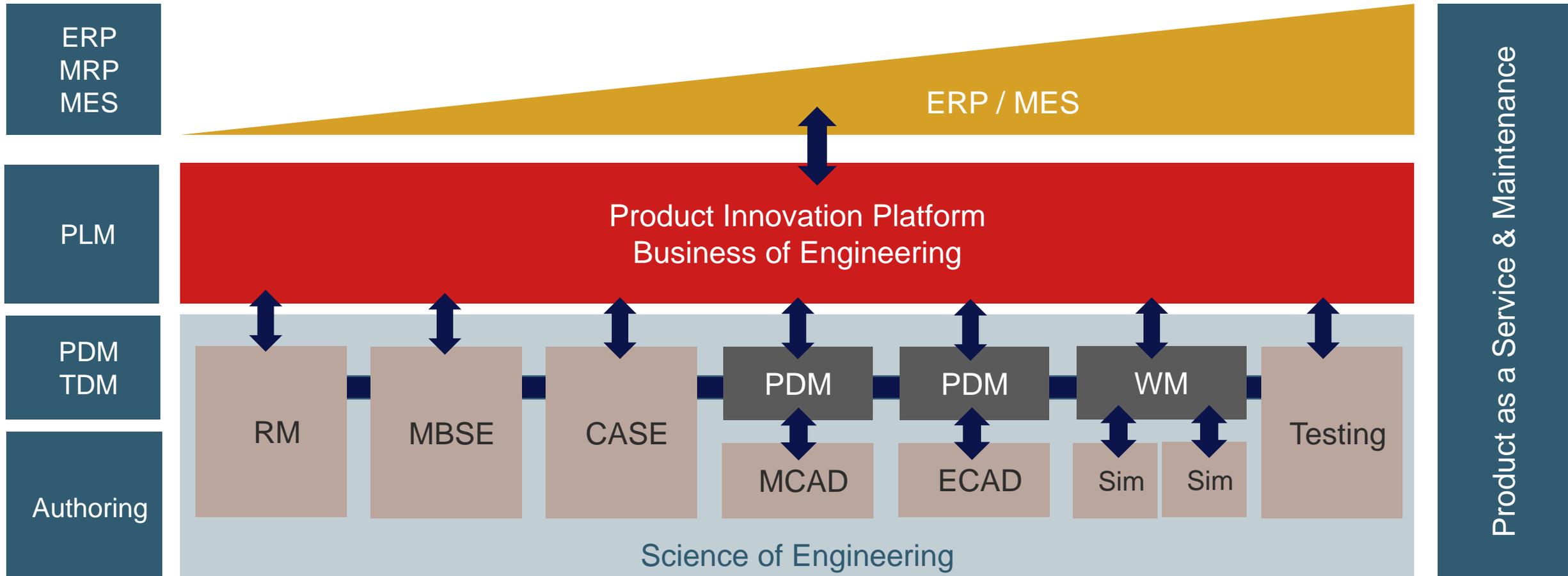


Physical  
Interaction  
Simulation

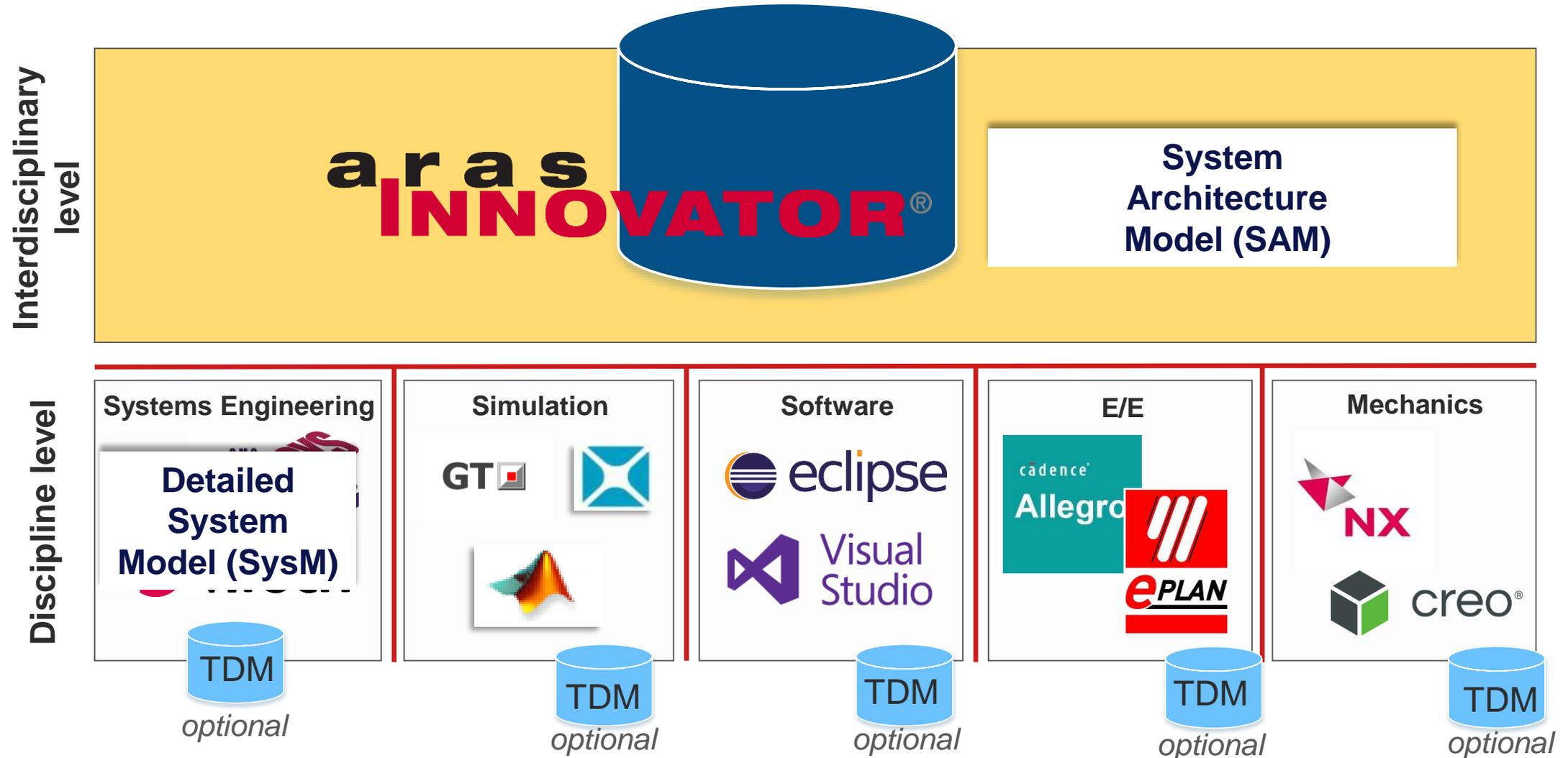
MCAD



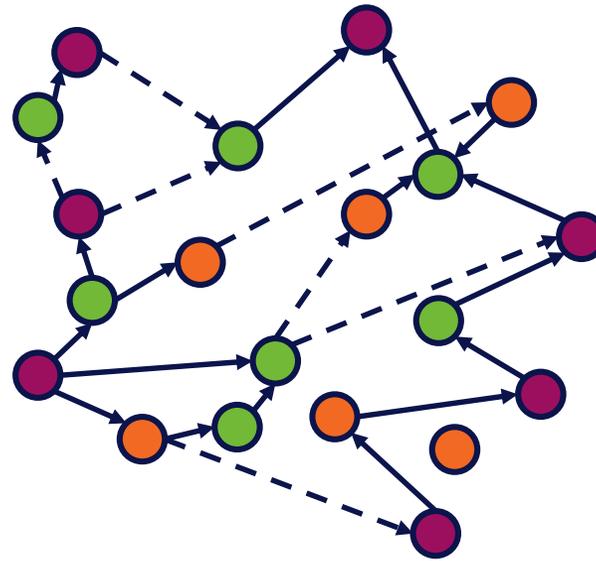
# Automotive IT Landscape → Platform



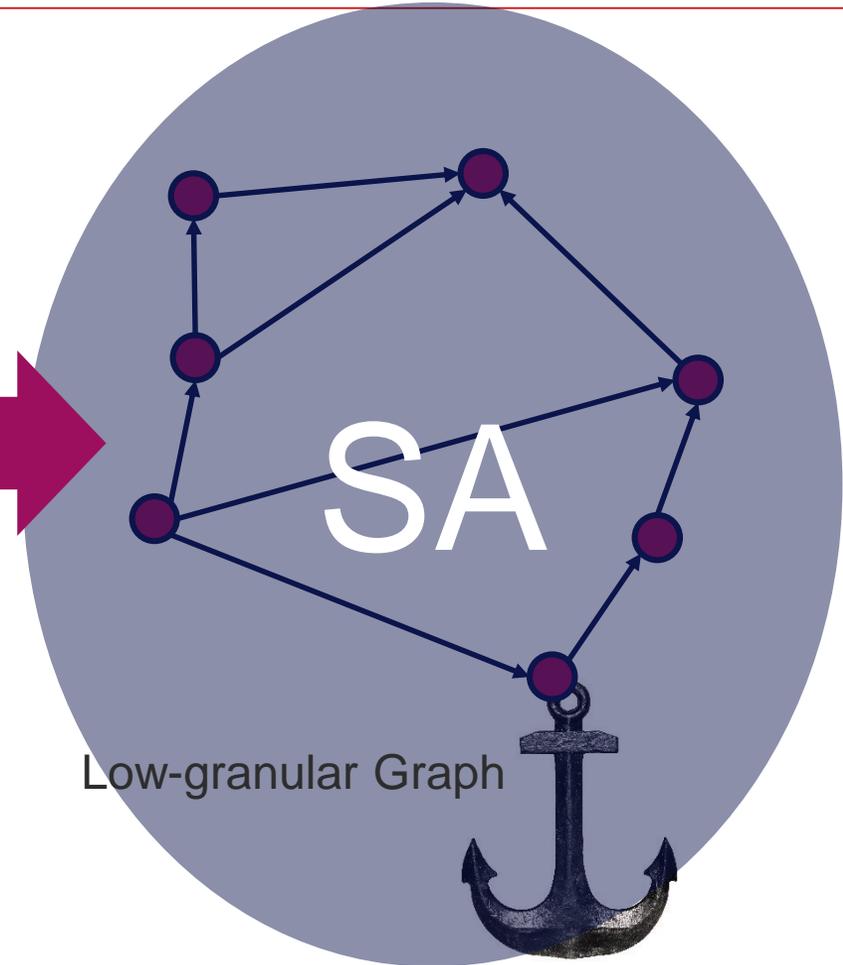
# Interdisciplinary Architecture



# What is a SA Model?



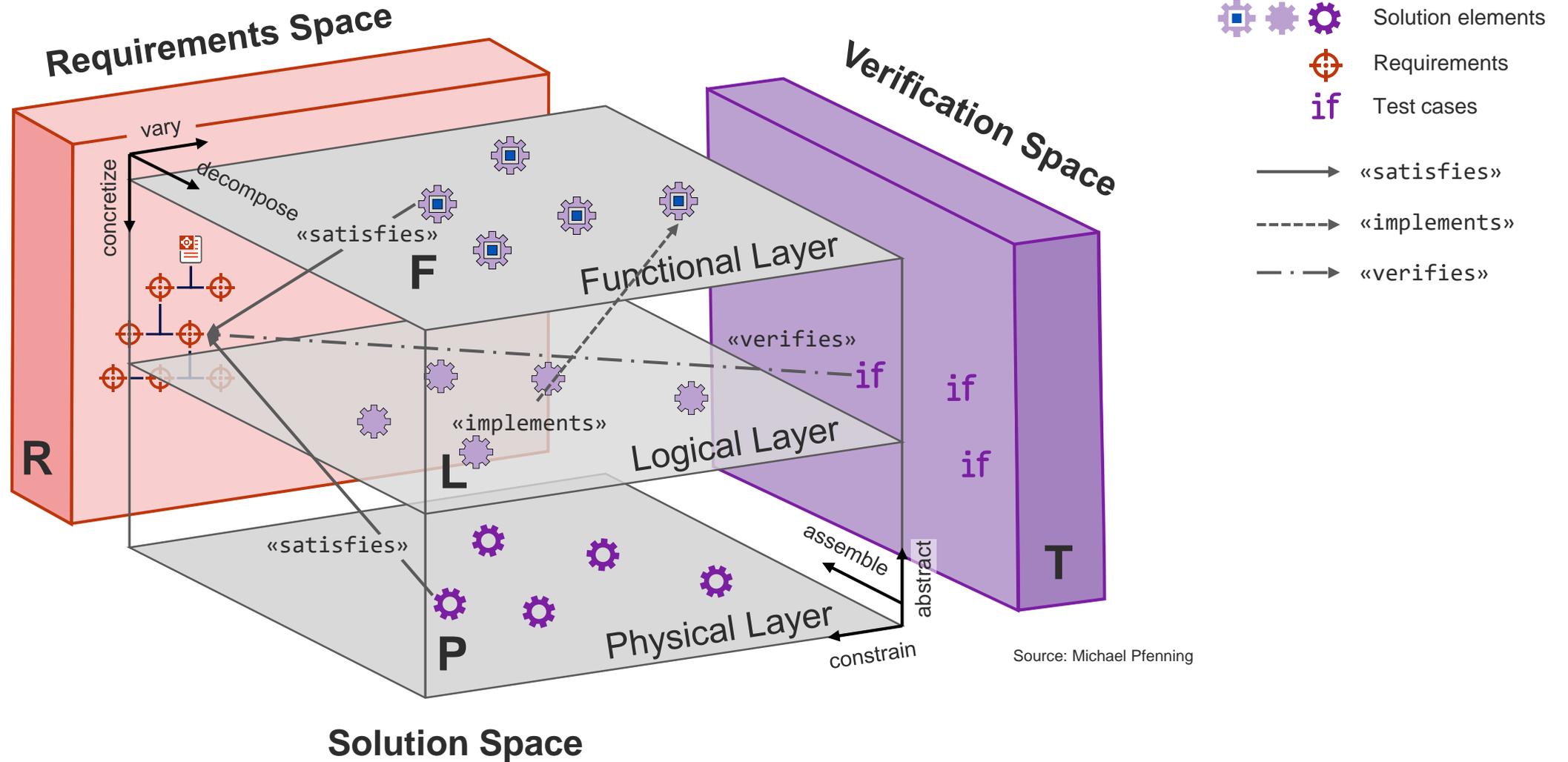
High-granular Graph



Low-granular Graph

# System Concretion Model

- RFLPT



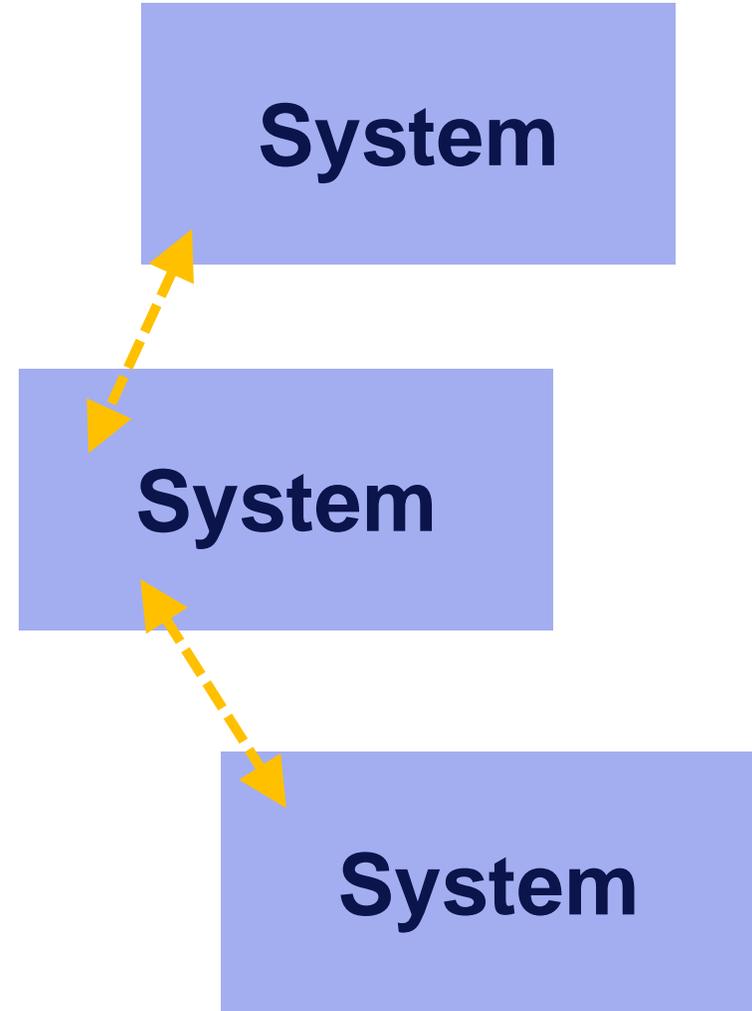
Source: Michael Pfenning

# What is the challenge?

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It is mainly about:  
1. Connectivity  
2. Interfaces

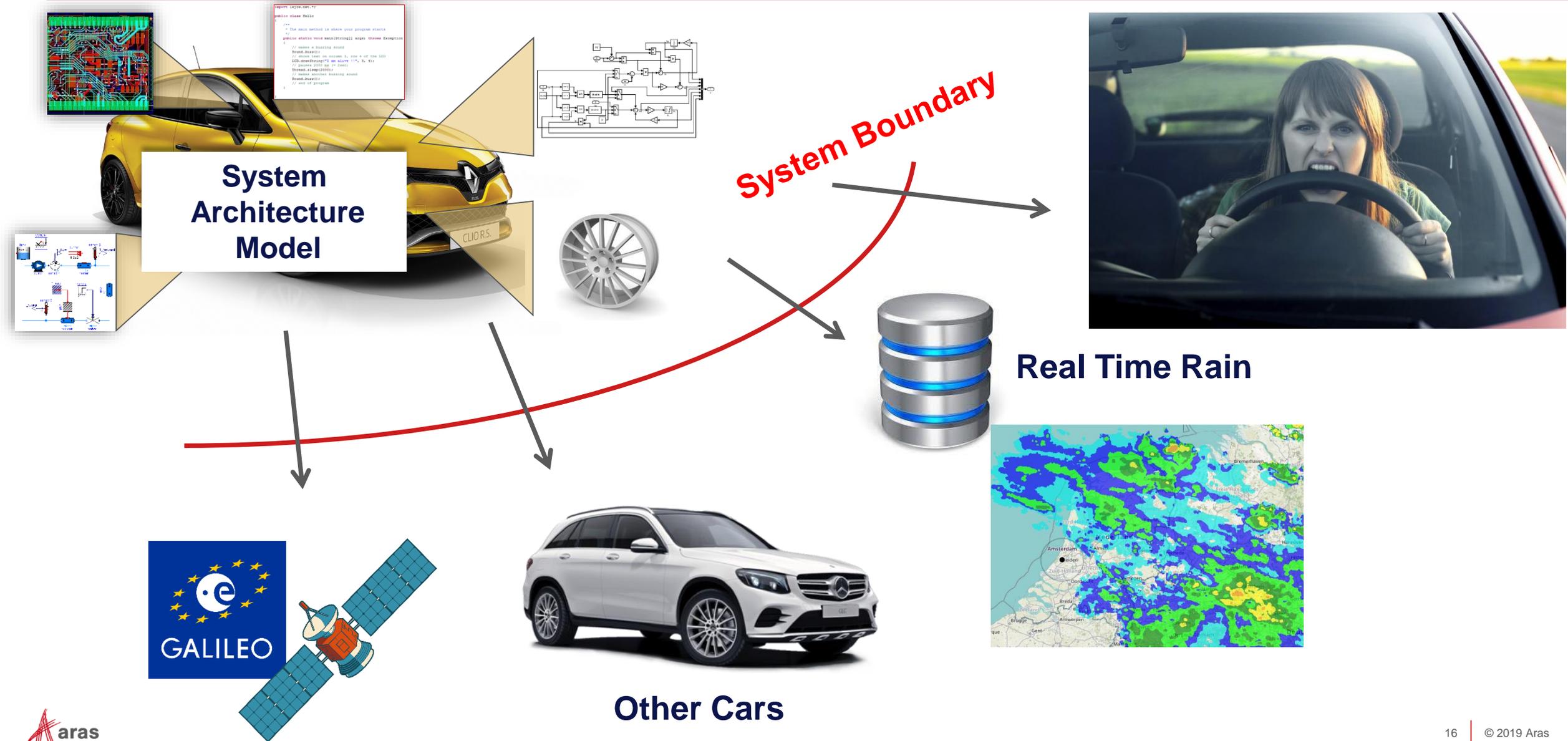


# Amazon delivers to your trunk

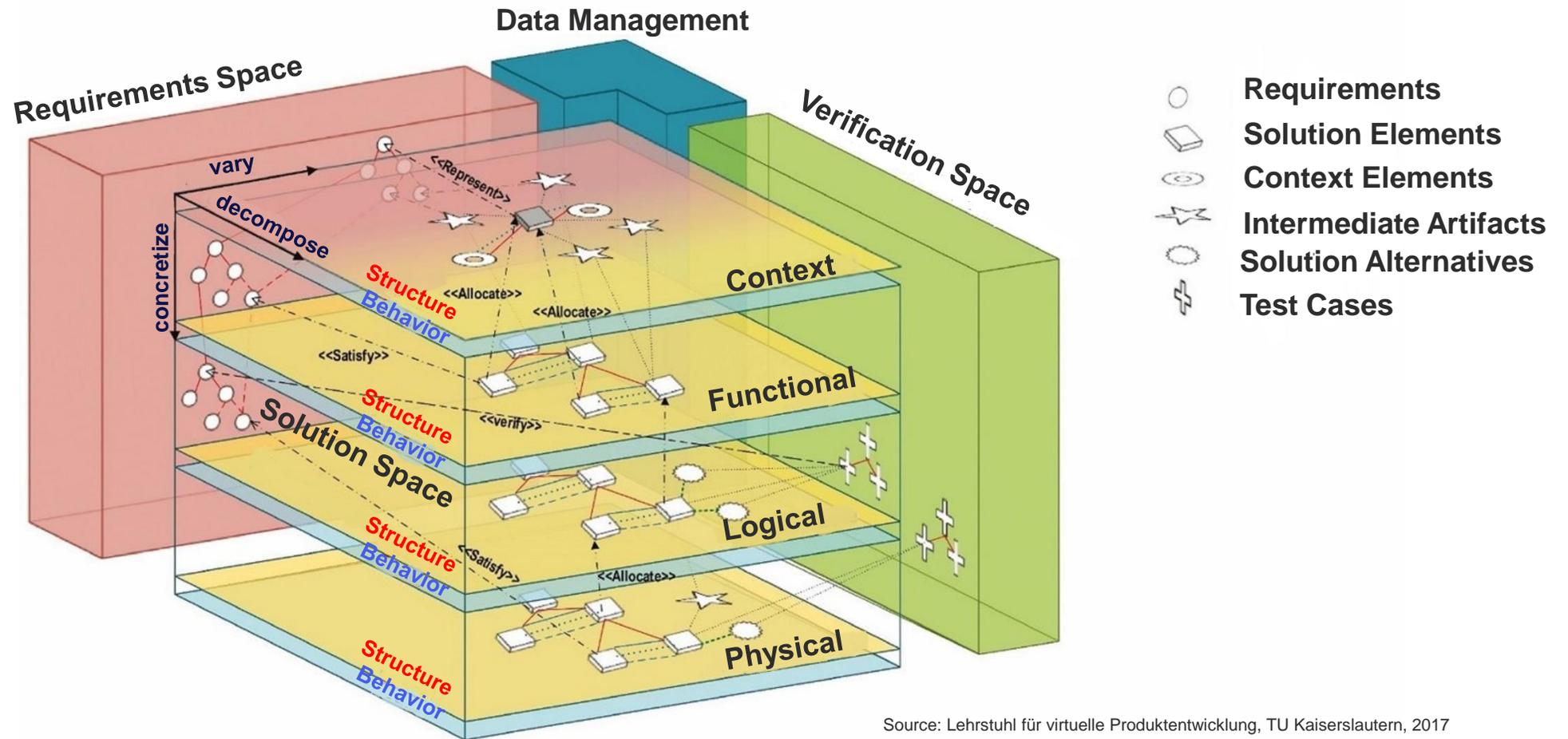
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# The System Context

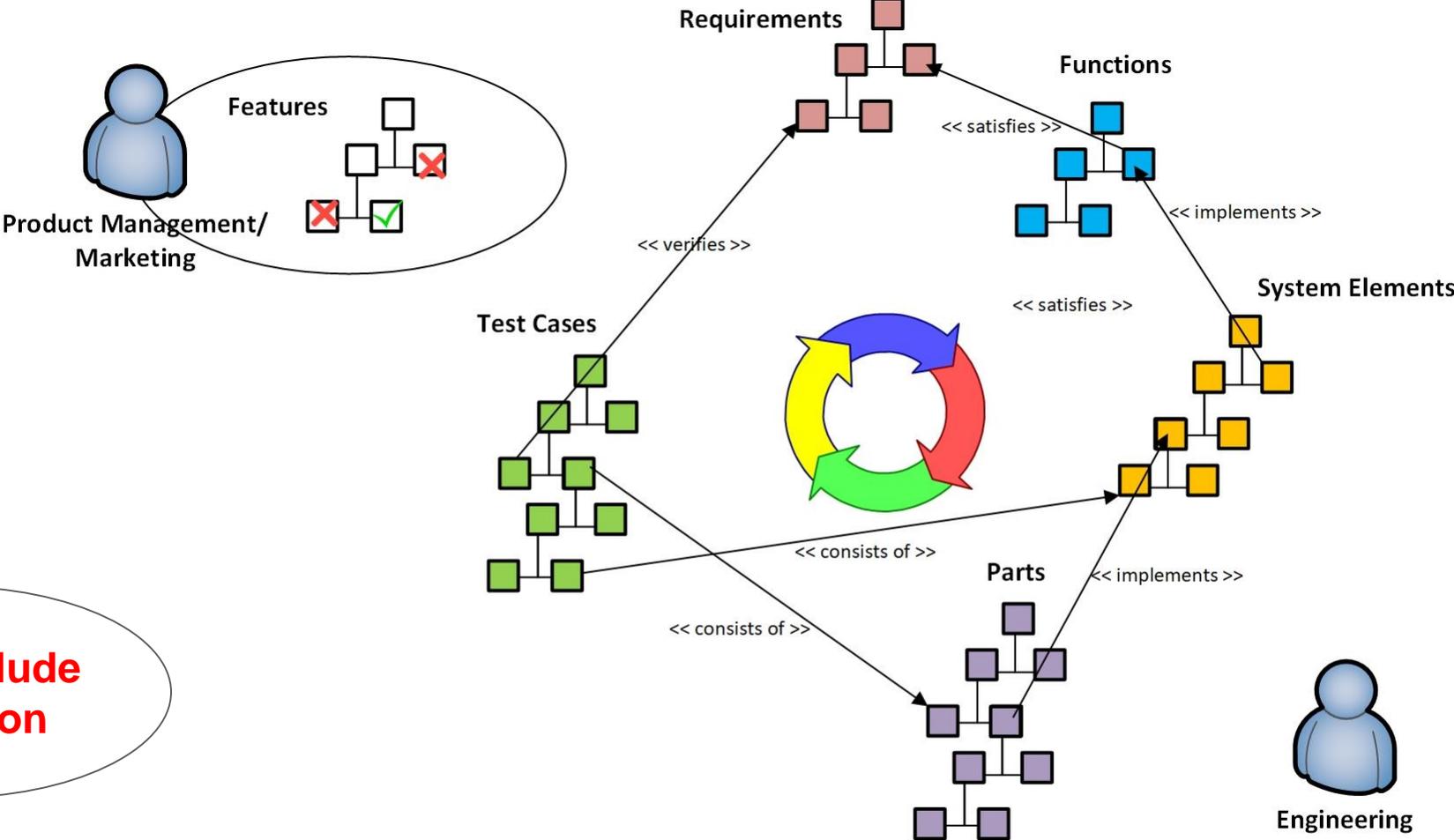


# The Kaiserslautern' System Concretion Model

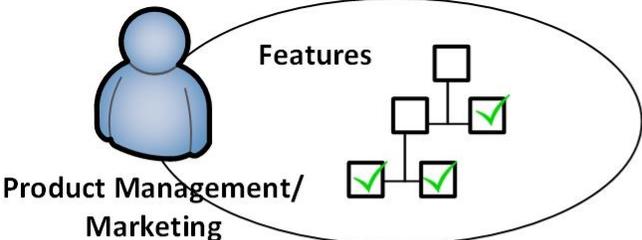


For SoS the System Context Layer needs to be added!

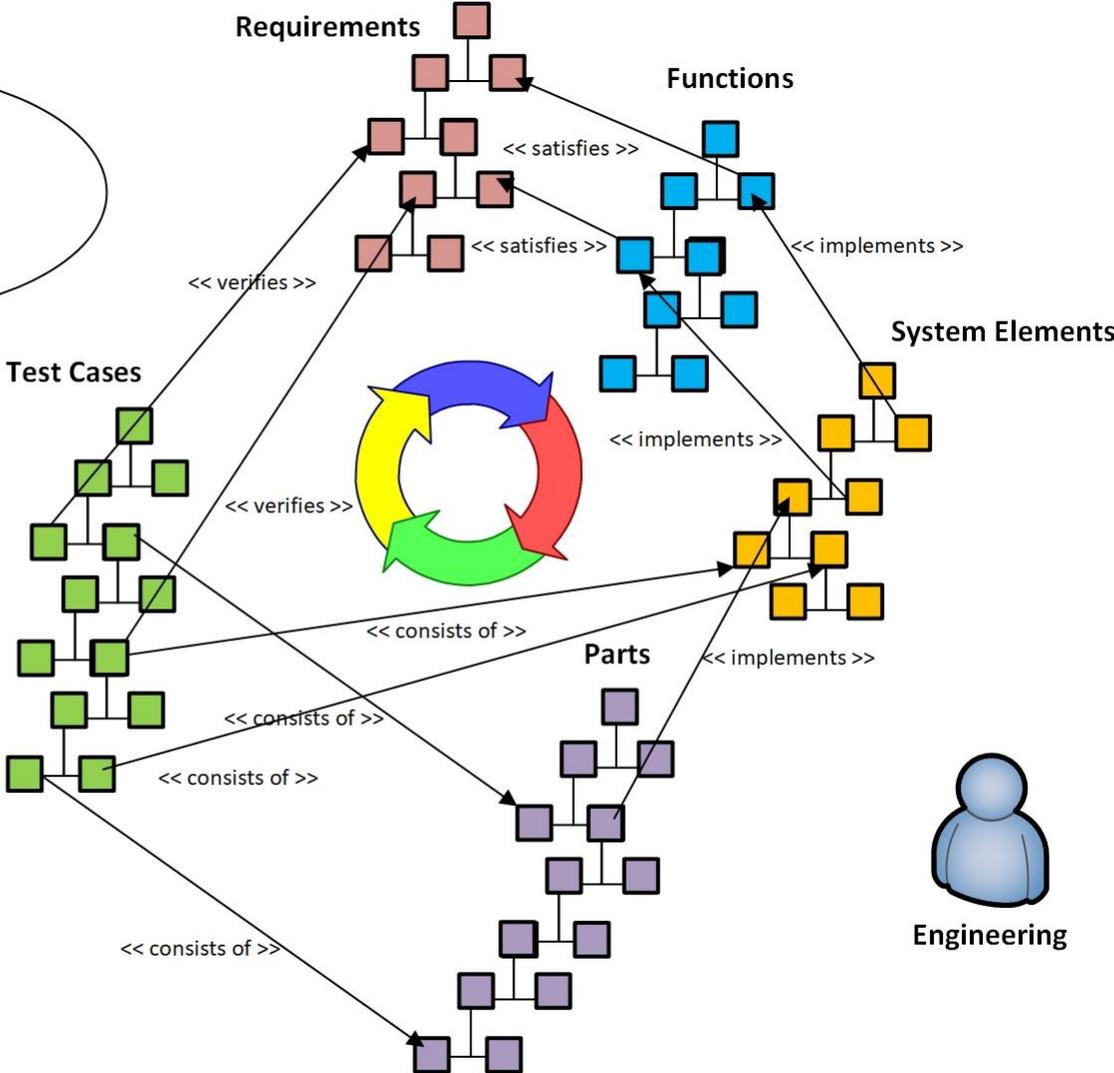
# Global Configuration



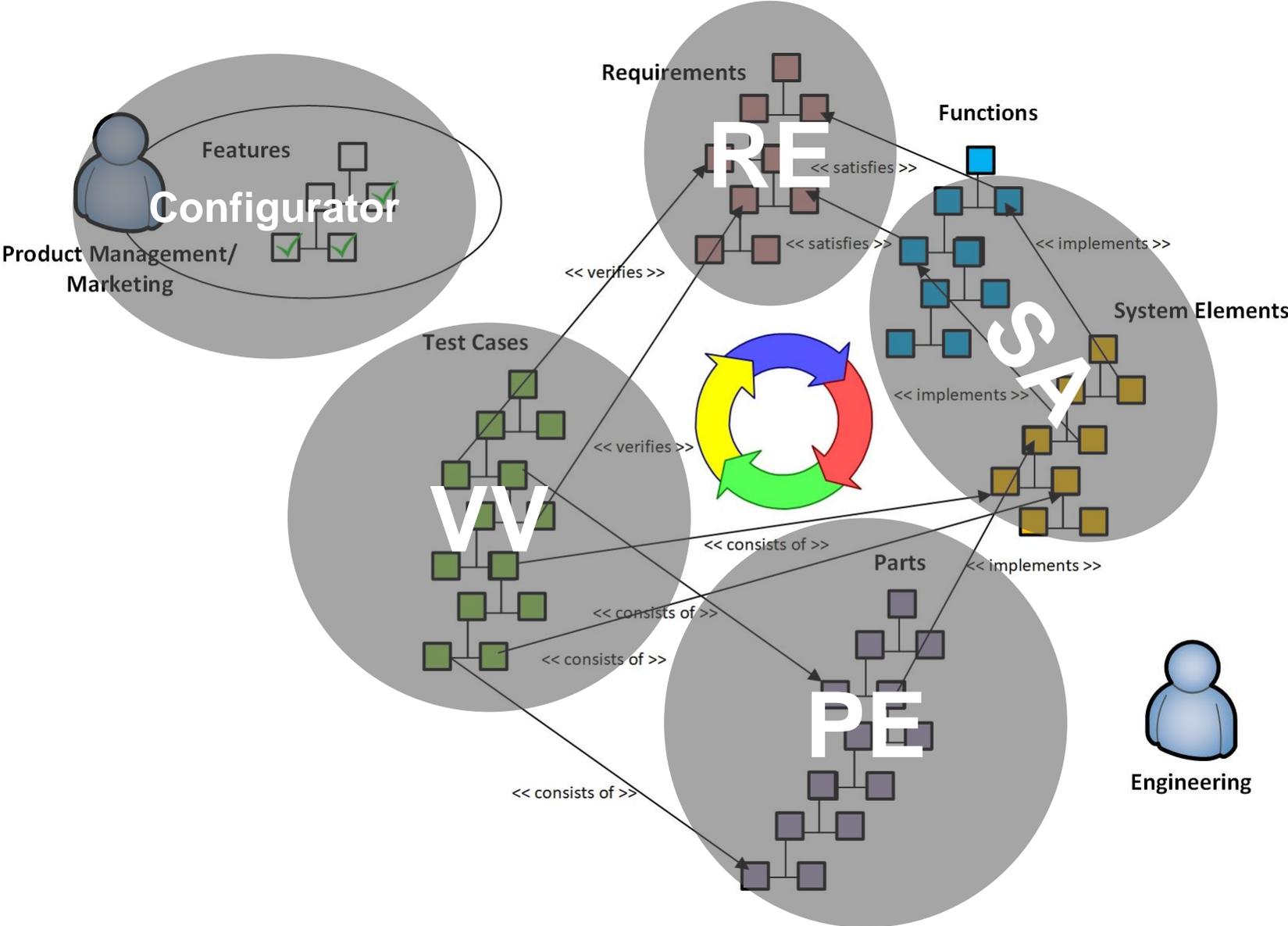
# Global Configuration



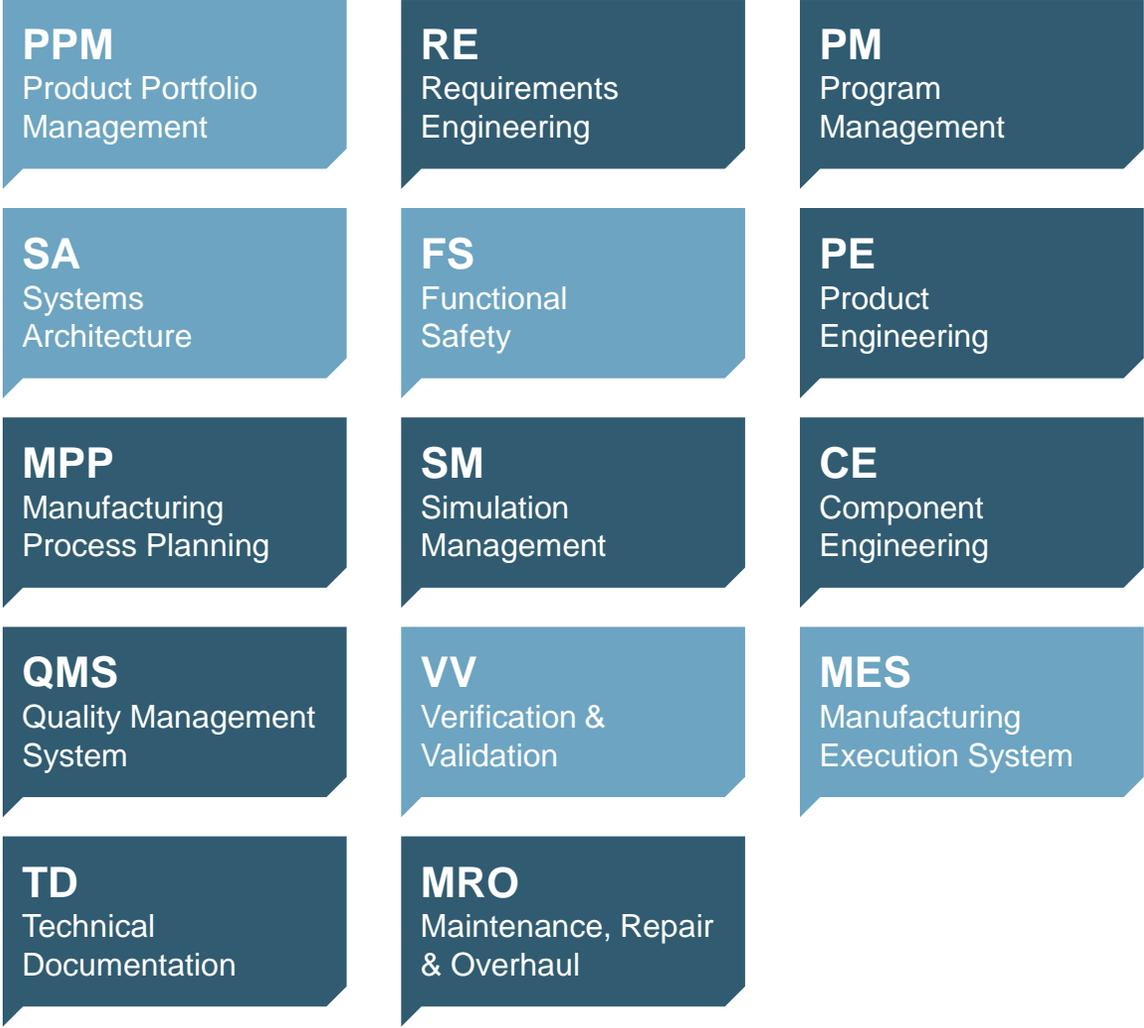
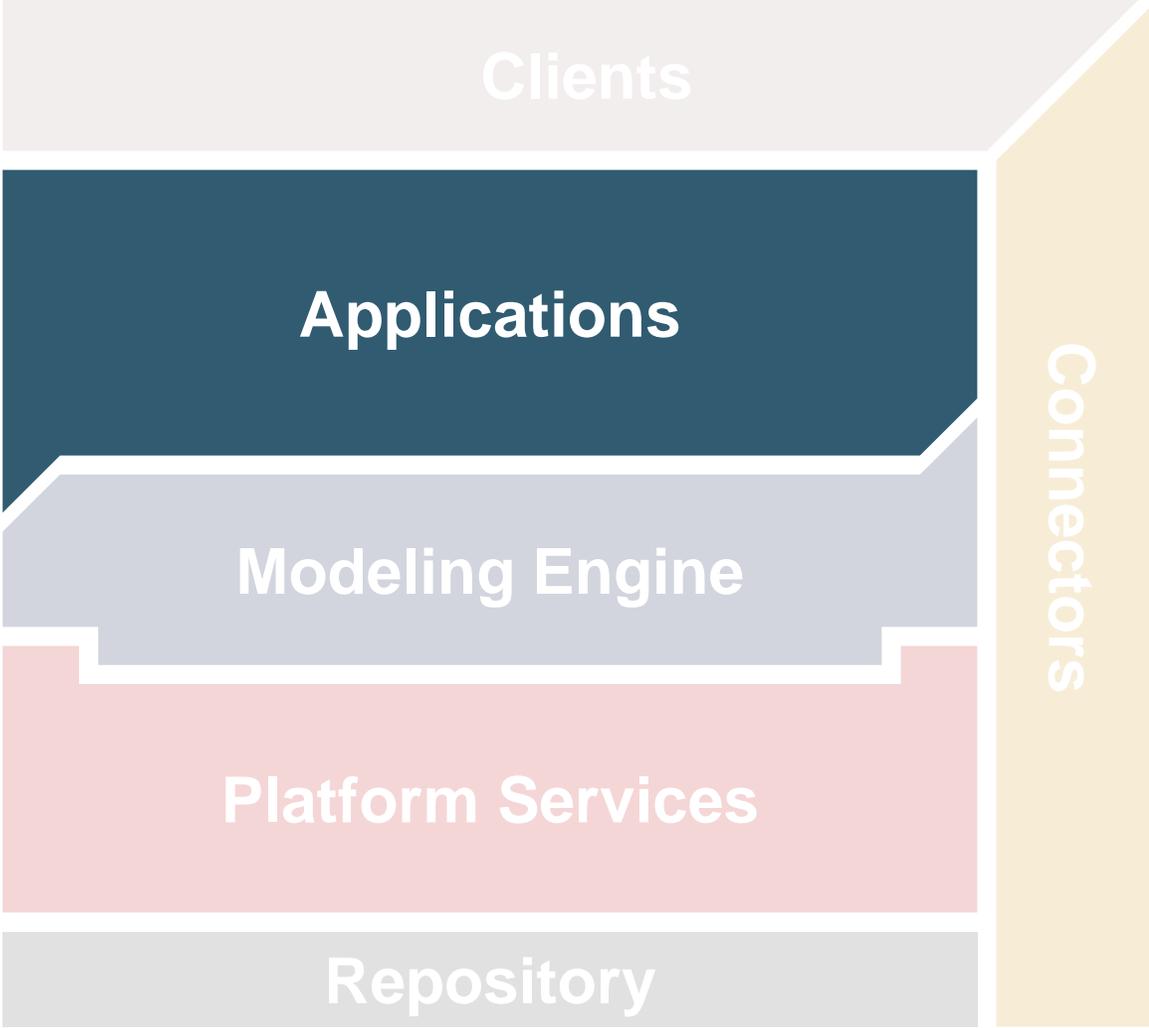
**Must include Variation**



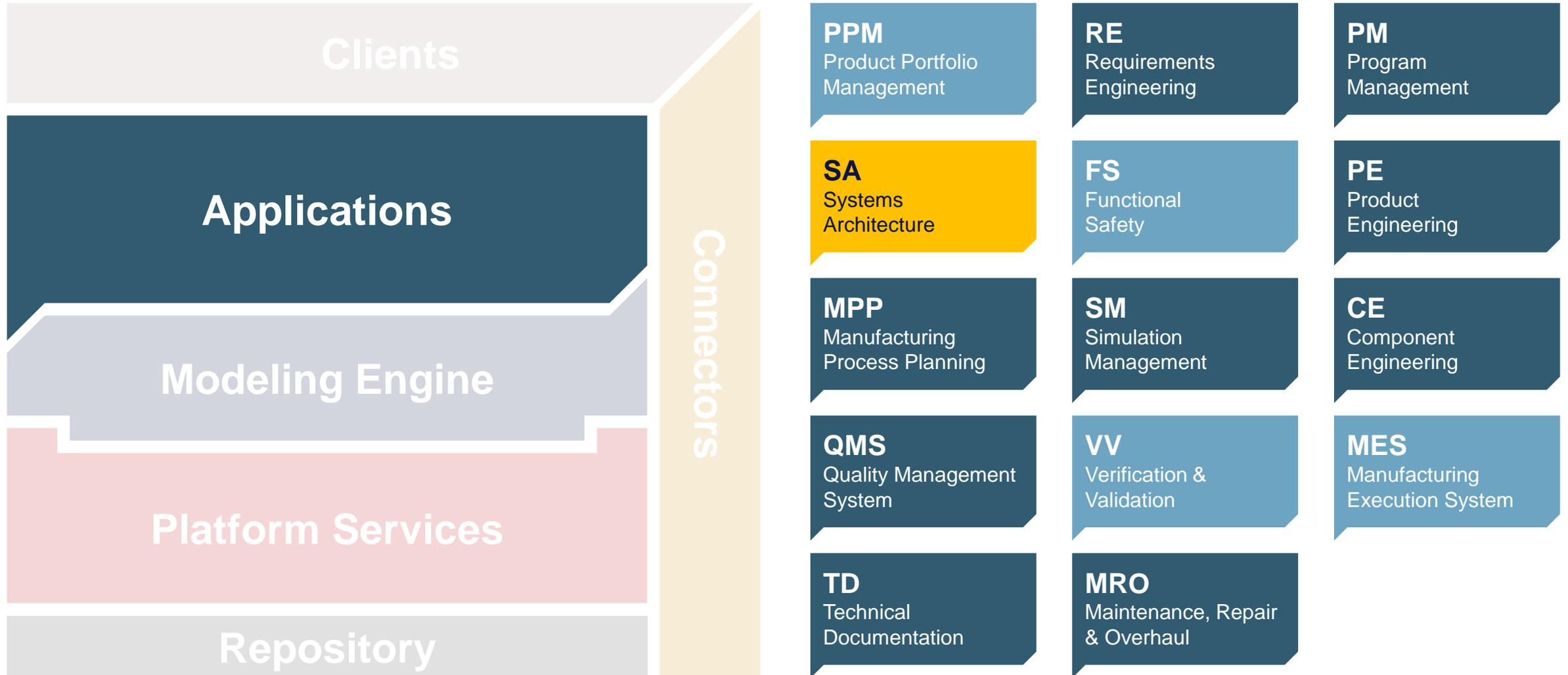
# Global Configuration



# Platform Applications



# Platform Applications

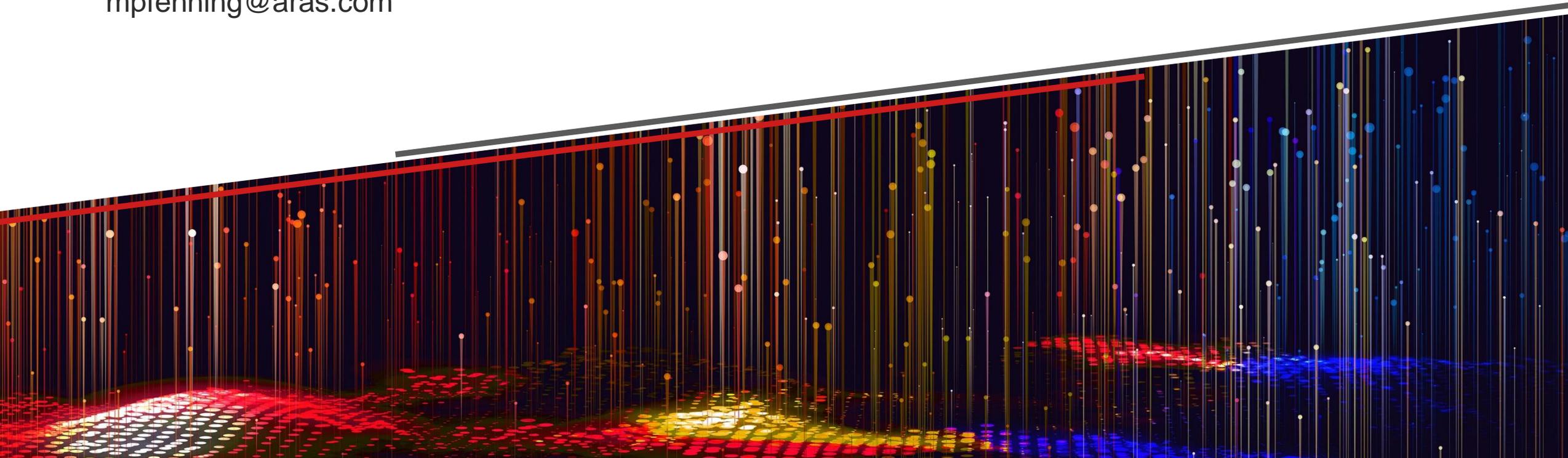




# Thank You

Michael Pfenning

[mpfenning@aras.com](mailto:mpfenning@aras.com)



# MagicDraw (aka Cameo SM) Connector

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- ARAS has developed a couple of PoCs in this area already (as shown on the video)
  - With University of Kaiserslautern  
(<https://www.youtube.com/watch?v=FlpuCbktyCU>)
  - With NoMagic (before the Acquisition by Dassault)
  - For an automotive OEM
- There is no standard connector on the ARAS Roadmap
- ARAS usually handles connectors in two ways:
  - Project-based development by service resources (ASF)
  - Partners

 CAMEO  
SYSTEMS MODELER™