Network Management Education: My Views

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My Background

◆ Senior Researcher and Lecturer (Assistant Professor) in the Computer Science Dept., UCL, 1990-1997
  - Introduced MSc course on Network and Services Management (NSM) since 1992-93
◆ Professor in the Dept. of Electronic Engineering, University of Surrey, 1998-2007
  - Developed further the above MSc course, updating the syllabus and introducing new areas as they were emerging
◆ Professor in the Dept. of Electronic and Electrical Engineering, University of Surrey, since January 2008
  - Continue teaching the above Network and Services Management MSc course
Other Related Teaching

◆ I have also been teaching Telecommunication Networks (synchronous transmission, SS#7) emphasising relevant management needs
  ● Relevant examples used in the NSM course

◆ I also have also been teaching Advanced Data Networks (IGP/BGP routing, MPLS)
  ● Essential background for the Traffic Engineering aspects of the NSM course

◆ I also teach Advanced Object-Oriented Programming
  ● Important background for the NSM lab assignment
My NSM Current Course Content

- Introduction to network/service management
- Manager-agent model. Open Distributed Processing model.
- Examination, comparison and examples of:
  - Internet SNMP, OSI Systems Management, OMG CORBA
- Hierarchical management, the TMN model
- Service and network management relationship
  - Service impact on the network, monitoring, provisioning
- IP Network configuration
  - Intra-domain Traffic Engineering (MPLS and OSPF configuration)
  - Inter-domain Traffic Engineering (BGP configuration)
- Quality of Service Management
  - Intra- and inter-domain example architectures and approaches
NSM Lab Assignment

◆ Lab-based programming assignment in Java using AdventNet SNMP and JDK CORBA
◆ Students build a series of monitoring programs
  ● Retrieve a SNMP table with dynamic entries (TCP connections), then optimise this retrieval
  ● Periodically retrieve a byte counter (ifInOctets, ifOutOctets) and produce a bandwidth rate through a moving average algorithm
  ● Wrap this up as a CORBA object and instantiate a numbers of these remotely through a factory (using also the name server)
  ● Assign a threshold to the bandwidth rate and trigger an event when crossed upwards that is received by a manager object
◆ They learn a lot and assimilate the theory
◆ Those who cannot program well do an essay-based assignment
  ● This year they are looking critically at Web Services
Other NSM Content

◆ In the past there was material on integrated network/service management and control architectures
  ● TINA, OSA

◆ Another version that is offered to BT employees has much more service management material
  ● TMF eTOM, ITIL, NGOSS, etc.

◆ Need to bring some of this into the academic NSM module but this stuff is difficult to examine
  ● Cannot easily reason about, not academic enough
NSM Teaching

- No single book covering relevant material
- In fact, the existing books address protocols (SNMP, CMIP/TMN), case studies (the 2 IEEE Press books) or are too general for such a course
- A good book and an agreed curriculum would be of great benefit to the community
- I have actually recruited many of my PhD students through this module and subsequent MSc projects
Summary

◆ My MSc course has been very successful over the years
  ● But students ask for a reference text book
  ● The viewgraphs of my notes are publicly available from my personal Web pages
◆ Lack of an agreed course structure and textbook
  ● This could add value to the area
  ● It would also prove that this is a valid scientific area
  ● It would help in attracting more PhD students and be beneficial to the community as a whole