Supporting Decision-Makers in Managing Quality in Rapid Software Development
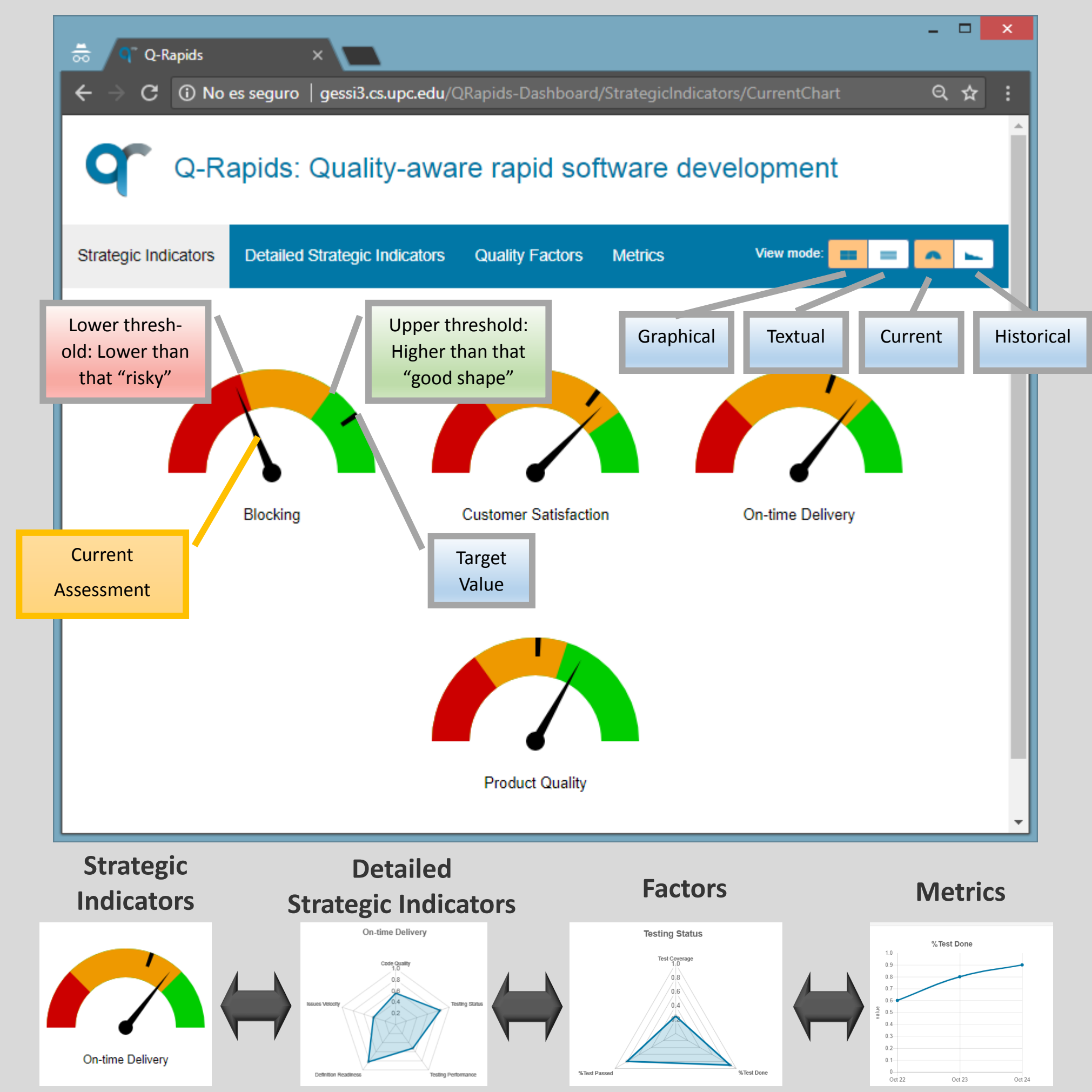
Q-Rapids

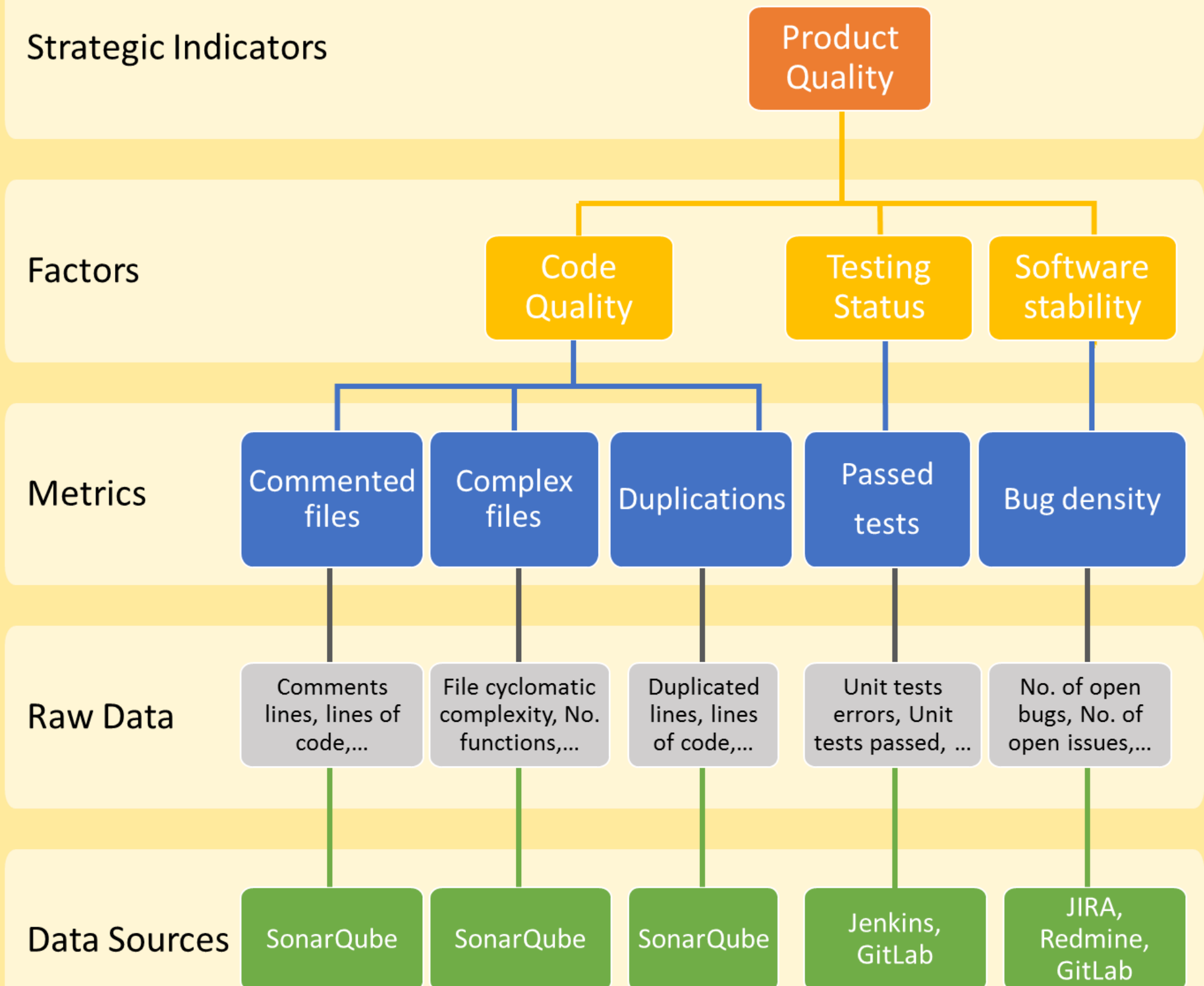## Q-Rapids Framework

Decision maker → Product Backlog → Development process → Software system → End-user

Decision rules Constraints → Strategic dashboard

Requirements assessment

Repositories (software, project)

Runtime data (usage, QoS)

Mined data
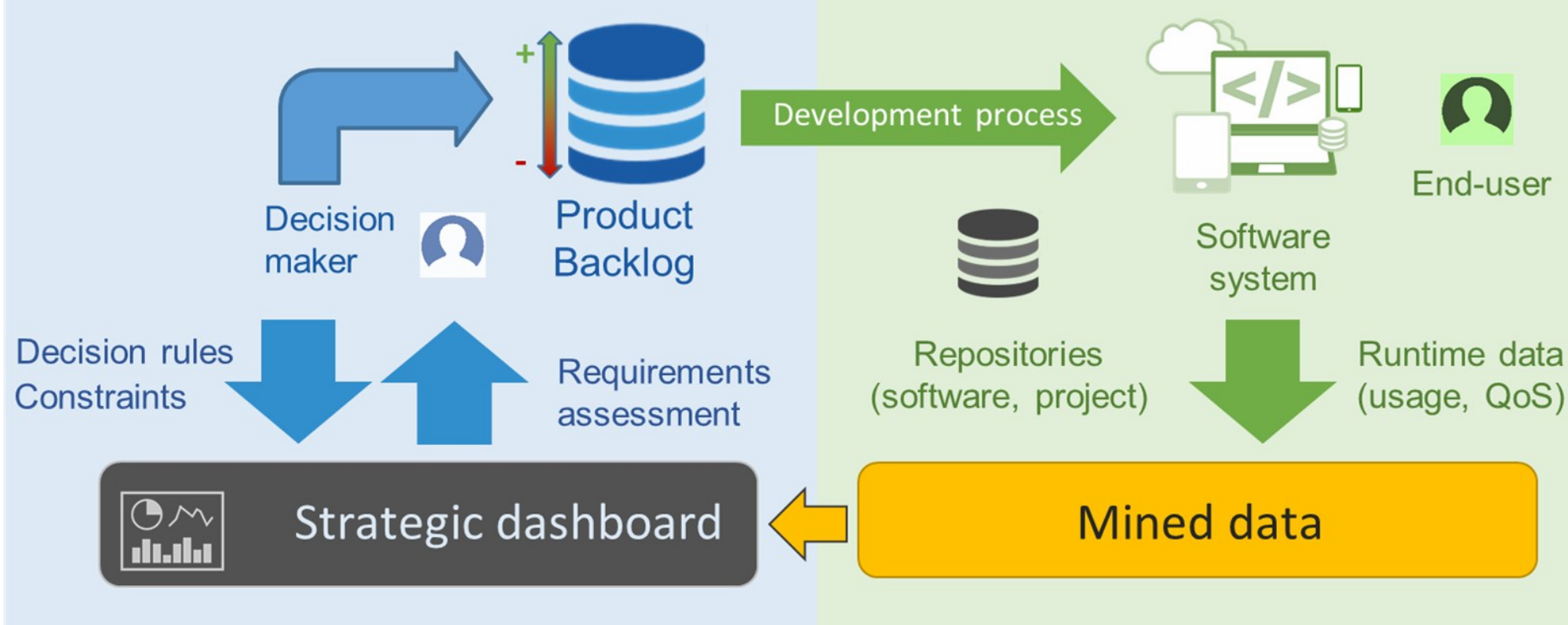
Heterogeneous Data Sources

- ◆ **Project Management Tools**
- ◆ **Software Repositories**
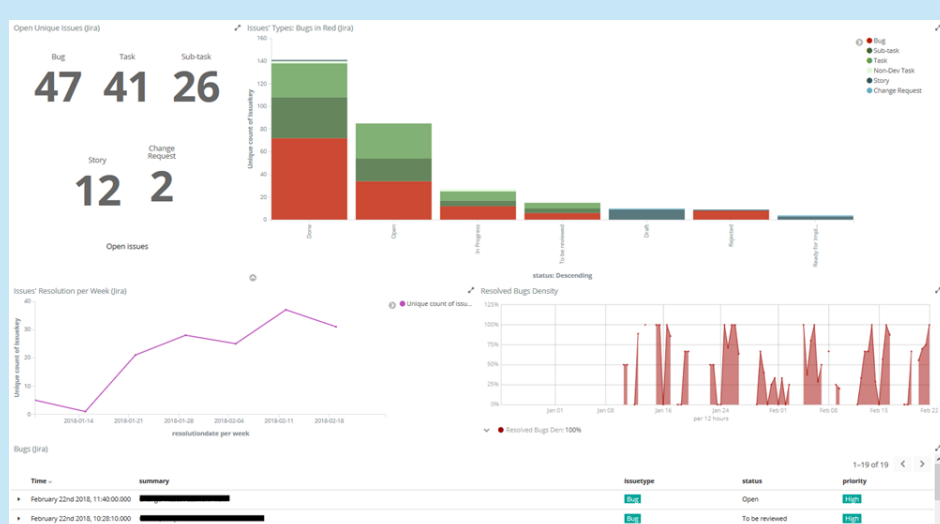- ◆ **Quality of Service**
- ◆ **Systems Usage**

Strategic Dashboard

Q-Rapids: Quality-aware rapid software development

Strategic Indicators | Detailed Strategic Indicators | Quality Factors | Metrics | View mode: Graphical Textual Current Historical

Lower threshold: Lower than that "risky"

Upper threshold: Higher than that "good shape"

Current Assessment

Target Value

Blocking

Customer Satisfaction

On-time Delivery

Product Quality

Strategic Indicators ⟷ Detailed Strategic Indicators ⟷ Factors ⟷ Metrics

On-time Delivery

Data Analysis—Quality Model

Strategic Indicators			Product Quality		
Factors		Code Quality	Testing Status	Software stability	
Metrics	Commented files	Complex files	Duplications	Passed tests	Bug density
Raw Data	Comments lines, lines of code,…	File cyclomatic complexity, No. functions,…	Duplicated lines, lines of code,…	Unit tests errors, Unit tests passed, …	No. of open bugs, No. of open issues,…
Data Sources	SonarQube	SonarQube	SonarQube	Jenkins, GitLab	JIRA, Redmine, GitLab

Improvements for Next Version

Raw Data Visualization

47 41 26
12 2

Prediction

85% 95% Prediction

What-if Analysis

Simulate Strategic Indicator values

Code Quality
Blocking Code
Quality issue Specification
Measures critical issues
Testing Status

Current Value | Simulated data

Product Quality Neutral (0.60) | Product Quality Neutral (0.63)

Blocking Good (0.82) | Blocking Bad (0.17)

Apply
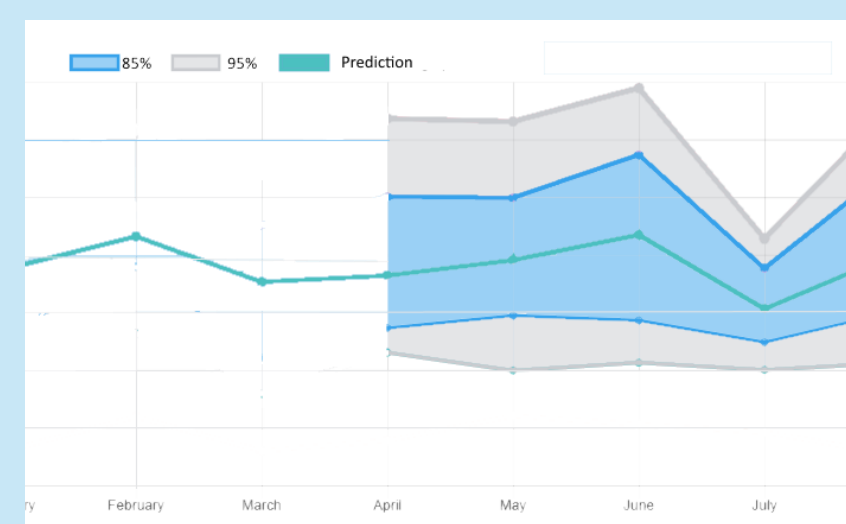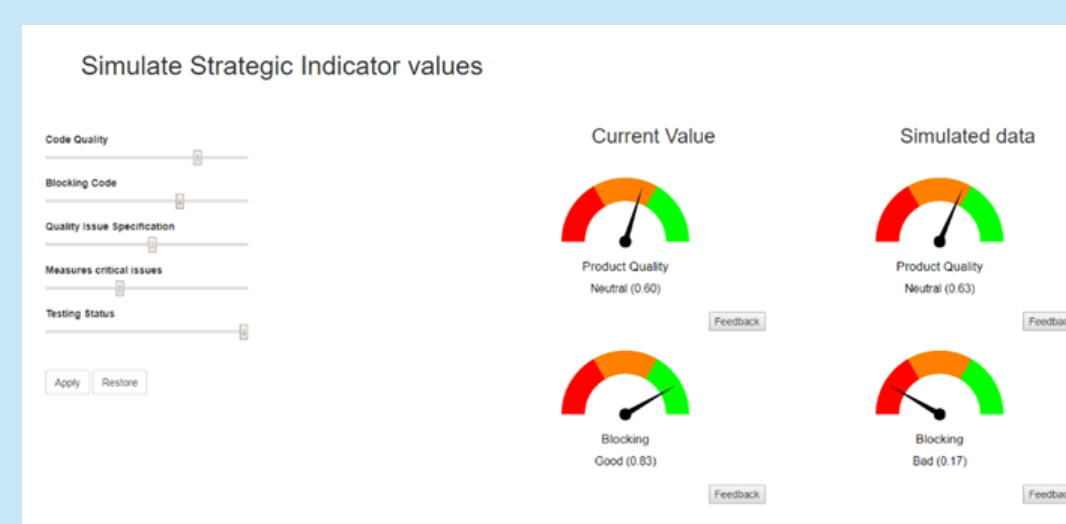
Quality Requirements Generation

% passed tests

Pattern goal Description	Improve the robustness of the system, reduce the number of bugs. This pattern expresses the need of having a system with a high percentage of unit tests successfully executed
Requirement form	The percentage of successful unit test should be at least ___ %
Cost function	Relative cost

% passed tests
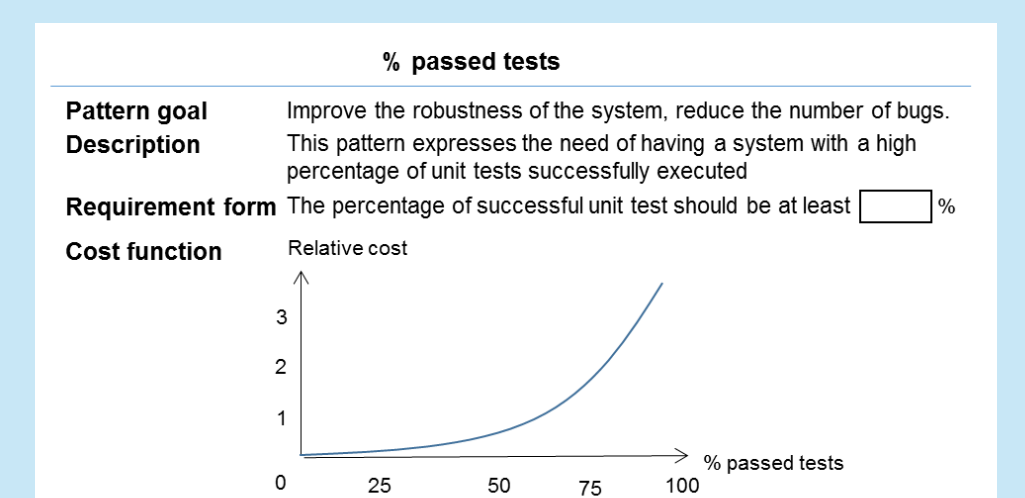
UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH
UPC

Fraunhofer IESE

iTTi

Lidia López
Cristina Gómez
Rafal Kozik
Anna Maria Vollmer

Silverio Martínez-Fernández
Michał Choraś
Liliana Guzmán
Xavier Franch

Andreas Jedlitschka

www.q-rapids.eu

Liliana Guzmán, Marc Oriol, Pilar Rodríguez, Xavier Franch, Andreas Jedlitschka, Markku Oivo, How Can Quality Awareness Support Rapid Software Development?–A Research Preview. In *Proceedings of the 23rd Conference Requirements Engineering: Foundation for Software Quality* (REFSQ), 2017, pp. 167-173.

Franch, X., Gómez, C., Jedlitschka, A., López, L., Martínez-Fernández, S., Oriol, M., Partanen, L., Data-Driven Elicitation, Assessment and Documentation of Quality Requirements in Agile Software Development. In *Proceedings of the 30th International Conference on Advanced Information Systems Engineering* (CAiSE), 2018, pp.587-602.

Martínez-Fernández, S., Jedlitschka, A., Guzmán, L., Vollmer, A.M. A Quality Model for Actionable Analytics in Rapid Software Development. In *Proceedings of the 44th Euromicro Conference on Software Engineering and Advanced Applications* (SEAA), 2018.