[PRACTICE]

D6.6 INDOOR FACILITY VALIDATION EXERCISE ARDEN EVALUATION REPORT

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Summary Work Package 6

Field Integration and Validation

The objective of work package 6 is to integrate the PRACTICE toolbox into real environments and to validate it by means of live exercises. Three exercises will be organized in three different countries and each with a different focus, thus covering different conditions and challenges related to CBRN threats. The exercises will be conducted by actual end users in a highly international composition and in realistic settings. The views of end users on the usefulness of the toolbox during these exercises will represent a significant added value for the project's conclusions. Existing and new PRACTICE tools will be integrated in order to evaluate the improvement of preparedness and resilience to realistic CBRN crisis.

Detailed documentation and professional evaluation of the exercises will produce guidelines for practical implementation of the toolbox within the EU including a validated training kit.

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1. Executive Summary

This evaluation report provides an account of the results, empirical methods and analytical approaches from the UK validation exercise ARDEN held at the Birmingham International Convention Centre (ICC) on August 15, 2013 as a part of the PRACTICE project. It presents the key aspects relevant to the tool evaluation: 1) the analytical objectives, 2) the set-up to achieve these objectives, 3) the results (as far as they were available at the time of writing), and 4) broader lessons for evaluating tools through exercises.

Analytical objectives

Three objectives of the ARDEN exercise can be discerned: first, the tool and theory development of WP8 on public responses to CBRN incidents was to be supported; second, additional inputs for developing an early toolbox version were sought; and third, various tools (including most importantly the evaluation support tool) were to be evaluated.

- In terms of WP8 tool development, the exercise aimed at, first, partially[1] evaluating the impact of (draft) risk communication manuals on the public response to CBRN incidents, and, second, advancing the theoretical and practical understanding of public information needs, public behavioural responses and the underlying drivers of these responses to CBRN events with a view to (further) developing risk communication manuals designed in WP8 (D8.11, D8.12 and D8.13). As such it included the observation/analysis of the emotional and behavioural responses to the incident and emergency response at the stages of release/evacuation, decontamination and survivor reception centre by the members of public
- Public reception/response to on-scene communication messages across all stages of the incident and emergency response (including messages provided in a prototype manual by King's College London)
- The impact of the participation in an exercise on public responses to CBRN incidents
- Silver command communication strategies during CBRN incidents

In terms of inputs for the development of the toolbox, the ARDEN exercise could not be used because at the time of the exercise there were no toolbox components possible to implement and use by first responders participating in the exercise. Instead the toolbox was demonstrated at a separate dissemination event, with participation from first responders, on the day after the exercise.

In terms of additional tools to be tested, a number of tools were available. This included in particular the "evaluation support tool" to be included in the toolbox. The evaluation support tool must be applied to the PRACTICE theoretical architecture in terms of the "Operational Functions" concept and the "tool box structure" concept. As these concepts have not been applied earlier, obtained data from ARDEN were necessary for testing and implementation of evaluation principles of the evaluation tools.

[1] Primarily messages for the manuals aimed at the public and operational-level first responders (deliverables D8.11 and D8.12)

Four specific tools were available to test the evaluation tool. These were evaluated in terms how they contributed to some operational functions central to the response of a CBRN incident.

- A Multi-Agency Initial Assessment Team (MAIAT). The MAIAT is designed to provide an initial assessment of actual or potential Chemical, Biological, Radiological, Nuclear (CBRN) events and rapidly detect, identify and monitor the presence of any hazardous substance to secure an informed and proportionate multi-agency response. This team makes the initial assessment of specific types of CBRNe (Chemical, Biological, Radiological, Nuclear and explosive) incidents, before any other resources attend the scene.
- The Multi-Agency Event Control Suite (ECS). The ECS is a facility which is used to co-locate response authorities in case of a major incident, which can be of either spontaneous or pre-planned bature. The ECS provides technical resources and an environment suitable to support a multi-agency tactical command group, in U.K. denominated Silver command. The ECS will be a core resource in case of an CBRN incident.
- Waysafe, a product for site demarcation and indication of a clear route to safety in hazardous conditions.
- HazKey, a downwind early warning and reporting decision support tool.

Finally, it is important to note that the evaluated tools, although not being specific outputs from the PRACTICE project, are planned to be incorporated in the PRACTICE toolbox.

The set-up for testing

Data collection for the achievement of the above objectives was undertaken in the unique context of a live exercise. The exercise was informed by an underlying scenario. The concrete scenario of the exercise was embedded in a broader narrative according to which chemical and defence companies across the UK had suffered from a series of illegal activities (burglary, cyber attacks).The investigation into these activities suggested that missing chemicals could be used to produce the deadly Nerve Agent Sarin. Against the background of this narrative, the concrete scenario of the ARDEN exercise, the release of a chemical substance by a suspected terrorist at a multi-faith conference being held in Hall 5 of the ICC, enfolded.

The nature of the scenario implies a focus on the C component of CBRN. This is a deliberate choice given that the public response, the primary focus of this exercise, is normally more accentuated as the reaction to chemical substances often are more acute compared to B and R.

The exercise included a total number of circa 230 participants.

- Circa 87 Role Playing volunteers acting as victims of the release.
- Circa 170 including exercise support staff from the three emergency agencies.
- Circa 70 Exercise control participants.

11 different semi-sequential phases were defined and formed a basis for the evaluation of the response:

1. Preparations and planning. Actions such as planning undertaken in advance of the incident.
2. Events occurring in advance of the release. All actions and events on the day of the incident occurring in advance of the release of the substance.
3. The release of the substance and the reaction in hall 5

4. The Alarm. The first reports of the incident to the emergency services and the subsequent initiation of the response.
5. The evacuation to Bay C. the evacuation of the participants of the multi faith conference from hall 5 to the evacuation area in Bay C.
6. Emergency Response in Bay C. Triage and other events occurring in the evacuation zone in Bay c before participants were moved to the decontamination site.
7. Substance ID. Actions undertaken in order to decide whether the incident was a CBRMN incident or not.
8. Move along the canal to mass decontamination site. Actions undertaken in order to move the participants of the multi faith conference from Bay C to the mass decontamination site in Bay B.
9. Decontamination in Bay B.
10. Forensic ID. Actions undertaken, in hall 5, to classify the released substance.
11. Survival reception centre. Actions undertaken in the survival reception centre in order to interview survivors in order to collect evidence and other important information as well monitor for delayed health impacts, provide suitable advice and treatment.

Data was collected in advance, during and after the exercise and included: Documantation of preparations and planning process, questionnnaires, video, GPS, voice recording, Note books" to RPV, interviews, observers, documents/Log files and debriefings. In order to capture the chain of events, the FOI F-REX system was used. F-REX is a toolset developed to support evaluation by constructing mission histories and exploring them through multimedia presentation in the main application, the F-REX Studio. The toolset also contains several applications for recording and collecting necessary data including, but not limited to, GPS tracks, computer screens and radio communication

In addition, an After Action Review (AAR) was undertaken with representatives from the Emergency services in order to present preliminary results and collect additional data. During the AAR the FOI F-REX system was used. F-REX is a toolset developed to support evaluation by constructing mission histories and exploring them through multimedia presentation.

An Ethics and Data Protection Supervisor provided ethical oversight during Exercise ARDEN in order to ensure ethically relevant management of the exercise and the evaluation.

The results

The results of the exercise have to be viewed against the three objectives outlined above.

In terms of WP8 research and tool development, the data on public responses to CBRN events collected at ARDEN are unique in their nature (collected during a life exercise) and breadth (quantitative, qualitative, at different phases). The data – broadly speaking – underpins arguments about the importance of risk and crisis communication during an emergency. More specifically, researchers from KCL, PHE and MIUN were able to achieve their two overarching goals: first, the data provided important insights into information needs by members of the public, emotional and behavioural responses to emergencies, as well as the drivers of the responses; second, they also provided feedback for the development of communication manuals, the manual for members of the public (D8.11), for emergency professionals (D8.12) and the manual for policy-makers and strategic leaders (D8.13). In a nutshell, researchers learned that:

- public information needs differ at different stages of an event and – in some stages – diverge from what is predicted by some of the existing research, and
- *public* information and education manuals are more likely to be useful as a long-term education tools rather than as an on-site, during-emergency information tool to the affected public

However, when it comes to the results regarding public response it is important to note that the findings put forward in this report are *preliminary* findings. A complete, systematic and *final* analysis is prepared for June 2014 in the context of the D8.15 deliverable.

In terms of tool box development, since ARDEN could not be used for these purposes, please consult the report on the stakeholder workshop on August 16th 2013 for feedback on the toolbox functionality.

In terms of testing individual and in particular the evaluation tool, the exercise has given valuable inputs for the development and application of evaluation principles based on to the PRACTICE theoretical architecture in terms of the "Operational Functions" concept and the "tool box structure" concept. The evaluation of the four tools, ECS, MAIAT, Waysafe and HazKey, constitutes four examples, different in character, which can be used as templates for future evaluations.

An important lessons learned from the exercise is the operationalization of the Operational Functions, i.e. defining meaningful instruments to measure the different Operational Functions. A two level model is suggested based on:

This results in a two level generic evaluation model:

- Measures of performance are the degree to which an individual, team, tool etc perform according to performance criteria such as time, correctness, specification etc. In other words:. Given the scenario, is performance adequate?
- Measures of merit are to what degree an action, tool etc contributes to society's ability. Note that this is partially independent of Measures of performance. A tool can very well perform to the highest standards without contributing to society's ability. In other words: Given societal expectations and investments, what is the contribution to societal ability?

The reference material included in this report will be used as examples and templates in the PRACTICE evaluation support tool. For example, the evaluation of the four tools, ECS, MAIAT, Waysafe and HazKey, constitutes four examples, different in character, which can be used as templates for future evaluations.

Evaluating through exercises

It is legitimate to say that exercises should become part of the methodological arsenal in social science research on CBRN incident management, it is equally important to highlight some shortcomings that ARDEN has revealed. The key methodological challenge is to assess how people act in a real world emergency without being able to expose them to real risk. While exercises are already closer to a real emergency than, for instance, just providing participants with video or written materials, ARDEN helped identify a number of issues that future exercise organisers should take into account:

- Participants were able to identify the group members of their fellow participants on the basis of the data collection tools. As a result, they soon realised that those without notebooks were the ones that fell ill, taking away elements of the unexpected and unfamiliar, as well as the sense of being at risk.
- Participants noticed that not all responders (and observers) on the scene were wearing protective clothing, thus again reducing the sense of danger and real world event. Also, some responders and many of the observers mingled quite freely among the contaminated population.
- The delay between different stages was perceived by participants as implausible (even though the responders confirmed that delay of 2-3 hours can also easily occur in a real event.

As will be seen during the PRACTICE exercises in Sweden and Poland, some of these issues can be improved upon, e.g. through stricter guidance for observers, different design and distribution of data collection tools and more forward-looking information on the stages and duration of the official response measures.

In spite of these methodological caveats that concern the research findings, it is essential to note that the participation in the exercise should also be understood as an educational tool. While the quantitative data on the four-factor-model in the pre- and post-exercise questionnaires show very limited variation (and thus suggests limited positive but also limited negative effects on the emotional and behavioural response to CBRN incidents, the post-exercise questions about the participation in the exercise demonstrate why organising exercises may serve as an effective tool for increasing the resilience and preparedness of segments of European societies. For instance, almost all participants claim increased knowledge of actors and procedures and suggested that the event was informative and interesting.