IDIRA

Challenges for disaster data exchange

IDIRA International Workshop on
Interoperability and rescue

9 May 2012 Assisi

Ludwig Kastner
Christian Flachberger

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CONTENT OF THE PRESENTATION:

Information Sharing Principles

- „From **Interoperability** to **Collaboration**"

Concepts, ideas and experiences

Scenario Based Approach

- **IDIRA CNVVF Scenario –** Major Earthquake in Umbria. Different organisations with their needs on data exchange

- **Identification of Information Exchange Needs**

- **Discussion of Challenges and solution concepts with IDIRA**

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"From Interoperability to Collaboration"

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Interoperability

"Interoperability is a property referring to the <mark>ability of diverse systems and organizations to work together</mark> *(inter-operate). The term is often used in a technical systems engineering sense, or alternatively in a broad sense, taking into account social, political, and organizational factors that impact system to system performance."* (Wikipedia)
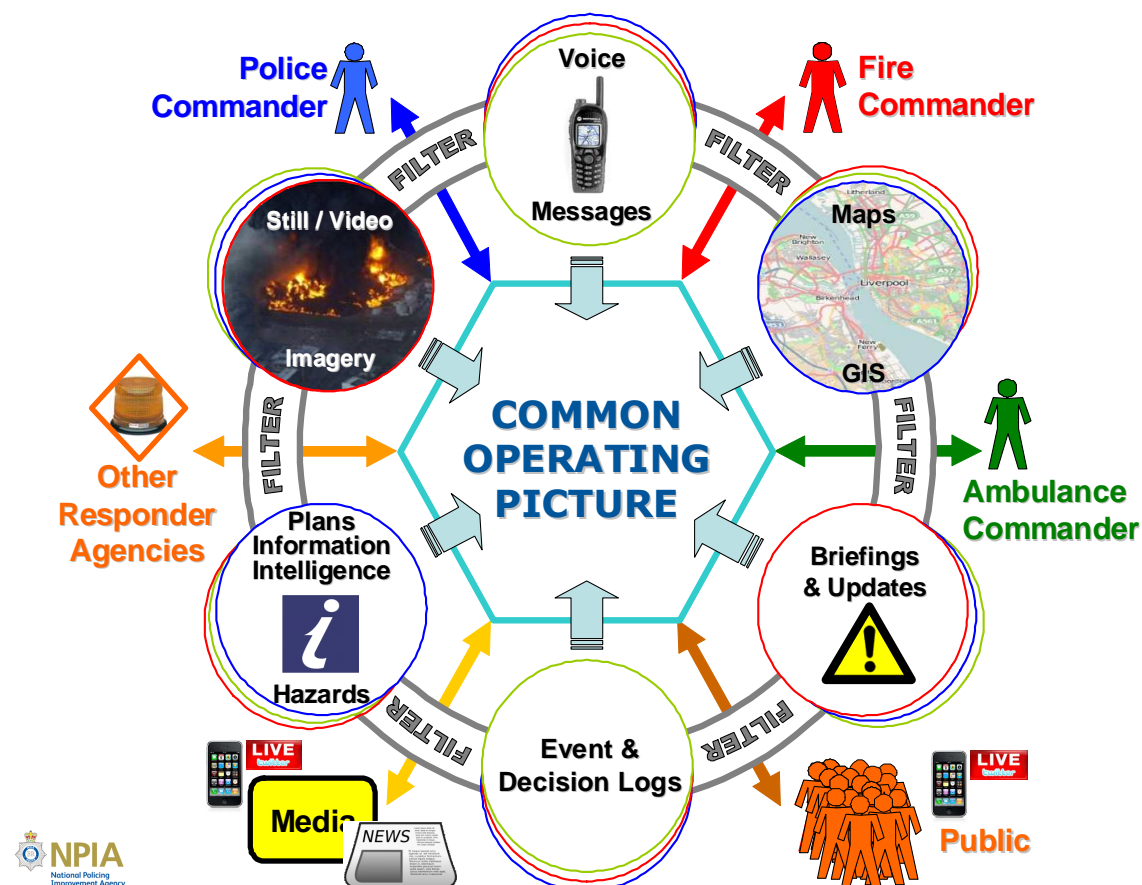
Interoperability is often adressed

- on **technical level** (e.g. data exchange standards)

- on **process level** (e.g. compatibility of SOPs)

Interoperability is (just) a pre-requisite to allow and facilitate collaboration

Example: Common Operating Picture

→ **Exchange of all kind of information**

→ **Semantic Interoperability** ensures a common understandig of the data

Multi-Agency Interoperability Programme

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„Push a piece of information on intention"

→ Up to today, the most frequently used concept for information sharing

Is my picture

… Complete???

… Relevant ???

… Up to date ???

COP = „Common Operating Puzzle" ???

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Alternative Concept:

Instead of

„Push a piece of information intentionally"

alternative concept:

„Work within a shared information space"

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Example: organisation of an appointment

First attempt: e-mail („push a piece of information concept")

Example: organisation of an appointment

e-mail responses:

… „I'm only available on Monday" …

… „26th March would be fine" …

… „Any time would fit, except 26th March " …

… „I'm available any time, but please tell me today" …

… „OK, I'm sending out some new possibilities" …

… „Sorry, in the meantime, my availability changed" …

Effort for organising the appointment:

40 e-mails + 6 phone calls

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Second attempt:
Online inquiry („work within a shared information space concept")

6 participants	MARCH 2012 Mon 26 9:00 AM - 10:00 AM	Mon 26 10:00 AM - 11:00 AM	Tue 27 9:00 AM - 10:00 AM	Tue 27 10:00 AM - 11:00 AM
Christian Flachberger	✓	✓	✓	✓
Gustav Klimt	✓		(✓)	✓
Pierre-August	✓	✓	✓	
Claude Monet		✓	✓	✓
Alfred Sisley	✓		(✓)	✓
Leonardo			✓	✓
Your name	Yes (Yes) ? No	Yes (Yes) No	Yes (Yes) No	Yes (Yes) No
Yes	4	3	4	5
Ifneedbe	0	0	2	0
No	2	3	0	1

→ Everyone sees the availability of all others

→ Stimulates the commitment to the common goal leading to higher personal flexibility

Effort for Organising the Appointment:

Setting up the online inquiry on doodle.com

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From Interoperability to Collaboration

Collaboration is …

„ working together to achieve a goal. It is a *recursive process where two or more people or organisations work together to realise shared goals, (this is more than the intersection of common goals seen in co-operative ventures, but a deep, collective, determination to reach an identical objective) — for example, an intellectual endeavour that is creative in nature — by sharing knowledge, learning and building consensus"* (Wikipedia)

→ **Facilitated by a shared working environment**

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Concepts, Ideas and Experiences

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Research project „VKT-GÖPL"

**Validation of concepts and technologies for
a shared strategic situation picture
for Austrian Public Authorities
and Critical Infrastructures**

KIRAS
Sicherheitsforschung

Online collaboration and shared information space for the strategic level national crisis management

Demographic data

Business data

Location of hospitals, fire departm.

Age pattern

Seismic data

Ministry of Interior

Ministry of Defence

Ministry of Health

Ministry of Economy

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Research Project „IDIRA"

Interoperability of data and procedures in large-scale multinational disaster response actions

SEVENTH FRAMEWORK PROGRAMME

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Example: Research Project „IDIRA"

- Integrated Project within FP7 - SEC

- 2011 – 2015

- 18 partners

- Goal: develop a new capability for more efficient multi-national and multi-organisational disaster response actions

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The Scenario

"One IDIRA scenario simulates a seismic event of a magnitude of 7.1 at a depth of 15 km located in Umbria, north of the 1997 epicentre, that would affect a major city, Perugia… "

Scenario elaborated by
Marcello Marzoli
Ministero dell'Interno
Dipartimento dei Vigili del Fuoco, del Soccorso Pubblico e della Difesa Civile

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Day	Time	
1	03:00	Earthquake strikes. Flood of Emergency Calls
1	03:02	National Institute of Geophysics and Volcanology informs civil protection about the earthquake
1	03:02	Call takers start posting of earthquake incidents to prefecture, civil protection, …. and the IDIRA information exchange space
1	03:03	The INGV estimates is published on IDIRA
1	03:10	A first early situation awareness briefing report is generated by civil protection and fire directorate. The report includes: Basic data about the earthquake and the region
1	03:15	The C&C of the firebrigades retrieve a common operational picture from IDIRA. The picture includes all posted information on incidents reported to various C&Cs
1	03:20	Fire Corp National Control Centre Alerts all regional Fire Corps Directorates
1	03:30	Civil Protection updates the IDIRA information exchange space with information needed by the rescue forces. (Seismographic map, damage forecast, data about population, infrastructure, hazards, points of interest, weather forecast, escape routes, etc.)
1	03:45	Civil Protection runs the evacuation simultation EXODUS for the first time
1	03:55	Fire Corp National Control Centre requests detailled ressources from regional Fire Corps and assignes them to specific sectors
1	05:30	transport infrastructure owners post their information to the civil protection and it is forwarded to the IDIRA information exchange space
1	06:30	helicopters are starting to assess the situation
1	06:30	firemen coloums arrive on scene, start organising themselves
1	07:00	The C&Cs are synchronising their common operating picture with IDIRA
1	07:20	Field commanders are starting to post damage assessments, needs, hazards, infrastructure information, Info about roads, bridges and tunnels, etc. (They use radio + C&C)
1	08:00	Civil Protection contacts data-owners for integration of additional data on request according to the contracts and integrates data into IDIRA. This is data from infrastructure providers (power-lines, water-supply, railway)
1	11:30	After setting up the internal decision chain (prefecture, prime minister, ministry of interior), the civil

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Basic Needs Identification

		Description
	🟧	Early Situation Awareness for the regional disaster management
	🟩	Early Situation Awareness for foreign organisations
	🟧	Situation Awareness for the regional civil protection
	🟦	Collaboration of organisations on site including volunteer units and foreign organisations
	🟩	Information Exchange with the European Civil Protection Mechanism
	🟨	Ressource Acquisition and Ressource Management of the Civil Protection
	🟪	Safeguard of cultural heritage
	⬛	Regional Ressource and Task Allocation

Day	Time		Event
1	03:00	🟧	Earthquake strikes. Flood of Emergency Calls
1	03:02	🟧	National Institute of Geophysics and Volcanology informs civil protection about the earthquake
1	03:02	🟧	Call takers start posting of earthquake incidents to prefecture, civil protection, ... and the IDIRA information exchange space
1	03:03	🟧	The INGV estimates is published on IDIRA
1	03:10	🟧	A first early situation awareness briefing report is generated by civil protection and fire directorate. The report includes: Basic data about the earthquake and the region
1	03:15	🟦	The C&C of the firebrigades retrieve a common operational picture from IDIRA. The picture includes all posted information on incidents reported to various C&Cs
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1	05:30	🟧	transport infrastructure owners post their information to the civil protection and it is forwarded to the IDIRA information exchange space

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Basic Needs Identification …. for the entire scenario

Identified Needs:

- Early Situation Awareness
  for the regional disaster management

- Early Situation Awareness
  for foreign organisations

- Continuous Situation Awareness for the
  regional civil protection

- Collaboration of organisations on site
  including volunteer units and foreign org's

- Information Exchange with the European
  Civil Protection Mechanism

- Resource Acquisition and Resource
  Management of the Civil Protection

- Safeguard of cultural heritage

- Regional Resource and Task Allocation

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Early Situation Awareness
for the regional disaster management

Within the first hours after the earthquake strikes, almost no information is available from the crisis region. Power-lines and telecom connections are out of order and no communication is possible from/to the core of the region. It is unknown, if bridges and tunnels are save.

Goal: early assessment of the situation

- **Situation of the People**
  Position and numbers of fatalities, injured, …

- **Situation of the Infrastructure**
  Electricity, water, streets, hospitals,…

- **Special Hazards**
  Damaged Seveso II enterprises

- **Usable Ressources**
  Access routes, material, services

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Early Situation Awareness
for the regional disaster management

Challenges

1. **Collecting + structuring information about destruction**

2. **How to quickly assess impact on people, infrastructure and ecology**

3. **Publishing information in a way to feed the relevant groups with the relevant information**

Solution Concept

1. **Static Data must be prepared and available beforehand:**
   Demographic data, Infrastructure, Economy, …

2. The National Institute of Geophysics and Volcanology can prepare a first **seismographic map** very quickly and provide it electronically

3. **Simulations** could be used to improve the results

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Early Situation Awareness for foreign organisations

After activation of the European civil protection mechanism, rescue teams from other European Countries are starting to prepare themselves for a possible mission.

Goal: Early assessment of the situation and the requirements for a relief mission

- Which **capabilities** will be **required**?

- Are the **own capabilities fitting** to the requirements on site?

- What must be done to ensure **safety** of the relief team?

- Are there special **country-specific aspects** to be considered? (legal, socio-cultural, language, …)

- **Logistics planning:** Transport routes, terrain, regulations, required relief items, weather, …

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Early Situation Awareness for foreign organisations

Challenges

1. **Creation of an early situation awareness briefing report**

2. **Keeping this report up-to-date**

3. **Filtering of relevant information for the individual organisation**

Solution Concept

1. An **excerpt** of the **early situation awareness** data of the regional civil protection could be shared ad-hoc with foreign organisations. (Regions with high damage, estimated numbers of fatalities, injured people; situation of the infrastructure, known hazards)

2. **Country-specific information** could be **maintained and made available continuosly** by all member states as part of the civil protection mechanism (additional to the CIA factbook and similar ...)

3. All information could be kept up-to-date in a secured shared information space with defined access rights

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Continuos Situation Awareness for the regional civil protection

After the first rescue teams and field assessment teams (FACT, UNDACS, regional,…) arrive in the disaster region, they start posting observations. In parallel, helicopters are delivering first images from the air.

Goal: Continous update and improvement of the situation awareness

Information is now based on on-site observations instead of simulations and estimations

- **Situation of the People**
  Position and numbers of fatalities, injured, …

- **Situation of the Infrastructure**
  Electricity, water, streets, hospitals,…

- **Special Hazards**
  Damaged Seveso II enterprises

- **Usable Ressources**
  Access routes, material, services

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Continuos Situation Awareness for the regional civil protection

Challenges

1. **How to gather and integrate continuously all pieces of information coming from the organisations and sensors on site**

2. **How to ensure reliability and currentness of data**

3. **How to make the information available to all involved parties**

Solution Concept

1. **Sensor integration**
   e.g. geo-referenced pictures from airborne sensors

2. **C&C integration**
   Integration of data from the C&C systems of the involved organisations

3. **Access to the common operating picture** via **Mobile Terminals** for Field Commanders

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Collaboration of organisations on site including volunteer units and foreign organisations

Organisations on-site are represented by their field commanders. During their relief mission they are exchanging information about needs, capabilities, observations, hazards, relief goods, infrastructure and so on.

Goal: Being efficient in the field

- „I need something – how can I get it immediately?"
- I have something important to offer / to report – how can I inform others about it?
- Up to day, people are mainly communicating point-to-point based on knowing each other from the past.

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Collaboration of organisations on site including volunteer units and foreign organisations

Challenges

1. **Structuring of information**

2. **Having common terms of expression, allowing to understand each other**

3. **Communication over language barriers**

Solution Concept

1. Increased efficiency by sharing information in the **IDIRA information exchange space** with filter- and search mechanisms. Possiblities to post pieces of information (needs, hazards, offered capabilities and services, observations) and supporting direct communication and collaboration of field-commanders.

2. **Agreed taxonomy / semantics,** allowing structured searches and automatic translations

3. **Acess to the information exchange** space via mobile terminals (tablets) or external (e.g. C&C) systems.

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Ressource Acquisition and Ressource Management of the Civil Protection

Challenges

1. **The available resources are not sufficient to handle the disaster relief activities**

2. **A fast acquisition of additional resources (e.g. civil engineers) from the local population is necessary**

Solution Concept

1. **Search of additional resources (civil engineers, material) who could assisst with the damage assessment.**

2. **The search is done using the IDIRA information exchange space which provides possibilities for regional queries of such resources and a variety of search and filter mechanisms**

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CONCLUSIONS

1. Precondition for **collaboration** is

   - a common understanding of terms

   - interoperability of procedures, data and systems

2. A **shared information space** is a key enabler for cooperation by

   - providing up-to-date and equal information to everyone

   - motivating people to contribute with their information

   - keeping data complete, structured and secured

   - providing search and filter funtionality for fast access to relevant information

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Thank you
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