PROTOTYPE OF THE PARTICIPATIVE WEB-BASED DECISION SUPPORT SYSTEM (DSS) IN RISK MANAGEMENT

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SEVENTH FRAMEWORK PROGRAMME

CHANGES Risk=HVA

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Objectives

- To facilitate the analysis of available risk information
- To integrate the workflow of risk management systematically with the diverse involvement of stakeholders.
- To assist the different stakeholders and experts for evaluation of risk management measures through the active online participation approach.

Layer Representation

- Integrates web-GIS and DSS functionality (using Multi-criteria evaluation methods) associated with the visualization tools

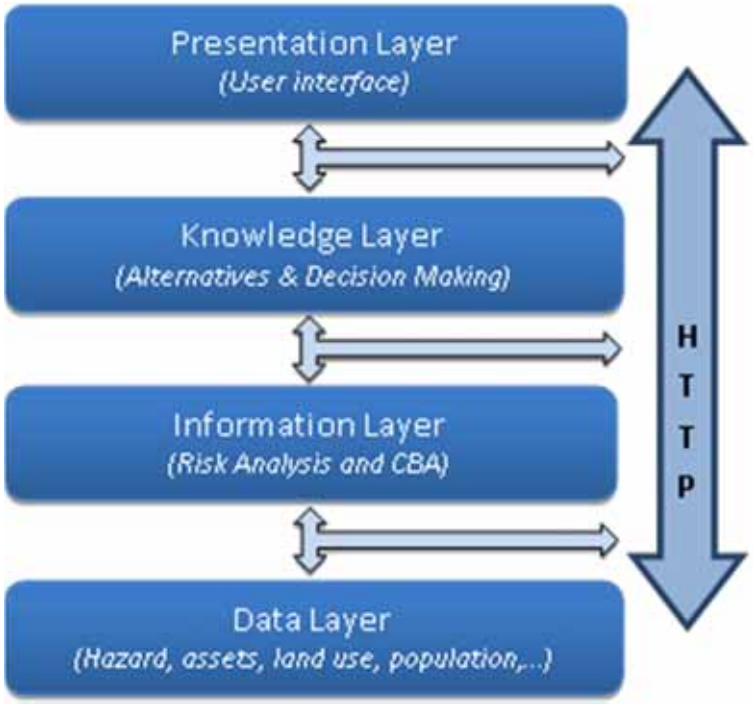
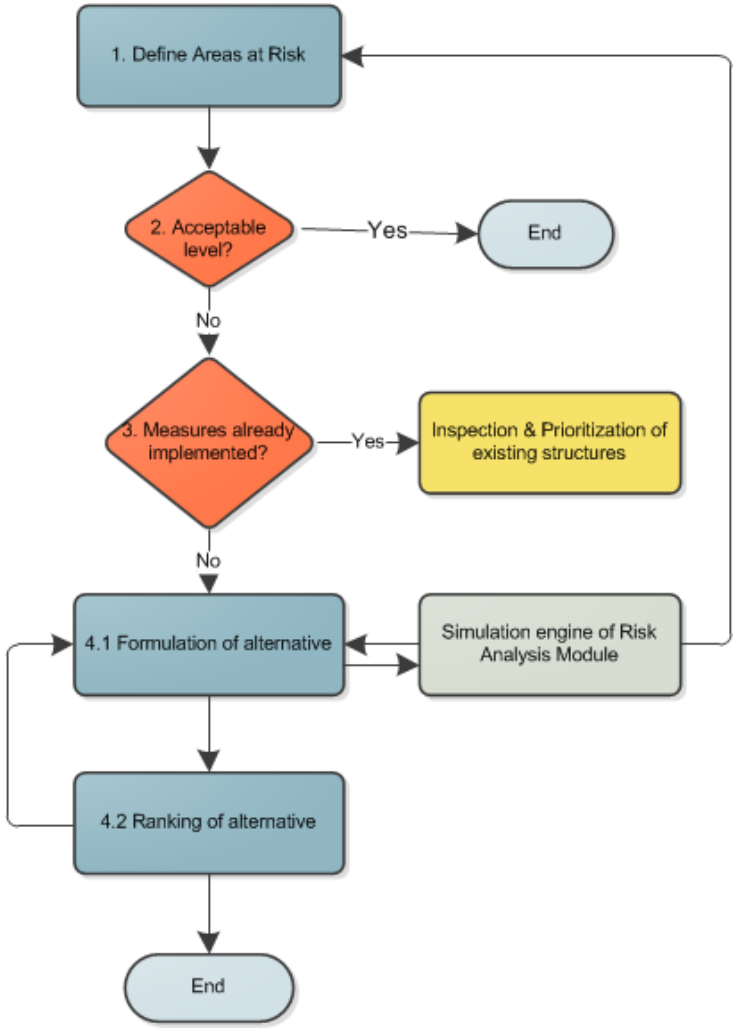
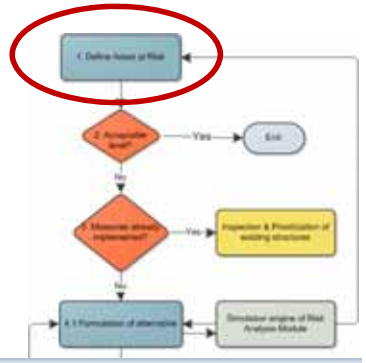


Fig. Architecture of the web-based DSS in terms of layer representation
(Adopted from Zhang and Goddard, 2007)

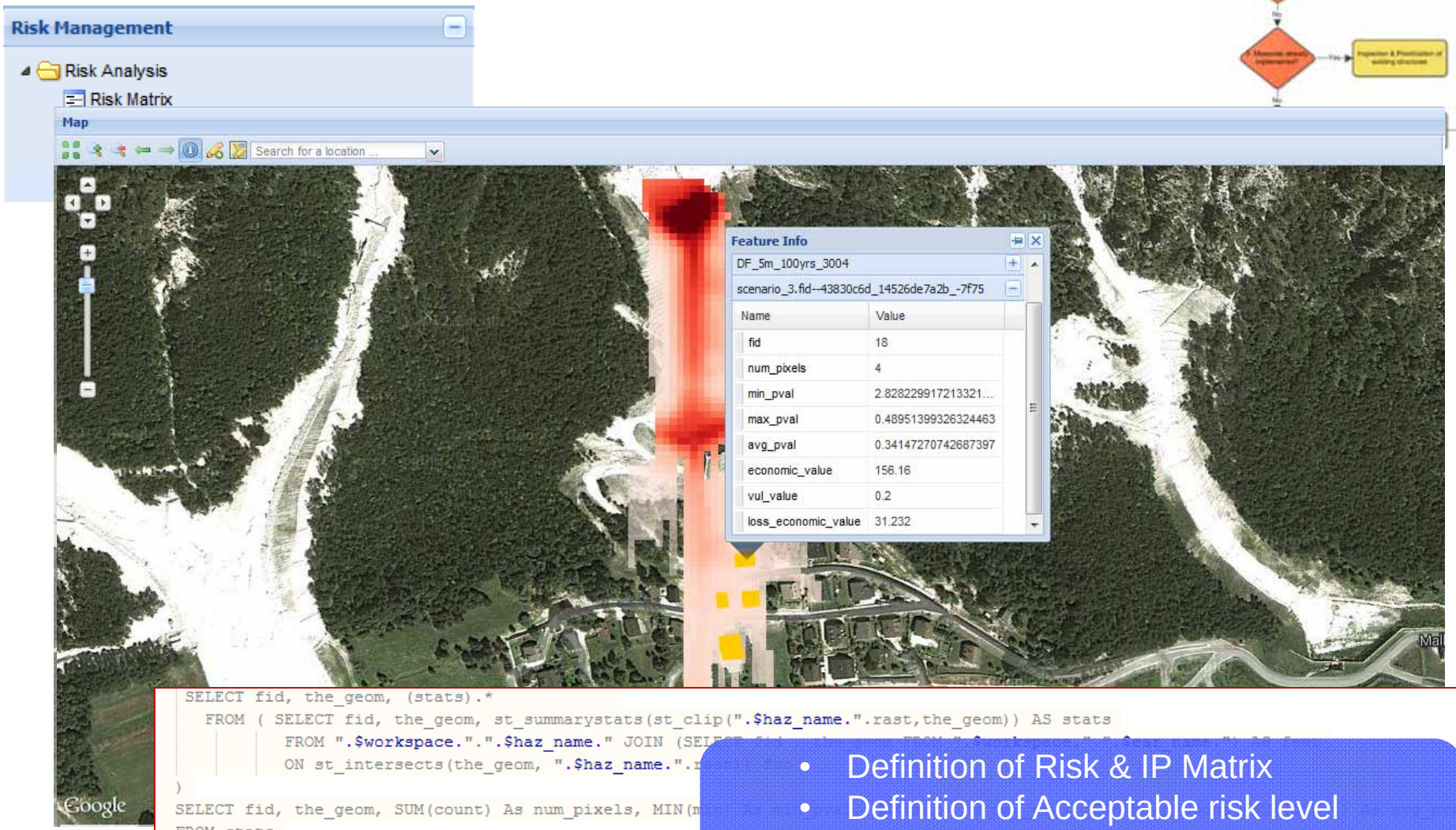
Main Steps in Decision Making



Define areas at risk



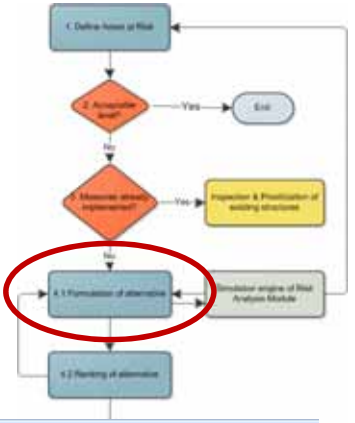
Define areas at risk (Cont.)

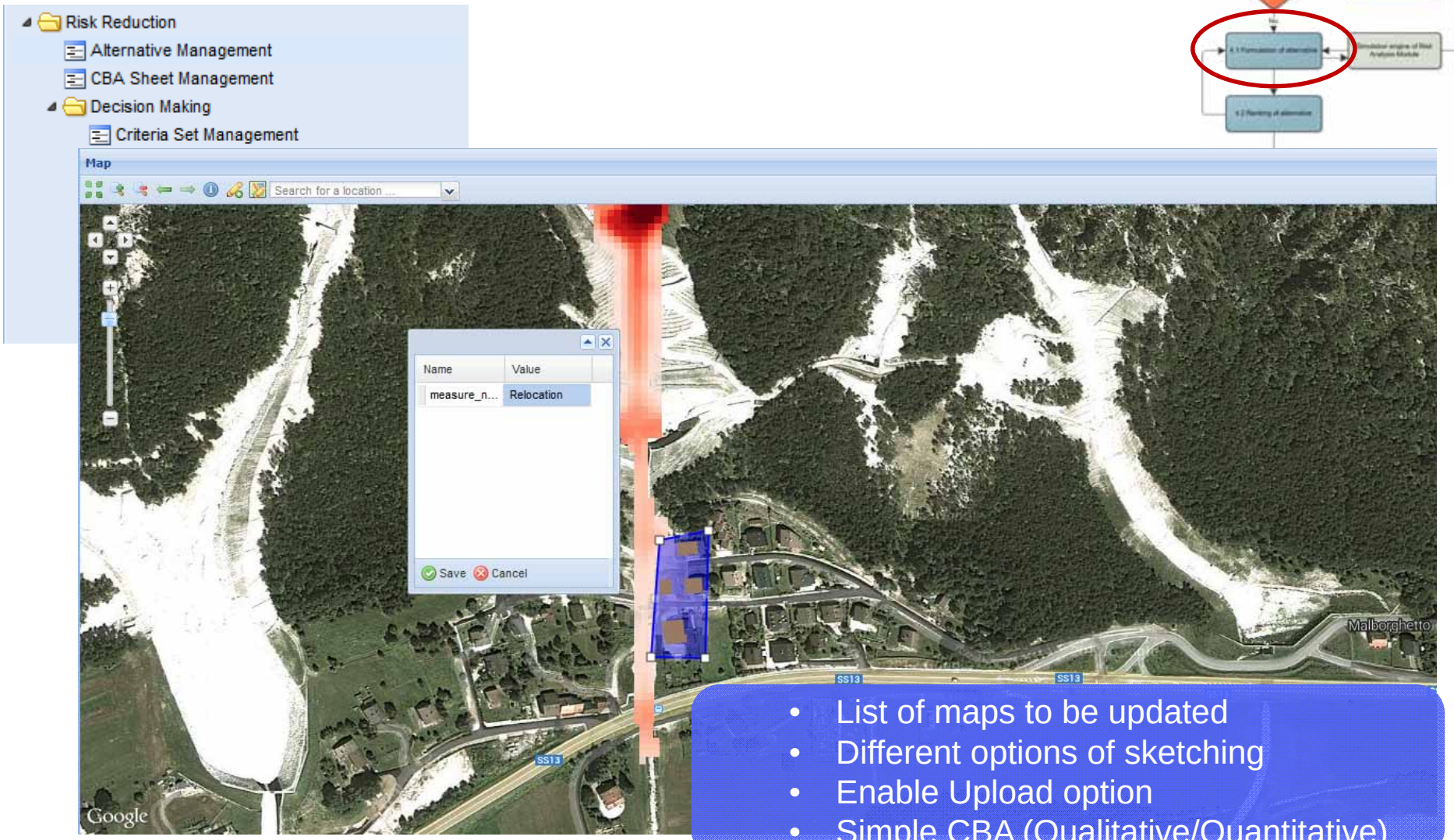



```
SELECT fid, the_geom, (stats).*
  FROM ( SELECT fid, the_geom, st_summarystats(st_clip(".$haz_name.".rast,the_geom)) AS stats
           FROM ".$workspace."."$haz_name." JOIN (SELECT
           ON st_intersects(the_geom, ".$haz_name.".r
)
SELECT fid, the_geom, SUM(count) As num_pixels, MIN(m
FROM stats
WHERE count > 0
GROUP BY fid, the_geom
ORDER BY fid);";
```

- Definition of Risk & IP Matrix
- Definition of Acceptable risk level
- Calculation on different types of EaR
- Vulnerability map (in raster format)

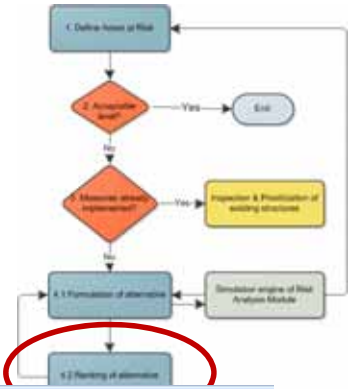
Formulation of alternatives





- List of maps to be updated
- Different options of sketching
- Enable Upload option
- Simple CBA (Qualitative/Quantitative)

Ranking of alternatives



- Decision Making
  - Criteria Set Management
  - Weight Set Management
  - Decision Matrix
  - Ranking Information

Map

Search for a location ...

Ranking of alternatives

Result | Graph | Group Comparison

Chart showing Distance per alternatives

Show Weight Set

Distance

0.7
0.6
0.5
0.4
0.3
0.2
0.1
0

Defense structures
Relocation
stabilization works
Planning regulations

Malborghetto

SS13

Google

- Set of criteria & weight
- Inclusion of utility functions
- Different MCE methods (incl. TOPSIS)
- Improvement on group comparison

Ranking of alternatives (Cont.)

- Compromise Programming (Simonovic, 2011)
  - Identify solutions that are closed to the ideal one, as determined by some measure of distance.
  - Recommended as multi-objective analysis method for disaster management applications.

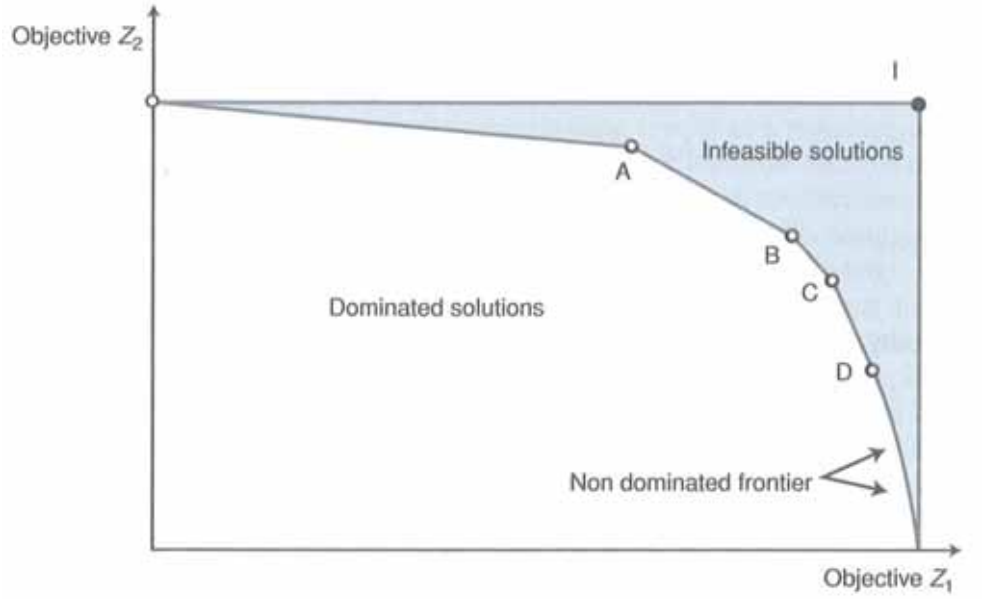


Fig. Illustration of compromise solutions

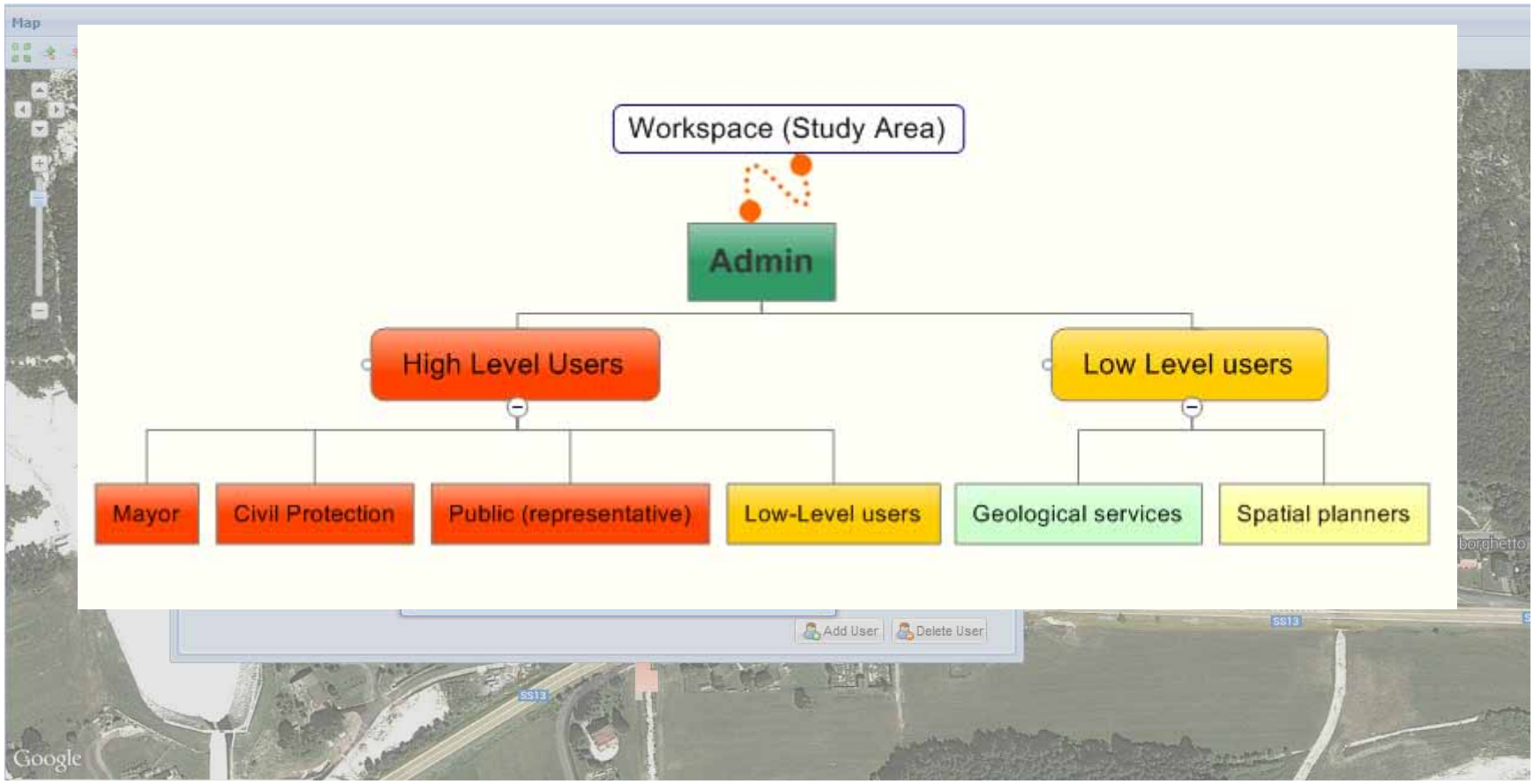
$$\text{Min} \left\{ L_p(x) = \left[\sum_{i=1}^{2} \alpha_i^p \left(\frac{Z_i^* - Z_i(x)}{Z_i^* - Z_i^{**}} \right)^p \right]^{\frac{1}{p}} \right\}$$

subject to

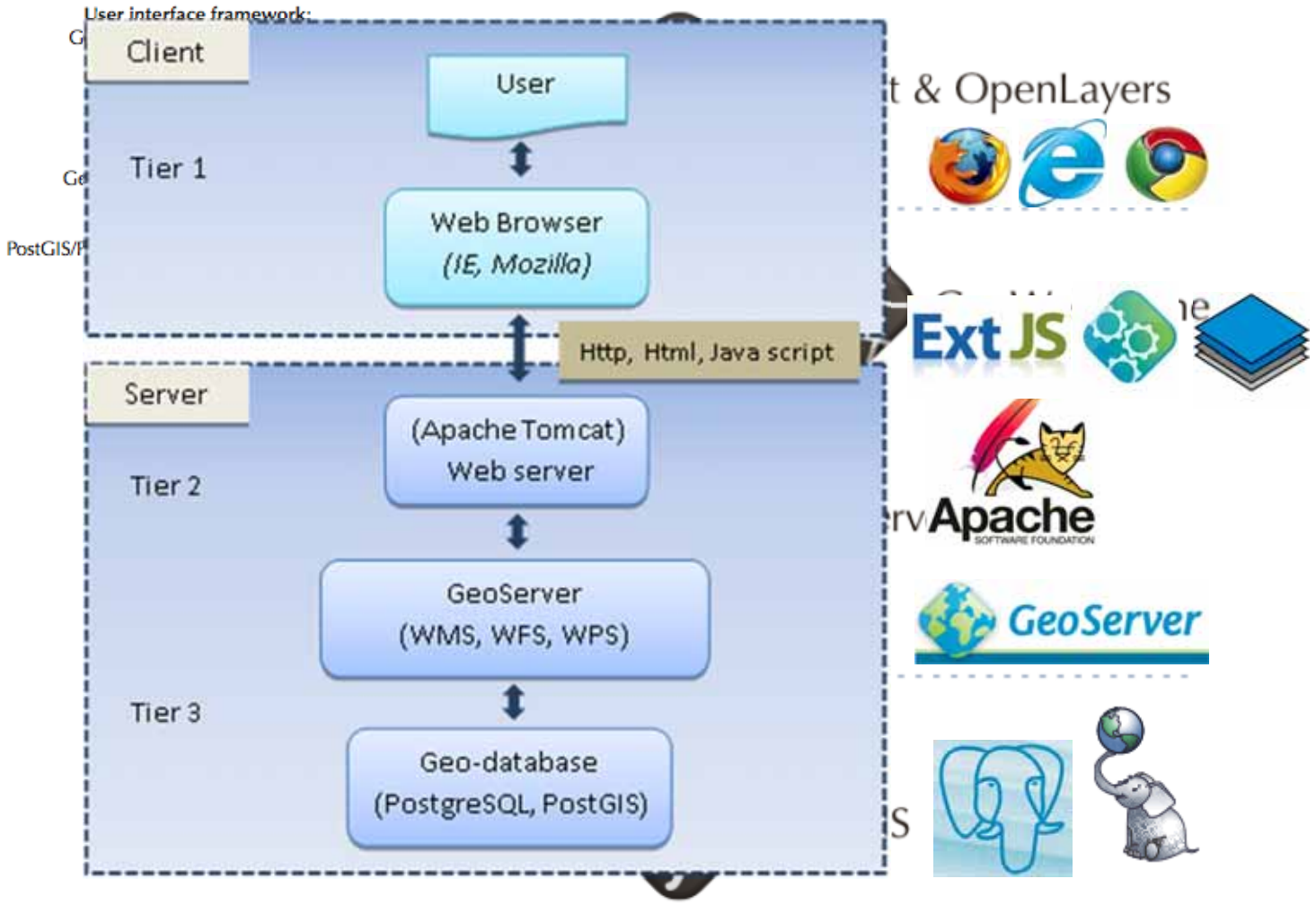
$x \in X$

p = compensation parameter
alpha = weight of the objective
Zi* = best value (maximum)
Zi** = worst value (minimum)

Users of the system



Background Framework



OpenGeo – Suite SDK app

- provides tools for building and deploying GeoExt-based web mapping applications backed by OpenGeo Suite.
- GXP built on top of: OpenLayers, Ext JS & GeoExt.
- an extensible framework - easy to add new tools.

- Widgets
  - gxp.CatalogueSearchPanel
  - gxp.CrumbPanel
  - gxp.EmbedMapDialog
  - gxp.FeatureEditPopup
  - gxp.FeedSourceDialog
  - gxp.FillSymbolizer
  - gxp.FilterBuilder
  - gxp.GoogleEarthPanel
  - gxp.GoogleStreetViewPanel
  - gxp.Histogram
  - gxp.LayerUploadPanel
  - gxp.LineSymbolizer
  - gxp.NewSourceDialog
  - gxp.NewSourceWindow
  - gxp.PlaybackOptionsPanel
- gxp.grid
  - gxp.grid.CapabilitiesGrid
  - gxp.grid.FeatureGrid
  - gxp.grid.SymbolizerGrid
- gxp.slider
  - gxp.slider.RangeSliderTip
  - gxp.slider.Tip
  - gxp.slider.ClassBreakSlide
  - gxp.slider.TimeSlider
- gxp.data
  - gxp.data.AutoCompleteProxy
  - gxp.data.AutoCompleteReade
  - gxp.data.FeatureTypeClassi
  - gxp.data.GroupStyleReader
- gxp.form
  - gxp.form.AutoCompleteComboBox
  - gxp.form.CSWFilterField
  - gxp.form.ColorField
  - gxp.form.ComparisonComboBox
  - gxp.form.ExtendedDateField
  - gxp.form.FilterField
- gxp.plugins
  - gxp.plugins.AddLayers
  - gxp.plugins.ArcRestSource
  - gxp.plugins.BingSource
  - gxp.plugins.CSWCatalogueSource
  - gxp.plugins.CatalogueSource
  - gxp.plugins.ClickableFeatures
  - gxp.plugins.DeleteSelectedFeatu
  - gxp.plugins.FeatureEditor

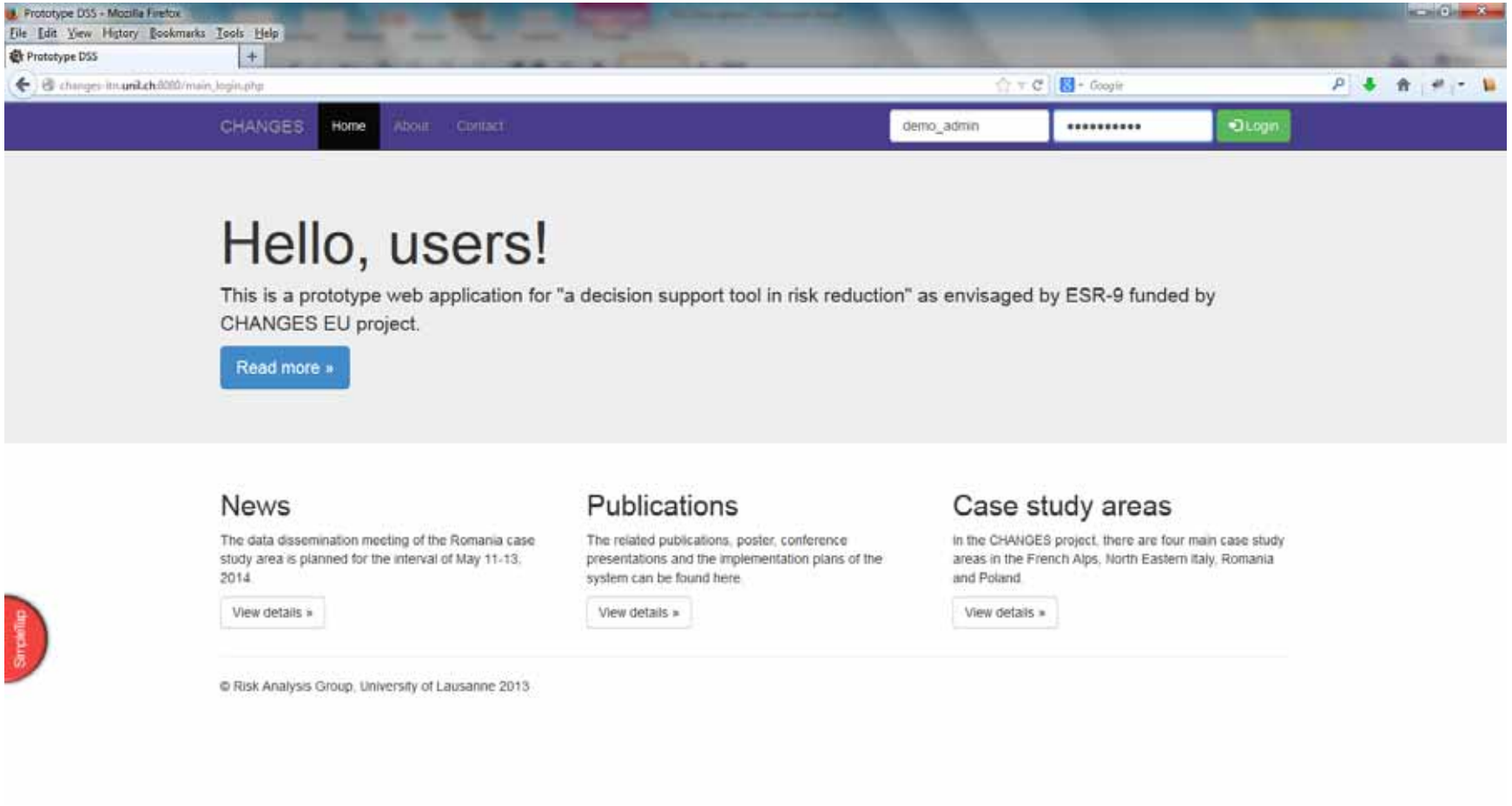
Discussion

- A flexible and generic framework to be applicable in other areas.

- Inclusion of participatory process can benefit
  - Reflects the trades-off between different alternatives
  - Shows different valuations of stakeholders
  - Risk awareness

- Enhance collaborative activities of involved stakeholders in risk management and decision making process (via a web-based platform)

THANK YOU!


Prototype DSS - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Prototype DSS
CHANGES
Home
About
Contact
demo_admin
Login
Hello, users!
This is a prototype web application for "a decision support tool in risk reduction" as envisaged by ESR-9 funded by CHANGES EU project.
Read more »
News
The data dissemination meeting of the Romania case study area is planned for the interval of May 11-13, 2014.
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Publications
The related publications, poster, conference presentations and the implementation plans of the system can be found here.
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Case study areas
In the CHANGES project, there are four main case study areas in the French Alps, North Eastern Italy, Romania and Poland.
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