CRYSTAL
Seamless Life-Cycle Collaboration for Safety-Critical Systems Engineering

Dr. Christian El Salloum
Project Coordinator, AVL List GmbH
Today’s situation at industrial companies

- **Aerospace**
- **Automotive**
- **Healthcare**
- **Railway**

**Industrial Workflows**

- Fragmented IT
- High manual effort to handle data

**Tool Layer**

- Analysis Tools
- Functions Database
- Product Definition
- Testing Databases
- Many more...

- Develop concepts
- Develop System
- Integrate System

- Gather Demand
- Plan System
- ...

**Impact**

- High maintenance costs
- Impact on quality and safety
- High maintenance costs
The tool-integration problem

- Point-to-point Integrations don’t scale
- Monocultures lock you in
- Past choices restrict present action and future vision
- Creating new integrations is unpredictable
- Maintenance, management, and change costs go up over time
- Ongoing and unexpected costs drain resources

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The CRYSTAL Vision

Enable New Engineering Methods

Open Integration Platform

Tool Layer

Users get better ways of working

- Based on Standardized Interoperability Specification
- Connect tools to expose & link data

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CRYSTAL has the critical mass to generate impact

- **68 partners** from **10 countries**
- **€82M** budget
- **European key players** from different industrial domains
- Large companies developing embedded systems act as **technology users** and case providers
- Large tool providers, SMEs and researchers as **technology providers**
Technical Approach

- **Standardize tool interaction, but not a tool’s capabilities!**
- Separate data from tool functions
- Apply **Interoperability Specification (IOS)** as the central standard
- Build on existing successful standards where appropriate

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CRYSTAL Interoperability Specification
A Layered and Modular Architecture

[Diagram of layered and modular architecture]

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Interoperability Challenges

- Full traceability of all involved artifacts
  - e.g., elements of heterogeneous models, configurations, parameters, requirements and test cases on system level and component level ...

- Seamless collaboration between integrated tools to enable efficient engineering methods
  - e.g., change impact analysis, trade-off analysis via heterogeneous co-simulation, re-use across different development stages ...

- Consistency management, version management, variant management and change history management
  - ... for distributed and loosely coupled tool chains (e.g., interlinked via OSLC)
Expected Outcomes

- **CRYSTAL Interoperability Specification (IOS)**
  - Open specification
  - Enables seamless integration of tools and full traceability across the product life cycle

- **CRYSTAL IOS compliant Technology Bricks**
  - Engineering Tools
  - Services
  - Methodologies

- **Platform Builder** for specifying, implementing, instantiating, tailoring, deploying, and maintaining System Engineering Environment

- **CRYSTAL Use-Cases** as reference scenarios
  - Demonstrators with high level of maturity
Envisioned Impact

- Improved system development
  - Lower cost, time, risk
  - Less rework
  - Higher Quality

- Increased flexibility for OEMs
  - No vendor-lock-in

- New market opportunities for technology providers
  - Facilitate innovation and market entry

- Openness as an opportunity for all 😊