

### Introduction

QSYS is a web-based survey software intentionally developed for running experiments dealing with visual design effects on respondents behavior as part of a dissertation project. In the current version, the software includes an easy to use online-editor supporting online survey's creation, accomplishment and administration. The users can develop an online-questionnaire without knowledge of HTML.

As online survey software constitutes a competitive market, one has to ask, why another product in this segment?

Conversely to other commercial and non-commercial products, QSYS gives users and developers access to the source code and the permission to create derivative works from the original survey software. This option allows the adaptation and extension of the software to customers' needs and installation of the complete package without any license fees.

The development process focused on the design of reliable and extendable software architecture. Therefore, new question types, extensions to existing question types and style/appearance of questions can be created/adapted easily without the necessity of breaking with existing software design concepts. Moreover, questions' visualization is strictly separated from the questionnaire's content, so each survey can be presented in an individual style with low demand on resources. QSYS supports all common question types and a diverse range of participation modes.

Some **key-features** of QSYS at a glance:

- Several different question types are supported with various configuration possibilities.
- The Editor comes with a WYSIWYG-Editor for all question types.
- Questions can be displayed in a paging (one page per question) or in a scrolling (multiple questions on one page) mode.
- When applying the scrolling mode, page separators support the question's categorization as logical units.
- Branching
- Mandatory questions. The user gets a feedback, when the question is not answered sufficiently.
- PDF export enables an offline version of the questionnaire (e.g. for mixed mode studies).
- XML export serves as an exchange and archiving possibility (answers of respondents can be exported as XML too).
- Paradata tracking: Export of time needed for filling out one question together with browser and operating system information, export of the IP address for each participant can be enabled (storage can be turned off to assure privacy).
- Language independence is secured, as language tokens are stored externally. As a result, a simple translation of these tokens adapts the software to a further language.
- An optional summary of all answers for the respondents can be offered at the end.
- Questionnaire's completion can be limited to a certain spell.

• Entire software is published under an Open Source License allowing extension and customization to distinct needs.

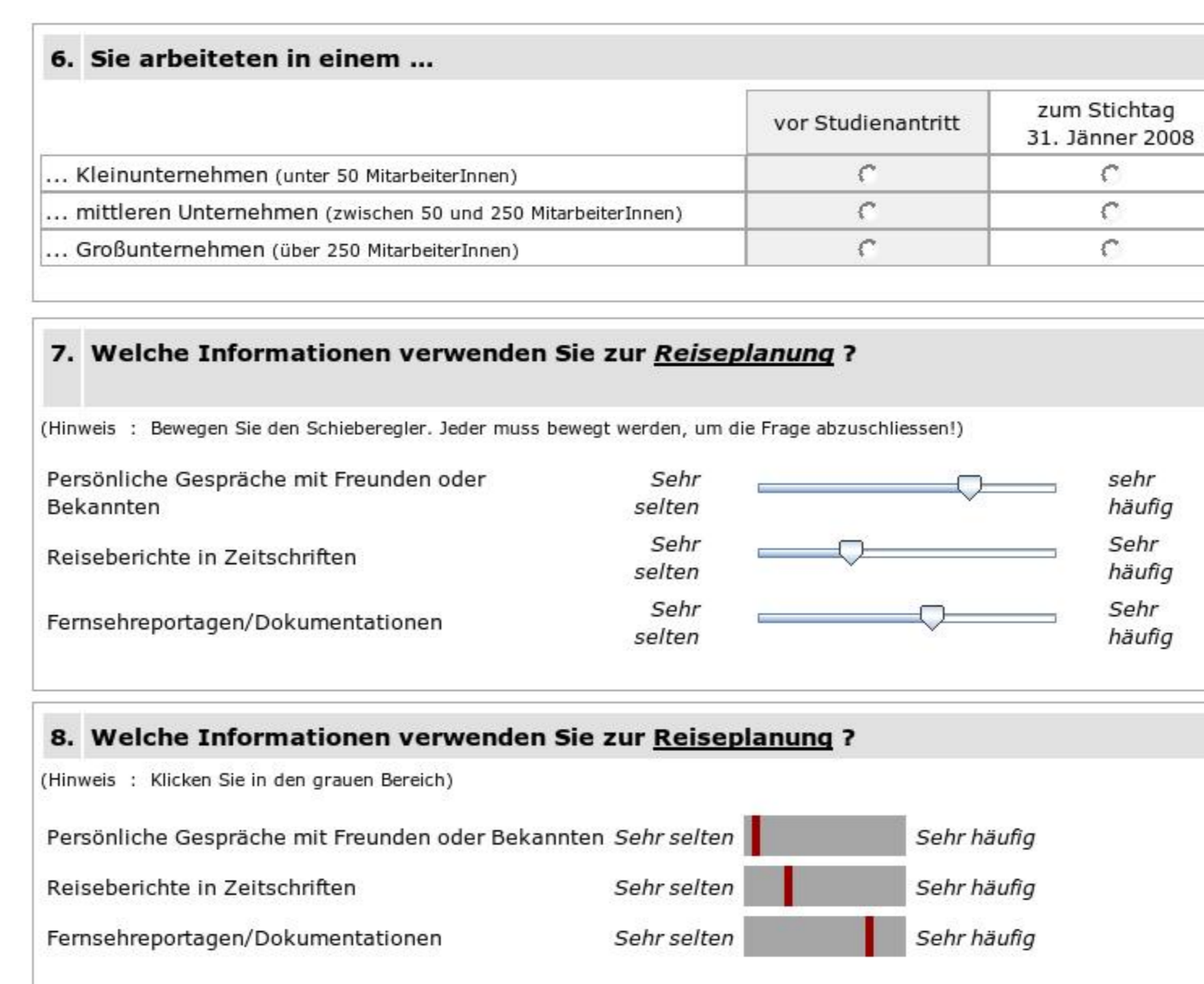
- A common servlet engine is sufficient to install QSYS on a server. Not even a database is needed.
- A Status (DEVELOPMENT, PRETEST, OPERATIONAL, DISABLED) can support the user to distinguish between different phases of the survey stored together with the given answers.

### Supported Question Types

QSYS supports a wide range of question types:

- Closedended question.
- Dichotomous question: similar to closedended question, the respondent can select one of two alternatives.
- Pictogram question: similar to closedended question, with pictures instead of alternatives.
- Closedended ranking question: bringing alternatives in the right order.
- Question matrix: multiple questions with the same alternatives to select.
- Question matrix with column grouping integrating multiple matrices with the same subquestions in one view.
- Semantic differential or VAS: Visual Analogue Scale (VAS) constitutes a measurement instrument measuring a characteristic or attitude believed to range across a continuum of values. VAS is verbally anchored on each end, e.g. *very good* vs. *very bad* (support for a couple of subquestions and the anchor points can be set for each subquestion individually).
- Interval question matrix: just like a semantic differential, labelling of anchor points is the same for all subquestions.
- Interval question: similar to interval question matrix, but without subquestions (rating the question itself)
- Openended question.
- Openended ranking question: presenting multiple openended input fields for one question to the user.
- Openended question matrix: presenting an openended input field for each subquestion of the matrix to the user.
- Image map question: respondents can select a certain region of an image map (e.g. a geographical map).
- Text blocks and page separators: adding HTML code to the questionnaire.

All question texts, page separators and alternative texts can be formatted with an easy to use WYSIWYG-online-editor. Various configurations are possible for each question type.



6. Sie arbeiteten in einem ...

	vor Studienantritt	zum Stichtag 31. Jänner 2008
... Kleinunternehmen (unter 50 MitarbeiterInnen)	<input type="radio"/>	<input type="radio"/>
... mittleren Unternehmen (zwischen 50 und 250 MitarbeiterInnen)	<input type="radio"/>	<input type="radio"/>
... Großunternehmen (über 250 MitarbeiterInnen)	<input type="radio"/>	<input type="radio"/>

7. Welche Informationen verwenden Sie zur Reiseplanung?

(Hinweis : Bewegen Sie den Schieber. Jeder muss bewegt werden, um die Frage abzuschließen!)

Persönliche Gespräche mit Freunden oder Bekannten  Sehr selten Sehr häufig

Reiseberichte in Zeitschriften  Sehr selten Sehr häufig

Fernsehreportagen/Dokumentationen  Sehr selten Sehr häufig

8. Welche Informationen verwenden Sie zur Reiseplanung?

(Hinweis : Klicken Sie in den grauen Bereich)

Persönliche Gespräche mit Freunden oder Bekannten  Sehr selten Sehr häufig

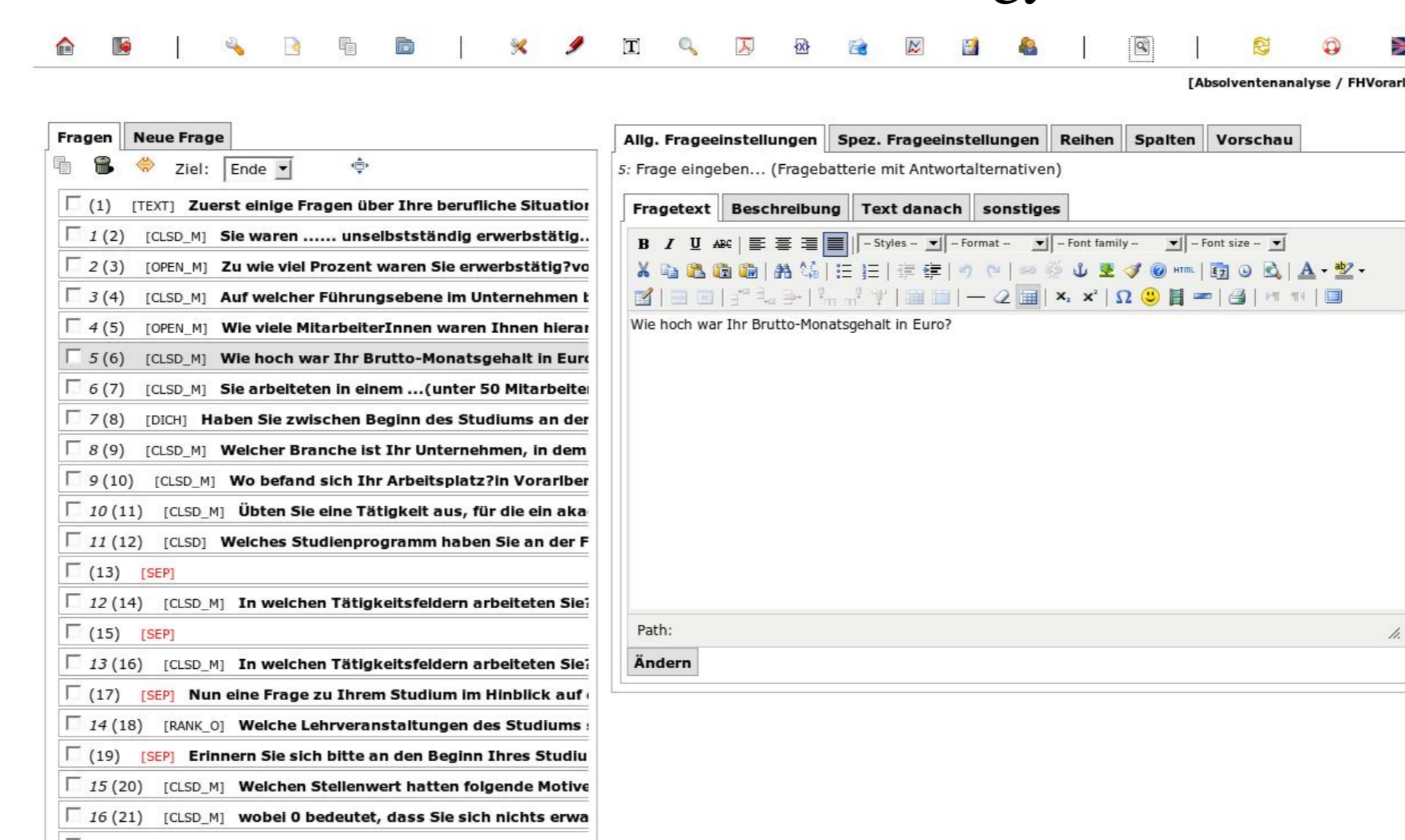
Reiseberichte in Zeitschriften  Sehr selten Sehr häufig

Fernsehreportagen/Dokumentationen  Sehr selten Sehr häufig

Figure 1: Three sample questions generated with QSYS

### Editor

The editor for creating and customizing the survey is easy to use and featured with AJAX technology.



The editor interface shows a list of questions on the left and a detailed view of a selected question on the right. The question view includes a text editor for the question text, a choice of question types (e.g., choice, matrix, ranking), and a visual representation of the question as it will appear to the respondent. The interface is user-friendly and designed for ease of use.

Figure 2: A sample view on the editor

### Technological Background

As developers can adapt QSYS easily, here a few notes on the technological background:

The software is based on Java technology, an extension of Struts is employed as Framework (for details see: <http://struxslt.sourceforge.net>), whereby XSLT visualises the XML content.

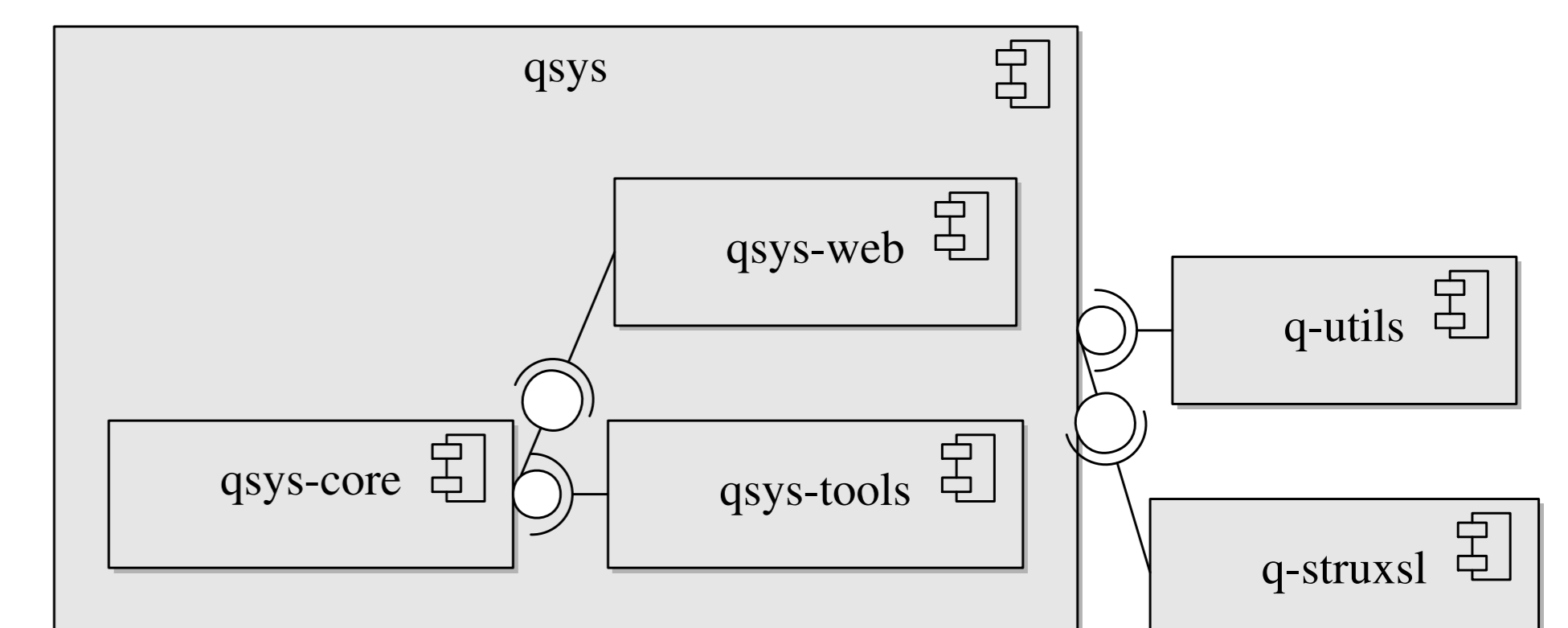


Figure 3: Base component model of QSYS

QSYS uses XML as a core technology (e.g. storage and exchange format). Data can be stored within an Oracle Database, also the open source database eXist can be used for this purpose same as only the file system (which means questionnaires, answers and configuration settings are held within XML documents). TinyMCE is used as online HTML-editor.

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<questionMatrix disp_id="3" flip_matrix="true" id="4" measurement="NOMINAL" obligatory="false" progress_value="2" subQuestionPortion="60"
var_col_width="false" var_label="enter a label" var_name="vname">
<text>
Auf welcher Führungsebene im Unternehmen befinden Sie sich?
</text>
<after_text/>
<description/>
<choices misc="false" mult="false">
<choice askreason="false" id="1">
<text>
Top Management (z.B. Geschäftsführung, Vorstand)
</text>
<choice askreason="false" id="2">
<text>
Mittleres Management (z.B. Bereichs-/Resortleitung, Hauptabteilungsleitung)
</text>
<choice askreason="false" id="3">
<text>
Operational Management (z.B. Abteilungsleitung, Gruppenleitung)
</text>
<choice askreason="false" id="4">
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</choices>
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<text>vor Studienantritt</text>
</question>
<question id="2">
<text>zum Stichtag 31. Jänner 2008</text>
</question>
</questions>
</questionMatrix>

```

Figure 4: A sample of internally question storage

### QSYS for Web Experiments

QSYS especially supports experiments assigning different designs to respondents at random. QSYS is based on the StruXSLT-framework, so assignment of several styles to one questionnaire is an option and the concrete selection of the style for the respondent is done by chance (Probabilities for the selection of a certain style are configurable). Editing XSLT-documents is sufficient to generate different designs for the questionnaires.

### Integration into Custom Infrastructures

In the current version, QSYS can e.g. connect to existing LDAP-Systems and gives only members of a certain group access to the questionnaire. At present, QSYS supports the study evaluation at the FH Vorarlberg (Austria) and works entirely integrated within the campus's infrastructure. Communication bases on simple URL-requests and XML as return values. SOAP-interfaces will be enabled to implement a more proper integration in the future. Because QSYS is published as open source, all functions can be extended to the needs of the individual application and IT infrastructure.

### Conclusion and Outlook

QSYS consists of a stable functional basis with working core functionality, but development continues to extend the functionality set and improve usability. Here a few examples of proposed extension: accessibility according to the WAI guidelines, back-button, further options for branching.

The QSYS-project primarily focuses on the forthcoming of the software. Please take a look at the project webpage, if you are interested participating in the project or simply use the software deploying on your own servers.

Nevertheless, one can request for an account to run surveys on an existing server at <http://www.survey4all.org>