

# **13<sup>th</sup> ICCRTS: C2 for Complex Endeavors**

## **Title of Paper:**

**Network-Centric Healthcare Algorithm Development for the Behavior Change in  
Non-Intrusive way**

## **Topics:**

**9. Collaborative Technologies for Network-Centric Operations**

Clifford T. Hagiwara <sup>1</sup>, Masahito Gotaishi<sup>2</sup>, Kazuo Aoki <sup>3</sup>,

Point of Contact: C. T. Hagiwara,

Medical Care-Welfare Engineering<sup>4</sup>  
Graduate School of Science and Technology<sup>5</sup>  
Nihon University

Koishikawa 5-10-18-501, Bunkyo-ku  
Tokyo 112-0002 Japan  
(tel) 81-90-1547-1816, (fax) 81-3-3814-2372  
clifford.netcentric@earth.ocn.ne.jp

## **Network-Centric Healthcare Algorithm Development for the behavior change in non-intrusive way**

### **Abstract**

This study presents an initial health promotional education system model of a Network-Centric healthcare management system which assists physicians or healthcare service providers to supply personalized contents for their patients or the pre-patients of lifestyle disease with precise, tailor-made direction leading to the healthier lifestyle behavior. The features of our trail system of systems are designed to realize the shared situation awareness between the pre-patients and the physicians or healthcare service providers and to release them from “compliance” by achieving self –synchronization. It is expected to encourage them to participate in a real or a virtual community healthcare. The goal of the system is to enable patients to detect the sign of the disease by themselves. Discussions on medical care on information security and human security protections the sensitive and specific clinical and health economics data are also designed in the algorithm of this pre-patients educational system.

**Keywords:** network-centric healthcare, pre-patients, non-intrusive technology, shared situation awareness, self-synchronization, personalized healthcare data, biometrics sensor, IP CCTV camera, behavior change, proactive security system, Global Healthcare Information Grid, human security engineering

### **Introduction**

#### *Network Centric Operation (NCO) and Power to the Edge (PTE)*

Network-Centric approach has been proposed in various fields including military (Albert, Garstka, & Stein, 1999, Alberts & Hayes, 2003), industrial, and healthcare (Lubitz & Wickramasinghe, 2007) operations. Originally its theoretical framework was structured by Alberts, et al. Afterwards it was applied to the healthcare by Lubitz et al.

The concept of Network-Centric Warfare and Power to the Edge are the transformation from traditional command & control. And the development of information technology enabled it. The concept of Network-Centric Warfare was created by analyzing the effective use of network and information technology in the business field. As Metcalfe’s Law defined that “the power of a network is proportional to the square of the number of nodes in the network,” military organization shifted its priority from platform to network. Structure of the organizations and troops in the battlefield was designed to communicate with each other. And, in order to exploit the advantage of network excellence, a high-powered information backplane or information grid, which is called “Global Information Grid” (GIG) was proposed. The robust network leads to the reliable information sharing and information sharing causes shared situation awareness. Consequently shared situational awareness enables self-synchronization, which is the most effective way of achieving mission. It would be applicable to various ICT solutions for our daily life.

Changing nature of the military operation accelerated this movement. Recent asymmetric & non-linear warfare required the empowerment of decision to the soldiers in the battlefield by the military ways of self synchronization. Besides, since recent peacekeeping operation requires coalition of the army with other organization, interoperability between different organizations became important. This concept will be further discussed in the later work. Alberts emphasized that the information collected in the theater should be held there and shared among different fields on demand. This concept led the “Edge,” which means entities distant from the center, to have more power. This new concept of “Power to the Edge” made much of agility and put more emphasis on quick response than prediction and planning.

#### *Network-Centric Operation of Healthcare*

Along the above concept, Lubitz et al. (Lubitz, Wickramasinghe, & Yanovsky, 2007) proposed the “Network-Centric Healthcare Operations.” This is the system of sharing information among different professional group via World Healthcare Information Grid (hereinafter WHIG). As Lubitz et al. described, NCHO was proposed as an application of PTE to the organization supplying medical care to the public. WHIG was expected to supply appropriate information to the entities which need them, penetrating the border of organization.

The NCHO and other similar eHealthcare services are mainly focused on acute conditions. Another model of medical care is working in chronic diseases. Haywood is operating a web site PatientsLikeMe (<http://www.patientslikeme.com/>). This site pulls data from patients of serious chronic diseases such as ALS, Parkinson, Muscle Sclerosis, etc. The participants have outnumbered those of ordinary clinical trials and consequently this site supplies very different body of information about the disease than found in the literature (<http://rwjfblogs.typepad.com/pioneer/2007/12/network-centric.html>). It should be noted that the “Edge” in the context of PatientsLikeMe is not the supplier of healthcare but the patients, who did not play any active role in the medicine in the traditional healthcare (1977).

#### *Concept of Network-Centric Operation in other Contexts*

The concept of NCW was created by observing and analyzing the current business practice effectively exploiting the internet. However, it should be noted that when personal computing (Illich, 2001) and communication by computers (Licklider, 1968) were proposed, they emphasized the importance of supplying information to the “edge.” Main purpose of their proposal was happiness of the people rather than accomplishment of a mission. The authors would like to emphasize that the methodology of NCO can be utilized in order to make people happy. However, its structure should be naturally different from the ones for Network-Centric Warfare (Alberts, Garska & Stein, 1999). We assume that we would have to restructure its logic based on the thought of Illich and Licklider, etc in order to apply the NCO to healthcare.

Here we would like to name our concept of network-centric operation as “Civil Network Centricity” (hereinafter CNC). It refers to the overall system of social technology and their basic concept focused on the improvement of the human life and the quality of life.

In other words, CNC means the overall picture of the peacetime Network-Centric Operation. The purpose of this paper is to propose our Network-Centric Healthcare system based on the CNC, which could present unique tenet for daily life and contribute to the creation of new human network. Consequently new identity of human beings as “commons” of the society would be found.

### *Definition of Terms*

Here we would like to introduce following new concepts and terms:

CNC Health: This is the doctrine and hypothesis which CNC healthcare is based upon. It constitutes of three doctrines and a hypothesis:

Tenets:

- (1) Human life must not be discommoded.
- (2) Human life must not be made a game to play.
- (3) Human life must not be made a commercial product.

### Hypothesis

- (1) Human beings have an innate wish to live thousands or millions of years, or leave something inherited to the later generation.

Network-Centric Healthcare Operation: NCO in the CNC theory redefines the basic concept of NCO or NCW from the aspect of civil human life. Network-Centric Healthcare is the model of “Power to the Edge” defining Edge as the patients and pre-patients. Currently Network-Centric Healthcare Operation mainly discusses prevention of lifestyle diseases in our paper.

Pre-Patients: When patients suffer from lifestyle disease, such as diabetes, hypertension, or some kind of cancer, their bio-metabolic data shows some predictor of the disease, but they are not diagnosed as diseased yet. This state is called “*Mibyō*,” or “Not Diseased yet” in Chinese medicine (Alternative medicine 2001). It should be noted that pre-patients needs healthcare or behavior change but no National Healthcare Insurance point is issued in the Japanese Health Insurance system as of January 2008.

Non-Intrusive Technology (hereinafter NIT): We have taken a hint from PTE theory to create the concept of NIT. Above assumption of the CNC Health is translated in the terms of health science. Development of communication media to communicate smoothly among medical service providers, patients, pre-patients, and their families is another theme of the CNC Healthcare. This is the NIT engine along the CNC theory. NIT Engine is the core part of the technology which enables the process fully exploiting Shared

Situation Awareness and Self-Synchronization (Alberts, et al. 2001) (Cebrowski and Garstka, 1998). NIT corresponds to the command & control in PTE.

Until the end of the 20<sup>th</sup> century, when medical care was based on the paternalism (Dubos, 1959), clinicians were supposed to send commands to patients. Clinicians cured them by requiring compliance or giving intervention. We place the NIT Engine as the new technology which can overcome the traditional asymmetry of medical information (Alberts & Hayes, 2002).

Personalized Healthcare Data: CNC Healthcare discusses personalized (tailor-made) health management (Gray, 1992) and the relevant data which it is based on. Current medicine had to make diagnosis based on the majority, which are in fact very limited data (Marmot, 1989). In reality there are considerable numbers of exceptional cases. The concept of personalized medicine/healthcare structures the concept greatly deviating from the Pareto's law (Grossman, 1972). Health management activity needs to precisely comprehend the health information fully considering the personality, social status, current situation, or affordance, time of the day (Gibson, 1979), ordinary event (Cohen, 1989).

## **Problem of the current Medicine**

### *Personalization of the Healthcare and Treatment*

One of the biggest problems of medicine is that the healthcare supplied to a specific person is not optimized for their personal property although the effect of the medical treatment differs among individuals. This problem is not solved even in the modern medicine yet. Evidence-based medicine (EBM) or evidence-based healthcare (EBH) has been developed since mid-1990s (Green, 1991). Japan also has been discussing them since around 2005. Consequently majority of the medical institutions began to identify that providing EBM/EBH should be one of the most advanced public medical cares (Geoffrey, 1992) although the delay of 10 years is not overcome yet. Nonetheless, it is widely agreed that even the EBM has not yet supplied the medical service and content sufficiently fitted for the specific patient different from anyone else.

We suppose that another kind of medical technology / sciences enables patients to benefit from the advanced medicine? Especially, progress of ICT is expected to enable medical treatment or health management by people themselves. A large scale information system for a number of participants including patients, patients' families, and medical professionals would be necessary. Goal of our proposal is to create the guideline for developing such systems. Important property common to most lifestyle diseases are that medical treatment of the patient is difficult, and that they are preventable without any advanced medicine. There are about 2.3 million patients of diabetes who are receiving treatment in Japan, with their medical bills amounting to 1.9 trillion JY (17.2 billion US\$) (Campbell, et al. 1996).

On the other hand, it is assumed that there are more than 20 million pre-patients who carry its risk factor but are not diagnosed as diabetic yet. They are likely to suffer from diabetes but the onset is preventable by appropriate behavior change, without any drugs

such as insulin. Nonetheless, Current medical system is not prepared for providing treatment to these people in order to prevent its onset. Paradox is that healthcare is not supplied until the health is harmed. It is to note that current medicine or medical insurance are not designed to make appropriate intervention to prevent the onset. Medical Saving Account (MSA) considers that, but they have not reached the solution yet. This situation is cynically expressed by Illich that “Doctors should create illness.”

A social system to assign economic rationality to the health management of pre-patients would be necessary. It would be built in the CNC Healthcare. It could be designed along the same logic as MSA/HSA. This system would encourage pre-patients to begin and continue the health management program by evaluating the achievement with CNC Healthcare Operation (hereinafter CNCHO) points.

#### *Ineffectiveness and difficulty of Behavior change*

Medical services assisting the behavior change of patients do exist. Unless the health insurance point is considered, pre-patients can also receive these service. However, the pre-patients are not satisfied. Mostly the inaccuracy is caused by ①specific patients deviating from the majority (race, age, co-existence of other illness, etc.) resulting in wrong prediction, ②complexity of the response of human metabolism, such as stress of diet causing larger adverse effect than the diet itself ③paternalism of doctors causing patients’ resistance. The inaccuracy undermines the patients’ trust further.

It would be found that detailed bio-metabolic data of numerous people is necessary and non-intrusive way is most effective in the direction to the behavior change. They would be achieved by mega-database and sensor network for collecting and storing diverse data from hefty number of people, and application of command & control to accomplish the behavior change.

### **CNC Healthcare Operation**

#### *Health Database of large population and Non-Intrusive Behavior change*

Two of the cornerstones of CNCHO are as follows:

- (1) precise diagnosis of the bio-metabolic data by statistical analysis against the appropriate parent population
- (2) controlling patients to the behavior change in non-intrusive way.

They are achieved by Global Healthcare Information Grid (hereinafter GHIG). As shown by PatientsLikeMe web site, various new facts are found by analyzing numerous data. As long as precise identification of the situation is achieved, professionals easily find what to do such as “stop smoking,” “reduce calorie intake,” or “walk 20 minutes a day,” etc. If gene information is added to the data, the diagnosis would become more precise.

As shown above, our concept of “shared situation awareness” and “self synchronization” is slightly different from the ones discussed in “Power to the Edge.” NIT is the algorithm

for accomplishing the behavior change. Relationship between paternalism and NIT corresponds to the one between “command” and “command & control” in PTE. Core of the algorithm is showing the direction and influence the pre-patients to act towards it..

NIT engine encourages the people to change the behavior by showing various alternatives and considering the personality, past experience, and change of mental condition. The status of the person is analyzed with various technologies including psychology, sociology, and various techniques used in other fields such as financial engineering. NIT engine identifies the personality and tendency of the person and presents the likely alternatives which they can choose to proceed to the necessary direction. It does not show the direction explicitly. Various implicit ways are taken, such as e-mail, portal sites, SNS, SMS, FAX, talk by human representatives, postal newsletters, etc. Ideally the aim of the alternatives should be masked.

### *NIT algorithm*

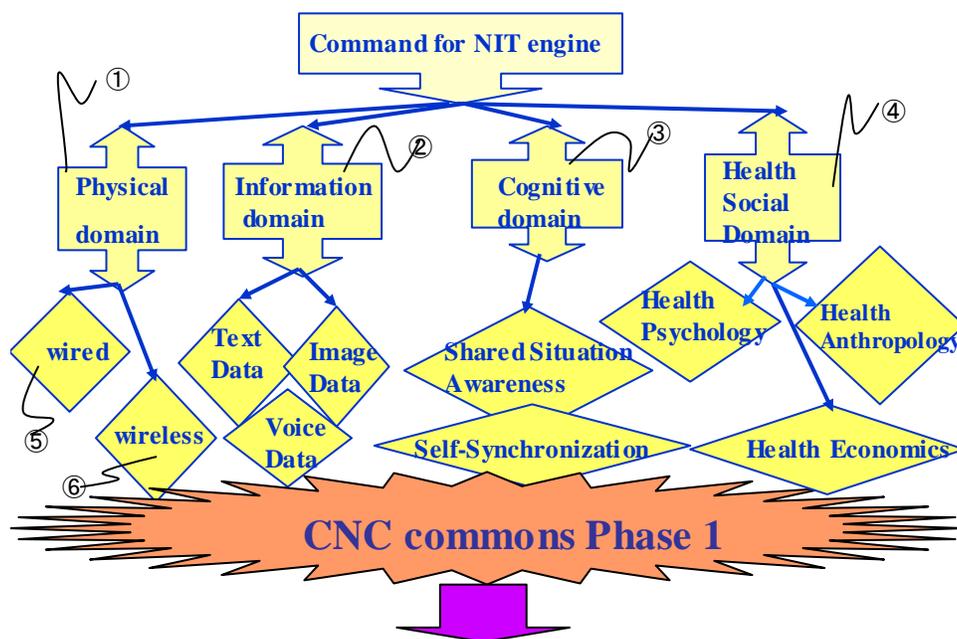


Figure 1. NIT engine leading a person to discover the purpose of life

Figure 1 shows the process of sending message to change the behavior.

For example, a pre-patient of cardiac infarction needs to stop smoking. He/She already knows its harm and recognizes that they should stop it. But they cannot take an action because they also know the pain of withdrawal symptom. In some cases they might continue smoking sacrificing the life according to their own preference. This situation of “unable to stop in spite of the harm” is called “*avidya*” in Buddhism. These cases such as fitness, nutrition, overwork, stress, etc are quite common in health management.

The pre-patients are ordered to stop smoking and they comply with it in the traditional medicine.

On the other hand, NIT engine analyzes the versatile factors influencing the unstable mind. The messaging paths are analyzed in the each of (1) Physical, (2) Information, (3) Cognitive, and (4) Social domains. . ① physical domain means either ⑤wireless or ⑥wired. Medical service providers can communicate in person with the patient also. ②information domain is the channel of health education. Its technical varieties are the media such as text, image, voice, etc. Accumulation of knowledge from this domain is the most important for the pre-patients. ③Cognitive domain is to smoothly realizing the shared situation awareness and self-synchronization. ④Healthcare social domain is the specification of the social structure, as described in PTE. Activity in the social domain is the recognition of its position including the influence of their health to the family or the local society. The issue should be discussed along the health psychology, health anthropology, and health economics.

By analyzing the state of “*avidya*,” how it was brought about and how they grow out of it, a process of building the health capital would be developed. Consequently the data of the person is registered as the CNC commons in the Healthcare Saving Account.

The analysis of “*avidya*,” would clarify their subconscious perception of life.

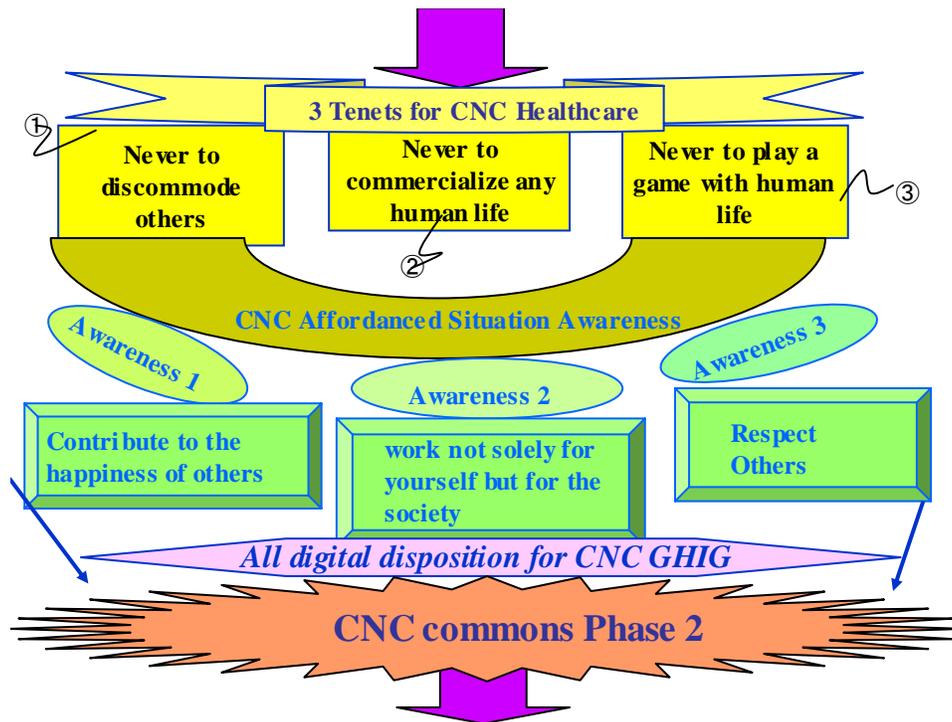


Figure 2. Algorithm leading People through the tenets of CNC Healthcare

Figure 2 shows the fundamental difference between other health management systems.

As most of the readers would have experienced in health checks, most people attempt to cheat the machine, such as getting on the weight scale with one foot on the floor. It should be noted that it is caused by quite natural human mind of “I don’t want to see bad thing.” The algorithm of correcting this bias while accepting this desire is planned separately and its concept is being prepared for publishing. Here is the algorithm to lead the people to “enjoy” knowing and telling the truth.

①②③ are the tenets as the basis of the CNC healthcare rule. Doctrine ① is “never to commercialize a human life.” There is a guideline of defining the concrete rule including the penalties. ② is the doctrine of “never to discommode others.” This is the basis of the guideline showing how an individual is related to others by each conduct of life. ③ is the doctrine of “never to make a game out of human life.” This is the tenet to create the guideline of doing without unnecessary treatment in medicine.

These three doctrines are not applied separately. Rather they should be the total solution to create the measure to lead a person to find the value of information sharing while fully considering the factors of life. The behavior according to the above tenets would be lead by the three kinds of awareness. Awareness 1 is the guideline of telling that someone became happy on account of their conduct. Awareness 2 is the guideline to find that their life influences others’ life. Awareness 3 is the guideline to identify the dignity of others as well as their own.

Numerous textbooks and papers on health improvement or patient education have discussed above behavior direction. Although, none of them has successfully removed the state of “*avidya*.”

We expect that the CNC health can achieve the settlement of healthy habit by international comparison in order to avoid the repetition of violation. Activities such as “smokeout marathon” are making effects in Japan. We plan to promote the activity from the aspect of international health.

Phase 2 shows that eventually resulting health data are stored in the GHIG as CNC commons.

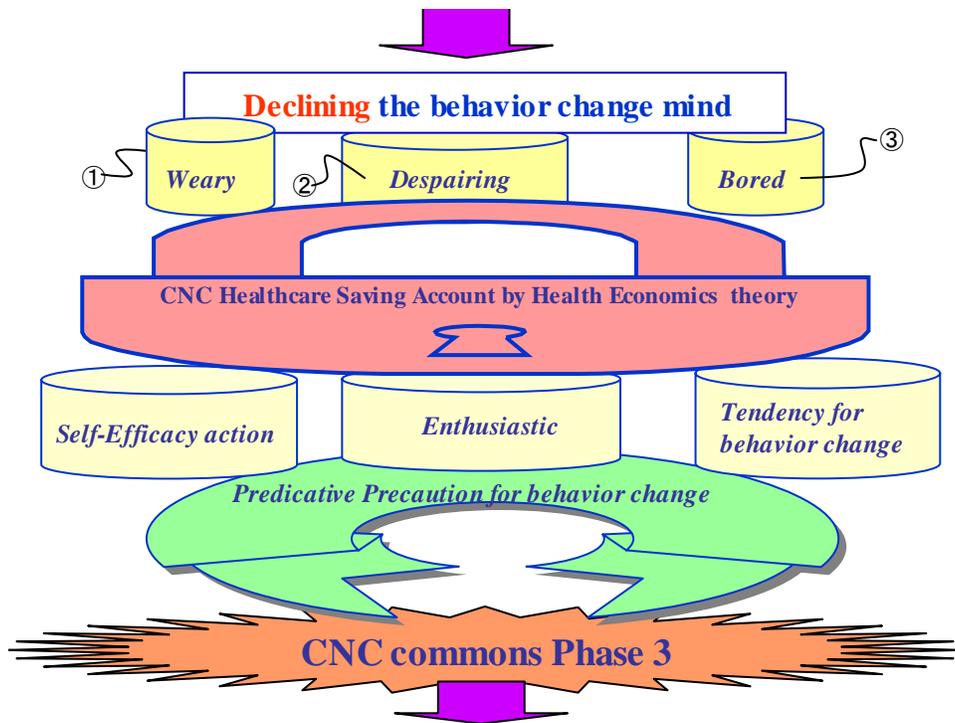


Figure 3. Algorithm to Motivate People by Health Economic Dynamics

There are groups who are not interested in or disregard behavior change. It is necessary to perceive them in the context of total environment where they inhabit.

Figure 3 shows how to cope with these people. Traditional medicine gave direction to them and required to comply. Usually these people discontinue the effort, as shown in ①-③ even if they try. But in the NIT, motivation is maintained by including the members in a group with the system of CNC Healthcare saving account. Consequently they come to enjoy recording the data.

If they come to enjoy the data collection, they join the CNC commons to contribute to others, in the same way as Figure 2.

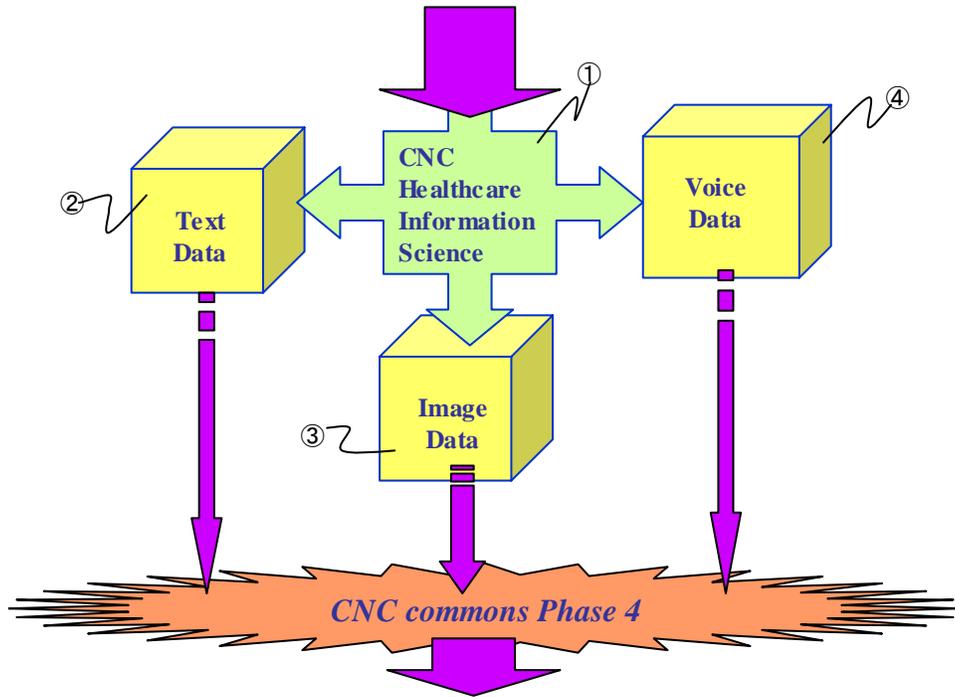


Figure 4. CNC Healthcare Information Science

Box① in Figure 4 shows the diagnosis of human body in the CNC Healthcare Geospatial Science. There is no dichotomy of “health or ill” in this health management system. ② is the text data. ③ is the voice recognition technology. Heritage of acoustic engineering might be able to reduce the asymmetry of medicine. ④ is the image processing, whose technology is continuously progressing image diagnosis. CNC health management system assumes the total health management system, fully exploiting the three basic technologies. CNC information science is focused on the technology to keep all of them integrated in any occasion. It should be noted that, once any one of them is lost, its excellence over the existing stovepipe medicine is lost. Data of 500,000 people in different format can be linked in an instant by adding appropriate metadata.

#### *Health Economy Dynamics and Health Philosophy*

One of the major obstacles to the realization of health database is that healthy people do not have enough motivation to measure the bio-metabolic data. There are already various attempts to build a database to share the data, such as among the parents of the juvenile diabetic children, etc. However, people without any serious illness are not motivated to do the toilsome measurement and recording. Only successful case is the database of basal body temperature. Although CNC is based on the hypothesis that “Human beings have an innate wish to live thousands or millions of years, or leave something inherited to the later generation,” it is also true that people need additional motivation to execute troublesome jobs. Undoubtedly the measurement should not be obliged, since it harms non-intrusiveness. We think that the motivation is added by economic rationality.

We propose to reward the contribution by “CNCHO point.” The contribution could be evaluated in the similar way as MSA evaluates the medical service by insurance point. Simultaneously the health or the improvement of health should be evaluated by the point. This system brings about the society where being healthy contributes to the health of other people. The motivation would be the combination of health economy (“health and data generate profit”) and health philosophy (“No happiness without health,” “Human beings have innate desire to contribute to the society”). The optimum evaluation rule would be found out by making conjoint analysis on the economic and philosophical factors.

The motivation by economy dynamics is another half of the NIT. Although health is essential for the happiness, some people would give priority to other things. Some people might continue smoking while identifying the danger; some could not stop drinking beer while knowing the blood urate level, etc. Motivation based on the economy would complete the “control” of CNC.

*CNC Data collection: How the Health is monitored*

CNC healthcare assumes wearable bio-sensors, which can collect information from every part of the body every time. For example, blood pressure of the same person on the same day fluctuates a lot. It changes as the movement, state of the mind, etc. Blood pressure during the meal is different from the one while bathing.

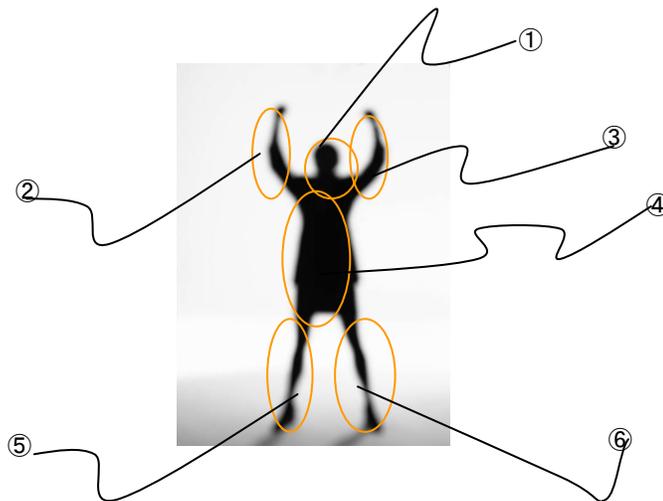


Figure 5. Human part where Health Indicators are collected

It should be noted that information which tells the health condition can be collected from every part of our body. A skillful physician can find whether the person has hyperpiesia just by glancing at the face. For example, 6 parts in Figure 5 tells us personalized information on the health condition:

① is the head and neck. The shape of the skull is important in bio-data. Considerable information would be collected using the existing technology of biometrics (face recognition, etc.). Besides, brain wave and physiological data around the neck are also important.

② is the right arm. Subtle motion of the right arm differs between individuals so much that it is more effective than fingerprint in biometrics.

③ is the left arm. It tells the blood pressure. Especially, it is expected to detect the stress level from the movement of the nondominant hand.

④ contains major organs. The data should be collected and deviation between individuals should be studied.

⑤ acceleration of the kick in dominant foot has potentially important data in detecting predictors of diseases.

⑥ nondominant foot supports the human body. Unstable two-foot position of the human body might reveal some indication of some ailment in this part.

Not only the ways done in the health check, watching every part of the body could show some sign of the illness if any.

### **CNC Healthcare makes individuals into CNC Commons**

Figure 6 is the conceptual diagram. It shows how human bio-metabolic data becomes CNC Commons. ①-④ is the 4 entrances to the Commons (fitness, nutrition, rest, mental). It shows that the target (red point) is reachable from any of the 4 entrances. ⑤ is the CNC Data media. It is assumed that a person can carry all of their health data in pocket. The media is as small as a dice and assumed to contain 10 petabyte of data. The development of this large-scale portable storage is in progress. ⑥ is the GHIG. Individuals can use any data of any person in any place, regardless of the race and culture. ⑦ is the user interface. The monitor screen can be divided to view multiple alternatives at once.

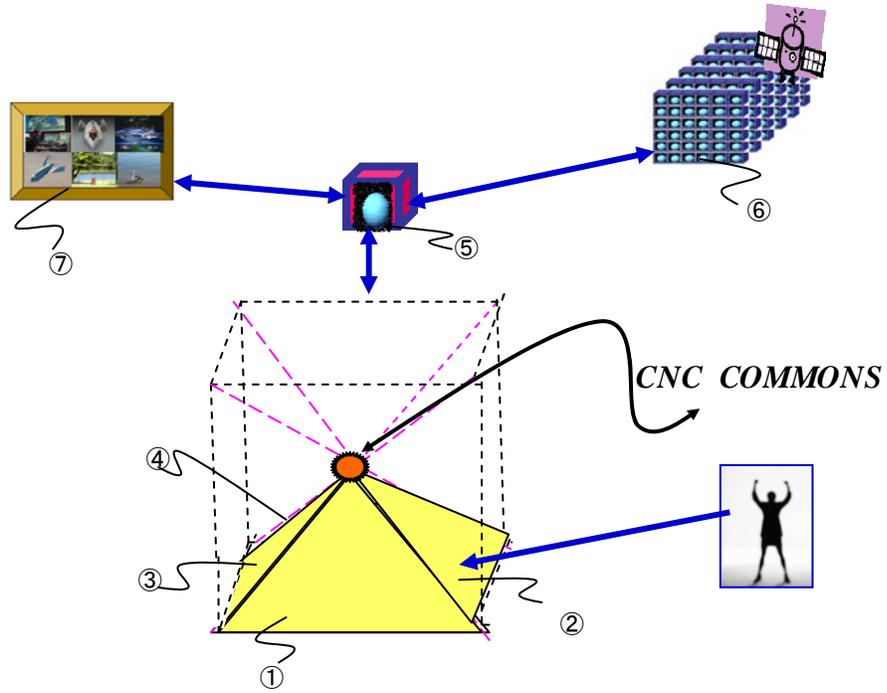


Figure 6. From Paternalism healthcare to CNC network care

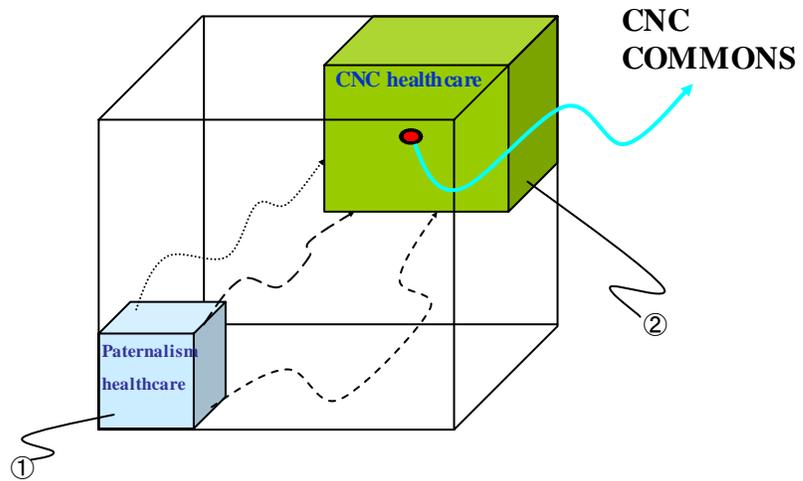


Figure 7. From Paternalism healthcare to CNC network care

Figure 7 shows the path from the paternalism medicine or stovepipe organization to the CNC Healthcare. ① shows existing medical system whose technology is based on platform. ② is the CNC Healthcare. Considering the outlook described in PTE, it is assumed to take three to five decades reaching this state. The red point on the centroid of the CNC Healthcare cube is the CNC commons, which overall health management system depends on. The world is beginning to move from ① to ②, but the path is not limited to one. There are versatile path to take.

### **Protection of the CNCHO information and valid use of NIT engine**

Most of the economy related to health and medicine proceed either by acquiring the points in exchange for the health data or buying a healthcare service with the point in the CNCHO. CNCHO is managed so that the data, service, and goods related to the health are distributed smoothly. The GHIG (Lubitz, 2006, 2007) and database are the core info structures (Millenson, 1997) in health economics. CNC info structure which overall society depends on must be fitted with robust and appropriate security, just as GIG must be robustly protected in order to carry out NCW/PTE.

The security of newly developed system would have to be built in the design. Since it is an important infrastructure, the security would have to be specified in the same way as e-Government, finance, or military system. Therefore it would be appropriate to define the specification following the standard of ISO15408 (<http://www.commoncriteriaportal.org/>).

More important matter is the ethics and philosophy to determine the access control rule. Current medicine might be experiencing the second start of “the medicine revolving around the patients respected as human beings,” which is recognized to have been created by Hippocrates in 4<sup>th</sup> century B.C. Nonetheless, those who would benefit from this advanced medicine fear them, instead of welcoming. One of the reasons would be the complexity of the second coming. One important reason is the wrong information about the gene medicine. Propaganda from various sources imprudently forecast that gene therapy is ready for launching (Duke, 2001). In fact gene medicine has a long way before the realization, including the development of biotechnology and extensive discussion on the ethics, identity of human beings, life and death, etc. This concern might have been amplified by the emergence of EBM/EBH, which is called “the medicine fully utilizing the internet” (Herzinger, 2003). Moreover, the biggest and basic concern for the patients is that the discussion of human right, which the rule of access to the health information should be based on, is quite immature. Since our society is about to exit from the classic paternalism medicine, we have to discuss the complicated rule of the access and ownership of the medical data, which was very simply specified that “only primary physicians have full access, and others none” in the days of paternalism. E-Healthcare (Lubitz, et al. 2007) has been regarded as the most advanced internet medicine and much is expected to it. But the theory of human right to the healthcare must be established in

order for the e-healthcare to spread among the ordinary households. Especially this system assures the technical availability of every bio metabolic data. Here the discussion of right to reject or limit the distribution of their data is skipped in order to simplify the description of the system. But the human right to use the data and right to limit the usage would have to be extensively discussed.

Another important matter is the NIT engine. It is quite likely that the considerable proportion of NIT algorithm itself would be personalized. The parameters of NIT are the core tool of CNC, but its use should be strictly controlled. It must be noted that NIT engine can control people freely to some extent. Therefore the NIT data must be strictly protected by security safeguard, since its abuse is a serious threat to the society. Besides, even for the purpose of health improvement, there should be a discussion of the limit of usage. If NIT is used for other fields such as environment conservation, politics, etc, serious discussion from various aspects is necessary.

## **Conclusion**

### *Vision of the CNC Healthcare*

CNC Healthcare described here would be a typical example of the system of systems (Cebrowski, 1988). This system also makes much of the continuation of human life (Slack, 2001). Like the system of systems used in PTE, such as GIG, is designed to interface with wide range of organization, CNC healthcare system described in this paper does not plan to substitute the existing medicine practiced in stove-pipe organization (Raffel, et al. 1994) or obsolete them. Rather it is designed to make effective use of the data collected in these legacy systems together with the recent ones. Its goal is the system of systems interfacing with the legacy system to have synergy. Therefore system engineer and system operators operating the existing healthcare system are expected to continue and improve the current system management while considering the interface with the CNC Healthcare. In the same way, CNCHO system does not mean to compete with the network-centric healthcare (Lubitz, 2007) which Lubitz proposed but to cooperate with it.

It means that robust and user-friendly guideline, and standardized protocol is necessary for the info structure of Civil Network Centric Healthcare Operation (Lubitz, et al. 2006), where interoperability among different organizations should be assured.

We must keep the fundamental question of “why do people suffer from disease and why they recover from it (McKeown, 1988)?” in mind while developing them. Each of us should ask the question to themselves stepping into the shoes of the ordinary people.

### *Potential of Civil Network Centric Operation*

The reason why bio-metabolic data becomes commons is that collection of individual data enables personalized medicine. As Pareto’s law goes, 20 % of the population constituted 80% of the medical statistics in traditional medicine. Other ignored 80% people have been neglected in the medical statistics.

The theme of health management would create a new human network and consequently individuals become “commons” which people need. Human relationship makes great influence on the health. Creation and maintenance of healthy lifestyle depends on the social network and precise identification of the mechanism influencing the health. Bio-metabolic data shared by GHIG contribute to the info structure of the global health management.

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## 13<sup>th</sup> ICCRTS: C2 for Complex Endeavors

(Note)

1. Research Student, PhD Candidate,                      Medical Care-Welfare Engineering  
Graduate School of Science and Technology Nihon University
2. Research & Development Institute, Chuo University  
1-13-27 Kasuga, Bunkyo-ku Tokyo, Japan 112-8551 +81-3-3817-1621  
gotaishi@tamacc.chuo-u.ac.jp
3. Professor, Doctor of Health Sciences,              Medical Care-Welfare Engineering  
Graduate School of Science and Technology Nihon University
4. [http://www.cst.nihon-u.ac.jp/graduate\\_school/english/senko/senko.html](http://www.cst.nihon-u.ac.jp/graduate_school/english/senko/senko.html)
5. [http://www.cst.nihon-u.ac.jp/graduate\\_school/english/index.html](http://www.cst.nihon-u.ac.jp/graduate_school/english/index.html)