

An Agile Force for a Resilient World

- How to be prepared to be surprised -

Mihaela Ulieru

Canada Research Chair

Director Adaptive Risk Management Lab

<http://www.cs.unb.ca/~ulieru/>

We introduce the concept of Self-Organizing Security (SOS) Network as a resilient architectural foundation on which the operational mechanism for deploying dynamic, short living emergency response teams of first responders and citizens capable to react quickly to emerging crisis situations can be evolved. Rooted in the ‘robustly networked organization’ paradigm shift introduced by Alberts and Hayes, an SOS Network unleashes the *power to the edge principle*, to infuse agility in the joint first responder forces by enabling the power of decision to be vested primarily with the lowest level elements - those at the edge, away from the power centers. This decentralization of authority opens the possibility of implementing an agile organization that ‘self-organizes’ around the needs of an evolving crisis through *emerging leaders* creating operational units as the situation demands. As a short lived *meta-organization* deployed ‘on the fly’ from units belonging to different organizations (military forces, police, firefighters, ambulance, provincial emergency response organizations, red cross and other non-government organizations as well as civilian citizens) coming together in a collaborative endeavor to address an emerging need (an acute and developing crisis situation), an SOS Network acts as a controller that co-evolves with the crisis to regulate the emerging processes while deploying ad-hoc protective mechanisms similar to how anti-bodies are being created to fight unexpected/unanticipated intrusions.

Each SOS network participant organization has specific capabilities captured in its own policies as well as in the protocols which define the individual roles within the organization. Traditionally, when such participants combine they create *interfaces* between capabilities to negotiate among the various organizational policies – let alone for the myriad of individual protocols. This acts as a barrier impeding the rapid configuration ‘pick, plug, and play’ process to meet a timely objective. To overcome this we have developed an intelligent communication backbone which enables the end-to-end management of processes running flexibly across many different organizations in many different forms. The central idea of our approach is that linking partners is on the basis of linking processes while allowing *individual execution* according to those processes. To enable the flexible adaptation of the top-down (mostly rigid) policies to the crisis dynamics requires to accommodate the ‘bottom-up’ emergence of groupings of hybrid resources (individuals from various organizations working together and their tools) to respond to the unexpected dynamics occurring ‘in the field’. The communication backbone running an agent-based modeling and simulation capability enables this

dynamic linking of resources by weaving the normative, structural, functional, human and geographic dimensions into a holistic approach to enable decision makers to anticipate the evolution of an emerging crisis and evaluate the effectiveness of different inter-agency configurations coming together in addressing it. This intelligent information infrastructure embedded into the SOS communication network materializes the high-level policies into flexible concrete action plans that are broadcast on the fly and distributed ('compiled') to each individual top-down as local rules (individual protocols). The individual-to-collective dynamics (how the agents create the collective behavior through the way they interact/influence each-other) in such a network is seamlessly attuned to the realization of the particular action plan most suitable to address the situation at hand.

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The biggest challenge in undertaking such a holistic approach to security systems dynamics is the need to balance the 'top down' command and control with the 'bottom up' emergent collective behavior. This requires an optimized sharing of information, teamwork and a collaborative working environment. While the popular view indicates that collaboration is usually better than solo problem solving, when it comes to decision making and problem solving within newly formed, hybrid and agile first responder teams of individuals coming from different organizational cultures and training backgrounds most of the time collaboration can stall due to conflicting success metrics (e.g. military vs. red cross). There is a time-information trade-off between the cognitive speed, agility, surprise, and adaptability that comes from individual decision-making versus the quality of decisions informed by the views of members of a team. This triggers a need to consider collective vs. individual problem solving when trying to maximize anticipation, reaction speed, opportunism, and fast adaptation in the case of an emerging crisis.

An SOS Network gains the power of people networking into a capability to deploy anywhere anytime 'safety nets', bringing an invincible ability to respond to any kind of incident by timely and dynamically (re)crafting the structure and configuration of the nets to encompass the resources and skills as they are needed. Citizen-centric safety nets working together with SOS networks of emergency responders catalyzed by a culture of collaboration can achieve seamless operational and organizational agility in complex situations to bring about the resilient society any public safety and security system we would only dream to provide. This calls for an important shift in the attitude of the Public Safety enterprise in an open society, namely: safety and security WITH rather TO citizens, to enable the citizen to become an active participant in the enterprise. We will introduce the concept of 'social entrepreneur' as an emerging leader which catalyzes networks of first responders and citizens into timely and effective SOS networks.

We will discuss the important trade-offs that must be analyzed and decided upon when choosing to transition from single organization operation to collaborative endeavor in enabling the ad-hoc creation of an SOS network as well as how to capture the coordination logic over an SOS network using an agent-based approach to implement an overarching operational layer that enables optimal synergy from the interactions of hybrid individual participants (agents). Recent results reflecting the extent to which this tool can evaluate the impact of inter- and intra-organizational norms and policies on the effectiveness of joint operations involving citizens will be revealed.