Organizational learning in emergency management: from Theory to Practice

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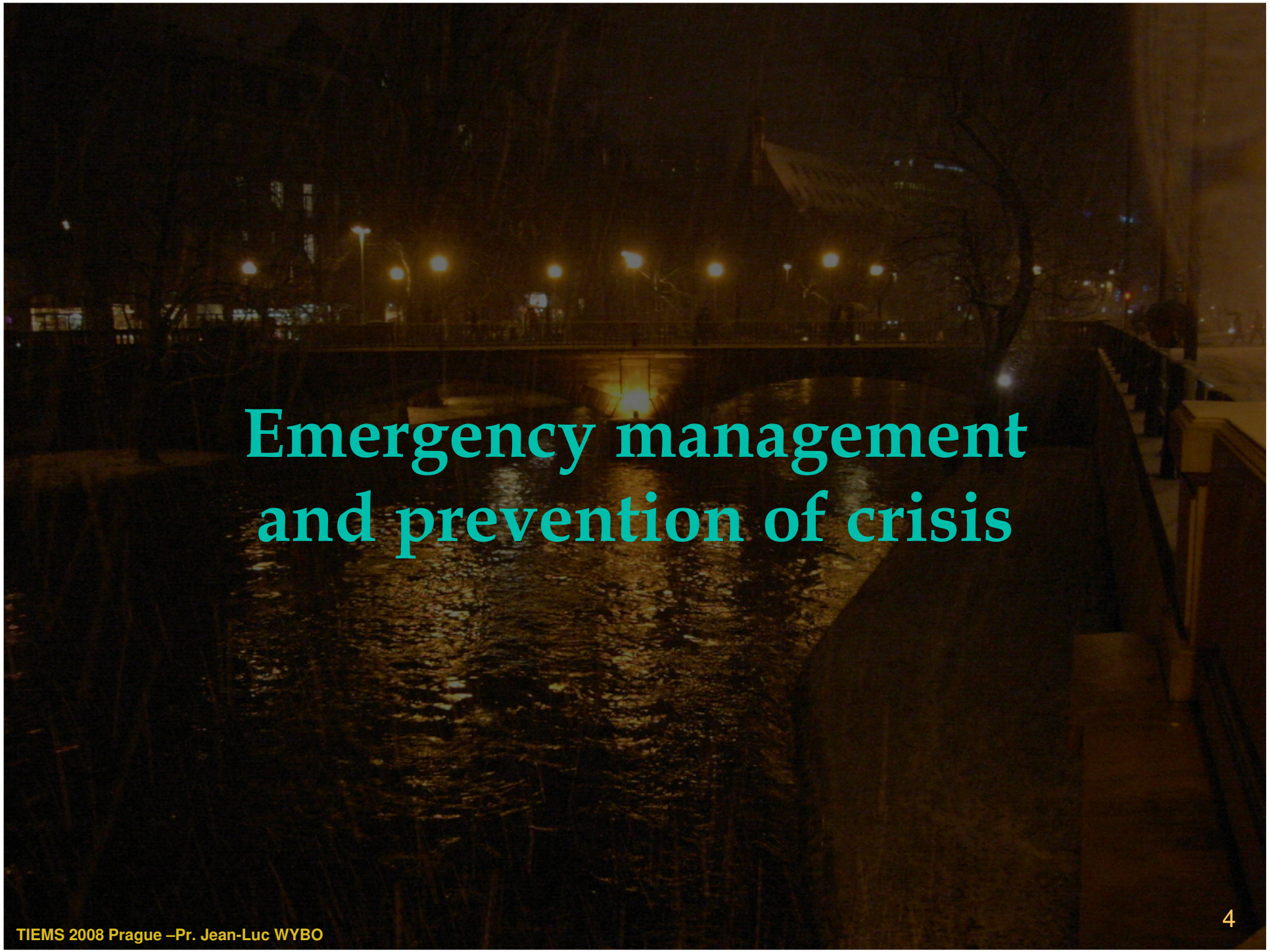
Two main categories of Situations

- **Emergency**
  - Situation was anticipated, it fits hypothesis
  - Applying plans allows managers to keep control
    - Preparedness designed from known accidental scenarios
    - Clear distribution of tasks provides confidence
- **Crisis**
  - Situation escapes from known scenarios
  - Loss of control, overwhelmed organization
    - Surprise, speed of evolution and domino effects
    - Extension in space, time and number of victims
    - Difficulties of communication among stakeholders
    - Uncertainty, dissonance among people, public and media
    - Shortage of available resources in relation with the needs

Example of crisis: the 2003 heat wave in France

- A real disaster : 15.000 victims (70.000 in Europe)
- Several overwhelming factors at the roots of the crisis
  - » Surprise (despite an alert message from the meteorological bureau)
    - – No alarming data during the first days (« natural » deaths)
    - – Not felt as an emergency by the rescue services
  - » Speed of evolution : contraction of time
    - – Public health organization was not designed to cope with urgency
  - » Extension in space : most of the country was concerned
  - » Uncertainty
    - – Unknown relation between cause (heat wave) and effect (death)
    - – Unknown number of potential victims (elderly people at home)
  - » Dissonance : Emergency doctors (protest) % Minister (minimize)
  - » Communications : no usual relations among organizations
  - » Shortage of resources
    - – saturation of hospitals, funeral services, cemeteries



Emergency management and prevention of crisis

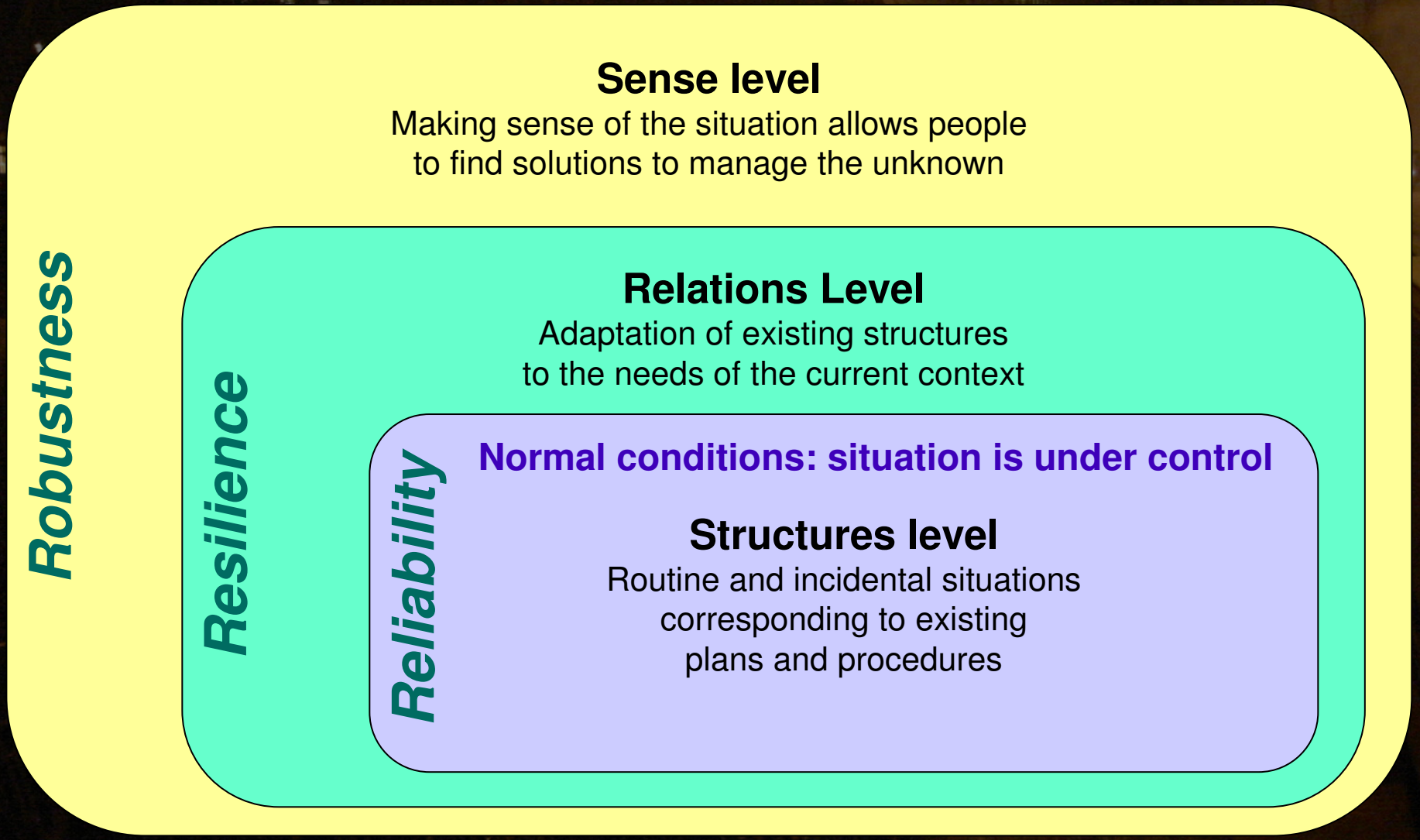
Vigilance : from weak signals to decision

- The normal process
  - When an operator receives or collects signals
    - He/she filters them (using a set of valid criteria)
    - He/she transmits relevant signals to the management level
    - Managers analyze the situation and take decisions
- Barriers that reduce vigilance capacities
  - Contextual barrier
    - What is to be detected; is the situation normal ?
    - This refers to the notion of « normality »
  - Routine barrier
    - What makes the relevance of a given signal ?
    - This refers to the notion of « sense »
  - Communication barrier
    - Is the operator willing to transmit the signal ?
    - This refers to the notion of « energy gap » between people

Cooperative / Individual Emergency management

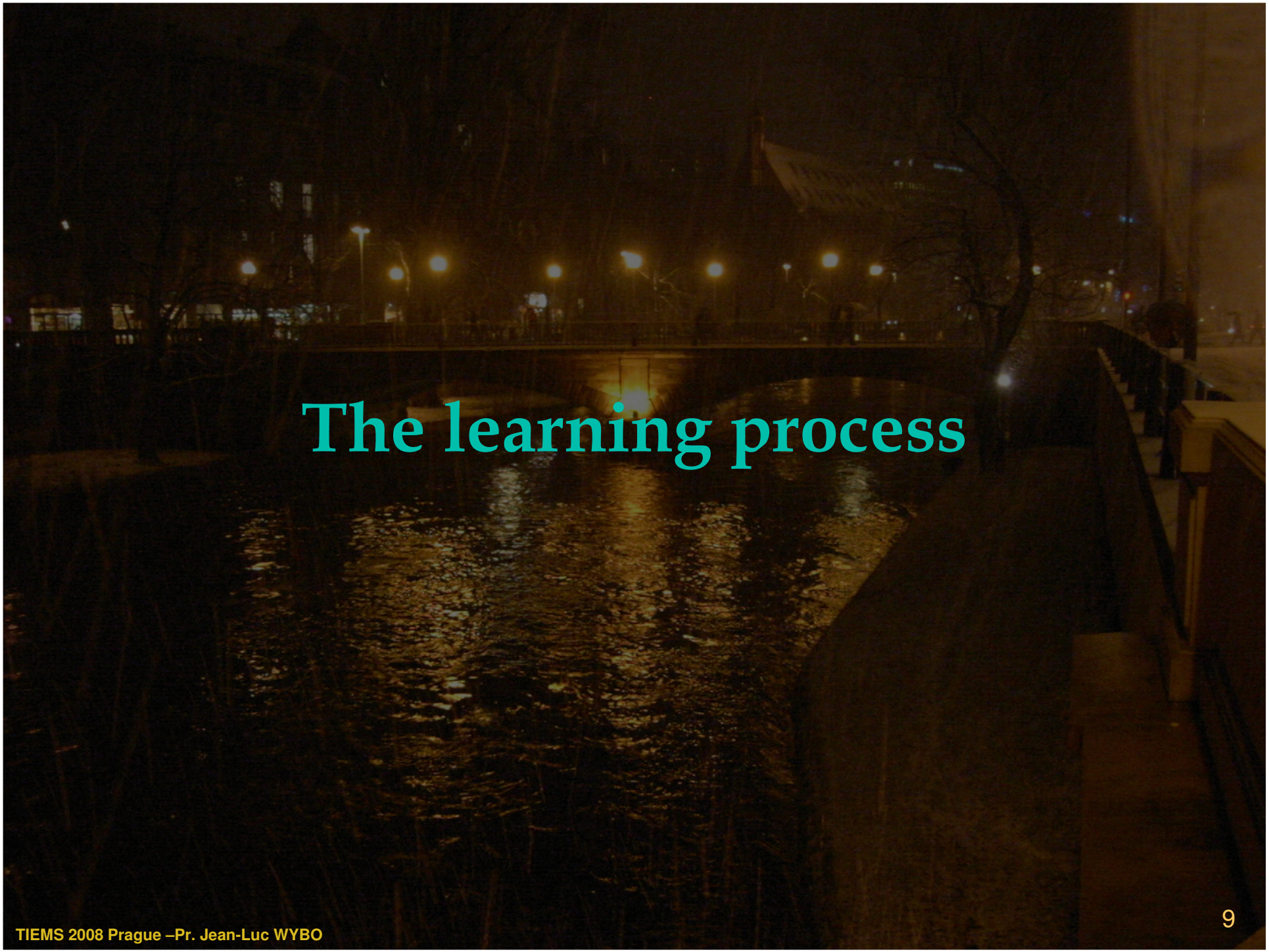
Organize ***cooperation among organisms*** on the site and in headquarters (HQ)	Organize ***cooperation among troops*** on the site
Adapt global organization and sharing of tasks among organisms to the current context	***Adapt internal organization*** to the current context
Organize communication and sharing of information among organisms to ensure ***efficient cooperation***	Organize communication and sharing of information among troops and HQ to ensure ***efficient achievement of tasks***
Organize cooperative planning : sharing of tasks and setting up/updating the global agenda of tasks	***Organize activities*** to achieve one's mission and set up/update internal agenda of tasks
Set up rendezvous and other control loops to ***maintain coherence of actions*** and tasks	***Set up feedback*** between field and HQ operations
Act together by allocating resources depending on the global development of the situation	***Follow up ongoing missions*** by allocating internal resources depending on the needs
Learn lessons by sharing experiences and knowledge among organisms, in order to improve global organization and cooperation	***Learn lessons by comparing*** achievements to planned activities, in order to improve internal organization and planning

Prevention of crisis: a 3-level model
Reliability, resilience and robustness



Resilience and robustness: a series of « Invisible acts »

- When faced to unplanned situations, some people
  - » Emerge from the group to « do something »
  - » Find how to adapt plans to the current situation
    - – Adapting existing technological means or procedures
  - » Find solutions to problems arising from unknown situations
    - – Setting up new organizational patterns, new communication routes
- These actions generally disappear when the crisis ends
  - » Experts consider their reaction as part of their “normal job”
  - » Evaluation would be negative: violation of procedures and plans
  - » Their actions aren’t visible from the “outside world”
    - – They appear inside a given team, to achieve a given mission,
    - – They last only during a period of time, they are not traced,
    - – They occur only in a given place, in an informal way.
- But they are key matters to understand and progress



The learning process

How to learn from experience?

- Analyze the management of accidents and crisis
  - Identify the “learning potential” (low, medium, high)
    - Assessment : LP = **severity** (level of damage) **x novelty**
  - Analyze the development of events and actions
    - To understand decisions in their context (temporal and spatial)
    - To assess reliability (comparison to the reference)
    - To assess resilience (capacity of adaptation of plans to the context)
    - To assess robustness (capacity of innovation)
  - Share lessons learnt among participants
  - Assess the level of modifications to achieve
    - Low potential : correct deviations
    - Medium potential : modify procedures
    - High potential : modify organization

Learning lessons from accidents and crises

- Analysis of accidents and crises provides knowledge
  - On **weaknesses of the system**: technical, human, organizational
    - What **means and resources** should be improved
    - What **training sessions** should be organized,
    - what **plans and procedures** should be improved
  - On **strengths of the system**: technical, human, organizational
    - Prevention and protection **barriers that functioned**
    - People, **groups and organizations that emerged** in chaotic situations
- Only if some basic conditions are satisfied
  - **Narration is dissociated from sanction**
  - **Everyone** has the opportunity to provide his/her experience
  - **knowledge sharing** is organized among stakeholders

Several kinds of lessons learnt from experience

- Accident scenarios
  - » Causes and consequences
  - » Barriers: prevention and protection (existing or to set up)
- The dynamics of events and decisions
  - » A succession of decision cycles; what else should be done ?
- The « control loops »
  - » They ensure reliability of organizations and processes
- The vulnerabilities of the organization
  - » Internal & external threats and hazards
- Resilience and robustness capacities

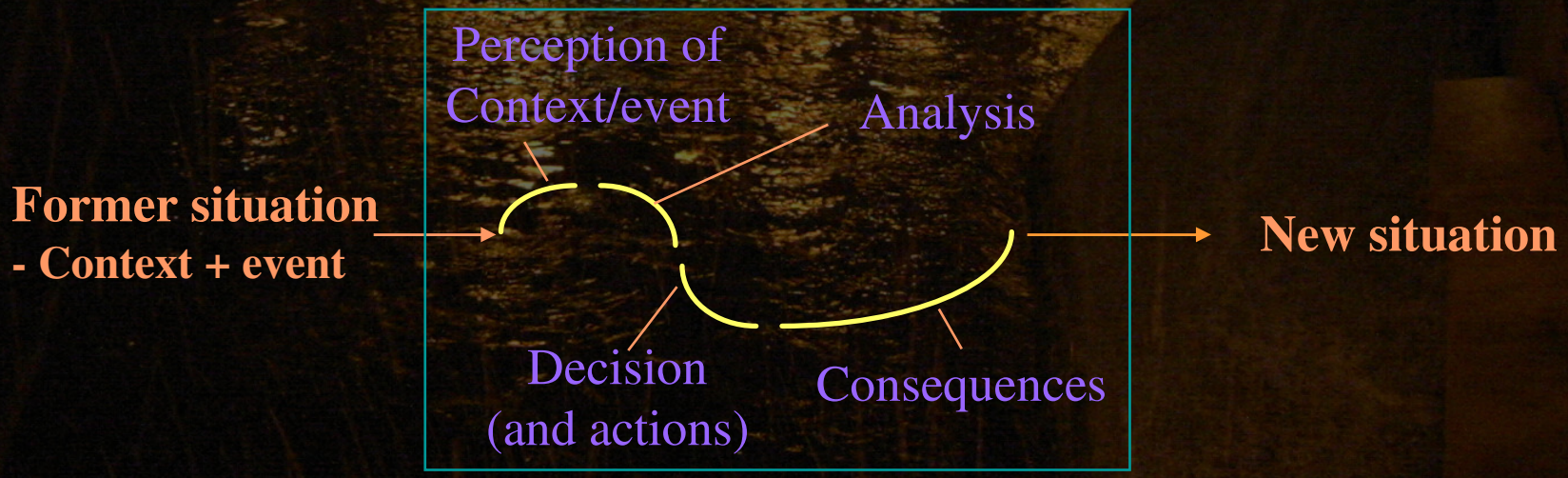
Learning from accidents: some failure factors

- **Looking for faults and guilt**
  - » Accident analysis : an “easy” way to assess responsibilities
  - » Fear of sanction drive people to « discretion »
- **Passing under the spotlights**
  - » The one who accepts to talk focuses attention of others
  - » Talk about our own actions provokes criticisms from others
- **Lack of feedback** to sources of information
  - » Flow of information is generally « bottom - up » oriented
  - » People perceive experience analysis as one more task to do

- Simulations provide a way to avoid the main difficulty
  - » No risk of sanction or responsibility for casualties & damage

A Simple mental model : the particle of experience

- Raw material : **narration** and **interviews** of witnesses
  - » "face to face", anonymous, non oriented
    - – Access "**episodic memory**" : questions from the narration
    - – Access **tacit knowledge** : hypotheses & alternatives, past experiences
- Memories are represented as a series of episodes
  - » "**particles of experience**" : self-explicating **decision cycles**
  - » **Reaction** of the person/group **to events** or changes in the context



Methodology to analyze high learning potential events

- Collect data
  - » Logbooks, sensors, messages, ...
- Establish chronology
  - » Rebuilt the development of events and decisions
- Conduct individual interviews
  - » Identify people that were involved
  - » Transcribe narration, look for alternatives and suggestions
- Make synthesis : succession of particles of experience
  - » A global representation of the development of the accident
- Organize a groupwork session
  - » Validate knowledge and create dialog opportunities
  - » Learn lessons, identify successes and improvements

Learning from simulations

Learning lessons from « routine » simulations

- Benefits
  - » Setting up a simulation is an opportunity to:
    - gather the stakeholders and discuss “who is in charge of what”
    - improve mutual knowledge and shared values among organisms
  - » Testing technological means and their use in realistic conditions
  - » Training people to practice their missions and tasks
- Drawbacks
  - » Poor level of realism decreases commitment
  - » **Evaluation** is based on a **rational model of success** :
    - Measures (time to do a task, efficiency of procedures)
    - Gaps between prescribed and achieved
- This is not enough to assess resilience and robustness
  - » How people will react in front of unplanned situations/events ?
  - » How to value innovation and emergence of “ad-hoc” solutions ?

Assessing resilience and robustness from simulations

- Based on a representation of an organization at work
  - » Structures: what is prescribed (hierarchy, plans) > Reliability
  - » Relations: roles and interactions at the local level > Resilience
  - » Sensemaking: how people justify their actions > Robustness
- Observation: combine multiple points of view
  - » The participants that "play the game"
    - – In Headquarters and in the field, in the different organisms
  - » Three categories of specialized observers:
    - – Key people: information they receive/emit, with whom they communicate/collaborate, decisions they take, what they do, ...
    - – Mission: how it is achieved, who participates, what difficulties occur, what solutions are found, what resources are used and how, …
    - – Location: who is there, what is done, how information is provided, shared and updated, how it is perceived by people, …
  - » Matters of focus for observation are set up in the preparation phase

Conclusion

- Crisis prevention : a progress loop
- **Anticipate** situations
  - **emergencies** : identify hazards and vulnerabilities
  - **crisis** : assess the potential of overwhelming
- Organize **vigilance**
  - Listen to what is expected
  - Detect changes and unusual signals
- **Manage unexpected situations**
  - **Planning**, **adaptation and innovation**
- **Learn from** what occurred and what was done
  - Analyze quasi-accidents, accidents, crisis and exercises
  - Validate and share knowledge
  - Use lessons learnt to improve anticipation