A Psychological Framework

for the S-HELP Decision Support System

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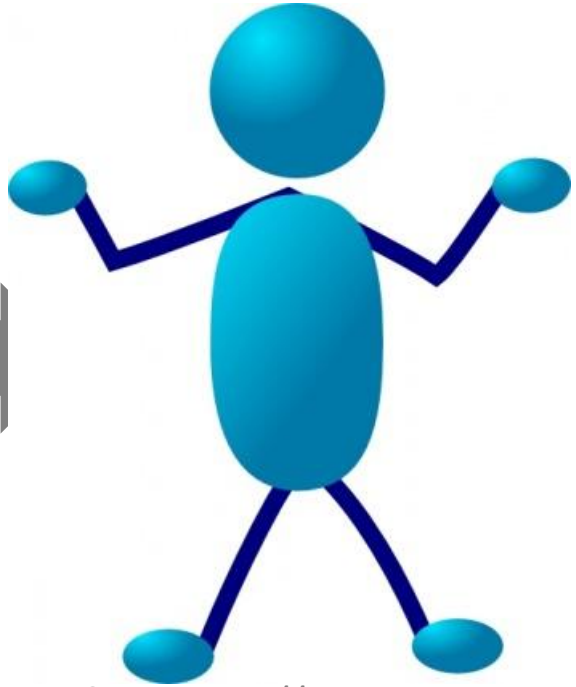
http://www.fp7-shelp.eu/

Development of **decision support tools** for improving preparedness and response of health services involved in emergency situations

System Functions and Information

Decision Support System and Tools

Human Factors in Decision Making



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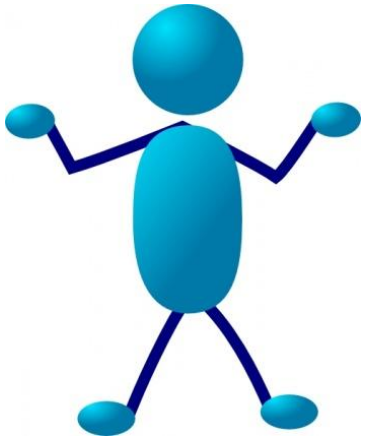
Introduction

System Functions and Information

Decision Support System and Tools

Human Factors in Decision Making

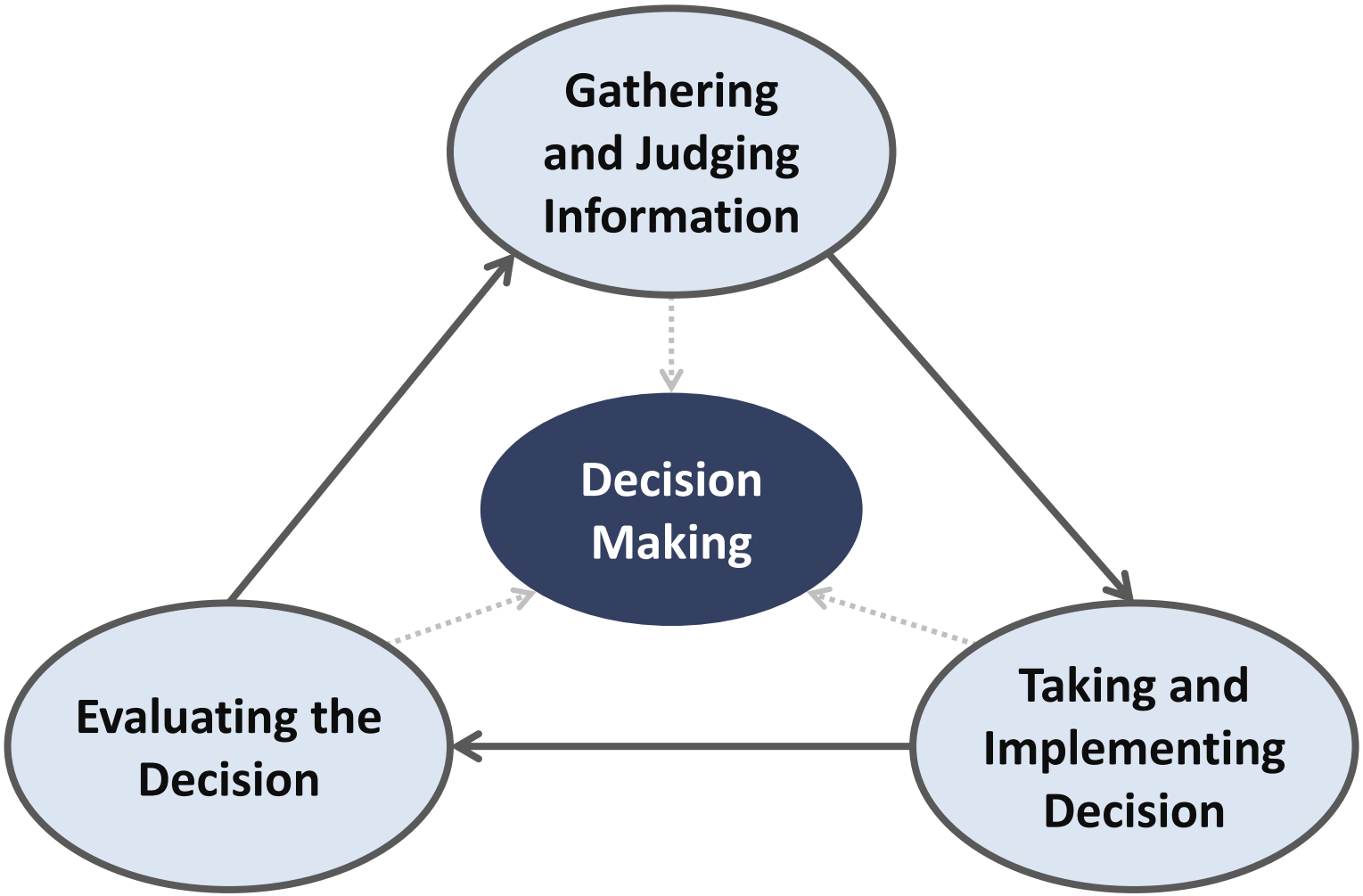


Development of a psychological framework that informs

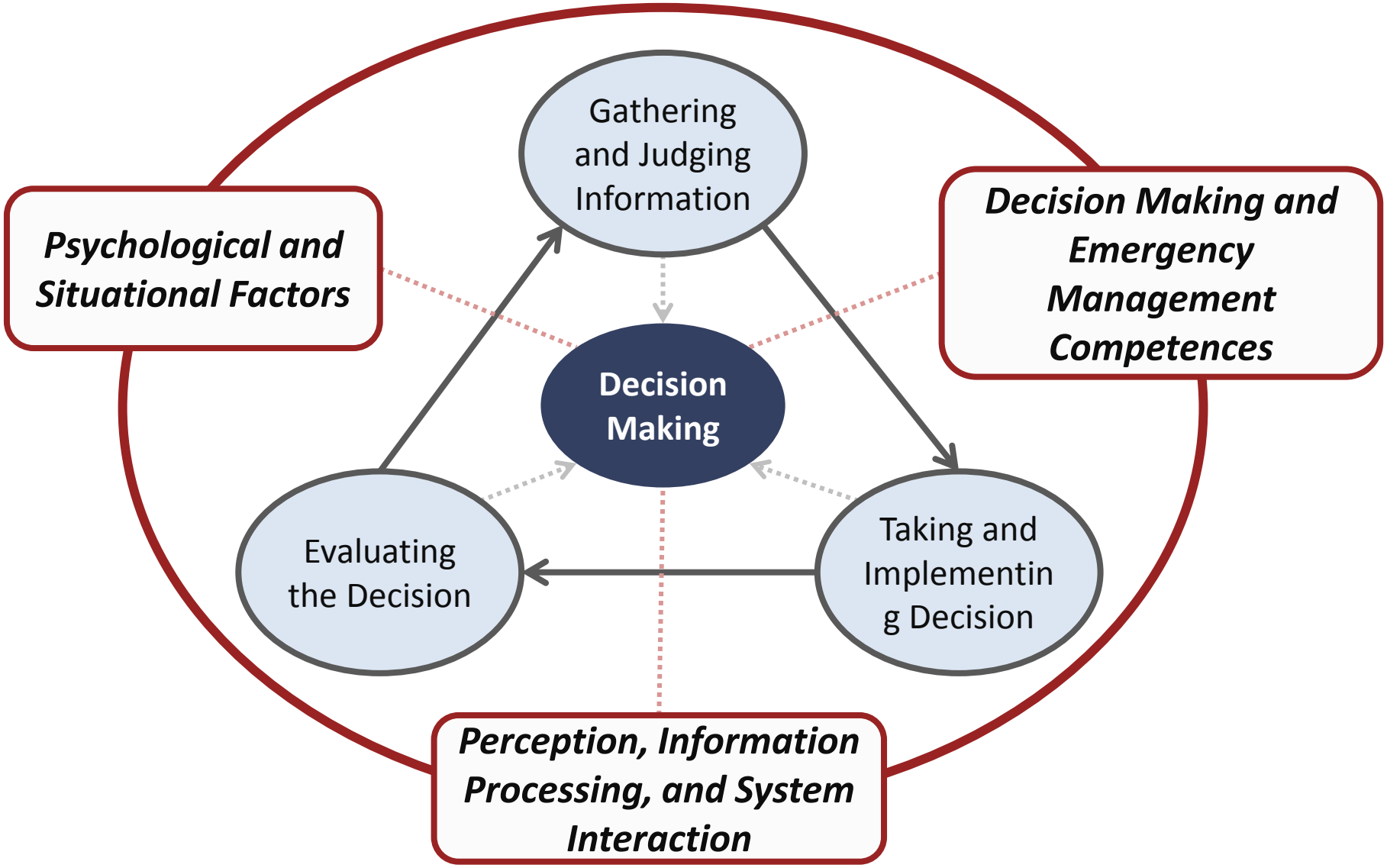
- **technology** that the decision maker uses
- **training** of the decision maker

Psychological Framework

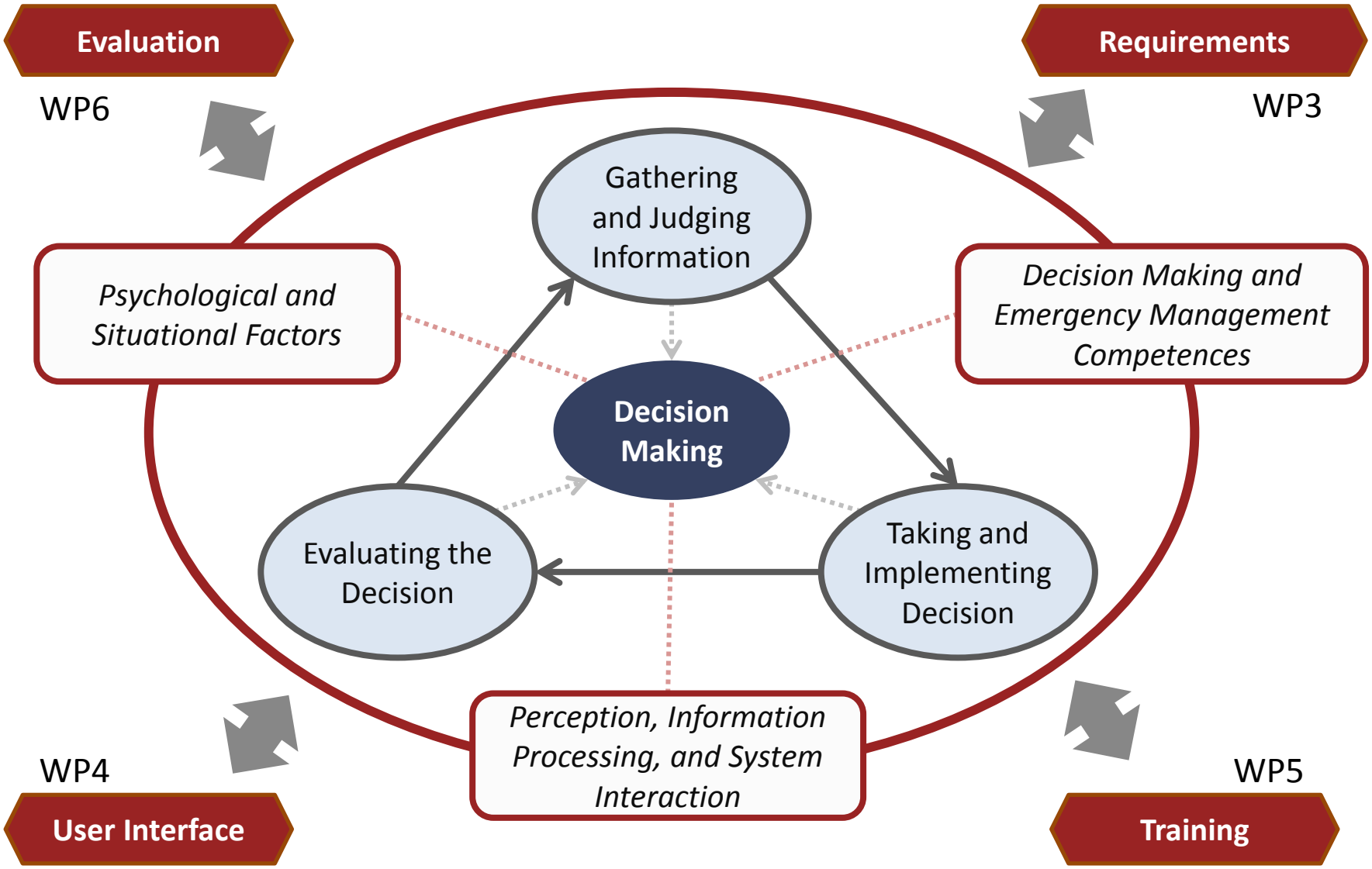
Psychological Framework



Psychological Framework



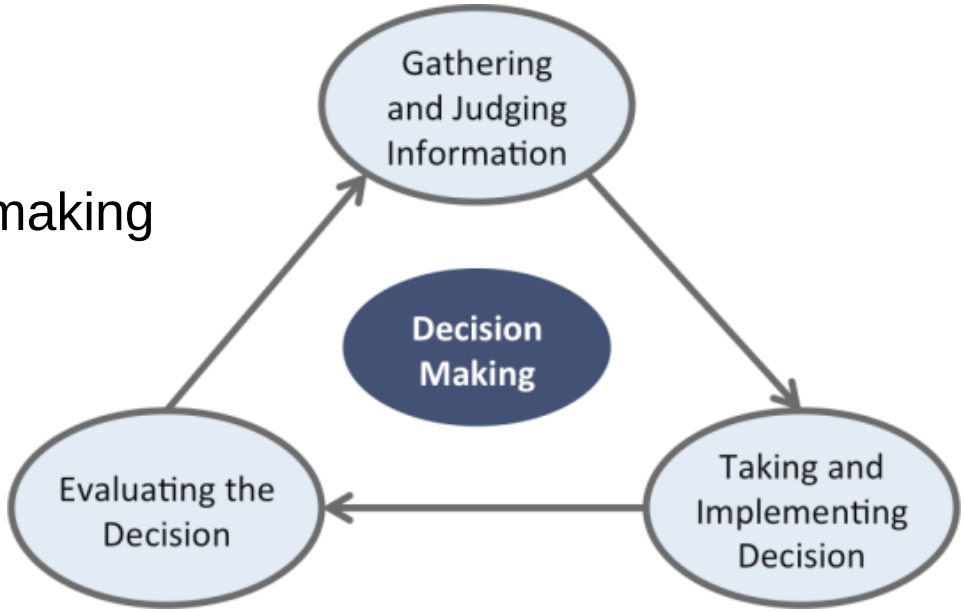
Psychological Framework



Self-regulated Decision Making Process

- Decision making is commonly considered as a multi-step process: pre-decision, decision, and post-decision (e.g. Zeleny, 1982)
- Similarities between decision making cycle and self-regulation cycle
  - explicitly addressing meta-cognition
- Consists of three cyclic phases
  - gathering information
  - taking decision
  - reflecting on decision

- Hierarchical levels of decision making



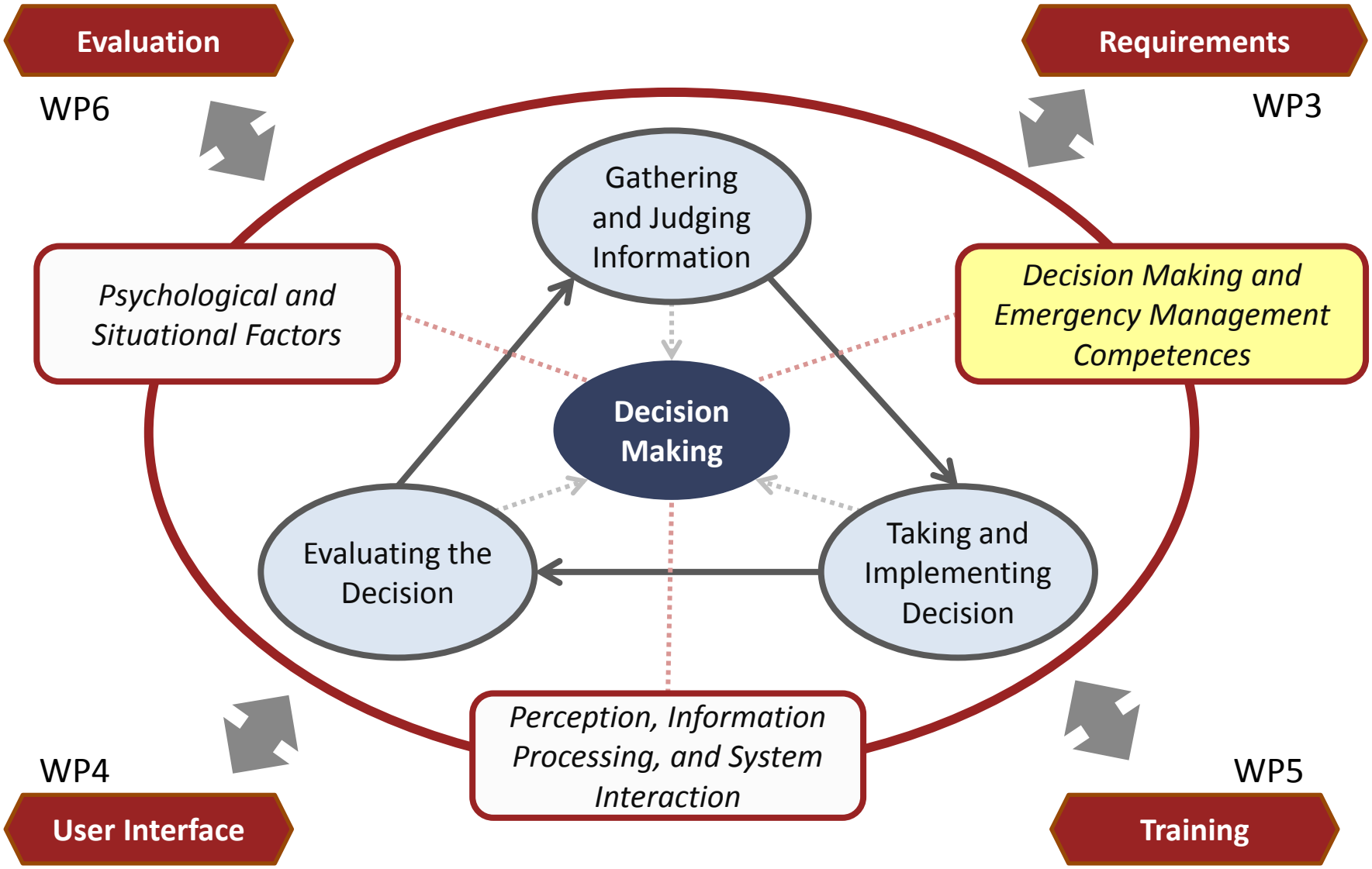
Self-regulated Decision Making Process

Translating psychology into technology: user interface **design principles**

ID	Design Principle
DG.1.01	Support the self-regulated decision making process in the user interface through appropriate visualizations

Description	The metacognitive activities should be supported by the UI …
Application approach and example	tools are needed for the reflection of the taken decisions; consequences should be seen on the display …
Theory	self-regulation and metacognition …
Evaluation Criteria	in a user study the responses of operators will be analysed …

Psychological Framework



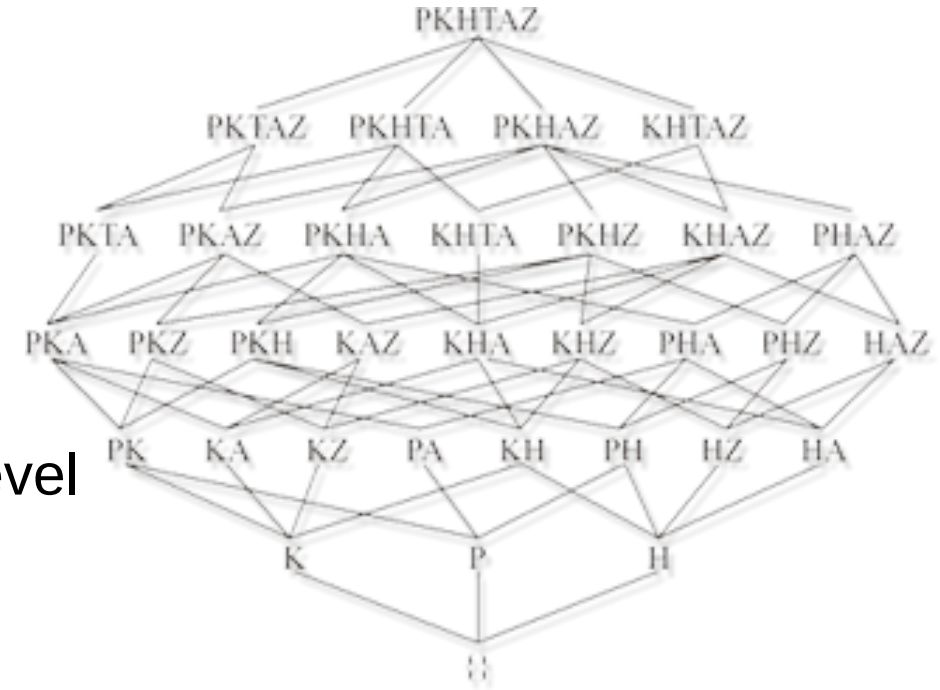
Decision Making Competences for Emergency Mgm.

- Specific emergency management competences
  - applying specific ***emergency management knowledge*** (run operations, etc.)
- Meta-competences related to emergency management, e.g.
  - ***evaluation***: evaluate facts and knowing when to stop
  - ***creativity***: develop means of accomplishing goals in ways that avoid or minimize ethical problems.
  - ***prediction***: foresee the potential consequences of conduct and assess the likelihood of risks
- Applying specific decision making models and principles
  - e.g. ***multi-criteria decision making***
- General meta-competences, e.g.
  - ***critical thinking***, ***stress coping***, ***communication***, ***teamwork and collaboration***

The Role of Competences for Training

- Competences can be trained
  - much experience and research in technology-enhanced learning

- Competence Model
  - current competences
    - assessment methods
  - goal competences
    - needed for clearance level
    - training methods
  - groups / clearance level
    - require different competences

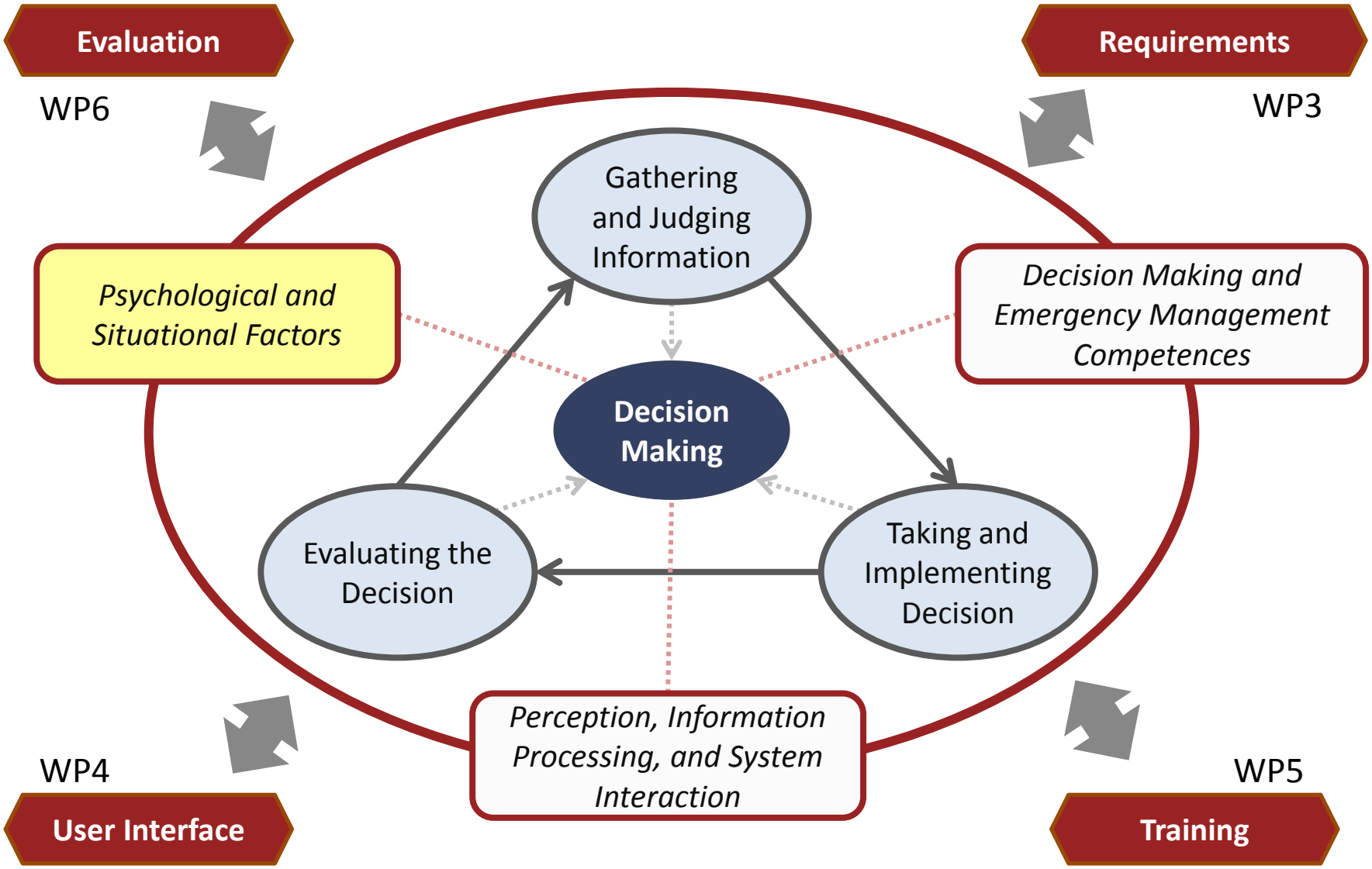


Translating psychology into technoloy: user interface **design principles**

ID	Design Principle
DG.2.01	Adapt user interface to competence level

Description	Usually clearance levels are related competence levels …
Application approach and example	present only information and control elements on the user interface that are in line with the user's competence level …
Theory	competence models, psychological research on competence, …
Evaluation Criteria	in a user study persons with different competence levels have to respond on an emergency situation …

Psychological Framework



Psychological and Situational Factors

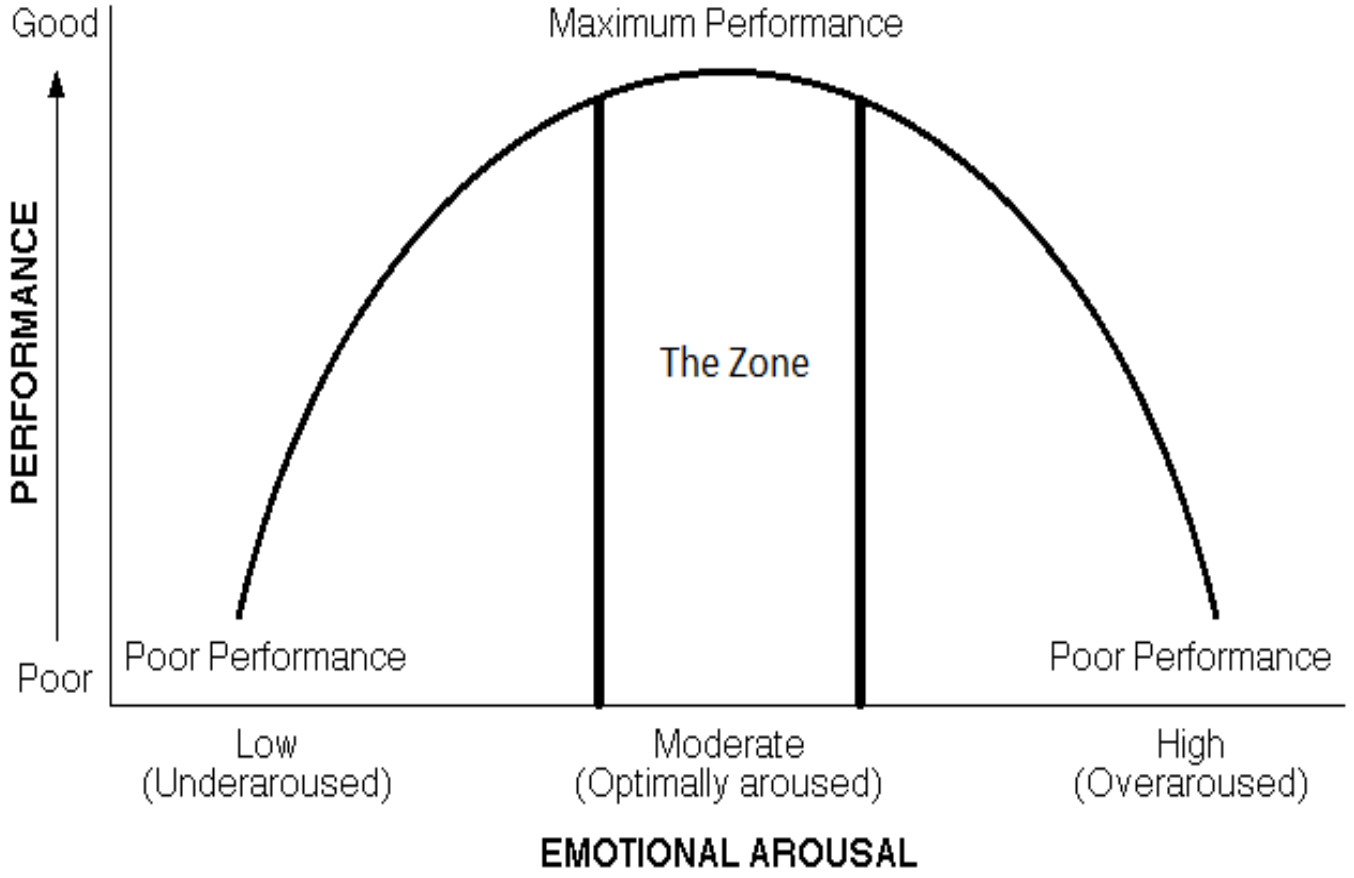
- Psychological factors
  - states (e.g. arousal)
  - traits (e.g. self-efficacy, confidence)

- Situational factors:
  - social situations and environmental conditions
  - e.g. time pressure, information overload, lack of information, conflicting information, uncertainty

- Stress as interaction of psychological and situational factors
  - time pressure, information overload

Psychological and Situational Factors

- Influence of stress on arousal



Psychological and Situational Factors

Example of a user interface that might be complicate under stress

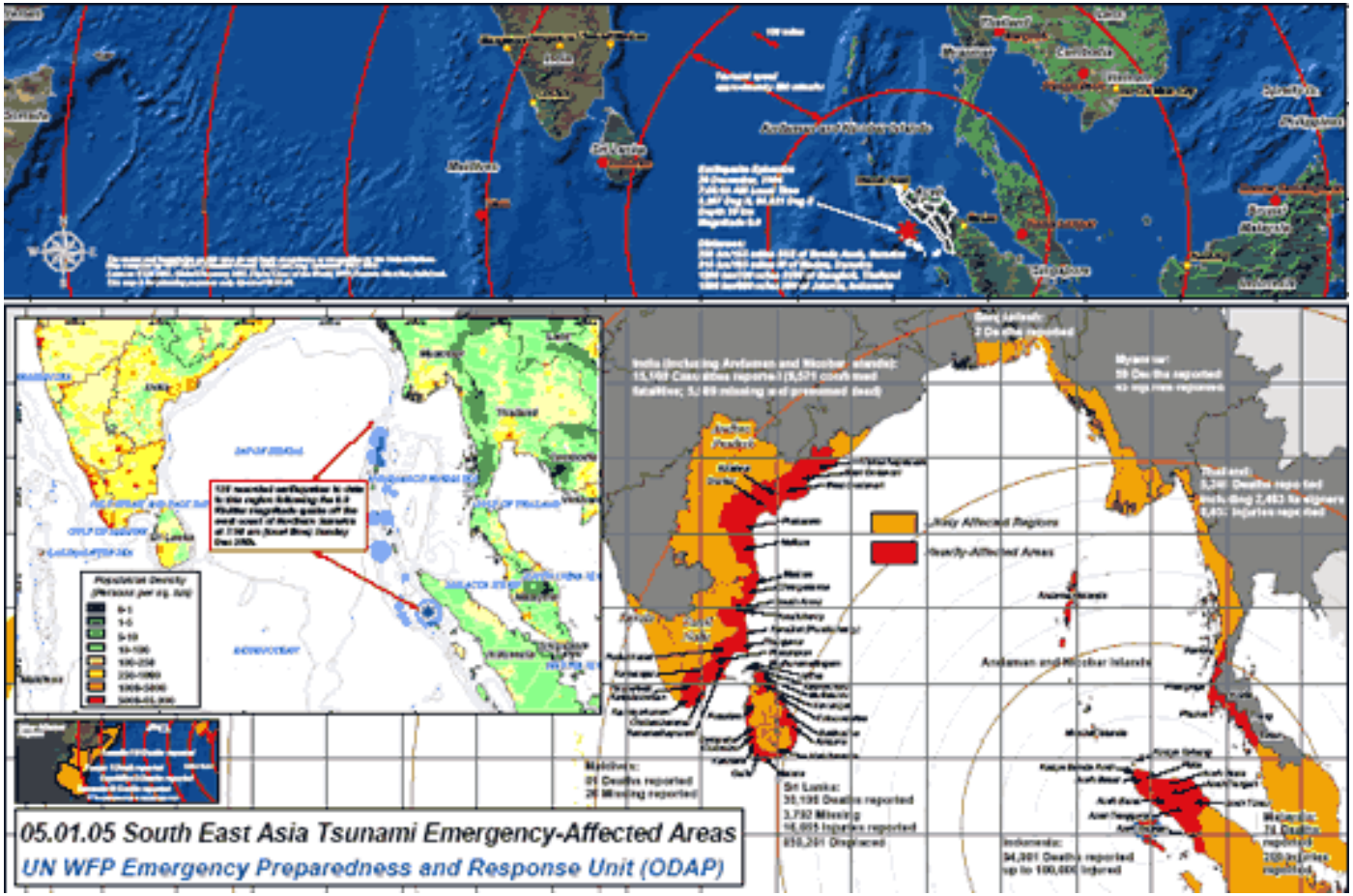


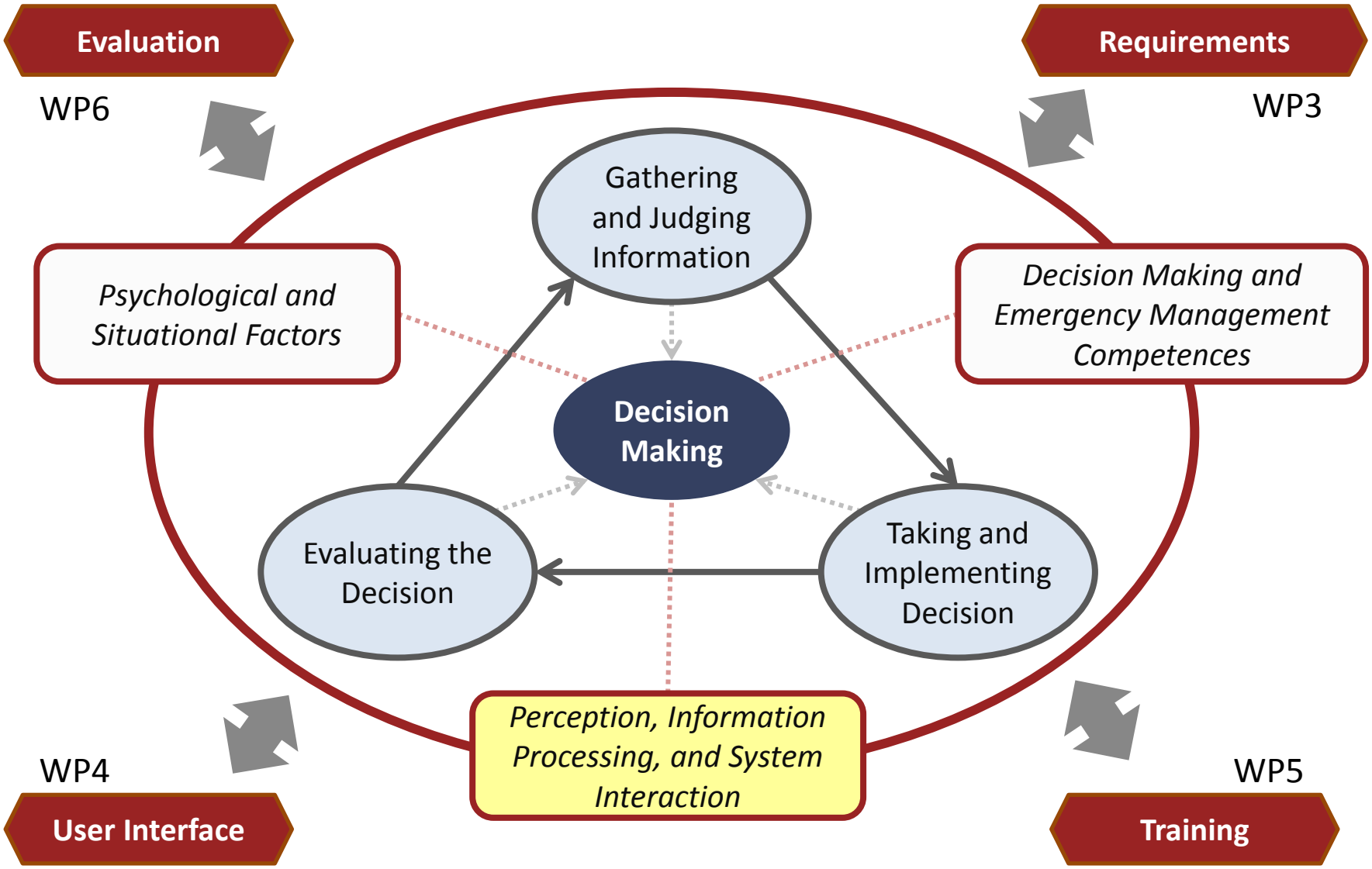
Image from: http://www.library.umaine.edu/geoscan/images/20041227Tsunami.gif
and: http://www.hewsweb.org/other_hazards/

Psychological and Situational Factors

Translating psychology into technology: user interface design principles

ID	Design Principle
DG.3.01	Omitting unnecessary information
DG.3.02	New information should be linked to data currently being processed
DG.3.03	An integrated information format should be used to present an overall "picture"
DG.3.04	Avoid the need for data transformation
DG.3.05	Avoid structural interference
DG.3.06	Allow to hide and show time information
DG.3.07	Minimising information dispersal over multiple sources
DG.3.08	Be consistent on the visual language for information visualisation

Psychological Framework



Information Processing and Perception

- Impact on efficiency, accuracy, strategy selection…
- psychological research how a person perceives information
  - e.g. Gestalt psychology

Focal point

Similarity

Translating psychology into technoloy: user interface design principles

ID	Design Principle
DG.4.01	Be clear/strict on focal points
DG.4.02	Avoid unwanted focal points
DG.4.03	Be clear on figure-ground distinction
DG.4.04	Grouped information should have similar visual attributes
DG.4.05	Grouped information should be located close to each other

Next Steps

- Further elaboration of the psychological framework
- User interface design:
  - guidelines and principles
  - relation to system functionalities
- Training concept
  - decision making competences
- Empirical studies and evaluation on
  - principles and guidelines
  - training concept

Contact

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