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

<table>
<thead>
<tr>
<th>Task</th>
<th>Specific Actions</th>
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<tbody>
<tr>
<td>Organize cooperation among organisms on the site and in headquarters (HQ)</td>
<td>Adapt global organization and sharing of tasks among organisms to the current context</td>
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<tr>
<td>Adapt global organization and sharing of tasks among organisms to the current context</td>
<td>Adapt internal organization to the current context</td>
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<tr>
<td>Organize communication and sharing of information among organisms to ensure efficient cooperation</td>
<td>Organize communication and sharing of information among troops and HQ to ensure efficient achievement of tasks</td>
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<tr>
<td>Organize cooperative planning: sharing of tasks and setting up/updating the global agenda of tasks</td>
<td>Organize activities to achieve one’s mission and set up/update internal agenda of tasks</td>
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<td>Set up rendezvous and other control loops to maintain coherence of actions and tasks</td>
<td>Set up feedback between field and HQ operations</td>
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<td>Act together by allocating resources depending on the global development of the situation</td>
<td>Follow up ongoing missions by allocating internal resources depending on the needs</td>
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<tr>
<td>Learn lessons by sharing experiences and knowledge among organisms, in order to improve global organization and cooperation</td>
<td>Learn lessons by comparing achievements to planned activities, in order to improve internal organization and planning</td>
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Prevention of crisis: a 3-level model
Reliability, resilience and robustness

Sense level
Making sense of the situation allows people to find solutions to manage the unknown

Relations Level
Adaptation of existing structures to the needs of the current context

Normal conditions: situation is under control

Structures level
Routine and incidental situations corresponding to existing plans and procedures
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