ASAM QSQ – Quantifying Simulation Quality

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Höhenkirchen

● This workshop will be recorded

ASAM Association for Standardization of Automation and Measuring Systems

Antitrust reminder

As this workshop potentially involves communication and collaboration between competitors, it must be ensured that no breaches of antitrust law occur.

Participants of this workshop must refrain from the following actions:

- **Exchange of strategic business information** (including but not limited to marketing or sales strategies, investment plans, know-how, customer data, product developments, sale and purchase prices, price lists, production costs, pricing policy and strategies, terms of sale)
- **Agreements on prices** (maximum and minimum prices, price components, granting of discounts, the timing of price changes, terms and conditions of sale and measures accompanying the price);
- **Allocation** concerning products, sales territories and customers;
- **Tender arrangements** (manipulation of tender procedures or invitations to tender);
- **Restrictions on production** (agreement to restrict output or to establish quota systems allocating a specific part of the total industry output amongst members);
- **Resale price arrangements** (setting binding minimum prices for resellers, distribution partners or retailers).

Please contact the ASAM Office if you are unsure whether any measure complies with antitrust law or a topic may involve the disclosure of strategic information.

About ASAM

11. September 2025

ASAM in a nutshell

VISION

Accelerate engineering for mobility.

DNA

We are a global not-for-profit association of mobility industry parties. **ASAM is what its members are.**

PRODUCTS

We create standards on implementation level for the entire lifecycle of mobility systems.

WORK MODEL

Our products are initiated and developed by our members to the benefit of the entire industry. We deliver with short time to market to a strong user base.

IMPACT

We facilitate competitive markets and drive innovation by enabling collaboration and cooperation between all stakeholders.

PROMISE

We leverage your ideas for standardization.

Scope and Goals

11. September 2025

ASAM

Today´s Workshop Goals

- Community feedback & Proposal´s refinement
- Identify and engage stakeholders

Summary

Virtual homologation depends on credible virtual methods (high-quality models, frameworks) & tools.

QSQ Proposal Draft
P_2025_xx_ASAM_QSQ_Proposal.pdf

- **Current gap**: No standardized quality metrics for simulation frameworks/models (esp. sensors)
- **Proposal:**
  - Create standardized data format for quality metrics
  - Define metrics & use-case specific weighting
  - Proof-of-Concept (PoC) to test applicability
- **GOAL:**
  - Establish credibility through industry consensus on how simulation quality is defined, measured, and communicated in simulation frameworks and sensor models used in ADAS/AD virtual homologation.
  - Improve credibility, comparability, and acceptance by authorities

Motivation & Preparatory Work

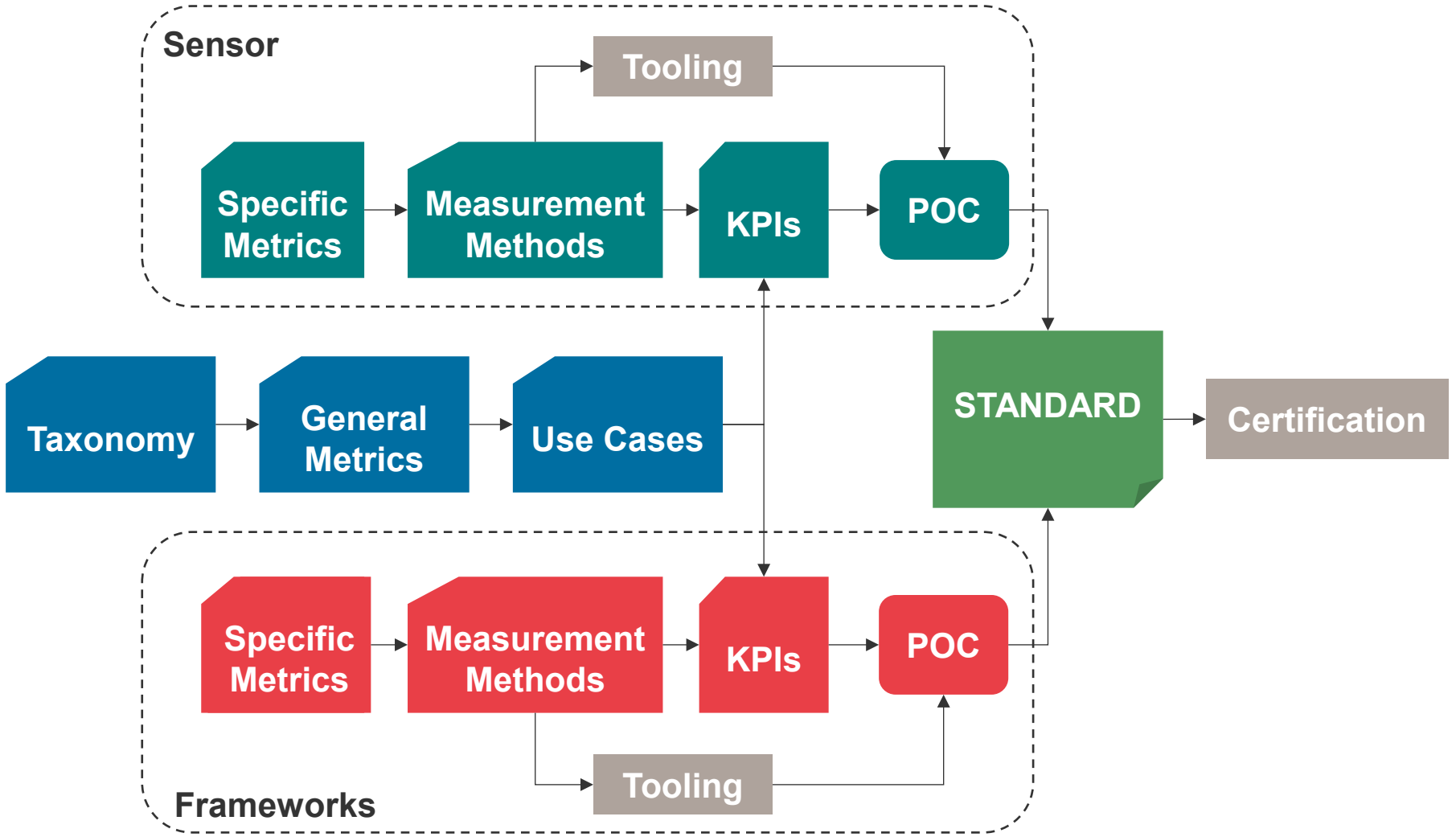
Simulation tools for ADAS/AD are numerous & diverse, varying greatly in features, uses, and compliance with standards

Hard for users to objectively compare offerings due to the lack of harmonization

Harmonized, machine-readable quality description. Objectivity, credibility, industry consensus

- **Workshops:**
  - 2021: "Quantifying Simulation Quality" (HSD & MD Engineering)
  - 2024: Ideation workshop with ASAM & industry stakeholders
- **Past projects:**
  - SimCert, IEEE P2020 (image sensor metrics), SETLevel research
- **Relevant collaborations:**
  - Prostep ivip, INTACS, EVIDENT, HAIViSH

Technical Approach



Goals

- Human & machine-readable standardized data format (e.g., XML)
- Taxonomy of "simulation quality"
- Metrics & KPIs per use case
- Instructions for measurement
- Ensure standards alignment
- Validate applicability through PoC assessments

Market assessment of tools not in scope !

Work packages

- WP1. Market scan (existing metrics)
- WP2. Taxonomy definition
- WP3. Use case definition
- WP4. Metrics & measurement methods & KPIs
- WP5. Data format definition
- WP6. Quality check rules for ASAM QC
- WP7. PoC demonstration
- WP8. Write the standard

Work packages

WP1. Market scan (existing metrics)

WP2. Taxonomy definition

WP3. Use case definition

WP4. Metrics & measurement methods & KPIs

WP5. Data format definition

WP6. Quality check rules for ASAM QC

WP7. PoC demonstration

WP8. Write the standard

- Review existing initiatives, research projects, and standards that have already defined metrics for simulation quality.
- Identify gaps, overlaps, and reusable elements (e.g., IEEE P2020 camera metrics, HAIViSH methods).

Next steps after WP1:

- Use the findings as a foundation for WP2 and WP4.
- Build a “state-of-the-art” document that serves as reference for the whole team.

Work packages

WP2. Taxonomy definition

WP3. Use case definition

WP4. Metrics & measurement methods & KPIs

WP5. Data format definition

WP6. Quality check rules for ASAM QC

WP7. PoC demonstration

WP8. Write the standard

- Create a clear, hierarchical classification of quality aspects for simulation models and frameworks.
- Define Taxonomy categories (e.g. accuracy, robustness, interoperability, etc.
- Provide one generalized and two scope-specific metrics definitions (for simulation frameworks and models)

Next steps after WP2:

- Taxonomy will be the structural backbone for defining metrics in WP4.
- Align taxonomy categories with ASAM TestSpecification to ensure compatibility.

Work packages

WP3. Use case definition

WP4. Metrics & measurement methods & KPIs

WP5. Data format definition

WP6. Quality check rules for ASAM QC

WP7. PoC demonstration

WP8. Write the standard

- Identify representative use cases for simulation, perception testing, safety validation, etc.
- For each use case, determine which quality aspects are most critical.
- This allows weighting metrics later (e.g., real-time capability is essential for HiL, but less important for offline simulation)

Next steps after WP3:

- Feed directly into WP4 to adapt metric definitions per use case.
- Provide input to WP5 for storing use-case weightings in the data format.

Work packages

WP4. Metrics & measurement methods & KPIs

WP5. Data format definition

WP6. Quality check rules for ASAM QC

WP7. PoC demonstration

WP8. Write the standard

- Break into parallel groups (common, framework, sensor models,…)
- For each metric provide a clear definition, define the measurement method, reference any relevant standards,…
- Ensure both “hard” metrics (e.g., frame rate) and “soft” metrics (e.g., completeness of documentation) are covered.

Next steps after WP4:

- WP5 uses these metrics to define the data format.
- WP7 will apply them in the PoC for validation.

Work packages

WP5. Data format definition

WP6. Quality check rules for ASAM QC

WP7. PoC demonstration

WP8. Write the standard

- Specify a human- and machine-readable format (likely XML or JSON) to store:
  - Metric definitions
  - Metric values for specific tools/models
  - Weightings for specific use cases
  - Metadata
- Include versioning and extensibility so the format can evolve.

Next steps after WP5:

- WP6 will create check routines to validate files against this format.
- WP7 will use it to store PoC results.

Work packages

WP6. Quality check rules for ASAM QC

WP7. PoC demonstration

WP8. Write the standard

- Extend the ASAM Quality Checker framework with new check bundles (e.g. Verify compliance with the data format, etc.)
- Ensure that both vendors and authorities can run automated quality checks.

Next steps after WP6:

- WP7 PoC participants will use these check routines.
- Feedback from WP7 may lead to refinements in WP6.

Work packages

WP7. PoC demonstration

WP8. Write the standard

- Apply the metrics to a small, agreed set of tools and models provided by project members.
- Demonstrate that the metrics and data format work in practice.
- Collect lessons learned to refine metric definitions and measurement procedures.

Next steps after WP7:

- Feed refinement changes back into WP4 and WP5.
- Prepare application examples for the final documentation in WP8.

Work packages

WP8. Write the standard

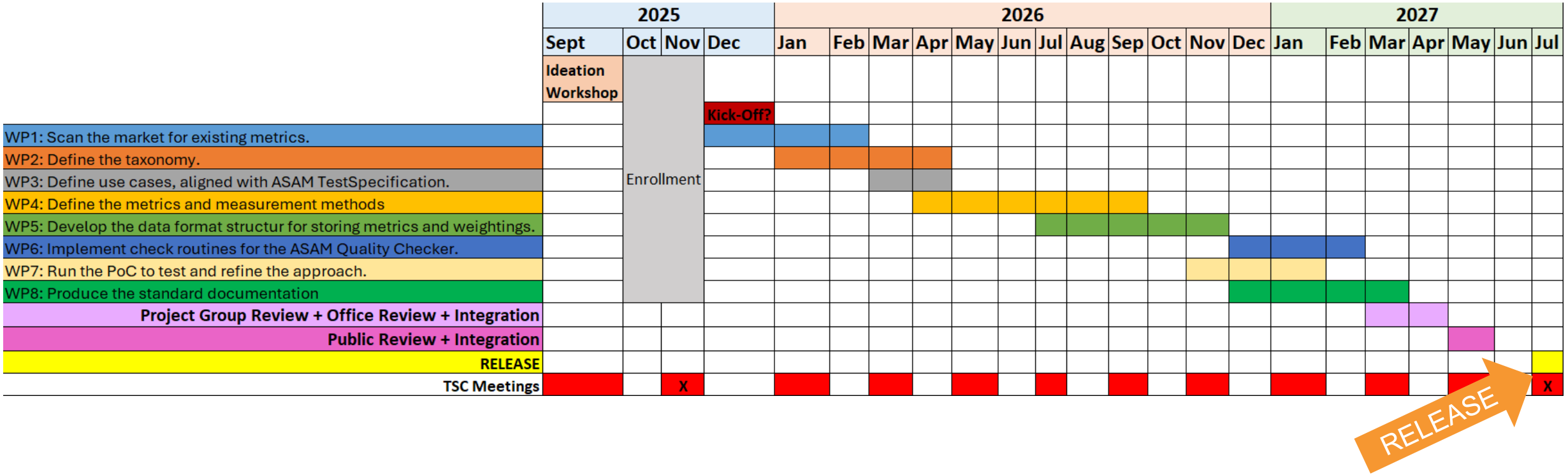
- Compile all results into an ASAM-compliant standard specification.
  - Include:
    - ✓ The taxonomy
    - ✓ Metric definitions
    - ✓ Data format specification
    - ✓ Best practice guidance
    - ✓ Quality check rules
    - ✓ PoC results as examples
- Ensure clarity for both technical and non-technical stakeholders.

Next steps:

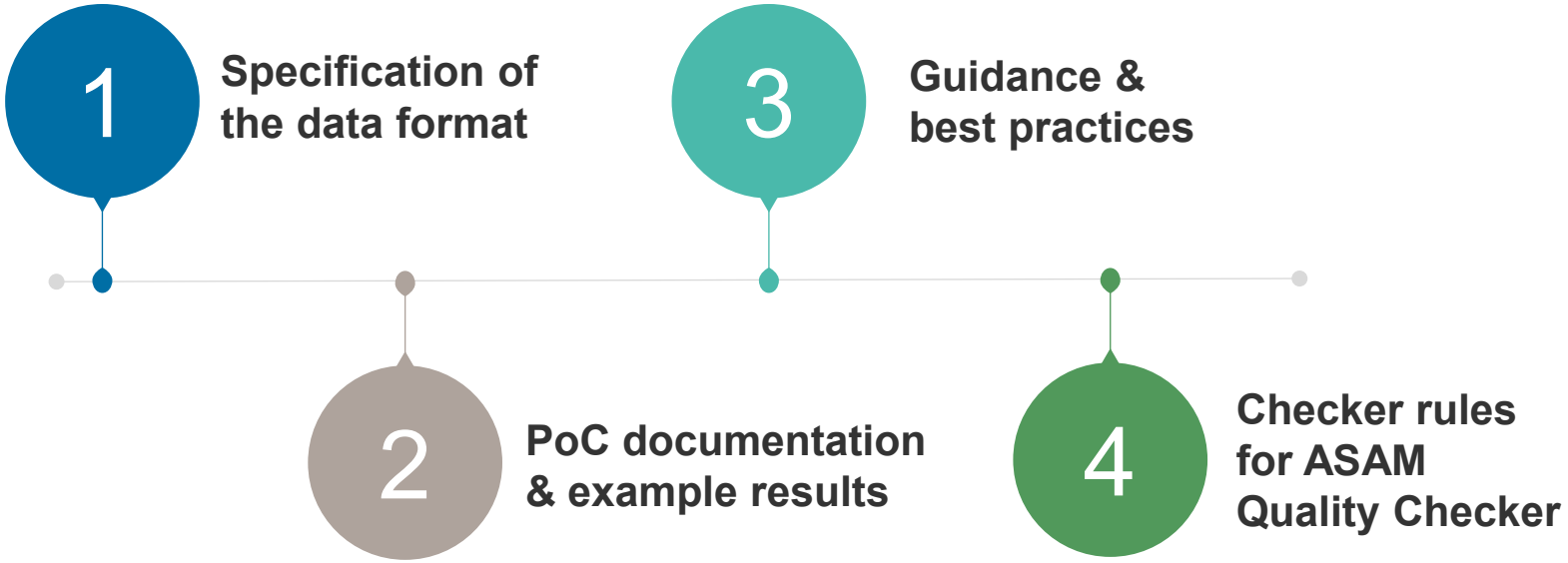
- Handover to ASAM for formal approval, adoption and publication.
- Promote the standard to industry stakeholders.

Project plan

- Development Duration: ~15 months
- Kick-Off: 01.December



Deliverables



Expected impact!

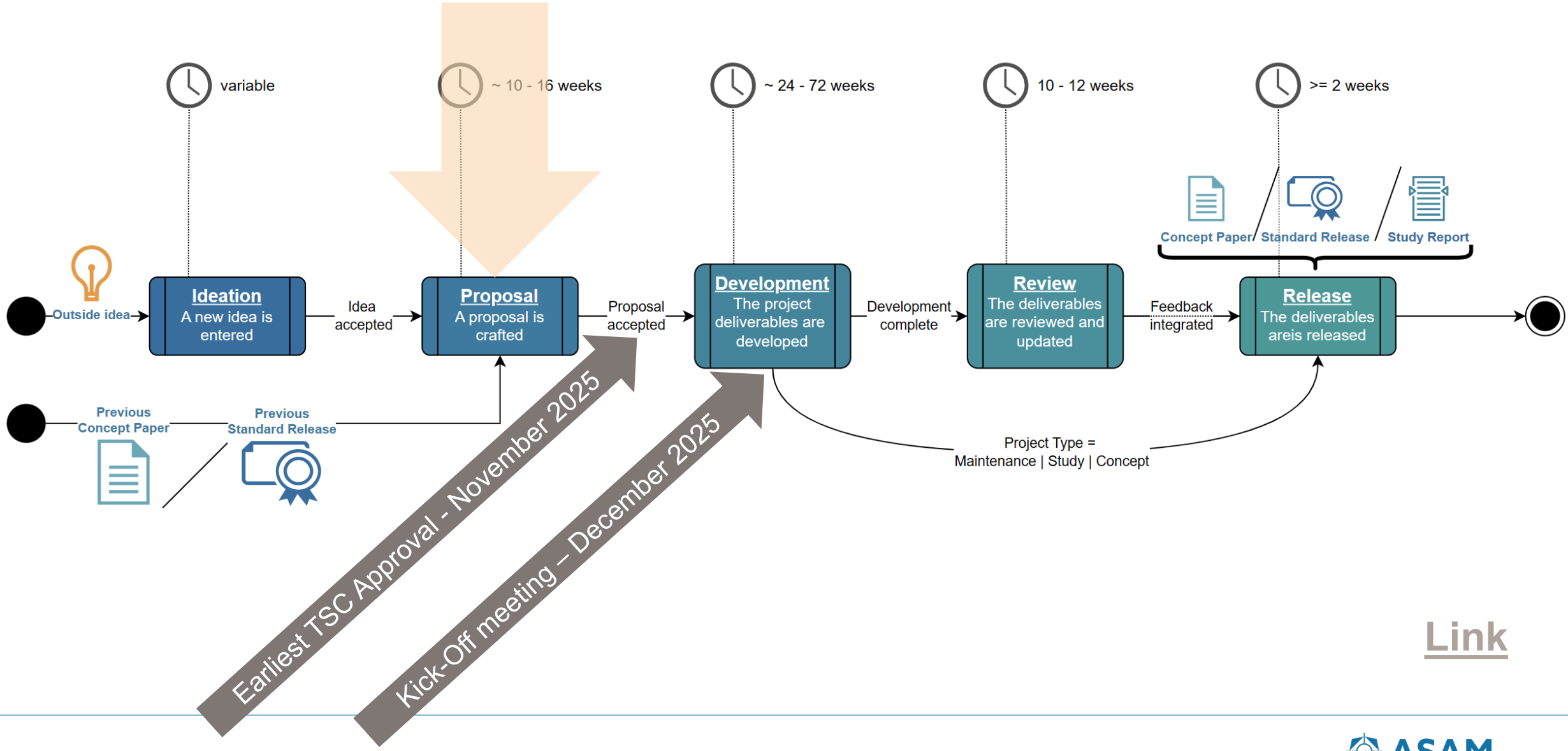
Standardized quality metrics improve:

- Tool comparability
- Supplier - customer communication
- Regulatory acceptance

Paves the way for credible virtual homologation!

Next Steps

Project lifecycle @ ASAM



Link

Resources

Feedback collection on Miro Board
QSQ(Quantifying Simulation Quality) Workshop - Miro

QSQ Proposal Draft
P_2025_xx_ASAM_QSQ_Proposal.pdf

Enrollment Link
P_2025_04 ASAM QSQ - Quantifying Simulation Quality

Thank you for your attention!

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