

Assessment of C2 Maturity during the Disaster Relief Operations Indian Tsunami (2004) and Elbe Flood (2002)

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"NATO Network Enabled Capability (NNEC) C2 Maturity Model"

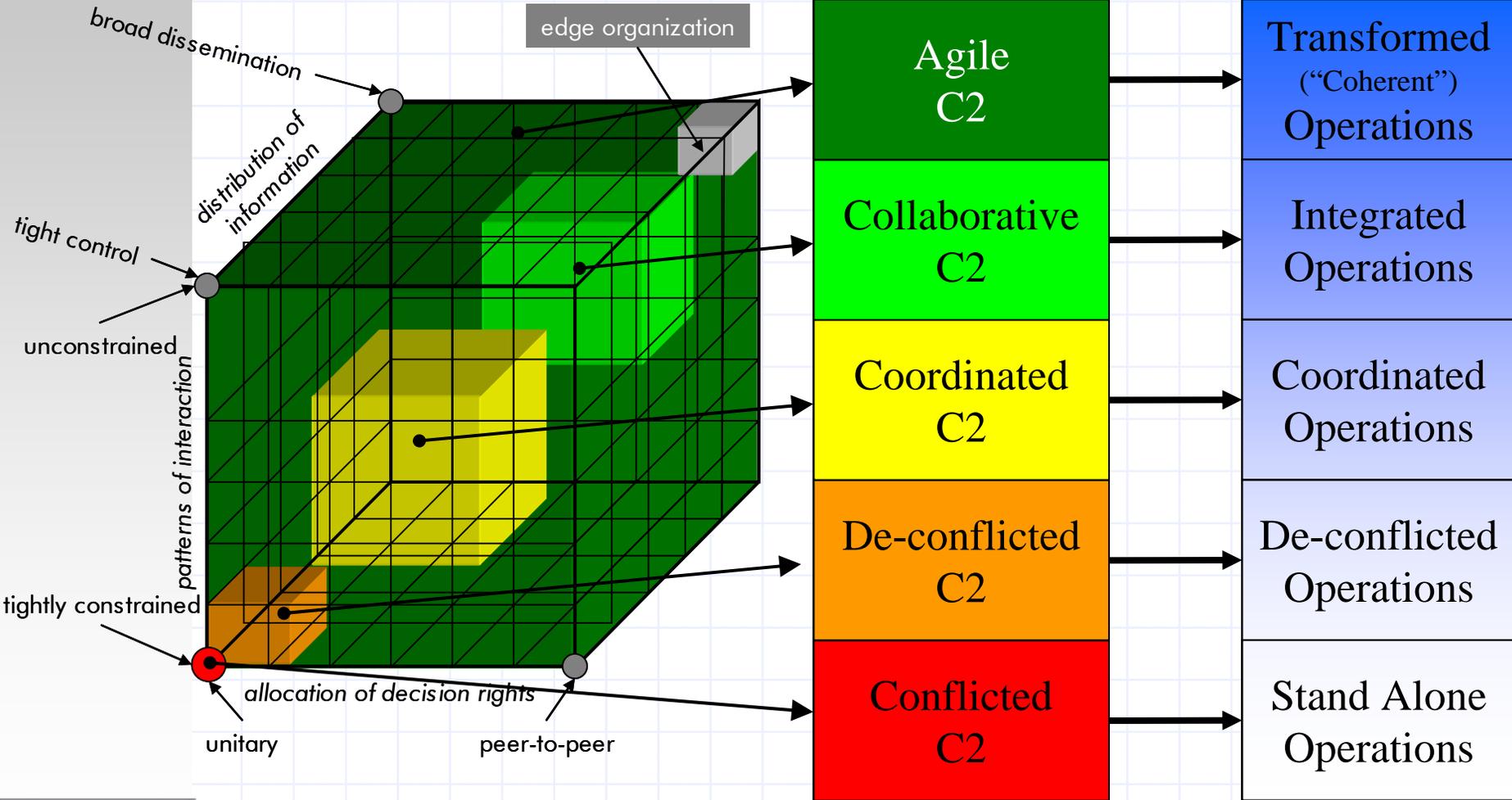


The NNEC C2 Maturity Model

C2 Approach Space

NNEC Feasibility Study

C2 Maturity Levels



Complexity

- Idea
 - ▶ Complexity of operations
 - ▶ Set of dimensions
 - ▶ Assessment of the degree of complexity (low, medium, high)

- Application of generic principles (Mitleton-Kelly, 2003)
 - ▶ Connectivity
 - ▶ Interdependence
 - ▶ Co-evolution
 - ▶ Far from Equilibrium
 - ▶ Space of possibilities
 - ▶ Self-organization

The Indian Ocean Tsunami (2006)

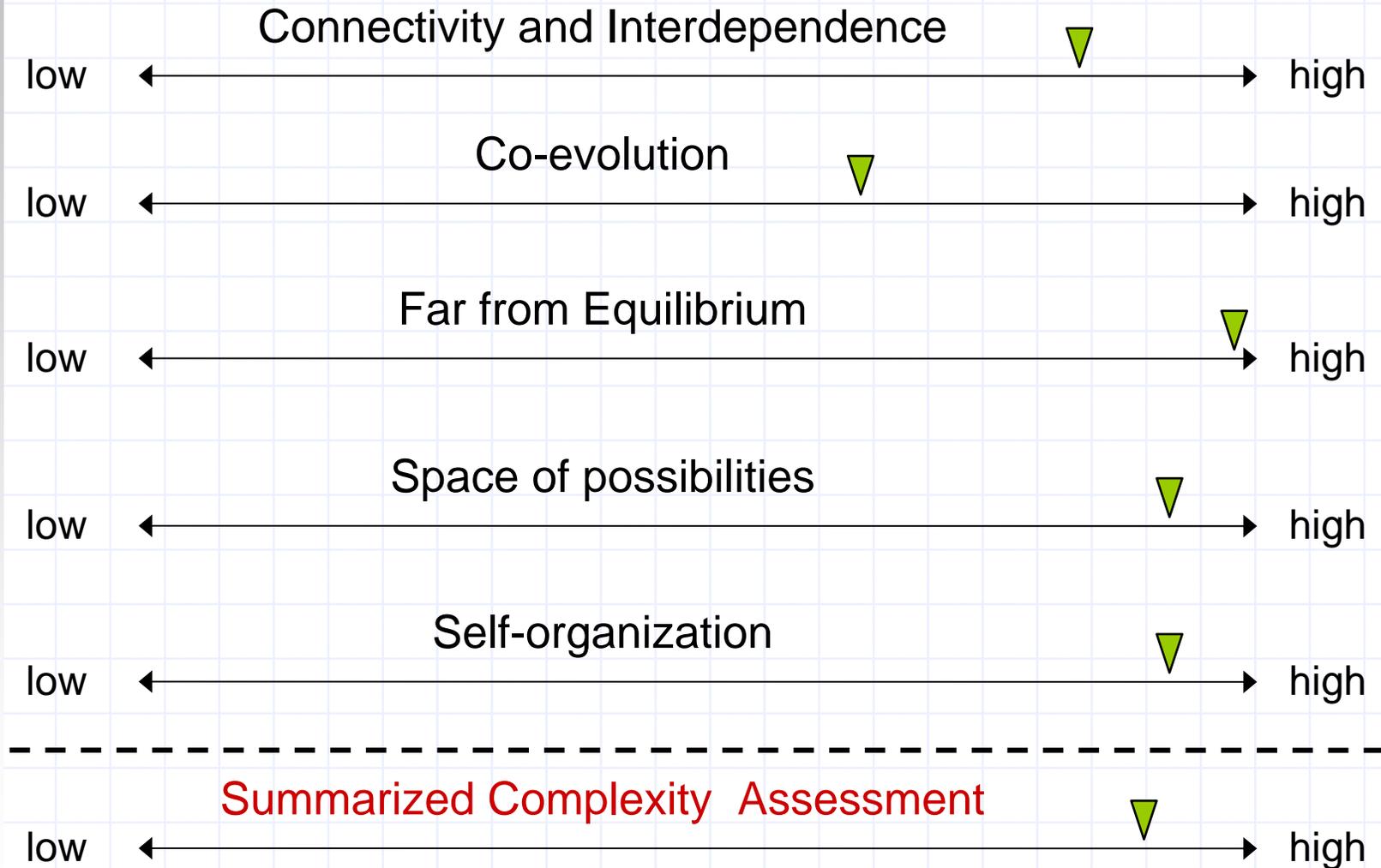


- 26 December 2004
- Deadliest natural disaster in modern history
- Over 227,000 killed
- 1.7 million people in 14 countries displaced
- US\$ 13.5bn in international aid.
- Over 1,000 non-government organizations engaged

Some Observations

- UN coordination capabilities overwhelmed
- duplicated and inappropriate international aid
- competition between NGOs for prestigious projects, beneficiaries, facilities, material, and staff
- military played a key role in the early phases of the relief operation
- Effectiveness improved to the degree that international organizations had previously been able to work closely with local organizations (high mutual trust)

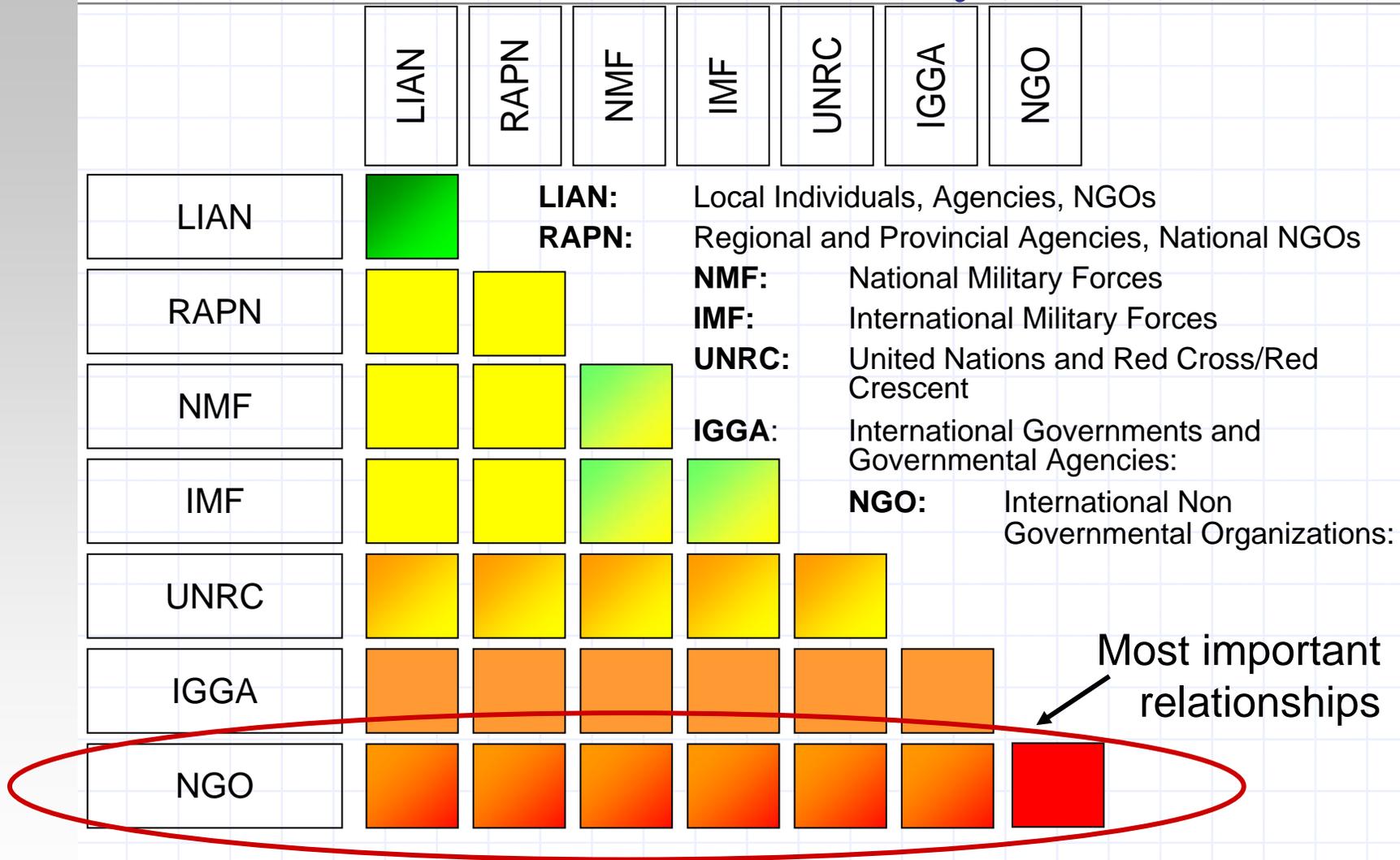
Complexity - Tsunami



Summarized Complexity Assessment



Assessment of C2 Maturity - Tsunami



Agile C2

Collaborative C2

Coordinated C2

De-conflicted C2

Conflicted C2

Conclusions - Tsunami

Selected recommendations from TEC report¹:

- *“fundamental reorientation of international humanitarian community from supplying aid to supporting and facilitating communities’ own relief and recovery priorities”*
→ implies that NGOs subordinate their intents to the intents of local communities
 - *“increased disaster response capacities and to improve the linkages and coherence between themselves and other actors in the international disaster response system”*
→ implies that NGOs support development of a coherent international disaster response system and redefine their role
- no central coordinating institution is able to manage operations of this kind ?

**High complexity disasters
call for Collaborative C2!**

¹Telford, John and Cosgrave, John: Joint evaluation of the international response to the Indian Ocean Tsunami: Synthesis Report. Tsunami Evaluation Coalition (TEC), London 2006

The Elbe Flood Disaster (2002)



- August 2002
- Among the worst natural disasters in Germany
- 80,000 people evacuated
- 80,000 responders
- 6.2 bn € material damage

Characteristics of the Elbe-Flood Disaster

Information flow

- Flood warning system reports actual water levels
 - Limited forecasting of water levels (no simulation)
 - Information chain involving several organizations and delay times
 - Limited information fusion
- Result: slow information-push system with insufficient ability to provide information for timely response

Flood development

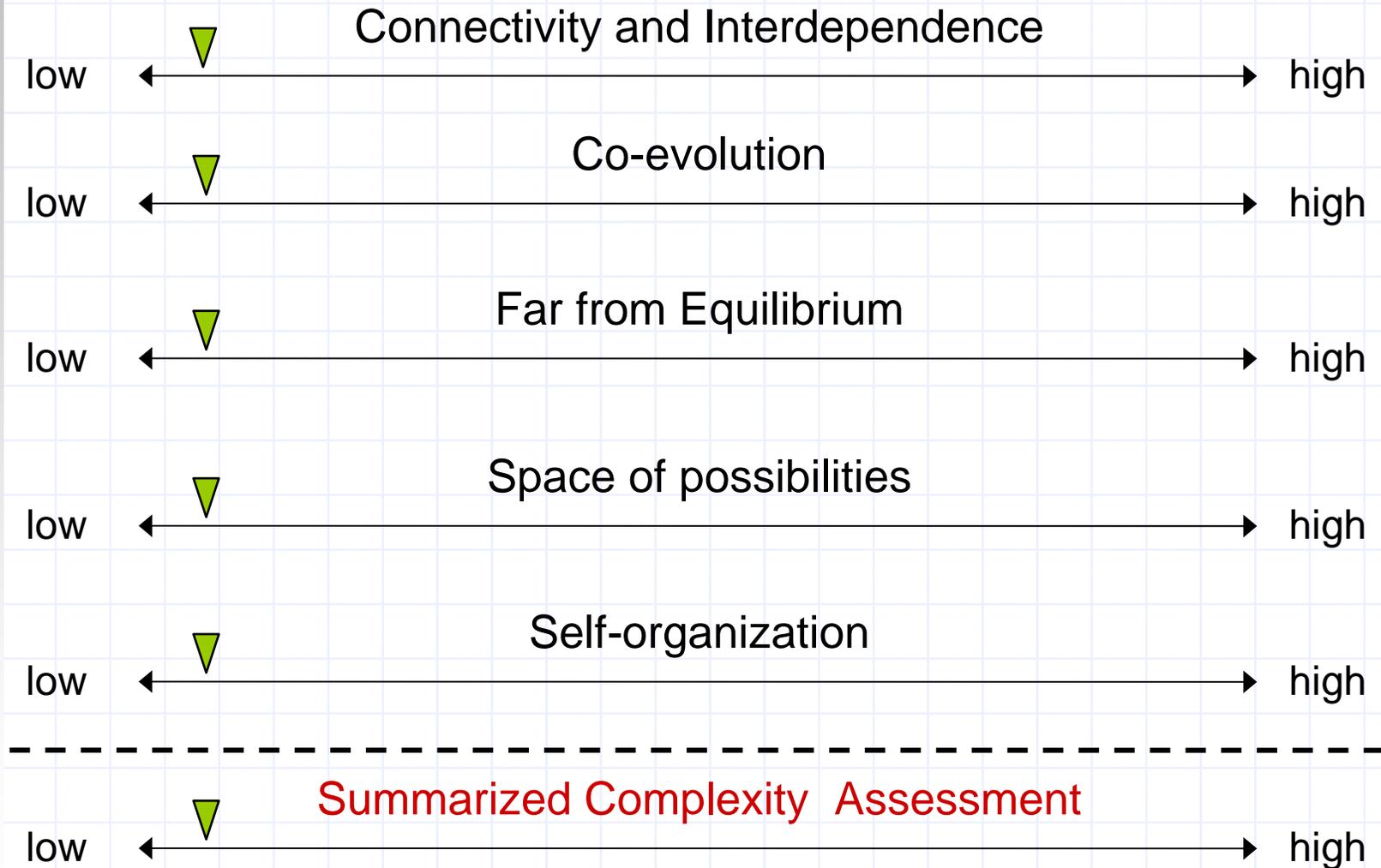
- Intensity of rain fall (rain quantity (12.08.2002) 4 times higher than long-time average for entire month of August)
- High water flow velocity in mountain rivers feeding the Elbe
- Saturation of ground and exhaustion of reservoir capability

Response operation

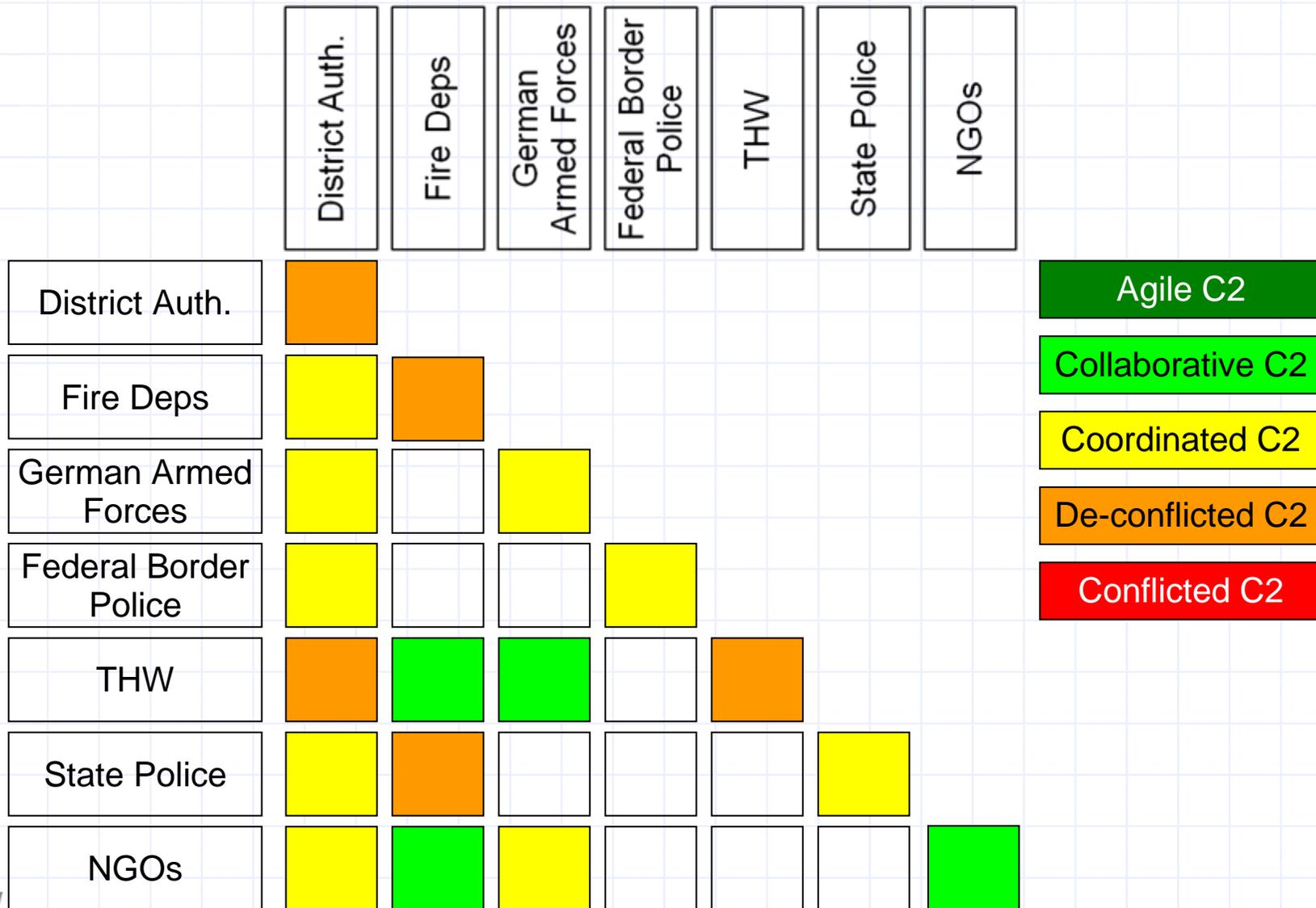
- Insufficient planning time / insufficient ability to anticipate
- Little time for anticipative actions (limitation to reactive actions)
- Damage to communication infrastructure caused coordination delays

Result: Operational tempo not high enough to proactively control disaster

Complexity - Elbe-Flood



Assessment of C2 Maturity - Elbe-Flood Response



Agile C2

Collaborative C2

Coordinated C2

De-conflicted C2

Conflicted C2



Conclusions - Elbe-Flood Response

- Review commission¹ assessed the approach of bottom-up activation of response resources and their centralized coordination as mature enough to manage the Elbe-Flood disaster operation
- Improvements of coordination capabilities recommended:
 - ▶ joint training /exercises
 - ▶ minor reorganizations of the disaster response system
- General conclusion: “Coordinated C2” is appropriate to manage interactions of a limited number(< 10) of hierarchically structured organizations in regional disasters of low complexity

Coordinated C2 appropriate for disaster response of low complexity.

¹von Kirchbach, H.-P., S. Franke, H. Biele, L. Minnich, M. Epple, F. Schäfer, F. Unnasch, and M. Schuster (2002) *Bericht der Unabhängigen Kommission der Sächsischen Staatsregierung Flutkatastrophe 2002*. Dresden

Comparison of Case Study - Findings

Case	Tsunami 2004	Elbe Flood 2002
Complexity	very high	low - medium
C2 Maturity	disjointed – de-conflicted	co-ordinated
Effectiveness	low	high
Efficiency	very low	medium

- lower complexity of the Elbe Flood's operational environment permitted a more efficient use of available resources
- as complexity of the operational environment increases so must C2 maturity

Lessons Learned / Further Research

Lessons Learned

- Case studies validate assumptions underlying the NNEC C2 Maturity Model
- Open question: What maturity level is required for which scenario.
- Complexity is not sufficient to characterize a scenario
- Dynamics is proposed as another scenario descriptor

Hypothesis for further research:

- Coordinated C2 sufficient for medium-high dynamics / low complexity scenarios
- Collaborative C2 is required, and agile C2 desired, for high dynamics / high complexity scenarios