

**Dept of Industrial & Systems Engineering, NUS, Singapore
&
IEEE Engineering Management Society, Singapore Chapter**

JOINT SEMINAR

on

***Can Biology and Medical Science Help with Today's
Complex Engineering Problems?***

Speaker: Professor David W Stupples, City University, London, UK

Time: 3:00pm – 4:30pm, 8 June, 2004 (Tuesday)

Venue: EA-06-02, Faculty of Engineering, NUS

Abstract: Enhancing or updating complex public infrastructure with new elements of modern technology or changing the management processes involved often leads to a poor return on investment at best. At worst the infrastructure system could become unstable thereby undermining public confidence with some outcomes having dire safety implications. The problem is that the internal behaviour of an operational system is not really understood and is rarely documented. Any change to a system therefore, be it technical or process, could push the system into an unstable state by inadvertently allowing the system to move outside its control range, or by releasing unwanted non-linear emergent properties.

The human body has adapted over time to a changing environment and to a continual onslaught of bacterial and viral attack, its mechanisms can repair DNA damaged during cell division, and medical practitioners can successfully introduce new organs to a human body even though the donor DNA is totally alien to the recipient DNA. These biological events can happen whilst the human body is contained within its control envelope.

This seminar will review through case studies how major infrastructure systems become unstable when change is introduced. We will visit the biological and medical worlds to identify possible models that can be used in the engineered world, and finally we will investigate how these models could be adapted for use in future systems design.

Biography: Dr David Stupples is Professor Engineering Systems and the Royal Academy of Engineering Professor of Integrated Systems Design at City University London. His research covers the development of mathematical and simulation methods to investigate the performance and behaviour of complex engineered systems, and how to optimise designs given that the economics of ownership have a substantial impact in the decision process. His current research investigates how biological models and medical science can be assist in understanding how engineered infrastructure can be made to evolve effectively. David Stupples has worked in government research, in the US aerospace industry, and with a leading international technical and management consultancy as a senior partner.

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