Delphi Study – Round 2

Dear Panellist,

To begin, I appreciate your participation in this Delphi survey and the completion of the Round 1 questionnaire.

In the first round of the Delphi, your opinion and feedback were gathered regarding RFID application within DMC[1]. Accordingly, I have revised and proposed scenarios for RFID application.

This round's aim is reaching to a consensus regarding the mentioned issues.

This round of questionnaires consists of closed questions; however, space is provided for you to comment and please feel free to extend the comment boxes and explain your ideas in detail as much as you wish. Please do not hesitate to comment on any aspect of the questionnaire, terminology or approach.

A- RFID Application within DMC

Below is the list of scenarios/tasks which are categorized into disaster phases based on the disaster management cycle includes Mitigation, Preparedness, Response and Recovery (Figure 4).

Figure 4. Disaster Management Cycle (1)

For each phase a brief introduction is given; based on the phase objective(s)/aim(s) and RFID, in your opinion on a scale of 1 to 5 how important is the role of RFID on improving efficiency and effectiveness of the following tasks (a space is provided for your further comments, and if you do not

[1] Disaster Management Cycle

agree on using RFID for the proposed task, please suggest and explain your choice of an alternative technology).

Section 1 – Mitigation Phase

This phase objective is to reduce disaster hazards. It can consist of studying and assessing the risk, investigating the causes of the hazard, and taking administrative measures to prevent or reduce the level of a hazard when it occurs and lessen the vulnerability of both the eco- and social systems (i.e. the community) (1). This phase includes activities like building codes and zoning; vulnerability analyses; public education.

	Task/Scenario	**Rating (1=least important – 5=most important)**
1	By equipping medical resources at each health centre with RFID tags, there could be a potential for improvement in the quality and accuracy of the local, region and even national medical resources assessment.	
2	There is a potential to develop an information system based on RFID to automatically gather medical resources data and integrate them into different levels of local, regional, and federal and finally into the disaster plan.	
3	If at health centres medical resources, staff, and patients equipped with RFID tags, it can be assessed current healthcare situation by considering the available medical resources, in-patients and their conditions, and pattern of medical resources usage, for essential medical plan in relation to disaster vulnerability analysis	
4	One of the issues that hinder providing proper disaster response plan is lack of research. One of the reason is, during response due to overwhelmed conditions and chaotic environment there is a limited statistics or reports are available regarding the quality and effectiveness of the response activities, shortage in medical supplies, etc. However, if RFID is being utilized this problem can be solved at least to some extent because of automatic data capturing. Therefore, for future disaster preparedness and response planning, it can be referred to past disasters and reduce the probability of happening the same shortcoming.	

Section 2 – Preparedness Phase

Preparedness: Means to ensure that appropriate systems, procedures and resources are in place to assist those affected by the disaster and enable them to help themselves (2);(3). It comprises gathering information, establishing preparedness plans and organizing management structures, doing drills, exercises and training to enhance the capabilities of the society when faced with crisis, and creating warning systems. (1).

	Task/Scenario	**Rating (1=least important – 5=most important)**
1	By tagging all medical resources, their pattern of usage (drug consumption) can be monitored automatically. Then by sharing the identified pattern among healthcare centres, a warning system can be developed. This system has a potential to identify epidemic out break and forecast epidemiology disasters by analysing medical resources usage pattern.	
2	If all the medicine are tagged with RFID from the pharmaceutical companies, authorities can be able to match inventory level of medicine with population size in each region and their demands. Therefore, societies can be well prepared for disasters.	
3	By using RFID tags on medical resources, patients and medical documents, the integration of health centres into existing EMR/EHR systems can be facilitated. Since, all information can be gathered automatically and regularly without human intervention that the latter one also improve information quality.	
4	If on each region, all medical resources and equipment or even medical staff equipped with RFID tags, the authorities can be able to match patient loads and needs with available hospital resources for each healthcare centre. This scenario specifically benefited people with chronic disease or those who needs constant health monitoring and	

	medicine. The ultimate advantage can be preparing a disaster response plan based on the available medical resources and peoples' medical requirement.	
5	If people in healthcare centres (or any other places) tagged with RFID, the pattern of their movement within area can be captured automatically. By analysing the captured patterns it can be developed a more effective plans for evacuation in healthcare centres.	

Section 3 – Response Phase

Response: Measures taken during or immediately after a disaster in order to bring relief to people and communities affected by disaster its purpose is to transfer disaster responders, resources and services to the disaster site (3). The response phase includes the measures taken to control and manage different effects of disaster and to minimise losses to property and human life. It consists of an array of emergency services following the crisis with the aim of saving human lives and property, providing relative welfare, and preventing the spread of the crisis including search and rescue, emergency relief controlling the crisis, the establishment of order in society, and arranging temporary housing.

	Task/Scenario	**Rating (1=least important – 5=most important)**
1	Using RFID make possible to keep track of the origin of the goods along each step of their delivery to the affected area. So that, RFID can used to identify, mobilize, dispatch, and track the resources required to support incident management activities.	
2	By tagging medical equipment and supplies managing and coordinating them, as well as identifying Idle resources at the disaster site can be facilitated. So that, disaster authorities can provide better management and coordination of disaster response activities	

3	Due to infrastructure degregation communication is one of the bottlenecks od disaster response tasks. In this regard, RFID can be useful because of their ability to collect information without Internet connectivity and storing data until connectivity is available).	
4	If RFID is deploying properly on healthcare centres, during disaster response, authorities are able to analyse number of patients inbound with number of available hospital beds and medical resources. Therefore, they can make rapid, accurate and decisions	
5	Replacing RFID tags with paper triage can reduce the number of over triage and wasting medical resources. Also, they can be used for early identification of epidemiological crisis in a camp of displaced refugees (based on the gathered information of the used medicine and casualties' health status).	

Section 4 – Recovery Phase

Recovery: Refers to those actions after a disaster that attempt to bring order to the disaster site and aid in bringing the situation back to normal. (2); it aims to restore the disaster-stricken area to before-crisis state. This phase is a stabilization phase and it may last for a long time (3). Recovery phase includes "long-term activities which should be performed after disasters to help the community to regain its normal conditions and become stabilized" (4). In other words, it comprises taking necessary measures after the crisis to restore the normal conditions to include: restoration, reconstruction, development, establishing normal conditions, evaluating and assessing the programs, and studying and evaluating the performance.

	Task/Scenario	**Rating (1=least important – 5=most important)**
1	If during response time all disaster's casualties were equipped with RFID tags, reuniting families can be facilitating. Because the (near) real-time information of all people and their location which they are kept is available.	

2	Instead of paper documentations, RFID tags can be used to keep track of disaster victims' health nutrition plan. In this regard, the chance of losing document(s) or medical error due to people's handwriting can be reduced.	
3	Mental health consequences of disasters is one of the common disasters' effects that needs long-term medical planning. In this case, RFID can be used to hold people's mental background and their current treatment. So that, patients can be able to refer to any healthcare centres without need to have paper medical documents or explaining their mental conditions and symptoms from the beginning for a new physician.	
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Reference:

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2. Ahmed A, Sugianto LF, editors. A 3-tier architecture for the adoption of RFID in emergency management. Proceedings of the International Conference on Business and Information 2007; 2007: Academy of Taiwan Information Systems Research.
3. Baldini G, Braun M, Hess E, Oliveri F, Seuschek H, editors. The use of secure RFID to support the resolution of emergency crises. Security Technology, 2009 43rd Annual 2009 International Carnahan Conference on; 2009: IEEE.
4. Altay N, Green III WG. OR/MS research in disaster operations management. European Journal of Operational Research. 2006;175(1):475-93.