SEC-2010.4.1-1
AFTERMATH CRISIS MANAGEMENT – PHASE I
- ACRIMAS -

D6.2 D&E CONCEPT

Grant Agreement number:	261669
Project acronym:	ACRIMAS
Project title:	Aftermath Crisis Management System-of-systems Demonstration
Funding Scheme:	CSA - supporting
Date of latest version of Annex I (DoW):	2011-01-13
Deliverable:	D4.2
Version and date of deliverable:	Draft v0

Coordinator:

Hans-Martin Pastuszka, Fraunhofer Institute for Technological Trend Analysis (INT), Euskirchen, Germany

Tel:	+49 22 51 18 298
Fax:	+49 22 51 18 38 298
Project website address:	www.acrimas.eu

Authors D6.2
Martin Hamrin (FOI, Stockholm, Sweden)

Table of contents

Table of figures

1 Introduction

1.1 The ACRIMAS project

1.1.1 ACRIMAS objectives

ACRIMAS is a 15 months Support Action with 15 partners from 10 European countries, in which a roadmap is developed for an upcoming Demonstration Project (in Phase II) within Crisis Management (CM).

This roadmap will elaborate a systematic development process for CM systems, procedures and technologies in Europe, to be implemented within the demonstration project.

The process aims for gradual evolvement of CM capabilities through demonstration and experimentation (DE) activities, transfer of related knowledge between stakeholders and by promoting an environment for co-development of CM technology and methodology where users, providers and researchers work together.

ACRIMAS further emphasises community-building which will be considerably supported by the execution of the subsequent Phase II, bringing together the various key stakeholders and the available DE infrastructures in a case-by-case demonstration or experimentation activity.

1.1.2 ACRIMAS work approach

Large-scale incidents (man-made and natural) inside and outside the EU require a coordinated response from crisis managers and first responders across Europe and with resources from all levels of government. Currently, CM in the EU can be regarded as a highly diversified „system-of-systems‟ integrating organisations and components with different cultures, policies and assets, and various stakeholders and procurement schemes.

To identify the critical areas and topics within this current CM „system-of-systems‟ which need to be addressed by the demonstration programme in Phase II, ACRIMAS follows a scenario-based and user-centric work approach.

ACRIMAS is scenario-based in the sense that characteristic CM scenarios will be identified, selected and developed to constitute a sound basis for ensuring the work of posing user needs and requirements, identifying current weaknesses and gaps in CM in Europe, looking at potential solutions and documenting corresponding demonstration topics and R&D needs to be integrated in a roadmap for Phase II. The scenario approach embraces an all-hazard view, including the EU external dimension.

ACRIMAS is user-driven in the sense that users and other stakeholders in terms of first responders, authorities and governmental bodies as well as the supply side are actively involved throughout the project process, some of them as full partners, most of them linked to the project through a supporting Expert Group and dedicated project workshops. They play a central role in complementing and validating the scenario analysis by expressing their needs and requirements regarding the identification of relevant CM topics, which should be addressed by DE activities in Phase II, and the demonstration concept to be elaborated.

1.1.3 Terms used and their understanding in ACRIMAS

According to the call text of SEC-2010.4.1-1 "Aftermath crisis management – Phase I", the ACRIMAS project has to focus on 'aftermath crisis management' as it was outlined, i.e. that it covers the response to large-scale disasters (man-made and natural) inside and outside Europe. However, the ACRIMAS project felt the need to briefly state its common understanding of the relevant terms used to achieve a common understanding, as in particular in the scientific community the term "crisis management" not necessarily need to be understood as "disaster response". Consequently, the ACRIMAS project referred to terms and definitions as provided by ISO in its TC on Societal Security (TC 223):

- **crisis:**
  incident affecting a society with the potential to cause loss or damage to persons, property or the environment which requires extraordinary coordination, resources, and skills in response
- **crisis management:**
  process of planning and implementing measures aimed at preventing, reducing, responding and recovering from a crisis
- **disaster:**
  a situation where physical damage or loss of life have occurred which exceeded the ability of the affected organization, community or society to cope using its own resources
- **(disaster) response & recovery:**
  - *Response*: measures taken during or immediately after a disaster to meet the immediate needs of the affected and minimising the impact on the incident
  - *Recovery*: activities designed to return conditions to an equivalent level acceptable to society
- **"aftermath crisis management"** (ACRIMAS understanding):
  the response to & recovery from large-scale disasters (man-made or natural) inside and outside Europe, including the preparation for response and recovery.

1.1.4 ACRIMAS expected results

ACRIMAS will prepare a roadmap setting out the main areas and relevant topics of CM to be addressed by the Phase II. In addition, ACRIMAS will deliver a demonstration concept for Phase II, describing how and where the DE activities in Phase II should be conducted.
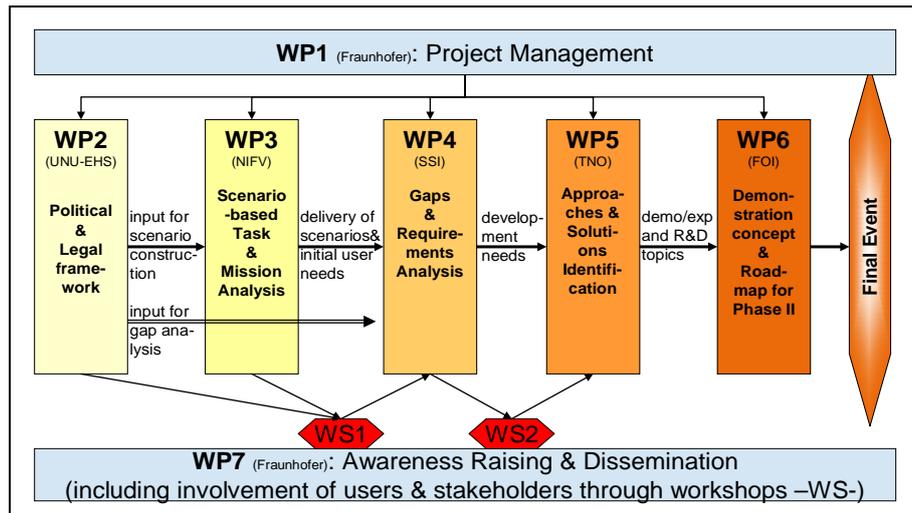
Figure 1 – The ACRIMAS Work approach

2 The idea of demonstration projects

The demonstration projects of EU FP7 Security Research represent a highest and, in a sense, final level of a hierarchy of project types. Citing from the ESRAB, the source of the concept of demonstration programmes:

"[S]ystems of systems demonstration […] aims at integration a number of systems to achieve multi-mission objectives. In a certain sense these multi-mission systems-of-systems demonstration could be viewed as European flagships providing a federative frame to coalesce research of significant European interest.

Their successful achievement will depend on the compatible, complementary and interoperable development of the requisite system and technology 'building blocks'. "

The concept of "systems-of-systems" – which remained a guiding phrase also for the call to which ACRIMAS responded - has been interpreted in a number of ways by different stakeholders. One, simplistic, interpretation is that a system-of-systems is merely an integrated set of (smaller) technical systems, and that a demonstration project thereby is mostly about technical integration of (usually IT) systems. There are evident problems with this interpretation. As FP7-SEC is certainly not only about technical components, such a demonstration programme would not fulfill the role of a 'federative frame to coalesce research'. To fulfill such a role a multi-perspective, or capability-oriented, approach is necessary.

A second interpretation of the system-of-systems demonstration idea is that it indicates a wish or requirement for the object at hand, in this case the crisis management capabilities inside the EU, to become very strongly integrated in some sense, which could be in terms of management, information exchange, technical infrastructure or otherwise. The key problem with this interpretation is that it is based on policy assumptions which are not accepted by neither member states nor the EU. Thus, a demonstration programme (DP) underpinned by this understanding would be at risk of becoming irrelevant, as it would rely on policy priorities unlikely to be realistic.

The interpretation of the systems-of-systems concepts used by ACRIMAS is therefore neither of these two. Rather we have, in our opinion, returned to the roots of the concept. In our interpretation, saying that the Demonstration should be dedicated to a system-of-systems rather indicated a top complexity level, in at least two senses.

First, we claim that the system-of-systems perspective concerns the level where technology and other assets come into actual use. Thus, one needs to look at capabilities, being usually delivered by more than one technological component or asset, rather than looking only at single components. In particular, issues which are solely related to the development of technology (or another type of assets) are not in focus in system-of-systems level project – rather issues which come into play when technology, procedures, training, doctrine etc. meet are in focus.

Second, we claim the system-of-system (SoS) perspective concerns enterprises consisting of a fairly large number of operationally independent but interconnected entities. Thus, a system-of-systems study concerns situation where unified command (neither when developing/evolving nor when using the SoS) is not an available control strategy. It is quite clear that the EU Crisis Management Community is already a system-of-systems in this sense – thus a system-of-systems perspective is appropriate when trying to attack systemic issues in this community.

THESIS

Two main characteristics of a DP that can be derived from its origin;

- **First, a DP should work from a capability perspective , looking at issues that emerge when technology, people, doctrine and other assets are combined at brought into actual use**

- **Second, a DP should look at systemic issues, which cut across large part of the system-of-system at hand, i.e. the (loosely defined) EU Crisis Management Community.**

---

3 Context

Within the EU, crisis management is governed by the maxim of "national responsibility and European solidarity", i.e. the EU Member States (MS) have the responsibility to protect their citizens and assets, while the EU itself predominantly facilitates European solidarity through the Community Civil Protection Mechanism and its MIC (Monitoring and Information Centre).[1]

Outside of the EU territory, the EU and the MS provide important contributions but as a part of the international community which includes UN Agencies, NGOs, other nations and importantly the government of the affected nation. In this situation, the UN is recognized as a key coordinating entity, particularly through OCHA and its support to the local government and through the Cluster System. The by far largest EU contribution to international relief is provided in the form of funding to UN, NGO or local agencies.

The EU itself is striving to reinforce effectiveness, efficiency, coherence and visibility of EU disaster response, shifting from ad hoc response to a (more) predictable, pre-planned and pre-arranged system[2,3]. On the intergovernmental level, a step in this direction is the implementation of the Crisis Coordination Arrangements (CCA).

On the regional level, neighbouring regions sometimes have bi-/multilateral agreements preparing for cross-border incidents, for example as in the CBSS (Council of the Baltic Sea States) or the Dutch-German "Euregio".

A variety of exercises, both on EU and MS level, including nation-wide, strategic exercises like e.g. LÜKEX in Germany form important opportunities for cross-border collaboration. Crisis management exercises co-funded by the EU like e.g. FloodEx in The Netherlands are increasingly becoming cross-border and multinational.

---

[1]   principle of subsidiarity
[2]   COM(2010) 600 *Towards a stronger European disaster response: the role of civil protection and humanitarian assistance*
[3]   COM(2011) 934 *Proposal for a Decision of the European Parliament and the Council on a Union Civil Protection Mechanism*, Brussels, 20 December 2011

4 The role and constituents of a DP for crisis management

Crisis management is a complex and often unpredictable activity. We have no means to foresee in any detail what types of disasters may hit the EU in the future, nor how they will affect the population, society in general or the response system. The threats, our vulnerabilities and our ability to cope with them are in constant evolution.

The development of crisis management capabilities and the research and development (R&D) efforts in support of this must be aligned with these characteristics. In particular, neither one-time efforts nor the development of monolithic technical systems are likely to be able to meet the requirements of constant change management.

However, with an adequate interpretation of the DP instrument, it can provide an excellent tool to strengthen the adaptivity of crisis management concepts, capabilities and procedures to future challenges, and by doing so to increase the disaster resilience of Europe.

In more concrete terms, a DP needs to contain a number of constituents which allow the participants – end-users, industrial partners, research organisations, public communities, disaster management policy makers and others – to iteratively progress within a number of areas in crisis management. This includes discovering *innovative concepts of operations*, developing *new forms of coordination and cooperation,* inserting *new technical solutions* and experimentally testing and further learning about these is realistic environments.

A key problem in this approach is that it is usually not feasible to test drastically new concepts, or technologies which we do not know yet how to optimally use, in real operations, at least not without significant precaution. Therefore there is a need to first identify, prepare and *provide infrastructure for experimentation in crisis management.*

This infrastructure needs to be provided to support the execution of the DP, but also forms an important deliverable - a crisis management test-bed - allowing for sustained progress even after the DP has ended.

In concrete terms, infrastructure needed should include:
-   Methods and mechanisms for evaluation and performance measurement, adapted to the needs in experimentation,
-   Support tools that allow for planning, management, control, information gathering and recollection of experiments,
-   Simulation methods and models that allow for testing of concepts, procedures and technology in realistic setting while only using live experiments when they bring benefit.

Due to the heterogeneity and interdependency of crisis management capabilities and actors, the DP must look at several areas in parallel to achieve impact. Each such area should be a cluster of important topics which need or benefit from being addressed jointly – a strand of demonstration.

A demonstration strand should consist of a number of iterations of concept development and experiments, as visualized by figure 1.
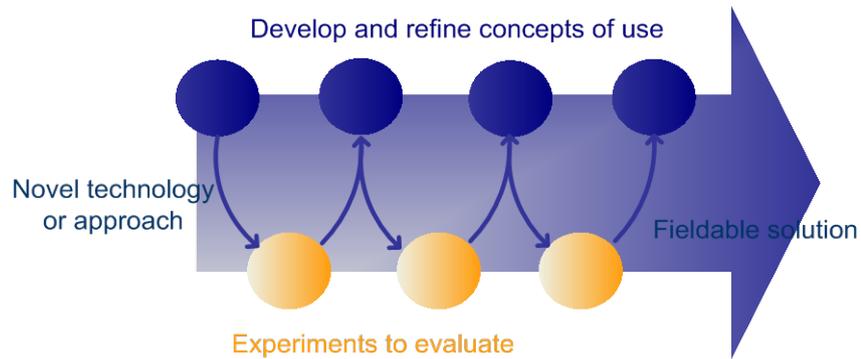
Figure 2 - The proposed Demonstration and Experimentation process

At heart of this iterative development approach the idea to have stakeholders within crisis management areas jointly develop new approaches and concepts, including the use of new technology, and gradually refine these into fieldable solutions.

Throughout the process, realistic experiments should be carried out, generating feed-back to adjust and refine the novel idea or approach, and also allowing stakeholders to experience through participation the benefits and drawbacks of different concepts.

This approach to demonstration projects as a series of experiments, where solutions are allowed to mature gradually into operational solutions, contrasts with an understanding of demonstration projects as show-case endeavours where products already perceived as ready-for-operations will be 'demonstrated' by an orchestrated exercise. We claim such an approach would neither lead to any new knowledge or associated improvement of the products demonstrated, nor would it lead to actual acceptance in the practitioner community.

The experimental understanding of a DP allows not only technology to be addressed, but also adjustments to doctrine and procedures, training needs, equipment requirements and organisational changes. Thus, the experimental approach to a DP aligns with the system-of-systems approach in its full sense.

THESIS

- **A DP for Crisis Management should create space for experimentation and for iterative improvement of concepts, systems and procedures by**
  - **Providing end-users the opportunity to develop novel approaches in terms of concepts, procedures etc. and to test them in a safe environment**
  - **Harvesting the benefits of promising technologies and other solutions by using experiments to identify their optimal operational use**

---

5 The scope of a DP for crisis management

5.1 The internal and external dimensions of crisis management

The management of disasters inside of Europe is a vital responsibility of the affected MS.
Additionally, the solidarity of those able to support is codified in the Treaty of Lisbon.
In the EU-internal dimension of crisis management, the efforts by which EU MS respond to
their responsibility to protect are generally established, professional and well-executed. Yet,
we do not know what disasters may strike Europe in the future, not how our ever-changing
society will cope with them. **Therefore, there is a need to continuously improve and adapt
the disaster management ability.**

Further, the close collaboration at EU level is still quite young, and the benefits it may
provide are not all harvested. The potential of better response by common operations is clear,
but further work on how to achieve integrated effort is required. The assimilated experience
and knowledge on crisis management throughout Europe is vast and a better exploitation of it
may raise the ability of both MS and Europe as whole.

A DP has the potential to deliver improvement in all these respects.

For disasters outside of Europe, the role of the EU is based upon the humanitarian will to
support the vulnerable. In this case, the responsibility to provide relief is shared with the
international community, and the authority to direct resides with the host government.
In this case, the MS and the EU, through the MIC, provide important resources, but
organisations such as UN Agencies and NGOs normally deliver the majority of the aid.
However, they can only do so with the financial support provided by the EU, the MS and
other nations.

While the ability of the EU to use its own resources in support of external operations is an
important area, it only forms a part of the overall response system. The EU has significant
interests, as a source of funding, in the effectiveness of this system.
An EU-external (part of a) DP, as a major, coherent effort at system-of-systems level, would
have best chances to deliver clear added value and become a visible flagship of FP7-SEC
research if dedicated to strengthening the overall international disaster relief system.

This system is currently facing significant challenges, as witnessed by the difficulties in
several recent disasters. These challenges are rooted in a lack of clear roles and
responsibilities, lack of trust and understanding across the international response system and
lack of coherence between efforts. A DP can be well-suited to contribute to progress on these
fundamental problems, and doing so should be the highest priority for an externally oriented
DP.

THESIS:

- **Both the internal and the external perspective are relevant for the DP**

- **A DP for the EU-internal dimension (or a dedicated subset of a DP) should take into account both common operations and cooperation in preparatory phases**

- **A DP for the EU-external dimension (or a dedicated subset of a DP) should focus on providing an EU contribution to the improvement of the international disaster relief system**

5.2 The disaster phases

While in some sense, the initial term "Aftermath Crisis Management" implies a focus on the response phase within the crisis management cycle, possibly stretching out to recovery phase activities; it is evident that any effective response needs to be prepared in advance. Therefore, the preparedness needs play a most important part for crisis management as such and even the aftermath part of it.

For this reason, preparedness and response cannot be separated from each other, thus calling for a clear inclusion of preparation needs into the DP. This requirement is also coming out of the ACRIMAS stakeholders consultations, leading to the 26 identified improvement needs in crisis management (cf. ACRIMAS D4.2 and 4.3), with most of the topics having received high support in the consultations are placed in the preparedness phase.

Moreover, an integral, critical element of any paradigm on societal resilience is the need for a comprehensive, holistic concept and assessment on how to achieve and improve resilience, thus itself calling for an integrated approach of crisis management in the DP, and not a phase-separated view.

5.3 Hazards and disaster types

The disaster response system in the EU must be prepared to deal with any disaster that may emerge. Of course, certain resources, skills and capacities will be acquired to prepare for certain specific disaster types.

Others, for example the overall organisation, coordination structures, collaboration mechanisms and other structural assets, must be designed to work in any type of crises. Since it is at this level a DP should aim for effect, the objectives of a DP should not be specific to a particular disaster type.

However, the primary focus of the DP should be the management of large-scale disasters. The crises considered by the DP should therefore be complex and dynamic, significantly stress-testing the ability of the overall crisis management capacity.

As a conclusion (and challenge) for the DP, it is recommended that the proposed demonstration strands should be designed to improve scenario-independent, cross-cutting capabilities.

On the other hand, it is evident that individual experiments need concrete scenarios. To assure that the concrete scenarios adequately represent the wide range of disasters the solutions need to meet, the selection and construction of scenarios in DP Phase II need the support of rigorous methodology.

5.4 The focus of the DP on crisis management

Obviously, a DP must aim to provide progress in the areas of disaster management in most need of improvement. Disaster management is however a heterogeneous and vast area, which means that even a DP will not be able to include all important areas.
Since a DP is a unique opportunity in terms of size and resources, one should primarily focus on topics which clearly benefit from being managed in such a coherent effort, while leaving those that rather benefit from more focussed efforts. Also, a DP is expected to bring clear operational benefit and thus topics where the maturity of solutions is too low may also be better managed elsewhere. In summary, suitable topics for the DP on crisis management should satisfy the following criteria:

-   They concern key areas of disaster management where there are significant opportunities for improvement,
-   They have a system-wide character, in the sense that they would be difficult to be managed without a large, coherent effort,
-   There are promising approaches which can be expected to be operationalized within the time-frame of the project.

To identify priority areas for the DP, ACRIMAS carried out an initial literature review, followed by an extensive stakeholder consultation campaign consisting of questionnaires, interviews with end-users and workshops with ca. 150 respondents. This effort resulted in a long-list of 26 areas where critical needs or opportunities for improvement have been identified and elaborated (cf. ACRIMAS D4.2 and 4.3).

These topics were contextualized in terms of organisational context and clustered into groups of topics, which are interconnected in a way that makes them suitable or necessary to manage inside one coherent effort.

The outcome of this process is a set of six *strands of demonstration*, plus one cross-cutting activity preparing the DP infrastructure, as depicted in figure 3 and further described in ACRIMAS deliverable D6.1.
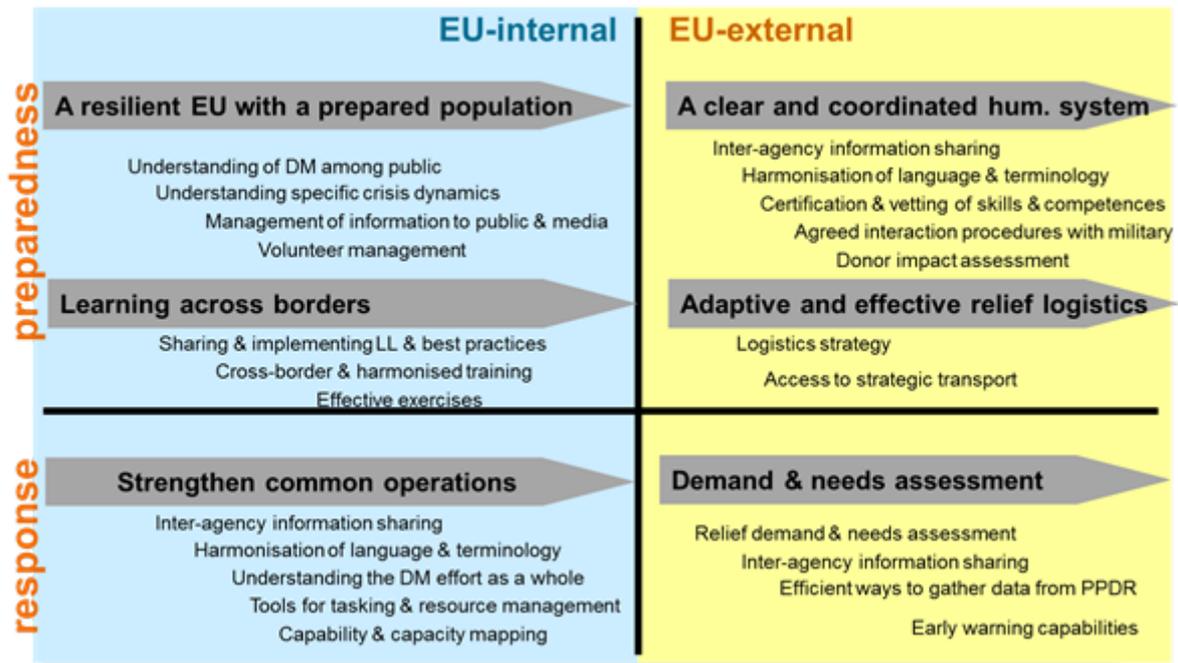
Figure 3 - Proposed strands of demonstration

6 Concluding remarks

In this report we have described an approach to demonstration projects which we claim is best suited to overcome the difficulties with operationalizing innovative solutions in the domain of crisis management, and to achieve actual stakeholder acceptance and understanding of these solutions.

This approach underscores the need to use experiments to progress on promising solutions, with the objective to overcome constraints and issues that appear at the systemic level, and contrasts with the approach to demonstration focussing on trying to prove usability in a single show.

Additionally, we have briefly described what areas of crisis management that would need or benefit from being included in a demonstration.