

# A Methodology to Analyze Interoperability in Crisis and Disaster Management

**IDIMT - Interdisciplinary Information and Management Talks**  
**Poděbrady, Czech Republic, September 2015**



**Establish Pan-European Information  
Space to Enhance seCurity of Citizens**

# Motivation

EPISECC will provide a concept of a common information space. To ensure that the required information will be provided

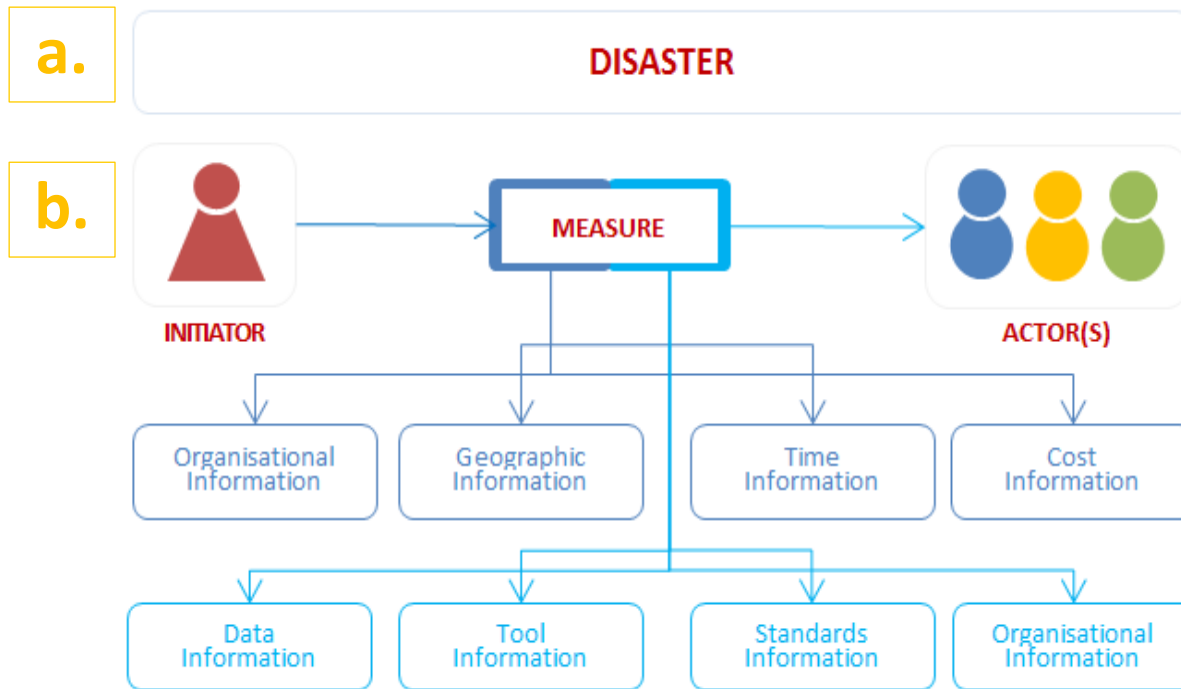
- Best practices and shortcomings of the management of past disasters need to be analysed
- Such analyses need to be performed in a way allowing comparable and quantifiable comparisons (taking data protection requirements into account)
- Questions of stakeholders on the management of past disasters will be answered

**That is what the EPISECC inventory ensures**

# Concept: Analyzing the response to questions from stakeholders

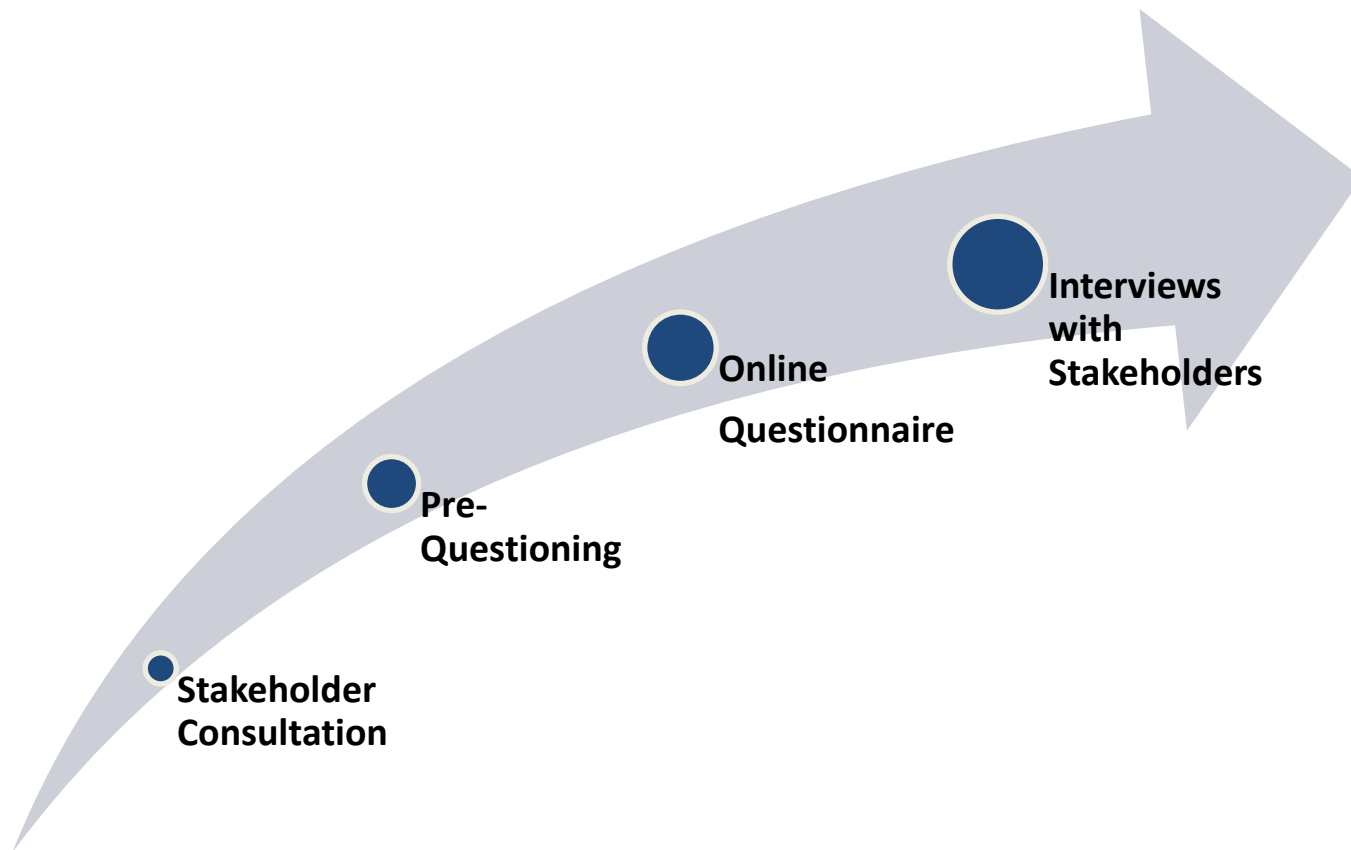
Questions are related to:

- a. Selected disasters
- b. Processes/measures of responding to the specific disaster



# Pan European Inventory of events/disasters, considering time dimension

- **Technical Approach:** Development process of EPISECC inventory

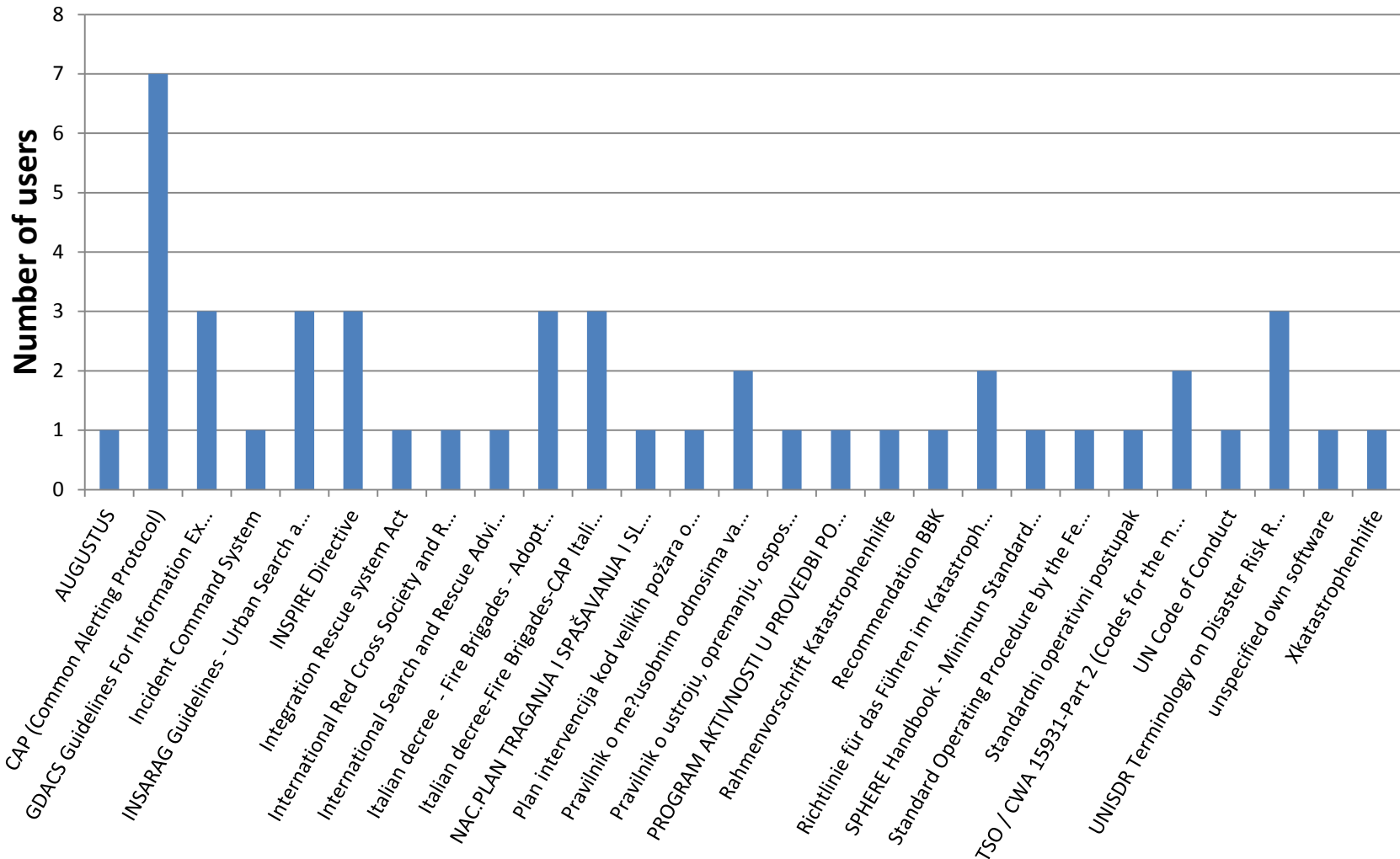


# Approach

1. Generation of SQL statement – combining adequate fields of information
2. Generation of tables – further processing in Excel – Example of a table

Oid	DISASTER_NAME	DisasterTypeID	DisasterType	Country	Process name	Measure name	Quantity	Resource Type
187	EQ L'Aquila	1111	Ground shaking	IT	Safety measures for cultural heritage buildings	Valutation and plannig predisposition	0	Material costs
187	EQ L'Aquila	1111	Ground shaking	IT	Safety measures for cultural heritage buildings	Securing cultural heritage	0	Material costs
124	Snowstorm Hungary, March 2013	1212	Extra-tropical cyclone (winter storm)	HU	Planning response operation for trapped people on Highway M1	ASFINAG - Snow plugs	30	Person hours
124	Snowstorm Hungary, March 2013	1212	Extra-tropical cyclone (winter storm)	HU	Planning response operation for trapped people on Highway M1	ASFINAG - Snow plugs	10	Person hours
124	Snowstorm Hungary, March 2013	1212	Extra-tropical cyclone (winter storm)	HU	Planning response operation for trapped people on Highway M1	ASFINAG - Snow plugs	10	Person hours
121	Flood June 2013	1300	Hydrological	AT	PROC1	Interaction with LWZ	50	Person hours
287	Great Flood in Germany 2013	1311	Generic (river) flood	DE	Liason and Coordination	Collecting information to provide overview of disaster situation	1000	Person hours
287	Great Flood in Germany 2013	1311	Generic (river) flood	DE	Liason and Coordination	Collecting information to provide overview of disaster situation	1	Facility costs
135	2013 European floods	1311	Generic (river) flood	DE	Evacuation	Evacuation	0	Person hours
135	2013 European floods	1311	Generic (river) flood	DE	Evacuation	Evacuation	0	Facility costs
135	2013 European floods	1311	Generic (river) flood	DE	Evacuation	Evacuation	0	Material costs
135	2013 European floods	1311	Generic (river) flood	DE	Evacuation	Evacuation	0	Person hours
135	2013 European floods	1311	Generic (river) flood	DE	Evacuation	Evacuation	0	Material costs
323	Flood (January 2005) Estonia	1313	Storm surge/coastal flood	EE	Providing uninterrupted communication	Ensuring communication for response phase	0	Person hours
323	Flood (January 2005) Estonia	1313	Storm surge/coastal flood	EE	Providing uninterrupted communication	Ensuring communication for response phase	0	Person hours

# Standards used by organizations



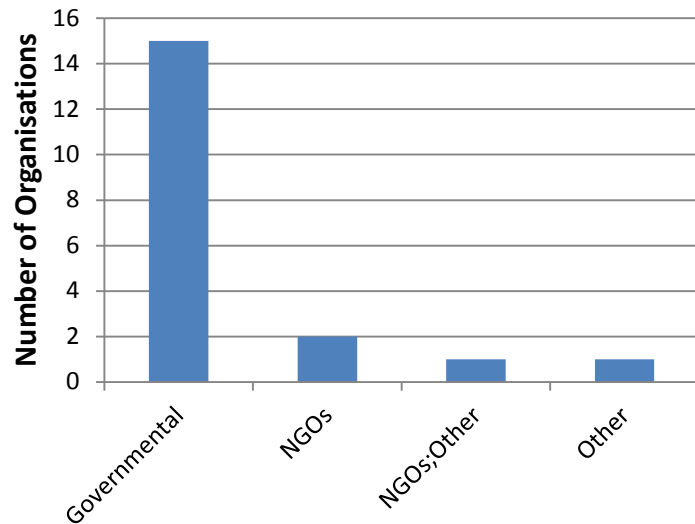
# Standards used by organizations

17 organizations stated using a total of 27 different standards.

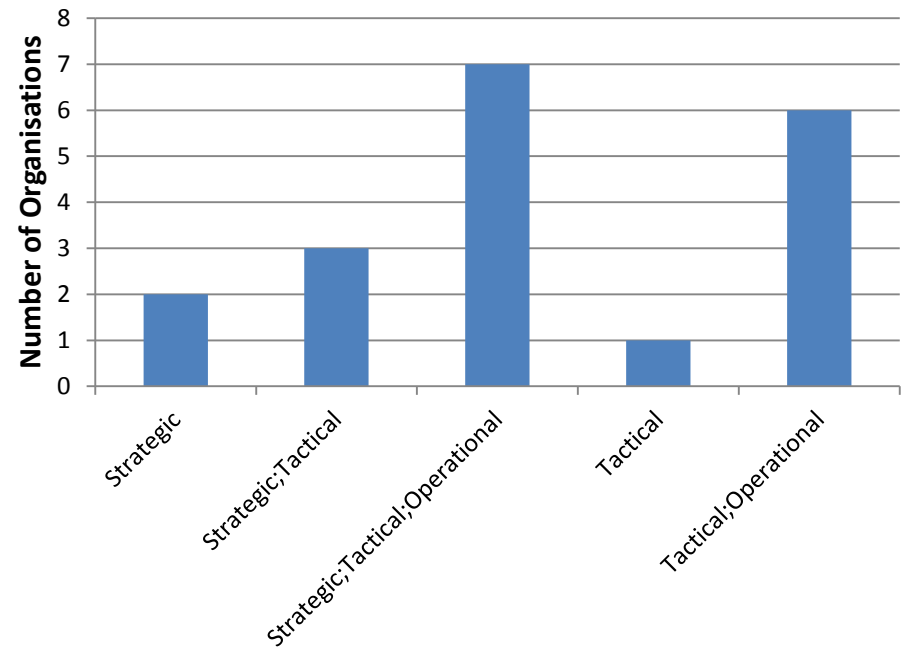
- The only standard that appears to be widely used (7 mentions) is the Common Alerting Protocol (CAP)
- Other standards used by multiple organizations include UNISDR Terminology on Disaster Risk Reduction and Insarag Guidelines
- Otherwise no clear trends – many standards used by only one organization

# Type of responding organizations

**Stakeholder Type**

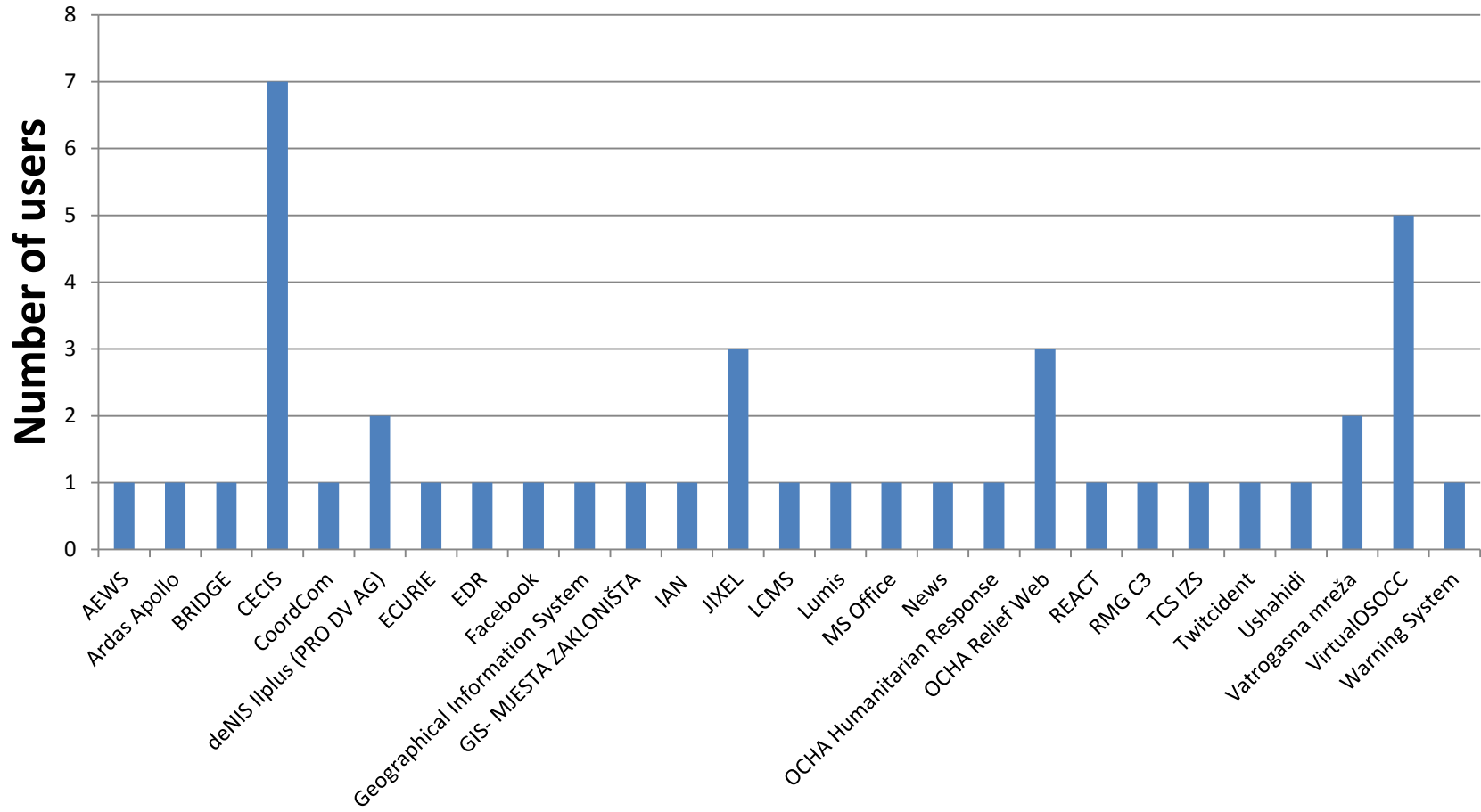


**Responsibility Type**





# Tools used by organizations



# Tools used by organizations

18 organizations stated using a total of 27 different tools.

- Most widely-used:  
Common Emergency Communication and Information System (CECIS) with 7 mentions
- Followed by:  
VirtualOSOCC, JIXEL, OCHA Relief Web  
(5, 3 and 3 mentions respectively)
- 5 organizations claiming to use 4 or more tools  
8 organizations claiming to use only one

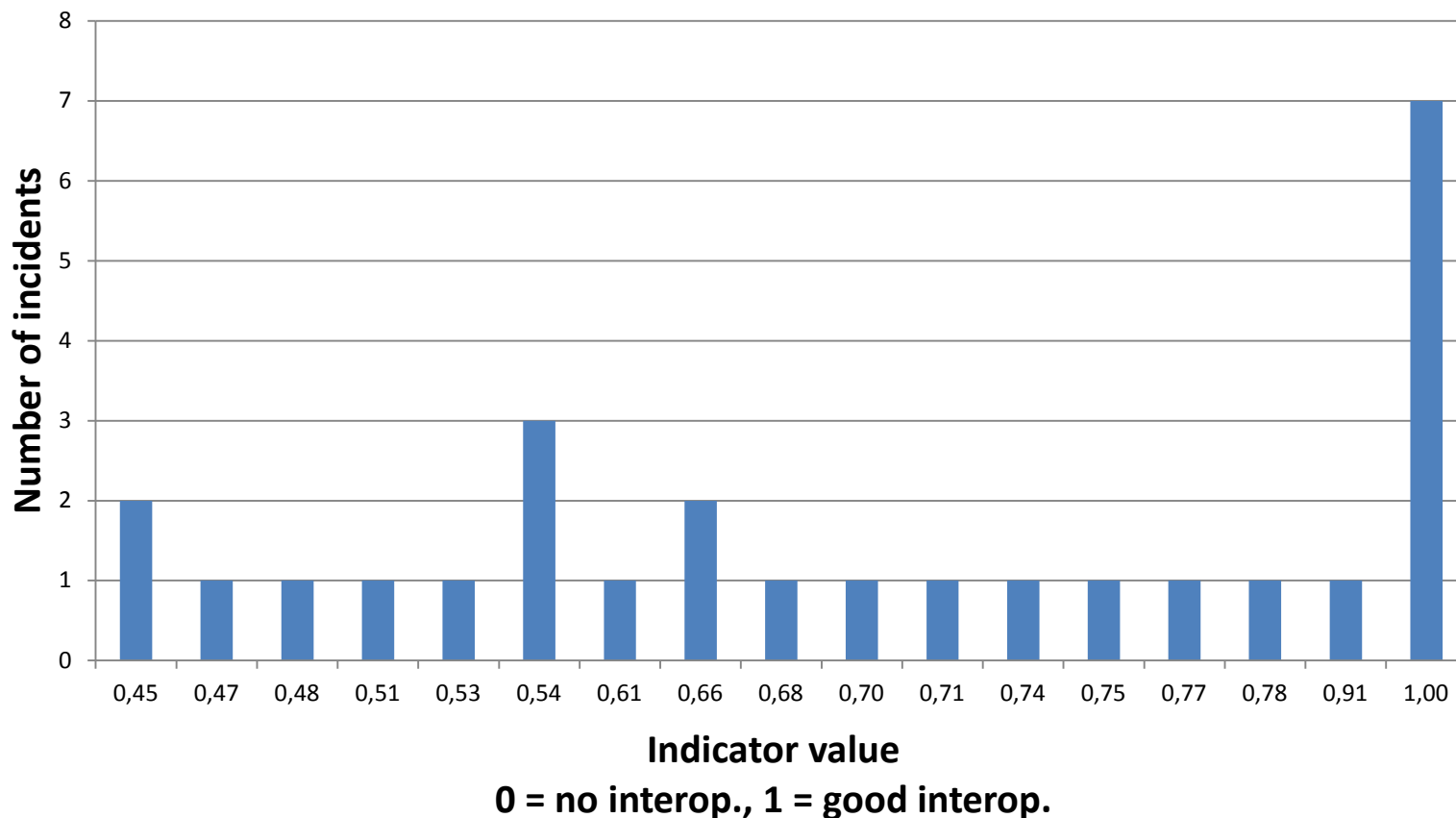
# Interoperability

$$KI_{Int} = [0,5 \cdot (1 - T_{suc}) + 0,5 \cdot (1 - T_c)] \cdot \left[ \frac{D_{Tr-is}}{D_{Tr-id}} \cdot \frac{D_{Us-is}}{D_{Us-id}} \right]$$

$KI_{Int}$	<b>Key Indicator for Interoperability</b> (Value between 0 and 1, 0 = Worst Case, 1 = Best Case)
$T_{suc}$	<u>Normalised</u> Time for setting up an information exchange channel, e.g. a frequency channel for communication (Value 0 ideal case = no time for setting up channel, value 1 worst case = worst case time to set up channel, depending on expectation of stakeholder)
$T_c$	<u>Normalised</u> Time for exchanging or provision of information (Value 0 ideal case = no time needed for the process of information exchange (ideal, not possible, the shorter, the better), value 1 worst case = worst case time for exchanging information, depending on expectation of stakeholder)
$D_{Tr-is}$	Data transmitted real status (is); (Value 100 best case = all required data transmitted, value 0 worst case = worst case, no required data transmitted)
$D_{Tr-id}$	Data transmitted ideal (id); always 100 (100%), all expected data transmitted
$D_{Us-is}$	Data understood real status (is); (Value 100 best case = all data transmitted understood, value 0 worst case = worst case, no required data understood)
$D_{Us-id}$	Data understood ideal (id); always 100 (100%), all expected data understood

# Interoperability

Interoperability Indicator



# Interoperability - Analysis

Mean values and standard deviations for the four parameters:

- Setup time =  $0.05 \pm 0.11$  (range: 0-1; best case = 0)
- Exchange time =  $0.15 \pm 0.21$  (range: 0-1; best case = 0)
- Data transmitted =  $93 \pm 9$  (range: 0-100; best case = 100)
- Data understood =  $86 \pm 13$  (range: 0-100; best case = 100)

Limiting factors appear to be exchange time and the amount of data understood

# Discussion

Currently, the review process is still in progress. However, preliminary conclusions can be drawn

- Nine different types of input fields are provided – avoiding free text improves analysis considerable (nevertheless there is need for narrative explanation in some cases)
- However, there is urgent need to consider the context in order to avoid unsuitable comparisons (e.g. can the time of arrival of first responders be compared in case of an earthquake in Haiti and flooding scenarios in mid-Europe?)

