User requirements for an Earth Observation (EO)-based landslide information web service

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Helicopter flight 17.04.2014, St. Johann im Pongau, Salzburg, Austria

SPOT-5 10.09.2011
2.5m resolution
Earth Observation (EO)-based landslide mapping: From methodological developments to automated delivery of web-based landslide information

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Service Concept – How EO data provides value

EO data provider -> Landslide mapping service provider
Web service
Landslide map production

User
Landslide documentation

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Methodology – User requirements gathering process

**Workflow**

Problem

- **Idea**
- **Conceptualize service**
- **Identify and evaluate users**
- **Develop questionnaire**
- **Conduct interviews with users**
- **Evaluate and consolidate user feedback on context**
- **Evaluate and consolidate user feedback on needs**

**Results**

- **Service concept**
- **Stakeholder/user diagram**
- **Questionnaire**
- **Interview protocols**
- **Personas & Scenarios**
- **User needs & requirements**
Stakeholder & user diagramme

Regional Emergency Responders
- WLV - OÖ

Infrastructure Operators
- ÖBF
- ÖAV
- ASFINAG

National and Regional Geological Services, Regional Survey Authorities
- GBA
- Geol - SBG
- Geol - Südtirol
- Geol - Bayern
- Verm - VBG

U4
- Austrian Service for Torrent and Avalanche Control

U2
- Austrian Federal Forestry Office

U1
- Austrian Mountaineering Club

U3
- Regional geological and surveying agencies

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User questionnaire for interviews

Our questions concerned:

• User and user institution
  – Organisation
  – Objectives
  – Established workflows

• Landslide information in general
  – Relevance to user
  – Type of required landslide information

• Landslide information from EO data via web service
  – Applicability to workflows
  – Reliability
  – Usability

• Expected impact
  – Value of EO-based landslide information
The interviews identified the following use scenarios:

• S1: Landslide Rapid Mapping
• S2: Landslide Documentation and Mapping
• S3: Monitoring of selected landslide sites
• S4: EO data search and tasking
Scenario S2: Landslide Documentation and Mapping

Reasons for landslide documentation:
- Reporting on major landslide events
- Production of landslide inventories
- Damage assessment for insurances
- Basis for landslide susceptibility mapping
- Updating maps

Selected user requirement – the issue of time
- (EO data) acquisition as soon as possible after the event (best case: landslides have not yet been cleaned away), landslide information product available within 6 months
User needs and relation to scenarios and users

User types
- Austrian Alpine Association
- Austrian Federal Forestry Office
- Regional geological and surveying agencies
- Austrian Service for Torrent and Avalanche Control

Scenarios
- Rapid Mapping
- Documentation
- Monitoring

Needs
- Need for information about new landslides
- Need for information about activity of known landslide or in debris retainers
- Need for information about damaged infrastructure
- Need for collection of / access to raw data on landslides
- Need for processing raw data to landslide information
- Need for easy-to-use comparison tools that analyse information about landslides and related assets
- Need for access to geodata for comparison
- Need for tools for reporting landslide information
### User requirements overview

#### Needs

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#### High level user requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>N° of sub-requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR1: Interface for landslide mapping and comparison</td>
<td>2</td>
</tr>
<tr>
<td>UR2: Landslide triggering event information</td>
<td>4</td>
</tr>
<tr>
<td>UR3: Data model for landslide information</td>
<td>10</td>
</tr>
<tr>
<td>UR4: Data model for affected infrastructure</td>
<td>9</td>
</tr>
<tr>
<td>UR5: Criteria for landslide identification</td>
<td>10</td>
</tr>
<tr>
<td>UR6: Processes for identifying landslides</td>
<td>4</td>
</tr>
<tr>
<td>UR7: Processes for comparing landslides to other data</td>
<td>3</td>
</tr>
<tr>
<td>UR8: Tools for accessing other geodata</td>
<td>2</td>
</tr>
<tr>
<td>UR9: Tools for publishing landslide information</td>
<td>3</td>
</tr>
</tbody>
</table>

Total: 44
Conclusions

• The user requirements cover landslide information based on the way of usage in application scenarios

• Problems in practice have been identified where new technology can provide an added value

• Next objective has to be: enable practitioners to integrate EO technologies in their daily workflows
State of web service development

- **Web service**
  - Design completed
  - First impressions of functional web service available

- **Test cases**
  - EO data acquired
  - EO data classification in progress
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