There is a Relationship Between Systems Thinking and W. Edwards Deming's Theory of Profound Knowledge.

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Deming's theory of profound knowledge is a management philosophy grounded in systems theory. It is based on the principle that each organization is composed of a system of interrelated processes and people which make up system's components. The success of all workers within the system is dependent on management's capability to orchestrate the delicate balance of each component for optimization of the entire system.

Deming believed profound knowledge generally comes from outside the system and is only useful if it is invited and received with an eagerness to learn and improve. A system cannot understand itself without help from outside the system, because prior experiences will bias objectivity, preventing critical analysis of the organization. Critical self-examination is difficult without impartial analysis from outside the organization. Also, insiders can rarely serve as hostile critics who speak frankly without fear of reprisals.

According to Deming, the journey from the prevailing management style to *quality* requires the understanding of systems. A system is composed of interrelated components. Quality is the optimization of performance of the components relative to the goal or aim of the system. Individual components of the system will reinforce, not compete with each of the other components of the system to accomplish the aim of the system.

Surprisingly, a lack of clearly defined purpose is common in U.S. organizations, particularly long-range purpose. Short-term thinking, quarterly and annual performance evaluations, and bottom line thinking forces attention to quick-fix solutions. Even if long-range plans exist, prevailing short-term thinking distracts from long-term behavior toward real solutions.

Quality is a systematic process. First, establish the aim: vision, mission, goals or constancy of purpose of the system According to Deming, without aim, there is no system (Identity) then identify the components and processes and the interrelationships of the components within the system (relationships). Constantly improve on the processes of the system (Information/Learning/Knowledge.)

There is a close similarity to ***self-organization in complexity science and Deming's components of a system listed above.***

The journey requires leadership with Profound Knowledge as a guide. Leadership is marked by a dedication to scientific knowledge as truth, as well as to the process of serving those whose followers depend on the leader. A leader, who practices win/win negotiations, is trusted and trusts others to act responsibly when empowered. Leaders are responsible for providing clearly defined purpose and margins, shared vision, quality resources and delegating responsibility, (That is similar to Bounded Instability in Complexity Science)

Profound Knowledge is made up of four interrelated components:

- **Appreciation of a system**
- **Theory of knowledge**
- **The psychology of change**
- **Knowledge about variation**

The four components cannot be separated. Knowledge of psychology, variation, theory of knowledge and appreciating the processes of a system must be managed with a delicate balance. They make up systems.

Adapted from the writings of W. Edwards Deming
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Appreciation of a System:

A system is complex. It is made up of interrelated components of people and processes with a clearly defined, shared destination or goal. Everyone must share a distinct understanding and commitment to the aim or purpose of the system.

Appreciation of a system depends on quality leaders' understanding the interconnectedness and interdependence the interconnectedness must be clearly defined and documented for successful flow or continuous improvement of the process.

Optimization of a system can occur when all interconnecting components are orchestrated to achieve the organization's goal. The people, free of fear and competition within the system can band together for optimization of the system. In a quality system, everybody gains. The traditional "management by objectives" philosophy fails to orchestrate the components, leaving each one to do a job separate from the other components and often causing them to work against the successes of others.

No one component may seek its own reward without destroying the balance of the system. Each component is obligated to contribute its best to the system as a whole. In all negotiations the results must be win/win.

A flow chart can be used to clearly illustrate the components of a system and their interconnectedness. It can serve as an organizational diagram. Each person must understand their job, know how to do it well, and understand the interdependent role he/she plays with the rest of the system. Using flow charts, people can see how each person's is interrelated to accomplish the organizational aim for the good of all. (*Today we use systems dynamics modeling to illustrate that clear view to the members of the system.)*

Competitiveness within the system leads to loss for the system. Each component works interdependently with the other components.

THE PSYCHOLOGY OF CHANGE

The system self-organizes around its Identity. That includes its vision, purpose, guiding principles, values, history, theory of success and shared aspirations. A clearly designed, shared identity allows the organization to self-organize in alignment with the identity desired by leadership. All systems are complex adaptive systems which adapt around their identity. The identity may be designed by leadership or it may occur without design, more by accident. If it is allowed to occur accidentally it will lack clear, shared direction. Thus empowerments will not be fully successful.

A new style of leadership is required in Complex adapting organizations. This style is one in which the leader serves their people with vision and guidance to see the interconnectedness of the whole system. The leaders must first gain and communicate a shared identity and then be able to allow the organization ownership of that identity. The leader serves the people with clear vision and guidance to empower them. To be empowered is to share ownership in the identity.

Often resistance to change is strong because everyone feels devalued. Resistance is diminished when everyone shares in the identity and understands the benefits of change. By adapting and developing new skills people feel their value increase, they have ownership in the change.

People are born with intrinsic motivation, self-esteem, desire to learn, creativity and joy in accomplishment, and a need for freedom and belonging. Early experiences may diminish self-esteem, but successful accomplishments serve to improve it. Giving people a certain degree of control over their work fulfills the need for freedom and provides opportunity for taking joy in work. Teamwork and loyalty to the work place satisfies the need to belong.

Industrial style thinking has lead to management styles of command and control. The industrial age influenced the workplace and schools to encourage individual completeness, absolute authority, and one-right answer

thinking. **A change in philosophy requires unlearning** industrial thinking evident in departmentalization, scarcity of knowledge and information competitiveness.

The industrial model discourages creativity and cooperative skills. Therefore, training in creativity, communication and interpersonal skills may be necessary. Opportunities to understand the means of leading change are readily available through a wealth of literature, seminars, and consulting specialist.

People learn differently. Each person has a unique set of experiences which shape learning. Managing people for optimization of performance requires an understanding of those differences. Common management theory operates on the theory that everyone learns alike. Common theory also acts on the assumption that motivation is extrinsic and influenced by external forces of reward or punishment and fear. Consider the inappropriateness of this way of thinking, and the false assumption that motivation is extrinsic. The human brain is designed to learn and achieve, it actually produces a chemical reaction to successful performance that serves as and internal reward in itself ---intrinsic motivation.

THEORY OF KNOWLEDGE

The theory of knowledge, as stated here, implies that system improvement depends on continuous study of the organization. Improvement is learning and developing new knowledge about the system. The learning process requires several steps: 1) forming a theory, 2) making predictions based on past experiences, 3) testing the theory, 4) checking the results. Building knowledge through systematic analysis of short-term/long-term results and revision and extension to the theory provides the learning process. This can be related to the Shewhart Cycle: Plan-Do-Check-Act.

Knowledge is developed from the application of theory. The theory provides a window from which to view the situation and gives meaning to experience. Prediction based in theory provides a foundation for planning a course of action. The formation of a theory is based on past experiences. It can be adjusted based on analysis of results of any actions applied. This cycle provides knowledge that can be applied for continuous improvement, thus a continuous improvement process is established.

Deming cautions that we do not mistake information for knowledge. Information without application of the cycle of theory-prediction-action-analysis-adjustment does not create learning or knowledge and does not improve the process.

Tampering with the system: actions applied to individual components without the guidance of profound knowledge works against the system even when best efforts are made. In this scenario, decisions are usually made in a reactionary manner which leads to other reactionary behavior which serves as a misbalancing force on the system.

Organizations which are caught in a reactionary cycle are incapable of operating on a theory of knowledge because reactionary cycle behavior usually excludes the use of the theory-knowledge cycle; a reactionary cycle is short-term and usually occurs without opportunity to check the effect of that action on other components of the system.

KNOWLEDGE ABOUT VARIATION

No two things are exactly alike, not people, not processes. Variation is a natural, inevitable part of life.

The goal of quality or continuous improvement is to reduce the range of variation over time, in addition to adjusting the process level to the desired level.

Almost all variation within a process is due to chance causes, inherent in the design of the process. Management controls the design of the process. People within the system are limited by that design.

Dr. Deming went to great lengths to illustrate this in his red bead experiment in which he demonstrated that despite coercive demands and the best efforts of the workers or supervisors, variation is still present in the number of undesirable red beads scooped up by the worker.

Limits within which the natural or common variation of a process falls can be determined from data collected from the process. When all data points fall within these limits, the process is said to be in control and stable. Once these limits (control limits) are established, one can set about to reduce the distance between the limits. Using a control chart allows one to easily observe when the process is outside the limits, thus indicating special cause variation within the process.

Problems arise when management reacts to common cause or chance variation as if it were special cause variation. This can be illustrated by the reaction to point-to-point variation in a process. That is, one point shows improvement and no one questions the goodness of the process. The next point might get worse and everyone asks why, when it is really common cause variation. Pressure is applied to operators who have no control over the variation resulting from the design of the process. The emphasis is placed on point-to-point variation rather than working to decrease all variation and improve the average.

Tampering can also be an issue. This happens when operators make adjustments to processes that are showing only common cause variation, i.e., all points fall within the control limits and there are no patterns indicating special cause variation. By doing this they will actually *increase* the amount of variation in the process.

Knowledge gained from this study of process variation must be integrated into continuous improvement efforts through the use of the continuous improvement cycle. Sometimes called the Shewhart Cycle, continuous improvement consists of (1) planning and studying data to predict a solution, (2) implementing changes while (3) carefully checking resulting effects on the system, when the desired results occur, (4) take action to fully implement the changes. The cycle stages are: Plan-Do-Check-Act.

SUMMARY

There is a relationship between Complexity Science principles and W. Edwards Deming's Theory of Profound Knowledge. Deming was about working for the optimization of the whole system by nurturing the intellectual capabilities with-in the system to draw on people's natural need to achieve their potential and find joy in work.

Deming's theory of profound knowledge presents a universal knowledge of organizations. By clearly defining quality and applying the knowledge of his concepts organizations can increase productivity and profit.

Quality is everyone's responsibility, but top management has more leverage toward continuous improvement of quality. Policies can put an upper limit on quality. As leaders responsible for system change, top management is most in need of profound knowledge.

Policies which demoralize employees, use fear, institute quotas, or foster competition will restrict quality. Quality is often determined in the boardroom. It occurs when the aim is clearly defined, people are trained and educated to do the job well and are provided the right tools and equipment. They must also work collaboratively to plan, implement, and measure processes to accomplish the aim.

Engaging the hearts and minds of people inspires intrinsic motivation. A link to reward and punishment diminishes that self-motivation. Joy in successful performance and recognition are the most effective means of optimizing employee commitment and self-driven performance. Rewards are important, but should not be given in a manner that devalues the intrinsic reward natural to people.

Most change is superficial because the change process fails to generate the learning necessary to engage the depth of understanding to achieve commitment.

Design the future system around a clear shared identity, allowing the future system to emerge in a parallel process with employee involvement in learning to optimize individual contribution and the system learning to optimize performance and profit by becoming a complex-adaptive system that is committed to continuous improvement in all parts of the organization.

Transformation Through Application of Deming's Fourteen Points:

Adapted with help from Mike Adams

1. **Create a constancy of purpose** toward improvement of product and service with the aim to become competitive and to stay in business, and to provide jobs.
2. **Adopt a new philosophy.** We are in a new economic age. Western management must awaken to the challenge, learn their responsibilities, and take on leadership.
3. **Cease dependence on inspection** to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.
4. **End the practice of awarding business on the basis of price tag**. Instead, minimize total cost. Move toward a single supplier for any one item on a long-term relationship of loyalty and trust.
5. **Improve constantly and forever the system of production and service**. Continuously improve quality and productivity, and thus constantly decrease costs.
6. **Institute training on the job**. Learning by experience and discovery of a better way.
7. **Institute leadership** (see point 12). The aim of leadership should be to help people and machines and gadgets to do a better job. Traditional leadership of management is in need of overhaul, as well as leadership of production workers.
8. **Drive out fear** so that everyone may work effectively for the company. Fear is a barrier to innovation and collaboration.
9. **Break down barriers** between departments. People in research design, sales and production must work as a team, to foresee problems of production and process that may be encountered with the product of service.
10. **Eliminate slogans, exhortations and targets** for the workforce who asks for zero defects and new levels of productivity. Inspire the workforce to self-directed excellence.
11. a. **Eliminate work standards quotas** on the factory floor. Substitute leadership.
    b. **Eliminate management by objective**. Eliminate management by numbers, numerical goals. Substitute leadership.
12. a. **Remove barriers that rob the hourly worker of his right to pride of workmanship**. This means, abolishment of the annual of merit rating and of management by objective, management by the numbers.
13. **Institute a vigorous program of education and self-improvement**.
14. **Put everybody in the company to work to accomplish the transformation**. The transformation is everybody's business.

Diseases That Stand in the Way of the Transformation:

1. **Lack of constancy of purpose** to plan product and service that will have a market and keep the company in business, and provide jobs.
2. **Emphasis on short-term profits, short-term thinking** (just the opposite of purpose to stay in business) fed by fear of unfriendly takeover and by push from bankers and owners for dividends.
3. **Personal review system evaluation of performance, merit rating, annual, or annual appraisal**, by whatever name for people in management, the effects of which are devastating. Management by objective on a go, no-go basis without a method for accomplishment of the objective is the same thing by another name. Management by fear would be better than those processes that are devastating to pride in work.
4. **Mobility of management, job hopping in large corporations**.
5. **Use of visible figures only for management**, with little or no consideration of figures that are unknown and unknowable.
6. **Excessive medical costs**.
7. **Excessive costs of liability**, fueled by lawyers that work on contingency fees.