Complex Adaptive Thinking

Idea In Short

A machine follows its design, while a living system changes as it goes. Complex adaptive thinking treats organizations as the second kind. Its agents, people and teams, respond to one another and to their environment, and their responses reshape the rules of the game in real time. Paul Plsek and Trisha Greenhalgh introduced this view to health care in the British Medical Journal in 2001, arguing that it offers new metaphors for leadership and change. This article explains the core properties of complex adaptive systems, shows how leaders can steer them through feedback and light guidance, and warns against borrowing the vocabulary without changing the practice.

A hospital issues a thick protocol for managing patient flow. Staff follow it, yet delays persist. Teams quietly develop workarounds, and some of them work better than the protocol. The managers face a choice: enforce compliance or learn from what people have invented. Complex adaptive thinking points to the second option, because the people in the system are not parts to be programmed. They are agents who adapt.

What makes a system complex and adaptive

Paul Plsek and Trisha Greenhalgh defined the term in a series of articles in the British Medical Journal. They describe a complex adaptive system as a collection of individual agents with freedom to act in ways that are not always totally predictable, and whose actions are interconnected so that one agent's actions change the context for other agents.1 The definition fits a hospital ward, a sales force, or a city.

John Holland, who studied such systems at the University of Michigan, described them in similar terms as systems of many components that adapt or learn as they interact.2 The two descriptions agree on the central point, which is that behavior arises from interaction and learning, and not from a master plan.

Three features follow. The agents are not controlled by a central plan, so behavior emerges from interaction. The mental models and rules within which the agents operate are not fixed. And, the authors observe, adaptation within the system can be for better or for worse, depending on whose point of view is considered. A workaround that helps staff may harm patients, and one that helps patients may burden staff.

A summary on the Patient Safety Network describes the first article as an exploration of the science of how adaptive systems respond to internal and external challenges, and of the roles of self-adjusting and interactive systems in managing interdependence among clinical practice, information management, research, and education.3

The article also notes that systems are embedded within other systems and co-evolve. A health center sits within a locality and a wider society, and each level shapes the others. Organizations in any field face the same nesting.

From machine to organism

The BMJ series introduced an alternative to the machine metaphor, the complex adaptive system. A later article by Plsek and Tim Wilson describes how treating organisations as complex adaptive systems allows a new and more productive management style to emerge, and it observes that the interactions within such a system are often more important than the discrete actions of individual parts.4

The machine view treats an organization as a set of parts that can be improved one by one, with plans that specify what each part must do. The organism view treats it as a set of relationships that learn. Improving a single department without regard to its links may help little, or even harm the whole.

The same article gives an example from the United Kingdom, where separate budgets and performance targets for primary care, secondary care, and social services promote an internal focus on each part and not necessarily the good functioning of the whole. Such targets segment the system and encourage each part to optimize itself.

Light guidance in place of detailed control

If agents adapt, detailed rules often produce either rigid compliance or hidden workarounds.

The same article offers an alternative drawn from complexity thinking: relationships between parts are more important than the parts themselves, and minimum specifications yield more creativity than detailed plans. Leaders can set a few clear boundaries and purposes, and let people find solutions within them.

What do minimum specifications look like? A hospital might require that every patient have a named clinician and a discharge plan within a day, and leave the method to each ward. A software team might require that every release pass automated checks and be reversible, and leave the design to engineers. The rules say what must be true, and not how to achieve it.

Pair light rules with fast feedback. When people see the effect of their choices within hours or days, they adjust in real time. Dashboards that show waiting times, error rates, or customer reactions serve this purpose, as do brief daily huddles in which teams discuss what they noticed.

Tension, paradox, and the unknowable

Plsek and Greenhalgh also advise a change in attitude. Their summary points include that in complex systems unpredictability and paradox are ever present, and that some things will remain unknowable. Another passage explains that tension and paradox are natural phenomena, not necessarily to be resolved, because complex systems interact with other complex systems.

For managers, this means giving up the hope that every conflict will be settled once and for all. Speed and safety, standardization and local judgment, and efficiency and flexibility will keep pulling against each other. Skilled leaders hold these tensions, revisit the balance as conditions change, and avoid declaring a permanent winner.

Accepting the unknowable also changes planning. Instead of a single forecast, prepare ranges, keep options open, and run small experiments. Plan for learning as much as for delivery.

Vocabulary without change

A 2018 editorial by Greenhalgh and Chrysanthi Papoutsi offers a sharp warning. It says that

medicine's interest in complexity has been largely superficial, that it is fashionable to talk of complex systems and wicked problems, and that few embrace the theme beyond name.5 Their concern was research methods, but the point extends to management.

Organizations often adopt the language of agility and complexity while keeping rigid plans, annual targets, and tight approval chains. The vocabulary changes, and the behavior does not. A useful test is to ask what a team does differently on Monday because of the new idea.

Real change shows in practice. Leaders delegate authority to the edges, measure outcomes over activity, and revise plans frequently in light of results. They also tolerate some mess, since adaptive systems rarely look tidy.

Practices for complex adaptive settings

Several habits help. First, design for feedback: shorten the time between action and information, and make results visible to the people who act. Second, encourage variation: allow different teams to try different approaches, and compare outcomes. Third, amplify what works: spread successful workarounds and retire those that cause harm.

Fourth, attend to relationships. Introduce people across boundaries, support communities of practice, and reduce barriers between units. Fifth, reflect often. Short reviews that ask what happened, why, and what to try next turn real-time feedback into learning.

Finally, watch for unintended adaptation. When a new metric or rule appears, people respond, sometimes in ways that defeat its purpose. Check for gaming, and adjust the measure before it distorts behavior.

A hypothetical example

Consider a hypothetical city transport agency that governs its bus drivers with a detailed timetable and strict penalties for lateness. Drivers respond by skipping stops and rushing at the cost of safety, and passengers complain. The agency switches to a minimum specification: buses should keep even spacing along each route, and drivers may hold at stops to restore it.

Real-time data on bus positions are shared with drivers, and route teams meet weekly to

review bunching and ideas. Drivers invent practices such as brief holds at key stops and signals to the next bus. Spacing improves and complaints fall. The example is invented, yet it shows how guidance, feedback, and freedom can outperform a rigid rulebook.

Cautions

Light guidance is not no guidance. Boundaries on safety, ethics, and legality must be firm, and everyone should know them. Freedom works only inside clear limits.

Adaptation also needs time and attention. Teams under constant pressure cannot experiment, so protect some slack. Beware of leaving people to improvise in high-risk settings without support.

Finally, do not treat the metaphor as proof. Test whether adaptive approaches improve results in your setting, and keep what the evidence supports.

- 1The challenge of complexity in health care
- 2Studying complex adaptive systems
- 3Complexity science: the challenge of complexity in health care
- 4Complexity, leadership, and management in healthcare organisations
- 5Studying complexity in health services research: desperately seeking an overdue paradigm shift

Summary

Complex adaptive thinking replaces control with guidance. Plsek and Greenhalgh define a complex adaptive system as a collection of agents with freedom to act in ways that are not always predictable, whose actions change the context for others. Leaders in such systems favor minimum specifications over detailed plans, pay attention to relationships, and expect tension and paradox. A later editorial warns that many people embrace complexity in name only. The test is whether behavior changes. Choose one initiative that has stalled under detailed rules, replace the rules with a few clear principles and a fast feedback loop, and watch how people adapt over the next month.