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The Critical Difference Between Complex and Complicated

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Featured excerpt from *It's Not Complicated: The Art and Science of Complexity for Business* (University of Toronto Press, May 2017).

The default mindset of leaders sets them up for failure in complex situations.

Rick Nason, a finance professor at Dalhousie University's Rowe School of Business, makes a compelling case that understanding the difference between complicated and complex is an imperative for highly effective executives.

Here's the problem:

Leaders, says Nason, tend not to realize that complicated issues are different than complex ones. Thus, they try to address them both in the same way. Want to guess what happens next?

It's what happens when you try to treat employees as if they were interchangeable robots or when you try to remove a passenger with a ticket from your airplane or when you merge two companies with very different cultures together. The situation deteriorates really fast.

Here's the difference between complicated and complex:

A complicated issue, explains Nason, is one in which "the components can be separated and dealt with in a systematic and logical way that relies on a set of static rules or algorithms." It may be hard to see, but there's a fixed order in something that is merely complicated and that allows you to deal with it in a repeatable manner.

Pumping crude oil from 6 miles below the surface of the Gulf of Mexico is complicated. So is making an electric car and a reusable rocket (just ask Elon Musk). But once you figure out how to do these things, you can keep doing them at will.

Complicated problems can be hard to solve, but they are addressable with rules and recipes, like the algorithms that place ads on your internet searches. They can be resolved with systems and processes, like the hierarchical structure that most companies use to command and control employees.

On the other hand, a complex issue is one in which you can't get a firm handle on the parts and there are too many unknowns to reduce to rules, algorithms, or natural laws, order, control, or predictability. A complex thing is much more challenging--and different--than the sum of its parts, because its parts interact in unpredictable ways.

Managing people is a complex challenge. So is integrating the two merging companies or figuring out how the market will react to a new product or strategy. Maybe you'll get lucky and figure it out once, but whatever you did this time won't generate the same result next time.

The solutions to complicated problems don't work as well with complex problems due to the unknowns and interrelated factors that don't reduce to rules and processes. A competitor with an innovative business model — an Uber or an Airbnb — is a complex problem. There's no algorithm that will tell you how to respond.

This could be dismissed as an exercise in semantics, except for one thing: When facing a problem, says Nason, managers tend to automatically default to complicated thinking. "The two ways of thinking involve different mindsets, different expectations, and different tolerances of ambiguity," he writes. "They involve different attributes and skills. They require dramatically different management techniques."

Instead, he says they should be "consciously managing complexity." Consciously managing complexity is broadly a function of four different strategies or tactics. They are:

(1) recognize which type of system you are dealing with;

(2) think "manage, not solve";

(3) employ a "try, learn, and adapt" operating strategy; and finally, and perhaps most importantly,

(4) develop a complexity mindset.

Identify System Type

Before anything can be managed, it must be recognized for what it is. This is especially important for complex versus complicated systems. The manager needs to consciously take a mental step back and classify the issues. It is relatively straightforward to ascertain which elements of the situation are simple, which are complicated, and which are complex. Simply getting the context correct automatically sets the manager on a better course for success.

Obviously, each type of issue needs to be managed in a way that is consistent with its characteristics. Simple systems need to be managed as simple systems. Well-known recipes, procedures, or rules of thumb need to be followed and adhered to. Simple systems are generally easy to manage, but that also can produce hubris that leads to mistakes.

Complicated systems require more expertise in their management, but as long as the proper expertise is available and used, the attractiveness of complicated systems is that they generally can be successfully managed. Complicated systems, by definition, adhere to a comprehensive and robust set of axioms and rules, and thus it is a matter of making sure that the proper models are being used for the situation at hand.

Complex systems are nuanced and require a nuanced approach. The one thing that will not work is a rigid, rules-based, complicated approach. Taking the time to make an accurate judgment about the type of management problem at hand helps to avoid the arrogance of complicated thinking. Complicated thinking applied to a complex issue leads managers to think that they are doing something purposeful when in reality they are likely doing more harm than good.

"Complexity thinking is not difficult," writes Nason. "Even something as simple as taking the time to ask whether a given issue is complicated or complex can be incredibly helpful and valuable."

Think "Manage, Not Solve"

Complex situations do not lend themselves to a solution, and it is folly to spend the time, energy, or effort even to attempt to create solutions. Yet this is exactly how the complicated way of thinking works. It is in evidence when companies try to optimize complex activities such as marketing strategy, production schedules based on demand, or long-range planning. This form of thinking is especially evident in economics, as politicians all promise solutions to economic ills. [Instead] the key is to think "manage, not solve."

"Manage, not solve" may be a humbling strategy to use but a lack of humility might be one of the reasons why managers default to complicated thinking. "Manage, not solve" can also be an unsettling strategy to use, as it is based on making relatively spontaneous decisions under uncertainty. The assumption in the complicated world is that knowledge facilitates control. "Manage, not solve" implies uncertainty, that true answers can only be experienced with hindsight, and that a situation is not completely manageable. This mode of management can be quite stressful if the manager has a complicated mindset that abhors ambiguity and uncertainty.

"Manage, not solve" does not imply that managers should not plan in the face of complexity. In fact, they should do extra planning and develop creative scenarios to understand as many of the possible outcomes as possible. In the end, however, they have to remember Eisenhower's saying, that in preparing for battle, "plans are useless, but planning is indispensable." The planning helps one to envisage how things might unfold but cannot explain exactly how things will unfold. The value of planning is in the exercise of planning and the creation of alternative scenarios and alternative responses, not necessarily in the result of the planning.

Try, Learn, Adapt

In a complex environment it is truly rare that a grand plan or strategy will work as intended. Successful managers, however, are not discouraged by this. They learn from their missteps and use their learning to move forward with a new angle on the problem. They essentially learn as they go. Furthermore, they *expect* to learn as they go. Complicated thinkers tend to get too intellectually invested in an idea and refuse to let go, despite sometimes overwhelming evidence that the plan is not working. Complexity thinkers have the humility and flexibility not to get trapped into this low-probability strategy.

With a try, learn, and adapt approach, organizations have to allow for mistakes to be made and for risks to be taken. They do not take large bets on grand projects or get too invested in comprehensive plans. A key characteristic of complexity is adaptation. To succeed with complexity, an organization must also be continually adapting. It is important to note that this does not necessarily mean getting better or continually improving. It is quite possible to keep continually improving on all of the wrong things. Kodak continued to improve its film products, but when digital photos replaced film, all of the continual improvement was for naught. Adapting means developing a keen sense of how elements of the system are changing and trying new ideas to see how they work in the context of the shifting environment. Ultimately, adapting means changing along with the environment rather than trying to get the environment to change

For a complicated thinker, adapting to changing and evolving situations can be difficult. It is not easy on the ego to admit that a well-thought-out plan is not going to succeed. However, having the humility and the risk-taking ability to adopt a try, learn, and adapt approach is necessary for success in the presence of complexity. Ecologist and complexity researcher C.S. Holling sums it up best when he states, “in complex systems, wealth should not be measured in money or power, but in the ability to adapt.”

Develop a Complexity Mindset

A complexity mindset is simply a mindset that accepts that complexity exists, accepts that complexity needs to be dealt with differently, and accepts that there are certain limitations on what the manager can control in complex situations. Furthermore, and perhaps most importantly, a complexity mindset embraces complexity and the challenges and opportunities that come with dealing with complexity.

While it is not necessary to be a genius to manage complexity, it is helpful to consider for a minute the difference between a genius and someone who is really smart. The name “Einstein” often springs to mind when the word “genius” is uttered. While the story that Einstein did not do well in school is a myth, the reality is that Einstein thought differently. The truth is that he was certainly an above-average mathematician but not a mathematical genius. A little-known fact is that most of his mathematical problems were solved by others, including an assistant, Walther Mayer, who solved many of the mathematical

equations and did most of the calculations that Einstein's theoretical musings required. Einstein called Mayer "the calculator." Mayer was obviously a very knowledgeable and talented mathematician. Einstein was a complexity thinker, while Mayer was a very good and very intelligent complicated thinker.

The difference between being super smart and being a genius is relevant for understanding the difference between having a complicated mindset and a complex mindset. Smart people — those who are very efficient in their knowledge of facts and very fast in applying that knowledge — do very well with complicated thinking. Complexity thinkers, however, think differently.

A complexity mindset is a creative mindset. It focuses on what can be, rather than what is. A complexity mindset is an imaginative mindset, as different from a complicated mindset as the difference between thinking and knowing. Thinking is a creative process, while knowing is an information-retrieval process.

In an ideal world, managers would develop both their technical knowledge and their creativity. In a sense, the manager would become a new kind of Renaissance man. However, instead of possessing knowledge across many different fields, the modern-day "Renaissance manager" would develop both complicated thinking skills and a complexity mindset. There is an approximate parallel between complicated thinking/complexity thinking and being a left-brain thinker versus a right-brain thinker. Being left-brain dominant is associated with being logical and analytical, while being right-brain dominant is associated with being more intuitive or creative. To excel in complexity requires flexibility in what side of the brain to use. In other words, it requires one to be able to flip between being right-brain dominant and being left-brain dominant. You need to be creative as well as analytical.

The final aspect of developing a complexity mindset is to learn to embrace complexity. Complexity is a fact of business. As long as there are economies, organizations, workers, and managers, there will be complexity in business. The sooner one recognizes and makes peace with this fact, the better. Complexity is not going to go away. Trying to make complexity disappear or to make it a nonfactor is unproductive and even harmful.

A complexity mindset recognizes that complexity creates both challenges and opportunities. It also creates an avenue for competitive advantage. If for no other reason, this should be more than enough motivation to develop a complexity mindset.

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