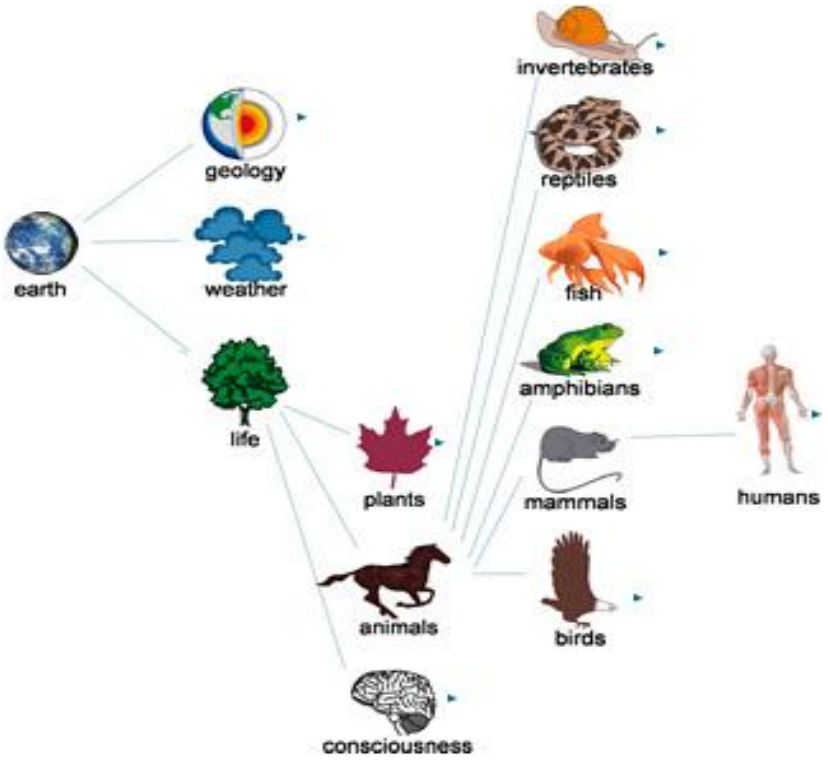
Quality Models



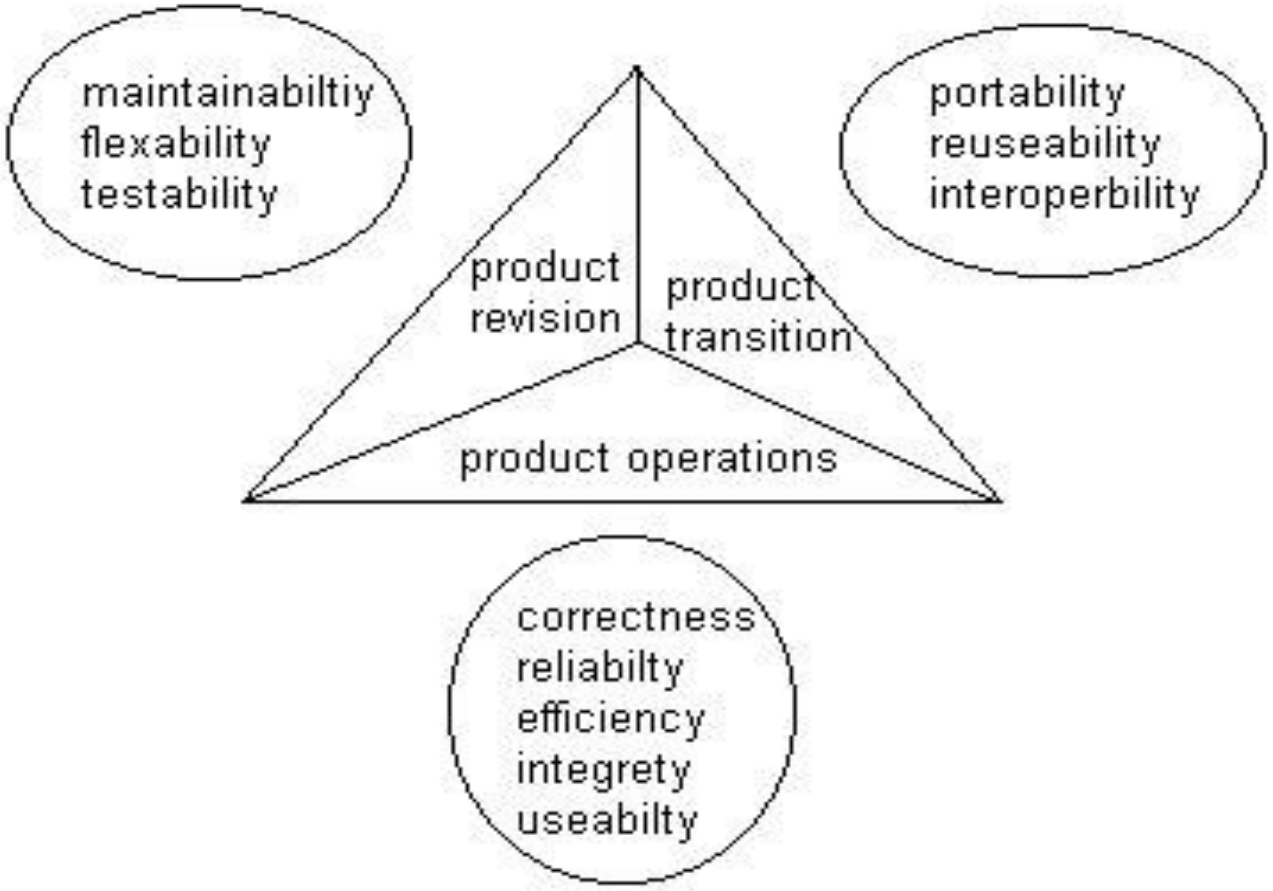
A standard taxonomy of quality attributes is called a quality model. A quality model serves as a framework for system specification and testing

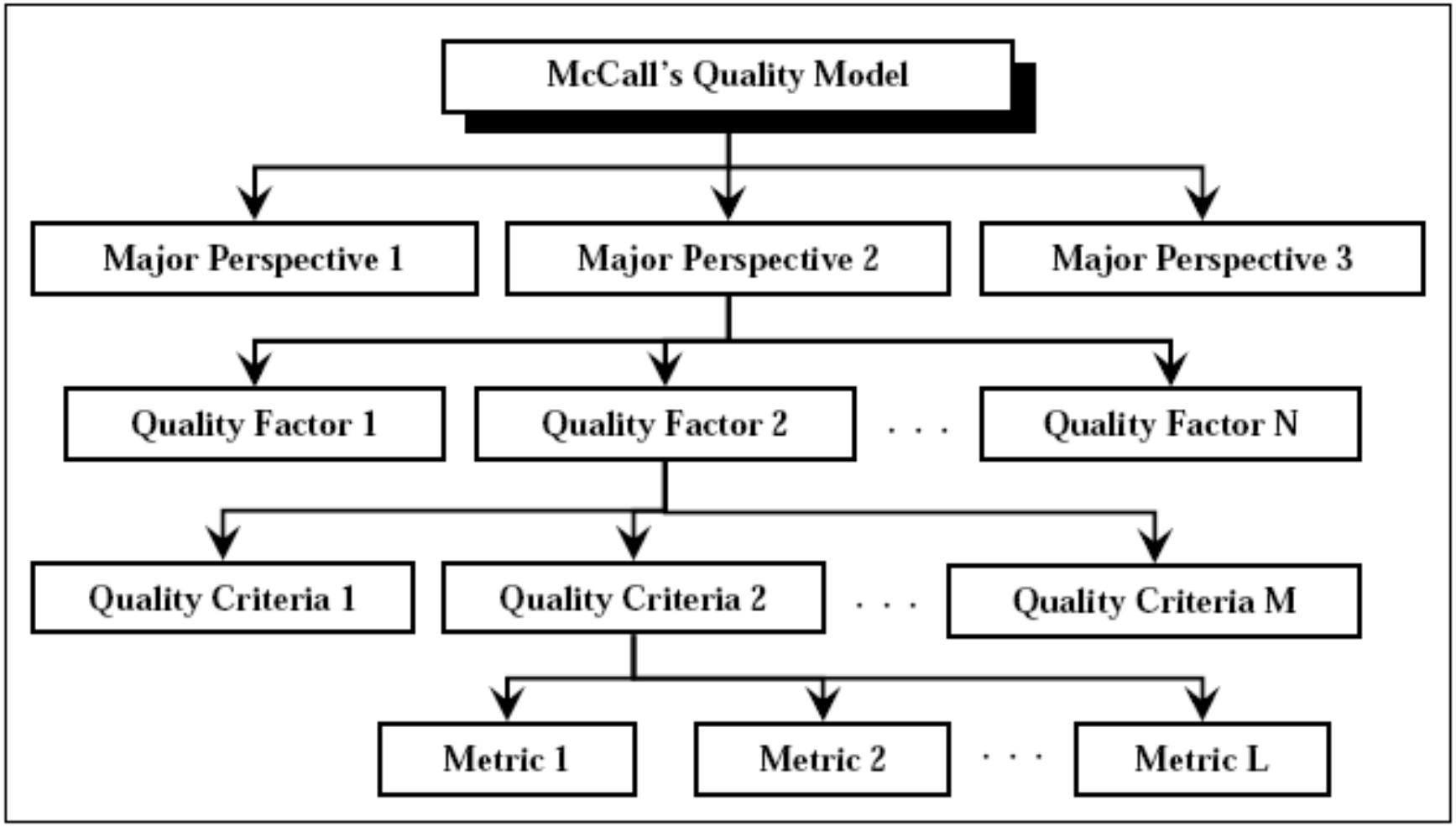
These models can be used as-is or as a starting point for creating project-specific or organization-specific software quality models.

Quality Models

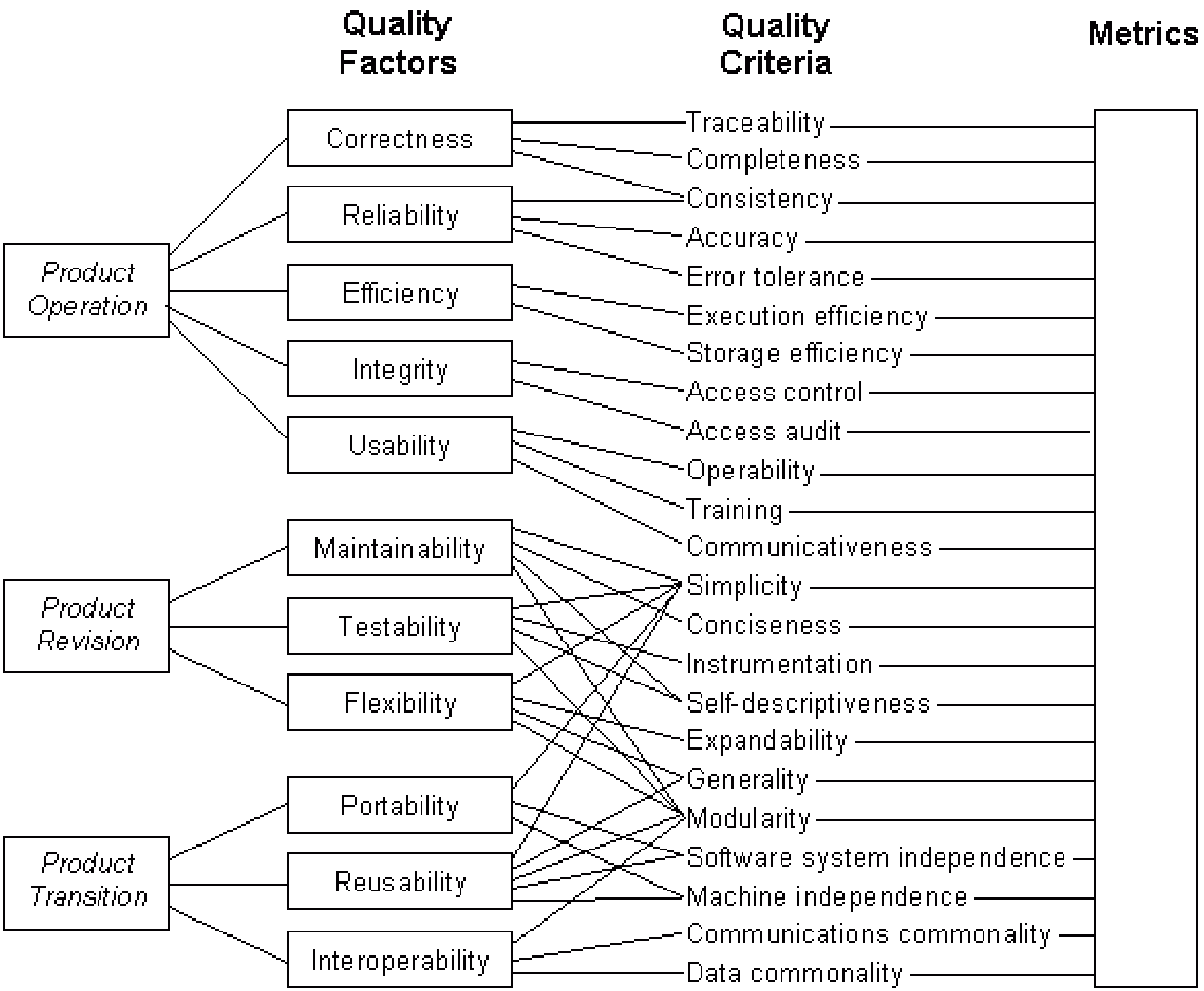
1. McCall/GE Quality Model (1976)
2. Barry Boehm quality model (1977)
3. DeGrace and Stahl
4. ISO/IEC 9126-1

McCall/GE Quality Model (1977)

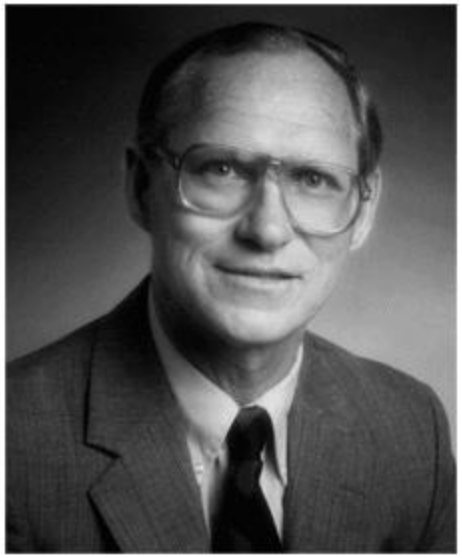




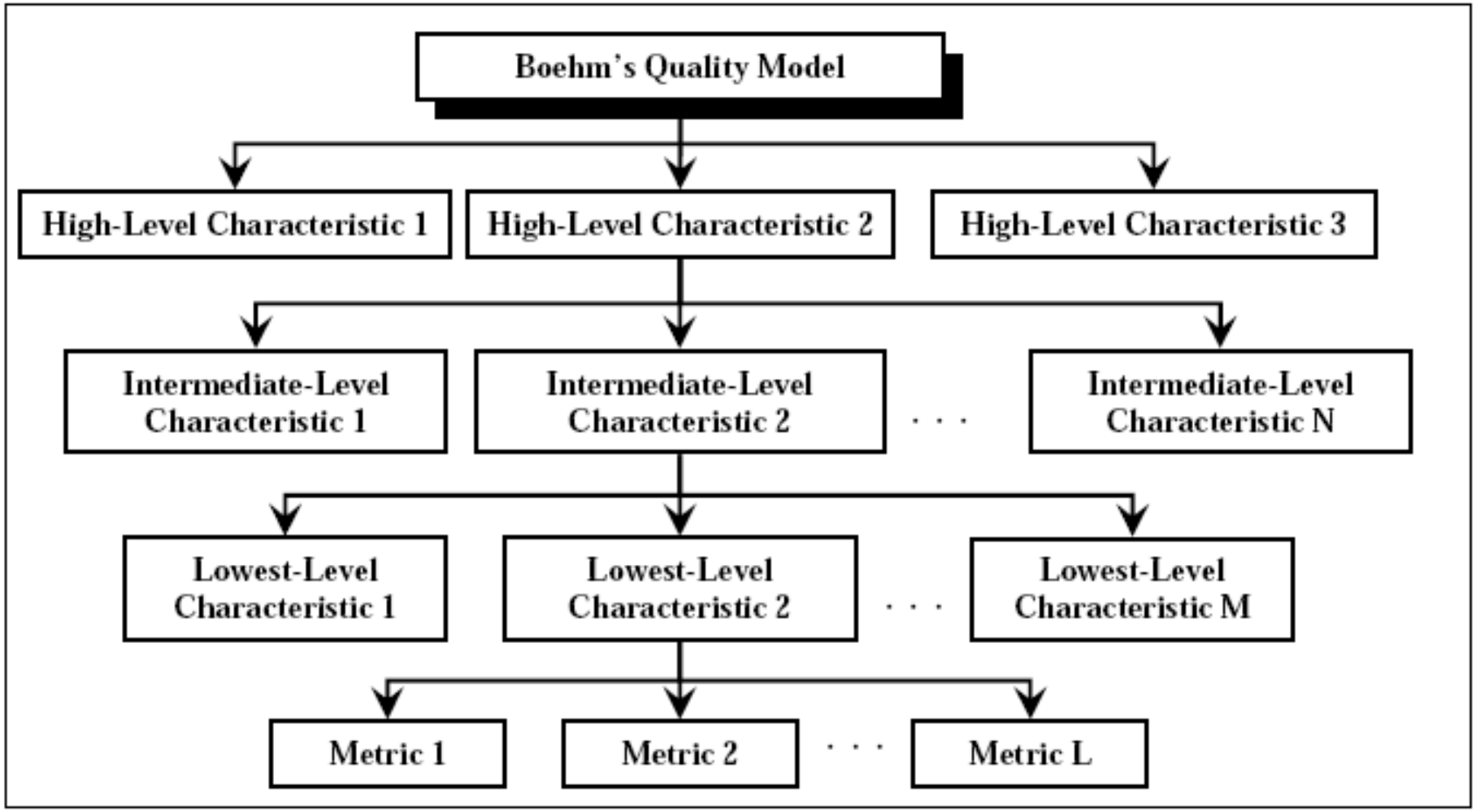
Three major perspectives and their 11 quality factors, 23 quality criteria


Quality Factors
Quality Criteria
Metrics
Product Operation
Product Revision
Product Transition
Correctness
Reliability
Efficiency
Integrity
Usability
Maintainability
Testability
Flexibility
Portability
Reusability
Interoperability
Traceability
Completeness
Consistency
Accuracy
Error tolerance
Execution efficiency
Storage efficiency
Access control
Access audit
Operability
Training
Communicativeness
Simplicity
Conciseness
Instrumentation
Self-descriptiveness
Expandability
Generality
Modularity
Software system independence
Machine independence
Communications commonality
Data commonality

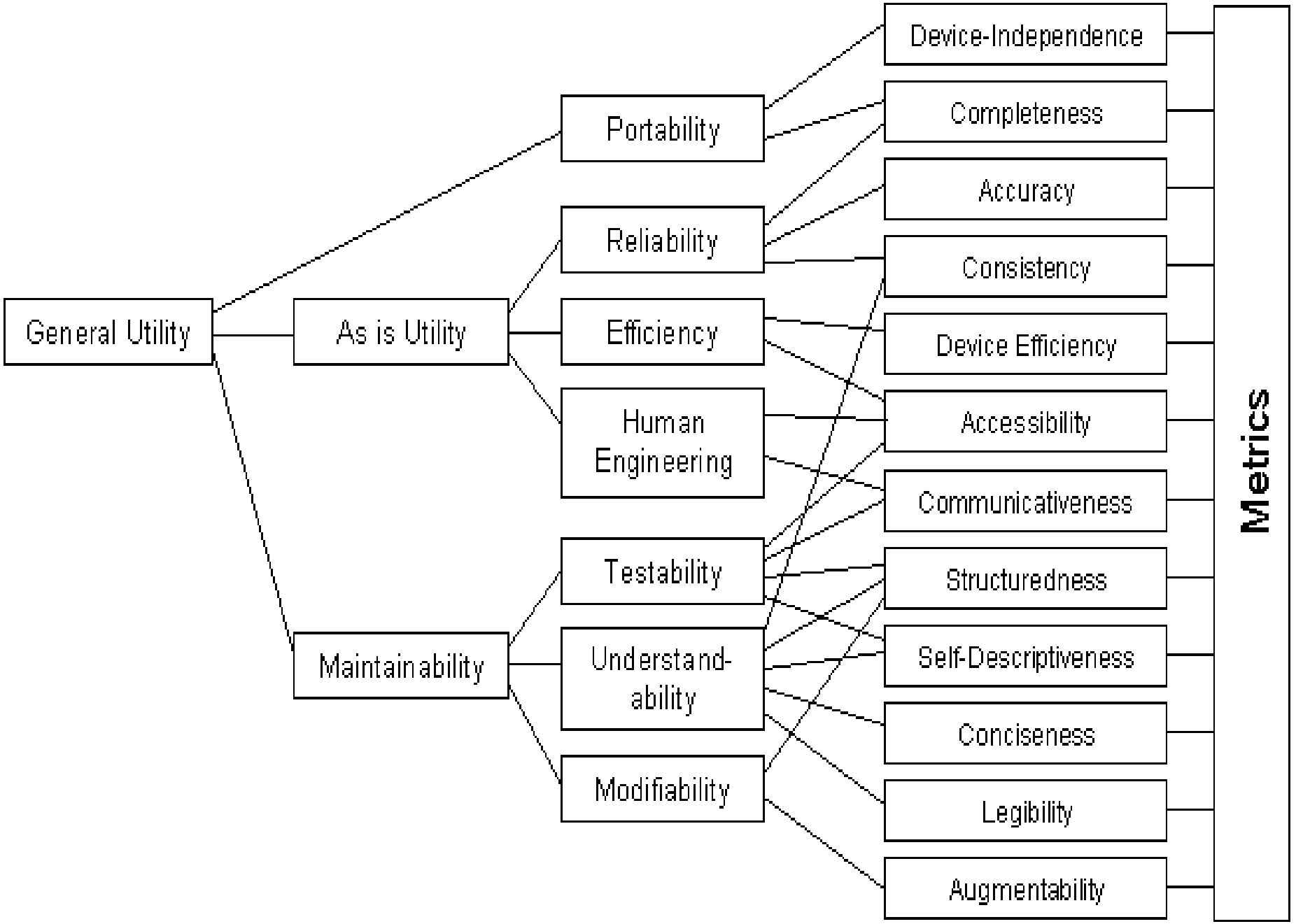
Barry Boehm Quality Model (1978)



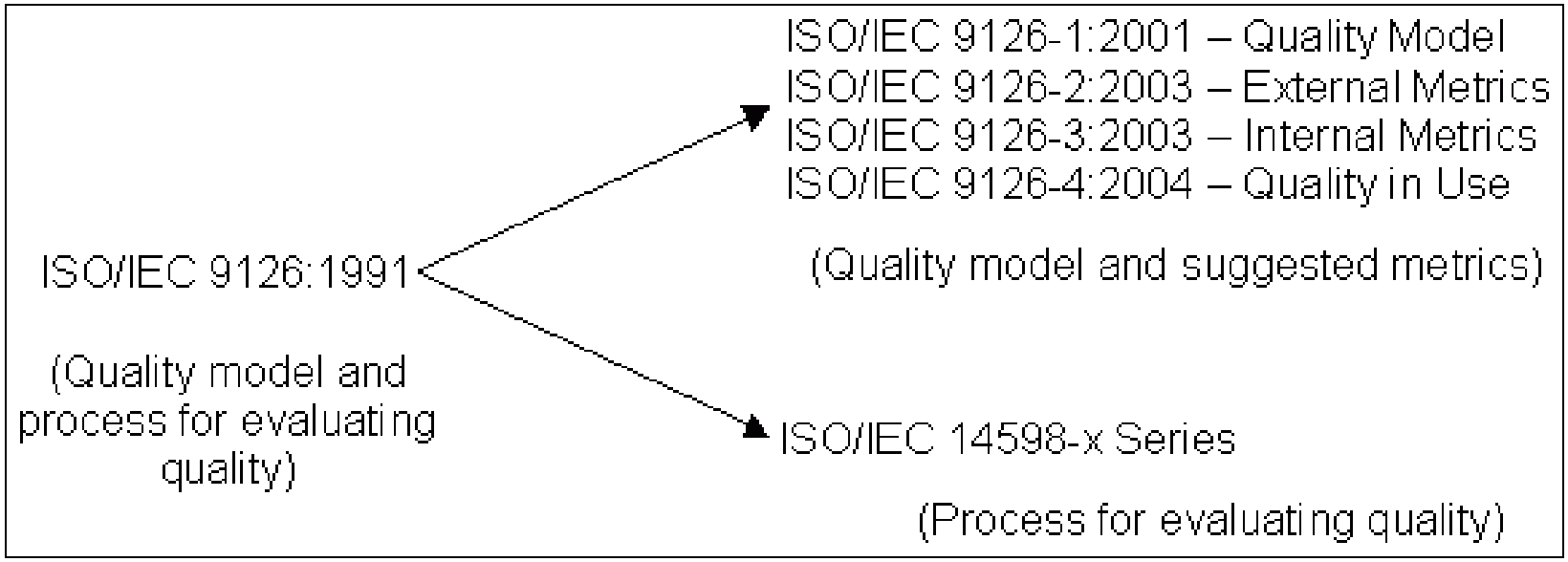
Barry Boehm

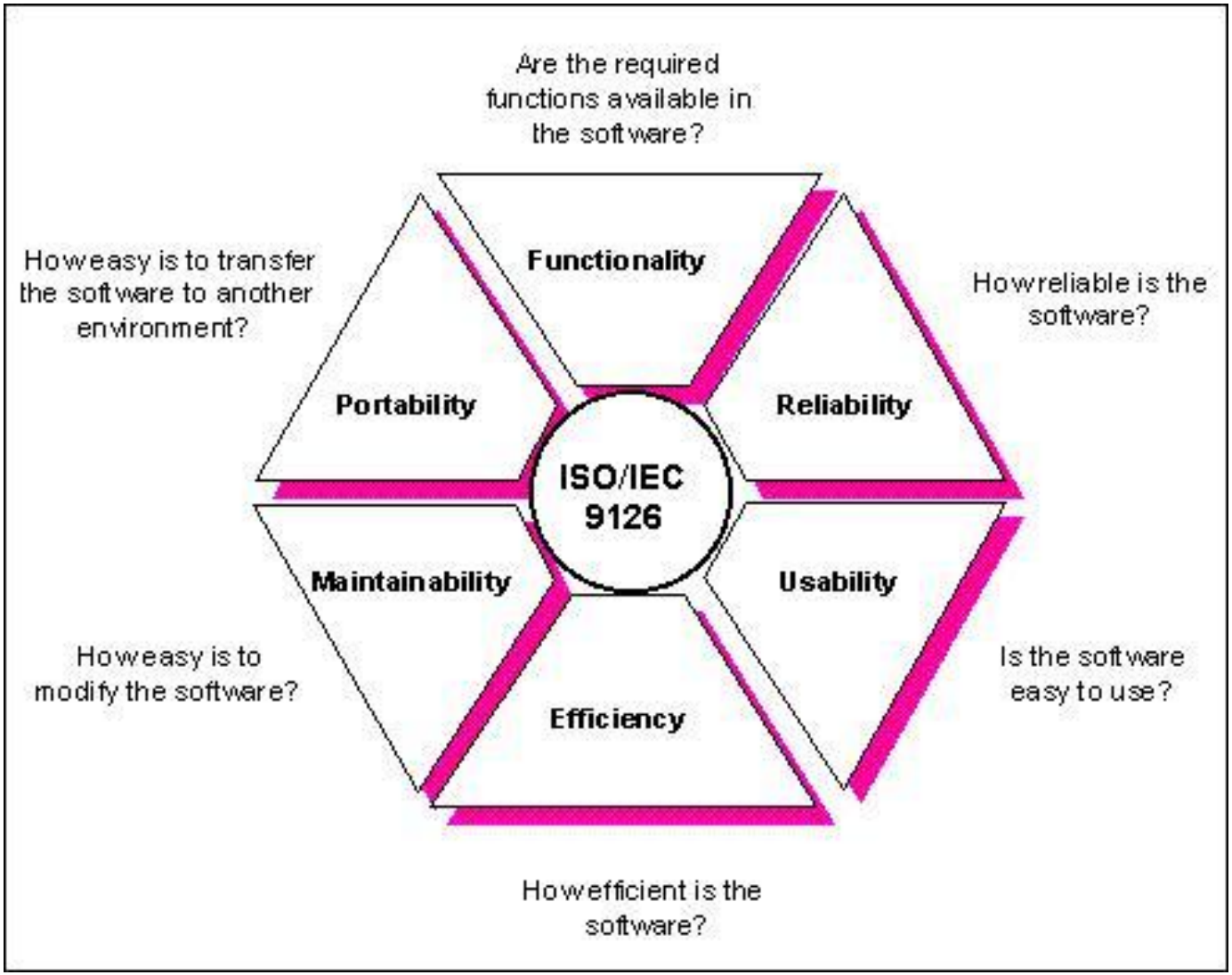


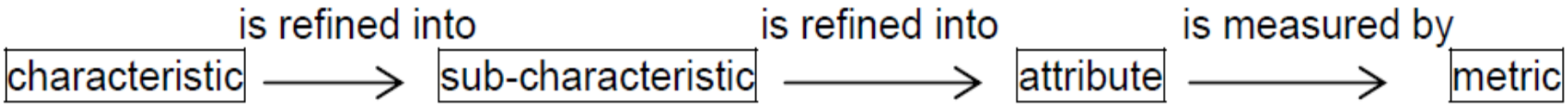
3 High Level, 7 Intermediate Level, 15 Characteristics

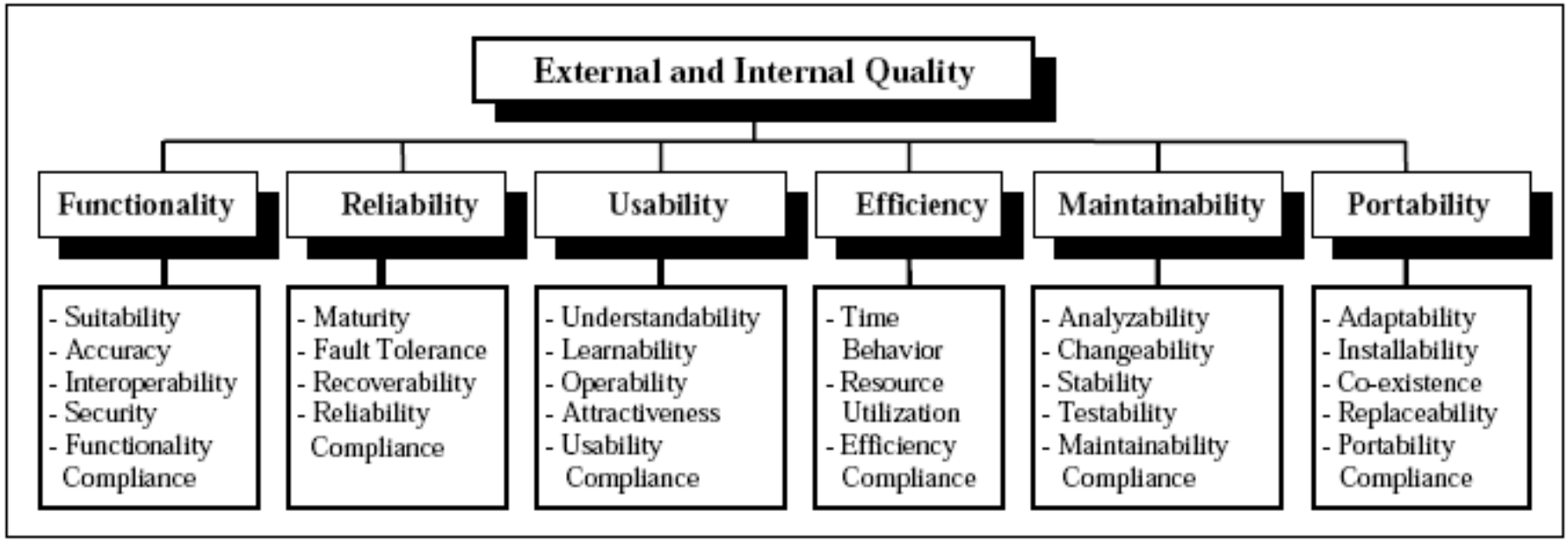

General Utility
As is Utility
Maintainability
Portability
Reliability
Efficiency
Human Engineering
Testability
Understand-ability
Modifiability
Device-Independence
Completeness
Accuracy
Consistency
Device Efficiency
Accessibility
Communicativeness
Structuredness
Self-Descriptiveness
Conciseness
Legibility
Augmentability
Metrics

ISO/IEC Quality Models

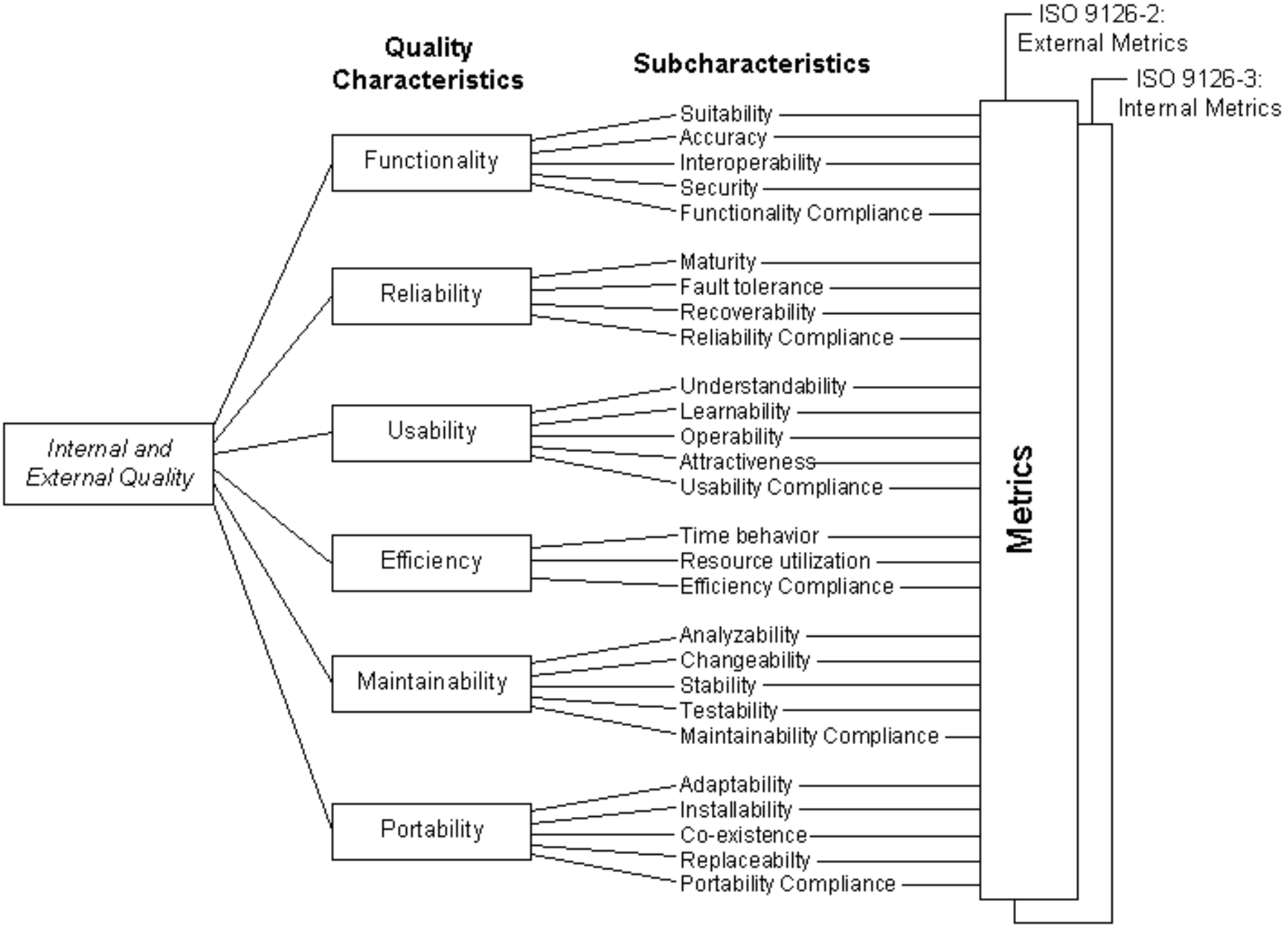



Are the required functions available in the software?
Functionality
How reliable is the software?
Reliability
Is the software easy to use?
Usability
How efficient is the software?
Efficiency
How easy is to modify the software?
Maintainability
How easy is to transfer the software to another environment?
Portability
ISO/IEC 9126


characteristic
is refined into
sub-characteristic
is refined into
attribute
is measured by
metric



6 characteristics in which they are subdivided into
27 sub-characteristics


Quality Characteristics
Subcharacteristics
ISO 9126-2: External Metrics
ISO 9126-3: Internal Metrics
Internal and External Quality
Functionality
Suitability
Accuracy
Interoperability
Security
Functionality Compliance
Reliability
Maturity
Fault tolerance
Recoverability
Reliability Compliance
Usability
Understandability
Learnability
Operability
Attractiveness
Usability Compliance
Efficiency
Time behavior
Resource utilization
Efficiency Compliance
Maintainability
Analyzability
Changeability
Stability
Testability
Maintainability Compliance
Portability
Adaptability
Installability
Co-existence
Replaceabilty
Portability Compliance
Metrics

Characteristic	Sub-characteristic	Explanation
Functionality	Suitability	Can software perform the tasks required?
	Accurateness	Is the result as expected?
	Interoperability	Can the system interact with another system?
	Security	Does the software prevent unauthorised access?
Reliability	Maturity	Have most of the faults in the software been eliminated over time?
	Fault tolerance	Is the software capable of handling errors?
	Recoverability	Can the software resume working and restore lost data after failure?
Usability	Understandability	Does the user comprehend how to use the system easily?
	Learnability	Can the user learn to use the system easily?
	Operability	Can the user use the system without much effort?
	Attractiveness	Does the interface look good?
Efficiency	Time Behaviour	How quickly does the system respond?
	Resource Utilisation	Does the system utilise resources efficiently?
Maintainability	Analysability	Can faults be easily diagnosed?
	Changeability	Can the software be easily modified?
	Stability	Can the software continue functioning if changes are made?
	Testability	Can the software be tested easily?
Portability	Adaptability	Can the software be moved to other environments?
	Installability	Can the software be installed easily?
	Conformance	Does the software comply with portability standards?
	Replaceability	Can the software easily replace other software?
All characteristics	Compliance	Does the software comply with laws or regulations?

Factors/Attributes/Characteristics	McCall	Boehm	Dromey	FURPS	ISO 9126
Maintainability	✓		✓		✓
Flexibility	✓				
Testability	✓	✓			
Correctness	✓				
Efficiency	✓	✓	✓		✓
Reliability	✓	✓	✓	✓	✓
Integrity	✓				
Usability	✓		✓	✓	✓
Portability	✓	✓	✓		✓
Reusability	✓		✓		
Interoperability	✓				
Human Engineering		✓			
Understandability		✓			
Modifiability		✓			
Functionality			✓	✓	✓
Performance				✓	
Supportability				✓	
17	**11**	**7**	**7**	**5**	**6**

Appendix

Dromey's Quality Model (1996)

Barry Boehm Quality Models

1. Does each program module contain a header block of commentary which describes program name, purpose, modification history, and assumptions?

2. Are the functions of the modules as well as inputs/outputs adequately defined to allow module testing?

3. Where there is module dependence, is it clearly specified by commentary, program documentation, or inherent program structure.

4. Are variable names descriptive of the physical or functional property represented?

5. Do functions contain adequate descriptive information (i.e., comments) so that the purpose of each is clear?