UN SENDAI Framework Information Management
- Challenges, Governance, Drivers, Management -

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Abstract

The UN SENDAI Framework text enforces the demands for coherence and synergies for substantial improvements in planning, operational response and recovery. Information governance is needed to foster mid- and long-term cross-domain and cross-organizational national as well as international implementations. Comprehensive application of advanced information management principles is essential to grant best support of societal, natural, technical, humanistic and ethical aspects for the future of people and planet.

Challenges

The UN SENDAI Framework for Disaster Reduction (UNDRR 2015) enforces the demands for complex information availability, coherence and synergies for substantial improvements in planning, operational response and recovery.

The paradigm change: from rescue-as-a-service to participatory / inclusive governance and operations in all phases of the Na/Tech disaster cycle. In consequence, we need to aim at common approaches between safety and security practitioners and the vulnerable civil society, considering human factors, societal, (psycho-)social, cultural, ethical as well as organizational aspects in all phases of the disaster cycle. The specific difference lies in enabling inclusive participation not only in preparation phases but also in the post-disaster evaluation of goal-reaching success and take-up of suggestions for consideration in revised action and adaptation plans.

Coherence with UN SENDAI Framework specifications is mainly reached by making periodic reporting and auditing mandatory at a framework specification level as detailed as possible (ECA 2019 / 2020).

The complete set of management best practice methods especially supports the principles of "critical thinking", enabling extensive reporting, transparent analysis, compliance to regulations and other boundary conditions, and constructive goal-reaching control. These control obligations include phases of retrace, audit, reexamination, analysis, avoidance of malpractice, and indications on weaknesses/vulnerabilities (Kremers 2019).

The processing and use of data holds enormous potential for new ways of enabling foresight, situation management and ex-post evaluation. For a successful decision and action support, we have to make the best possible use of this potential.

Big Data volume, variety, velocity and veracity methods and techniques (Lukoianova 2013) along with adequate application of management principles contribute essentially to avoid subjectivity, deception and implausibility. These data type oriented typologies need to be complemented by information use procedures quality measures like incompleteness, uncertainty, precision, ambiguity, reliability, usability, compliance.

While currently the focus is mainly in generating "availability" and "access" of information, the next years will much more intensely show a shift of focus into domains of information use (decision making support, analysis and all other management categories of action and control).

On the operational level, syntactic, semantic and pragmatic coherence (full semiotics coherence i.e. on syntax, semantics and pragmatics level) needs to be achieved on local, regional, national and international levels. Special attention is given to ontologies that cover pragmatics (multi-stakeholder operational decision and action management concepts for workflows and processes in dynamic situations)

including modeling goal reaching control (Bel-lahsène 2011, Lolli).

Complex structural and procedural models always should follow use-case oriented measures of expressiveness by considering its relevance for decision support, action and goal reaching control.

Command Support Systems based on cross-level and cross-organizational integration are widely missing. Joint projects and development in the fields of civil-military cooperation can not only improve shared information processing but also raise awareness in the benefit of building on sound management principles, including prerequisite competences education and development especially for the huge variety of administrational / organizational public and private sector units involved.

Gaps in cross-organizational data availability, incompatible data quality and missing interoperability are well-known today to disable best possible decisions and services in all types of countries (Bialzak 2020).

There is a constantly growing number of interdisciplinary domains that are concerned and already successfully facing these challenges (cf. Health (Nunes-Vaz 2019), Agriculture (crops and animals), Food Supply Chain, Transport and Logistics (Chong 2019), Business Processes etc.) (ECHLEG 2020, Galbusera 2020, Lachhab 2017, Richmann 2020, Ruiz 2019, Voßschmidt 2019, Weske 2020).

Although implementation of current best available practice strictly based on structured ontologies using formal methods will be the essential key to successful solutions for quite some time, there is urgent need to keep human specification efforts on finding, categorizing and coding formal concepts details at a minimum. A parallel process of R&D in the fields of applied Big Data and Artificial Intelligence is needed to gain operational perspectives of novel implementations for less structured or unstructured representations and their emerging innovation potential for achieving the necessary framework for coping with the complexity of information expected in 10 years (semantics and pragmatics advanced technology engineering) along with validating its repeatable correctness and trustworthiness, added value and synergy (Holm 2020, Kovacic 2013).

Governance

Information governance is needed to foster mid- and long-term cross-domain and cross-organizational national as well as international implementations.

First responder organizations not only are interested in digitizing their current procedures but at the same time strive for implementing up-to-date available digital techniques, analyses and information use workflows. Substantially increasing the benefit for all stakeholders involved in disaster prevention and mitigation is in due need of broader multi-actor / multi-organizational based governance on the appropriate levels of accountability (Department of Health 2013 , Bundeskanzleramt 2019).

The holistic view of Big Data availability and cross-organizational as well as cross-domain interoperability (Pérez 2017) still needs to find adequate attention from information management governance (Smallwood 2014, Constantinides 2014). According to the UN SENDAI Framework principles, information governance is a process to be organized and implemented in a permanent and inclusive ("leave no one behind") multi-stakeholder way.

Drivers

Besides the general way of procedure for accomplishing or approaching particular (selected) aims in a systematic way, much more attention should be devoted to all those situations, where suboptimal information management currently leads to substantial gaps / deficits in natural, technical sustainability and in humanitarian disasters.

National, European and global initiatives (Digital Agenda for Europe (COM2010), European Interoperability Framework (EIF 2017) ant others) drive information infrastructure and interoperability implementations for the benefit of administration / law-enforcement agencies, private sector and NGO actors.

Future research and development in those areas will bring a significant contribution to all the cycle of sustainability analysis and the sustainability management areas only if the inherent complexity of inter-disciplinary/cross-organizational data, data analytics, data transmission and use processes, and sophisticated ontology models for situation prediction along with consequences scenarios for all types of actors is based on formal methods standards and Information Infrastructure principles.

Information infrastructure efforts are guided by joint commitment and requirements specifications of actor organizations (public administration, civil society, private sector and R&D). Transfer and adaption / extension of concepts that have been proofed adequate for large-scale information infrastructure realization (e.g. INSPIRE) are in due need for the corresponding elements of good governance.

Establishing cross-organizational Information Infra-structures is one of the core technique to enable cross-organizational interoperability in data and in all phases of operational forces management (Constantinides 2014, da Silva 2017, DG HOME 2017, Hofinger 2016, Mertins 2016).

Modern developments allow for granting data protection in terms of privacy and business data confidentially.

UN Instruments information in its complexity is in due need of very broad systematic integration, processing, evaluation and goal oriented applications of large amounts of data of heterogeneous origin in real time. Big Data offers the appropriate technology to integrate data from the various sources, to analyze it and to make it available on different actor-type adjusted and consistent abstraction levels for decision processes and operations support (Consoli 2013, Kremers 2020).

In Germany, there is strong effort by the Territorial Tasks Command of the Bundeswehr to create a "Territorial Hub" for civil-military cooperation (Breuer 2020, Smith 1981). According to the Basic Law for the Federal Republic of Germany, the Länder are responsible for disaster prevention and the setup of civil-only national central facilities for disaster management (Information Management and others) would be more straightforward after sweeping changes in legal and structural conditions.

The European Commission and the European Defense Agency aim at maximizing the complementarity and synergy of civilian security and defense-related research activities. This synchronization of Research & Technology investment takes place in the context of the European Framework Cooperation.

Management

Application of informatics state-of-the-art methods and technology that meet the demands of complex multi-actor and cross-organizational information management is urgently required for organizationally as well as technically implementing Treaties, Frameworks and Programs and for granting coherence in the required holistic way.

The management principles applications reach from "availability" for decision making to delivering use-case situation oriented proposals for alternatives (considering variations in availability of data types, data qualities and context parameters) along with indications on operational resources consumption, weakness / stability criteria in the structural and functional information flow for decisions as well as goal-reaching effectivity.

An overview of management principles along with information types and structures involved is presented in Kremers (2020).

Recommendations

Information models underlying UN Instruments implementations must be communicated for transparency and in support of accountability. The whole communication process requires substantially more investigation in order to become reliable and efficient enough to achieve the overall goal of better under-standing, decision making, and action in cases of UN Instruments joint efforts for sustainability and humanitarian situation improvement.

The following recommendations always refer to RISK Information Management

- Make Data Management Plans mandatory to grant correctness dynamically in the course of system availability and modifications, possibly to be supported by Data Lifecycle Management tools.
- Find flagship actors in Private Sector, Administration, R&D and current implementations with considerable potential to strive for advanced methods, techniques and solutions, including national/CEN/ISO standards development and applications
- Match with national and EU / International strategies supporting Digitalization, Digital Transformation, Interoperability Frameworks and Cross-Border information exchange
- Realize the considerable information use overlap and expected synergy from joint strategies in Safety and Security domains
- Enable steps in direction of institutionalizing participative Governance of RISK Information, including periodic reporting as well as independent auditing according to holistic management principles on all levels. Alignment of interest and operational role of different stakeholder groups is achieved by open participative procedures.
- Audit against the full requirements of the UN SENDAI Framework text and encourage NGOs to document their stakeholders view and recommendations from situations in the disaster and from the aftermath situation
- Consider the role of UN DRR National Platforms in cross-domain and inclusive participation, especially for and with most vulnerable groups and socio-economic effects far beyond formal / legal catastrophe situation definition

- Draw from existing previous long-term experiences in the broad fields of environmental information and geoinformation (INSPIRE, ORCHESTRA 2008).
- Find adequate ways for closing the R&D / Practitioners gaps by making technical best practice mandatory for routine procedures in operational actors groups and organizations
- Support the development of a Safety and Security Information Policy for the European Commission

Future

The consistent implementation of digitization is a task for the entire community of practitioners in the areas of Safety and Security, across all management levels, which goes beyond the area of technology and will influence both organization and processes as well as humanitarian assistance capabilities

There are some key future demands in applying appropriate Information Management Principles for implementation of the UN SENDAI Framework for Disaster Reduction and adjacent other UN Instruments under requirements of coherence in methods, techniques and management.

It is Our Future: Multi-Stakeholder Governance guiding principles, structure, participation and practice for implementation of Conventions and other Instruments is imperative (UN IEAG 2014). These efforts are not just for the operational demands of technicians and administrators, they are essential for Society at large.

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