Common meritocracy: A multi-agent system as the model for a co-operative community in healthcare.

Paper to be presented at the 4th CIRIEC International Research Conference on Social Economy (ICOSE) - Social economy on the move at the crossroads of structural change and regulation. Antwerp, Belgium,
24-26 October 2013.

Ryszard Stocki
University of Social Sciences and Humanities
Faculty of Psychology, Katowice
e-mail: ryszard@stocki.org

Andrzej Bielecki
Wojtyla Institute – Research Foundation
Smoleńsk 29, 32-112 Cracow, Poland

Running head: Common meritocracy

Key words: healthcare, multi-agent systems, meritocracy, co-operative community, participation in decisions, total participation,

Common meritocracy: A multi-agent system as the model for a co-operative community in healthcare.

Abstract

The paper presents a model of hospital governance based on the premise that participation is an innate feature of human nature and thus should be characteristic of all institutions in our lives. This concept lies behind practices of total participation that may be encountered within a business world. The paper proposes to apply the same to the complex reality of hospital governance. Three aspects are necessary for the model to be successfully implemented: (1) accepting the hospital incumbents as subjects free to make choices regarding whatever concerns them; (2) implementing information and communication technologies (ICT), (3) making all incumbents real owners of the hospital. The decision-making process process is based not on structural divisions, but on competencies and other features recorded in the general database of the hospital. For each decision, a different group of incumbents is asked to react. Who, how and when the decision is taken is also controlled by the system after a person initiating the process describes the decision specification. In this system, everyone's competency is used for common good of all the incumbents of the hospital and for general public. At the end of the paper, some assumptions regarding a formal cybernetic (multi-agent system) model are presented. Formalization of the governance model may help to compare effectiveness of the conventional model and this one, and finally replace the traditional hospital and assist in founding and managing a heterogeneous co-operative community to provide healthcare. It may also help us to find out what we have to undertake to make a co-operative hospital a successful social enterprise.

Introduction

This paper is a possible application of a phenomenon of total participation analyzed in detail in the business world by Stocki, Prokopowicz & Żmuda, (2012) and Blawat & Drobny (2010). When exploring practices of such companies as Suma Whole-foods Co-operative, Semco, SRC Holding Corporation, Southwest Airlines, and SAIC, we discovered that what differentiates those companies from others was considering participation as a natural feature of the human being, a part of human ontology, and not a value, not a management style, not a management technique, nor HRM strategy. As we have found similar conclusions in a book “Amazing Oversight” (Graham & Titus, 1979) we followed the authors to call this phenomenon total participation. It is worth mentioning that totality refers here more to internal rather than external reality. Thus, the phenomenon has rather anthropological than ethical character. Universality of participation could be proven not only by examples of “utopias” such as Paraguay Reductions or Robert Owen's New Lanark, but in the teachings of Laozi, Confucius, Solon, Old Testament prophets and Jesus. General character of participation as part of human dignity has found the best expression in the writings of Polish philosopher Karol Wojtyła (Wojtyla, 1983) who entitled the last chapter of his “Person and Act”: “The outline of participation theory”. The idea of general and innate participation as a human feature calls for reexamination of many institutions – not only enterprises we analysed in our book. We chose health care as one of the areas where mistakes have the greatest and tragic consequences. We followed Bielecki Stocki (2010) who made an overview of national health care systems and analysed them by systems theory, particularly the concept of autonomous systems introduced by Mazur (1966). The analysis showed internal inconsistencies and flaws in all existing health care systems (Figure 1). In that paper, they proposed a solution of creating a system which will totally get rid of the intermediary institution of an insurance company. They proved how insurance companies or institutions distort the flow of information and energy (resources), consuming quite a large portion of them. From Mazur's theory viewpoint, the solution proposed by Bielecki and Stocki (2010) depends on optimization of information accumulation and processing.

The goal of the present paper is to present a model of governance of an ideal hospital based on the principle of total participation. We want to show not only how it

differs from the existing systems in the role played by all important stakeholders, but we would also like to show concrete decision-making procedures, which may be implemented in such a system in reality. Thus, we propose, in fact, a first version of a complete governance model based upon the concept of meritocracies and total participation of all involved in the functioning of such a system. In the paper, we explicitly refer to co-operative enterprises as the best-known example of participation-based organisations. We realize that our concept of participation highly supersedes the existing ones and reaches the verge of what sceptics call “utopian”, but we decided to publish it because of technological development we witness, which has already changed many past dreams and utopias to reality.

Although the governance model is the key issue in this paper, what conditions it is very important as well. We have mentioned the role of the anthropology on which the model is based. According to this anthropology, every human being has the right to participate, i. e. to make free voluntary decisions regarding anything that concerns him or her. The second important condition of success of the model is the concept of IT governance. We are convinced that information systems make a revolutionary change in our reality. As making fire changed our civilization by offering settlements in colder regions, unknown foods, new warfare and mobility, etc. taming of information which we perceive nowadays is much more than inventing the printing press by Gutenberg. It is changing medicine, government, culture, education, every aspect of our life. If we want it or not it will change the governance model of hospitals, but not necessarily for the better, if we do not direct the change properly. The third aspect that has to be taken into account is the monetary aspect, which alienates the financial function and sets it as the only aspect the hospital managers are interested in. In this respect, hospitals are victims of on one hand prevailing homo economicus anthropology, but on the other hand, the drive for efficiency leading to inhuman bureaucracy (DiMagio and Powell, 1983). Anthropology, information technology and financial efficiency are three forces that underlie the governance model. In each of the three aspects, we encounter phenomena that must be taken into account in the following part of the paper we shall shortly deal with each of them.

IT – New opportunities

There is no other area of human life that could profit from ICT (Information and communication Technology) more than health care. Hajiheydari et al. (2013) give

numerous examples how the process of treatment could be improved due to ICT. Special attention is paid to mobile technology and its spread all around the world. Some authors openly speak of m(mobile)-governance (Pandey & Sekhar, 2013). Although studies indicate lack of training and awareness among the doctors about use of ICT (Verma, 2013), the new discipline of m-health is slowly emerging proposing to substitute many practices with their new mobile counterparts (Istepanian, et al., 2006). From diagnosis, epidemiology, data collection through treatment process and later control every aspect of medical is changing. Diagnostic equipment available only to specialist hospitals worth hundreds of thousands of dollars is available as plug-in device for several thousand dollars. Also the governance of healthcare institutions changes as Frączkiewicz-Wronka (2006) writes the hierarchic governance structures are being slowly substituted by flat community networks.

Financial efficiency

Although specificity of healthcare institutions is not questioned, Eecklooa, et al (2004) claim that corporate model is the frame of reference for hospitals. The Hospitals have to interpret it in its own way. It should be noted that this is natural process of organisational isomorphism (DiMaggio & Powell, 1983) transferring all organisations to efficient bureaucracies. Although it is obvious that corporate model is not the only one, it certainly is more characteristic for for-profit, private health care sector. But the choice of the governance model is not only the matter of financial aspect. Depending on the financial model of governance different aspects of quality are emphasised. Private hospitals seem to be more financially efficient, while public hospitals account for other values (Bogue, et. al. 2007). But the choice of the model is highly dependent on ownership. Many studies (e.g. Eldenburg, et al. 2004; Weiner & Alexander, 1993) show that ownership type reflects heterogeneity across consumers and producers, and that differences in these groups lead to differences in the organisation's objectives and governance. There are some attempts made to make state health care more social, e.g. by forming Foundation Trusts in the UK. However they failed to really introduce social ownership and local accountability (Wright et al, 2012).

Patients, nurses, doctors as subjects

The tendencies in patient awareness, ICT and financial functioning create space for

more participative and collective governance. Nevertheless, being aware of the forces of organisational isomorphism and the history of co-operative movement, we are skeptical about the impact of such tendencies, if they are not supported by systemic ownership changes and human transcendence (Wojtyla, 1989) allowing all stakeholders to accept and get involved in the changes. As shown in Bielecki & Stocki (2010) the changes should start on national level because in most countries the health care systems are based on fundamental conflict of interest between the insurance institutions (either private or national), hospitals and patients. Bielecki and Stocki propose a system of insurance where the patients are insured with a hospital not an insurance institution. The benefit from this system is that the surplus resulting from patients being healthier ends up in the healthcare community, so doctors and all the staff are interested in prophylactics and keeping the patients as healthy as possible as this gives the hospital (or better healthcare community) more money because they do not have to finance costs of medical procedures and can spend it on sanological activities rather than treatment.

We are aware of many positive phenomena in medical studies and SCR showing that more and more attention is paid to all health care stakeholders (Tabish, 2012). Much stress is put on patients and their interests (Buetow, 2013). As postulated by Karol Wojtyla (Crosby, 2004), patients are slowly becoming subjects of their treatment. This does not necessary mean they want to make decision instead of doctors, but they certainly want to be better informed about their illness (Strull & Charles, 1984). Internet technologies allow them to control their treatment by building their adaptive coping and self-care skills through collecting information from various digital sources. This represents a significant step in modern medicine toward increased patient self-health care (Seckin, 2010). Yet, this focus has to be thoroughly scrutinised because instead of treating patients as persons, they are more and more often treated as clients and the patient-physician relationship is commercialised (Gray, 1997). This leads to different pathologies e.g. upcoding diseases to reimburse greater sums of money from insurance institutions (Silverman & Skinner, 2004). Also physicians are recognised as partners in management of hospitals (Burns et. al. 1989).

Patients, nurses, doctors as subjects

We are aware of many positive phenomena in medical studies and SCR showing that increasingly more attention is paid to all health care stakeholders (Tabish, 2012). Much stress is put on patients and their interests (Buetow, 2013). As postulated by Karol Wojtyla

(Crosby, 2004), patients are slowly becoming subjects of their treatment. This does not necessary mean they want to make decisions instead of doctors, but they certainly want to be better informed about their illness (Strull Charles, 1984). Internet technologies allow them to control their treatment by building their adaptive coping and self-care skills through collecting information from various digital sources. This represents a significant step in modern medicine toward increased patient self-health care (Seckin, 2010). Nevertheless, this focus has to be thoroughly scrutinised because instead of treating patients as persons, they are more and more often considered to be clients and the patient-physician relationship is commercialised (Gray, 1997). This leads to different pathologies, e.g. upcoding diseases to reimburse greater sums of money from insurance institutions (Silverman & Skinner, 2004). Physicians are also recognised as partners in management of hospitals (Burns et al. 1989).

What is real on the general organizational level may not necessarily be true on an individual level. A pulmonologist employed at a hospital may not be interested in reduction of cigarette smokers in the hospital's community as lack of patients may undermine the sense of him being employed in the hospital. Similarly, the administration of a hospital may be attentive to dividing the surplus of the income among themselves rather than spending it on treatment of a rare illness or even further prophylactics. On the other hand, there are many extremely expensive medical procedures that could easily devour all the money saved through prophylactics. In the long run, such practices may cause the epidemiology of the community to reflect the composition of specialists employed at a hospital. Eradication of one conflict of interest may evoke many others. Following Vaughn (1999) we should remember that organizational pathology is the other side of systemic adaptation. Long term adaptation of a hospital to a situation will naturally end up with pathological consequences not because of ill will, but because of the very nature of systems.

Integration of the three aspects into one governance model

We have to be aware that today the overwhelming corporate model is more and more often questioned by societies, e.g. by occupy movement (Bramball, 2012). New governance models are sought for. Savage, et al. (1997) propose introducing overarching and facilitating boards. Schlieter et al, (2012) also see the limits of the corporate model which may go against interests of patients and propose evidence based clinical processes. This method is based on the two central instruments in the treatment context: the Clinical

Practice Guideline (CPG) that aggregates evident medical knowledge, and the Clinical Pathway (CP) that describes the clinic-specific processes for defined patient groups. Such integration gives merger of financial management with the interests of patients and as a result completely new clinical process governance.

Some business examples may also encourage functionality of network and community-based models. This is the case with Visa. Tom Peters in the introduction to Hock's “One from Many” (2005) writes: “Visa may simply be the best business example of an emerging revolution in organising, kin to such diverse organizations as the Internet, AA (Alcoholics Anonymous), and the worldwide air traffic control system. None has a president in control. None has owners separate from their members. Each is a network of free agents, none of whom understands the whole of the network nor do they need to, but each of whom knows the ground rules for participating. Each, like Visa, is formative and has its own set of problems. But each has grown rapidly and had a large-scale impact on otherwise insoluble problems.” All those kinds of thinking are not very personalistic. They are considering patients as equals and in governance models not all stakeholders are equal. We have mentioned the problem of legal ownership, but there is also an equally important problem of competency. This is why the following part of the paper will be devoted to the question how to merge governance with inequality in competence.

From naivety to mastership

Historical arguments (Kwiatkowski, 1947) convince that the development and sustainability of political systems is based on internal flexibility of community members resulting from their knowledge of the environment and understanding of the processes they are subject to. Stocki and Bławat (submitted) show empirical evidence that the same rule applies on organizational level.

- - - - - - - - - - - - - -

Figure 1. About here

- - - - - - - - - - - - - -

If we look at Aristotle's traditional division of political systems (Winters, 2011), much more important is whose interests are represented, then whether or not they are represented by competent rulers. Perhaps this is because being a monarch was not so

complex job as being a president today. Being aware of the challenges of today's world, we propose to introduce one more layer into the model. One, that is seeking common good – as something in between common interest and self-interest. There is no better way to answer this level as by “common meritocracy” (See Figure 1).

The traditional systems do not take into account the fact that knowledge has tremendously grown since the time of Aristotle and Plato, one of the first, besides Confucius, advocates of meritocracy. Following Wojtyła (1983), we would like to introduce the third level – the level of common good, which is negotiated through participation. Participation requires persons to act, and the act can be only based on truth. The quest for truth is thus fundamental for participation. Today, the truth seeking requires much more specialization than ever before. We may say that we are more and more dependent on trust, i.e. someone else's witnessing the truth. However, even in ancient democracy out of 350 000 inhabitants of Athens, only 6 000 actively participated in democratic processes today the numbers are much worse. Immature electorate was satisfied when governed by someone who promised to meet their needs and relieved them from responsibility. Mature electorate was ready to take part of the responsibility. Knowledge required for the responsible decision making is dispersed all across the organization. This is why depending on the kind of decision different persons from the organization should be involved in the decision making.

Vroom's participation model

Vroom's model of decision making (Vroom & Jago, 1988; Vroom, 2003) includes 11 factors which we supplemented by 12th factor not included by Vroom and his collaborators – the leader's governance competence. For the purposes of the present study, the 12 factors have been placed into three categories: (1) characteristics of the incumbent: (i) Interaction Constraint, (ii) Goal Alignment, (iii) Leaders or members' role in the process; **(iv) Competence in the Subject of the Decision; (v) Co-op Governance Competence;** (2) characteristics of the decision: (vi) Likelihood of Disagreement (vii) Likelihood of Commitment; (viii) Value of Time, (ix) Value of Development, (x) Decision Significance, (xi) Importance of Commitment. (3) characteristics of the situation: **(xii) Leader's Governance Competence, (xiii) Leader Expertise in the Subject of the Decision, (xiv) Incumbents' Team Governance Competence,(xv) Incumbents' Expertise in the Subject of the Decision**. In boldface, we have marked all factors related to competence. As it can be

seen expertise in its various aspects (both process and content) is represented in many places of the model.

Some of the characteristics are repeated in two categories as for example for an incumbent, who is not a leader, leader's ignorance in the subject matter of the decision is a situational factor. The limit of space does not allow to develop this theme in more detail here.

The substitute of the corporate model?

The main drawback of corporations that does not fit to the first ingredient of our model – personalistic character of patient-physician interaction is the fact that they are partnerships of capital, very often anonymous capital. On the opposite side, there are partnerships of persons – cooperatives. This is why we have chosen the co-operativist model as an alternative to corporate model. Analysis of the co-op values and principles (Novkovic, 2008) proves that co-operatives play a vital role in their communities where other types of organisations are forceless. We have decided to choose the multi-stakeholder co-operative as the best organizational model for the hospital or in this case a health care community, as the characteristic feature of the new form is trespassing the functions of a conventional hospital. If we used traditional distinction between political systems, hospitals are closest to oligarchy, where few individuals govern the hospital.

In the next part of the paper, we would like to show how such governance model based on dispersed agents making decisions can be used to model interactions and decision making in a hospital.

Description of the model

The description of the model will start with the description of the stakeholders. It should be noted that each group of stakeholders make one constituency. Although the model does not assume any representative bodies, the constituencies may play a practical role in personal interaction, training and possibly in a legal form of the organization. We shall shortly describe all the stakeholders of a hospital with reference to possible co-

operative form of governance specific for each group. Because of lack of space, only two groups will be described in more detail: patients and physicians. In the second part of the model description, we shall discuss the proposed process of decision making starting from initiation and ending in the final decision. In the third part, we shall propose formal description of the model allowing to develop an ICT implementation.

Hospital stakeholders in their constituencies – database of the system

LC members.

The traditional name for this group is “patients” yet etymologically the word derives from “suffering” whereas the proposed concept of the hospital assumes that there are no patients. So we should rather call this group “local community members (abbreviated LC members)” stressing the importance of location of the hospital. These are all citizens who pay a monthly insurance fee to a selected hospital and receive health care services. The services are delivered by the hospital, but if it does not have them, the hospital outsources a service with another hospital the LC member does not have to pay for them. Most of the services are provided by local day care subsidiaries of the hospital. The staff of the subsidiaries spends some of their time in hospital and some in the local centres. Here are some of the characteristics of the group: (i) Interaction Constraint. Not long time ago, it was impossible to organize a quick vote on any decision with a group of let's say 100 000 members. Now, it is just the mater of minutes. All is required is an appropriate smart phone application. However, this constraint may still be valid for elderly persons or those who have not mastered technologies well enough, an alternative form of participation should be proposed to them. (ii) Goal Alignment. The main goal of the LC member is one's own and family's health and well being. Another goal may be reducing the insurance fee. This is why the fee should be similar to the existing one and defined on the national level. (iii) Leaders' or Members' Role in the Process. Interest, access to information, interest and engagement in the functioning of the co-op, all may be variables important in this role. In some situations, LC members may want to select their representatives for a task. Such representatives are going to play the role of leaders of LC members' constituency to perform the tasks. (iv) Competence in the Subject of the Decision. The personal profile of each member should include the competence levels for different kinds of decisions. This is the point in which most democratic systems fail and lead to creation of oligarchic systems (Michels, 1968). If we want people to decide and not to be manipulated, we have to secure

them with development systems, which will increase their competence. We may think of general groups of domain-specific decision types such as: governance, medical, financial, technological, accordingly the voting constituency may be different in each case. Ideally, the competency should not only be declared, but also legitimized by some form of validation procedure. (v) Co-op Governance Competence. The whole process described here may be quite complicated. Probably not all of its features may be turned on immediately. We are not aware how much knowledge is assumed in our functioning in any bureaucratic system. Staniszkis (2003) states that we often ignore evident pathologies to secure functionality of a system. She calls this process “functionilizing pathology in a system”. The more so if the system is under probe. However, in the perspective of general criticism of those institutions the learning of the new system should be quite fast. A mature organization should also have self-repairing mechanisms. So complaint and grievance systems should be modules of the general system for each constituency.

Medical Doctors

(i) Interaction Constraint. In comparison to LC Members Medical Doctors are a small number and can meet at one place they can make decisions, which require deliberation.

(ii) Goal Alignment. Some goal alignment may be achieved if Medical Doctors are also LC Members. Depending on the stage of their professional and family status, they may be oriented either towards increasing personal profits, or increasing professional competence. Some of the factors should be defined in their individual profile.

(iii) Leaders or Members' Role in the Process. Doctors, by definition will often play the role of leaders in the treatment, purchasing, organizational, outsourcing processes thus the system should be sensitive to kind of leadership there. Some decision practice and decision correctness trail may be left in the individual profile.

(iv) Competence in the Subject of the Decision. Of course, the description provided for LC Members is valid here as well. The medical competence in this case should, however, be particularly well defined. Perhaps a system of recently popular, yet validated endorsements could play some role here.

(v) Co-op Governance Competence. The same remarks apply here as in the LC Members

description.

The lack of space does not allow to describe all stakeholders in detail, we should only remember that the hospital community will also comprise of: Nurses and Midwives, Dieticians, Pharmacists, Administration and support, Financial Officers, Social Workers, each of these groups will have specific decision making characteristics.

Database position

All the features of the incumbents shall be formalised and written into the database of all Incumbents. In case of necessity to make a decision, the system shall scan all the positions in the database.

We propose the following distinctive features regarding his or her competencies in all domains mentioned above.

Decision initiation rights

Level of general competencies:

- humane problems
- interpersonal relations
- business management

Level of specialist competencies endocrinology pharmacy

- accounting
- project management
- etc. (full list)

Organizational position

- availability
- readiness to take decisions
- age
- tenure
- membership in professional groups
- membership of a subsystem.

The functioning of the system – how decisions are made.

Now that we know the characteristics of the decision-makers and their representation in the database, we may describe the process of decision making. All problems can be divided into open and closed ones. In the former ones, one is trying to use group or individual competency to generate new possibilities and solutions. Heuristics is the domain of methods of generating solutions. Of course, many fields of knowledge such as social economics make efforts to produce new solutions like the one proposed in this paper. In the present paper, we are not dealing with this kind of problems.

The second kind of problems is related to situations when there are many possible solutions and a group or a person has to choose one. In Figure 1 we present the diagram of the determinants of the decision making process.

- - - - - - - - - - - -

Figure 1 about here

- - - - - - - - - - - -

In this kind of decisions, Vroom distinguishes five forms of decision-making: (i) individual decision without consultations, (ii) individual decision after individual consultations, (iii) individual decision after group consultations, (iv) group decision moderated by the leader, and finally (v) group decision not moderated by the leader.

Initialization

The process of decision making may be initiated only by a governing specialist, i.e. a person who knows the functioning of the system and realizes what are decision making costs. Such person should know, that certain decisions should not be considered highly important, as they may require a consensus vote, what may prolong the process of decision making. The competence of governing specialist should be given to as many as possible incumbents. Governing specialist can initiate the decision process at any time when they consider it helpful in their jobs. Of course, decision initiation rights are important impediment in total participation. This is why, there should be constant monitoring and upgrading of the rights as the competencies of the incumbents increase. In Figure 2 we describe the decision making process.

- - - - - - - - - - - -

Figure 2 about here

- - - - - - - - - - -

Describing the decision to be made

The first task of the initiator is to answer the question what is the domain of the decision. After a review of literature concerning the domains important in business, we propose the following domains:

A) humane problems – regarding universal problems related to human live and elementary values. Such issues as life and death, suffering, pain, engagement, motivation to work, life-style, conflict of interests, etc.

B) problems related to interpersonal relations. This domain should include problems of interpersonal conflicts, mobbing issues, dominance, feelings related to others, etc.

C) business domain – regarding the sales and financial issues, problem of costs and profits, marketing, public relations,

D) management domain – regarding the systems, quality issues, coordination of work, plans and strategies, time management, processes, etc.

E) specialist domain – this will include all branches of medical science as best divided by a group of specialists.

The second task is to decide about the requirements as to the decision makers.

The third task is to make choices regarding decision parameters. They include:

- costs related to the decision,
- decision significance,
- urgency – importance of time,
- likelihood of disagreement,
- likelihood of commitment,
- value of development,
- importance of Commitment.

These three tasks allow the system to give the outcome described in the section on outcomes.

The decision making requirements

The system gives three requirements:

Requirement one – how the decision should be made. Based on this scale to make the system applicable to our co-operative model, we should have the following set of outcomes.

Too early for the decision – not enough data to make decision – recommendation to work on more options or include new decision makers (e.g. outside consultants).

Decision can be made by the governing specialist after bi-lateral consultation with a selected group of incumbents, the list of incumbents is yielded by the system.

Decision can be made by the governing specialist after – multilateral consultations of chosen incumbents; in many-sided consultations the consulted can also consult one another.

Decision can be made by incumbents selected by the system, but after – multilateral consultations.

The system apart from formal description listed above may also give some additional information based on the experience and the knowledge of the system. For instance, high (vi) Likelihood of Disagreement should be preceded by educational and information campaigns. Low (vii) Likelihood of Commitment is related to (x) Decision Significance for a given incumbent. Again if (xi) Importance of Commitment is high, the decision should be well prepared beforehand. (viii) Value of Time in a hospital may have profound consequences – including the threat to someone's life. So this characteristic should be particularly well-defined and, the decision making procedure selected. In a set of decisions in Emergency Departments, the formal computer-based decision-making process may be abandoned altogether. (ix) Value of Development is always important in a system like this one, so the system should immediately signal such opportunity and compare it with cost and time involved.

Requirement two – selection of incumbents to make the decision.
The next variable of the system is the selection of incumbents to make the decision. It may be any number from 1 to the number of all members of the system.

Requirement three – required consensus level.

Depending on the decision importance the next dependent variable is the required level of consensus. We propose five such levels:

a) majority of the voting incumbents
b) majority of the incumbents selected for voting
c) consensus of the incumbents who voted
d) consensus of all selected incumbents (in reality obligatory voting).

The outcome – the decision.

Here the system after voting gives the numerical result and qualitative measure depending on the requirement three: yes – no.

Some remarks regarding formalization of the governance system by multi-agent systems.

The multi-agent systems theory (Ferber, 1999) can be a good theoretical basis for the design and implementation of such a system. The first stage of such an endeavor is to specify features and functionalities of each type of agents within the context of the Vroom's model of decision making. Then the chart of data and control flows have to be created. A multi-agent system consists of (i) agents, (ii) relations between the agents, and (iii) regulations governing the agents' activity.

Agents.

In the context of Vroom decision theory applied in the management of hospital governance, the following main types of agents can be distinguished: Physicians, LC members, Medical Support Staff, Administration, Managers, Technical Staff, etc. Each type consists of specific characteristics, which have to be properly represented in the system. For instance, physicians differ in their multiple specialisations, the level of competency and their roles in medical processes. However, nurses and midwives will be a more homogenous group in respect of their specialisations, but their interpersonal skills might be more important than those of physicians.

Relations

There are a few possible taxonomies of relations. The first relies on the number of agents participating in the relation. Eg. One to One, One to Many, Many to many, etc.

Another taxonomy relies on what is transferred in the relation between agents, e.g. Data, Commands, Services, Resource.

Regulations

Regulations are a set of external rules that govern the agents' activities. Agents can undertake actions only within the frame of these regulations. For instance a physician has to offer medical help in the threat of death. Many of the regulations are implicit, and creation of such a model will make them explicit. The regulations in the multi-agent system cannot be inconsistent in a formal system such as a multi-agent model implemented by ICT. They are very often contradictory in social systems. In this case, there are spontaneously generated methods of dealing with such contradictions. Our model will have to detect all of them beforehand. This will require a very clear description of the regulations similar to ISO norms or clinical procedures.

Choices

In a given moment the system is in a concrete state that can be described by the values of the state parameters (e.g. budget, income statement, patient satisfaction, etc.). The actual state of the system limits possibilities of achieving another state in a defined time interval. However, usually there is more than one possibility, we can choose between. For instance, if a hospital is indebted for a sum of 10 million dollars and according to economic reality, the debt may change about one million within the next month. In a month, each state between $9 and 11 million debt is possible. Each saving action decreases the debt, and each spending action increases the debt. So we have choices between possible actions.

Decision making

The need for decision always results from some disequilibrium or intention to optimize the system. Taking the decision balances or optimizes the system. The balance or optimization may be achieved by: changes in the number of agents (recruitment and dismissal), changes in the types of agents, creating new relations, erasing some existing relations, creating internal regulations. The process of decision making is the choice between possible actions. The result of decision making in multi-agent systems is an initialization of a certain algorithm according to which the system acts. In a hospital, there are millions of decisions taken each day by all the incumbents and of course, the system we are describing does not have to be engaged in them. The system performs, however, two functions. First, it makes all incumbents being aware that they take choices and decisions – they act and their actions have consequences. This function is important for participatory

purposes. Second, if they are not able to make a choice, or are uncertain about their choices, they can apply the system to assist them in the process by increasing the possible expertise, experience, etc. Probably the next time in a similar situation the system will not have to be applied. It may sound strange, but the decision making system serves the purpose of a large automated tutoring system. Of course, a detailed design of such a multi-agent system goes beyond the present paper. It is intended to be the topic of the next paper.

Common meritocracy – Healthcare community as one multi-agent cooperative.

Traditionally, it is hardly possible for us to imagine a mixture of worker, consumer and producer cooperatives as a single organization. People's roles, structural positions and first of all, temporal and mental engagement are so deeply different. The task is hard because we are accustomed to hierarchical organisations or matrix organisations, which can hardly account for variability natural for the human kind. Even the traditional and contemporary meritocratic systems and organisations seem very elitist. Whereas, we propose a meritocracy for all. Because everyone is competent in something related to health. New technologies but also new requirements make these hierarchical forms outdated. A volunteer, a retired doctor or patient's family are not present in any hospital's organizational charts, not to mention decision making and taking processes, although they can play a vital role in all aspects of the hospital functioning. This is why we propose a flexible cluster organization, where roles, activities and rights to vote are predesigned not by artificial label or formal membership but by competence or other merits – including common sense. As it was shown by Csikszentmihalyi (2000) in his motivational research, engagement (flow) was the function of competence, task difficulty and feedback. All three are increasingly applied in a variety of Internet tools. This is why the generation of present teenagers will be naturally prepared for using the same tools in more important aspects of their lives such as health care. All the variables described above require quite a complex multi-agent system model. Though the system seems to be complicated and may require demanding software architecture its practical use may be very easy and give real power to all stakeholders of a co-hospital as described here. This is why in this paper, we make the first attempt to describe such a model.

References

Bielecki, A. & Stocki, R. (2010). Systems Theory Approach to the Health Care Organization on National Level. *Cybernetics and Systems: An International Journal, 41, 7,* 489-507.

Bogue, R. J., Hall, C. H., & La Forgia, G. M. (2007). Hospital Governance in Latin America. Washington DC: World Bank, 536-

Bramball, S. J. (2012). 21st Century Revolution. Dr Stuart Jeanne Bramhall.

Buetow, S. (2013). Medical professionalism requires that the best interest of the patient must always come first. Journal of Primary Health Care, 5, 1, 76-77.

Bui, T. & Lee, J. (1999). An agent-based framework for building decision support systems. *Decision Support Systems, 25, 3,* 225–237.

Burns, L. R., Andersen, R. M., & Shortell, S. M. (1989). The impact of corporate structure on physician inclusion and participation. *Medical Care, 27,10,* 967-982.

Crosby, J. F. (2004). Karol Wojtyła on treating patients as persons. In Tollefsen, C. (Ed.) *John Paul's II Contribution to Catholic Bioethics,* 151-168.

Csikszentmihalyi, M. (2000). *Beyond boredom and anxiety*. Jossey-Bass.

DiMaggio, P. J. & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organisational fields. *American Sociological Review, 48*, 147-160.

Graham, B. S. & Titus, P. S. (Eds) (1979). The amazing oversight: Total participation for productivity. New York, NY: ANACOM.

Gray, B. H. (1997). Trust and trustworthy care in the managed care era. *Health Affairs, 16(1),* 34-49.

Hajiheydari, N., Khakbaz, S. B., & Farhadi, H. (2013). Proposing a Business Model in Healthcare Industry: E-Diagnosis. International Journal of Healthcare Information Systems and Informatics (IJHISI), 8, 2, 41-57.

Hock, D. (2005). One from Many: VISA and the Rise of Chaordic Organization.

Berrett Koehler Publishers, Inc.

Istepanian, R., Laxminarayan, S., & Pattichis, C. S. (Eds) (2006). M-health: emerging mobile health systems. Berlin: Springer.

Edmonds, B. & Meyer, R. (eds.). (2013) *Simulating Social Complexity: Understanding Complex Systems.* Berlin: Springer-Verlag.

Eecklooa, K., Van Herckb, G., Van Hulleb, C. & Vleugelsa, A. (2004). From corporate governance to hospital governance. Authority, transparency and accountability of Belgian non-profit hospitals' board and management. Health Policy, 68, 1, 1-15.

Eldenburg, L., Hermalin, B. E., Weisbach, M. S., & Wosinska, M. (2004). Governance, performance objectives and organizational form: evidence from hospitals. Journal of Corporate Finance, 10(4), 527-548.

Ferber, J. (1999). *Multi-Agent System: An Introduction to Distributed Artificial Intelligence.* Harlow: Addison Wesley Longman.

Fornara, N., Cardoso, H. L., Noriega, P., Oliveira, E., Tampitsikas, C., & Schumacher, M. I. (2013). Modelling Agent Institutions. In *Agreement Technologies* (pp. 277-307). Springer Netherlands.

Frączkiewicz-Wronka, A. (2006). Relacje sieciowe i ich wykorzystanie w zarządzaniu publiczną ochroną zdrowia. Współczesne Zarządzanie, (4), 84-96.

Mazur, M. 1966. Cybernetic theory of autonomous systems. Warsaw: PWN. (in Polish).

Michels, R. (1968). *Political parties*. Taylor & Francis.

Novkovic, S. (2008). Defining the co-operative difference. *The Journal of Socio-Economics 37*, 2168–2177

Olfati-Saber, R., Fax, J. A., & Murray, R. M. (2007). Consensus and Cooperation in Networked Multi-Agent Systems. *Proceedings of the IEEE 95, 1*.

Pandey, R., & Sekhar, K. V. (2013). From e-Governance to m-Governance—The Way Forward. In: Bhatt, N. & Aggarwal, A. (Eds). E-Governance Techno-Behavioural Implications. www.excelpublish.com, 117-128.

Puranam, P. & Raveendran, M. (2013). Interdependence and organization design. In: Grandori, A. (ed). *Handbook of Economic Organization: Integrating Economic and Organization Theory.* Edward Elgar Publishing (p. 193-209).

Savage, G. T., Taylor, R. L., Rotarius, T. M., & Buesseler, J. A. (1997). Governance of integrated delivery systems/networks: a stakeholder approach. Health Care Management Review, 22(1), 7-20.

Schlieter, H., Juhrisch, M., Dietz, G. and Esswein, W. (2012). Governance in Hospitals - The Case of Business Process Alignment. AMCIS - 2012 Proceedings. Paper 30.

Seckin, G. (2010). Patients as Information Managers: The Internet for Successful Self-Health Care & Illness Management. *Open Longevity Science, 4,* 36-42.

Silverman, E., & Skinner, J. (2004). Medicare upcoding and hospital ownership. *Journal of Health Economics, 23, 2,* 369-389.

Staniszkis, J. (2003). *Władza globalizacji*. Scholar Books.

Stocki, R & Bławat, A. (submitted). Are complexities of implicit organizational theories related to development and adaptive ability of organizations? The concept of responsibility in the cognitive maps of employees of three hotels in Poland.

Stocki, R., Prokopowicz, P. & Żmuda, G. (2012). *Pełna partycypacja w zarządzaniu. 2nd edition.* Warsaw: Wolters Kluwer.

Strull, W. M., Lo, B., & Charles, G. (1984). Do patients want to participate in medical decision making? *JAMA: The Journal of the American Medical Association, 252, 21,* 2990-2994.

Sun, R. & Naveh, I. (2004) Simulating organisational Decision-Making Using a Cognitively Realistic Agent Model. *Journal of Artificial Societies and Social Simulation 7, 3*

Tabish, S. A. (2012). Healthcare: From Good to Exceptional Governance. *JIMSA, 25, 3,* 147-149.

Vaughn, D. (1999). The dark side of organizations: mistake, misconduct, and disaster. *Annual Review of Sociology, 25,* 271-305.

Verma, V. (2013). Current Status of E-Governance in Hospitals. International Journal of Science and Research, 2, 4, 256-259.

Vroom, V. H. (2003). Educating managers for decision making and leadership. *Management Decision, 41(10),* 968-978.

Vroom, V. H. and Jago, A. G. (1988). *The New Leadership: Managing participation in organizations.* Englewood Cliffs, NJ: Prentice Hall.

Weiner, B. J., & Alexander, J. A. (1993). Corporate and philanthropic models of hospital governance: a taxonomic evaluation. Health Services Research, 28(3), 325-355.

Winters, J. A. (2011). Oligarchy. Cambridge: Cambridge University Press.

Wojtyla, K. (1979). The Acting Person, trans. by Andrzej Potocki. Dordrecht: D. Reidel

Wright, J. S., Dempster, P. G., Keen, J., Allen, P., & Hutchings, A. (2012). The new governance arrangement for NHS foundation trust hospitals: Reframing governors as meta-regulators. *Public administration, 90, 2,* 351-369.

Figures

Figure 1. Upgraded categorization of political systems.

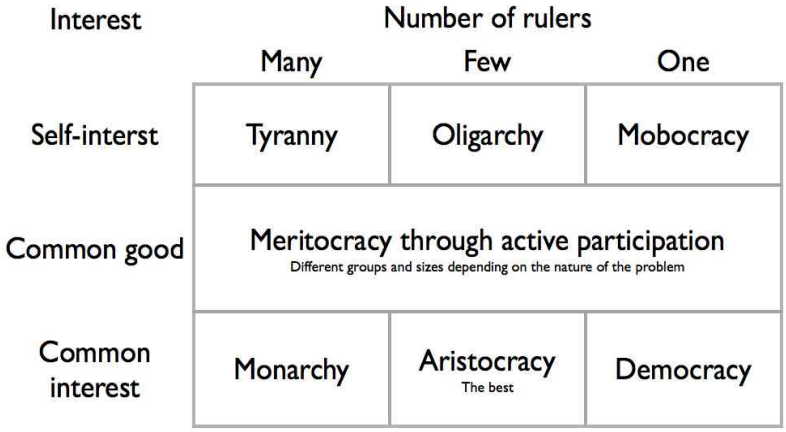

Figure 2. Determinants of meritocratic process.

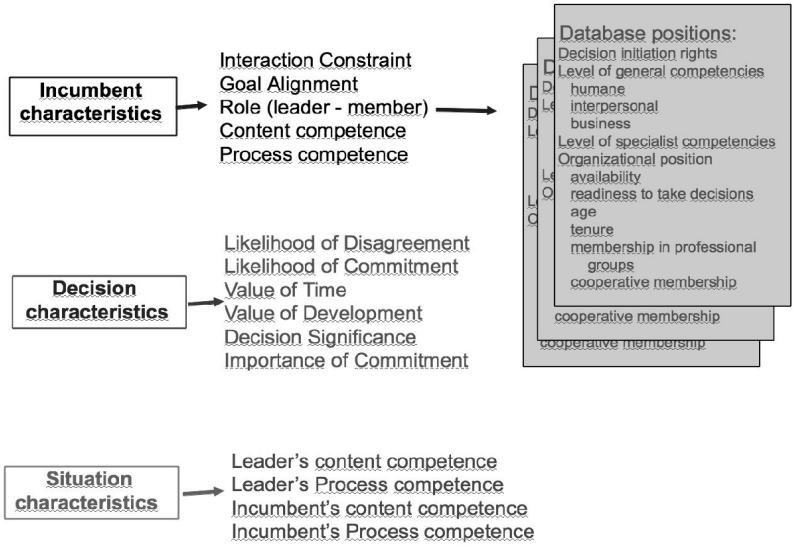

Figure 3. Meritocratic decision making process.