

健康教育システムの継続運用のための健康データ管理

Network-Centric Everlasting Healthcare Education System

萩原 孝信^{1,2} 五太子 政史^{1,3}

Clifford T. Hagiwara¹, Masahito Gotaishi¹

¹CNC ngo

² 日本大学大学院理工学研究科医療・福祉工学

² Graduate School of Science and Technology, Nihon University,

Medical & Health Science Engineering

³ 情報セキュリティ大学院大学

³ Institute of Information Security

Abstract: Global Health ideas for everlasting healthcare education system, especially for pre-patients. We propose Network-Centric Healthcare Education system for the behavior change using self-synchronization in non-intrusive ways.

1. Introduction

As proposed by United Nations University International Institute for Global Health, Global Health goes hand in hand with the concept of Human Security.

One of the keys of global health would be the activity taken by each people in order to improve the health. Behavior change would be one of the most important things in preventing and coping with the lifestyle disease, a serious problem in developed countries. The "healthy behavior" cannot be defined uniformly since each people has different innate factor. Most people measure the bio-metabolic data regularly and respond to it. If there was a data showing cardiac disease, they would stop smoking, reduce calorie intake, etc. How to cope with the inherited factors printed in the gene is a skill to be handed on to the subsequent generations. In fact, it is beginning to realize that a person with good bio-metabolic data is rewarded by lowering the individual payment for medical care. Recently discussed "Health Saving Account" or "Medical Saving Account" plans to encourage people to manage the health by adding such incentive [10][11]. This practice can be also regarded as "healthy people sell their bio-metabolic data." A methodology should be developed based on the accumulation of the behavior data and how the bio-data respond to it. Undoubtedly a number of successful cases are necessary and social system rewarding the success should be built. This system assumes the establishment

of the people's basic right to their own bio-data such as the ownership.

There are various policies including the one defined by French Government that the personal health data should be managed by the nation. The subsequent question is how the pool of the data can be maintained for thousands of years and transmitted to the next generation. The most important discussions on the life ethics for the network-centric healthcare are:

(1) Establishment of the ownership of the bio-metabolic data

(2) Establishment of the social system to enable the owner of the data to acquire the profit from them [14].

The author plans to debate the technical matter of NCO from this aspect [1].

2. NCO Healthcare system

NCO is totally different from the current stovepipe system [19]. It is the "system of systems," which is designed to utilize a data in versatile ways in versatile situations. The "system of systems" is not the distributed systems on the hierarchical system but a totally new system architecture [16] which includes existing information system technology. Detailed description of the system should be described elsewhere.

This paper discusses how the people should behave in order to avoid the need of medical care. Discussion on how the breakdown of the current medical spending of

30 trillion yen should be is outside the scope of our paper. The core of the discussion consists of two points: The first point is the identification of the innate risk factor as one of the health information such as the blood pressure or blood sugar level. If the blood sugar level of a person biases out of the normal range, they would find it a risk factor of diabetes. In the same way, if a person is genetically subject to the cardiovascular disease, it would show that they have to manage the lifestyle more carefully than average people to avoid the illness. Another point is the identification of the know-how of managing lifestyle as a “skill” of health management. If a person has any genetic risk factor, they would have to manage the lifestyle to avoid or extend the onset. Here we propose to establish basic Health Engineering to enable behavior change and a new NCO health saving account which enables permanent storage of the health data and enables a specific health data to be used by other people [6][7].

3. Permanent Forensic Engine

There are several technical issues on linking health data to NCO personalized health management system

- (1) Permanent forensic engine [18] is necessary in storing personal health data for millions of years, as shown in Figure 2. As already discussed, right to the health information is far from being established. Therefore it should be discussed as to what kind of protocol should be developed to interface between the conventional medical information systems. We have to go back to the social domain in planning this protocol [1][2][3].
- (2) As shown in Figure 2, permanent forensic engine should manage following 6 protocol function:
 - (a) Generic Communication Protocols
 - (b) Personalized Security Protocols
 - (c) Sector-oriented Forensic Protocol
 - (d) User Authentication Protocol
 - (e) Voice recognition Protocol
 - (f) Imaging Protocol

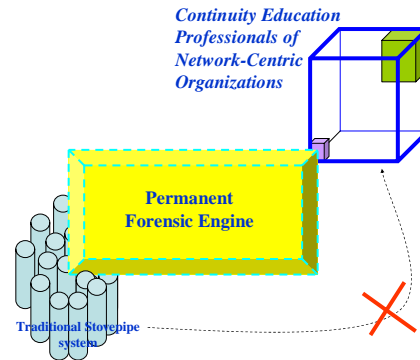


Figure 1: Current stovepipe system cannot access to the NCO easily.

- (3) Each protocol function should be designed accessible from any other protocols. It is thus enabled to interface with the current medical system [19]. It is difficult for conventional system to access to the NCO system of systems directly (Figure 1).

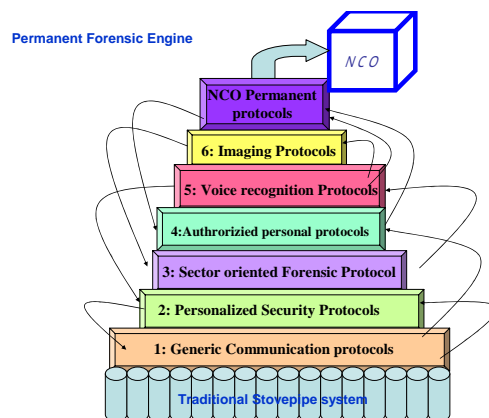


Figure 2: Each function is accessible from any other protocols.

4. Interaction between the Health Saving Account and Permanent Forensic Engine

The core of the Health Saving Account is the socio-medical system designed to delay the risk factor of a specific person to develop. It is already managed as a pilot system in Canada, USA, and Singapore. One of its biggest problems is that people’s basic right to their health data is not fully discussed yet. The data itself is already generating a profit in the form of ‘medical discount,’ like a bank account. This practice can be expressed as “selling the data to the organization managing the insurance point. The idea of evaluating the health with the insurance point would look simple, but it should be extensively discussed whether the nation should influence the personal will. Currently this kind of

discussion is limited within the category of life ethics. More specifically, it has been discussed only whether the organ transplants fit to the local philosophy on life and death. Personal right to the health data as the combination of track record of health management and DNA data has never been discussed in 19th century [15], when the basic theory of human right was established. Transmission of the health management data is quite recent topic [10][12] which would influence the continuation of a nation. NCO is the system concept which runs the complex socio-life system [19]. Existing stovepipe system cannot serve this purpose. Moreover, utilizing the thousands years of health management data pool to predict the effect of the current behavior and find versatile alternatives would be impossible. It would be impossible even to screen for the solution. However, if basic rules and social system assuring the right to sell the health data is prepared, and democratic process is built, virtual comparison between the offspring might be done and generate various unexpected effects[15][16].

5. Proposal of life information Forensic Science

Permanent storage of health management data could not be discussed along the conventional theory. Cybernetics theory proposed by Robert Wiener [16] would not analyze the matter successfully. Permanent storage of health management data means restructuring the life information science and development of one architect based on the robust NCO-style system management on digital forensic. Digital forensic [20] is a technology to assure the authenticity of the data. Conventional digital forensic is the recovery of the wiped data or analysis of the file system to acquire hidden trace of the data access. This is the technology to discover the truth overcoming the evil attempt to delete evidence.

The life information forensic science confronts the attempt of destructing evidence in a different way. Data such as body weight or blood pressure can be cheated such as by stepping on the bath scale with one foot on the floor. Such acts are caused by the wish to report good results. But it also contains a potential will to become better. Important point is that such foul plays and fake data should be discovered and corrected but the intension behind the act should not be refused.

Information business science which launched in the 20th century would move on to the NCO-style information science as the fusion of life science and information science after the 21st century and continue the progress

during the next thousand years. This quantum leap would be enabled by the ability to process images including animation. A revolutionary change would occur if the ICT system bears the “eyes.” It is important to keep the versatile alternatives and identify them from the global aspect. Human beings would become able to change the domain of life easily. They might be able to communicate in any language as long as they have good command of the first language within next 50 years. It would be possible to store the health data for thousands of years. Necessary thing is not reviewing the conventional sciences as the “general human science,” but to launch the discussion on the urgent issues to solve [13]. NCO health management algorithm would utilize the existing stovepipe and make full use of the data to work agilely.

References

- [1] Chang, W. Y.,: Network-Centric Service-Oriented Enterprise, Springer (2007)
- [2] Juliff, P., Kado, T., Hitachi Ltd. Ben-Zoion Barta, Bar-Code Computers Ltd (ed.): Educating Professionals for Network-Centric Organizations, Kluwer Academic Publishers, (1998), IFIP TC3 WG3.4 International Working Conference on Educating Professionals for Network-Centric Organizations August 23-28, 1998, Saitama Japan (Boston,USA)
- [3] Phang, K.F. : Modeling and Evaluation of Design Problems in a Network-Centric Environment, Submitted to the Department of Mechanical Engineering on February 24, 1998, in Partial Fulfillment of the Requirements for Requirements for the Degree of Doctoral of Philosophy in Mechanical Engineering,
- [4] Pahng, G.-D.F.; Seockhoon Bae; Wallace, D.: A Web-based collaborative design modeling environment, Enabling Technologies: Infrastructure for Collaborative Enterprises, 1998. (WET ICE apos;98) Proceedings., Seventh IEEE International Workshops on Volume , Issue , 17-19 Jun 1998 Page(s):161 – 167
- [5] Lee, J.Y., Han, S. B., Kim, H., Park, B. S. :Network-Centric Feature-Based Modeling, p. 280, Seventh Pacific Conference on Computer Graphics and Applications, (1999)
- [6] Dave Honey, Larry B Stotts, Paul Kolodzy,: Networking for Network-Centric Operations: Technologies and Challenges, Proceedings of SPIE: Defense Transformation and Network-Centric systems Volume 5820, The International Society for Optical Engineering, (SPIE, 2005)

- [7] Khosla, D., Nichols, T. : Hybrid evolutionary algorithms for network-centric command and control, Proceedings of SPIE: Defense Transformation and Network-Centric systems Volume 6249, The International Society for Optical Engineering, (SPIE, 2006)
- [8] Alster, K. B. : The Holistic Health Movement, The University of Alabama Press, (1990)
- [9] Dubos, R.: Mirage of Health , Utopias, Progress, and Biological Change, Harper & Brothers, (1959)
- [1 0] Pizzorno, J: Total Wellness, Improve Your Health by Understanding the Body's Healing Systems, Prima Publishing, (1996)
- [1 1] Ballentine, R.: Radical Healing, Integrating the World's Great Therapeutic Traditions of Create a New Transformative Medicine, Harmony Books, (1996)
- [1 2] Dubos, R.: Man Adapting, Yale University Press, (1959)
- [1 3] Illich, I.: Limits of Medicine, Medical Nemesis: The Expropriation of Health, Marion Boyars, (1976)
- [1 4] Marcuse, H.: One Dimensional Man, Studies in the Ideology of Advanced Industrial Society, Beacon Press, (1964)
- [1 5] Putnam, H.: Ethics without ONTOLOGY, (2004, Harvard University Press)
- [1 6] Wiener, N.: The Human Use of Human Beings, Cybernetics and Society Anchor Books, (1954)
- [1 7] Klaus, G. :Kybernetik und Gesellschaft, VEB Deutscher, (1973))
- [1 8] Carrier, B., :File System Forensic Analysis, Addison-Wesley, (2005)
- [1 9] Alberts, D. S., Hayes, R. E.,: Power to the Edge: Command...Control... in the Information Age, CCRP Press, (2003)