Export Licensing of Intangibles

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The government proposes, in a recent white paper, to bring 'intangible exports' within the export licensing regime. This will have highly unpleasant effects on universities and on the UK science base generally. For example, it will become an offence to give foreign nationals (including colleagues and students) access to a lot of software and other technology in electronic form, or to impart a narrower range of technologies 'relevant to weapons of mass destruction and long range missiles' orally or by demonstration. Previously, only the export of material goods was covered by the regulations. The White Paper may be found at `<http://www.dti.gov.uk/export.control/stratex/>`.

It is important that the academic community make its objections known by the 30th September to the responsible minister, the Rt Hon Peter Mandelson, and through whatever other channels as may be available.

The proposed regulations would have their most severe effect on science, technology and medicine. For example, the teaching of medicine to a foreign national would appear to require a licence; many of the core curriculum subjects, such as bacteriology, virology, toxicology, biochemistry and pharmacology are central to a chemical and biological weapons programme (indeed South Africa's programme was set up and run by PW Botha's personal physician). Other subjects where 'oral export' could be problematic include not just nuclear physics and chemistry but also aerodynamics, flight control systems, navigation systems, and even computational fluid dynamics.

The broader list of technologies whose export 'electronically' would become subject to licensing is set out by international treaty (though the DTI could no doubt add extra items if it wished). The relevant treaty, known as the Wassenaar agreement, covers most of the subjects of interest to scientific and technological researchers, whether directly or through the tools we need to use; see the list at `<http://jya.com/wa/watoc.htm>`.

For example, a physicist doing research in single-electron memories may use an electron beam litho machine to make prototypes, and this equipment is on the list as it can also be used to fabricate masks for military semiconductors. Existing regulations merely control the physical export of the machine, and so do not intrude much; but the new regulations will mean that all the researchers who need access to its software (which is all of them) will need to be UK nationals or have personal export licences.

The proposed regulations would cover most of our research in computer science (fast networks, high performance computing, neural networks, real-time expert systems, hardware and software verification, reverse engineering, computer security, cryptography) and could even force a rewrite of lecture course and project material. The Department of Engineering would be hit by the listing of numerically controlled machine tools and fibre winding equipment, robots, optical amplifiers, software radios and aero engine control systems, as well as many lasers, gyros, accelerometers and similar components. The restrictions that previously only applied to physical hardware objects will be extended to the software used to design, test, control or operate them, or to integrate them into larger systems.

There will be a very severe impact on collaborative research across national boundaries, including the EU funded research which now accounts for a large proportion of our science base. Such collaboration necessarily involves many intangible exchanges of technology. Recently, for example, I worked with scientists in Norway and Israel to develop a candidate encryption algorithm for a US government competition. This involved sending over 400 emails back and forth, many containing fragments of source code. The DTI has confirmed to me that in future such exchanges will require a licence.

As three-quarters of Cambridge's research students in science and technology are foreign nationals, licensing will have a significant impact on the research base. The added delays and uncertainty involved in export licence applications will add to the pressures on departments; and it remains to be seen whether the licences would be sufficiently broadly phrased to support current ways of working, in which researchers move at will from one topic to another, and form ad hoc collaborations to tackle particular problems.

The proposed regulations will also have an adverse impact on undergraduates, particularly blind and deaf students who require course materials in (controlled) electronic form rather than (uncontrolled) paper form. As more and more course material comes to incorporate software and other electronic components, the number of students affected will increase until it includes essentially all foreign nationals studying in the School of Technology. Not all student collaborations are closely supervised: for example, our second year computer science undergraduates undertake group projects in teams of six or seven, and several of these projects in an average year will not only incorporate controlled technology but also have foreign nationals on the team. To prevent unlawful technology transfers, we would have to introduce tiresome administrative measures or greatly restrict the choice of project topic.

The effect on the many high-tech companies in Cambridge would also be severe. These companies, many of them set up in collaboration with members of University departments, produce all sorts of intangible yet potentially licensable products, ranging from software for GSM phones, network computers and engine controllers, through designs for ATM switches and other chips.

The likely effect on 'Cambridge plc' can be inferred from the effects of US export regulations on a UK multinational (the USA is the only major country that controls intangible exports at the present time). This company uses supercomputers in mineral exploration, and the effect of the regulations is that it cannot construct the global data network that it wants; the US government fears that this might allow a Kazakh or Burmese employee to have access to controlled software. A senior manager described the result as 'having to implement

US foreign policy on every machine on my network'. If he also had to implement UK foreign policy, operations would grind to a halt whenever there was a clash. Placing such burdens on industry would seriously affect our collaborative research projects with them.

There may well be legal challenges to the policy. Opponents will argue that it fails the test of proportionality, especially since the proposed controls were clearly not required during the Cold War. They will argue that while one may well decide to curtail long-established academic liberties because something bad has happened, it is excessive to do so because a bad thing might happen, but hasn't. Although it may in theory be possible for a rogue government to acquire harmful know-how by sending students to British universities, we have not seen any evidence that it occurs in practice.

Even in the absence of legal challenges, requiring academics to get licenses to do their work when they had previously been left to get on with it will give rise to furious protests, and will lead to widespread contempt for the DTI. There will be attempts to make licenses conditional on academic behaviour: a senior civil servant informed the author that we had better drop our opposition to the so-called 'voluntary vetting' scheme whereby some universities agree to forward details of third world applicants for technology PhD places to the security services, who then advise them (for example) not to let Pakistanis or Chinese do doctorates in computer security. Cambridge and Oxford have always refused to participate, taking the view that the FO can if it wishes always refuse a visa. Bringing the academic community inside the arms export licensing system will cause such disputes to proliferate and fester. In the long run, creating a mechanism that can be used by DTI civil servants to punish individual academics — without due process or the possibility of appeal — will seriously impair academic freedom.

Even if academic freedom is not considered to be the DTI's problem, the effects of the proposed policy on the credibility of the export control regime should be considered. A government concerned about proliferation via academic channels should seek the support and cooperation of academics rather than passing a law certain to antagonise them.

The Secretary of State for Trade and Industry has publicly expressed his intention to exercise much closer personal control over British science (Research Fortnight, 5/8/98). The main obstacle to this at present is the low regard in which the DTI is held by most academic researchers. The present proposals will deepen that and entrench it rather than helping to rebuild trust and respect.