***COMPLEXITY SCIENCE SEMINARS***

**29th October Wednesday: 13.00-14.00, Room: A108**

**Speaker:** **Prof A G Hessami**

Vega Systems, Systems & Control Centre

*“Systems Safety, Security & Sustainability Framework”*

**Abstract:** The incessant demand for better value, increased functionality and enhanced quality underlies the drive towards innovation and exploitation of emerging technologies. Whilst these bring a mixed bag of desirable properties in modern products, services and systems, they are often accompanied by complexity, uncertainty and risk. The performance of products, services, systems and undertakings is a measure of their utility, output and perceived or real emergent properties. The key facets to performance can be summarized as:

·          Technical

·          Reliability / Availability

·          Commercial

·          Safety

·          Security / Vulnerability

·          Environmental / Sustainability

·          Quality &

·          Perceived Value / Utility

Whilst the above dimensions are reasonably distinct and often inter-related, the key differentiation between safety and security aspects is broadly as follows; safety is freedom from harm to people caused by unintentional or random/systematic events whilst security is freedom from loss caused by deliberate acts perpetrated by people.  In this spirit, security is principally characterized by intent and causation as opposed to strictly being an output performance indicator reflecting degrees of loss or gain. Sustainability is a more complex attribute and encompasses societal, economic, environmental, resource and technological dimensions. Other than hard (Technical, Commercial) and soft (Quality and Value) performance criteria, the rest are mainly measured probabilistically in terms of risk or reward due to inherent uncertainties. The overall utility and success of any endeavor essentially amounts to getting the correct balance between these hard and soft performance attributes of the goal being pursued. The optimization of these factors poses a major challenge to the duty holders and decision makers today since it demands understanding and competence in social, behavioral, commercial, legal as well as technical engineering disciplines. In this spirit, systems assurance comprises the portfolio of methods, processes, resources and activities adopted to ensure products, services and systems are designed and operated to deliver a required blend of desired performance measures whilst remaining free from undesirable emergent properties which pose a threat to health, safety and welfare of people, commercial damage to the businesses and harm to the natural habitat.