

Objectives of RISK MAP

Improving risk communication by means of **flood maps**:

1. Developing of appropriate stakeholder **participation** processes
 - incorporation of local knowledge and preferences
 - foster communication and risk awareness
2. Improving the **content** of flood maps by considering additional risks & other contents
 - participative multicriteria risk mapping tool
3. Improving the **visualisation** of risk maps in order to produce user-friendly risk maps
 - experimental graphic semiology: eye-tracking approach

RISK MAP Team

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- FHD - University of Applied Science Deggendorf (Germany)
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- Université François-Rabelais Tours, EPU'DA, UMR CNRS 6173 CITERES (France)
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Sally Priest, Joanna Pardoe, Sue Tapsell, Simon McCarthy, Christophe Viavattenne
- UFZ – Helmholtz Centre for Environmental Research (Leipzig, Germany):
C. Kuhlicke, H. Unnerstall, J. Luther, S. Scheuer, V. Meyer (Coordination)

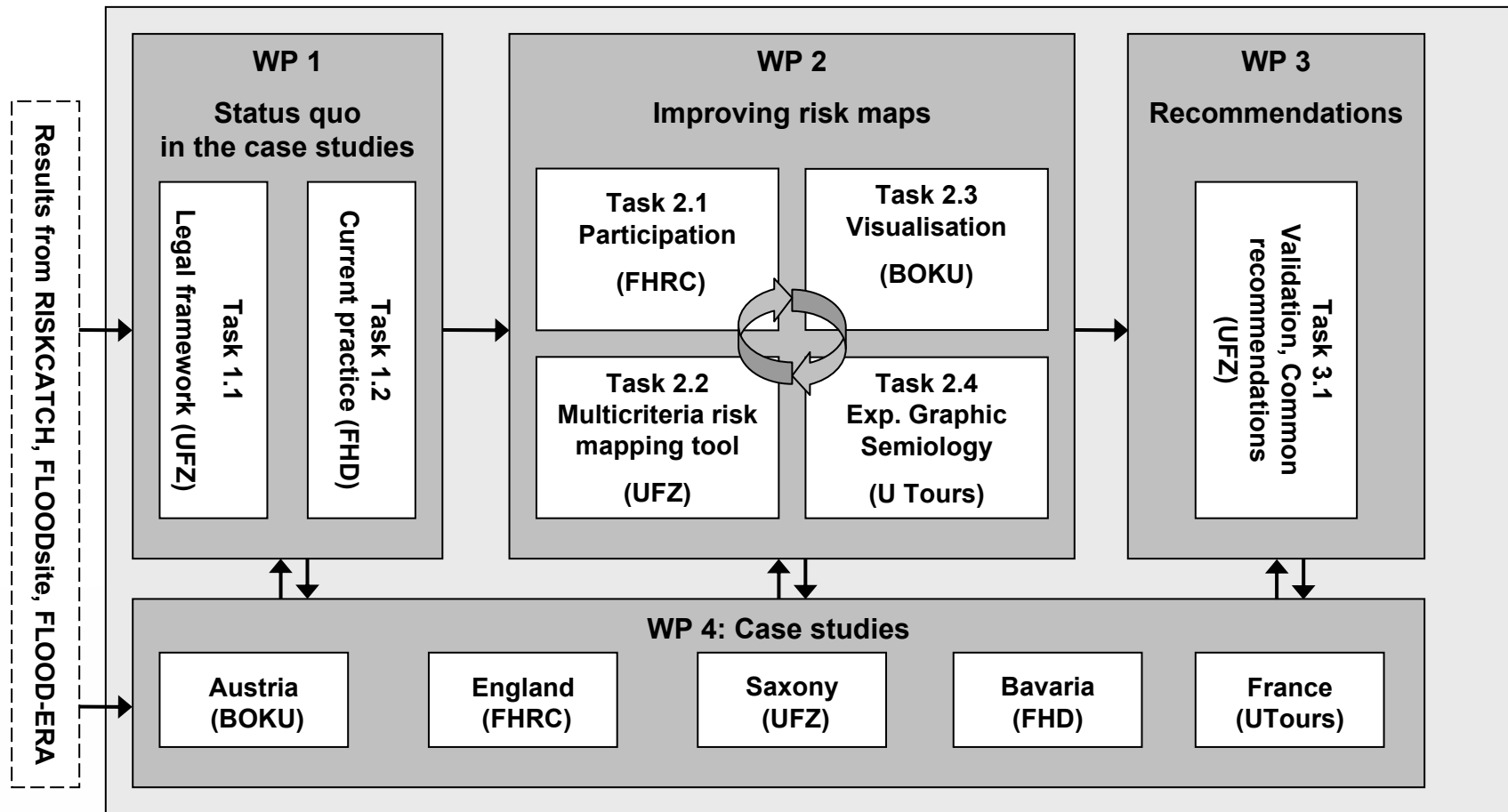


University of Natural Resources
and Applied Life Sciences, Vienna



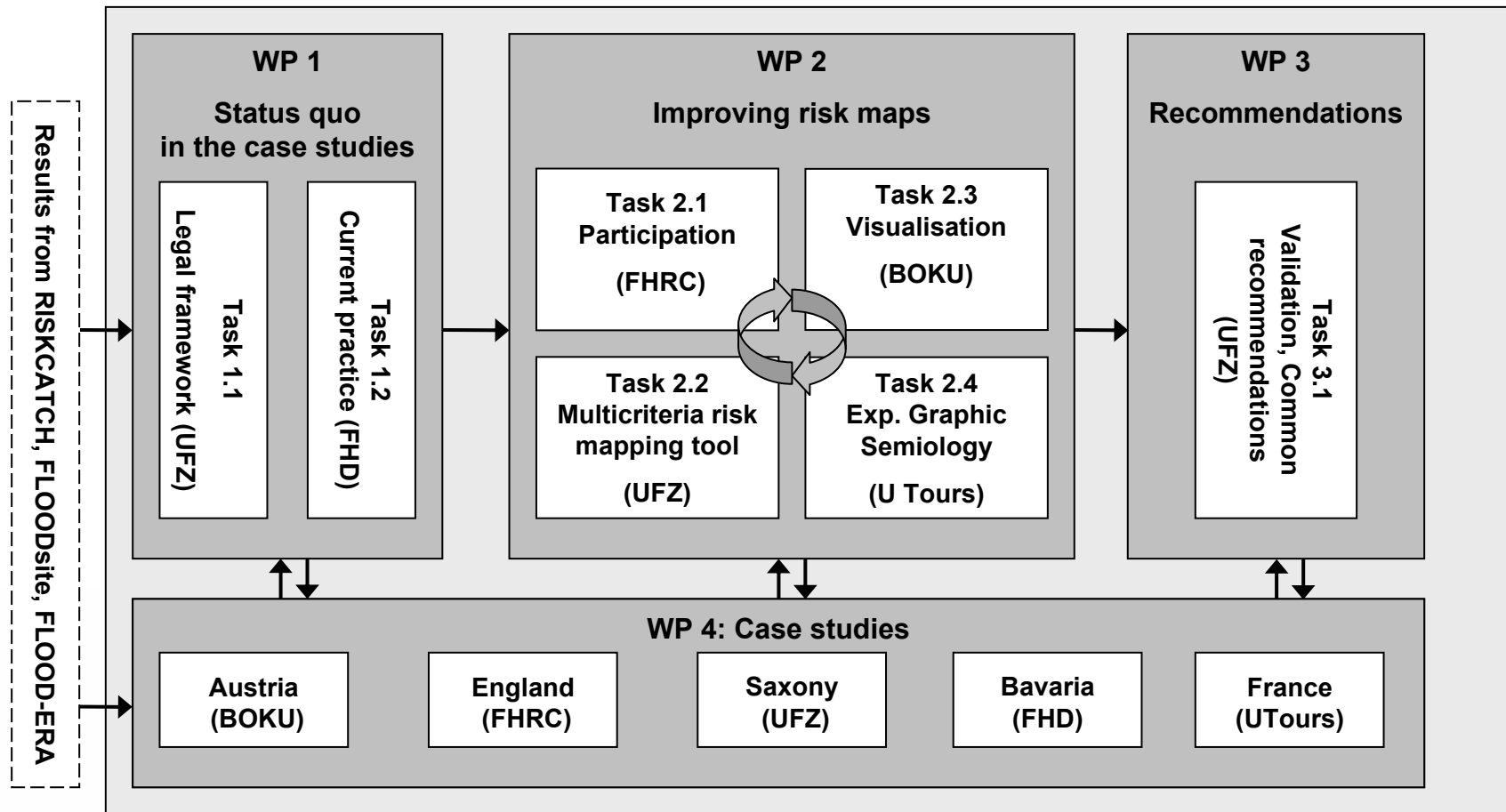
Structure of RISK MAP

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Task 2.1: Participation

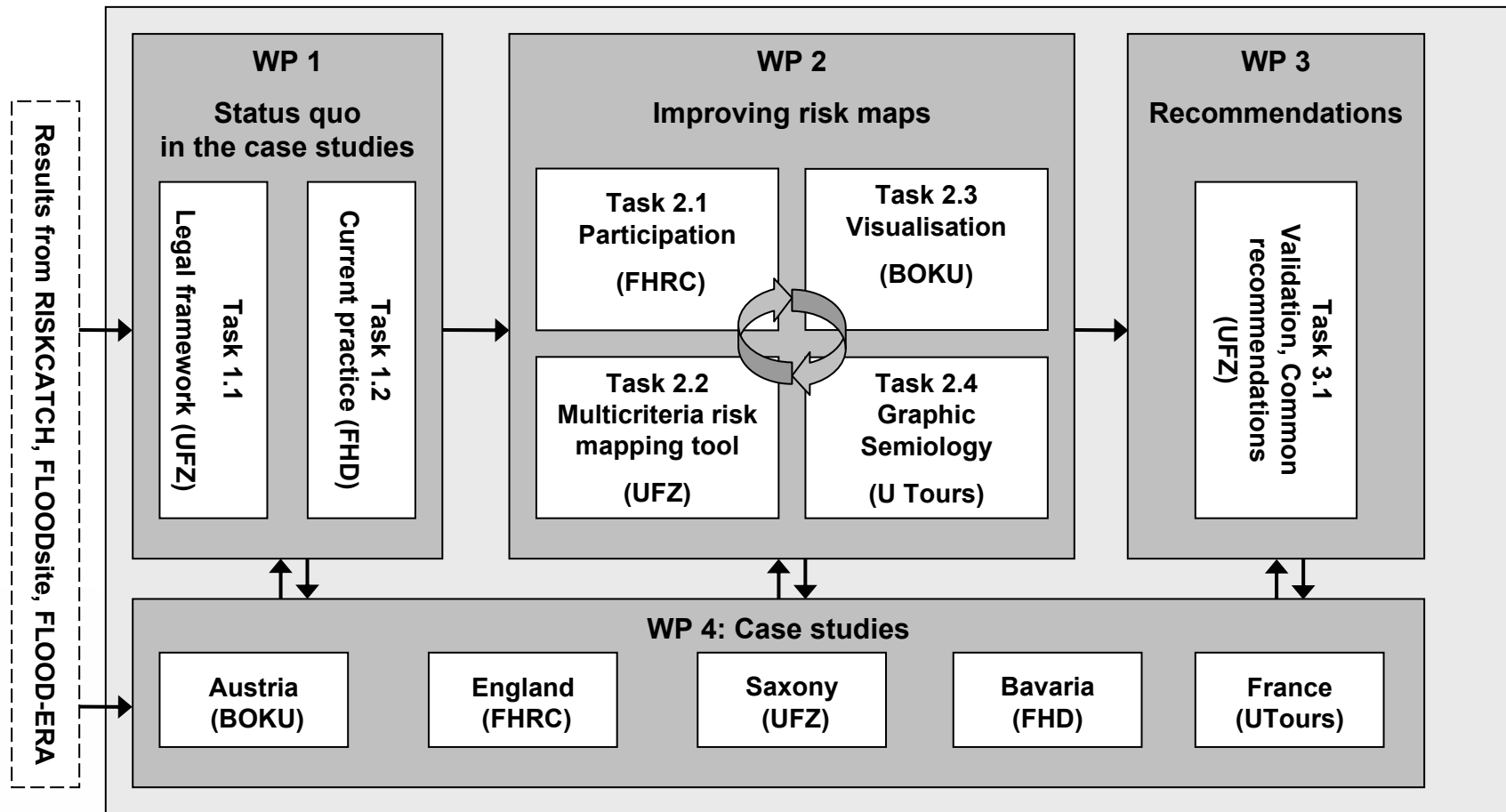
- Approach/Methods
 1. Literature review on participation
 2. Differentiation of stakeholder groups
 3. Interviews & series of workshops:
 - >50 interviews
 - 2 workshops in each case study, different target groups:
 - e.g. Lower Thames: focus on people at risk
 - e.g. Bavaria: focus on emergency managers

See also presentation by
Sally Priest et al.



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Economic:
annual average
damage

Environmental:
erosion, accumulation
of polluted material,
biotopes

Population:
annual affected
population

social hot spots:
hospitals, schools, ...

Multicriteria risk mapping: aggregation of different risk criteria maps

Innovations in RISK MAP

- Participation (⇒ Task 2.1):
 - Selection of criteria
 - Weighting of criteria
- Improved visualisation (⇒ Task 2.3 & 2.4)
- Ontology development
 - based on WS findings:
 - Define advanced rules for risk calculation
 - Include local knowledge

See poster by
Sebastian Scheuer et al.
on the FloodCalc-Tool!

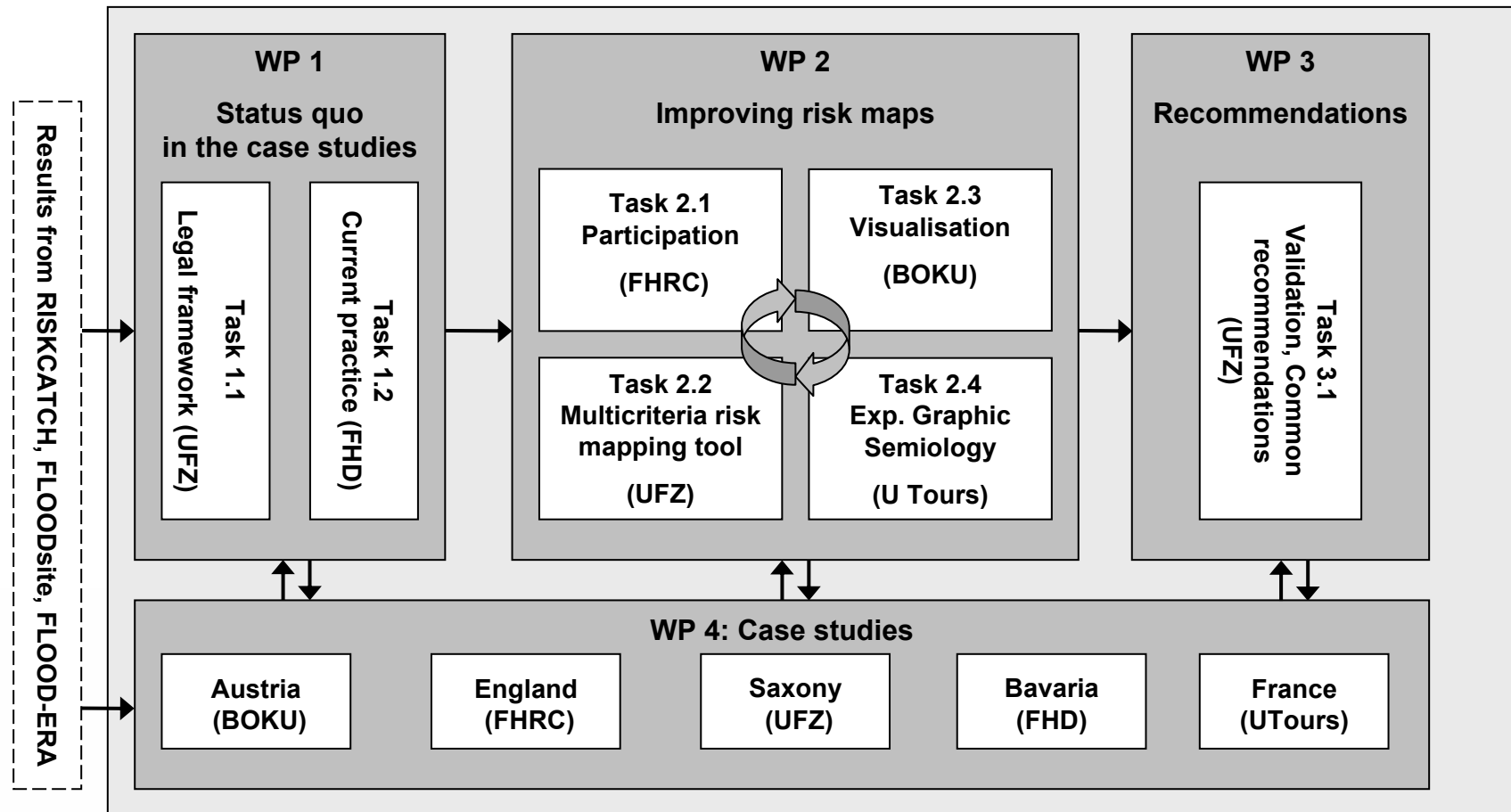
exemplary weighting

- economic:
0.4
- population:
0.4
- soc. hot spots:
0.1
- environmental:
0.1

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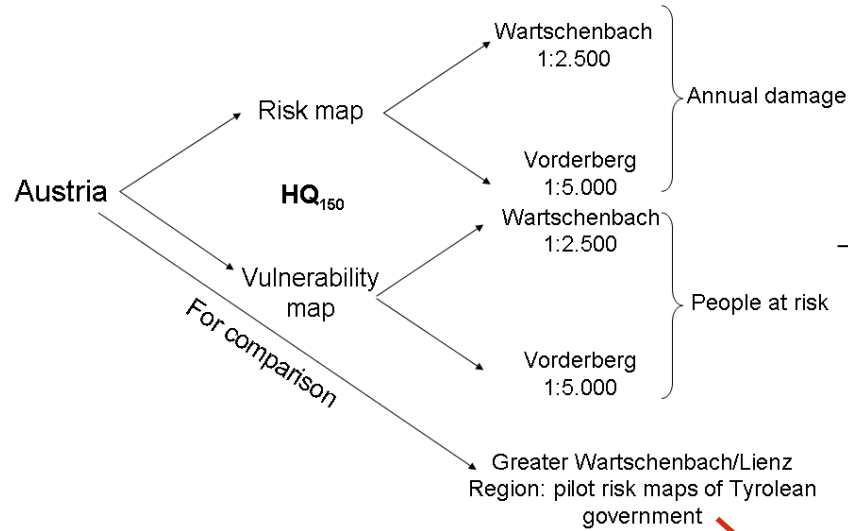
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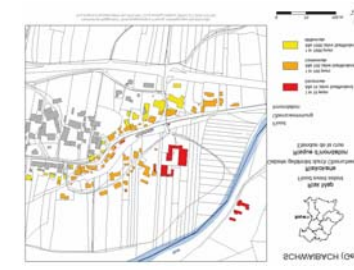
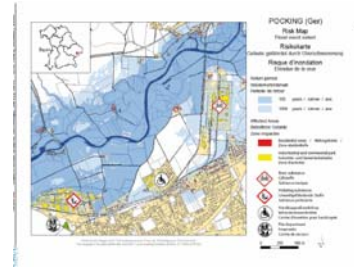


Steps

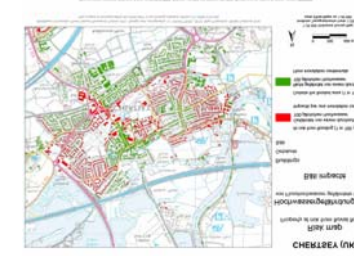
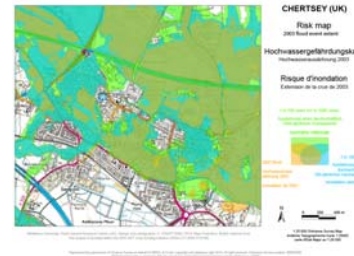
1) 4 test maps for each case study



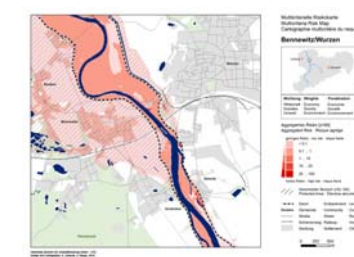
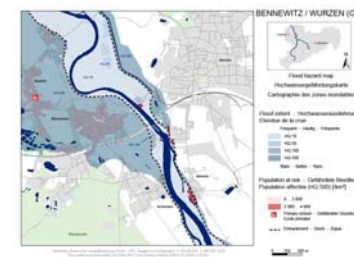
20 maps altogether



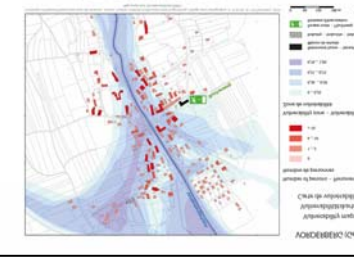
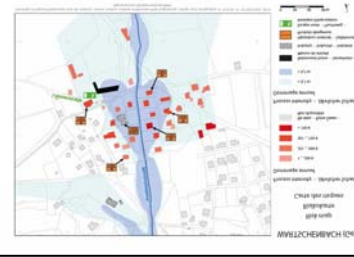
Bavarian site (Ger)



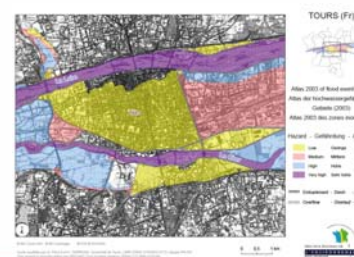
UK case study



Saxony site (Ger)



Austrian case study



French case study

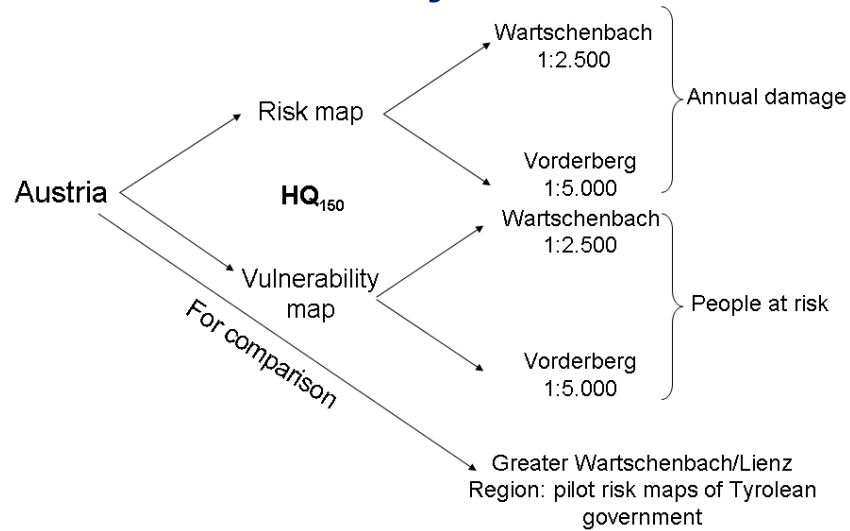


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Steps

1) 4 test maps for each case study



2) Eye-tracking (15 s, 20 maps, ~ 50 test persons)



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3) Survey

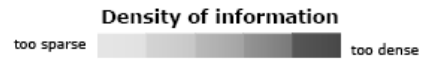
Questionnaire (part 1)



RISKMAP – Experimental Graphic Semiology, Survey form – CHU Tours, October, 2010

II. Perception of the maps

Place a vertical line at the level you consider to be representative of the map for each criterion:

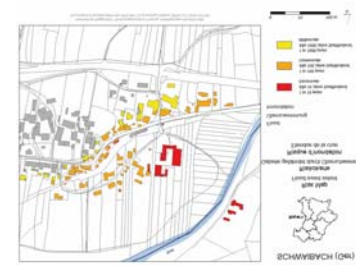
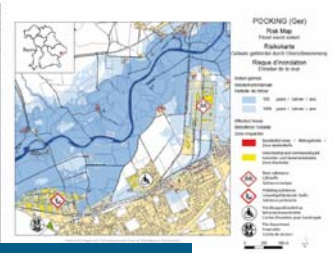


(Mark the proposition(s) which seem(s) to you the most adapted to this map)

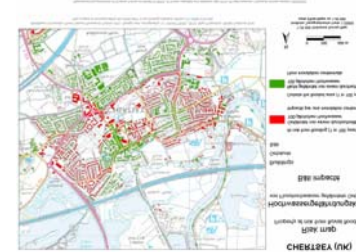
- Useless
- Personal needs (impact on the house, children' school, office, places used for the personal life, ...)
- Informative needs (height of water, speed of the water, duration for returning to the normal situation, ...)
- Legal needs (constraints on urban development, building permit, impact on town planning, ...)
- Others:

What have you understood of this map?

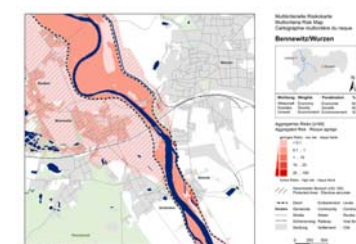
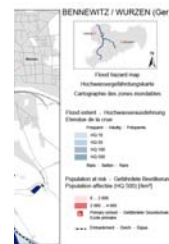
Other comment(s):



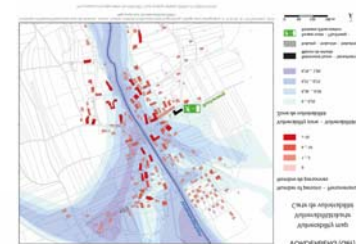
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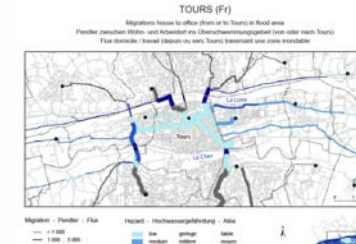
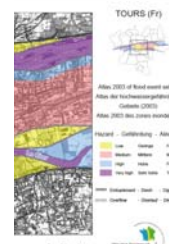
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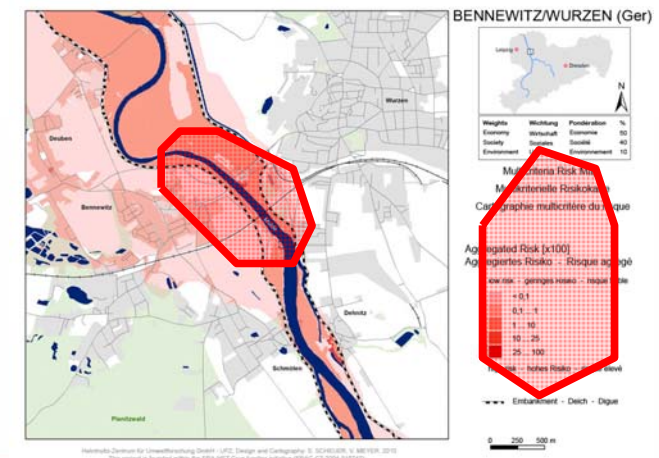
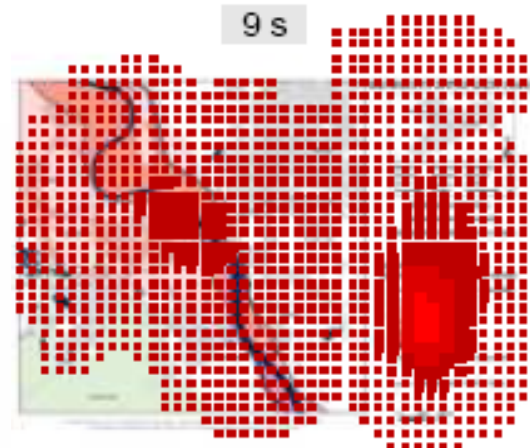
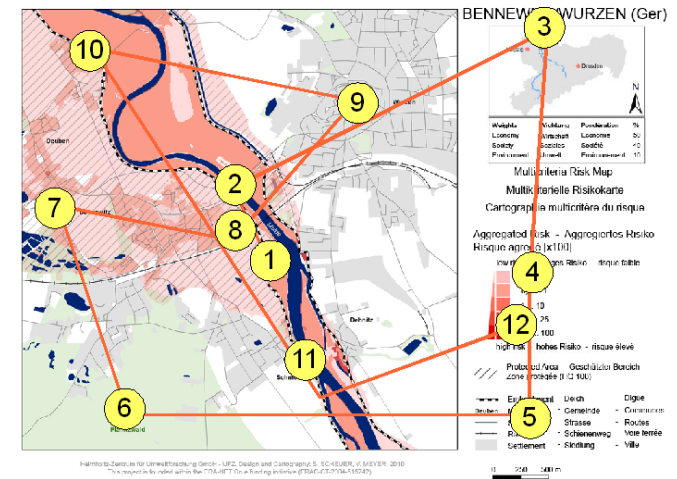
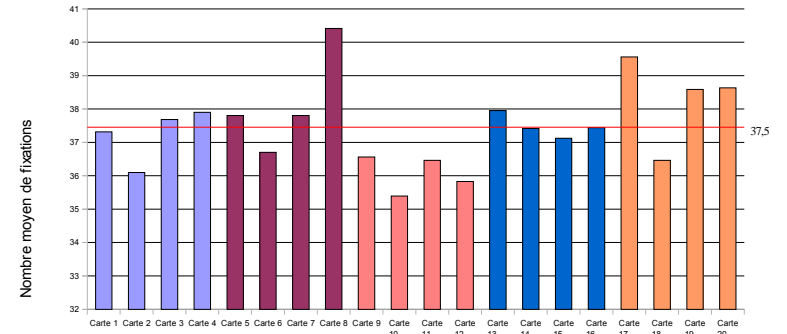


French case study

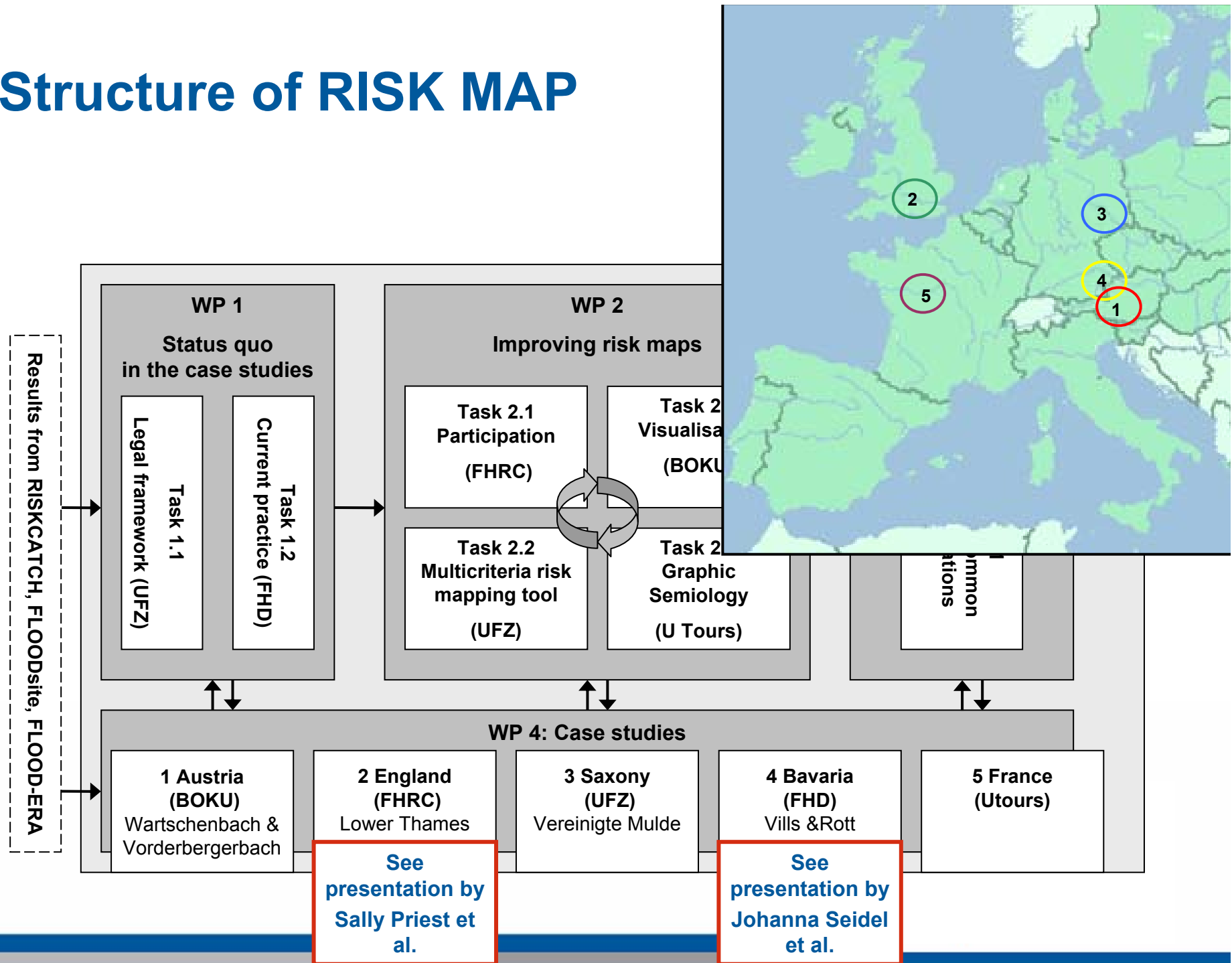
Analysis

1. Statistical analysis of eye fixations
2. Dynamic analysis
 - *Sequence of fixations*
 - *Main points of interest*
3. Survey

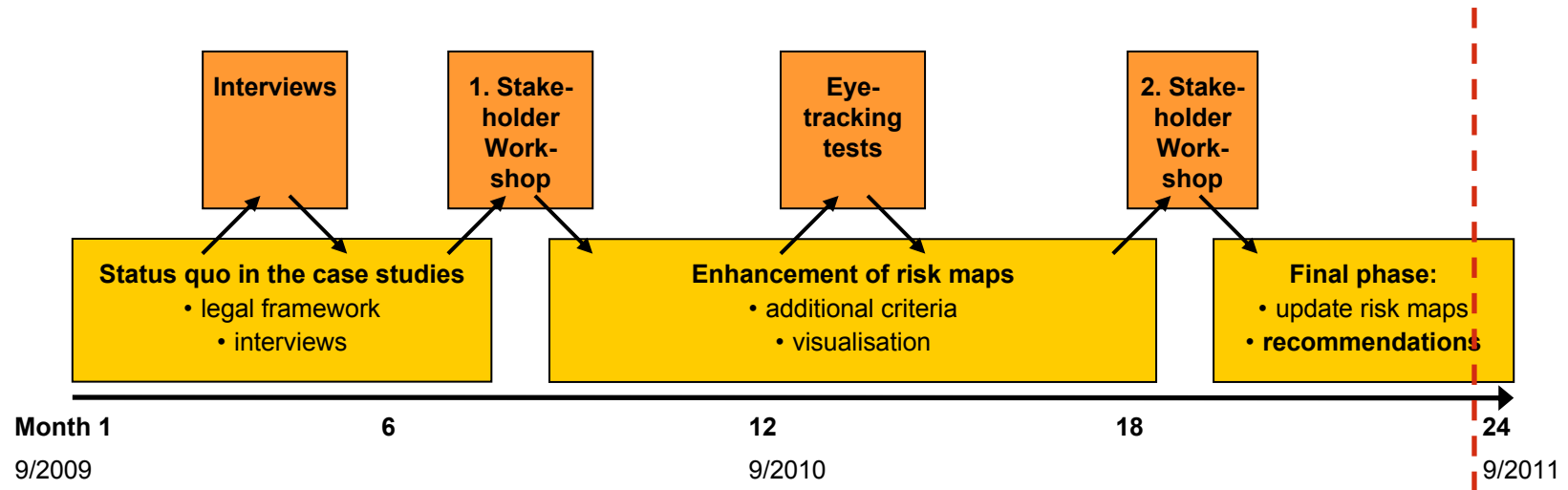
See Report for detailed results!



Structure of RISK MAP

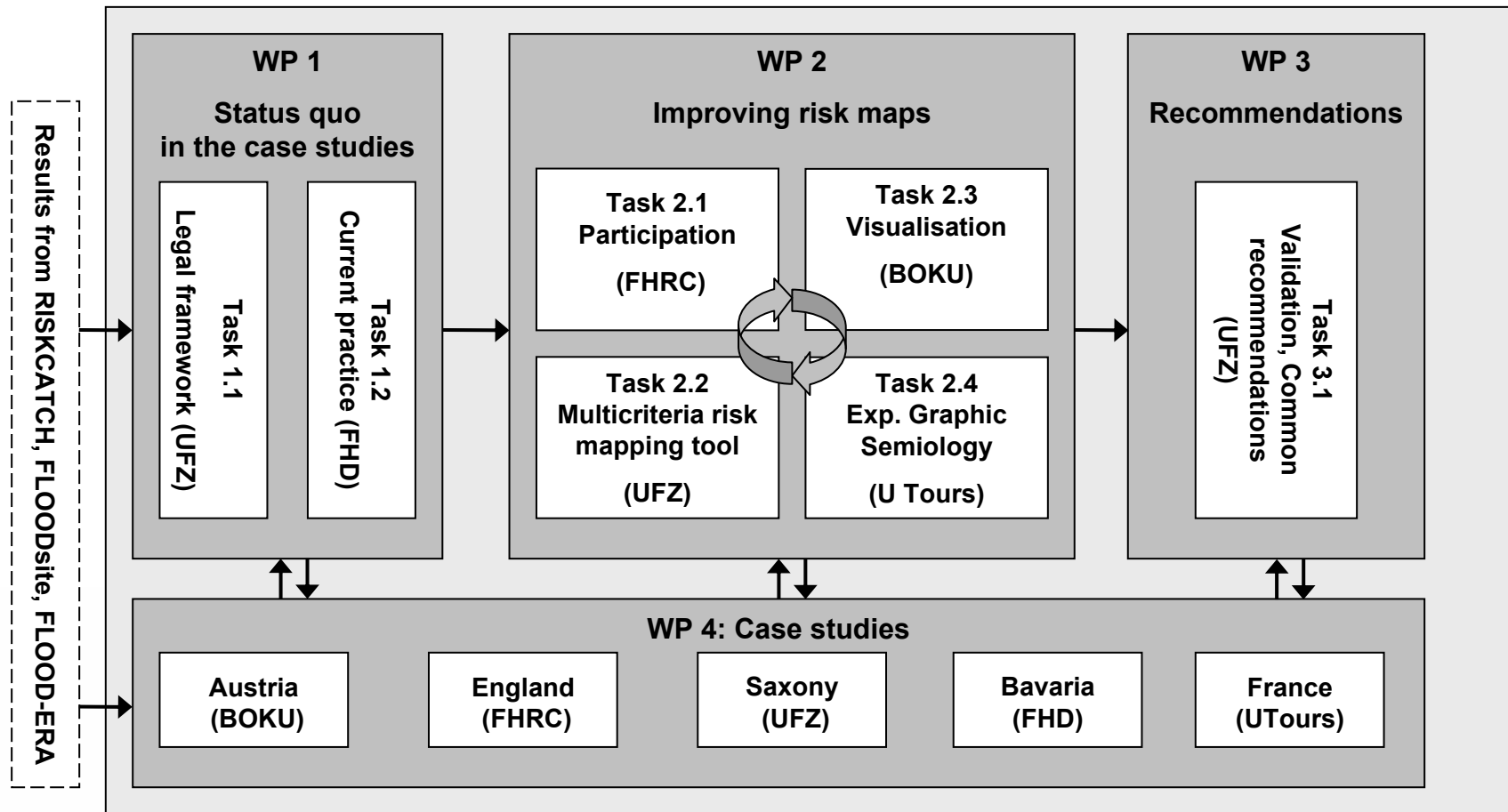


Case study process



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Common Recommendations

1. **Participation** in Flood Mapping
2. **Contents** of flood Maps
3. **Visualisation** of Flood Maps

User groups of flood maps

Different map users require different maps!

- Strategic Planning
- Emergency Management
- The (affected) public

Recommendations for participation



Recommendations for participation

Purpose of participation

- ***Substantive*** rational:
improving the content, including local knowledge
- ***Instrumental*** rational:
building trust, raising awareness, increasing legitimacy

- The degree to which
both rationales are accommodated
should be tailored to the **project objectives**

Recommendations for participation

Objective	1. Substantive: <i>improving content</i>	2. Instrumental/ substantive: <i>verifying content</i>	3. Instrumental: <i>raising risk awareness</i>
Participants	Those with 'expert' knowledge <ul style="list-style-type: none"> • strategic planners • emergency managers • citizens with expertise by experience. 	<ul style="list-style-type: none"> • Open to all stakeholders • Mixed groups of stakeholders 	Individual members of the general public
Process	<ul style="list-style-type: none"> • Series of meetings • centred on production and verification of maps 	<ul style="list-style-type: none"> • Repeated meetings to report and check changes 	<ul style="list-style-type: none"> • One meeting to raising risk awareness. • Two or more meetings to improve trust and legitimacy
Focus	<ul style="list-style-type: none"> • Content (development and verification) 	<ul style="list-style-type: none"> • Content (selection, verification) • Visualisation 	<ul style="list-style-type: none"> • intuitive usability for a broad and general audience
Outcome	<ul style="list-style-type: none"> • Verified and corrected maps 	<ul style="list-style-type: none"> • Raising awareness • maps tailored to end-user preferences • increased trust • development of co-operation networks 	<ul style="list-style-type: none"> • Raising awareness • tailored maps to suit end-users • increased trust and legitimacy

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Recommendations for participation

Participants

- open to all stakeholders
- representing a broad range of interests
- Participation should be by choice and not an obligation
- End-users and map producers should be involved together
→ improve usability and trust in the maps

Participation for Risk Awareness

- Mix participants with and without risk
→ share experience

Verifying content

- engage groups of experts that may be excluded from contributing to mapping in their traditional capacities
→ improve the accuracy and confidence in the map

Recommendations for participation

Timing

- Participation should take place at an early stage
- Iterative process with follow up events
→ demonstrate changes made as a result of participant contributions

Neutral facilitation

- Employ neutral facilitation
→ ensure discussions are focussed and fair

Evaluation

- Conduct an evaluation of the participation process
→ capture participants' perspectives and any additional information



Recommendations for contents of flood maps

See also recommendations by
EXCIMAP

Recommendations for contents of flood maps

General recommendations

- Hazard and risk maps as required by the EU Floods Directive should not be seen as an end-product.
 - very good basis for communicating risks to the end users
 - But could be extended by other useful information...
- Where needed, **risk or emergency management information should be included in the flood maps.**
 - e.g. information on existing (or planned) defences, evacuation routes, assembly points etc.
 - not required by article 6 of FD but **could be integrated in the maps in the process of the development of risk management plans.**
- further adjustments to the end-user needs...

Recommendations for contents of flood maps

General recommendations

- Digital and print-out maps should be seen as complementary, not as alternative services.
 - digital map servers allow for individualised, end-user-specific maps.
 - print-out versions (limited number) should be at hand in case of emergency for the most important user groups.
- All maps should refer to a single data basis.
 - very irritating for end-users if maps refer to different models or model runs.
- Reference date of the maps, if possible frequent updating

Recommendations for contents

	Strategic planners	Emergency planners	General public
Information density / complexity	high	high	low
Hazard	<ul style="list-style-type: none"> • Flood extent and depth (different probabilities) • Flow velocities were available 	<ul style="list-style-type: none"> • Flood extent and depth (different probabilities) • Critical depth and velocities • Link to alarm stages 	<ul style="list-style-type: none"> • Flood extent and depth (high, medium, low probability, if available also for recent or historical events) • Link to alarm stages
Consequences/ Risk	<ul style="list-style-type: none"> • Event specific damage, also annual average damages (for economic appraisals) • Economic, social, cultural and environmental risks • critical infrastructure 	<ul style="list-style-type: none"> • Number of people at risk (to be evacuated) • Critical infrastructure (to be protected or evacuated): hospitals, energy & water supply, traffic infrastructure 	<ul style="list-style-type: none"> • Buildings (affected) • Roads (affected)
Additional information	<ul style="list-style-type: none"> • Existing flood defence, protected areas, residual risk 	<ul style="list-style-type: none"> • Emergency management information: Assembly points, evacuation routes etc. • Existing flood defence, potential weak points, protected areas • Usability of e.g. evacuation routes, hospitals 	<ul style="list-style-type: none"> • Most important emergency management information: Shelter, assembly points, evacuation routes, hospitals

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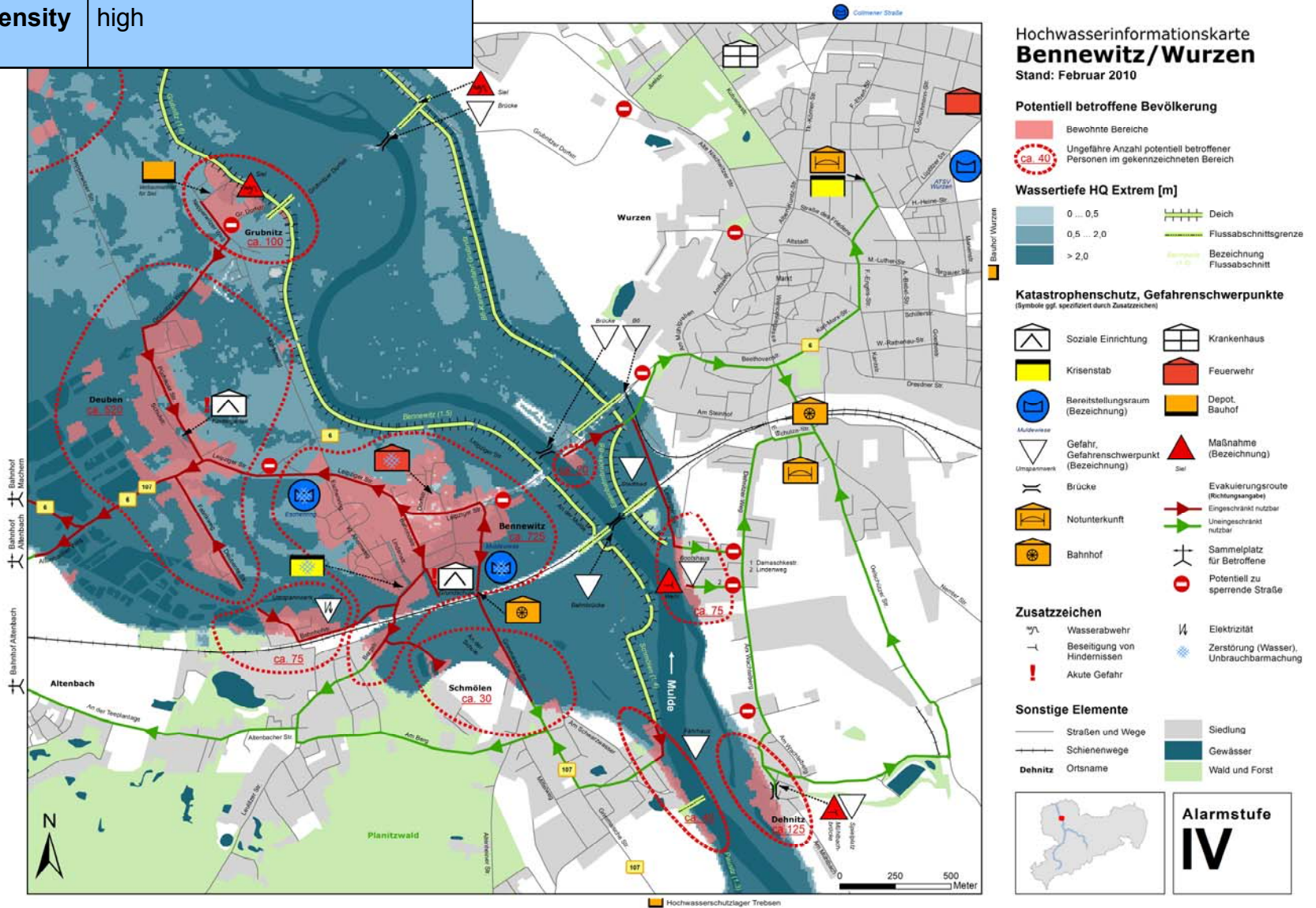
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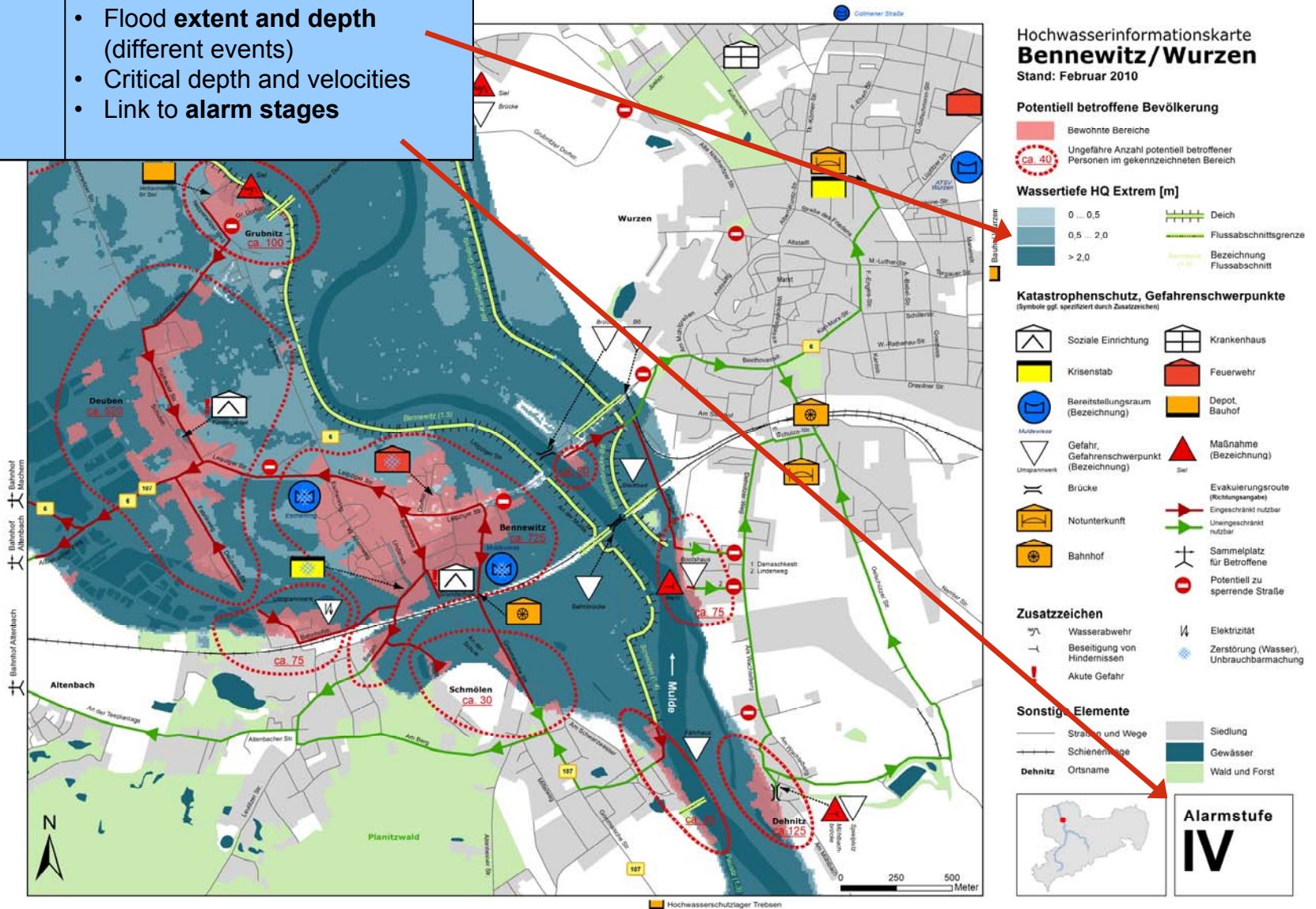
Recommendations for contents

	Emergency planners
Information density / complexity	high



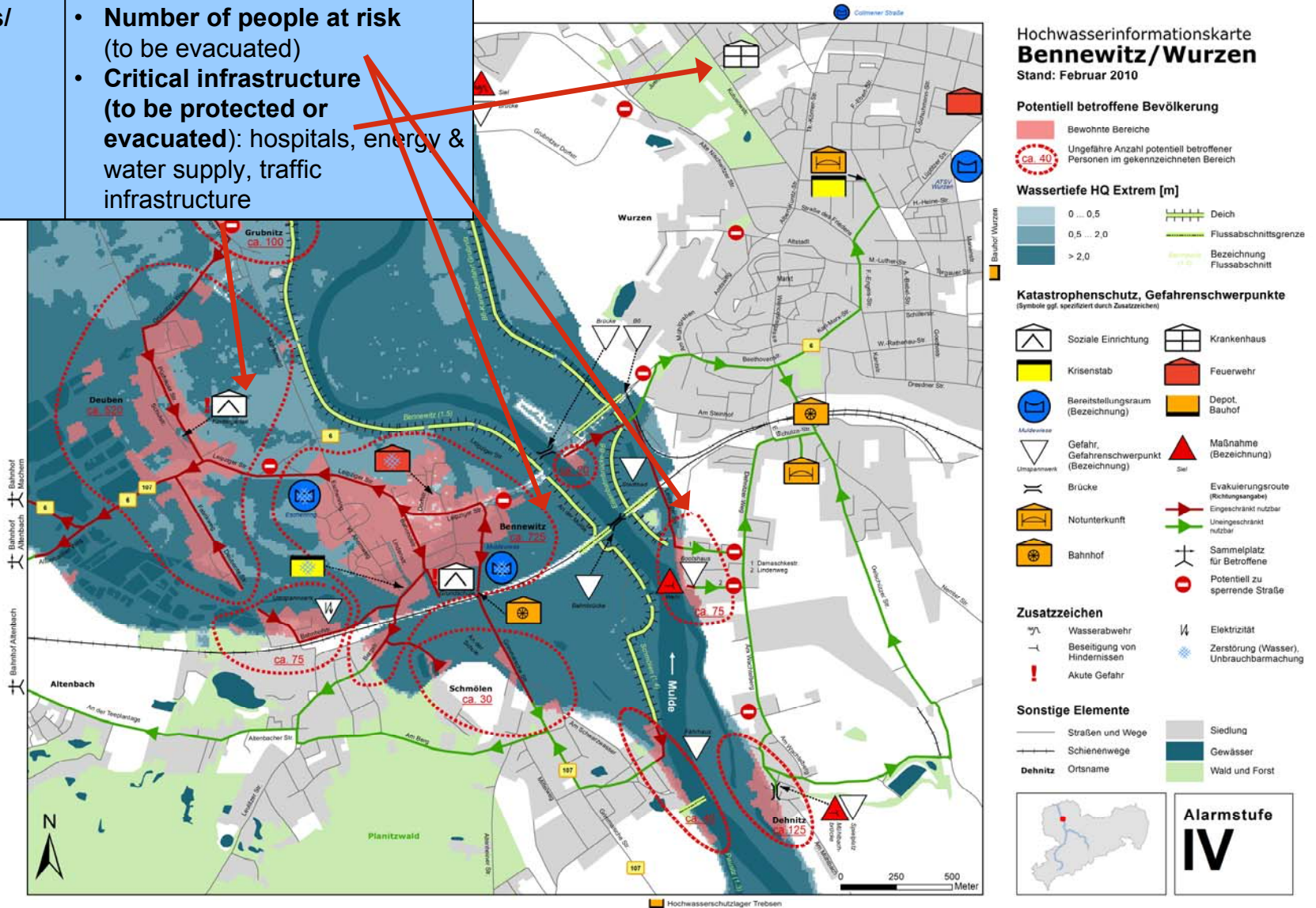
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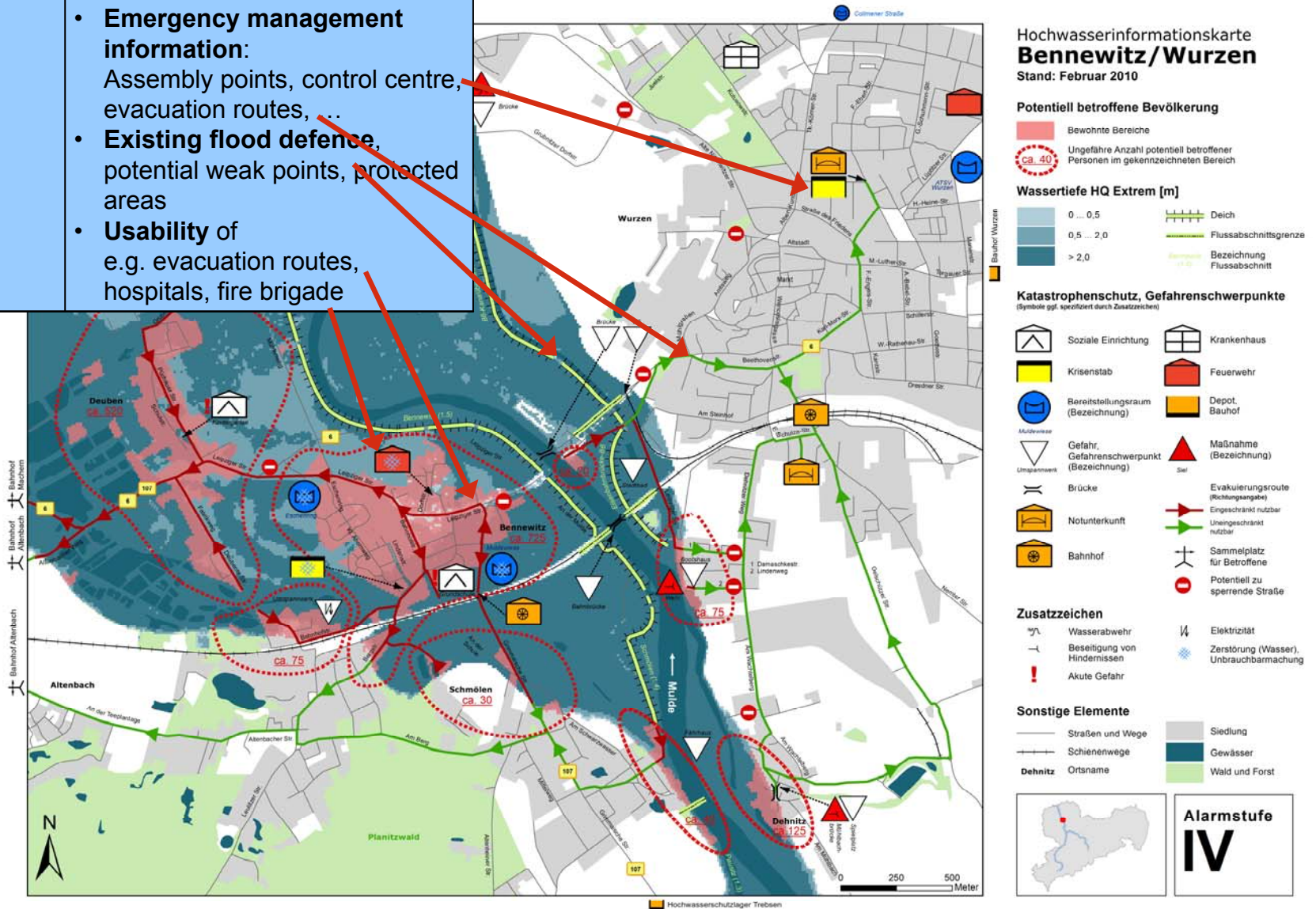
Recommendations for contents

	Emergency planners
Consequences/ Risk	<ul style="list-style-type: none"> Number of people at risk (to be evacuated) Critical infrastructure (to be protected or evacuated): hospitals, energy & water supply, traffic infrastructure



Recommendations for contents

	Emergency planners
Additional information	<ul style="list-style-type: none"> • Emergency management information: Assembly points, control centre, evacuation routes, ... • Existing flood defence, potential weak points, protected areas • Usability of e.g. evacuation routes, hospitals, fire brigade



Recommendations for visualisation of flood maps

See also recommendations by
RISKATCH

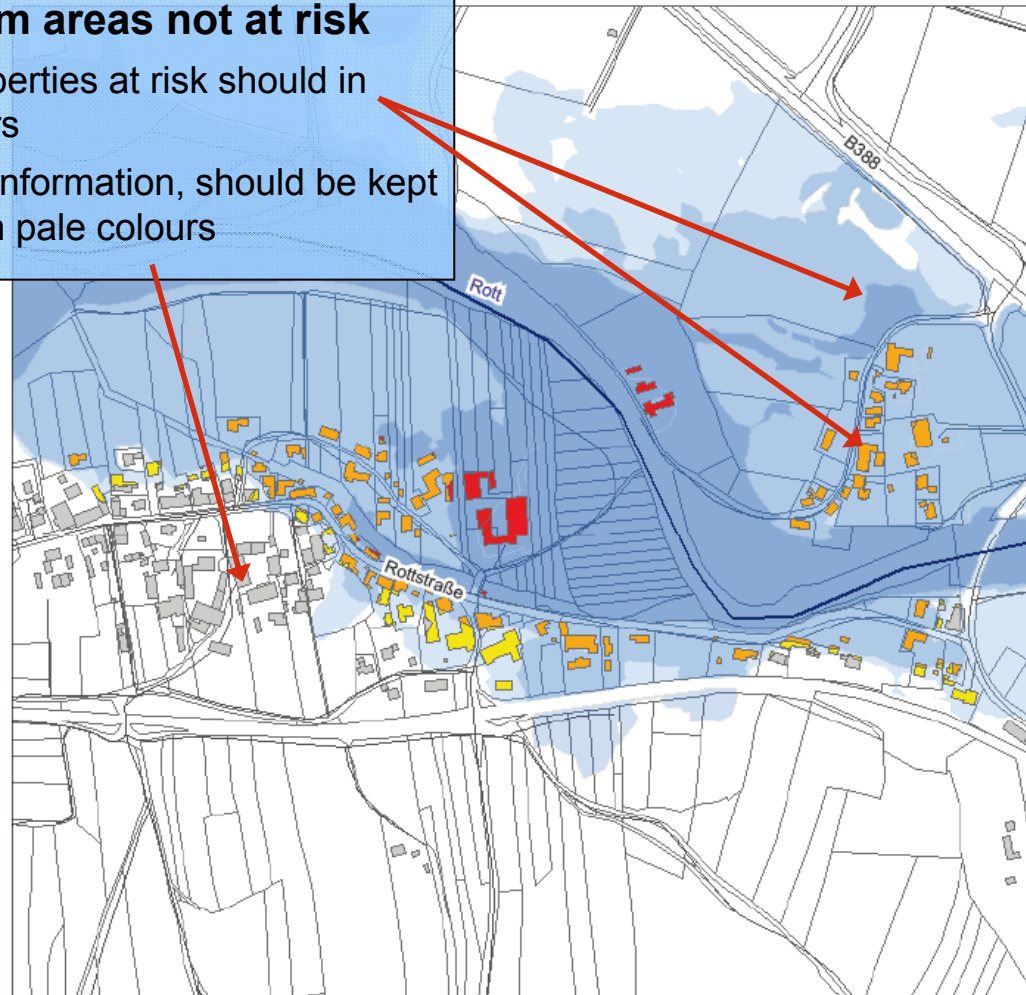


Recommendations for visualisation

General Recommendations (based on RISKCATCH & RISK MAP)

Areas at risk should be clearly visually differentiated from areas not at risk

- areas or properties at risk should in strong colours
- background information, should be kept simple and in pale colours



SCHWAIBACH (Ger)



Risk Map
Flood event extent

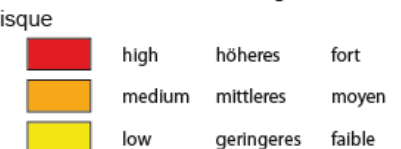
Risikokarte
Gebiete gefährdet durch Überschwemmung

Risque d'inondation
Etendue de la crue

Flood
Überschwemmung
Inondation



Risk for affected areas
Risiko für betroffene Siedlungen
Risque



0 100 200 m

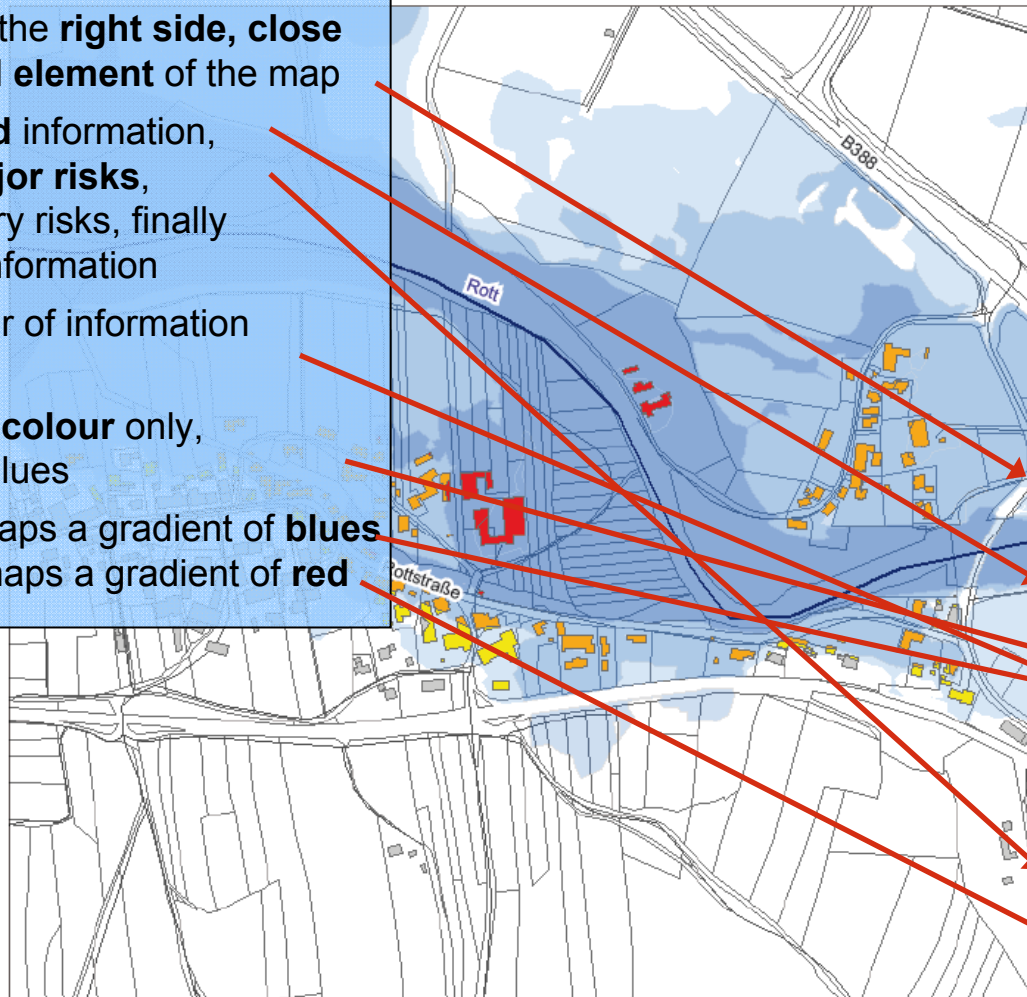


Recommendations for visualisation

General Recommendations (based on RISK CATCH & RISK MAP)

Legend:

- preferably on the **right side, close to the central element** of the map
- Firstly hazard information, secondly major risks, then secondary risks, finally background information**
- limited number of information (**< 6 classes**)
- one range in colour only, decreasing values**
- For **hazard maps** a gradient of **blues** and for **risk maps** a gradient of **red**



SCHWAIBACH (Ger)



Risk Map
Flood event extent

Risikokarte
Gebiete gefährdet durch Überschwemmung

Risque d'inondation
Etendue de la crue

Flood
Überschwemmung
Inondation

- 1 in 10 years
Alle 10 Jahre Stattfindend
Décennale
- 1 in 100 years
Alle 100 Jahre Stattfindend
Centennale
- 1 in 1000 years
Alle 1000 Jahre Stattfindend
Millennale

Risk for affected areas
Risiko für betroffene Siedlungen
Risque

- high höheres fort
- medium mittleres moyen
- low geringeres faible

0 100 200 m



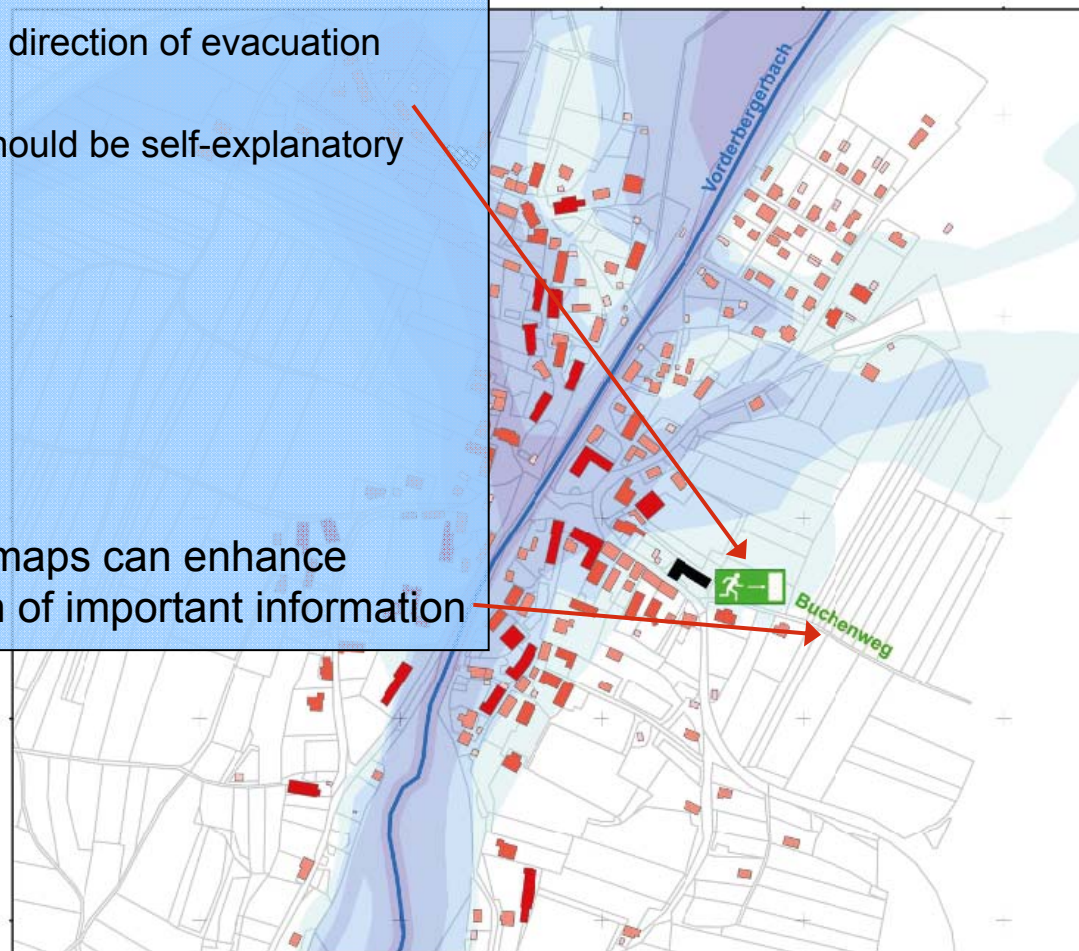
Recommendations for visualisation

General Recommendations (based on RISKATCH & RISK MAP)

- Specific **symbols** for highlighting major risks

- E.g. the direction of evacuation routes
- Icons should be self-explanatory

- **Text** within the maps can enhance the transmission of important information



VORDERBERG (Ger)

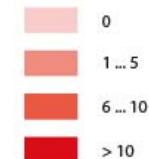
Vulnerability map

Vulnerabilitätskarte

Carte de vulnérabilité

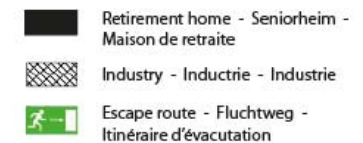
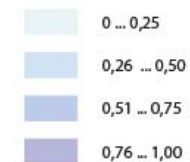
Number of persons - Personenanzahl

Nombre de personnes



Vulnerability zone - Vulnerabilitätszone

Zone de vulnérabilité



0 60 120 180 m



University of Natural Resources and Life Science, Vienna, Austria, Institute of Mountain Risk Engineering. Design and Cartography: S. FUCHS, R. TOTSCHNIG, 2010
Map projection: Bundesmeldenetz BM31

This project is funded within the ERA-NET Crue funding initiative (ERAC-CT-2004-515742)

Recommendations for visualisation

specific recommendations

	Strategic planners	Emergency planners	General public
Information density / complexity	High	High, but quick access to information	Low, Quickly & easily understandable
Legend	<ul style="list-style-type: none"> Up to 5 classes 	<ul style="list-style-type: none"> Not more than 3 classes 	<ul style="list-style-type: none"> Not more than 3 classes
Hazard & consequences in the same map?	<ul style="list-style-type: none"> yes 	<ul style="list-style-type: none"> yes 	<ul style="list-style-type: none"> Mainly hazard information
Additional map elements	<ul style="list-style-type: none"> optional 	<ul style="list-style-type: none"> Symbols (commonly used) Text 	<ul style="list-style-type: none"> Symbols (self-explanatory) Text

Recommendations for visualisation

specific recommendations

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Recommendations for visualisation

specific recommendations

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Recommendations for visualisation

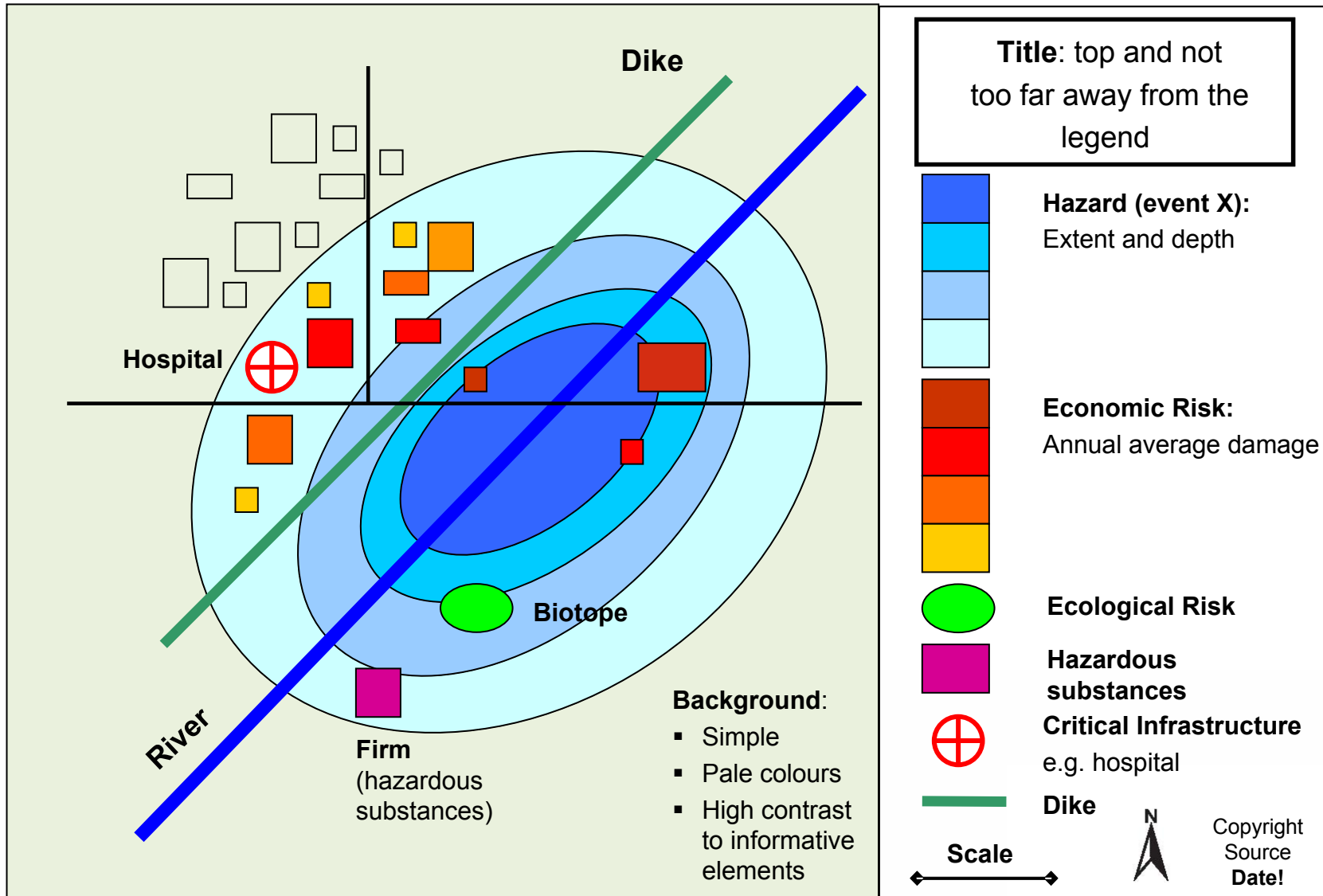
specific recommendations

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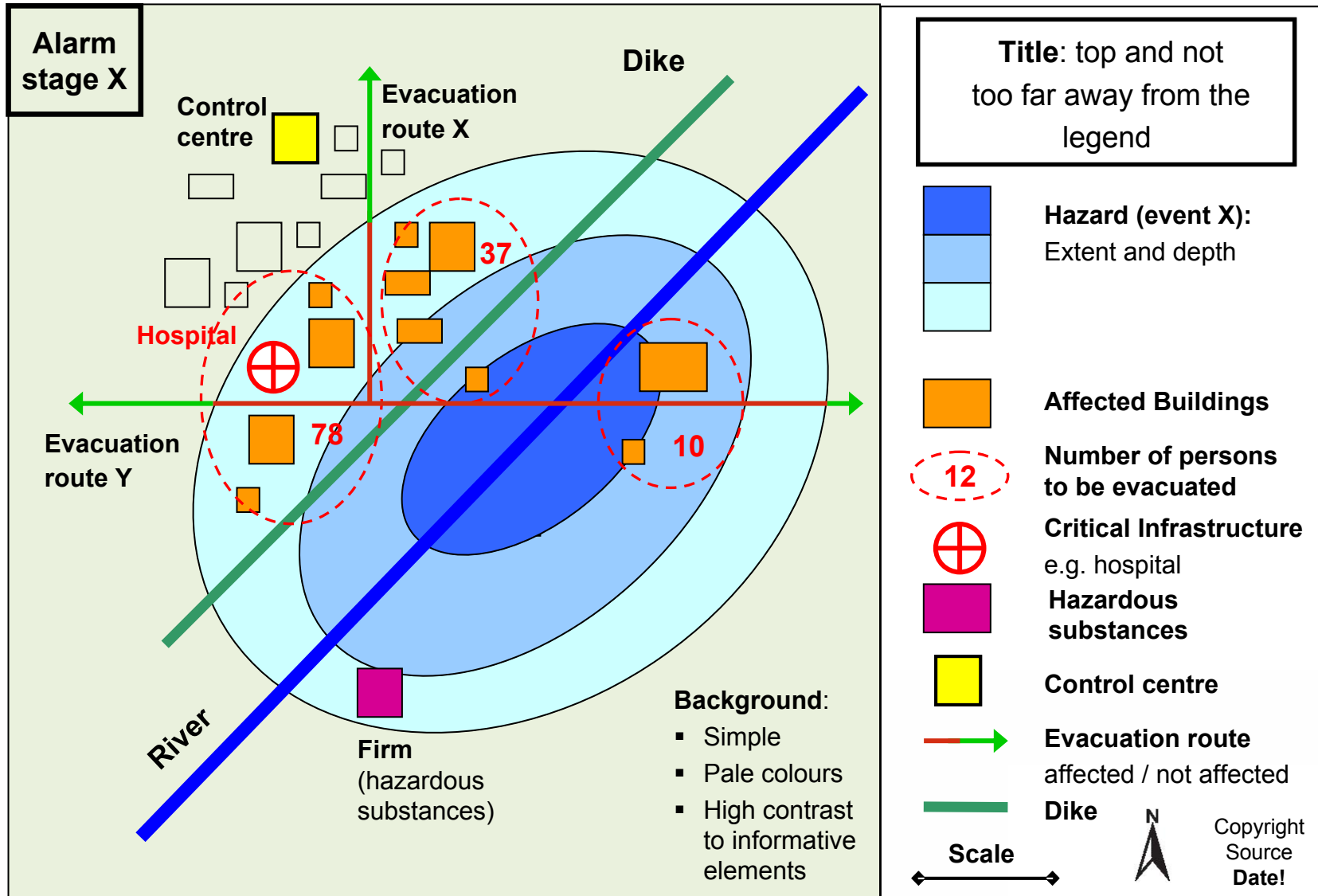
**Idealised,
user-specific maps**
based on content & visualisation
recommendations



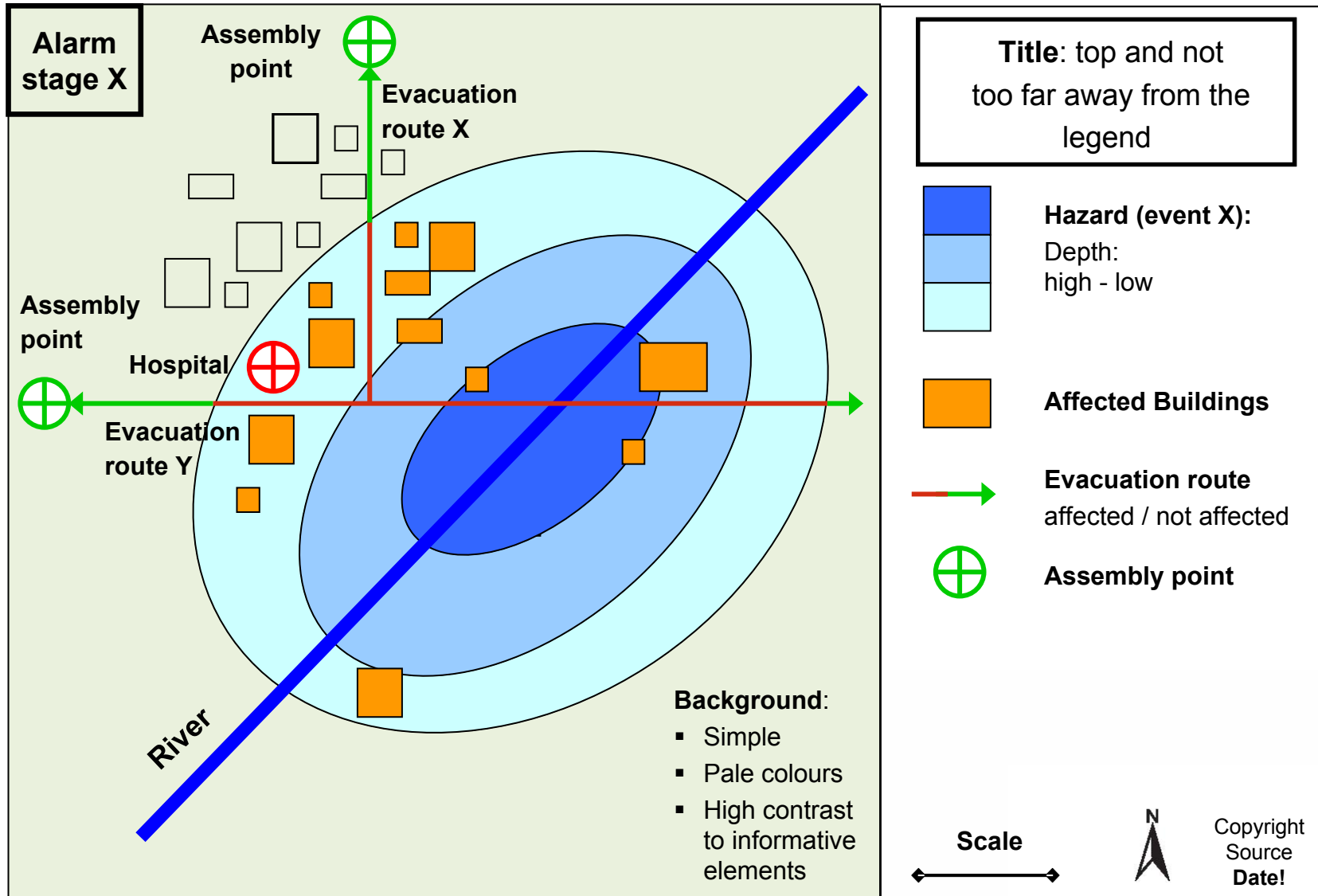
Idealised map: strategic planning



Idealised map: emergency management



Idealised map: public





Outlook

RISK MAP

However...

- There is not *the one* ideal map
 - Regional preferences can be very different
→ Participation
 - Digital map server for individualised maps
 - Limited number of print-out maps also needed
- More detailed results in the final report, see also www.risk-map.org
- Recommendations will be also published as a stand-alone document

funded by:



lebensministerium.at



Ministère de l'Écologie, de l'Énergie,
du Développement durable et de la Mer
en charge des Technologies vertes et des Négociations sur le climat

Thank you very much!

Improving Flood Risk Maps as a Means to Foster Public Participation and Raising Flood Risk Awareness: Recommendations from the RISK MAP project

V. Meyer, C. Kuhlicke, S. Fuchs, S. Tapsell, S. Priest, W. Dorner, K. Serrhini, H. Unnerstall,
S. Scheuer, J. Luther, J. Pardoe, J. Seidel, G. Palka, C. Viavattenne, S. McCarthy

