Spago4Q Overview

Authors Spago4QTeam

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Version

Version n°: **Release n°:**	1.0 1.0.0-RC1	**Data Version:**	January,18th 2008
Update description:	First version		
Version n°: **Release n°:**	1.0 2.0	**Data Version:**	March,16th 2009
Update description:	The contents of all chapters are changed The chapter 4 was deleted and a new "HowTo" document was created.		

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1 Document Goal

The document aim is to introduce the reader to the Spago4Q concepts.

Software and documentation are freely downloadable from the OW2 forge

(http://forge.objectweb.org/project/showfiles.php?group_id=301)

The document includes the following main chapters :

•**Conceptual and architectural overview**. Introduction to the core concepts of the Spago4Q free open source platform.

•**Functionalities overview**. An explanation of the Spago4Q administration functionalities and the main activities of the various users typologies.

1.1 References

For further information about Spago4Q platform refer to the documentation, available on the project site (http://www.spago4q.org/).

The How To document released is the Spago4Q-2.0.0-HowTo.pdf, it can be downloaded from the OW2 forge. From the same location is possible to get also the Installation Guide. This guide is named Spago4Q-2.0.0-Installation-Guide.pdf.

1.2 Help for lecture

Follows a short description of the most common views in Spago4Q.

1.2.1 Stylistic conventions

LITTLE CAPITALS	The LITTLE CAPITALS reference to the icon in a mask.
italics	The *italics* refer to fields of the masks.
<ITALIC CAPITALS>	In *<ITALIC CAPITALS>* the logical variables are suitable.
boldface	In **boldface** the main concepts.

1.2.2 Special sections

Note

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Example

Reference to other section or documents.

In revision phase

Future implementation. To be done.

Advice for the reading of the section

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2 Spago4Q overview

2.1 Conceptual overview

Spago4Q – SpagoBI for Quality – (www.spago4q.org) is a Free Open Source Software platform, released under GNU LGPL license, for maturity assessment, effectiveness of development software process and quality inspection of the released software: this goal is achieved by evaluating data and measures collected from the project management and development tools with non-invasive techniques.

Spago4Q supports both companies and organizations in the certification process and, more in general, in monitoring a formalized development process.

Spago4Q supports all the activities of a Measurement&Analysis process based on PDCA (Plan, Do, Check, Act) cycle.
The main activities addressed are the following:

- Establish measurement objectives with the specific metrics, The GQM method could be applied to align metrics with measurement objectives (the goals of the Organization)
- Specify data collection and storage procedures. Measurement sources identification and attributes collection. Implementation of the procedures to extract data to load into the datawarehouse.
- Analyze measured data and show the results. It's possible to add an interpretation criteria of the metrics values that is useful to better understand the values produced at runtime.
- Thanks to the security features it's possible to define some access criteria on the reported results. Identification of the Relevant stakeholders, who will receive periodically the results of data analysis, based on the role in the organization.

2.2 Architectural overview

Spago4Q architecture, obtained as a verticalization of SpagoBI (the Business Intelligence Free Platform www.spagobi.org) is designed in order to be easily adapted to complex organizational contexts. It integrates an advanced meta-model which makes Spago4Q fully independent from the adopted software development processes, infrastructure tools, measurement and assessment frameworks.

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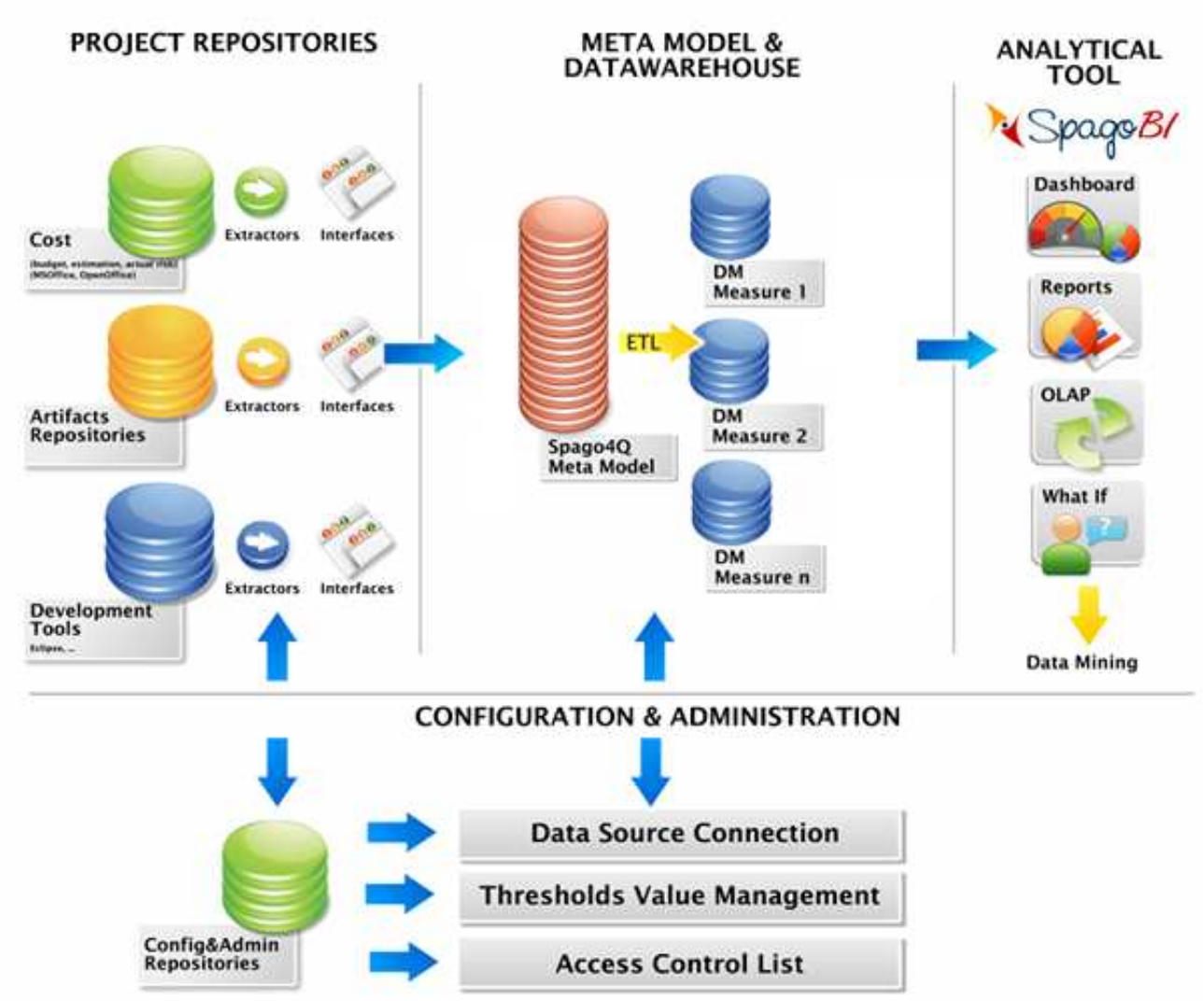

Figure 1 – Architectural overview

Figure 1 depicts out Spago4Q architectural overview, the main components are following described.

Specialized extractors or *ETL* (Extract Transform Load) procedures extract data from the infrastructure tools.

Extractors are specialized components to collect data from different data sources.
They have the following characteristics:

- collect data from infrastructure tools and load the "Interfaces" components;
- an extractor can load one or more "Interfaces" components;
- can be developed with different technologies, the configurable extractor released (Java) is for accessing a database and extract data using a query;
- more extractors can exist to collect data from a specific tools;
- it's possible to apply dynamic rules to filter or transform extracted data to be compatible with the "Interface" data.

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Release 2.0 includes extractors to collect data from Database.

Interfaces are components that defines the data format used for the analytical documents and the KPI computation. They create a decoupling layer between extractors (tool dependent) and the analytical logic (tool independent).

They have the following characteristics:

- for every area of measure (i.e. requirements, bugs, test) only one interface is defined in order to standardize the data format collected from different projects or tools.
- The interface format can be defined using administration functionalities

Release 2.0.0 includes new administration functionalities to define the Interface format. See the How To document.

DWH-Spago4Q is the repository of all data collected from projects developed by an Organization. This part of the database is identified by the tables with the name that stats with:

- DT_: these table are used to describe the custom environment or are the tables to get the data from
- FT_: these are the tables that represent the "Interfaces" so it's where the extraction process store it's data.

Refer to chapter 2.3 for more details.

Analytical tools: they analyze data and represent KPIs. In order to complete the assessment process, data inserted in the datawarehouse has to be analyzed by the analytical component. This module has been implemented inside of SpagoBI, in order to cover and satisfy the whole range of BI requirements, both in terms of analysis and data management, administration and security. Using SpagoBI platform to implement the Spago4Q analytical components makes easy to represent every KPI, metrics and the related thresholds as an instance of a particular analytical document type offered by SpagoBI itself (report, OLAP, dashboard, data mining, free inquiry, geo-referenced analysis).

Configuration & Administration modules allow system configuration.
All the components described above can be properly configured through the *Configuration & Administration modules* that provide the following characteristics:

- model, KPI and thresholds values management;

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- extraction processes that collect data from repositories and tools through the extractors components and adapt them to the specific interface.

- interfaces configuration, that allows the definition of the data structures that are going to store the information extracted from repositories and tools.

Note : the Spago4Q modular architecture and meta-model design guarantees extensibility towards others infrastructure tools and to further sets of activity measure areas.

2.3 DATAWAREHOUSE

Spago4Q can support Organizations that have to guarantee uniform levels of process and product quality across all their projects. In order to achieve the following goals:

- high adaptability to various organizational contexts;
- support for a complex system of evaluation;
- measurement process not bound to the adopted software development process and tools;
- automatic data collection from a set of tools;

The DWH_Spago4Q is designed on a meta-model definition followings the Meta-Object Facility (MOF) approach proposed by the Object Management Group (OMG).

2.3.1 META-MODEL

The Meta-model, defined by the contribution of the University of Milan - Department of InformationTechnology - SESAR (Software Engineering Software Architecture Research Lab) http://sesar.dti.unimi.it/ , represents the process(es) to be monitored, the measurements to be taken and the assessment frameworks to be used.

These three components have been designed independently, allowing to apply the same measurement framework to different processes, or to measure the same process according to different measurement frameworks. The interface between the process and the measurement modules is realized by the specification of measurable attributes of process activities and work products, needed by metrics. The interface between the measurement and the metrics modules is defined as a set of Key Performance Indicators (KPIs) based on measurements.

Computing process KPIs required the implementation of a series of specific extractors, that know which attributes to extract and where these attributes could be found in process and product definitions. Finally, all process metrics to be included in process reports are defined in terms of KPIs.

The meta-model is depicted in Fig. 2

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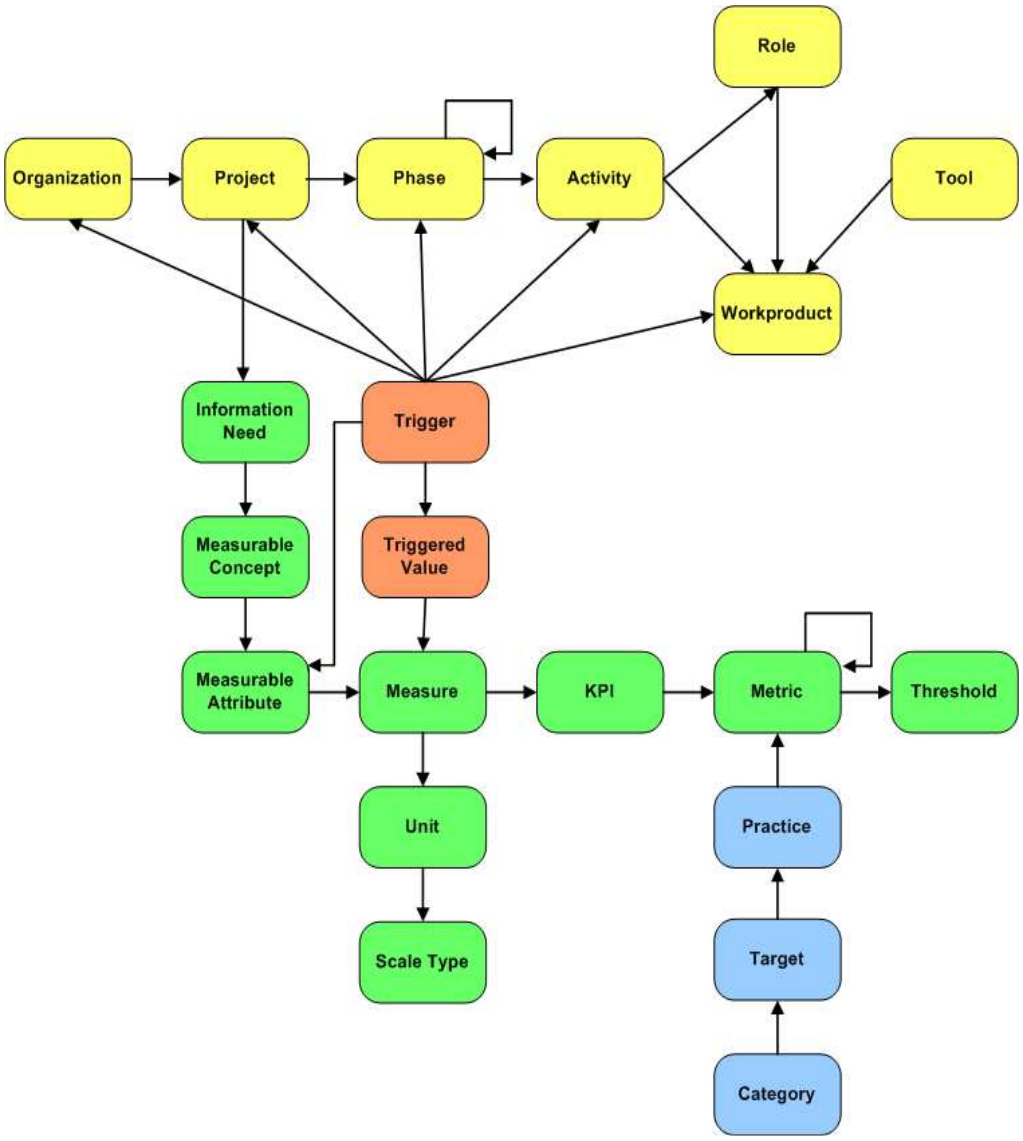

Figure 2 – Spago4Q Meta-model

We briefly describe the major meta-model modules: Process, Measurement, and Assessment.

Process module.
The top element is the node Organization, which describes the whole organization and allows enterprise-wide measurements. It gathers all the Project nodes, which indicate a single project of the organization. Each project is associated to a specific development process model (waterfall, Agile, ..).

Measurement module.
It is based on our reverse GQM (Goal-Question-Metric) approach and defines a generic framework exploitable to get measures from any development process.
The Information Need node is the container node that defines the need that drives all the measurement actions. For each information need there is a set of Measurable Concept nodes. These concepts drive the definition of the Measurable Attributes, which indicates the attributes to be measured in order to accomplish the analysis goals.

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The Measure node defines the structure of data retrieved during a measurement campaign. This node is directly connected to attributes and supplies raw data to KPI and Metric. Each node is specified by the nodes Scale Type and Unit, defining, respectively, the unit of measurement used and the type of scale adopted (nominal, ordinal, and so forth).
The monitoring indicators are defined in terms of KPIs (Key Process Indicator) and Metrics. Finally, the Metric class is in relation with the Threshold entity specifying the threshold values for each metric when needed for qualitative evaluations.

Assessment Module
The module simply defines a general assessment framework as CMMI or ISO 9001:2000.
This module allows a simple classification in terms of Category, Target, and Practice. The Practice node is connected with the Metric class in the Measurement module, highlighting the concept that the evaluation of a set of metrics could assess the real appraisal of the practices.

2.3.2 DWH_Spago4Q

DWH_Spago4Q is an implementation of the meta-model.
The DWH_Spago4Q, due to its complexity, is divided in five areas: each area is composed by a group of tables that are functionally strictly related to each other and have some links to other areas.
In the following figure 9 the five areas are represented, with the general links between them.

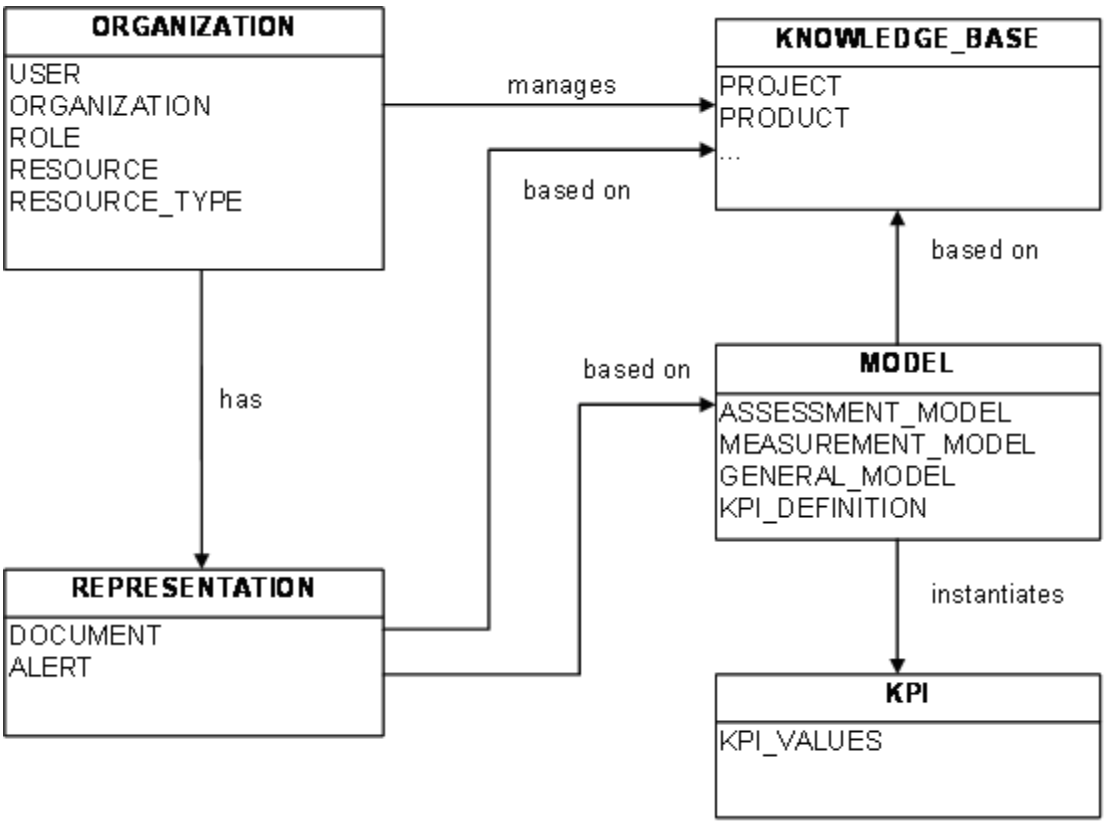

Figure 3: General metamodel schema with areas

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A detailed description of the five areas is the following:

- Organization - the tables in this area define the organization representation, including users, roles and authorizations. The Organization is related to:
  - the "Knowledge Base" area because the organization manages the resource to be measured
  - the "Representation area" because the representation object could be authorized to some elements of the organization.
- Model - the tables in this area represent the assessment model, the measurement model, the general model and the KPI and thresholds definition. This Model is related to:
  - the "Knowledge Base" area because the models are based on resources
  - the "KPI" area because the KPI defined in the Model area are instantiated in the KPI area.
- Knowledge base - this area represents the data-warehouse, where the resources representation, to be measured, are hosted. In this area new tables, related to all resources measured, can be added during a real project design phase.
- Representation - the tables in this area host the definition of the analytical documents or alerts to be produced. It's based on Model and Knowledge Base areas. The Representation is related to:
  - The "Knowledge Base" area because it takes information on resources from there
  - The "Model" area because a representation is an instance of a model, based on one or more resources.
- KPI - This area, with one table only, is defined to store all the KPI values.

Datawarehouse structure

The datawarehouse is modeled on the dimensional model concept.

According to this theory record data is stored in de-normalized tables named "Dimension tables" Transactional data is stored in "Fact tables". This structure is named "star schema" .

Spago4Q implements the dimensional model theory applying the "snowflake" technique. This method requires to manage level of normalization on dimension tables. This normalization increases the number of Joins and introduces a potential performance worsening, but the configuration operations are more useful.

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3 Functionalities overview

Functionalities are described for users and administrators.

3.1 Recurring themes

The graphical interface adopts conventions described in this chapter.

3.1.1 Layout

Every page points out some common characteristics:

- On the top, there is the title identifying the page meaning.
- On the right side of the title, some icons allow the access to the general functions acting on the page's content. The main functions are (where admitted):

• 	going back to the previous page without saving changes;	Every page
• 	creating a new element;	Every page
• 	switching from the list view to the tree view;	Document config.
• 	switching from the tree view to the list view;	Document config.
• 	saving information;	Details pages
• 	saving information and going back to the previous page;	Details pages
• 	testing before saving.	LOV details
• 	Return to main page	Details pages
•		
•		
•		

- The '*' character identifies the required fields.

3.1.2 List and detailed View

One of the most common views in Spago4Q is a simple table showing a list of elements.

Common characteristics are:

- On the top, the title identifying the table meaning.
- The first row shows a label for each column displayed.
- The list can be divided into pages that can be turn over using the two arrows on the bottom row.

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•The current page and the total number of pages are displayed in the middle of the bottom row.
•Every list has a detailed page showing and allowing to modify all the data about a single element.

Every list is alphabetically ordered on the first column's content (the label) and each row shows the essential data of an element, always identified by a unique label or title.

On the right side of every row, some icons drive the operativeness on the single element (row) of the list. The main possible functions are (where admitted):

- accessing the details page for the selected element (row). — Every list
- deleting the corresponding element (row); — Every list
- executing the corresponding element (row); — Analytical Doc. list only
- Selecting all. — Tree management
- Selecting element (row) — Every list
- View parameters — Every list
- View list values — Threshold list

A standard view of a list and detailed page follows.

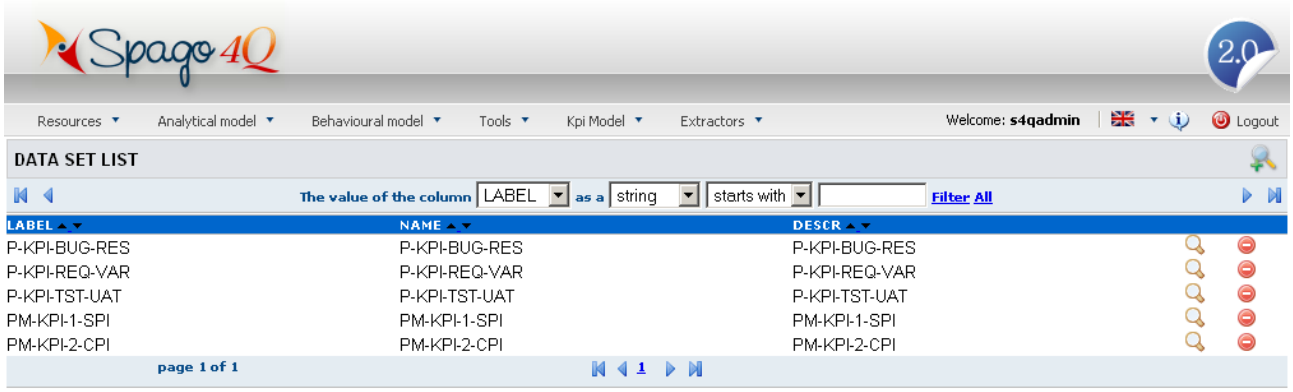

Figure 4 – List-detail examples

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3.2 SPAGOBI USERS

For further information about SpagoBI users - Administrator, Developer, Tester - refer to the documentation, available on the project site www.spagobi.org).

3.3 SPAGO4Q ADMINISTRATOR

The Spago4Q administrator (s4qadmin/s4qadmin) has the wizards which let him perform the following main operations:

- managing Models to create or modify assessment framework models, measurement models or generic models;
- managing the KPIs , the thresholds, the relationship between KPIs, analytical document and "dataset" (software objects implementing calculation rules);
- managing Model Istances to create a relationship between Models, KPIs and resources;
- managing the data sources and extraction processes in terms of interfaces, and extraction operations.

For further information about administration refer to "HowTo " document

Administration Reports

The construction of the models, kpis, thresholds, instances and their relationships could be very complex.
Reports are available to support the verification of the completeness of the work done. Two of these report are made available and they summarize the model instance configuration and the extraction process configuration. You can call each one of them form the user interface on the list of these items respectively.

The next screenshot shows a sample of the summary report of a Model Instance.

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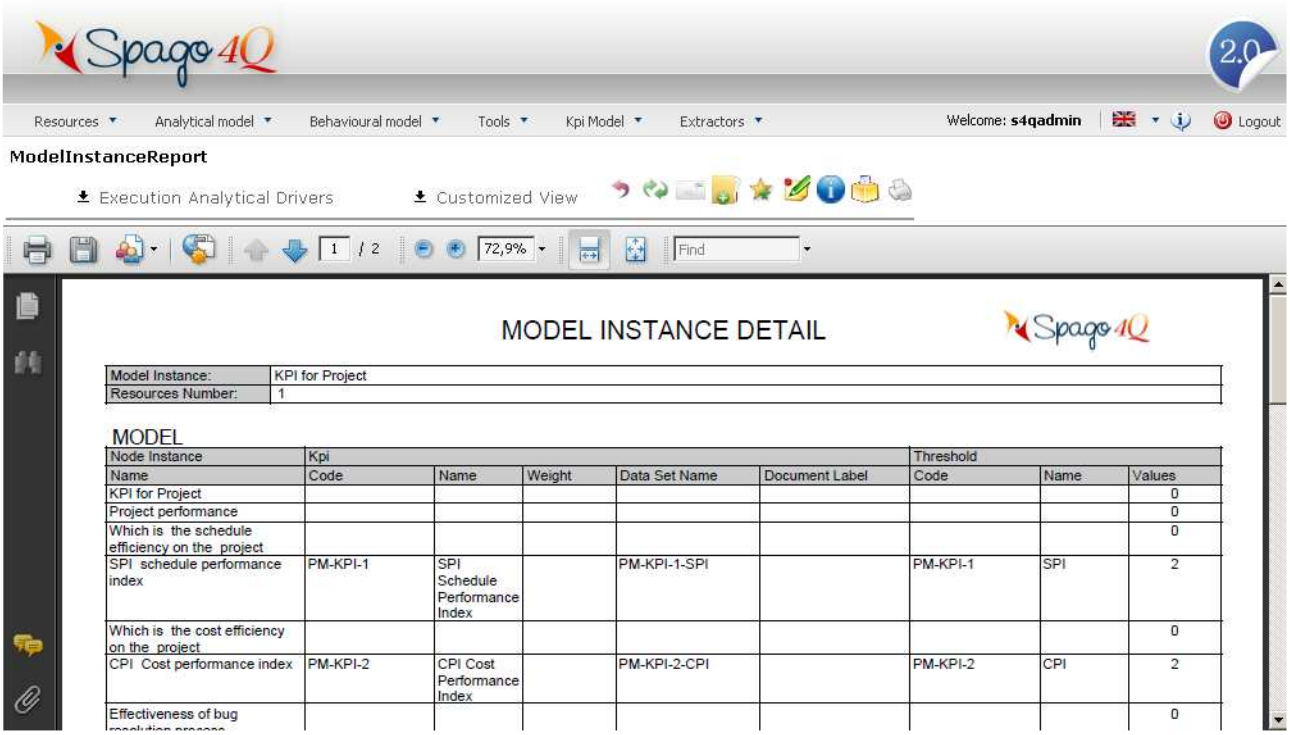

3.3.1 SOURCE WIZARDS

Source Wizards functionalities are the following:

- Data source management.
- Extraction process management.

The "Data Source" wizard lets the user choose a source type among the ones defined in the system . It shows therefore a list of all the data sources associated to the selected type and lets the user insert new one, update or delete the current one.

The "Extraction process" wizard shows a list of all extraction processes, each one characterised by a name, a description and a list of operations. For a complete description of the extraction management see the How To manual.

3.4 END-USER

Spago4Q shows to the user, logged in as "s4quser/s4quser", the following page:

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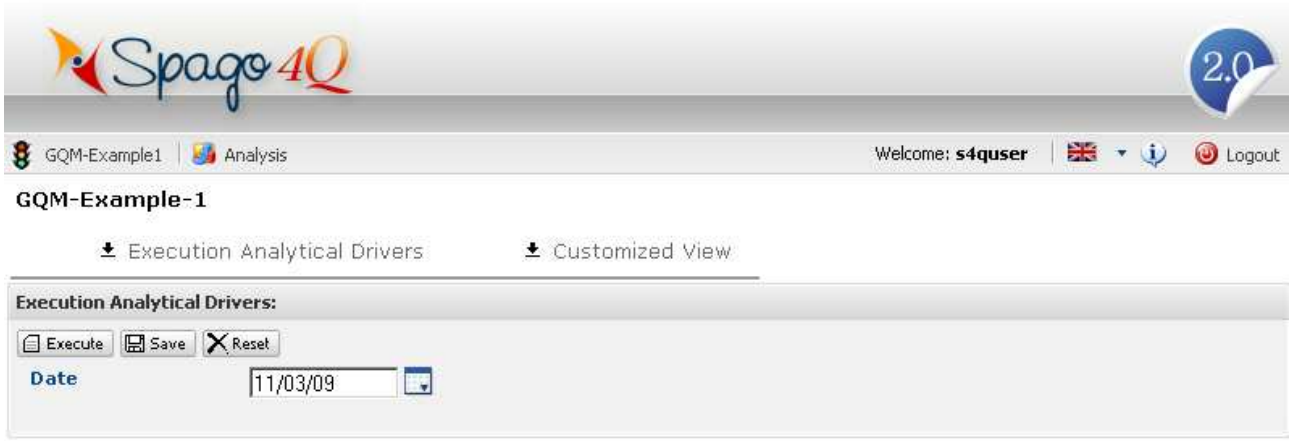
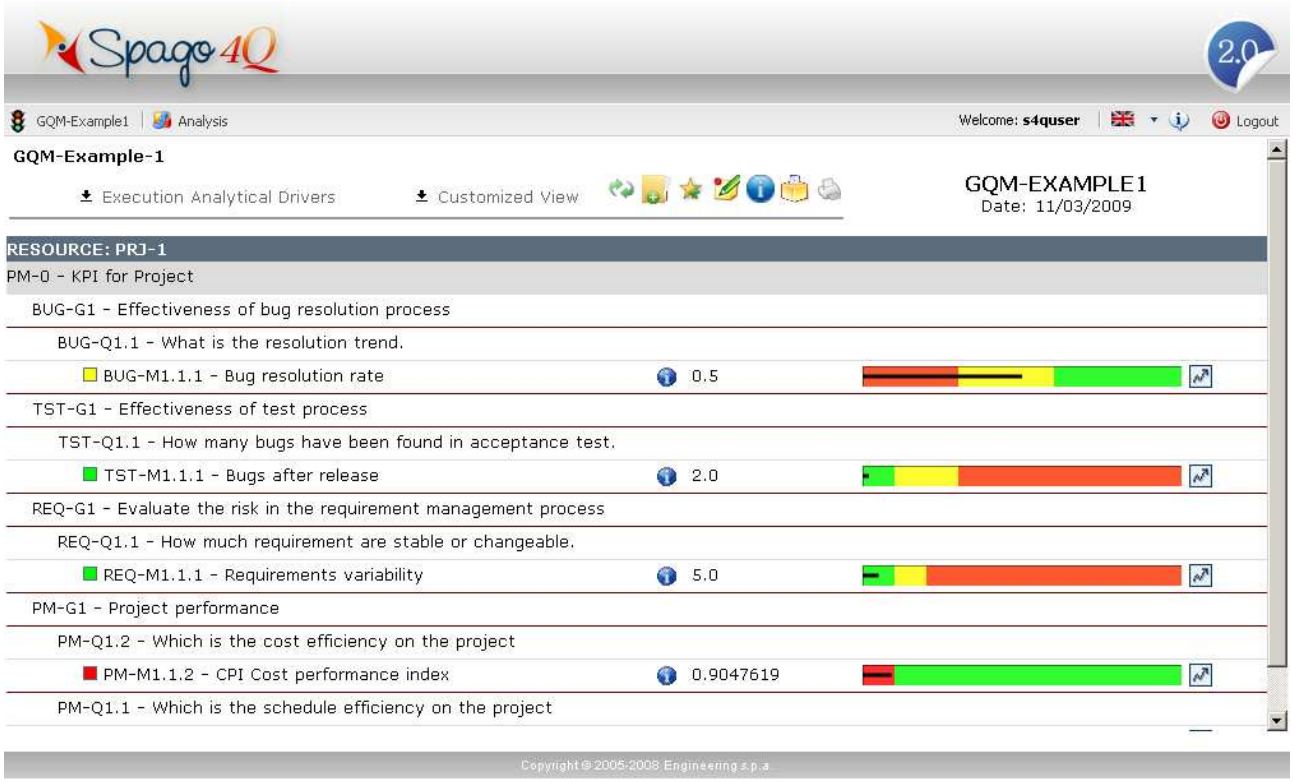


Click on Execute to enter in the Dashboard view.



This page shows for each resource the model instance tree with all the KPIs calculated. If your execution has been on more than one resource you will see after the title some clickable words that permit to open and close each resource tree. For example by clicking on Close All, nothing will appear on the page and then by clicking on one *Resource Description*, only that will appear.

KPI Reports

For every KPI it's possible to associate another analytical document, related to the KPI, and associated in the KPI detail page, that will be available at the end of the row as a document icon. By clicking on this icon you will get the report executed.

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Composed document

An useful type of KPI report can be the SpagoBI composed document that let you dynamically relate the KPI state with whatever is of interest of your analysis.

Analysis by Role

Click on the "Analysis" menu item to display all the analytical documents available to the logged user. (these associations are managed by SpagoBI administrator)

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