

Disseminating Research Outputs: The CrowdHEALTH Project

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ABSTRACT

Introduction: Dissemination benefits come from the outputs integration and implementation by the key audience, who will also determine the relevance and usability of the disseminated content. **Aim:** One of the CrowdHEALTH project's objectives is the transition from patient health records towards the Holistic Health Records (HHRs) and Social HHR. The CrowdHEALTH project aims at integrating high volumes of health-related data collected from various sources to support policy-making decisions. **Methods:** The European Federation for Medical Informatics (EFMI) supports the development of an effective Communication and Collaboration Plan identifying the messages, the tools and channels in disseminating the project and its outcomes to the target audience based on the McGuire approach. **Results:** The process for defining the dissemination strategy is a cyclic one as shown in the following figure involving review of each step periodically. The next step was to define the four dimension dissemination approach based on McGuire attributes of persuasive communication. The objectives, target groups, key messages, the tools and channels were defined at this stage. **Conclusion:** The CrowdHEALTH project and its outcomes were disseminated with a variety of tools and channels such as scientific journals, conferences, exhibitions and social media communication.

Keywords: Knowledge Dissemination, Diffusion.

1. INTRODUCTION

CrowdHEALTH is an European Union (EU) funded project which offers an integrated platform that incorporates big data management mechanisms for data acquisition, cleaning, integration, modeling, analysis, information extraction, interpretation and visualization (1). More precisely, these mechanisms can be clustered across three main domains: (i) extended health records, (ii) collective health knowledge and (iii) big data techniques (2). CrowdHEALTH project aims at disseminating research outputs to the key groups (3). For

this reason, the dissemination strategy was developed, implemented and presented in this article.

1.1. Dissemination theories

Dissemination benefits come from the outputs integration and implementation by the key audience, who will also determine the relevance and usability of the disseminated content. Therefore, target groups need to be considered early in the process of carrying out the research, the outputs of which they might use (4). According to a systematic scoping review of conceptual frameworks, twenty out of thirty-three frameworks

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were created in order to be used by researchers in an attempt to guide their dissemination plans and activities. Twenty-eight frameworks were influenced by one or more of the following different theoretical approaches, the persuasive communication, the diffusion of innovations theory, social marketing (5) and community organization model (6). William J. McGuire was one of the first in perceiving and explaining how mass media messages convince people (7). His communication/persuasion matrix (8) is one of the step-based models of persuasion. In more detail, it was proposed that persuasion is the result of a successful transition among different phases. The model defines inputs and outputs: the inputs are the different aspects of the persuasion attempts and outputs are the phases of persuasion, each of which can be measured. According to McGuire there are five inputs: The Source which is about the trustworthiness of the sender, the Message which covers the type, strength and language of the argument, the Channel which is the means of the message communication, the Receiver who belongs to the target group and has a specific attitude, beliefs, prior knowledge and habits and the Context including all the environmental factors that can influence positively or negatively the communication process. A number of versions of his model with varying number of steps was proposed, with the widely known six steps version including the exposure, attention, comprehension, yielding, retention, and behavior (9).

As far as the diffusion of innovations is concerned, literature presents a number of topics associated with the innovation diffusion theory such as needs, selective exposure, institutional/structural thresholds and personal thresholds. Hassinger (10) stated that actors' need for an innovation is a prerequisite when seeking information to improve their awareness. If actors do not have a need for innovation then they won't engage in awareness and influence processes. Selective exposure was used by Rogers (11) when discussing the actors' agency in awareness and influence processes, suggesting that actors would avoid messages that are in conflict with their personal beliefs. However, actors' perceptions can be influenced by the environment, their social networks and institutional and organizational forces. Hence, actors avoiding innovations is a more complex concept than Hassinger and Rogers initially suggested, especially if these

innovations are supported by the contextual framework. Today, the expansion of social networks, the plethora of communicated messages through various forms of media and the advertising dynamics play an important role in shaping actor's tendencies and needs (12). Such arguments align with the notions of 'system thresholds' (13) 'structural equivalence' (14) and even 'group-think' (15) when considering the innovation diffusion process.

Another dissemination model found in literature is the social marketing theory of dissemination, which uses a consumer-oriented approach. Social marketing as defined by Kotler and Zaltman (16) implements marketing principles to influence a key audience to actively accept, reject, modify, or abandon a behavior. The social marketing model applies marketing principles to promote positive public health behaviors. The Core elements are based on product, price, place, and promotion. One of the lessons learned from social marketing campaigns is that message-based communication of knowledge alone is unlikely to lead to a long-term behavior change (17). According to Martin et al. (18) the four phases include the market analysis, the market segmentation, the market strategy and the evaluation. The market analysis phase involves which involves intensive participation of the individuals who will be involved in the dissemination. In this phase, the use of focus groups, surveys, and advisory boards are recommended. The market segmentation phase includes determining the domain into which the innovation should be introduced. The market strategy phase is concerned with the planning of the dissemination activities and with implementing the plan in a way that the communication strategies and techniques for a specific innovation are appropriate for the target audience. During this phase, an extended Kotler and Zaltman model (16) with six core-items: product, price, promotion, place, politics, and public opinion was introduced by Martin (18). Finally, the evaluation phase consists of the evaluation of the effectiveness of the innovation, as well as of clinician and client satisfaction with the innovation (6).

A last dissemination theory is the community organization model (19) which was developed for health promotion in the community setting. The theory has common ground with the diffusion and social marketing models, particularly in

its evaluation phase, which focuses on assessing the resources, attitudes, and readiness for acceptance of the community. The model also incorporates a design and implementation phase in which planning groups and organizational structures are identified, an implementation phase in which work plans are developed, implemented and monitored, a program maintenance phase in which the interventions are set into the community gaining a positive organizational climate and a dissemination and reassessment phase in which the effectiveness is assessed and the results are promoted (6).

1.2 Measuring impact

Different indicators to measure dissemination impact are used for practitioners, policy makers, academics/scientists and the general public. Journal metrics, for example Journal Impact Factor and h5-index, author metrics such as h-index or i10-index and article metrics as for instance the number of journal citations, article downloads, or views on academic social media sites are the most common indicators used for researchers and academics (19–21). However, the journal and author metrics outlined above have been criticized as a poor measure of quality or scientific impact (21) while others claim that downloads may be an additional way to measure research dissemination impact apart from the citations (22). Furthermore, none of the traditional metrics assess the dissemination of research to policymakers, the practice community, or the general public. As a result, researchers and publishers have turned to alternative metrics as for example the Altmetric score (23). Altmetric collects mentions in blogs and traditional online media, forums and discussion sites, social media such as Twitter and Facebook, and policy documents. Alternative metrics open a window for the opportunity to measure dissemination impact on other groups that are closer to implement the findings and transform them into policy and practice. However, up until now none of the alternative metric aggregating services are comprehensive (17). Other metrics that can be used in social media are insights, exposure, reach, and engagement. Insights refer to consumer feedback from social media applications that can be derived from practices such as sentiment analysis or data mining algorithms to extract consumer attitudes and other perspectives on a particular topic from social media pages. Exposure refers to

the impressions or number of views of the content in a social media page and reach is the number of people who have contact with the social media application. Engagement is a metric that represents action on the content and can range from low to medium to high (21).

2. AIM

One of the CrowdHEALTH project's objectives is the transition from patient health records towards the Holistic Health Records (HHRs) and Social HHR. CrowdHEALTH aims at integrating high volumes of health-related data collected from various sources to support policymaking decisions.

3. METHODS

The Dissemination strategy is defined through a cyclic process consisting of five components linked together. The development of the Collaboration and Communication plan was influenced by McGuire's persuasive communication approach consisting of four pillars: the dissemination objective, the message to be communicated, the tools and channels of communication, and the target audience.

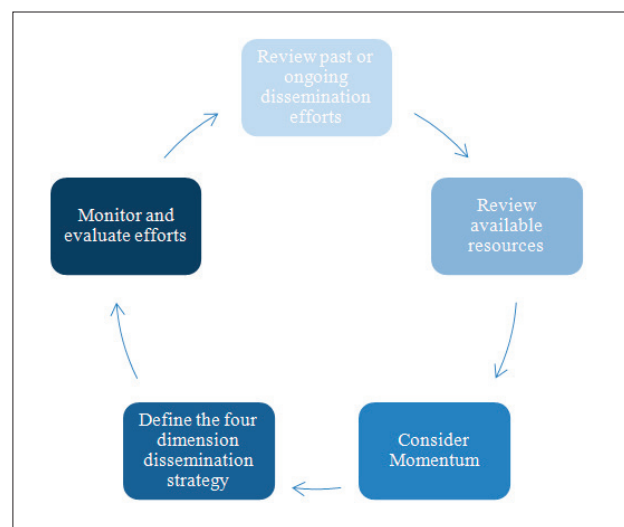


Figure 1. Steps in Developing the dissemination strategy

4. RESULTS

The process for defining the dissemination strategy is a cyclic one as shown in the following figure involving a review of each step periodically (Figure 1). The first step for defining the dissemination strategy was to review relevant literature (17, 21, 24–26) and past or ongoing dissemination plans. Based on other public dissemination and communication deliverables of H2020 projects (27–30) the most common high impact dissemination activities and tools (31, 32) were the use of

digital media (website, blog, social media), printed and digital materials (Flyers, Demos), publications in scientific journals, participation in exhibitions and conferences with oral presentations, posters and workshops and participation in initiatives with other EU projects to foster synergies. After reviewing the available resources, it was considered when the dissemination activities should take place. For this reason it was prudent to identify and plan critical time points, consider external influences for direct feedback (creation of an Impact Creation Board consisting of experts in academia and industry), identify supporting groups (ex. EFMI working groups), and utilize existing opportunities such as upcoming conferences, other events and exhibitions. Building momentum throughout the entire project life-cycle was a point of departure, for example timings for sharing findings. The next step was to define the four-dimension dissemination approach based on McGuire attributes of persuasive communication (7). The objectives, target groups, key messages, the tools and channels were defined at this stage (33) (Figure 2).

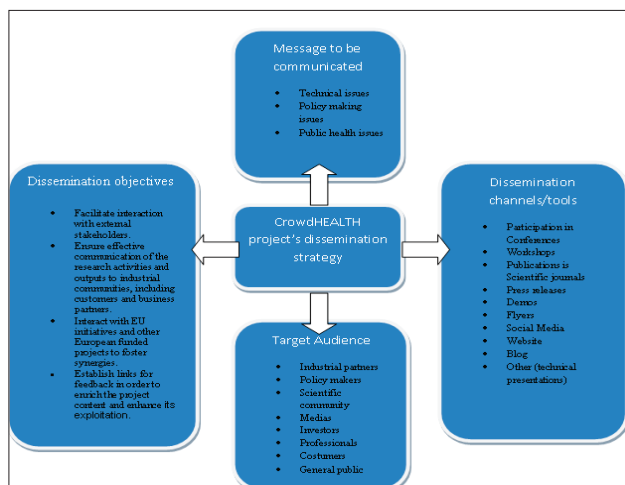


Figure 2. Four dimensions of the Dissemination Strategy

4.1 The objectives

The main objective is to engage and inform the target audience (European Institutions, public bodies, broad business, research and medical communities, hospitals, and general public) about the CrowdHEALTH project and its outcomes (34). All efforts take the following into account: a) Assuring a strong cooperation among the consortium partners to guarantee an efficient communication inside the project and facilitate interaction with external stakeholders. b) Ensuring timely and appropriate communication of the research activities and outputs to industrial

communities, including customers and business partners. c) Interacting with EU initiatives and other European funded projects to foster synergies. d) Establishing links for feedback in order to enrich the project content and its dissemination.

4.2 The target groups

The identified target groups are the Stakeholders who have a vested interest in the project or will be affected by its outcomes (relevant institutions, organizations, and individuals). CrowdHEALTH addresses a wide audience from various fields such as academia, research community, industry, EU institutions, healthcare sector, public bodies and general public. Each target group is addressed appropriately using different approaches: technical, pedagogical, commercial and political language is used according to different groups.

4.3 The Key messages

Key messages for big data analytics solutions, the development of extended health records and efficient policymaking in Europe is disseminated during the lifetime of the project. More precisely:

- Solutions for innovative approaches and technologies in the field of data aggregation and exchange. In more detail, information on research and innovation activities (implemented by the project) and project results are provided. Regarding the scientific community, this system helps to study non-homogeneous datasets. CrowdHEALTH is delivering a secure Information and Communication Technology (ICT) platform that seamlessly integrates Big Data technologies, providing Data as a Service (DaaS) and a Data Analysis Toolkit.

- Benefits regarding the transition to HHR and Social HHR. During the project general awareness is raised about the benefits of the HHR and Social HHR. It captures both health-related facts (such as clinical data, diagnoses, medication, genomics, etc.) and additional information such as nutrition, lifestyle, environmental conditions, sensors information (home or wearables), or social information. This provides the ground for personalized medicine, disease prevention, and effectively leading to a reduction in readmission rates.

- Efficient policy making across domains takes into consideration collective knowledge that emerges from multiple information sources from using Policy Development Toolkit.

4.4 The Dissemination channels and tools

Digital visibility is considered an efficient and reasonable way to publicize the project and its re-

sults. For this reason, the first step was to design the official website with a Blog that includes abstracts of the public deliverables and tasks related to CrowdHEALTH project. CrowdHEALTH is promoted in exhibitions with flyers, demos and technical presentations and in external events and conferences with posters, presentations and workshops as the main participation techniques. Conferences are carefully selected to match the needs of the CrowdHEALTH project. The most relevant conferences are related to Policy making, Data management and Public Health. Publications to scientific journals are also proposed in order to enhance the dissemination of the project results to the scientific community in order to influence researchers and get feedback from peer review. Articles to newspapers and e-magazines were also promoted in order to engage an audience consisting of policymakers, professionals and the general public.

The final phase recommends monitoring the Key Performance Indicators (KPIs) in order to assess performance of dissemination activities and readjust the strategy if there are any failures or to enhance the plan accordingly should success occur. In order to measure the impact, social media metrics such as shares, likes, insights, exposure, reach and engagement were monitored. Website metrics such as visits, visitors, hits and Search Engine Results Page (SERP) were also monitored to identify dissemination efficiency. Also conference and exhibition participations (number of visitors) were also measured and Article submissions in peer-reviewed journals and citations were recorded.

5. CONCLUSIONS

The CrowdHEALTH project is tackling a number of current trends in health informatics (35) that may influence health care delivery (36), health care professionals (37) and health sciences education (38-41). It is important that the target audience is addressed through appropriate means in order to be informed about the progress of the project and to raise their awareness about the project and its deliverable outcomes. The CrowdHEALTH project implemented a process for defining the dissemination strategy consisting of five steps in an attempt to better communicate the project's findings. On the basis of McGuire's approach the four pillars of the dissemination strategy were described: defining the dissemina-

tion objective, the message to be communicated, the tools and channels of communication and the target audience.. Scientific journals, conferences and exhibitions remain the core traditional means of disseminating research, although social media has become an important channel for disseminating research in CrowdHEALTH project. Each applied tool has different assets and drawbacks in reaching the audience and therefore by using more than one, the tools complement one another. Key performance indicators are also identified to measure impact in order to evaluate the dissemination activities and readjust plans if needed.

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- **Conflict of interest:** None declared.

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General

The International Medical Informatics Association is an independent organization established under Swiss law in 1989. IMIA was originally established in 1967 as Technical Committee 4 of the International Federation for Information Processing (IFIP – www.ifip.org). In 1979, it evolved from a Special Interest Group of IFIP to its current status as a fully independent organization. IMIA continues to maintain its relationship with IFIP as an affiliate organization. IMIA also has close ties with the World Health Organization (WHO – www.who.int) as a NGO (Non Government Organization), and with the International Federation of Health Information Management (IFHIMA). IMIA is also a Liaison A category organisation in cooperation with ISO (ISO liaison).

The working language of IMIA is English.

Purpose, Goals, Objectives

IMIA plays a major global role in the application of information science and technology in the fields of healthcare and research in medical, health and bio-informatics. The basic goals and objectives of the association are to:

- promote informatics in health care and research in health, bio and medical informatics.
- advance and nurture international cooperation.
- to stimulate research, development and routine application.
- move informatics from theory into practice in a full range of health delivery settings, from physician's office to acute and long term care.
- further the dissemination and exchange of knowledge, information and technology.
- promote education and responsible behaviour.
- represent the medical and health informatics field with the World Health Organization and other international professional and governmental organizations.

In its function as a bridge organization, IMIA's goals are:

- moving theory into practice by linking academic and research informaticians with care givers, consultants, vendors, and vendor-based researchers.
- leading the international medical and health informatics communities throughout the 21st century.
- promoting the cross-fertilization of health informatics information and knowledge across professional and geographical boundaries.
- serving as the catalyst for ubiquitous worldwide health information infrastructures for patient care and health research.



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