Complex Systems

"Complex Systems". It is a number of years now since I heard those words in an engineering lecture theatre and felt a shiver pass through the room. Thoughts of all those difficult maths equations came flooding back last week as I joined a group whose whole life is complex systems. But instead of sitting down with pen, paper and theoretical equations, these people attack modern complex situations much more physically.

Life used to be much simpler – in the days of paper. Information was printed or written down and then the visible atoms were transported to some resting place and awaited someone's interest. The "In Tray" was a readably understandable and quantifiable item. The complexity of the modern world comes from the effortless transportation of unbelievably large quantities of information – completely transparently as electrons and bits rather than atoms. There is nothing, any more, to get hold of, no visible representations of what is going on. That is where this group of people come into their own. They study such invisible situations and make them visible and understandable to the rest of us.

Most businesses and business processes grow. The once understandable becomes more complex and incomprehensible, but leaves us with the erroneous feeling that we are still understand and are in control. This team does not ask "what do you think is happening?" they visit the operation and audit what actually is happening as well as what you would like to be happening. They do this by asking a structured set of questions of the people involved in the business process. A graphical technique is then used to create moving coloured pictures of exactly what is happening – and we have discussed before just how good we humans are at analysing moving coloured pictures. The model is then re-worked to represent the system that is wanted – as opposed to that which is currently happening.

One of the first examples I saw was a call centre. After the initial audit a 3D representative model was created, which looked very much like any real call centre that I have visited. There were rows and rows or desks, with supervisors there - but at a distance. The model could be "exercised with traffic" and there was a pictorial representation of the call queue. Lights on the call centre agent's desks indicated if they were busy, free, or off duty, and occasionally one would get up from the desk and walk out of the room. It was all very realistic and understandable.

The model was then re-worked – the incoming calls being distributed in a more efficient manner and the call centre was "re-built". Now, instead of the rows of desks, the agents were sitting at a ring of desks on the outside of the room and the supervisors were in the centre. The new model was "exercised with traffic" in exactly the same pattern as before, but this time there was no call queue at all. This is good for the customer, instant responses with no more "All our agents are busy at the moment you are held in a queue" messages, repeated over and over and….! It is also good for the agents as the stress levels are significantly reduced – there being no queue of irate "do you know how long I have had to wait…" customers.

Both models were then played to the CEO and board members of the organisation. CEOs are very good at understanding moving coloured pictures – they are, like us students, very bad a complex theoretical equations. Once the CEO sees the advantages, systems usually are changed very quickly in organisations.

Now you can argue, quite correctly, that this process is not cheap, but a similar piece of work was done in a telephone company, and in a process that was costing $60 million each year, a saving of over £20 million was achieved. That is a saving of $20 million this year , and next year and the year after. Very soon the costs become minimal compared to the value.

In the old days of the "In Tray" we could understand what was going on, and it was very obvious that there was a problem if the in-tray became stacked too high. There was also an indication of another, totally different, problem if nothing ever was placed in that in-tray!

The project I was involved in was looking at the process of providing Broadband services. I have never dreamt that so much was involved in the provisioning system, and it did not take any rocket science to see the bottle necks and congestions that were causing the customer complaints.

As we travel deeper and deeper into the Information Age, techniques like these are going to be more and more essential.