The Double Challenge: working through the tension between meaning and motivation in a large system

Introduction

An enterprise is made up of a number of *systems of practice* within which its work is organized, whether the enterprise is public or private, virtual or not, or for-profit or not. Such an enterprise faces a double challenge in the way it elaborates its systems of practice: this challenge places it between what it knows how to do, and the demands made on it by turbulent environments (Emery and Trist 1965) that take it beyond what it knows. A case study of a large system, the US wildland fire service, is used to exemplify these ideas, and the implications for considering the kinds of leadership that are needed to meet this challenge.

Motivation is defined as that which emerges where there are gaps in the ability of the enterprise to do what it needs to survive and prosper, gaps that are in its systems of practice. These gaps are understood as 'driving' the enterprise (Lacan 1973 [1978]), and show themselves as dilemmas that are symptomatic of these gaps. The double challenge presented by these dilemmas are relate to vertical and horizontal kinds of leadership (Armstrong 2007). Horizontal leadership is then linked to the need for a consulting ethic that is reflexive.

Wildland Fires

The wildland fire service sought to examine the use it made of fire management software tools and systems. The goal of the Software Engineering Institute's (SEI's) consulting team was to develop recommendations which could guide the agencies involved with wildland fire management as they moved into a "system-of-systems" environment that could enable these tools and systems to be used together (Software Engineering Institute 2007). Success in this environment required that the agencies build "sufficient technical, organizational, and operational practices, and govern these practices in a manner that could be "tuned" to the realities of this systems-of-systems environment. In particular, the governance cycle required a strong understanding of operational context…" (Joint Fire Science Program 2007). This context was a large socio-technical ecosystem comprised of many different kinds of organization trying to identify and mitigate the risks presented by wildland fires. A basis had to be determined for intervening on such a large system.

The problem presented was the need to develop a way of managing a proliferating number and variety of tools and systems. At the same time, the fire services were facing escalating levels of costs associated with wildfires. Thus in 2000, "approximately 94% of the total burned acreage every year came from just 2% of all fires, and in turn, these 2% of all fires accounted for over 97% of the total nationwide suppression expenditures. Indeed, during the 1994 season just 20 out of the 24,072 total fires on federal lands cost more than $200 million to suppress." (Ingalsbee 2000) Paradoxically, the more effectively wildland fires were suppressed, the worse were the fires that got out of control, so that while the total number of fires had gone down since 1970, the amount of burned acres had gone up. At the same time, the accelerating

process of climate change was altering the very conditions in which wildland fires were likely to occur, changing the risks faced by local communities (Campbell, Gulledge et al. 2007).

These problems could be understood as particular dilemmas that had to be faced in the way the wildland fire service operated. Their resolution involved proposing forms of distributed collaboration that could align the tools and systems with the environments in which the service was working.

The Leadership question

The familiar model of leadership separates out the issues facing the top leaders of an organization as a whole from those issues facing the professional groups working within the organization 'bottom-up'. This defines an axis of leadership, in which the leaders 'above' might have authority over the professionals 'below' working within the organization, but in which the professionals 'below' also have authority because of their direct involvement in how things do or do not work. This axis was clearly present in this wildland fire case.

But if this axis linking above and below is defined as the 'within' of the organization, then there is also a second axis of leadership in relation to the 'without', associated with satisfying the particular needs of the clients of the organization: in this case the communities at risk. This second axis is like the doctor's responsibility to his patients, which introduces the need for a *tripartite* form of leadership: top leaders, professionals *and clinicians* (Division of Clinical Pscyhology 2007). The firefighters are of course also professionals, but the axis of leadership that they represent in relation to a particular fire constitutes acting in the interests of their clients *above* those of their employing institution. In this paper I want to explore how these two axes and the associated tripartite form of leadership is *necessary* to meeting the double challenge.

The Double Challenge

The fundamental difficulty facing those involved with wildland fire was being between two different kinds of pressure, on the one hand from the federal and state agencies, and on the other from the changing nature of the risks associated with local wildland. Thus there were the federal agencies who had the job of doing something about wildland fires, backed by a research community. And then there were the local organizations charged with managing the risks. The research agency responsible for developing the knowledge needed to bridge between these two kinds of pressure was sponsoring our work, and these were some of the questions that it was asking:

- What do we do with proliferating numbers of software tools and systems?
- How do we deal with the escalating costs associated with current approaches to wildland fire management?
- How do we factor into this the impact of climate change?
- What forms of governance are needed to align these with the (socio-technical) systems environment in which we are working?

In order to make sense of these questions our approach to the client system assumed that it was being presented with a double challenge.

The double challenge at the level of the individual

The response of an employee doing his job within the context of an organization that fights fires is determined by the way the organization has been set up by those at its 'top'. This is 'hierarchy-driven' in that it establishes standard ways of responding to fires.

Contrast this with what happens when the standard procedures do not work, and the fire gets out of control. An incident commander is brought in who is empowered to set up an organization that he designs to deal with the situation as it unfolds. This is an 'edge-driven' response in which the situation 'at the edge' of the organization is used to define what particular form of organization is needed to contain the fire.

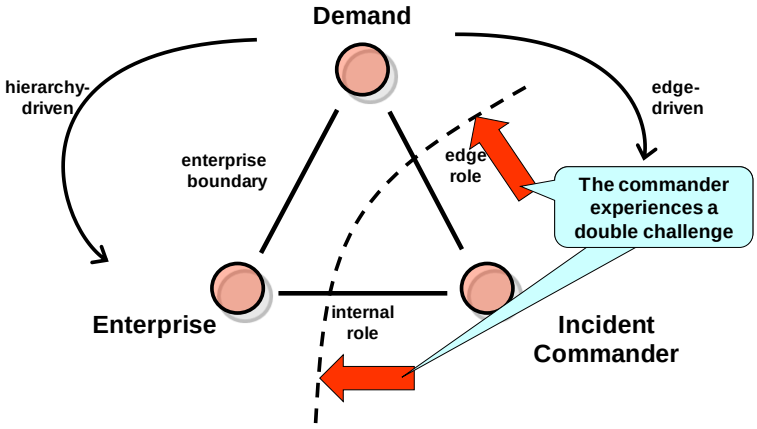

Figure 1: The Double Challenge at the Level of the Individual

We can describe both of these in terms of Figure 1. The 'hierarchy-driven' response moves anti-clockwise, starting from the demand presented by the fire, but using the organization of the enterprise to determine how the employee in the bottom-right responds to the fire. In contrast, the 'edge-driven' response moves clockwise, again starting from the demand, but this time using the person in the edge role (e.g. the incident commander) to define how the organization should respond to the particular fire.

We can now see how the incident commander is faced with a double challenge. The hierarchy-driven (anti-clockwise) approach will have its standards and routines that the incident commander may have to challenge in order to secure the behaviors that he needs to be effective. But the edge-driven (clockwise) approach also may present a set of circumstances that might challenge his ability to judge an appropriate response. Failure to do the former may lead to him to be too constrained in his approach to the fire, while failure to meet the latter may involve him in misunderstanding the nature of the demands being presented by the situation itself. The double challenge means that the incident commander is constrained both by what will work in the situation, and also by what he can get the enterprise to do.

The double challenge at the level of the enterprise

Now consider this double challenge from the point of view of the enterprise (see Figure 2). The axes of the double challenge are represented by governance issues and by the relation to demand. The first axis is expressed in terms of three levels of supply-side complexity at which a hierarchy-driven governance framework holds individuals accountable:

1. In terms of the performance of a *single task system* (we know how to make fire trucks).

2. In terms of a *single enterprise* containing multiple task systems (we know how to provide catering services for the firefighters).
3. In terms of *multiple autonomous enterprises*, each one containing multiple task systems (we know how to bring together an organization that can manage wildland fires).

Of these, the governance of multiple autonomous enterprises is particularly problematic because it has the largest span of supply-side complexity. In our case, multiple enterprises were always involved, including both different federal agencies, local organizations and other organizations providing various specialist services.

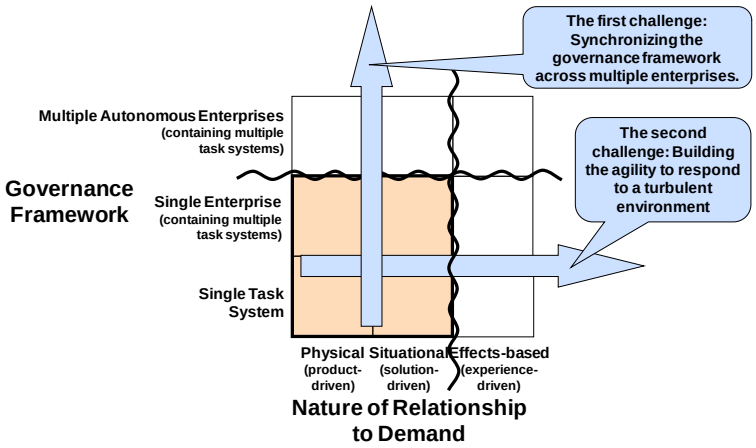

Figure 2: The Double Challenge at the Level of the Enterprise

The second axis describing the edge-driven challenge is expressed in terms of three stages in the development of the relationship to demand as more and more of the demand-side complexity of the customer's situation is included:

1. A *product- or service-centric* approach in which the product or service is defined independently of the way in which it will be used in terms of its *physical characteristics* (we provide fire trucks).
2. A *solution-centric* approach in which the product or service provided is designed to solve the problem presented by the customer in their *particular situation* (we can provide on-site catering for fire crews).
3. An *effects-based* approach in which the solutions provided over time are designed to produce particular effects on the customer's ongoing experience (we can manage the fire to minimize risk to life and property).

Of these, the effects-based approach is the most problematic because the demand environment is assumed to be turbulent, that is, to have a life of its own, making the relationship to demand dynamic. In our case this turbulence was being faced by local communities that needed to mitigate the future risks to life and property from their wildland environment. The difficulty was to hold a longer term view effectively.

The need for distributed collaboration

Distributed collaboration is a response to demand that is driven by the relationship to the customer, where there is a need for collaboration across enterprises that can be wholly edge-driven i.e. shaped directly in response to the dynamically unfolding nature of the demand in its particular context. This is one of the responses to the double challenge distinguished by the squiggly lines in Figure 3. Inside both squiggly lines is the 'comfort zone' for an enterprise: this

is the familiar single organization that can competitively provide specific kinds of products or solutions to its customers. To the right of this zone is the area bottom-right, in which the response to demand is 'left to the market'. Whether or not a single enterprise will take up opportunities here are left until someone is prepared to fund them, and the absence of such funding results in what is called 'market failure', resulting in the absence of a competitive supply-side response.

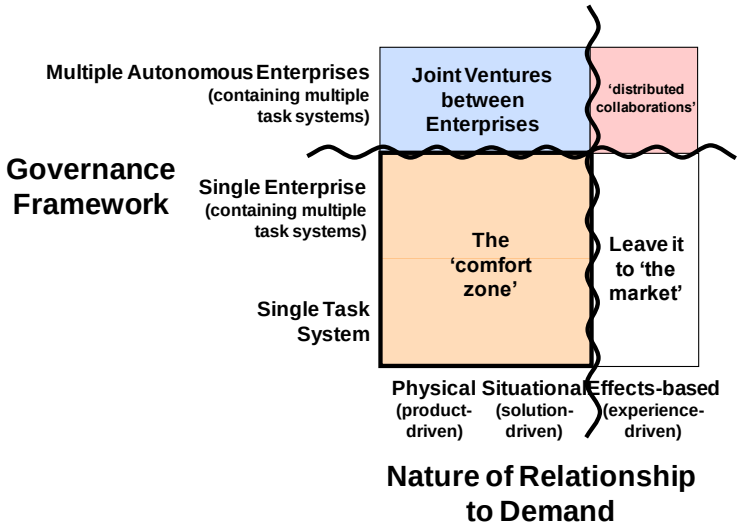

Figure 3: Distributed collaboration enables the client to deal with turbulence

The area top-left involves creating joint ventures spanning multiple enterprises. Here is where we find virtual enterprises coming together around providing particular products or solutions. Finally there is distributed collaboration top-right, where demand is turbulent and cannot be defined beforehand, and where the double challenge is at its most acute. With wildland fires, this was the situation in which local organizations found themselves when seeking to mitigate the risks arising from their complex and changing environment. The absence of support for such distributed collaboration meant that local organizations were forced into the 'leave it to the market' zone bottom-right. This meant that it was not until a state of emergency had been declared that the state and federal governments could be called in.

We can now re-examine the clockwise and anti-clockwise directions in Figure 1 presenting the double challenge at the level of the individual. Figure 4 shows anti-clockwise how the enterprise bestows authority on the individual by virtue of their position in the organization; and clockwise Figure 4 shows how the nature of the customer's demand at the 'edge' authorizes the individual's response. This makes the value experienced by the customer that which authorizes the supplier's response.

In the case, the responsibility to establish budgetary discipline over how money was spent fell clearly under the authority of the enterprises involved. But the reality of fires and the behaviors needed to suppress them also forced these limits to be exceeded because of the authorization that flowed from the incident commanders through 'horizontal' relationships that cut across the 'vertical' budgetary authorities.

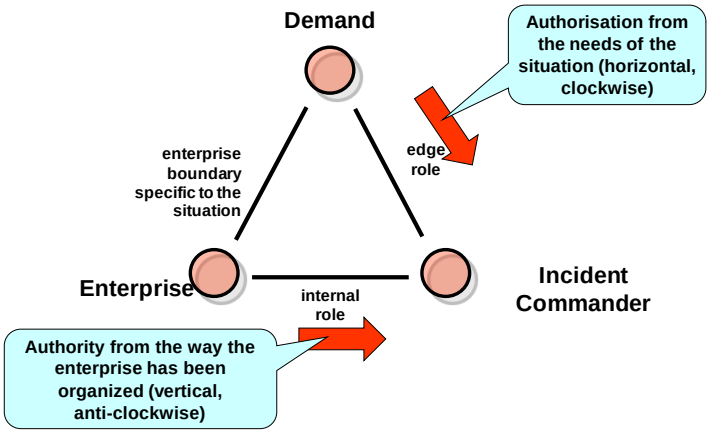

Figure 4: Authority vs Authorisation

The expectation of the client had been to rationalize the numbers of models. But the wildland fire service clearly faced a double challenge both at the level of the individuals managing fires and at the level of the agencies and community organizations facing the risks of wildland fire. What became apparent was that the numbers of models were symptomatic of the tensions that existed between the way these two challenges were being met. To develop strategies for resolving these tensions, we therefore needed to look more closely at how they were being experienced.

Meaning and Motivation

The approach to understanding the organization's response to the double challenge was in terms of the *systems of practice* that it used. The concept of 'system of practice' is adapted from Foucault's notion of a discursive practice (Foucault 1970; Foucault 1972), and builds on Argyris & Schon's notion of theory-in-use (Argyris and Schon 1974). Its essential characteristic is that it has *roles* associated with it, particular *assumptions* about how it approaches problems that fall under it, *processes* by which it acts on problems, and *outcomes* around which its processes are organized. And to those participating in the system of practice it creates *meaning*.

In order to begin to understand these systems of practice, interviews were held with individuals across the agencies and organizations involved with wildland fire in order to understand how they made sense of the problems originally identified by our client.

Systems of practice

One such system of practice was associated with those individuals involved in suppressing fires, particularly the volunteer firefighters (to 'suppress' a fire is to put it out). Figure 5 shows how we summarized this system of meaning.

The *role* of these individuals was to specialize in the *processes* of fuels and fire management to suppress fires, their *primary focus* being to provide emergency responses to fires, while in the off-season engaging in fuels management (i.e. clearing undergrowth, fallen timber etc). The *operating assumptions* that they worked from were that they could cut costs and use less taxpayer funds as a result of being effective at suppressing fires, and that the wildland ecosystems were relatively stable and isolated from urban communities. The *outcome* of their work was contained fires, and the *consequences* of being effective at containing fires was to continue in their fire suppression roles. This combination of role, processes, primary focus,

operating assumptions, outcomes and consequences together formed a system of practice that gave meaning to their work, and within which those who took up these roles lived.

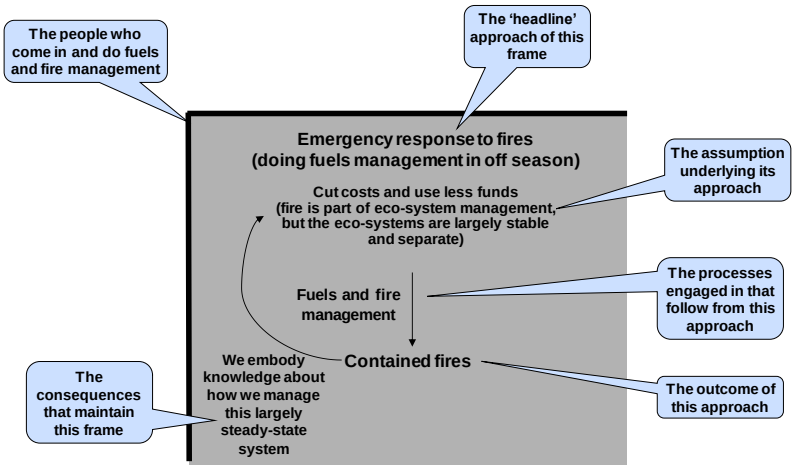

Figure 5: Suppressing Fires

Another system of practice was associated with those seeking to minimize the outbreak of fires, shown in Figure 6. In this case the *role* is taken up by people who do the planning for and mitigation of wildland fire risk. The *processes* in this case are still to put fires out quickly, but also to do a lot of planning before initiating prescribed fires (prescribed fires are fires that are planned and lit in order to manage the fuels in given wildland). The *primary focus* is ecosystem management to minimize fire risk and the *operating assumptions* are to protect the interface between wildland and urban communities and other vested interests, given that the life, economic, property, and political costs of failing to minimize fire are very high. The *outcome* is no unplanned fires, and the *consequences* of this are to continue to manage fire risks at the local level.

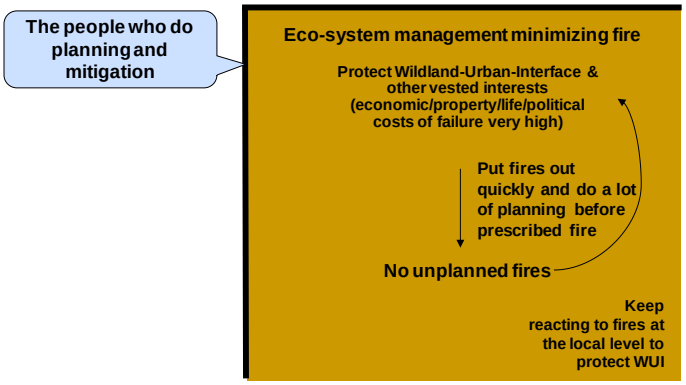

Figure 6: Minimizing Fires

Both of these systems of practice are identified with particular organizations, or parts of organizations, and their particular ways of doing business. But neither is perfect in itself. Thus there are circumstances in which each system is unable to sustain its own position, giving rise to potential dilemmas in the larger system of which they are a part.

Motivating Dilemmas

Within each system of practice there are potential consequences that cannot be contained within its operating assumptions and processes. Thus in suppressing fires (Figure 5), the fires may become too big and too difficult to manage creating a new level of crisis. Equally, in minimizing fires (Figure 6) the fuels and weather issues may become too difficult to manage locally. If the former forces a greater emphasis on minimizing fires, while the latter forces greater emphasis on suppressing fires, then we have the dilemma summarized in Figure 7. The approach to mapping dilemmas in this way is in (Cronen and Pearce 1985). The part played by dilemmas in the behavior of enterprises is described in (Hampden-Turner 1990).

The characteristic of a dilemma is that each system of practice can be 'flipped' into another one in a way that creates a figure-of-eight oscillation over some timeframe, and which oscillates around an impossibility. The impossibility defining this particular dilemma is having perfected knowledge about the dynamic behaviors of the local eco-systems. In general, this impossibility is that which cannot be contained by the systems of practice on either side of the dilemma, for which it represents a 'gap' in their system. This gap is motivating insofar as it challenges the ability of either system of practice to be effectively containing. It is the relationship of this gap to the oscillation around it that gives it the property of a drive (Lacan 1973 [1978]), and it is this gap that is motivating.

Figure 7 shows a larger system of practice within which this dilemma can be held (see Figure 8). This is the larger organization that can manage the balance between the two approaches for wildland fire: managers judging the tradeoffs between immediate dangers and the effectiveness of longer term approaches. This larger system of practice that is containing this dilemma has to deal with population movement into wildland areas increasing the underlying pressure towards suppressing all fires, while knowing that the result of doing this is the increasing size of the fires that eventually 'escape' suppression. This nesting of dilemmas can continue indefinitely, so that at any level it is possible to identify impossibilities that are being contained. In each case, the impossibility is motivating of the system of practice that contains it: every system of practice has its limitations.

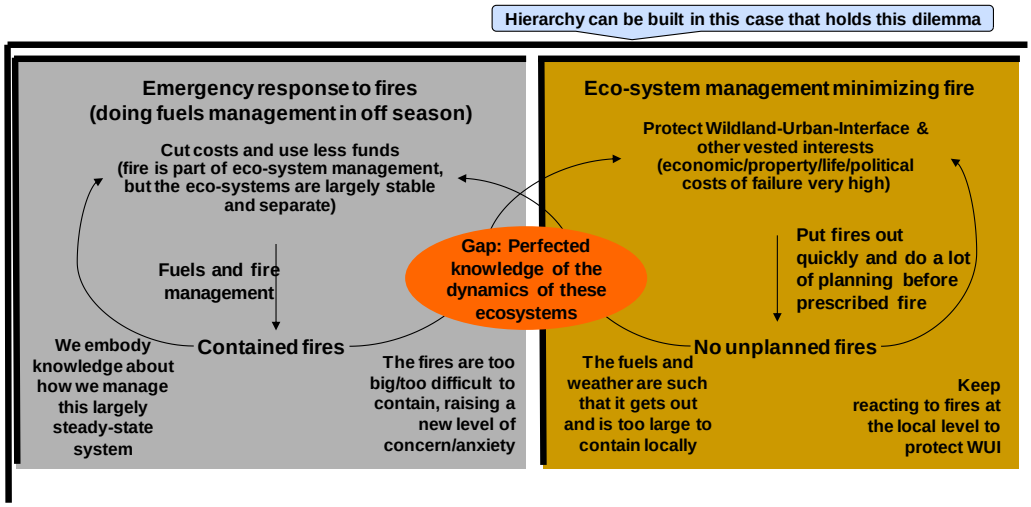

Figure 7: The Dilemma of Suppressing vs Minimizing Fires

Putting all this together gives us is a way of relating meaning and motivation: the system of practice that gives meaning contains impossibilities, and the impossibilities motivate the development of containing systems.

Dilemmas at the edge

The dilemma in Figure 7 revolves around the local management of fires, partly through suppression and partly through the prescribed use of fires. This dilemma is summarized as a whole on the left-hand side of Figure 8, representing the role of those formally responsible for the local wildland.

Their primary focus is on the fuels, their process is dependent on the models used to predict fuels and fire behavior, the intended outcome is to be able to predict local fire behavior, and the approach is built around fuels management. The consequence that stays within this system of practice is the managing of the fuels and the putting out of the fires. But what happens when the consequence is too many large fires that get out of control? In Figure 8 we see this as taking them beyond what their organization can manage into a larger situation driven by climatic conditions:

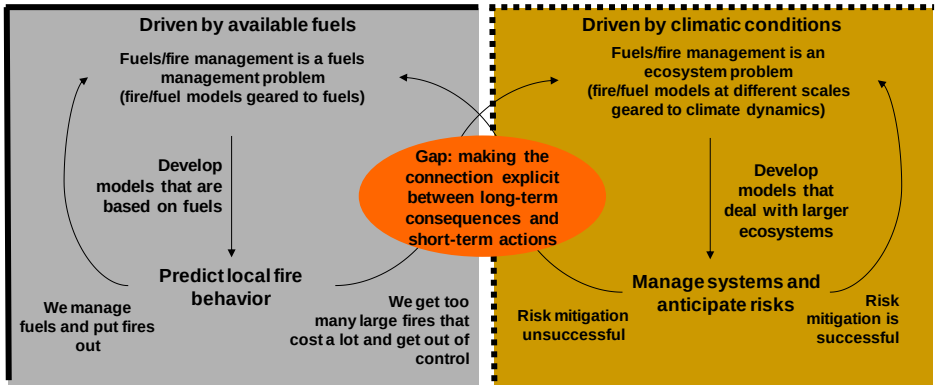

Figure 8: The Dilemma of local vs large-scale fuels/fire management

The dotted line around the right-hand system of practice represents the fact that there are no particular roles with associated systems of practice that take up these issues, other than indirectly as a research agenda. Were it to be, its primary focus would be driven by the effects of climate change, its process would be to develop models that could deal with the behavior of larger ecosystems, and its approach would be to treat fuels and fire management as part of a larger system spanning multiple scales of analysis and prediction.

The absence of the system of practice on the right leaves the federal and state agencies having to deal with 'mega-fires' (for example in California), and otherwise puts the problem back in the hands of the local community. The difficulty with taking up this right-hand system of practice is that it falls between a large number of agencies and organizations. To hold it means distributed forms of collaboration and a research agenda explicitly focused on supporting its processes and approach.

In this sense the right-hand system is at the edge of the organization, and the impossibility at the edge of the organization is the non-existence of models that can manage the local vs large-scale trade-off in approach. This impossibility is not being able to anticipate the interactions between the short-term and the long-term, between the small scale and the large scale. It becomes a gap between what the organization can and cannot contain.

This gap is between the local organization and issues that constitute a significant threat to the continuing effectiveness of the local organization. The question for the consulting team was for whom could this gap become motivating? The gap was symptomatic of the absence of a larger system of practice that could contain both sides of the dilemma in Figure 8, and the question of who in the governance framework had the authority to take up the dynamics that this dilemma implied, as well as who would be motivated to do so.

The two axes of practice

Figure 9 distinguishes the two axes of practice referred to at the end of the previous section: one is in the vertical direction of systems of practice that contain impossibilities that fall within the organization's definition of itself; and the other is in the horizontal direction, holding the relationship across a particular gap that represents a current limit to what the organization can contain:

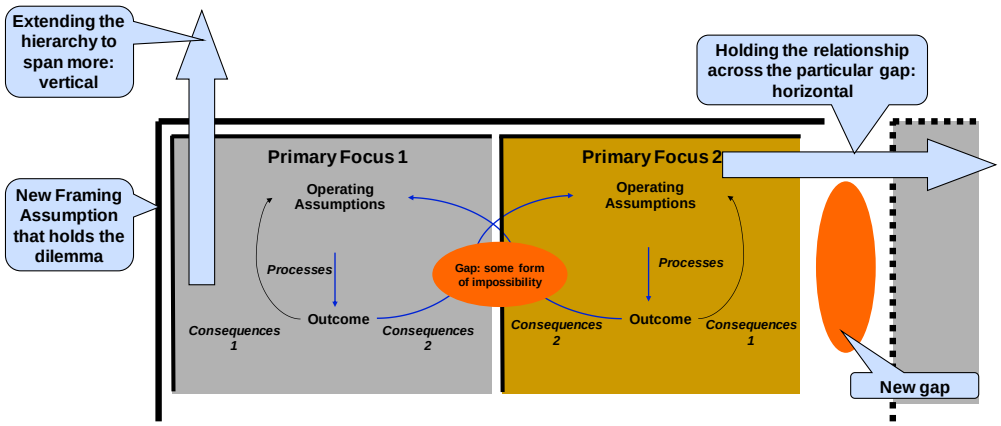

Figure 9: The Two Axes of Practice

The systems of practice available to the organization are sustained by the vertical axis, but not the implicit system of practice from which demand is emerging on the other side of the horizontal gap, at the edge of the organization. We therefore need to distinguish two kinds of motivation:

- Motivation coming from the gaps within the organization that become manifest as symptoms that cannot be dealt with by the current system of practice, and which drive the organization to develop its practices further; and
- Motivation coming from the relation to the gaps at the edge of the organization that are symptomatic of threats to the organization itself as it currently organizes its systems of practice.

In psychoanalytic terms, the vertical axis is an axis along which the systems of practice work, but for which gaps provoke anxiety about their ability to perform in accordance with expectations. The horizontal axis is different, however, in that this is an axis along which current systems of practice do not work on the 'other side' of the gap, so that the gap becomes a symptom that provokes anxiety about the effectiveness of the vertical axis *per se* (Boxer 2004): the efficacy of the organization *itself* is called into question. The particular issue emerging from our work with the client system was therefore to develop ways of enabling it to work with both forms of motivation. The corollary of this on the part of the consulting team was whether they were able to provide a sufficiently containing environment (if given the chance) to enable it to develop ways of containing the issues emerging along the horizontal axis.

Working Reflexively

If we look at the double challenge in terms of the forms of organization it requires of the enterprise, then it is only in the top-right zone that we cannot know what forms of demand we will be encountering, because of the turbulent nature of a demand environment that 'has a life of its own'. It is here that a balance had to be held explicitly between the two axes of meaning. The difficulty in doing this is that new gaps encountered horizontally may demand changes to the way the systems of practice are organized vertically: the horizontal axis is disruptive (Christensen, Johnson et al. 2002). Put another way, it becomes necessary for the organization to work reflexively (Boxer and Eigen 2008).

To work reflexively means the organization being able to examine the systems of practice (and their associated ways of making meaning) within which it is currently making sense of the problem(s) being presented by its demand environment. Accepting this challenge means putting those systems of practice into question, which will themselves be rooted in the way the organization does business. This is like riding a bicycle and fixing it at the same time. It is difficult because it means the organization must recognize what it may not have considered as important before, which may put its current definition of its competitive identity at stake.

Such processes are typically facilitated by consultants, but this means that the consulting team too must be able to work reflexively if it is not to get in the way of the client system's process. For the consulting team to work reflexively is to examine its own system of practice through which it is making sense of the problem being presented by its client system, and questioning its way of consulting that is rooted in its collective valency for how it takes up that relationship to the client system. Now the role of the consulting team too is at stake because it is committed to looking for what is in its own blind spot in recognizing what it may never have seen before. This is the consulting ethic that becomes necessary for working in the top-right zone in Figure 3.

In our case, this faced the consulting team with some difficult challenges. It had within itself the ability to focus on the technology issues to the exclusion of the other issues facing the client system in a way that exactly mirrored the client system's own tendencies. To succeed in helping the client system, the team had to contain its own differences in how it understood the wildland fire service within its larger context.

In Conclusion

The double challenge provides a way of understanding both the competitive pressures on the organization, and the way the individual experiences those pressures. And it is the horizontal axis and the relationship of the person in an edge role to authorization that makes the difference. We can summarize this difference in terms of different approaches to leadership. In 'Bipartite Leadership' we have leadership organized around the vertical 'authority' axis. This leadership involves both the leaders at the top of the organization, and those working within the organization, whether its professionals or its organized labor. The leadership comes from the way the tension between these two perspectives are held ('1' and '2' in figure 10). It is a tension because while the 'top' must concern itself with the direction of the organization as a whole, it is the professionals/unions who are dealing 'bottom-up' with the impossibilities embedded amongst the organization's systems of practice.

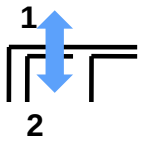

Figure 10: Bipartite Leadership

When we introduce the horizontal 'authorization' axis however, we introduce 'Tripartite Leadership'. This is the 'edge-driven' axis presenting the interests of customers that the organization is seeking to respond to individually within the context of their lives, for example doctors' patients, or service engineers' clients ('3' in Figure 11). In the case, those representing the interests of the horizontal axis were the incident commanders who had the job of mitigating the risks of wildland fires that had become too big to contain locally.

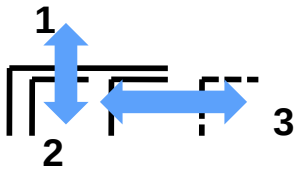

Figure 11: Tripartite Leadership

The need for tripartite leadership will only arise of necessity in the top-right zone in Figure 3 facing turbulence in the environment, and it introduces a new tension with both ends of the bipartite leadership. Used positively, these new tensions can generate demand for change (Beer, Eisenstat et al. 1990), but used negatively they marginalize those in edge roles while insulating the organization itself from the need to change (Boxer 2004). The different kinds of anxiety created by working on these different axes help us understand the different kinds of leadership needed in response.

About the Author

Philip Boxer is a senior member of the Integrating Software Intensive Systems (ISIS) initiative at the Software Engineering Institute of Carnegie Mellon University. He has consulted on strategy since 1980, supporting leadership teams across many different industry sectors, both public and private, in bringing about transformational change. His focus is on the challenges organizations face from asymmetric forms of demand, and on the mitigation of risks associated with failing to develop requisite agility. Philip has authored numerous articles and delivered presentations at conferences and workshops worldwide.

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