4 Prototyping

There are no facts,
only interpretations.

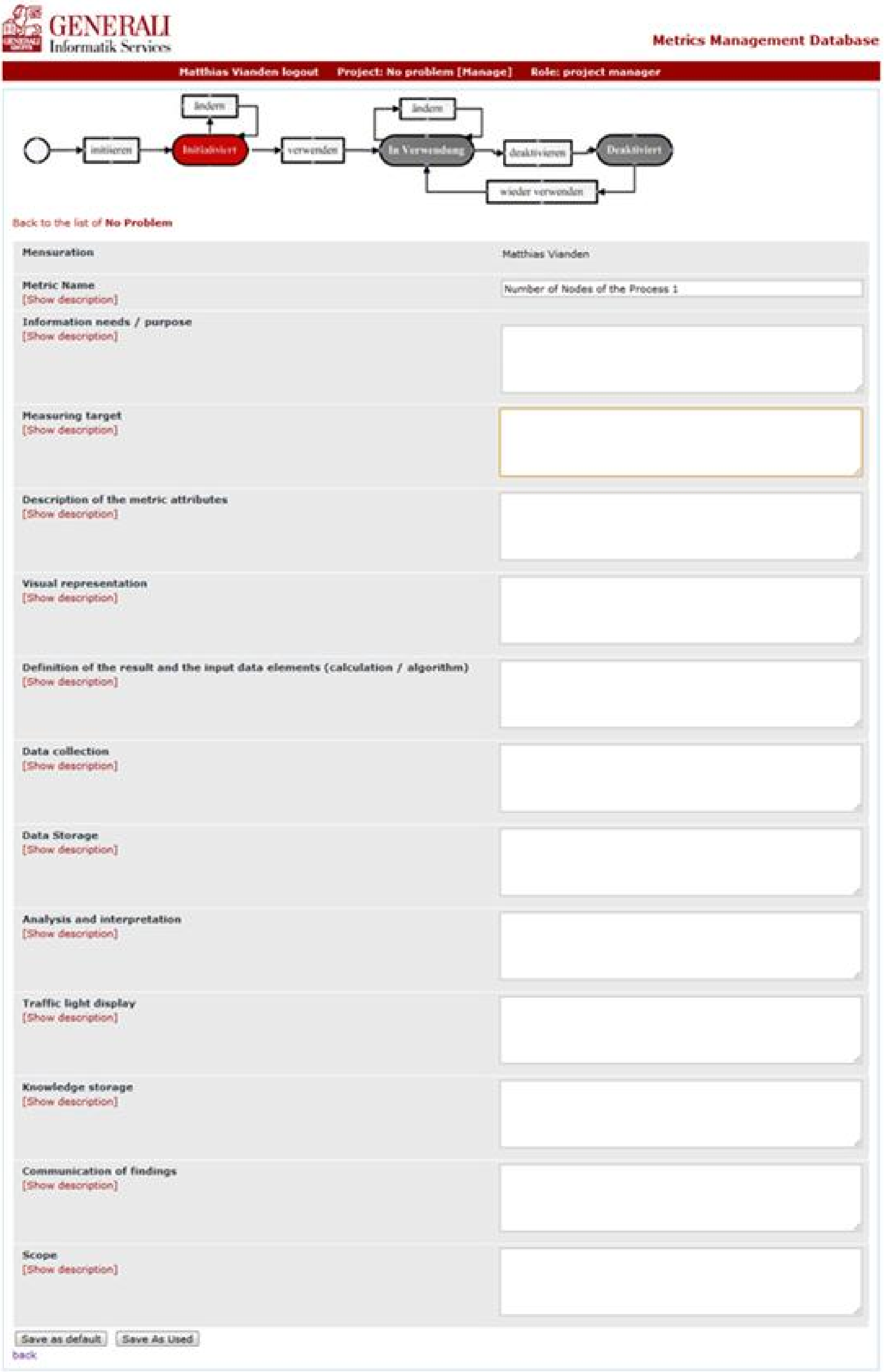
(Friedrich Nietzsche)

Contents

Software prototyping refers to the activity of creating a prototype of a software application [Wik11], for example; an incomplete version of the software program that is being developed or a specific subsystem of the program. Prototyping in this chapter is part of the implementation plan of the new meta-model of the MeDIC information system. The prototyping will be provided with horizontal dimension of prototyping, represented with some initial sketches of the system interface to provide a first look at the actual implementation. With prototyping, the software designer and implementer can get feedback and confirmation from the users in early phases of project implementation and reduced the time and cost of making changes during the actual implementation.

Horizontal prototyping provides a broad view of an entire system or subsystem, focusing on user interaction more than low-level system functionality. The scope of the prototyping will be focused on two main variation points in the MeDIC system described in chapter three; information needs and metric measurement model. Furthermore, a simple application scenario is attached to each variation point to give a brighter description about the prototype. GUI prototyping below is created witha free trial web tool application, the sketch looks like the result, and will focus the user on what is really important for the system rather than itsappearance.

Figure 4.1 shows a graphical user interface of the project specific metric proposal from current implementation of the MeDIC information system, MeDIC version 2.0 that have been in development since September 2010. Interfaces from the screenshot below are divided into two parts, the current state of metric shown at the upper part, and the detailed information of metric parameters describe at the lower part. The current implementation has not supported entity variability modeling yet; the entity that has variability potential is still described with a textual description.



Metrics Management Database

Matthias Vianden logout   Project: No problem [Manage]   Role: project manager

Back to the list of **No Problem**

Mensuration	Matthias Vianden
Metric Name [Show description]	Number of Nodes of the Process 1
Information needs / purpose [Show description]	
Measuring target [Show description]	
Description of the metric attributes [Show description]	
Visual representation [Show description]	
Definition of the result and the input data elements (calculation / algorithm) [Show description]	
Data collection [Show description]	
Data Storage [Show description]	
Analysis and interpretation [Show description]	
Traffic light display [Show description]	
Knowledge storage [Show description]	
Communication of findings [Show description]	
Scope [Show description]	

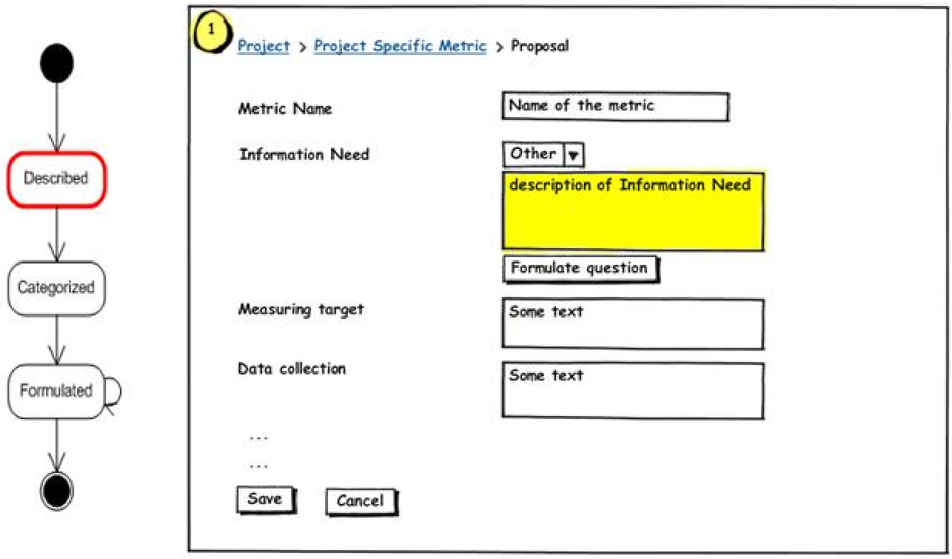
Save as default   Save As Used

back

Figure 4.1: GUI of the MeDIC Version 2.0.

4.1 Information Need Prototype

The first step of measuring software product or process is to define the information needs. As a variation point of entity variability in the MeDIC system, information needs is always started with textual description written by theuser to describe all of the information that they need to propose a metric. This section provides the prototype of GUI that simulates the initiation of information needs and the user's input to develop the information needs entity. All prototypes of information needs are described in figure 4.2 - figure 4.7. Along with prototypes, the information needs's state diagram is attached on the left side of each prototype to track the current state of information needs.



Metric Name: Name of the metric

Information Need: Other ▾

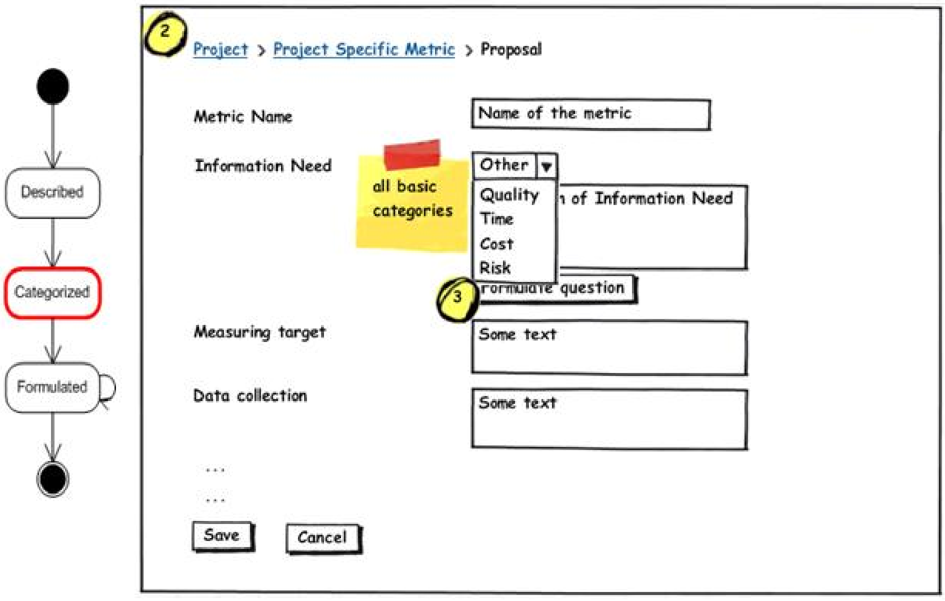
description of Information Need

Measuring target: Some text

Data collection: Some text

Figure 4.2: Information needs description

The first prototype in figure 4.2 shows the interface of information needs initiation, provided by the textbox highlighted in yellow,where user describes their information needs textually. On the right hand side, the state indicates information needsin the 'described' state. In the second figure as below, information needs are categorized by choosing an available category in the system, provided in the dropdown list, while the state diagram in figure 4.3 shows the evolution of information needs, to be in the 'categorized' state.



Project > Project Specific Metric > Proposal

Metric Name: Name of the metric

Information Need: Other ▾ (Quality, Time, Cost, Risk) — of Information Need

Formulate question

Measuring target: Some text

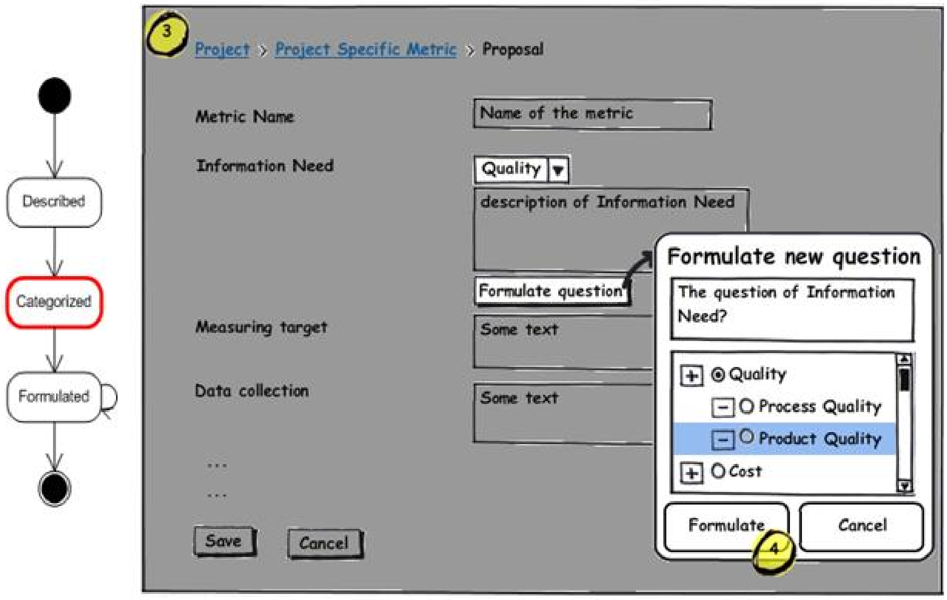
Data collection: Some text

...

...

Save | Cancel

Figure 4.3: Information needs categorization



Project > Project Specific Metric > Proposal

Metric Name: Name of the metric

Information Need: Quality ▾

description of Information Need

Formulate question

Measuring target: Some text

Data collection: Some text

...

...

Save | Cancel

Formulate new question

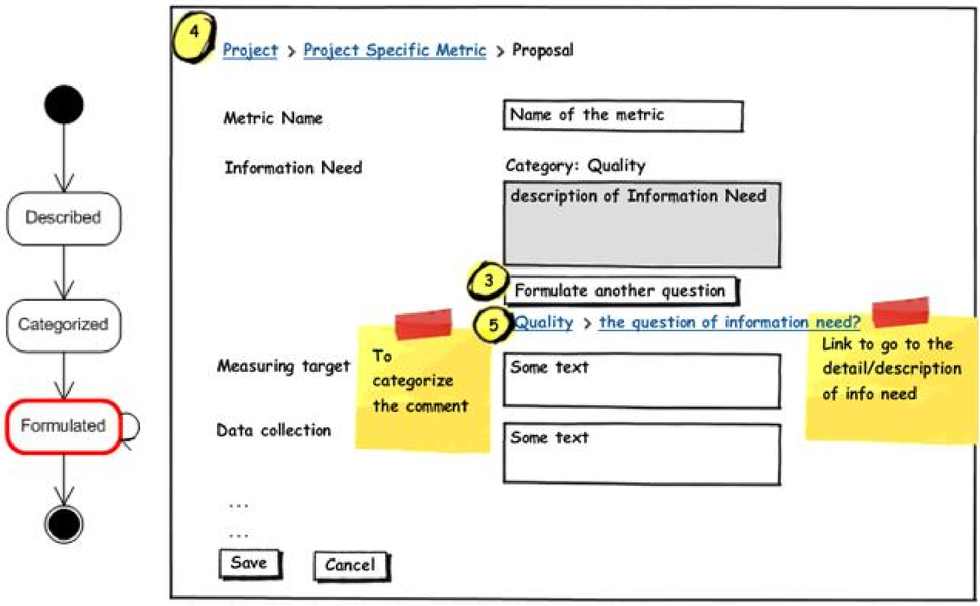
The question of Information Need?

⊞ ● Quality
⊟ ○ Process Quality
⊟ ○ Product Quality
⊞ ○ Cost

Formulate | Cancel

Figure 4.4: Question formulation for information needs

The state diagram in figure 4.4 still maintainsthe state of information needs in a 'categorized' state, while the user formulates a question for the aforementioned information needs. The formulating question window is executed using the available button. The question is typed in the available textbox, while the default category is the same category as the category that has been chosenpreviously, otherwise the user will be able to choose a new or more specific category. Aftertheinformation needs question formulating process, the state of information needs are updated into 'formulated' state and the list of formulated questions will be shown under the initial description of information needs (figure 4.5).



To categorize the comment

Link to go to the detail/description of info need

Figure 4.5: Information needs with formulated question

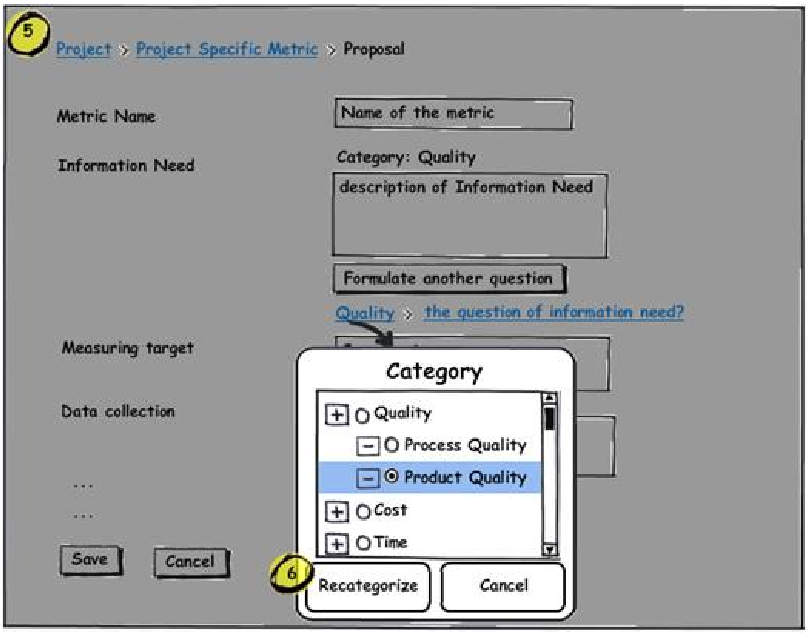
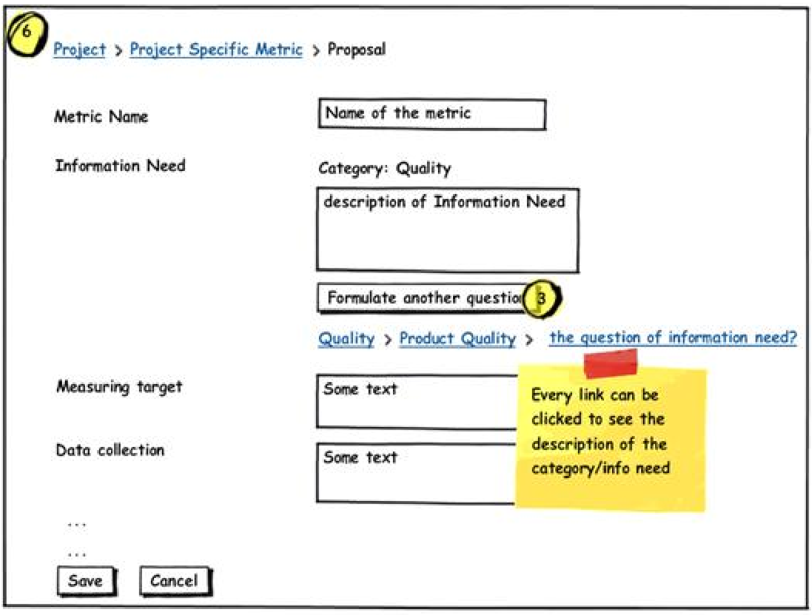


Figure 4.6: Re-categorization of formulated information needs

The formulated question on the list is preceded with the category that the question belongs to. Furthermore, every category is represented as a link that can be re-categorized with a more specific category, or can be changed into different categories. The process of re-categorization of formulated questions is presented in figure 4.6 and the result is shown in figure 4.7 below.



Project > Project Specific Metric > Proposal

Metric Name: Name of the metric

Information Need: Category: Quality

description of Information Need

Quality > Product Quality > the question of information need?

Measuring target: Some text

Data collection: Some text

...

...

Every link can be clicked to see the description of the category/info need

Figure 4.7: Information needs with sub-categorization

4.2 Measure/Metric Prototype

Measurement is the main element of a metric meta-model. The variability source of measure entity is the variation type of entity evolution. Metric measurement is initiated with a textual description, and the specification of the measurement approach later will determine the type of measure. The interface prototype of metric measurement will be presented within the scenario of Cost Performance Index (CPI). CPI is the cost efficiency ratio of earned value to actual costs to predict the magnitude of overrun possibility. The ratio is the calculation result of other measurement values; Earned Value (EV) and Actual Cost (AC). Therefore, CPI is a derived metric.

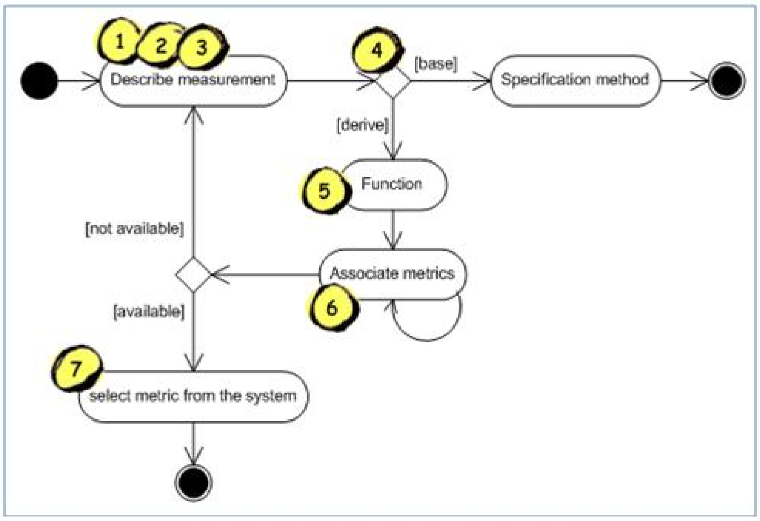


Figure 4.8: State diagram of metric measurement

The prototypes of metric measurement are presented in figure 4.9 - figure 4.11. Every prototype will have a specific number in the left top corner, to show the sequence of the scenario. In addition, the sequence state diagram of the measure is shown as figure 4.8 above, with reference numbers to the relevant prototype in each measure state. The first interface prototype describes the initiation creation of measure with pressing the available button. Description of CPI measure is written in a popup window which occurs when creating new measurements. Measurement approach can be defined right after the description of measure, or can be defined later. Figure 4.10 shows the definition of measurement approach, in this scenario, CPI is considered as derived measurement with function: CPI = EV/AC. After determination of measurement approach, types of measure will be shown beside the measure's name. The next step of derived measure specification is to associate related measures, such as earned Value Measure and Actual Cost. Available related measures can be chosen from the existing system (figure 4.11), otherwise the related measure have to be defined first.

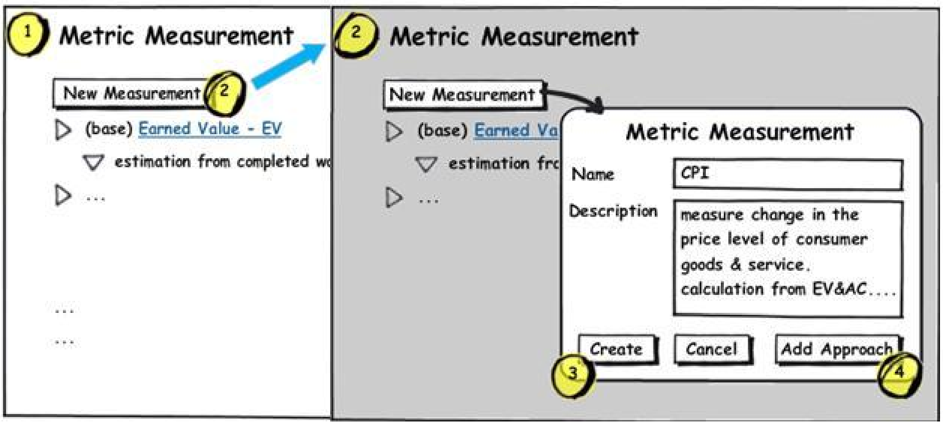


Figure 4.9: Metric measurement initiation

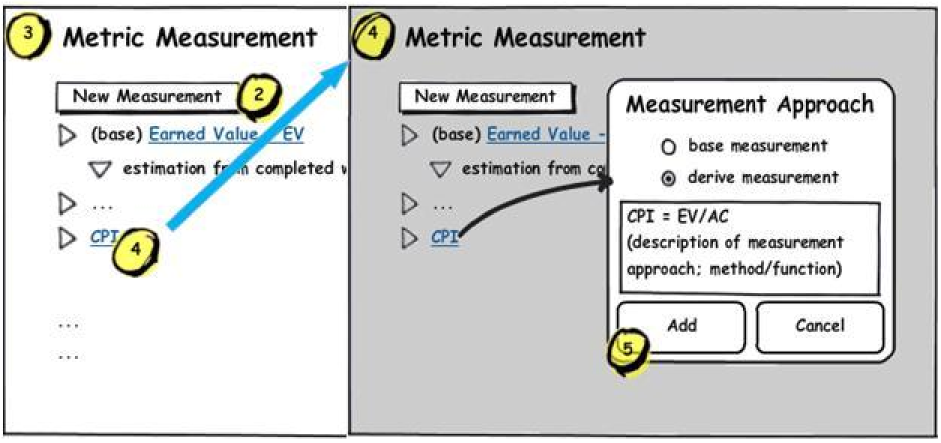


Figure 4.10: Measurement approach determination

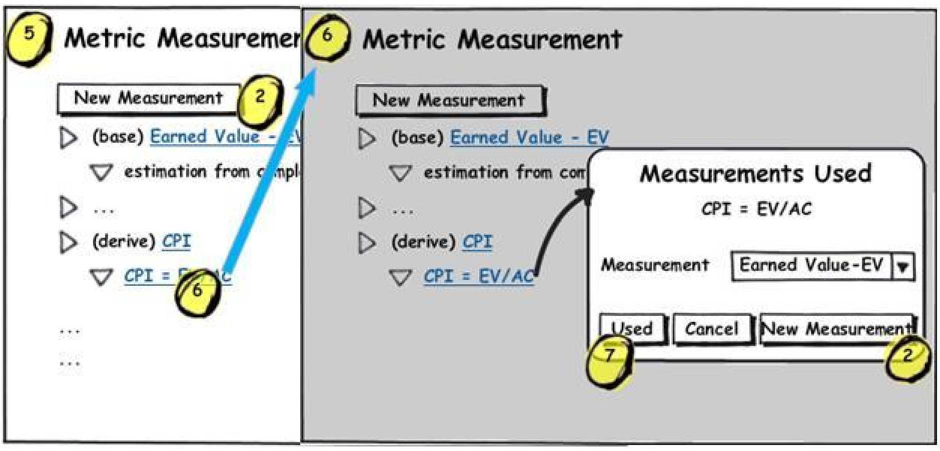
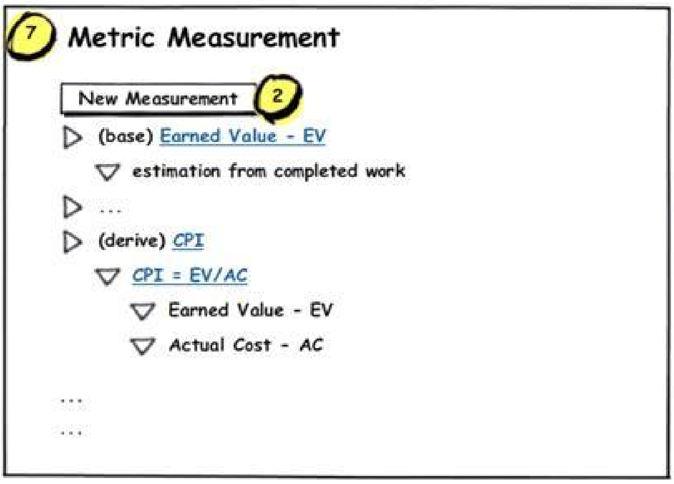


Figure 4.11: Function specification with used measure association

The whole picture of metric measurement prototype is presented in figure 4.12. All defined measures are listed in a tree form, all base and derived measures. For base measure, the leaf of the tree is the measurement method itself. The example of base measure shown in figure 4.12 is Earned Value measure, and measurement method is represented as a leafto get the value of EV, presented as project manager estimation of completed work packages. The example for derived measure is CPI, asper the scenario description used in this section. The leaf of CPI is the function formulateion of CPI itself, and the second degree leaf is all related measures that are needed to calculate the reference function.



Metric Measurement

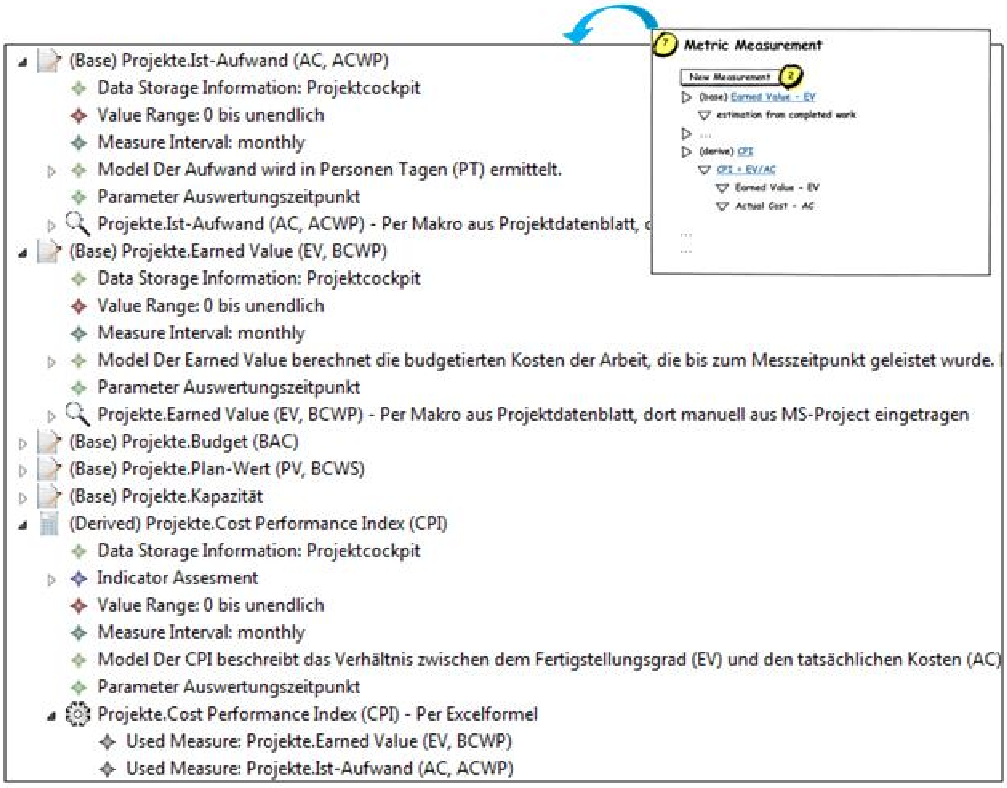
New Measurement

▷ (base) Earned Value - EV
    ▽ estimation from completed work
▷ ...
▷ (derive) CPI
    ▽ CPI = EV/AC
        ▽ Earned Value - EV
        ▽ Actual Cost - AC

...
...

Figure 4.12: Interface of metric measurement prototype

Figure 4.12 is depicted as the main interface of metric measurement prototype, where we can see all the lists of measures and their measurement approaches. The next screenshot is figure 4.13, the screenshoot of rich client interface of the MeDIC version 1.0, an initiate interface to show the users an overview about the system that were going to build. Based on our current implementation shown in figure 4.1, current applications have not meet the expectation yet, that is illustrated in the rich client interface of the MeDIC version 1.0. However, the measurement prototype shown in figure 4.12 is more reflective of the implementation that we want to achieve. The prototype of metric measurement in this chapter is a prototyping resulting over several steps of entity variability modeling that we explained in the previous chapter. With some adjustment and more detailed analysis, we hope that this prototyping can be used to help the realization of the final implementation of the MeDIC system.



```
(Base) Projekte.Ist-Aufwand (AC, ACWP)
    Data Storage Information: Projektcockpit
    Value Range: 0 bis unendlich
    Measure Interval: monthly
    Model Der Aufwand wird in Personen Tagen (PT) ermittelt.
    Parameter Auswertungszeitpunkt
    Projekte.Ist-Aufwand (AC, ACWP) - Per Makro aus Projektdatenblatt,
(Base) Projekte.Earned Value (EV, BCWP)
    Data Storage Information: Projektcockpit
    Value Range: 0 bis unendlich
    Measure Interval: monthly
    Model Der Earned Value berechnet die budgetierten Kosten der Arbeit, die bis zum Messzeitpunkt geleistet wurde.
    Parameter Auswertungszeitpunkt
    Projekte.Earned Value (EV, BCWP) - Per Makro aus Projektdatenblatt, dort manuell aus MS-Project eingetragen
(Base) Projekte.Budget (BAC)
(Base) Projekte.Plan-Wert (PV, BCWS)
(Base) Projekte.Kapazität
(Derived) Projekte.Cost Performance Index (CPI)
    Data Storage Information: Projektcockpit
    Indicator Assesment
    Value Range: 0 bis unendlich
    Measure Interval: monthly
    Model Der CPI beschreibt das Verhältnis zwischen dem Fertigstellungsgrad (EV) und den tatsächlichen Kosten (AC)
    Parameter Auswertungszeitpunkt
    Projekte.Cost Performance Index (CPI) - Per Excelformel
        Used Measure: Projekte.Earned Value (EV, BCWP)
        Used Measure: Projekte.Ist-Aufwand (AC, ACWP)
```

```
Metric Measurement
New Measurement
▷ (base) Earned Value - EV
    ▽ estimation from completed work
▷ ...
▷ (derive) CPI
    ▽ CPI = EV/AC
        ▽ Earned Value - EV
        ▽ Actual Cost - AC
...
...
```

Figure 4.13: Screenshot of the rich client interface of the MeDIC V.1.0