

# Evaluation of E-health

Quynh Lê

## Learning Objectives

On completion of this topic, students will be able to:

- Introduce current evaluation frameworks;
- Explore methods/tools used in E-Health evaluation;
- Provide understanding of evaluation frameworks applied to E-Health applications;
- Identify research methods/tools used in E-Health evaluation; and
- Develop an evaluation plan for a systemic E-Health initiative.

## Introduction

Evaluation is an activity which requires considerable amount of time and resources. Any products, processes or services have their own aims as they are developed for a purpose. In other words, they are there because they fulfil a need. For example, a comprehensive cancer care network is established to improve community access to cancer care (NSW Health Telehealth Initiative 2003); a web site is developed to provide the public with information about various services in the hospital and how to access these services on-line; an E-Health programme to keep teenagers from smoking and alcohol consumption.

Broadly speaking, evaluation has the following functions and purposes:

- We need to find out whether the aims and objectives have been achieved or not.
- Evaluation helps to identify the strengths and weaknesses of a product or service. The result of evaluation can be used to improve a product or service.
- Evaluation is useful to health organisations to ascertain how online health application is situated in the broad context of health care.

## What is evaluation?

Evaluation is assessing and judging the value of a piece of work, an organisation or a service. It is fundamentally about asking questions, and then designing ways to find useful answers.

Evaluation is a process which examines the quality of a product or entity (a piece of work, an organisation or a service) such as a training program, sport project, and health software.

Evaluation involves a goal-orientated task which takes place in a certain context during a period of time involving certain methods of evaluation.

Without evaluation, it is hard, if not impossible, to know how a product works. For example, a Paediatric Oncology Video is designed for clinicians to assist with the management of patients upon returning home (NSW Telehealth Initiative, 2003). It is important for stakeholders such as administrators, developers, participating health professionals to know whether the programme achieved its aims, how the

participants thought and gained from the video, what needs to be improved etc.

On one hand, evaluation may take place individually and informally, particularly in self-evaluation, such as a teacher evaluates his or her first year of teaching in a rural school. On the other hand, evaluation can be a huge task involving a team using a variety of evaluation approaches and tools, e.g. evaluation of a health program for rural people in isolated regions of Australia.

Please note evaluation is not equivalent to research even it uses research techniques as a mean of generating information and employs criteria for reliability and validity to judge the quality of evidence. The main difference between evaluation and research is that evaluation involved making judgement about the value of what is being evaluated whereas research determined the questions you want to ask and how you are going to answer them (Murdoch University, 2004). Evaluation tends to be broader than research and requires information about products, services and processes.

## E-Health evaluation

With the rapid development of Information Technology (IT) and its permeation in various aspects of modern society, E-health is a testimony of the impact of IT in the field of health. The Internet and other electronic media are present in many health institutions and health services. To some people, E-health is not just an introduction of modern technology to health but it is a new paradigm which requires adjustment in thoughts and behaviours. The term E-Health includes use of the internet or other electronic media by the public, health workers, and others to disseminate health related information or services (Wyatt & Liu, 2002). We should not take for granted that everything goes smoothly with E-health. It is important not to welcome the implementation of IT in health without critical consideration of its effectiveness in a new context. Thus programs and services which involve E-health need evaluation, formally or informally, depending on their nature, scope and social context.

Health informatics which is an important aspect of E-Health provides a new way of informing the public and health workers with information and opportunities for accessing health services. Many useful web sites and electronic materials have been produced to make health care readily available to the public. Though this is considered as a very innovative and productive development in health care, there are also risks caused by inaccurate information, mismanagement of health data, and IT-based problems, particularly when health services heavily depend on health informatics. Thus evaluation of E-Health is vital in improving health care.

E-Health evaluation depends heavily on users. The appropriate level of evaluation depends on the needs of the users. Therefore, important issues that need to be evaluated in design and developing an online health application are users' needs, product's risks and benefits, its feasibility, and user acceptance to the new adopted technologies (Gustafson D, Taylor J, Thompson S, & P, 1993; Gustafson & Wyatt, 2004).

## What should be evaluated?

One of the first and most important questions in E-Health evaluation is to identify what are the targets of evaluation. It can be a health informatics program, shared health database access facility, or a website promoting a health service. Evaluation can cover the whole product or some specific aspects. Generally an evaluation is needed to find out what works and what does not work.

User satisfaction is the primary aim of E-health evaluation. It is vital to find out how users value the product developed for them when other alternatives are also

available. User-friendly evaluation includes cultural sensitivity and user needs. The quality and quantity of information are two important aspects of evaluation of E-health products. User evaluative feedback helps us to determine which information needs to be included as it is a primary source and which should be treated as less important or unnecessary.

Usability and accessibility issues are important when developing an appropriate user interface for different kinds of target users (Gustafson & Wyatt, 2004; Wyatt & Liu, 2002). For example, the interface of an E-Health programme that provides services to palliative care, clinical consultation, bereavement support and education will be different from the one that prevents teenagers from alcohol and other drugs issues. The web site for teenagers needs to be fun to use whereas easy access to key information is more important to palliative caregivers. Up-to-date and accurate information on the web site are essential to avoid confusion and misleading.

As E-health includes the use of the Internet and other electronic media, evaluation generally covers the screen design, navigation, written information, visual information, hardware and software support; and HELP facilities.

Cost implications are important in evaluating E-Health programme (Smaglik , Hawkins, Pingree, & Gustafson, 1998). We should consider how E-health programmes affect the use and costs of healthcare services relative to other options. What change in access to service or support has an E-Health application made for its end-users? What is the cost effectiveness of different E-Health delivery programme (Eng, 2002; Glasgow, 2007; Gustafson & Wyatt, 2004). Cost effectiveness and/or cost benefit is highly valued within the decision making of chosen E-Health application.

## Evaluation framework

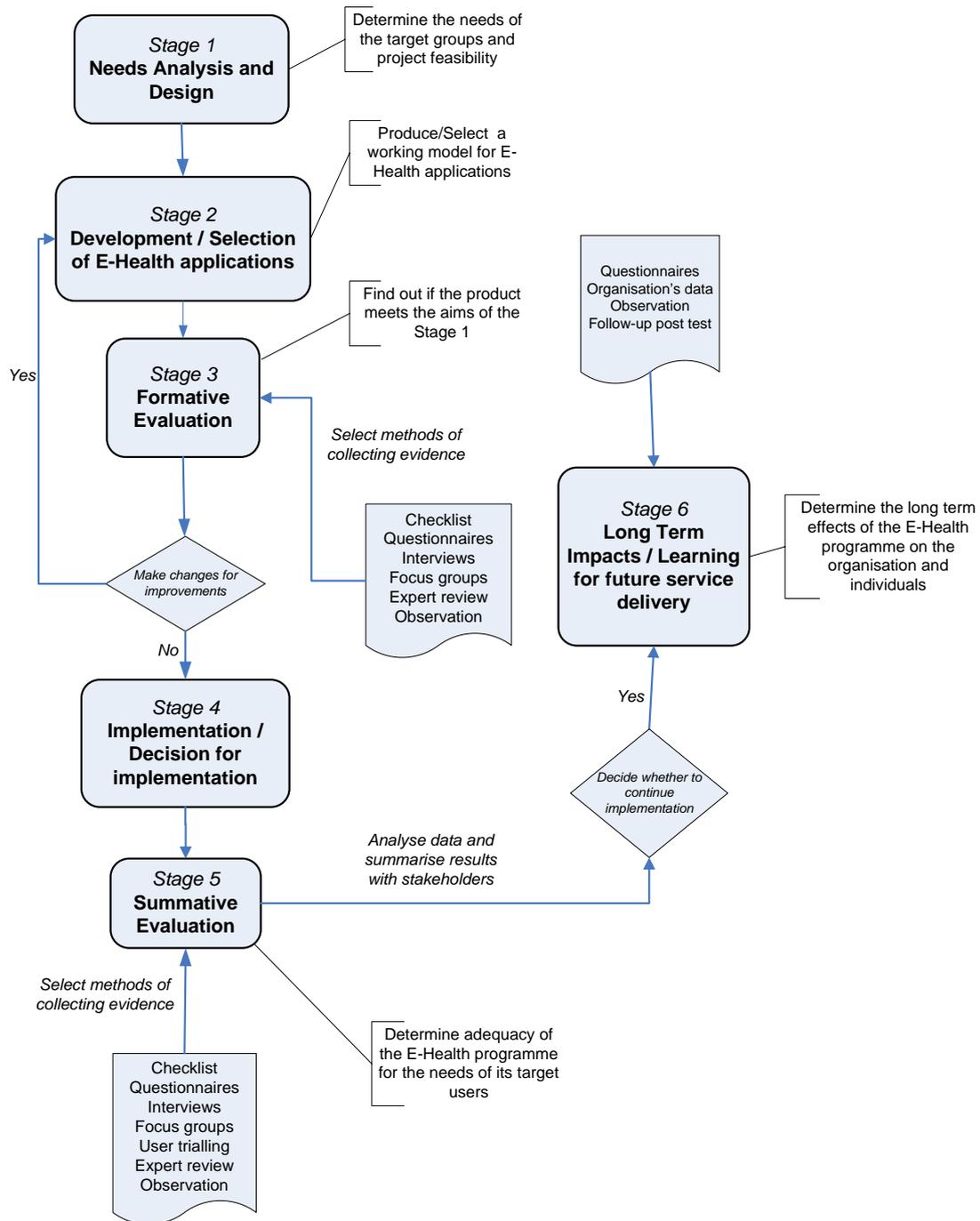
There are a wide range of evaluation methods used in health services and the approach and tools used will depend on the application (Evers, 2006; Hawe, Degeling, & Hall, 1990; Nguyen, Cuenco, Wolpin, Benditt, & Carrieri-Kohlman, 2007).

All evaluations need to ask a specific question and the type of data collection. Thus, data analysis and report on results are determined by the question in the scope. The possible questions to be addressed are:

- What is to be evaluated?
- Who is the evaluation for?
- Who are the relevant stakeholders?
- Who you will report the results to?
- What are the benefits and limitations of the projects?
- What are the cost implications for the project?
- What are privacy, security and standards issues?
- How are health services performing compared to other service alternative available?
- What resources (hardware/software/human resources) are needed?

The generic evaluation process of E-health can be described in the following diagram:

## Generic E-Health Evaluation Process



**Figure 1: Generic E-Health evaluation framework**

Source: Adapted from Phillips et al (2004) and LTDI (1998)

Planning an evaluation normally involves the following steps:

1. Identify the purpose of evaluation;
2. Select the questions to be addressed;
3. Select the method of collecting the evidence: see methods of evaluation

section;

4. Prepare the documentation: test the questions to ensure they are clear and address adequately the purpose of your evaluation.
5. Conduct activities for collecting the evidence;
6. Analyse the results; and
7. Report on the results.

## Who should be involved?

Any health product should have its target users. An evaluation of an E-health program for health workers need to find out how they think and feel about the product. Their feedback needs to be monitored during the formative evaluation process. Similarly, an evaluation of a health website for the public needs to identify who are main target users and potential users. Their views and attitudes need to be taken into account the evaluation. It is no use to develop a website written in scientific English for migrants who are semi-illiterate.

The second group of stakeholders is the implementer of the E-health product. What are some issues which concern them during the implementation? In their views, does it 'works'? Why? What needs to be done to improve the product?

Expert advice is important in the evaluation. The experts may include IT specialist, medical professionals, and allied health workers.

## Methods of evaluation

The way information is presented can be essential to key parties perceive the study. Different types of information convince different people (LTDI, 1998). Quantitative measurements may offer more use in demonstrating concrete achievement to funding organisations and top management, but qualitative feedback may be more useful in establishing improvements necessary for users of a system. Quantitative evaluations should be supplemented by qualitative studies where users explain what they feel when they use the system and how it affects their lives (Gustafson & Wyatt, 2004).

E-health evaluation can be conducted by using a single method or a combination of methods. It may take place in a short or long period of time and involves simple or complex tools depending on the scale and scope of an evaluation. The information you choose to gather will affect the tools and techniques you adopt, with consequences for the resources you require to complete the study successfully. Formative evaluation and summative evaluation are often used to describe the process of evaluation. Formative evaluation takes place during the time of implementation and its information is used to shape the activity as it happens whereas summative evaluation occurs at the end of the implementation phase and is used to make judgement about its success or failure. It is common to combine these two types in E-health evaluation.

The following methods can be used for evaluation in E-health:

**Table 1: Methods for collecting evidence**

Methods	Description
<b>Checklist</b>	<p>Brief and introductory way of highlighting main items to be 'checked'. It is useful for follow-up evaluative tasks.</p> <p><i>Reading:</i>  <a href="http://www.icbl.hw.ac.uk/ltidi/cookbook/checklists/index.html#endhead">http://www.icbl.hw.ac.uk/ltidi/cookbook/checklists/index.html#endhead</a></p>
<b>Questionnaire</b>	<p>Question items cover different aspects of user evaluation. It may include users' feedback choice (closed questions) and open-ended questions.</p> <p><i>Reading:</i>  <a href="http://www.icbl.hw.ac.uk/ltidi/cookbook/questionnaires/index.html#endhead">http://www.icbl.hw.ac.uk/ltidi/cookbook/questionnaires/index.html#endhead</a></p>
<b>Interview</b>	<p>Interview is a direct way of seeking feedback from users. It can be conducted on a face-to-face basis or on-line, individually or in small groups. Confidentiality needs to be maintained. There are different types: structured, semi-structured, and open-ended.</p> <p><i>Reading:</i>  <a href="http://www.icbl.hw.ac.uk/ltidi/cookbook/interviews/index.html#endhead">http://www.icbl.hw.ac.uk/ltidi/cookbook/interviews/index.html#endhead</a></p>
<b>Focus group</b>	<p>It involves a selected number of users to be included in a focus group for a period of time, including a series of interviews, observations and group discussions.</p> <p><i>Reading:</i>  <a href="http://www.icbl.hw.ac.uk/ltidi/cookbook/focus_groups/index.html#endhead">http://www.icbl.hw.ac.uk/ltidi/cookbook/focus_groups/index.html#endhead</a></p>
<b>Expert review</b>	<p>Expert feedback is important, particularly when a program deals with highly technical health information.</p>
<b>Tester and user trialling</b>	<p>It is necessary to test initially whether the product matches the aims and objectives of an intended product. It may involve a small group of target users to seek their feedback before the product is finally introduced to the public.</p>
<b>Observation</b>	<p>The main purpose of the observation is to obtain a detailed understanding of the ways E-Health applications are used and the problems they are encountered.</p> <p><i>Reading:</i>  <a href="http://www.icbl.hw.ac.uk/ltidi/cookbook/supplemental_observation/index.html#endhead">http://www.icbl.hw.ac.uk/ltidi/cookbook/supplemental_observation/index.html#endhead</a></p>

Source: Adapted from Evaluation Cookbook (LTDI, 1998).

## Conclusion

E-Health plays an essential role in the contemporary context of health in general and health care in particular. It builds innovative bridges of information and interaction for health services, health workers and the public. However, one should not take for

granted that it is all smooth sailing in E-Health. Like many IT-based development, there are problems and risks which need to be examined. Evaluation is an important way in ascertaining whether an E-Health product works.

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