Magus toolbox

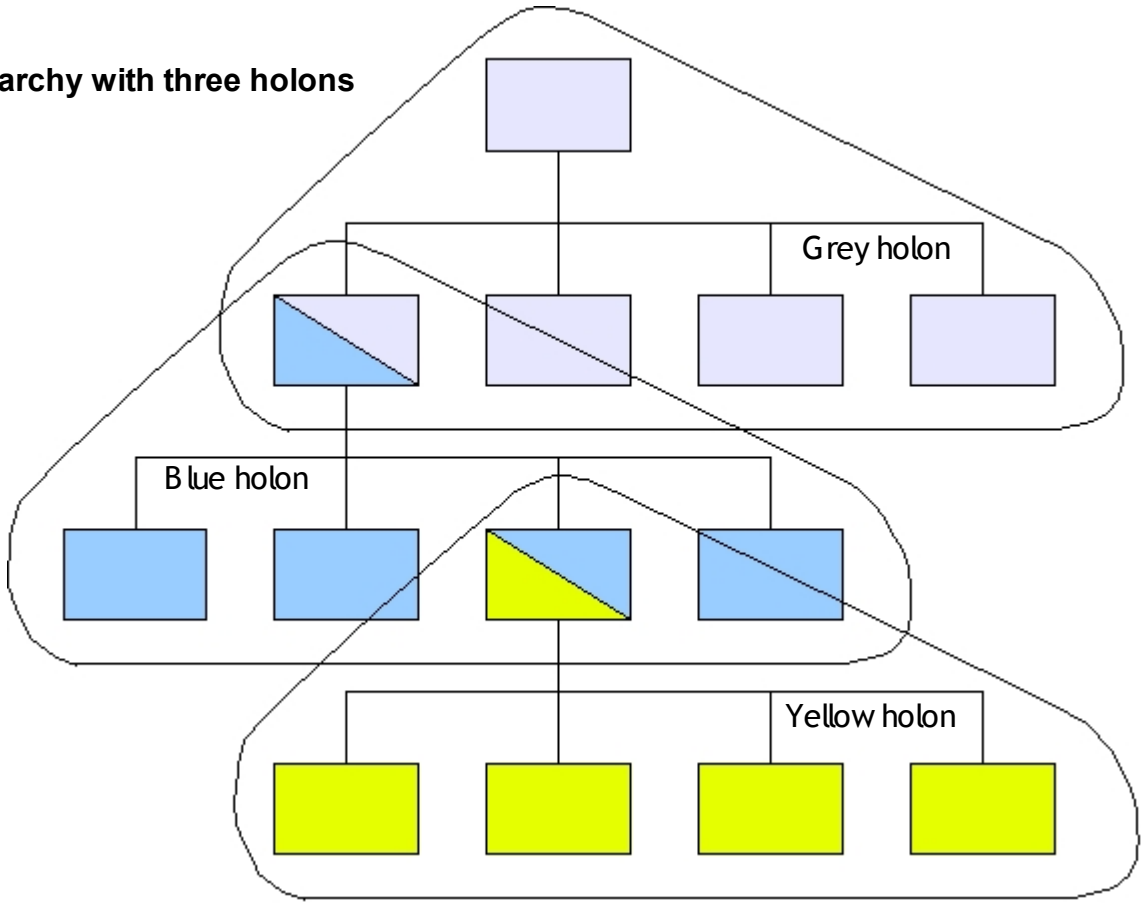
The Janus principle and complex adaptive systems in organisations

A very common form of organisation in nature is that of the hierarchy. A well recognised example is that of a tree. There is the (normal) hierarchy of roots under the ground, topped by an inverted hierarchy of branches that reaches for the sky. Each hierarchy has its own separate function within the ecosystem called a tree. The roots seek water under the surface, and feed it, together with various nutrients into the rest of the structure. The leaves on the branches apply a process called photosynthesis that uses the energy from sunlight to produce sugar, which cellular respiration converts into a fuel, (that is actually used by all living things).

When we look inside the physical structures of the tree, we see a similar hierarchical model being applied all the way down to the molecular and sub-molecular levels. Some of the headings that would apply are (in ascending order of detail) organ systems, organs, tissues, cells, organelles, molecules, atoms and sub-atomic particles.

The study of hierarchies in nature has revealed a number of lessons that can, with a little imagination, be applied to organisational hierarchies. Here are a few key lessons.

Hierarchy with three holons



First, a label and the meaning of the label. See the diagram below for an illustration.

Arthur Koestler suggested the name 'holon' as a label for the basic building block of all hierarchies. (Janus[1]: a summing up ~ Hutchinson ~ 1978). In the hierarchy illustrated in the diagram, there are three holons. These are identified by the three colours grey, blue and yellow. Koestler described holons as being Janus-faced. Each has a face looking down, and each has a face looking up. Where an element is a member of two holons, this is depicted by being dual-coloured.

The reason for selection of the name holon is that each hierarchical element acts as both a 'whole' and a 'part' – holons are sub-wholes. This gives the clue to the ability of holons to act in two quite different ways.

When acting as a whole, that is looking down in the diagram, the function of the holon is self-assertion. When acting as a part (of the whole ecosystem), that is looking up in the diagram, the function is integration.

The face turned downwards is one of independence and self-sufficiency. This is an hierarchical element that is equipped with self-regulatory devices and that has a considerable degree of autonomy or self-government. The face turned upwards is one of dependence and following rules dictated higher up in the hierarchy. There is little freedom at the interface with the 'next holon up', as integration can only work on the basis of conformance with the rules emanating from the higher holon.

It is common in natural systems for there to be simple rules that govern the behaviour of all holons. These should not be regarded, however, as being unduly restrictive. In practice they are rather like the rules of the game of chess. Those rules stipulate the only permissible ways in which the various pieces are set out at the beginning of the game, and the way that the players are permitted to move them. The strategies adopted by the players are highly variable as are the tactics they adopt, in response to the moves of the other player.

In this way, simple rules enable highly variable, adaptive strategies to evolve.

An important point that is observed in natural hierarchical systems is that the whole ecosystem will be healthy as long as the two functions of holons are in equilibrium. The independent, self-assertion, self-governing function has to be kept in balance with the dependent, integration, conformance function. Where either of these two functions takes precedence over the other, the whole ecosystem is now at risk.

If the integration function takes over, then the role of the holon to govern the behaviour of other, lower-order holons is at risk. Blind obedience to rules imposed from above ignores the imperatives of signals coming in from the environment outside the ecosystem. If the self-assertion function takes over, then chaotic behaviour in both the holon and lower order holons will ensue. By ignoring the contribution the holon plays to the health of the whole ecosystem, as defined through the set of rules prescribed from 'above', then higher level holons will cease to be able to play their part.

Another way of thinking about the two, complementary functions of holons is to consider them as signal processing devices. On the input side, as signals come in from the external environment (or 'down the hierarchy'), the holon scans the messages, filters out noise on the line and abstracts the essential meaning of the message. In this sense the

1 The Roman God of gates and doors, who hence had to face both ways

holon acts as a device to assess complex signals, and interpret them to simple codes or outputs.

On the output side, the holon triggers responses that make concrete the information in the incoming messages as actions. On this side, simple triggers (codes) convert to complex activities. This amounts to a translation of incoming signals into appropriate action.

It should be noted that, in this sense, internal (single ecosystem) holons interact, directly or indirectly, with other holons within the ecosystem, as well as external hierarchies in the local environment, to produce appropriate responses to incoming signals. Hence, the hierarchy with its multi-layered, multi-faceted holons represent part of the ecosystems survival system.

One last lesson learned from the natural sciences has critical echoes for managers thinking about their organisational hierarchies. It is about the way that ecosystems respond to applied stress – that is when the external environment suffers significant changes. Initially, the ecosystem responds by applying its simple rules to develop new adaptive strategies. When, however, the external changes can no longer be handled within the existing range of permissible patterns of behaviour, new patterns of behaviour are tried, tested and adopted if they work – that is, they help the ecosystem to survive. In this way, ecosystems adapt to a changing environment.

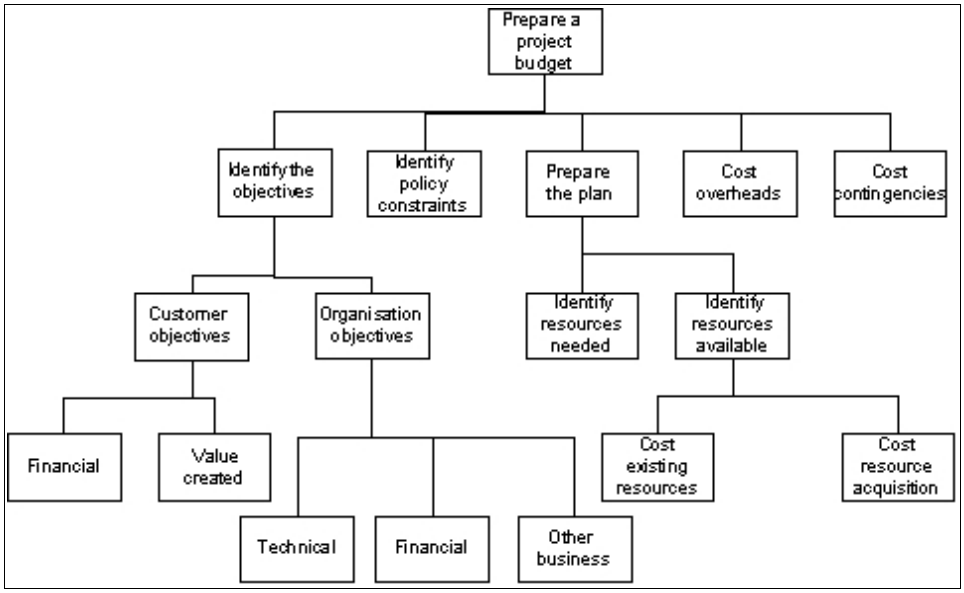
If, however, for whatever reason, the ecosystem is not able adequately to respond to a changing environment, then the process of adaptation will not be complete and the ecosystem will die. In passing, it is worth noting that this process often begins at the extremities of the ecosystem – those most closely in touch with the external environment. As has been noted, rigor mortis spreads inwards and upwards from the extremities.

Organisational holons – a quick skirmish with a complex topic

Before moving on to try to apply some of the lessons about hierarchies derived from the natural sciences, it may be worth pausing to reflect that business organisations have many hierarchies operating at the same time within one organisation. The most obvious is that of the formal organisational structure. This is the the one that so many senior managers insist on changing from time to time – redrawing the lines on the organisation chart - as if that will make any significant difference to the way the organisation system actually functions. Another thought - anyone who thinks that 'networked' or 'matrix' organisations do not have hierarchies had better think again. Talk to people in any of those networked or matrix functions, and you will always find that hierarchies are truly alive and well – under the surface.

Then there are the informal structures that actually drive real value through the organisation to customers and that enable the organisation to survive and, hopefully, grow and prosper. There are also hierarchies of knowledge and skills – that employees in a variety of roles need in able to do their jobs to at least an acceptable standard. There are hierarchies of power, which may align to the organisation chart but frequently do not. In spite of the current (sensible) addiction to managing horizontal processes, many processes follow the standard hierarchical form. The vast majority of assembly processes in manufacturing follow the hierarchical model, as do project management process. In the latter case, the hierarchy is turned on its side. Finally, there are social hierarchies throughout all organisations.

A skills example



If we regard (acquired) skills as operating at a reasonably detailed level in the organisational hierarchy, we can still draw some interesting lessons from thinking about how skills holons actually function.

The first point to note that we are talking about acquired skills, and not innate or instinctive skills. 'Acquired skills' implies an intentional process over time, that begins with an employee setting out to learn a new skill, so that a specific part of the job can be done. An example of a skills hierarchy is given in the diagram on the next page. (This is very much a simplified version of the full set of sub-skills needed for the top level skill 'Prepare a project budget'. It is also acknowledged that there are lateral and diagonal lines that could be added to the hierarchy diagram to increase the validity of the model. This is the characteristic of hierarchical holons to have relationships with other holons in addition to the vertical line noted above.)

For anyone who has never prepared a project budget before, there is a formidable set of skills to be acquired. This generally begins, via whatever learning mechanism is adopted, through a 'mental' or intellectual approach to learning to do the job. Over time and with practice, preferably reinforced with analytical feedback to complement the experiential feedback that arises through the results achieved, the new set of skills moves from the 'mental' or 'mindful' application of intellectual energy to the mechanical. The behaviour patterns acquired have become a routine which no longer requires a conscious effort of the intellect. It is important to note, however, that each project for which a budget has to be prepared will be quite different from all its predecessors. Here again is an example of a simple set of rules producing complex adaptive behaviour patterns. It is also important to note that while shifting to the mechanical level of skill application adds value in terms of efficiency, it brings with it the risk of rigidity.

The proficiency that the employee will need in preparing project budgets will be determined by the number of variables and unknowns that have to be processed while budgeting for a specific project – the difficulty level. Assume that, for the sake of this illustration, the number of variables and unknowns has been moderate. In that case, after the mechanical level of skill application has been achieved, providing only that the difficulty level is not ratcheted up, then the process of budget preparation will go ahead without too many problems.

At the point where a project arrives where the number of variables and unknowns has increased substantially, then the employee has a problem that has to be handled. Most commonly, the employee will shift away from the mechanical level of skill application, and revert to the mental or intellectual level. In this phase, new ways of applying the

'project budget' rules have to be worked out, tested and then applied. This may apply to the entire skill set, or just to some specific skill holons within it. It might, for example, only need the 'Cost contingencies' skill to be adapted.

Once the new pattern of skilled behaviour has been tested and applied, then it is time for the employee to move the new patterns, through repeated application, to the mechanical level again. A new complex adaptive strategy has been formed.

Suppose now, however, that a seriously complex project hits the desk, with an 'infinite' number of variables and unknowns. This is equivalent to extreme stress coming from the external environment. If the employee can find no way of adapting to the new need by applying the existing 'project budget' rules, then more drastic action is needed. This will, in effect, amount to rewriting the rule book, to develop completely new patterns of behaviour to cope with the demands of a project that simply cannot be budgeted using the existing rules.

In this transitional period, two critically important issues will arise. The first is that to develop the new rule book, test it, modify it, test the modifications and then adopt the new model will consume resources, probably the most immediate being time. The second is that while the new set of rules is applied, on the way to them becoming mechanical, there is a high risk of some failures. There is a requirement for the employee's manager to provide adequate time for the development and learning phase, and then to treat any subsequent failures that do arise as a source of open learning – for employee and manager alike. In short, there is a need for the employee's manager to give permission for the experimentation and new learning to occur.

If the employee's manager does neither, then a different kind of stress will occur, and it will not be stress from the local environment that is specific to the job itself. It will be that part of the environment that is provided by the manager. In these cases, all the usual responses to excess stress are likely to occur, including sickness, absenteeism – and ultimately exit stage left, or there goes another good employee lost to the competition!

If we revisit the lessons learned from the natural sciences, there is a risk here for the organisation at large. If there is no permission for the employee to learn a new pattern of behaviour, then the job will not get done to an appropriately high standard – rigidity will have struck. This particular holon – 'part' within the whole organisation or ecosystem – will cease to function. Since, as noted above, rigor mortis spreads inwards and upwards from the extremities, one specific example of failure to adapt may presage the failure of the organisation at large to adapt, and that points in the direction of failure of the whole system.

Generalising from the skills example

In summary;

- New skills have to be acquired through an intellectual process, and then, once acquired and in the name of economy or efficiency, shift to the mechanical level of application.
- When a signal from the external environment indicates the need for a new pattern of behaviour to be adopted, skills application moves back to the intellectual level.
- Then when adaptation has occurred, skill application shifts again to being

mechanical.

- The risk of the mechanical level is rigidity.
- Failure to adapt means that inappropriate patterns of behaviour persist.
- As rigor mortis spreads inwards and upwards from the extremities, the whole ecosystem (in this case employee) is at risk.

The question is this. If we restate this paragraph so that its target is a high level holon – the organisation at large – will it still be true? Let us try.

- New organisational behaviours (processes and systems) have to be acquired through an intellectual process, and then, once acquired and in the name of economy or efficiency, shift the to the mechanical level of application.
- When a signal from the external environment indicates the need for a new pattern of behaviour to be adopted, organisational behaviour moves back to the intellectual level.
- Then when adaptation has occurred, organisational behaviour shifts again to being mechanical.
- The risk of the mechanical level is rigidity.
- Failure to adapt means that inappropriate patterns of organisational behaviour persist.
- As rigor mortis spreads inwards and upwards from the extremities, the whole ecosystem (in this case organisation) is at risk.

That sounds like more or less standard stuff about how organisations adapt and survive. So, at the macro level, the generalisation appears to work. The next question is whether or not we can apply to organisations the more detailed lessons from the natural sciences, and the study of holons as well. So, here is a quick summary of four key lessons, but worded so as to fit an organisational application instead of nature.

1 Self-assertion versus integration

All organisational structural units, be they individuals, sections, departments, divisions or even whole business units are holons. That means they will display the characteristics of holons. One of these is that they will be Janus-faced, and have two competing sets of rules and behaviours. On the one hand they need to assert their independence – they are to a degree self-organising, self-governing entities, guided by simple internal rules that enable complex adaptive strategies to emerge. On the other hand, they need to integrate with the whole organism, and that means they need to conform to another set of rules 'handed down from above'

If these two sets of behaviour are in equilibrium, then all will be well. But if they get out of balance, then trouble will be looming on the horizon. No organisation can tolerate totally maverick behaviour by any organisational unit. This would mean the establishment of total independence, with the unit behaving as if the rest of the organisation did not exist – higher level rules would be ignored. Equally serious, however, would be the position where the demands for integration are so excessive that the organisational unit loses its ability to respond to incoming information signalling the

need for change.

In the first case, the ability of the whole organisation to adapt to a changing environment would be damaged. In the second case, the ability of the organisational unit and hence the whole organisation to adapt to a changing environment would be damaged. Given the observation that rigor mortis spreads inwards and upwards from the extremities, both cases will threaten the ability of the organisation to survive.

The lesson is clear. For all organisational holons the rules that govern behaviour must be clear and simple. The more they are shared up and down and across the whole organisation the better, since that will limit the risk of conflict. But a word of warning. The simple rules cannot be universal. Organisational holons have different functions to deliver, just like their biological analogues, and trying to impose one universal set of rules will spell failure. No tree can survive a position where leaves and roots slavishly have to follow an identical set of rules. Their behaviour needs to be different so the rules governing that behaviour must also be different.

One more point about the 'rules' – the rules need to be simple and flexible. Rigid rules, such as can arise with skill mechanically applied, add efficiency but rigidity as well. The more detailed and prescriptive the rules are, the greater the risks. Watch out for the bureaucrats! Detailed prescriptions about the 'HOW' mean that holons and employees have no permission to process incoming signals for change, interpret them and translate the learning into new patterns of behaviour. That requires a shift to the intellectual level of driving behaviour, along with experimentation and learning. That is simply not possible if the rules are too detailed and prescriptive, so, in a turbulent world, that is just another route to organisational death.

One implication of all of this is that the driver of behaviour of organisational holons is a complex combination of two sets of rules. Those learned through a process of adaptation by the holon itself, and those stipulated by the hierarchy external to the holon. It is to be hoped that the second set of (external) rules have also been learned through a process of adaptation, and do not have the characteristic of rigidity that occurs when learning ceases. Whatever the case, if the performance of the organisational holon goes off course, there are two places that an examination for cause has to take place, as there are two places where remedial actions will be needed. These are the two sets of rules that govern the behaviour of the holon. There is only the rare, exceptional case where the causes or performance problems and solutions to those problems reside solely in the holon itself. No holon is an island!

2 The core of the organisation and its extremities

As it is the extremities of ecosystems that are directly in touch with the external environment, so it is with organisations. In this case the extremities are operational people and their supervisors – operational holons. They are the holons that first experience changes in behaviour of customers or competitors. They are the holons that are hit by incoming information signalling the need for change. The key question is about how they respond.

What should happen is the shift from mechanical processing of information to the intellectual level. This is required for the information to be interpreted, instead of just generating a mechanical response. What follows is, perhaps, a simplistic and silly example, but hopefully it makes the point. The customer has always asked for 'yellow' and asks for yellow one more time. The response is to ship yellow, according to

whatever 'rules' govern the shipping of 'yellow'.

Suppose however, the customer asks for 'red'? The mechanical response would be to state that 'red' is not manufactured and supplied. A better response would be to find out why 'red' is being requested, and then to test the market to see if 'red' is being requested and supplied elsewhere – could this be a one-off event, or could it be signalling the start of a trend? The next step would to assess whether or not 'red' could be supplied from within existing resources and processes, and if that could be done profitably. If not, and a distinct shift in market behaviour is signalled, what would be required to adapt existing products and processes to meet the emerging need? Or could it even be possible to develop a 'red plus' product and steal a march on competitors?

But the shift to an intellectual response to the signal requires one critical feature in the integration relationship of operational holons with the rest of the organisation. The rules given to the organisational holon must explicitly give permission for the shift to take place. Permission must exist for the members of the operational holon to reflect on the significance of the signal, interpret it and translate the interpretation into action. This is an example of the 'signal processing' role of all holons – scanning messages, filtering out noise on the line and abstracting the essential meaning of the messages – and then providing an appropriate response.

Note that 'permissions' are seldom explicitly stated. It would take too many words describing what is and what is not permitted, and that would lead into the trap of excessively detailed and bureaucratic rules, and that, in turn, leads to rigidity. Real world permissions are symbolic messages contained in the design of structures and processes, and management behaviours – they come from the core of the organisation. (For a fuller discussion on the important topic of organisational permissions, please see the MTL paper 'Permissions and the resilient organisation').

But suppose the permissions are that operational holons shall only act at the mechanical level - an all-too-common condition. This is the condition where the integration function of the holon is no longer in equilibrium with the self-assertion function. The need for integration is preventing the self-assertion function from performing properly. Sounds like the organisation will fail to adapt to changing circumstances and that is likely to herald the slow death of the organisation at large. Remember – rigor mortis spreads inwards and upwards from the extremities!

3 High external stress levels and how to respond

All of the responses suggested in the section above are likely to fall within the range of adaptive strategies that can emerge from the application of simple rules. The game may be challenging, with a clever and resourceful opponent – but we are still playing chess. What happens in organisations, however, if the stress levels from the external environment rise to the point where the intellectual level response, within the existing rule set, no longer produces an effective response?

What is required is new learning – the creation of new knowledge - and that requires both an intellectual response combined with a new condition. This is learning through trial and error. Implicit is the development of a new set of rules – this is innovation at work. Observation of real world organisations suggests that this new type of learning works best through a process of problem resolution involving people from different functions. To use the language introduced above, members of holons have to work with members of other holons that are related vertically, laterally and diagonally.

The problem to be solved in this case is the stress applied by the external environment. The solution is a new set of rules that will enable new complex adaptive strategies to emerge, that will mean that the organisation can survive in the changed external environment.

The challenge for organisations is this. New sets of rules cannot emerge in an organisation governed by detailed, bureaucratic procedures. Neither can they emerge in an organisation that is heavily controlled as vertical silos. Equally serious is a management focus on short term results, especially of the monthly or quarterly budget variety.

Learning by trial and error is resource hungry, time consuming and risky. In the short term, there is generally a falling off of performance, not an improvement. Many attempts at new ways of working will fail. Treating these developmental failures as needing a witch hunt to assign responsibility is equally fatal to the need to create new learning. As a generalisation, if the holons' needs for integration take over at the expense of the need for self-assertion, there will be no learning, as trial and error will not be permitted.

The permissions that members of holons now need are complex and multi-faceted. They amount, at the least, to it being OK to:

- Challenge the existing way of working, even if it is a well established and successful model
- Break the rules
- Accept that 'we don't know all the answers right now' so that we can seek new answers
- Work on new ways of delivering value to customers – even if that means that shareholder value will take a short term hit
- Take time out to try new ideas – even if they do not all succeed
- Innovate without waiting for explicit management authority
- Take time out to reflect on developmental failures so that new learning can occur – through open, non-defensive dialogue
- Work across functional boundaries, even if that means that it is another function that reaps the reward, not the function donating the resource
- Live with short term performance hits, so that longer term gains can be achieved
- Establish simple new rules that will enable new, adaptive strategies to emerge

So, at times of high external stress, the need is for self-assertion to take precedence over integration. To avoid truly chaotic behaviour, there needs to be a clearly understood direction, for the experiential learning to follow. This is generally provided by some sort of strategic direction or strategic intent – the 'roughly west' variety is one accepted model.

4 Holons as signal processors – the intentionality exception

All of the lessons summarised above are a straight translation of the lessons from

nature. A key difference arises as soon as we play human beings into the equation, as these are uniquely capable of a level of intellectual behaviour that can include breaking even more rules – sometimes erroneously tagged as resistance to change. A good example is when the organisational holon receives incoming signals, not from the external environment, but from the hierarchy above. These include information stipulating the rules of integration.

When members of an organisational holon receive a new piece of information, they filter out noise on the line and abstract the essential meaning of the message. They then translate the signal into new behaviour, but that response may be very different from the intention of the organisational holon that was the source of the original signal. What if, given their different interpretation of the information, holon members conclude that observing the new rules may threaten the continuing existence of the holon? What if holon members conclude that the survival of the whole organisation is at stake?

Either way, the response is not likely to be blind, mechanical observation of the new rules. If the 'rules of the game' permit feedback up the line, that is the least that can be expected. If feedback is not permitted, then, in the former case, there are several different, well rehearsed responses that can be adopted. These range from ignoring the new rules (avoidance), fudging the image of what is happening, malicious obedience or flight. Either way, the organisation loses. In the latter case, where the perception is that the whole organisation is threatened, either feedback is permitted or it is not. If it is, then high level holons had better listen to lower level holons, in case their perception turns out to be valid. This would raise the question of why the new rules were issued without consultation in the first place, which would have completely side stepped the whole sorry series of events.

If feedback is not permitted, then flight is the only option that makes sense.

All of which is just another way of saying that superior knowledge, perceptions and insights are not the sole prerogative of holon members who happen to sit at or near the apex of the whole hierarchy. Specifying strategic direction or intent is fine, but specifying how holons should behave, in detail, without taking time out to discover why they behave the way they do is a touch risky. Bear in mind that all holons are subject to the need to create their own survival. Bear in mind also that most operational holons are directly in touch with the external environment, so they are hardly likely intentionally to create and apply patterns of behaviour that screw over customers or suppliers. That is not generally regarded as a good tactic to keep the monthly pay cheque arriving.

However wrongly, Theory X managers often suggest that employees show no creativity whatsoever, except when finding ways around the company rule book – at which point, it is alleged they become more creative than a cartload of monkeys. Perhaps managers taking this position might reflect on the probability that the 'creative, rule breaking' response is more about the nature of the rule book than any inherent characteristic of employees.

Given that all employees behave with intentionality, providing simple guidelines that enable complex adaptive strategies is a better way to stimulate creativity that adds new value to the organisation, than unwittingly directing employees towards rule-breaking creativity just to survive the daily round of their jobs.

A final note

By the way, please remember the comment in relation to the skills diagram. For simplification, all the lateral and diagonal lines were excluded. The same issue arises with organisational holons. All holons interact with others in the organisation, and with others in the local, external environment as well. Thinking about those relationships and interactions, the simple 'up and down' model is excessively simplistic. To truly understand the whole organisational construct needs to incorporate the idea of organisational networks as well. Moreover, these are also Janus-faced holons and will display the same sets of characteristics as the holons discussed above.

But to get into that dimension of the topic is beyond the bounds of this paper, and so must be left for another day. Next chapter coming up ...

