The law of requisite variety and team agility - The Bumble Bee

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> An obvious characteristic of nature's best teams is that they seem to have just the right amount of structure to handle their environments. Too much and they would be slow and cumbersome; too little and they would lack the sophisticated responses to protect their position in the food chain.

Picture Source: http://www.4greatapes.com/

This raises a number of big questions for human teams:

- How agile is your team to react to unexpected change?
- Is your team "over-structured" compared with its fast-moving external environment?
- How do you know if your team has the right amount of internal structure and relationships to handle whatever its external environment is likely to throw at it?

The answer is the "Law of Requisite Variety"

In 1963 **Ross Ashby** formulated **the law of Requisite Variety**: *when the variety or complexity of the environment exceeds the capacity of a system (natural or artificial) the environment will dominate and ultimately destroy that system.* (See Glossary)

The law tells us that *a "system" only has "requisite variety" if its repertoire of responses is at least as big as the number of different stimuli it may encounter in its environment*. A system without requisite variety will fail whenever it encounters the unexpected and as such is not a "viable system". We see examples of this all the time in business where an enterprise with a limited set of responses is unable to react to unforeseen stimuli due to a change in market conditions.

Inadequate variety

If your environment is more sophisticated in terms of complexity than your teams available responses then the moves will be simplistic and ineffective. This is inadequate variety and is like trying to drive your car by moving the passengers weights from side to side because you don't have a steering wheel.

Excessive variety

If however your team has too much structure then it won't be agile or fast enough to react to changes in its environment. This is excessive variety and is like driving your car with a such a complex dashboard that you need to dual control it with a co-pilot !

How does nature achieve Requisite Variety?

The levers for achieving requisite variety are the same whether it be a swarm of bees or an ant colony or a big cat hunting pack:

- **Mass** - enough members to cover the territory
- **Engagement** - members interact deeply in their local external environments
- **Randomness** produces variety - you might find unexpected "food"
- Supporting Team **Roles** - the team needs enough "foragers"

Randomness is an important enabler of variety. For example, researchers have painstakingly produced foraging maps which show the directions an ant colony will forage each day over a period of many weeks. From this work they have learned that an established colony seems to have up to about eight foraging directions. On any day however it uses only three to five of them. So ant foraging embodies a randomness principle to support requisite variety.

More anecdotally I have heard stories of African tribes who start each days hunt by effectively spinning a "sacred stick" to make a random choice of hunting direction. If they did not do this they would be at a constant risk of "over hunting" certain territories which had been successful in the past and missing out on new but unexpected food sources.

A human team can achieve Requisite Variety - but not by command and control!

All teams face two important structural challenges in achieving requisite variety.

Cohesion - allowing the members of a team to produce meanings beyond their personal needs.

Adaption - allowing the team to remain viable over time in co-evolution with they key players in its external environment.

If these structural challenges are inadequately addressed, for example through inappropriate command and control structures, then the team experiences what is known as *"Control Dilemmas"*.

Espejo [1] puts it like this:

"Management having lower *implementation variety than the autonomous units they control, cannot possibly maintain awareness of all that is going on within them;...Yet management knows that they are accountable for any loss of control. The anxiety to know more leads to increased demands for special reports etc; however in reality these demands only serve to reduce the variety of autonomous units, making them less flexible, as they struggle to fulfil increased management requirements at the expense of carrying out their own operations.....Because of the law of requisite variety management in the cohesion function cannot win with this type of control strategy"*

So how do you do it then?

Human teams have two options open to them in designing for requisite variety - **Amplification** and **Attenuation**.

Amplification

Amplification is where the team sets up cooperation with other agents in its external environment to amplify its ability to respond to stimuli.

For example an on-site IT support person is a way for the central IT Support Team to amplify its responses to a given customer.

Attenuation

The objective of *attenuation* is, through sampling, to reduce the number of signals the system has to listen to. Examples of this include exception reporting and "managing by walking around".

References

1. Espejo, R., 2003 *"The Viable System Model - A briefing about organisational structure"*

Tags: agility, organizational teams, requisite variety