Overview

- Selected examples of activities
- Research: Remarks on RAE2001
- Teaching and Learning
  - Failure statistics and recent actions
- Departmental Culture (Personal View)
- Analysis of Academic Planning Budget
  - Adverse effects of under-investment

Trajectory for future
Examples of Activities

• Large research grants: e.g. EPSRC Interdisciplinary Research Centre on Advanced Knowledge Technologies
• Interdisciplinary research: e.g. Bioinformatics support for Bio-Medical Sciences and Obstetrics
• Innovative teaching: e.g. Genesys Solutions Ltd.
• Public understanding of science: e.g. Magna Trust
• Industrial contacts: e.g. Games Technology Centre
• Authored Books: e.g. Alan Watt’s 3D Graphics

Mathematical and Computational Support for Biologists
Mouse eye & ear development
Research Assessment Exercise

• Monotonic Increase in RAE achievement, measured by
  – Publications
  – Research environment
  – Grant Income
  – External Visibility

![Exponential Growth in Quality](chart.png)

HEFCE Grant to DCS
620K in 2001/02
1.1M in 2002/03

Lessons from RAE2001

<table>
<thead>
<tr>
<th>Institution</th>
<th>#Submitted</th>
<th>Grant £000</th>
<th>RA</th>
<th>RS</th>
</tr>
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<tbody>
<tr>
<td>Cambridge</td>
<td>34</td>
<td>45</td>
<td>0.6</td>
<td>2.4</td>
</tr>
<tr>
<td>Southampton</td>
<td>26</td>
<td>62</td>
<td>1.5</td>
<td>2.5</td>
</tr>
<tr>
<td>York</td>
<td>39</td>
<td>50</td>
<td>0.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Imperial</td>
<td>42</td>
<td>58</td>
<td>0.6</td>
<td>2.0</td>
</tr>
<tr>
<td>Edinburgh</td>
<td>87</td>
<td>37</td>
<td>0.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Manchester</td>
<td>55</td>
<td>44</td>
<td>0.9</td>
<td>1.6</td>
</tr>
<tr>
<td>Average 5* submission</td>
<td>47.8</td>
<td>49.3</td>
<td>0.82</td>
<td>1.78</td>
</tr>
<tr>
<td>Sheffield</td>
<td>23</td>
<td>44</td>
<td>1.0</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Big is beautiful?
Notes on External Funding

• More of the money is becoming available in initiative driven large chunks:
  IRC, E-Science, Framework VI

• Only a small number of Faculty bring in research grants
  – But this may be true of other Departments too

University’s Mission Statement

to maintain the highest standards of excellence as a research-led institution of international standing, whose staff work at the frontiers of academic enquiry and educate students in a research environment

RAE 5 Quality [...] of international excellence in up to half of the research activity and to national excellence in virtually all of the remainder.

RAE 5* Quality [...] of international excellence in more than half [...] national excellence in the remainder.
Observations

- Our alignment to the University’s mission statement has room for improvement…
  …even if we have reservations about the instruments with which the gap can be measured

- ~40% of the research submitted for assessment was either
  - Not done in Sheffield
    [Niranjan, Mendler, Gheorghe, Luetgen, Wu, Guthrie]
  - Done by full time researchers
    [Cunningham, Bogdanov, Gotoh]

Exploiting Opportunities

- Information, Speech and Language
  - Multi-modal retrieval and extraction

- Computational Biology
  - Systems Biology
  - Data driven modelling

- Visualization, Graphics and Games
- Distributed Computing: Grid and E-science
- Artificial Intelligence, Robotics
- Decision support in Medicine
- Software in crime, terrorism, security
- Nano-technology; DNA and Membrane Computing
- Computational Neuroscience

Sources of Large Funds

New Sources of Research Funding
Teaching and Learning

- Commitment to Teaching
- Innovation in Teaching
- Teaching Business
- Teaching Quality Issues
High Commitment to Teaching and Learning

- Equal teaching load carried by all academic staff
- ~220 contact hours per year per academic
- Policy of Professors teaching at L1 and L2
- Effective actions when necessary:
  - e.g. COM161 issue with Aerospace degree
- Ability and willingness to teach outside area of speciality
  - e.g. E-Commerce module from specialist in Auditory Scene Analysis

Innovative Teaching in DCS
Teaching Business £££

• Sharp drop in Home UG - Compensated by expansions elsewhere

• New Courses
  – Dual UG programme (CPE, PHY)
  – Data Communications MSc (with EEE)
    • Intake in 2001/02 20
    • Intake in 2002/03 40
  – Advanced Computer Science PGT 2001/02
  – Functional Genomics possible 2004/05
  – Many other ideas being actively developed

Teaching Business £££

• Lessons from Mobile Communications initiative

“Don’t mention Srba”

Ancient Chinese Proverb:

“Build the research base before launching a degree programme”
Failure Statistics

- Re-sit rate presented to Academic Strategy Group in November 2001; DCS identified as problem

- Visit by Faculty Deans (Professors Frisby & Holcombe) to Department in February 2002; tough questions:
  - “What are you going to do about this?”
  - “What is the acceptable failure rate for a module?”
  - “We are here to help you”

- Several causes identified and actions put in place

Causes of High Failure Rates

- **Half-Modular Structure**
  - Reporting assessment in 10-credit chunks;

  Ancient Chinese Proverb:
  *You assess more; they fail more*

  \[
  p = 1 - (1 - 0.05)^{12} 
  \]

  \[
  = 0.46 
  \]

  - Amount of material:
    - 2 * 10 credit half modules > 20 credit module
Causes of High Failure Rates

- **Heavy Curriculum**

  External examiner comments:
  curriculum has more advanced material than at other Universities

  MN: “the top end of DCS graduates comparable to Cambridge Engineering graduates”

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Causes of High Failure Rates

- **Students**
  - Large variation in motivation
  - Large variation in abilities

  This is more true for Computer Science than for other Engineering disciplines
Causes of High Failure Rates

• Diminished Faculty Motivation
  – Increasing culture of complaint amongst student body
  – Increasing culture of blame from Quality Assurance Process

Causes of High Failure Rates

• Resources
  – Student Staff Ratio at 20:1 (see graphs later)
  – Admin Support (see graphs later)
  – Laboratory: Space and Equipment

Learning to Program is very different from:

• History - How did the wives of Henry VIII die?
• Electronics - Small signal model of transistors?
• Vibrations - Second order differential equations?

The cognitive demand on the learner is to be creative right from the beginning
Actions taken recently

• Increased lab-based teaching
  – e.g. COM161 Java Programming  (2002/03)
  – e.g. Pattern Processing  (2002/03)

• Review of modules with high failures in 2002
  – each module reviewed by two lecturers  (Summer 2002)

• Review of Coursework set at Level 3 modules
  (Summer 2002)
• Inflated credits on L3 dissertations (40 to 60)
  to reduce workload on students  (Session 2002/03)

Actions taken recently

• Link modules at L1 to report marks in 20 credit units  (Summer 2003)

• Plan future new modules in 20 credit units for content and assessment  (Session 2003/04)

• Assess any 10 credit unit only by exam or by coursework  (Session 2003/04)
Department Culture & Desirable Change

Predominantly teaching-centric culture

- Most teaching committee actions tend to increase teaching load on academics
- Several members of Faculty do not see external funding for research as part of their job

Department Culture & Desirable Change

- Suggestion for change in teaching is usually met with strong opposition; e.g.
  - “large failure rates because new HoD has scaled down the Tutorial system”
  - “you are anti-teaching”
  - “this is attacking our heritage”
  - “this is butchering the teaching programme”
Head of Department’s Vision

Culture change towards Research centric thinking

What is needed to achieve change?

• Tight control of the teaching programme  
  – 2001/02: 62 half modules taught by Faculty
  – 2002/03: 48 taught by Faculty + 5 buy-in
    [Allocation managed by MN]
  – 2003/04: 51 taught by Faculty + 3 buy-in
    [Managed by Teaching Committee]
  
• Reduction in Faculty teaching load (2.5 modules to 2.0 modules)  - has limitations

• Investment compatible with goals of the University  
  - purpose of this meeting

Next: Analysis of ADC Figures
2000/01
Income 3676 K
Expenditure 3002 K

2001/02
Income 4292 K
Expenditure 3052 K

Increase in Income: 674 K
Increase in Expenditure: 50 K

What contributed to the 674 K increase?

157 K from Re-banding 1.8 to 2
142 K from increased research
333 K from fees and increased overseas
Research Vs Teaching

Not Possible
Not Desirable

CUED
SHU
Adverse Effects of Under-Investment

1. Hurts Teaching Quality
   - criticisms from external examiners
2. Hurts Recruitment
3. Frustrates & de-motivates Faculty:
   - hurts career advancement
   - Mendler, Luettgen, Wu resignations
4. Reduces research output

There is clear evidence for (1), (3) & (4)
(2) is not impossible

How can the problems be solved?

• Teaching laboratory:
  investment in space and computers
• Secretarial support:
  transfer two secretaries
• Student- staff ratio:
  invest to reduce SSR to sensible levels
• Better NSB to support innovative teaching ideas:
  e.g. Robotics lab
How can the (teaching) problems NOT be solved?

• Increased TQA type red-tape; Inventing more forms to fill
• Blaming it on individual academic staff
• Blaming it on students
  – student abilities (when they come in)
  – motivation (when they are here)

Space and Environment

• Inadequate teaching laboratories has direct impact on quality of teaching

• Research space is sufficient for current volume; can only accommodate growth in
  » HSL site
  » ICoSS
  We are involved in both these
Serious space difficulties

More Research Assistants in Open Plan Offices

Professors in BIG Offices could share
**Investment: Laboratory**

- **URGENT need for Additional Teaching Laboratory**
  - Space 250 sq m
  - Equipment 80 good computers, Software & regular upgrades

- **Ideas:**
  - Commercial activity in Regent Court
  - Build a Dome/Tent over Courtyard
  - Genesis in Innovation Center

**Investment: Staffing**

- **Permanent Contracts**
  - Graham Bates, Stephanie Portier

- **Two secretarial posts**

- **Senior Level**
  - Lyn Walker from AT & T Laboratories, New Jersey  
  - Transfer 80% Rod Smallwood from Medical Physics  
  - Fabio Ciravegna following Information Studies Chair Interview  
    - Done

- **New Blood posts**
  - Kalina Bontcheva, Barry Norton, Marta Milo

- **Lectureships**
  - Distributed Computing, Speech Sciences

- **Teaching Assistantships * 3**

- **Software Engineer in Genesys; Junior technician**
How do we come into alignment with University’s Mission Statement?

Research Vs Teaching

Not Possible
Not Desirable