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Tools for Analysis and Screening of Solutions

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DIREKTION

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DIREKTION Project

The number and severity of disasters are increasing in Europe, due to climate change, ageing of industrial facilities and infrastructures, geo-political instability, poor knowledge management for critical activities and the vulnerability of the population exposed (density, age, migration…). To face these challenges, firefighters, rescuers, emergency medical responders and civil protection staff, have to implement effective and affordable solutions to support their operations. The DIREKTION project will establish and implement mechanisms and procedures to enhance knowledge sharing by directing the development of innovative technologies answering the needs of practitioners and policymakers. The steering role of international organisations (CTIF, FEU) and end-users will guarantee useful and practical results.

The project starts with the deployment of tools assessing the relevance and interoperability of innovative technologies developed by EU Horizon projects. A structured analysis of needs and gaps and the screening of potential solutions will then be undertaken. The procedures will use the outcomes of projects like FIRE-IN, DRIVER+ / CMINE, MEDEA, the pilot for the Network of European Hubs for Civil Protection and Crisis Management and will follow the taxonomy of the EU security market study to ensure a structured use of results. Based on the capability-driven evaluations and a detailed analysis of the opportunities and constraints for the uptake of innovative solutions, DIREKTION will establish priorities for future research programming and capacity building. Moreover, the project will further establish networking and dissemination opportunities of interest for the DRS community in close collaboration with existing communities of users. They will involve industry, SMEs & start-ups, research organizations and practitioners, at EU and national levels. DIREKTION will strengthen current practice and future research and innovation planning in disaster resilience.

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Executive Summary

As the core output of Task 1.2. is the toolset itself, this deliverable focuses on a description of the toolset design and development process. An outline of the expected operationalisation of the toolset for both during and after the project, is also included. In addition to a catalogue of additional resources.

Section 1 sets out the scope of the deliverable, its structure, and relationship with other DIREKTION tasks and deliverables.

Section 2 describes the expected use of the toolset during the project's lifecycle, as well as outlining potential post-project use and steps taken in support of the open science principle.

Section 3 provides an overview of the design and validation of the DIREKTION toolset. This includes a high-level description of the toolset, and the development and validation steps underpinning its design to date. A detailed description of the tools and their individual steps is available in the form of a User Guide, under Annex 3 of this report.

The report is accompanied by two additional Annexes. Annex 1 presents a summary of change management requests resulting from the testing of the toolset (as part of T1.3) and how they have been actioned in subsequent iterations of the toolset. Annex 2 includes a catalogue of additional resources that the tool user(s) or other interested parties may avail themselves of.

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List of acronyms

Acronym	Definition
CDA	Capability Driven Approach
CERIS	Community for European Research and Innovation for Security
CSA	Co-ordinated Support Action
DoI	Digital object Identifier
DR	Disaster Resilience
DRR	Disaster Risk Reduction
DRS	Disaster Resilient Societies
DRM	Disaster Risk Management
DRMKC	Disaster Risk Management Knowledge Centre
EU	European Union
IA	Innovation Action
KPIs	Key Performance Indicators
PCP	Pre-Commercial Procurement
RIA	Research and Innovation Action
RRI	Responsible Research and Innovation
SUS	System Usability Scale
TRL	Technology Readiness Level
TX.X.	Task X.X.
UCP Knowledge network	Union Civil Protection Knowledge Network
WP	Work Package

1 Introduction

1.1 Overview and scope

Increases in the severity and frequency of disasters, coupled with changing risks due to climate change, have reiterated the need for innovative solutions to support the operational challenges faced by first responders. Against this background, the European Union is placing increased focus on research and innovation efforts and the ability to successfully bring these efforts to market. Over the last several years it has supported multiple initiatives addressing this issue, through the promotion of research results using the Horizon Results Booster[1]; supporting platforms for solution investment, such as Innovation Radar Bridge,[2] Dealflow[3], and the European Innovation Council,[4] and through the creation of dedicated spaces for the exchange of cross-disciplinary knowledge and best practices, such as the UCP Knowledge Network,[5] the DRMKC,[6] and CERIS.[7] These efforts are supported by strategic policy initiatives, such as the move towards a Capability Driven Approach (CDA) to support longer term planning of user needs and investment in European civil security research (COM, 2021).

The DIREKTION project aims to support these objectives through the creation of a network that will promote innovation and technology uptake. DIREKTION will systematically capture the capability needs of responders and match these needs by assessing solutions at various levels of readiness and innovation maturity. To support this process, Task 1.2. has developed an excel based toolset to assess capability needs and gaps, and the compatibility of solutions with these needs.

This deliverable reports on the development of the DIREKTION toolset. The toolset will directly support WP2 on the screening and mapping of capability needs and gaps and WP3 on the assessment and validation of current and expected state of the art solutions, and will contribute to the objectives of WP4 on mapping of opportunities and constraints for future programming, building on the DIREKTION Screening and Assessment Framework (DASF) developed under Task 1.1.

The toolset includes:

- A tool for assessing capability needs and gaps,
- A tool for assessing solution compatibility and expected impacts,
- A tool for demand and supply side actor collaborations,
- A supporting user guide,
- User experience feedback forms,
- A catalogue of additional resources.

[1] https://www.horizonresultsbooster.eu
[2] https://innovation-radar.ec.europa.eu
[3] https://dealflow.eu
[4] https://eic.ec.europa.eu/index_en
[5] https://civil-protection-knowledge-network.europa.eu
[6] https://drmkc.jrc.ec.europa.eu
[7] https://home-affairs.ec.europa.eu/networks/ceris-community-european-research-and-innovation-security/about-ceris_en

The tools are excel-based. Assessments have been designed around several question sets. Questions are answered via easy-to-use dropdown lists, with an option to select multiple responses, if needed. Supporting free text boxes are provided to include further comments on the response(s) chosen. Post-assessment reflection questions help to situate the assessment in the wider context of innovation needs and willingness to adopt/supply a solution. A visualisation of assessment results enhances understanding and provides a summary of assessment results for easy comparison.

1.2 Structure of the deliverable

As the core output of Task 1.2. is the toolset itself, this report is focused on a description of the toolset design and development process, and an outline of the expected operationalisation of the toolset both during and after the project.

Section 2 describes the expected use of the toolset during the project's lifecycle, as well as outlining potential post-project use and steps being taken to support open science principles.

Section 3 provides an overview of the design and validation of the DIREKTION toolset. This includes a high-level description of the toolset, and the development and associated validation steps underpinning its design to date. A detailed description of the tools and their individual steps is available in the form of a User Guide, available under Annex 3 of this report.

The report is accompanied by two further Annexes. Annex 1 presents a summary of change management items resulting from the validation of the toolset (as part of T1.3) and how they have been actioned in subsequent iterations of the toolset. Annex 2 includes a catalogue of additional resources that the tool user(s) or other interested parties may avail themselves of.

1.3 Relationship with other tasks and deliverables

This deliverable is the output of T1.2 on the development of DIREKTION tools. The toolset aligns with the DASF developed under T1.1., supporting its operationalisation in the DIREKTION project. The toolset will be operationalised within WP2 and WP3, in addition to providing supporting insights to WP4. The use of the toolset, the assessment process and assessment results will be reviewed as part of the work of the European Fire and Rescue Forum (EFRF), under WP5.

Finally, the toolset will be made available to the public through the DIREKTION website and networking activities with other projects and DRS initiatives. In this sense, the toolset is expected to be a Key Exploitable Result, to be promoted under WP6.

2 Operationalisation

2.1 Project Use

DIREKTION supports first responders to identify and assess their capability needs and foster demand-led innovation and development.[8] DIREKTION has developed a methodological assessment and screening framework (DASF) supporting the identification and prioritisation of capability gaps, the assessment of solutions, and the identification of future research needs.[9] The DIREKTION Toolset supports this framework. Together they draw on best practice approaches in research and innovation to support the development of a capability driven approach for Disaster Risk Management (DRM). The toolset has been designed with the understanding that the final owner will be personnel from responder organisations.

Within DIREKTION, the toolset will be used as part of WP2 on the screening and mapping of capability needs and gaps and WP3 on the screening, assessment and validation of current and expected state of the art. In addition, the findings from the application of the toolset in WP2 and WP3 will support the objectives of WP4, in particular, the responses to questions on innovation needs and willingness to supply/adopt and the results from the Solution Uptake tool.

To aid this process an online "train the trainer" session will be held with both WP2 and WP3 leads (FhG and KEMEA, respectively). This will provide WP2 and WP3 leaders with the necessary knowledge to support and direct responders in the use of the toolset. Below are examples of how the toolset might be used as part of WP2 and WP3.

WP2 – Capability (Gap) Assessment:

- Responders apply the DIREKTION Assessment and Screening Framework (DASF) to identify their capability needs (DASF step 1.1) and gap(s) (DASF step 1.2).
- Responders apply the DEMAND tool to assess their capability by need for improvement and need for prioritisation (DASF step 1.3).
- Responders apply the DEMAND tool to identify the challenges related to addressing these gaps (DASF step 1.3).
- Responders apply the DEMAND tool to identify the functionality they think will best help to address the gap (DASF step 2.1).
- The DIREKTION team collates the list of capabilities identified for improvement and prioritisation, the challenges associated with addressing these gaps, and the functionalities the solution should provide. The results of which are used to inform the identification of solutions for assessment under WP3.

WP3 – Solution Assessment:

- Based on the results of WP2, the DIREKTION team identifies potential solutions that can address capability needs and gaps (DASF step 2.1).
- The DIREKTION team coordinates with solution providers to engage in the assessment process. This can be done by reaching out to providers directly or co-ordinating with research projects, depending on the level of solution maturity being targeted.
- Solution providers apply the SUPPLY tool to assess the readiness of the solution. The results of the assessment are discussed internally using the post-assessment reflection questions (DASF step 2.2).

[8] For further details see: https://www.fire-in.eu

[9] For further details on DASF, please see Deliverable.1.1, Chapters 4-8, of the DIREKTION project.

- Responders apply the DEMAND tool to screen and assess the solution. The results of the assessment are discussed internally using the post-assessment reflection questions. Assessment feedback can be provided to the solution providers (DASF step 2.3 and 2.4).
- Using the SOLUTION UPTAKE tool solution providers and responders collaboratively discuss the results of the SUPPLY and DEMAND assessment tools. Depending on the result of the assessment and the innovation stage of the solution, next steps to support scaling up and adopting of the solution can be discussed and decided on.

As DIREKTION does not have the capacity to host and run field tests within the project, the toolset has been designed as a paper-based assessment.

2.2 Post Project Use

As DIREKTION is focused on supporting responder organisations to better address their needs, sustainability of the assessment process is key. To aid this, the validation of the DIREKTION tools and methodology sought to understand how the tools could be used post-project.

A key insight resulting from T1.3 is that the assessment processes of responder organisations vary greatly. These variations are not only national but also organisational in nature. For example, within some organisations the assessment process is highly decentralised, incorporating participation from multiple departments, and decision-making processes are typically consensus-based. However, in other organisations the assessment process is far more centralised and decision making follows the formal hierarchy or command structure of the responder organisation.

In addition, it is worth noting that assessment of solutions is not done in isolation, rather several factors play into the uptake of research outputs (see for example, European Commission, 2022). While these issues cannot be resolved through the application of the toolset, they are important to bear in mind when reflecting on how solution assessment occurs and the interventions that can be made to support innovation uptake and the creation of a European market for DRS.

These issues will play a key role in understanding how the toolset could be operationalised post-project and will be a key focal point of feedback for toolset use within the project lifecycle.

2.3 Open Science

In line with open science best practices the toolset and supporting user guide will be made available on the DIREKTION website during the project. Many responder organisations are already engaged in processes of assessing capability gaps and solutions, which the toolset can support. Results from the use of the toolset, produced with consortium partners and networks, will be made available to the public, further supporting the circulation and exchange of knowledge.

In addition, the toolset and supporting user guide will be made available to non-consortium responder organisations, solution providers, and other interested parties for use in their own work via the DIREKTION website. These users will be invited to share any results from the use of the toolset but will not be obliged to do so.

Both consortium and non-consortium users will be asked to provide feedback on the toolset using the feedback forms included in the user guide. Feedback questions focus on user experience and suggestions for improvements. This feedback will inform the planned update of the toolset (M35) and direct future opportunities for uptake and exploitation of the toolset.

In line with the FAIR principles of making research Findable, Accessible, Interoperable and Reusable,

- The toolset will be made available on Zenodo, an open science platform, with a unique DoI to ensure they are citable and trackable.
- The toolset will be made openly accessible on the DIREKTION website and via Zenodo, as outlined above.
- The source materials for the toolset design have been clearly described in this report, with supporting links to reference materials.
- The toolset is based on standardised file formats (.pdf and .xlsm) that are easily interoperable with open-source software.

The following chapter provides an overview of how the Toolset was developed, including two rounds of development and responder validation testing.

3 DIREKTION Toolset

3.1 Overview and Design

Extant literature has highlighted the role innovative solutions can play in disaster management, especially in an evolving risk landscape (Izumi, et al. 2019; Rahman and Fang, 2019). The need for innovative solutions that can meet the needs of responder organisations is paramount. The DIREKTION project seeks to address this need by bringing together demand and supply side actors, matching capability needs with solutions, promoting promising research results, and identifying future areas for research programing support and investment.

Research has also demonstrated the bi-fold challenges of bringing innovative solutions to market and achieving meaningful solution uptake and adoption (Butler, 2008). This issue is further complicated by a lack of frameworks dedicated to assessing the innovative potential of solutions (Klessova et al, 2022) and the fact that responder organisations are traditionally slow to adapt existing practices and techniques. Thus, there is a well-established need for tools designed to improve demand and supply interactions in the context of innovation assessment (Webster and Gardener, 2019; Nepelski and Van Roy, 2021). The DIREKTION toolset aims to meet this need by providing flexible tools to develop and strengthen collaborative assessment and better match supply and demand side needs (see Krikigianni et al, 2022).

The design and development of the toolset is grounded in three interrelated objectives:

- to support demand-led innovation and solution uptake,
- to connect the assessment of capability gaps with the assessment of solutions,
- to connect demand and supply actors in the assessment process.

These objectives are interlinked, as it is reasoned that solutions that better meet users' needs are more likely to achieve successful market uptake. Based on this premise, solution design and development should be based on a clear understanding of responder needs. To meet these objectives the toolset:

- Provides a systematic assessment process that supports responder organisations to assess capability needs and gaps.
- Focuses the assessment of solutions on compatibility with user needs, operational needs, and organisational needs, in addition to expected impacts.
- Integrates both demand and supply side perspectives, reflections, and points of discussion and dialogue into the assessment format.

The toolset is composed of:

- A tool for assessing capability needs and gaps,
- A tool for assessing solution compatibility and expected impacts,
- A tool for demand and supply side actor collaborations,
- A supporting user guide,
- User experience forms,

- A catalogue of additional resources.

The tools are excel based and follow a series of steps guiding the user through the process. Assessments have been designed around several question sets, where questions are answered via easy-to-use dropdown lists. Depending on the question, the user is instructed to select single or multiple responses, as needed. Free text boxes are provided to include further comments on the response(s) chosen. Both the DEMAND and SUPPLY tools include post-assessment reflection questions designed to situate the assessment in the wider context of innovation needs and willingness to adopt/supply a solution. Finally, DEMAND tool assessment results are visualised to enhance understanding. These visualisations can be copied into a summary file to provide easy comparison across multiple assessments. Any changes to the source visualisations will automatically update.

3.2 Design Methodology

As DIREKTION is a Coordinated Support Action (CSA), the methodology for design focused on identifying and incorporating previous work on capability gap and solution assessments into the toolset.

Desk-based research was carried out on existing criteria for capability gap analysis and solution screening and assessment to support the design and development of the toolset. This includes criteria applied in previous research projects. Projects were identified from a recent mapping of all projects within the security programmes for H2020 and Horizon Europe carried out under the TRANSCEND project (TRANSCEND, 2023). From this list, the review was limited to projects funded under DRS call topics.[10] A timeline was also used to set the scope of the materials reviewed. Projects reviewed include all DRS funded projects ending year 2020 through to year 2023 (N=38). Projects within this timeline were primarily funded under Horizon 2020, with the exception of (N=2) projects receiving joint funding from the Korean government and (N=1) receiving funding from DG ECHO under the UPCM. The projects covered multiple call types including, Innovation Action (IA); Research and Innovation Action (RIA); Coordinated Support Action (CSA); Pre-Commercial Procurement (PCP). The review drew on publicly available materials accessed either directly from the project website or through the European CORDIS portal.

A second round of analysis focused on identifying previous/ongoing research that addresses topics related to the objectives of the toolset, as outlined in Section 3.1. This review moved out of the DRS space to include other research domains, in particular other CSAs also targeting these issues (e.g. Cyclopes;[11] ILEAnet;[12] I-LEAD;[13] ResiStand;[14] MEDEA[15]) in addition to expanding beyond the project focus of the first round to include white papers and grey literature. The results confirmed the focus of the assessment topics and criteria for assessment were saturated, with no new criteria identified.

Desk-based research was supplemented by exploitation of consortium knowledge of the domain, bringing to the fore past research in the DRS space (e.g. ResiStand) in addition to relevant research taking place in other domains (e.g. MEDEA and ENTRAP), as well as an in-house tool for capability assessment (CAT) sourced from a consortium partner, TNO.

[10] Some projects addressed issues crossing cutting to DRS; BM; and FCT. These projects were included in the review.
[11] For more information see, https://www.cyclopes-project.eu
[12] For more information see, https://cordis.europa.eu/project/id/740714
[13] For more information see, https://cordis.europa.eu/project/id/740685
[14] For more information see, https://cordis.europa.eu/project/id/700389
[15] For more information see, https://www.medea-project.eu

While this method offered a systematic means to review a large volume of material, the following points are worth noting. First, the degree of publicly available materials varies across the projects, this is particularly true in relation to older projects and projects with high levels of security sensitive materials. Second, due to this variation, specific assessment criteria could not always be identified per project; however, this does not mean that assessments were not carried out in the project. Despite these limitations, the review enabled a more thorough understanding of the current topics/criteria used to assess DRS project solutions, supporting the development of the DIREKTION tools.

While the method was designed to identify and include assessment criteria for as many solution types possible, results for 'softer' solutions, i.e. for communities of practices, processes, training, handbooks etc., were not as well established as those for technologies (hardware and software). This skews the sample in favour of criteria designed to assess technologies. T1.2 focused on identifying solution assessment criteria to aid the development of the toolset, whereas WP3 will focus on assessing the solutions themselves.

The review revealed that the criteria used to assess solutions are often project specific, however three key areas of focus emerged, including:[16]

- User needs assessment, often focusing on matters of performance and usability;
- Ethical, legal, and societal issues (ELSI) assessments;
- Innovation and exploitation assessments.

In addition, first-hand testing was identified as the primary method through which solutions are assessed. The kind of testing applied (e.g. tabletop exercise vs field exercise) depended both on the type of solution being assessed and its stage of development (typically determined by Technology Readiness Level (TRL)). Many solutions underwent multiple rounds of testing as they progressed in their maturity.

The review also revealed that existing efforts to assess solutions have focused either on a specific solution type, primarily technology, or a specific hazard type, e.g. flooding, wildfires. The DIREKTION tools have been designed to be applied to a range of solution types, including methods and standards. In addition, they provide an option for an all-hazards assessment. This approach aligns with the methodology developed under the DIREKTION screening and assessment framework (DSAF, D1.1) in collaboration with the objectives of WP2 and WP3.

The following section outlines the development process for the toolset.

3.3 Tool Design

The toolset underwent two cycles of development. Drawing on the insights of the desk-based review the first cycle took place from M1-5. This version of the tool was then validated under T1.3. Based on feedback from the validation process, a second round of development took place from M7-M8. The sections below describe the design of the tool across these two cycles of development. A final round of development based on the use of the toolset will take place in M35.

3.3.1 Development Cycle 1

The desk-based review identified maturity models as one of the principal methods through which capability assessments are carried out. Maturity models have been successfully applied across a range of fields to assess capability. A maturity model is "essentially a classification scheme that places patterns in developing organizational capabilities under a certain capability stage, assuming linear progression from an existing

[16] A full overview of the DRS project details and assessment methods and topics is available in D1.1, Annex 5.

mature state to a higher maturity level" (UNDP, 2022, p. 10). A typical maturity model "represents stages of increased quantitative or qualitative capability changes of a maturing element to assess its advancement concerning a defined focus area" (ibid).

In line with the objectives established early in the task, the design of the tools focused on developing an assessment process that would connect the assessment of capabilities with the assessment of solutions and integrate demand and supply side participation in the process. Flexibility was also prioritised as it is well understood that the assessment needs of responder organisations vary.

The first round of development resulted in four components that could be flexibly combined to suit assessment needs. These components were chosen to meet the objectives of the toolset:

- Component 1, Solution readiness assessment – captures the contribution of solution providers for integration of supply side participation in the process.
- Component 2, Capability gap analysis – to enable systematic capability gap assessment by responders.
- Component 3, Solution assessment – to enable systematic solution assessment, linked to results of capability gap analysis.
- Component 4, Discussion – to encourage collaboration between demand and supply side actors, and communication of responder needs for demand-led innovation.

The different components target different stakeholder groups (Supply and Demand), with the overarching aim of supporting collaboration and dialogue between supply and demand side actors, successful solution development, and market entry and uptake.

The Capability Gap Analysis component asks the assessment owner to score identified capability gaps using a maturity scale (from 0-5). The maturity of capability gaps is analysed by 6 capability elements (infrastructure, interoperability, technology, human, organization, regulatory) building on the results of the EU-funded project MEDEA.[17] Each element is scored according to its **current** maturity level. Maturity levels are described below and assigned a numerical value for scoring.

Maturity/Level	Description	Score
N/A	Not applicable (explanation required)	0
Ad hoc	Desired, but is not planned.	1
Recognised	Planned, but with no resources available to achieve the capability.	2
Defined	Planned and with resources available to achieve the capability.	3
Managed	In progress/partially implemented OR fully implemented but lacking performance assessment and compliance with standards.	4
Optimised	Fully implemented AND performing, full compliance with standards, continuous improvements is done on an ongoing basis on quantified performance goals.	5

Table 1: Maturity Scale, adapted from UNDP, 2022.

[17] For information, see: https://www.medea-project.eu

The combined score of the capability elements is averaged to produce an overall maturity score for the capability gap. Scores are calculated and categorised according to an action, as outlined below.[18]

Score	Description	Source
0-2	Improvement needed	ENISA, SIM3v1 self-assessment tool.
3	Compliant	ENISA, SIM3v1 self-assessment tool.
4	Better	ENISA, SIM3v1 self-assessment tool.
5	State of the art – repeat assessment.	DIREKTION

*Table 2: **Results schematic.***

Capability elements are then grouped by complexity domains and assigned to potential solution functionalities, in line with the recent EU security market taxonomy (Deloitte & Ecorys, 2022). Complexity is assessed using a dropdown list following the Cynefin framework (Rancati & Snowden, 2021). The Cynefin framework identifies 4+1 domains of complexity: clear; complicated; complex; chaotic; and disordered. These domains are applied to the results of the capability gap analysis, and the relationship between a capability gap and the kind(s) of solution functionalities required to meet them are organised according to these domains.

Under the 'Solution Assessment' component the assessment owner scores solutions (from 1-5) twice. The first assessment focuses on the likelihood that the solution will improve the maturity score of the 6 capability elements assessed in the previous component. This is repeated per solution assessed for each of your identified capability gaps. Each capability element is weighted evenly, and scores are summed and averaged. Results are calculated horizontally per solution and vertically per element, as illustrated below:

A	B	C	D	E	F	G	H	I	J	K
How likely is the solution to influence your maturity in:	DRR Phase	Hazard type	Capability Gap	Infrastructure	Interoperability	Technical	Human	Organisation	Regulatory	Score
Solution Name	Prepare.	All hazards	Description of Gap	unlikely 1	Very unlikely 2	Likely 3	Very likely 4	5	unlikely 1	3.2
Solution Name	Prepare.	All hazards	Description of Gap	Very unlikely 2						0.4
Solution Name	Prepare.	All hazards	Description of Gap	Very likely 4						0.8
				1.4	0.4	0.6	0.8	1	0.2	

Figure 1: Solution Assessment, 1st Assessment (with sample data and scoring for illustrative purposes).

The second assessment focuses on the importance of a number of high-level priorities shaping the adoption and implementation of the solution being assessed. These factors vary depending on the kind of solution being assessed and the importance of these factors is linked to the context of the specific solution assessment and its expected use case. Each priority is weighted evenly, and results are calculated horizontally per solution and vertically per element, as illustrated below:

When assessing solutions, how important are the following:	Socio-cultural	Environment & Sustainability	Ethical	Legal & Political	User Needs	Compatibility	Procurement & cost-benefit balance	Feasibility & Maturity	Standards	Score
Solution A	Not at all important 1	Moderately important 3	Somewhat important 2	Moderately important 3	Very important 4	Not at all important 1	Somewhat important 2	Extremely important 5	Not at all important 1	4.4
Solution B	Somewhat important 2									0.4
Solution C	Moderately important 3									0.6
	1.2	0.6	0.4	0.6	0.8	0.2	0.4	1	0.2	

[18] The actions for the scored are based on the scoring of the ENISA maturity model. For more information, see: https://www.enisa.europa.eu/topics/incident-response/csirt-capabilities/csirt-maturity/csirt-survey

Figure 2: Solution Assessment, 2nd Assessment (with sample data and scoring for illustrative purposes).

The Discussion component provides a series of discussion questions on three topics:

- Solution adoption and implementation,
- Solution impact,
- Innovation collaboration, with a particular focus on the EU research domain.

These questions are designed to encourage discussion and debate on the readiness and willingness to implement new solutions (if and when they come on the market); the potential impact and added-value of the solution; and the role of innovation collaboration in producing solutions that meet capability needs.

3.3.2 Validation

To support user validation of the toolset multiple iterations of the tool were presented to consortium partners for review and feedback. This included regular presentations on the status of the tool at monthly consortium progress meetings to all consortium partners, and active engagement with WP2 and WP3 leads (as the target owners of the assessment process within DIREKTION) to ensure the tools meet their needs both during and after the project.

The toolset, along with the methodology from T1.1, was formally validated under T1.3 (see D1.3 for further details). This involved two workshops resulting in a list of change management requests that informed subsequent and final iterations of the toolset.[19] Following the workshop, an internal responder-led short-term working group was set up to further understand how current assessment processes are carried out within their organisations (for both capabilities and solutions), and how the toolset could integrate with these processes.

During the validation of the toolset, the importance of the user interface was highlighted by workshop participants. Much of this feedback was actioned in the ensuing rounds of tool development, focusing on improved ease of use (see Annex 1 for an overview of actions taken based on feedback gathered during validation testing).

Workshop discussions also highlighted the challenge related to the use of clear terminology. The issue of terminology has been a challenge across multiple EU areas of integration. To aid this task, the assessment process has focused on removing ambiguous terms (this was particularly relevant in relation to the assessment scoring scales). In addition, the user guide includes a section on key terms used with the toolset and Annex 1 of Deliverable 1.1. offers a concise list of key terms and definitions within the DRS space.

3.3.3 Development Cycle 2

The second cycle of development sought to action the feedback from the validation process. The majority of the feedback focused on the need to simplify the tool interface and to clarify the assessment purpose. The following key changes were made:

- Redesign of component structure, Capability assessment and solution assessment integrated into 1 DEMAND tool.
- Maturity model capability elements and scoring schematics removed in favour of assessment questions set and dropdown lists.

[19] See D1.3 for more details on the testing and validation process. See Annex 1 for an overview of change management actions and their integration into the toolset design.

- Solution assessment topics refocused on compatibility with needs (user, organisational and operational) and expected impact in line with Responsible Research and Innovation (RRI) approaches.
- Post-assessment reflection questions on innovation needs and willingness to adopt/supply integrated into DEMAND and SUPPLY tools.
- Bar charts for visualisation of assessment results included in the DEMAND tool.
- Support on how to create a Master file with summarised assessment results included in User Guide.
- Discussion component re-named and re-oriented towards suggestions to support solution scaling. Design interface simplified to improve assessment flow, ease of use and clarity of purpose.

Based on these changes, the toolset now includes:

- The DEMAND tool for capability and solution assessment by responder organisations,
- The SUPPLY tool for solutions readiness assessment by solution providers,
- The SOLUTION UPTAKE tool for discussions on solution scaling to be completed collaboratively,
- User guide,
- User experience feedback forms,
- A library of additional resources on assessment related topics.

Each of the tools is designed around a series of steps, guiding the user through the assessment process. These steps include a combination of questions set, dropdown lists, and free text boxes. The dropdown lists present easy-to-understand scales where the user is asked to respond to the question using the options provided. Such scales were widely used in the assessment processes reviewed, particularly in relation to assessing if solutions meet user needs, as they are both easy to understand and provide a clear format to capture user feedback. To supplement the dropdown lists, free text boxes provide space for the user to include additional qualitative comments, adding further depth and context to the responses of the dropdown lists. To develop a toolset that can be applied to a range of capability gaps and solution types, assessment questions are designed to be generic. Users are not required to respond to all assessment questions and/or can mark questions as 'not applicable'.

In line with the original design methodology of exploiting existing knowledge in the DRS domain, the following table lists source materials for the second development cycle of the tools, combined and adapted to the objectives of DIREKTION. The first column indicates the source materials. The second and third columns list the specific tool and step within the tool, respectively. And, the fourth column describes the part of the step the source materials contributed to.

Source	Tool	Tool Step	Input to
DIREKTION D.1.1.	Demand	Capability Gap Assessment, Step 0, Preparation.	Hazard: options on the dropdown list
DIREKTION D.1.1.	Demand	Capability Gap Assessment, Step 0, Preparation.	Phase: options on the dropdown list
CAT – TNO.	Demand	Capability Gap Assessment, Step 0, Preparation.	Capability Group: options and hierarchy relationship to phase in dropdown list
CAT – TNO.	Demand	Capability Gap Assessment, Step 1, Capability Gap Assessment.	Current capability assessment: question topics
CAT – TNO.	Demand	Capability Gap Assessment, Step 1, Capability Gap Assessment.	Capability Gap assessment: question topics.

ENTRAP[20]			
ENTRAP	Demand	Capability Gap Assessment, Step 1, Capability Gap Assessment.	Biggest challenge to addressing the gap: options on the dropdown list.
EU civil security market study	Demand	Capability Gap Assessment, Step 1, Capability Gap Assessment.	Functionality classification: options on the dropdown list.
Innovation Radar	Demand	Solution Assessment, Step 1, Solution Screening.	Innovation maturity: options on the dropdown list.
HEIMDALL[21]	Demand	Solution Assessment, Step 1, Solution screening.	Compliance readiness: scoring schematic.
ResiStand[22] **Assessment topics identified from SoTA review.**	Demand	Solution Assessment, Step 2, Solution compatibility and impact analysis.	Compatibility: question topics
ROADMAP2[23] **SATORI**[24]	Demand	Solution Assessment, Step 2, Solution compatibility and impact analysis.	Impact: question topics.
BRIGAID[25]	Demand	Post Assessment Reflection.	Innovation needs: question topics
ILEAnet BuildERS[26]	Demand	Post Assessment Reflection.	Willingness to Adopt: question topics
EU civil security market study	Supply	Step 0, preparation.	Functionality classification: options on the dropdown list.
CAT	Supply	Step 0, preparation.	Capability supported: options and hierarchy relationship on the dropdown list.
MultiRate[27]	Supply	Step 1, Solution readiness Assessment.	Readiness levels
BRIGAID	Supply	Step 2, post assessment reflection.	Innovation needs. Questions topics
ILEAnet	Supply	Step 2, post assessment reflection.	Willingness to Adopt: questions adapted.
ELHRA[28]	Solution Uptake	Step 2, Tactics for scaling.	Tactics and demand and supply questions

Table 3: DIREKTION toolset source materials

To support the application of the tools a user guide has been developed. This guide provides step-by-step instructions on both the assessment process and the different tools and steps within the toolset. A copy of the User Guide is available in Annex 3 of this deliverable.

[20] For more information see, https://cordis.europa.eu/project/id/740560
[21] For more information see, https://cordis.europa.eu/project/id/740689
[22] For more information see, https://cordis.europa.eu/project/id/700389
[23] For more information see, https://civil-protection-knowledge-network.europa.eu/projects/roadmap2
[24] For more information see, https://satoriproject.eu
[25] For more information see, https://cordis.europa.eu/project/id/700699
[26] For more information see, https://cordis.europa.eu/project/id/833496
[27] For more information, see https://www.multirate.eu/
[28] For more information see, https://www.elrha.org/researchdatabase/how-to-scale-tactics-adopting-humanitarian-innovations/

4 Conclusion

This deliverable responds to the objectives of T1.2, Development of DIREKTION tools. The report outlines the design methodology and tool validation supporting the development of the toolset. The toolset, user guide and catalogue of resources will be made available within the DIREKTION network, supporting project objectives.

The toolset supports the DIREKTION methodological framework (DASF) developed under T1.1. The toolset has been designed for operationalisation within the DIREKTION project by WP2 and WP3, with supporting insights being offered to WP4. In line with this, WP leads have been closely integrated into the review process, providing feedback on the suitability of the toolset to meet their needs.

In addition, post-project use of the toolset has been actively discussed and will be further explored in the conversation with the European Fire and Rescue Forum (EFRF) (WP5) with further actions for dissemination and exploitation to be discussed under WP6.

A planned update for the toolset (M35) will capture feedback from the use of the toolset and guide future development.

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Annex 1 : Change Management Protocol

No.	Change Request	Rationale	Proposed Action	Status
1	General: Add column to include details on who is doing the assessment.	Provides a point of contact for any follow up questions. Adds context to the assessment perspective. E.g. depending on their position within an organisation the scale of a capability gap will be defined differently.	Column added to provide space on the names of both the assessment owner(s) and assessment contributor(s).	Actioned for both the DEMAND and SUPPLY tools.
2	General: Add column on the objectives of the assessment.	Provides context on the objectives of the assessment.	Column added to provide space on the objectives of the assessment.	Actioned for the DEMAND tool.
3	General: User interface. Put all responder organisation assessments into 1 sheet and solution provider assessments into 1 sheet	To support ease of use and improve the design of the assessment layout.	Tool interface changed from horizontal to vertical so that the DEMAND tool could be integrated into one sheet. Separate guidance and preparation steps included in the interface to mark the beginning and end of the assessments, supported by colour coding.	Actioned for both the DEMAND and SUPPLY tools.
4	General: Simplification of scoring schematics. Suggested action: Provide more information to the user on how to interpret the scoring to justify the score chosen.	Feedback from the workshop highlighted challenges with the understanding of the scoring schematics. To improve clarity and ease of understanding.	Simplified scales were used to replace the initial maturity scales. These scales offer clear terms that can be flexibly applied depending on the organisational interpretation.	Actioned for all toolset.

5	General: Simplification of assessment terms.	Feedback from the workshop highlighted challenges associated with interpretation of assessment terms. To improve clarity and ease of understanding.	Where possible standardised terms have been used (e.g. the DR Phases). However, interpretation of terms is beyond the scope of the tool development.	Actioned for the toolset.
6	General: Visualisation of assessment results	To improve clarity and ease of understanding. To provide a baseline for setting actions.	Bar charts for the DEMAND assessment steps added to the DEMAND tool.	Actioned for the DEMAND tool.
7	General: A functionality that situates the assessment results in the context of the readiness and willingness of the organisation to adopt the solution will add value.	N/A	Post-assessment questions on these topics integrated into design interface of assessments for DEMAND and SUPPLY tools.	Actioned for DEMAND and SUPPLY tools.
8	General: A functionality linking the results to a master sheet, with summing tables	To improve the added value of the assessment process.	Inclusion of bar charts to visualise results, with a description of how to create a master sheet based on these charts included in user guide.	Actioned for DEMAND tool.
9	Capability Gap Assessment: clarify that this assessment is for the capability gap and not the solution. Suggested action: Move the solution name column to the end. And the capability gap column is at the start. OR take the information about the solution out of the capability gap analysis page. The complexity assessment should come after the capability gap description column.	To improve clarity and ease of understanding.	Tool interface changed from horizontal to vertical so that the capability gap assessment and solution assessment could be better distinguished from one another. Separate guidance and preparation steps included in the interface to mark the beginning and end of the assessments, supported by colour coding.	Actioned for the DEMAND tool.
	Capability Gap Assessment: Change title of solution functionality. A further explanation is required. It should also come earlier. A restructuring of the columns.	To improve clarity and ease of understanding.	Title change implemented. Supporting explanation included in 'red tab' and in the user guide. The structure was amended to reflect the new design.	Actioned for DEMAND and SUPPLY tools.
10	Capability Gap Assessment: the complexity assessment does not add value to the process.	Lacks integration with the assessment process. Purpose not justified.	Complexity assessment removed.	Actioned for the DEMAND tool.

	There is no direct link between the capability gap score and the complexity assessment.			
11	Capability Gap Assessment: include an option to exclude certain assessment questions from the process	To enhance flexibility of the assessment, so the users can adapt the assessment to their needs and context.	A 'Not Applicable' option was added to the dropdown lists. Any questions answered as not applicable are not captured under the visualisation of results.	Actioned for the DEMAND tool.
12	Capability Gap Assessment: assessment focus must be clearly defined and easy to understand.	To improve clarity and ease of understanding.	Assessment focus shifted from general topics to clear assessment questions.	Actioned for the DEMAND tool.
13	Capability Gap Assessment: Capability elements – must be clearly defined. Overlaps between the categories. With supporting examples. The definitions per organisations is different. You first need the table to understand what the terms mean – a learning requirement.	To improve clarity and ease of understanding. To support understanding the purpose of the assessment.	The confusion from the maturity model scale and capability element, was the focus of the redesign effort in the second round of development. The maturity model was removed in favour of self-assessment questions, with a simplified scoring schematic.	Actioned for DEMAND tool.
14	Solution Assessment: for the 2nd assessment the horizontal scoring is not necessary.	To improve the assessment process.	The confusion of the scoring process was the focus of the redesign effort in the second round of development. The topics addressed under the 2nd assessment were used as the basis for the screening step requested under change request no. 15 below.	Actioned for DEMND tool.
15	Solution Assessment: include a screening step that helps to filter solutions that are not compatible with key requirements.	To improve the assessment process.	Screening questions designed based on a review of current policy priorities. Redesigned to include assessment of innovation maturity and compliance topics.	Actioned for the DEMAND tool.
16	Solution Assessment: improve the clarity of the Likert scale.	To improve clarity and ease of understanding.	New, simplified scale input with focus on improved clarity.	Actioned for the DEMAND tool.
17	Solution Assessment: improve the text explaining the purpose of the assessment.	To improve clarity and ease of understanding.	Associated text in the user guide edited. Individual preparation step with	Actioned for the DEMAND tool.

			instructions provided for both the capability gap and solution assessments.	
18	Discussion: repetition of discussion topics with issues covered in the previous components.	To improve clarity and ease of understanding.	Reviewed for repetition and deleted. Redesign of questions, with a focus on questions discussing tactics and possible actions for supply and demand side actors to take for solution scaling.	Actioned for the SOLUTION UPTAKE tool.

Table 4: Change Management Actions for Toolset Design

Annex 2 : Additional Resources

Topic	Title	Description	Source
Capability	**Dynamic Capabilities Approach (DCA)**	A 4-phase strategic approach that provides guidance on how to plan, monitor and evaluate Capacity Development in a given sector, emphasising the dynamics of factors in business ecosystems.	https://capacity4dev.europa.eu/groups/public-cd-tc/info/dynamic-approach-capabilities-development_en
Capability Analysis	**TNO Capability Assessment Tool (CAT)**	Tool designed to support the process of systematically analysing the status of the capabilities that are essential in the given security context. Its functionalities include capability identification, performance evaluation, needs improvement and assessment to strengthen capabilities. This iteration of the tool was developed further under DIREKTION in support of disaster resilience capabilities assessment.	https://tno.github.io/cat/

Capability Analysis	CRISPRO Assessment tool	Online tool that serves crisis managers and organisations with planning and mitigating risks and implementing measures to reduce negative effects in disaster management.	https://crispro.eu/assessment-tool/
Gap Identification	DRIVER+ Gap Explorer	The page allows the user to view existing gaps in crisis management and to find out which solutions could be addressing them. Users can also define or add new gaps into the tool.	https://civilprotection.solutions/en/gaps
Gap identification	Disaster Risk Management Knowledge Centre (DRMKC) Gaps Explorer	The tool provides targeted recommendations for hazards, tailored to different stakeholder profiles (policymakers, practitioners and scientific researchers) based on thematic reviews. Forest Fires is the first available topic.	https://drmkc.jrc.ec.europa.eu/science-for-drm/gaps-explorer
Gap Identification	Platina3 Report on gap analyses on R&D to promote market uptake conditions	The report provides an overview of new and innovative ideas around inland waterway transport (IWT) in general, and standardised transport units, vessel designs, and transhipment infrastructure more specifically, which is used to analyse the market gaps.	https://platina3.eu/gap-analyses-on-rd-to-promote-market-uptake-conditions/
Gap Identification	Foresight tools by the Competence Centre on Foresight	Overview of foresight tools, including Horizon Scanning, Digital Transition Toolkit or the Scenario Exploration System (ESS), to ease foresight for decision-making.	https://knowledge4policy.ec.europa.eu/foresight_en
Gap Analysis	EU Civil Protection Mechanism (UCPM) Peer Review Programme	The tool provides a country or region the opportunity to reflect on its readiness to cope with natural hazards and human-induced disasters and to strengthen its prevention and preparedness policy and practices. It is managed by the Commission's Civil Protection and Humanitarian Aid department.	https://civil-protection-humanitarian-aid.ec.europa.eu/what/civil-protection/peer-review-programme_en
Gap Analysis	Data Drivenness Process Capability Determination Model (DDPCDM)	The model enables organisations to determine their current management capabilities, derivation of a gap analysis, and the creation of a comprehensive roadmap for improvement in a structured and standardised way.	https://ietresearch.onlinelibrary.wiley.com/doi/pdf/10.1049/sfw2.12033#:~:text=The%20proposed%20Data%20Drivenness%20Process,from%20a%20holistic%20multidisciplinary%20perspective

Gap Prioritisation	Balance Scorecard (BSC)	A strategic planning and management systems through which organisations can communicate objectives, align strategies, prioritise products and services, or measure and monitor progress towards strategic targets.	https://balancedscorecard.org/bsc-basics-overview/
Gap prioritisation	RICE	A prioritisation formula consisting of four measurements – Reach, Impact, Confidence, and Effort. Useful for (crisis) management practitioners to prioritise needs.	https://getspeckled.com/blog/the-rice-prioritization-formula-1#
Solution Identification	DRIVER+ Portfolio of Solutions	Solutions search that can filter by hazard (e.g. earthquake, wildfire, pandemics, etc.), by innovation stage (e.g. concept, R&D, market growth, etc.), and by crisis cycle phase (e.g. mitigation, response, etc.).	https://civilprotection.solutions/en/PoS/solutions
Solution Identification	ROADMAP2 Solutions Explorer	An open-source web platform with access to data and experiences in the field of Disaster Risk Management, available at different governance levels – local, regional, national and international. Its database is interoperable with the DRMKC Gaps Explorer and can be linked with other available databases.	https://solutionsexplorer-roadmap.ci3r.it
Solution identification	UNDP Frontier Technology Radar for Disaster Risk Reduction (FTR4DRR)	The radar systematically tracks frontier technologies as they are developed so that technological solutions can be categorised by technology type, disaster/crisis type, and maturity level, helping stakeholders navigate the variety of existing and emerging technologies and their use cases.	https://drrtechradar.org
Solution identification / Screening / Assessment	FIRE-IN	The project was aimed at improving the national and European Fire & Rescue (F&R) capability development process by fostering innovation in this domain and promoting cutting edge solutions to operational needs to reduce residual risks and enhance the civil security of EU citizens.	https://www.fire-in.eu/fire-in
Solution identification /	MEDEA	The project was aimed at establishing a safer and more secure societies throughout the Mediterranean and Black Sea region	https://www.medea-project.eu/

Screening / Assessment		using research and innovation as catalyst to promote collaboration between practitioners from diverse regions and fields – Border protection, Disaster Management or Human Development.	
Solution identification	CORDIS	EU Research & Innovation website to access all information regarding projects, topics, results and publications by the EU's research programs.	https://cordis.europa.eu/
Solution identification	Innovation Radar	A platform to identify EU-funded innovations and innovators.	https://innovation-radar.ec.europa.eu/
Solution identification	Stakeholder and Citizen Engagement in Climate Adaptation: a DIY manual	The manual supports regional and local authorities identify which participatory activities, tools and methods can be implemented in each step – communicate, engage, connect and enable (action) - of the Regional Adaptation Support Tool (RAST).	https://climate-adapt.eea.europa.eu/en/mission/solutions/citizen-engagement-manual
Solution identification	UCPM Projects	UCP Knowledge Network projects explorer. It enables filtering by type of project, by project status, by hazard type, by duration, by DRM phase, by sector, or by geographical area.	https://civil-protection-knowledge-network.europa.eu/projects/search
Solution identification	World Bank Nature-based Solutions (NBS) catalogue for urban resilience	Guidance document to support growing demands for NBS by enabling an initial identification of potential investments in NBS.	https://documents.worldbank.org/en/publication/documents-reports/documentdetail/502101636360985715/a-catalogue-of-nature-based-solutions-for-urban-resilience
Solution identification	ARITON Disaster Management AI Portal	Includes several datasets, AI algorithms and manuals and training materials about different disaster scenarios.	https://www.kios.ucy.ac.cy/ARTION/
Solution identification	CRISPRO Solutions	Overview of different tools developed by the project.	https://crispro.eu/category/solutions/
Solution identification	TREEADS Technologies	Portfolio of technological solutions and products developed by the project.	https://knowledge-hub.treeads-project.eu/?product_cat=technologies

Solution identification	TREEADS Demonstrators	Portfolio of demonstrators developed by the project.	https://knowledge-hub.treeads-project.eu/?product_cat=demonstrators&paged=1
Solution identification	ELRHA Guidance on how to search for solutions	Guidance modules to find solutions that have been tested to address a problem identified by the user in the humanitarian context.	https://higuide.elrha.org/toolkits/search/search-for-solutions/
Solution Identification	ENGAGE	This EU-funded project created a repository of knowledge, strategies, methods, tools and practices used by real-world practitioners and citizens, and matured results from earlier projects to combine and extend them to create innovative solutions to disaster management and new ways of fostering trans-disciplinary collaboration and learning across disciplines.	https://www.project-engage.eu/knowledge-platform2/
Solution identification	The Nexus Environmental Assessment Tool (NEAT+)	An environmental screening tool designed to identify issues of environmental concerns that addresses humanitarian actors needs and provides a practical approach to integrating sustainable practices in humanitarian aid.	https://resources.eecentre.org/resources/neat/
Solution identification	Be-Ready – Environmental Decision Support System (EDSS)	Tool to help end-users in the response to marine pollution events.	https://bereadyproject.eu/
Solution identification	Rapid Na-tech Risk Assessment Tool (RAPID-N)	An open and collaborative web-based application tool for analyzing and mapping the risk of natural hazard impacts on industrial sites (Na-tech risk).	https://rapidn.jrc.ec.europa.eu/?__process=8969
Solution identification	Anticipatory action projects by Anticipatory Hub	Besides information on various anticipatory action and initiatives, the site contains three useful databases – Early action database, Evidence database, and Trigger database.	https://www.anticipation-hub.org/experience
Solution identification	DRMKC Projects Explorer	Portfolio of disaster risk management projects that can filter results based on several categories such as funding institutions or programs, period of time, research sector or organisation-related filters.	https://drmkc.jrc.ec.europa.eu/science-for-drm/project-explorer/projects-explorer#project-explorer/1035/projects/list

Solution identification	SAYSO Multistakeholder Situational Awareness Systems (MSSAS)	Innovative European cost-effective toolkit that provided practitioners with user-friendly solutions in the field of crisis management.	https://cordis.europa.eu/project/id/740872
Solution screening	eNOTICE	EU-funded project that established a European network of CBRN training, testing and demonstration centres aimed at enhancing CBRN training capacity for improved preparedness and incident response through increased collaboration between CBRN training centres and practitioners' needs-driven CBRN innovation and research.	https://www.h2020-enotice.eu/
Solution Assessment	DRIVER+ Trial Guidance Tool	Includes the Trial Guidance Methodology (TGM), a methodology for designing, conducting and evaluating the results of Crisis Management trials, which are also available in the tool.	https://www.dcna.at/index.php/de/portfolio-of-solutions.html
Solution Assessment	Testing Maturity Model (TMM)	It is based on the Capability Maturity Model (CMM) and provides a 5-level framework for assessing the maturity of the test processes in an organisation while providing targets on improving maturity.	https://en.wikipedia.org/wiki/Testing_Maturity_Model
Solution Assessment	MoSCoW Method	A prioritisation technique used in business management to reach common understanding with stakeholders on the importance they place on the delivery of each requirement.	https://www.agilebusiness.org/dsdm-project-framework/moscow-prioririsation.html
Market Analysis	BRIGAID Test and Implementation Framework (TIF)	It provides innovators with a framework for innovation and guidelines for assessing an innovation's technical effectiveness, its social acceptance, and its impact on different socio-economic and environmental sectors.	https://brigaid.eu/wp-content/uploads/2020/11/BRIGAID_D5.5_Towards-a-European-climate-disaster-resilient-future.pdf
Market Analysis	PESTLE Analysis	Identifies and evaluates how Political, Economic, Social, Technological, Legal, and Environmental factors impact business operations, to help managers in the decision-making process.	https://pestleanalysis.com/what-is-pestle-analysis/
Market Analysis	SWOT Analysis	A strategic planning and management technique used to help an individual or an organisation identify Strengths, Weaknesses, Opportunities, and Threats related to business competition or	https://corporatefinanceinstitute.com/resources/management/swot-analysis/

		project planning. It can also be called situational assessment or situational analysis.	
Market Analysis	Porter's Five Forces	A framework used to identify and analyse an industry's competitiveness forces – competition in the industry, the threat of new entrants to the industry, bargaining power of both suppliers and customers, and the threat of products' substitutes.	https://getdowntobusiness.typepad.com/rdjohnson/files/how_competitive_forces_shape_strategy.pdf
Market Analysis	Go-to-market (GTM)	A strategy designed to bring a new product to market and drive demand while helping identify a target audience, outline marketing and sales strategies, and align with key stakeholders.	https://www.coursera.org/articles/go-to-market-strategy
Market Analysis	TELOS Model	A project management framework to determine the feasibility of a product based on five areas – Technological, Economic, Legal, Organisational, and Scheduling.	https://www.consuunt.com/telos-analysis/
Market Analysis	Business Model Canvas	A strategic management tool that helps to define and communicate a business idea or concept. This template can be used for developing new business models and document existing ones.	https://www.strategyzer.com/library/the-business-model-canvas
Market Analysis	Office of Technology Transitions' Adoption Readiness Levels (ARL) Framework	A tool to drive technology commercialisation that complements the Technology Readiness Level (TRL) framework.	https://www.energy.gov/technologytransitions/adoption-readiness-levels-arl-complement-trl
Market Analysis	BRIGAID Market Analysis Framework (MAF+)	An online collaboration system conceived to train inventors, engineers and scientists to conduct methodical assessments of the market for climate-adaptation solutions.	https://brigaid.eu/wp-content/uploads/2020/11/BRIGAID_D6.5_BRIEF_ECO_20201015.pdf
Market Analysis	Commercial Adoption Readiness Assessment Tool (CARAT)	A framework developed by the U.S. Department of Energy to assess adoption readiness of a technology, as a complement to the technology readiness level (TRL) scale.	https://www.energy.gov/technologytransitions/adoption-readiness-levels-arl-complement-trl

Market Analysis	Collaboration Readiness Levels	Self-assessment tool for R&D partners to explore mutual interests, manage expectations and build trusted, impactful relationships.	https://www.csiro.au/en/work-with-us/funding-programs/sme/collaboration-readiness-level
Market Analysis	Readiness Matrix for Cross-Sector Collaboration	A visual tool offering structured process for the potential collaborative to discuss commonalities, differences, barriers and opportunities.	https://www.phf.org/resourcestools/Documents/Readiness_Matrix_Tool.pdf
Innovation Communication	BRIGAID Community of Innovations	Community of innovations consist of organisations and networks that are keen to support climate innovations with expertise on business development, policy, funding, finance, and management.	https://brigaid.eu/wp-content/uploads/2020/09/BRIGAID-D7.12_Final-report-on-the-activity-of-Communities-of-Innovation.pdf
Innovation Communication	Innovation evidence toolkit by Response Innovation Lab	Monitoring and Evaluation (M&E) tool for humanitarian innovation aimed at providing innovators with the necessary tools to monitor and evaluate to achieve successful innovations.	https://www.responseinnovationlab.com/innovation-evidence-toolkit
Innovation Communication	Innovation Radar Methodology	It aims to identify high-potential innovations and innovators.	https://innovation-radar.ec.europa.eu/methodology
Innovation communication	Humanitarian Innovation Guide ELRHA	Online resource to help individuals and organisations navigate within humanitarian innovation. It contains useful information regarding key enabling factors, and key pointers and aspects within the humanitarian system.	https://higuide.elrha.org/enabling-factors/
Innovation Procurement	Procure2innovate resources	The page showcases the most important outputs of the project for stakeholders interested in P2I's work and innovation procurement.	https://procure2innovate.eu/resources/
Innovation Procurement	European Assistance for Innovation Procurement (EAFIP)	Initiative that supports public procurers across Europe in developing and implementing innovation procurement.	https://eafip.eu
Innovation Procurement	Innovation Procurement Brokers	The project facilitates the procurement of innovative goods and services by strengthening the links between public buyers on the	https://innovation-procurement.org/innobrokers/

		demand side and innovative companies (SMEs and start-ups) on the supply side.	
Innovation Procurement	InvestEU	EU programme aimed at boosting the economy through mobilising private financing for strategic investments.	https://investeu.europa.eu/index_en
Public Procurement	Publication "Making socially responsible public procurement (SRPP) work"	A case study collection aimed at improving awareness and understanding of the potential of SRPP as examples of how public procurers have achieved social benefits in practice.	https://op.europa.eu/en/publication-detail/-/publication/e8cf51d0-f632-11ea-991b-01aa75ed71a1
Public Procurement	Publication "Buying Social – a guide to taking account of social considerations in public procurement"	Guide aimed at raising public buyers' awareness of the potential benefits of SRPP and to explain in a practical way the opportunities offered by the EU legal framework.	https://ec.europa.eu/docsroom/documents/45767
Procurement	Science Practice, Library of Equitable Funding Practice	Identification of innovative practices that other organisations have used to address inequities in funding outcomes.	https://www.science-practice.com/blog/2022/12/02/equitable-funding-practice-library/
Research	TIMES Lab - FutuResilience	The Lab applies foresight methods to design future scenarios that bring together social response in emergencies, new governance schemes/planning tools, and potential interaction with new dedicated technologies with a collaborative approach.	https://futuresilience.eu/future-resilience-labs/times
Research	FASTER	An innovating digital ecosystem for emergency first responder teams that enhances situational awareness control in dynamic environments where first responders operate.	https://www.mdpi.com/2078-2489/13/3/115
Research	CURSOR	Search and Rescue Kit based on several technological components, including unmanned aerial vehicles (UAVs).	https://www.cursor-project.eu/about/the-approach/
Research	RESCUEr	First responder support toolkit composed of several technologies and tools from a cross-sectoral perspectives.	https://rescuerproject.eu
Research	Respond-A	Set of technologies based on 5G wireless communications, AR and VR, and autonomous robots to optimise first responder's work.	https://respond-a-project.eu/products-services/

Research	Firelogue	Knowledge and innovation platform for wildfire risk management practitioners	https://firelogue.eu/
Research	IFARI R&D repository	Repository for academia, industry and government representatives that collects and provides information on past and ongoing research projects that focus on innovative first responder technology and concepts.	https://www.internationalresponderforum.org/services/research-and-development-repository
Research	SATORI	Research on ethics assessment frameworks for research and innovation.	https://satoriproject.eu/framework/section-1/
Research	SIENNA	A collection of methodologies to assess the ethics of emerging technologies.	https://www.sienna-project.eu/publications/deliverable-reports/
Research	TechEthos Societal readiness web tool	A prototype of a tool to help actors in product design innovation develop product social readiness, and to facilitate qualitative societal readiness self-assessment.	https://www.techethos.eu/techethos-societal-readiness-web-tool/
Research	STRATEGY	Research on a pan-European framework of pre-standardisation activities for systems, solutions and procedures for crisis management.	https://cordis.europa.eu/project/id/883520/results
Research	JRC Vulnerability Framework	Indicator for measuring vulnerability at the European level, composed of four dimensions (social, economic, political and environmental) and is meant to capture the systemic vulnerability to disasters at different administrative levels.	https://publications.jrc.ec.europa.eu/repository/handle/JRC118850
Research	Engage2Innovate	EU-funded project that investigates and addresses barriers to implementing EU security research and innovation outputs.	https://www.engage2innovate.eu/
Research	Climate, Environment and Disaster Risk Reduction Integration Guidance (CEDRIG)	Developed by the Swiss agency for Development and Cooperation SDC, CEDRIG is a practical and user-friendly tool that systematically integrates climate, environment and DRR into development cooperation and humanitarian aid to enhance the	https://www.cedrig.org/

		overall resilience of systems and communities. The tool offers three different modules.	
Research	Invest4excellence	Project aimed at developing an integrated and long-term joint strategy on research and innovation in line with the education strategies from the INVEST EU University Alliance.	https://www.invest4excellence.eu/
Research	Digital Maturity Assessment (DMA)	The tool assesses the overall digital maturity of EDIH customers (SMEs and PSOs) in six dimensions - Digital Strategy & Investments, Digital Readiness, Human-Centric Digitalisation, Data Management & Security, Interoperability, and Green Digitalisation.	https://european-digital-innovation-hubs.ec.europa.eu/news/digital-maturity-assessment-now-available-public-sector-organisations

Table 5: Additional Resources

Annex 3 : User Guide

DIREKTION Toolset User Guide

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1.0 About DIREKTION

The DIREKTION project promotes innovation collaboration and uptake amongst different disciplines and stakeholders. DIREKTION supports first responders to identify their capability needs and foster demand-led innovation and development.[29] DIREKTION has developed a methodological assessment and screening framework (DASF) supporting the identification and prioritisation of capability gaps, the assessment of solutions, and the identification of future research needs.[30] The DIREKTION Toolset supports this framework. Together they draw on best practice approaches in research and innovation to support the development of a capability driven approach for Disaster Risk Management (DRM).

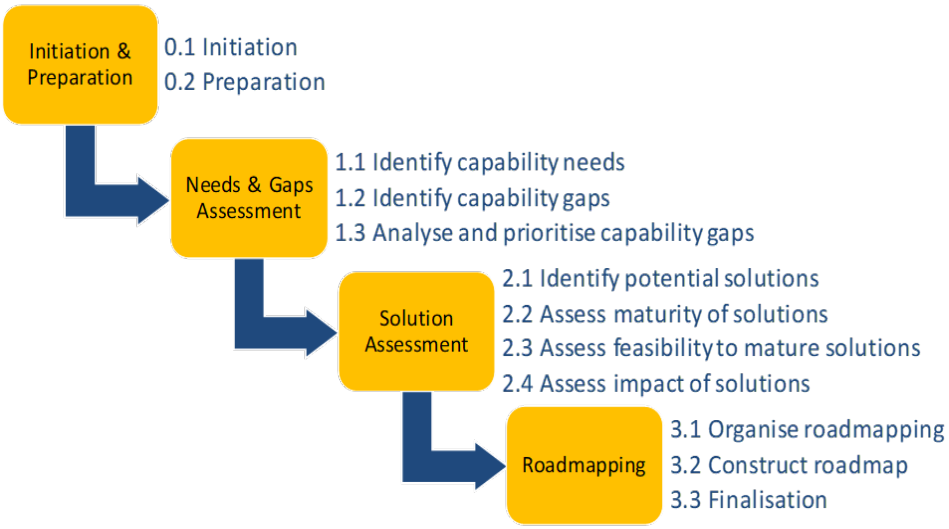

Image 1: Overview of the DIREKTION Assessment and Screening Framework

The tools and the user guide have been designed with the understanding that the assessment process will be managed by personnel from **responder organisations**. This guide has been developed with responder organisations as the target audience.[31]

[29] For further details see: https://www.fire-in.eu
[30] For further details on this framework, please see Deliverable.1.1 of the DIREKTION project.
[31] This does not prevent solution providers from taking on the role of assessment owners and using the toolset to structure their engagement with potential solution users. However, the guidance in the manual will not be as directly applicable in this case.

1.1. About the Toolset

The toolset is a series of excel based tools that are designed to be easily accessible to a variety of users. The objective of the toolset is to support a systematic assessment of your capability needs and gaps and the expected compatibility of a solution with your needs. The results of the assessment will contribute to the identification and alignment of your long-term capability needs and innovation investment.

The toolset supports the assessment of multiple solution types, including technology, methods, and standards. It can be used to assess stand-alone solutions; integrated solutions; and solutions used either within an organisation or between organisations, e.g. where a potential solution relies on collaboration between multiple actors.

The toolset involves 3 tools that can be flexibly combined to suit your assessment needs. A brief description of these tools is provided below.

1.1.1. Demand

This tool is completed by the responder organisation, ideally with input from the targeted solution user. The tool incorporates two assessments, capability gap assessment and solution assessment. The assessment steps can be combined according to the level of analysis you wish to carry out.

The Capability Gap Assessment is composed of 4 elements:

- Assessment of your current capability,
- Assessment of your capability gap,
- Identification of challenges to addressing the gap,
- Identification of the functionalities that would best help you to address the gap, supporting your search for a solution(s) if you have not already identified one.

This assessment will provide a baseline overview of your capability and support you in determining and rationalising the level of response you require when choosing and investing in a solution.

This assessment supports Step 1.3 on analysis and prioritisation of capability gaps and Step 2.1 on Identification of potential solutions of the DIREKTION Assessment and Screening Framework.

The Solution Assessment is composed of four elements split across two steps. Under step 1 solutions are screened by:

- Innovation maturity,
- Compliance with policy priorities and sectors laws, regulations and standards.

Under Step 2, solutions are assessed by:

- Compatibility with user needs, operational needs, and organisational needs,
- Expected impact.

The results of both assessments are visualised to aid user comprehension. Post-assessment questions have been included to help to situate the assessment results in the context of innovation uptake, prompting reflection on innovation needs and willingness to adopt.

This assessment supports Step 2.3 on feasibility to mature solutions and Step 2.4 on impact of solutions of the DIREKTION Assessment and Screening Framework.

1.1.2. Supply

This tool is completed by the solution provider and assesses the readiness of the solution according to a variety of scales: technology; societal; manufacturing; integration; commercialisation; legal, privacy, and ethical; and security.[32] This tool is intended to provide a structured space to capture information on the readiness of the solution.

Post-assessment questions have been included to help to situate the assessment results in the context of innovation uptake, prompting reflection on innovation needs and willingness to supply. The results of this assessment are shared with the responder organisation as the assessment owner and will help to inform the solution assessment carried out under the DEMAND tool.

This tool supports Step 2.2 on maturity of solutions and Step 2.3 on feasibility to mature solutions of the DIREKTION Assessment and Screening Framework, from the perspective of the solution provider.

1.1.3. Solution Uptake

[32] For more information on these scales, see: https://www.multirate.eu

This tool presents a range of questions to promote discussion about the factors that enable and hinder the adoption and implementation of solutions between Demand and Supply side actors. The tool is completed collaboratively by the solution providers and solution users.

These questions focus on enhancing understanding of responder needs, and determining potential actions Demand and Supply side actors are willing to undertake to support solution scaling and successful innovation uptake.

This tool provides insights in support of the objectives of Roadmapping (Step 3.1 – Step 3.3) of the DIREKTION Assessment and Screening Framework.

1.1.4. Toolset Structure

The tools target different stakeholder groups, with the aim of supporting collaboration and dialogue between supply and demand side actors.

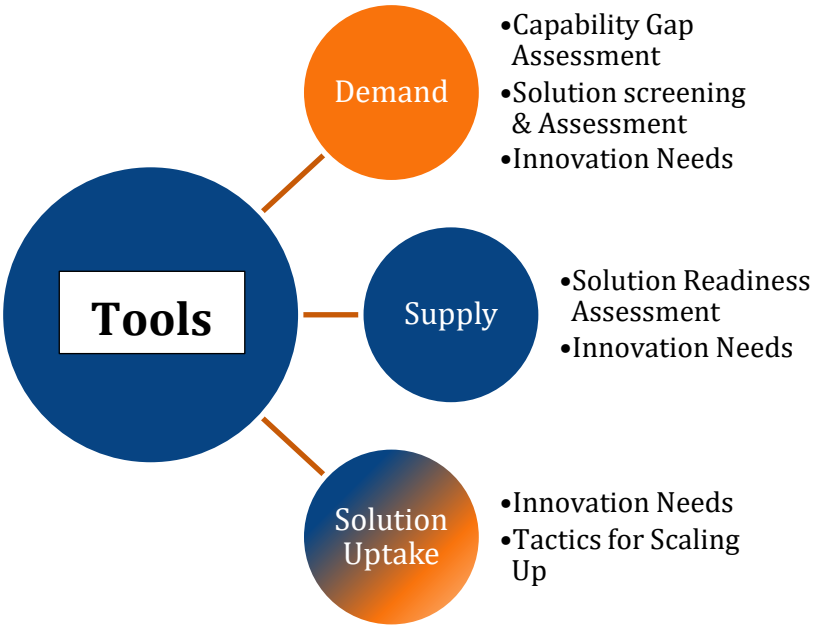

Image 2. DIREKTION Toolset by stakeholder type

The toolset focuses on two key stakeholder groups, Demand (in blue), Supply (in orange), and their collaboration in the context of innovation (orange and blue).[33]

For each of the tools, high-level guidance is outlined at the top of the sheet and colour coded in purple. The different steps of the assessment are numbered and colour coded in navy, while sub-steps are colour coded in blue. Supporting notes/comments can be found under the red tabs located across column headings.

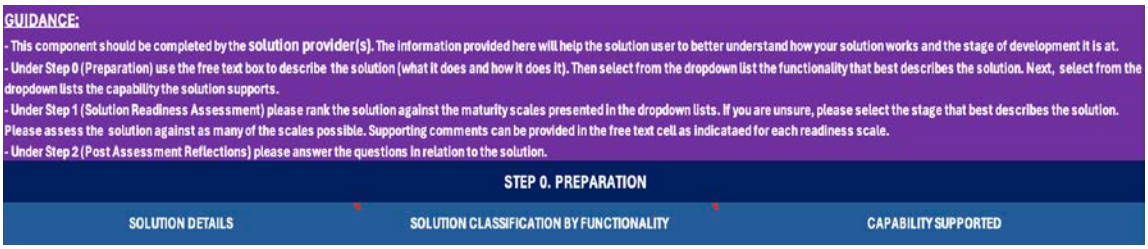

Image 3: Example of tool structure

The toolset is designed around a number of question sets. Questions are answered via easy to use dropdown lists, with the option to select multiple responses, where indicated. Free text boxes provide space to include further comments explaining the response(s) chosen.

We recommend allocating a half day to familiarise yourself with the tools and this user guide and to put in place the necessary supports to carry out the assessments. To get the most out of the assessment process we recommend reading the guidance below. Chapter 2.0 will provide guidance on how to set up and use the toolset. Chapter 3.0 summaries key terms used in the assessments. Chapter 4.0 provides detailed user instructions for the tools. Chapter 5.0 includes user experience feedback forms, which may be completed and returned to the email address provided.

A catalogue of additional resources on topics addressed withing the tools is also available under Deliverable 1.2 on the DIREKTION project website, www.direktion-network.org.

[33] Demand side organisations are broadly defined as responder organisations, this includes fire services, medical services, emergency services, police services, and public authorities. Supply side organisations are broadly defined as solution providers, this includes industry, universities, public-private partnerships, and oftentimes responder organisations themselves.

2.0 Getting Set Up

2.1 User Profile(s)

This guide has been developed with responder organisations as the expected owner of the assessment process. However, responder organisational structures and set-ups vary greatly! When it comes to thinking about who in your organisation should use the toolset, we've produced some helpful guidelines below.

The assessments can be completed by a single user or it can be completed collaboratively, with multiple users completing all steps together or completing different steps individually before reviewing and concluding as a group. As the assessments cover a wide variety of topics, it is not expected that a single user will have first-hand information of all topics. In this case, single users should consult the relevant person(s) within their organisations on these issues.

When using the toolset, we suggest engaging people, either directly or indirectly, with the following kinds of knowledge:

- Knowledge of the capability gaps you want to address and the steps being taken to do so.
- Knowledge of the operating environment in which the potential solution will be used, be this in the field or in the office.
- Knowledge of the support required to ensure successful solution uptake and use.

No matter who in your organisation uses the toolset, we recommend identifying an 'assessment owner(s)'. This person(s) will be responsible for overseeing the process and keeping track of the assessment results and actions. Ideally, this is someone who is familiar with how your organisation works and its evolving needs.

2.2. Before starting the process

Before using the toolset we recommend asking yourself the following questions.

1) Have you identified the capability you want to assess?

Yes – that's great! Skip to Question 2.

No – Don't worry! DIREKTION can help with this. Deliverable 1.1. of the DIREKTION project outlines step-by-step instructions on how to identify your capability gaps.

You will need at least a general idea of the capability you wish to assess in order to do a Capability Gap Assessment. However, this does not prevent you from carrying out a Solution Assessment.

2) Have you identified the solution(s) you want to assess? Do you have sufficient information to assess it?

Yes and yes – that's great! Skip to Question 3.

No – also not an issue! Because of its flexible design, the toolset can be used to assess already identified solutions or it can be used to help identify the kind of functionality you need to meet your capability gap, guiding the process of solution identification and screening.

When gathering information on the solution you would like to assess, we recommend contacting the solution provider. You can ask them to complete the SUPPLY tool on solution readiness, and/or ask them to provide you with information on how the solution works, the capability it targets, and its current state of development.

In addition, the DIREKTION project has developed a method for solution identification (Deliverable 1.1.) and a library with links to state-of-the-art solution catalogues (Deliverable 1.2.), that can further support this process.

3) Have you identified the right personnel to complete the assessment?

Yes – that's great! Skip to Question 4.

No – That's ok, remember, you know your personnel best! But, if in doubt, please see the guidelines above on suggested user profile(s), section 2.1.

4) Have you identified your assessment goals?

Yes – that's great! Skip to Question 5.

No – that's ok! Assessments require time and effort, and when done in isolation offer very little added value to your organisation. So, if you're going to do one, you should know why you're doing it and what you will do with the results once you have them. A good assessment should fit with your organisational processes, goals, and values.

We recommend thinking about your organisational goals and how the assessment results can help you to achieve these. We also recommend formalising this process by setting KPIs or follow-up actions to be implemented after the assessment is complete.

5) Have you identified your opportunities and constraints?

Yes – that's great! You're almost ready to get to started.

No – not a problem! While assessments are helpful and worthwhile, they're not the only thing you have to get done in a day's work. In fact, you're probably a very busy person. We recommend thinking about the time and resources you can assign to the assessment. Identifying these issues in advance can help to avoid unnecessary delays and challenges later in the process.

2.3 The assessment process

Chapter 4.0 will provide instructions on how to use the different tools. This section provides recommendations to the assessment owner(s) on how to implement the assessment process.

The toolset has a flexible design with modular tools that can be combined in multiple ways, depending on your needs. As you prepare to use the toolset it is worth thinking about what kind of assessment you would like to complete.

If you are planning to assess your capability needs and gaps ONLY, then you will:

- Need to have already identified the capability you wish to assess.
- Use the DEMAND tool to apply the capability gap assessment questions, see Chapter 4, section 4.1 for instructions on the DEMAND tool, Capability Gap Assessment.
- Repeat this process per capability you wish to assess.
- Action the results of the capability gap assessment to guide your next steps for solution identification and/or assessment.

The tool is designed to assess capabilities at a variety of scales. Users may submit each capability group a solution is designed to address to an individual assessment. Alternatively, users may select multiple capability groups to be assessed in combination. If the first option is chosen the user will need to create multiple files per capability gap/solution assessed. If the second option is chosen the user can complete the assessment in one file, but the assessment results will not be as granular.

If you are planning to assess a solution this can be done in two ways. OPTION A, you will:

- Need to have identified a solution and have the necessary details within your organisation to complete the assessment.

- Use the DEMAND tool to apply the two-step solution assessment process, see Chapter 4, section 4.1 for instructions on the DEMAND tool, Solution Assessment.
- Share the results of the solution assessment with the solution provider.
- Use the SOLUTION UPTAKE tool to collaboratively discuss the assessment results with the solution provider, see Chapter 4, section 4.3 for instructions on the SOLUTION UPTAKE tool.
- This process is repeated per solution you wish to assess.

OPTION B, you will:

- Need to have identified a solution and have engaged the SOLUTION PROVIDER as part of the assessment process.
- Share the SUPPLY tool with the solution provider, see Chapter 4, section 4.2 for instructions on the SUPPLY tool.
- The solution provider completes the Solution Readiness Assessment (SUPPLY).
- The results of the Solution Readiness Assessment are returned to the assessment owner(s) and shared with the necessary personnel.
- Use the DEMAND tool to apply the two-step solution assessment process, see Chapter 4, section 4.1 for instructions on the DEMAND tool, Solution Assessment.
- Share the results of the solution assessment with the solution provider.
- Use the SOLUTION UPTAKE tool to collaboratively discuss the assessment results with the solution provider, see Chapter 4, section 4.3 for instructions on the SOLUTION UPTAKE tool.
- This process is repeated per solution you wish to assess.

As with the capability gap assessment, the solution assessment can be applied to either a single solution addressing an individual/group of capabilities, or a suite of solutions addressing an individual/group of capabilities. If a suite of solution of solutions is being assessed, the user assesses them as a whole. Details on which capability gap the solutions are designed to address should be included under “Solution description” (to be filled in under Step 0, preparation of the solution assessment). For example, a suite of solutions may include 3 solutions: 1 targeting risk assessment, 1 targeting rescue operations, and 1 targeting disaster clearance. The results of the solution assessment will be at the group level. If a user chooses to assess solutions individually, they will need to create multiple files per capability gap/solution assessed. If the user chooses to assess a suite of solutions as a group they can complete the assessment in one file, but the assessment results will not be as granular.

After you have completed the assessment, you may wish to access further resources on the assessment topics. A range of resources on these topics can be found in Annex 2 of Deliverable 1.2, available on the DIREKTION website.

In addition, we are always looking for ways to improve and would appreciate any feedback you could provide on your experience using the toolkit. Chapter 5.0 provides user experience feedback forms where you can include any suggestions for future improvements.

In the following chapters you will find a summary of key terms used across the tools, and detailed user instructions for each of the tools. The guidance targets responder organisations as the assessment owner and outlines steps for how to use the toolset. Guidance is also provided on the SUPPLY tool, that can be communicated to the solution provider as part of the assessment process.

3.0 Key Terms

The table below provides a description of key terms used in the assessments. These terms are organised alphabetically. The descriptions will help you to understand what is covered by each of the assessments.

Term	Description
AI Act	Refers to compliance with the Artificial Intelligence Act (AI Act), establishing a common regulatory and legal framework for the development and deployment AI solutions in the EU.
Capability	The means to accomplish one or more tasks under specific conditions.
Capability gap	The gap between the current ability to provide a response and the actual response assessed to be required for a given threat or hazard. Plans should be made to reduce or eliminate this gap if the risk justifies it.
Community Engagement	Refers to the engagement and empowerment of community actors and citizens as part of enhancing disaster resilience.
(Cyber) Security	Refers to compliance with the necessary (cyber) security measures to ensure the solution is safe for use.
Disaster Resilience Phases	Refers to the 4 phases of disasters: mitigate, prepare, respond, recover.
Effective	Is the capability successful in producing its intended or desired result?
Efficient	Refers to the relationship between use of resources and the quality of results.
Expected Impact	Ethical related topics that are considered for solution assessment include: • Privacy; • Trust; • Transparency; • Sex and gender dimension; • Environment; • Legal compliance; • Non-discrimination; • Accountability; • Dignity; • Duty to provide care; • Avoidance of harm; • Autonomy (including understandability of new technologies and solutions); • Solidarity; • Degree of inclusion of civil society in the development process; • Operating context specific needs.
Fundamental Rights	Refers to compliance with the protection of fundamental rights, as the basic rights and freedoms guaranteed to individuals under the European Convention for the Protection of Human Rights and Fundamental Freedoms and the Charter of Fundamental Rights of the European Union
GDPR	Refers to compliance with the General Data Protection Regulation, regulating information privacy across the EU.

	For further details, see: Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).
Innovation Maturity	Refers to the 4 levels of innovation maturity: • Exploring: defined as getting things started. • Business ready: defined as advanced on market preparations, requires further solution development. • Solution ready: defined as advanced on solution development, focused on commercialisation. • Market ready: defined as mature solutions that are ready to go to market For further details, see: https://innovation-radar.ec.europa.eu/methodology
Interoperability	Refers to compliance with the European Interoperability Framework. For further details, see: European Commission (2017) New European Interoperability Framework. Promoting seamless services and data flows for European public administrations. Luxembourg: Publications Office of the European Union.
Operational needs	Operational needs that can be considered, include: • Amount of personnel • Competence of personnel • Training and Education of Personnel • Health and Safety aspects of personnel • Human/solution interface – human factors • Compatibility with operational goals and norms; • Degree of solution readiness; • Degree of risk in case of solution failure.
Organisational needs	Organisational related topics that are considered for solution assessment include: • Procedures • Organisational structure • Procurement and Financial Aspects • Procurement readiness • Willingness to pay • Supply side concentration • Cost savings. • Feasibility – technical, economic, legal, schedule, operational and maintenance. • Agreements in place to cooperate with other organizations. • Governance of crises • Organisational culture • Political will • Public expectations of emergency services; • Public norms on the use of innovative solutions; • Public norms on preparedness and risk management; • Societal acceptability; Trust in public bodies.

Sustainable Development Goals	Refers to compliance with the sustainable development goals, along with the Sendai Framework and The Paris Agreement on climate change. For further details, see: https://www.undrr.org/implementing-sendai-framework/what-sendai-framework
User needs	User needs that can be considered, include: • Performance; • Robustness and reliability; • Efficiency; • Usability; • Usefulness; • Security; • Maintenance; • Responder safety; • User specific needs.

4.0 TOOLSET Guidance

4.1. DEMAND

This tool should be filled in by the responder organisation/solution user. This tool incorporates two assessments, composed of 2 and 3 steps respectively. In addition to a visualisation of assessment results and post-assessment reflection questions.

Capability Gap Assessment: STEP 0 – Preparation.

This step includes space to document the name(s) of the assessment owner(s) and contributors, and the assessment objectives. Please note, the assessment owner does not need to be the same person(s) who will carry out the Capability Gap Assessment.

Under Step 0, the user(s) inputs details on the current capability and capability gap to be assessed. This includes a free text box to describe both the current capability and the capability gap to be assessed. This is followed by a dropdown list to select the hazard type most associated with the capability and capability gap, with the option to select multiple responses. And, a cascading dropdown list to classify the Disaster Resilience Phase and Capability Group, with the option to select multiple responses.

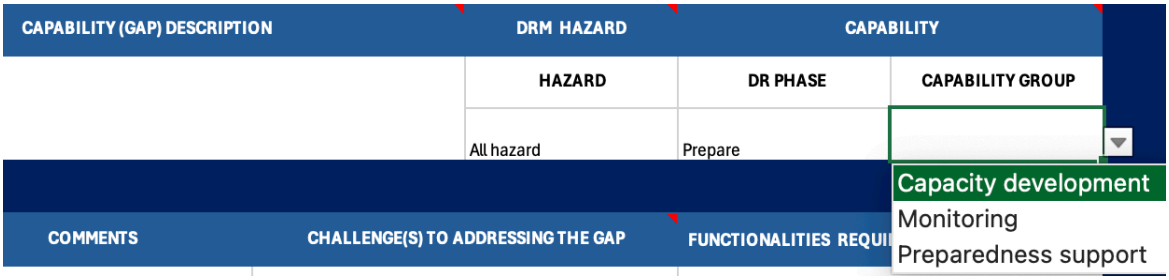

Image 4: DEMAND – Capability Gap Assessment, Step 0: Preparation.

A capability gap is described as the gap between the current ability to provide a response and the actual response required for a given threat or hazard. Plans should be made to reduce or eliminate this gap, if the risk justifies it. To describe a capability gap is to express an operational problem. The description should state a limit in the ability to perform a task to the adequate level of performance. In line with the IFAFRI methodology, a gap should be communicated using the following format, "The ability to ….".[34] It is immediately understandable by other crisis managers and does not use jargon/vernacular.

[34] IFAFRI. (2017) *Recommended Method for National Capability Gap identification and Prioritization,* p. 5.

If you are unsure which hazard type or disaster resilience phase your capability (gap) is most associated with, please select your best estimate. These cells can also be left blank.

Capability Gap Assessment: STEP 1 – Capability Gap Assessment

This step will help to assess your current capability needs and capability gap. To do so, you must have already identified the capability you would like to assess. This step includes a set of questions to assess your current capability, on a scale of low, medium, high, or not applicable.

The first score, 'Impact of Capability' is calculated by taking the **maximum** value of responses to the first and second question. This means that the highest score selected for either question will determine the results. The 'Impact of Capability' score is the answer to the question, how important is this capability? The second score, 'Performance of Capability', is calculated by taking the **average** score of responses to the final three questions. The 'Performance of Capability' score is the answer to the question, how well is this capability performing?

Users respond to the questions via the dropdown list provided (select one), with a supporting free text box to provide further comments on their responses.

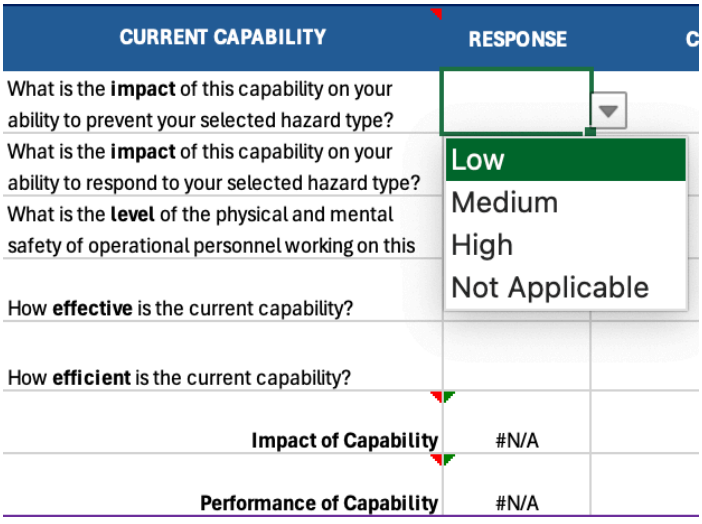

Image 5: Demand – Capability Gap Assessment, Step 1: Current Capability.

This is followed by a set of questions to assess the prioritisation of your capability gap. The 'Severity of the Capability Gap' score is calculated by taking the **maximum** value of responses to all questions. This means that the highest score selected for any question will determine the result. The 'Severity of the Capability Gap' score is

the answer to the question, how critical is the gap? And should help to guide your internal prioritization of capability gaps to address.

Users respond to the questions via the dropdown list provided, with a supporting free text box to provide further comments on their responses.

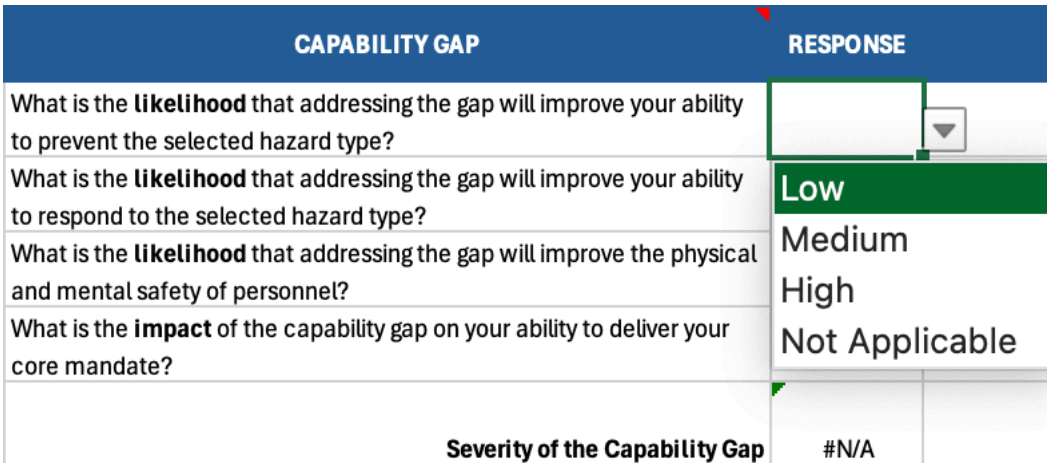

Image 6: Demand – Capability Gap Assessment, Step 1: Capability Gap.

This is followed by a dropdown list with options to identify challenges to addressing the gap. Multiple options can be selected from the list. Space is provided to include additional challenges, if they are not covered by the dropdown list.

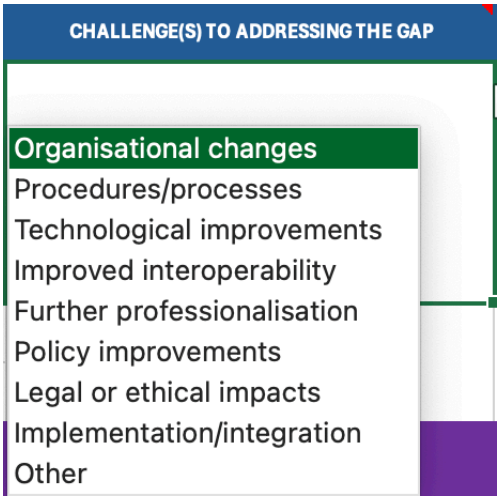

Image 7: Demand – Capability Gap Assessment, Step 1: Challenges to addressing the gap.

This is followed by a dropdown list to identify the functionality you think would be best able to address the gap, with the option to select multiple functionalities if needed.[35] If the functionality required does not match any of the options on the dropdown list, please select the 'Other' option, and include further details in the space provided.

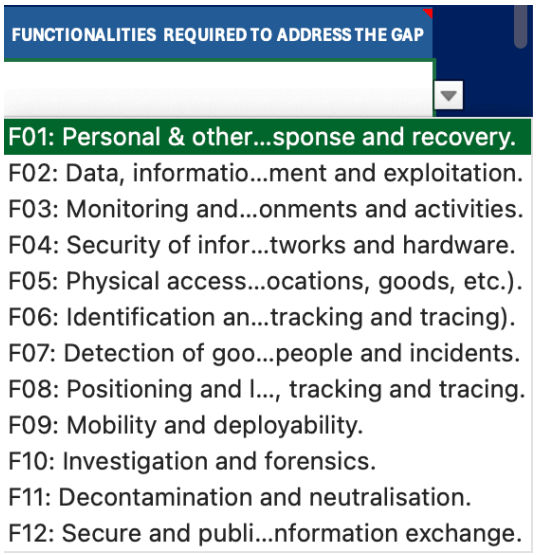

Image 8: Demand – Capability Gap Assessment, Step 1: Functionalities required.

If you have not yet identified a solution for assessment, the dropdown list of functionalities can be used to guide your search criteria for potential solution(s) that can address the gap.[36]

Solution Assessment: STEP 0 – Preparation

This step includes space to document the name(s) of the assessment owner(s) and contributors, and the assessment objectives. Please note, the assessment owner does not need to be the same person(s) who will carry out the Solution Assessment.

Under Step 0, the user(s) input details on the solution to be assessed. This includes a free text box to describe the solution. This is followed by a dropdown list to identify the hazard type the solution is mostly likely to be used in, with the option to select multiple hazard types. And, a cascading dropdown list to identify both the Disaster

[35] This list is based on the recent study by Deloitte & Ecorys, (2022) EU security market study: Final report: 31 May 2022. Luxembourg: Publications Office of the European Union.

[36] These criteria can guide your application of the DIREKTION method for solution identification (available in Deliverable 1.1.) and your review of existing solutions catalogues (selection of solution catalogues available in Deliverable1.2, Annex 2).

Resilience Phase and Capability Group (with the option to select multiple responses) the solution is mostly likely to be used in.

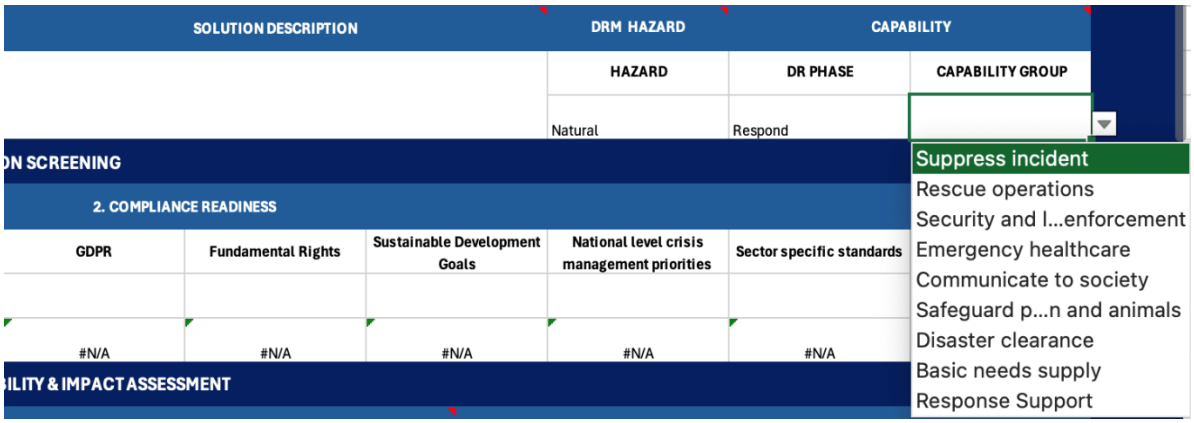

Image 9. DEMAND – Solution Assessment, Step 0: Preparation

Solution Assessment: STEP 1 – Solution Screening

This step presents the user with a range of topics against which they can screen the solution for both innovation maturity and compliance. Innovation maturity is screened according to the following scale:

- Exploring: defined as getting things started.
- Business ready: defined as advanced on market preparations, requires further solution development.
- Solution ready: defined as advanced on solution development, focused on commercialisation.
- Market ready: defined as mature solutions that are ready to go to market.[37]

Next a range of topics, reflecting current policy priorities, are presented for compliance screening, including:

- (Cyber) security,
- Interoperability,
- AI Act,
- Community engagement,
- GDPR,
- Fundamental rights,
- Sustainable Development Goals.

In addition to national level crisis management priorities and sector specific standards, laws, and regulations. Compliance is assessed using a dropdown list with recommended actions provided based on the option chosen, as illustrated in the table below.

[37] Scale adapted from Innovation Radar. For more information, see: https://innovation-radar.ec.europa.eu/methodology

Compliance	Description of Recommended Actions
Pass	Proceed with assessment.
Partial	Pause Assessment. Engage with solution provider for further details on how they plan to meet compliance threshold.
Fail	Stop Assessment. Notify solution provider of screening results. Discuss likelihood of remediating actions. Take decisions on willingness to resume/repeat assessment in the future.
Not Applicable	Proceed with assessment.

Table 2. DEMAND -Solution Assessment. Step 1. Solution Screening

The results of the screening can help to decide which solution(s) should move forward for a full assessment. As well as providing an opportunity to identify potential issues that will affect future uptake, which can be communicated to the solution provider, if needed.

Solution Assessment: STEP 2 - Solution Compatibility and Impact Assessment

Step 2 guides you through a structured assessment of the solution. This step is made up of 2 elements: compatibility and expected impact. Compatibility is assessed across three question sets, which the user responds to using the dropdown list provided. Questions are grouped according to user needs, operational needs, and organisational needs.

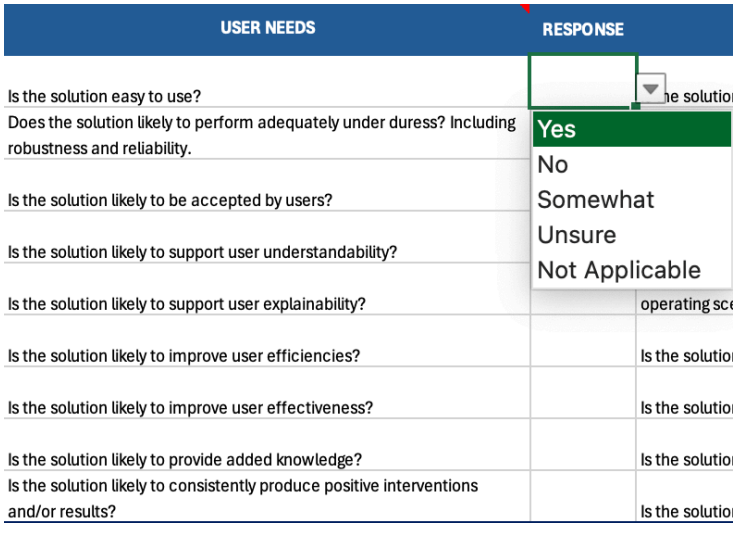

Image 10. DEMAND – Solution Assessment, Step 2: Solution Compatibility – User Needs.

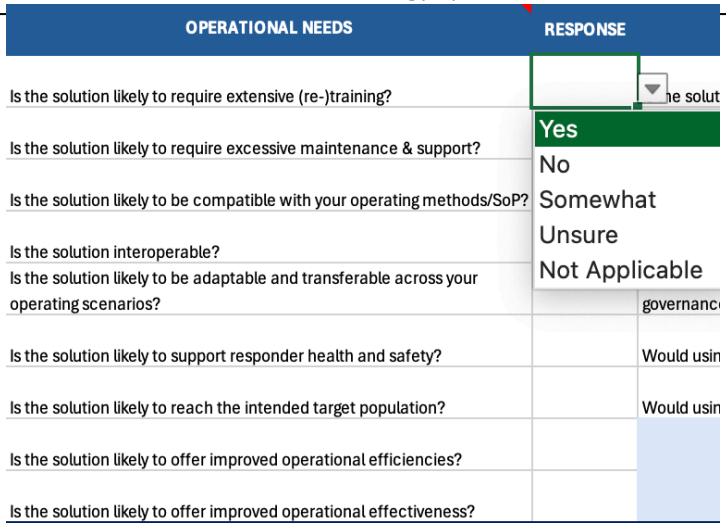

Image 11. DEMAND – Solution Assessment, Step 2: Solution Compatibility – Operational Needs.

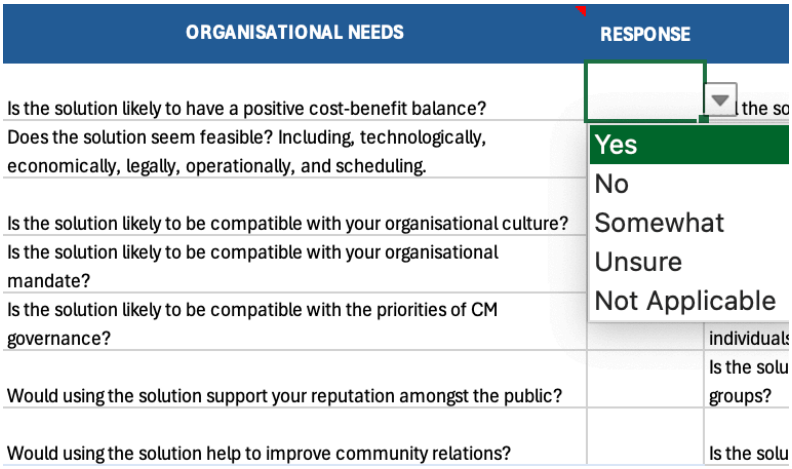

Image 12. DEMAND – Solution Assessment, Step 2: Solution Compatibility – Organisational Needs.

This is followed by a question set on the expected impact of the solutions. These questions focus on likelihood of ethical, legal, and societal impacts, which the user responds to using the dropdown list provided.

EXPECTED IMPACT	RESPONSE
Will the solution be applied in the context of human healthcare?	
Does the solution involve the processing of personal data?	
Is the solution likely to have a negative impact on the rights & freedoms of individuals and groups? E.g. privacy, dignity, autonomy, solidarity.	
Is the solution likely to have a negative impact in terms of social justice and equality?	
Is the solution likely to have a negative impact on the well-being of individuals or groups?	
Is the solution likely to increase the vulnerability of individuals or groups?	
Is the solution likely to pose a potential safety risks?	
Is the solution likely to have a negative impact on the environment?	
Is there SIGNIFICANT uncertainty regarding the legal, ethical, and societal impacts from the use of the solution?	

Yes
No
Somewhat
Unsure
Not Applicable

Image 13: DEMAND – Solution Assessment, STEP 2: Expected Impact.

Visualisation of Assessment

The results of the capability gap assessment, solution screening, and solution compatibility and expected impact assessments are summarised and visualised in a series of bar charts.

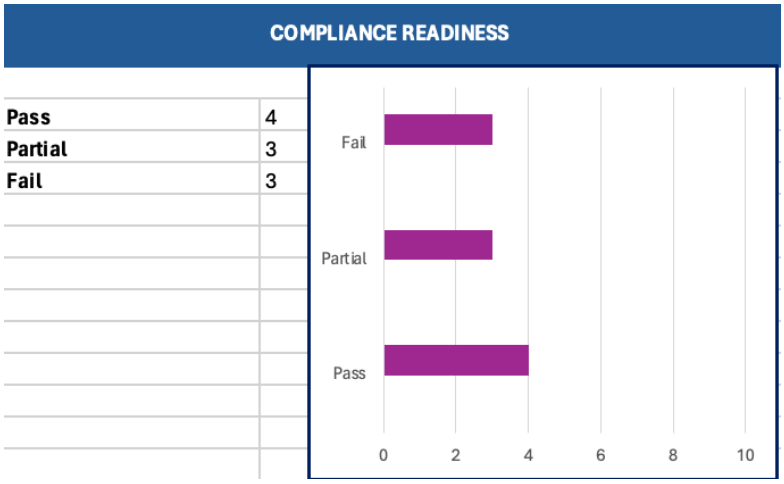

Image 14: DEMAND – Sample Visualisation of Results, Compliance Readiness.

The visualisation of the assessment results enhances understanding and provides a summary for easy comparison across assessments. Because the tool relies on Microsoft excel, a widely available format, the charts for the visualisation of results can be copied and pasted into a new summary file.

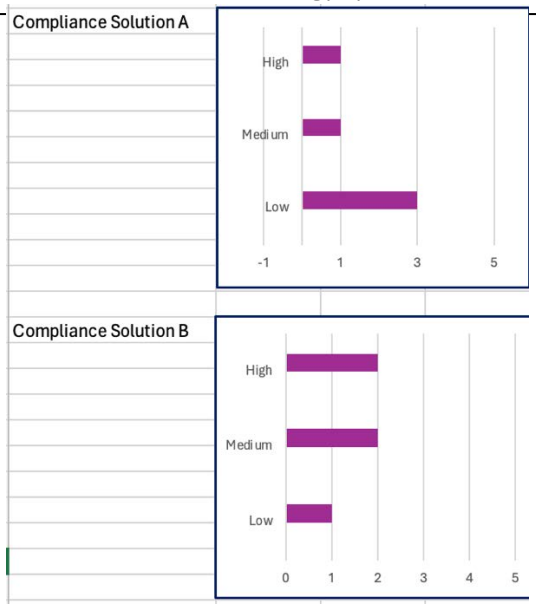

Image 15: DEMAND – Visualisation of results, example of summary charts.

These charts will automatically update to reflect any changes to the source assessment charts, providing a high-level summary across multiple assessments, and making the results easily sharable across your organisation.

Post Assessment Reflection: Innovation Needs and Willingness to Adopt

This step presents two sets of questions. The first focuses on your understanding of your innovation needs. The second focuses on your willingness to adopt a solution. Solutions users are asked to respond to these questions using the dropdown list provided, with a supporting free text box to include additional comments based on their choice.

INNOVATION NEEDS	RESPONSE
Have you identified a pressing need and are you willing to act on it?	
Based on its current stage of development, can the solution easily satisfy this need?	
With further developments, could the solution easily satisfy this need?	
Can you easily access relevant solution providers to communicate your needs?	
Do you need procurement support to successfully adopt this solution?	
Are your needs well addressed through EU research programming efforts?	
Are your needs are well addressed through national level research programming efforts?	
Are your needs well addressed through private research efforts?	

Yes
No
Somewhat
Unsure
Not Applicable

Image 16: DEMAND – Post assessment reflection, Innovation Needs.

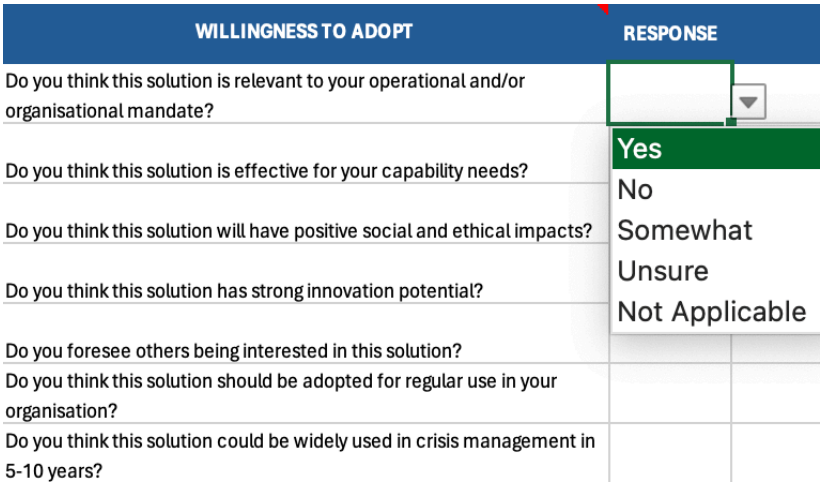

Image 17: DEMAND – Post assessment reflection, Willingness to adopt.

The red tabs direct the user(s) to further resources on the topics covered by the questions, providing access to additional practical tools addressing these matters if they have not already done so (Available in Deliverable 1.2., Annex 2).

4.2. SUPPLY

Making sense of what a solution does and doesn't do, and how it does or doesn't do it is a complex process. The SUPPLY tool aims to help with this issue, offering a systematic format to capture information on the capability the solution supports and the readiness of the solution(s) from a variety of perspectives. This tool should be filled in by the solution provider, indicating where the solution is in the development process. This tool is made up of three steps.

Step 0 – Preparation

This step asks the solution provider to input details on the solution(s). This includes,

A free text box where a basic description of the solution can be filled in. This is followed by a dropdown list to classify the solution by functionality, with the option to select multiple functionalities.[38] If the solution does not match any of the options in the dropdown list, please select the 'Other' option, and include details in the space provided.

[38] This list is based on the recent study by Deloitte & Ecorys, (2022) EU security market study: Final report: 31 May 2022. Luxembourg: Publications Office of the European Union.

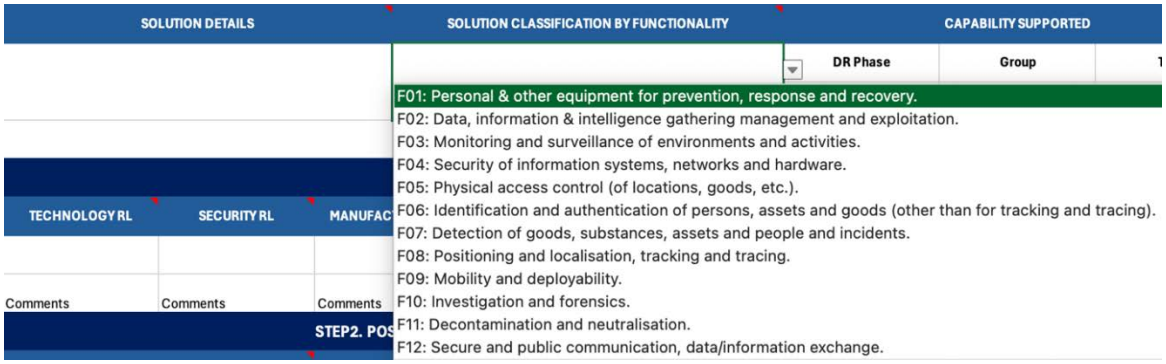

Image 18: SUPPLY – Step 0: Preparation.

A set of cascading dropdown lists ask the solution provider to identify the capability the solution supports/provides by Disaster Resilience (DR) Phase (select one), Capability Group (select one) and Task (select as needed).[39] If the capability supported by the solution does not match a specific phase, or is not phase specific, please use the free text box space provided to include details of the capability.

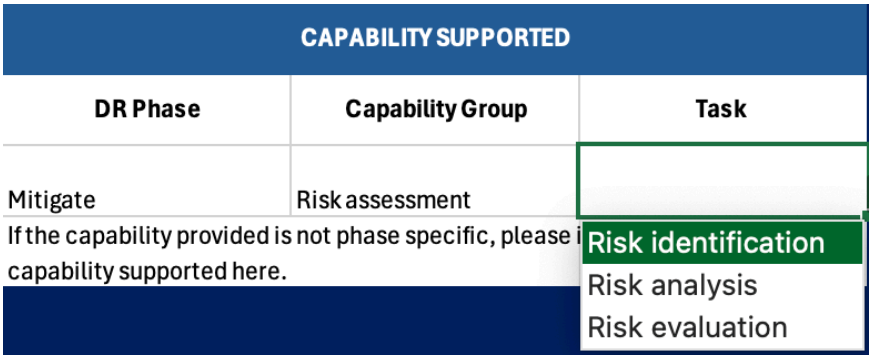

Image 19: SUPPLY – Step 0: Preparation – Sample Capability Supported.

Step 1 – Solution Readiness Assessment

This step asks the solution provider to assess the readiness of the solution. This includes seven dropdown lists with a series of maturity scales. Please select the level that best describes the solution. Please assess the solution against as many of the scales possible. Supporting free text boxes are also provided include additional comments on the level chosen per scale.[40] This could include, for example, plans to progress the solution along the scale.

[39] These lists are based on the ResiStand Conceptual Framework, for details see Annex 2 of DIREKTION D1.1.
[40] For more information on the scales see: https://www.multirate.eu

STEP 1. SOLUTION READINESS ASSESSMENT						
TECHNOLOGY RL	SECURITY RL	MANUFACTURING RL	INTEGRATION RL	COMMERCIALISATION RL	SOCIETAL RL	LEGAL, PRIVACY & ETHICAL RL
Comments	Comments	Comments	Comments	Comments	Comments	Comments

Image 20: SUPPLY – Step 1: Solution Readiness Assessment.

The maturity scales address a wide range of issues that factor into the overall readiness of a solution, from the traditional Technology Readiness Levels (TRL) to Societal, Manufacturing, Integration, Commercialisation, Legal, Privacy, and Ethical, and Security. For each of these scales you will find a red tab located in the upper right-hand corner, with a short note explaining its purpose/scope.

Step 2 – Post Assessment Reflection: Innovation Needs & Willingness to Supply

This step presents the solution provider with two sets of questions. The first focuses on their understanding of customer needs. The second focuses on their willingness to bring a solution to market. Solutions providers will be asked to respond to these questions by choosing from a dropdown list. A free text box provides space to include additional comments based on their choice.

INNOVATION NEEDS	RESPONSE
Does the customer group have a pressing need and are they willing to act on it?	
Do you have a **market ready offering** that can easily satisfy this need?	
Do you have an **in-development offering** that can easily satisfy this need?	
Can you easily access/communicate with the customer base to promote your solution?	
Do you need commercialisation support to successfully bring the solution to market?	
Do you expect this solution to progress to market through EU research programming efforts?	
Do you expect this solution to progress to market through national level research programming efforts?	
Do you expect this solution to progress to market through private research efforts?	

Yes
No
Somewhat
Unsure
Not Applicable

Image 21: SUPPLY – Step 2: Innovation Needs.

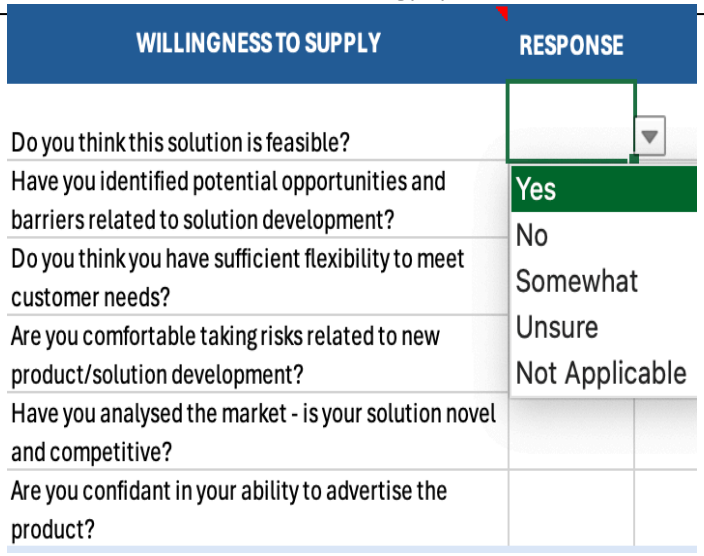

Image 22: SUPPLY – Step 2: Willingness to Supply.

The red tabs direct the user(s) to further resources (available in Annex 2 of Deliverable 1.2.) on the topics covered by the questions, providing access to additional practical tools addressing these matters, if they have not already done so.

4.3. SOLUTION UPTAKE

This tool can be completed collaboratively by the solution user and the solution provider. The tool provides a series of discussion questions on innovation needs and tactics for solution scaling. The questions are designed to encourage discussion and debate between Demand and Supply side actors.

Step 1 – Innovation Needs Dialogue

This step provides a free text box to support discussions in response to questions on,

- Understanding the need,
- Ability to satisfy the need,
- Communication between Demand and Supply side actors,
- Standardisation.

Step 2 – Tactics for Scaling Up

This step presents a range of tactics to support the scaling up of solutions. Supporting question sets for these tactics are presented for both Demand and Supply side actors, which can be answered using the dropdown list provided. This includes,

- Determining your long-term role,
- Building and using your network,
- Building on what already exists,
- Making it easy to integrate,
- Working with the entire adopter,
- Moving beyond research grants.

4.4. USING YOUR RESULTS

Once you have completed the assessments the results can be used in the following ways.

The results of the capability gap analysis can help to identify if a capability should be targeted for improvement and prioritisation, guiding your strategies and use of resources. The identification of challenges to addressing the gap and the selection of functionality provide criteria to guide the selection of solution type needed to address the gap.

The results of the solution readiness assessment completed under the SUPPLY tool will provide insights on the readiness of a solution and the capability it supports, helping you to better understand where the solution is in the development process. The solution readiness scales (SUPPLY tool) can be pre-emptively completed by solution providers and used to communicate about their solution when seeking to gather feedback from potential future users and customers.

If the solution assessed is on or close to market, the solution assessment results (DEMAND tool) can help to guide and refine your procurement process. The assessment results should support you in deciding if the solution will meet your needs.

If the solution is still under development, the solution assessment results (DEMAND tool) can be used to guide collaboration and engagement with solution providers on your needs, either for the solution assessed or as part of future needs identification. The results of the solution assessment can be fed back to the solution provider to guide the development process in line with your needs.

Repeating the assessment process overtime will allow you to check if the solution has improved your capability, or if further investment is required. Repeating the capability gap assessment, even without a solution to assess, will also allow you to track how your capability needs have evolved over time.

The results of the SOLUTION UPTAKE tool can be used to guide future collaborative interactions during the solution scaling and uptake process.

We hope the tools will add value to your efforts to assess your capability gaps and will support you in systematically assessing solutions according to your needs and their potential expected impacts, in addition to helping to strengthen demand-led innovation and supply and demand side collaborations. The following chapter provides user experience feedback forms where you can have your say on the next round of design and development of the toolset.

5.0. User Experience Feedback Forms

We hope you enjoyed using the toolset. We are always looking for ways to improve and would appreciate any feedback you could provide on your experience using the toolset. Please send feedback to info@fire-in.eu.

1. Are the tools helpful? And, why/why not?

2. How did you use the tools?

3. Would you continue to use the tools as part of your work? And, why/why not?

4. What improvements would you like to see made to the tools?

Please score the following statements from 1-5, where 1=strongly disagree and 5 = strongly agree. Please explain your score in the comment box.

Adapted Usability Scale	Score	Comment
I think that I would like to use these tools frequently.		
I found the tools unnecessarily complex.		
I thought the tools were easy to use.		
I think that I would need the support of a technical person to be able to use the tools.		
I found the various functions in the tools were well integrated.		
I thought there was too much inconsistency in the tools		
I would imagine that most people would learn to use the tools very quickly.		
I found the tools very cumbersome to use.		
I felt very confident using the tools.		
I needed to learn a lot of things before I could get going with the tools		

If you have any further thoughts or comments, please include them here: