

A Bayesian Network Approach to Assess and Predict Software Quality Using Activity-Based Quality Models

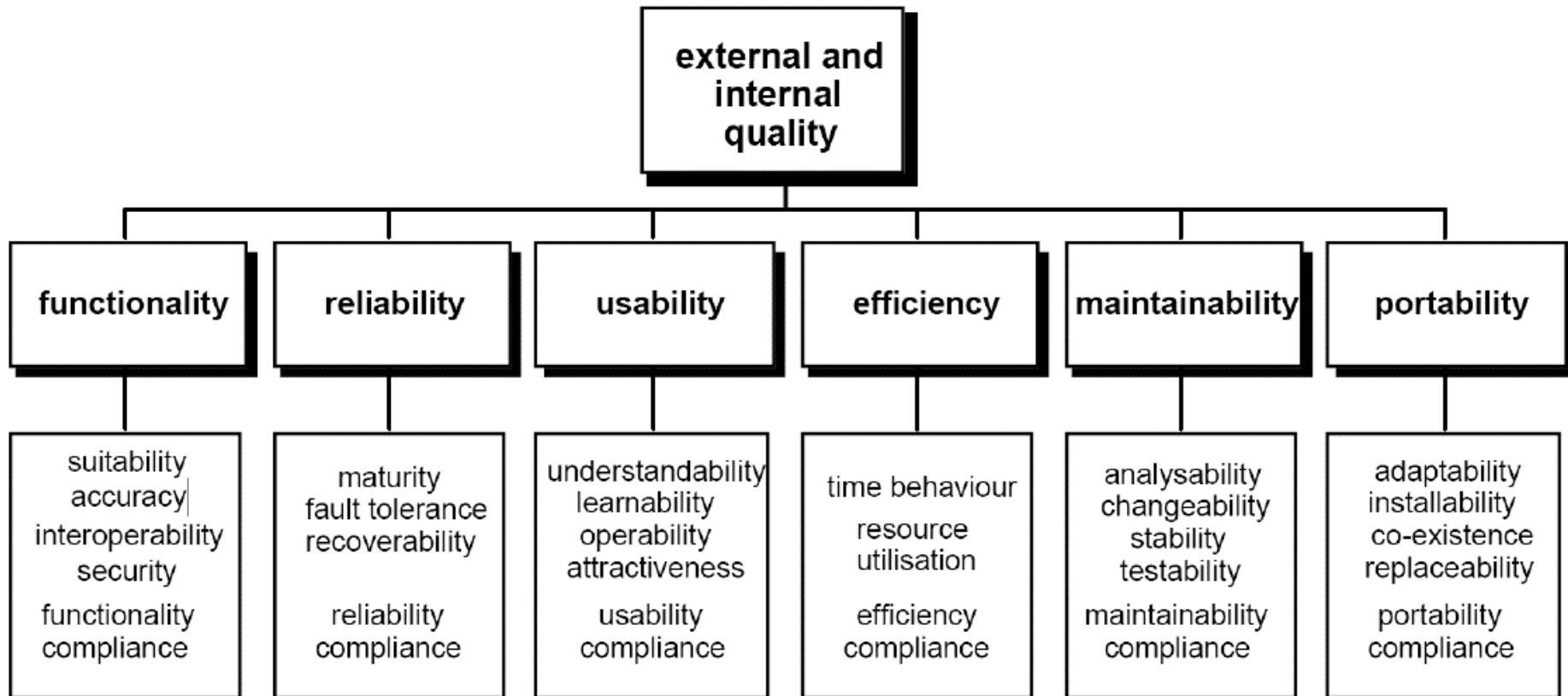
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PROMISE 2009

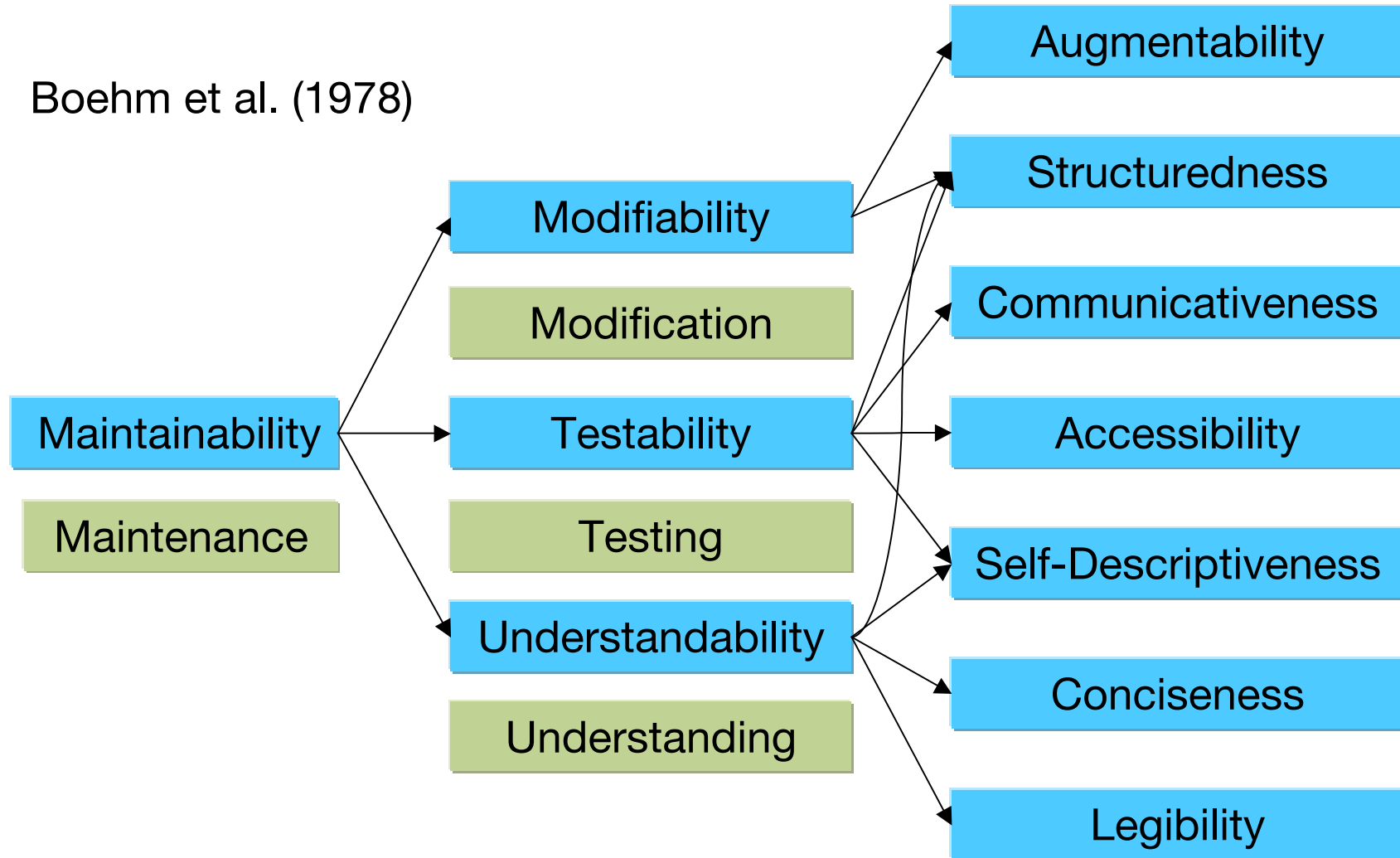
May 18, 2009

ISO 9126

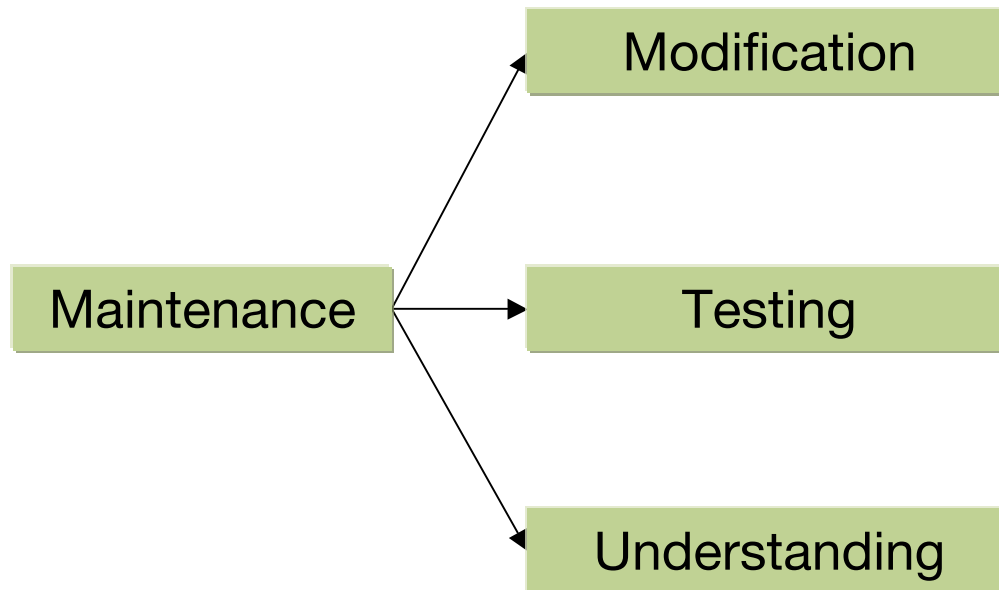


Activity-Based Quality Models (ABQM)

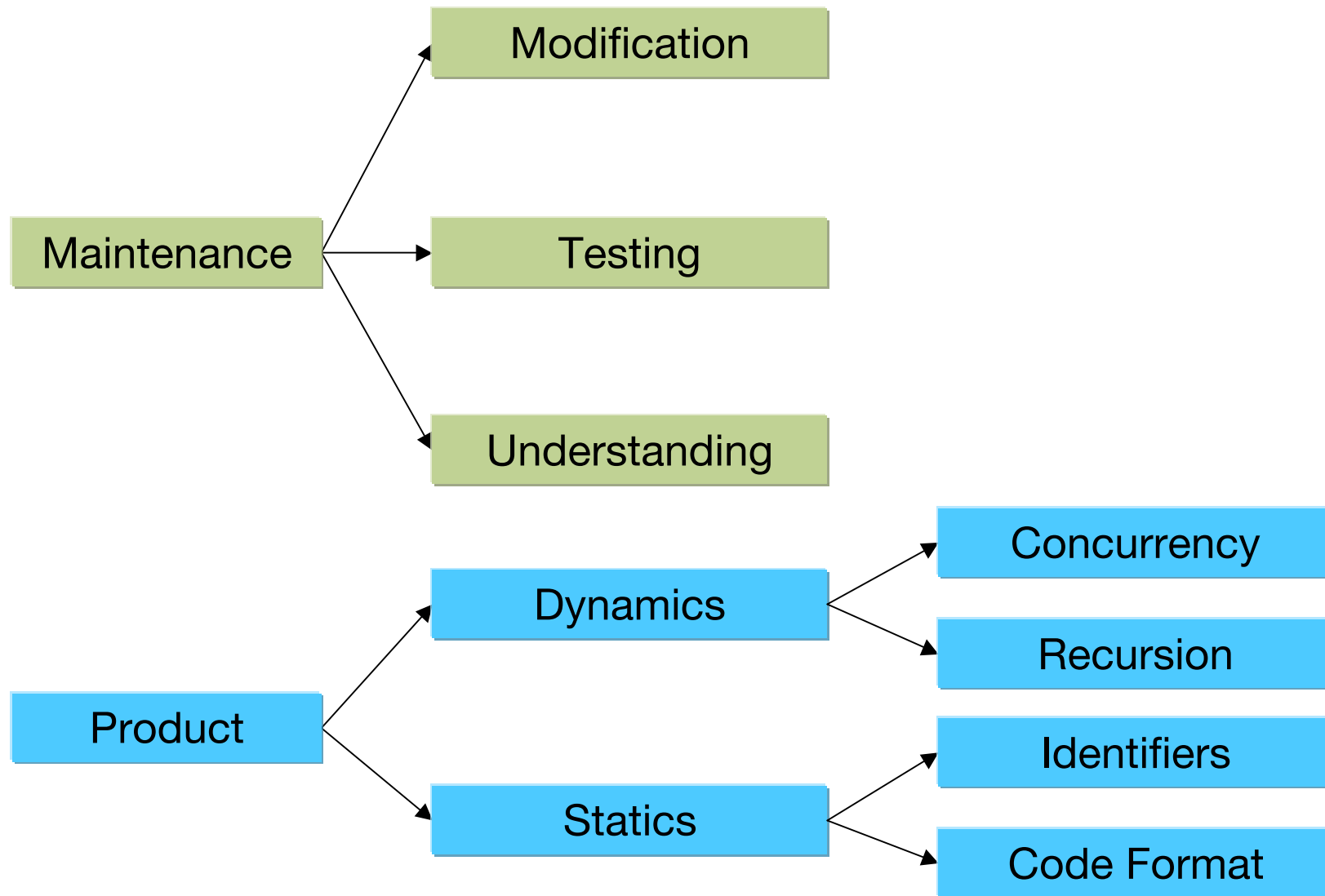
Boehm et al. (1978)



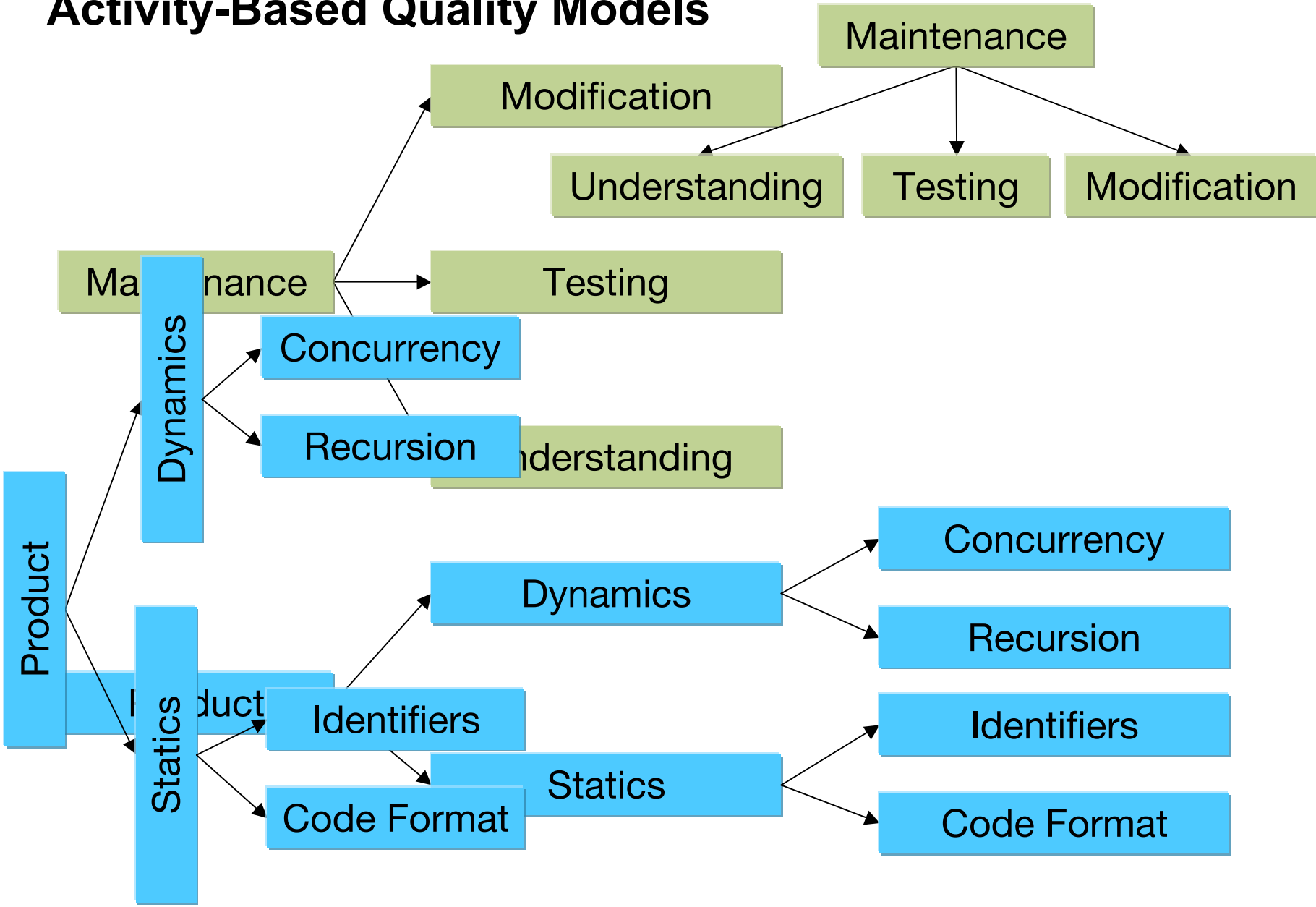
Activity-Based Quality Models (ABQM)



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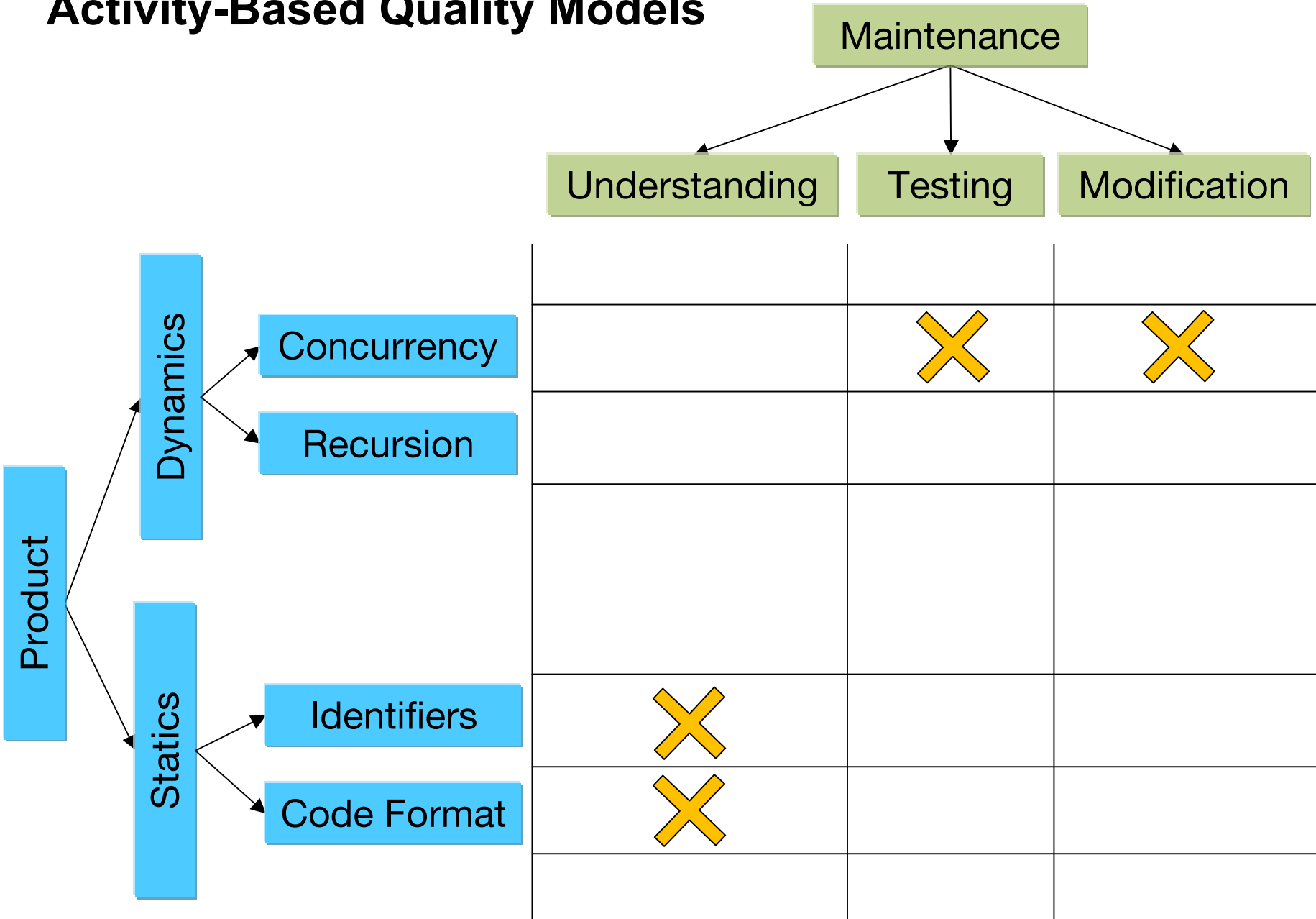


Activity-Based Quality Models



[F. Deissenboeck et al. ICSM. IEEE CS Press, 2007.]

Activity-Based Quality Models



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Current Usage of ABQMs

- Generation of guidelines and checklists
 - Derivation of static and dynamic analyses
 - Measurement of facts

 - No support for assessment and prediction
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Example: Average Maintenance Effort

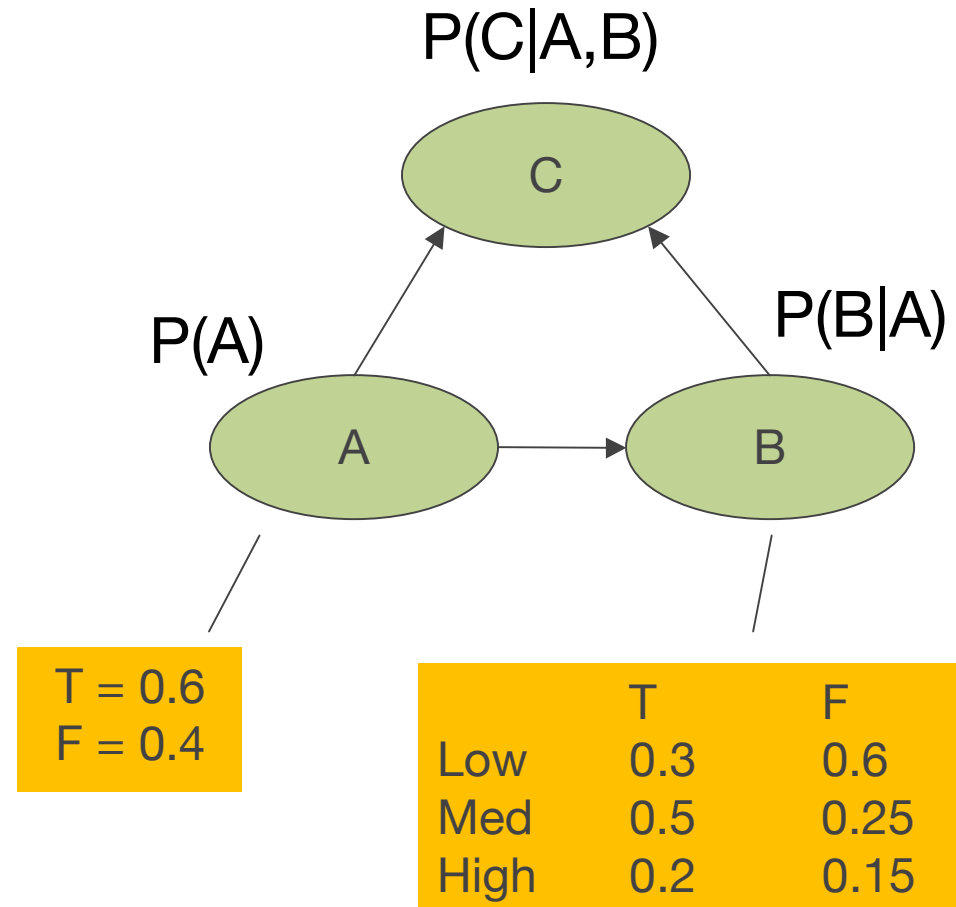
- NASA CM1 system
 - Space craft instrument
 - Developed in C

 - How will the average change effort be?

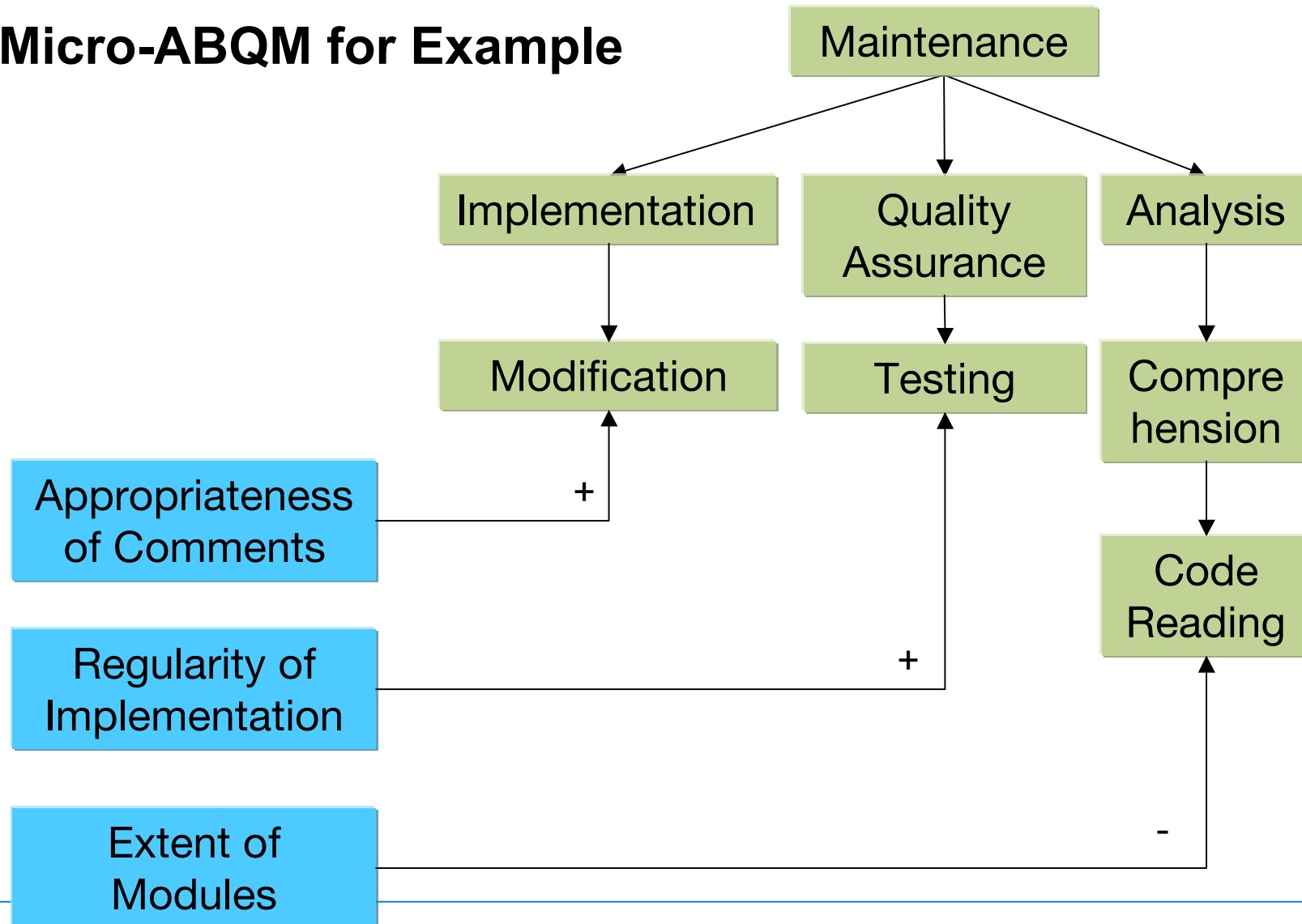
 - Usage of existing maintainability model
-

Bayesian Networks

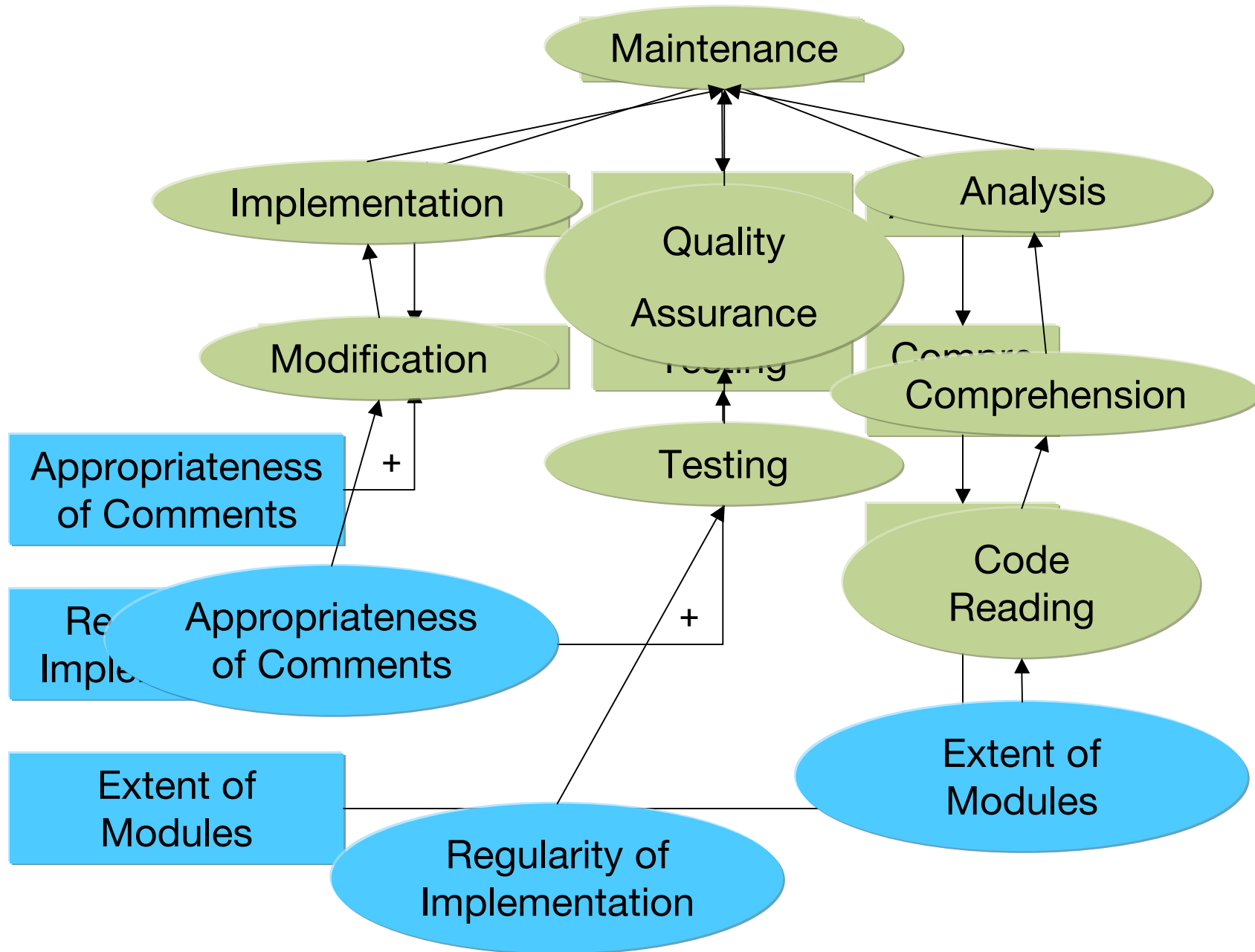
- Cause effect graphs
- Based on Bayesian inference
- Are therefore able to model uncertainty
- Node Probability Table (NPT) for each node
- $N \times M$
- N states in the node
- M product of the cause node states



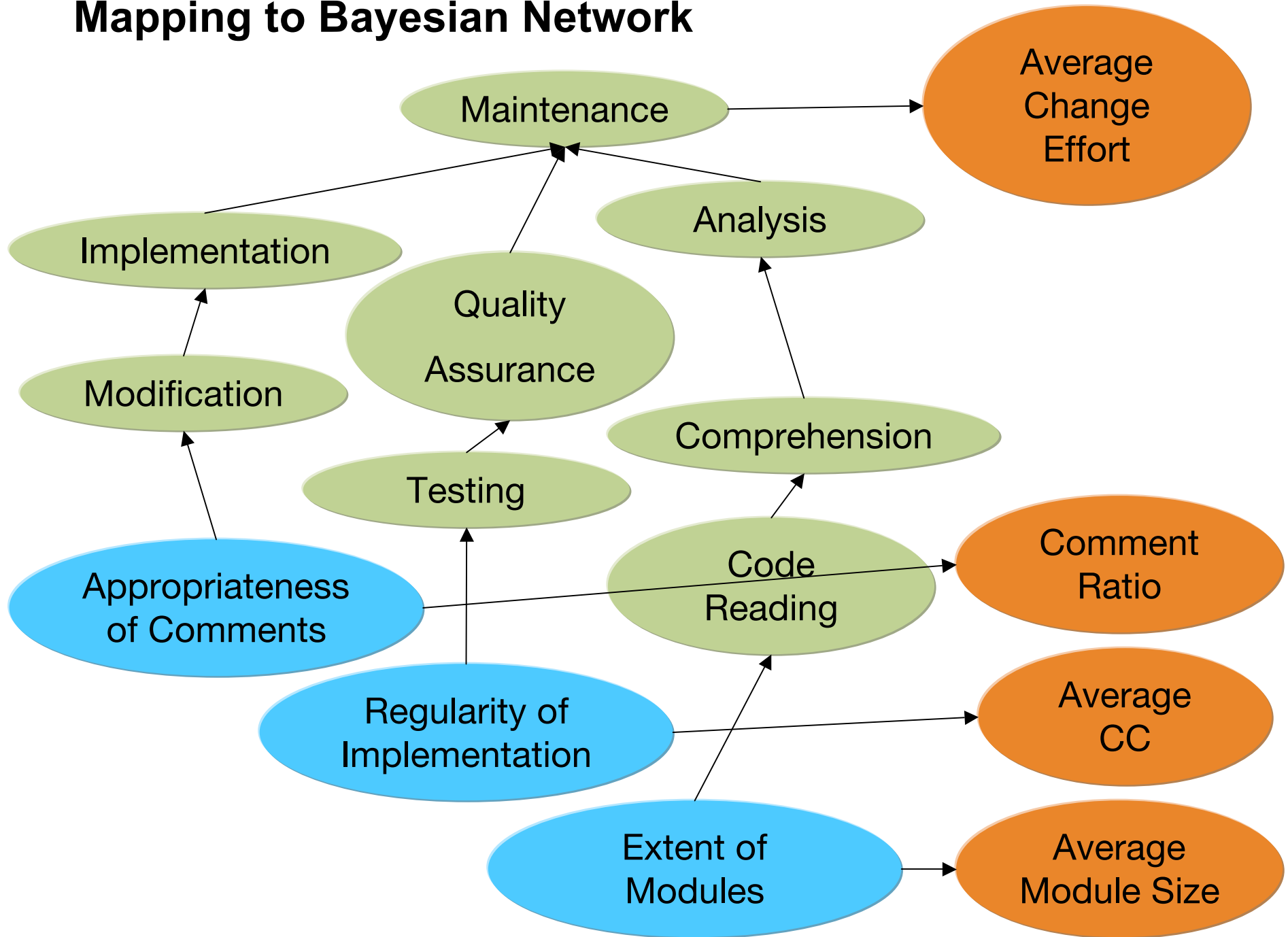
Micro-ABQM for Example



Mapping to Bayesian Network

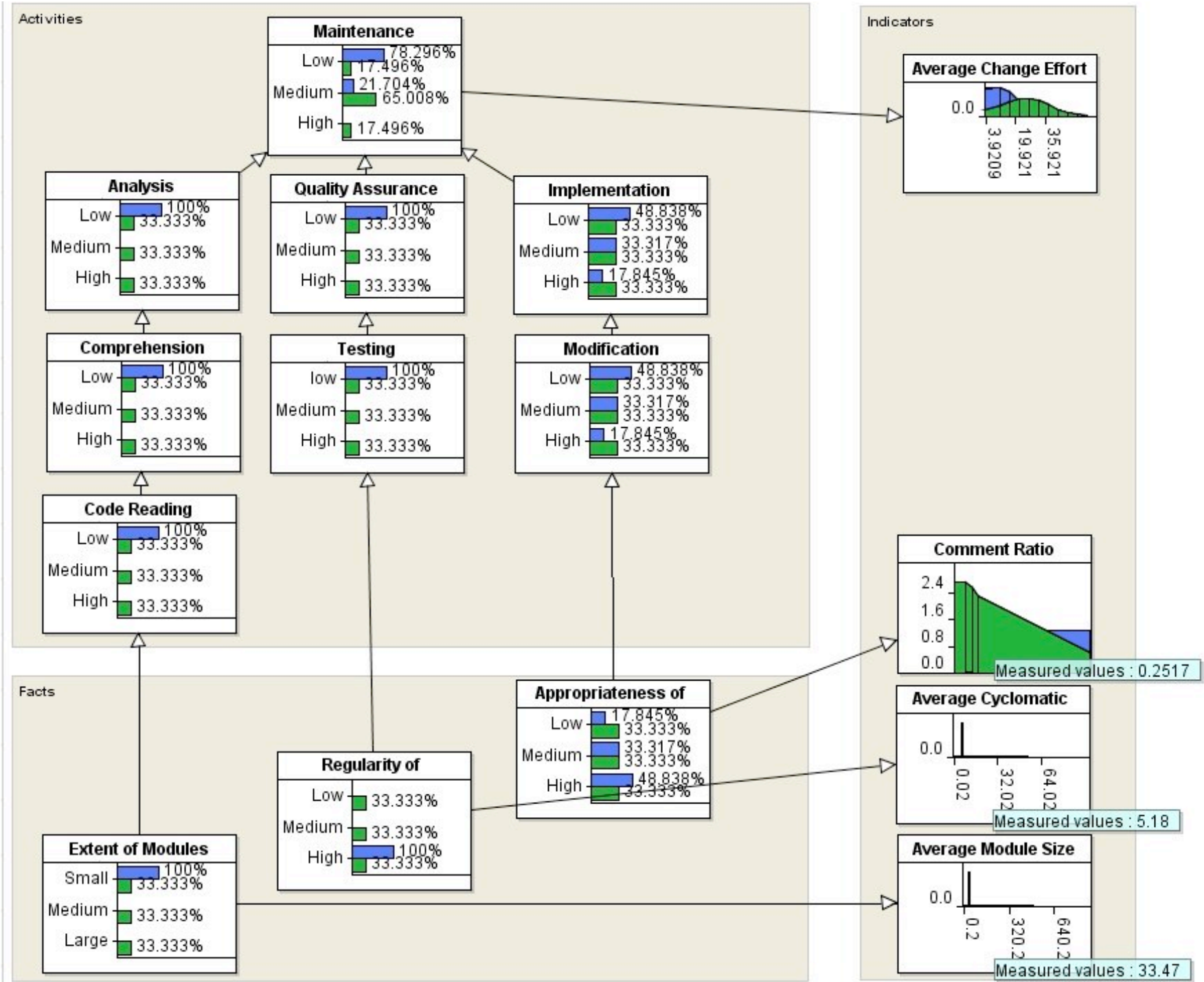


Mapping to Bayesian Network



Quantification

- Mainly ranked nodes
 - Method by Fenton, Neil and Galan Caballero
 - Empirical data for indicator nodes
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Summary

- Quality assessment with Bayesian networks based on ABQM
- Proven basis for relationships between factors
- Quantification with BN
- Only proof of concept
- Needs more experimentation

Current Work: Study on Quality Models in Practice

- Large scale study on quality model usage in practice
- Phase I (until end of May)
 - Interviews with experts from industrial partners (SAP, Siemens, Capgemini sd&m, itestra)
 - What models?
 - What quality attributes?
 - What improvements?
 - Qualitative und quantitative analysis
- Phase II (starting June)
 - Broad web questionnaire
 - World-wide distribution to experts
 - Mainly quantitative analysis
- If you're interested, mail me: wagnerst@in.tum.de



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