NUCLEAR AND RADIOLOGICAL SKILLS STUDY

Report of the Nuclear Skills Group

PART 2

ANNEXES

Issue 1

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NUCLEAR AND RADIOLOGICAL SKILLS STUDY

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Annex A

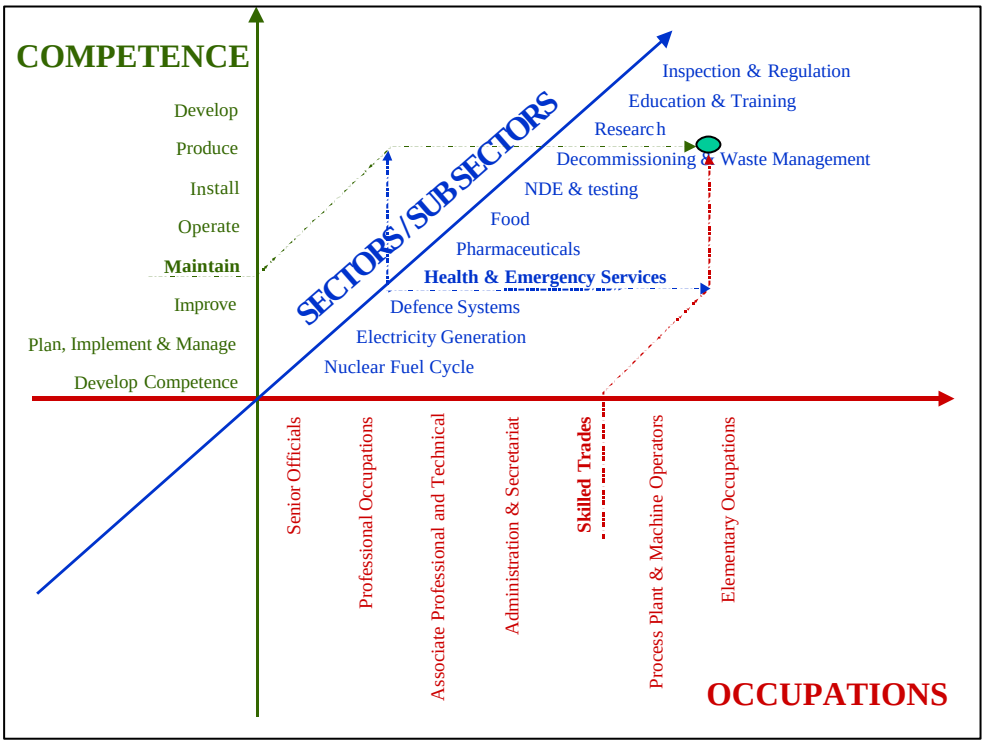
SECTOR STRUCTURE

SECTOR MODEL

The Skills Audit considered a 3-Dimensional model of the industry, the axes being:

- Skill Sub Sector
- Competence
- Occupation

The model can be visualised thus:



Each node (eg a Skilled Tradesman, conducting Maintenance in the Health sub-sector) will be made up of a collection of Roles, and each Role will have a number of Attributes (education, training & experience) which a person must have for them to be competent to perform that role.

A worked example of a nuclear power submarine and fleet of submarines is at Worked Example

SUB-SECTORS

The nuclear and radiological sector is composed of a number of sub-sectors. Eleven sub-sectors were chosen for analysis:

	SKILL SUB SECTORS	KEY WORDS
1	Nuclear Fuel Cycle	
2	Electricity Generation	
3	Defence Systems	
4	Health & Emergency Services	
5	Pharmaceuticals	
6	Food	
7	NDE & Testing	
8	Decommissioning & Waste Management	
9	Research	
10	Education & Training	Teaching (as opposed to Learning)
11	Inspection & Regulation	

Sub-sectors can be further sub-divided, eg defence systems could be sub-divided into propulsion and weapons, however the audit considered the above eleven sub-sectors only in the first instance. If more detailed analysis is required, this will need to be the subject of a later exercise.

Differentiation has been made between teaching and learning. Teaching is the ability to impart skills to others, and is a sub-sector in its own right, whereas learning is the ability to benefit from teaching. The ability to learn, or 'develop one's own competence', is defined by the Occupational Standards Council for Engineering (OSCEng) as a competence each individual must possess.

Return to SKILL SECTOR STRUCTURE

COMPETENCE

Competencies define the generic purposes to which skills are applied and are based on the Occupation Standards Council for Engineering (OSCEng) 'Statements of Competence'. The eight Competencies are:

	COMPETENCE	KEY WORDS
1	Develop [product or process]	Research, Design, Develop, Specify, Requirements
2	Produce [product or process]	Manufacture, Produce, Production
3	Install [product or process]	Construct, Install, Commission, Decommission
4	Operate [product or process]	Operational Requirements, Operate
5	Maintain [product or process]	Maintenance Requirements, Maintain, Repair
6	Improve [product or process]	Regulate, Quality, Compliance, Test
7	Plan, implement & manage [projects]	Project Management, Support Services, Risk Management
8	Develop own competence	Learn (as opposed to Teaching) Experience

The eight competencies can be applying globally to the sector or to individual sub-sectors by considering the products and processes that constitute each sector / sub-sector.

Return to SKILL SECTOR STRUCTURE

OCCUPATION

Occupations define the type of person who applies a skill and are based on the Standard Occupational Classification used by the Office for National Statistics (ONS). The seven occupations[1] are:

	OCCUPATIONS	KEY WORDS / NOTES
1	Senior Officials	The term Manager is avoided, as many professionals and associate professionals are also managers; this study is concerned with their professional skill
2	Professional Occupations	Chartered Engineer, Scientist or equivalent
3	Associate Professional & Technical	Incorporated Engineer, Scientist or equivalent
4	Administration & Secretariat	
5	Skilled Trades	Technician Multiple Skill / Advanced Modern Apprenticeship
6	Process Plant & Machine Operators	Craft, Mechanic Single Skill / Foundation Modern Apprenticeship
7	Elementary Occupations	

Return to SKILL SECTOR STRUCTURE

[1] The ONS uses 9 Standard Occupational Classifications. These include 'Personal Services' and 'Sales and Customer Services', occupations that are outside the nuclear and radiological skill sector. Hence the Nuclear Skills Audit will consider 7 occupations only.

ATTRIBUTES

Attributes define the education, training and experience needed by a person to perform a role. Six attributes were considered:

	ATTRIBUTES	KEY WORDS / NOTES
1	Level of Competence	5 Company / National Expert 4 Teach Role to Others 3 Perform Role Unsupervised 2 Perform Role Supervised 1 Recognise Role (These are akin to NVQ Levels 1 to 5)
2	Academic Qualification	Based on the Universities and Colleges Acceptance Service classification (UCAS).
3	Vocational Qualification or Certificate of Competence	National Vocational Qualifications Scottish Vocational Qualifications Certificate of Competence, eg COSHH
4	In House Training	Length of In House Training, in addition to external education & training, needed to be considered competent.
5	Length of Experience	Length of Experience needed to be considered competent.
6	Membership of Professional Institute	

In-House training and Experience are both measured in time:

- In-House training is a complex combination of different training. An example of available in-house training (Ministry of Defence) is at MoD In-House Training. This lists 19 courses, 5 of which lead to an academic qualification, 1 to a competence certificate and 13 are in-house training. By comparison, a total of 76 In-House Training Courses, covering similar subject matter but applied to AGRs, have been identified within British Energy.
- Although similar occupations and competencies in different companies will require similar training, it is difficult to equate one company's training with another.
- The length of training and experience is a measure of the additional skill development a company must apply to a nationally qualified person to convert them to a competent person within the company.

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UNIVERSITIES AND COLLEGES ACCEPTANCE SERVICE CLASSIFICATION

B Subjects allied to medicine
B1 Anatomy/Physiology
B2 Pharmacology
B3 Pharmacy
B8 Radiography
B9 Other subjects related to medicine-based sciences
C Biological sciences
C4 Genetics
C5 Microbiology
C6 Molecular Biology/Biophysics
C7 Biochemistry
C9 Other biological sciences
D Agriculture and related subjects
D1 Veterinary science
D4 Food science
D8 Agricultural sciences
D9 Other agricultural subjects
F Physical sciences
F1 Chemistry
F2 Materials science
F3 Physics
F9 Environmental and other physical sciences
G Mathematical sciences and informatics
G1 Mathematics
G4 Statistics
G5 Computer science
G6 Computer systems engineering
G7 Software engineering
G9 Other mathematical and informatics sciences
H/J Engineering and technology
H1 General engineering
H2 Civil engineering
H3 Mechanical engineering
H5 Electrical engineering
H6 Electronic engineering
H7 Production and/or Manufacturing engineering
H8 Chemical engineering
J2 Metallurgy
J3 Ceramics and glass
J4 Polymers and textiles
J5 Other materials technology
J9 Other engineering and technologies
N Business and administrative studies
N1 Business management
N7 Institutional management
N8 Land and property management
N9 Other business and administrative studies

Return to ATTRIBUTES

NATIONAL / SCOTTISH QUALIFICATIONS FRAMEWORK

Definitions:

- **General qualifications**, such as GCSEs and A Levels are about a particular subject, eg history, maths or English.
- **Vocationally-related qualifications**, such a vocational A Levels (Advanced GNVQs), give a broad introduction to a particular sector of the economy, eg engineering.
- **Occupational qualifications**, such as NVQs (National Vocational Qualifications) test the skills and knowledge needed to do a specific job.

NVQs / SVQs are work-related, competence based qualifications

- NVQs / SVQs reflect the skills and knowledge needed to do a job effectively
- NVQs / SVQs represent national standards recognised by employers throughout the country

Levels	Definitions	Equivalent
Level 1	Competence which involves the application of knowledge in the performance of a range of varied work activities, most of which may be routine and predictable.	GCSE D – G Foundation GNVQ / GSVQ
Level 2	Competence which involves the application of knowledge in a significant range of varied work activities, performed in a variety of contexts. Some of these activities are complex or non-routine and there is some individual responsibility or autonomy. Collaboration with others, perhaps through membership of a work group or team, may often be a requirement.	GCSE A* - C Intermediate GNVQ / GSVQ HNC Foundation Modern Apprenticeship
Level 3	Competencies which involves the application of knowledge in a broad range of varied work activities performed in a wide variety of contexts, most of which are complex and non-routine. There is considerable responsibility and autonomy and control or guidance of others is often required.	A / AS / Higher Grade Advanced GNVQ / GSVQ HND Advanced Modern Apprenticeship
Level 4	Competence which involves the application of knowledge in a broad range of complex, technical or professional work activities performed in a variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and the allocation of resources is often present.	Academic Degree Vocational Degree
Level 5	Competence which involves the application of a range of fundamental principles across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for the allocation of substantial resources features strongly, as do personal accountabilities for analysis, diagnosis, design, planning, execution and evaluation.	Post Graduate Degree

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WORKED EXAMPLE

NUCLEAR SUBMARINE – ENGINEERING DEPARTMENT

Title	No	Occupation	Competence	Atributes
Marine Engineering Officer	1	Professional	O, M, I, P	Competence Level 4 Engineering Degree 3 years in-house training 5 years experience
Deputy Marine Engineering Officer	1	Professional	O, M, I, P	Competence Level 4 Engineering Degree 3 years in-house training 2.5 years experience
Assistant Marine Engineering Officer	3	Associate Professional	O, M, P	Competence Level 3 Engineering Degree 3 years in house training
Cat A - Artificer	6	Associate Professional	O, M, P	Competence Level 3 HND 1 year in-house training 6 years experience
Cat B - Electrical Artificer	5	Skilled Trade	O, M	Competence Level 2 HND 1 year in-house training 3 years experience
Cat B - Mechanical Artificer	5	Skilled Trade	O, M	Competence Level 2 HND 1 year in-house training 3 years experience
Cat C - Electrical Artificer	5	Skilled Trade	O, M	Competence Level 2 HND 1 year in-house training
Cat C - Mechanical Artificer	5	Skilled Trade	O, M	Competence Level 2 HND 1 year in-house training
Cat D - Mechanic	13	Machine Operators	O	Competence Level 1 O Level 6 months in-house training
Senior Medical Assistant	1	Associate Professional	O, M, I, P	Competence Level 3 HND 1 year in-house training 3 years experience
Junior Medical Assistant	2	Skilled Trade	O, M	Competence Level 2 HND 1 year in-house training
Total	**47**			

NUCLEAR SUBMARINE FLEET – ENGINEERING DEPARTMENTS

	Number of Crews	ME	DME	AME	Cat A	Cat B	Cat C	Cat D	SMA	JMA	Sub Total
	1	1	1	3	6	10	10	13	1	2	47
SSN	10	10	10	30	60	100	100	130	10	20	470
SSBN	8	8	8	24	48	80	80	104	8	16	376
Sub Totals		18	18	54	108	180	180	234	18	36	**846**

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EXAMPLE - MINISTRY OF DEFENCE TRAINING

Course Title	Acad Qual	In-House Training	Competence Certificate	Duration	
Nuclear Technology & Safety Management	MSc			52	Weeks
Nuclear Reactor Technology	PgD			26	Weeks
Marine Engineering Application Course		*		30	Weeks
Operators Course		*		8	Weeks
Radiological Protection	PgC			12	Weeks
Nuclear Plant Engineering	PgD			23	Weeks
Nuclear Reactor Chemistry	PgC			12	Weeks
Nuclear Familiarisation Course		*		5	Days
Nuclear Introductory Technical Course		*		8	Days
Nuclear Introductory Course				2	Weeks
Health Physics Nuclear Accident Response Course		*		5	Days
Senior Health Physics Nuclear Accident Response Course		*		5	Days
Nuclear Systems Designers Course		*		6	Weeks
Nuclear Instrumentation Calibration Course			Qualified Person IRRs	3	Weeks
Nuclear Accident Procedures Course		*		5	Days
Nuclear Accident Procedures Course (Transport)		*		4	Days
Nuclear Site Safety Justification Course		*		5	Days
Nuclear Vanguard Technical Managers Brief		*		5	Days
Nuclear warship Support Course		*		8	Weeks

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Annex B

UNIVERSITIES AND COLLEGES ACCEPTANCE SERVICE

STATISTICS 1994 TO 2000

ENGINEERING AND PHYSICAL SCIENCES

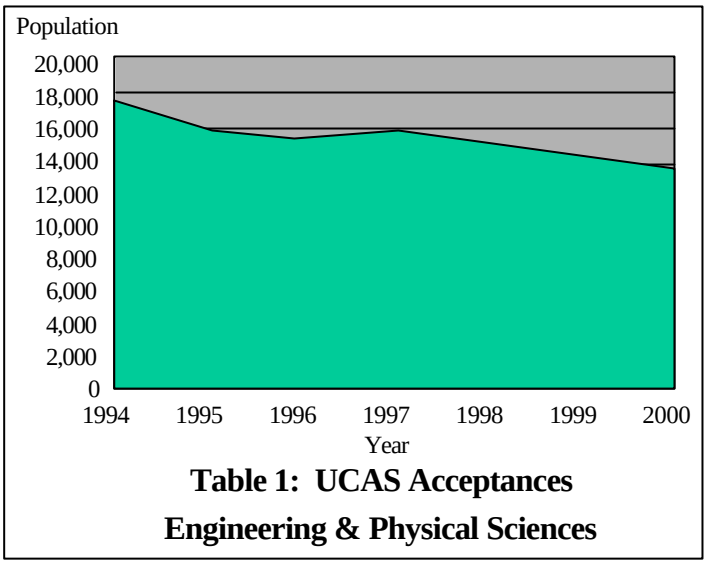


Table 1: UCAS Acceptances
Engineering & Physical Sciences

Table 1 shows the number of acceptances of UK students for Mechanical, Civil & Electrical Engineering, Physics & Chemistry courses, between 1994 and 2000; showing a fall of 25% over 7 years.

ALL SUBJECTS

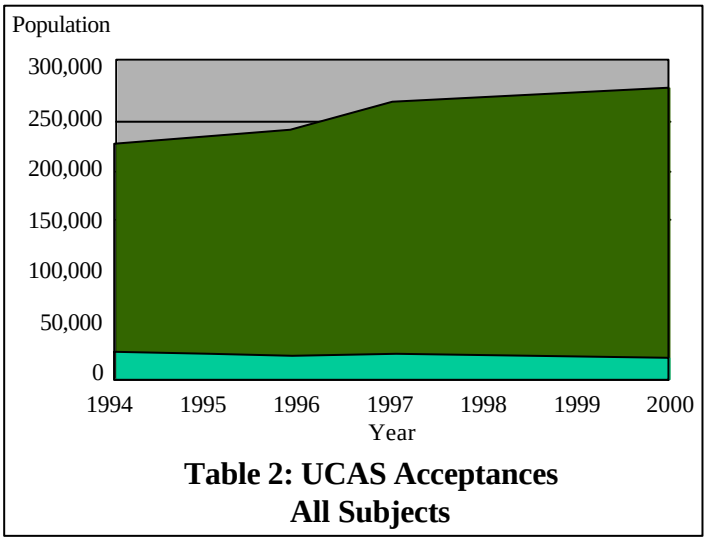


Table 2: UCAS Acceptances
All Subjects

Table 2 shows the number of acceptances of UK students for all subjects over the same period. All acceptances rose by 23% over 7 years and the Engineering & Physical Sciences market share fell from 8% to 5%.

Annex C

EDUCATION AND LEARNING PATHWAYS

THE LEARNING PROCESS

Educated and skilled people are developed by means of a process involving stages of education and training in which people learn and develop their skills. The process leads to people who are suitably qualified and educated to undertake one of a number of 'occupations', as defined in the skill sector model. The Learning Process is shown diagrammatically at Figure 1. The key aspects of the process to note are:

- Academic education
- Vocational education
- Range of occupations

QUALIFICATIONS

At each stage of education, people can attain qualifications that certify that they have attained a level of competence. Such qualifications are often statements of academic competence, but increasingly they are being used to certify vocational competence. Examples of commonly recognised qualification certificates are shown overlaid on the Learning Process at Figure 2.

DECISIONS AND SECTOR LOSSES

At several points in the process people must make decisions on their learning path, dependent upon their aspirations, ability and previous qualifications. At each decision, the potential exists to lose people from the science and technology or nuclear and radiological sector. The factors affecting such decision-making are the factors that the action plan must address to deliver adequate numbers of skilled people for the industry. The decision points and associated losses are shown overlaid on the learning process at Figure 3a and Figure 3b.

FEEDBACK

At each decision point, feedback is necessary to:

- Encourage the required people to make informed decisions; and
- Confirm that the level of competency produced by the preceding stage of learning is commensurate with the base requirements for the next stage of learning.

The required feedback is shown at Figure 4, overlaid on the learning process.

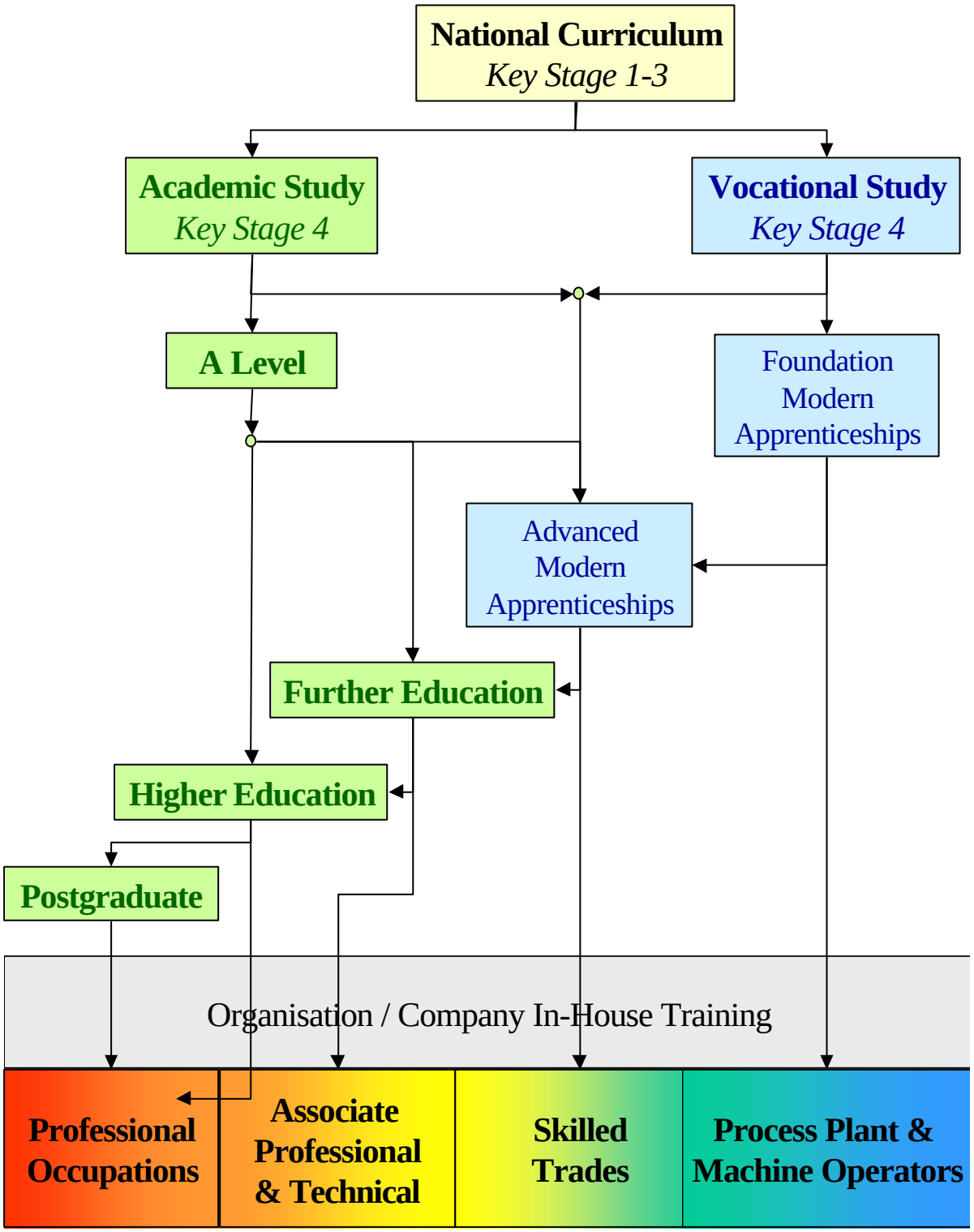


Figure 1: The Learning Process

Return to "Learning Process"

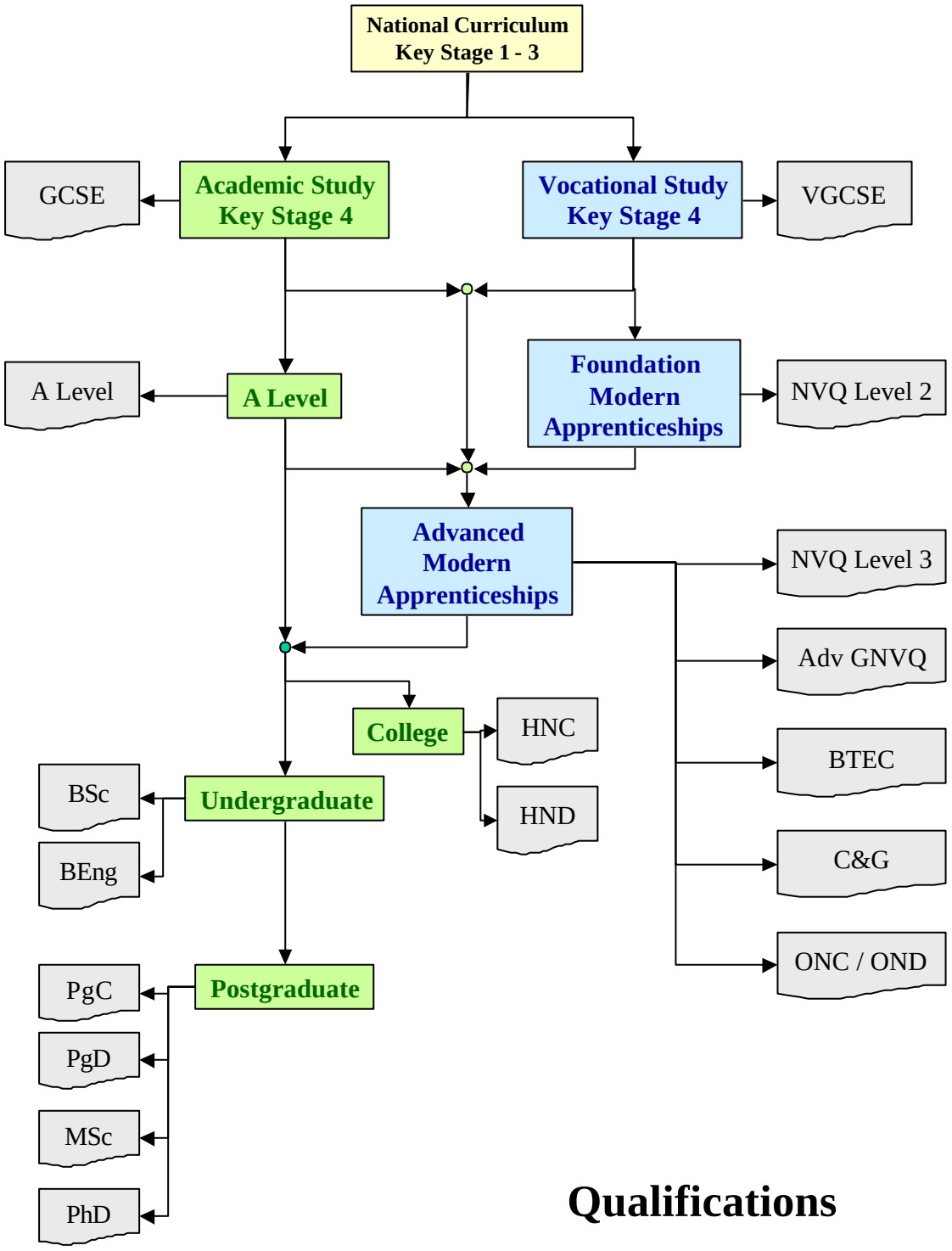


Figure 2: Qualifications

Return to "Qualifications"

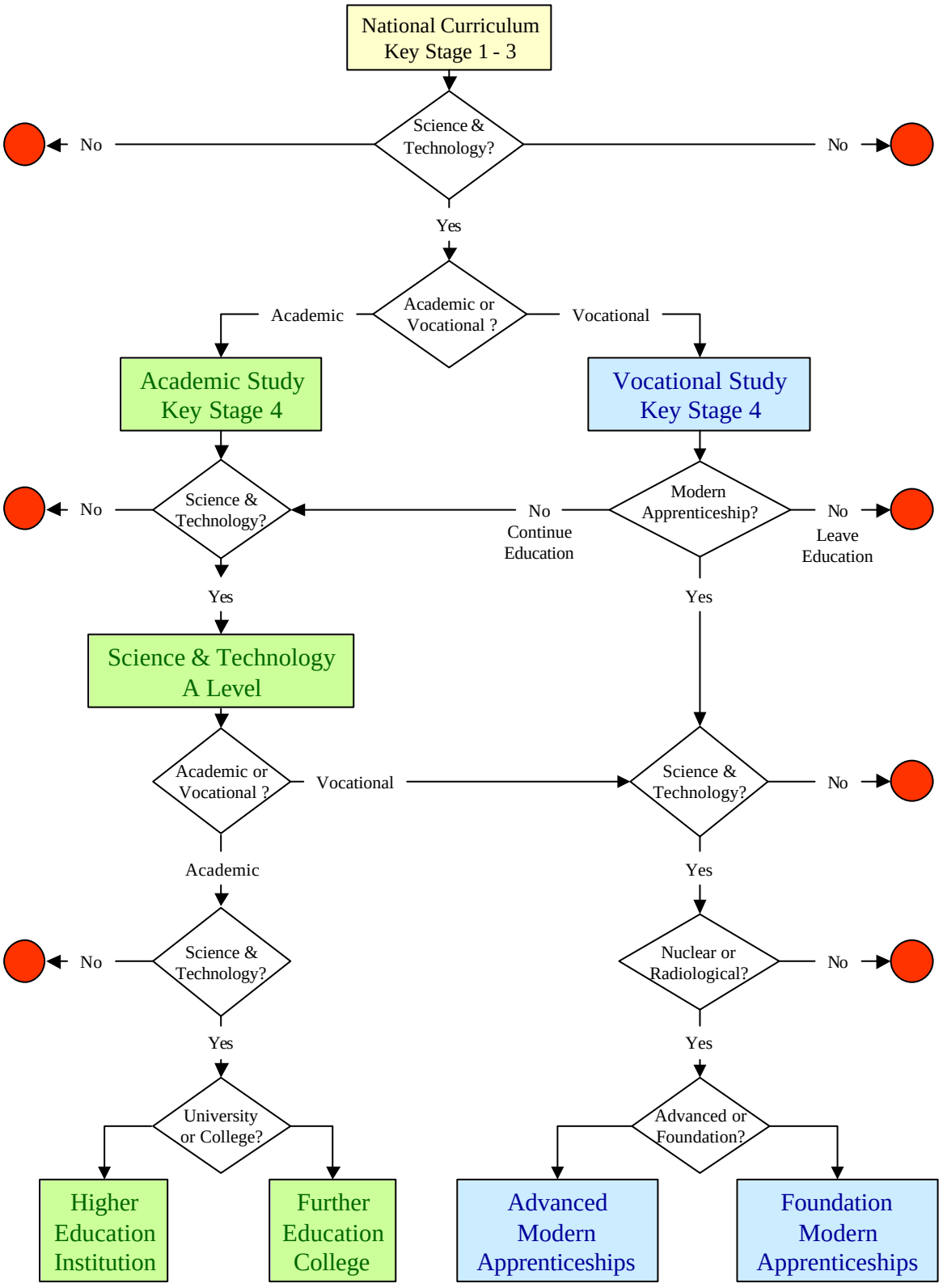


Figure 3a: Decisions and Losses

Return to 'Decisions'
Go to Figure 3b

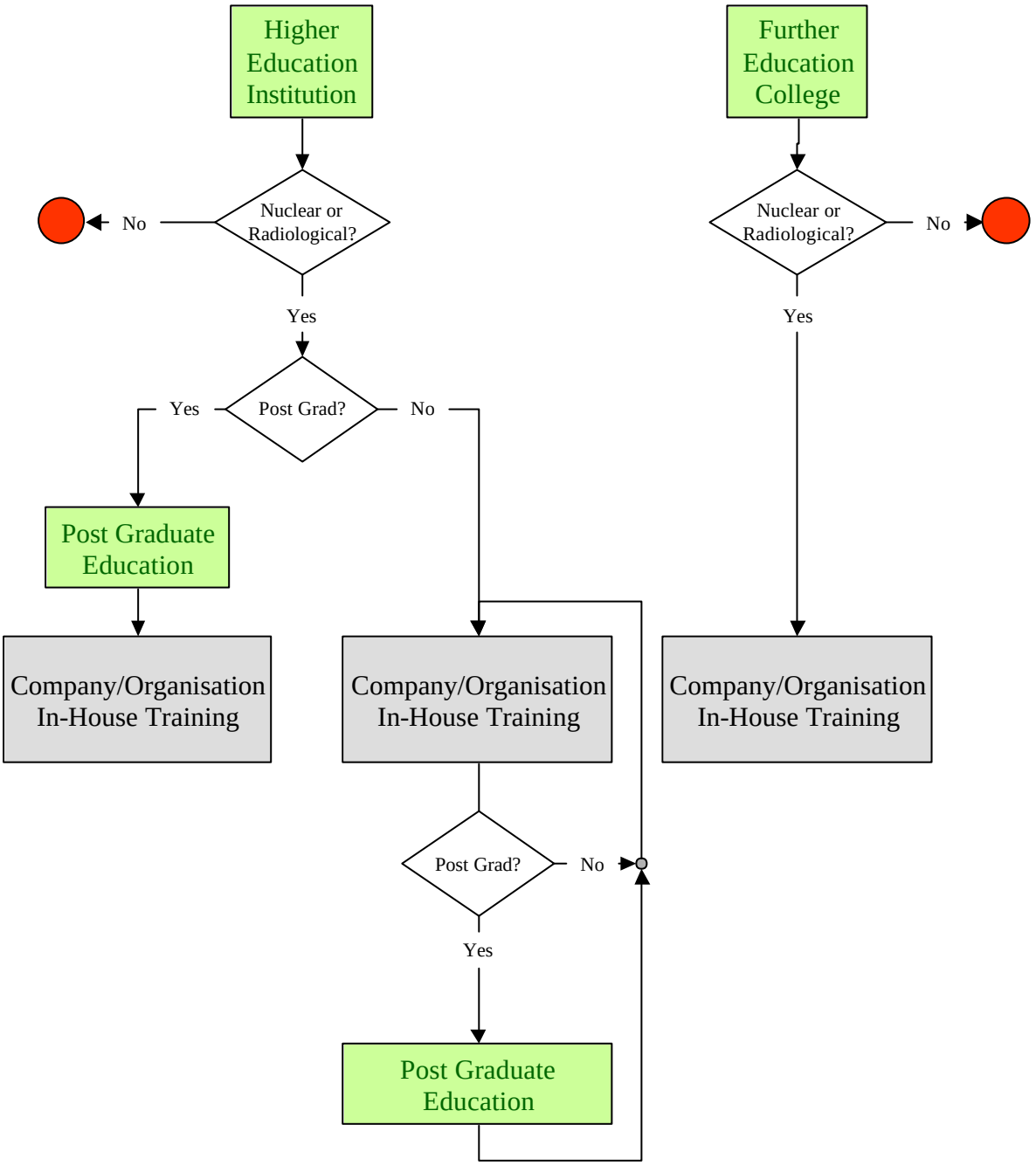


Figure 3b: Decisions and Losses

Return to 'Decisions'
Go to Figure 3a

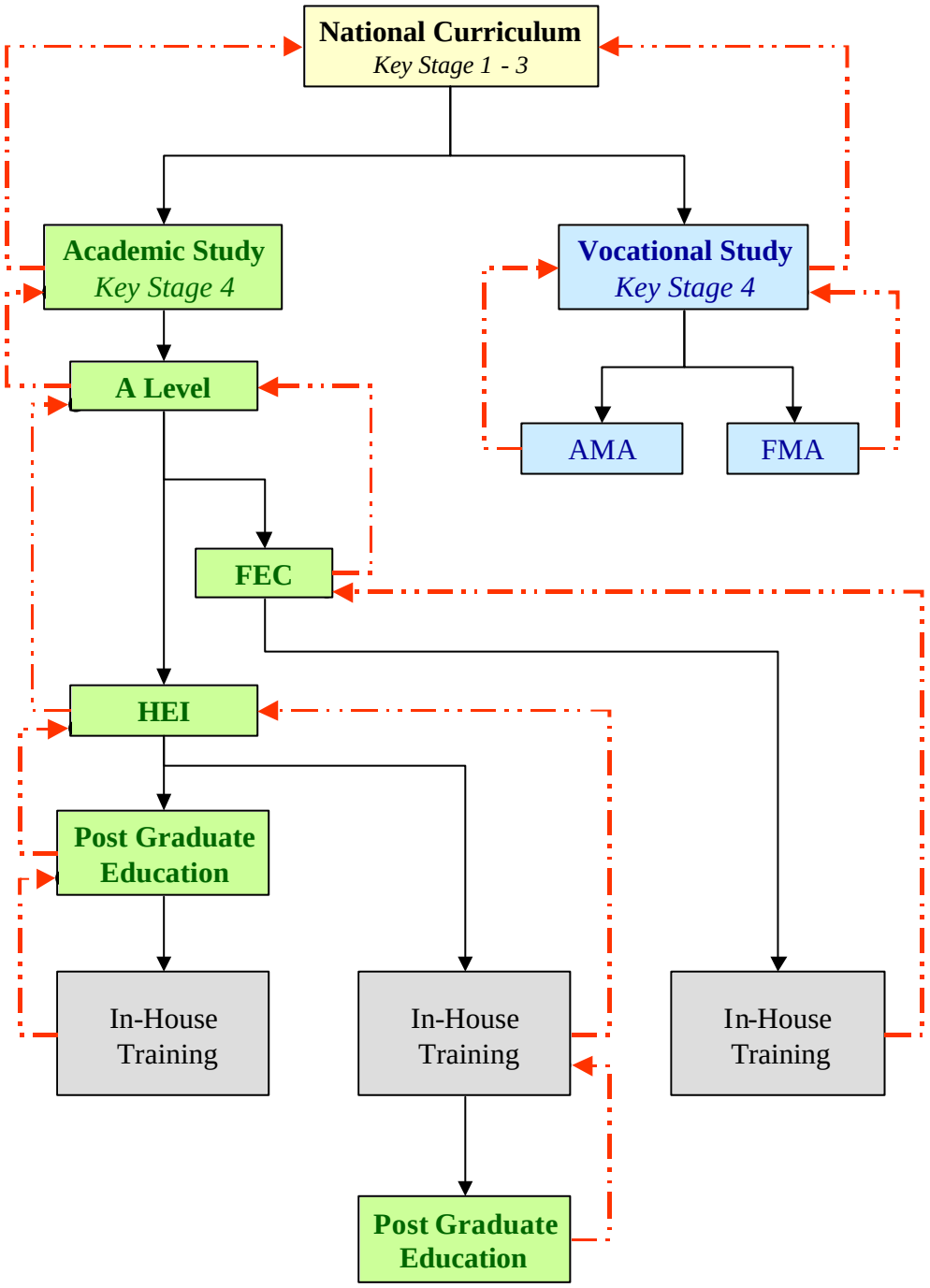


Figure 4: Feedback

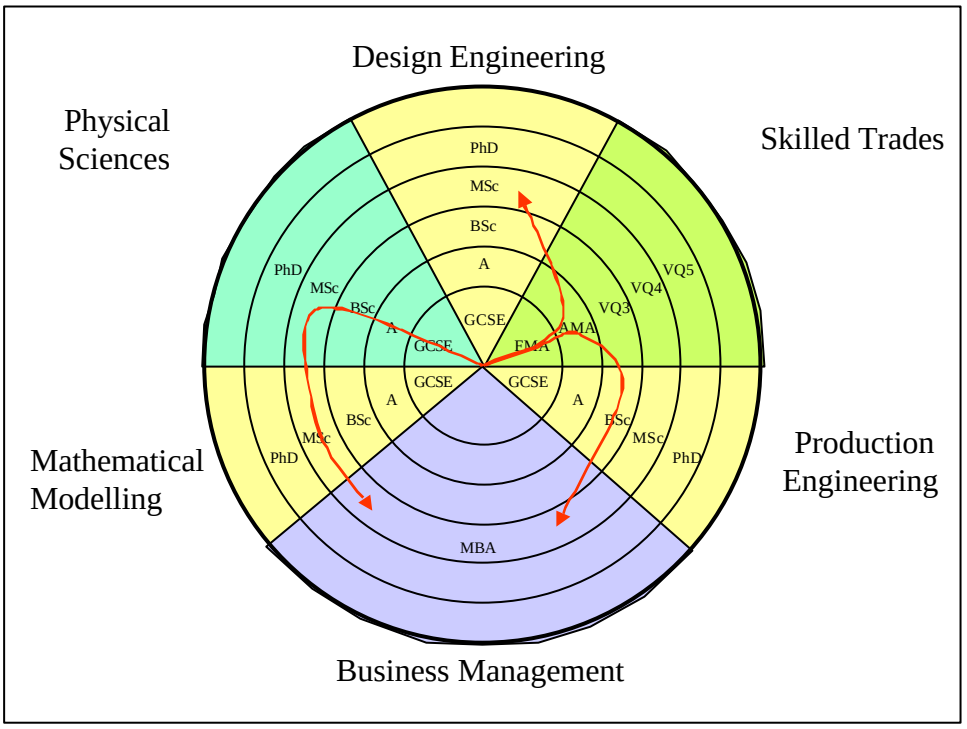
Return to 'Decisions'

Annex D

SKILL DEVELOPMENT TARGET DIAGRAM

The skill sector can be considered in terms of a target diagram. This concept is closely linked to the learning pathway, but provides an alternative way of visualising the sector that can be a useful vehicle for providing structure to the strategy for promotion of the skill sector and development of learning pathways.

Within the target diagram, the concentric rings represent qualifications or level of skill, the centre representing basic qualifications (eg GCSE), and the level of qualifications or skill rising as one progresses to the outer circles.



Skill Sector Target Diagram

The target diagram is split into segments, each segment representing a generic discipline, physical scientist, design engineer etc. The distribution of the segments is representative of the way in which the skill sector functions, ie:

- Physical scientists develop a fundamental understanding of scientific principles that are applied by the skill sector.
- Design engineers take those scientific principles and turn them into practical designs to exploit the physical principles.
- Skilled trades manufacture and maintain the hardware needed by the skill sector, implementing the design engineer's specifications.
- Business managers consider the market to be exploited by the skill sector and set objectives for production.
- Production engineers optimise operation of the hardware to deliver business management's production objectives.

The skill development pathways of individuals within the skill sector can be mapped on the target diagram, enabling visualisation of how skills have been developed in the past, and also establishment of principles of how skills may be developed in the future.

A number of example skill development pathways are shown on the diagram.

- Many people in the skill sector began their careers by undertaking a skilled trade apprenticeship. They would progressively develop their skills within that skill segment, but at some point seek a change in direction, and by means of additional courses and qualifications, to become either design or production engineers. Of those that chose to become production engineers, some subsequently continued the transition to become business managers.
- A number of people in the skill sector followed a skill development pathway of academic study of physical sciences, a key element of such disciplines being mathematical modelling. At some point in their development they seek a change in direction, and apply those modelling skills not to science and engineering but to business management models. The migration of physicist to the finance and insurance sector is an example of such a change.

The purpose of the target diagram is to provide a tool for visualising trends, and not an exact modelling tool. The boundaries between skill circles and discipline segments are not hard boundaries, but are indicative of differences to enable consideration to be given to transition and change.

Annex E

14-19: EXTENDING OPPORTUNITIES, RAISING STANDARDS

(Synopsis of DfES Green Paper)

BACKGROUND

The economy is dependent on the creativity and skills of its people. Vocational qualifications are undervalued. Technical and vocational education must not be considered a second-class fallback for the less able and vocational education must be as rigorous as academic. Collaboration is needed between:

- Schools and colleges;
- Learning and Skills Council (LSC);
- Local education authorities (LEAs); and
- Employers.

Stronger involvement of employers (large and small) is needed to support the curriculum and offer opportunities for learning in the workplace so young people can see how they are gaining skills relevant to their future careers.

OPTIONS AT AGE 14 – SUPPORT AND ADVICE FOR YOUNG PEOPLE

Support for young people towards the end of Key Stage 3 will be crucial in raising their aspirations and in providing advice and guidance on the choice of pathways. The wider range of options from age 14 and the focus on outcomes at 19 rather than 16 mean that choices made towards the end of Key Stage 3 will assume a greater significance.

Support will be needed to provide this advice to young people.

THE 14-19 CURRICULUM

More vocational qualifications and new hybrid qualifications will be developed. New qualifications must be robust and high quality. All GCSEs and A Levels will be called by a subject title, without any vocational label.

The most able students will demonstrate greater depth of understanding by taking A2 papers, leading to a new distinction grade for the higher achievers.

Modern Apprenticeships will form an important part of the 14-19 vocational pathway.

All pupils will study mathematics, English, science and ICT, alongside careers education. Science will become required study, with options of single, double or applied science.

Design and Technology has moved forward in recent years and DfES want to see creative and practical skills fostered by design and technology playing a key role, but it will not be required study. Science and Engineering Ambassadors from industry will offer their own expertise to teachers in support of the curriculum and out of school activities.

Many young people will continue with general education programmes, but work-related programmes will be extended. The involvement of employers will be crucial. Work-related learning is not seen as an inferior alternative for less able pupils and high-quality qualifications should be attractive to young people who aspire to higher education.

Vocational GCSEs will be available from Sept 02; initially in Applied Art & Design; Applied Business; Engineering; Health and Social Care; Applied ICT; Leisure and Tourism; Manufacturing; and Applied Science.

14-19: EXTENDING OPPORTUNITIES, RAISING STANDARDS

Extracts of DfES Consultation Document

FOREWORD

In the 21st century, to be prosperous, the economy will depend heavily on the creativity and skills of its people.

For too long, vocational studies and qualifications have been undervalued. This must change – we must introduce qualifications and pathways that are of an excellent standard, that deserve and are accorded high status, that are not a sink option for failed students, but which can lead the bright and able through into higher education and beyond.

Whether young people choose academic, vocational or a mixture of options at 14, there will be a clear ladder of progression. Our aim is clear – keeping young people in education and training at 16, academic excellence, high-quality vocational routes and increased participation in higher education.

It is estimated that by 2004 the UK economy will have a skill shortage of 150,000 network ICT workers alone. If our education system does not quickly respond to this demand for new skills the damage to national economic performance will be considerable

THE VISION

…successive attempts have been made to improve vocational education and raise its standing in society. In practice most of these changes were piecemeal and enjoyed limited or no that more short-term success, while a long tradition of apprenticeship training was allowed to go into decline.

We need now to rectify the traditional neglect of vocational education as a route to success and encourage far more young people to stay on in learning after age 16.

More people need to be better educated than ever before if we are to be a successful high-skills economy.

The lack of high-quality vocational pathways in the UK explains why far too many young people do not reach or move beyond Level 2, or fall out of education and training before they are 19. The case for improving skills, and especially intermediate and technical skills is irrefutable, as many employers have insisted and the Skills Task Force has demonstrated.

The evidence on their (young people's) views about what they would like to see suggests that there is significant interest in vocational options, but, since they are aware that vocational courses are often held in lower esteem than general ones, they are not attracted to them.

We need to build a world-class system of education which delivers the technical and vocational skills of an advanced economy so that every young person has a pathway to success.

Technical and vocational education should become a positive and fulfilling choice, not a second-class fallback for the less able or disaffected.

Collaborative working between schools and colleges, supported by the Learning and Skills Council (LSC), local education authorities (LEAs) and employers, is beginning to break down the barrier between general and vocational education.

They (vocational programmes) must also be as rigorous as the traditional academic pathway. We need stronger involvement of employers, including small and medium-sized enterprises, in supporting the curriculum and in offering more opportunities for effective learning in the workplace, so that young people can see how they are gaining skills relevant to their future careers.

14-19: MARKING THE START OF THE PHASE.

The 14-19 phase of learning should be marked by a clear beginning, middle and end. The phase should start with a review of achievement towards the end of Key Stage 3. This will provisionally identify longer-term career and learning goals. GCSEs and equivalent qualifications will continue to have an important role but will over time evolve into a progress check.

MAKING THE RIGHT CHOICES AT AGE 14

Support for young people towards the end of Key Stage 3 will be crucial in raising their aspirations and in providing advice and guidance on the choice of pathways. The wider range of options from age 14 and the focus on outcomes at 19 rather than 16 mean that choices made towards the end of Key Stage 3 will assume a greater significance.

Much effective practice exists to help young people plan their learning. The end of Key Stage 3 is already a significant point, when schools have arrangements in place to help young people consider their learning goals and make choices wisely. For young people aged 13 and over, Progress File has been developed to help them plan and review their learning transitions.

We want to help schools build on existing good practice in preparing and motivating young people for entry to the 14-19 phase and helping them to manage their subsequent learning with an eye to eventual careers. This will include guidance on good practice in careers education and guidance throughout Key Stage 3. The aim is to:

- mark the end of Key Stage 3 and entry into the 14-19 phase;
- raise young people's aspirations towards staying on in learning post 16, the Matriculation Diploma, higher education and their eventual careers;
- ensure that young people are equipped with the skills to plan, manage and review their learning and to set personal targets;
- help them to choose the most suitable options from age 14, and to identify the learning and other development they need to gain the Matriculation Diploma at age 19.

THE 14-19 CURRICULUM

We propose a new structure for the National Curriculum at Key Stage 4. We believe there should be a core of compulsory subjects that are essential for progression and development beyond the end of compulsory schooling. All pupils should study mathematics, English, science and ICT, alongside… careers education.

We intend to develop more vocational qualifications and new hybrid qualifications that combine traditional general subjects with their vocational applications. We will ensure that new qualifications are robust and high quality. We intend to call all GCSEs and A Levels by a subject title, without any vocational label. We propose to enable the most able students to demonstrate a greater depth of understanding at advanced level through introducing more demanding questions into A2 papers, leading to a new distinction grade for the higher achievers. The new generation of Modern Apprenticeships will form an important part of the 14-19 vocational pathway.

A NEW, FLEXIBLE 14-16 CURRICULUM

The new 14-16 requirements should have a clear and transparent rationale. Subjects should be mandatory at this stage only if they meet one of two overlapping criteria:

- They provide an essential basis for progression, across all areas of learning and for keeping young people's options open; or
- They are essential for personnel development, contributing to young people's… moral development as they begin to take their place in… the world of work.

Within this rationale, mathematics, English, science and ICT meet the first criterion of being essential for progression. These subjects remain as statutory requirements. In mathematics and

English there would be an expectation that breadth and depth of content should be no less than at present. For many pupils this would also be the case for science. Most pupils would continue to sit GCSEs in mathematics, English and science (a single or double award in balanced science). We would expect pupils to continue to use ICT in many subjects and to take a qualification in it.

We considered the position of science very carefully. It is at present one of the subjects which may be disapplied at Key Stage 4 to allow wider opportunities for work related learning; in 2000/01 this was the case for some 2000 pupils. On the other hand science is a core subject in Key Stages 1, 2 and 3, along with mathematics and English; it is important for our economy; and careers in many areas increasingly need an underpinning of science. Over 80% of pupils now follow a course leading to a double award GCSE which provides a secure base for progression to more advanced study in a range of science subjects. In the light of those considerations we have retained science in the core of compulsory subjects.

We recognise the need to ensure that science GCSEs provide a range of choices relevant to all abilities and aptitudes. The double award will remain the preferred option for many. An additional GCSE in applied science, one of the eight new GCSEs in vocational subjects, will be introduced in September 2002. QCA is to pilot from 2003 an innovative and flexible structure for GCSE science. This will engage pupils with contemporary scientific issues and focus on their role as users and consumers of science. The National Curriculum programme of study for science will be reviewed and updated, to achieve a core of science relevant to all learners. This smaller programme of study could be built into a wider range of qualifications.

In addition we think it is essential for progression and for personnel development that all young people should undertake some work-related learning. Such learning should be designed to develop pupil's employability and to help prepare them for working life. It involves gaining experience of work, working practices and environments, developing skills for working and learning through activities and challenges set in work related contexts.

Design and Technology develops a range of creative, practical and applied skills that contribute to adult and working life. From its craft base it has moved forward significantly in recent years, enabling pupils to experience modern industrial practice at first hand. Over £1 million has been invested in training teachers in CAD/CAM, following its introduction in the 2000 revised National Curriculum. Teacher and curriculum development projects in, for example textiles software, primary food technology, 'future' design and electronics, will, over time, provide more opportunities for teachers to update their skills. Science and Engineering Ambassadors from industry will offer their own expertise to teachers in support of the curriculum and out of school activities.

Design and technology is studied by all pupils from the age of 5 and has a range of sub-disciplines at Key Stage 4 leading to a variety of GCSEs, but for many pupils it is not seen as central to their programmes. Disapplication provisions are used for more than 23,000 pupils. We recognise that in around 20% of schools the quality of resources and accommodation are issues affecting teaching of design and technology, and we will be looking to see how schools and the LEAs can be encouraged to address these needs as a priority. We also recognise that new technologies have made considerable demands on design and technology teachers, and we encourage schools to enable them to update their skills. As increased numbers of pupils opt for more substantial work-related learning programmes from the age of 14, we want to see the creative and practical skills fostered by design and technology playing a key role. But we do not think that design and technology should be required study for all pupils.

DEVELOPING VOCATIONAL OPTIONS

Many young people will continue as now with predominately general programmes. But increasingly we would expect others to extend the work-related element of their programme – beyond the minimum core we are suggesting for all – to pursue genuinely mixed programmes of study. The involvement of employers, including small and medium sized enterprises, will be crucial. Too often in the past work-related learning has been seen as an inferior alternative to general study and appropriate only for less able pupils. High-quality and well-respected qualifications should become attractive to the full spectrum of ability, including many young people who aspire to entry to higher education. For those who so

wish, it will also be possible to pursue predominately vocational programmes which provide a sound basis for progression to a Modern Apprenticeship at age 16. In all cases we want to be sure that programmes are sufficient to ensure a broad based education and that choices made at 14 are not so narrow as to restrict the ability to change direction at age 16 or beyond.

The first new GCSEs in vocational subjects are to be available from September 2002 in some schools. We expect they will be far more widely available from September 2003. These new GCSEs will initially be available in Applied Art & Design; Applied Business; Engineering; Health and Social Care; Applied ICT; Leisure and Tourism; Manufacturing; and Applied Science. Each will be a double award, equivalent to two GCSEs. As these take hold, and subject to resources, we would like to extend the range of areas in which these subjects are available to reflect the greater range of subjects offered at Vocational A Level. We would like the first of these titles to be available from September 2004. We also hope to meet the needs of a larger range of pupils by considering the case for some new GCSEs in vocational subjects equivalent in weight to existing single subject titles.

We also believe choice and parity of esteem would be better served by no longer attracting labels to signal GCSEs are general or vocational, and instead simply naming them all GCSEs.

A More Coherent 14 – 19 Phase

We are still in the initial implementation stage of the Qualifying for Success reforms (Curriculum 2000). The first students will complete their full advanced level programmes next summer. Many more young people are undertaking larger and more varied programmes of learning than before; 60% of students are studying four or more subjects in their first year of advanced level study, compared with 10% before. The new A Level structure, divided into AS and A2 has proved successful both in encouraging progression to the full A level and ensuring that those who decide not to continue with a particular subject into the second year are still able to gain a demanding qualification in the AS before changing direction.

Curriculum 2000 is therefore providing a sound pathway for many of the 50% of young people who should be aspiring to higher education. It includes the Advanced Extension Awards (AEAs), introduced to stretch the most able advanced level students.

The pathway to higher education is broadened and enhanced by the Vocational Certificate of Education (Vocational A Level). We introduced this to establish clearly the status of vocational learning in schools and colleges alongside the traditional A Level. In its recent report on the Qualifying for Success reforms, QCA has advised us that in the longer term the Vocational A Level should follow the AS/A2 model.

Modern Apprenticeships

Our nation's long and respected tradition of apprenticeship all but disappeared in the recent past. That was wrong and denied industry the skills it needed and thousands of young people a worthwhile qualification. We are now building apprenticeships up again to meet the skill needs of today. The new generation of Modern Apprenticeships, which we announced at the end of November 2001, is an important component of the 14-19 phase.

Modern Apprenticeships will play a critical role in helping many young people with a wide range of abilities and aspirations to make progress towards their chosen profession. For young people who leave school at 16 and who can best pursue their qualifications in the workplace, they offer a high-quality pathway. They also offer a way into the labour market for young people with good qualifications from school or college who can acquire practical skills and experience while earning a wage.

The new Modern Apprenticeships are intended to meet high standards endorsed by employers' organisations. A National Vocational Qualification will attest their job-specific skills in the workplace. This will be complemented by key skills qualifications and a technical certificate, which reflects broader knowledge and understanding acquired through off-the-job learning. Technical certificates within Advanced Modern Apprenticeships will strengthen the prospect of progression to higher education for the more able trainees.

We are implementing the main recommendations of the Modern Apprenticeship Advisory Committee, chaired by Sir John Cassels. The Advisory Committee's report recommends that we do more to ensure that all Modern Apprenticeships meet the highest standards and to encourage take up by employers and young people. We have therefore announced that, working with the LSC, we will:

- Ensure that employer places are increased so that over a quarter of young people enter Modern Apprenticeships before they are 22 years old, by 2004/05.
- Introduce from September 2004 an entitlement to a Modern Apprenticeship place for 16 to 17 year olds who have five GCSE passes, including mathematics and English.
- Establish a national framework for apprenticeships which defines basic standards and strengthens the relationship between the employer and apprentice. The national framework will include an apprenticeship agreement between the employer and the apprentice, and a standard period of probation. It will also establish minimum durations, with an accelerated option of Advanced Modern Apprenticeships.
- Launch a sustained three-year marketing campaign to promote Modern Apprenticeships.
- Introduce a 'programme led' option that will allow some young people to acquire the technical certificate and key skills in an institutional setting, before they sign an apprenticeship agreement with an identified employer and undertake the on-the-job training.
- Introduce a new programme of high quality learning, called Entry to Employment, for those young people who are not yet ready to enter Modern Apprenticeships.

We and the LSC will publish shortly an implementation plan setting out how we will take forward these and other recommendations over the next three years.

NATIONAL QUALIFICATIONS FRAMEWORK

The National Qualifications Framework developed by QCA under the 1997 Education Act is intended to provide a guide for students, employers, parents, teachers and institutions in understanding and making choices about particular qualifications and progression routes. In the light of the changes to qualifications we intend to invite QCA to review the structure and criteria underpinning the framework to ensure that it continues to provide a rational and transparent guide to all users.

CAREERS EDUCATION AND GUIDANCE

Young people who have received an effective careers education programme delivered through the curriculum, alongside impartial advice and guidance from external guidance specialists, make the best transitions at age 16 and are less likely to switch or drop out of courses in year 12. In schools where this dual approach has been employed, young people are better able to see their strengths and weaknesses and make successful career decions; are able to recognise and appreciate the pathways open to them; and are more confident about tackling the post-16 transition successfully.

Under our proposals, young people will be asked to make choices at 14 on a much broader range of options. Young people will be asked to begin to plan their pathways towards the Matriculation Diploma at 19 and beyond. This will mean not only making choices about options at Key Stage 4, but also having some idea about options post-16, whether in school, college or the workplace. Young people need to be prepared to make these choices at age 14 through an effective careers education programme during Key Stage 3. We propose that the focus of activity should be in Year 9, but with some preparatory work in Years 7 and 8. Consequently, we will encourage schools to develop a careers education programme from the beginning of Key Stage 3, albeit with a very light touch in the early stages.

IMPLEMENTATION

COLLABORATION BETWEEN SCHOOLS, COLLEGES, TRAINING PROVIDERS AND EMPLOYERS

We have said that we do not expect every school or college by itself to be able to offer a greatly extended range of options for the 14-19 phase; that the right way to extend options available to students is through collaboration with other schools, colleges and training providers, and involving local employers too.

CENTRES OF VOCATIONAL EXCELLENCE

With the LSC, we will continue to work with colleges to transform and modernise technical and vocational education to raise standards to achieve a world-class system.

Annex F

EDUCATION IN SCHOOLS AND THE CURRICULUM

INTRODUCTION

This annex provides an overview of school education and curriculum issues that may:

- Contribute to increasing the pool of children studying science and technology at key stage 4[2] and beyond, in order to increase the number of people considering scientific/technical/engineering apprenticeships/study etc.
- Ensure that people are not closed to the option of nuclear as a career. This is partly an issue of reputation of the industry, but predominantly about encouraging considered decision making about nuclear/radiological industries.

BACKGROUND

THE SCIENCE CURRICULUM

Changes to the National Curriculum in the mid 80s to introduce 'balanced science for all' means that 80% of young people now study double science up to the age of 16, but this has not had a corresponding effect on those studying advanced science post 16. There has been a marginal increase in the numbers of young people studying advanced physics post 16, but as a percentage of all AS/A Level students this figure is falling, with students preferring to study mixed courses (science and non-science) at the expense of majoring in science.

In 2001, 87% of 11 year-olds achieved the expected standard, or above, for their age in science. 77% of pupils entered double award science GCSE and of those 40% achieved A*-C grades. By 2004, the government's target is for 70% of 14 year-olds to achieve the expected standard, or above, for their age in science. Nevertheless concerns remain about science education in schools. The Council for Science and Technology has stated that:

> "Notwithstanding their examination results, too many school leavers lack basic literacy in science. The quality of those choosing to continue their studies in science subjects is patchy. There are also widely held fears that too many of the more able pupils are being turned off science during their compulsory school education."

None of the many curriculum initiatives over the last 30 years have increased the numbers committed to maths and physics post 16; hence considerable effort is being expended by Government and non-government organisations to increase the uptake of science education. These initiatives include Science Year, the Science and Engineering Ambassadors Scheme, the recent green paper on Education for 14 to 19 year olds and development of Specialist Schools.

Much is being done to review the science curriculum to make it more relevant, interesting and attractive to students; Kings College London (KCL), University of York, Sheffield Hallam University and the Nuffield Foundation being been prominent in this field. Reports such as 'Beyond 2000: Science Education for the Future' propose a shift in the science curriculum towards to enhance scientific literacy. It is envisaged that differentiation will occur at key stage 4 (KS4) between scientific literacy ('science for citizenship') and the early stages of specialist science education (see appendix 1), the aim of these changes being to achieve inclusiveness and also strive for excellence.

Work has also been undertaken on students' and parents' attitudes towards the Key Stage 3[3] and Key Stage 4 science curriculum. Parents and students value science education but the following concerns have been identified:

- **Relevance and Topicality**: the science curriculum must engage with topical issues.

[2] Key Stage 4: Education in Year 10 and 11 (age 14 to 16) leading to GCSEs.

[3] Age 11 to 16 – Academic years 7, 8 and 9.

- **Ethics**: the opportunity to explore ethical issues in science is needed.
- **Depth versus Breadth**: should fewer topics be studied in greater depth
- **Stimulation**: there is too much routine and repetitive work, which was not intellectually stimulating.
- **Challenge**: for some the higher paper is not challenging enough.
- **Assessment**: it is easy to do well at GCSE without understanding any science because so much of the testing is based on recall.
- **Preparation**: the curriculum is not adequate preparation for advanced study.

The science curriculum is clearly a factor in the development of nuclear and radiological skills, and this issue should be taken up with the Qualifications and Curriculum Authority (QCA), in particular how the nuclear component of the curriculum could be adapted to address the skill sectors needs. For example, at KS3 the focus is on electricity and nuclear power generation, but there are opportunities to introduce nuclear into the teaching of other subject areas, eg the teaching of risk or citizenship could usefully use "nuclear issues" as a model.

There are also likely to be opportunities relating to the introduction of more vocational qualifications for 16 year olds.

TEACHERS' CAPABILITY TO TEACH SCIENCE

Teachers have a profound effect on the attitude to, and interest in, science and technology; consequently the knowledge, confidence and competence of science teachers is critical. Research undertaken by KCL for the Council for Science and Technology has identified that teachers need a systematic process of Continuing Professional Development (CPD), which is subject related, uses high quality in-service training, is focused on practical activity and involves interaction with other teachers. Constraints on CPD are time and money, and also perceptions of its value.

Teachers appear to make little use of the third party support available to them. While teachers stated that they were inundated with materials from numerous sources, they do not meet their needs and are often out of date with regard to the National Curriculum. These problems were exacerbated by the fact that there was often a lack of training on how to use the materials and a lack of independent sources of advice. 32% of (responding) primary teachers use materials from industry and secondary teachers use them only occasionally. Importantly, the majority of primary and secondary teachers would like to see more materials from third party suppliers on ideas for scientific investigations and courses for teachers. The Council for Science and Technology has recommended that products and services should be supplied in teacher friendly ways and that government should work with key stakeholders to improve the operations of supply arrangements. There needs to be a definition of good practice within the area of materials to support the curriculum. Examples of good practice certainly exist (such as *Young Foresight* and *Primary Solutions* within the Design and Technology curriculum).

A Centre of Excellence has been proposed which would act as a framework for achieving these outcomes. The Centre would be expected to develop the provision of CPD in science, working with partner organisations. Wellcome has already expressed an interest in partnering in support of biological sciences. DfES is currently undertaking a consultation on the establishment of a Centre. The response has been high, indicating demand for such a resource.

CAREERS ADVICE

A report 'Choosing Science at 16' published by CRAC (Careers Research and Advisory Centre) in 2000 identified real weakness in the nature, extent and quality of careers advice available to young people in schools. The report is indicative of an important area in which industry and the science-based professional institutions could make a very important contribution. The aim should be to change the perceptions of young people, parents, teachers and careers advisers about the many opportunities open to people with scientific qualifications, both at the technical (NVQ) level and through higher education.

Activities in this area could be extended beyond support to careers teachers and may also include high quality materials and resources about what it is really like to work in science and engineering careers.

THE FRAGMENTATION OF INDUSTRY AND ITS ABILITY TO SUPPORT EDUCATION

If "industry" is going to support the delivery of science education, the question must be asked, does it have the organisation capacity to do this? The more successful industry partnerships are driven by large corporations, capable of significant investment: Wellcome, GlaxoSmithKline, Pfizer, Shell. BNFL is also a key player. Apart from BNFL, the input from other industry members is small and fragmented. When we look at the health sector, the industry itself is broken down even further, to the level of the individual hospital. This makes planning and provision of effective support almost impossible. The options are to continue with individual companies/ organisations undertaking small-scale projects, generally focused on local communities or to pool resource and co-ordinate effort in an attempt to make a greater impact.

SUMMARY

Opportunities exist for using the education process within schools to support the development of skills for the nuclear and radiological skill sector. To achieve this, ways must be sought to support the teaching of science and satisfy the demand for contemporary, relevant and interesting materials to use in the teaching of science.

The development of science teachers through in-service training and CPD must be encouraged. Careers teaching also needs to be supported to make students aware of the employment opportunities available to them through science and technology study.

Two goals exist: to swell the numbers studying science and to encourage students to be open to the option of nuclear as a potential career route. Developments in the curriculum, in particular the teaching of risk, ethics and citizenship, can be exploited to open the debate on nuclear and radiological technology, not only in its application to power generation, but also in other uses, eg the risk from radiation from mobile phones and health screening programmes.

The nuclear and radiological skill sector is a collection of large and small organisations, private and public, which makes skill sector support of education in schools problematical. There are examples of good practice, but these tend to be focused on distinct issues within the curriculum and may not be opening students to the wider issues associated with nuclear and radiation technology. Ways are needed overcome the fragmentation, for co-ordinated effort and for encouraging partnering of organisations to achieve the common aim.

RECOMMENDATIONS AND ACTIONS

Ways to influence curriculum development, in particular where a real contribution can be made, need to be established, but as much work is already being undertaken across government, this is not a key priority. Discussion with the QCA would be advantageous, the next curriculum review taking place in 2005.

Work to support the teaching of science, across primary and secondary schools must be encouraged, including:

- Development of resources that can be used to support the teaching of the national curriculum (BNFL and to a lesser extent BE are active in this area)
- In service training and CPD of teachers

Awareness of nuclear and radiological issues needs to be developing by a suite of materials that can be used in a variety of subject areas (Science, Geography, Design and Technology, Citizenship etc.) closely linked to the curriculum. These must not be "pro-nuclear" but be balanced. These should be developed in conjunction with a non-industry body, such as the Association for Science Education, the Engineering and Technology Board or science teachers' Centre of Excellence.

The portfolio of activities to support Careers Guidance teaching must be widened to open students to the opportunities awarded by Science, Engineering and Technology careers. Other activities might include the development of high quality materials and resources, such as videos.

Collaboration between the various elements of the skill sector is needed to reduce fragmentation of effort across diverse industry groups and to reduce short termism.

DEVELOPMENTS IN THE SCIENCE CURRICULUM AT KEY STAGE 4

There is continuing concern that the science curriculum at Key Stage 4 (KS4) is broadly similar to that offered to students in academic streams, as a preparation for more advanced study. This does not correspond to the needs of students, where interests, aptitudes and aspirations become more diverse at 14 to 16 years.

In 1998, a group of leading science educators published a report, *Beyond 2000 – Science education for the future*, which proposed that there is a need for the science curriculum to develop citizens to have a level of knowledge and understanding of science which allows them to engage with the issues science and technology pose, as well as preparing the people who will follow academic courses in science. A course that will deliver science education, based on *Beyond 2000* is now being developed by the University of York and the Nuffield Curriculum Centre. The aims of this project are to produce a curriculum that will:

- Communicate more clearly to students the key science explanations at the heart of scientific understanding
- Use a range of teaching and learning activities and practical work, aimed at developing understanding of how we know about these explanations and the nature of scientific enquiry
- Balance exact science (biology, chemistry, physics) with ideas drawn from sciences such as epidemiology and health sciences that depend upon assessment of risk and probability
- Use of model of core sciences, aimed at developing scientific literacy, studied by all, with additional science modules preparing students for further scientific study or pre-vocational study.

The core science course would have a set of 10 core modules. Current working titles for these modules area:

- Air quality
- Genetics and health
- Radiation and life
- Life on Earth
- Keeping healthy in a complex world
- Material choices
- Food
- The Earth in the Universe
- The brain and the mind
- Using radioactive materials

There would then be two additional science modules, one that was designated as academic and one that was designated applied. The selection of topics in academic would counterbalance the bias towards biological topics in core science.

Working titles for the academic course:

- Creation of scientific knowledge
- Life processes
- Growth and development
- Chemical patterns and principles
- Materials
- Analysis and Synthesis
- Difference and change
- Force and motion
- Electricity and its effects
- Waves

Working titles for the applied course:

- Cultivating plants
- Food science
- Emergency care
- Communications
- Transport
- Scientific detection
- Built environment
- Sports science
- Consumer science
- Managing the environment

Annex G

MODERN APPRENTICESHIPS

MODERN APPRENTICESHIPS

The term Modern Apprenticeship is a protected term[4] for a training course aimed at developing skilled trades. Modern apprenticeships were introduced in 1994 and are targeted at 16 to 24 year-olds, but must be completed by the age of 25. They involve a mix of work-based training and education. Two types of Modern Apprenticeship exist: Foundation Modern Apprenticeship – targeted at developing craft skills; and Advanced Modern Apprenticeship – targeted at producing technicians.

An apprenticeship is a scheme in which young people are employed to undertake education and training within a company to prepare them for progression within a chosen career. Apprentices "Learn as they Work". This normally means going to a Further Education College and/or a Training Centre for either a day a week or for longer periods called 'block release'. This, combined with training 'on-the-job' in the company, provides the skills and knowledge needed for a future career.

The benefit of apprenticeships for companies is to secure the highly skilled people they need for the long-term future of their industry.

The main features of a modern apprenticeship include:

- Employment status and wages, or unemployed status with a training allowance.
- A training plan, setting out the training to be undertaken.
- A written training agreement placing responsibilities on the apprentice, the employer, the training provider and the local learning and skills council.
- Training leading to the achievement of a level 2 (foundation) and level 3 (advanced) national vocational qualification and key skills, including communication and numeracy.
- A nationally recognised certificate on completion of the MA.
- Improved career prospects and job security in a chosen industry, and the opportunity to enter higher education.

ENTRY QUALIFICATIONS

These are stated by the recruiting company and vary from company to company. Generally, to become a Technician (NVQ Level 3) 4/5 GCSE's at grade C as a minimum are required, including English, Mathematics and Science. For those concerned with mainly practical Craft skills (NVQ Level 2) then GCSE requirements are for 4 or more grade C-G.

AGE

Modern Apprenticeships are available to School/College leavers aged 16+, 17+ and 18+ and indeed to older candidates provided they complete their training to NVQ Level 2 or 3 before their 25th Birthday. Successful completion of Advanced / Intermediate Level GNVQ's in Engineering or Manufacture with their associated Work Experience and Key Skills are preferred. Companies also recruit 18+ School/College leavers with A Levels or the International Baccalaureate.

FINAL QUALIFICATIONS

The Foundation Modern Apprenticeship leads to National Vocational Qualification (NVQ) Level 2 and the Advanced Modern Apprenticeship to NVQ Level 3. Students can progress

[4] As a 'protected term' the title Modern Apprenticeship can only be used to describe education and training courses that meet the criteria set out by the DfES. This prevents devaluation of the courses and maintains standards of qualification.

from a Foundation Modern Apprenticeship to an Advanced Modern Apprenticeship. The final qualifications depending on the type of apprenticeship undertaking. Most apprenticeships will lead to a Level 3 NVQ as a minimum, and some lead to a Level 4 NVQ. A number of companies will allow apprentices to go on to Higher Education and take degrees, either in business or in engineering subjects. In addition to the NVQ, many apprentices will also gain City and Guilds or BTEC qualifications.

PAY

Apprentices are paid throughout their apprenticeship, the amount dependent on the company sponsoring the scheme. Typical starting rates are between £5K and £6K per year, increase during an apprenticeship to the skilled job rate. Currently many skilled people in the engineering and manufacturing industry are earning in excess of £15K per year.

LENGTH OF APPRENTICESHIP

Modern Apprenticeships in the engineering industry usually take between 3 ½ - 5 years to complete, depending upon background experience and ability and the nature of the apprenticeship. Some companies still offer the traditional time-served apprenticeships which vary in training content and duration.

MORRIS, BROWN AND HEWITT ANNOUNCE PLANS FOR MODERN APPRENTICESHIPS

Press Release - 29 November 2001

Education and Skills Secretary Estelle Morris, Chancellor Gordon Brown and Trade and Industry Secretary Patricia Hewitt today announced plans to make on-the-job training for young people in England match the best in the world. The Government wants more than a quarter of young people to enter Modern Apprenticeships before they are 22 years old by 2004 and called on employers to help achieve this target.

They also confirmed that the Government, working with the Learning and Skills Council, will deliver key recommendations made by the Modern Apprenticeship Advisory Committee including:

- a national framework for apprenticeship which defines basic standards and strengthens the relationship between the employer and apprentice;
- an entitlement to a Modern Apprenticeship place for all 16 and 17 year olds with five or more GCSE passes at grades A* to G, from September 2004; and
- a £16 million marketing campaign, over three years, which will begin early in the new year to promote apprenticeships and boost take-up among employers and young people.
- new technical certificates for Modern Apprenticeships which ensure in-depth technical knowledge is a key component of the Apprenticeship Diploma; and
- a new leaflet calling on public sector organisations to embrace the next generation of apprenticeships.

SPEAKING AT NUMBER 11 DOWNING STREET, CHANCELLOR GORDON BROWN SAID:

> "Increasing skills is vital to raising Britain's productivity performance. Firms with skilled workers can benefit from greater innovation, increased flexibility and adapt better to new technologies - and more highly-skilled individuals can benefit from higher wages and suffer lower rates of unemployment.

"Investing in the skills of the future must start today. It is particularly important that all young people are able to gain the skills required in an increasingly knowledge-based economy. In the past too many young people have not been offered the opportunity to train. This Government is determined - through modern apprenticeships and our new ambition to make a significant difference in the number of people with basic and level 2 skills - to tackle the chronic UK problem of low skills."

MS. MORRIS SAID:

> “At a time when one in ten employers are experiencing skills shortage problems, we must be bold in addressing the training gaps in the present and future workforce. A highly skilled workforce is essential to a competitive economy and an inclusive society. Earlier this week we announced £40 million pilots to give working adults a second chance to gain qualifications. Today we are announcing new plans to offer young people high quality training.

“Modern apprenticeships have a key role to play in giving young people the skills they need to do the job to the high standards employers require. Our task now is to ensure all Modern Apprenticeship provision meets the highest standards and to encourage their take-up among employers and prospective apprentices. By providing an entitlement to a place for all 16 and 17 year olds with five or more GCSE passes from September 2004 we are delivering on our promise.

“The report by Sir John Cassels and his committee sets out a clear action plan for achieving our ambition. The Learning and Skills Council - working closely with new Sector

Skills Councils and the Connexions Service - will spearhead the delivery of this new generation of Modern Apprenticeships.

“High quality work-based training is at the heart of the Government’s 14-19 agenda. The recent White Paper set out our plans to create a flexible curriculum which will allow young people to play to their strengths – whether these are vocational, academic or a mix of both. Modern Apprenticeships are a key part of this, providing a bridge between GCSEs and progression into higher education, for example through the new two-year foundation degrees. The investment we are already making - an additional £180 million over the three financial years 2001-04 – is a clear sign of our commitment to deliver this next generation of apprenticeships.

“The new technical certificates we are introducing will ensure that standards remain consistently high across the broad spectrum of apprenticeships on offer. Some Modern Apprentices already take familiar qualifications such as BTECs and City and Guilds to provide more in-depth knowledge which complement the skills aspect of the apprenticeship.

“Technical certificates will extend this knowledge base to all and make sure that our apprentices are on a par with the best in Europe. We have been working closely with the National Training Organisations and the Qualifications and Curriculum Authority to make sure that all sectors which offer Modern Apprenticeships will eventually be covered by technical certificates.

“If Modern Apprenticeships are to be instrumental in the creation of a highly skilled workforce it is vital that employers are committed to them. Employers large and small have had a long-standing involvement through their National Training Organisations in the development of the Modern Apprenticeship frameworks. They are best-placed to identify and address the training needs of the workforce and I encourage them to build on this commitment through the Sector Skills Councils. I also want them to redouble their efforts in recruiting apprenticeships. They have a vested interest in training the employees they need for the future and the Learning and Skills Council stands ready to help them in delivering this training.

“Partnership is central to the success of Modern Apprenticeships. We can no longer cling on to the outmoded notion that the world of work and the world of training and education are separate. Government has laid the foundations for a modern apprenticeship success, we are now challenging employers to help us increase the number of apprentices and achieve our participation target. We must create a dialogue between Government and its agencies, employers and training providers, if we are to create an enterprise society where the skills of the workforce match the best in the world by 2010.”

SECRETARY OF STATE FOR TRADE AND INDUSTRY, PATRICIA HEWITT, SAID:

"Good business already recognises the importance of on-the-job training so I believe Modern Apprenticeships are an important opportunity for businesses of all sizes. This Government is committed to helping UK business become more successful by promoting innovation and technological excellence. Skills are key to this and will help industry create better jobs and more wealth for the future.

"I very much welcome this new generation of Modern Apprenticeships, they are vital to raising our game in the global economy."

Cabinet Office Minister Chris Leslie welcomed today’s announcement and the renewed drive to increase the number of Modern Apprenticeships in the public sector:

“As a significant employer the Civil Service accepts the challenge of bringing Modern Apprenticeships into the heart of Government. We’ve challenged business to commit themselves to Modern Apprenticeships and we in Government intend to make the same commitment in the public sector. We must show more young people the diverse and interesting jobs we have on offer, underpinned by high quality training.”

EDITORS NOTES

This press notice relates to England

1. The Government's reforms which underpin the new generation of Modern Apprenticeships include: · a commitment to an apprenticeship place for every young person who reaches the required standard;· the development and incorporation of technical certificates to improve understanding and knowledge;· the introduction of an overarching Apprenticeship Diploma to encompass the NVQ, key skills and the technical certificate; and· a drive to encourage more employers to get involved in Modern Apprenticeships, especially in under-represented sectors of the economy.

There was a public consultation in 2000 on the reforms, which demonstrated widespread support among key partners.

2. The Modern Apprenticeship Advisory Committee was set up, in March 2001, to advise on a three year action plan for developing, promoting and delivering the new generation of Modern Apprenticeships. The Committee was chaired by Sir John Cassels, formerly Director-General of the National Economic Development Office and Chairman of UK SKILLS.

3. Sir John submitted the committee's report - 'Modern Apprenticeships: The Way to Work' - to the Secretary of State for Education and Skills and the Chair of the Learning and Skills Council on 28 September 2001.

4. The key recommendations of the Cassels Report which have been welcomed by the Department for Education and Skills and the Learning and Skills Council can be found on www.dfes.gov.uk/ma.consultation. Press notice 2001/0368 gives further details.

5. There are currently 213,000 young people aged 16 to 25 participating in Modern Apprenticeships. The local government sector has about 4,300 Modern Apprentices and has pledged to double numbers over three years. There are under 100 Modern Apprentices in central government departments, of whom 51 are in the Department for Education and Skills. There are about 3,000 Modern Apprentices in the Armed Forces.

Annex H

INFLUENCES ON CAREER CHOICES

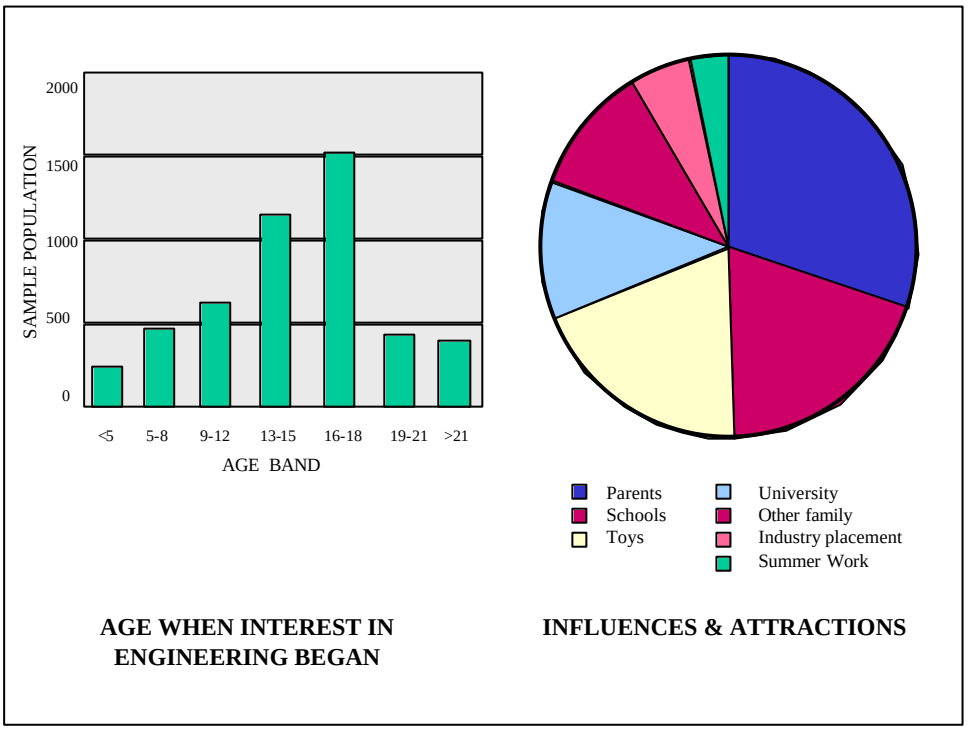
Exit Survey – Engineering Recruitment Show 2001

SURVEY

The IMechE and IEE each year host a series of Recruitment Shows. An exit survey was conducted at the 2001 events to obtain statistics on people seeking new or a change in employment in the engineering sector. Two questions asked in that survey were:

- How old were you when you first became interested in an Engineering Career?
- Who or what was the first major influence on you to take up an Engineering Career?

Over 5000 people responded to the survey, the results of which are summarised as follows:



AGE WHEN INTEREST IN ENGINEERING BEGAN

INFLUENCES & ATTRACTIONS

The significant factors from this survey are:

- The age at which people were attracted to engineering – 13 to 18.
- The major influences on career choice, the top 4 being parents, school, toys and choice of university degree.

Annex I

EPSRC WORKSHOP SKILLS NEEDED TO MANAGE WASTE NUCLEAR AND RADIOACTIVE MATERIAL

EPSRC WORKSHOP

The EPSRC recently hosted a workshop[5] to consider new applications of nuclear physics, a key part of which involved consideration of the skills needed to support liability management. Approximately 70 senior academic staff and representatives of the skill sector attended the workshop, which comprised three sessions considering:

- The skills needed to manage waste nuclear and radiological material in the UK.
- The challenges and opportunities presented by this demand.
- The potential for collaboration between industry and academia in delivering the skills needed by the next generation.

Liability management represents only one element of the nuclear and radiological skill sector; however the EPSRC workshop delivered very similar results to the foresight workshops.

REQUIRED RESEARCH

Session 1 considered the types of research needed to enable effective management of the UK's waste radioactive material.

The activities needed to manage waste nuclear and radioactive material were first determined and the discrete skills needed to perform those activities identified.

COMMUNICATION / PUBLICITY

Communication skills are needed to promote the industry and skill sector in order to:

- Foster the trust of the general public, media and pressure groups in the ability of the skill sector to process and store material with due regard for the environment.
- To create an image of the skill sector that is attractive to potential recruits.
- To enable effective communication between the diverse specialists which comprise the skill sector.

The types of skills include:

- Publicists
- Social Scientists
- Economists
- Environmental Scientists and Environmentalists

Note: The need for improved communication and informed publicists has been highlighted as the top priority in all workshops.

[5] EPSRC Workshop in New Applications of Nuclear Physics – 13-14 May 2002.

PROCESSING AND STORAGE

Management of waste radioactive material will inevitably require assaying, segregation, immobilisation and storage. This requires a multi-skilled organisation, including:

- Remote Handling and Remote Detection
- Radiochemists
- Metallurgists
- Material Scientists
- Engineers (including Mechanical, Civil, Electrical, Electronic, Chemical)
- Nuclear Physicists
- Physicists

LONG-TERM STORAGE

Long-term storage will require:

- Geologists
- Geochemists
- Hydrologists
- Economists
- Environmental Scientists

Research is also required into new technologies, eg transmutation, which will require:

- Nuclear Physicists
- Radiochemists

SITE MODELLING

The ability to model sites is fundamental to understanding the environmental effects of industrial activity. This requires:

- Geologists
- Hydrologists
- Geochemists
- Ecologists
- Mathematicians

ENVIRONMENTAL IMPACT

Responsible management also requires an understanding of the wider environmental effects of industrial activity, which requires:

- Water Transport
- Atmospheric Transport
- Economists

GENERIC SKILLS

Underpinning the above, the following skills are needed:

- Modelling
- Activity standards
- Portable, simple and disposable detectors.

Regulators of the industry are also required who must parallel all of the above skills.

TRAINING, EDUCATION AND RESEARCH

Having identified the range of skills for each activity, the complete range of skills needed by the industry was listed to indicate the discipline in which training, education and research is required:

SKILLS – TRAINING AND EDUCATION NEEDS

- Publicists
- Social Scientists
- Economists
- Environmental Scientists and Environmentalists
- Radiochemists
- Metallurgists
- Material Scientists
- Engineers (including Mechanical, Civil, Electrical, Electronic, Chemical)
- Nuclear Physicists
- Physicists
- Geologists
- Geochemists
- Hydrologists
- Mathematicians

SCIENCE AND TECHNOLOGIES – RESEARCH NEEDS

- Remote Handling and Remote Detection
- Modelling
- Activity standards
- Portable, simple and disposable detectors.

Multi-skilled teams are required to manage radioactive materials, and those teams must contain experts from the above disciplines. To be effective the teams must work closely together, which in turn requires an appreciation of each others discipline and the ability to communicate, specialists in different disciplines having evolved terminology and standards particular to their own discipline.

CHALLENGES AND OPPORTUNITIES

Having determined the range of training, education and research required, in Workshop 2 the challenges and opportunities of conducting that training, education and research were considered:

OPPORTUNITIES

The opportunity exists:

- To unite Physical Sciences and Social Sciences.
- To develop and retain a needed knowledge base.
- To develop international collaboration to address a common problem.
- To 'Green' the Nuclear Industry.
- For commercial exploitation, national and international.
- To demonstrate the ability to manage wastes, which would be an important step towards opening the possibility for new build.

CHALLENGES

- The biggest problem is image and publicity.
- Management of the task is complex because of the number of disparate groups involved.
- It is questionable whether sufficient numbers of skilled people exist to undertake this task.
- New science and technologies are needed, eg transmutation.
- The capture and retention of past knowledge is required.
- Funding is required to underpin research, education and training.

Annex J

LEARNING AND SKILLS COUNCIL

MISSION AND RESPONSIBILITIES

The Learning and Skills Council (LSC) is sponsored by the Department for Education and Skills and is responsible for funding and planning education and training for over 16-year-olds in England. The LSC's mission is to raise participation and attainment through high-quality education and training, which puts learners first. The LSC's vision is that, by 2010, young people and adults in England will have the knowledge and productive skills matching the best in the world.

With a budget of £7.3 billion the Council operates through 47 local offices and a national office in Coventry. Established in April 2001 the work of the LSC covers:

- further education
- work-based training and young people
- workforce development
- adult and community learning
- information, advice and guidance for adults
- education business links.

Of particular interest to the Nuclear Skills Study is the LSC's involvement with:

- The funding of Further Education Colleges
- Modern Apprenticeships.

Annex K

CONNEXIONS

WHAT IS IT?

Connexions is the government's new support service for all young people aged 13 - 19 in England. The service aims to provide integrated advice, guidance and access to personal development opportunities for this group and to help them make a smooth transition to adulthood and working life. The success of Connexions depends on the involvement of young people - listening to and taking account of their views in the design and delivery of Connexions will be essential.

WHAT WILL IT DO?

Connexions joins up the work of six government Departments and their agencies and organisations on the ground, together with private and voluntary sector groups and youth and careers services. It brings together all the services and support young people need during their teenage years. It offers practical help with choosing the right courses and careers, including access to broader personal development through activities like sport, performing arts and volunteering activities. It will also provide help and advice on issues like drug abuse, sexual health and homelessness.

HOW WILL IT WORK?

Connexions is being delivered through local Partnerships working to national planning guidance. The Partnerships will cover the same geographical areas as the Learning and Skills Councils. They will have flexibility to meet local needs using the design that works best. Delivery of the service will be managed and monitored by local management committees, which usually cover the same areas as local authorities.

Connexions offers differentiated and integrated support to young people. All young people will have access to a personal adviser . For some young people this may be just for careers advice, for others it may involve more in-depth support to help identify barriers to learning and find solutions brokering access to more specialist support. The personal advisers will work in a range of settings, schools, colleges, one-stop shops, community centres and on an out-reach basis.

WHEN WILL IT BE AVAILABLE?

There are now 15 areas in England that provide the service. All the rest are planning to go live later in 2002/03. Connexions will not be available in Scotland, Wales or Northern Ireland.

Annex L REGIONAL DEVELOPMENT AGENCIES

GENERAL INFORMATION

RDAs are non-department public bodies (NDPBs) with a primary role as strategic drivers of regional economic development. RDAs aim to co-ordinate regional economic development and regeneration, enable the English regions to improve their relative competitiveness and reduce the imbalance that exists within and between regions.

Each RDA has 5 statutory purposes, which are:

- To further economic development and regeneration
- To promote business efficiency, investment and competitiveness
- To promote employment
- To enhance development and application of skill relevant to employment
- To contribute to sustainable development

RDAs agenda include regional regeneration, taking forward regional competitiveness, taking the lead on regional inward investment and, working with regional partners, ensuring the development of a regional skills action plan to ensure that skills training matches the needs of the labour market.

HISTORY

Deputy Prime Minister John Prescott announced the new programme for the regions in December 1997, launching the Regions White Paper - Building Partnerships for Prosperity. The RDAs were established under the Regional Development Agencies Act 1998.

Regional Development Agencies (RDAs) were formally launched in eight English regions on 1 April 1999. The ninth, in London, was established in July 2000 following the establishment of the Greater London Authority (GLA).

Following the 2000 spending review, the Government announced increases in RDA funding and an increased emphasis on the RDAs role as strategic drivers of regional economic development. In line with this, responsibility for sponsorship of the RDAs moved from the former DETR to the DTI following the June 2001 election.

ECONOMIC STRATEGIES

The Government asked RDAs to develop a new strategic vision for each of the English regions. It issued statutory and non-statutory guidance to the RDAs on the formulation of these Strategies. The guidance encouraged RDAs to formulate clear priorities for seeking to improve regional economic performance, and to identify strategies for achieving them. The aim was to help to ensure that regional opportunities are fully exploited, and that those responsible for economic decision-taking are working effectively together, with common goals and accepted priorities for regional development.

Following extensive consultation and working with and through regional partners, the RDAs (excluding London) presented their Strategies to the Government on 26 October 1999 (London's Economic Strategy was published in July 2001). The Government responded on 12 January 2000 giving a broad welcome to the Strategies. Copies of the Strategies can be accessed at the RDAs' websites. RDAs are obliged to review their strategies in full every three years.

FINANCE

The Deputy Prime Minister, Chancellor and Secretaries of State for the Department for Education and Employment and the Department of Trade and Industry agreed that the Government would significantly increase the RDAs' budgetary flexibility bringing funding

together in a single cross-Departmental budget by 2002-3. An inter-departmental working group, including RDA representatives, are working towards this objective.

As a step towards establishing Single Programme arrangements, RDAs have been given more flexibility during the 2001-02 financial year to switch resources between programmes and are also able to transfer a proportion of their budgets in 2001-02 to a new Strategic Programme. These measures will better enable RDAs to meet regional priorities where the scope of existing programmes is too narrow.

Government Offices (GOs) work close with their RDAs, as they take forward their broad spectrum of responsibilities in the economic development and regeneration fields.

Local authorities have a significant stake in the work of the RDA. Four of the thirteen RDA board members are drawn from local government - with the choice reflecting a balance between type and size of authority, as well as geographical and political spread. Board members reflect regional interests (such as the voluntary sector, rural areas and tourism).

REGIONAL CHAMBERS

RDAs are accountable to Ministers and Parliament, but there will also be arrangements in place to ensure that the RDAs are responsive to regional views and that they give an account of themselves to those with an interest in their work. To achieve this, regional chambers were formally designated under powers in the Regional Development Agencies Act 1998.

From 2001/02 - £5m a year of new resources will be available to the Chambers to help them to establish a substantially expanded scrutiny role within the regions and enhance their capacity to engage constructively with the RDAs as they progress towards their targets and delivery of their Regional Strategies. The Chambers will be well placed to help ensure that the RDAs' strategies and activities mesh in with the wider framework of strategies for the region.

The Government expects the relationship between the RDA and its Chamber to be one of partnership and co-operative working.

REGIONAL DEVELOPMENT AGENCIES

The following RDAs are in operation:

- One NorthEast
- North West Development Agency
- Yorkshire Forward
- Advantage West Midlands
- East Midlands Development Agency
- East of England Development Agency
- South West of England Regional Development Agency
- South East England Development Agency

Annex M

PROFESSIONAL INSTITUTIONS, LEARNED SOCIETIES AND TRADES UNIONS

ENGINEERING INSTITUTIONS

- Engineering and Technology Board
- Science Council
- Institute of Mechanical Engineers
- Institute of Electrical Engineers
- Institute of Civil Engineers
- Institute of Nuclear Engineers
- Institute of Chemical Engineers
- Institute of Physics and Engineering in Medicine
- Institute of Marine Engineers

PHYSICAL SCIENCE INSTITUTIONS

- Royal Society of Chemistry
- Institute of Physics

MANAGEMENT INSTITUTIONS

- Institute of Quality Assurance

LEARNED SOCIETIES

- Royal Academy of Engineering
- British Nuclear Energy Society
- Institute of Energy

TRADE ASSOCIATIONS

- British Nuclear Industries Forum
- Electricity Association

TRADES UNIONS

- Trade Unionists for Safe Nuclear Energy
- UNISON Public Service Union
- Prospect Merger of the Institute of Professional Managers and Specialists (IPMS) and the Engineers' and Managers' Association (EMA)
- Amicus Formed in January 2002 from the merger of the Amalgamated Engineering and Electrical Union (AEEU) and Manufacturing Science and Finance (MSF)
- T&G Transport and General Workers Union
- GMB Britain's General Union

INTERNATIONAL INSTITUTIONS

- World Association of Nuclear Operators
- World Nuclear Association
- Institute of Nuclear Power Operators

Annex N

FUNDING OF HIGHER EDUCATION

BACKGROUND

The following notes provide a synopsis of the Higher Education Funding Council for England's report 'HEFCE 01/14' dated March 2001 "Funding higher education in England - How the HEFCE allocates its funds. The synopsis addresses the funding of higher education in England, but similar arrangements exist in Scotland, Wales and Northern Ireland.

HEFCE advise the Secretary of State for Education and Skills on the funding needs of higher education in England. The level of funding for higher education is decided by the Government and voted by Parliament.

ALLOCATION OF FUNDS TO SUPPORT TEACHING AND RESEARCH

The Higher Education Funding Council for England (HEFCE) allocates funds by 'block grant' to universities and colleges to support teaching and research. The HEFCE funds by this process:

- 132 Higher Education Institutions (HEIs); &
- 221 Further Education Colleges (FECs).

HEFCE allocate funds to each university or college to support teaching, research and related activities, and aim to:

- increase opportunities for students from all types of backgrounds;
- maintain and enhance the quality of teaching and research;
- encourage universities and colleges to work with business and the community;
- support diversity;
- encourage efficiency in the use of public funding;
- provide stability in funding from year to year.

HIGHER EDUCATION INSTITUTIONS

HEIs receive funding from:

- HEFCE Teaching Grants;
- Tuition Fees;
- HEFCE Research allocations;
- Office of Science and Technology / Research Council allocations; and
- Other sources (eg industry sponsorship).

HEFCE is the largest single source of income for the higher education sector. The proportion of an institution's total income allocated by the HEFCE will depend on its activities and money raised from other sources. After Council grants, tuition fees are usually the other major source of funding for teaching, the fee level representing about a quarter of the average cost of tuition.

Exceptions to this are:

- **Medical Education and Research**: jointly funded by HEFCE and NHS:
  - HEFCE funds teaching and research; while
  - NHS funds clinical facilities and health related subjects
- **Teacher Education and Training**: funded by the Teacher Training Agency.

FURTHER EDUCATION COLLEGES

FECs only receive HEFCE funding for students studying for Higher Education Qualifications. The Learning and Skills Council (LSC) fund other courses.

TEACHING FUNDING

Institutions receive teaching funds in HEFCE grants and students fees [which together = resource]. Grants are based upon the number of Home and EU students on higher education courses, not funded from other public sources. Grants are weighted, recognising that subjects needing laboratories and workshops are more expensive than subjects wholly taught in lecture theatres. The weighting factors are:

Group	Description	Weighting
A	The clinical stages of medicine, dentistry and veterinary courses	4.5
B	Laboratory-based subjects (science, engineering and technology)	2
C	Subjects with a studio, laboratory or fieldwork element	1.5
D	All other subjects	1

Other weightings also apply; eg to Specialist or Small Institutions. Institutions can also bid for additional places, but in such cases funding is conditional on meeting HEFCE set recruiting targets.

RESEARCH FUNDING

Research attracts dual funding. HEFCE funds infrastructure [salaries, premises, libraries, central computing etc]; while Research Councils fund direct project costs.

HEFCE considers 2 types of research:

- Quality Related Research, and
- Generic Research.

QUALITY RELATED RESEARCH

The funding of Quality Related research is based on Quality, Relative Costs and Volume:

- Quality is based on a Research Assessment Exercise (RAE) weighting.
- Relative Costs are also weighted, taking into account overhead costs:

	Overheads	Weighting
A	High cost laboratory and clinical subjects	1.7
B	Intermediate cost subjects	1.3
C	Others	1.0

Volume is assessed by: the number of academic and assistant research staff; research fellows, postgraduate research students and income from charities.

The quality of research is assessed in a Research Assessment Exercise (RAE) conducted every four or five years. The last RAE was conducted in 2001, which will inform funding decisions from 2002-03.

In the last RAE, each institution was awarded a rating, on a scale of 1 to 5* (five star), for the quality of its research in each unit of assessment in which it was active. The table below shows how these ratings relate to funding multipliers. Ratings 1 and 2 attract no funding, while a rating of 5* attracts approximately four times as much funding as a rating of 3b for the same volume of research activity. As a result HEFCE funding, research is highly selective. In 2001-02, 75 per cent of HEFCE research funds went to 25 higher education institutions.

RAE rating	Funding weights in QR model
1	0
2	0
3b	1
3a	1.5
4	2.25
5	3.375
5*	4.05

GENERIC RESEARCH

Generic Research was introduced in response to the 1993 Science and Technology White Paper 'Realising our Potential', recognising the need for collaborative research that does not have a single beneficiary.

OTHER RELATED FUNDING

HEFCE also fund strategic priority areas, eg:

- learning and teaching strategies / adoption of best teaching practice;
- collaborative projects in regions to widen participation in higher education;
- developing, with DTI, the capabilities of HEIs to respond to the needs of business.

In 01/02, ½ of special funding is addressing past under-investment in the sector.

REWARDING AND DEVELOPING STAFF IN HE

HEI staff salaries are met through the 'block grant', but an additional £330 million was announced following the Government's 2000 spending review, to reward and develop staff in higher education.

These funds are to be used to recruit and retain high quality academic staff in strategically important disciplines or areas, and to help modernise the management processes in the sector.

PRIVATE FINANCE AND THE HEFCE

An option open to HEIs is to work in partnership with commercial organisations and HEFCE provide advice on opportunities for public/private partnerships. Events are held to bring together institutions and potential investors; the Government's PFI initiative is one such opportunity, others fall under the generic heading of Public/Private Partnership (PPP). PPP covers procurement methods that include features such as joint ventures, innovative ways of contracting out services, levering in private finance, and selling services into wider markets. HFECE policy is to support PFI and PPP within the higher education sector, as procurement methods with potential to deliver better value for money.

Annex O

SCIENCE ENGINEERING AND TECHNOLOGY NETWORK SCIENCE AND ENGINEERING AMBASSADORS

WHAT IS SETNET?

SETNET is the Science Engineering Technology Mathematics Network and has 58 member organisations representing Government, industry, the engineering professional institutions, education and education charities. It is one of the outcomes of a Government initiative-*Action for Engineering.* SETNET is about ensuring that there is a flow of well-motivated, high quality, people from schools who have an interest in, and an understanding of, engineering related subjects.

WHAT ARE SETNET'S AIMS?

To present a coherent message to teachers and industry about the schemes and initiatives available to enhance and extend the key curriculum subjects of science, technology and mathematics.

To bring about collaboration between the various organisations to influence more effectively the teaching of engineering related subjects.

To ensure a more effective communication system for schools and industry.

HOW IS SETNET ACHIEVING THIS?

SETNET has established SETPOINTS in the UK which operate as a focus for teachers, business and industry to obtain information about resources, schemes and initiatives concerned with science, engineering, technology and mathematics.

A freephone number is available: 0800 14 64 15

You can e-mail us at: info@setnet.demon.co.uk

WHAT ARE SETPOINTS?

SETPOINTS:

- Provide a 'one-stop shop' for information about science, engineering, technology and mathematics
- Encourage co-operation in the scheduling and organisation of joint projects and events
- Encourage greater publicity for success stories from teachers and students
- Create and promote a focus for distribution and collection of information for teachers, industry and business
- Undertake reviews of local activities, highlighting delivery 'gaps' and duplication
- Organise seminars and meetings to disseminate good practice

Website: http://www.setnet.org.uk

GOVERNMENT LAUNCHES INDUSTRY-BACKED DRIVE FOR SCHOOL AMBASSADORS

Joint DTI, DFES and Science and Engineering Ambassadors Press Release.
31 January 2002

The recruitment drive for Science and Engineering Ambassadors was kicked off by the Government today, boosting the campaign to inspire young people about science and technology. The Science and Engineering Ambassadors Programme is backed by companies including BAE SYSTEMS, BP, IBM, Ford and Unilever, who run similar activities with local schools.

The Government's Science and Engineering Ambassadors Programme aims to encourage more young people to study science and technology after the age of 16 by helping them find out at first hand what a career in science and technology could offer them.

Ambassadors will work in schools across the country to explain to young people the importance of science in everyday life and talk about their own careers.

John Weston, Chief Executive BAE SYSTEMS said:

"BAE SYSTEMS is committed to supporting the Ambassadors Programme. We are doubling the number of our Ambassadors from 500 to 1000 and welcome the overarching organisation that the UK programme provides. Education liaison activities bring good development opportunities for our employees and bring the excitement and challenge of engineering to young people. Through the UK Ambassadors Programme many more organisations, large and small, can give and receive similar benefits."

Ambassadors will be young people with science, technology, engineering and maths skills, working in a range of different jobs. They could be working as scientists, engineers and mathematicians or using those skills in other careers. They will:

- support out-of-school activities like clubs, awards and competitions;
- offer mentoring and careers guidance
- act as role models; and
- help to provide work experience placements for teachers and students.

Science Minister Lord Sainsbury said:

"Many young people can be turned off science and technology subjects at school, often because they don't feel that science is interesting or relevant to their daily lives. I want their eyes to be opened to the wide opportunities a career in science can offer.

"Science today is very exciting and there is no better way to convey this message than by bringing lessons to life with help from skilled people already working in the industry and academia.

"I am delighted that some of our largest and most prestigious companies such as BAE SYSTEMS, BP, Ford, IBM and Unilever have agreed to support this programme. I now want to encourage many more companies and organisations, large and small, to come forward to help, as I believe that working together in this way we can make a real difference."

Schools Minister Baroness Ashton said:

"For me, one of the most exciting parts of Science Year is the legacy we leave behind – new resources, new networks, ideas and enthusiasm. But what better legacy than Ambassadors, from business, the public sector and higher education, working with schools all around the country?

"As we move ahead into the 21st century, we all know that our young people need to be equipped to understand the fast-changing world of science and technology, and to deal with the moral and social questions that will increasingly be posed. Ambassadors have an important role to play in preparing the citizens of tomorrow to meet the challenges that lie ahead."

QUOTES FROM OTHER SUPPORTING ORGANISATIONS:

Dr Alan McKinnon, Director of the Unilever R&D Laboratory, Port Sunlight said:

"Unilever is pleased to align its successful Community Scientists programme with Science and Engineering Ambassadors.

"We applaud the Government's initiative in setting up the programme and believe it will help support and further strengthen our employees' commitment to play their part in inspiring future young scientists and engineers."

Andy Taylor, Director, Corporate Citizenship for Ford of Europe, said:

"Ford has a strong record of engaging with the community, and has run several programmes involving employees working with local schools.

"Working under the umbrella of the Government's Science and Engineering Ambassador Programme will give employees the opportunity to train formally for this kind of work.

"We look forward to working in the future to engage young people in science and technology, and to help with the future development of the Ambassadors concept."

Sir Peter Williams, Chairman of the Engineering and Technology Board said:

"The launch of the Science and Engineering Ambassadors Programme is a vitally important step forward because it marks a renewed attempt to interest young people in disciplines which are fundamental to future wealth creation.

"Treating science and engineering as a seamless robe is also an immensely welcome shift of approach. The Engineering and Technology Board also looks forward to integrating its own Neighbourhood Engineers Programme with the Ambassadors Programme in the near future."

Notes to Editors

- The Science and Engineering Ambassadors Programme is a joint Department of Trade and Industry and Department for Education and Skills initiative, set up as part of Science Year, and announced by the Trade and Industry Secretary Patricia Hewitt on 16th January 2002 at a DTI conference.
- In 2001, 87% of 11 year-old pupils achieved the level expected for their age or above in science. By 2004, the government's target is for 70% of young people aged 14 to achieve the expected level for their age in science, or above. In 2001, 77% of pupils entered double award science GCSE and 40% achieved A*-C grades. The PISA international study published in December 2001, showed that tests taken by 15 year olds in 2000, in scientific literacy (defined as "the capacity to acquire and use scientific knowledge and to draw evidence-based conclusions) the UK was 4th out of 32 countries.
- Science Year is an initiative managed by NESTA on behalf of the Department of Education and Skills, and involving their key partners the Association for Science Education and the British Association for the Advancement of Science. It aims to raise awareness of science among young people aged 10-19 years and their key influencers - parents and teachers. Working with teachers, industry and the Government, Science Year is the launch pad for a wide range of activities,

initiatives and programmes delivered by local and national organisations from September 2001 – August 2002. Science Year seeks to highlight the many creative opportunities that exist in the workplace today for young people with a science qualification, together with the importance and the impact that science has on our everyday lives. Visit www.scienceyear.com for further information or contact Siobhan Doherty (020 7808 1898) or Scott Swinton (020 7925 5261)

- SETNET will co-ordinate the Ambassadors programme nationally. SETNET is the Science Engineering Technology Mathematics Network and has 58 member organisations representing Government, industry, the engineering professional institutions, education and education charities. It is one of the outcomes of a Government initiative-*Action for Engineering.* SETNET is about ensuring that there is a flow of well-motivated, high quality people from schools who have an interest in, and an understanding of, engineering and science related subjects.
- For further information, or to apply to be an Ambassador, visit the Science Year website at www.scienceyear.com . Alternatively visit www.setnet.org.uk or telephone SETNET on 020 7636 7705.

Annex P

NATIONAL OCCUPATIONAL STANDARDS

OCCUPATIONAL STANDARDS COUNCIL FOR ENGINEERING (OSCENG)

BACKGROUND

OSCEng, the Occupational Standards Council for Engineering, is a voluntary, employer-led association of parties sharing a commitment to the development of a coherent framework of Occupational Standards and, with Awarding Bodies, qualifications across the full range of engineering occupations. Members of the Council are drawn from employers, Lead and Awarding Bodies, Trade Unions, employer organisations, academia, the Engineering Council, engineering professional Institutions and other parties involved in setting standards of performance for engineering.

OSCEng became operational in September 1996, providing continuity from the Engineering Occupational Standards Group and the Engineering Industry Standing Conferences for Extraction and Processing, Manufacture and Engineering Services.

THE OSCENG MISSION

OSCEng will co-ordinate NTO efforts to develop, revise and maintain Occupational Standards for engineering. In so doing, OSCEng will ensure active participation of employers, the Engineering Council, the Professional Institutions, the Trade Unions and academia in this process.

OSCEng will develop the uses of Occupational Standards for engineering and encourage their implementation; and illustrate and promote the added value of the use of Occupational Standards.

MISSION OBJECTIVES

- To implement an appropriate strategy and plan for the development of National Occupational Standards for all functional levels in engineering.
- To ensure that Occupational Standards are presented in easily understood language and format, and are revised to keep pace with technological developments and industry needs
- To maintain quality control over the use of engineering Occupational Standards.

OSCEng receives substantial support and commitment to achieve its mission objectives from the Engineering and Marine Training Authority, the Engineering Construction Industry Training Board, the Engineering Employers' Federation and the Engineering Council.

ORGANISATION

OSCEng is

- Employer led
- Responsive to the engineering sector; and to the engineering requirements of all sectors.
- Committed to supporting the development of qualifications based upon the Occupational Standards

SCOPE OF WORK

OSCEng endeavours to cover all engineering activities within the broad areas of extraction, processing, manufacture and production and services. The principal achievements for OSCEng to date have been:

- Production and publication of the new engineering Occupational Standards for the Higher Levels
- Production of occupational and functional maps for engineering
- Working with QCA and SQA, through an agreed referral process, to ensure consistency in qualifications at and between all levels and within the agreed framework
- Managing the development of Specific Application Statements for Engineering Reformation Project Units at Levels 1–3.
- Encouraging the use of Occupational Standards, as demonstrators of competence, and in particular as a component of engineering qualifications for Institution and professional membership.
- Representing the collective views of the OSCEng to Government, QCA, SQA, industry and other interested parties.
- Encouraging the take-up of Occupational Standards and Qualifications by industry and individuals to complement the work of National Training Organisations and Awarding Bodies.
- Co-ordinating activities with other organisations having engineering interests relating to Occupational Standards and qualifications.

MEMBERSHIP

AVO International
BCECA
BP Amoco
Chemical Industries Association
City & Guilds of London Institute
Costain Oil, Gas & Process
Cranfield University
ECITB
EEF
EMTA
Engineering Council
ETA
Gas Industry NTO
IChemE
IEE
IIE
IMarE
IMechE
NFEC
NTO Telecom
OPITO
Petroleum Industry NTO
Rail Industry NTO
Scottish Power
Transport & General Workers Union
Tripartite Services Group (MoD)

NATIONAL OCCUPATIONAL STANDARDS IN HEALTHCARE SCIENCE

This project will develop National Occupational Standards (NOS) for approximately 40 different disciplines within the Healthcare Science workforce. These standards will be developed for practitioners working at all levels and will provide national benchmarks for competent performance within the Healthcare sector. Integral to the project outcomes will be the development of accompanying assessment strategies, the identification of educational requirements and delivery mechanisms and the definition of a clear implementation strategy.

The project is jointly sponsored by NHS, QCA and SQA over a four year period. Steering Group representation ensures UK coverage for this important development.

National Occupational Standards will be developed in consultation with Professional Bodies and practitioners across 40 disciplines. The first introductory workshop was held in London on 24th January 2001 and was attended by 30 practitioner delegates representing 24 Professional Bodies.

Annex Q

NUCLEAR SKILLS GROUP

Chairman

Professor John Chesshire	Chairman

Independent Members

David Barlex	Nuffield Foundation
Professor Alexander Elliott	Department of Clinical Physics and Bioengineering, Glasgow Royal Infirmary
Professor Brian Fulton	Department of Physics, University of York
Brian George	Taylor Woodrow Construction
Catrina Hassall	BNES, Young Generation Network
Paul Thomas	BNFL

Departmental Members

Helen Leiser	Department of Trade and Industry
Stephen Spivey	Department of Trade and Industry
Sarah Haywood	Department of Trade and Industry
Dr Peter Storey	Health and Safety Executive
Malcolm Westgate	Ministry of Defence
Roy Cummings	Ministry of Defence
Dr Hilary Walker	Department of Health
Steve Ebdon-Jackson	Department of Health
Liz Morrey	Department for Education and Skills
Mervyn Humphries	Department for Education and Skills
Stephen Rhodes	Department for Education and Skills
Phil Holmes	Department for Education and Skills

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