

MODIFIED MIND MAPPING FOR EHEALTH MODELING

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Abstract

eHealth Mind Map is derived through Busan's iMind Mapping software. Analysing and combining the advantages of the Dialectical Spiral, Boehm's Spiral Model and Spiral Iterative Development the eHealth Mind Map model is modified into a spiral one. It is widely applicable in the field of eGovernment, because of the potential for fast modification of the model for other procedures. The results are obtained in the project "Simulation Modelling of Administrative Services and Processes for e-Serving and Management", funded by the grant for research at the Technical University of Sofia. The author is a leader of the team of the scientific project and creator of this innovative approach.

1. INTRODUCTION

eHealth is a brand new area which needs a lot of innovative knowledge-based modelling techniques to be well understood, modelled and simulated. The improvement of the automated electronic services requires application of new approaches for the stages of service procedures. The service quality requirements must be combined with the level of service from input to output, taking causation so as to ensure the network characteristics that define the communications between separate administrative units.

2. BUSAN'S MIND MAPPING

Visual thinking is our brain's natural way to solve problems creatively [3]. A mind map is a normal way of organizing information that is both rational and artistic. It uses visual thinking to create an organized display of the problem. It is typically an organic multicoloured chart, containing words and drawings for the mind's images and associations by arranging them around a central theme. It utilizes analytical left brain functions such as key words, sequencing, and associative links combined with spatial right brain functions like symbols, colour, images, links, attachments, dimension, and connective lines [2]. It leads to harmonious whole brain thinking that brings together the left and right brain thinking parts which is greater than the simple sum of them.

3. Ehealth MIND MAP

An eHealth Mind map model is proposed on Figure 1. In its centre is the core idea – eHealth

(symbolically shaped in red heart). After the central idea is set, then modifying the eHealth mind map begins with creating of main branches. These main branches represent the most important aspects of eHealth - Health knowledge management, mHealth, Telemedicine, Virtual Physiological Human, national eHealth, ePharmacy, Internet, Virtual Care Teams, Electronic Medical Record, Personal Health Systems, ICT for Patients Safety.

Mind map development continues with identifying topics connected to mentioned main branches. These topics are parent nodes of eHealth mind map. If information labeled on a parent node should be expanded, then child node is created with specific description. The process goes further in order to completely uncover all the important events or data concerned with the core idea. The last thing to do when modifying a mind map is to draw feed back connections between communicating nodes.

Health knowledge management is a design of a customizable prototype public health knowledge management repository system and interface with optimal interoperability and the capability to provide timely access to public health information in support of decision making at the point and time of need.

mHealth includes the use of mobile devices in collecting aggregate and patient level health data, providing healthcare information to practitioners, researchers, and patients, real-time monitoring of patient vitals, and direct provision of care (via mobile telemedicine) [7].

Telemedicine is a rapidly developing application of clinical medicine where medical information is transferred through interactive audiovisual media for the purpose of consulting, and sometimes remote medical procedures or examinations [8].

The Virtual Physiological Human (VPH) is a methodological and technological framework that, once established, will enable collaborative investigation of the human body as a single complex system [7]. The collective framework will make it possible to share resources and observations formed by institutions and organizations creating disparate, but integrated computer models of the mechanical, physical and biochemical functions of a living human body. The VPH is a framework which aims to be descriptive, integrative and predictive.

Connections are data bases store information for computer models.

Parent nodes are:

- Fields of research – bioinformatics, genomics, neuron-informatics;
- Aims – personalized care solutions; reduced need for experiments on animals; more holistic approach to medicine; preventive approach to treatment

Virtual healthcare teams consist of healthcare professionals who collaborate and share information on patients through digital equipment. ePharmacy and Virtual Care Teams imply the use of Internet to provide connections [7].

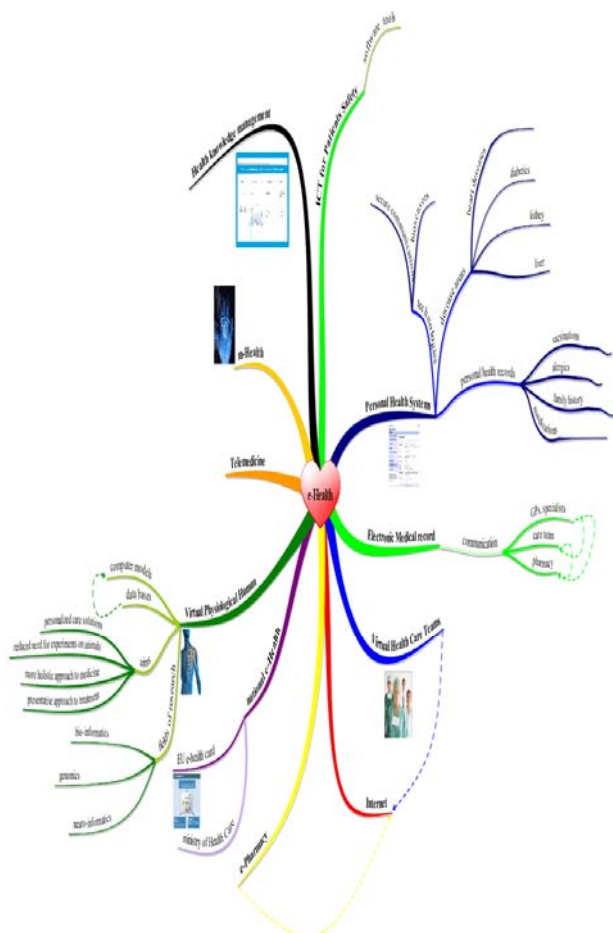


Fig. 1. eHealth Mind Map

3.1. Dialectical Spiral of the eHealth development

The systemic pattern of eHealth evolution can be visualized as an ascending spiral (Figure 2) where its first convolution reflects the conflict (theses vs. antitheses), the second convolution - the conflict resolution (synthesis), and the third convolution -its transcendence [4]. This model assumes that we will be able to learn how to ascend the dialectical staircase and build a better security governed e-Society free of bureaucracy and corruption for all.

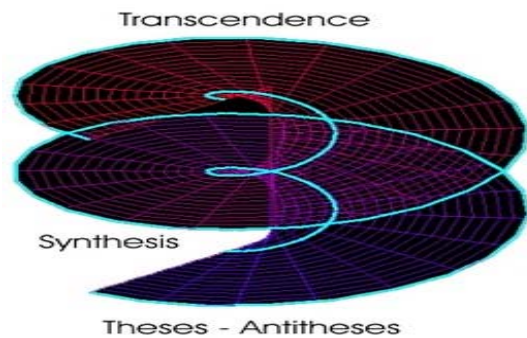


Fig. 2. Dialectical Spiral

3.2. Boehm's Spiral Model

Boehm's Spiral Model (Figure 3) [1], [5] is a 2D variant of the "dialectical spiral" and as such provides useful insights into the life cycle of the system. It can be considered as a generalization of the prototyping model with the first iteration being a prototype.

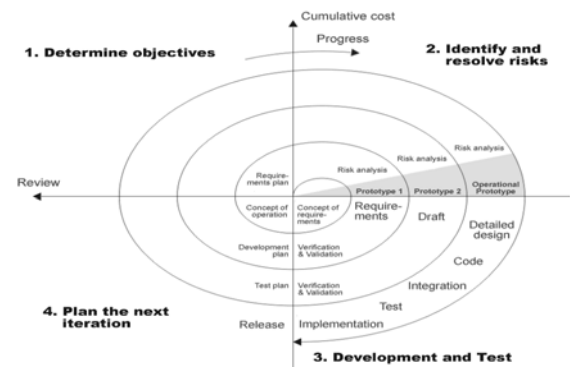


Fig. 3. Boehm's Spiral Model

3.3. Spiral Iterative Development

Spiral Iterative Development (Figure 4) [6] is an approach to building software in which the overall project life cycle is composed of several sequential

iterations. Each iteration is a self-contained mini-project composed of activities such as requirements analysis, design, programming, and test. The final iteration release is the planned product released to the client. Our decision-making process uses a series of steps to ensure the best possible outcomes.

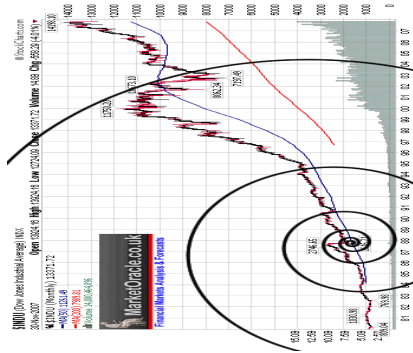


Fig. 4. Spiral Iterative Development

4. Ehealth MODIFIED MIND MAPPING

Modified Mind Mapping approach proposes integration of spatial-temporal structures into 4D or 2D (Figure 5) models. It symbolizes a lateral variation of the ordinary Mind Mapping. It combines the advantages of the mind mapping and dialectical spiral dynamics into an integrated iterative model. Struggle of contradictions is the moving mechanism or development engine. Basic principle is the stages repetition at a higher level of development. Causation and iterative procedure are used to reveal the different aspects and stages of eHealth development process. The spiral development process starts with new system objectives, alternatives, and constraints being identified. It is followed in a circular pattern with evaluating alternatives and identifying and resolving risks. As in the conventional Mind Mapping in the Modified one the information and tasks circulate around a central theme or goal. But the difference is that as in the spiral dynamics they are arranged over a single spiral line branching out of it. Thus Modified 'Mind Mapping' approach for eHealth modeling is derived.

5. CONCLUSION

This modified spiral model is widely applicable in the field of eGovernment, because of the potential for fast modification of the model for other procedures. After deposition of modifications on the model, it can be used for determining the traffic jam

in the information flow and to optimize the processing of documents in local or global plan of any eService. The advantages of the modified spiral model are easiness to work with the model, the opportunities to regulate the duration of the simulation, model portability between computer systems with different software and/or hardware and compatibility with older versions of the programming environment. The ways in which it could be used and the positive results that would ensue in its successful implementation are analyzed.

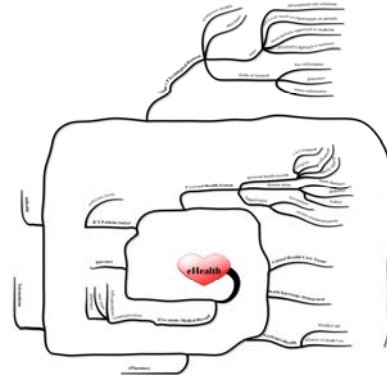


Fig. 5. eHealth Modified Mind Map

6. APPENDIX AND ACKNOWLEDGMENTS

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