Research and Theory

The meaning of integrated care: a systems approach

Lars Edgren, PhD, *Professor of Health Management, Nordic School of Public Health,* **Göteborg, Sweden**

Correspondence to: Lars Edgren, The Nordic School of Public Health, PO Box 12133, SE-402 42 Göteborg, Sweden, Phone: +46 31693918. E-mail: lars.edgren@nchsa.se

Abstract

Introduction: Organizations can be regarded as systems. The traditional model of systems views them as machines. This seems to be insufficient when it comes to understanding and organizing complex tasks. To better understand integrated care we should approach organizations as constantly changing living organisms, where many agents are interconnected in so-called Complex Adaptive Systems (CAS).

Theory and discussion: The term "complex" emphasizes that the necessary competence to perform a task is not owned by any one part, but comes as a result of co-operation within the system. "Adaptive" means that system change occurs through successive adaptations. A CAS consists of several subsystems called agents, which act in dependence of one another. Examples would be the ant-hill, the human immune defence, the financial market and the surgical operating theatre team. Studying a CAS, the focus is on the interaction and communication between agents. Although these thoughts are not new, the CAS-approach has not yet been widely applied to the management of integrated care. This helps the management to understand why the traditional top down way of managing, following the machine model thinking, may meet with problems in interdependent organizations with complex tasks.

Conclusion: When we perceive health and social services as CASs we should gain more insight into the processes that go on within and between organizations and how top management, for example within a hospital, in fact executes its steering function.

Keywords

integrated care, complexity science, complex adaptive systems, self-organization, successive adaptation, complex tasks

Introduction

Background

In all well developed societies there tend to be barriers between different organizations and different professions, even when those professions want to co-operate to help individuals to satisfy their needs. People with different kinds of knowledge are still kept well apart [1]. Health and social services today face groups of patients who have composite problems and are often unstable. They include, very obviously, elderly persons with multiple problems, chronically ill children, and persons suffering mental ill-health. They have continuing need of care and in search of care they move between primary care, hospital care and municipality care, such as that provided for elderly persons [2]. Their situation demands some form of integration between health and social services [3–5], the benefits of which have been identified as including reduced hospital use, a strong focus on prevention and keeping patients healthy, and the provision of care closer to home [6]. From the perspective of the person seeking care, medical and social needs are connected. Individuals do not see themselves as 'multi-ill', but as needing support for their needs as they know them [7]. It must be said that from the 1970s onwards a number of integrative approaches have been tried out, not least in education. Although there are exceptions to learn from, generally speaking European health and social services are fragmented and poorly equipped to take care of patients with composite needs [8]. So far, and to a great extent, the task of integrating different delivery systems, of managing the transitions from one provider to another, has fallen on the shoulders of patients themselves or their relatives [2]. Much of the evidence indicates that the problem we face is a result of the prevailing mindset [9].

Problem statement

How can we increase our understanding of health and social services that are located in different organizations?

Theory and discussion

Lindberg [10] observed examples of meaningful co-operation at the local level, with colleagues from different organizations meeting and pooling their knowledge of local conditions with the patient or user as the focal point. The phenomenon has been variously called the chain of care, integrated care, seamless care or shared care [11]. This co-operation aims at creating a continuing relationship with the patient/user regardless of who at a given moment is the responsible provider. Edgren and Stenberg [2] found these practical attributes of co-operation in CASs:

- A common task is shared among the co-working agents.
- Collaboration is in people's minds, it is instinctive behaviour.
- Each actor's capabilities are known and respected.
- A combination of monetary and non-monetary incentives exists in order to create lasting mutually acceptable solutions.

According to Brommels in his presentation to the EHMA-conference 2006, the CAS approach means, among other things:

- Identifying and supporting constructive relations between agents within the system – and understanding tensions and conflicts.
- Avoiding strict definitions of roles and concentrating on agreed actions.
- Giving agents their freedom to organize current activities [12].

If we are to improve our understanding of how a health or social service provider functions as an integrated part of a locally driven health and social service system, we need an innovative, in terms of changing practice, model to guide our thinking. Traditional models view systems as machines. Instead, we could approach them as constantly changing living organisms. This is the importance of Complexity science [13]. It helps us understand what happens in dynamic living systems, where many agents are interconnected. In order to make clear its significance let us first recapitulate the machine model.

The machine model thinking

For a long time effective organizations have been looked upon like well-oiled machines. The machine has a constructor, the top manager, who describes the integral parts and how they are supposed to co-operate [14]. Hospitals and other health services organizations are usually designed to function according to principles of scientific management [15, 16]. Rationality, objectivity, stability and predictability are the terms we associate with this approach. Rationality, for example, requires that all integral parts act on perfect information, have the same background and similar values and work towards the same goals, and that there is a system designer, the top manager, who is from outside the system [17]. Change is seen as a linier and predictable process, controlled by top managers and carried out by works managers. Plans are made and are to be followed, and the intended change, takes place as a direct consequence. If problems do arise during the implementation of change, then *either* there is wrong expectations *or* there is an inability or refusal to take prescribed action [18]. They are then often met with new rules, regulations, and restrictions. The change takes time and energy and the outcome is difficult to take in. When political decisions setting precise goals are centralized and detailed rules are laid down and lines of action specified, and when there is constant top-down monitoring and assessment, there is a very real risk of destroying capacity and motivation at the so-called 'lower' level, the operational level. And then, when the unforeseen happens, the whole system breaks down, because there is no readiness or capability to adapt – all 'solutions' have been pre-programmed beforehand [19]. From this we learn that when there is no motivation to renew the system, when there is an inability to innovate, the survival of the system is threatened. We need another model.

If health and social service providers are to meet changing demands and expectations from patients or users, they must be able to move quickly to find mutually acceptable, *locally* developed forms of integration at their points of intersection, that is, where their separate services should be coming together [2]. Instead of theories assuming cause and effect linkages between separate details, we need theories to deal with *patterns and principles* [20].

Complex adaptive systems (CASs)

A few years ago concepts such as the knowledge society and learning organizations, and the associated mechanisms and technologies – the Internet, e-mail, mobile phones and digital imaging – were all unknown. Davis [21] coined the expression "Any time, any place" when he describes how time and space restrictions have been nullified. This has given us enormous possibilities to communicate, to become connected, to network. As we advance in the "knowledge society", the basic assumptions behind much of what is taught and practiced in the name of management are now hopelessly out of date.

Indeed, most of our assumptions about organizations are at least fifty years old [22]. So why turn to Complexity science and to Complex Adaptive Systems (CAS)?

According to Zimmerman et al. [23] they provide an alternative to traditional management principles, that is they offer *patterns and principles* whereby we can better act in an increasingly complex world [24], as when we attempt to harness health and social care and other services to meet the particular needs of the individual. In such a way complexity science can serve as a sense making tool. It also enables us to develop locally adapted solutions in order to manage complex tasks, such as we find in advanced home health care. Complexity science is the latest generation of systems theory. Complexity can be expressed as the amount of information needed to describe or understand something [25]. And an important part of complexity science is the Complex Adaptive System (CAS). The term "complex" emphasizes that the necessary competence to perform a task is not owned by any one part, but comes as a result of co-operation within the system. "Adaptive" means that system change occurs through successive adaptations.

A CAS consists of several subsystems called agents, which act in dependence of one another [25]. They are *inter*dependent. They may either compete or co-operate according to their sense of their interests and what will bring them an advantage. Complex Adaptive Systems are distinguished by *self*-organization. Self-organization is about creating order or increasing the regularity of the system *without help from the outside.* Good examples would be the ant-hill, the human immune defence, the financial market and the surgical operating theatre team.

The CAS research area is intense, and notably inter- and multi-disciplinary. Important work has been carried out at the New England Complex System Institute and the Santa Fe Institute and elsewhere. Researchers in chemistry, physics, biology, medicine, anthropology economics, and sociology have been asking fundamental questions about living systems, living systems that are not fixed, but change, grow, heal up, adjust, renew and develop organically [23]. Prominent figures in the field include Nobel Laureates Ilya Prigogine in chemistry [26, 27] and Murray Gell-Mann in theoretical physics [28]. Within medicine we find Paul Plsek and Trisha Greenhalgh [29]. Within biology we find Stuart Kauffman [30, 31] and physics Russ Marion and Mary Uhl-Bien [32].

According to Augustinsson [24], one way to explain the phenomenon of complexity is by reference to the possibility to apply routines to carry out a particular task. The more a task is characterized by regularities the more we can think in terms of applying routines.

When everyday work is characterized by both regularities and irregularities, by a mix of the predictable and the unpredictable, then we have the highest degree of complexity.

Although more research is needed to achieve greater understanding of Complex Adaptive Systems and to strengthen the knowledge base for action [33], we do have a growing number of examples that show the CAS concept gaining ground within the health and social services.

The agents see the point, because they create order out of many local interactions. All this is done without directives or detailed guiding principles from above.

Complexity science offers new ways to understand how complementary knowledge organizes for co-operation. We can regard integrated care partners as partners in a *common* system and we can regard them logically as agents in this system. Emergency treatment is a clear example of independent agents interacting locally with other independent agents. Each agent has a task and a simple set of rules to follow [34]. Another example comes from elderly care where the CAS concept has been applied to secure agreement between politicians and civil servants [35]. The objective was to identify how local politicians and managers understand problems and goals regarding the structures and processes involved in the care of the elderly. A common vision, easy to understand and to communicate, was created to connect the two groups.

Characteristics of a CAS

Every Complex Adaptive System is unique, shaped and influenced by its past [17]. It shows a complicated web of relations between agents within and outside the system. There is no external constructor, no superior centrally located source to govern the design of the system [36]. When we study a CAS, the focus is on the *interaction* and *communication* between agents [37]. Rewriting the old cliché, that the whole is greater than the sum of the parts, the whole is the *relations* between the parts. Whether between two persons or between human being and machine or between machine and machine, it is the intensity of relations that determines the complexity of the system, the constant change, adaptation and development of the system, which will be in an unforeseeable non-linear way [24]. Today's information technology eases interaction and communication. Digital imaging as a diagnostic technology brings together the specialist radiologist and the primary practitioner treating the patient in a way that was virtually impossible previously. And thereby generate new possibilities of professional interaction and patient involvement as well as new forms of inter-organizational collaboration.

Complexity science emphasizes the inherent power of development and self-organizing nature of the system [38]. Order, innovation and progress arise naturally from interactions within a CAS. They do not need to be prescribed from "higher" levels or from the environment [29].

Change cannot be forced from above. Agents are intelligent. As they experiment and gain experience, agents learn and change their behaviours accordingly. Therefore, overall system behaviour inherently changes over time [39]. Attempts from above to reduce the complexity of the system in order to gain control, are often counterproductive [40]. In practice we assume that any provider's top down attempt at specifying tasks will risk more complexity for the patient. Such top down attempts are usually made in order to make it simpler for the provider – not the person seeking care. Working in isolation – the burden of coordination passes to the patient.

When we address a given community's health and social problems, the process is *local*: both in intelligence gathering, using multiple local sources to build up the knowledge base for action, and in connecting all those locally based agencies/institutions and individuals with competence to do something about them [2]. One important aspect of Complexity science is that it has shown how complementary knowledge organizes for co-operation.

We must also note a number of other features of a CAS. First a CAS develops in interplay with its environment [13]. Later studies of CASs have emphasized how the interplay between the environment and the system results in a sort of co-development, whereby each influences the other. Next, boundaries exist between different agents in the system. Boundaries are neither good nor bad but parts of the system that generate communication [41]. Thirdly, individual agents can at the same time be parts of several systems [29]. So, for example, a hospital inpatient can at the same time be a part *both* of the hospital system *and* another system at his workplace.

Feed-back loops are also important. These function as triggers for change in CASs. Feedback loops can enhance or buffer changes that occur in a system. Positive feedback loops enhance or amplify changes and tend to move a system away from equilibrium stage. For example in general terms, there is a positive feedback loop between income and consumption in an economy. The bigger the income of the individuals, the more the whole population consume, which further increasing their income as individuals. Negative feedbacks tend to dampen or buffer changes and hold a system to some equilibrium state, like a thermostat in a fridge [17]. These loops are carriers of information, material and energy between the agents of the system, and facilitate the adaptability of the entire system [41]. In complexity science positive and negative feedback are both seen as important. When complexity is at its greatest, the system contains both types of feedback [24].

Management and control in a CAS

There is not much sense in agents spending time separately on detailed planning since the functioning of the system is a result of their interactions [35]. Instead Holden [33] talks about "direction without directives". It has been found that for purposes of fostering connectivity among diverse agents, effective coupling of structures, ideas and innovations, and ensuring that they are neither too loose nor too tightly interdependent, complex systems are better led by indirect than by direct leadership behaviours [32]. Indirect leadership is to be understood as influencing by being a role model.

The CAS approach helps agents to see themselves as co-workers, part of an innovative team with great potential. With their local knowledge of needs, they are so much better placed to act than any centrally located management ever could be. They sense that they have control over their own work situation, perhaps the most important change needed to create "the good workplace". In this way we see that the CAS approach satisfies the fundamental human need to participate, to have a feeling of solidarity, to be part of a greater whole [42].

Criticism of the CAS approach

General criticisms of the CAS approach coming from practitioners concern a lack of recommendations as to how they should behave being part of a CAS. Some theorists would claim that CAS is nothing but the emperor's new clothes. Others may argue that this is only one of several possible approaches to promote integrated care.

Let us refer to some problems that have been raised. Communication- and co-ordination conflicts among participating agents, or rather free riding agents, have been noted. A certain level of system inertia may also develop over time [43]. To learn to use a different approach to organizing may mean insecurity and risk similar to being expected to accept new technology [44]. Seen from a staff perspective the CAS approach may mean increased insecurity, greater responsibility, more decision-making and more elements of risk management [18]. The CAS approach raises some ethical concerns that refer to decision making that can neither be supported by science nor by objective criteria. First this is due to the nature of the system which is determined by the sum of choices made in it. Secondly, when there

appears to be no simple final objective or calculable ground for our decisions, we cannot shift the responsibility for the decision onto something or somebody else – "don't blame me; the genetic algorithm said we should sell!" We *know* that all our choices to some extent represent a step in the dark, and therefore, we cannot but be responsible for them [45]. No technology can remove responsibility from the decision maker to make choices. But the CAS approach lays out the considerations to be taken into account more clearly than the alternatives.

Conclusion

When the competence necessary for carrying out a given task does not lie within one individual provider organization, co-operation between agents within the system comes into play to discharge that task. CAS is a sense making tool offering patterns and principles guiding such cooperation. We are no longer talking about the individual organization/agent but shaping overall workable solutions taking a patient/user perspective. This applies to matching care with the needs of different patient groups and of individual patients.

The CAS approach helps the management to understand why the traditional top down way of managing may meet with problems in organizations with complex tasks. There is a different steering logic compared to traditional systems. An important discussion is about how the top management in fact executes its steering function. Leaders may consider accepting complexity instead of trying to reduce it, formulate few simple and concrete goals, communicate and give feedback and measure performance. When we perceive health and social service organizations as CASs we should gain more insight into the processes that go on within and between organizations.

Are we willing to face the interdependence between health and social services, the dependence on collaboration to deliver appropriate integrated care? If we do, complexity science could be an important step towards fresh thinking in order to fulfil our patients' and users' presently unfulfilled needs.

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Reviewers

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