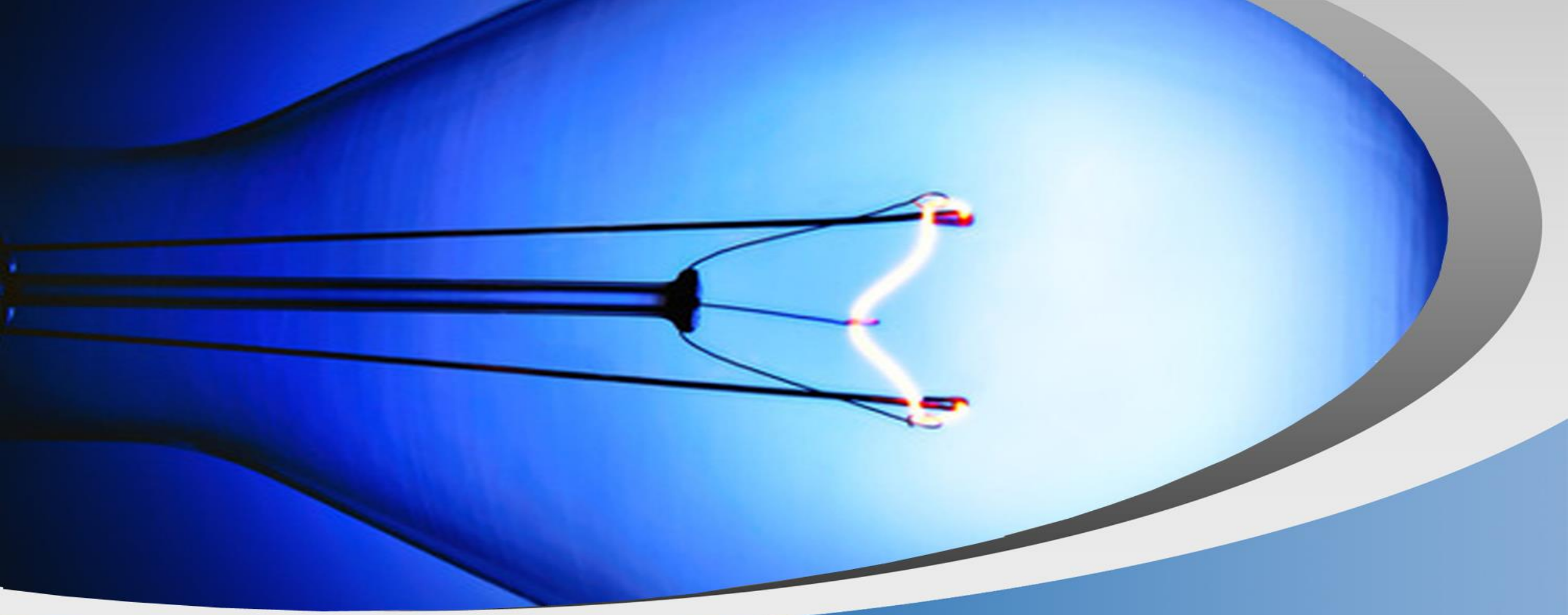

Accellera Federated Simulation User Group (FSUG)

Martin Barnasconi, Mark Burton

July 2024

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Agenda

- Introduction & problem statement
- Cross-industry collaboration model
- Organization: Working Group, User Group vs. industry projects
- Accellera Standardization Development Cycle
- Activities conducted by the Accellera Proposed Working Group
- Federated Simulation User Group
- Industry project under definition
- Tentative meeting schedule
- Outlook and next steps

Introduction and problem statement

Different simulation approaches and standards…

Avionics

ED-247 (VISTAS / VHTNG

Space

SMP2

Semi's

SystemC TLM IP-XACT

Automotive

openADx openDRIVE openSCENARIO openCRG openPASS

Mechatronics

FMI / FMU

Interoperability challenge:
How to efficiently connect different models and/or simulation approaches?

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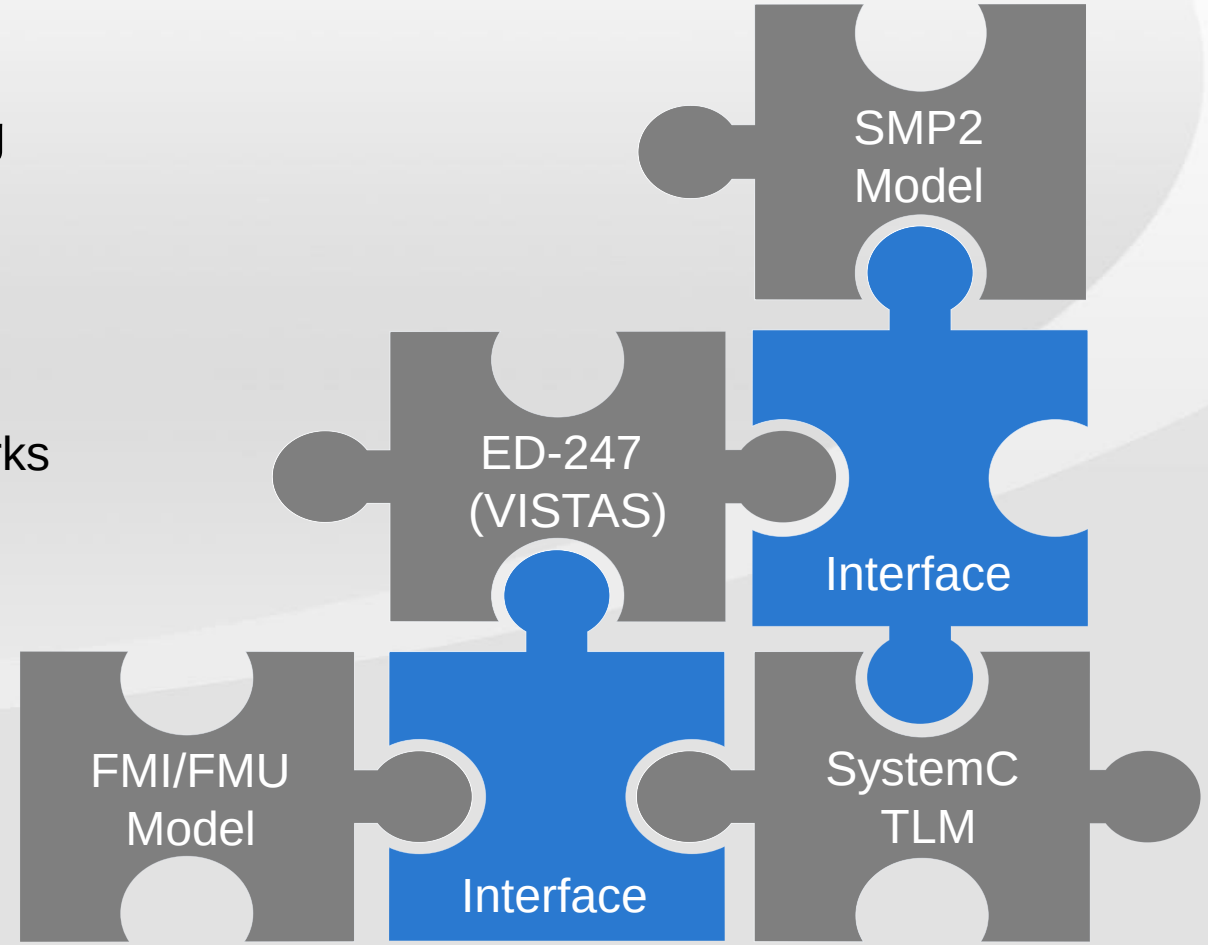
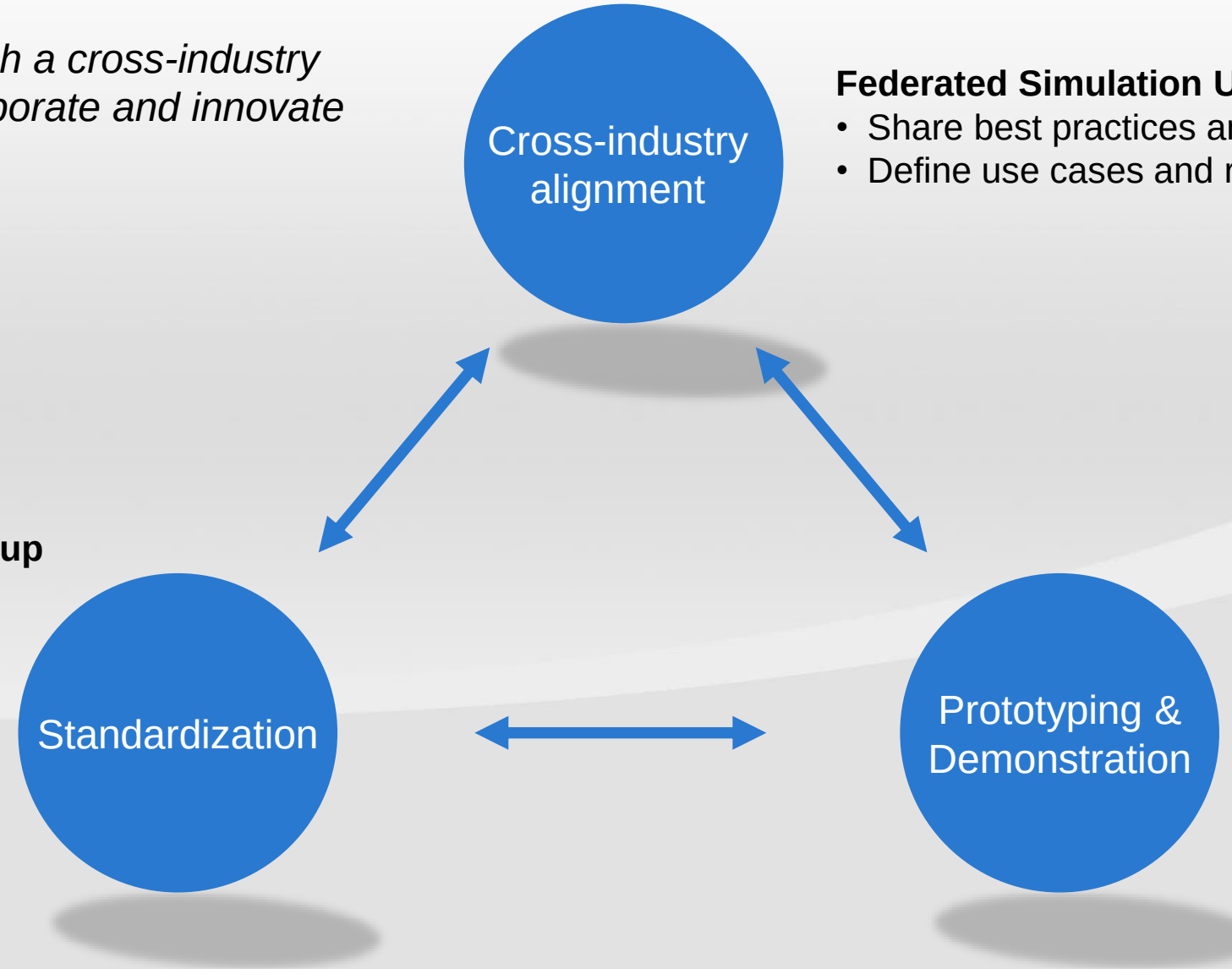
Cross-industry collaboration enabling interoperability of simulation frameworks

- **Approach: Leveraging and connecting existing standards and industry formats**
  - Not re-invent wheels
- **Introduce standardized interfaces**
  - Enabling interoperability between simulation frameworks
- **Targeting a scalable simulation and modeling ecosystem**
  - Support models and simulation domains used at different levels of the ‘OSI stack’
  - Ecosystem of simulators, models, and other components that together form Systems-of-Systems



Collaboration model

Opportunity: Establish a cross-industry organization to collaborate and innovate



Federated Simulation User Group (FSUG)
- Share best practices and experiences
- Define use cases and requirements

Federated Simulation Standard Working Group (FSSWG)
- Define interoperability standard, including
  - Meta-/data-model
  - API
  - Semantics

Industry project(s) (e.g. IRT project, other Consortia, etc.)
- Study existing technologies
- Collaborative SW development
- Ecosystem development

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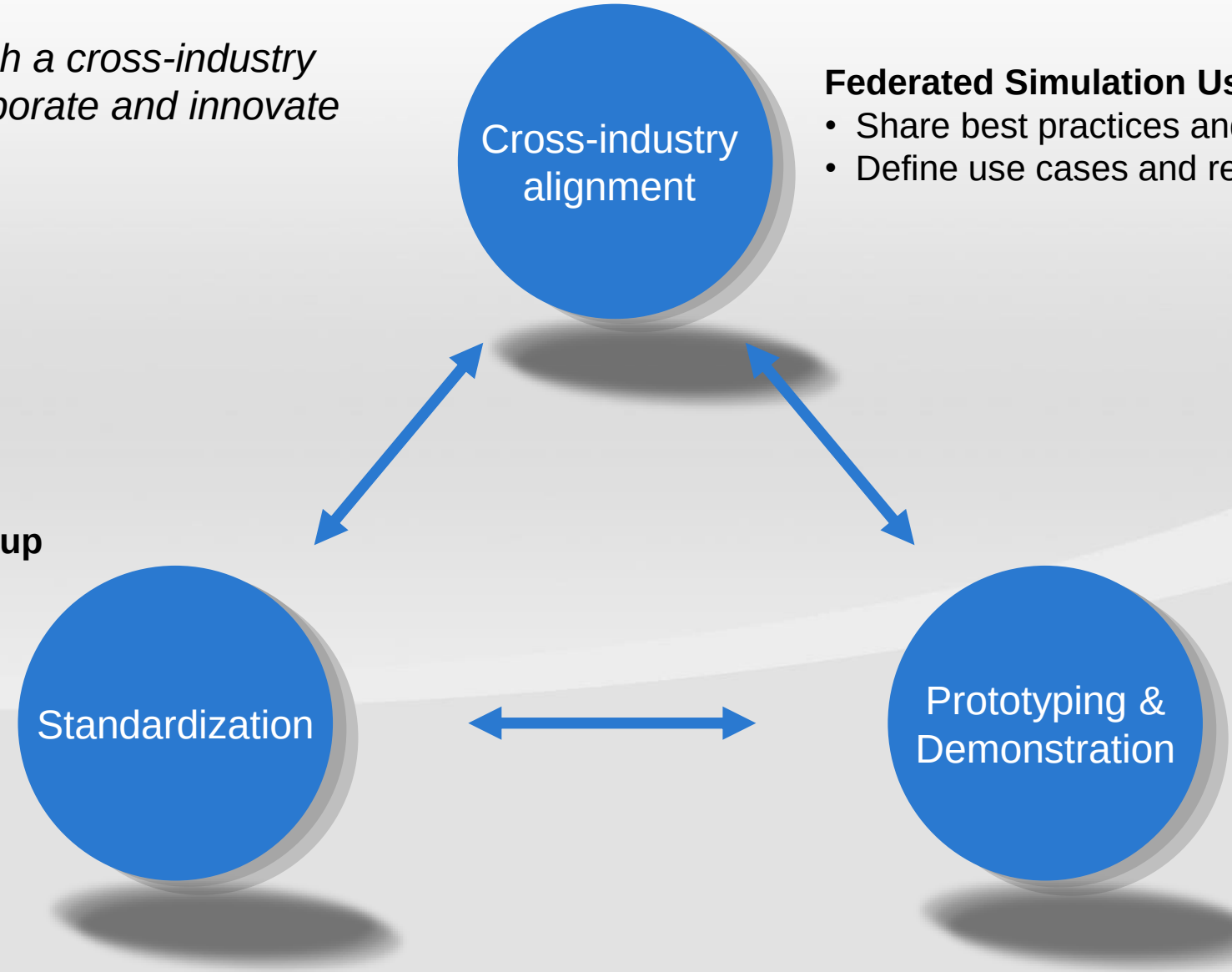

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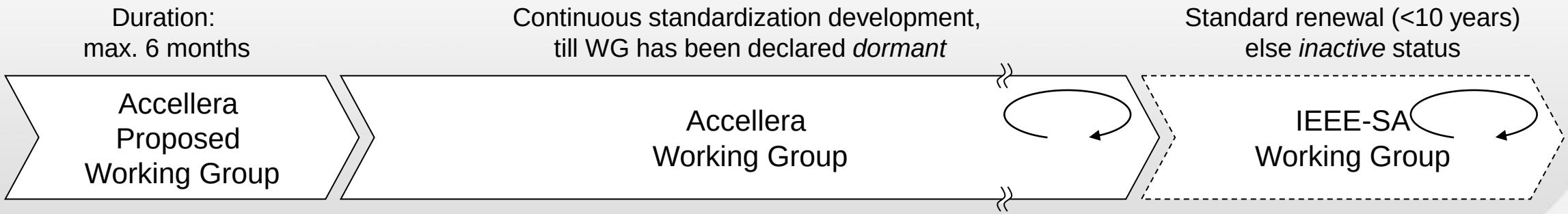
Federated Simulation Standard Working Group

- **Working Group supported by Accellera Systems Initiative**
  - Requires Accellera membership, governed by Accellera Policies and procedures and IP Rights Policy
- **Charter**
  - Cross-industry alignment and collaboration to improve the interoperability of product and environment simulation using existing and new open standards
- **Scope and objectives**
  - Develop a standard (meta-model and API) and open infrastructure to enable interoperability of established modeling and simulation standards, technologies and tools as part of a distributed, orchestrated and federated simulation ecosystem
- **Main Deliverables**
  - Standard definition / document
  - Supplemental material enabling standard deployment (e.g. reference implementation, examples, etc.)
- **Meeting schedule (proposal)**
  - Monthly online meeting (alternates with FSUG)

Accellera Standardization Development Cycle



- Identify industry interest & participants
- Collect requirements
- Feasibility study
- Reporting evaluation of proposed standard developments

- Consolidate technical requirements in a Design Objective Document (DOD)
- Standards development in the form of a Language Reference Manual (LRM)
- Development of “supplemental material” (e.g., reference implementation, XML schema, etc.)
- Call for Contributions: Participants are encouraged to contribute technology, API proposals, etc.
- Promotion and deployment of standardization activities at conferences (e.g. DVCon, DAC)

- Transfer of standards document after Accellera Board approval to IEEE-SA (excl supplemental material)
- Standards development under the responsibility of an IEEE-SA Working Group
- Objective to release as IEEE standard

Activities conducted by the Proposed WG

- **Commonly identified use cases**
  - Pre-silicon sensor fusion development (simulated compute + simulated sensors + simulated environment)
  - Early system/architecture/SW development
  - CI/CD and software development using virtual models of the hardware (simulated compute + simulated physical system)
  - Virtual & hybrid testing (simulation models mixed with physical devices)
- **Initial requirements gathering**
  - High-level requirements/constraints for FSS standard defined (review & refinement to be done in FSS WG)
  - Requirements captured for FSS reference implementation and demonstrator
- **Early concept definition**
  - Definition of a meta-model / API to support interoperability between models, tools, simulator and hardware/emulation
  - Technology exploration for the underlying infrastructure and use of different transport layers

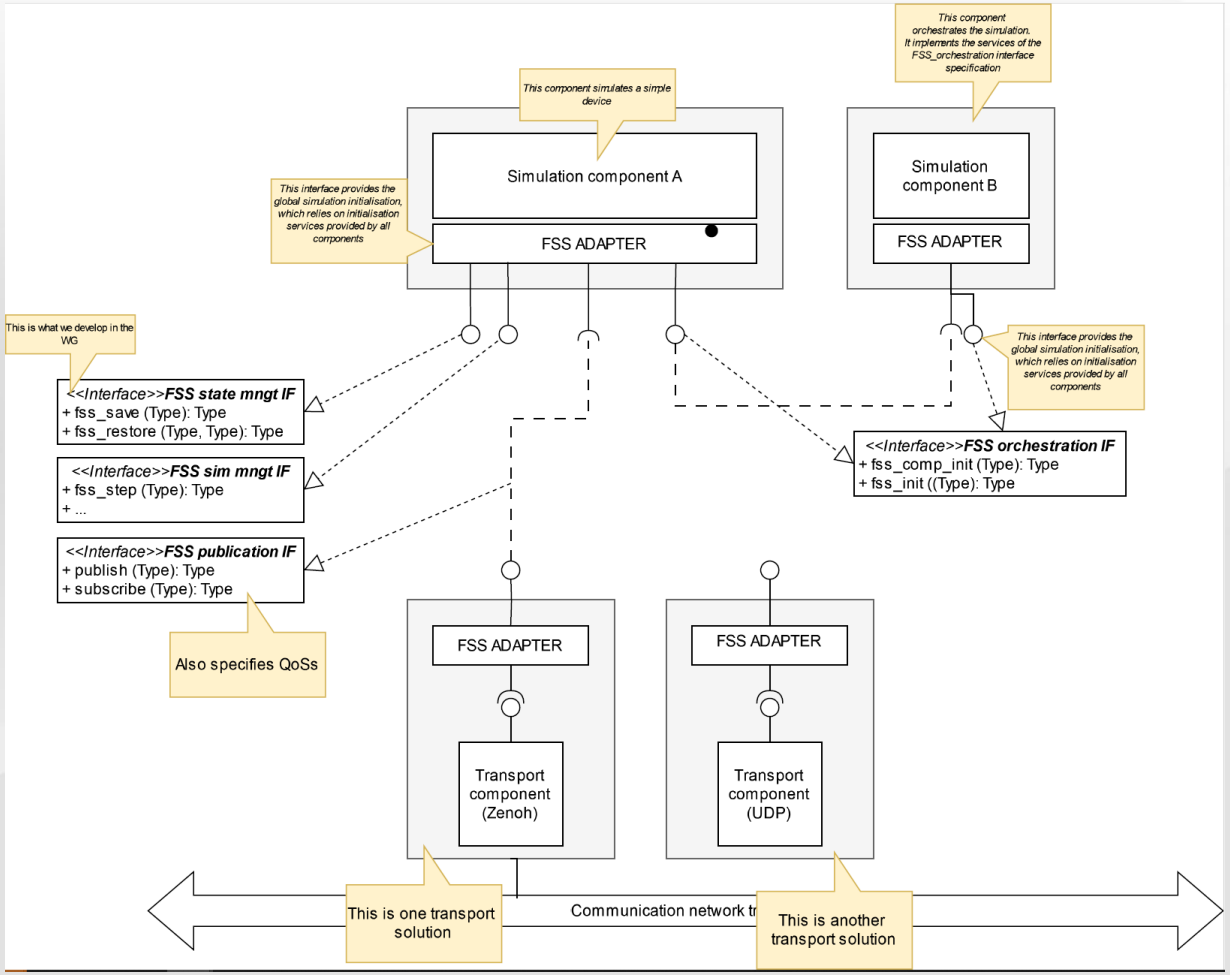
Federated Simulation User Group

- **User Group supported by Accellera Systems Initiative**
  - Group of unaffiliated users, governed by Accellera Policies and procedures and IP Rights Policy
- **Charter**
  - Cross-industry collaboration to align on existing practices, technologies and standards used in the context of federated simulation
- **Scope and objectives**
  - Share best practices and experiences
  - Define use cases and requirements
  - Public information to be shared with FSS working group and any other organization(s) involved/interested
- **Meeting schedule (proposal)**
  - Monthly online meeting (alternates with FSSWG)

NOTE: The User Group will not define the standard, this is the focus of the FSS WG

Industry project under definition

- **IRT innovation project proposal (under definition)**
  - Conduct detailed technical study and implementation such as requirements consolidation, study state-of-the-art, concept definition, PoC and demonstrator development
  - Project to be supported and funded by industries and other organizations interested in Federated simulation
  - Please contact us if you are interested to join this innovation project
- **Explore establishing other projects and/or partnerships with open collaboration and innovation consortia**



Example of concept definition in IRT project definition (draft)

Meeting schedule Q3/Q4 2024

Tentative schedule, to be confirmed using meeting invite(s)

Federated Simulation User Group	Federated Simulation Standard Working Group*
9 September	
	23 September
7 October	
	21 October
4 November	
	18 November
2 December	
	16 December

*Accellera membership required

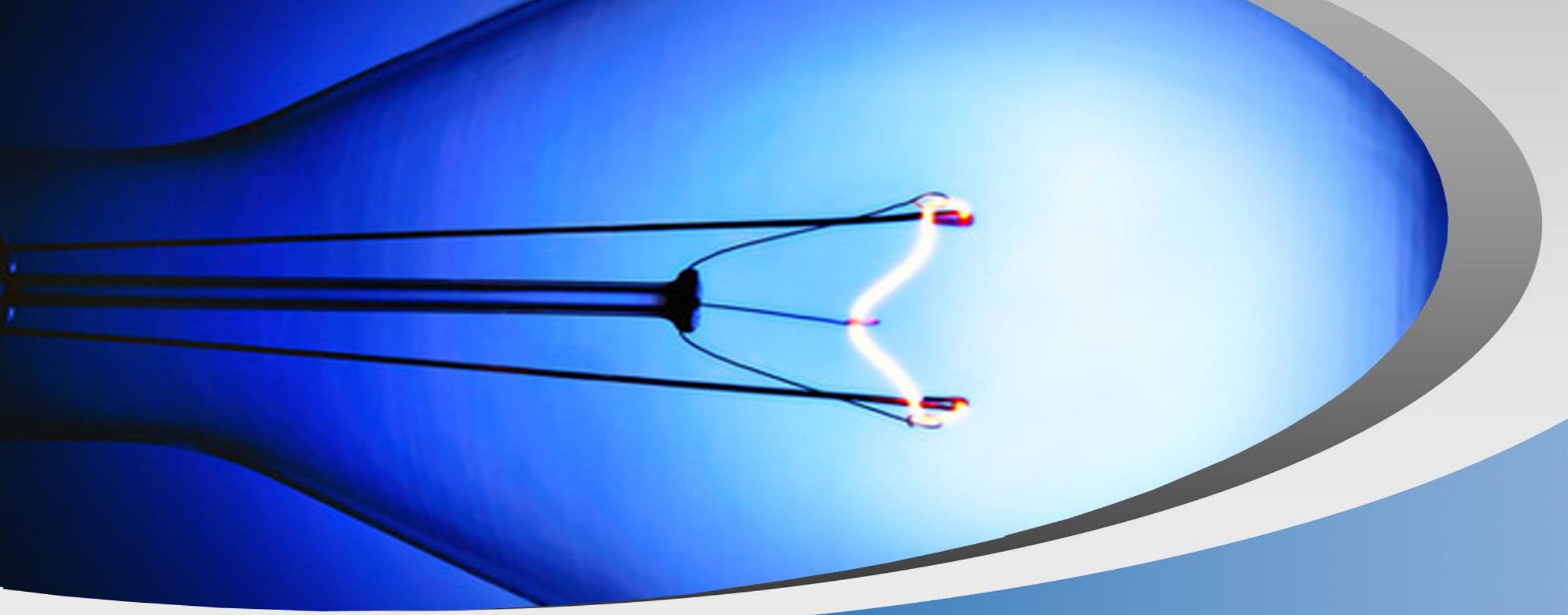
Meeting time: Monday's 17h CE(S)T / 8am PDT (PST)

Outlook and next steps

- **Federated Simulation is an *industry opportunity* to address interoperability of models, tools, simulators and other components at the systems-of-systems-level**
- **Collaboration models**
  - Federated Simulation User Group: Align on industry best practices, use cases, and needs
  - Federated Simulation Standard Working Group: Development of a standard, API and meta-model
  - Industry project(s): Industry-driven technology development including prototyping and demonstration
- **Explore establishing other projects and/or partnerships with open collaboration and innovation consortia**
  - E.g. other standardization initiative, SW development activities, other Special Interest Groups, etc.
- **Meeting schedule**
  - Alternate User Group / Working Group meetings, monthly occurrence
  - Meeting series starts in September

More information

- Accellera Systems Initiative
- Accellera Membership
- Federated Simulation Standard Working Group **(public page)**
- Federated Simulation Standard Working Group Workarea **(members only page)**



Q & A

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Standardization / OSS organizations landscape

Standard Definition

Implementation

FSS WG

FS UG

Accellera

- EDA, Semi industry
- SystemC (IEEE1666)
- IP-XACT (IEEE 1685)
- UVM (IEEE 1800.2)

IEEE

ECSS

- Space Industry
- SMP2

OMG

- DDS

EUROCAE

- Civil Aviation Equipment
- ED247 VISTAS
- VHTNG

…

Modelica Association

- Mechatronics
- FMI/FMU
- DCP

…

SISO

- Modeling and Simulation (M&S)
- HLA (IEEE 1516)

Eclipse Foundation

- Open source software collaboration
- SDV
- Zenoh

Linux Foundation

- Open source software collaboration
- RISC-V
- KVM???

Apache Foundation

- Open source software collaboration
- …

Software Freedom Conservancy

- QEMU

…

Linaro

- ARM ecosystem

…

GitHub

- E.g. ED247_LIBRARY

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