ISO/IEC SQuaRE : The second generation of standards for software product quality

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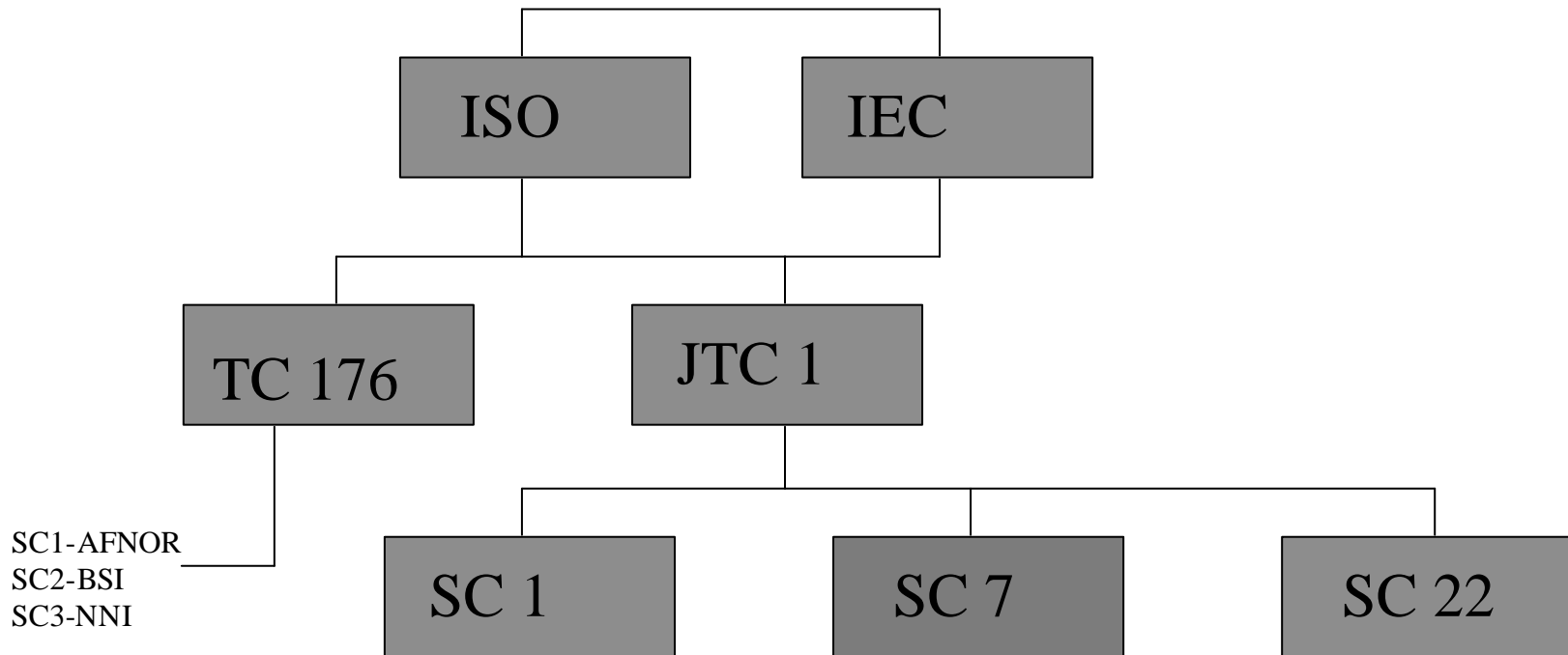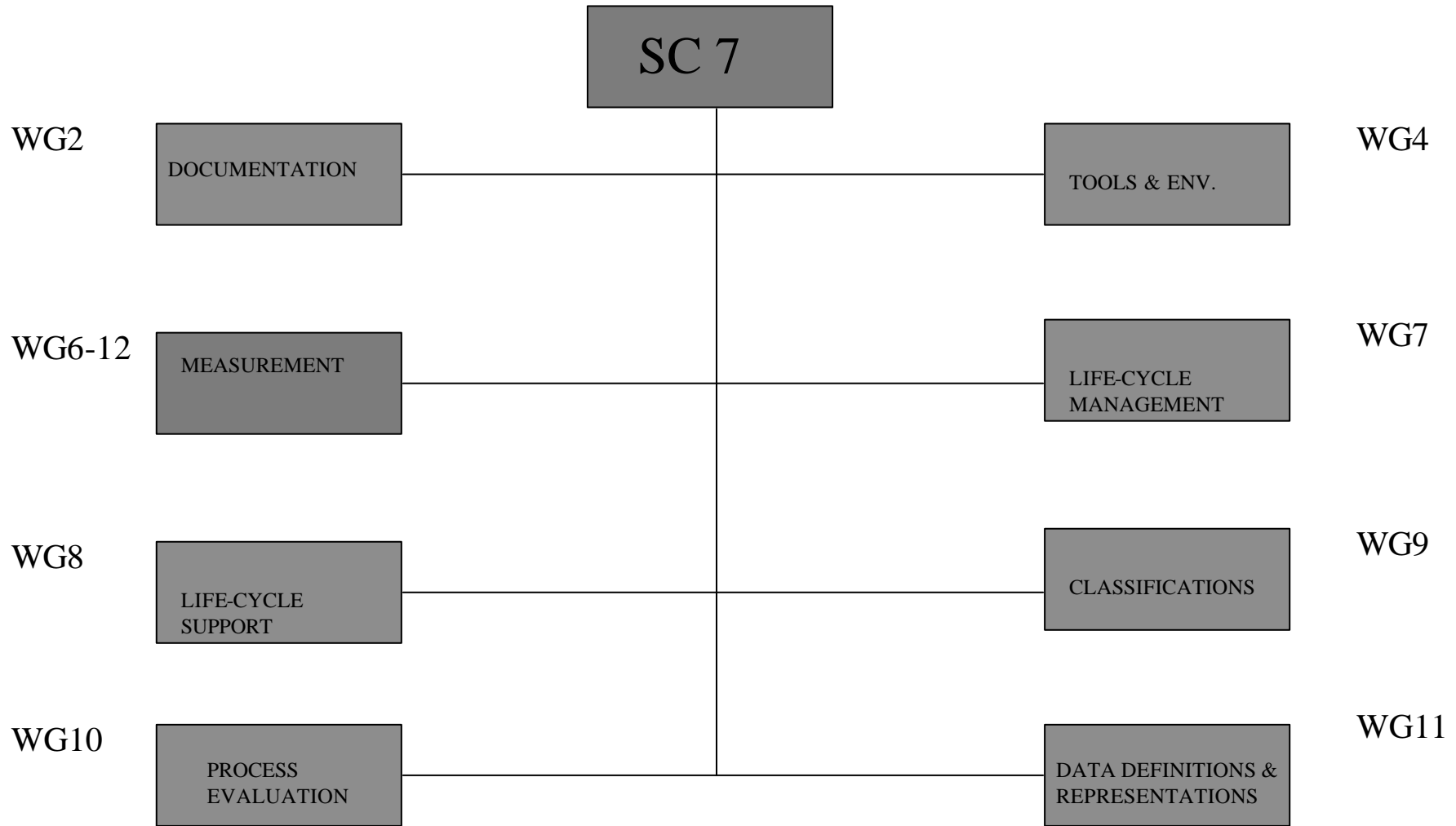
IASTED

Marina Del-Rey November 5th 2003

Presentation Topics

- Who develops the software related standards in ISO
- What is the current software product standard of ISO
- Overview of ISO9126
- What are the components and where do they apply
- Is it used (results of the web-based survey)
- The next generation SQuaRE design

Software International Standards

SC1-AFNOR
SC2-BSI
SC3-NNI

SC7 Components

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                              ┌──────────┐
                              │   SC 7   │
                              └────┬─────┘
                                   │
WG2  ┌──────────────┐              │              ┌──────────────┐  WG4
     │ DOCUMENTATION ├──────────────┼─────────────┤  TOOLS & ENV. │
     └──────────────┘              │              └──────────────┘
                                   │
WG6-12 ┌──────────────┐            │            ┌──────────────────┐  WG7
       │ MEASUREMENT  ├────────────┼────────────┤   LIFE-CYCLE     │
       └──────────────┘            │            │   MANAGEMENT     │
                                   │            └──────────────────┘
WG8  ┌──────────────┐              │              ┌──────────────────┐  WG9
     │  LIFE-CYCLE  ├──────────────┼──────────────┤ CLASSIFICATIONS  │
     │  SUPPORT     │              │              └──────────────────┘
     └──────────────┘              │
WG10 ┌──────────────┐              │              ┌──────────────────┐  WG11
     │  PROCESS     ├──────────────┼──────────────┤ DATA DEFINITIONS │
     │  EVALUATION  │              │              │ & REPRESENTATIONS│
     └──────────────┘                             └──────────────────┘
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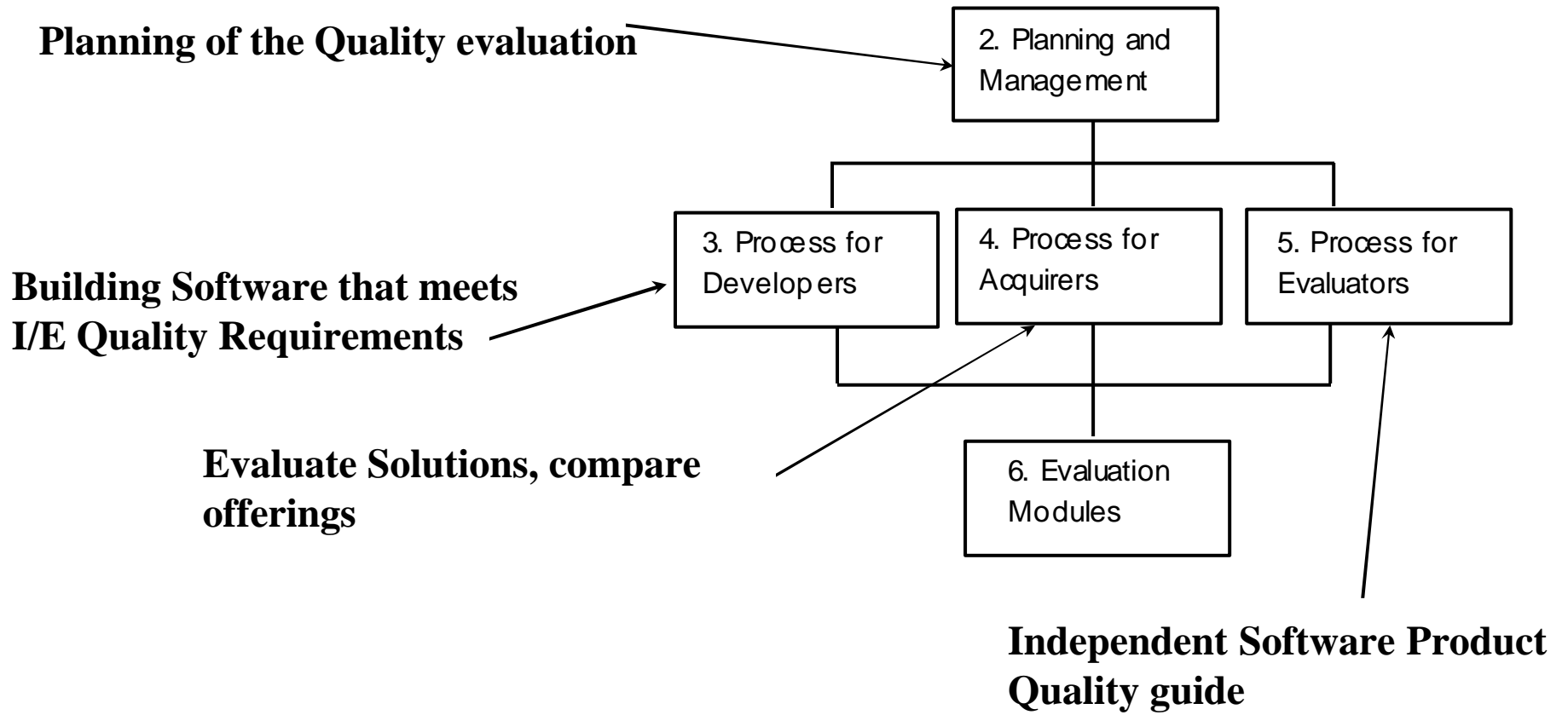
SC7/WG6 Current documents

ISO/IEC 9126-1 --- Part 1 Quality Model (Japan + England)
ISO/IEC 9126-2 --- Part 2 External Metrics (Japan+Canada)
ISO/IEC 9126-3 --- Part 3 Internal Metrics (Japan+Netherland)
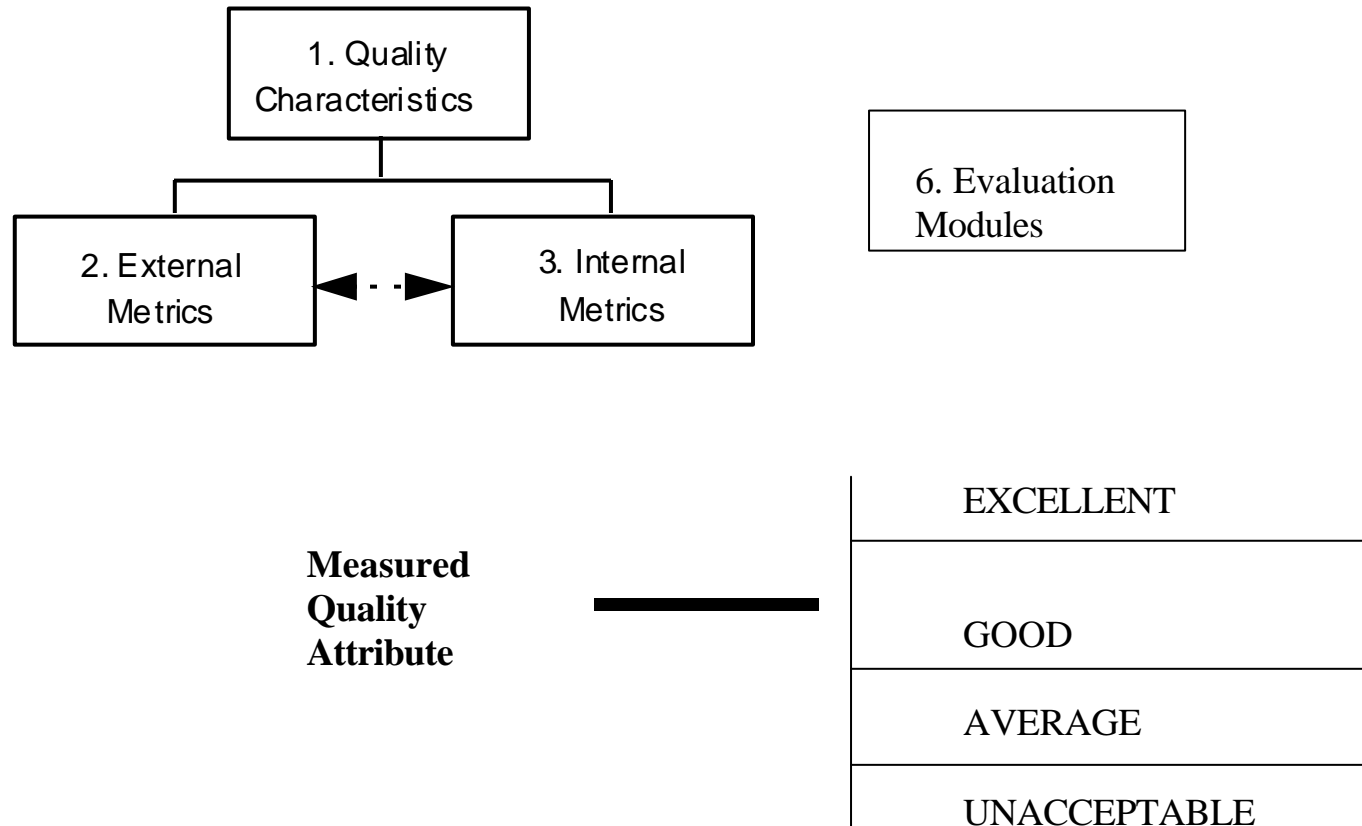**ISO/IEC 9126-4 --- Part 4 Quality in Use (USA)**

Product Evaluation guides (perspectives)

ISO/IEC 14598-1 --- Part 1 Overview (Japan+England+USA)
ISO/IEC 14598-2 --- Part 2 Planning & Management Guide (Angl.)
ISO/IEC 14598-3 --- Part 3 Developer's Guide (USA+Denmark)
ISO/IEC 14598-4 --- Part 4 Acquirer's Guide (Canada)
ISO/IEC 14598-5 --- Part 5 Evaluator's Guide (France)
ISO/IEC 14598-6 --- Part 6 Evaluation modules (Denmark)

Model includes many perspectives

Planning of the Quality evaluation

2. Planning and Management

Building Software that meets I/E Quality Requirements

3. Process for Developers

4. Process for Acquirers

5. Process for Evaluators

Evaluate Solutions, compare offerings

6. Evaluation Modules

Independent Software Product Quality guide

Common to all the perspectives

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┌─────────────────┐
│   1. Quality    │
│ Characteristics │
└─────────────────┘
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┌──────────────┐        ┌──────────────┐
│ 2. External  │◄- -►   │ 3. Internal  │
│   Metrics    │        │   Metrics    │
└──────────────┘        └──────────────┘
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┌─────────────────┐
│  6. Evaluation  │
│    Modules      │
└─────────────────┘
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**Measured
Quality
Attribute**

EXCELLENT

GOOD

AVERAGE

UNACCEPTABLE
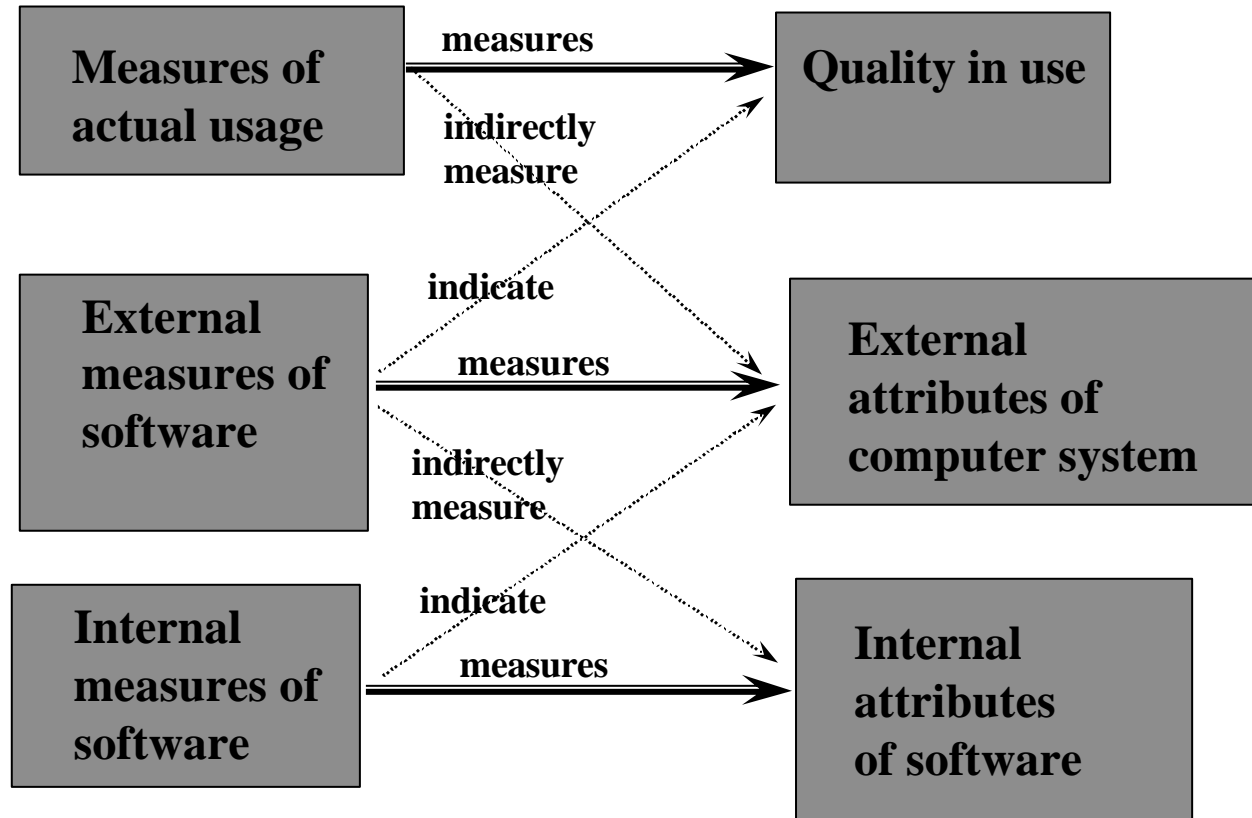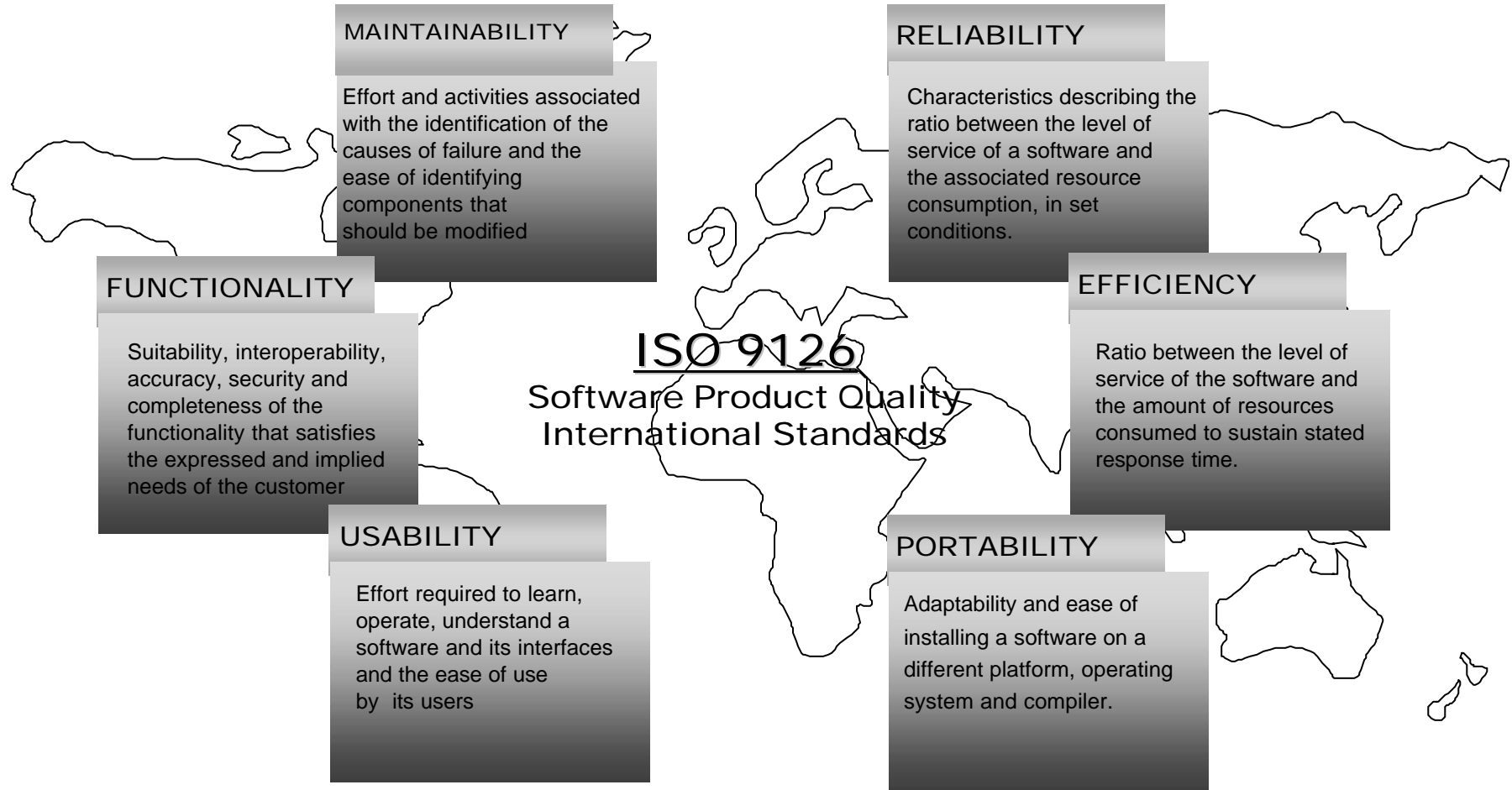
Quality Model of ISO9126
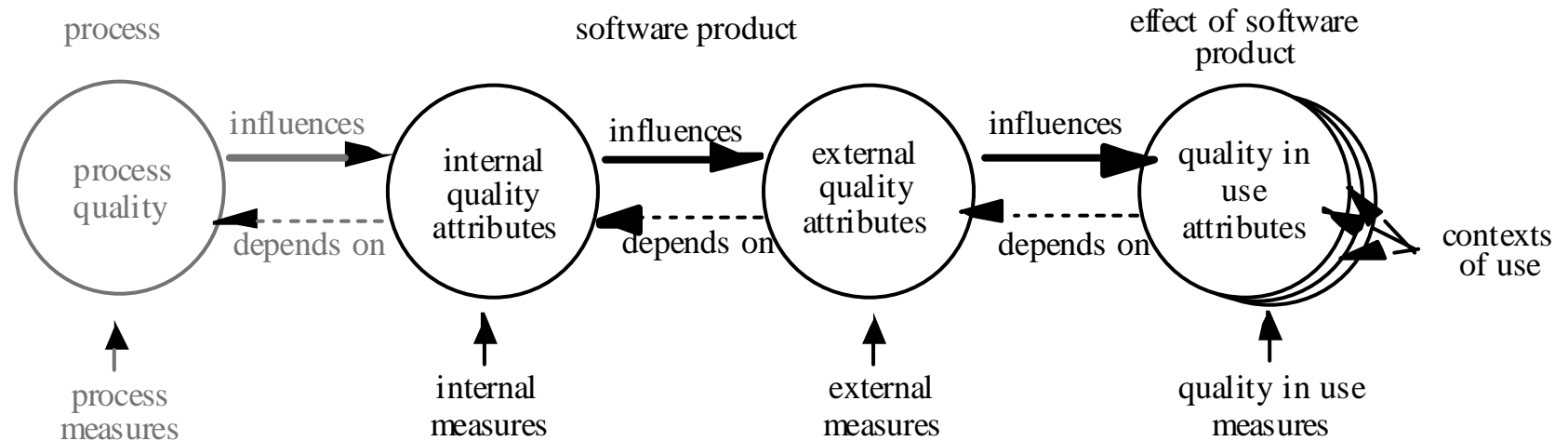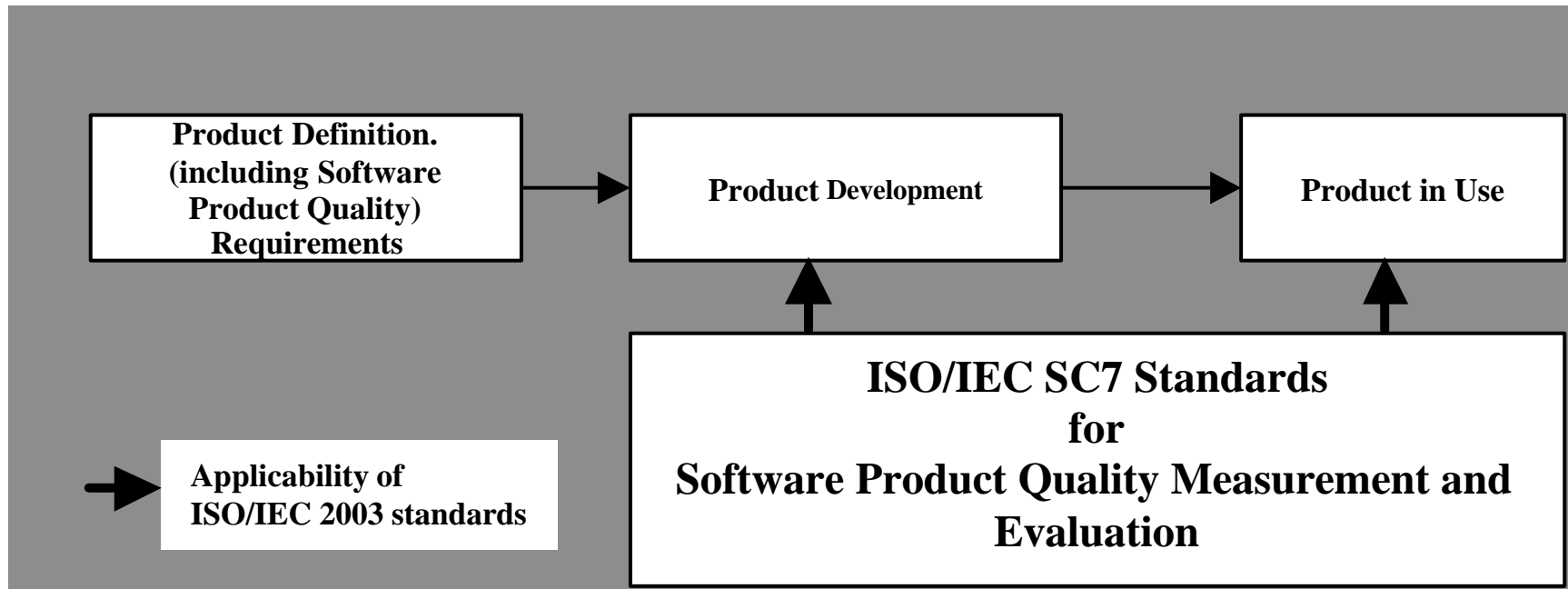
Relationship model metrics/attributes

Definitions

- *internal measure*: **A measure derived from the product itself. It is not derived from measures of the behavior of the system of which it is a part.**

- *external measure*: **A measure of a product derived from measures of the behavior of the system of which it is a part.**

Characteristics of ISO9126

MAINTAINABILITY

Effort and activities associated with the identification of the causes of failure and the ease of identifying components that should be modified

RELIABILITY

Characteristics describing the ratio between the level of service of a software and the associated resource consumption, in set conditions.

FUNCTIONALITY

Suitability, interoperability, accuracy, security and completeness of the functionality that satisfies the expressed and implied needs of the customer

ISO 9126
Software Product Quality
International Standards

EFFICIENCY

Ratio between the level of service of the software and the amount of resources consumed to sustain stated response time.

USABILITY

Effort required to learn, operate, understand a software and its interfaces and the ease of use by its users

PORTABILITY

Adaptability and ease of installing a software on a different platform, operating system and compiler.

Where does it apply

Product Definition.
(including Software
Product Quality)
Requirements

Product Development

Product in Use

Applicability of
ISO/IEC 2003 standards

ISO/IEC SC7 Standards
for
Software Product Quality Measurement and
Evaluation

It is also mapped with ISO14598

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┌─────────────┐   ┌─────────────────────────────────────┐
│ Establish   │───│ Establish purpose of evaluation (7.1)│
│ Evaluation  │   ├─────────────────────────────────────┤
│ Requirements│───│ Identify types of product(s) (7.2)  │
│             │   ├─────────────────────────────────────┤      ┌──────────────────┐
│             │───│ Specify quality model (7.3)         │◄─────│ 9126-1  Quality  │
└─────────────┘   └─────────────────────────────────────┘      │   Characteristics│
       │                                                        └──────────────────┘
       ▼
┌─────────────┐   ┌─────────────────────────────────────┐      ┌──────────────────┐
│ Specification│──│ Select metrics (8.1)                │◄─────│9126-2 External Metrics│
│ of the      │   ├─────────────────────────────────────┤      │9126-3 Internal Metrics│
│ Evaluation  │───│ Establish rating levels for metrics (8.2)│  │14598-6 Evaluation │
│             │   ├─────────────────────────────────────┤      │     Modules       │
│             │───│ Establish criteria for assessment (8.3)│    └──────────────────┘
└─────────────┘   └─────────────────────────────────────┘
       │
       ▼
┌─────────────┐   ┌─────────────────────────────────────┐
│ Design      │───│ Produce evaluation plan (9.1)       │
│ of the      │   └─────────────────────────────────────┘
│ evaluation  │
└─────────────┘
       │
       ▼
┌─────────────┐   ┌─────────────────────────────────────┐
│ Execution   │───│ Measure characteristics (10.1)      │
│ of the      │   ├─────────────────────────────────────┤
│ Evaluation  │───│ Compare with criteria (10.2)        │
│             │   ├─────────────────────────────────────┤
│             │───│ Assess results (10.3)               │
└─────────────┘   └─────────────────────────────────────┘
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WG6 Survey of users of ISO9126

- 2001-2002
- Feedback from practicioners & academia
- 60 companies from 12 countries
- Completeness issues
- Consistency issues
- Scope of applicability issues

Completeness: Missing mappings

- There is a need for a standard to tackle the software quality requirements specifications
- A need for verification of the quality measures

Consistensy: Missing mappings
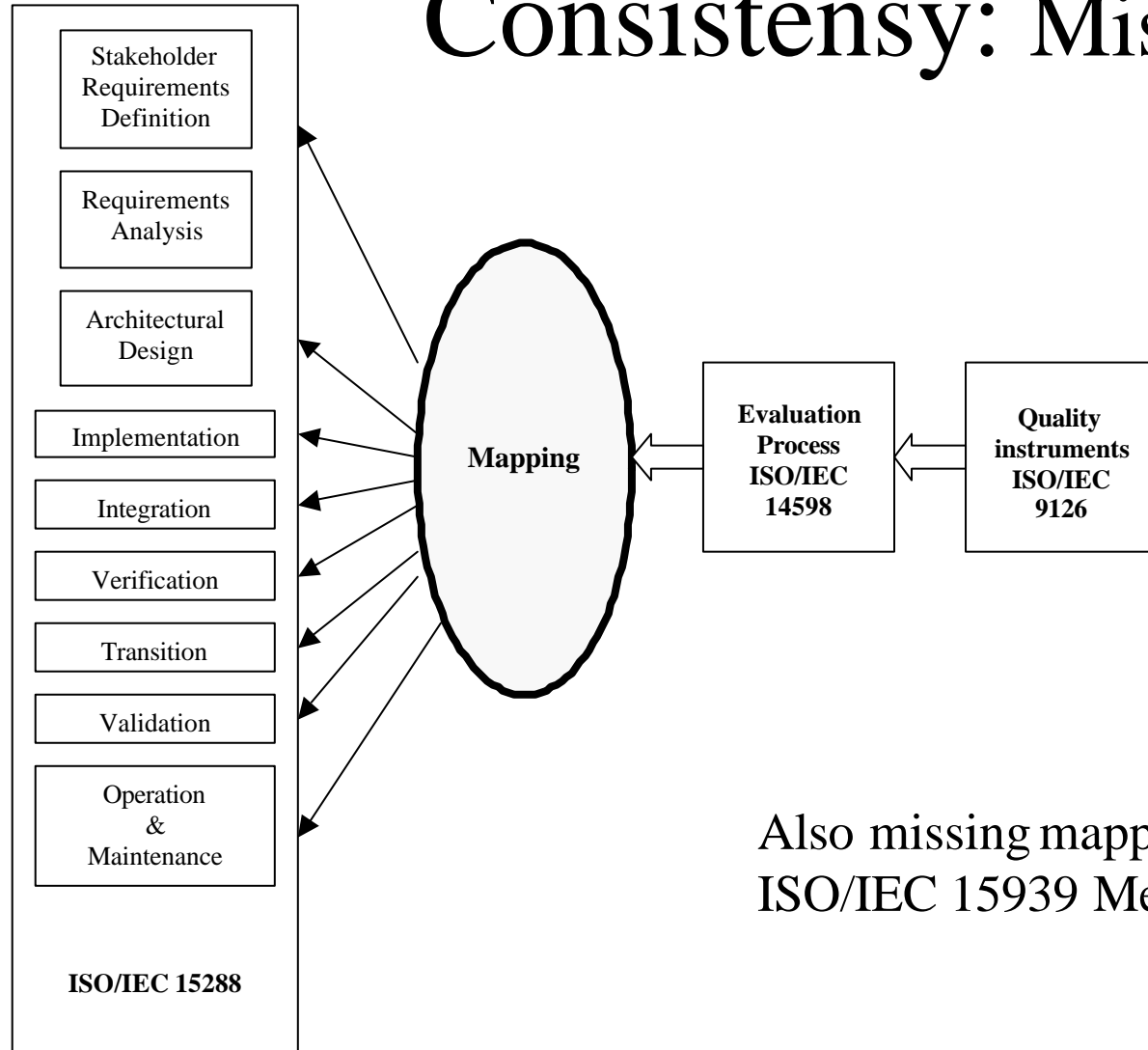
Also missing mapping with the emerging
ISO/IEC 15939 Measurement Model

Applicability: More guidance

- Enhancements to better address quality needs in life-cycle phases

- End-User guidance

- Workflow to support the documentation to guide the users

Next Generation SQuaRE

- Includes a Quality requirements standard;
- 14 documents grouped in 5 Topics:
  - Quality Management
  - Quality Model
  - Quality Measures
  - Quality Requirements
  - Quality Evaluation

SQuaRE : Quality Management

- Guide to SQuaRE – overview of the structure and terminology;

- Planning & Management – to provide guidance for planning & managing software product evaluations.

SQuaRE : Quality Model

- Quality Model and guide – describes the model for internal/external quality and quality in use. Presents the characteristics and subcharacteristics.

SQuaRE : Quality Measures

- Measurement reference model and guide;
- Measurement primitives;
- Measures for internal quality;
- Measures for external quality;
- Measures for quality in use.

SQuaRE : Quality Requirements

- Quality Requirements and Guide – to enable software product quality to be specified in terms of quality requirements all along the life-cycle of a software project or acquisition, maintenance and operation.

SQuaRE : Quality Evaluation

- Quality Evaluation and guide
- Process for Developers
- Process for acquirers
- Process for evaluators
- Documentation for the evaluation module

Hyper–Media Guide to SQuaRE

General Guidance
Learn & Navigate

↓

Particular Guidance
Choose

↓

Quality Engineering
Execute

↓

Requirements Specification	Planning	Measurement	Evaluation
PROCESS			

↓

TARGET OF PROCESS
Software Product or *User Task*