Online Tests and Exams

Online Tests and Exams
- Different types of questions
- Used for e.g.
  - Online polls
  - Tests in e-learning courses
  - Exams in universities
- Advantages of Online Tests
  - Fast deployment
  - Automatic data entry
  - Fast analysis
  - Reusability of questions

Current Solutions
- Single-/Multiple-Choice questions
- Good quality of learning materials
- In the past years: more graphics based questions
  - Hot-Spot,
  - Drag & Drop, ...
- Plug-In needed (Shockwave, Flash)
- Questionnaires have a fixed structure
- Authoring is time- and cost-intensive

GIA (Graphical Interactive Assessment)

Goals for GIA
Development of a tool with the following characteristics
- Graphics based tests
- Short authoring times
- Automatic evaluation process
- Modular architecture
- Extensibility of the system
GIA: Templates

GIA: Extensibility by the use of templates
- Templates developed through:
  - Analyzation
  - Generalization
  - Separation into components

GIA: Extensibility by the use of templates

- PHP and HTML
  - In use for authoring, providing, evaluation and administration of the system.
- Javascript
  - Manipulation of the image (DOM) and verification of the user input.
- SVG (Scalable Vector Graphics)
  - Graphical components within the questions.

GIA: Technical specifications

GIA: authoring

(1) GIA-module for building tests and questions
- Developed question templates
  - „buffer“ (draw a polygon)
  - „image“ (filtering a raster image)
  - „graph“ (mathematical graph)
  - ...
- Internet based building of questions
- Personified exams or tests
- Support for building questionnaires

GIA authoring
Use of Metadata within GIA

- Structuring of the questions for better locating and therefore an easier reusability
- In GIA: Segmentation in chapter and subchapter

Requirements:
- Plug-in free
- Full Graphical support
  - Raster
  - Vector
- Standardised technology
  - XML based
  - Web-based access

Approach
- Scalable Vector Graphics (SVG)
  - To be 2D Vector standard
    - (W3C Recommendation Jan 14th, 2003)
  - Functionality of SVG
    - Text-based description
    - Vector graphics (inclusion of raster graphics possible)
    - Seamless Zooming
    - Online-Painting possible

Approach
- Scanning
  - Text-based description
  - Vector graphics (inclusion of raster graphics possible)
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(3) Presentation module

Shows the graphical part of the question without the correct answers given by the author.

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(3) Evaluation module

Evaluation of a graphical question ("buffer")

- Evaluation using algorithms of the field of computer graphics and image processing within the "buffer"-template.

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Legend
- Point of intersection
- Buffer of the author
- Answer of the learner
- BoundingBox author
- BoundingBox learner

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GIA: Evaluation module

Online tests | GIA | Results

Running Plattform
- Short authoring times
- Automatic verification process
- Storage of the user profiles
- System Application in two areas
  - UAS Mainz (used for research and in the geomatics-lecturing)
  - Health&Media (used for Certified Education in Medicine)
- Enduser Evaluation
- Author

GIA

Results

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GIA

User tests in Mainz

- Tests with altogether 52 students of „Geomatics and Surveying“ with the goals:
  - Test of the functionality of the prototype
  - Usability of the question templates
  - General acceptance
- Tests with several authors (among others professors and staff from the institute) with the following goals:
  - Usability of the prototype
  - Comparison of the time needed to build a questionnaire

GIA

Summary

- Online assessment has a vast field of usages
- Graphical Questions provide a large potential
- GIA solution offers support for authors by means of specified templates
- Success of the chosen approach is shown in currently two application areas