Mapping the Information Flows for the Architecture of a Nationwide Situation Awareness System

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Government of a nation

- Ministries, agencies…
- Decision-makers at many different levels
- Heterogenity:
  - Decision-making procedures
  - Decision-making levels
  - Inter-agency communication mechanisms
  - Escalation mechanisms

Goal: help decision-makers to make better decisions

Decision-makers shall be able to

- get right information at right time
  - … through a sufficiently resilient information system
  - … through standardized APIs
- follow their KPIs and KRIs
- forecast, what will happen and what has happened
  - in the environment
  - at other institutions

Build an information system for SA

Develop the SA information system architecture

Information system for SA:

Goals

- SA system for a large *System-of-Systems*
  - est. 600 systems
- Detect potential threats against this SoS
  - In due time
  - To avoid / mitigate them
- Get right information to right place in right time
- Support reconfiguration of information flows

Non-goals

- Information fusion
- Drawing of conclusions
- Visualizing information

Comprehensive national defense

Coordinated activity by • to resolve •, in order to •.

- Gov. and non-gov. Organizations
- Central, regional, local governments
- Crises and war
  - Full spectrum
- Post-crisis normalization and restauration

Provides

- Strategic guidance and resources
- Coordination
  - in all relevant levels of activity
  - Between all relevant agencies
- Preserve sustainability of
  - Society
  - Military operations

Describe decision-making procedures

- Identify nodes that create, store, process, consume information
- E.g.
  - Institutions
  - Departments
  - Job titles
  - IT systems

Normative documents

Describe existing information flows

Fill the table with the following columns:

Column name	Description	Possible values
Agent	Actor (an institution, or a decision-maker at a specific management level) performing a specific task	Name of an organization or its structural division
Goals, as stated	Goals / objectives, as stated in normative documents (laws, statutes)	Name of the normative document, relevant articles / paragraphs
Cooperations	A list of other actors: • With whom information is shared when performing tasks • Their roles in specific tasks	Names of the partnering organizations or their structural divisions
Task, subtask, ...	A comprehensive national defense related task • Relates to the goals and objectives of the agent	An element from a standardized list of possible tasks
Data owner	Organizational entity, responsible for storing, securing, sharing the data	Name of the organizational entity, and/or Information system that stores the data
Phenomenon	The phenomenon about which the information is requested	“situation”, “environment”, “impact”, “estimated time”, etc.
Type	Is this primary information (collected by the agent), or Is this the result of some analysis?	“primary”, “analysis”
Format	The data type	Number, text , image, video, database (with given schema), etc.
Content	What is this information flow about?	A narrative about the content of the communication
Frequency	How often, how regularly is the information transmitted?	“once”, “regularly” (incl. frequency), “ad-hoc” (either “push” or “pull”)
Data source	If type is “primary”: how is the information collected?	“observed by human”, “collected by sensors”, etc.
Security class of data	Confidentiality, integrity, availability requirements of the information and the flow	Each of 3 components comes from a standardized list
Data channel	Description of the channel used to transmit information	“well-defined API”, “informal discussion between officials” (“face-to-face”, “over phone”), etc.
Data validity period	How long can the receiving party rely on the received information?	A time interval and/or Description of an event (e.g. “until next transmission”)
Data validity region	To which geographic region does the information apply to?	Town, county, state, operational areas, etc.

Interviews.
Three classes of interviewees:

- Senior specialists
  - Roles and activities
  - Information that they use
- Members of ad-hoc crisis management committees
  - Information needs while handling a crisis
- Technical personnel
  - Technical aspects of information transmissions

IT System Logs

- X-road transactions (17 years)
- Exchanges of official documents
- Protocols of official meetings
- Metadata of work-related phone-calls / e-mails
- ...

- Determine key resources
- Identify KPIs and KRIs

Key Performance / Risk Indicators

- NATO Mission Essential Task List
  - Preparation for, handling, recovering from a crisis
- Additionally, civilian-only tasks

Build models of institutions

- Focus on “phase changes”
  - Escalation and de-escalation points
- Identify information needs of institutions

System architecture

- Nodes, where software is installed
- Communication links
  - Parameters of the links
- Information flows

Technical architecture

- Internal structure of the components
- Data formats and communication security

Validation

- Interviews
- War-games

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