Is this a date? – New perspectives on ICT for harmonized inter-organizational crisis management

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ABSTRACT (150 WORDS)

In this paper, we challenge common conceptions related to the role and development of information and communication technology (ICT) for crisis management. Based on an understanding of inter-organizational crisis management as self-organizing through processes of *harmonization* in complex adaptive systems, ICT is positioned as an enabler in the bridging of social and organizational boundaries. In this view, the primary requirements for ICT in inter-organizational settings are defined by current information sharing needs, which are continuously changing with the context and co-working partners. From this understanding of inter-organizational relations in crisis management, this paper suggests two complementary approaches to ICT focusing on policy adjustment and training that supports adaptive organizational capabilities and utilization of easily available commercial ICT. The ideas put forth in this paper are intended to add perspectives and spark discussions on ICT for crisis management.

Keywords

Inter-organizational Crisis Management, Harmonization, ICT, Interoperability, Complex Adaptive Systems

INTRODUCTION

Almost exclusively, crisis management of larger undesired events – be they man-made or natural – is seen as a governmental responsibility (Christensen, Laegrid and Rykkja, 2016). When discussing crisis management from a governmental agency perspective, pre-defined, process-based, and planned efforts are imagined. Approaches to ICT for crisis management usually mirror this image, suggesting tailor-made solutions to support (and enforce) specific crisis management structures and functions. This is an approach based on the assumption that it is possible to envision a general crisis management system apt for most situations. Studies of actual crisis management endeavors paint another picture. Crisis management often takes the form of organizational improvisation and spontaneous inter-organizational interactions (Mendonca and Wallace, 2004; Ansell, Boin & Keller, 2010; Noori, Wolbers, Boersma and Cardona, 2016). There is thus a tension between envisioned and actual crisis management systems. Through a study of the response to Hurricane Katrina, Comfort (2007) illustrated the consequences of dysfunctionality in these spontaneous interactions, and how insufficient ICT support contribute to crisis management failures during highly complex events. With this as a point of departure, this paper assumes that ICT developed based on a normative view of crisis management will seldom be fit for purpose in real life crises, therefore demanding new approaches to ICT for inter-organizational crisis management.

Based on this assumption, this paper aims to make two distinct contributions. First – building off previous position papers from the present authors (Herkevall & Johansson, 2022a; 2022b; Johansson, 2020) that suggest crisis management be understood as a phenomenon emerging through interactional processes in complex adaptive systems (CAS) – we propose *harmonization* (Herkevall & Johansson, 2022a; NATO STO SAS-143, forthcoming) as a descriptive model of the processes through which ad hoc crisis management constellations are formed.

Second, we reason about the implications of harmonization for the development and deployment of ICT in crisis management. This reasoning is based on the assumption that ICT does not solve crises – people do. This assumption positions the role of ICT in crisis management systems as a support and an enabler of co-working

processes – be they novel and ad hoc or pre-planned and well trained. We establish a theoretical foundation from which to reason about what this view of ICT in crisis management means in terms of requirements and different approaches for fulfilling these requirements.

BACKGROUND

Christensen, Laegrid and Rykkja (2016) define crisis management as "the process by which an organization deals with a crisis before, during, and after it has occurred" (ibid., p. 888) – a process that involves identifying, assessing, understanding, and coping. As pointed out by Quarantelli (1988), centralized and military-like approaches to crisis management are likely unsuitable to cope with disasters. It has been suggested that rather than focusing on control, emphasis should be on *coordination*. Much like crisis management, coordination is an ambiguous term. Christensen, Laegrid and Rykkja (2016) point to several contradictions concerning coordination when it comes to crisis management in the public sector, such as tensions between vertical and horizontal coordination, and between networked, distributed decision-making and centralized, hierarchical control. Hybrid coordination arrangements, where combinations of hierarchical and networked systems emerge depending on which organizations or actors that happen to be involved in a specific crisis management operation is a more realistic description of crisis management coordination (ibid.). In line with recent findings in military research on command and control, there is no "one size fits all" approach to managing complex endeavors like crises (NATO STO SAS-085, 2014). Thus, the pursuit of coordination is not necessarily the solution to crisis management, but rather one of many, as different challenges demand different solutions. "Co-ordination is sometimes discussed as if it were an absolute good. This is not true. There can be relatively effective organizational responses in disasters without a high degree of co-ordination." (Quarantelli, 1988, p. 383). This line of reasoning points to the need of a more nuanced concept of inter-organizational relations in crisis management situations.

Crisis response systems as complex adaptive systems

Johansson (2020) has argued that crisis management systems can be viewed as complex adaptive systems (CAS) that emerge from the interactions and relationships between the organizations taking part in the response to a crisis. This is not a new observation as such. Comfort (1994) described crisis response as a self-organizing system, leaning on classical sources from systems thinking like Prigogine & Stengers (1982), Kauffman (1993) and the system sociology of Luhmann (1986). A CAS is signified by the lack of a centralized control, and by emergent behaviors resulting from interactions among the partaking entities (Holland, 1992). These general characteristics of complex systems can also be found in large-scale organizational interactions. Majchrzak, Jarvenpaa and Bagherzadeh (2015) discuss the fact that inter-organizational cooperation is characterized by dynamic relations and changes in the number of participating organizations, something that is supported by the findings of Noori et al. (2016) in their studies of how different organizations form coordination clusters that emerge and dissolve over time during crisis responses. Naturally, prepared structures, agreements, areas of responsibility and other laws and regulations provide a sort of frame that shape crisis management endeavors, but the unpredictable nature of crises makes it impossible to foresee all possible constellations of actors that will be involved in future crisis management operations. Every real-world crisis management case has unique features in terms of involved organizations and actors, their ability to collaborate, and the challenges posed by the crisis itself (Ansell, Boin and Keller, 2010; Comfort and Kapucu, 2006). Comfort and Kapucu states that the "challenge to administrative theory and practice is how to design and support governmental systems that can adapt readily to the urgent demands and complex operating conditions in extreme events" (2006, p. 312). The main advantage of adapting the perspective of crisis response systems to that of complex adaptive systems is that it allows for understanding the basic mechanisms of adaption in the effort of creating the kind of support for governmental systems suggested by Comfort and Kapucu.

The Role of ICT in Inter-organizational Crisis Management Systems

Viewing ICT in the light of complex adaptive systems demands a different way of thinking than when thinking about ICT for pre-defined organizations or collectives. With a pre-defined group of users, ICT systems can be tailored to the (estimated) requirements of these specific users and their patterns of interaction. For some smaller, and (relatively) frequently recurring events (such as traffic accidents, apartment fires, etc.) this approach is entirely possible to use, since roles and responsibilities can be defined beforehand to a large extent. For larger scale events with higher levels of uncertainty and complexity, it must instead be assumed that all organizations to some degree are responsible for all functions on an individual basis. ICT, in the most general sense, such as radio, telephone and various digital communication channels, are prerequisites for initiating and/or maintaining contact with other organizations and actors (Comfort, 2007). In ad hoc situations, there are rarely, if ever, dedicated crisis management ICT available. The role of ICT in heterogeneous collectives of actors involved in crisis management

can be related to at least three different communicative challenges. These challenges have been labelled for example technological, social, and organizational *barriers* (Johansson, 2005; Manoj and Baker, 2007); technological, social, and organizational *systems* (Johansson and Hollnagel, 2007); and syntactic, semantic, pragmatic *boundaries* (Carlile, 2004). Put in a crisis management context, the commonality of these conceptualizations is that they position ICT as *enablers of human problem solving through improvisation and adaptation*, rather than problem solvers in their own right.

In a precursor to the ideas above, Weaver (1953) defined three distinct challenges of mediated communication that are useful for understanding the associated challenges. Weaver defined the challenges as "(1) transmitting symbols (through a technical system) in such a way that they are possible to decode, (2) the semantic challenge i.e. how well the symbols convey the desired meaning of a message, and, (3) the efficiency challenge – does the message affect the receiver in the intended way?" (Johansson, 2020, p. 433). As shown by Weaver (1953), information systems are primarily enablers on the first level by making available the appropriate information channels. This is by no means trivial, especially in the complex environment of crisis management. Quarantelli (1988) noted that problems of information flows generally occur due to "a tendency to think of organizations not as systems, but rather as components operating independently of each other" (1988, p. 378). Each specialized crisis response organization therefore tends to have their own specialized ICT systems, with little or no possibility of supporting needed two-way communication and information sharing. In addition, what information that is appropriate or needed to share will change over the course of a crisis. In an inter-organizational setting, this is commonly shaped through harmonization between involved actors. In other words, harmonization determines the common frames of reference on the social and organizational levels, in turn setting and re-setting the requirements for technological capabilities needed to support inter-organizational crisis management.

It can be concluded that (1) actual crisis management cannot rely solely on pre-planned structures and processes as the unpredictability of crises demands adaptability in terms of involved actors, and (2) participating actors will most likely have different approaches to crisis management, different ICT solutions, different rationale for participating in the endeavor, and varying crisis management and response capabilities. In the following section, *harmonization* is introduced as a model for describing and understanding the dynamics that follow from these conditions.

HARMONIZATION IN CRISIS MANAGEMENT

The following description of the *harmonization* model echoes descriptions in Herkevall and Johansson (2022a) and NATO STO SAS-143 final report (forthcoming). The purpose of including this description is not to propose entirely new ideas, but to put these existing ideas in a new context and reason about their possible implications for crisis management ICT.

The harmonization model (Figure 1) spans co-working options in terms of closeness from 0 (Unawareness) to 4 (Integration). The steps in the model are labelled *options* to emphasize the fact that it is not necessarily appropriate to reach for the highest option. The harmonization options reflect the degree of collaboration and integration that exists between two organizations. Depending on the nature of the task, Option 1 (practically just staying out of each other's way) might be the most efficient, in which case it would be a waste of resources to continue harmonization efforts toward higher options. The higher harmonization options are needed in situations that demand increasingly closer forms of co-working in order to handle the present challenges. Option 2 (Coordination) denotes a situation where organizations coordinate their respective actions toward a common end goal. In an Option 3 (Collaboration) situation, the participating actors are formulating and conducting tasks together. Option 4 reflects a situation where two organizations temporarily merge into a single organization, in order to deal with a specific task or problem.

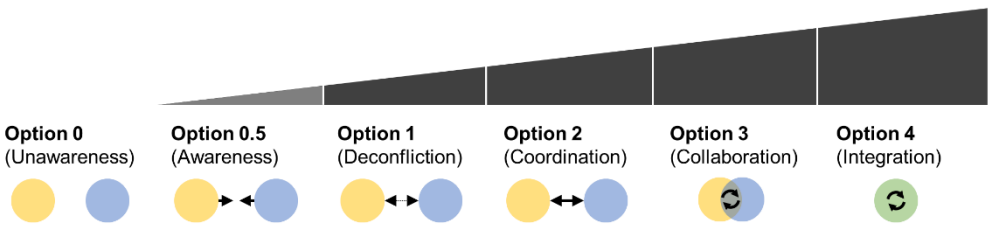

Figure 1. The harmonization model, adapted from NATO STO SAS-143 (forthcoming).

Finding the most appropriate harmonization option in a given situation is an act of balancing harmonization *costs* and *potential benefits* of harmonizing at higher options in relation to the task in focus. The costs of harmonizing are primarily *time* and *resources.* Harmonization is a person-to-person process that demands engagement and boundary spanning capability. It takes place through interaction, meaning that there must exist physical spaces or mediated means (ICT) for interaction to take place. Organizations that engage in harmonization must thus devote personnel and technical resources, i.e. undertake *harmonization arrangements*, to support the process. Increasing investments in harmonization can be considered motivated as long as they serve the holistic efficiency of the crisis management effort. Further investments intended to reach higher harmonization options should be avoided if this is associated with stealing excessive amounts of essential personnel and resources from the crisis response.

The cost of harmonization is related to the harmonization capability of the involved organizations. This capability is dependent on two factors of adaptability: first, being able to adapt existing relations, or establish new relations, to the organization(s) with which one wants (or needs) to harmonize; and, second, adapt to the current task. This requires the ability to adapt management approaches, decision-making, and communication such that it becomes compatible with the required harmonization arrangements in relation to the given crisis. In crisis response, organizations typically have multiple relations to a variety of other organizations – meaning that a single organization will have different harmonization arrangements in play simultaneously during a crisis.

In practice, harmonization is a process that takes place through interactions between members of the involved organizations. It requires interaction across organizational boundaries. Here, organizational boundaries are to be interpreted not only in the normative sense as organizational membership or physical boundaries, but also in terms of ideas, practice, language, and organizational culture. Understanding how to exist, and act, within boundaries are an important aspect of organizational *belonging*. All of this is reflected in the discursive practices of members from different organizations (Linell, 1998). Boundaries are not to be seen only as obstacles to be overcome. Instead, boundaries are also gateways, or offerings for interaction (Akkerman and Bakker, 2011). Understanding where immaterial boundaries like the ones of an organization are, and how to find points of interaction to reach through them is an important aspect of harmonization. Harmonization arrangements can significantly alter these boundaries, with higher levels of harmonization resulting in blurring boundaries or the creation of new boundaries.

Enablers of Harmonization

NATO STO SAS-143 (forthcoming) have identified three enablers of harmonization: *harmonization awareness*, referring to the awareness of other organizations working on similar issues and their prerequisites for harmonization; *boundary spanning*, the ability to reach out and establish relations across organizational boundaries; and *orchestration*, meaning the ability to establish common goals and direction through harmonization. All three enablers represent capabilities related to adaptation, meaning co-adapting through interactions with other actors. These adaptive capabilities are all distinct but related and mutually re-enforcing.

Harmonization awareness refers to the inherent knowledge about other organizations, their ways of organizing, rationales for decision-making, ways of communicating and interpreting information. The better one's harmonization awareness in relation to another organization or actor, the easier it is to develop appropriate adaptive measures in interaction with that specific actor.

Boundary spanning refers to the ability to initiate, develop and maintain contact across organizational boundaries. In other words, boundary spanning is the practical ability of making use of (or further developing) harmonization awareness. As such, these capabilities feed into and support each other. Research have shown that the boundary spanning ability of an organization is often present in one or a few members of the organization (Akkerman & Bakker, 2011), referred to as *brokers* (Wenger, 1999) or *boundary spanners* (Kapucu, 2006; Williams, 2002). These are individuals with especially suited capabilities for understanding and articulating different perspectives in order to align intentions and finding common ways forward. These individuals act as drivers of organizational harmonization and are key resources in inter-organizational crisis management.

Harmonization can to some degree be organized, or at least supported, by specific agents that, like boundary spanners, have the ability to understand and relate organizations and their intentions. Additionally, these individuals have the capability and ambition to work actively towards an appropriate degree of harmonization. Such individuals can initiate orchestration, the process of achieving and controlling harmonization. For example, Reypens, Lievens and Blazevic (2021) suggest that "orchestrators act as environmental scanners who address emergent network challenges by switching between orchestration modes". This can be done both by influencing (dominating), and by consensus. Dominating resembles a formal, top-down approach as "a core actor (or a group of core actors) sets the collaborative agenda, recruits partners, and typically relies on formal contracts to steer relationships" (Reypens et al., 2021, p. 62). While in the consensus-based approach "partners collectively negotiate the agenda, membership is often voluntary, and trust predominantly governs relations" (ibid., p. 2). Harmonization, as it occurs in most crisis management situations, mostly resemble the consensus approach.

Harmonization and ICT

The harmonization model entails a set of maturity options in terms of inter-organizational co-working relations. In this sense, it is similar to previous maturity models, such as the *Organizational Interoperability Maturity Model for C2* (*OIM*, Clark and Jones, 1999). In contrast to the OIM however, the harmonization model also entails a process component and a set of enablers for achieving appropriate options of harmonization. The harmonization model therefore adds layers that make it more powerful as a *descriptive* model of how harmonization is achieved in complex endeavors, in comparison with the OIM as a normative model, simply suggesting what different levels of co-working relations would (or should) entail.

Something that Clark and Jones (1999) do in developing and describing the OIM model that is useful for the purposes of this paper is relating its levels of organizational relations to levels of technical interoperability. The OIM levels are derived from the *Levels of Information System Interoperability* model (LISI, C4ISR Interoperability Working Group, 1998). The thesis of this paper is in line with this ambition of aligning technical, social and organizational aspects of interoperability or inter-organizational dynamics. However, our rationale is essentially the opposite; coming from the standpoint that technical interoperability has no end in itself but rather is to be seen as an enabler for social and inter-organizational purposes. As such, we are more or less attempting to reverse engineer the process by which Clark and Jones (1999) developed the OIM model and identify the implications for technical interoperability when it is driven by social and organizational aspects rather than the other way around.

Harmonization and ICT as online dating

To illustrate the relationship between harmonization and the use of ICT, we can look closer at a more common relational process as mediated through technology – namely, what is today the dominating process of finding a partner – online dating[1]. The first step in this process is joining an online dating platform. As soon as a user have created their account, they are at harmonization Option 0 (Unawareness) with all registered singles that match their specific search criteria. That is, they are technically interoperable in the sense that they have the possibility of sharing information and communicating – given that, they find each other. However, at this point they are still unaware of each other's existence.

Next, users start swiping through the profiles of potential matches. For each profile they encounter, they have now reached Option 0.5 (Awareness) of the harmonization model, meaning that they are aware that the other person exists. At this option, they are presented with a choice. Either they make the judgement that this person is not of interest, in which way nothing further happens. Alternatively – should they find interest in initiating a conversation – they can indicate that interest. At this point, the mechanics may differ slightly between platforms, but the general rule is that if both parties signal interest, the availability of starting a conversation opens up. This activates Option 1 (Deconfliction). It is really at this option that the harmonization process begins.

At the initial stages of dating (or harmonization), the involved actors try to get a sense of any shared goals, interests, intentions and so forth. If none is found, the actors can agree simply to stay out of each other's ways, thus actively choosing to deconflict and end harmonization efforts at option 1. If, on the other hand, the two people (or organizations) find that they have common interests and goals, they may move on to the prospect of meeting in person. This requires a step up to Option 2 (Coordination). In the case of online dating, this entails the coordination of a time, place, and activity for a first date. At this point, it is not uncommon for the involved actors to switch over to another communication platform, such as social media apps, designated messaging apps or the exchange of phone numbers. While the dating apps work well for initiating contact, their messaging functions are both restricted (it is for example not possible to send pictures, in order to limit abuse) and somewhat unreliable in comparison with other alternatives. As such, when agreement has been reached to meet up, the dating app is often considered to have played its part.

Given that the first date goes well and mutual interest is maintained or strengthened, it can be assumed that additional dates will follow. If we further assume that the common goal of this dating endeavor is a traditional couple's relationship, this initial dating phase can be considered as the process of moving from coordination to Option 3 (Collaboration). Increasingly, the involved actors will share resources (in terms of money and time), plan together, develop common goals and so forth. At some point, following further along the traditional trajectory of romantic couples, the relationship will reach a point where the involved individuals will feel it appropriate to live together and, perhaps, to get married. This would constitute Option 4 (Integration). At this point, the two individuals, for most intents and purposes (including legally), act from a common foundation as one single unit.

[1] This analogy is a developed version of a previous 'bar analogy' from a previous paper by the present authors, adding a focus on the role of ICT. For examples of crisis management situations relating to each harmonization option, see original analogy in (Herkevall & Johansson, 2022a).

The couple may use a host of ICT solutions to support their shared life, such as apps for synchronizing shopping lists, sharing photo albums, coordinating shared bank accounts and so on. These choices of supporting ICT will differ between couples, driven by the specific arrangements (i.e. harmonization arrangement) of their relationship.

ICT APPROACHES FOR HARMONIZED CRISIS MANAGEMENT

Harmonization is not a new phenomenon as such – it is just a framework to describe, and highlight, the way organizations and actors self-organize in relation to the situation and context in which they find themselves. It contrasts terms like *manage* when manage is used to denote the application of prepared structures and procedures. Harmonization provides a term that allows us to discuss what organizations do in practice to align with other organizations and to think about the costs associated with this. It is not a way of replacing existing approaches to or interpretations of crisis management, but a complementary view that acknowledges the need to remain sensitive to the fact that we cannot foresee nor pre-plan for all possible circumstances. After more than 30 years of continuously reaching pinnacles of technological innovation, the crisis management challenges manifested in the COVID-19 pandemic response (Herkevall & Johansson, 2022b) were largely the same as concluded by Quarantelli's review study in 1988. Going back even further, Kupperman, Wilcox and Smith stated already in 1975 that "few conventional information systems are equal to the task of covering unconventional situations, so managers in a crisis must frequently fall back upon experience, intuition, and bias to make ad hoc decisions" (Kupperman, Wilcox and Smith, 1975, p. 404). There is little evidence to suggest that this is any less true today. In the following sections, we discuss two different approaches to ensure availability of appropriate and usable ICT support for harmonized inter-organizational crisis management, challenging dominating conceptions of ICT development for crisis management.

Pre-planning

Previous studies (e.g., Quarantelli, 1988; Kapucu and Hu, 2016) have emphasized the benefits of building inter-organizational working relationships in advance of crises to any extent possible, as it takes "a great amount of effort and resources to form and build emergency management networks" (Kapucu and Hu, 2016, p. 400). From this follows that inter-organizational coordination between crises should focus on development of and training for *information interoperability*, rather than just data interoperability. This can be understood as a sort of day-to-day harmonization with ICT as a central, mediating component. Current challenges illustrate the need for a sociotechnical approach in these processes, as many governmental agencies already use similar ICT, but are prevented, or limited, in their ability to cooperate for legal, organizational, or other bureaucratic reasons that do not relate to technical interoperability as such. For example, in many cases Swedish governmental agencies in the health care sector have access to digital patient data but are unable to share it with other health care actors due to legal constraints and a lack of routines for data sharing. Furthermore, the same data may not carry the same information for different actors in the crisis management system. Information is always an interpretation of data, and it is important for each actor in a crisis management situation to be aware of other actors' understanding and perspectives, otherwise it is not possible to judge what data is relevant and how it may be interpreted in a different organizational context. As such, development of information interoperability refers not only to the technical aspects of development but should involve regularly conducting tasks that fall in-between organizational boundaries – forcing harmonization in day-to-day work and thus training information interoperability on the social and organizational levels as well.

Ad hoc

No matter the extent to which different organizations and agencies are forced to work together in day-to-day operations, crises will force entirely novel constellations of actors. Chances are these organizations will lack both social and organizational understanding of each other, as well as interoperable ICT. Reaching sufficient harmonization options without functioning solutions for information sharing and communication is a great challenge, and proper information channels should be set up as fast as possible. Rather than trying to establish or build new solutions, our suggestion is to focus on adapting policy such that it allows for utilization of commercial ICT in times of need. A focus on supporting ad hoc harmonization leads to a trivial conclusion for ICT: organizations using commonly available and used ICT solutions are more likely to be able to establish workable information channels than organizations utilizing specialized gear and software. Commercial desktop and cloud systems may lack many of the specialized features desired in crisis response systems, but they will on the other hand allow for harmonization-enabling functions like verbal and text communication, document sharing and editing, and interoperability through internet-based standards. Instead of spending time overcoming technical obstacles, focus should be on training in terms of interpretation and implementation of adaptive policy, redistribution of decision mandates, information-sharing rights and so forth.

CONCLUSION

Understanding and improving crisis response capability can only be achieved by embracing the uniqueness and complexity of crisis response operations and exercises, and by acknowledging the fact that system performance on the macro-level is an emergent effect of interactions that take place on the micro-level between rather than within systems components. The harmonization model presented in this paper has been positioned as a descriptive model of the inter-organizational processes that take place when pre-planning is insufficient as support for a crisis management endeavor. In no way is this a suggestion that pre-planning is useless or irrelevant for the success of crisis management. On the contrary, pre-planning and ad hoc processes are to be seen as *complementary*, and the associated ICT approaches should be as well, such that pre-planning activities support and develop the harmonization capabilities of crisis response organizations.

Harmonizing in the midst of an ongoing crisis is a big challenge. It requires the simultaneous adaptation of one's own organization in relation to both the situational characteristics of the crisis and to other organizations involved in the same crisis management endeavor. These adaptive processes are costly in terms of time and resources and the magnitude of the investment always needs to be weighed against potential alternatives. The major costs of harmonization are associated with the alignment to other actors on social and organizational levels, such that common goals and approaches can be formulated and enacted. In light of this, ICT needs to function as an enabler in relation to these challenges rather than adding an additional challenge, requiring further amounts of time and resources.

In this paper, we have proposed two approaches to dealing with this challenge, which are complementary rather than mutually exclusive. We believe the key to minimizing ICT costs in harmonization processes is to allow crisis management personnel to choose ICT they are used to and that fits their current information-sharing needs. In cases where pre-planning is possible, this can be achieved through joint training. It is imperative this training encompass cross-organizational interpretation of data and information as well as purely technical operation of ICT solutions. In ad hoc situations, where the involved actors have had no chance to conduct prior planning or cooperative training, we suggest that policy is adapted such that it allows the involved actors to deploy commercial ICT that they are used to from their daily lives. It is expected that this approach will support the most immediate information sharing and communication needs in relation to the harmonization effort.

Our conclusions can be summarized as follows:

- Harmonization, especially during a crisis (ad hoc), comes with a cost in terms of time and resources that must be spent to align goals and activities.
- Pre-planning can reduce the cost of harmonization, but it will never eliminate the need for harmonization as we cannot foresee all possible crisis situations. Therefore…
- …pre-planning and ad hoc processes are complementary.

Our recommendations can be summarized as follows:

- Pre-planning should include joint training of organizations that are expected to be engaged in inter-organizational crisis response. Such joint training must encompass cross-organizational interpretation of data and information as well as purely technical operation of ICT solutions.
- Policy should be adapted to allow involved actors to deploy commercial ICT they are used to from their daily lives to support immediate information sharing and communication needs in ad hoc situations.

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