

# Four Methods for Describing Systems with Examples of How Management is Changing in the U.S. and Russia

**Tatiana A. Medvedeva**

Department of World Economy and Law  
Siberian State University of Transport  
Novosibirsk, Russia  
email: mta@stu.ru

**Stuart A. Umpleby**

Department of Management Science  
The George Washington University  
Washington, DC 20052  
email: umpleby@gwu.edu

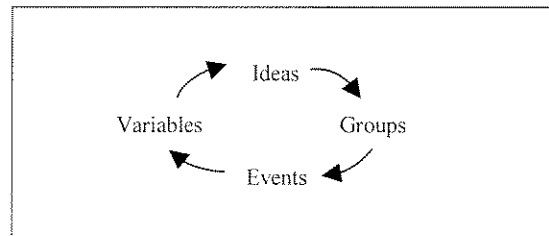
## Abstract

The various disciplines have adopted different methods for describing systems. Some disciplines describe systems as sets of interrelated variables (e.g., physics, economics). Some disciplines describe the behavior of a system in terms of a sequence of events (e.g., history, computer science). Some disciplines look at systems as collections of groups (e.g., political science, sociology). Some disciplines focus on ideas that influence behavior (e.g., psychology, cultural anthropology). When dealing with a complex system, all of these methods can be used to create a richer description of the system of interest. This paper provides two illustrative cases. The first case is the adoption of quality improvement methods by managers in the U.S. The second case is the change in management methods in Russia following the breakup of the Soviet Union.

## 1 Methods for Describing Systems

Scientific fields have adopted quite different ways of describing the systems they study. Some disciplines describe a system as a collection of variables. Some disciplines define sequences of events. Some disciplines think of systems as composed of groups of people. Some disciplines focus on ideas or beliefs or values. Efforts to change a system usually require using more than one descriptive method. For example, people study a current system (described in terms of variables) and try to devise a new, better way of doing things (an idea). They then seek to convince others to adopt the idea. Often they must assemble a winning coalition (groups). Eventually the idea is put into practice (an event) and has some effect on the behavior of the larger system (described in terms of variables). Another new idea is then devised. See Figure 1. The long-term evolution of a social system can

therefore be described as a “dialogue” between ideas and events. New ideas bring about fundamental changes in the social system. These changes lead to new ideas, etc. For an example involving economic theories see Umpleby [1990]. Although disciplines tend to emphasize one way of describing systems, a richer description of a social system results when more than one method is used. [Umpleby, 1997] Multi-disciplinary descriptions of social systems are less likely to leave out important considerations.



**Figure 1. A model of social change using four methods for describing systems**

Explicit attention to conceptual systems, or to beliefs and values, is not a new development within the social sciences, but in some fields, such as economics, there has been a tendency to assume that the beliefs of individuals do not matter or at least cancel out. The neglect of beliefs and values in some social science disciplines may be traceable to a desire to emulate the physical sciences. In the physical sciences statements may describe causal relations, but they do not alter them. As the social sciences mature, new methods, appropriate to the phenomena being studied, are being developed.

1. Variables: Probably the most highly regarded approach within the scientific community is to define a system as a set of interrelated variables. Such an approach lends itself to quantification and measurement, to statistical analysis, to building deductive theories, and to computer simulation. In economics commonly used variables are per capita income, savings, investment, and

gross national product. Variables used by demographers include mortality and fertility rates and total population. When describing a system in terms of variables, the structure of a system is described by the relationships among the variables, ideally presented in the form of equations. The equations can be tested against data using various statistical methods. The behavior of the system is described by the changes in the values of the variables over time. Variables provide “dashboard” indicators describing the state and behavior of a system.

2. Events: Not all systems can easily be described in terms of measurable variables. Some systems are described by a sequence of events or states. Computers are programmed using a sequence of instructions, and programs are “debugged” by stepping through the sequence of states generated by the program. The history of a country is usually related as a sequence of major events. In family therapy a problematic pattern of interaction between two partners is often presented as a recurring sequence of events.

3. Groups: Social systems are often described as being composed of different groups of people. Each group has a history and a set of shared interests or goals. Groups, such as political parties, form coalitions to advance their interests relative to other groups. Game theory is one way of describing the strategies that individuals and groups adopt to achieve their ends. Groups can be defined by profession, income, education, organizational membership, and/ or beliefs and values.

4. Ideas: One feature of complex social systems is that different individuals and groups are playing different games. They not only have different goals, they live in different conceptual worlds. One way to compare the different ways that individuals or groups think is to list the key beliefs, assumptions or values which make up two or more “conceptual systems” in a table.

Usually authors will choose to emphasize one of these four methods for describing a system. However, it is possible to make connections among the four methods. Variables measure certain features of a system, for example the unemployment rate and the inflation rate. Events can be defined by the specific values of the variables used to describe a system. For example, a recession could be defined as a period during which the growth rate is negative and unemployment is high. A boom could be defined as a period during which the growth rate is positive and unemployment is low. A sequence of events constitutes a description of the behavior of a system. Groups can be regarded as the major actors within a social system. Their behavior determines the sequence of events. Individuals and groups act out their beliefs and values, which are shaped by their experiences and their conversations with each other. These four methods can be viewed as a way of

operationalizing Karl Mueller’s epigenetic theory. [Mueller, 1998]

As we move from variables to events to groups to beliefs, we move from measuring aggregate human behavior to examining the beliefs and values which shape or justify behavior. As we move closer to the rationalizations of human behavior in ideas, we move closer to being able to influence human behavior through communication and conversation. In some sciences there has been a change over time from describing systems in terms of variables, then states, then groups, and finally conceptual systems. For example, in management science the tools of operations research, developed during the 1940s, were concerned with building mathematical models. Interest in systems analysis led to creating flow charts, which are sequences of events. Organizational behavior focused attention on groups and organizational politics. A concern in recent work has been with designing a conversation and then leading a group through the conversation [Umpleby, 1994]. We present two examples to show how these four methods can be used to describe change in a complex system.

## 2 How Management is Changing in the U.S.

The first example is the adoption of quality improvement methods in the US. Since 1980, when the NBC documentary, “If Japan can, why can’t we?” was shown in the U.S., organizations have undertaken a major change in management practices. One executive described quality improvement methods as the third industrial revolution, following Eli Whitney’s invention of the concept of replaceable parts and Henry Ford’s invention of mass production methods. [NBC News, 1980] Figure 2 shows the differences between the old and new ways of thinking among managers.

Old Thinking	New Thinking
Motivate people	Remove barriers
Who is wrong?	What is wrong?
Define responsibilities	Define procedures
Watch bottom line	Watch quality
Measure people	Measure systems
Define job	Define customer
Fix deviations	Reduce variability
“Obey orders”	“Improve things”
Individual rewards	Team rewards
Monetary incentives	Praise, recognition and gain sharing

Figure 2. How an emphasis on quality is changing management ideas in the US

Figure 3 describes the people in organizations who are usually in favor of adopting the new management system and those who are opposed. Usually the greatest opposition comes from middle managers, since workers are trained to make many of the decisions that managers once made.

In favor of change	Opposed to change
People new to the organization	Those whose jobs involve administering the old system
Quality improvement consultants with new knowledge	Managers who believe the old system is based on sound psychology
High-level managers who want to reduce costs	Workers who believe the current system is inevitable and do not want to be bothered
Those who see some personal benefit	Middle managers who fear being laid off

**Figure 3. Groups that favor and oppose the new way of managing**

Figure 4 describes two sequences of events. On the left, in the old system, a new idea is often not adopted, because the person who proposes it does not have sufficient resources to bring it to fruition. On the right, in the new system, a new idea is much more likely to be adopted. The person who proposes it is then recognized and rewarded. New ideas are evaluated on the basis of cost effectiveness, aesthetics etc. The energy for implementation is provided by all members of the organization.

Old System	New System
Someone has an idea	Someone has an idea
The person tells his or her department head	The person takes the idea to a quality improvement committee
The department head tries to be supportive and tells the person to go ahead	The committee considers the idea and replies or asks for clarification
The person must now convince all relevant people to act on the idea, but the idea is a personal interest, not a department initiative	If convinced, the committee and the entire organization work to implement the idea
The person runs out of steam and becomes discouraged. He or she learns to accept things as they are	The person is recognized and publicly praised
New ideas come to be viewed negatively, as a drain on personal energies	New ideas come to be viewed positively, as an enhancement of the organization

**Figure 4. Sequences of events in the old and new management systems**

Figure 5 describes a similar process as in Figure 4, except in terms of variables rather than events. If there is no process improvement team, new ideas are not implemented and customer satisfaction, revenue, profits, salaries, and employee satisfaction do not grow. If there is a process improvement team, new ideas are implemented and customer satisfaction, revenue, profits, salaries, and employee satisfaction all increase. The addition of quality improvement teams changes two negative feedback loops into two positive feedback loops.

### 3 How Management is Changing in Russia

A second example of how the four methods can be used in describing a complex system is the recent changes in management in Russia. Russia is currently moving from a command economy to a market economy. This transition is occurring within a general crisis: a crisis in the political system, the economic system, and the cultural system. The transition is occurring on several levels: on the level of society, on the level of organizations, and on the level of individuals.

Management practices in Russia are changing from the authoritarian management of the former Soviet Union to more market-oriented management practices. [Rapoport, *et al.*, 1993] Several trends are now occurring. Old, authoritarian style managers are being replaced by younger, more flexible managers. Russian workers are struggling to adapt to new practices at work. And Russian managers are searching for management practices that combine Russian culture and Western efficiency. How Russian management is changing can be described in terms of ideas, groups, events, and variables.

Figure 6 describes some of the basic beliefs in the Soviet style of management and contrasts them with beliefs in the market style of management. It is possible

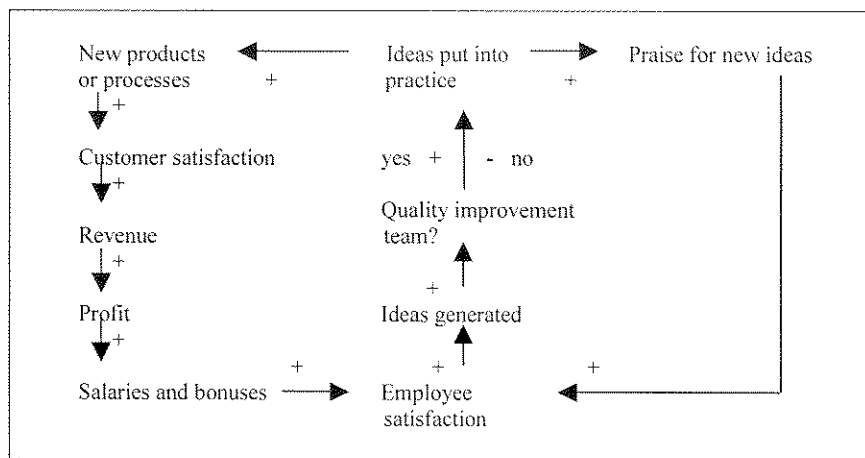


Figure 5. How the old and new systems can be described in terms of variables

to find both styles of management in Russia today. Most Russian firms use a mixture of these two styles. There are many Russian managers who use a strict Soviet style

of management in their organizations while doing business in the new conditions. The stress of the time of transitions makes an authoritarian style of management

Old Soviet System	New Russian System
Supply is more important than demand	Demand is more important than supply
Managers strive to control resources	Managers strive to increase demand
Barter is used to exchange excess resources for desired goods. In the early transition economy barter was used to avoid cash transactions and hence taxes	Tax rates should be low enough that individuals and companies will pay them rather than avoid them
Workers wait for bosses to decide	A market economy requires that those who work in a process continually strive to improve the process
A mistake leads to someone being blamed and punished	A mistake leads to the process being redesigned so the error does not occur again
The "external environment" is a ministry planning office and several suppliers	The "external environment" includes government regulations, competing firms, independent labor unions, consumers, and residents who live near factories
Managers do what is good for their boss	Managers do what is necessary to be successful in the market
Employees do what they are told but do not exercise initiative	Employees exercise initiative, innovate
Business is based on personal relations	Business is based on market and professional relations
Charismatic, personal leadership	Lead by organizing and by defining a vision and mission for the organization
Authoritarian style of management	Creativity and flexibility in management
Treat employees as interchangeable parts	Treat employees as highly skilled knowledge workers who know the company, its history and its capabilities
Pay workers as little as possible	Provide salaries and benefits that make employees loyal, highly skilled and highly motivated
Family relationships in organizations	Business relationships in organizations
Maintain traditions	Deliberately create the desired organizational culture

Figure 6. Ideas underlying the old and new management systems in Russia

tempting. But a more democratic style is more compatible with developed market economies and more suited to international competition. The transition from the old to the new style of thinking is not complete. There is great variety in thinking among people and confusion in the minds of many.

Figure 7 describes the people who are in favor of changes or opposed to changes. Usually young people, who grew up during the time of radical political, social and economic reforms in Russia and who received a new education in Russia or abroad, support the change in management practices. The older generation, whose ideal was socialism, feels disoriented, disappointed and opposed to changes. Often middle managers are opposed

In favor of change	Opposed to change
Younger generation (less than 30)	Older generation (older than 60)
Managers with new knowledge	Workers and managers who believe in the old system
High level managers	Mid level managers
People who can find personal benefits in the new system	Workers and managers who lose something because of the changes

**Figure 7. Groups who favor and oppose management changes in Russia**

to changes just because they have to introduce the new style of management in the old system and face extraordinary difficulties in reorganizing and in training workers.

Figure 8 describes the main sequences of events during the time of transition in Russia.

Figure 9 shows a positive feedback loop that is driving change in management in Russia. All of the arrows are positive. As quality improvement methods are used more and more, employees receive training, competition for skilled workers increases, salaries rise, consumer spending increases, demand for high quality goods and services increases, etc. For a comparison of the U.S. and Russian economies in the early 1990s described in terms of variables and causal influence diagrams, see Umpleby and Makeyenko [1996].

Attempting to move Russian managers from a Soviet style of management to a more international style of management encounters several obstacles. Some of these are:

1. Favoritism in hiring. There is a tendency to hire people who are family members or friends rather than the people who are the most qualified for the job.
2. Equal pay for unequal work. Equal pay without regard to performance means that both good and bad workers do not have an incentive to improve, other than pride of workmanship.

3. Low pay. Inadequate pay leads workers to have two or more jobs. Consequently they do not focus on doing one job well.
4. Poor equipment. Low quality equipment discourages workers, reduces motivation, and leads to poor quality.
5. Lack of customer orientation. Although it was not the original intent, the old system evolved so that it functioned to benefit the people in the system rather than the customers of the system. When customers have a choice among suppliers, they will go where the service is best. Firms that deliver poor quality will die. But there is still not a lot of competition in Russia.
6. Cultural change. Russia needs to learn a new culture of doing business. Cultural changes are difficult and take time.

## 4 Conclusion

Quality improvement methods currently are spreading around the world, both through the widespread adoption of the ISO 9000 standard and the creation of national quality awards. [Medvedeva and Umpleby, 1998]

Changing a style of management involves many small and large changes throughout society. By describing these changes using several methods, more of the complexity of this social change process is likely to be described.

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1985	Gorbachev becomes General Secretary of the USSR Communist Party
1986-1989	A series of reforms called glasnost and perestroika
1989	Berlin Wall falls
1989-1991	Crisis of Soviet power in the republics
1991, Aug	Attempted coup against Gorbachev. Yeltsin makes a short speech standing on a tank. People take to the streets to defend democracy.
1991	Collapse of USSR and creation of a Confederation of Independent States
1992	Price liberalization and hyperinflation. A majority of Russians lose their savings. Stratification of society increases. Most of the population becomes impoverished
1993, Oct.	Tanks in Moscow shoot at anti-Yeltsin leaders in the Russian parliament
1991-present	Development of parliamentary government in Russia. Four Russian Duma's
1991-1996	Production falls more than 50 percent. Economic links among republics of the former USSR are broken
1992-1996	Privatization, which was called by people "prihvatizatsiya." It is a play on words: "prihvatit" is a popular expression meaning "to steal"
1992-1996	The crisis of nonpayments. Workers were not being paid, so workers went on strike
1993, Dec – 1996	First military campaign in Chechnya
1995-2003	Terrorist actions in Moscow and other Russian cities
1996	Second election of Yeltsin. General Lebed signs Chechen peace treaty
1998, Aug	Currency default. Second impoverishment of a majority of people in Russia
2000-2002	Second military campaign in Chechnya
2000	Putin becomes President of Russia. Creation of "vertical power." Presidential representatives are appointed for seven Russian districts.
2003	First democratic election in Chechnya. Acceptance of Chechen Constitution. Reconstruction of Chechen economy. Party of Putin's reforms wins parliamentary election
2001-present	Economic growth in Russia

Figure 8. Some events during the transition in Russia

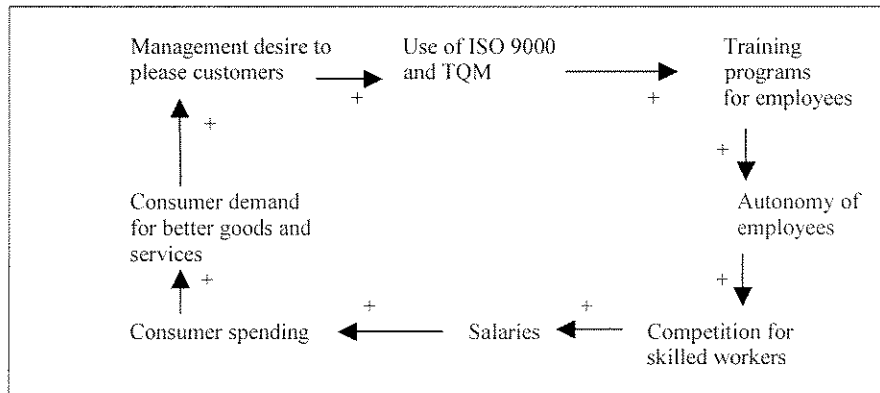


Figure 9. Variables show how the old system is changing into the new system