

ASWEC 2006 – Complexity in ICT Systems and Projects Workshop

Shaun Wilson & Chris Skinner
Systems Engineering Society of Australia
www.sesa.org.au

1 INTRODUCTION AND ACKNOWLEDGEMENTS

Welcome to this *Complexity in Information and Communications Technology (ICT) Systems and Projects Workshop*.

The workshop is an activity of *The Australian Software Engineering Conference 2006 (ASWEC 2006)* that begins in earnest tomorrow ...

... and has been organised by Mr Chris Skinner on behalf of the *Systems Engineering Society of Australia (SESA)*. The support of the *Australian Computer Society (ACS)*, *Engineers Australia (EA)*, the *Australian Information Industry Association (AIIA)* and most especially *The Warren Centre for Advanced Engineering of the University of Sydney* are acknowledged also.

2 THE CHALLENGE OF INCREASING COMPLEXITY

SESA has recognised the management of complexity in systems and projects as a major challenge, especially as the pervasive nature of ICT facilitates a continuing rise in both the complexity and sheer scale of systems and projects across modern society.

Traditional Systems Engineering (TSE), which arose as a response to the rapid increase in the complexity of military and aerospace projects in the decades after World War II, has a proven history of identifying end-user needs and translating these into workable system solutions. As well as strong process underpinnings, as expressed in standards such as MIL-STD-499B and others, a fundamental pillar of TSE is multi-disciplinary teaming which has allowed it to cope with socio-technical systems integrating diverse technologies and to develop a sophisticated understanding of end-user issues through the application of formal human factors approaches.

However, the scale, heterogeneity and resulting complexity of many contemporary systems and projects is such that TSE is struggling to deliver satisfactory solutions. Why is this so?

Perhaps the answer to this question can be found in the nature of these systems: In many cases, they are composed of ‘parts’ which are standalone systems in their own right. One term for this is the somewhat over-used ‘system of systems’.

As noted by Norman and Kuras (2004) in their well-publicised MITRE corporation paper entitled *Engineering Complex Systems*, the individual systems that make up these systems-of-systems often:

- Don’t share a common conceptual basis;
- Aren’t built for the same purpose or for use exclusively within the ‘parent’ system-of-systems;
- In the case of military systems, share an acquisition environment which positively encourages them to be standalone;
- Have no **effective** common control or management;
- Don’t share common funding which can be directed to fixing integration ‘problems’ as required;
- Have many ‘customers’ of which the subject system-of-systems is only one; and
- Particularly in the case of ICT systems, evolve rapidly and at different rates (as do individual system components) subject to different, generally uncoordinated, pressures and needs.

Furthermore, some systems-of-systems aren’t ‘designed’ at all, instead being an opportunistic aggregation of existing or already-planned systems.

3 RESPONDING TO THE CHALLENGE

With a challenging problem space now laid out before us, we who consider ourselves practitioners in the complex systems field now have the day to make a start on more effective methods to manage complexity in ICT systems and projects.

To ensure that the results of this workshop are not lost, SESA has also agreed to underwrite the collection of papers from this and future workshops and to arrange for their publication by Sydney University Press.

I look forward to a constructive and stimulating day.

4 REFERENCES

Norman, DO & Kuras, ML 2004, *Engineering Complex Systems*, The MITRE Corporation Case #04-0043, viewed 14 April 2006, www.mitre.org/work/tech_papers/tech_papers_04/norman_engineering/norman_engineering.pdf