

Chapter 6

DSS for Health Emergency Response: A Contextual, User–Centred Approach

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ABSTRACT

This paper presents the design approach and architecture of a Decision Support System (DSS) for the Hellenic Centre for Emergency Health Care (EKAB, <http://www.ekab.gr>). The DSS supports the cooperation and decision-making processes at the EKAB call centre concerning the effective activation and allocation of appropriate resources mainly: ambulances, healthcare personnel and other public emergency resources like fire fighting and police. The DSS is a geographic web-based mash-up that builds on top of existing information systems and databases, and collects, aggregates, records, and presents various types of dynamic information about medical incidents in real time, promoting evidence-based medicine. The system provides a number of user interfaces (web-based and mobile) for call centre operators, radio centre operators, ambulance personnel, and administration. A contextual approach was necessary for the design of the system based on various related methods. Field observation of the current ways of work at EKAB sites, design, and development of data resources and user interfaces were conducted.

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1. INTRODUCTION

Medical decision-making is influenced by numerous factors that can be classified according to Haynes et al (2002) into: (a) research evidence relevant to a clinical problem or decision; (b) physiological rationale; (c) individual experience. In addition, the context of decision-making severely affects the choice and mix of decision criteria: decisions tend to rely solely on human judgment when the timeframes are short, the situation is stressing, the available information is incomplete, and when there is a lack of recorded evidence about similar past situations. Health emergency response is a perfect example of such a stressing environment: it requires the intense and continuous cooperation and decision-making of various people and roles involved in life-critical situations of providing urgent medical care.

Health emergency response systems have been studied from a number of perspectives. A large stream of research has focused on service optimisation issues (Derekenaris et al., 2001; Yoo et al., 2005; Haghani & Yang, 2007); other systems emphasise on technology related to network and information technology integration (Kyriacou et al., 2003); while other approaches focus on remote medical intervention through telemedicine (Chu & Ganz, 2004). Regardless of the focus of each approach, it is widely admitted that any approach for health emergency response should build upon current norms, practices and knowledge of people and organisations involved. According to Carver and Turoff (2007, p. 38) “*a user-centred systemic approach is required with a major emphasis on user requirements driving technological developments (for the design of emergency response systems)*”.

The paper presents the design approach and architecture of a Decision Support System (DSS) that supports the real time representation, communication and logging of various types of information about incidents that require urgent medical assistance for the case of the Hellenic

Centre for Emergency Health Care (EKAB, <http://www.ekab.gr>). The overall approach is based on various user-centred design and evaluation methods, including contextual design (Beyer & Holtzblatt, 1998) and paper prototyping (Snyder, 2003) as well as on methods of classic systems design (Cross, 1998) (especially the objectives tree method), principles of information systems design and development (Hirschheim et al., 2008) and detailed software design based on UML (Pascal, 2004). The user-centred design approach is particularly relevant for this project, since that users are not well-acquainted with technology and it was necessary to seamlessly integrate their current work practices with the designed system. According to Liu et al. (2006) a large number of technically innovative decision support systems fail into actual use because they have little relevance to the real world and clinical needs.

The proposed DSS is a geographic, web-based mash-up application that integrates and represents various types of dynamic information about health emergency response (like location of incident on city maps, dynamic indication about road traffic, progress status about the incident, etc.) in a similar way to other web-based dynamic mash-ups like the open-access system of marine traffic (<http://www.marinetraffic.com>) (Lekkas et al., 2008). The DSS delivers useful information at the coordinating centre and the points of care and records incident management data like calls, transportations, hospitals’ treatment, patients’ health problems and response times. This provides the necessary data and network infrastructure for evidence-based decision making. Evidence-based decisions do not rely on human judgement and previous clinical experiences alone, but take into account a wide range of data about the situation at hand including recorded past similar cases.

The paper is structured as follows: Section 2 presents related work in terms of a review of approaches and systems supporting health emergency response and background in terms of the user-centred methods used for this work.

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