



**CHILD**  
RESCUE

## Collective Awareness Platform for Missing Children Investigation and Rescue

### D4.1 - ChildRescue Validation Framework

**Workpackage:** WP4 – ChildRescue Validation Framework Elaboration

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## ChildRescue Project Profile

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### Partners

	National Technical University of Athens (NTUA), Decision Support Systems Laboratory, DSSLab <u>Co-ordinator</u>	Greece
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	The Smile of the Child (SoC)	Greece
	Foundation for Missing and Sexually Exploited Children – (Child Focus)	Belgium
	Hellenic Red Cross (REDCROSS)	Greece
	Frankfurt University of Applied Sciences (FRA-UAS)	Germany
	SingularLogic ANONYMI ETAIREIA PLIROFORIAKON SYSTIMATON KAI EFARMOGON PLIROFORIKIS (SLG)	Greece
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## Executive Summary

This deliverable is part of WP4 – “Missing Persons Cases Piloting and Evaluation” and reports the outcomes of Task 4.1 - “Validation Framework Elaboration”.

The purpose of the deliverable is to specify the various categories and performance indicators, as well as the appropriate procedures that will be used for the evaluation of the ChildRescue piloting. These components form the ChildRescue validation framework, which will indicate what kind of data should be collected during the pilots’ implementation for the final assessment.

As described in the DoA, D4.1 receives its main input from the already gathered user needs, formulated as user requirements and user stories in D1.1. Further elaboration of the aforementioned needs and requirements has already been conducted for the purposes of D3.1, which was authored in parallel to this deliverable, hence a separate revision of them was not required, as they could be directly drawn from there.

Since a project’s real success lies in the fulfilment of the user-organisations’ objectives and expected benefits from it, it was crucial to view ChildRescue from the pilot’s aspect. The impact that pilots anticipate from ChildRescue on their operation, derived both directly from interviews and workshops but also indirectly from the system and user requirements, as formatted thus far based on the interaction with the pilots. Additionally, as ChildRescue envisages to be integrated and contribute in existing procedures where the organisations have long time experience, it is essential to become aware of any metrics the pilots might already use for their own assessment. The use of these metrics in the validation framework is twofold: they inform us about data already collected by the organisations, which could also be used to measure several key performance indicators and secondly, these metrics could be considered as the basic ingredient for ending up with the ChildRescue validation performance indicators.

Following the preparatory work on the pilot requirements, we proceed with the main section of this deliverable, viz. the definition of the validation framework. Based on the Performance Based Management principles, an adapted integrated validation approach is then presented, identifying in detail what is required to fit the needs of ChildRescue, and subsequently the procedure is applied, generating the specific performance indicators for ChildRescue. These indicators are set out along with the approach to their baseline values’ calculation, which is foreseen in the next activities of WP4.

The present deliverable constitutes the groundwork for the evaluation of ChildRescue, which will take place in the forthcoming WP4 tasks. Containing the ChildRescue performance indicators, it outlines the procedure that shall be applied to receive necessary data and extract the exact baseline values for the ChildRescue validation, after completion of the two piloting phases. Any additions, completions and modifications of the here presented validation framework and the included performance indicators, will be reported in the final deliverable of WP4, namely D4.6.

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# 1 Introduction

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## 1.1 Purpose & Scope

ChildRescue aims at supporting organisations involved in the investigation for missing children and welfare of unaccompanied migrant minors, by introducing technologies for better information management, greater social awareness and involvement, and improved team cooperation. In order to assess the actual impact of ChildRescue on the already existing processes of the pilot organisations and, consequently, the value and future sustainability of the solution, an extensive and detailed evaluation framework was developed and is presented in this deliverable, within the context of Task 4.1 - "Validation Framework Elaboration". D4.1 is part of WP4, which includes the overall pilot cases planning and operation, and it shall provide the guidelines on metrics and data required for the final evaluation against the pilot's objectives from ChildRescue. Besides user requirements and stories, the validation framework has been elaborated, keeping in mind also the benefits the pilots expect to derive from the usage of ChildRescue. Existing metrics of the pilot organisations could help extract possible baselines for the performance indicators and capitalise on existing data for comparison purposes. The performance indicator system proposed in this deliverable, will guide the processes towards the final evaluation and assessment of the pilots, which will lead to the composition of conclusive lessons learnt in D4.6, along with reporting of any additions and modifications in the present validation framework.

## 1.2 Structure of the deliverable

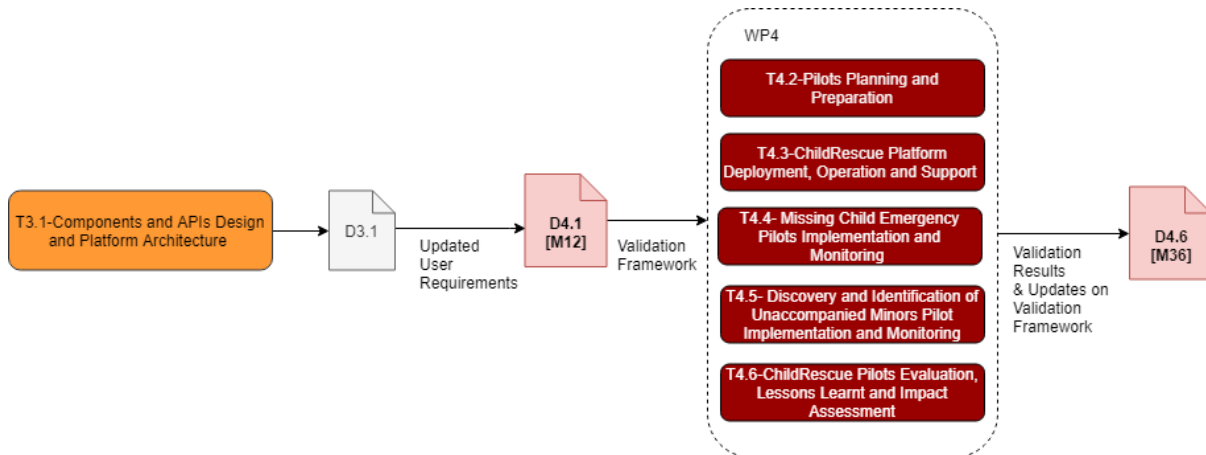
The deliverable at hand is structured as follows:

- Section 1 introduces the reader to the deliverable, describing its purpose, scope, structure and relation to other work packages.
- Section 2 presents the pilots' viewpoint, regarding their expectations from ChildRescue and performance metrics they already use.
- Section 3 includes the validation framework, consisting of the proposed validation method and the specified performance metrics that should be utilised for the assessment of the ChildRescue pilots.
- Section 4 concludes the outcomes of the deliverable and describes forthcoming activities in the context of WP4.

## 1.3 Relation to other WPs & Tasks

This deliverable reports the outcomes of Task 4.1 – "Validation Framework Elaboration". This task signifies the onset of WP4 and the piloting activities, and sets the methodological foundations for the evaluation of ChildRescue's performance. The basis for Task 4.1 is set from the user requirements, which were initially reported in D1.1. However, due to parallel work done for Task 3.1 towards the definition of the ChildRescue architecture and components, the latest updated version of the user requirements and stories will serve as main input, as listed in D3.1. The rest of WP4 is highly dependent on the validation framework presented in this deliverable: the performance indicators must be featured in the pilot planning, required data must be collected as indicated during the pilot implementation phase and finally, the ChildRescue performance assessment will be based on this framework. The results of

the assessment will be included on D4.6 along with any improvements of the validation framework that occurred in the meantime.



**Figure 1-1 Relation to other WPs/Tasks**

Deliverable D4.1 will be available to the public after delivery, as required by the dissemination and data management plan of WP5.



## 2 Pilots' View on ChildRescue

In order to create a truly beneficial tool for the end-users and be able to assess its actual value, we need to identify how it can improve current organisation performance.

### 2.1 Expected Results

The actual value offered by ChildRescue will be evaluated after measuring the effect of the platform against the pilots' expectations. At this stage, we define the core activities and goals from the pilots' point of view, as they demonstrate the most essential aspects where ChildRescue should contribute, and will lead to the extraction of the specific performance indicators in section 3. They are listed in the following table (Table 2-1), expressed as the expected outcomes and impact of ChildRescue on the organisation's operation and are based on knowledge attained through meetings and other kinds of interaction with the pilots.

**Table 2-1 Desired Results of ChildRescue on Pilots**

#	Impact Description	Relevant Pilot
<b>The pilot wants to...</b>		
Involvement of Citizens		
<b>RE.01</b>	raise social responsibility/awareness regarding missing children and unaccompanied migrant minors.	All
<b>RE.02</b>	increase public response in emergencies.	All
<b>RE.03</b>	target location of notifications, so that users are not overwhelmed with announcements.	All
<b>RE.04</b>	increase the valid feedback received from citizens regarding a missing child.	All
<b>RE.05</b>	increase information of citizens on ways to respond when they detect minor victims of neglect, abuse, exploitation etc.	All
<b>RE.06</b>	increase its volunteer basis.	All
<b>RE.07</b>	improve citizens' confidence and trust in its activities and social contribution.	All
Collaboration		
<b>RE.08</b>	increase operational effectiveness, by promoting ChildRescue solution to more and more stakeholders and response organisations across EU.	All
<b>RE.09</b>	improve national and cross-border collaboration in order to enhance all activities regarding unaccompanied migrant minors (identification, safeguarding, support).	REDCROSS, SoC

<b>RE.10</b>	improve communication with other organisations and external stakeholders (authorities, NGOs etc.) in missing children investigations.	All
<b>RE.11</b>	improve internal collaboration between departments and hosting facilities.	REDCROSS
<b>RE.12</b>	improve coordination, communication and task allocation within volunteer/search and rescue teams.	All
<b>Efficiency</b>		
<b>RE.13</b>	increase information integrity and data consistency.	All
<b>RE.14</b>	improve management of hosting facilities and the overview of vacancies.	REDCROSS
<b>RE.15</b>	improve child identification resolution for tracing requests.	RC
<b>RE.16</b>	reduce the time span between the time of disappearance and the detection of the missing child.	All
<b>RE.17</b>	reduce the time needed for information dissemination to the volunteer/ search and rescue team members and to citizens.	All
<b>RE.18</b>	increase usage of information from archived cases in assisting current investigations.	All
<b>RE.19</b>	reduce time consumed by operators to combine multi-source information.	All
<b>RE.20</b>	improve efficiency of decision making regarding a missing child or an unaccompanied migrant minor.	All
<b>RE.21</b>	test and validate the accuracy, effectiveness and reliability of ChildRescue before using it widely for real life cases.	All
<b>Aftermath</b>		
<b>RE.22</b>	reduce time consumed by operators to create reports.	All
<b>RE.23</b>	increase archiving efficiency in cases of repeated disappearances.	All
<b>RE.24</b>	increase of productivity due to real-time knowledge sharing.	All
<b>RE.25</b>	reduce organisation costs for resources and assets during investigations.	All
<b>RE.26</b>	improve knowledge of the welfare and movement of unaccompanied migrant minors.	REDCROSS, SoC
<b>RE.27</b>	increase accuracy of statistics regarding missing children and unaccompanied migrant minors.	All

<b>RE.28</b>	increase understanding of the complex context of a case and improve insights on the overall phenomenon of disappearances.	All
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## 2.2 Existing Metrics

In this section we will present metrics already used by the pilots to extract statistical information and monitor their activity, mainly around cases of missing children and unaccompanied migrant minors who departed from a shelter. Data collected for these metrics could be used for comparison purposes during the validation process. Furthermore, additional information will be received as required, during the piloting planning and preparation phase, such as data about cases by date/time period, status of cases (open, closed), use of rescue teams etc.

The collected metrics are presented in the two following tables grouped by use case, in Table 2-2 and Table 2-3 respectively.

**Table 2-2 Existing Metrics for Missing Children Use Case**

#	Metric Description
Statistics and Demographics	
<b>01</b>	Case Type: <ol style="list-style-type: none"> <li>1. Number of runaways</li> <li>2. Number of parental abductions</li> <li>3. Number of abductions from third persons</li> <li>4. Number of alarming disappearances</li> <li>5. Number of total cases</li> </ol>
<b>02</b>	Children Profile: <ol style="list-style-type: none"> <li>1. Number of males per age group (0-6, 7-12, 13-18)</li> <li>2. Number of females per age group (0-6, 7-12, 13-18)</li> <li>3. Number of total cases</li> </ol>
<b>03</b>	Nationality: <ol style="list-style-type: none"> <li>1. Number of males per nationality (Greek, Other 1, Other 2, Other 3)</li> <li>2. Number of females per nationality (Greek, Other 1, Other 2, Other 3)</li> <li>3. Number of total cases</li> </ol>
<b>04</b>	Reason of Disappearance: <ol style="list-style-type: none"> <li>1. Number of disappearances due to argument with family (per age group)</li> <li>2. Number of disappearances due to relation with the opposite sex (per age group)</li> <li>3. Number of disappearances due to internet addiction (per age group)</li> <li>4. Number of disappearances due to abuse (per age group)</li> <li>5. Number of disappearances due to health issues (per age group)</li> <li>6. Number of disappearances due to other reason (per age group)</li> <li>7. Number of total cases</li> </ol>
<b>05</b>	Total number of children found

<b>06</b>	Total number of children still missing
<b>07</b>	Total number of children for which the cooperation has ended
<b>08</b>	Reasons for ending the cooperation: <ul style="list-style-type: none"> <li>1. Legal issue</li> <li>2. End of communication from the family</li> <li>3. Other</li> </ul>
<b>09</b>	Cooperation with organisations: list of organisations' names
Publicity	
<b>10</b>	Total number of children for whom Amber Alert was activated
<b>11</b>	Total number of children for whom A4 posters were distributed
<b>12</b>	Total number of children for which the disappearance was promoted in media
<b>13</b>	Total number of cases for which posters were distributed
Organisation's Activity	
<b>14</b>	Total number of cases for which the search and rescue team was activated
<b>15</b>	Total number of cases with provision of guidance
<b>16</b>	Total number of cases for which counselling and support were offered
<b>17</b>	Total number of cases for which there was cooperation with the relevant actors
<b>18</b>	Total number of cases for which there was transnational cooperation

**Table 2-3 Existing Metrics for Unaccompanied Migrant Minor Use Case**

#	Metric Description
Statistics and Demographics	
<b>01</b>	Case Type: <ul style="list-style-type: none"> <li>1. Number of persecuted children</li> <li>2. Number of children subject to trafficking</li> <li>3. Number of parental abductions</li> <li>4. Number of abductions from third persons</li> <li>5. Number of total cases</li> </ul>
<b>02</b>	Children Profile: <ul style="list-style-type: none"> <li>1. Number per age group (7-12, 13-18)</li> <li>2. Number of females per age group (7-12, 13-18)</li> <li>3. Number of total cases</li> </ul>
<b>03</b>	Nationality: <ul style="list-style-type: none"> <li>1. Number per nationality (Greek, Other 1, Other 2, Other 3)</li> </ul>

	2. Number of total cases
<b>04</b>	Reason of Disappearance/Departure from Shelter: <ol style="list-style-type: none"> <li>1. Number of disappearances due to pending issues regarding their legal process for asylum (per age group)</li> <li>2. Number of disappearances due to relations with the rest of the children within the shelter (per age group)</li> <li>3. Number of disappearances due to their wish to leave the country (per age group)</li> <li>4. Number of disappearances due to other reason (per age group)</li> <li>5. Number of total cases</li> </ol>
<b>05</b>	Number of children that disappeared / left the shelter and the district attorney was informed
<b>06</b>	Number of referrals made for cases
<b>07</b>	Number of children still missing
<b>08</b>	Number of children that returned and reasons for their return to the shelter
<b>Organisation's Activity</b>	
<b>09</b>	Number of cases for which psychosocial support and counselling services were offered
<b>10</b>	Number of cases referred for further support and treatment
<b>11</b>	Number of cases for which there was cooperation with other agencies / organisations
<b>12</b>	Number of cases for which there was cooperation with the Tracing Service of Hellenic REDCROSS or with other services dealing with family reunification within the REDCROSS Movement
<b>13</b>	Number of collaboration activities with competent authorities
<b>14</b>	Number of cooperation activities with: <ol style="list-style-type: none"> <li>1. National Centre for Social Solidarity</li> <li>2. Public Prosecutor in the area</li> <li>3. Police authorities</li> <li>4. Ministry of Migration Policy</li> <li>5. Other</li> </ol>

## 3 Validation Framework

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### 3.1 Validation Scope

The scope of the present deliverable is to present the validation framework developed and adopted by ChildRescue partners from the view of the project's pilots. Such a framework answers the question whether the ChildRescue developed solutions offer sufficient value to the pilots against their stated operational requirements. This type of validation is called business validation, with the term 'business' referring in the case of ChildRescue to the whole operation of the pilot users and not to their economic activity: it demonstrates that the software developed has clear benefit to the pilot users, either allowing them to operate more efficiently (mainly in terms of time or quality) than before, or supporting them to do things they couldn't do before, or both (which is what stands for ChildRescue).

For clarity reasons, before examining the proposed validation framework, we have to distinguish the ChildRescue platform technical verification, which is to be performed in the framework of WP3 (Task 3.4), and the ChildRescue validation framework to be applied during the project piloting which, as part of WP4, is presented in the present deliverable and is to be applied in the framework of all the "Missing Persons Cases Piloting and Evaluation" activities of the project. While the former (technical verification) ensures that the software has been developed and operates correctly and according to the usage scenarios, it is the business validation that examines if the delivered solution is of real value for the end users.

To this direction, the scope of the validation is considered strictly 'business' oriented since all technical aspects have been / will be examined and assessed in the framework of WP3 - "ChildRescue Platform Architecture Definition and Implementation" tasks. This is why if the results of the business validation are not considered successful, then the solution has to be examined not in terms of how it is developed, but in terms of re-defining the specifications on the basis of which the ChildRescue solutions have been developed (or selected) and integrated.

In general, such a validation takes place against the pilots' business requirements on the basis of specific performance objectives. In order to measure the accomplishment of the business objectives, a set of performance indicators has to be defined for each pilot, providing the way to compare the efficiency of the operation of the pilot organisations before and after the application of ChildRescue solutions. The indicators reflect the performance of the pilots as far as their ChildRescue supported activities are concerned, towards their core objectives already identified. So, in a way the scope of the validation ends up to the comparison of the performance of some core activities of the pilots with and without ChildRescue solutions applied.

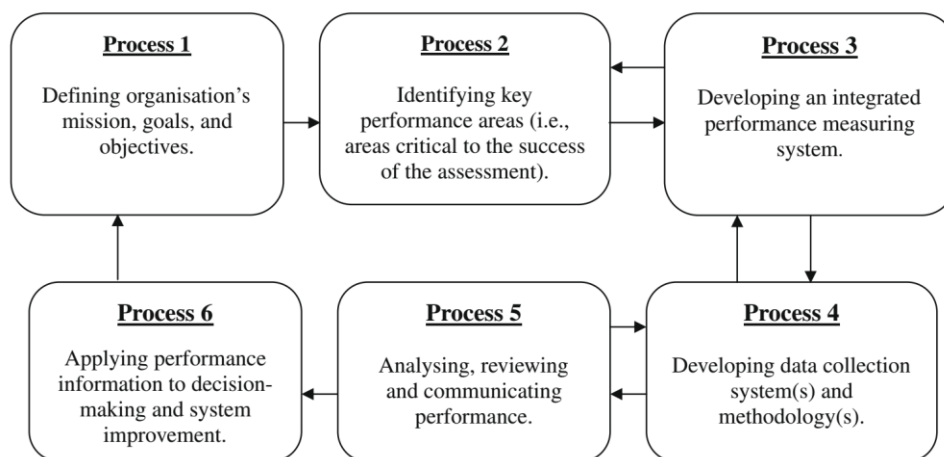
### 3.2 Methodological Approach

As mentioned above, the necessity to validate the operation and the performance of ChildRescue during the piloting phase of the project comes out of the need to evaluate whether the main outcomes of the project do support the achievement of the objectives of the participating organisations and have a positive impact on their operational efficiency. The validation framework which is proposed next represents a procedure of assessing how successfully ChildRescue fulfils user requirements and covers the project objectives, through improving the way that Missing Children Response Organisations and Humanitarian Organisations supporting (among other) minor migrants operate and react on specific

situations on which ChildRescue is expected to have a positive impact. Given that the validation framework focuses on the pilots of the project as the end-users of the ChildRescue platform, the clear target of the framework is to assess the impact of ChildRescue on the performance of the pilot organisations towards their activities which relate to the project scope.

Assessing the efficiency and performance of the pilot organisations on such activities is one of the most systematic means of differentiating success from failure, and therefore identifying the strengths and weaknesses of the solutions provided by ChildRescue. Due to that fact, the proposed pilot Validation Framework of ChildRescue relies on the basics of Performance Based Management (PBM). According to [2], Performance Based Management (PBM) refers to "...a systematic approach to performance improvement through an ongoing process of establishing strategic performance objectives; measuring performance; collecting, analysing, reviewing, and reporting performance data; and using that data to drive performance improvement".

The definition indicates that there are at least six predominant processes involved in PBM which facilitate assessment in a systematic and iterative manner [3]. The information gained from each process is used to constantly improve the quality of any intervention, as well as, justify continuous improvement.



**Figure 3-1 Six key processes of PBM style (adopted from [1])**

As graphically presented in the figure:

- The first process involves the definition of mission, goals, and objectives in measurable terms.
- In the second process an analysis of the infrastructure is carried out to identify and highlight the areas that are most crucial to understanding and measuring its success. This is necessary since it may not be possible or practical to measure all aspects.
- The third process is a key aspect of the application of PBM and forms the main part of the validation approach presented in the present deliverable. Here, what is to be measured and how it is to be measured is decided. A significant outcome of this process is the development of metrics - Performance Indicators (PI) - to provide performance information to assist in the determination of the success or failure of the project.
- The fourth process involves the development of policies and systems to efficiently and effectively collect performance information.

- In process five the performance information collected is analysed, reviewed, and communicated to the decision-makers.
- Process six, the final process, is the application of the performance information to the improvement of the solution applied.

Apparently PBM uses management processes that translate business strategies into actions at the operational level (where they can be assessed for best value), develop and apply measuring tools, analyse and report the results and apply these results to improve performance [4]. In the project's case, the pilot validation framework refers exactly to the establishment of such a systematic method focused on the performance of the pilots, however not in the full extent of their operation but focused exclusively on the activities supported by ChildRescue. Such a validation approach shall include assessment of the pilot cases execution and operation, in terms of both efficiency and effectiveness. An assessment of efficiency refers actually to measuring if ChildRescue achieves its objectives in an optimised 'economical' manner (input versus output: mainly in terms of time as this is the most crucial parameter for missing children cases). On the other hand, an effectiveness assessment (output versus outcome/impact) refers to the measuring of ChildRescue offerings to determine if it is achieving its goals (that is the desired outcome), along with having the predicted social impact.

No matter what type of assessment has to be made, validation is supposed to be based on the definition and usage of indicators as a yardstick to measure performance. Indicators of this nature, used to assess efficiency and effectiveness, are referred to as Performance Indicators (PIs) [5].

A Performance Indicator can be defined as [6]:

"...the measurement of a piece of important and useful information about the performance of a program expressed as a percentage, index, rate or other comparison which is monitored at regular intervals and is compared to one or more criterion".

According to the literature and to successful practises implemented in the past, PIs are designed with respect to the organisation's goals and/or objectives and can be either a quantitative or a qualitative measure [1], [5].

Quantitative PIs are composed of numeric values and a unit of measure. The numeric value provides the PI with magnitude (how much), while the unit of measure gives the numeric value meaning [7]. In addition, a quantitative PI can be a single dimensional unit (for instance time or money) or it can be a multidimensional unit of measure (for example a ratio). Single dimensional unit PIs are usually used to compare or track very basic functions of an organisation, while for more complex information collection, multidimensional PIs are used.

Qualitative PIs are usually used to measure the socio-political outcomes or impact of an organisation (such as the user's satisfaction). However, although the outcomes or impact of infrastructures are usually qualitative, it is quantitative information that is required by governments and funding agencies in order to ensure that cognitive decisions are made regarding investment [8]. That is, PIs are normally required for a comparative purpose and therefore, researchers recommend that where possible a quantitative value be placed on a qualitative PI [9]. This value is an important aspect for ChildRescue pilots' assessment since a significant number of the outcomes and impacts of the project are qualitative



in nature. In general, the transformation of any qualitative PI to a quantitative PI is an intricate task, even more so for pilots performing such crucial operations for the society.

Other characteristics PIs should have, if they are to be considered as proficient PIs, are as follows [10]:

- **Specific** – Clearly defined and easy to understand
- **Measurable** – Should be quantifiable in order to facilitate comparison with other data
- **Attainable/Feasible** – Practical, achievable, and cost-effective to implement
- **Relevant** – True representation of the functions they intend to measure. Should be capable of providing factual, timely and easy understandable information about the function(s)
- **Timely and Free of Bias** – Information collected should be available within a reasonable time-frame, impartially gathered, and impartially reported
- **Verifiable and Statistically Valid** – Should be scientifically sound with possibilities to check the accuracies of the information produced based on sample size
- **Unambiguous** – A change in an indicator should result in clear and unambiguous interpretation. For example, it should be clear whether or not an increase in the value of PI represent an improvement or reduction in the item measured
- **Comparable** – Information should show changes in process over time or changes between processes. This may require quantification of the PI

PIs having the majority of the above characteristics – specifically SMART (see highlighted letters in the list above for the definition of SMART) – are referred to as robust, proficient indicators and are therefore more likely to be intelligible for their intended use [11]. However, in real life situations it may be difficult to create PIs that precisely fulfil all the criteria listed above, therefore a trade-off may be necessary when designing PIs. Although trade-offs are expected, PIs can still be effective if they are developed within the pilot organisation’s mission, goals and management style. At the same time, although PIs may have some drawbacks, when it comes to measuring the qualitative aspects identified, their other useful qualities make them ideal for the ChildRescue validation approach. However, for the PIs to have actual meaning in the validation, their design must ultimately be based on the complexity and sensitive nature of the cases handled by the pilot organisations and not be implanted from other domains or other types of organisations.

### 3.3 Performance Indicators Design Approach

The challenge for building a valid framework for the validation of ChildRescue pilot operation, is to design Performance Indicators that are capable of measuring the complicated performance of the pilot organisations when it comes to activities which are related to ChildRescue scope. These PIs must be capable of measuring the direct qualitative and quantitative performance of ChildRescue, as well as the externalities (qualitative or quantitative) produced. Consequently, PIs to assist in the comprehensive assessment of ChildRescue must incorporate in their design the variables that contribute, and affect, the ChildRescue solutions performance.

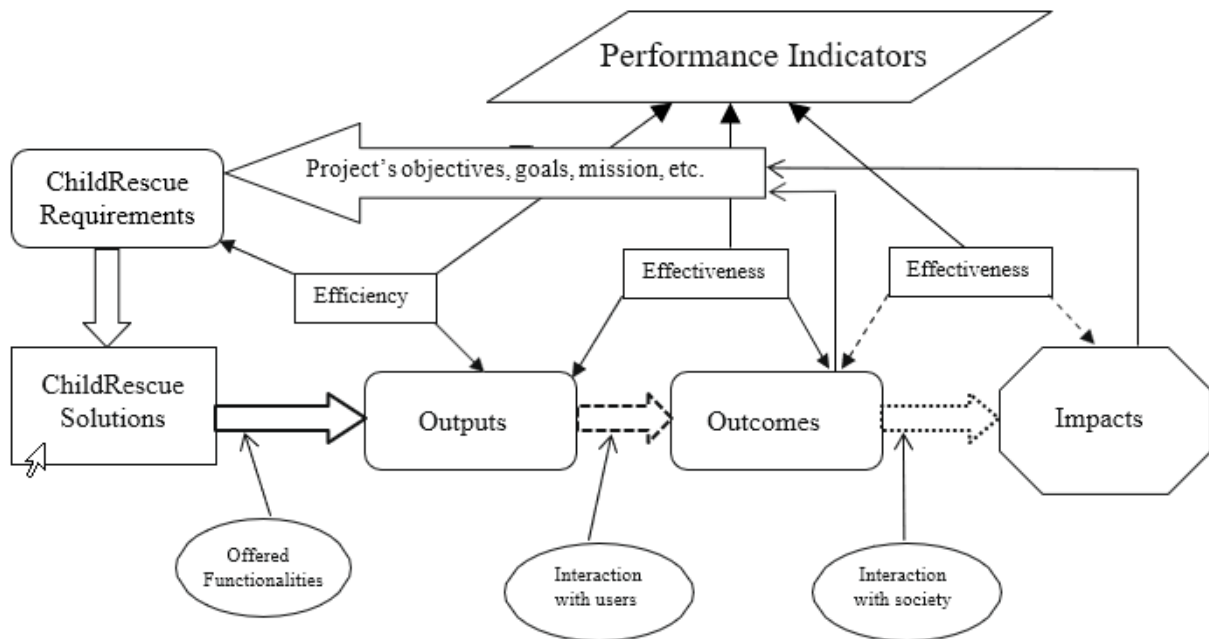
Performance Indicators design calls for the usage of methodologies that involve clearly designed logical steps viewed as series of logic flow models tailored to capture key functions and activities, external assessment factors, and the purpose of the assessment [4]. That been said, a conceptual model (i.e. a framework) can be created that includes universal concepts, principles and activities that are generally used in the design of PIs [12]. This framework would be in part high-level and would require fine-tuning by individual organisations before actual execution. The above theory implies that the traditional methodologies for developing SMART PIs form can be used as a baseline of a conceptual framework for the development of PIs for ChildRescue pilot validation. The main function of this Framework is to act as a guide to the project community in the development of PIs, specifically to assist in validating the performance of ChildRescue pilot operation.

Given all the above, the framework for designing the Performance Indicators to be included in the ChildRescue validation methodology is presented next, based on an adopted – for the needs and the scope of ChildRescue – version of the generic Performance Indicators design approach initially proposed in [4] and expanded (although applied in a totally different domain) in [1]. According to the aforementioned approach, interventions like those proposed by ChildRescue are based on a “theory of change” that serves the purpose of connecting the project activities with the project goals.

The first step for applying the approach is to build a logic model for the intervention to be validated, i.e. a graphic representation of the theory of change, in that, it illustrates how the inputs and activities connect to the results. The logic model seeks to convey explicitly the assumed relationships (activities and interactions) amongst inputs, outputs, outcomes and impacts through the usage of boxes, connecting lines, arrows (double directional in some cases), feedback loops and other visual metaphors. Such a logic model serves as an iterative tool for providing a framework to support program planning, implementation and assessment [13].

The following figure presents the conceptual logic model for ChildRescue. It illustrates the relationships amongst inputs, outputs, outcomes and impact within the context of efficiency and effectiveness. The broad arrows map the relationships between aspects of the components with the different styles - straight lines to dash lines - indicating the growing fuzziness in defining the relationships.

The efficiency relationship illustrated by the logic model gives rise to an initial set of PIs to measure this level of performance. Similarly, the effectiveness relationships (output vs. outcomes and outcomes vs. impacts) promote the need for additional PIs in order to complete the set of the Performance Indicators.



**Figure 3-2 ChildRescue Validation Logic Model**

The framework for designing the Performance Indicators consists of 10 fundamental steps which were designed using analogies from cases identified in the literature like in [1] & [2]. Of course, these steps were customised in order to capture the features unique to ChildRescue. It should be noted that the steps recommended are non-linear, iterative or cyclical processes that require regular revisiting.

Listed below are the 10 steps of the approach as developed for ChildRescue:

1. With the aid of the logic model identify the main activities/ functions/ inputs that are essential to the key objectives of the project.
2. Clearly define in operational and measurable terms, the expected outputs, outcomes and expected impacts.
3. Identify and encapsulate factors, internal (e.g. users' requirements) and external (e.g. added value functionalities) that are likely to influence the Outputs, Outcomes, and Impacts and therefore, affect the validation.
4. Based on the purpose of the assessment, select the category of PIs required.
5. Design a set of efficiency-related indicators on the basis of the expected outputs. Here the aim is to determine whether or not the solution is operating optimally. Typical indicators measuring efficiency are those linked to the satisfaction of the users.
6. Out of the set of previously defined indicators, and by using the logic model and the SMART concept to assist in the selection, define a smaller set of indicators to be included in the Validation Framework. For this selection, what has to be determined for all initially identified indicators is if they are providing information pertaining to critical issues for the success of the project.
7. Design a set of effectiveness indicators, both qualitative and quantitative. The development of indicators in this case requires extensive investigation into the medium to long-term effects on the pilot organisations and consequently on society, given the nature of the activities of the organisations.

8. Select Performance Indicators from the list developed in the previous step (following step 6 process).
9. Verify the PIs to determine if they can pass the SMART test, they are cost-effective to implement, data are available for these PIs, pilots are able to collect and analyse the required performance information, and they are providing all the required information for validating the success of the pilot operation of ChildRescue.
10. Conclude on the final set of Performance Indicators to be included in the ChildRescue Validation Framework

### 3.4 Performance Indicators for ChildRescue Pilots Validation

Following the approach defined above, a complete set of Performance Indicators has been designed in order to measure the degree of reaching the expected results after integration of ChildRescue in the pilots' processes. The indicators, which are presented in this section, can be relevant to more than one result and vice versa, accomplishment of a result may be denoted by more than one indicator.

Most of the PIs selected are quantitative - objective facts, without involvement of personal thoughts, feelings, opinions, however there are also a few qualitative PIs which are mostly based on the perception of the pilot organisations on specific issues, adequately justified.

The descriptions of the performance indicators provided below are accompanied by suggestions on how to calculate the baseline values in the forthcoming tasks of WP4. However, for particular indicators, no existing procedures and data can be used for comparison (as for example with PI.09 – "average number of citizens receiving notification through ChildRescue to total number of mobile application downloads per case"). In such cases, the baseline will be set to "0". During the pilot preparation and implementation phase, formal procedures will be defined per pilot in order all the required data to be acquired, while the baseline values will be specified following the proposed calculation approaches. In the fourth column, it is stated whether the PI contributes in the assessment of efficiency or effectiveness. In the selected PI design approach, which was presented in the previous section, efficiency is mainly related to the outputs, whilst effectiveness can refer to outcomes and to impacts from the usage of the ChildRescue solution.

**Table 3-1 ChildRescue Performance Indicators**

PI #	Performance Indicator Description	Baseline Calculation Approach	Assessment of ...	Related Result #
PI.01	number of ChildRescue mobile application downloads monthly	(baseline equal to "0")	efficiency	RE.01
PI.02	number of aggregated ChildRescue mobile application downloads	(baseline equal to "0")	efficiency	RE.01
PI.03	average number of notified citizens (through SMS, mobile	average number of citizens notified per case (through	efficiency	RE.01

	notifications and social media) per case	SMS, and social media) before ChildRescue		
<b>PI.04</b>	total number of notified citizens (through SMS, mobile notifications and social media) annually	total number of citizens notified annually (through SMS, and social media) before ChildRescue	efficiency	RE.01
<b>PI.05</b>	number of notifications sent through ChildRescue and opened	(baseline equal to "0")	efficiency	RE.01
<b>PI.06</b>	average number of citizens providing evidence per case	average number of citizens providing evidence per case before mobile application launch	effectiveness	RE.02
<b>PI.07</b>	average number of citizens providing evidence through the ChildRescue app per case	(baseline equal to "0")	effectiveness	RE.02
<b>PI.08</b>	ratio: number of citizens who provide feedback through any channel to number of received mobile notifications per case	number of citizens who provide feedback to number of received SMS notifications per case	effectiveness	RE.02
<b>PI.09</b>	ratio: average number of citizens receiving notification through ChildRescue to total number of mobile application downloads per case	(baseline equal to "0")	efficiency	RE.03
<b>PI.10</b>	ratio: number of notifications sent to specific locations to total number of notifications	(baseline equal to "0")	efficiency	RE.03
<b>PI.11</b>	ratio: number of valid feedback to total number of submitted feedback	(baseline equal to "0")	effectiveness	RE.04
<b>PI.12</b>	ratio: number of mobile app users who visited the relevant informative section in ChildRescue app (Do's & Don'ts, how to respond in case of child neglect, abuse etc.)	(baseline equal to "0")	effectiveness	RE.05

<b>PI.13</b>	number of new volunteers who applied encouraged by ChildRescue	(baseline equal to "0")	effectiveness	RE.06
<b>PI.14</b>	qualitative: estimate progress in public perception of the organisation's activities	existing surveys on public perception	effectiveness	RE.07
<b>PI.15</b>	number of organisations using or interacting with ChildRescue	number of pilots = 3	effectiveness	RE.08, RE.09, RE.10
<b>PI.16</b>	number of EU organisations, in countries except Greece and Belgium, using or interacting with ChildRescue	(baseline equal to "0")	effectiveness	RE.08, RE.09, RE.10
<b>PI.17</b>	number of organisations using or interacting with ChildRescue during missing children investigations	number of pilots involved in missing children use case = 2	effectiveness	RE.10
<b>PI.18</b>	number of unaccompanied migrant minors matched to existing profiles near EU entry points	(baseline equal to "0")	effectiveness	RE.09, RE.11
<b>PI.19</b>	number of organisations using or interacting with ChildRescue during activities pertaining unaccompanied migrant minors	(baseline equal to "0")	effectiveness	RE.09, RE.11
<b>PI.20</b>	average number of posts and announcements made through the ChildRescue collaboration space per case	(baseline equal to "0")	efficiency	RE.12
<b>PI.21</b>	qualitative: improvement in information integrity and data consistency	(no baseline to be defined – the indicator is expressed by a percentage of improvement in comparison to the initial/current status)	effectiveness	RE.13
<b>PI.22</b>	total number of unaccompanied migrant minor profiles registered in ChildRescue	(baseline equal to "0")	effectiveness	RE.14

<b>PI.23</b>	average time needed to find a vacancy in a hosting facility	average time currently needed to find a vacancy in a hosting facility	efficiency	RE.11, RE.14
<b>PI.24</b>	average time needed to detect the absence of an unaccompanied migrant minor from the hosting facility	average time currently needed to detect the absence of an unaccompanied migrant minor from the hosting facility	efficiency	RE.11, RE.14
<b>PI.25</b>	average time between issuing a Tracing request and locating the missing child	average time currently needed between issuing a Tracing request and locating the missing child	effectiveness	RE.15
<b>PI.26</b>	average time between reporting of disappearance and locating the missing child	average time currently needed between reporting of disappearance and locating the missing child	effectiveness	RE.16
<b>PI.27</b>	average time needed for volunteer/search and rescue team formation per case	average time currently needed for volunteer/search and rescue team formation per case	efficiency	RE.12, RE.17
<b>PI.28</b>	average time needed for citizens to get informed for a case for the first time, after the decision for dissemination	average time currently needed for citizens to get informed for a case for the first time, after the decision for dissemination	efficiency	RE.17
<b>PI.29</b>	average number of old cases matched to current case	(baseline equal to "0")	effectiveness	RE.18
<b>PI.30</b>	average time needed for examining and retrieving information from old cases similar to current	average time currently needed for examining and retrieving information from old cases similar to current	efficiency	RE.18
<b>PI.31</b>	average time needed to find and combine information from operating line, social media, maps, testimonials, profiles and old cases	average time currently needed for an operator to find and combine information from operating line, social media, maps, testimonials, profiles and old cases	efficiency	RE.19, RE.24
<b>PI.32</b>	number of investigation activities in irrelevant locations	current number of investigation activities in irrelevant locations	effectiveness	RE.12, RE.20, RE.25

<b>PI.33</b>	number of citizens contributions during real-life cases piloting	(baseline equal to "0")	effectiveness	RE.01, RE.02, RE.21
<b>PI.34</b>	number of missing children real-life cases piloting	(baseline equal to "0")	efficiency	RE.22
<b>PI.35</b>	average time needed for creating complete case reports	average time currently needed for creating complete case reports	efficiency	RE.22
<b>PI.36</b>	average time needed for retrieving information of repeated disappearance cases	average time currently needed for retrieving information of repeated disappearance cases	efficiency	RE.13, RE.23
<b>PI.37</b>	average time needed by operator to share new information to relevant stakeholders	average time currently needed by operator to share new information to relevant stakeholders	efficiency	RE.24
<b>PI.38</b>	response organisation human effort and direct costs per case	current investigation costs per case	effectiveness	RE.25
<b>PI.39</b>	qualitative: estimated accuracy of statistics regarding missing children and unaccompanied migrant minors	(no baseline to be defined – the indicator is expressed by a percentage of improvement in comparison to the initial/current status)	effectiveness	RE.27
<b>PI.40</b>	qualitative: estimating how much ChildRescue assists in the organisations' and operators' knowledge and understanding about disappearances as a phenomenon	(no baseline to be defined – the indicator is expressed by a percentage of improvement in comparison to the initial/current status)	effectiveness	RE.28
<b>PI.41</b>	number of cases in which ChildRescue contributed significantly according to the response organisations activity reports	(baseline equal to "0")	effectiveness	RE.15, RE.16



### 3.5 Recommendations for the Application of the Validation Approach to the Pilots of the Project

With the aim to infuse a practical and applicable philosophy of the validation steps to the project stakeholders, a set of concrete recommendations has been constructed in order to be taken into account by the partners supporting the ChildRescue pilot operation and evaluation activities. The recommendations' list doesn't have the scope to impose pilots to do specific things, but is being provided in order to be taken into account during the next Tasks of WP4 (and in general in the future tasks of the project), forming a mutual understanding that will support the fruitful collaboration among the ChildRescue partners, enhancing the result-oriented scope of the project and at the same time help all involved stakeholders to comprehend the requirements of the project validation activities.

The following provided recommendation list is based on core verification and validation notions found in the literature - [14], [15] - adopted to the needs and special characteristics of ChildRescue:

#### **Validation Recommendation 1: Have a deep knowledge of the requirements and the ends sought in each pilot.**

Within each pilot's environment, business and technical requirements represent what must be delivered to provide value. In order to proceed to effective verification and validation activities, all stakeholders involved need to be familiar with the requirements that have been expressed as well as with the objectives pursued with the applied solutions.

In this direction, concrete requirements and specifications have a crucial role in V&V, especially when demonstrating the following attributes: Unambiguous (one and only interpretation of each requirement); Complete; Verifiable (existing process through which a human or a machine can verify that the component correctly implements the stated requirements); Consistent; Modifiable; Traceable; and Usable.

#### **Validation Recommendation 2: Infuse a performance evaluation culture to the pilot operations**

In order to attain the maximum impact within the pilot operations, an evaluation-rooted culture needs to be fostered. All ChildRescue users need to become aware of the potential benefits through appropriate communication activities that will contribute to viewing the Validation related tasks under a new perspective, especially taking into account that they are typically considered as time and effort consuming. Successful validation activities will eventually lead to significant added value and benefits for each pilot that would be impossible to get otherwise. Any members of the pilot organisations with hands-on experience on validation activities can significantly support the infusion of such a culture in their organisations.

#### **Validation Recommendation 3: Create a concrete validation data collection process tailored to each pilot needs and competences.**

Since building a generic validation data collection process, compatible with all the internal processes, operations and data handling principles of each pilot user is impossible and having a specific process

per pilot is the most recommended way to go, a concrete approach for collecting data to be used for validation has to be developed for each pilot. Such a process should adhere to the concepts and principles of the validation method and of course to be considered as feasible for the constraints and limitations of the trials.

**Validation Recommendation 4: Engage the required stakeholders from the very beginning, assigning them with appropriate responsibilities and decision power.**

In order to support the validation tasks during the pilot operations, many stakeholders (mainly members and staff of the pilot organisations) need to be involved at various engagement levels: from active, everyday engagement, to merely periodic feedback. Involving all of them at the appropriate roles based on their position within the organisation is a complex task that should not be underestimated. To this end, the necessary roles within each organisation need to be explicitly outlined and the associated responsibilities, especially for collecting all required information and data, should be put into effect from the very beginning.

**Validation Recommendation 5: Tap the power of data to effectively conduct V&V activities.**

No matter how well-defined or detailed an approach is, high-quality data represent the “holy grail” of performance/ business validation. Particular attention thus needs to be given to collect, filter, curate and intelligently tap data, available from multiple sources, i.e. through the organisations back-office systems, annual/ periodic reports, country statistics etc. As many validation cases typically struggle to cope with too much or too little data of the appropriate level and frequency to calculate the appropriate indicators, reliable data sources need to be foreseen from the very beginning and incorporated in a real-time manner to allow for pragmatically informed judgments.

**Validation Recommendation 6: Keep the balance between business and technical feedback provisioning.**

In the scope of ChildRescue, achieving the operational intentions of the participating organisations that comprise the pilot installations goes hand in hand with the need to assess the technical characteristics and the applicability of the tools that will be provided. Although providing feedback on the technical aspects is important in order to be taken into account during the development of the platform, for performing the validation what is important is to examine whether the solutions provided satisfy intended use and user needs and determine whether the requirements of the final release of the ChildRescue platform are met. Ensuring that the feedback to be provided by ChildRescue users balances between business and technical is important in order both perspectives to be examined in the framework of the project.

**Validation Recommendation 7. Keep a complete validation log and document in detail the findings.**

In order to evaluate and ameliorate the underlying validation approach itself, it is important to communicate the actual/ real-life results of the validated ChildRescue solutions back to the rest of the stakeholders involved in the project. Keeping detailed documentation of all the validation results is proposed, which could also act like a guide towards detecting the causes of potential unexpected results, as well as avoiding the same mistakes in the future.

**Validation Recommendation 8. Treat validation as a continuous, iterative procedure.**

The validation activities should be treated as an intangible, continuously exploitable asset of the pilot organisations under a long-term perspective. They should not represent a one-off effort in the framework of the project, but rather represent the commitment of the pilots to measure and recalculate their Performance Indicators along a certain period of time.

## 4 Conclusions

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Main focus of this deliverable was the compilation of the ChildRescue validation framework in the context of Task 4.1, which will serve as a guideline for the next steps of WP4 – “Missing Persons Cases Piloting and Evaluation”, leading to the final evaluation of the platform in terms of added value for the organisations.

Initially, we identified the anticipated effect of ChildRescue on pilots’ activities as viewed from their own perspective and recorded existing performance metrics and statistics they use, in order to set the benchmark for the platform validation.

Following was a brief overview of the validation framework’s scope within ChildRescue and the selection and necessary adaptation of the one considered most fitting to the needs of ChildRescue, namely the Business Performance Management approach. A BPM-oriented validation approach has been presented in detail and applied in order to devise the ChildRescue performance indicators, addressing thoroughly and effectively the essential points set from the pilots.

The approach and the performance indicators reported in this deliverable constitute the framework for the evaluation of ChildRescue after conduct of the two pilot phases. The baseline target values will be specified and reported in the forthcoming tasks of WP4.

The assessment results along with any modifications and additions to the here presented framework, will be reported in the conclusive deliverable for the ChildRescue piloting, namely D4.6 in M36.

## Annex I: References

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