SAID BUSINESS SCHOOL, University of Oxford

SEMINAR SERIES / TRINITY 2009

Convenors: Felix Reed-Tsochas, *Institute for Science, Innovation and Society, Saïd Business School*
Eduardo López, *Saïd Business School*

Tuesday 28th April
12.30 – 2.00pm
James Martin Seminar Room, Saïd Business School

Prof. Sanjeev Goyal
Faculty of Economics, *University of Cambridge*

"Robust Networks"

ABSTRACT

We study the problem of designing a network which is faced with an intelligent adversary. The key tension here is that, on the one hand, connections among nodes are critical to the efficiency of an organization, but that on the other hand, links represent a liability in so far as they also allow an adversary to reach connected nodes.

In the basic framework the designer chooses a network and the adversary chooses the nodes to attack. We show that the optimal attack strategy involves targeting a few nodes and ignoring the rest. Faced with this attack strategy, a robust network consists of equal size groups whose number grows (and size falls) as the attack budget of the adversary increases.

We then enrich the problem: the designer can choose the network AND defend a subset of nodes. Our main insight is that it is attractive to protect central nodes as this minimizes the prospects of indirect detection/infection. As reliability of defence grows the designer links more nodes to the protected nodes; with perfectly reliable defence the robust network is a star.

Our meetings intend to provide a forum for rigorous research (in a broad range of disciplines) focusing on complex adaptive systems, using methods and techniques such as agent-based modelling and complex network analysis. Since potential areas of application for such approaches can be located across the social, natural and engineering sciences, our aim is to involve participants from a wide range of departments in Oxford. We welcome talks which focus on particular areas of application and associated technical issues, but also encourage contributions which address more fundamental conceptual or mathematical problems. The CABDyN Seminar Series is one of the activities of the CABDyN Research Cluster (http://sbs-xnet.sbs.ox.ac.uk/complexity/).

Sandwiches and drinks will be provided

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