

# Shared Mental Models in Emergency Management

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What does it look like when people think they are sharing a mental model?

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They have been described as working models of the world that humans *cognitively construct* as a means for understanding their environment (Johnson-Laird, 1985).

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**A Mental Incident Action Plan is like a Mental Model!**

*Bob is the Incident Controller for a Level 1 incident, a very minor spill event. He develops a mental Incident Action Plan (IAP) that includes the use of standard operating procedures and pre-existing response plans, and the use of assets to achieve the incident objectives. Bob's plan is very much like a mental model and will change dynamically as the incident progresses.*

In complex, dynamic, high-risk environments such as EM it is not sufficient for an individual to hold a mental model – that mental model must be **shared** with others involved in the response to the emergency.

This leads to the concept of Team Mental Models (TMM), also known as Shared Mental Models.

**Shared + Quality = Good SMM**


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Parts of Team Mental models:

- Shared job or task models.
- Understand the technology or equipment with which they are interacting..
- Shared understanding of how the team interacts.
- Shared understanding of other team-members.

**Psychological safety**  
It's a term that Harvard Business School Prof. Amy Edmondson defines as "a shared belief that the team is safe for interpersonal risk taking."

*A Logistics Section is working on a Level 3 incident. The team-oriented Team Mental Model for the section includes understanding the roles of the Facilities, Supply, COMMS Support, Ground Support Units, Catering, Medical Services and Finance units, recognising the knowledge and skills of the people working in those units and their strengths and limitations. Geoff works in the Supply Unit, he uses his Team Mental Model of the Logistics Section in discussions with the Catering Unit to explore options for food storage and distribution. He knows that Kate is an experienced head of the Catering Unit, so is happy to take her advice wherever possible to achieve the objective.*




Lots of technological solutions facilitate a common operating picture and therefore a SMM




However in a Resilient System its not enough to implement technology, we must dynamically manage SMM

Question	Diagnostics - which component of the mental model	Scale 1-5 From a limited to a great extent
How well are team members performing their own individual tasks; (e.g. demonstrate that they know the procedures equipment etc. needed for the type of event)	Task oriented/Accuracy	
How well are individual members executing their responsibilities in terms of using: - The relevant policies and procedures - The information systems and technologies required?	Task oriented/Accuracy	
How well are the team sharing their understanding of what was needed with each other?	Team oriented/Accuracy	



Indeed it is also necessary in exercising and simulation to establish the quality and sharedness of TMMs – here an AAR

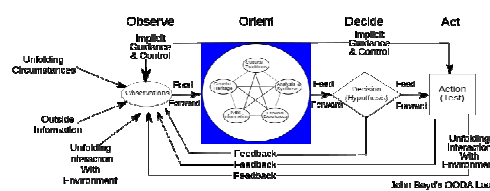
	4 to a limited extent	3 to some extent	2 to a good extent	1 to a great extent	0 not observed
How well did individual team members anticipate the need to set up and operate new equipment/procedures/templates to accomplish team goals?					
How well did people understand others' roles during the event?					
How well did the team share their understanding of their own and others roles as they managed the event?					
How well did the team anticipate each other's needs in managing the event actions?					




Organisational resilience  
Attributes and Indicators

Digging deeper into indicators of organisational resilience and testing those through crisis and emergency management exercising





Boyd (1986) asserted that "Without a common outlook, superiors cannot give subordinates freedom-of-action and maintain coherency of ongoing action." Therefore, "A common outlook ... represents a unifying theme that can be used to simultaneously encourage subordinate initiative yet realize superior intent (p. 74).



How to control Boyd's concept of freedom-of-action and maintain coherency of ongoing action

"Rather than trying to control behaviour by fighting deviations from a particular pre-planned path the focus should be on the control of behaviour by making the boundaries explicit and known and by giving opportunities to develop coping skills at the boundaries" Jens Rasmussen

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Growing understanding of the neurological basis of individual mental models using brain training via the mechanism of brain plasticity

55-60 years of age – the average person has moved from 50<sup>th</sup> percentile to 15<sup>th</sup> percentile for brain operations and accuracy.

Knowledge and wisdom (expert manipulation of knowledge) increases into 60s and 70s.

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Our current research on decision-making the Fukushima tsunami/nuclear reactor incident USAR response reveals that extraordinary emergency management is actually standard emergency management executed extraordinarily well under pressure. This leads us to focus on how people execute well under pressure.

- Brain plasticity
- Leader's understanding of cognition and affect.
- Courage, emotional intelligence
- Cultural factors (esp. psych. safety)

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- Effective SMM = sharing + quality.
- Break 'em down - Three 'T's – tasks, technology and teams.
- COP tech embeds TMM in design – but BA requires us assess dynamically (ops, exercises, org resilience).
- Fit tasks to humans but make the human fitter (brain plasticity).
- Build psychological safety = increased sharing.

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