Avoiding Fragility in Innovative Learning Organizations

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Do you conceptualize your organization as a machine? If so, you may be led down the wrong path for optimizing business processes. Machines are complicated, but truly complex systems, like an organization, a marketplace, an ecosystem, are not like machines. Evidence for this is both familiar and surprising. It is the "Enlightenment Bias" which blinds us to the true nature of organizations. If you want your organization to excel, you need to understanding the true nature of organizations, and the new generation of tools that are becoming available to support them.

1. ANTI-FRAGILE

An organization hires knowledge workers so that they will think outside the box. However, a BPM system that automates work is precisely the box they are hired to think outside of. This paper will deal with "BPM for intelligent workers" and particularly why an approach called adaptive case management (ACM) might be a good fit. Before concluding this, we need to understand some rather surprising things about human organizations. Let's start by exploring the concept of *antifragile*. This term was coined by Nassim Nicholas Taleb in his 2012 book "Antifragile: Things That Gain From Disorder."

We all know the meaning of 'fragile': When you stress something that is fragile, it might break. What is the opposite of fragile? Most people will readily suggest that the opposite of fragile is 'robust.' Something that is robust is something that, when you stress it, it does not break; it remains the same. You might call this robust, sturdy, resilient, but in all cases the idea is that the thing does not change at all when subjected to a disturbance or stress.

There exist things that are less fragile than robust. These are things that when subjected to stress, they not only resist change, they actually grow and get stronger. They actually get better when subjected to stress, and remain better after the stress is removed.
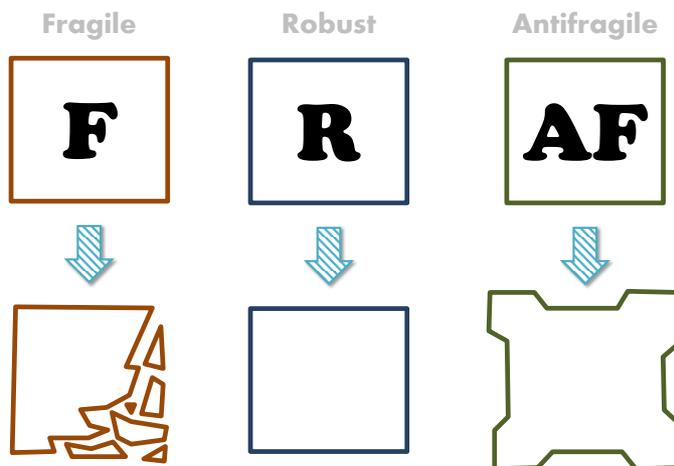
What kind of crazy notion is this? It is common sense that everything around you eventually wears out and breaks down. It may not happen all at once like a china teacup. Friction on the bearing of a wheel will eventually wear down and fail. Wind on a canvas tarp will eventually work the material and rip the weak spots. We simply know at an intuitive level that stress always causes things to wear out.

More sophisticated readers will point to the laws of thermodynamics which state that entropy of a system must always increase, and for something to get better might imply that entropy is decreasing, and therefore, antifragility is impossible, Q.E.D. Yet, on further consideration, there actually are many things around us that demonstrate antifragility.

Consider muscles. If you exercise, the result will be increased size and strength of the muscles used. To learn to play the piano, you practice. Reading a book on piano technique is not effective. Only by actually sitting at the keyboard and working through songs will you gain proficiency. To learn to play tennis, you have to get out on the court and start hitting balls.

Learning in general is antifragile. Quizzes and exams are purposeful stresses that help to prepare a student for when they will have to face real situations. Performing a fire drill is clearly an unwanted extra stress that takes people away from their main job, but the result will be an organization better prepared for such an emergency. A fire drill teaches these behaviors far faster and more effectively than any amount of textbook learning.

Things that actually get better as the result of stress are known as adaptive systems. Antifragility is a property that emerges from a complex adaptive system. Complex adaptive systems are all around us; ecosystems, biological systems, organizations, marketplaces, social networks, the economy, even our own muscles and brain. These do not behave like machines.

2.   MACHINES

To create a good machine, you break the design into a set of discrete parts. Each part is made very precisely and accurately from a hard and durable material to perform a particular function. Parts fit together as perfectly as possible, with just the right gap to minimize friction and other degrading forces.

A good analogy for an idealized machine is a fancy mechanical watch. There are many gears, each made to fit precisely together with the other gears. The better watches have a jewel movement, which use a very hard stone at the pivot points. Built correctly, the watch will run for a very long time, and be very accurate.

It is rather obvious that machines are not adaptive systems. No matter how many

times you run out of gas, the car does not get better about conserving fuel! (However the driver might.) Less obviously, we should understand that organizations are not machines, even though we like to think of them as machines. Organizations can learn and flexibly adapt to situations. The introduction of a new CEO, with a different management philosophy, can have the effect of redefining many jobs in the company, without any explicit orders being given. The roles that people play are not like the parts of a watch. People routinely fill in for others while they are away on vacation. Organizations do not wear out; they may come to an end in many different ways, but they never simply wear out. Organizations routinely do many things that a machine could never do.

3. STABILITY

Stability is desirable because it allows us to anticipate and be prepared for things before they happen. In many ways, the purpose of an IT system is to help support the stability of the organization. A well-functioning IT system will help smooth out the peaks and valleys of the business environment, and allow the personnel to perform more effectively. The organization gets more done because it uses its existing resources better.

Organizations do not achieve stability the same way that machines do. Remember mechanical stability comes from designing parts very precisely and forming them from very hard materials. Even so, this stability is a temporary thing: the machine will eventually wear out.

An adaptive system achieves stability through what is called *homeostasis*; this stability comes from a balance between different adapting forces. In an ecosystem, good weather may cause an increase in vegetation. In response the population of grazers might increase. Later, the population of predators might increase as well. The next year weather might be less productive, and grazing populations would be down, and so would the predators. These population proportions are not maintained by any central plan, but instead by a balance of different adaptive forces working off each other.

Thinking that adaptive systems should be treated like machines is a large part of what I call "Enlightenment Bias." This is a way of viewing the world using ideas from Descartes, Newton, and other Enlightenment philosophers who promoted the idea that behind every complicated phenomenon is a set of simple rules that define the behavior. These ideas were revolutionary at the time and led to a tremendous expansion in understanding of natural laws. These ideas expanded into management with the advent of Scientific Management where large complicated operations are seen to be decomposable into smaller, simpler steps that can be precisely and rigorously defined. Scientific management is a part of our culture. We all learned that you should first plan, and then act. If you fail to act, then the fault can be attributed to poor planning. Plan better and you will act better in the future.

The ultimate expression of the Enlightenment Bias is in BPM systems where management attempts to define every possible detailed action that workers might make, and to find the optimal sequence of these actions. These designers are imagining the organization as a kind of machine. They are trying to define very precise and very durable parts for that machine. This works for automating routine processes, but more and more organizations are turning to support for knowledge workers who do work that is anything but routine. At the level of knowledge workers, the organization is not a machine. It behaves more like an adaptive system, and applying machine principles can actually harm the organization.

"The only sustainable competitive advantage is an organization's ability to
learn faster than the competition."
Peter M. Senge

4. ADAPTIVE SYSTEMS CRAVE STRESS

Adaptive systems not only respond well to stress, they actually need stress. This
seems surprising when stated that way, but we already know of many examples
around us.

If you don't use muscles, they atrophy; they shrink and become weaker. A large
muscle uses resources, and that is a waste if a large muscle is not necessary.
Growing and *shrinking* muscles are the balancing adaptive forces that allow the
body to optimize resource usage. Yet if muscle strength declines too far, it is pos-
sible to be injured by something that a normally healthy person would not be
hurt by. So exercise is an important part of remaining healthy.

If a forest is protected from fires, the undergrowth grows up, and makes the forest
more susceptible to fires, and if a fire breaks out it is likely to do far more dam-
age. The policy of preventing all fires in a forest has had the disastrous conse-
quence of indirectly causing far larger and more damaging fires that are harder to
recover from. In a very real sense, protecting a forest from fire makes it grow
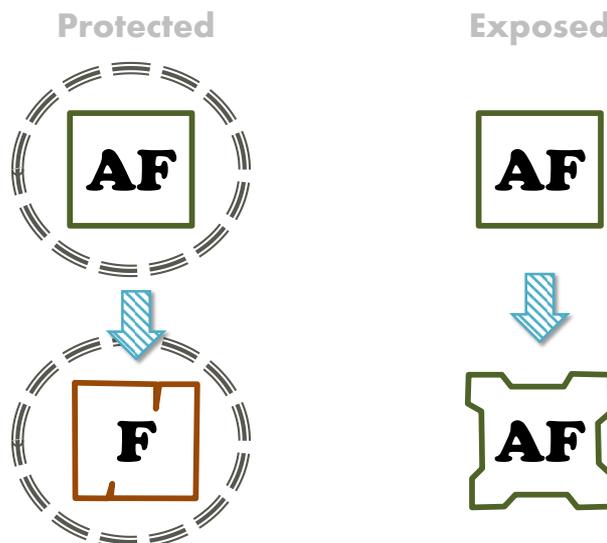
weaker. To maintain the strength of a forest, you need to have regular, modest
sized forest fires.

Here is the surprising conclusion: adaptive systems need a certain amount of
stress. *If they are protected from all stress they become fragile.*

The same is true with organizations. I mentioned earlier that fire drills are re-
quired to ensure that the employees are prepared for the case that an actual fire
occurs. Suspending all fire drills will cause the organization to be less prepared
for fire. Emergency response teams that do not drill themselves on different simu-
lations and scenarios in advance, would find themselves ill-prepared to meet the
next unexpected situation.

If a football team wants to win the tournament, it does so by practicing and play-
ing many scrimmage games on the field. If it spent the time instead sitting still,

resting, and conserving muscle movement, team members would be less likely to win the game. Unlike a machine, a team is an adaptive system, which gains from being exercised, and is actually harmed if it does not exercise.

Such exercise must include variations. Olympic swimmer Michael Phelps was forced by his coach to swim in unexpected circumstances: sometimes with the lights turned off, sometimes woken up in the middle of the night without warning. This intentional variation in training has been credited with his ability to win a gold medal in the Beijing Olympics even though his goggles cracked and filled with water.

Business teams crave this as well. Running simulations and scenarios as a business team is a well-known way to improve team performance. Doing things differently allows the team to understand how to coordinate on the fly. Then, if a situation comes along where the team has to do things differently, they are more prepared to meet this challenge.

5.   THE BEST PRACTICE CONUNDRUM

It is ironic that the very purpose of most business process management initiatives is find the single best practice, and institute that best practice by forcing employees to follow it. Here we get to the central theme of this paper—if you remember nothing else—remember this; *enforcing a single best practice on an organization can make it **fragile**.*

This can be hard to understand if you think of an organization as a machine. After all, a diesel truck will perform best (no matter how to define best) at a particular speed in a particular gear. A truck driver wants to find that speed and gear and use it whenever the situation is favorable. But organizations are more like muscles than trucks.

I mentioned Michael Phelps above. A coach searching for the single best practice might run a lot of tests, and find out that Phelps swims best at 2:00 in the afternoon, after sleeping to 10am and when the pool temperature is 72 degrees. He might then institute this best practice, asking Phelps to rise at 10am every day, swim and 2:00, and keep the pool at 72 degrees. But doing this would not prepare Phelps for many important aspects of actually competing in the Olympics. If the final swimming environment was not at 2:00pm, or he would not be able to sleep until 10am, then he would not be prepared.

The same thing happens in business teams. If a process is put into place that enforces that 'A' is done first, then 'B', and then 'C', the people working in the office come to expect it to always be this way. By acclimatizing to *always* having this pattern, the organization loses the ability to handle cases in any other order.

If you continually take antibiotics, your immune system gets weak possibly allowing you to die from a minor but novel infection. In a complex adaptive system constant stress is not to be mistaken as overreacting to noise but must be understood as environmental tuning information. We need to re-learn that in a complex world the notion of a single logical cause or a predictable outcome of an action is suspect. Constant, random stress is information that aligns the small anti-fragile system with the changes in its environment

The central point of Taleb's book was that antifragile systems crave stress, and if you withhold stress, they wither or become dangerously unstable. He went further to say: "Stability is a Time Bomb." While an adaptive system is able to readily accommodate modest perturbations, if you protect the system from those chang-

es, attempting to provide a static environment, then the system becomes fragile and dangerous.

For the IT professionals reading this, let me make one thing clear: the system is the organization, not just the computer system. The computer system may or may not be adaptive on its own. Our goal is clearly to make the business run better, and that involved people as well as the computer system. Organizations are adaptive, and it is the role of IT systems to support that adaptiveness.

This is not really a new idea. Management guru Tom Peters' 1988 book "Thriving on Chaos" discusses organizations that thrive on the churn and turmoil around them. It is common to suggest that an organization need occasional "shaking up" to keep it healthy. Agile software methodology works on understanding that software development is complex and unpredictable, and does not try to define everything perfectly in advance.

6.   PLANNING AS PART OF WORK

Part of the reason for attempting to identify and isolate the single best practice is to eliminate the need to spend time planning what to do. If there is a fully elaborated best practice, then there is no need to waste time planning. Planning is viewed as a waste, and if planning can be eliminated, then workers can spend all the time doing productive work.

That, at least, is the theory, but many leaders have expressed opposition to this point of view. For example, the following two quotes:

> "No plan survives contact with the enemy."
> Helmuth von Moltke the Elder

> "Planning is essential, plans are worthless."
> Dwight D. Eisenhower

The military is the place where you might expect to see the most rigorously defined and standardized modes of operation, but these respected leaders go out of their way to stress the importance of the planning activity itself. The importance is not just the end result–the plan–but the actual activity of planning itself is important.

Translated to modern terms, it is almost as if Eisenhower was saying that it is important to model your business processes, but when you are done you can throw the resulting models away. It is not the models that have value, but the activity of doing the modeling that provides the value.

From this we can conclude that planning itself should not be eliminated, but in fact should be done as part of work. A best practice should be enforced without question, but instead as a guideline that might, or might not, be followed. There should be a point where the team sits down and evaluates whether the best practice is going to work in this case, and if not, to come up with an alternative. Planning needs to remain part of what the knowledge worker does.

7.   INFORMATION TECHNOLOGY TO SUPPORT THIS

We hire knowledge workers to think outside the box. A IT system dedicated to anticipating every move of a knowledge worker in advance will simply an elaborate box constraining on what the knowledge worker can do. If we want organizations that are strong in the face of varying market conditions, if we want them to

be responsive to new situations, then instead of enforcing a single best practice, the IT system should allow for myriad different practices.

This is very surprising and quite disturbing. It flies in the face of everything we learned about finding and instituting the best practice. There are two approaches one might take to allow may varying paths, one I call the "radical" approach, and another I call the "innovator" approach.

The radical approach is to suggest that the information itself system should mix things up a bit. That is, it should randomly alter some parts of the business process in order to see what happens. This would exercise the workers in the same way that a vaccine exercises the immune system. Workers would certainly learn how to accommodate variations in the process, and they would certainly be able to accommodate future changes. In the long run the system might identify a novel, improved business process, however this approach is wasteful.

The less radical approach is the "innovator" approach in which knowledge workers are allowed to do the process differently if it seems necessary to them. This relies on the knowledge worker coming up with an idea about what might be a better way to do things. In my own personal experience many knowledge workers have plenty of ideas on how things might be done better. The innovator approach would allow them to try out their idea and see if it works.

This is not really a new idea either. Before the advent of BPM systems, managers would redesign their processes as needed when they thought they could do it better. Generally, if successful, they would be rewarded for "taking initiative." An IT system that enforces a particular best practice can actually stand in the way of these innovators, which is why we need specialized system that allow for these kinds of changes.

8. ADAPTIVE CASE MANAGEMENT

This is precisely the purpose of an adaptive case management (ACM) system to be a BPM system for intelligent workers. It does not constrain the workers to any given business pre-defined process. The process can be changed by any participant, and changing the process is a natural part of everyday activity.

A lot of systems talk about their ability to change, but in most cases they assume that a specially trained person will do the changes. Here, when we say that the process can be changed by any knowledge worker, it is necessarily understood that no special skills or knowledge must be necessary for making these changes. The users must be not only allowed, but also able to make those changes. This activity rules out most of the more formal ways of modeling processes which require specialized training. The process must be expressed in a way that a completely untrained knowledge worker can modify at will.

We don't think of this as process modeling, but instead planning. Knowledge workers don't work on pre-planned units of work, but instead planning itself is part of doing the job.

This approach is very hard to accept by those who view an organization as a machine that operates on a set of simple principles. It is contrary to the idea that there is a single best way to do something, and our goal is to find the one best way and make sure that everyone does it. Failure to accomplish goals in the organization is seen by these people as an inability to follow the best course.

> "The future is uncertain—but this uncertainty is at the very heart of human creativity"
> Ilya Prigogine

9. SUMMARY

We started by defining a few concepts:

- **fragile**—the quality that when disturbed has a propensity to break. Kicking around a fragile object reduces or destroys its value.
- **robust**—the quality that when disturbed it remains the same. Kicking a robust object has no effect on it at all.
- **antifragile**—the quality that when disturbed it improves. Kicking an antifragile object actually makes it more valuable.

Antifragility is a quality that emerges from an adaptive system. While it sounds crazy, there are adaptive systems all around us, and a human organization is one of those.

Not only do adaptive systems respond well to stress, they actually degrade when all stress is removed. Like muscles that need exercise, an organization needs a certain amount of variation in order to remain healthy.

Adaptive case management is an approach to supporting knowledge workers that does not constrain the working patterns to a predefined best practice. Instead, it allows knowledge workers to evaluate what the options are in this case, and to plan a course of action that might be unique for this case. It then focuses on communications about the plan, and in support of the plan.

This approach is likely to be very uncomfortable to traditional scientific managers who view their organization as a machine that has a single best mode of operation. Experienced managers already know that knowledge workers are not simple gears in a clock, but instead are capable of far more than would be expected, if they can only be given the ability to experiment and try to do things better.