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SAEC Days 20
Big Data for Safety: Unleashing the Power of Your Software Project Data

Reaching Maturity with Continuous Quality Process

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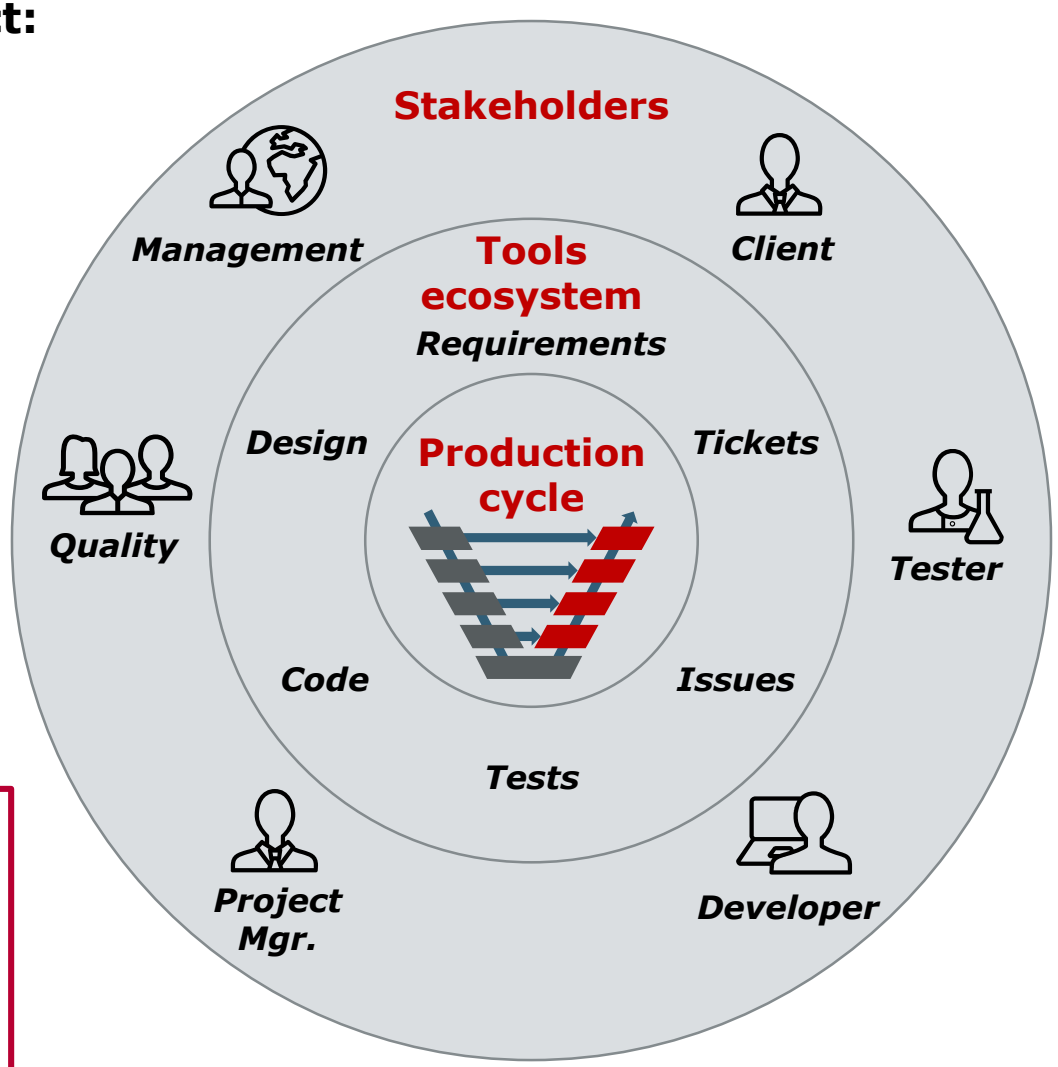
Agenda

- **Context:** Quality layers
- **Concept:** Continuous Quality
- **Proposition:**
  - Quality Indicators and Evaluation
  - Quality Gates
  - Quality in Continuous Integration

Handling multiple Quality layers

Quality in an industrial systems / software project:

- Is expected by **several Stakeholders** with specific needs
- Depends on **multiple tools** with varying versions, data models and formats
- Uses large data sets during the **production cycle** continuously generated



Reaching quality is complex and data-intensive

Handling quality layers must be:

- **Efficient**
- **Cost-effective**

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Continuous Quality

"Quality is not an act, it is a habit."

(inspired by Aristotle)

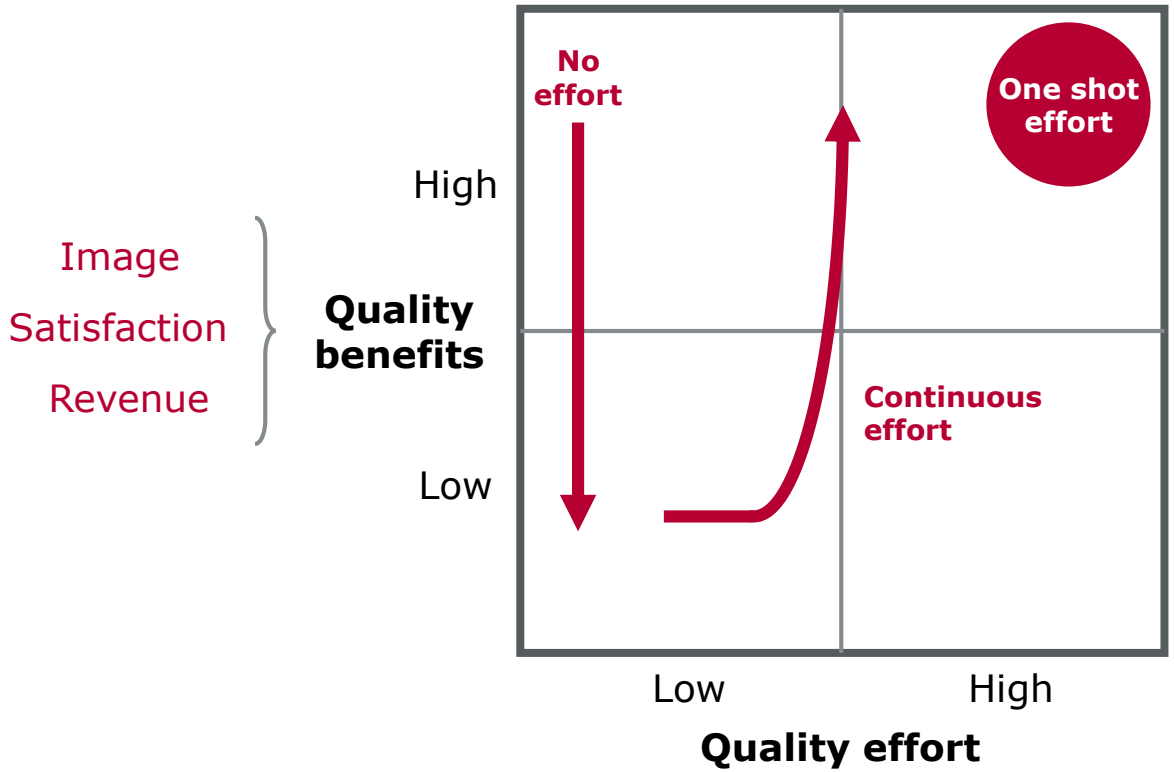
Quality must continuously be evaluated and monitored

To meet Quality objectives	To comply with Standards		To improve Maturity
Agree on quality evaluation	CMMI	ASPICE	At Product level
Break down quality into scopes	ISO 9001	ISO 25010	At Project level
Monitor quality drifting	Corporate	DO-178	At Process level

Why and how to address quality?

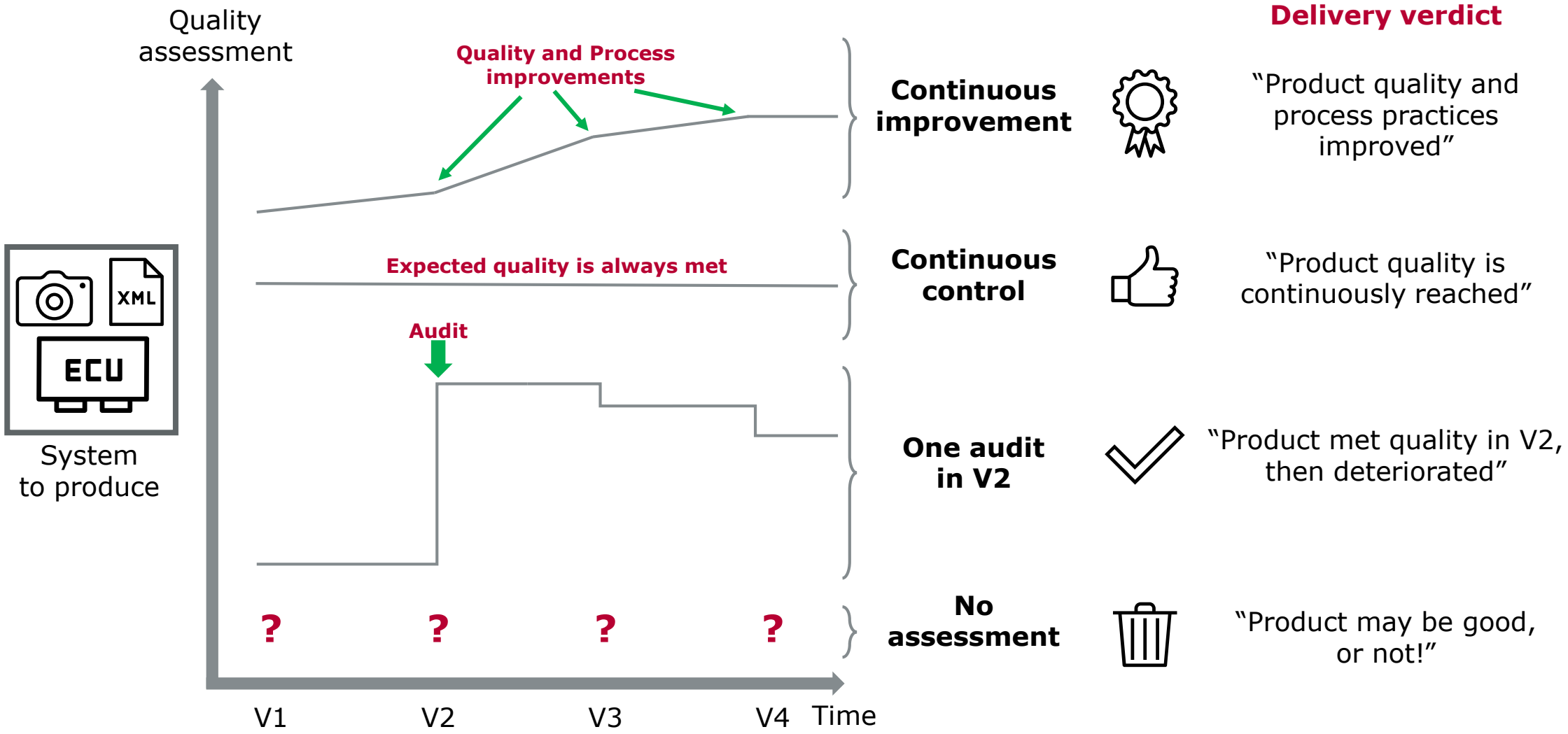
- **Quality benefits**
  - Corporate Image
  - Customer Satisfaction
  - Business Revenue

- **Quality effort strategies**
  - **No effort**
    - High risk of quality drop
    - Negative impact on business benefits
  - **One shot effort** (audit, certification)
    - Costly
    - Temporary marketing & business boost
  - **Continuous effort**
    - Initial cost of new M&T, of stakeholders
    - Distributed among actors and processes
    - Lasting positive impacts



Continuous Quality has long lasting benefits

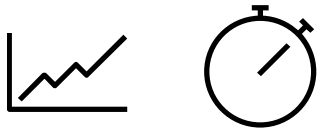
Benefits of continuous quality



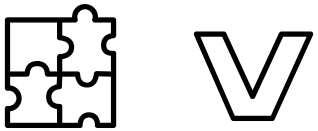
Quality Indicators

- **Achieve product quality**
  - Check Design
  - Track Requirements
  - Monitor Tests
  - Analyze Code

- **Achieve project quality**
  - Manage costs
  - Anticipate delays
  - Follow objectives and milestones



- **Achieve process quality**
  - Enforce best practices
  - Optimize methods
  - Verify tools usage



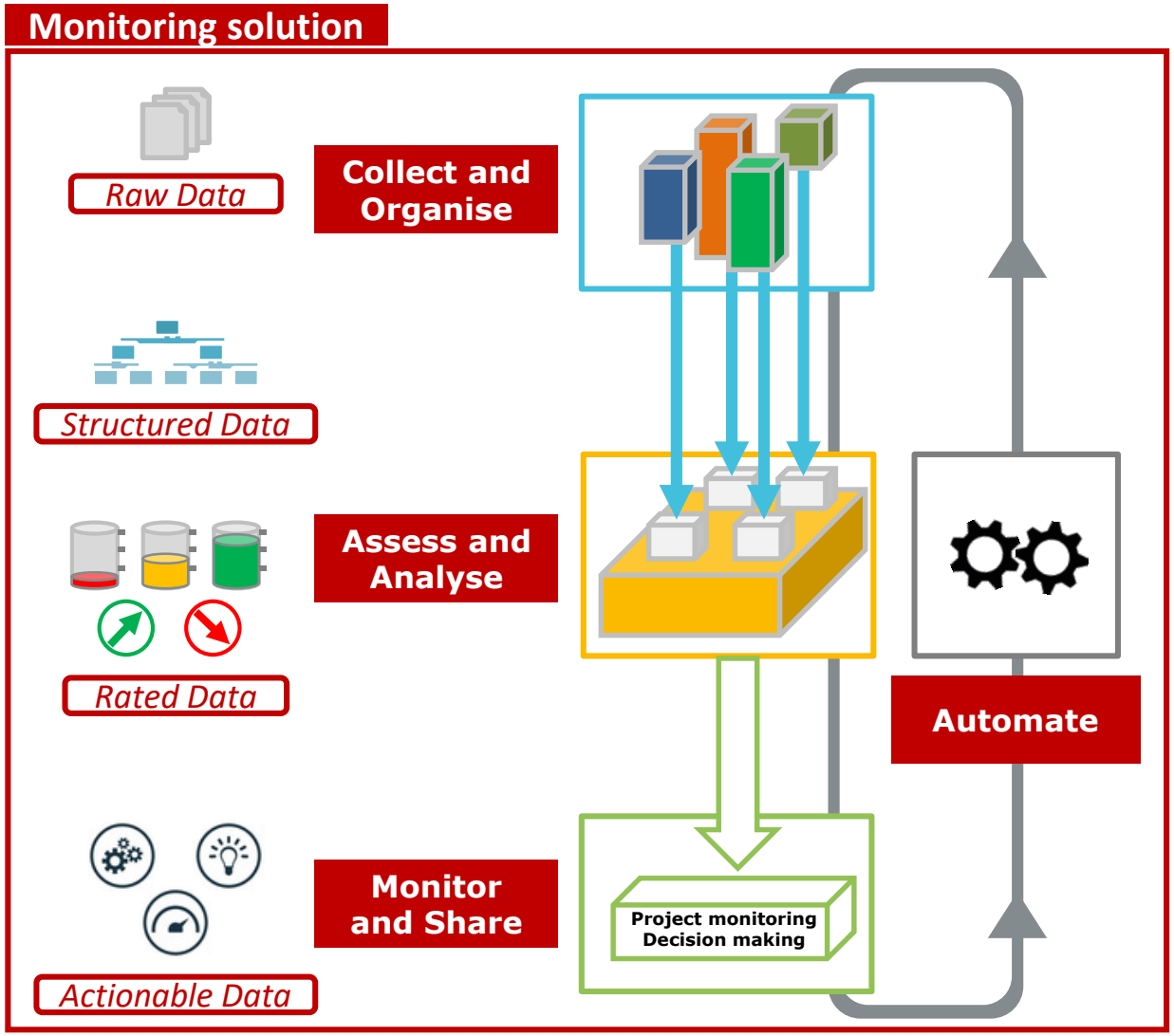
By using indicators

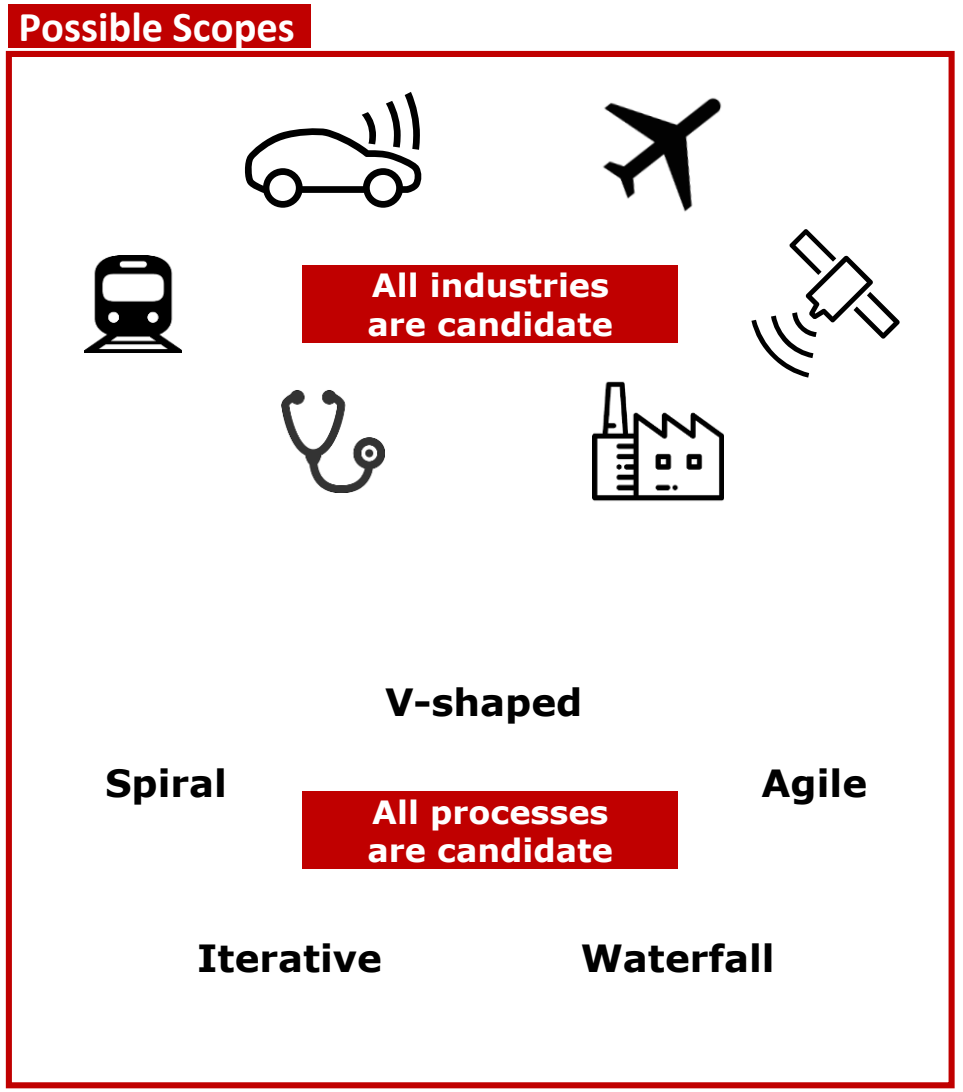
- Shared by all stakeholders
- Computed by a deterministic method
- Continuously generated by automation

Software production is a natural fit for indicators automation

Indicators are essential to quality monitoring

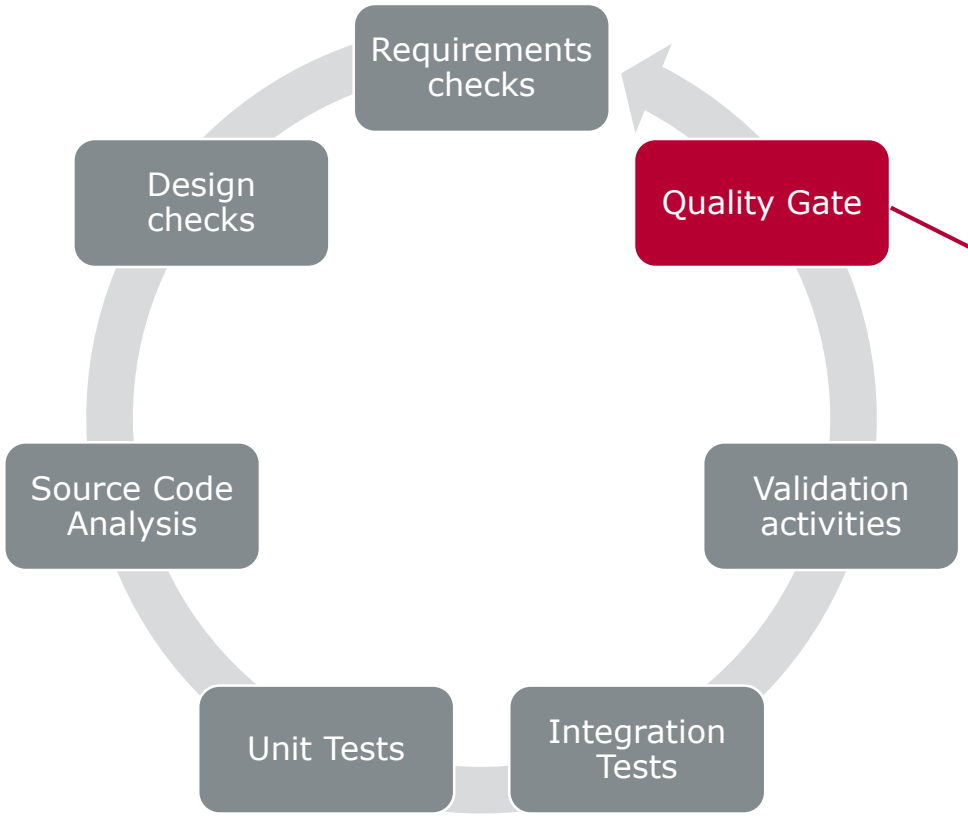
Quality Evaluation overview





Quality Gates

Classic DevOps phases

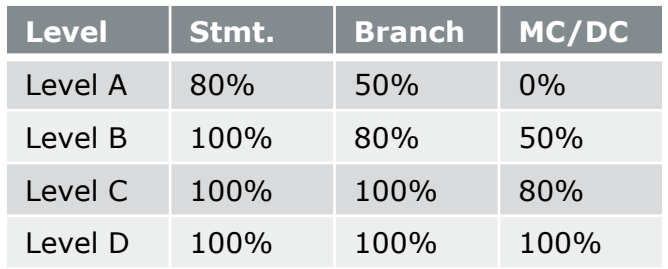


A Quality Gate is a checkpoint in the cycle

It should be:

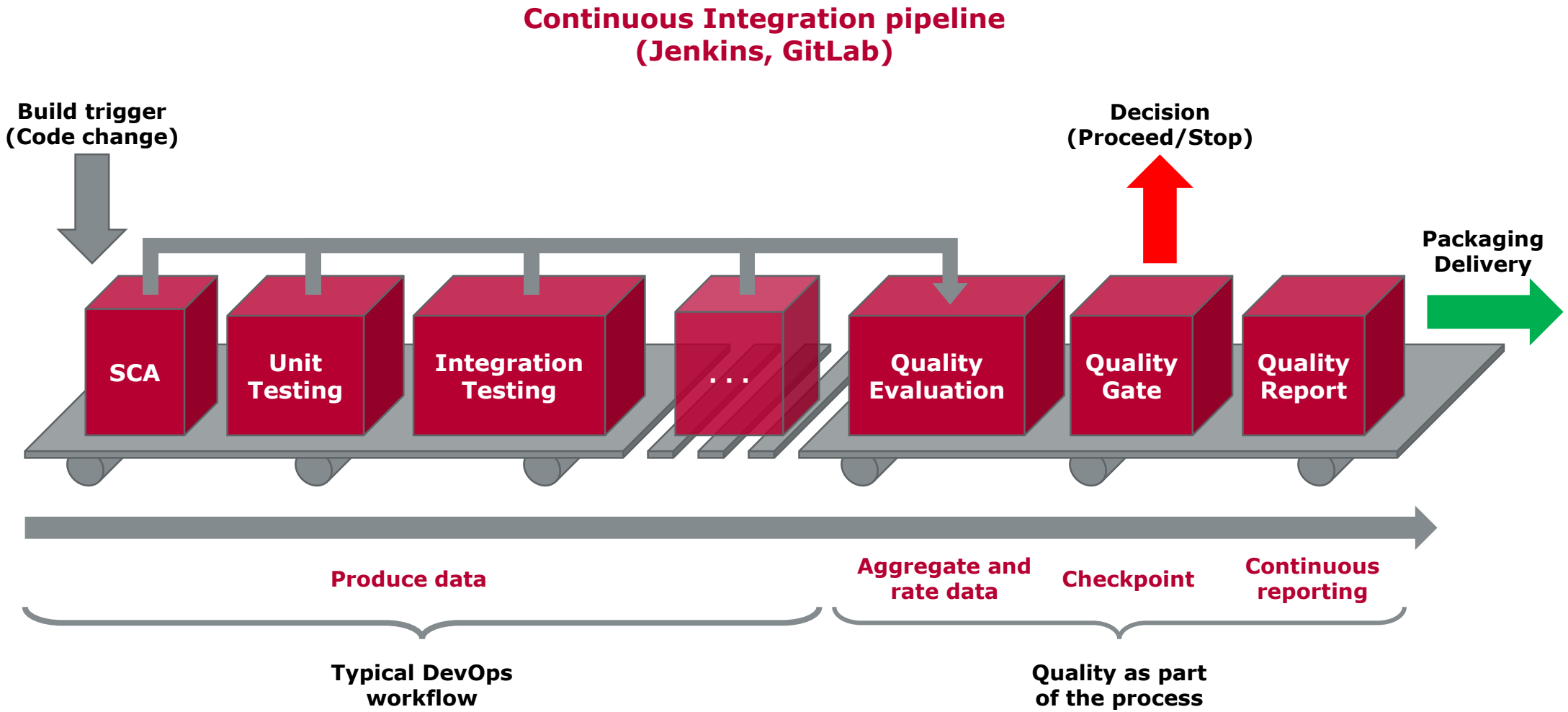
- **Flexible**
  Some projects don't need all phases
  Checkpoints vary with the project lifecycle
- **Replicable**
  Massive deployments need Quality Gate templates
- **Automated**
  Business Intelligence analytics

Quality Gates examples

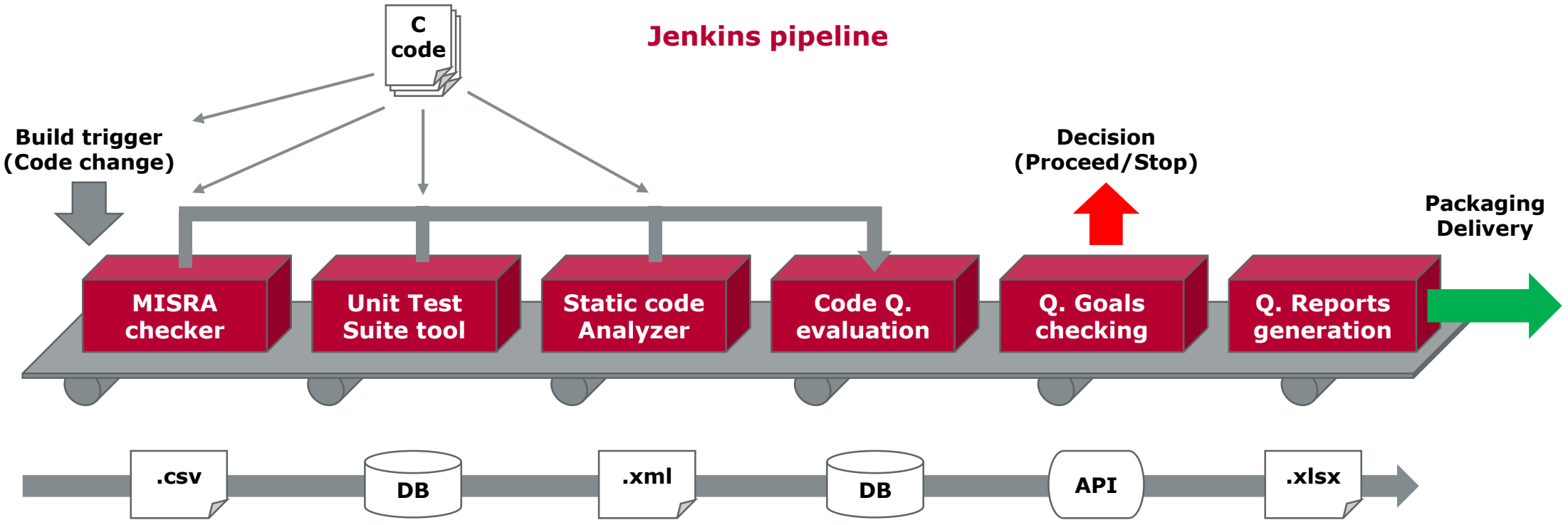
Objective	Checkpoint	Details
Check basic Coverage objective	"Global Code Coverage must be >50%"	Coverage is aggregated at project level
Encourage good practices	"Don't accept any violations on new source code"	Based on "New Technical Debt" computation
Inspect risk-based Coverage compliance	"Expected coverage has to depend on SIL breakdown"	
Monitor development processes	"Requirement/Code/Tests stability must comply with project lifecycle"	Uses trend and traceability analysis

Level	Stmt.	Branch	MC/DC
Level A	80%	50%	0%
Level B	100%	80%	50%
Level C	100%	100%	80%
Level D	100%	100%	100%

Quality in Continuous Integration



Quality in Continuous Integration example



Checks + **Tests** + **Analysis** = **Rating** + **Alerts** + **Reports**

Continuous Quality with Squore

Project versions

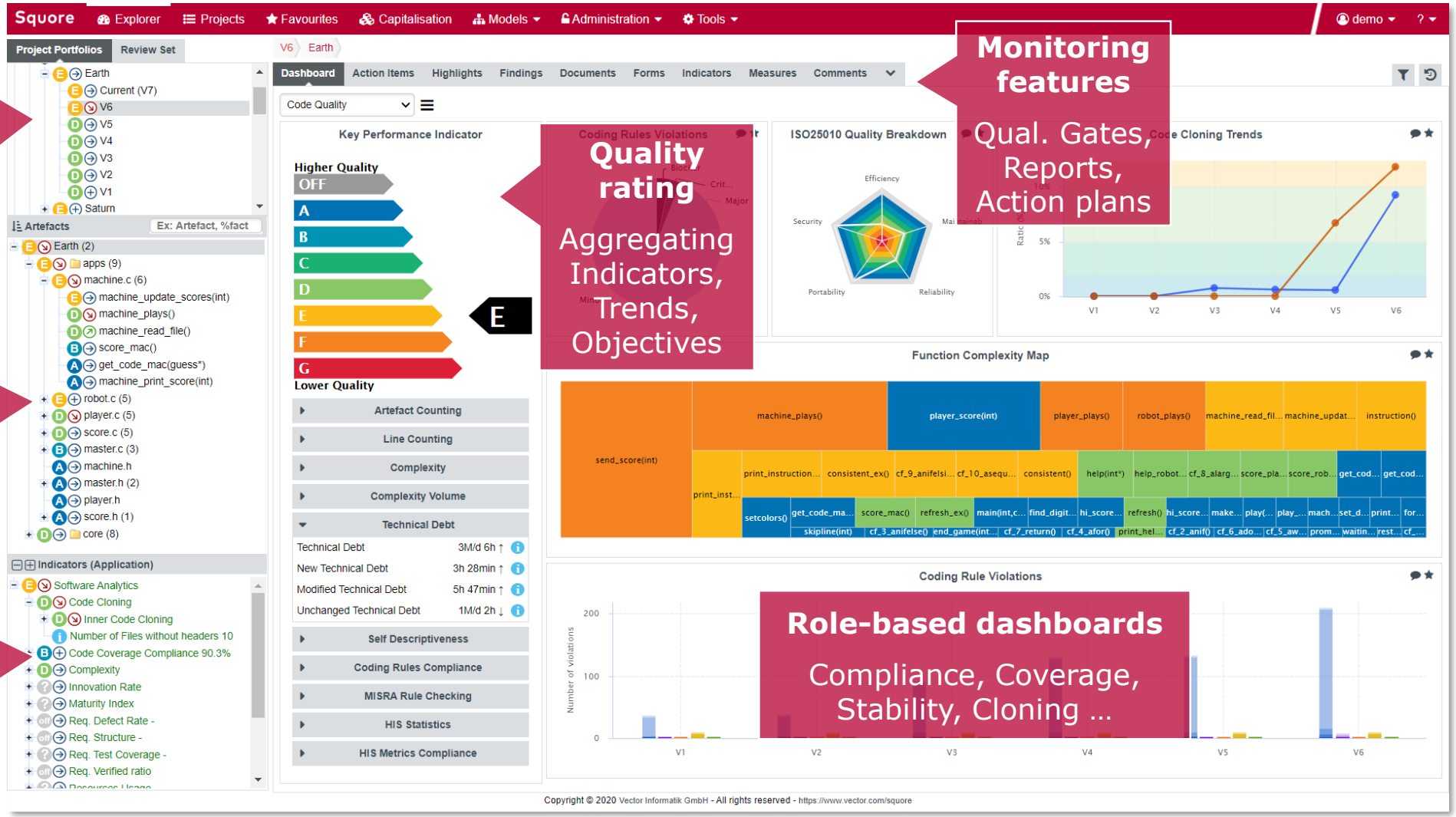
Created by Continuous Integration

Project breakdown

Fed by tools ecosystem

Quality indicators

Grouped by categories

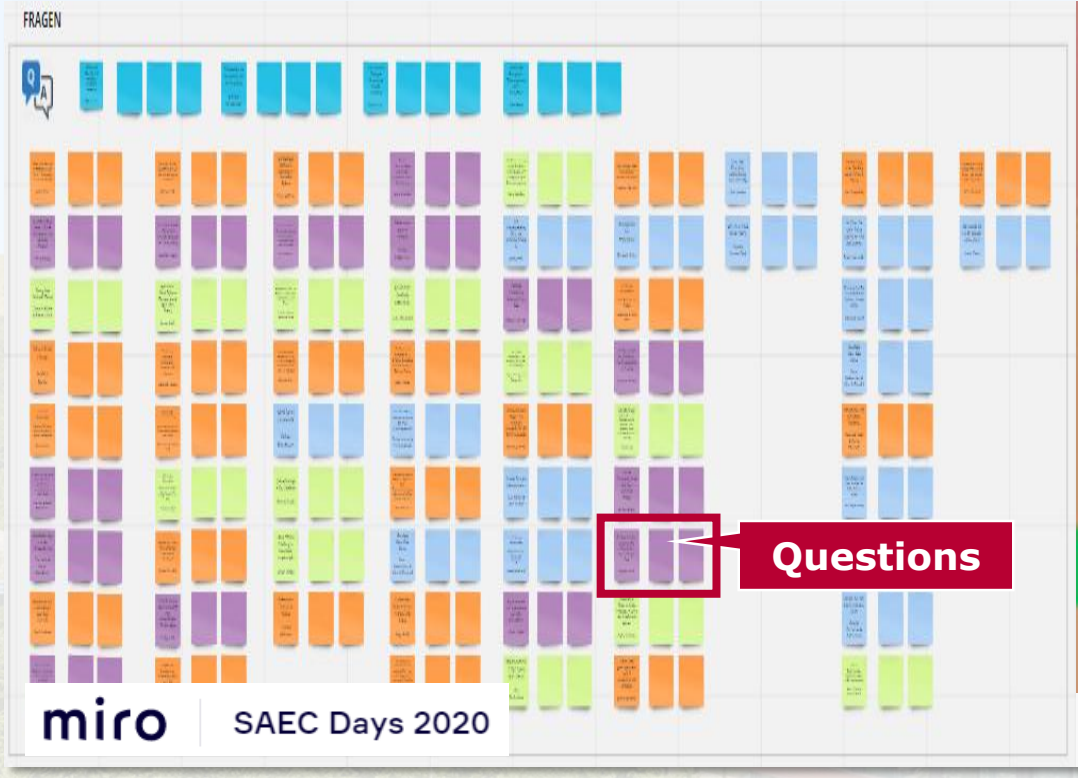


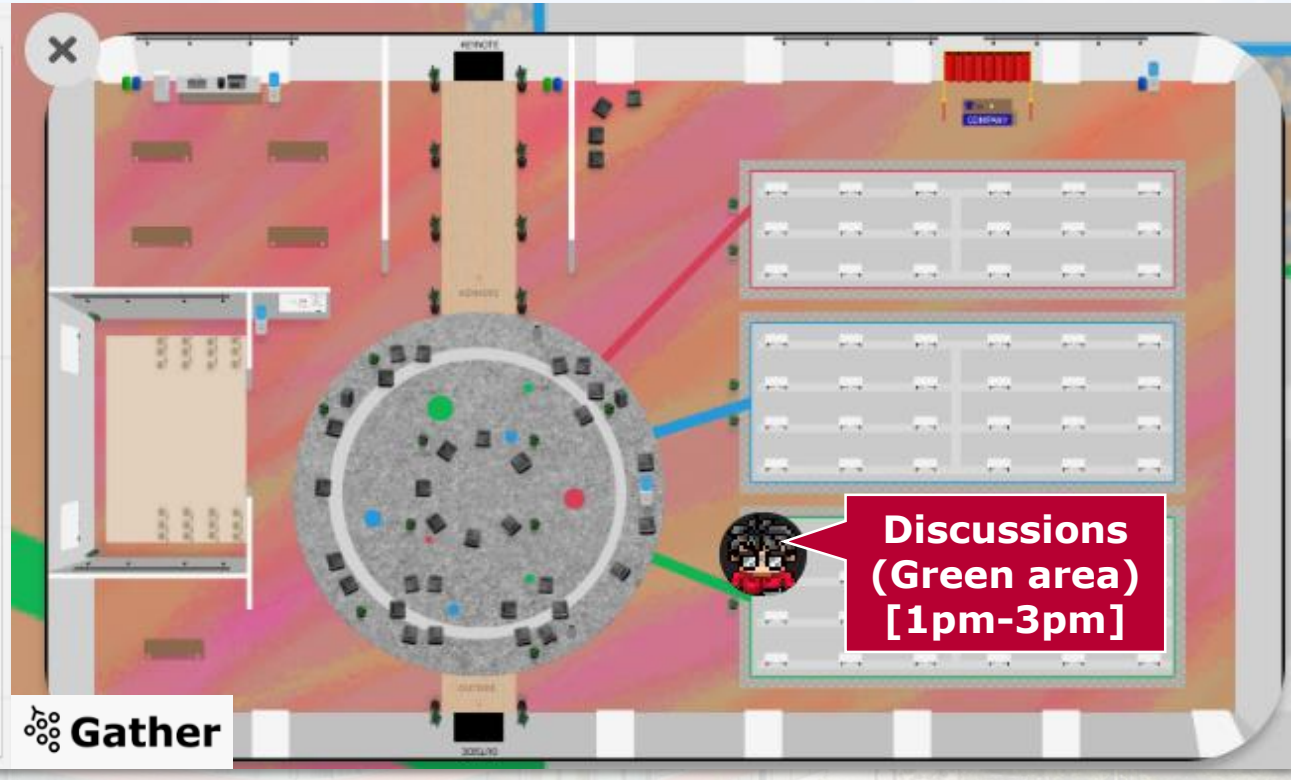
Conclusion

Continuous Quality Benefits

- **Daily benefits**
  - Distributed work
  - Shared responsibility
  - Continuously monitored quality
- **Long term benefits**
  - Smoothed initial cost
  - In-process quality
  - Improved maturity

Thank you for your attention. Questions are welcome!





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