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Systematic Support for Measurement and Evaluation in Software Projects

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3. Context-Sensitive M&E Approach
4. Domain Integration
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CIBSE 2013

:: Motivation

- Quality depends on:
 - Product/Service requirements,
 - Process, methods and stakeholders
 - Environmental/Contextual factors
- Effective and accurate understanding and controlling of an entity (and its situation) requires:
 - **Data and information** based on relevant properties and facts.
 - A **Strategy** for measurement, evaluation, analysis and recommendation

:: Motivation

- An M&E Strategy should be designed for a given purpose and information need
- It should be based on three principles or capabilities:
 1. An ***M&E Conceptual Base/Framework***,
 2. An ***M&E Process specification***, and
 3. ***Method specification***.
- We have developed GOCAME (*Goal-Oriented Context-Aware Measurement and Evaluation Strategy*) based on these three capabilities:
 - We support the premise that a M&E strategy is **integrated** if these three capabilities are to a great extent achieved simultaneously

:: Motivation

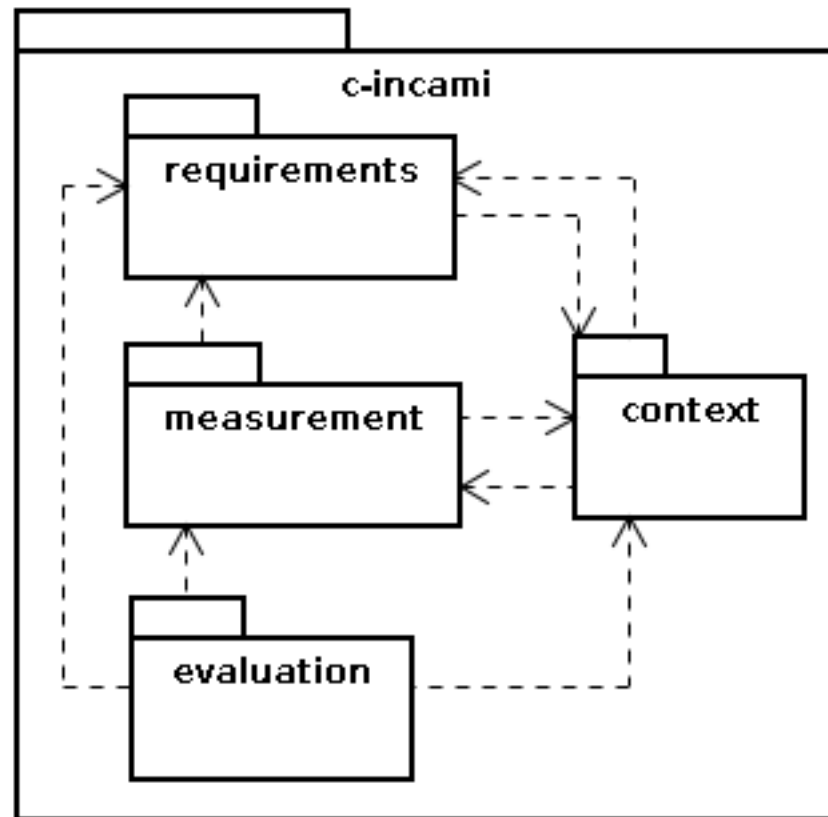
1. *An **M&E Conceptual Base/Framework** (named **C-INCAMI**),*
 2. *M&E Process specification,*
 3. *Method specification.*
- **C-INCAMI** (*Contextual-Information Need, Concept model, Attribute, Metric and Indicator*) has six **components**:
 - *M&E project definition,*
 - *Nonfunctional requirements specification,*
 - *Context specification,*
 - *Measurement design and implementation,*
 - *Evaluation design and implementation, and*
 - *Analysis and recommendation specification.*

:: Motivation

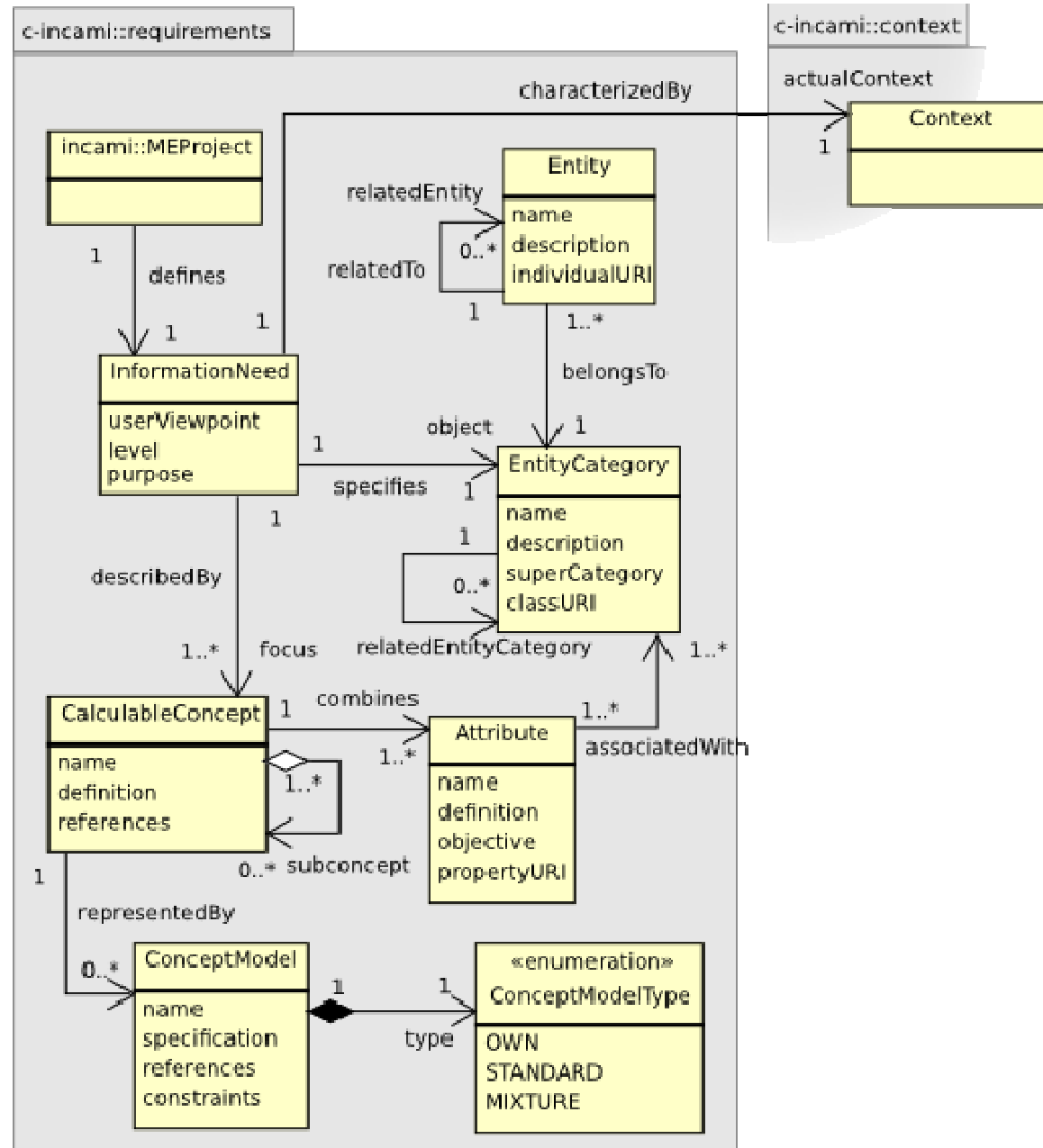
- C-INCAMI explicitly allows representing **meta-data** and **data** of:
 - **information needs** and **purposes**;
 - **entities** and their **attributes**
 - **context** entities and properties (which are attributes)
 - **metrics** (measurement procedures, scales and units) and **measurements**
 - **indicators** (calculation procedures, decision criteria, scales and units) and **evaluations**
 - The M&E strategy is then a **context-aware approach** built on **ontologies**
 - Application domain integration based on RDF/RDF Schema
- Current related proposals lack sound M&E metadata specifications

:: M&E Data and Metadata

- Some C-INCAMI components



:: M&E Data and Metadata NF Requirements specification



:: M&E Data and Metadata NF Requirements specification - Examples

Table 1. *Information Need for the EQ evaluation of Cuspide.com*

<i>Purpose</i>	<i>Focus</i>	<i>User Viewpoint</i>	<i>Entity Category</i>	<i>Entity</i>
Improve	External Quality	Customer user	Web Application	Cuspide.com

External Quality

1. Usability

1.1. Understandability

1.1.1. Shopping cart control ease to be recognized

1.1.2. Add-to-cart control ease to be recognized

1.2. Learnability

1.2.1. How-to-buy help availability

1.2.2. Readability of text

1.3. Operability

1.3.1. Shopping cart control permanence

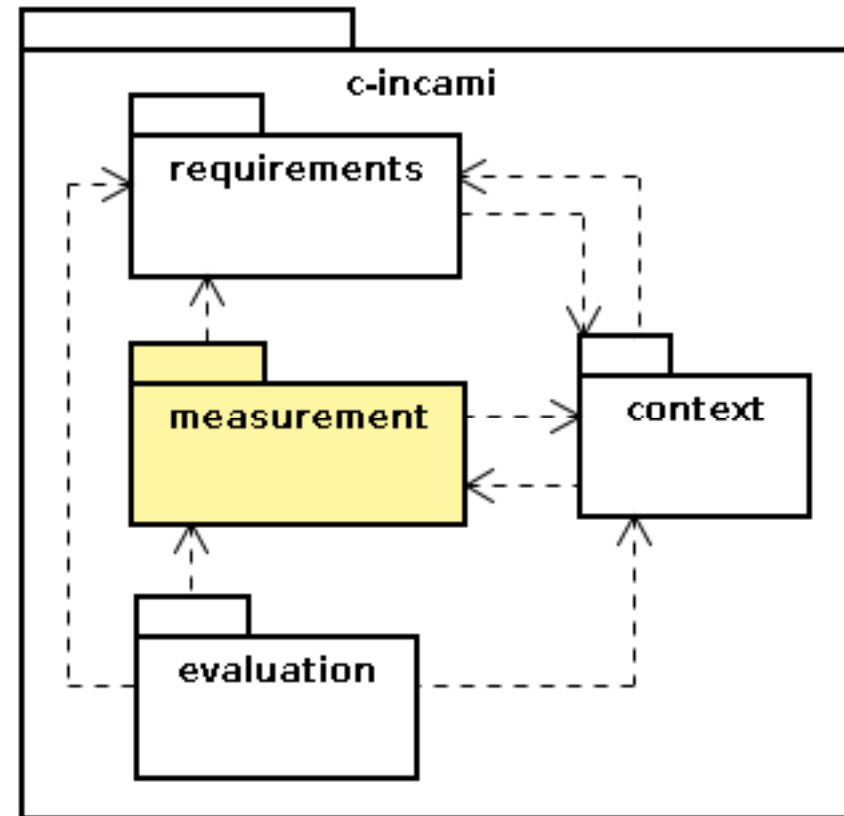
1.3.2. Add-to-cart control permanence

1.3.3. ...

2. ...

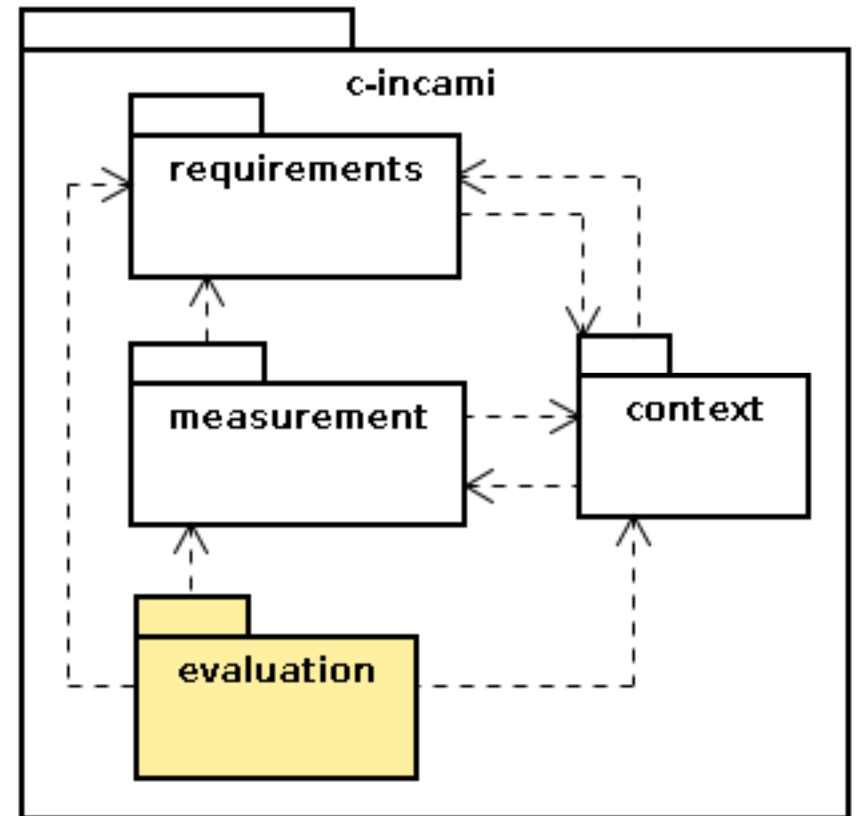
:: M&E Data and Metadata Measurement Design and Implementation

- Metric
 - ✓ Direct and Indirect
- Scale and Unit
- Measurement Procedure
- Measurement and Measure



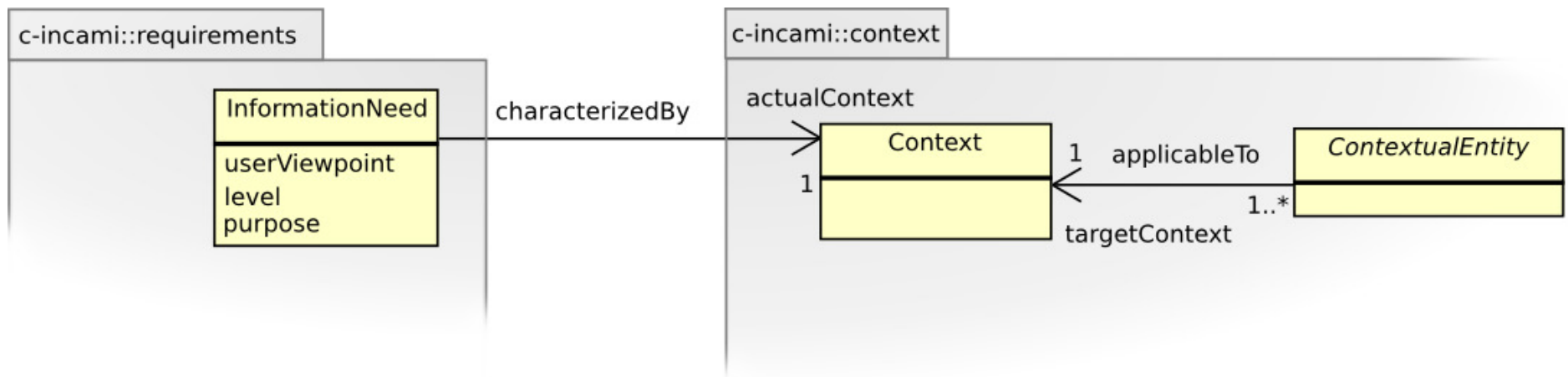
:: M&E Data and Metadata Evaluation Design and Implementation

- Indicator
 - ✓ Elementary and Global
- Scale and Unit
- Calculation Procedure
- Elementary and Global Models
- Decision Criteria

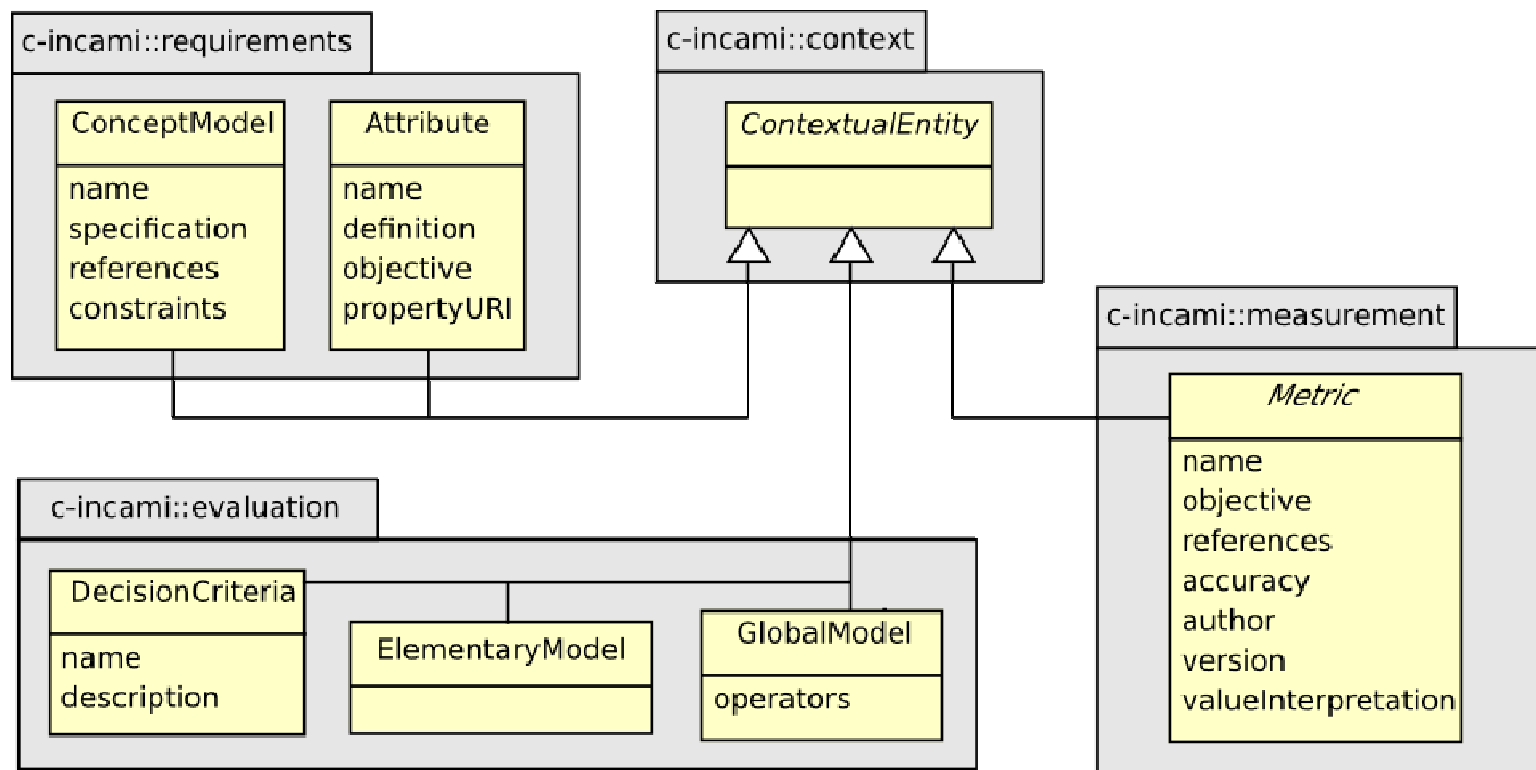


:: Context Sensitive M&E Two Scenarios:

- **Actual context** in which the M&E project/activities are performed
- **Target context** to which a given *contextual entity* is applicable and can be recommended
 - ✓ Def. **Contextual Entity**: ..whose correct **usage or interpretation** is **sensitive** to the **context** in which it is applied and/or analysed.



:: Context Sensitive M&E Contextual Entities



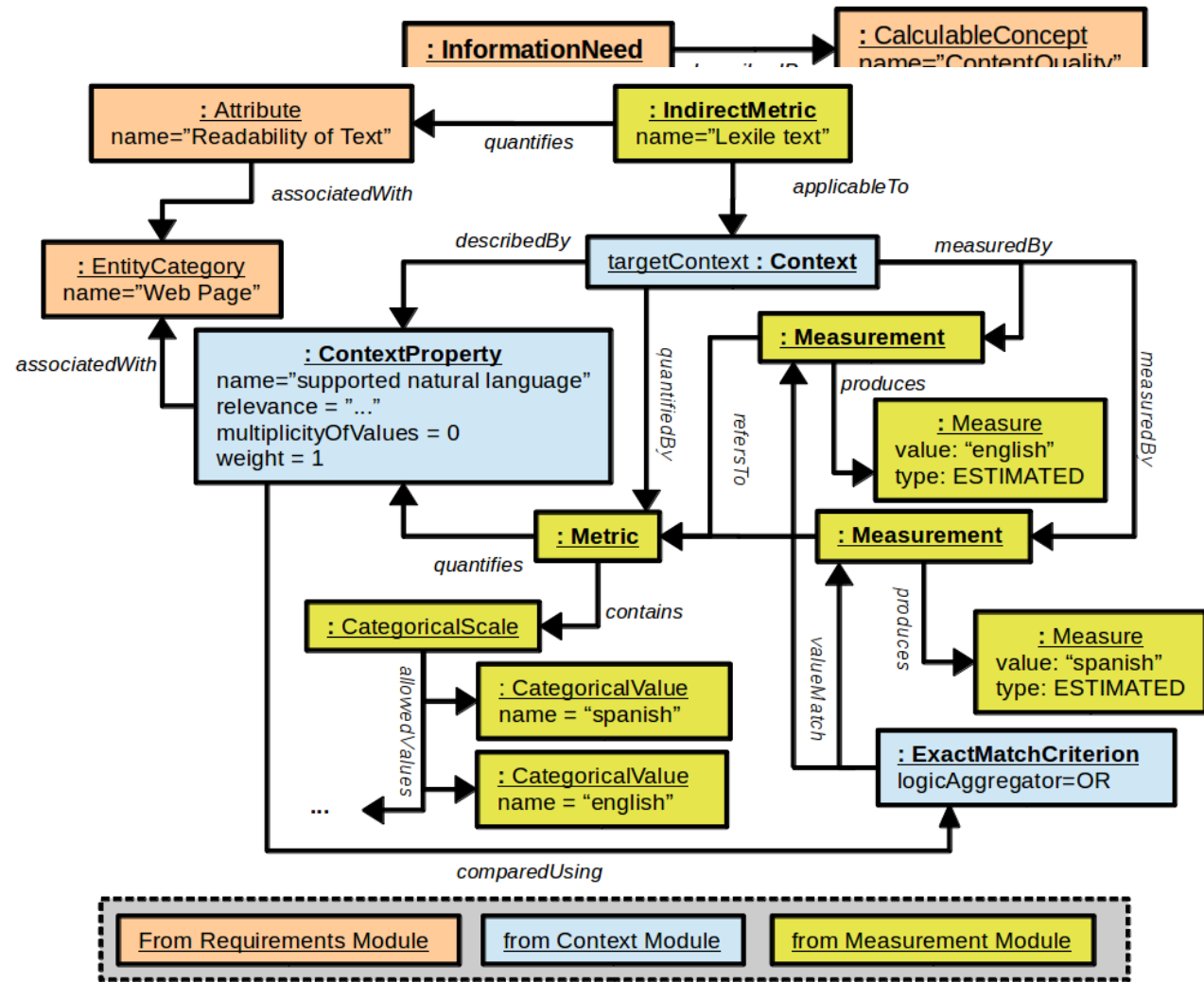
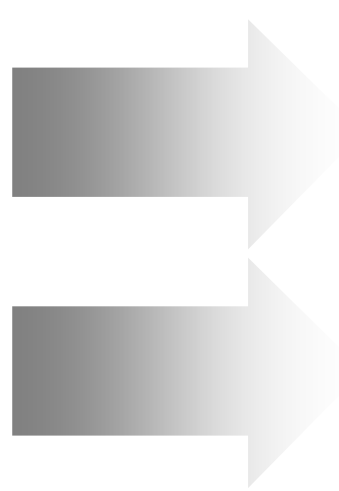
:: Context-Sensitive M&E Approach Context quantification

- Attribute's quantification
- Metrics and Measurements

- 1.1.1. Shopping cart control ease to be recognized
- 1.1.2. Add-to-cart control ease to be recognized
- 1.2. Learnability
 - 1.2.1. How-to-buy help availability
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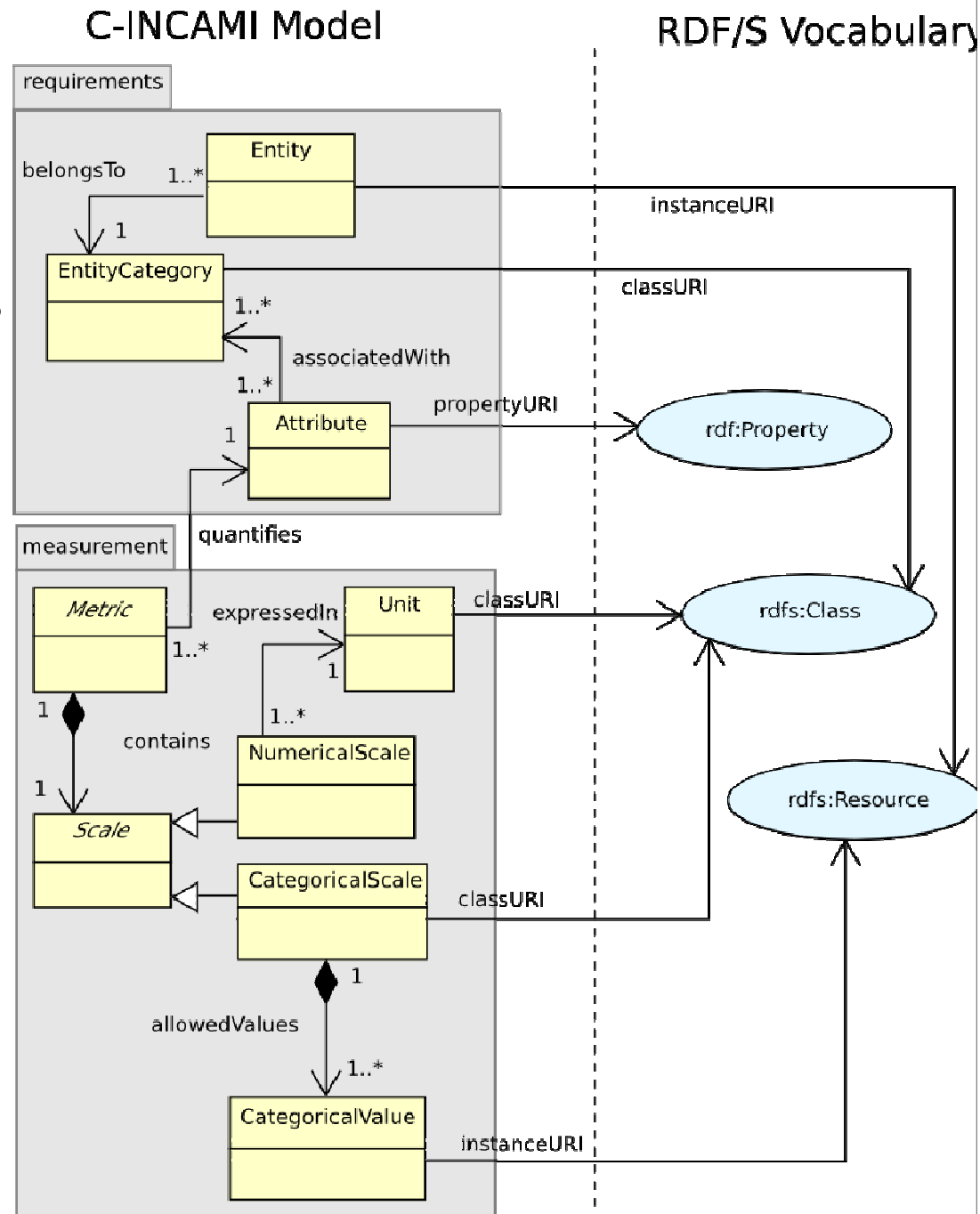
Actual context quantification

Target context quantification



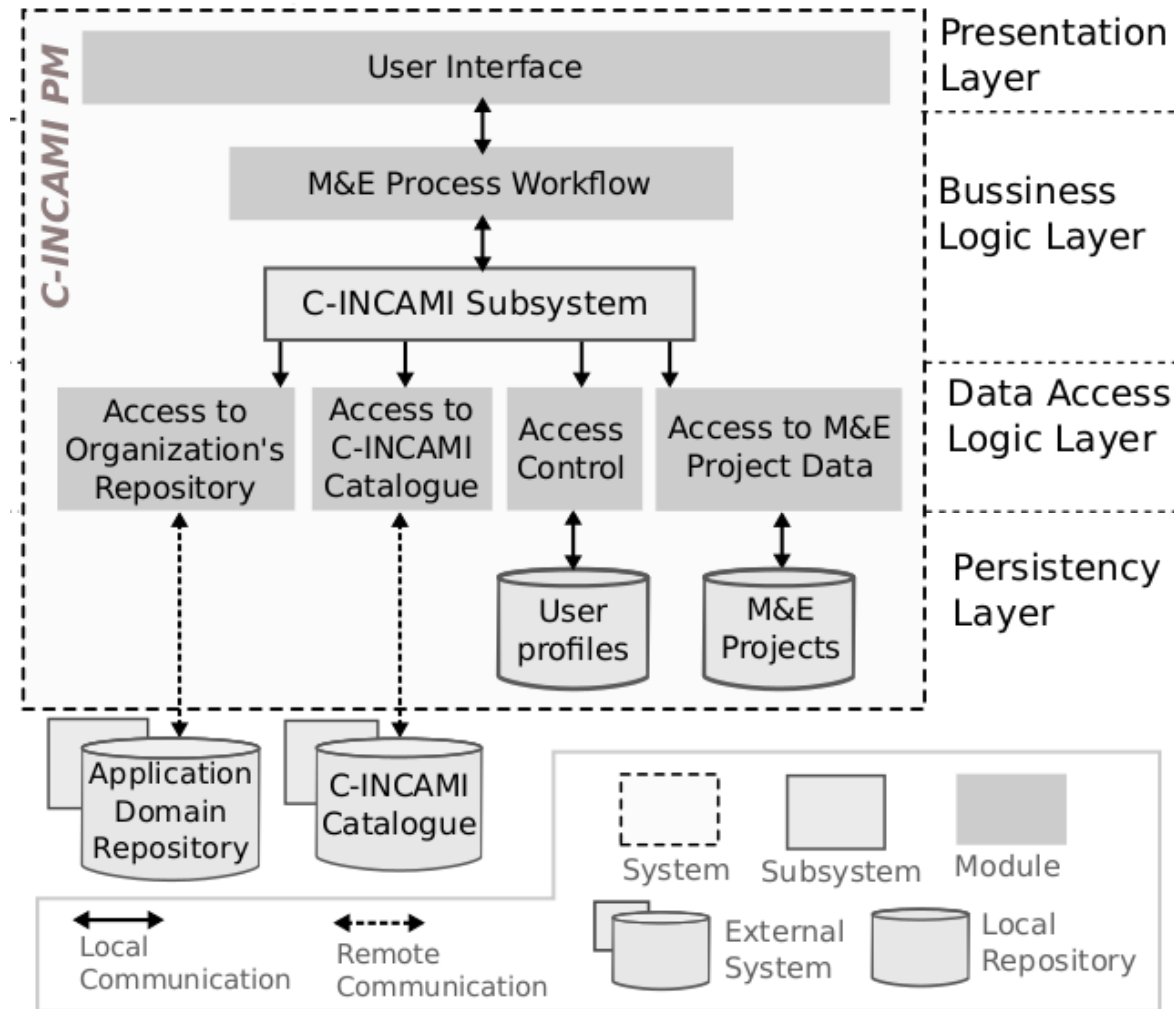
:: Domain Integration

- Integrate application domain specifications to M&E specifications
- URI based (traditional and semantic web)
- Ontology modelling approach
 - Application domain represented in RDF/RDFS
- Improved consistency of M&E specifications



:: Technological support Software architecture

- C-INCAMI Project Management
 - Web Application
 - C-INCAMI Modules
 - Persistent M&E Projects
- C-INCAMI Catalogue
- Application Domain Repository



:: Concluding Remarks and Future Work

- C-INCAMI supports explicit and structured information models (data and meta-data) for M&E projects and activities
 - Context sensitive M&E
 - Application domain integration / Technological support
- C-INCAMI is integrated to a M&E Strategy named GOCAME
- Future work
 - Integrating Context to an M&E Strategy for different organizational levels (GOCAME+).

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Thank you for your attention

Any question?