CODATA-Germany

Strategy Report

Challenges in Operational Risk Information Management

Berlin, Germany
2019

Challenges in Operational Risk Information Management Strategy Report 2019

Horst Kremers

CODATA-Germany
P.O. Box 20 05 48, 13515 Berlin, Germany
office@horst-kremers.de

In this report we compile current challenges and recommendations within the broad field of Risk Information Management in all disaster cycle phases according to the specifications in the UN SENDAI Framework text and with special emphasis on operational implementation of R&D results and in respect to the vast variety of organizations and actors involved.

Keywords: UN Sendai Framework for Disaster Risk Reduction, national/regional implementation, natural hazards, technical hazards, risk information management, risk models, informatics, data science, big data, multi-organizational and multi-actor issues, participation, complexity, situation documentation, data gathering, data quality of emergencies records, auditing, risks and decision thresholds, event management and preparedness, standardization of emergencies documentation, social vulnerability, business process modeling, social media, risk information governance

1.   Motivation and Purpose

Since the adoption of the UN SENDAI Framework for Disaster Risk Reduction (SFR) in 2015 there is considerable effort to compile overviews of current science and operational practice state-of-the-art [PFG1] and derive roadmaps to guide adequate implementation activities for the duration of that 15-year agreement. Recently, efforts towards strategies and practical implementation of the UN SENDAI Framework [ISDR1], [ISDR2] have been discussed.

Supplementary to progress and plans in other science and operational fields, this report focuses on the challenges of the underlying ***Information Management*** efforts needed to cope with the complexity of actors and organizations involved.

A systems management and engineering approach [LACH], [SEBOK], [SG01], [SMITH] convincingly shows the necessity for transparent procedures of documentation, assessing, decision-making, action and goal reaching control in very dynamic situations of highly complex actors, specifications and boundary conditions [FARY]. This allows providing objective/trustworthy information to all actors (especially: Media/Investigative Journalism [HARL], [GIL], [HATC]). Special attention if given to those aspects that broadly enlarged the overall scope of the UN SENDAI Framework (2015-2030) in comparison to its predecessor UN HYOGO Framework of Action (2005-2015).

Finally, this report provides a set of actionable recommendations based on Information Management principles.

2. Information Management

Throughout the United Nations system, new or revised texts of Declarations and Instruments call for extensive information management details.

"Data will be one of the fundamental elements of the accountability framework for the SDGs" [REVO] and the same applies in the fields of Disaster Risk Reduction.

The elements of Information Management are not only "pure" data but all facts (values, metainformation, methods, functions, processes, models, measures, principles, expectations, actors and their sociology, documentation, decisions, actions, effects and control).

It is UN best practice to enable cross-organizational information availability and consistency for international/national/regional/local actors' strategies, decisions and actions.

DATA ARE THE LIFEBLOOD OF DECISION-MAKING AND THE RAW MATERIAL FOR ACCOUNTABILITY

Documentation and analysis of information management components is critical to success in recovery, strengthening resilience and building back better (there is a growing concern about the complex information needs in the vast domain of Migration [UN02], [UNHCR]).

Documentation, assessments, design, planning and practical operations do not only support first response, they are as well essential for best operations and control of recovery phases[1].

Data are the lifeblood of decision-making and the raw material for accountability
(UN Data Revolution Group, 2014 [REVO])

3. Management Principles Applied

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.

Some of the core management procedures listed (e.g. audits) have to be assigned to independent organizations mainly because of the general public interest of consequences in Risk Information Management accountability (compare to basic principles of European Court of Auditors [ECA]

---

[1] Kate Brady (Australian Red Cross) stated in a paper in 2018: "No review process required: Recovery management is rarely included in disaster reviews or enquiries. Program evaluation is currently optional good practice, rather than standard practice or a requirement, though this is starting to change" [BRAD], [PATR]

4. Informatics Methods and Techniques

The UN SENDAI Framework requirements for information management are effectively implemented by applying state-of-the-art methods and techniques from informatics / information engineering and information processing (mainly based on data, software and actionable use/processes).

Current (static) data models need to be extended from service structures towards integration of processes, workflows, events and decisions [BART], [KRÜ01], [MOSC], [ÖD01], [THIE]:

- BPM (Business Process Modeling)   ISO/IEC 19510:2013-07

- DMN (Decision Model and Notation)   OMG Standard
                                          (Object Management Group)

Other data, analysis, events and action models are specified and compiled from techniques like: use cases scenarios [MSB1], [WJB1], requirements and applications of distributed and event-based systems, Internet-of-Things, cyber-physical systems, sensor networks, social networking, multimedia analytics, smart contracts / service level agreements, blockchains and further tools of Artificial Intelligence [EC01].

The governance of existing complex information infrastructures is well documented and can be regarded as broadly accepted best practice (e.g. [AUS3], [COBA], [CORA], [INSP], [VDK]).

The complexity of data sources can very well be met by applying methods and techniques for making SFR-related data discoverable by automated processes of dedicated search engines.

5. Big Data

- The use of social media data for example for the Sendai framework with participatory aspects of risk management automatically pile in the classical risk analysis community to the challenges of the big data world and it's problematics to which the world of risk analysis is already in a good part, well aware.

- Therefore, the arrival and consequent processing of these new data types in large volumes, high structural variety and different quality will lead to rethink the classical technology portfolio and infrastructure used by the risk analysis community. The first challenge is linked to the obsolescence and consequent remodeling of technology linked to classical analytical databases and data warehouses. Another well-known and identified challenge by the risk analysis community is the strengthening of data integration based on accepted information infrastructure concepts and comparable to existing complex implementations. Nevertheless it's important for the risk analysis community to be aware on which way they will implement this new technology for processing all of the data and technology now in place. How can existing technology and data used for risk analysis, be improved by adding big data from social media? (cf. [ODC]) How can new forms of analytics and applications use both the old and the new risk analysis and emergency response data framework?

MASSIVE, COMPLEX DATA, ANALYSIS, AND DECISION SUPPORT

- Among these applications linked to cloud computing, the risk analysis community the risk information management community will face new evolutionary computing challenges in the risk domain, for example by new techniques like genetic algorithms, ant colony optimization in order to resolve the problem of load balancing in cloud environment, bees algorithm for grid balancing solutions. The objective will be to enhance the performance analysis of large scale risk analysis projects by load balancing algorithms in cloud computing.

- Currently there is no consent on how to collect, store, publish, analyze, critically revise Big Data (neither technically nor in use cases like Media/Journalism [GOLD])

6. Data Availability vs. Data Demand

- The UN Sendai Framework explicitly requests all details of cross-organizational and interdisciplinary data for the operational as well as for the strategic tasks and addresses all management levels. There is currently a large debate on the term "Available Data", especially with regard to official statistics agencies holdings. It should be clear that such data will only meet fractions of the requirements written in the Sendai Framework text. Data Readiness is one of the central concepts of operational interoperability and information infrastructure requirements [EC04]. It would be more adequate if cross-organizational data demands for each of the specific requirements of the Sendai Framework would soon find its adequate attention in comparison with the statistics data discussions needed currently especially not for operational but for strategic issues (indicators). The overlap of Geoinformation combined with Statistical Information with all the vast amount of data needed for operational management is marginal.

UN SENDAI FRAMEWORK INFORMATION DEMANDS

- Gaps in cross-organizational data availability (especially considering domains of Health, Social Care, Demographics, Agriculture, Food/Nutrition, Transport/Logistics, Urban Planning and Municipal Management [GLO1], [UNHA01], [UNHA02], [UNHA03], Private and public Sector Operational Capabilities [KRMA], [PA01], [PA02] etc.), incompatible data quality and missing interoperability are well-known today to disable best possible decisions and services [DRG], [PIY01] in all disaster phases in <u>all</u> types of countries [TAME].

CROSS-ORGANIZATIONAL INTEROPERABILITY

- Information demand for operational purposes reaches far beyond rescue and first aid requirements. The step forward from the former Hyogo Framework especially broadens the concern towards all kind of effects of disasters (natural and technical / man made). The corresponding holistic view is very well described in the Sendai Framework but still needs to find adequate attention by Information Management Governance.

7. Data Quality Issues, Data Sharing with the Private Sector (Industries, Business, Insurances etc.), Transferability

- The example of the US national inventory of disaster loss, showed the complexity of the data reporting of sensible private data, owned and coming from different sources with management issues regarding loss data, compatibility between databases, integration of different data cultures like public health and weather services, the open data problematic. The goal will be to deal with better aggregated data having a better coverage across all magnitudes of the data cycle. Interesting issues with future collaboration with the insurance business branch are very promising, how to deal with disaster loss data, cost concepts, and property values.

- A future issue can be to look at a data sharing ecosystem who provides space for multiple diverse datasets in order to encourage multidisciplinarity and data sharing benefits by solutions like data remixing and combining. Benefits can be expected from opportunities to re-analyze older data using contemporary methods, text mining for searching added values and discoveries, data remixing and combination, semi-automated, or algorithmic hypothesis generation for meta-analysis [WANG], [AA99].

- The involvement of private sector for crisis / emergency / resilience investigations and operations is currently not very well formalized. In all information exchange, task-related quality measures need to be provided. The EU SEVESO III Directive [EC03] gives helpful impressions on the topic. Typical situations in the SENDAI Framework domains need to be specified and probably some comparable measures/regulations/specifications need to be taken, especially when the complexity of (cascading) disasters and many types of actors are considered [EU01], [EU04], [EU10].

8. Complex Data Visualization and Comparability Issues

- Environmental data issues processing shows the complexity of visualization of environmental risks, the complexity of visualizing hazards and the quasi impossibility to produce understandable risk maps in case of chemical accidents on waterways is eloquent, actually the more developed risk visualizations are mainly developed for human hazards and vulnerability.

- Problems arise because there are no international standards for risk visualization and therefore it brings a lot of problems linked to comparability and understanding of risk maps. Themes like vulnerability do not have a unified visualization framework, because the notion of vulnerability itself is rather vague because the word suffers from a semantic overflow mainly because it covers several notions evoking both dependence, fragility, insecurity.

- Technical Infrastructure of underground network elaborated and visualized with the creation of artificial intelligence tool brings also new insights about visualizations of the undergrounded networks and the equipment and interesting corresponding new risk visualization patterns dealing with uncertainties [SETO].

- The new methods and paradigms inside business risk allow to revivify the classical operational research field in business with an automated production of actors involved sociograms, in that way opening new perspectives for the risk analysis community, helping them better taking account the positions and open or hidden issues of actors involved in a risk topic or situation.

9. Standards Needed

The current deficits are best characterized by missing standards for documenting disasters (facts, information flows, analysis, use and communication). There are exceptional cases where in specific disasters there were special efforts on data and information documentation. The very detailed and comprehensive investigations on "Unpreparedness" in the Hurricane Katrina (2005) disaster [US01] [US02] depicts the huge demands of post-event information analysis and in this case, of course, illustrates the missing availability and consequences of non-interoperability, information flows, information use, incompatibility, misinterpretation scenarios etc. etc.

Even in disaster exercises, the only reliable information documentation can be expected from the official rescue teams of fire brigade, police, ambulance etc. Currently, no comprehensive information strategy covering preparation phases, operations, and post disaster analysis and accountability issues is formalized and [AA08], [AA11], [BAKE], [RAMC]). Even basic specifications of complex disaster documentation is missing. There is specific demand for institutions like Public Prosecution Service, Liability Insurance Associations, Labor Inspectorate and others.

DATA, PROCESSES, DECISIONS, CONTROL

Current standardization practices mainly address specific (semantic, technical) topic issues. In addition to this there is a need to develop standardization concepts that cover complete modules of disaster situational needs. Modularization is extremely helpful in specification and implementation of typical scenarios as well as for operational / decision supporting systems [KRE10], [KRE11], [MOREI], [MSB1], [WJB1].

Without concise and comprehensive documentation in the sense of the UN Sendai Framework, learning from disaster will not be possible at the level that members and organizations of information society would expect in striving for a responsible, secure, safe and reliable environment.

From an operational practical point of view, a change from topic-oriented to situation-based standards development is desirable because benefits of standards as well as synergies of standards components would be much better demonstrable.

STANDARDS: FROM TOPIC TO SITUATION

Situation-based standards also would strongly support the concepts of creating testbeds for mutual analysis and for verification of management results in controlled information environments.

10. Information Complexity

Future research and development in those areas will bring a significant contribution to all the cycle of risk analysis and the disaster management area only if the inherent complexity of interdisciplinary/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 standards and Information Infrastructure principles [EU03], [ORCH], [BAU01], [VDS], [WES1], [WES2], [ZIEM].

CHALLENGES FROM THE
TEXT OF THE
UN SENDAI FRAMEWORK

Risk Information is in due need of very broad systematic integration, processing and evaluation 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 for decision processes, operations guidance and goal-reaching control according to user requirements.

11. UN Sendai Framework Formal Requirements

In the UN Sendai Framework for Disaster Risk Reduction (2015) [ISDR01], [UN01] information details mentioned explicitly in the text show convincingly that it is much more than just the indicators that need to be specified, compiled, monitored and analyzed.

UN ISDR compiled a Science and Technology Roadmap to support the implementation of the Sendai Framework [ISDR02], the European Joint Research Center corresponding strategy is documented in [PFG1]. Detailed R&D requirements have been published in RIMMA report series [BKS1], [KRE04], [KRE06], [KRE08], [KSB].

Very recent discussions already show that the role of information management in its broad sense of the Sendai Framework text is considered central to effective disaster management. (c.f. R. Glasser in [SFRM]). But the corresponding steps towards transparent cross-organizational information availability, interoperability enabling ontologies (much more complex by Interdisciplinarity and actors/organizations than the current (core) GeoInformation Infrastructures [OGC1], [BAU01]), and decision-supporting analysis processes are just in the beginning.

12. Coherence

Levels / domains of coherence

-   Other UN Declarations and Instruments (UN HABITAT, UN Sustainable Development Goals SDGs, UN Framework Convention on Climate Change, Int. Platform on Biodiversity and Ecosystem Services IPBES, Human Rights, Children Rights, IPCC, UNDP, UN World Food Program, and many others)
-   Information Management and Technical coherence
-   Administrative / legal coherence

- Cross-border coherence
- Coherence with state-of-the-art professional practices (interdisciplinary) and standards
- Coherence with Security/Safety domains - CBRNE

The UN together with their declarations and instruments corresponding national / european implementation laws, regulations and directives (e.g. [EU05], [EU06], EU07], [EU08]) acknowledge the coherence requirements but systematical investigations, especially mutual semantic mapping, are not yet supported in adequate ways.

13. Information Governance Needed

Information governance becomes increasingly important due to the proliferation of data in various formats at different levels of within and across organizations. The UN SENDAI Framework requires "…strengthening disaster risk governance and coordination across relevant institutions and sectors and the full and meaningful participation of relevant stakeholders at appropriate levels" [ISDR1] par. 14, [AKBH].

All facets of Data and Information Science are needed in Disaster Information Management. Though methods and technologies for handling complex tasks of Syntax, Semantics and Pragmatics are available, applications in the disaster information management domains are rather based on projects than on broad integration concepts. The overall complexity is in due need of getting its own governance, mainly because of the huge variety of organizations/actors involved and because of the vast demands in all phases of the disaster cycle.

Information governance is the set of multi-disciplinary structures, policies, procedures, processes and controls implemented to manage information at an enterprise level, supporting an organization's immediate and future regulatory, legal, risk, environmental and operational requirements [WIK1].

INFORMATION GOVERNANCE DEFICITS

Legal issues on all information management aspects (especially open access, [EU09]), including discussions on ethical issues [PRI01] in open data provision and use, need to become part of Risk Information Governance. On the strategic level there is a strong effort in supporting cross-sectoral aspects of Digital Society [BMWI], Industries 4.0, general Information Infrastructures [EC04], [EIF], Digital Agenda - Europe 2020 Strategy [DAE] and corresponding regulatory frameworks.

A special role is with Application Program Interfaces (APIs) [EC02] that allow to

- assess digital government APIs landscape and opportunities to support the digital transformation of public sector;
- identify the added value for society and public administrations of digital government APIs (key enablers, drivers, barriers, potential risks and mitigates);
- define a basic Digital Government API EU framework.

Risk information management in Europe will be embedded in EU strategies on EU Action Plan on the Sendai Framework [EUSF]

The complexity of the Sendai Framework Implementation can effectively be met in applying existing methods that support the overall process from agreements of initial conditions via choosing suitable and compatible development methodologies through controlling and reporting on realization stages.

14. R&D / SciTech Community Supporting Governance

Already in the stage of tendering of R&D / SciTech projects (Calls), an explicit demand for including a chapter on strategic issues that arise from the project should be incorporated covering topics like

- Conditions for broad practical implementation (beyond project partners own interest)
- Gaps recognized during project
- Requirements in Standards
- Information availability, exchange, analysis and usability (FAIR Principles [FAIR]) in the operational domains
- Comparison of pre-project and post-project Data Management Plans
- Scalability of solutions
- Administrative conditions for continuous operation (personnel, finances, organization, private sector contracting for administrative services [KLIS] etc.)
- Potential business cases
- Anticipated legal aspects
- Intellectual property rights
- Ethics issues

In most cases, such information requests currently are either missing or not mandatory. There have been efforts to make data management plans mandatory.

General problems caused by gaps between SciTech communities and operational practice (in many discussions this situation is called "trenches") on all levels of project funding exist despite very substantial investments in R&D [CZZ01]. Within the frame if the National Platform concepts, broad discussions and negotiations including political and administrative representatives should result in feasible solutions enabling responsible implementation of recognized methods and techniques in the area of general (administrative) practice.

Innovative application fields (like Big Data, extensive use of Social Media Content and many more) currently lack the possibility of broad implementation because corresponding for personnel numbers and professional skills, data, software and process information management solutions negotiated beyond the project level, basics and compliance measures for implementation and operational use are not elaborated in sufficient (administrative) practice, nor are alternative solutions (e.g. provisionable /on-demand service operated by private sector) investigated, discussed and contracted for. Efforts now are starting, but especially focused on traditional Civil Protection / First Aid phase demand. The SFR scope of situations (including all other disaster management phases after first, through preparedness are not very well covered by overarching situation management principles.

Structured text elements (xml markups) including transparent publication/open access will allow governance-enabling analyses, decisions and action.

15. From SFR National Focal Points to SFR National Platforms

Fundamental to SFR governance and implementation are all aspects of information management noted in the SFR text. So one of the central and demanding tasks of the National Platforms is to enable multi-stakeholder discussions and negotiations (including private sector representatives, associations and interested parties from all sectors of society), documenting best practice of information management details as well as gaps, malpractice, "lessons not learned" and suggesting/initiating operational conditions for broad interdisciplinary multi-stakeholder information concepts and their long-term management as well as technical support (including Risk Information Infrastructures).[2]

Experience from implementation of the Sustainable Development Goals underline the role of Non-Government Organizations in such complex situation: "As recognized by the 2030 Agenda, NGOs play critical roles in SDG implementation: we raise awareness and mobilize; build capacity; design and implement projects; monitor and review policies; collect data; provide technical expertise; and both support and hold governments accountable to their commitments. We note with concern the shrinking space for civil society, and call for increased political and financial support for civil society participation at all levels and stages of implementation and review, to increase the Goals' chances of success" ([NGOM] p. 3) and also postulating "parallel reporting by civil society ([NGOM] p. 10)

Among the large number of tasks to be handled by a SFR National Platform, the following are especially addressing issues of information management as required in the SFR text:

- Enable the broad transformation needed especially in digital information terms based on intense democratic discourse and a politically accompanied and moderated process

- Enable, widen and guide the underlying principles of transparency obligations and general information demands according to the SFR text, adapting existing complex solutions in other domains (Geoinformation, Environmental Information) as well as reaching out for adequate innovative methods and techniques to cope with larger complexity issues.

- Ensuring implementation and expansion of federal funding for community / civil society organizations

16. General Remarks / Actionable Recommendations

- The tasks (as requested throughout the SFR text) are known in principle, but the methodological-technical progress has been quite hesitant since the UN SENDAI Framework was endorsed by the UN General Assembly.

- The rather large efforts already put on SFR Indicators and Terminology did not yet reach the very broad and complex range range of information requirements put forth in the text of the SFR.

- It is not clear in many places to what extent a distinction is made between the HYOGO and the SENDAI formulations in the current implementation efforts. Some claim that the SFR is not sufficiently broadly understood. This may be

---

[2] Note the difference of Risk Information Infrastructure (comprizing aspects of information syntax, semantics, interoperability and procedural use) e.g. [AUS3], [INSP], [JOBST] and "Critical Information Infrastructure Risk" (security aspects) e.g. [GIB18], [HIL], [HL01]

consequence of limited media work for the SFR on all levels. National Reports should explicitly indicate on how far the current SFR implementation is realized in the SFR extensions to the HYOGO framework.

- The UN SENDAI Framework clearly broadens the view from "Resilience-as-a-service" to whole-of-society mutual responsibility.

- Reducing the (national, regional, local) implementation of the UN SENDAI Framework to only parts of its content **does not comply**

  - with the legitimate interest of those affected,

  - with societal growing awareness about mutual responsibility for best humanitarian decisions and actions,

  - with expectations of future generations that are concerned about full operational management of United Nations Declarations and Instruments globally negotiated and adopted best practice.

- Reaching out to the Safety and Security domains for joint information interests and corresponding synergy effects

We continue discussion for holistic evaluation of disaster risk management area according to the UN SENDAI Framework specifications. Many innovative ideas and insights emerge from publications, professional events and formal negotiation groups comprising public administration, private sector and civil society organizations. All these emerging topics regarding the generation and the use of risk information analysis are deeply embedded in the future of participatory inclusiveness.

APPLYING PRINCIPLES OF INFORMATION MANAGEMENT INFORMATICS

The following key areas are identified as a priority to be shared at upcoming strategic meetings on regional, national and international level for discussion of appropriate / best practice governance models, as well as for structuring of accompanying R&D programs.

- Critical technical, business and social infrastructure data and processes

- Risk communication : participation and public investment

- Development of new approaches for risk communication not only for operations but also for public involvement

- Data availability and data quality measures (including uncertainty, reliability and "fit for use") from local to global level

- Data quality global and consistent assessment

- Data systematization and standardization on a global level including regional, sectorial and local strata

- Harmonization of Risk Information Management Models, terminology and communications to enable cohesive and more effective disaster risk prevention

- Social inclusion and dissemination of Risk Information Management best practices

- National and International legal frameworks for cross-organizational disaster risk information management [ZIE01], and climate change, including private sector domains

- Addressing data and model uncertainty
- Functional and operational issues in principles and practices of Threshold values, effects, decisions and alternatives of action
- Creation of action plan which enhances risk resilience
- Model validation and reliability of data
- Continuity of the disaster management projects and related information gathering efforts
- Risk analysis linked to evolving technologies

TECHNOLOGY AND
METHODS
TRANSFER

- Addressing the use and consequences in terms of costs, respectively finances, at every risk analysis step and for anticipated alternatives of decision and action
- Standardization of data, improvement and availability of socio-economic data for calculation of social vulnerability
- Enhancement of business risk management and industrial process management, (food and products/parts) supply, transport and logistics (including the variety of actors dynamic information on capacities and supply in medical care) in risk information analysis [DES01], DRAH], [GARC], [LEOB1], [NRF01]
- Formal specification and unification of process chains modeling for information flow, analysis and use in all phases of the disaster cycle [WES1], [WES2], [VRST], [ZIKO]
- Compliance and audit information management [KNRE] [AA99]

"Ultimately, more empowered people, better policies, better decisions and greater participation and accountability, leading to better outcomes for people and the planet." [REVO]

17. References

[AA08] Accountability: Aa1000 Accountability Prinzipien Standard 2008. Institute of Social and Ethical Accountability (2008) 21 p. *http://www.accountability.org/images/content/5/0/501.pdf*

[AA11] Accountability: Aa1000 Stakeholder Engagement Standard 2011. Institute of Social and Ethical Accountability (2011) 52 p.
http://www.accountability.org/images/content/3/6/362/AA1000SES%202010%20PRINT.PDF

[AA99] Accountability: AccountAbility 1000 (AA1000) – accountability standard, focused on securing the quality of social and ethical accounting, auditing and reporting. Institute of Social and Ethical Accountability (1999) 28 p.
http://www.accountability.org/images/content/0/7/076/AA1000%20Overview.pdf

[AKBH] Akerkar, Supriya; Bhardwaj, Rhea: Good practice guide: embedding inclusion of older people and people with disabilities in humanitarian policy and practice. (2018) 160, Age and Disability Consortium, ISBN 978-1-910743-33-1

[AUS1] Enhancing Disaster Resilience in the Built Environment - Roadmap. Australia (2012), PlanDev Business Solutions on behalf of the Land Use Planning and Building Codes Taskforce, a working group of the National Emergency Management Committee (NEMC).

[AUS2] National Disaster Risk Reduction Framework. (2018) 24 p., Commonwealth of Australia,

[AUS3] National Environmental Information Infrastructure, Commonwealth of Australia,
http://www.neii.gov.au/

[BAKE] Baker, C. Richard: Breakdowns of accountability in the face of natural disasters: The case of Hurricane Katrina. Critical Perspectives on Accounting 25(2014)(7)620-632, Elsevier, 1045-2354

[BART] Barton, Thomas; Et al.: Prozesse, Technologie, Anwendungen, Systeme und Management. Tagungsband zur 29. AKWI-Jahrestagung vom 11.09.2016 bis 14.09.2016 an der Technischen Hochschule Brandenburg (2016) 345 p., mana-Buch, Heide, ISBN: 978-3-944330-54-9

[BAU01] Baumann, Peter: Konzeptuelle Modellierung von Geodiensten. Informatik Spektrum 31 (2008) (5) 435-450

[BKS1] Betz, Stefanie; Kremers, Horst; Susini, Alberto: CODATA Symposium on Risk Models and Applications Kiev, Ukraine, Oct. 5, 2008. (2008) *http://www.codata-germany.org/RMA_2008/RMA_Kiev_CODATA_Symposium_Report____Betz_Kremers_Susini_.pdf*

[BMWI] German Federal Ministry for Economic Affairs and Energy (BMWi): Digital Strategy 2025. (2016) *http://www.bmwi.de/DIGITAL/Redaktion/EN/Publikation/digital-strategy-2025.html*

[BRAD] Brady, Kate: Disaster recovery: are we doomed to repeat the same mistakes?. Australian Journal of Emergency Management 33 (2018) (3) 10 ff ISSN: 1324 1540
https://knowledge.aidr.org.au/media/5825/ajem_july2018_kh.pdf

[COBA] Constantinides, Panos; Barrett, Michael: Information Infrastructure Development and Governance as Collective Action. Information Systems Research 26 (2014) 1-17 DOI: 10.1287/isre.2014.0542 *https://www.researchgate.net/publication/273130860_Information_Infrastructure_Development_and_Governance_as_Collective_Action*

[CORA] Conforti, Raffaele; Et al.: A recommendation system for predicting risks across multiple business process instances. Decision Support Systems 69 (2015) 1-19, Elsevier,

[CZZ01] Coles, John B.; Zhang, Jing; Zhuang, Jun: Bridging the research-practice gap in disaster relief: using the IFRC Code of Conduct to develop an aid model. Annals of Operations Research (2017) 1-21, Springer, ISSN: 0254-5330

[DAE]   A Digital Agenda for Europe - Europe 2020 Strategy. Communication from the Commission to the European Parliament, the Council, the European Economic And Social Committee and the Committee of the Regions. COM(2010) 245 (2010)
https://www.kowi.de/Portaldata/2/Resources/fp/2010-com-digital-agenda.pdf

[DES01] Desel, Jörg; Weske, Mathias: Proc., Prozessorientierte Methoden und Werkzeuge für die Entwicklung von Informationssystemen. Lecture Notes in Informatics (LNI) P-21(2002) ISSN 3-88579-350-4

[DRAH] Draheim, Dirk: Business Process Technology. A Unified View on Business Processes, Workflows and Enterprise Applications. Figures and Listings. (2010), Springer
http://draheim.formcharts.org/BPTslides.pdf

[DRG]   Dunkl, Reinhold; Rinderle-Ma, Stefanie; Grossmann, Wilfried: Decision Point Analysis of Time Series Data in Process-Aware Information Systems. CEUR Workshop Proceedings 1164 (2014) 33-40 *http://eprints.cs.univie.ac.at/4083/*

[EC01]   European Commission: Koordinierter Plan für Künstliche Intelligenz. Mitteilung der Kommission an das Europäische Parlament, den Europäischen Rat, Den Europäischen Wirtschafts- und Sozialausschuss und den Ausschuss der Regionen COM/2018/795 final (2018) *https://eur-lex.europa.eu/legal-content/DE/TXT/?qid=1550060223055&uri=CELEX:52018DC0795*

[EC02]   European Commission: APIs4DGov: APIs for Digital Government. Study (2018) *https://ec.europa.eu/digital-single-market/en/news/improving-use-api-digital-government*

[EC03]   Directive 2012/18/EU of the European Parliament and of the Council on the Control of Major-Accident Hazards Involving Dangerous Substances. Official Journal of the European Union L197/1 (2012) *https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=celex%3A32012L0018*

[EC04]   European Commission: DCAT application profile for data portals in Europe. Share and reuse inter-operability solutions for public administrations 2016 https://joinup.ec.europa.eu/catalogue/distribution/dcat-ap-version-11

[ECA]   Fostering trust through independent audit - The European Court of Auditors' Strategy for 2018-2020. (2017) *https://www.eca.europa.eu/ https://www.eca.europa.eu/Lists/ECADocuments/STRATEGY2018-2020/STRATEGY2018-2020_EN.PDF.pdf*

[EFDR]   EFDRR: European Forum for Disaster Risk Reduction 2015-2020 Roadmap for the Implementation of the Sendai Framework. *https://www.preventionweb.net/files/48721_efdrrroadmap20152020anditsactions20.pdf*

[EIF]   EIF European Interoperability Framework – Implementation Strategy. Communication from the Commission to the European Parliament, the Council, the European Economic And Social Committee and the Committee of the Regions. COM(2017) 134 final (2017) *http://eur-lex.europa.eu/resource.html?uri=cellar:2c2f2554-0faf-11e7-8a35-01aa75ed71a1.0017.02/DOC_1&format=PDF*

[EN01]   Ensor, Jonathan: What is equitable resilience?. (2019) 6 p., Stockholm Environment Institute, *https://www.sei.org/wp-content/uploads/2019/04/equitable-resilience-discussion-brief-ensor.pdf*

[EU01]   European Union: Directive 2013/30/EU on Safety of Offshore Oil and Gas Operations. Official Journal of the European Union L 178/66 (2013) 41 p. *http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2013.178.01.0066.01.ENG&toc=OJ:L:2013:178:TOC*

[EU03]   European Union: Infrastructure for Spatial Information in the European Community (INSPIRE). *http://inspire.ec.europa.eu/*

[EU04]   European Union: Birds Directive (Directive 2009/147/EC). Official Journal of the European Union L 20/7 (26.1.2010) 19 p. *http://eur-lex.europa.eu/eli/dir/2009/147/oj*

[EU05]   European Union: Habitats Directive (Directive 92/43/EEC). Official Journal of the European Union L 206 (22.07.1992)   p. 7 - 50 *http://data.europa.eu/eli/dir/1992/43/oj*

[EU06]   European Union: Marine Strategy Framework Directive (Council Directive 2008/56/EC). Official Journal of the European Union L 164/19 (25.6.2008) 22 p. *http://eur-lex.europa.eu/eli/dir/2008/56/oj*

[EU07]   European Union: Floods Directive (Directive 2007/60/EC). Official Journal of the European Union L 288/27 (6.11.2007) 8 p. *http://eur-lex.europa.eu/eli/dir/2007/60/oj*

[EU08]   European Union: Water Framework Directive (Directive 2000/60/EC). Official Journal of the European Union L 327/1 (22.12.2000) 72 p. *http://eur-lex.europa.eu/eli/dir/2000/60/oj*

[EU09]   European Union: Freedom of access to information Directive (Directive 2003/4/EC). Official Journal of the European Union L 41/26 (14.2.2003) 7 p. *http://eur-lex.europa.eu/eli/dir/2003/4/oj*

[EU10]   European Union: Control of Major-Accident Hazards Involving Dangerous Substances Directive 2012/18/EU. Official Journal of the European Union L 197/1 (24.7.2012) 37 p. *http://eur-lex.europa.eu/eli/dir/2012/18/oj*

[EUSF]   Action Plan on the Sendai Framework for Disaster Risk Reduction 2015-2030, A disaster risk-informed approach for all EU policies. SWD(2016) 205 final/2 (2016) *http://ec.europa.eu/echo/sites/echo-site/files/1_en_document_travail_service_part1_v2.pdf*

[FAIR]   The Internet of FAIR Data & Services. *https://www.go-fair.org/resources/internet-fair-data-services/*

[FARY]   Faulconbridge, R. Ian; Ryan, Michael J.: Managing Complex Technical Projects: A Systems Engineering Approach. (2003) 255 p., Artech House, ISBN 1-58053-378-7

[GARC] García-Holgado, Alicia; García-Peñalvo, Francisco José; Hernández-García, Ángel: Analysis and Improvement of Knowledge Management Processes in Organizations Using the Business Process Model Notation. New Information and Communication Technologies for Knowledge Management in Organizations, LNBIP Lecture Notes in Business Information Processing 222 (2015) 93-101, Springer

[GIB18] Global Infrastructure Basel: Guidance Checklists: Preparation of Sustainable and Resilient Infrastructure Projects. (2018) 30, Global Infrastructure Basel, Switzerland, *http://www.gib-foundation.org/content/uploads/2019/02/Guidance_Checklists_for_Sustainable_Infrastructure_Development_and_Finance_2018.pdf*

[GIL] Gilligan, Andrew: Fukushima: Tokyo was on the brink of nuclear catastrophe. The Telegraph (2016-03-04) *http://www.telegraph.co.uk/news/worldnews/asia/japan/12184114/Fukushima-Tokyo-was-on-the-brink-of-nuclear-catastrophe-admits-former-prime-minister.html*

[GLO1] Global Alliance for Urban Crises: Urban Profiling for Better Responses to Humanitarian Crises. (2019) 24 *https://www.preventionweb.net/files/63918_1.urbanprofilingforbetterresponsest.pdf*

[GOLD] Goldhammer, Klaus; Et al.: Auswirkungen von Bigdata auf den Markt der Onlinemedien. BMBF Projekt 01|S15016A-F *http://www.abida.de/sites/default/files/ABIDA%20Gutachten%20Auswirkungen%20von%20Big%20Data%20auf%20den%20Markt%20der%20Onlinemedien.pdf*

[HARL] Harlow, Summer: Journalism lessons learned on the 5th anniversary of Hurricane Katrina in the U.S.. (2010-08-30) *https://knightcenter.utexas.edu/blog/journalism-lessons-learned-5th-anniversary-hurricane-katrina-us*

[HATC] Hatch, Jenavieve: In Natural Disasters, A Disability Can Be A Death Sentence - How disability rights advocates want to change the landscape of disaster response. HuffPost (2018-12-24) *https://www.huffpost.com/entry/in-natural-disasters-a-disability-can-be-a-death-sentence_n_5c1ba22ee4b0407e9077eb58*

[HIL] Hilty, Lorenz: Emerging Risks in Information Infrastructures: A Technology Assessment Perspective. Proceedings of IDRC (2008)

[HL01] Hanseth, Ole; Lyytinen, Kalle: Design theory for dynamic complexity in information infrastructures: The case of building internet. Journal of Information Technology 25 (2010) 1-19, Palgrave, doi:10.1057/jit.2009.19

[INSP] Infrastructure for Spatial Information in Europe - INSPIRE. *https://inspire.ec.europa.eu/*

[ISDR1] UNISDR: Sendai Framework for Disaster Risk Reduction 2015 - 2030. *http://www.unisdr.org/we/inform/publications/43291*

[ISDR2] UNISDR: The Science and Technology Roadmap to Support the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030. (29 February 2016) 9 p. *http://www.unisdr.org/files/45270_unisdrscienceandtechnologyroadmap.pdf*

[JOBST] Cetl V., Tomas R., Kotsev A., de Lima V.N., Smith R.S., Jobst M.: Establishing Common Ground Through INSPIRE: The Legally-Driven European Spatial Data Infrastructure. Döllner J., Jobst M., Schmitz P. (eds) Service-Oriented Mapping. Lecture Notes in Geoinformation and Cartography (2019) 63-84, Springer Nature, ISBN 978-3-319-72433-1

[KLIS] Klischewski, Ralf; Wetzel, Ingrid: Vertragsbasiertes Prozessmanagement als Leitbild für die Organisationsübergreifende Workflowunterstützung. Proc., Prozessorientierte Methoden und Werkzeuge für die Entwicklung von Informationssystemen (LNI) P-21 (2002) 81-93

[KM01] Krüger, Marco; Max, Matthias: Resilienz im Katastrophenfall - Konzepte zur Stärkung von Pflege- und Hilfsbedürftigen im Bevölkerungsschutz. (2019) 294 p., transcript, 978-3-8376-4488-3

[KNRE] Knuplesch, David; Reichert, Manfred; Rinderle-Ma, Stefanie: On Enabling Compliance of Cross-organizational Business Processes. *http://dbis.eprints.uni-ulm.de/947/1/KRFR13_BPM.pdf*

[KRE02] Kremers, Horst: Sociology of Agents in Sustainable Development. in: "Environmental Communication in the Information Society".. Proc., 16th Int. Conf. on Informatics in Environmental Protection. W. Pillmann / K. Tochtermann, eds., Vienna 2 (2002) (250)

[KRE04] Kremers, Horst: Risk Management - International Workshop, Berlin, Sept. 10-11, 2009 – Report. Lecture Notes in Information Sciences 4 2010 179-190. http://www.codata-germany.org/RMA_2010/2009_Berlin_Risk_Management_Workshop_Report_.pdf

[KRE06] Kremers, Horst: Risk Models and Applications International CODATA Workshop, Berlin, Germany August 26-27, 2010. Report. Lecture Notes in Information Sciences 5 (2012) 103–109, CODATA-Germany, ISBN 978-3-00-036336-8 *http://www.codata-germany.org/RMA_2010/RMA_Berlin_2010__Risk_Models_and_Applications___report_.pdf*

[KRE08] Kremers, Horst; Bakhtina, Victoria; Et Al.: Risk Management - International Workshop, Berlin, Sept. 10-11, 2009 – Report. 2009
http://www.codata-germany.org/RISK_2009/2009_Berlin_Risk_Management_Workshop_Report_.pdf

[KRE10] Kremers, Horst: Risk Management - International Workshop, Berlin, Sept. 10-11, 2009 – Report. Lecture Notes in Information Sciences 4(2010)179-190, CODATA-Germany, ISBN 978-3-00-030278-7
http://www.codata-germany.org/RMA_2010/2009_Berlin_Risk_Management_Workshop_Report_.pdf

[KRE11] Kremers, Horst: Risk Information Management Challenges for Operational Forces in Multi-disciplinary Decision Processes. Lecture Notes in Information Sciences 7 (2015) 177 – 183, CODATA-Germany, ISBN 978-3-00-048844-3

[KRMA] Krüger, Marco; Max, Matthias: Resilienz im Katastrophenfall - Konzepte zur Stärkung von Pflege- und Hilfsbedürftigen im Bevölkerungsschutz. Gesellschaft der Unterschiede 46 (2019) 294 p., Transcript, ISBN 978-3-8394-4488-7 *https://doi.org/10.14361/9783839444887-fm*

[KRSU2] Kremers, Horst; Susini, Alberto: Challenges in Operational Risk Information Management. Strategy Report. (2017) *http://tinyurl.com/LNIS8-UNISDR-Strategy*

[KRSU1] Kremers, Horst; Susini, Alberto: Risk Information Management, Risk Models and Applications. Lecture Notes in Information Sciences 7 (2015) 189 p., CODATA-Germany, ISBN 978-3-00-048844-3

[KRÜ01] Krüger, Uwe: Fehlervermeidung und Prozessmonitoringin komplexen und dynamischen Groß-schadenslagen. Dissertation (2014) 149, Universität Jena,
https://core.ac.uk/download/pdf/33432209.pdf

[KSB] Kremers, Horst; Susini, Alberto; Bakhtina, Victoria: Perspectives in Disaster Risk Information Management. RIMMA 2014 Berlin International Workshop Summary Outcomes. Lecture Notes in Information Sciences 7 (2015) 185 – 189, CODATA-Germany, ISBN 978-3-00-048844-3
http://rimma2014.net/RIMMA_2014_summary_Kremers_Susini_Bakhtina.pdf

[LACH] Lachhab, M.; Et al.: Towards an Integration of Systems Engineering and Project Management Processes for a Decision Aiding Purpose. IFAC PapersOnLine 50-1 (2017) 7266–7271 50-1 (2017) 7266-7271, Elsevier, ISSN: 2405-8963

[LEOB1] Lenz, Kirsten; Oberweis, Andreas: Integrierte Dokumenten- und Ablaufmodellierung von E-Business-Prozessen. Proc., Prozessorientierte Methoden und Werkzeuge für die Entwicklung von Informationssystemen (LNI) P-21 2002 40-51.

[MOREI] Moreira, João: Developing Situation-Aware Applications for Disaster Management With a Distributed Rule-Based Platform. CEUR Workshop Proceedings 1417 (2015) 6 p. ISSN 1613-0073

[MOSC] Moscato, Francesco; Mazzocca, Nicola; Vittorini, Valeria: Workflow Pattern Analysis in Web Services Orchestration: The BPEL4WS Example. Lecture Notes in Computer Science 3726 (2005) 395-400, Springer

[MSB1] The Swedish Civil Contingencies Agency (MSB): A summary of risk areas and scenario analyses 2012–2015. (2016) 978-91-7383-681-4
https://www.msb.se/Upload/Forebyggande/Krisberedskap/MSB1021_Summary-Risk-Areas-Scenario-Analyses.pdf

[NGOM] Non-Governmental Organizations (NGO) Major Group - Official Position Paper for the 2017 High-Level Political Forum. (2017) 13
http://www.ngomg.org/ https://sustainabledevelopment.un.org/content/documents/15002NGO.pdf

[NRF01] Nüttgens, Markus; Rump, Frank J.: Syntax und Semantik Ereignisgesteuerter Prozessketten. Proc., Prozessorientierte Methoden und Werkzeuge für die Entwicklung von Informationssystemen (LNI) P-21 2002 64-77.

[ÖD01] Özcan, Gökhan; Drescher, Andreas: Geschäftsprozessmanagement in global verteilten Produkt-entwicklungsprojekten. INFORMATIK 2017,Lecture Notes in Informatics (LNI) (2017) 849-855, Gesellschaft für Informatik, Bonn

[ODC] Onorati, Teresa; Díaz, Paloma; Carrion, Belen: From Social Networks to Emergency Operation Centers: A Semantic Visualization Approach. Future Generation Computer Systems 95 (2019) 829-840, Elsevier, ISSN: 0167-739X

[ORCH] Orchestra Consortium: Orchestra – an open service architecture for risk management. (2008) 128 p.
http://www.eu-orchestra.org/documents.shtml

[PA01]   PAHO Pan American Health Organization: Disability Inclusion in Hospital Disaster Risk Management (INGRID-H): An evaluation/action methodology to improve the inclusion of persons with disabilities. (2019) *https://www.paho.org/disasters/newsletter/index.php?option=com_content&view=article&id=626:disability-inclusion-in-hospital-disaster-risk-management-ingrid-h-an-evaluation-action-methodology-to-improve-the-inclusion-of-persons-with-disabilities&catid=309&lang=en&Itemid=355*

[PA02]   PAHO Pan American Health Organization, : Prevention and Response to Health Emergencies: First regional meeting of national health disaster coordinators and national focal points for the International Health Regulations (IHR). (2019) *https://www.paho.org/disasters/newsletter/index.php?option=com_content&view=article&id=627:prevencion-y-respuesta-a-emergencias-de-salud-primera-reunion-regional-de-coordinadores-nacionales-de-desastres-en-salud-y-puntos-focales-nacionales-para-el-reglamento-sanitario-internacional-rsi&catid=309&Itemid=355&lang=en*

[PATR]   Patrick, Jonathan: Haiti Earthquake Response Emerging Evaluation Lessons. Evaluation Insights (2011) (1) 14, Network on Development Evaluation of the OECD Development Assistance Committee (DAC), *http://www.oecd.org/countries/haiti/48165069.pdf*

[PFG1]   Poljanšek, K.; Marin Ferrer, M.; De Groeve, T.: Science for Disaster Risk Management 2017: Knowing Better and Losing Less. (2017), Publications Office of the European Union, Luxembourg, ISBN 978-92-79-60678-6 *http://drmkc.jrc.ec.europa.eu/portals/0/Knowledge/ScienceforDRM/Science%20for%20DRM%202017_version%2017%20May%202017.pdf doi:10.2788/688605*

[PIY01] Piyoosh, Rautela: Lack of scientific recordkeeping of disaster incidences: A big hurdle in disaster risk reduction in India. International Journal of Disaster Risk Reduction 15 (2016) 73–79, Elsevier

[PRI01] Prieur, Michel: Ethical Principles on Disaster Risk Reduction and People's Resilience. EUR-OPA Major Hazards Agreement (2011) *http://www.coe.int/t/dg4/majorhazards/ressources/pub/Ethical-Principles-Publication_FR.pdf*

[RAMC]   Raikes, Jonathan; McBean, Gordon: Responsibility and liability in emergency management to natural disasters: A Canadian example. International Journal of Disaster Risk Reduction 16 (2016) 12-18, Elsevier, 2212-4209 *http://www.sciencedirect.com/science/article/pii/S2212420915301850*

[REVO]   A World that Counts - Mobilising the Data Revolution for Sustainable Development. (2014) 32 p., UN IEAG, *http://www.undatarevolution.org/wp-content/uploads/2014/11/A-World-That-Counts.pdf*

[RIM]   RIMMA Interdisciplinary Conference Series on Risk Information Management, Risk Models and Applications. *http://RIMMA.org*

[SEBOK] Cloutier, R.J.: Guide to the Systems Engineering Body of Knowledge - Information Management. (2017) *https://www.sebokwiki.org/w/index.php?title=Information_Management*

[SETO]   Setola, Roberto; et al.: Managing the Complexity of Critical Infrastructures. Studies in Systems, Decision and Control 90 (2016) 300, Springer, ISBN 978-3-319-51042-2, ISBN 978-3-319-51043-9 (eBook), DOI 10.1007/978-3-319-51043-9 *https://link.springer.com/content/pdf/10.1007%2F978-3-319-51043-9.pdf*

[SFR1]   United Nations: UN SENDAI Framework for Disaster Risk Reduction. *https://www.unisdr.org/we/coordinate/sendai-framework*

[SFRM]   UNISDR: Sendai Framework Monitoring, Plenary Session at the 2017 UN ISDR Global Platform. Video (2017) *https://youtu.be/1bTNT9Xz_AY?list=PLBDwPnveHho9-20vwbjqg5-v6uV_XJnKe*

[SG01]   Schopp, Johannes; Goeken, Matthias: Erfolgsfaktoren und Misserfolgsfaktoren im Projektmanagement – ein Systematischer Review. Projektmanagement und Vorgehensmodelle 2018, Lecture Notes in Informatics (LNI) 286 (2018) 51-61, Gesellschaft für Informatik, Bonn,

[SMITH] Smith, Mike: Fundamentals of Management. 2nd ed. (2011), McGraw-Hill Education, ISBN-13 9780-07-712693-3

[TAME]   Tavares, Alexandre O.; Mendes, José: Risk Prevention, Risk Reduction and Planning Policies. Misunderstandings and Gaps About the Local Context. Proc., ENVIROINFO2009, 23rd Int.Conf. on Informatics for Environmental Protection 1 2 (2009), Shaker Publ., Aachen, 978-3-8322-8397-1

[THIE]   Thiele, René: BPEL gestützte Modellierung der ISO 19135 Register- Prozesse. Mitteilungen des Bundesamtes für Kartographie und Geodäsie 29 (2009) *https://www.ikg.uni-hannover.de/aga/fileadmin/aga/documents/pdf-files_aga2009/AgA09_BPEL_Reg.pdf*

[UN02]   UN: Global Compact For Safe, Orderly And Regular Migration. (2018) 34 p. *https://refugeesmigrants.un.org/sites/default/files/180713_agreed_outcome_global_compact_for_migration.pdf*

[UNHA01]UN-Habitat': Barcelona Resilience Week Report. (2018) 68 p. *http://urbanresiliencehub.org/wp-content/uploads/2018/12/BRW-2018-Final-Report.pdf*

[UNHA02]UN-Habitat: Urban Resilience Hub. *http://urbanresiliencehub.org/*

[UNHA03]UN-Habitat: HABITAT III Text. (2016) 24 p. *http://habitat3.org/wp-content/uploads/Habitat-III-New-Urban-Agenda-10-September-2016.pdf*

[UNHCR]UN High Commissioner for Refugees: Collection of International Instruments and Legal Texts Concerning Refugees and Others of Concern to UNHCR. (2007) *https://www.unhcr.org/455c71de2.pdf*

[US01]   US Congress: A Failure of Initiative. Final Report of the Select Bipartisan Committee to Investigate the Preparation for and Reponse to Hurricane Katrina. 109-377 (2006) 582 p., US House of Representatives, *http://www.gpo.gov/fdsys/pkg/CRPT-109hrpt377/pdf/CRPT-109hrpt377.pdf*

[US02]   US Senate: Hurricane Katrina - A nation still unprepared. Special report of the Committee on Homeland Security and Governmental Affairs. . 109-322 (2006) 737 p., US Senate, *http://www.hsgac.senate.gov/download/s-rpt-109-322_hurricane-katrina-a-nation-still-unprepared.pdf*

[VDK]   Vescoukis, Vassilios; Doulamis, Nikolaos; Karagiorgou, Sofia: A Service Oriented Architecture for Decision Support Systems in Environmental Crisis Management. Future Generation Computer Systems 28 (2012) (3) 593-604, Elsevier, ISSN: 0167-739X

[VDS]   Kooperationsschnittstelle zur gemeinsamen Gefahrenabwehr Schnittstellen- und Prozessbeschreibung. VdS-Richtlinien für Gefahrenmeldeanlagen VdS 3480-1 (2019), VdS Schadenverhütung GmbH,*https://shop.vds.de/de/download/440db69ce49790a590aafad407daf77e/*

[VRST]   Vranes, S.; Stanojevic, M.; Janev, V.: Application of Complex Event Processing Paradigm in Situation Awareness and Management. Database and Expert Systems Applications (DEXA), 22nd International Workshop (2011) 289-293, IEEE, 978-0-7695-4486-1

[WANG]Wang, Richard Y.; Storey, Veda C.; Firth, Christopher: A Framework for Analysis of Data Quality Research. IEEE Trans. Knowl. Data Engn 7 1995 (4) 623-640.

[WES2]Weske, Mathias: Organizing the Business Process Management Space. Proc., 2nd Int. Workshop EMISA 2007, St. Goar, Germany, Oct. 2007. GI Edition, Lecture Notes in Informatics 119 (2007), Gesellschaft für Informatik, Bonn, ISBN 978-3-88579-213-0

[WES2] Weske, Mathias: Business Process Management: Concepts, Languages, Architectures. 3rd Ed. (2019 (in Press)), Springer Verlag, ISBN 978-3-642-28615-5

[WIK1]   Wikipedia: Information Governance. *https://en.wikipedia.org/wiki/Information_governance*

[WJB1]   Wein, A.M.; Journeay, M.; Bernknopf, R.L.: Scenario-Based Risk Analysis within an Analytic-Deliberative Framework for Regional Risk Reduction Planning. Proc., MODSIM07, International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand, (2007) 1688-1695 978-0-9758400-4-7 *https://www.mssanz.org.au/MODSIM07/papers/26_s32/Scenario-Based_s32_Wein_.pdf*

[ZIE01]Ziemann, Jörg; Matheis, Thomas; Freiheit, Jörn: Modelling of Cross-Organizational Business Processes. Proc., 2nd Int. Workshop EMISA 2007, St. Goar, Germany, Oct. 2007. GI Edition, Lecture Notes in Informatics 119 (2007) 87-100, Gesellschaft für Informatik, Bonn, ISBN 978-3-88579-213-0

[ZIEM]   Ziemann, Jörg: Architecture of Interoperable Information Systems - An enterprise Model-based Approach for Describing and Enacting Collaborative Business Processes. (2010) 298 p., Logos Verlag, 978-3832524142

[ZIKO]   Ziebermayr, T.; Kollarits, S.; Ortner, M.: A proposal for the application of dynamic workflows in disaster management: A process model language customized for disaster management. Proceedings of the 22 International Workshop on Database and Expert Systems Applications, F. Morvan, A. M. Tjoa, R. R. Wagner (editors) (2011) 284-288, IEEE, 978-0-7695-4486-1

RIMMA Community

Risk Information Management, Risk Models and Applications

your challenges:

- complexity of actors and organizations
- cross-domain knowledge transfer and operational implementation of R&D results
- coherence generation for conventions, directives and programs
- transition from static data models to dynamic process specifications and implementations for cross-organizational just-in-time decision and action support

our aims:

- promote effective information management methods and techniques to be applied in Security as well as in NaTech Risk operational practice
- justify the need of cooperative information governance for the UN SENDAI Framework national and regional implementations
- generate value-adding information synergies based on multi-stakeholder strategies and interrelated roadmaps

**Guided by the demands for UN SENDAI Framework Implementation
UNISDR United Nations International Strategy for Disaster Reduction**

CODATA-Germany e.V., Chair Horst Kremers http://RIMMA.org
German National Committee for the International Science Council ISC Committee on Data for Science and Technology

CODATA-Germany
German National Committee for the
ISC International Science Council (ICSU)
Committee on Data for Science and Technology

Chair, Horst Kremers
P.O. Box 20 05 48,   13515 Berlin, Germany
office@Horst-Kremers.de

http://CODATA-Germany.org