

# Emergency Medical IT Services for Migrants Rescue Operations

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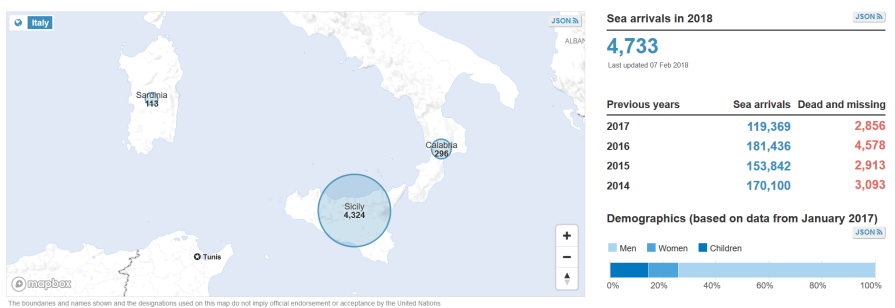
**Abstract.** This paper illustrates the research and development work done in the last 4 years in the frame of rescue operations of migrants who attempt to reach Italian coasts via sea journeys on Mediterranean routes. The context, characterized by humanitarian, social, and organizational issues, presents complex challenges that can only be tackled with a multidisciplinary, participatory, and internationalized approach. The ITHEALTH system and the results of its usability and user experience evaluations are presented. It takes inspiration from other projects developed for different purposes but acting in similar context and according to similar socio-technical dimensions.

**Keywords:** Participatory design, Human Work Interaction Design, international development, domain experts, migration, emergency medical services.

## 1 HWID for Emergency Medical Services

Due to its peculiar geographical position, Italy is used to handle difficult situations of migratory flows, especially recently ending with landing on the southern coast of the Country. According to UNHCR (United Nations High Commissioner for Refugees) report [1] as described in Fig. 1, in 2017, 119,369 immigrants have entered Italy from the Mediterranean.

In [2] World Health Organization defines a mass casualty incident as “an event which generates more patients at one time than locally available resources can manage using routine procedures. It requires exceptional emergency arrangements and additional or extraordinary assistance”. This definition well describes what happens during the rescue operations for managing immigrants’ landing, when offering medical assistance to a number of people who often exceed what the relief structures can accommodate becomes a mandatory operation. These conditions make it essential to study and implement specific strategies and work plans followed by all actors involved in the rescue operations. Such operations are carried out by staff specialized in various disciplines such as doctors, nurses, and paramedics.



**Fig. 1.** Mediterranean situation. Sea arrivals since 1 January 2018 to 7 Feb 2018 in Italy and report of the arrivals in the previous years [1].

Professionals from different domains are called upon to contribute with their expertise in challenging environments and with very tight timing and emergency intervention modes. This means having to perform sensitive tasks in a short time, though maintaining a high level of security, efficiency, and reliability of performance. This can be supported by the design and development of IT applications to support the whole rescue operations. In particular, this research and development work is framed into studying how to design the interaction of IT solutions for enabling Emergency Medical Services (EMS). EMS are defined in [3] as “[...] the ambulance services component that responds to the scene of a medical or surgical emergency, stabilizes the victim of a sudden illness or injury by providing emergency medical treatment at the scene and transports the patient to a medical facility for definitive treatment”. However, the issues in this context do not only relate with medical assistance: operation workflows have to be put in place and leadership and organizational aspects have to be faced. To manage rescue operation in an efficient way means to nominate one or more managers who can successfully lead and coordinate all team members. One of the most critical actions to be taken in rescue operations is the triage, i.e. efficiently determining severities of injuries and prioritizing treatments. This action constitutes one of the most important tasks for basic life support. Furthermore, there are other crucial activities, like organizing and running specific areas of operation for triage, treatment, and transportation. Therefore, it is mandatory to take care of the specific flow of information between the operation managers and the team members. Such a research context can be clearly seen as framed into Human Work Interaction Design (HWID) [4, 5, 6, 7, 8], a lightweight version of Cognitive Work Analysis, addressing the concept of Work in Human-Computer Interaction. The background and experience the authors bring in the field is twofold. On one hand, INMM (In Manibus Meis) is a registered supplier to NATO and is responsible for providing medical information support systems for first responders and military rescuers, medical control systems for first aid rescue teams, supporting systematic collaborative to emergencies management. On the other hand, the members of MIPS (Multimedia Interaction Perception Society) Laboratory of Università degli Studi di Milano bring into play their experience in interaction design for domain experts in several application domains [9, 10, 11, 12, 13].

This paper presents the research and development work done in the last 4 years in the frame of rescue operations of migrants who attempt to reach Italian coasts via sea journeys on Mediterranean routes. Specifically, the ITHEALTH system is illustrated and the results of its usability and user experience evaluation are discussed.

## 2 Emergency Medical Service

An Emergency Medical Service (EMS) can be defined as “a comprehensive system which provides the arrangements of personnel, facilities and equipment for the effective, coordinated and timely delivery of health and safety services to victims of sudden illness or injury.” [14]. The aim of EMS focuses on providing timely care to victims of sudden and life-threatening injuries or emergencies. [20] provides a general description of a comprehensive disaster plan is, with some reference to more specific sort of plan, such as those needed for factories and hospitals.

With the advent of digital processing it is now possible to map situations that evolve by iteration and, several tools have been developed for dealing with medical emergencies utilizing advanced Information and Communication technology (ICT). [21] describes a set of general and supporting design principles and specifications for a “Dynamic Emergency Response Management Information System” by identifying design premises resulting from the use of the “Emergency Management Information System and Reference Index”. Starting from these considerations, this paper aims at investigating a digital solution that allows private and public safety organizations to integrate EMS systems with monitoring systems making the task of triage manageable in uncontrolled environments of pre-hospital settings such as the ones rescuers have to face during sea arrivals of immigrants.

Existing examples of these systems can be: Ambutrax<sup>1</sup>, AngelTrack<sup>2</sup>, Emergency Services Scheduler<sup>3</sup>, Operative IQ<sup>4</sup>, and NowForce Solution<sup>5</sup>. They are designed for first responders including: EMS, fire departments, police, hospitals and clinics. In general, they include functionalities for managing patient database, daily analysis, asset management, inventory management, fleet maintenance, and narcotics tracking solutions. These tools are devised to be complete EMS systems that can reduce the time spent on data collection and management and, in some cases, offer cloud-based computer aided dispatch, and mobile response tools for private security, and public safety organizations, enabling reduced response times, full situational awareness, and enhanced communications. The web portal Capterra [15] reports an interesting comparison aimed to find the best EMS Software for business. This comparison is based on product reviews and features of the most used EMS systems. The reported reviews highlight as these tools are in some cases overcomplicated and mainly are oriented to support only one agency at a time, not allowing safety organizations to share infor-

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<sup>1</sup> [www.epigate.com](http://www.epigate.com)

<sup>2</sup> [angeltracksoftware.com](http://angeltracksoftware.com)

<sup>3</sup> [www.bradgoodmansolutions.com](http://www.bradgoodmansolutions.com)

<sup>4</sup> [www.operativeiq.com/](http://www.operativeiq.com/)

<sup>5</sup> [www.nowforce.com](http://www.nowforce.com)

mation among them. Other interesting solutions are proposed in [22, 23]. The first paper reposts an interesting idea but it is based on website that results to be difficult to use directly at the place of landing. Instead, the second article describes how Sahana, a free and open source disaster management information system, is adopted for managing all stages of a disaster response. An extension of this paper, [24] proposes a decision maker system built as module for Sahana, that aims at supporting making needs of crisis managers.

Anyway, there have not yet been any independent evaluations of Sahana deployments in the field, making it impossible to definitively judge whether the platform has played a significant role in any given response. Moreover, it is missing of the possibility to share encrypted health cards or clinical information between international safety organizations in order to increase the operative efficiency and reduce the possibility of clinical error risks.

This information sharing could enable organizations to gather patients' data from their rescue to their hospitalization and to locate people in distress and dispatch the closest available responder to any emergency situations.

Following on from these considerations, the project aims at investigating how mobile digital tools used during critical and emergency activities not only facilitate the intervention on the field but also guarantee a benefit to whole related organizational structures.

The idea is to provide a system that besides a real help to rescuers can offer great benefits to the network of local private and public safety organizations. The equal access to the information for each organization can favor their cooperation and collaboration and the monitoring of the patient's status from the first triage to the final hospitalization. The authors believe that a single app used to support rescue and assistance operations in Italy can improve the whole organizational structure favoring better cooperation between all operative units and government agencies in order to enable more equal immigrants' treatment and distribution among all European countries.

### 3 Challenges

In authors' 4-year experience in design and development of IT solutions to be used in critical emergency situations, they identified six main challenges:

1. **Time and resources management:** the applications need to support the rescuers in gathering medical data and in managing the operation as a whole as quickly as possible but keeping a high-level quality of the actions.
2. **Clinical risk reduction:** electronic guides are provided to avoid incomplete and incorrect medical data collection in stressful situations, which could impair the final outcome exposing patients to possibility of mistakes along the rescue chain.
3. **Human rights preservation:** the entire workflow needs to be addressed efficiently and in reasonable time but always paying attention to not overcome human rights and dignity in the process. Specifically, discriminations on any ground have to be avoided.

4. **Privacy preservation:** medical data have to be managed in compliance with law requirements. This means to collect, store, protect and use all gathered data in conformance with the requirements of legislation and regulations, both on a National and EU level [16].
5. **Internationalization:** there are two different aspects of the context that require an internationalized approach. Firstly, the migratory wave is characterized by a multiplicity of different nationalities. To enable the collection of medical data and informed consent, and to efficiently and effectively deploy medical care, any IT application has to be designed and developed in more than one language. Secondly, it is desirable to trigger an information exchange process in order to facilitate the transmission and analysis of the data between European countries.
6. **Security:** information security controls had to be implemented to protect databases against compromises of their confidentiality, integrity and availability.

These challenges are commonly found in emergency management contexts and particularly affect immigrants rescue operations. They became in fact the six main requirements at the basis of the ITHEALTH design and development.

## 4 ITHEALTH

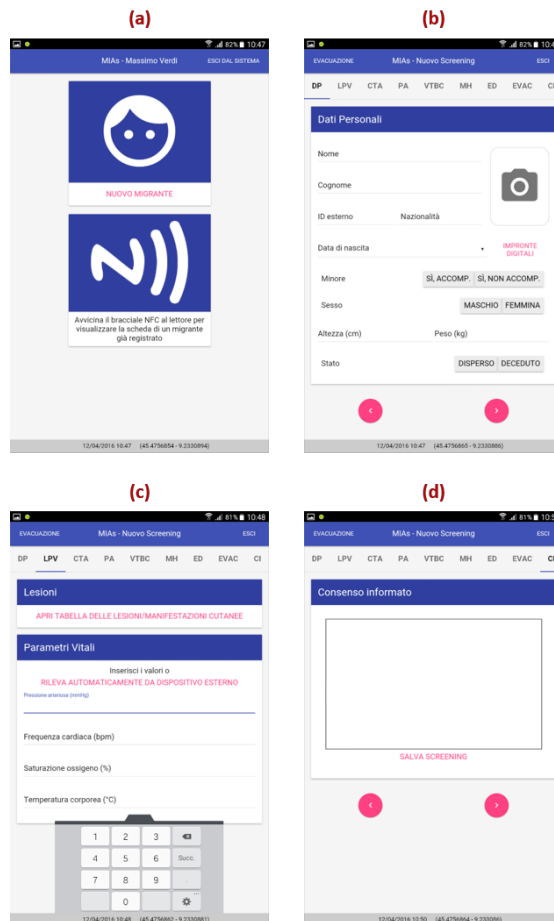
INMM in collaboration with researchers of Università degli Studi di Milano have designed and developed ITHEALTH (International Traveller Health Surveillance System), a digital tool that through a tablet device provides rescuers with a set of functionalities for gathering patients' medical data and for managing and coordinating rescue operations. ITHEALTH allows rescuers, who are provided with a portable device (tablet or smartphone), to assign an electronic bracelet to the patients tagged with a unique alphanumeric code (made available in three versions: manually read by the rescuer, read via NFC chip or scanned as a QR Code), and then screening is assisted by the system in use at entry points (seaports and on board of ships) and along with transfer and relocation of migrants and refugees.

All personal data is securely encrypted, and the bracelet (a medical tag) is worn by the migrant as her/his right to access to emergency healthcare. The resulting electronic health records (EHRs) are automatically and securely stored locally both in the ITHEALTH system and on the individual medical tags. Only authorised personnel who have sufficient credentials to the system can access the data, thus physically the data is sent and visible only on authorized devices.

When the connection is available data can be transferred to a server, installed on a laptop computer, normally placed at an operating center and/or at the Hospital.

In case of arrival from an epidemiological 'area of risk', the system, updated with previous preloaded information, matches data and instructs caregivers to perform an accurate screening while alerting the healthcare system of a possible threat, by sending a message saying that there may be the risk of a public health threat to monitor. In case a disease is confirmed, the caregiver is assisted to command the prompt evacuation by adopting the EVAC protocol, hospitalisation and/or isolation of the person.

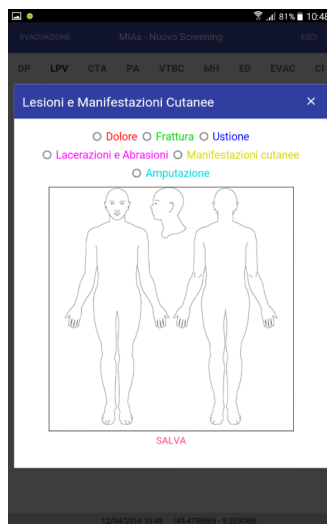
The workflow implemented in ITHEALTH follows official protocols and standard procedures, so that screening is guided in a unified manner, throughout the whole chain of care. IT HEALTH system focuses on the triage phase and it is used during the first action after the migrants' landing in order to understand if sanitary emergencies are necessary and to sort people toward proper specialized centres. The digitalization of such protocols allows to face the first two challenges mentioned earlier in this paper – i.e. time and resource management and clinical risk reduction. The quality of the workflow is guaranteed by the implementation of standard protocols, whereas the digital processes enable a quick data collection, management, and delivery. When a rescuer collects data, an informed consent is shown to the migrant to be signed. This page is translated in a number of languages and offers information about the reasons behind the data acquisition process.



**Fig. 2.** Screenshots of some pages of the ITHEALTH medical data acquisition process

Fig. 2 depicts a set of screenshots that present some of the steps of the ITHEALTH medical acquisition process. Fig. 2(a) requires to create a new patient profile or to load data previously registered in an electronic bracelet assigned to her/him. The forms in Fig. 2 (c) and (d) are used for collecting immigrant's status, biographical data, and medical data respectively. In this latter case, data concern heart rate, oxygen saturation, and body temperature. Finally, the screen in Fig. 2 (d) requires the patient to sign the informed consent about the gathered data. This page is translated into the immigrant's language, if available, or in one of the languages spoken by her/him.

When an intervention is completed, the resulting EHRs are automatically and securely stored both locally in the ITHEALTH system and on the medical TAG. When Internet connection becomes available (in case of sea operations the connection is not always granted), the rescuer can synchronize the EHRs and the additional information through a secure communication channel (recently radio communications have been exploited too). The server keeps a database that securely stores all that has been done during the operations, enabling the creation of reporting to use for coordinating different rescues and for enabling the cooperation between various intervention agencies. About human rights and privacy presentation, EHR systems need to manage new and additional safeguards to address the fundamental conflicts and dangers of exchanging information in an electronic environment [14]. As said in the previous section, any IT application has to be designed and developed in more than one language, and this is particularly important for the specific case at hand. It is in fact mandatory to mitigate misunderstandings between the rescuer and the immigrant about data processing and collection purposes that could eventually put on a hold or slow down the information transmission process and the rescue operations procedures.

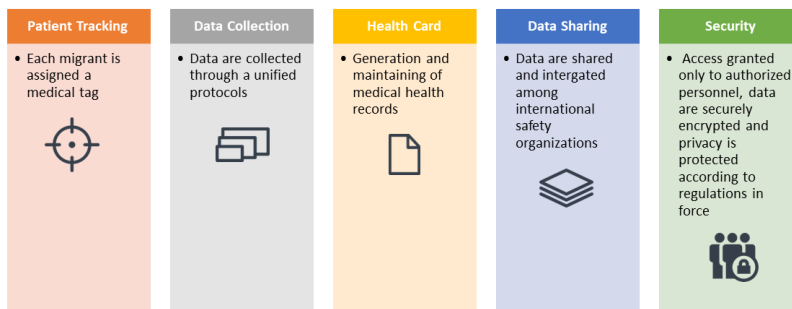


**Fig. 3.** A screenshot that depicts how medical data are gathered in a visual and intuitive way.

Fig. 3 presents another screenshot used for reporting possible pain, fractures, burns, wounds, skin manifestations, or amputation. By sketching on the figure, the rescuers can annotate where the problem is located by using a color code to specify the type of problem. This visual strategy is very useful and simple to use for the rescuer and highly understandable by the immigrant too.

Finally, to deal with the second aspect concerning political and diplomatic issues the authors designed an information exchange protocol among the parties in order to: (i) set forth the information to be exchanged, the operational procedures to be followed, and the security mechanisms and other safeguards to be maintained; (ii) and set out the ways that such exchange of the particular information would be consistent with the purposes.

To this aim, ITHEALTH provides modules that allow coordinators of the involved teams to follow remote rescue operations, giving orders, guiding the actions of the individual rescuer, recording data about injured, and setting up coordination tasks. In this way, the great innovation of the ITHEALTH system is that it provides rescuers with a mobile digital tool to use during critical and emergency activities that not only facilitate the intervention on the field but also guarantee a benefit to the network of international private and public safety organizations. Fig. 4 presents the ITHEALTH screening and data flow management that is used for implementing the protocol of first evaluation and screening for migrants. At the first stage, a medical tag is assigned to each migrants in order to access to health care as well as to initialize the informative system to profile health data. Then, the system allows collecting data of the triage according to unified protocols directly at the place of landing. These data are then used for generating the health card that will be maintained throughout the whole chain of care. Health cards that will be also shared between international private and public safety organizations in order to increase the operative efficiency and reduce the possibility of clinical error risks. Further clinical evaluation and data update are always possible along the chain of care and help increase data accuracy. At each stage, THEALTH system guarantees an access only to authorised personnel and maintains personal and clinical data securely encrypted and protects the privacy according to regulations in force.



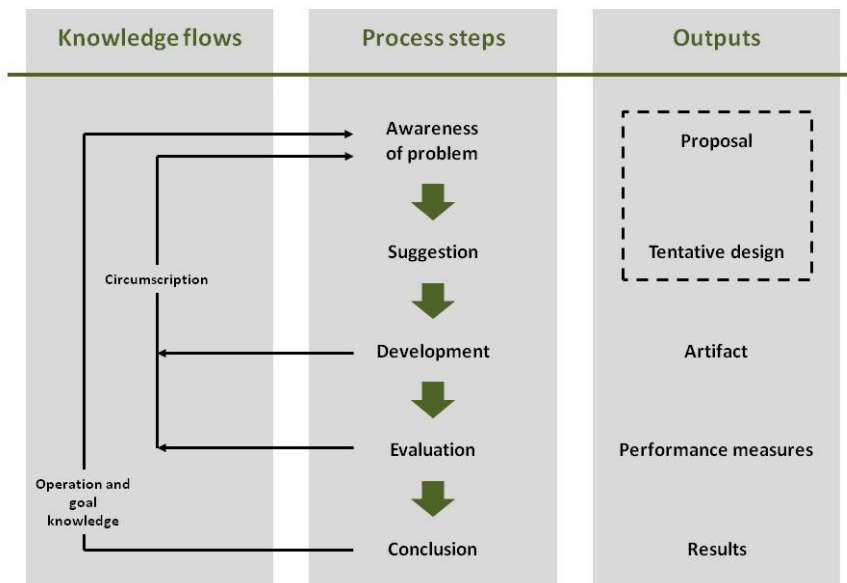
**Fig. 4.** Screening and data flow management for profiling and compiling health card for migrants.



In order to evaluate ITHEALTH the authors carried out several tests in different scenarios for testing how the tool can support rescuers during their actions and other rescue operations in order to decrease their workload while accomplishing several unusual tasks in parallel and under time pressure. Specifically, in the next section the chapter presents the results of the last usability and user experience evaluations performed involving healthcare professionals. This specific last usability test led to the adjustments that are currently under development in these months.

#### 4.1 Design Research Methodology and Development

The methodology followed in this research project is the one described in [25] and depicted in Figure 5. Its application in this research is described in what follows focusing on all the phases – Awareness of problem, Suggestion, Development, Evaluation and Conclusion.



**Fig. 5.** The methodology of design research. Adapted from [25].

##### 4.1.1 Awareness of problem

This phase was aimed at studying the research context, the literature review and state of the art to understand open problems, challenges and opportunities. The study of the requirements was performed also by interviewing and in general involving representatives of the domain experts.

#### 4.1.2 Suggestion

Once informed by the preliminary research and study done in the Awareness of problem phase, the research team drafted some intervention proposals and explored their feasibility.

#### 4.1.3 Evaluation and Conclusion

These two last phases were devoted to gather, analyze and discuss the results of evaluations and more in general of the overall project flow. The details of the evaluation method used, the participants and the analysis and discussion of results are given in Section 5.

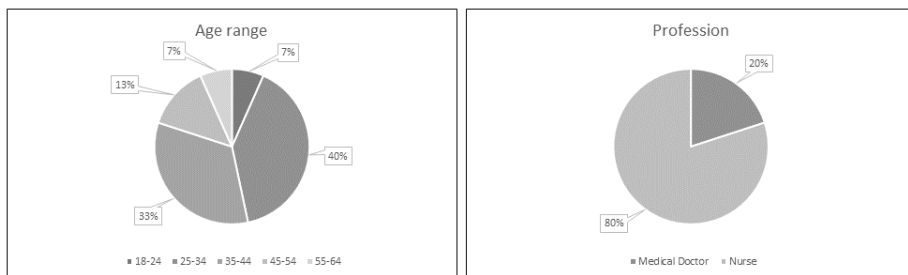
## 5 Usability and User Experience Evaluation

This section presents the results of a usability and user experience evaluation. Due to political and security reasons, this first stage of evaluation was performed as lab-based while further stages of testing are planned to be performed on the field.

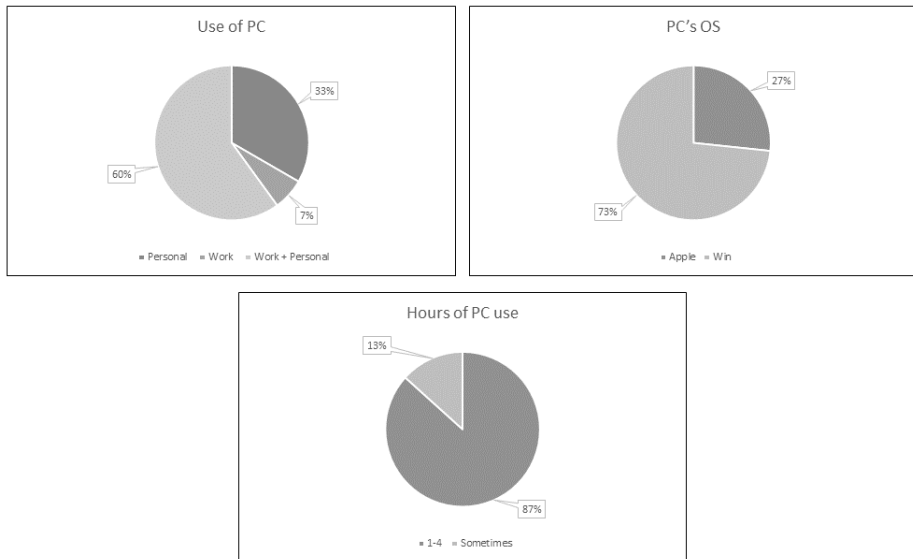
To test the usability of ITHEALTH the authors performed a study that involved 15 professionals in healthcare domain. With 4 of them they also had the chance to test the user experience of the system with a specific questionnaire.

### 5.1 Participants

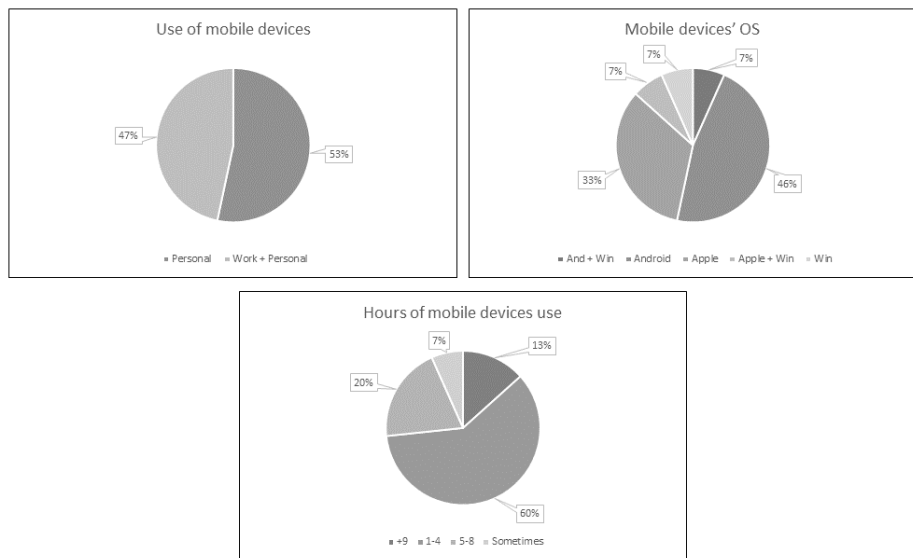
Being a study focused on a highly domain-dependent IT system to be used by highly skilled professionals in a peculiar domain, the number of participant was limited: the authors involved 15 users (all male, being part of a male-only division of the Italian Red Cross Military Corps, aged from 18 to 64 years. All participants were experts in rescue operations with long experience in the frame of migration flow management. According to the initial questionnaire they filled in, 3 of them were Medical Doctor and the other 12 were Nurses. Figure 6 shows the characteristics of the participants to the study (in terms of age and profession), while Figures 7 and 8 illustrate the type and duration of use of PC and mobile devices respectively.



**Fig. 6.** Characteristics of the user test's participants.



**Fig. 7.** Use of PC (motivation, operating system and hours of use).



**Fig. 8.** Use of mobile devices (motivation, operating system, hours of use).

## 5.2 User Test Protocol

After the submission to the participants of the initial demographic questionnaire, the authors performed the tests in a silent room where the participants were able to use the ITHEALTH system following a set of tasks listed on a printed document. For the test, the participants were invited to follow the think aloud protocol. The tasks assigned to the users covered all the triage activity: collection of personal data, current health conditions, past conditions, vaccines, and informed consent. All tasks were performed correctly and in a reasonable time span. At the end of the test, a usability questionnaire was submitted to the participants: it was composed by 29 Likert scale questions – a combination of SUS (System Usability Scale) [17] and CSUQ (Computer System Usability Questionnaires) [18] questionnaires and an unstructured informal interview concluded the test. SUS is a 10-items usability questionnaire very broadly used, especially in industry that can return reliable results even when administered to small sample of users. CSUQ is a 19-items questionnaire developed by IBM and is mostly focused on measuring the satisfaction in using the application or tool under evaluation. Finally, to four of the participants, the ones with more experience in the field, the authors submitted an UX evaluation questionnaire that was created according to the UEQ (User Experience Questionnaire) [19] method.

## 5.3 Usability and UX Evaluation Results

### 5.3.1 System Usability Scale (SUS)

The answers to the SUS questionnaire proved that the ITHEALTH system is usable and appreciated by its users. In particular, the SUS analysis result is 82, which is well above the sufficient average for this kind of evaluation method (which is 68). Particularly positive responses (average of 5 out of 5 points) were collected for the questionnaire items “I thought the system was easy to use” and “I would imagine that most people would learn to use this system very quickly”. However, the authors would like to point out that a few results were negative (highlighted in bold and italic in Table 1): participant P8 gave bad marks to items 5 (“I found the various functions in this system were well integrated.” 2 points out of 5) and 6 (“I thought there was too much inconsistency in this system.”, 5 points out of 5 – where 1 was the most positive and 5 the most negative mark); P9 answers with a low value (2 out of 5) to item 9 (“I felt very confident using the system”); and P11 valued with a 4 (out of 5 – where 1 was the most positive and 5 the most negative mark) the item 10 (“I needed to learn a lot of things before I could get going with this system”). Apart from these negative responses by a few participants on just a few items, the results of this evaluation are quite positive.

**Tab 1.** SUS detailed results. For each participant the results obtained for each item are given.

	1	2	3	4	5	6	7	8	9	10
P1	4	2	5	1	4	2	5	1	4	2
P2	4	2	4	2	4	2	5	2	5	1
P3	4	1	5	1	4	1	4	1	4	1
P4	4	1	5	1	5	1	5	1	5	1
P5	4	2	4	1	4	1	4	2	4	2
P6	4	2	4	2	4	2	4	2	4	2
P7	4	1	5	1	4	2	5	1	5	1
P8	4	2	5	1	2	5	4	2	5	2
P9	5	3	4	2	4	3	5	2	2	2
P10	3	3	4	2	3	3	5	2	4	2
P11	4	2	5	1	5	3	5	1	4	4
P12	5	1	5	2	5	1	5	2	5	1
P13	4	2	4	2	3	3	4	2	4	2
P14	3	2	4	2	4	2	4	2	4	1
P15	5	1	5	1	5	1	5	1	5	1
MEAN	4	2	5	1	4	2	5	2	4	2

**Tab. 2.** CSUQ detailed results. For each participant the results obtained for each item are given.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
P1	4	4	4	5	4	4	5	4	4	4	4	4	5	5	4	4	5	4	4
P2	5	5	4	3	4	4	4	4	3	5	4	4	5	4	4	4	4	4	4
P3	5	5	4	4	4	4	5	4	4	4	4	4	4	5	4	4	4	4	4
P4	5	5	4	4	4	5	5	3	3	5	5	5	5	5	5	5	5	4	5
P5	1	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	3	4
P6	4	4	3	3	3	4	4	2	3	4	4	4	4	4	4	4	4	4	4
P7	4	5	4	5	4	5	5	4	4	4	4	4	4	5	5	4	5	3	4
P8	4	4	4	4	4	4	4	2	1	2	4	4	4	4	4	3	4	2	3
P9	4	4	3	2	3	2	4	2	3	3	4	4	3	4	4	4	4	2	3
P10	4	4	3	3	3	4	4	3	4	4	4	4	4	3	4	4	4	3	3
P11	5	5	4	4	4	4	5	4	5	5	5	5	4	4	4	5	4	4	4
P12	5	5	5	5	5	5	5	4	4	4	5	5	5	5	4	4	5	4	5
P13	4	4	4	3	4	4	4	3	3	3	3	3	4	4	4	4	4	3	4
P14	4	4	5	5	5	5	4	4	4	5	5	5	5	5	5	5	5	3	4
P15	5	5	5	5	5	5	5	4	4	4	5	5	5	5	5	5	5	5	5
MEAN	4	4	4	4	4	4	4	3	3	4	4	4	4	4	4	4	4	3	4

### 5.3.2 Computer System Usability Questionnaires (CSUQ)

The results of the CSUQ questionnaire are positive as well (see Table 2 for the detailed responses), for all the four aspects: SYSUSE (system usefulness), INFOQUAL (information quality), INTERQUAL (interface quality), and OVERALL (overall satisfaction). In fact, for all the four aspects, the result of the questionnaires is 4 out of 5.

### 5.3.3 User Experience Questionnaire (UEQ)

The results of the User Experience Questionnaire (UEQ) are positive as well but not for all the UX aspects. For UEQ, the range of values is between -2 and +2. The most positively rated items indicate that ITHEALTH has been identified with the terms understandable, easy to learn, inventive, leading edge, secure, efficient, clear, practical, organized, and innovative. However, considering the UEQ Scales (see Table 3), one can notice that Attractiveness and Stimulation did not reach a very high score. This means that ITHEALTH look and feel quality could be improved, nevertheless for a system used in emergency contexts by professionals the most important features regard perspicuity, efficiency, and novelty aspects that happen to be very positively evaluated in this user test.

**Tab. 3.** UEQ results.

<b>ATTRACTIVENESS</b>	0.417
<b>PERSPICUITY</b>	1.375
<b>EFFICIENCY</b>	1.750
<b>DEPENDABILITY</b>	1.000
<b>STIMULATION</b>	0.500
<b>NOVELTY</b>	1.313

### 5.3.4 Unstructured Informal Interviews

Through a brief unstructured informal interview to each participant, the authors were able to collect suggestions on how to improve the system and what were its strength and weak points. The suggestions were focused mainly on minor interaction and navigation issues; e.g. for the trauma tool (see Figure 3) some users pointed out that an annotation tool would be useful for better describing the health conditions of the migrant; out-of-range values to vital parameters should be highlighted for advising the health practitioner.

## 6 Conclusion

The difficult situation of migratory flows in Italy of the last decades sees the emergency care organizations engaged in the front line in the research and development of

systems that simplify and accelerate their activities in respect with National and International standards and protocols. ITHEALTH aims at providing rescuers with a mobile tool that can support them in monitoring the vital parameters of the injured that can be extremely robust and resistant. The system consists of an application installed on tablets, for collecting data in the field and for transmitting them to a server (local or in cloud) placed on a laptop specifically designed for their reception, display and management. Besides a form strictly dedicated to the triage of the rescued immigrants, the system provides functionalities that by following the official protocols and the standard procedures, support information exchange between all operative units and government agencies in order to enable a more equal immigrants' treatment and distribution among all European countries.

The evaluation of ITHEALTH highlights positive results and an effective impact on the rescue activities proven by usability tests carried out by involving 15 professionals in healthcare domain and expert in migrants rescue operations.

In conclusion, the described system and the tests carried out on the field are able to prove the efficacy of the solution in supporting emergency care organizations in situation where rescuers have to offer health assistance to immigrants in critical situations.

The use of system allows rescuers to constant monitor the situation of all patients, to keep track of all the needed information from the first field intervention to the subsequent levels of treatment, to operate according to a single method of intervention and management of rescue activities, to have a constant availability of data for any subsequent evaluations regarding the performed operations.

Future development will be focused on a further improvement of ITHEALTH's look and feel and subsequent new evaluations performed on the field with the involvement of migrants. This will allow to evaluate, besides usability and user experience, also the tool acceptance by its real end users.

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