EUROPEAN CHEMICAL REGIONS NETWORK

SKILLS, TRAINING AND EDUCATION

UK North East

UK North West

Asturias (Spain)

Lombardy (Italy)

Piedmont (Italy)

UK Humber

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PROJECT PART-FINANCED BY THE EUROPEAN UNION

North East South West INTERREG IIIC

Introduction ECRN

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ECRN: The "European Chemical Regions Network" (ECRN) has the objective to exchange experiences about the joint challenges for chemical regions and initiate a mutual learning process for the strengthening of the chemical sector. Joint positions on relevant policy issues are developed to raise the regional voice in the European decision making process. The partner regions are Saxony-Anhalt, acting as the coordinator, North Rhine Westphalia and Lower Saxony, (GER), Huelva, Asturias and Catalunya (SPA), Lombardia and Piemonte (ITA), North East and North West of England (UK), Limburg (NL), Masovia (PL), and Ida-Viru (EST). Contacts to further chemical regions have been established to enlarge the network and become a stakeholder at European level. Rhineland Palatinate and Schleswig Holstein have recently joined the network. The total project budget is 1,639,000 €, 61% of which is funded by the European Union. More details about the ECRN can be found on its website at www.ecrn.net.

INTERREG IIIC is an EU-funded programme that helps Europe's regions form partnerships to work together on common projects. These projects enable regions to share knowledge and experiences that will help them develop new solutions to economic, environmental and social challenges. 98 percent of all European Union regions are involved in INTERREG IIIC projects. There are more than 250 INTERREG IIIC projects running, involving 2,500 local and regional actors from 50 countries. 20 percent of these actors are from the new EU Member States. More information on INTERREG IIIC can be found on www.interreg3c.net.

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ECRN STUDY TOPIC 2: SKILLS, TRAINING AND EDUCATION

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SUMMARY

1 This study, carried out on behalf of the Humber Chemical Focus with the close involvement of the Tees Valley Joint Strategy Unit, has aimed to compare the experience of six participating European regions in the area of skills and training, and how each region addresses the issues related to this topic.

2 The study obtained information by means of a questionnaire addressed to the six participating regions:

- Asturias (Spain)
- Lombardy (Italy)
- Piedmont (Italy)
- UK Humber
- UK North West
- UK North East

3 It covers the topics

- The size and characteristics of the region's chemical industry
- Current staffing and skills issues
- Skills and training providers
- How skills issues are identified
- Examples of skills issues currently being addressed
- Future skills issues

4 The study has produced information on current skills and training issues, and how they are being addressed, that it will be useful to explore further at the dissemination stage of the project.

5 Main skills issues reported:

The differences between the chemical industries in each region influence the relative importance of the skills issues each faces, but there are still several important themes largely in common across several of the participating regions. These include:

- A general shortage of graduate staff, particularly in scientific disciplines, caused partly by a fall in numbers of graduates matriculating in these subjects from Universities, and partly because careers in the industry are not perceived by graduate as attractive.

- Shortage of graduate staff with certain more specialist skills, which vary from region to region

- At the skilled technician level, difficulty in recruiting engineering technician staff for maintenance and construction activities

- The need to increase the skills levels of existing staff, especially at the technician level where age profiles are rising

Issues specific to individual regions include:

- In Asturias, some difficulties in recruiting experienced staff knowledgeable in particular processes or technologies.

- An impending shortage of staff with skills related to biotechnology, mentioned particularly by UK NE.

6 Each region appears to have an adequate number of providers of skills and training, though each does rely on recruitment of graduates from outside its own area.

7 There is significant involvement of central and regional government agencies in the whole area of skills and training, though often on a wider-basis than in chemical industry-specific matters. They are often especially concerned with matters of funding.

8 No region appears to be satisfied by the links between industry and providers of skills and training, and each is addressing this in its own way. Industry-led initiatives taken by the Industry Association (Italy) or by regional chemical cluster organisations (UK regions) seem to be providing the most examples of active projects.

9 Each region has developed its own structure of organisations and institutions concerned with the area of skills and training for the industry. It is not possible from this study to conclude what advantages or disadvantages each may have.

10 Examples are provided of how each region is addressing some of its current skills and training issues. These show a variety of approaches, which it will be very useful to share when the results of this study, like those on the other topics, are disseminated.

11 Little if any work is being done by any of the regions to forecast longer-term trends and the skills issues that may arise as a result of them. An exchange of ideas in this area may also be very useful to suggest ways in which this could be done.

12 From the information provided, it is possible to suggest three important areas for which an early exchange of information would be useful. These are:

1 Links between industry and skills providers – each region appears to have a somewhat different approach to this mechanism and it would be useful to understand the advantages which arise from each organisational method.

2 Encouraging students to study chemistry and other sciences, and graduates to take up scientific careers in industry – while Lombardy and Piedmont have the greatest problem in this area at present, similar concenrs are expressed particularly in the UK regions.

3 Examples of successful projects – all regions give examples of skills-related projects that have been effective, and an gretaer understanding of the factors which have led to their success would be advantageous.

It is suggested that these topics are included in the Agenda for the dissemination of the results of this report, during April 2006

13 The topic area is one of considerable interest and it is proposed that ECRn investigates futher steps to continue it by means of collaborative work. Possible projects would include:

1 The prediction of longer-term skills needs by use of a joint 'Foresight' project. Since none of the participating regions has yet been able to devote much time or resource to trying to forecast the future requirements new skills arising from the development and change that can be expected in the industry over the next 5 – 10 years, use of a collaborative forecasting methodology such as 'Foresight' could be very useful. Ths would involve facilitated meetings at which industry experts would combine their knowledge to generate possible scenarios for the industry based on social, economic and scientific and technological trends, and from these to identify what emerging needs for new skills, training and education should be addressed, either generally or in their own regions.

2 Joint exchange of best practice and possible collaborative actoin to encourage gradiuates into Science and the industry. An early presentation methods currently being used by the participating regions is recommended in 12 above, but since the problem is growing and seen in many regions of the EU, the need to work together to develop new and combined approaches is apparent.

3 Joint exchange of practice on systems for learning related to the chemical industry. While the short-term dissemination event proposed in 12 above will give a brief view of a number of specific projects that are seen as successful in each of the partiicipating regions, they will not examine in detail the educational and training systems used for different categories of employees, nor for the types and levels of skills involved. A more extended project to compare and exchange such information is recommended, from which it may be possible to exchange or jointly develop training materials and methodology.

OBJECTIVES AND METHOD

The European Chemical Regions Network (ECRN) is a co-operation of regions in which the chemical industry plays a leading role in economic performance and development, and in employment. It has 13 member regions, and a further 7 are actively involved in the network, which is carrying out an INTERREG IIIC project funded by the EU. This will exchange information on five topics of importance to member regions and identify areas in which better collaboration can be achieved. This report covers Topic 2 - Skills.

Objectives

The aim of the study was to collect information from the participating regions to promote

- understanding of how key skills issues affecting the chemical sector are identified and addressed
- identification of the most effective methods for doing this
- sharing of information on key skills affecting each region

Because regions from different countries are involved, it was expected that in many cases the organisations involved in these issues are likely to be different, perhaps associated with particular regional and national institutional structures specific to each country. Since it is unlikely that such major structures can be copied in other countries, it was hoped that the study would identify the characteristics of methods being used to identify and address skills issues, and that the contribution from each region would highlight examples in which skills issues have been successfully addressed. If so this could lead to useful exchanges of best practice for all regions, including those not involved as contributors to this study.

Method

In common with the other studies, one of the participating regions acts as a co-ordinator to develop and circulate a questionnaire on the topic, to receive responses from each region and to collate the information received. This report is the result of this process, which has been co-ordinated by the UK Humberside and North East, with the Humber Chemical Focus and Tees Valley Joint Strategy Unit (TVJSU) as the regional organisations managing this process.

Questionnaire Sections

The questionnaire devised covered the following aspects:

Section 1: The characteristics and dimensions of the chemical industry in each region

The aim of this section was to provide enough information about each region's chemical industry so that the responses on skills issues etc can be related to its characteristics of size, sub-sector and the business functions (eg manufacturing, sales, marketing, R&D and

engineering etc) present in the region. It was not intended to provide a complete statistical description of the industry.

Since definitions of the chemical industry vary considerably, it was hoped to include in this survey as wide a range of sub-sectors as possible, to avoid excluding useful experience. Therefore as well as information relating to the conventionally-designated chemical industry and all its sectors (eg bulk, fine and speciality chemicals, petrochemical and petroleum processing, detergents and personal care products), it was expected that the pharmaceuticals, pharmaceutical intermediates and biotechnology and bioprocessing sectors would also be covered if they are relevant in a region. The extent to which important service industries (eg engineering, construction, analytical, logistics) directly related to the chemical sector are included was also sought.

Section 2: The main skills problems in the region

An overview and list of such problems from each region will enable a comparison to be made, and can be placed in the context of the industry's characteristics. This list would cover current and forecast staff and skills shortages, any relevant information on the categories of job/employees involved, age profiles where available, and problems specifically involved in attracting young people to the industry.

Section 3: Skills and training providers

The aim was to obtain a picture for each region of the types of organisations involved in provision of education and training relevant to the industry; to what extent this regional provision is enough to meet the recruitment and training needs of the industry; what resources from outside the region are needed to supplement local provision. Part of this question was intended to gain a broad understanding of the roles of regional or national government agencies in skills-related matters.

Section 4: The identification of skills issues

This section of the questionnaire was designed to investigate the processes by which skills and training providers are made aware of the needs of the industry for skilled staff and the sorts of training and education they need, including whether regular manpower or skills surveys are carried out, and whether organised or other links exist between the industry and relevant educationalists and training providers to assist this process.

Section 5: Examples of skills solutions currently being implemented

This section was provided to enable regions to provide real examples of how som of the skills issues they face are, or have been, addressed. The aim was to provide information on good practice that will exemplify methods used, as a basis for future sharing and exchange.

Section 6: Key future skills issues remaining to be addressed

Here the aim was to examine whether regions have been able to look ahead beyond the immediate future to identify skills or staffing needs that may arise because of longer-term trends and changes in industry or society, or have mechanisms for doing this. If so, what plans are being put in place to enable these issues to be addressed at the appropriate time.

PARTICIPATING REGIONS

The regions that have been able to take part in this study are:

- Asturias (Spain)
- Lombardy (Italy)
- Piedmont (Italy)
- UK Humberside (UK)
- UK North East (UK)
- UK North West (UK)

Some other regions originally expressed interest, though they have not been able to take part because of resource limitations. It is hoped that they will be able to take place in the information-dissemination and sharing that will follow this stage of the project.

THE CHEMICAL INDUSTRIES OF THE PARTICIPATING REGIONS

Table 1 below summarises the information is provided in response to Question 1.

Size of the Industry in the regions

The chemical industries of participating regions differ considerably in size, whether measured by numbers of companies, numbers of employees or total annual turnover. Definitions of what these figures include vary slightly. All regions except the UK NW region have been able to include information on the pharmaceuticals sector even though this region does have a large pharmaceutical industry. Asturias mentions separately companies involved in plastics and rubber; these are present in other regions too, but not separately stated. The UK NE region includes specific mention of its biotechnology sector; elsewhere these may or may not be statistically included.

Overall there appears to be considerable similarity between the regions in the range of chemical activities they host, and each region's industry seems to have companies operating in each of the sub-sectors. They differ mainly in the relative balance in each region between these. In Lombardy the emphasis appears to be towards fine, formulated and speciality chemicals, whereas the other regions appear to have significant presence of basic and commodity chemicals, including petrochemicals.

Company sizes

Asturias provided considerable detail about the sizes of the companies that comprise its chemical sector, and the region appears to have a very large proportion of micro-companies as well as SMEs and a smaller number of large companies. Elsewhere the proportion of large companies seems to be greater. Lombardy in particular mentions a significant number of HQs of multinational companies. The effect of these differences may lead to variations in the amount of R&D carried out between the regions, and hence in the needs for more highly scientifically or technically qualified graduates.

Business functions and types of jobs

All business functions appear to be present in each region, the range depending on the size of business and whether companies are multinationals, SMEs or, in the case of Asturias, micro-companies.

The major business activity in each region appears to be manufacturing. UK Humber, for example, has 50% of its chemical companies in this activity. In each region other business functions are also present such as marketing, business development or customer service. R&D is carried out in each region. UK North East and Piedmont specifically mention R&D Centres, Science and technology parks etc though these are also likely to be present in the other regions too.

All regions give figures for proportions of graduate jobs except Asturias and Piedmont. Lombardy has the highest proportion of jobs at graduate level, at 30%, with the three UK regions ranging from 11 to 20%. In Lombardy half of the graduates are chemists; elsewhere this proportion is not specified though technical disciplines appear to dominate.

In all cases outsourcing of engineering work for maintenance and construction is an important feature.

TABLE 1						
SECTION 1 RESPONSES SUMMARY – CHEMICAL INDUSTRY BACKGROUND IN THE REGION						
Question	ASTURIAS	LOMBARDY	PIEDMONT	UK HUMBERSIDE	UK NORTH WEST	UK NORTH EAST
1 (a) Chemical industry profile Number of companies	112 companies (chemicals 64, plastics and rubber 48)	1,678 chemical companies (1st region in Europe)	1,800 chemical companies	More than 100 companies (50% in chemical manufacturing) plus a further 40 companies identified in the bioscience sector	470 chemical manufacturers plus 130 sales offices A growing bioscience sector.	200 chemical, pharmaceutical and biotech companies. Includes 40 companies in biotech sector
Number of employees (direct)	Approx 3200 (chemicals 2358, plastics and rubber 769)	75,883 (2nd region in Europe)	50,000 employees (7.3% of Italian chemical sector)	10,000 employees (direct and indirect)	44,000 direct 120,000 indirect	34,000 direct, including 4800 employees in rapidly growing biotech sector
Industry annual turnover	EURO 0.774 bn (2003)	Not mentioned	Not mentioned	EURO 8.8bn	EURO 14.8bn	EURO 11.8bn
Company sizes and activities	Micro-companies form the largest group with about half as many SMEs. A limited number of large companies	Most companies are SMEs but significant number of HQs of multinationals		50% of companies provide service to the chemical sector	Companies include major multinationals and SMEs (80%).	Mix of major international companies and SMEs.
Business functions present in region	80 - 90% of larger companies carry out R&D, either themselves or via contractors. For SMEs and smaller, about 45% (chemicals) and 20% (plastics & rubber) are involved in R&D.	SMEs - all business functions Multinationals include HQ functions such as marketing and business development	All functions plus Facilities with chemical related capabilities: 25 research centres 4 science and technology parks 2 incubators 2 business innovation centres	Business functions >40% manufacturing, 40% engineering services, approx 20% other functions including R&D	All functions are present including manufacturing, R&D, customer and technical service	Manufacturing R&D (with approx 20 major centres of industrial research) Business functions including marketing.
Service companies		Important outsourcing industry for engineering, construction and other services	Important outsourcing industry for engineering, construction and other services	Engineering, construction and service work in these categories is largely outsourced	Much outsourcing of engineering and other service support.	Engineering maintenance is largely outsourced. Approx 150 Supply chain companies.

TABLE 1 (continued): SECTION 1 RESPONSES SUMMARY – CHEMICAL INDUSTRY BACKGROUND IN THE REGION						
Question	ASTURIAS	LOMBARDY	PIEDMONT	UK HUMBERSIDE	UK NORTH WEST	UK NORTH EAST
1 (b) Main sub-sectors	Carbochemistry Fertilizers Synthetic fibres Pharmaceutical products Conveyor belts Plastic materials Vulcanizers	Pharmaceutical actives Fine chemicals Speciality chemicals Cosmetics Formulated pharmaceuticals Agrochemicals	Basic chemicals Petrochemicals Polymers Plastic and rubber Synthetic fibres Electronic chemicals Catalysts	Petrochemicals Paints Packaging Pharma intermediates Pigments Bulk organic and inorganic chemicals Speciality organics	Basic and commodity chemicals (147 companies) Speciality and fine chemicals, pharmaceutical companies (283 companies)	Oil and Gas processing Petrochemicals Speciality chemicals Pharmaceuticals Biotechnology
1 (c) Types of jobs in the industry	Production operators (L1-2) Foremen (L2-3) Lab analysts (L3) Maintenance technicians (L2-3) Administrative staff (L2-3) Levels vary slightly according to the company size (Training levels: L1 = Professional initiation L2 = Intermediate level-Technician L3 = Advanced level-Superior Technician)	30% of employees are graduates, 50% of these in chemistry.	Percentage of graduates not known for this region. For graduates in Italian Chemical Industry: Laboratory technicians – synthesis, formulation, quality control Chemical engineers in process and projects, safety Others in purchasing, technical assistance, environment, certification and patents	Manufacturing 40% Engineering and technology40% R&D 5% Other business functions 15% 15 – 20% of manufacturing jobs are graduates eg • Operations • Engineering • SHE / environmental management • Some R&D	Manufacturing (53% of jobs). Graduates form approximately 11% of the direct employees. Considerable detailed information is available.	Majority of jobs are in manufacturing or engineering support services. 15 – 20% at graduate levels, the majority in technical disciplines

THE MAIN SKILLS PROBLEMS

Table 2 summarises the results from each region on the shortages of staff currently being experienced, skills limitations of the current work forces, forecasts for the future, information when available on age profiles and the particular issues of the recruitment of young people to the industry. The conclusions are:

Staff shortages, now and forecast

All regions report some problems with recruiting staff, though there is a considerable variation between them in the sort of difficulties experienced.

Asturias – recruitment difficulties normal unless a company's workforce is diminishing. Issues often arise when a company wishes to recruit staff with experience in their particular industry, perhaps because of the varied nature but relatively small size of the industry in the region, so that there are few other companies with staff having the same expertise. For the future no major shortages are foreseen except in areas where growth is predicted such as biodiesel manufacture.

Lombardy and Piedmont – problems for both are in the shortages of graduates, since the numbers matriculating is falling while the demand for such graduates remains steady. The mobility of graduates, especially those most talented, is seen as a particular problem in Italy. These trends are expected to continue, though the recent introduction of Triennial degree courses, offering a more general scientific training may partly help if the training they provide is relevant to the needs of industry.

UK Humber – there are particular shortages of engineering staff, both at the technician level for maintenance and construction, and for specific disciplines eg project management. This situation is expected to continue, perhaps worsening because of the present aging workforce.

UK North West – has general problems of shortages of engineering technicians, and also of graduates with relevant skills, particularly in science disciplines. As in the Italian regions, this is seen to be because of the decrease in numbers of graduates matriculating in science and technical subjects, and because (it is said) that the chemical industry does not appear to offer desirable careers to graduates. These issues are expected to continue unless action can be taken in the short term.

UK North East – as for the other two UK regions, shortage of engineering technicians is named as the most important numbers limitation for both maintenance and construction, and this is currently predicted to continue. Difficulty in recruiting, though not critical, is seen by some companies trying to find chemical engineering graduates, skilled laboratory technicians, instrument technicians for laboratory work and Qualified Persons for regulatory jobs in pharmaceuticals. To these may be added a significant shortage of staff with skills relevant to the biotechnology sub-sector, which is growing rapidly in the region.

Skills Limitations

In almost all the participating areas there are shortfalls in the skills of the present workforce, but the exact nature of these limitations varies considerably from region to region.

For ***Asturias***, professional skills in particular specialised topics such as languages, are limited.

In ***Lombardy and Piedmont*** the problem is graduate-related and seen in particular activities such as in R&D and formulation work, in patents and some non-technical activities such as marketing.

In ***the UK***, basic technician skills need to be improved, both in engineering and in production activities. Limitations of a wider type are seen in general management, particularly in SMEs, but also in personal rather than technical skills in the UK North West, which mentions communication and self-development are mentioned as shortfalls.

Age profiles

Only the UK North West has carried out a comprehensive study of age profiles across the industry, and that in 2002. The other UK regions have had such studies done for particular groups of workers eg production technicians (UK North East) and engineering workers (UK Humber). In each case the same sort of pattern has emerged, of the larger proportion of the workforce in the age-range 35 to 55 (or higher), and few employees aged below 30. This is expected to cause serious staff shortages in a few years' time as retirement age is reached for the significant number of older employees. It is also related to the lower than desirable skill levels of some of the older employees, who may lack educational and training qualifications that were unavailable during the early periods of their working lives.

Asturias collected some age information directly as a result of this study. This shows a slightly different age range (25 – 50 years) than the UK work has shown, with average ages ranging between 35 and 44, this variation depending to some extent on the size of the company.

Recruitment of young people

The most common theme emerging here is the gradual fall in numbers of science graduates, and the difficulty of attracting them into the industry. This is seen particularly in the Italian regions where the tight labour market provides many competitive opportunities while highly skilled graduates are not attracted to SMEs, especially, in the chemical sector.

The position in the UK has been hidden to some extent by the a limited amount of recruiting in recent years, and the tendency for companies to recruit experienced staff made available because of the general fall in numbers employed in the sector. The UK (Humber and North East especially) also report increasing difficulty in attracting entrants with good school qualifications in mathematics and science into apprenticeship training for technician positions.

In this topic Asturias differs. There difficulties of recruiting young people are experienced only by small and micro-companies, but this may be related to the preference of companies to take in people who have previous industrial experience.

TABLE 2						
SECTION 2 RESPONSES SUMMARY – THE MAIN SKILLS PROBLEMS IN THE REGION						
Question	ASTURIAS	LOMBARDY	PIEDMONT	UK HUMBERSIDE	UK NORTH WEST	UK NORTH EAST
2(a) Current staff shortages	Majority of companies experience difficulties in recruitment. Those that do not are usually ones whose work force is diminishing. No common pattern on the types of jobs, probably because of the varied nature of company activities in the region. Problems arise when companies need to recruit staff with previous experience, not available in the relatively small regional industry.	Lombardy suffers even more than the rest of Italy from a shortage of graduates. Fewer graduates matriculate while industry demand remains the same. Regional chemical industry takes 40-50% of Italian chemistry graduates while its Universities provide about 15% of Italian chemistry graduates. Mobility of talented staff is a problem in Italy.	Fewer graduates matriculating against steady demand for them from the industry. Some problems of mobility of most talented staff	Specific engineering staff, craft and electrical technicians; project managers	General shortage of staff with technical skills at levels 2 and 3 (technician). Shortage of graduates with relevant skills, particularly in Science disciplines. Seen to be due to decreasing number of University students in science subjects, and chemical industry seen as a less desirable career option.	No major current shortages of staff, except engineering and construction for peak workload projects. Instrument technicians, particularly for laboratory work. Some companies have difficulty in recruitment of certain categories eg chemical engineering graduates, skilled laboratory technicians, Qualified Persons for pharmaceutical roles.
2 (b) Present skills limitations	Shortage of professional training in specific skill areas eg languages.	Particular problems for R&D departments; for formulation chemists in speciality chemical companies; and in some non-technical areas eg marketing.	Particularly in R&D, marketing, patents and management functions	General management skills in SMEs Basic technical, craft and electrical technician skills	Skill levels of existing staff are seen to be limiting performance in 60% of companies. In many cases these limitations are in personal skills eg communication, self-development etc rather than job-content-related.	There is a need to increase the skill levels of several job categories eg production technicians and some engineering craftsmen to handle the developing technology of the industry.

TABLE 2 (continued): SECTION 2 RESPONSES SUMMARY – THE MAIN SKILLS PROBLEMS IN THE REGION						
2 (c) Forecast skills shortages	Lack of staff for the next year is not foreseen in most cases. Only in an area where growth is foreseen (biodiesel) are new requirements predicted.	Expect current trends to continue. Triennial degree courses (more general, established for 3 years) may partly help if training is designed to follow industry needs	Expect current trends to continue. New triennial degree courses may partly help if training is useful for industry needs	Higher demand in engineering service sector predicted for the future because of aging workforce. Present skills limitation expected to worsen.	Skills shortages seen as continuing in the future unless action is taken.	Likely to be shortage of engineering technicians. Shortage of staff for biotechnology sector's continued growth.
2 (d) Age profiles	The average age of all employees ranges from 35 to 44 years in different sizes of company. Almost all employees are between 25 and 50	No information available. Ad hoc studies needed	No information available	Workforce survey in engineering service sector showed aging population with low intake of young people, leading to forecasts of major shortages in future.	Comprehensive survey across the chemical sector showed that most of the workforce is in age-range 35 – 55 with too few employees aged below 30. Engineering service companies not included in this survey but similar picture anticipated.	Age profile studies have been carried out for certain groups of employees though no comprehensive survey for all groups has been done. Studies often show an aging population with small number of young people recruited.
2 (e) Young people recruitment	Large and medium companies – no problems except in one case. Small and almost all micro-companies have difficulties, though their requirements for recruits with experience may account for this.	Fewer matriculations in all scientific subjects. Tight labour market in Milan gives many opportunities. Highly skilled graduates often do not see SMEs as attractive employment opportunities.	Fewer matriculations in all scientific subjects. Tight labour market gives many opportunities. Highly skilled graduates often do not see SMEs as attractive employment opportunities.	Difficulties in attracting applications from school-leavers of the best quality for apprenticeships, Basic maths and science standards are often lacking.	There has been little recruiting in recent times. When this has been done, older people from other companies have been recruited rather than new intakes of young people to the industry.	Some difficulty in attracting well qualified school-leavers into apprenticeships for engineering or production technician training. Nationally the numbers of science graduates is falling and difficulty of attracting them into the industry is increasing.

SKILLS AND TRAINING PROVISION

The results of Question 3 are summarised below in Table 3. The main conclusions are:

All regions have a large number of educational institutions and training providers, ranging from Universities to colleges and schools. There is some variation on the relevance of different courses to the specific and sometimes more applied science requirements of the industry.

Universities

Universities provide the widest range of education and courses. As would be expected, the main graduate degrees are of an academic nature, with some applied science degrees available in some cases. They seem to be responding to the needs of industry in the emergence of more specialised training in the form of Masters Degrees in subjects of direct industrial relevance (eg one Lombardy University offers masters courses specifically for the pharmaceutical sector).

The UK is introducing a new category of degree course, the Foundation Degree, aimed at those currently employed in industry and providing an ordinary degree in two years, with emphasis on a vocational approach through projects devised and carried out in conjunction with local industry. One of these in the UK North East is directly specifically at the needs of the chemical sector for more highly skilled production technicians. This type of degree may be somewhat similar to the new Triennial degree courses introduced in Italy over the last three years.

In Lombardy, Piedmont and the three UK regions, graduates are recruited on a national basis and not just from Universities within the local region. Lombardy in particular has a very high demand for graduates from outside the region, taking 40 – 50% of the country's chemistry graduates even though it produces 15% of the nation's total itself.

Technical training

Training for technicians is provided in each region by training through colleges or high schools, and most of this appears to be carried out within each local region. Courses appear to be applied science or vocationally directed, and some colleges provide courses devised specifically for particular topics of direct relevance to local industry. In the UK, a new category of college-provided education is emerging through the introduction of Centres of Vocational Excellence (CoVEs), often as a result of partnership between colleges of Further Education and Industrial Technical Training organisations, aimed at providing high quality practically-based training related to particular industry sectors. Both the UK North West and UK North East regions have recently opened such organisations, aimed respectively at the Chemical industry and the engineering industry serving it.

Resources outside the Asturias region are not generally used except for training in some very specific skills such as techniques of quality control, industrial hygiene and Good Manufacturing Practice (GMP) and for highly specialised technologies such as paint or plastics.

Private sector training providers

Company in–house training is an important resource, in the Italian and UK regions, in the former sometimes with ESF funding support and advice from Federchimica, Italy's association of the chemical industry. Private sector providers play an important role in the UK. They may be associated with industry groupings and are often involved in the training of technicians at the apprentice level after leaving school.

Regional and national Government Agency Involvement

The comprehensive professional training scheme in Asturias operates within a strong regional and national training structure and plan, also involving local agencies and ESF co-funding. This has established a well-structured framework for different types of professional training, with appropriate accredited qualifications for each level.

Italy also uses co-funding between regional authorities and ESF to support the financing of courses inside or outside companies.

In the UK, Regional Development Agencies (RDAs) are involved at a strategic level in plans for developing skills at a regional level, working in collaboration with the Learning and Skills Council, a central Government Agency with regional and sub-regional branches. Though not training providers themselves, these agencies are often involved in funding support, and work alongside the Sector skills Council (COGENT), a Government Agency responsible for the chemical and other related industries. COGENT acts as the accreditation authority for qualifications relating to the industry. It is also developing an electronic learning system for use by staff in the workplace.

TABLE 3						
SECTION 3 RESPONSES SUMMARY – SKILLS AND TRAINING PROVISION						
Question	ASTURIAS	LOMBARDY	PIEDMONT	UK HUMBERSIDE	UK NORTH WEST	UK NORTH EAST
3 (a) Skills and training providers in the region	Three types of professional training are provided via certain schools, colleges and institutes, aimed at different levels. A limited number of skills specific to the chemical sector are included.	6 Universities (3 in Milan) in region offer chemistry-related disciplines at graduate and post-graduate level. 1 university offers some Master Courses specifically for the Pharmaceutical sector	3 Universities – Chemistry: general, applied, industrial; specialisms in clinical, environmental, materials; Pharmacy, Pharmaceutical chemistry, Biotechnology Engineering: chemical, materials and plastics, environment, textiles	Hull University supplies graduates and post-graduates in science and some engineering disciplines, plus MBA graduates.	8 universities in the region provide a wide range of courses relevant to the industry, in technical and other business-related disciplines including MBAs. Qualifications include graduate, master and PhD degrees	5 universities in the region. The direct relevance of their main degree courses to the regional industry is variable. However many are offering or developing Masters courses in subjects of direct relevance to various sub-sectors of the industry.
	University of Oviedo offers chemistry-related courses at undergraduate (degree) and graduate (master courses and PhD programmes) level: Biochemistry, Chemical Engineering, Environmental, Organic, Organometallic, Physical, Analytical and Food Chemistry		18 High Schools with chemical specialisations, training technicians in industrial chemistry, biology, health, environment, textiles, dyeing, tanning, and Operators in chemistry and biology	Further education colleges provide wide range of general training including some engineering and process operation skills, plus some industry-specific courses for eg Health and Safety	Wide range of Further Education Colleges. A recently established CoVE (Centre of Vocational Excellence) is directed specifically at the needs of the chemical industry	Many Colleges of Further Education, some with strong connections to the industry. These include several CoVEs (Centres of Vocational Excellence) to develop industry-related skills
			Company in-house training, sometimes with ESF support, and advice from Federchimica, Industrial Associations or Regional Training Agencies	Wide range of private sector training providers, some competing with Further Education Colleges, some specialist training. May be tailored for industry-specific needs. Many companies carry out in-house training.	Large number of private sector training providers offering apprenticeships and training in specialised topics	Many private sector training providers, including the UK's largest technical training organisation, provide much of the apprentice training for technicians. Many companies operate in-house training activities or departments.

TABLE 3 (continued): SECTION 3 RESPONSES SUMMARY – SKILLS AND TRAINING PROVISION						
Question	ASTURIAS	LOMBARDY	PIEDMONT	UK HUMBERSIDE	UK NORTH WEST	UK NORTH EAST
3 (b) Geographic location of training and education outside the Region	Training resources outside Asturias are not generally used except for some very specific skills eg quality control, GMP, industrial hygiene, management techniques, paint technology, plastics technology	Lombardy's high demand for graduate staff is supplied from the main universities all over Italy.	Many students from Piedmont study in neighbouring Lombardy universities. High School Education is normally provided inside the region. More specialised in-house vocational training is often provided by national and international experts.	High-level graduates for technical and management roles are recruited from the UK as a whole. Many operational staff, up to supervisor level, are recruited and trained locally. Specific training for existing staff is provided either locally or on a wider regional or national basis	Companies recruit graduates and post-graduates from all UK (and some European) universities as well as from those in the region. Much technical training and recruitment is carried out locally and regionally.	Graduates are recruited from universities both in the region and across the UK nationally. Technical trainees originate mainly from within the region. Training for employees is provided in-house, or by regional or national suppliers, depending on its nature and specialisation.
3 (c) Regional and Central Government Agency involvement	This system operates within the Training Plan of the Regional Government of Asturias. Local agencies are also involved, and ESF co-funding is used.	Some Master courses are co-financed by the Lombardy region and ESF	Courses inside or outside companies can be part financed by Regional or ESF funds.	Regional Development Agency (RDA) involved in funding, in co-operation with the sub-regional Learning & Skills Council. The Government-appointed Sector Skills Council (COGENT) acts as accreditation body for qualifications within the industry	Regional Development Agency (RDA) involved in funding, in co-operation with the sub-regional Learning & Skills Council. The Sector Skills Council acts as accreditation body for qualifications within the industry.	Funds to supplement industry contributions can be obtained from the local Learning and Skills Councils (LSCs). The Regional Development Agency operates strategic support. COGENT, (Sector Skills Council) acts as accreditation body for qualifications within the industry
				Sector Skills Council (COGENT) is developing an electronic learning system for the use of staff in the workplace.		

LINKS BETWEEN INDUSTRY AND SKILLS PROVIDERS

Section 4 of the questionnaire was intended to investigate how the skills and training needs of industry are communicated to educationalists and other providers. The results are summarised in Table 4 below.

Understanding the needs of the chemical industry

It appears that there are significant differences between the regions on how, and the extent to which, providers understand the training needs of the industry.

In ***Lombardy and Piedmont***, Federchimica, the national association for the chemical industry carries out a dialogue with Universities, by concentrating on the communication of targets and sharing of objectives. There is also an annual survey of manpower and skills carried out by the Italian federation of Chambers of Commerce, and a national survey, also annual, of the occupational destinations of graduates from Italian Universities though neither of these are specific to the chemical industry.

In ***the UK***, Regional Chemical Initiatives (RCIs) have in recent years taken the initiative in this area of activity. The RCIs are groups representing companies in the industry 'cluster' ie both core chemical companies and those in their supply chains. Each has taken the lead in carrying out manpower and training studies aimed at particular types of chemical industry jobs in their region, often at a detailed level. Such studies have led to projects, carried out in collaboration with companies, training providers and funding organisations, to address specific skills needs identified as a result of the studies. Examples are given in Section 5. The RCIs therefore provide an important means of specifying and communicating the industry's skills and training needs, which had not previously been effectively carried out in the UK.

In ***Asturias***, the CFGP, the Superior Council of Professional Training, provides a regional structure to facilitate the exchange of information on manpower and skills needs, and a National system of Professional Qualifications is responsible for the accreditation of professional competencies etc. The CFPG involves representatives of companies, unions, and communities. Within this system much responsibility rests on individual companies to define their needs and inform training providers, and one company has hired staff from a training provider to ensure continuous communication of its needs to providers.

Some more formal links between companies and providers are being established in the ***UK***. For example, the in UK Humber the RCI (Humber Chemical Focus - HCF) has established a Skills and Training Brokerage that exists not only to direct companies to the most appropriate provider of a particular type of training, but also to form a link to communicate companies' training needs to providers. In the UK North West, the RCI (Chemicals North West) has taken the lead in establishing a Sector Skills and Productivity Alliance to bring chemical companies, training providers, Regional Agencies and the Sector Skills Agency COGENT together to develop a strategy for addressing the sector's skills needs. In the UK's North East, NEPIC, the Regional Chemical Intiative has set up a Skills and Education Team involving business leaders, regional and local agencies, the Sector Skills Council and representatives of education, skills and training providers. This is developing a comprehensive action plan covering many aspects of the skills issues concerning the industry.

TABLE 4						
SECTION 4 RESPONSES SUMMARY – LINKS BETWEEN INDUSTRY AND SKILLS PROVIDERS						
Question	ASTURIAS	LOMBARDY	PIEDMONT	UK HUMBERSIDE	UK NORTH WEST	UK NORTH EAST
4 (a) Understanding the training needs of the Sector	Companies have mixed views on whether training providers are familiar with the needs within the sector. In one case a company has hired staff from a training provider to give continuous communication between the company and the provider. Few concrete examples of transmission of training needs to providers.	Federchimica dialogue with Universities on industry needs (previously often forgotten), by concentrating on communication of targets and sharing of objectives.	Federchimica dialogue with Universities on industry needs; Regional Training Agencies or private trainers collect some information from Companies; Some statistical analysis is done on behalf of Regional or Provincial Public Administration	Direct contact between training providers and companies can lead to identification of needs, though this is perceived to be less effective with public sector providers. Humber Chemical Focus (HCF - regional chemical cluster organisation) carries out various activities (manpower studies, networking events etc) Sector and regional Skills Councils, Regional Development Agencies can also be involved.	Chemicals North West (Regional chemical cluster organisation) has formed Sector Skills and Productivity Alliance to link funding providers with industry needs. Involves companies, Regional and Sector Skills Councils, Regional Development Agency.	Contacts between individual companies and training providers lead to communication of some needs. The cluster group for the industry (NEPIC) acts as an important link to communicate industry's needs collectively, and to work with providers to develop training solutions.
4 (b) Regular manpower or skills surveys	Several examples of in-house analysis of staff skills and training needs based on organisational and competency studies. External bodies provide accreditation of qualifications obtained by various training and educational activities.	Annual survey of manpower and skills markets by Italian Federation of Chambers of Commerce, not specific to chemical industry ('Excelsior' survey)	Annual survey of manpower and skills markets by Italian Federation of Chambers of Commerce, not specific to chemical industry	LSCs, RDAs Cluster organisations carry out surveys of either general nature or to address specific areas of industry or skills. Surveys by independent training providers may be done but are often not seen as independent.	Chemicals NorthWest carried out major skills and manpower surveys to identify issues and provide basis for future action.	The Cluster Group carries out studies to identify skills and training issues in different aspects of the industry. These may include age profile surveys.

TABLE 4*(continued): SECTION 4 RESPONSES SUMMARY – LINKS BETWEEN INDUSTRY AND SKILLS PROVIDERS*						
Question	ASTURIAS	LOMBARDY	PIEDMONT	UK HUMBERSIDE	UK NORTH WEST	UK NORTH EAST
4 (c) Formal links between industry and educationalists	Main link – Superior Council of Professional Training (CGFP) involves companies, unions and communities. National and regional industry bodies, Chambers of Commerce etc also facilitate exchange of information.	No such links exist yet.	None at present	Some links at National level between industry and Skills Councils. HCF provides networking opportunities and also its Skills Brokerage service (see below) provides information to providers of company training needs.	Not seen to be strong. About 60% of employers had no involvement with education or vocational training before the establishment of the Sector Skills and Productivity Alliance.	Regional Skills Strategy provides links between industry and providers, though not sector-specific. NEPIC has set up Skills and Education team which has developed a plan to address skills issues for the sector, with companies, providers and agencies involved.
4 (d) Academic methods of identifying educational needs	National System of Professional Qualifications leads to accreditation on professional competencies etc. Within this framework much responsibility rests with companies to identify training needs and inform training providers	National annual survey of occupational destinations of graduates ('Almalaurea' survey)	National annual survey of occupational destinations of graduates; feedback to Universities from companies on the students they provide training stages for.	Perceived to be limited. Some LSC local/national statistics may be available to quantify demand	Various manpower and labour studies carried out by regional agencies. Direct contact between training providers and industry customers in some cases.	Involvement in regional skills strategy activities. Market research or direct contact with companies to explore demand for particular courses or training.

EXAMPLES OF CURRENT SKILLS SOLUTIONS

Each participating region has given some examples of activities or projects that have been carried out to address local skills issues. These are varied and can form the basis of a useful exchange of ideas and best practice. They range from projects carried out by individual companies to clarify organisational objectives and individual job roles, and used to assess personal competencies and training needs (Asturias), to work by Federchimca and Assolombardia (Lombardy, Piedmont) to improve scientific career paths and to facilitate better access to the industry for new graduates. Other examples from the UK regions show how cluster organisations have been the catalysts for a variety of projects resulting in new training programmes, including electronic learning for mature production technicians (UK North East) or institutions such as CoVEs delivering new sponsored apprenticeships for the industry (UK North West).

In the three UK regions considerable effort is going into a significant programme of science education, linking industry and science with schools, at both primary (5 – 11 years) and secondary (11 – 18 years) levels. The aim of this is to encourage interest in, and a more positive perception of science amongst pupils and students, and their teachers. While some of this is being carried out by various regional activities, some incorporates national initiatives, which include a newly established network of Regional Science Learning Centres, together with a National Centre with a complementary aim. Another national project also being undertaken in the UK is a National Skills Academy for the Chemical and related industries, currently under discussion.

These examples are listed in Table 5, summarising the outcomes of Section 5 of the Questionnaire.

TABLE 5						
SECTION 5: RESPONSES SUMMARY– EXAMPLES OF CURRENT SKILLS SOLUTIONS						
Question	ASTURIAS	LOMBARDY	PIEDMONT	UK HUMBERSIDE	UK NORTH WEST	UK NORTH EAST
5 (a) Key programme examples	One large company uses a systematic process via annual task analysis and individual training and development needs which are then converted into a training plan for each employee. A close relationship between the company and the training provider enables the required training to be delivered.	Some Federchimica programmes to examine industry needs and priorities, and to facilitate better access to the Industry for new graduates. A joint programme is under development between Federchimica and Assolombarda to improve scientific career paths	Universities organise some Master Courses. Some Federchimica programmes to examine industry needs and priorities, and to facilitate better access to the Industry for new graduates	Centre for assessment of technical competence (CATCH) will open in Sept 2006, to be used by training providers to train apprentices, assess competence of existing workforce, increase skills of present and unemployed workers in a unique training environment mimicking real chemical plant. Chemical industry-led in collaboration with other industry and public sector. Jointly public and private sector funded.	Much work being done to improve knowledge and image of the sector and its career opportunities by industry liaison with primary and secondary schools and universities. Centre of Vocational Excellence for Chemical Industry (ChemiCol) has been established in the region and is delivering sponsored apprenticeships and enhanced NVQs for the chemical industry.	Work between industry cluster and university led to the development of a Foundation degree (2 year, vocational) in Production Technology. Study of process technicians by industry cluster led to development of a) advanced production technician apprenticeship and b) major e-learning project for mature production technicians.
	A second company uses the Hay method to evaluate organisational posts and to detect gaps in the competencies of individuals and the organisation.			HCF established a Skills Brokerage service to link training needs of companies to suitable training providers.	Framework is being established for skills requirements and generic chemical industry job descriptions to enable funding to be directed to these core needs.	Industry cluster study has defined biotech training needs for the future and is the basis of development of relevant courses, including biotechnology apprenticeships.

TABLE 5*(continued): SECTION 5 RESPONSES SUMMARY– EXAMPLES OF CURRENT SKILLS SOLUTIONS*						
Question	ASTURIAS	LOMBARDY	PIEDMONT	UK HUMBERSIDE	UK NORTH WEST	UK NORTH EAST
				In all three UK regions there are well-established and growing science education programmes for iimproving liaison between the industry and schools at primary and secondary levels. Science Learning Centres have also been recently set up both nationally and regionally, and 'Science City' concepts are being developed. A project to establish a National Skills Academy for the Chemical Industry has been launched.		

KEY FUTURE SKILLS ISSUES

Section 6 of the Questionnaire was designed to explore how or whether regions are looking beyond the immediate future to examine what trends and future developments relating to the industry may affect its needs for new skills and training. The outcomes are summarised in Table 6 below.

It is clear from this that, perhaps understandably, the priorities of each region are at present concerned with dealing with the skills issues relevant to the next few years, and few are spending any time to look further ahead towards new developments. The working groups on skills and training relatively recently established in two regions, UK North West and UK North East, may provide the means by which longer-term issues may be examined. At present however there is little progress to report.

TABLE 6						
RESPONSES SUMMARY: SECTION 6 – KEY FUTURE SKILLS ISSUES						
Question	ASTURIAS	LOMBARDY	PIEDMONT	UK HUMBERSIDE	UK NORTH WEST	UK NORTH EAST
6 (a) Identification of future skills needs	None detected, with one micro-company excepted	Not being addressed at present		Evolving – areas of innovation, leadership, regulatory issues identified.	Part of role of Sector Skills and Productivity Alliance	Information from evolving industries eg environmental, renewable technology etc feeding through into industry cluster networks
6 (b) Plans to address future skills needs	A micro-company has put in place plans to improve motivation, professional achievement and attainment of objectives.	None at present	No Regional or National activity at present. Opportunistic approach.	Limited progress so far.		Limited progress so far.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1 The study has provided useful information on the skills and training issues experienced in each of the participating regions, and on the mechanisms used by each to connect the needs of chemical companies with educators and training providers.

2 It has also provided a number of examples of how various regions have addressed particular skills and training issues.

3 The current issues experienced by each region have some aspects in common, though the size and the characteristics of the industry in each area influences the relative importance of each issue locally.

4 A feature common to most regions is an increasing shortage of graduates, either in all science disciplines (Lombardy and Piedmont) or in more specialised scientific subjects (UK regions). Two factors are mentioned as contributing to this:

- A fall in numbers of graduates matriculating in science subjects
- A perception that graduates do not see the chemical industry as providing an attractive career option

5 Apart from general shortages of graduates, each region has shortages of graduate staff with particular specialised skills which vary from region to region. These include language skills, formulation chemistry, patent work, marketing, chemical engineering.

6 At non-graduate levels, issues common to the UK regions include the high age profile of many staff at technician level in engineering and construction activities, and the difficulty in recruiting for these positions.

7 All three of the UK regions also reported the need to increase the skills levels of their present staff, both in basic technical skills and also in terms of personal skills of communication and self-development, because of the increasing complexity of the industry's technology.

8 The UK North East mentioned specifically the increasing need for staff trained in biotechnology-related skills in view of the rapid growth of this sub-sector.

9 None of the participating regions reported any shortage of suppliers of training, and each gave some examples of courses or training institutions developed specifically to meet industry's needs.

10 A clear impression was gained, however, that the links between universities and colleges and the industry are not strong or systematically applied and the needs of the latter not consistently reviewed or addressed.

11 Regional or central government is involved through its agencies in the issues of skills and training in each region, often at a general level such as funding, rather than in ways specific to the chemical industry.

12 Apart from Asturias, where a regional Council has been established to oversee professional training and qualifications, much of the progress made in other regions has

been as a result of industry-led initiatives. These have been instigated either by Industry Associations (Italy) or by Industry Cluster Groups (UK), carrying out work to study particular skills issues or groups of workers, and then creating partnerships of companies, training providers and government agencies to develop and implement solutions.

13 Apart from the manpower surveys carried out by the UK regional cluster organisations for particular studies, little work has been carried out in a comprehensive way to examine age distributions and skills profiles of workers in the chemical sector. Where work has been done by regional agencies, this tends to be non-specific to the industry sector.

14 Only the UK regions mentioned programmes being carried out to improve links between industry and schools to improve perception of the industry and to encourage more students to enter science careers.

15 So far none of the participants appears to be considering in a substantial way the need to look ahead at future developments in the industry and its technologies, to forecast the effects these will have on the staffing, skills and training needed in the longer-term future.

Recommendations

1 From the information provided, it is possible to suggest three important areas for which an early exchange of information would be useful. These are:

1. Links between industry and skills providers – each region appears to have a somewhat different approach to this mechanism and it would be useful to understand the advantages which arise from each organisational method.

2. Encouraging students to study chemistry and other sciences, and graduates to take up scientific careers in industry – while Lombardy and Piedmont have the greatest problem in this area at present, similar concenrs are expressed particularly in the UK regions.

3. Examples of successful projects – all regions give examples of skills-related projects that have been effective, and an gretaer understanding of the factors which have led to their success would be advantageous.

It is suggested that these topics are included in the Agenda for the dissemination of the results of this report, during April 2006

2 The topic area is one of considerable interest and it is proposed that ECRN investigates futher steps to continue it by means of collaborative work. Possible projects would include:

1. The prediction of longer-term skills needs by use of a joint ‘Foresight’ project. Since none of the participating regions has yet been able to devote much time or resource to trying to forecast the future requirements new skills arising from the development and change that can be expected in the industry over the next 5 – 10 years, use of a collaborative forecasting methodology such as ‘Foresight’ could be very useful. Ths would involve facilitated meetings at which industry experts would combine their knowledge to generate possible scenarios for the industry based on social, economic and scientific and technological trends, and from these to identify what

emerging needs for new skills, training and education should be addressed, either generally or in their own regions.

2 Joint exchange of best practice and possible collaborative actoin to encourage gradiuates into Science and the industry. An early presentation methods currently being used by the participating regions is recommended in 12 above, but since the problem is growing and seen in many regions of the EU, the need to work together to develop new and combined approaches is apparent.

3 Joint exchange of practice on systems for learning related to the chemical industry. While the short-term dissemination event proposed in 12 above will give a brief view of a number of specific projects that are seen as successful in each of the partiicipating regions, they will not examine in detail the educational and training systems used for different categories of employees, nor for the types and levels of skills involved. A more extended project to compare and exchange such information is recommended, from which it may be possible to exchange or jointly develop training materials and methodology.

ANNEX 1 – SKILLS STUDY: ASTURIAS RESPONSE

SECTION 1: Background of the Chemical Industry in the Region

a) Provide a brief profile of the chemical industry in the region.

Response and Commentaries:

In order to carry this study out the companies corresponding to the CNAE 24 (Chemical Sector) and CNAE 25 (Plastics and Rubber Industries) have been classified as the chemical sector.

Production and Employment:

According to the most recent data, the Chemical Sector in Asturias employs approximately 3,200 persons distributed among 112 companies, which have a general income of 773.92 million euros (data from 2003) as may be observed in the following chart:

Years	Asturias		
	Number of Companies	Employment	Business Figures (Millions of €)
1998	93	2.123	435,92
1999	110	2.388	483,98
2000	115	2.469	552,27
2001	108	2.722	551,28
2002	102	2.856	728,58
2003	109	3.127	773,92
2004	112	n.a.	n.a.

Taking the data from 2004 provided by the Industrial Poll of Businesses of the INE (National Institute of Statistics) as reference, the number of companies in the Chemical Industry subsector ascends to 64 as opposed to 48 in the Plastics and Rubber Industries. As a result, the number of employees is also higher in the Chemical Industry, 2,358 as opposed to 769 in the Plastics and Rubber Industries.

Research and Development

The following chart compiles a general view of the R&D activities carried out by the Asturian companies from the two chemical industry subsectors, in relation to the size of the same. The results which date from 2002, are presented in %.

Companies of 200 or less employees		
	Chemical Industry	**Plastics and Rubber Industries**
Neither carries out nor hires	55,3	80,3
Carries out but does not hire externally	17	14,8
Hires but does not carry out in the company	4,3	1,5
Hires and carries out	23,4	3,3
Total	**100**	**100**
Total Companies	**47**	**61**
More than 200 employees		
Neither carries out nor hires	6,8	20,0
Carries out but does not hire externally	20,5	15,0
Hires but does not carry out in the company	4,5	5,0
Hires and carries out	68,2	60,0
Total	**100**	**100**
Total Companies	**44**	**20**

Innovation Technology:

The following chart reveals the expenses in innovation technology, which have been carried out by the Asturian companies from the Chemical Sector, in the Chemical Industry as well as the Plastics and Rubber Industries, and contrasted with the total carried out in the whole of Spain.

Chemical Industry Expenses in innovation technology (thousands of €)			
Year	**Asturias**	**Spain**	**%**
2000	4.573	731.143	0,52

Source: Survey of innovation technology in companies 2000. INE

Plastics and Rubber Industries Expenses in innovation technology (thousands of €)			
Year	**Asturias**	**Spain**	**%**
2000	3.063*	238.484	1,28

Source: Survey of innovation technology in companies 2000
*** Last data from Asturias available to INE**

b) Which are the principal sectors in the existent regional industry?

Response and Commentaries:

Main activities by subsectors:

For the current study, the chemical sector, in relation with the National Classification of Economic Activities (CNAE), corresponds to those in CNAE 24 and CNAE 25.

- ✧ CNAE 24: Chemical industry
- ✧ CNAE 25: Production of rubber products and plastic materials

The sector is defined under the following classifications:

Epigraph	Activity
CNAE 24.1	Manufacturing of basic chemical products (gases, basic inorganic chemical products, fertilizers and composite nitrogenous fertilizers).
CNAE 24.2	Manufacturing of pesticides and other agricultural-chemical products.
CNAE 24.3	Manufacturing of paints, varnishes and similar coatings, printing press dyes and putties.
CNAE 24.4	Manufacturing of pharmaceutical products (base, pharmaceutical preparations and other pharmaceutical products for medicinal purposes).
CNAE 24.5	Manufacturing of soaps, detergents and other cleaning and polishing articles. Manufacturing of perfumes and other beauty and hygiene products.
CNAE 24.6	Manufacturing of other chemical products.
CNAE 24.7	Manufacturing of synthetic and artificial fibres.
CNAE 25.1	Manufacturing of rubber products.
CNAE 25.2	Manufacturing of plastic material products.

In the following chart, the main activities may be observed by subsector:

CHEMICAL INDUSTRY CNAE 24	RUBBER AND PLASTIC MATERIALS INDUSTRY CNAE 25
Carbochemistry; Coke ovens, tras, naftalinas and technical oils	Conveyor belt
Fertilizers	Plastic materials
Synthetic fibres: Espifically related to Dupont manufacturing	Vulcanizers
Pharmaceutical products	

Main indicators by subsector:

Taking the data from 2004 provided by the Industrial Poll of Businesses of the INE (National Institute of Statistics) as reference, the number of companies in the Chemical Industry subsector is up to 64 as opposed to 48 in the Plastics and Rubber Industries. As a result, the number of employees is also higher in the Chemical Industry, 2,358 as opposed to 769 in the Plastics and Rubber Industries.

CNAE 24 (Chemical Industry):

Years	Number of Companies	Employment	Business figures (thousands of €)
1999	59	1.740	414.175
2000	62	1.779	745.554
2001	58	1.931	455.784
2002	55	2.202	650.104
2003	61	2.358	683.403
2004	64	n.a.	n.a.

Source: DIRCE Industrial Survey of Companies of INE

Companies by salary levels					
Years	Without salaried workers	Micro Companies	Small and Medium Companies	Large Companies	Total
2000	11	34	15	1	52
2001	9	31	17	1	58
2002	8	38	8	1	55
2003	11	34	15	1	51
2004	10	38	13	3	64

Source: Central Company Directory (DIRCE). INE

CNAE 25 (Rubber and Plastic Material Industries)

Years	Number of Companies	Employment	Business figures (thousands of €)
1999	51	648	69.801
2000	53	690	76.715
2001	50	791	84.501
2002	47	654	78.476
2003	48	769	90.521
2004	48	n.a.	n.a.

Source: DIRCE Industrial Survey of Companies of INE

Companies by salary levels					
Years	Without salaried workers	Micro Companies	Small and Medium Companies	Large Companies	Total
2000	11	27	14	1	53
2001	8	29	12	1	50
2002	7	28	11	1	47
2003	8	26	13	1	48
2004	6	27	13	2	48

Source: Central Company Directory (DIRCE). INE

c) Provide a list of the most important posts within the regional industry.

Response and Commentaries:

From the analyses of the responses obtained through the surveys carried out among the companies within the sector, it may be summarized that the main necessities in posts and training levels are those compiled by the following charts.
It should be noted that the results have been grouped by taking into consideration the size (per number of employees) of the companies.

The considered training levels have been:

1: Professional Initiation.
2: Intermediate Level-Technician.
3: Advanced Level- Superior Technician.

Large and Medium sized Companies:

POSTS	Required Education Level
Specialists, Plant Operators, Production Operators.	1-2
Foreman, Shift boss.	2-3
Laboratory analysts.	3
Electrical Maintenance Operators and Electricians.	2-3
Instrumentalists.	2-3
Mechanical Maintenance. Mechanics.	2-3
Administrative Staff.	3

Small Companies:

POSTS	Required Education Level
Specialists, Plant Operators, Production Operators.	1-2
Foreman, Shift boss.	3
Laboratory analysts.	3
Electrical Maintenance Operators and Electricians.	2-3
Instrumentalists.	2-3
Mechanical Maintenance. Mechanics.	2-3
Administrative Staff.	2

Micro - Companies:

POSTS	Required Education Level
Specialists, Plant Operators, Production Operators	1-2
Foreman, Shift boss.	
Laboratory Manager.	
Electrical Maintenance Operators and Electricians.	2
Mechanical Maintenance. Mechanics.	2
Administrative Staff.	

SECTION 2: Main problems regarding professional competencies

a) Does the industry show problems in terms of a lack or scarcity of professionals?

Although there is no homogeneity in the answers received, only a minority of the companies surveyed demonstrated having “little” or “no” difficulty in order to find qualified personnel, while the majority declared that they had found “some” or even “a lot of” difficulties in finding qualified personnel.

Regarding the posts and/or definite professional categories for which the different chemical companies in the region detect a more limited market for qualified personnel; the following received responses have been grouped in relation to the size of the different companies.

Large and Medium sized Companies

In the case of large and medium sized chemical companies in the region **there is no coincidence among the work posts which have difficulties being filled because of lack of professionals**, this may be due to the existing diversity of production processes within the companies surveyed, these being the manufacturing of artificial and synthetic fibres, the production and first transformation of lead, zinc and tin, the manufacturing of fertilizers and composites of nitrogenous fertilizers, the manufacturing of base pharmaceuticals and the manufacturing of products based on organic chemistry (bonded asphalt).

Small Companies

In a manner analogous to that indicated in the case of large and medium sized companies, there is no coincidence among the categories or posts for which there is a smaller market of qualified personnel. Some of these posts mentioned by the companies are:

- Mold operators (in CNAE 25 companies).
- Manufacturing and maintenance Operators of transport belts.
- Specialists in die stamping (in CNAE 25 companies)

Microcompanies

There is no unanimity in the posts for which the microcompanies detected scarcity or lack of professionals. Nonetheless the responses obtained mention the following posts:

- Chief Maintenance Mechanic
- Production Operator

b) Does the industry have significant limitations in the levels or quality of skills at present*?*

Large and Medium Companies

The common denominator for the difficulties presented by the large and medium companies is that the competition needed in order to adequately carry out the duties required by the posts cannot be acquired via the formal training processes, an ample work experience in the post is necessary.

Thus, one of the main limitations conveyed by the companies when looking for qualified personnel is related to the need of hiring experienced personnel for the post.

Likewise, the responses received make mention that:

- Those searching for employment lack the necessary ideal professional training for the chosen post, and
- There is a punctual lack of training in certain concrete aspects: languages, stages, etc.

Small Companies

In the case of small companies, the difficulties indicated in relation to qualified personnel are:

- The inexistence of adequate Professional Training,
- The unemployed lack professional training,
- The training programs do not consider the new required qualifications,
- The company prefers to hire personnel with work experience.

It should be noted that a company from the vulcanized subsector points out that the difficulties found when looking for qualified personnel stem from **the small quantity of companies with the same type of activity in the region.**
It should be remarked that the small companies which claim to not have difficulties when trying to hire qualified personnel, relate this to the fact that **their predicted activity and short term staffing is diminishing.**

Microcompanies

This group of companies indicates that their fundamental difficulties are that:

- The company prefers to hire personnel with work experience,
- The candidates' attitude is inadequate (they are very passive).

***c)* Are skills or personnel shortages forecast for the sector in future?**

Large and Medium Companies

In terms of Personnel:

The whole of large and medium companies contemplate a forecast of maintenance of the staff for the next year, in which a lack of personnel is not foreseen.

In terms of Qualifications:

The whole of large and medium companies contemplate not having detected any new professional competencies for the near future.

Small Companies

In terms of Personnel:

The staff forecast for the next year for the whole of small companies is that of maintenance and a lack of personnel is not foreseen. There is only one case of a diminishing staff as a result of the market downslide and the corresponding adjustments to be carried out.

In terms of Qualifications:

An ample majority of the companies have not detected new any new professional competencies for the near future. Those that, on the contrary, claim to have found new professional competencies for the future declare that they have established no plans as to how to handle said competencies.

Microcompanies

In terms of Personnel:

For practically the totality of the microcompanies the forecast in terms of the number of workers for the next year is that of a maintaining of staff, so no lack of personnel is foreseen.

Nonetheless two small companies differ each one referring that:

- Despite having spent 40 years in continuous activity and due to the continued fall in volume of activity, the short term forecast for the staff is that of a decrease in number and a tendency pointing towards a total disappearance (soap manufacturing and other clearing and polishing products):

- Having been recently created (production dates from 2005) and due to the increase in demand, the forecast for the volume of activity as well as the number of workers is on the rise (Bio diesel manufacturing).

In terms of Qualifications:

Two of the microcompanies refer to not having detected any new professional competencies for the near future, nonetheless, one of them has established plans as how to handle said competencies if they were to arise. On the contrary, those who claim to have detected new professional competencies for the near future have not established any plans as to how they are to be dealt with.

d) Is information available on workforce age profiles?

Average Age of the workers by company size

The average age of the company staffs that have responded to the survey in function of the size of same is compiled in the following chart.

	Nº of Workers	**Average age**	
Large	902	42,9	
	742	36	
		Average age	**39,8**
Medium	141	49	
	113	43	
	102	33	
	82	50	
		Average age	**43,9**
Small	42	38	
	38	43	
	32	45	
	30	42	
	27	32	
	23	35	
	22	34	
	21	37	
	12	49	
	10	37	
		Average age	**39,2**
Micro	9	28	
	9	35	
	8	35	
	6	40	
	5	32	
	4	50	
		Average age	**35,3**
	Average age Sector		**40,4**

Average age of the workers by Posts:

POSTS	Average age
Specialists, Plant Operators, Production Operators	<25 and between 25-50
Foreman, Shift boss	between 25-50
Laboratory analysts	between 25-50
Electrical Maintenance Operators and Electricians	between 25-50
Instrumentalists	between 25-50
Mechanical Maintenance. Mechanics.	between 25-50
Administrative Staff	between 25-50

e) Does the industry have particular problems in attracting and recruiting suitably qualifies young people?

Large and Medium Companies

In general, the large and medium companies have not detected any problems in hiring and attracting young personnel to the companies in the sector. One case in particular should be commented, in which a company which maintains an agreement for internships with a regulated training centre has verified that the personnel who carry out the internships in their facilities is systematically uninterested in working for said company.

Small Companies

With one exception the small companies recognize that they have found some or many difficulties in finding young personnel for the required posts. The main difficulties referred to the inexistence of adequate Professional Training, as well as the lack of agreements so that the young can carry out internships within the company. In some cases, the companies claim that they prefer to hire people with work experience.

Microcompanies

Although there is no coincidence in the answers, half of the microcompanies claim to have a great difficulty in finding young personnel for the required posts and they concur in that the fundamental cause of this is due to the fact that they prefer to hire Personnel with experience. The remaining 50% of the microcompanies claim to have some or few difficulties finding young personnel for the required posts.

SECTION 3: Skills and training providers

a) What types of organisations exist in the region to provide supplies of skilled staff for the chemicals sector?

Professional Training: Three subsystems

In Spain, there have been three Professional Training subsystems with differentiated specific characteristics and singular collective addressees since 1993.

- Specific or Regulated Professional Training
- Professional Occupational Training
- Continuous Professional Training

Specific or Regulated Professional Training

Description:
In first position is the Specific or Regulated Professional Training. The studies which encompass the initial Professional Training which are reached after having completed the Obligatory Secondary Education (ESO) and/or the Baccalaureate may be found under this title. This is fundamentally for young people between the ages of 18 to 20.
It is regulated by the LOGSE (1990) and is structured in 22 Professional Families, among which **Chemical Industries** may be found, within the framework of the present study.
Specific or Regulated Professional Training is a **long training cycle** (between 1300 and 2000 hours).

Objectives:

The Specific Professional Training has as its principal mission:

- Preparation of students within a wide professional field and supply them with an all-purpose training.
- To look after the qualification demands of the goods and services production system.

Structure:

The Specific Professional Training is organized in Training Cycles of 2 levels:

- Superior Degree Training Cycles: Title of Superior Technician.
- Medium Degree Training Cycles: Title of Technician.

These Training Cycles are structured in Training Modules (subjects or materials) of variable lengths. Due to their nature, these modules are classified in:

- Professional Modules: associated to a unit of competency.
- Transversal Modules: associated to various units of competencies.
- Work and Training orientated Modules (FOL): obligatory ion all the training cycles

Training Supply:

During the 2005/2006 academic year, the following titles corresponding to the Chemical Industry professional family were offered:

Professional Training Subsystem	Training Cycle	Specialty	Area	Students	Hours	Centre/Organisation
Specific or Regulated Professional Training	Medium Level	Analysis and Control	Aviles	30	2000	"Secondary School Juan Antonio Suances"
	Medium Level	Laboratory	Aviles	30	1300	"Secondary School Juan Antonio Suances"
	Medium Level	Manufacturing Operations of Pharmaceutical Products	Langreo	30	1300	La Quintana
	Superior Level	Environmental Chemistry	Gijón	30	1400	Secondary School Universidad Laboral
	Superior Level	Environmental Chemistry	Oviedo	30	1400	Secondary School Juan de Villanueva
	Medium Level	Laboratory	Oviedo	30	1300	Secondary School Juan de Villanueva

Professional Occupational Training

Description:

In second place is the Professional Occupational Training, which includes the set of training actions aimed at the unemployed. This modality of training as opposed to the regulated one is of a short cycle, with cycles lasting an average of 300 hours.

Objectives:

The main objectives related with Professional Occupational Training are based on:

- Supplying the participants with the qualifications required by the productive system.
- Labour insertion when lacking Specific Professional Training.

Structure:

The Professional Occupational Training in Asturias is presented via the following Plans and Actions:

- National Training and Professional Insertion Plan (Plan FIP).
- Occupational and Continuous Training Plan (PFOC), co-financed by the European Social Fund (FSE).
- Actions developed through the Foundation for the Development of Training in the Coal Mining regions (FORMIC).

The courses of Professional Occupational Training have a variable structure and length depending on their nature. The courses are organized in relation to receiving the corresponding Certificate of Professionality (it consists of an official document which describes a profession in terms of professional competencies and defines the minimum contents of the training action which, after having been reached by the participants enables them to carry out said profession)
For the professional family of the Chemical Industry there are 3 Professional Certificates published:

- Laboratory Analyst: R.D. 2197/95. Valid on 10-02-96.
- Chemical Plant Operator: R.D. 1392/95. Valid on 09 -09-95.
- Transformation of Plastics and Rubber Operator: R.D. 2198/95. Valid on 22-02-96.

Training Supply:

During 2005, the offer of Professional Occupational Training for the Chemical Professional Family, although not very abundant has contemplated the courses in the Plan FIP as well as the FSE related in the following charts.

Professional Training Subsystem	Training Modality	Specialty	Area	Students	Hours	Centre/Organisation
Professional Occupational Training	F.I.P. Plan	Chemical Plant Operator	Castrillon	13	240	Asturiana de Zinc, S.A.
	F.I.P. Plan	Chemical Plant Operator	Gijon	15	490	Fundacion Metal Asturias

Professional Training Subsystem	Training Modality	Specialty	Area	Students	Hours	Centre/Organism
Professional Occupational Training	F.I.P. Plan	Microbiological Analyst	Siero	13	100	"Secondary School Juan de Villanueva"
	F.I.P. Plan	BPL Normative Laboratory Organization Technician, Safety and Hygiene and Environment	Gijon	30	1400	"Secondary school Universidad Laboral"

Continuous Professional Training

Description:

The third subsystem of Professional Training is that made up of the Continuous Professional Training, which is identified as the group of training actions aimed at workers with the goal of improving their professional qualifications and/or adapting to the technological or organizational changes of their companies. Thus, the contents are adapted and directed towards the specific requirements of the work position.

Objectives:

The goal of the Continuous Professional Training is:

- Improvement and increase in the productive capacity of active workers.
- Improvement of the productive environment via the adaptation of technological innovation, of management and production within the corresponding professional framework.

Structure:

This type of training is carried out through two channels; through:

- The Tripartite Foundation for Training and Employment
- The Occupational and Continuous Training Plan of the Government of the Principality of Asturias, which is co financed by the FSE.

The courses in Continuous Professional Training vary in structure, subject and length depending on their nature: The training actions vary greatly depending on the companies that are receiving them since the intention is to adapt the measures in order to fulfil the company-s necessities in production, technology, marketing, administration, personnel, management, etc.

Training Supply:

The training market in Asturias within the framework of the Occupational and Continuous Training Plan of the Government of the Principality of Asturias, co financed by the FSE, in relation to the Chemical Industry is quite scarce. The courses offered in Asturias during 2005 which correspond to this plan are presented in the following table.

Professional Training Subsystem	Training Modality	Specialty	Area	Students	Hours	Centre/Organisation
Continuous Professional Training	FSE	Penetrating Liquids	Gijon	15	30	Fundacion Metal Asturias
	FSE	Magnetic Particles	Gijón	15	30	Fundacion Metal Asturias
	FSE	Radiology	Gijon	12	85	Fundacion Metal Asturias
	FSE	Ultrasound	Gijón	10	85	Fundacion Metal Asturias
	FSE	Environmental Management	Siero	15	28	"Secondary School Juan de Villanueva"

Currently there is no indicative data available concerning the courses given in the companies within the chemical sector under the responsibility of The Tripartite Foundation for Training and Employment.

b) Does the Chemical sector in the region depend on educationalists from outside the region, or are suppliers mainly local? What types of personnel or training is provided by educationalists outside the region?

From the results of the surveys that have been carried out and, as was done in the previous sections, considering the diversity of the obtained answers, the results have been grouped according to company size.

Large and Medium sized Companies

In general the companies of the sector do not recur to educationalists outside the region in order to train their personnel, with the exception of some very specific cases related to *quality control, GMP (Good Manufacturing Practice), industrial hygiene and management techniques.*

Small Companies

As a general norm, small companies do not have the need to recur to external training entities in order to request training. Nonetheless, some concrete cases signal the necessity of receiving training outside of Asturias for very specific levels and subjects (*master in paints; paint technology courses, plastics, injection and blow machines, and tooling design software...*).

Micro companies

All the companies surveyed claimed to **not** having recurred to any educationalists outside the region in order to train their personnel.

c) Are regional or central government agencies involved in skills and training issues?

Regional Area

Professional Training Headquarters

The *Professional Training Headquarters* depending on the Principality of Asturias Department of Science and Education, manages the regulated professional and occupational training integrally as well as the continuous training given to active workers from the area of the competencies which the Autonomous Community is assigned, offering a public service in which the professional training is agile and adapted to the labour needs within Asturias and is committed to the new training paradigm of permanent learning.

Nonetheless, as has been analyzed from the questions in section 3ª, the actions carried out related to the chemical sector are of little consideration.

Council of Asturias for Professional Training

The Council of Asturias for Professional Training arose as a result of the Institutional Pact for Employment 2000-2003 which was subscribed for by the Regional Government and Social Agencies once the educative competencies had been assumed. It was created according to the 78/2000 Decree October 2000 being formed as a "concerted and social and institutionally participatory consulting organism dedicated to the planning, coordination and evaluation in the subject of Regulated Continuous and Occupational Professional Training."
It is ascribed to the Department of Science and Education, which provides the economic, material and human means necessary for the exercise of its functions within its budget.
The meeting point between Social Agencies, the Administration of the Principality of Asturias, the academic area, Councils and other convenient representations was created alongside thus allowing for an adequate forum in order to undertake Professional Training in Asturias as a general benefit for all, by those responsible both publicly and privately, by the Administration, and by the Companies and the Syndicates.

Regional Area

Local Agency for Economic and Employment Promotion of the Gijón Town Hall

There are also agencies within the local area which develop initiatives of this type as is the case of the *Local Agency for Economic and Employment Promotion of the Gijón Town Hall* which, through the Training Department, finances actions with the goal of:

- Facilitating the updating of knowledge, the development of new professional competencies and adaptation to technological changes for active workers.

- Facilitate the knowledge, abilities and attitudes required by the current labour market for the unemployed.

Initiatives related with any of the functional areas and/or existent productive sectors in the region may be proposed within these projects, and thus may encompass the processes and functional areas presented in chemical companies.

SECTION 4: How are skills issues identified?

4a) How do skills and training providers understand the needs of the chemical and related industry sectors?

In relation to this question, it should be noted that the surveys have been directed towards the companies of the sector, not towards the training providers, as a result the answers refer exclusively to the views of the companies.

With this premise and depending on the size of the company, the following grouping of results have been carried out:

Large and Medium sized Companies

Companies' point of view:

Almost all the companies surveyed have stated that the training providers are up to date in terms of the needs within the sector: Although there is a small difference in opinions, the majority of the companies consider that the training within the region is based on a familiarity with the sector and are able to adjust the training market to the companies' real needs.

Nonetheless, except for one company, there has been no specific mention of the collaboration with the training entities in identifying the necessities and new competencies. This action corresponds to the companies which, in turn, communicate their new needs to the training entities and these then prepare and give the new training actions and finally include them in their own catalogue.

The exception is posed by one company, which has hired personnel from a training entity. The personnel acts as a continuous transmitter of information in a two way interchange between the company and the training entity. Given that this entity provides training for companies from different sectors, the company in question, from the chemical sector, has information for the applying of technologies, methodologies, didactic measures, etc which have already been detected in other sectors and which may not have been used in the training actions within the chemical sector.

Small Companies

Companies' point of view:

There are two polarized opinions regarding whether or not the training entities have the correct information for the sector's situation, in terms of training needs: Practically 50% of the answers have been clearly negative and the other 50% is in disagreement. However, as in the previous case, none of them show a clear and concrete example of how the training entities "Collaborate" in the updating of the competencies and needs of the sector. This aspect is again exclusive to the companies, which end up later transmitting this information to the training entities.

Micro companies

Companies' point of view:

The majority of the micro companies surveyed state that the training providers within the chemical industry are "sometimes" up to date with the necessities of the sector, which signifies a second position in a scale of four.

The majority of the micro companies surveyed state that the training providers within the region only "sometimes" know and are capable of adjusting their training market to the companies' real needs.

There are no concrete cases of collaboration with the training providers.

4b) Are regular manpower or skills surveys performed?

This question may be approached from an internal or external perspective to the company. Internally, the company itself obtains the information necessary in order to determine what competencies are necessary. Externally, among others, the general Council of Professional Training through the State Public Service of Employment would be the institutional body in charge of carrying these types of studies out.

Internally:

Some examples follow regarding the detection of training needs commented by the surveyed companies themselves. Some companies comment that they have used detection tools designed by Consulting multinationals such as, the HAY Method from Hay Group Consulting (explained in further detail in an example in section 5).

Examples:

1. One company indicates that it has an organization with a map of clearly defined professional competencies at its disposal. The current state of the competencies are revised annually and a training itinerary to be followed for each of the workers is agreed upon through the analysis of their professional and training careers, with the finality of completing or extending the professional competencies, be they of the worker or of the work crew, in a determined area.

2. In the micro companies there are two examples available which indicate how those in charge check and supervise their employees work and observe first hand the lack of capabilities and/or personnel training. This process is carried out each semester via a "Performance Evaluation" of the work post, maintaining at all times the company's objectives and their degree of fulfilment as reference.

3. Within the small companies one of them has indicated that the process of detection of needs is usually preceded by the launching of a new product, which automatically means that all the different departments (Marketing, Sales, Logistics, Production…) get in contact with the Training department.

4. Another small company claims that, due to its specific manufacturing system, the competencies for each job undertaken are continually analyzed. Said analysis is mainly of the production personnel and passes the technical area personnel by.

5. One small company comments the case in which a "tutor" is established who is responsible for the new workers and is in charge of observing their needs and establishing and guiding them in their training plan. This is explained fundamentally because, from the company's point of view, the competencies are clearly defined and do not vary since they consist of activity which has not evolved.

6. Another small company indicates that it establishes a system of comparatives to see what is done in the sector. It is updated depending on what is discovered. They are no pioneers, but they observe the market nonetheless.

7. One company comments that in order to determine the training needs it has at its disposal a system of analysis from the internal quality surveys (given to their

employees) and the surveys of the degree of satisfaction of their clients. This analysis is carried out by the department directors who inform the central offices, concretely the Human resources department, which elaborates a training plan that covers the gaps detected in the obtained results. The centralization of these demands allows, in turn, that other work centres can get a jump on future needs which have been detected previously in other centres belonging to the group.

Externally:

There are diverse external entities and bodies which carry out territorial and sectoral studies concerning employment, competency analyses and/or training needs:

Some examples of the studies carried out and the products obtained via the professional training mode are:

Occupational Training:

Occupations. Professional Certifications State Public Service of Employment - National Centre for Professional raining of the Professional Family of the Chemical Industry. Sectorial studies.

Regulated Training: Qualifications. INCUAL.

Continuous Training: Qualifications. INCUAL.
Sectorial studies: organisations such as FEIQUE, AIQPA.

Among all of these the studies carried out by the General Council of Professional Training are especially outstanding as *consulting body for institutional participation and counsel to the Government in professional training material*. This entity integrates the collective bargaining of the business organisations as well as the unions and the administration itself.

The General Council of Professional Training received the commission of elaborating the First National Program of Professional Training (1993-1996), the objective of which, in relation with the renewal of the training market, was the creation of a National System of Professional Qualifications based on the **Sectoral Studies carried out for each productive sector.**

The experience in investigation of the labour market which the State Public Service of Employment (formerly INEM) has, as well as its competencies in professional training materials, have made it the ideal body, as leader of the General Council of Professional Training, to undertake the study of different productive sectors. In this sense it has carried out the Sectoral Studies of the Chemical Industries.

The final objective of the elaboration of the Sectoral Study of the Chemical and Related Industries has been to facilitate a level of general and simultaneously detailed information of the Sector for those interested, which would establish models of current and future actions regarding the planning of Professional Training, occupational structuring, professional certifications and qualifications as well as their levels of equivalence.

4c) Are there formal links between industry and relevant educationalists to address needs?

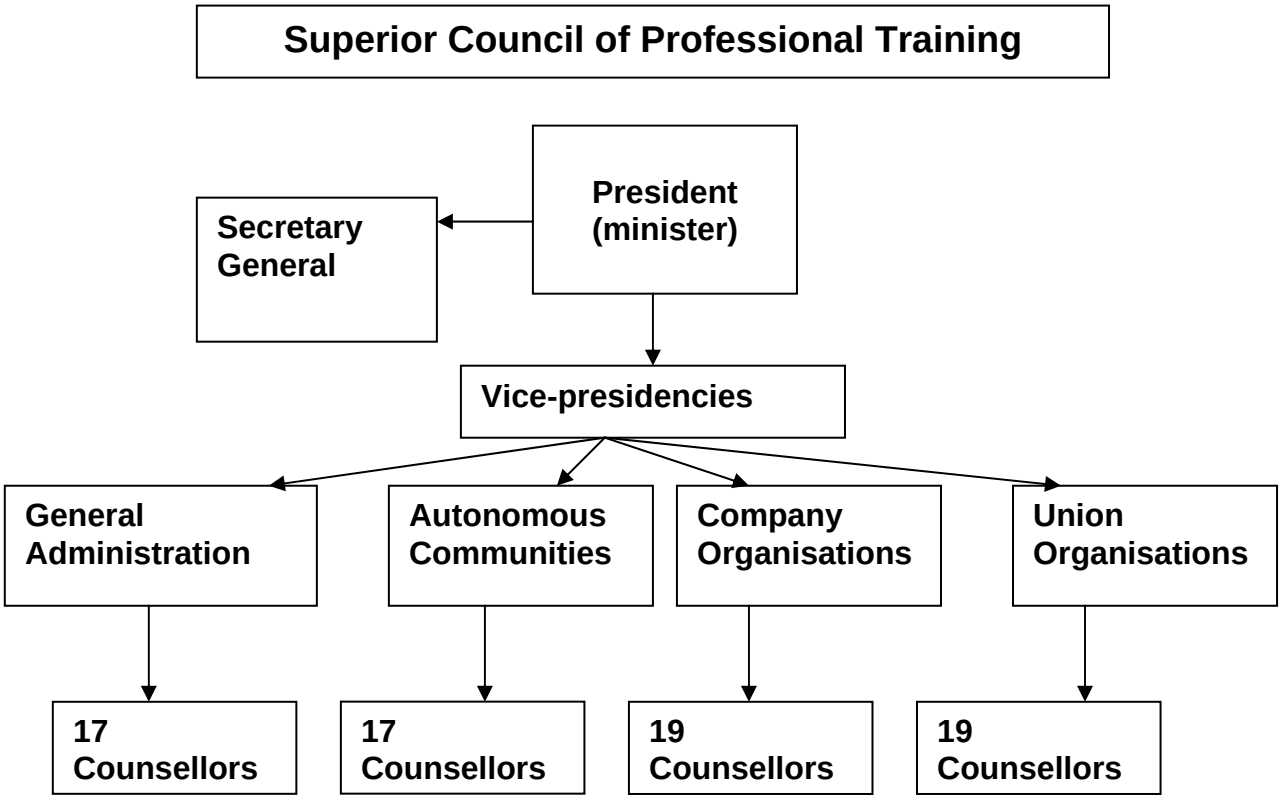
The main entities and bodies (both national and regional) that facilitate contact among the companies of the sector and the training providers, and establish the exchange of information are:

- Superior Council of Professional Training
- State Public Service of Employment (National Centre of reference for the Professional Family of the Chemical Industry)
- Professional Training Council of Asturias
- FEIQUE (Federation of Companies of the Chemical Industry)
- AIQPA (Chemical and Process Industry Association of the Principality of Asturias)
- IDEPA (Institute for the Economic Development of the Principality of Asturias)
- Quality Club
- Chambers of Commerce

Main Link between Industry and Educational Organizations

Among the entities and bodies mentioned the main formal and institutional link between the companies and the training providers is constituted by the Superior Council of Professional Training (CGFP).

Both the company and union organisations as well as the General Administration and the Autonomous Communities are represented in this body. The make up of the CGFP may be seen in the organisation chart of the following diagram.



As previously mentioned in other sections, this Council has been commissioned to create a **National System of Professional Qualifications (SNCP)**, the central mission of the same being the *establishment of an interrelation between the professional competency and the productive activity*.

The system's fundamental instrument is the **National Catalogue of Professional Qualifications**, the objectives of which are:

a) Facilitate the adaptation of the professional training to the requirements of the productive system.
b) Promote integration, development and the quality of what professional training has to offer.
c) Facilitate lifetime training via accreditation and accumulation of professional learning acquired in different environments.
d) Contribute to the transparency and unity of the labour market and the mobility of the workers.

4d) *Do schools, colleges and universities have other methods of determining the types and amount of education they provide that is relevant to the chemical sector?*

Methods

That which agglutinates the relative or relevant information is constituted by the National System of Professional Qualifications to which corresponds the accreditation of the professional competencies so that it favours the social and professional development of the person and covers the necessities of the productive system.

Apart from what has been discussed in previous sections, regarding continuous training it is fundamentally the companies themselves that determine what training they in order to be operative and as such, competitive (using, in every case their own methods of deduction), and as a result, the initiative of informing their training providers about which training actions are going too be required depends on them. In section 5 some examples have been collected from the surveyed companies where different methods of detection of training needs and their later application are explained.

Data of Training Given

The Professional Training Headquarters annually publishes the relation of the training actions by sectors, indicating the training modality, specialty, municipality where it has been given, training provider, number of students and length of course.

SECTION 5: Examples of skills solutions currently being implemented

a) How was the need identified and how was the need converted into the programme being provided?

Two cases will summarize how the companies detect the training needs and translate them into training plans.

CASE I:

The following case demonstrates how a Large Company from the chemical sector detects the required professional competencies, determines the training needs and establishes a training plan for its workers, in collaboration with certain training providers.

In this large company from the chemical sector there is a tendency towards a “unique” work system, on the basis of multifunctionality. The objective is to be able to implant self managed teams, which are adapted to the characteristics of the processes, where the people are organized in self managed shifts which request the tools necessary to carry out their work.

This system offers development opportunities for all its employees, in such a way as to allow them to:

1. Develop in all the work areas (multifunctionality). The employees carry out operative and management tasks during the greater part of their career, which contribute to their progress.
2. Know what must be done in terms of the learning of new competencies (both operative and management), that is, how to act in order to get to the next step within the Individual or Personal Development Plan.
3. Have the training necessary in order to reach said progression available throughout a professional career (Annual Training Plans).
4. Obtain the most objective evaluation possible of their contribution to the business activity.

The business management in this company is carried out through processes of an added value which are constantly evolving, thus the internal organizational needs must be made compatible with customer satisfaction, and with the expectations of the employees. Basically what are being looked for are all the necessary capacities for the effective and efficient functioning of the company while having the satisfaction that there are perspectives for future growth.

Each employee belongs to various work teams, which carry out different operative and management processes. The people have a wealth of competencies, which increase in collaboration with the team. The sum of the competencies of the processes in which each individual participates reveals the profile of the individual competencies that will be associated with a level of the business development matrix (this is a matrix with various levels, which indicate the possible development of an employee could have in relation to the competencies they acquire.

Each individual's personal development within the organization contemplates the whole of the person: function (knowledge and know how), being and will (knowing how to act), in such a way that for each employee, personal interests and capacities as well as the business' needs are balanced.

Task Analysis

Each of the company's processes presents an analysis of tasks where all the competencies to be covered by the different participating work teams are described so that the process is executed correctly.

The basic tool used in the identification of the training needs is the "**Task Analysis**" which must be carried out for all the processes.

The final product obtained from the task analysis is the training requirements needed in order to carry out the jobs entrusted to the different work teams and, as a result, to the people who make up the same. Thus, it is a basic instrument for the definition of the training needs for each worker.

The Task Analysis for each process collects information regarding what and how each task that make up each process should be carried out, as well as what training is needed in order to be able to perform them correctly.

Training Plan

This company's training plan considers the business objectives as well as the needs of the persons who are to be trained:

- Initial Training. All the workers should be trained and qualified before beginning a new job.

- Refresher Courses. All the workers should receive continuous training in order to refresh possibly forgotten concepts at adequate intervals so that they are permanently qualified to carry out the operations.

- Cross Training. All the workers should be continuously trained, thus acquiring new competencies (in addition to the first competency, they will begin to be trained in order to carry out additional competencies).

Relation between the Personal Development Plan and the Training Plan

Each individual's training plan is developed in relation to the analysis of the Contribution that the company expects of them. It is to be carried out periodically. The worker along with an administrator, in accord with their personal needs and the key objectives to be fulfilled for that period define the Personal Development Plan for the short term.

The functional ("knowledge", "know how") part is focused by taking the "Task Analysis" of the processes carried in relation to the specific business needs and has as objective:

1. Making sure that all the personnel is prepared to carry out their competencies, to do so, training must be provided for all aspects related to the specific tasks related to their jobs.
2. Maximize each person's functional capacity in order to progressively improve him or her.
3. Implement new technologies.

The training which involves the development of being and will (knowing how to act), is designed to promote the personal integration of each employee with the needs of the teams to which they belong, as well as improve interpersonal relations, effective communication and problem solving, with the intention of reaching the best results.

Process for the Elaboration of the Annual Training Plan

The period of time for the implementation of the Training Plan is fundamentally annual and is determined by the needs of the organization and based on the current Personal Development Plans of the business members.

Those responsible for the training will establish meetings in different areas to obtain the personal and organization's training needs. An initial proposal of the training that each member of the group should receive will be made with the compendium of the information obtained from this analysis all the information regarding the general training needs will be collected in the first proposal of the training Plan.

An analysis period to consider the observations that have been presented and to verify the validity and viability of the plan follows. If no incongruence is found the validation of the same will proceed, if, on the contrary, irregularities or incongruencies are detected the opportune modifications will be carried out until a viable Training Plan is made available.
Once the definitive plan is approved, those responsible for the training will also be in charge of planning and scheduling the training actions that make up that plan.
Throughout the year and as the plan is being carried out, changes may arise in respect to the foreseen plan so that revisions must be made depending on the detection of new needs.

The changes that arise throughout the year which result in new training needs regarding the original plan are connected to technological changes, revisions of the task analyses of the processes, changes in personal assignments, hiring, etc.

Annual Training Plan: Components

The training plan specifies the general and operative objectives, as well as the contents, material and human resources, the methodology to be followed, time, place, evaluation and the group to be trained.

In relation to the foreseen training, this annual plan responds to: For what? What? How is it carried out? With what? With whom? Can any grant be obtained? When? How much? Where?

Training Plan: Execution

The definitive planning of the training actions will be carried out while considering the company's general objectives and giving priority to work loads and training in critical aspects.

A process for the execution of the different training actions, which make up the plan, will be established keeping these premises in mind.

Those responsible for the training will be in charge of the logistics of the training managing the material resources as well as the human ones necessary in order to give each of the training actions, and the same will apply to any necessary paperwork in order to obtain grants or government funds in order to carry the actions out.

Once the training action is executed a record of the training will be kept, indicating the identity of the employee and the trainer, the objectives of each action, the date and length regarding when the courses took place. The company will use a computer program, which will keep the employee's training history while employed by the company. This program is used to manage the training and will also permit the workers to follow the courses "On-line."

Once the training course is completed the impressions of the various courses will be recompiled and the results obtained will be analysed. This step is used to improve planning, programming and later execution of training plans.

Implications for the External Training Provider

The training provider should be familiar with " the way things are done" in the company (its work culture).

The training provider will be involved in the organization of the training actions from the initial identification of the objectives to the evaluation and the final feedback.

The company and the provider have to work together. The provider will use the company's "language" and understands that the client's objectives are the priority.
The provider will maintain the training in perspective and the client expects the means in order to carry the training out.

CASE II

A second company mentions the use of the Hay method as a basic tool in the evaluation of the organization posts and as a system in order to detect the gaps in the competencies.

To complement this evaluation system the deficiencies detected after the evaluation of the posts are analysed and the necessary corrective measures are established in order to make up for them, measures that are intimately related with specific training processes.

What is the Hay method?

The Hay method, also known as the system of Scales and Profiles of Post Evaluation, was conceived by the Hay Group in the 50s. Its basis is to be found in comparison of factors, in which Edward Hay had been a pioneer.

In the current version, it has become the most widely used process for the evaluation of professional managerial and technical posts. It is used by more than 6,000 organizations in more than thirty countries in the world.

This system uses a series of guide charts to evaluate and quantify the differences between the different work posts. There are three charts employed and they correspond to three basic factors Competency Solution of Problems and Responsibility. Each one of these factors is divided into sub factors, for example, in Responsibility the Freedom to Act, the Impact and the Magnitude of the Results of the post must also be considered (see accompanying chart).

The relation of factors and sub factors used by this method are illustrated in the following chart as an example.

Factors	Sub factors	Scales
COMPETENCY	Technical Competency	1. Primary 2. Elementary procedures 3. Procedures 4. Advanced procedures 5. Basic functional spacing 6. Mature functional spacing 7. Company spacing 8. Exceptional mastery
	Managerial Competency	1. Minimum 2. Homogenous 3. Heterogeneous 4. Spacious 5. Global
	Human relations Competency	1. Basic 2. Important 3. Essential
SOLUTION OF PROBLEMS	Reference Frame	1. Strict Routine 2. Routine 3. Semi routine 4. Diverse norms 5. Defined 6. Moderately defined 7. Orientated 8. Abstract
	Demands of the Problems	1. Selective memory 2. With models 3. Interpolation 4. Adaptation Thinking 5. Creative thinking
RESPONSIBILITY	Freedom to Act	1. Prescription 2. Control 3. Standardization 4. General regulation 5. Direction 6. Orientated direction 7. Strategic direction 8. Strategic Orientation
	Implications of the Results	1. Remote 2. Contributory 3. Shared 4. Primary
	Magnitude of the Results	1. Very small or undetermined 2. Small 3. Medium 4. Large 5.Very large

SECTION 6: Key future skills issues remaining to be addressed

a) Have future skills needs been identified that are not being addressed at present?

Large and Medium Companies

With the exception of one of the companies surveyed, the rest of them coincide in that there have been no new professional competencies detected for the near future, since there are no plans for diversification or technological updating of the processes foreseen.

Small Companies

A clear majority do not identify future professional competencies that are not currently dealt with.

Microcompanies

Practically all the microcompanies indicate that they have not identified future professional competencies. There is only one exception that indicates having detected future competencies.

b) Are plans in place on how these will be tackled in future?

Large and Medium Companies

As previously stated, these companies dispose of mechanisms in order to supply of the necessary competencies to their personnel and their work teams for the effective development of their activity.

These mechanisms function independently of whether the competencies are “new” or “already known” which are redistributed among the personnel and /or company work teams.

This accounts for the fact that the companies are not faced with any uncertainty when confronting the possibility of discovering new competencies in the future.

Of all the surveyed companies, the large company that status having detected future professional competencies does so in relation to a functional reorganization of the post of production operator.

Small Companies

Only one of the surveyed companies declares having established plans to undertake new and necessary professional competencies in the future, although the method to be used is not described in their answer.

Microcompanies

One of the surveyed companies signals that in order to undertake the future professional competencies it establishes systems of communication, coaching and performance evaluation. These tools are basic for motivation, professional achievement and reaching of objectives.

ANNEX 2 – SKILLS STUDY: LOMBARDY RESPONSE

SECTION 1: Chemical Industry Background in the Region			
N°		***Question***	***Information required***
1	***a)***	Provide a brief profile of chemical industry in the region	Approximate n° companies Approximate n° employed Types of business functions carried out in the region
		Answer & comment	
		In 2004 in Lombardy Region there were about 1,678 operating chemical companies, in which about 75,883 people were employed. Lombardy ranks 2nd among European Regions as for the number of employee and 1st as for the number of companies, of which most of them are SMEs but that number include in a “good mix” a significant number of headquarters of chemical multinationals. Regarding these SMEs they carry out in the Region all the business functions. Regarding the multinationals’ headquarters they tend to carry on more specifically marketing and business development functions.	
	b)	What are the main sectors of the industry present in the region?	List different sub-sectors in order of importance
		Answer & comment	
		A) Active Pharmaceutical Ingredients (API) B) Fine chemicals - Auxiliaries for the Industry C) Specialty chemicals (as paints, adhesives, etc.) D) Cosmetics E) Pharmaceuticals (drugs) F) Agrochemicals	
	c)	Provide a list of the types of jobs of most importance to the industry in the region	Types of job, whether graduate, or non-graduate. Do these jobs include those in important service industries for the chemical sector eg employees in the engineering sector providing maintenance and construction services?
		Answer & comment	
		It’s not possible to define types of jobs, no evidences or numerical data from field-researches on the topics. About 30% of the people working in the regional chemical companies are graduates (newly employed people are graduates even in a major quota, about 36%). Of these, about 50% is graduated in chemistry. Lombardy Region has an important “outsourcing” industry for chemical companies, as engineering, construction and other related services.	

SECTION 2: Main skills and staffing problems			
N°		***Question***	***Information required***
2	***a)***	Does the industry have shortages of staff at present?	List important shortages and categories of staff involved
		Answer & comment	
		Yes. Italian chemical industry already suffers this problem. Lombardy even more. Main problem arise from the combined effect of declining offer of graduated staff (decreasing matriculations) and same level (year-on-year) market demand. Lombardy Region absorbs between 40% and 50% of Italian new-graduates in chemistry (Regional Universities provide about 15% of total graduates in chemistry each year). Furthermore Lombardy/Italy experiences scarce mobility of most talented staff.	
	b)	Does the industry have significant limitations in the levels or quality of skills at present?	List important skills limitations of existing staff
		Answer & comment	
		Yes. Apart the already mentioned limitation for R&D departments, an exceptional shortage is experienced in non-technical areas such as Marketing and other Management functions). Another experienced limitation is in the specialization in “Formulation chemistry” required by many Specialty companies.	
	c)	Are skills or personnel shortages forecast for the sector in future?	Indicate the type of skills and/or staff expected to be in short supply in future, and if possible on what timescale
		Answer & comment	
		We expect an exacerbation of the critical trends above mentioned. Some relief could be provided by the newly-offered triennial degree courses, which could offer a partial remedy if trained people will effectively fit to industrial needs, as the courses will be able to acknowledge their evolution process.	
	d)	Is information available on workforce age profiles?	Data if available on age profiles
		Answer & comment	
		No available information. “Ad hoc” research should be conducted on the topic.	
	e)	Does the industry have particular problems in attracting and recruiting suitably qualifies young people?	Information on particular difficulties of this type.
		Answer & comment	
		The mentioned decrease in matriculations affects all scientific fields, not only chemistry. This vocational problem in Milan is worsened by the tight labour market that often presents an offer-excess, even for low-tech non-scientific staff. Another problem is that often highly skilled people, including that specialized in chemistry, do not consider often, as a good employment opportunity, to work in a local SME (which actually dominates the Lombardy Region economic tissue).	

<table>
<tr><th colspan="4">SECTION 3: Skills and training providers</th></tr>
<tr><th colspan="2">N°</th><th>Question</th><th>Information required</th></tr>
<tr><td rowspan="6">3</td><td rowspan="3">a)</td><td>What types of organisations exist in the region to provide supplies of skilled staff for the chemicals sector?</td><td>List the types of educationalists that exist

Indicate if possible whether they provide generally trained personnel or specific types of skills training.

Give an indication where possible of the level of training provided.</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="2">Lombardy Region presents a wide kind of formative offer, both for graduates and undergraduates There are 3 Universities in Milan and other 3 in the Provinces of Pavia (UNIPV), Como/Varese (UNINS) e Brescia (UNIBS) that offer course in chemistry-related disciplines.
From few years are available more general courses (triennial).
POLIMI (in Milan) offer some Master Courses for the Pharmaceutical sector.</td></tr>
<tr><td rowspan="2">b)</td><td>Does the Chemical sector in the region depend on educationalists from outside the region, or are suppliers mainly local?</td><td>What types of personnel or training is provided by educationalists outside the region?</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="2">The main Universities all over Italy provide partially to the high demand of graduated-staff, structurally in excess, existing in Lombardy.</td></tr>
<tr><td rowspan="3">c)</td><td>Are regional or central government agencies involved in skills and training issues?</td><td>List the main such agencies involved</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="2">Some Course Master is co-financed by Lombardy Region and European Social Fund (ESF)</td></tr>
</table>

SECTION 4: How are skills issues identified?			
N°		***Question***	***Information required***
4	***a)***	How do skills and training providers understand the needs of the chemical and related industry sectors?	Any general or specific methods used by educationalists or others
		Answer & comment	
		Federchimica, the National Industrial Association of Chemical Industry, trying to ease the above mentioned problems that affect its members, has started a dialogue with Italian Universities in order to reduce the existing gap and try to reconcile the Universities courses and objectives with the often forgotten industrial needs. Most attention has been posed over target-communication and objectives-sharing.	
	b)	Are regular manpower or skills surveys performed?	Are such surveys carried out? For whom are they performed? Which organisation(s) initiate(s) them? Please give examples where possible.
		Answer & comment	
		Yes. Unioncamere, the Italian Federation of Chambers of Commerce, monitor on an yearly basis the manpower and skills markets (survey “Excelsior”).	
	c)	Are there formal links between industry and relevant educationalists to address needs?	What such links, forums or discussion groups exist? Do they cover both private and public sector training and education providers?
		Answer & comment	
		No, such formal link does not exist yet.	
	d)	Do schools, colleges and universities have other methods of determining the types and amount of education they provide that is relevant to the chemical sector?	List examples of such methods if they exist
		Answer & comment	
		There exist annual surveys conducted at national level over the actual occupational conditions of graduated people (“Almalaurea”).	

SECTION 5: Examples of skills solutions currently being implemented			
N°		***Question***	***Information required***
5	***a)***	Give examples of key programmes being implemented to meet the skills needs of the industry sector	This question is intended to identify a limited number of important programmes that will lead to an understanding of how links between educationalists and the industry have been effective in generating them. A comprehensive list of all the training programmes taking place in the region is not sought. For these key programs, please give : The skills and training topics being provided The levels of education involved eg graduate, non-graduate, specialist practical skills How was the need identified and how was the need converted into the programme being provided?
		Answer & comment	
		Federchimica existing programs: • "Chemical Industry' formative needs" (field-research and analysis of the scientific needs and priorities existing in the chemical industry) • "Stage" (the project aim at facilitating the access to work for young people just coming out of University and increase the opportunity for the industry to better know the ideal candidates from available graduates). Another program under development jointly promoted by Federchimica, Assolombarda (the regional industrial association) and other Associations, is directed to improve the situation characterized today by an important vocational crisis of scientific career paths.	

SECTION 6: Key future skills issues remaining to be addressed			
N°		***Question***	***Information required***
6	***a)***	Have future skills needs been identified that are not being addressed at present?	List the key needs of this type.
		Answer & comment	
		No. Attention has been concentrated on easing already present critical trends and existing problems.	
	b)	Are plans in place on how these will be tackled in future?	List the methods which will be used to examine and solve these issues?
		Answer & comment	
		No.	

ANNEX 3 – SKILLS STUDY: PIEDMONT RESPONSE

SECTION 1: Chemical Industry Background in the Region			
N°		***Question***	***Information required***
1		Provide a brief profile of chemical industry in the region	Approximate number of companies Approximate number employed Types of business functions carried out in the region eg production, R&D, sales and marketing, business management, research or innovation centres
		Answer & comment	
	a)	For what concern the chemical sector, Piedmont cover about 7% of the people employed in chemistry at national level. The great part of the employees in chemical production and research are concentrated in one Province, the Provincia di Novara, that has a common border with Lombardy Region. Provincia di Novara is one of the 20 Provinces of the Italian Observatory for the Chemical Sector, an operative branch of the Italian Ministry of Industry. Piedmont has: • 3 Universities with chemistry-related departments • 25 Private and Public Research Centres (excluding the departments of the universities) with recognized specialization in chemistry-related topics • 4 Scientific & Technological Parks with chemistry-related competencies • 2 incubators • 2 Business Innovation Centres And Chemical Industry has the following numbers: • Companies: 1,800 • Employees: 50,000	
	b)	What are the main sectors of the industry present in the region?	List the different sub-sectors of the chemical, pharmaceutical and related industries operating in the region in order of importance
		Answer & comment	
		Main sectors are Plastic and Rubber, Basic Chemicals, Pharmaceutical, Polymers, Synthetic fibres, Petrochemical production, high tech electronic, catalists.	

		Provide a list of the types of jobs of most importance to the industry in the region	Types of job. Whether graduate, or non-graduate. If numerical data is included please provide a broad summary in a useful form. Do these jobs include those in important service industries for the chemical sector eg employees in the engineering sector providing maintenance and construction services?
		Answer & comment	
	c)	7.3% of the Italian employees in Chemistry work in Piedmont region. About the 4.2% of the people working in Piedmont Industries are graduates but we don't know the percentage of graduates in Chemistry or similar categories or the percentage of graduates working in the Chemical Industry. We can suppose there is a high percentage of graduates in Chemical Plants dedicated to the R&D (60-70% and more) and that the newly employed people are graduates even in a major quota than the past. If we take into consideration a survey conducted by Federchimica[1] (Guide for the University studies and for the graduated people in Chemistry) the main types of job in Italy for a Chemist are: Technician of laboratory synthesis, formulation, quality control, Chemical Engineers, for process, projects production, security, purchasing, technical assistance, environment, certification, patents. As in Lombardy region, also in Piedmont there is an important "outsourcing" industry for chemical companies, as engineering, construction and other related services.	

[1] Federchimica is the national Federation which includes the majority of chemical enterprises.

SECTION 2: Main skills and staffing problems			
N°		***Question***	***Information required***
2	***a)***	Does the industry have shortages of staff at present?	List important shortages and categories of staff involved
		Answer & comment	
		Yes. The Italian chemical industry already suffers this problem since several years. Main problem arise from the combined effect of declining offer of graduated staff (decreasing matriculations) and at the same level (year-on-year) market demand within Piedmont region absorbs between 10% and 5% of the Italian newly-graduated in chemistry (Regional Universities provide about 10% of total graduates in chemistry each year). Furthermore Piedmont experiences a very scarce mobility of most talented staff and it happens also in the whole of Italy.	
	b)	Does the industry have significant limitations in the levels or quality of skills at present?	List important skills limitations of existing staff
		Answer & comment	
		Yes. The limitation in mainly for R&D departments. Also, and exceptional shortage is experienced in non-technical areas such as Marketing, Patent and scientific adjournments and other Management functions). Another experienced limitation is in the specialization in “Formulation chemistry” required by many specialized companies strictly linked with high demand customers.	
	c)	Are skills or personnel shortages forecast for the sector in future?	Indicate the type of skills and/or staff expected to be in short supply in future, and if possible on what timescale
		Answer & comment	
		We expect an exacerbation of the critic trends above mentioned. Some relief might come from the newly offered triennial degree courses. These could offer a partial remedy if trained people will effectively fit the industrial needs. The courses must be able to follow the evolution of innovation processes.	
	d)	Is information available on workforce age profiles?	Data if available on age profiles either for the sector as a whole or for individual employee categories.
		Answer & comment	
		No available information.	

		Does the industry have particular problems in attracting and recruiting suitably qualifies young people?	Information on particular difficulties of this type.
		Answer & comment	
	e)	The mentioned decrease in matriculations affects all scientific fields, not only chemistry. This vocational problem is worsened by the tight labour market that often presents an offer, even for low-tech scientific staff for high responsibility (here the knowledge of the foreign language and other capabilities might represent a premium). Another problem is that often highly skilled people, including those specialized in chemistry, do not consider a good employment opportunity, to work in a local SME.	

<table>
<tr><th colspan="3">SECTION 3: Skills and training providers</th></tr>
<tr><th colspan="2">N°</th><th>Question</th><th>Information required</th></tr>
<tr><td rowspan="3">3</td><td rowspan="3">a)</td><td>What types of organisations exist in the region to provide supplies of skilled staff for the chemicals sector?</td><td>List the types of educationalists that exist eg universities, colleges, schools, specialist institutes, private sector training organisations, in house training sections. A list of all providers is not required.

Indicate if possible whether they provide generally trained personnel or specific types of skills training.

Give an indication where possible of the level of training provided.</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="2">In Piedmont region we have:

• 3 Universities with chemistry-related Faculties
• 18 Public High Schools with chemistry-related specialisations

For what concern Piedmont’s Universities, they coach Chemical Engineers, Material Engineers, Environment Engineers, Plastic Material Engineers, Textile Engineers, General or Industrial Chemists, Chemists specialised in Clinical Chemistry, in Environmental Chemistry or in Science of Materials, in Applied Chemistry or Biotechnologies. There are also courses in Farmacy and Pharmaceutical Chemistry and Technology.

As regard the High Schools, teachers prepare:
1. young technicians (at a first level) in Industrial Chemistry, Biology, Health and Environment, Textile Sciences, Dyeing, Tanning, Environment
2. young operators (a level lower than technician) in Chemistry and Biology

For the internal vocational training, normally each Company organizes in house training sections, sometime with the support of the European Social Found. Very often to organize this type of courses, the companies seek Federchimica, Industrial Associations or Regional Training Agencies advice.</td></tr>
</table>

	b)	Does the Chemical sector in the region depend on educationalists from outside the region, or are suppliers mainly local?	What types of personnel or training is provided by educationalists outside the region?
		Answer & comment	
		It is important to emphasize that Piedmont region borders on Lombardy region and a lot of students (of the Province of Novara, the Province of Vercelli, the Province of the Verbano Cusio Ossola) go to study in Lombardy's Universities with chemistry-related Faculties. For the inside vocational training the teachers are usually professional men and women that work not only in the region in which they have the office, but in Italy and in Europe. So we can say that the University level and the inside vocational training are provided also by educationalists outside the region. The High Level education is normally provided inside the region.	
	c)	Are regional or central government agencies involved in skills and training issues?	List the main such agencies involved
		Answer & comment	
		It is possible for a University, a regional Training Agency or an Industrial Association organize a Course Master part financed by Piedmont Region and European Social Found. Companies, a regional Training Agencies or Industrial Associations can organize some courses for the employees of the regional Chemical Plants, part financed by Piedmont Region and European Social Found.	

SECTION 4: How are skills issues identified?			
N°		***Question***	***Information required***
4	***a)***	How do skills and training providers understand the needs of the chemical and related industry sectors?	Any general or specific methods used by educationalists or others
		Answer & comment	
		Federchimica, the National Industrial Association of Chemical Industry dialogues with Italian Universities in order to reduce the gap existing between Chemical Companies needs and University courses. Regional training Agencies or private trainers collect the request of the Chemical Industries to organize some courses for the employees of the regional Chemical Plants. Sometimes the Public Administrations (Region and/or Provinces) collect these type of information through studies elaborated by some organizations specialized in Statistical Analysis.	
	b)	Are regular manpower or skills surveys performed?	Are such surveys carried out? For whom are they performed? Which organisation(s) initiate(s) them? Please give examples where possible.
		Answer & comment	
		UNIONCAMERE, the Italian Federation of Chambers of Commerce, monitor on a yearly basis the manpower and skills markets through the “Excelsior” survey.	
	c)	Are there formal links between industry and relevant educationalists to address needs?	What such links, forums or discussion groups exist? Do they cover both private and public sector training and education providers?
		Answer & comment	
		No, such formal links do not exist yet.	

		Do schools, colleges and universities have other methods of determining the types and amount of education they provide that is relevant to the chemical sector?	List examples of such methods if they exist
		Answer & comment	
	d)	At national level there are annual survey conducted over the actual occupational conditions of graduated people (“Almalaurea”). It is possible to find also some University Departments that conduct similar surveys. Universities can also have this kind of information through the questionnaires that each company fills up at the start and at the end of the stage of each student: in Italy each university student has to do a stage before to get the University degree. On the base of the demand of skills of the companies and the satisfaction of them, University can collect these data.	

SECTION 5: Examples of skills solutions currently being implemented			
N°		***Question***	***Information required***
5	***a)***	Give examples of key programmes being implemented to meet the skills needs of the industry sector	This question is intended to identify a limited number of important programmes that will lead to an understanding of how links between educationalists and the industry have been effective in generating them. A comprehensive list of all the training programmes taking place in the region is not sought. For these key programmes, please give: The skills and training topics being provided The levels of education involved eg graduate, non-graduate, specialist practical skills How was the need identified and how was the need converted into the programme being provided?
		Answer & comment	
		Programmes to improve skills needs are organized at the University level with a Master course. There is a national law for the stage organized with an agreement between some institutional organization and the companies. There are also some Federchimica programs: • "Chemical Industry formative needs" (field-research and analysis of the scientific needs and priorities existing in the chemical industry) • "Stage" (to facilitate the access to work for young people just coming out of University and increase the opportunity for the Industry to better know the ideal candidates from available graduates).	

<table>
<tr><th colspan="4">SECTION 6: Key future skills issues remaining to be addressed</th></tr>
<tr><th colspan="2">N°</th><th>Question</th><th>Information required</th></tr>
<tr><td rowspan="5">6</td><td rowspan="2">a)</td><td>Have future skills needs been identified that are not being addressed at present?</td><td>List the key needs of this type.</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="2">No. Attention is dedicated to correct the present critical trends and solving existing problems. Contact with Universities and Foreign Institutions (MIT, Fraunhofer, SRI, TNO etc.) could be important in facilitating the solution of future skills.</td></tr>
<tr><td rowspan="2">b)</td><td>Are plans in place on how these will be tackled in future?</td><td>List the methods which will be used to examine and solve these issues?</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="3">Not at Piedmont nor at National level. Only occasional opportunities are taken.</td></tr>
</table>

ANNEX 4 – SKILLS STUDY: UK HUMBER RESPONSE

<table>
<tr><th colspan="4">SECTION 1: Chemical Industry Background in the Region</th></tr>
<tr><th colspan="2">N°</th><th>Question</th><th>Information required</th></tr>
<tr><td rowspan="4">1</td><td rowspan="2">a)</td><td>Provide a brief profile of chemical industry in the region</td><td>Approximate number of companies

Approximate number employed

Types of business functions carried out in the region eg production, R&D, sales and marketing, business management, research or innovation centres</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="3">100+ companies, 50% direct manufacturing, 50% service (further 40 identified in biosciences).
£6billion t/o, 20% GVA, including petrochemicals.
10,000 people direct/indirect employment.
Business functions split 40% + in manufacturing, 40% engineering services, 20% all other functions including R&D.</td></tr>
<tr><td rowspan="3">b)</td><td>What are the main sectors of the industry present in the region?</td><td>List the different sub-sectors of the chemical, pharmaceutical and related industries operating in the region in order of importance</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="3">Petrochemicals, paints, packaging, pharma intermediates, pigments, bulk commodities, organic/inorganic chemicals, speciality organic chemicals. Manufacturing</td></tr>
</table>

	c)	Provide a list of the types of jobs of most importance to the industry in the region	Types of job. Whether graduate, or non-graduate. If numerical data is included please provide a broad summary in a useful form. Do these jobs include those in important service industries for the chemical sector eg employees in the engineering sector providing maintenance and construction services?
		Answer & comment	
		Manufacturing 40%, engineering and technology 40%, R&D 5%, other functions 15%. Approximately 15-20% of manufacturing sector within the Humber are graduates. • Production and engineering operations in petrochemicals, commodity and speciality chemical manufacture. • Engineering service jobs for craft and technical engineering work. • Hazard/SHE and environmental management. • Some R&D roles in some organisations.	

SECTION 2: Main skills and staffing problems			
N°		***Question***	***Information required***
2	***a)***	Does the industry have shortages of staff at present?	List important shortages and categories of staff involved
		Answer & comment	
		Specific engineering, craft, electrical and project management areas.	
	b)	Does the industry have significant limitations in the levels or quality of skills at present?	List important skills limitations of existing staff
		Answer & comment	
		Within the SME sector – general management capability Within engineering services sector – basic technical, craft and electrical skills	
	c)	Are skills or personnel shortages forecast for the sector in future?	Indicate the type of skills and/or staff expected to be in short supply in future, and if possible on what timescale
		Answer & comment	
		Yes. 50% of craft sector approaching 50 years old, low number of new recruits taking jobs in this sector. Squeeze on some skills already being felt. Availability of skilled personnel predicted to worsen over next 5 years.	
	d)	Is information available on workforce age profiles?	Data if available on age profiles either for the sector as a whole or for individual employee categories.
		Answer & comment	
		Information is available on age profiles in different skills sets, in separate report.	
	e)	Does the industry have particular problems in attracting and recruiting suitably qualifies young people?	Information on particular difficulties of this type.
		Answer & comment	
		Yes, difficulties in attracting highest quality people to apply. Fewer apprenticeships being offered, number of applicants for places is relatively high, but quality of applicants is perceived to have dropped, do not possess basic science and maths standards required.	

<table>
<tr><th colspan="4">SECTION 3: Skills and training providers</th></tr>
<tr><th colspan="2">N°</th><th>Question</th><th>Information required</th></tr>
<tr><td rowspan="4">3</td><td rowspan="2">a)</td><td>What types of organisations exist in the region to provide supplies of skilled staff for the chemicals sector?</td><td>List the types of educationalists that exist eg universities, colleges, schools, specialist institutes, private sector training organisations, in-house training sections. A list of all providers is not required.

Indicate if possible whether they provide generally trained personnel or specific types of skills training.

Give an indication where possible of the level of training provided.</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="3">Hull university supplying graduates in sciences, some engineering disciplines and MBA graduates. NVQ level 4+.
FE colleges providing wide range of general training, some engineering and process skills being delivered. Some industry specific courses for health & safety etc. NVQ levels 2, 3 and 4 or equivalents delivered.
Wide range of private sector providers, some courses competing with Further Education Colleges, others offering specialist training, or tailored to meet industry specific needs. NVQ levels 2,3,4 delivered.

See section 5 for details of CATCH.</td></tr>
<tr><td rowspan="3">b)</td><td>Does the Chemical sector in the region depend on educationalists from outside the region, or are suppliers mainly local?</td><td>What types of personnel or training is provided by educationalists outside the region?</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="2">For high calibre graduates, managers, leadership roles the region imports staff eg graduates trained elsewhere. Bulk of staff for operation roles to supervisor level are recruited locally, many trained locally.

The chemical sector uses local provision for some more general or common training courses. But many different providers from outside the region are used all the time to meet needs of industry that cannot be met in the region. Many companies carry out in house training.

NB More statistics may be available from the Humber Chemical Focus' Skills Brokerage Service.</td></tr>
</table>

	c)	Are regional or central government agencies involved in skills and training issues?	List the main such agencies involved
		Answer & comment	
		Yes. Significant funding programmes for chemical skills exist with regional government – Yorkshire Forward the regional development agency for Yorkshire and the Humber. National Learning & Skills Council delivered through sub regional offices. Government appointed sector skills councils. For example Brokerage model.	

SECTION 4: How are skills issues identified?			
N°		***Question***	***Information required***
4		How do skills and training providers understand the needs of the chemical and related industry sectors?	Any general or specific methods used by educationalists or others
		Answer & comment	
	a)	Their own research/surveys or direct contact between providers (usually a business development role) and training managers from chemical companies. Via HCF type organisations and their networking activities. Via sector skills councils, LSC, RDA, trade associations such as Chemical Industries Association (CIA) or Chambers of Commerce. There is a perception that training providers (especially public sector) are not good at listening or understanding industry needs!	
	b)	Are regular manpower or skills surveys performed?	Are such surveys carried out? For whom are they performed? Which organisation(s) initiate(s) them? Please give examples where possible.
		Answer & comment	
		Yes. Surveys are performed by local LSC offices often for wide range of sectors/employees. RDA lead various cluster surveys, covering more business issues than just skills. HCF type organisations initiate sector specific skills surveys to establish trends in skills issues and to develop actions to address any gaps etc. Training providers may perform surveys, but in the past the validity has been questioned by industry (small sample sizes used, leading questions, hidden agendas/not independent, data not published or shared.)	
	c)	Are there formal links between industry and relevant educationalists to address needs?	What such links, forums or discussion groups exist? Do they cover both private and public sector training and education providers?
		Answer & comment	
		At national level Sector skills councils have established some links between industry and the education sector. Through organisations such as HCF, Skills Brokerage and CITO or ChemSkills networks provides links between both public and private sector training providers and industry – HR and training managers in larger companies, General Managers in smaller companies.	

		Do schools, colleges and universities have other methods of determining the types and amount of education they provide that is relevant to the chemical sector?	List examples of such methods if they exist
		Answer & comment	
	d)	Limited, it is perceived that most educationalists are led by funding and 'bums on seats' approach rather than driven by business demand. Some national or local statistics through LSC may provide 'demand' data to providers. Sector skills councils to produce 'sector skills agreements' which may also provide further details for educationalists to use. However, if numbers of people applying to do eg chemistry A level are dropping, this cannot be entirely blamed on the provider! The chemical industry has a responsibility to create a demand!	

SECTION 5: Examples of skills solutions currently being implemented			
N°		***Question***	***Information required***
5	***a)***	Give examples of key programmes being implemented to meet the skills needs of the industry sector	This question is intended to identify a limited number of important programmes that will lead to an understanding of how links between educationalists and the industry have been effective in generating them. A comprehensive list of all the training programmes taking place in the region is not sought. For these key programmes, please give: The skills and training topics being provided The levels of education involved eg graduate, non-graduate, specialist practical skills How was the need identified and how was the need converted into the programme being provided?

		Answer & comment
		CATCH – masses of detail available, but for now… 1998/99 – 2 strategic partnerships established led by chemical industry – HCF and IMPRESS. HCF develops strategic agenda for chemicals manufacturing and forges links with public sector – DTI, RDA, LSC, local authorities and other bodies such as CIA, SSC other RCI's. IMPRESS develops partnership between 'clients' and 'contractors' to build apprenticeship programme to add extra young people to ageing pool of engineering craft workers (industry already predicting problems). 2001/02 – Strategic skills group established involving HCF, Impress, industry, public partners to address future skills needs of chemical industry. Research commissioned to confirm ageing workforce and skills profiles reported by industry. Reports attached. Gap exists between classroom/workshop facilities offered by existing training providers and need for learners to gain experience on real equipment before being permitted to work with chemical related hazards. 2002 – present – CATCH concept developed – a centre for the assessment of technical competence – Humber. Real scale process operations and equipment in a unique training environment, to mimic real chemical working practices. Centre to be used by existing training providers to train apprentices, provide assessment of competence of existing workforce, up-skilling and multi-skilling for unemployed and current workers. Construction phase of new CATCH building now underway, public and private joint funding, including equipment donated from industry. 2006 – new CATCH centre due to open September.

SECTION 6: Key future skills issues remaining to be addressed			
N°		***Question***	***Information required***
6	***a)***	Have future skills needs been identified that are not being addressed at present?	List the key needs of this type.
		Answer & comment	
		Evolving. Areas of innovation, leadership, regulatory issues (REACH) and service sector business development all new areas but no data/strategy yet in place to address this.	
	b)	Are plans in place on how these will be tackled in future?	List the methods which will be used to examine and solve these issues?
		Answer & comment	
		Limited. Quality of dialogue between UK (CLC skills), regional (YF, LSC, FE, ECITB, Cogent, University) and industry and supply chain is not completely joined up. A strategy (Cogent) may emerge but industry/business changes are moving fast.	

ANNEX 5 – SKILLS STUDY: UK NORTH EAST RESPONSE

<table>
<tr><th colspan="4">SECTION 1: Chemical Industry Background in the UK NE region</th></tr>
<tr><th colspan="2">N°</th><th>Question</th><th>Information required</th></tr>
<tr><td rowspan="4">1</td><td rowspan="3">a)</td><td>Provide a brief profile of chemical industry in the region</td><td>Approximate number of companies

Approximate number employed

Types of business functions carried out in the region eg production, R&D, sales and marketing, business management, research or innovation centres</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="2">More than 200 chemical and biotechnology companies in the UK’s North East, with 34,000 direct employees and an estimated 85,000 in directly related employment. GDP of the sector in the region is approximately £8bn. The main activities carried out are production, with subsidiary activities in logistics, marketing and R&D. The sector has a significant number of major research centres, both as part of private and public sectors industry.</td></tr>
<tr><td rowspan="3">b)</td><td>What are the main sectors of the industry present in the region?</td><td>List the different sub-sectors of the chemical, pharmaceutical and related industries operating in the region in order of importance</td></tr>
<tr><td colspan="2">Answer & comment</td></tr>
<tr><td colspan="2">Oil and gas processing, petrochemicals, pharmaceuticals and pharmaceuticals intermediates, polymers, fine and speciality chemicals, inorganics, bioprocessing and biotechnology. The Tees Valley is the location for the UK’s largest petrochemical complex; the region’s pharmaceutical industry represents approximately one third of the UK’s pharma manufacturing. The Biotech sector, though smaller, is growing very rapidly</td></tr>
</table>

	c)	Provide a list of the types of jobs of most importance to the industry in the region	Types of job. Whether graduate, or non-graduate. If numerical data is included please provide a broad summary in a useful form. Do these jobs include those in important service industries for the chemical sector eg employees in the engineering sector providing maintenance and construction services?
		Answer & comment	
		Numerically a high proportion of jobs are in manufacturing, both as direct employees of the chemical sector companies and also engineering and maintenance employees in the closely-related supporting engineering service and construction companies. R&D activities employ a much higher proportion of graduate scientists. As a whole there are approximately 15 – 25% at graduate level or above in the sector. Specialist support companies eg analytical services also employ a high proportion of graduates. Many of the graduate level jobs are in scientific or technical disciplines.	

SECTION 2: Main skills and staffing problems			
N°		***Question***	***Information required***
2	***a)***	Does the industry have shortages of staff at present?	List important shortages and categories of staff involved
		Answer & comment	
		There are no major immediate shortages of staff in the chemical sector itself, though shortages of skilled craftsmen are sometimes seen for peak work-load engineering activities such as construction or major maintenance projects. Some difficulty is experienced by individual companies in recruiting certain categories of graduate eg chemical engineers, but this is not a universal problem. Difficulty is experienced in recruiting skilled biotechnology workers at graduate, post-graduate and technician levels, in a sub-sector that is growing more rapidly.	
	b)	Does the industry have significant limitations in the levels or quality of skills at present?	List important skills limitations of existing staff
		Answer & comment	
		Limitations are seen in the skills of some older employees in production and engineering because of the rapidly-changing nature of production technology and methods.	
	c)	Are skills or personnel shortages forecast for the sector in future?	Indicate the type of skills and/or staff expected to be in short supply in future, and if possible on what timescale
		Answer & comment	
		Forecast shortages are: Skilled craftsmen for engineering maintenance and construction work Highly skilled process technicians Increasing difficulty in recruitment of scientific and technical graduates because of the reducing numbers of students wishing to study science and engineering at university. This is a problem nationally, not specific to this region.	
	d)	Is information available on workforce age profiles?	Data if available on age profiles either for the sector as a whole or for individual employee categories.
		Answer & comment	
		A study has been done showing an increasing age profile for production technicians. There are similar indications for the age profile of engineering craftsmen.	

	e)	Does the industry have particular problems in attracting and recruiting suitably qualified young people?	Information on particular difficulties of this type.
		Answer & comment	
		There is some difficulty in attracting young people at approximate age 18 into apprenticeships for training at craftsmen level. Because of the falling numbers nationally of young people wishing to study science, engineering or related technical subjects at university, recruitment of new graduates in these disciplines is becoming more difficult.	

SECTION 3: Skills and training providers			
N°		***Question***	***Information required***
3	***a)***	What types of organisations exist in the region to provide supplies of skilled staff for the chemicals sector?	List the **types** of educationalists that exist eg universities, colleges, schools, specialist institutes, private sector training organisations, in-house training sections. A list of all providers is not required. Indicate if possible whether they provide generally trained personnel or specific types of skills training. Give an indication where possible of the level of training provided.

		Answer & comment
		Universities: 5 universities across the region provide degree courses for graduates in science and technical subjects, as well as in other non-scientific disciplines. There is some specialisation: chemistry is widely offered, with chemical engineering to a lesser extent. Pharmacy and Biotechnology courses are available in some of the Universities only. Some universities offer post-graduate courses (MSc, PhD) in various scientific subjects relevant to the industry. There are many Further Education (FE) Colleges providing a wide variety of courses of a vocational type in technical and non-technical (business and commercial) subjects. In technical areas these courses are often related to apprenticeships offered by individual companies, providing the academic components for the practical and vocational training provided in industry or apprentice schools. Some have acquired the status of Centres for Vocational Excellence (CoVE). A number of public and private organisations offer such apprentice training for school-leavers in the age range 17 – 21, either on behalf of individual companies or on a more general basis. An example is TTE Ltd, the UK's largest technical training organisation, which as well as apprentice training also provides a wide range of specialist courses for technical and operational skills and management activities. In general schools in the region provide education for students up to age 18, with emphasis on traditional subjects, though the number of vocational courses now being provided is increasing, sometimes with links to industrial companies. There are a large number of private sector specialist training organisations, which offer many different types of training, mostly for company employees, in the range of skills needed for industry. These include those abilities relevant to management and more effective working in teams. Many of the larger chemical companies operate their own training departments to organise the training for their own staff on topics of specific relevance to their company. In many cases such departments engage training providers form outside the company to deliver particular courses.

	b)	Does the Chemical sector in the region depend on educationalists from outside the region, or are suppliers mainly local?	What types of personnel or training is provided by educationalists outside the region?
		Answer & comment	
		In general the sector recruits its managerial and professional staff at graduate and post-graduate level on a UK-wide basis, and in a few cases from outside the UK. Technical and commercial staff are more often recruited on a local basis unless there is a local shortage of candidates for a particular specialised skill. Therefore the industry depends for its supply of graduates on the universities across the UK, but for technical staff its suppliers of training are more often local and regional educational establishments.	
	c)	Are regional or central government agencies involved in skills and training issues?	List the main such agencies involved
		Answer & comment	
		The UK Learning and Skills Council (LSC), a national body, provides an overview for educational and skills training for post-16 learners, and is the body responsible for management of government-provided funding for adult learning except in Universities. It is not involved in specific skills issues directly related to the chemical sector. Within the region various local Learning and Skills Councils exist to carry out the LSC work. These provide funding locally for a wide range of skills and training activities, including those related to local industry, particularly the sectors important within the region or sub-region. In the Tees Valley the LSC links closely with the Chemical sector to help it pursue important relevant skills developments. The UK also has a series of Sector Skills Councils (SSC) to promote the development of skills for particular industrial sectors. Cogent, the SSC for the oil and gas, chemical, polymers and nuclear sector, operates nationally with some representation in the UK's North East in conjunction with various local and regional body, providing a range of training and qualification-related services. The pharmaceutical and Biotech sectors have separate Sector Skills Councils. The Regional Development Agencies (RDAs) also provide strategic input into the skills and training area. The direct relevance of this input to the chemical sector depends on the size and importance of the sector in the region, which in the NE UK is considerable.	

SECTION 4: How are skills issues identified?			
N°		***Question***	***Information required***
4	***a)***	How do skills and training providers understand the needs of the chemical and related industry sectors?	Any general or specific methods used by educationalists or others
		Answer & comment	
		Private sector providers establish links with customers (existing or potential) to try to establish their training needs and priorities. Public sector providers eg FE colleges and Universities vary considerably in the extent to which they establish links, formal or informal, with industry to gain an understanding of what training and education is needed by the chemical sector. Links may be established by the efforts of Cluster organisations such as the Regional Chemical Initiatives (in the North East UK, NEPIC) on behalf of the industry.	
	b)	Are regular manpower or skills surveys performed?	Are such surveys carried out? For whom are they performed? Which organisation(s) initiate(s) them? Please give examples where possible.
		Answer & comment	
		Such surveys are carried out on an irregular basis, most often by the Regional Chemical Initiative on behalf of the industry. In many cases such studies address particular skill or job areas eg process technicians, biotechnology	
	c)	Are there formal links between industry and relevant educationalists to address needs?	What such links, forums or discussion groups exist? Do they cover both private and public sector training and education providers?
		Answer & comment	
		The RCI has set up working groups involving industry representatives and members of the regional government agencies specifically to identify the skills needs of the sector and to develop solutions. These involve training providers, particularly at the project development and implementation stage.	
	d)	Do schools, colleges and universities have other methods of determining the types and amount of education they provide that is relevant to the chemical sector?	List examples of such methods if they exist
		Answer & comment	
		There is no generally used approach to address this question. Where such methods are used they are informal or set up on an ad hoc basis.	

SECTION 5: Examples of skills solutions currently being implemented			
N°		***Question***	***Information required***
5	***a)***	Give examples of key programmes being implemented to meet the skills needs of the industry sector	This question is intended to identify a limited number of important programmes that will lead to an understanding of how links between educationalists and the industry have been effective in generating them. A comprehensive list of all the training programmes taking place in the region is not sought. For these key programmes, please give: The skills and training topics being provided The levels of education involved eg graduate, non-graduate, specialist practical skills How was the need identified and how was the need converted into the programme being provided?

		Answer & comment
		1 The Regional Chemical Cluster Initiative carried out work to investigate the need for professional qualifications for Production Technicians and together with a local University established a Foundation Degree in Process Technology. This is a two year course leading to an ordinary Degree, which can lead on by further study to an Honours Degree in a related subject such as Chemical Engineering. The Course is designed for Production Technicians in employment, with a large component in the form of problem-solving projects devised and carried out in conjunction with local chemical companies. The time-table enables the work to be carried out by shift-workers. 2 A study was initiated by the Regional Chemical Initiative, funded in part by the Local Learning and Skills Council, to investigate the numbers and future demand for Production Technicians, their age range and skills needs. The work identified the need for a new Advanced Skills Apprenticeship, which was devised and established by the RCI working in close partnership with a group of chemical employers and the local Technical Training Organisation. This was supported by the Learning and Skills Council and has succeeded in bringing in more young people to the industry via this route. The study also showed that there is a strong requirement to enhance the skills of mature production technicians, many of whom have many years future careers in the industry but who have had little technical training to enable them to deal with modern production technology, especially IT-based. As a result, a major open-learning programme has been devised in conjunction with local chemical employers and funded by the Learning and Skills Council, using electronic learning techniques. This will allow experienced technicians to learn at their own speed to enhance their skills and gain accredited qualifications as well as to improve their performance. 3 The RCI has initiated an investigation into the manpower and training needs of the rapidly-developing Biotechnology sector in the North-East of England. This has led to an action-plan to establish a number of courses including a biotechnology technician apprenticeship in the region. 4 The RCI has for some years run a Science Education Group to strengthen links between the region's chemical industry and schools and Colleges. It does this by initiating and organising a large number of science activity projects for pupils in the primary (5 – 11 years) and secondary (11- 18 years), which bring them into contact with companies and Universities. It has also for several years hosted an advisory teacher for primary schools in a project called Children Challenging Industry, provided by the Chemical Industry Education Centre at York University. This has measurably improved the perceptions of the industry among School children and their teachers. Other UK regions also participate in this project in their own localities.

SECTION 6: Key future skills issues remaining to be addressed			
N°		***Question***	***Information required***
6	***a)***	Have future skills needs been identified that are not being addressed at present?	List the key needs of this type.
		Answer & comment	
		The Skills and Education group of the local industry Cluster is examining future trends and needs in conjunction with local providers and funding agencies as part of developing a comprehensive skills strategy for the sector.	
	b)	Are plans in place on how these will be tackled in future?	List the methods which will be used to examine and solve these issues.
		Answer & comment	
		No details are yet available	

ANNEX 6 – SKILLS STUDY: UK NORTH WEST RESPONSE

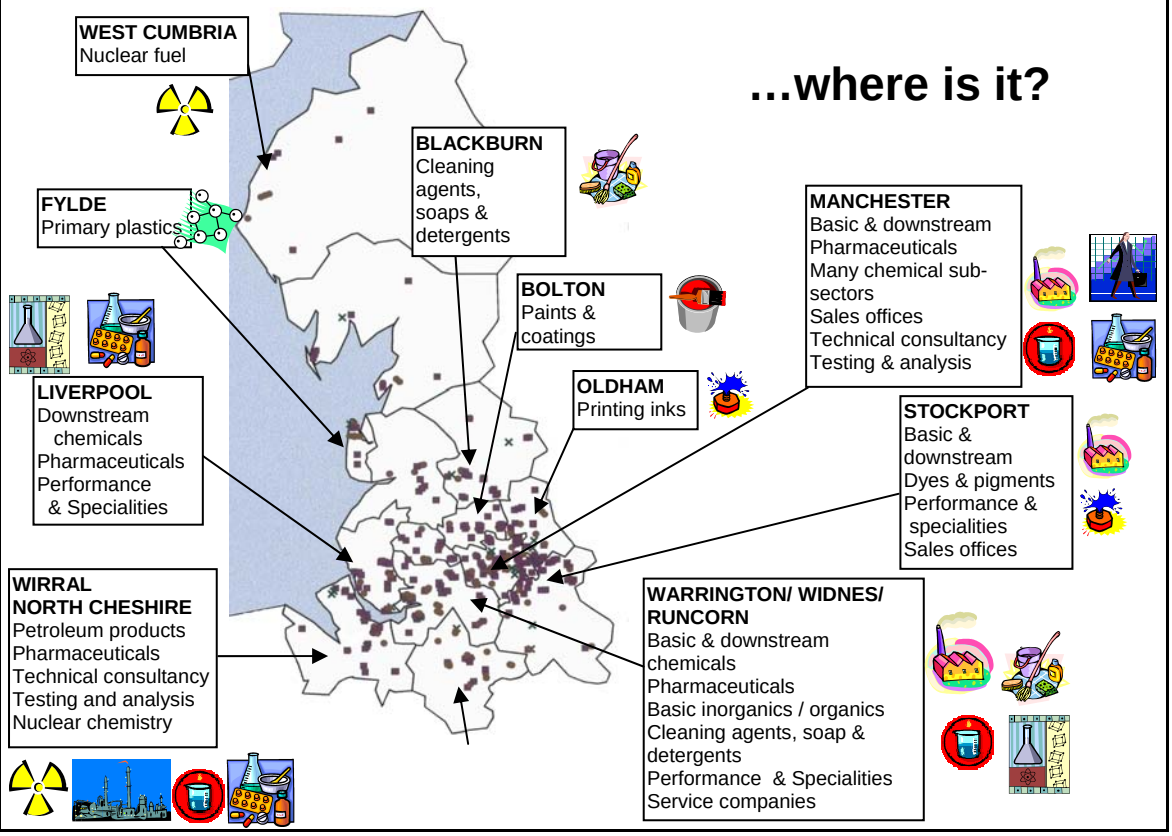
Note: the response from the UK North West Region was provided partly in the form of answers to the questionnaire, given below, and partly in the form of several supporting documents giving much more detail of various aspects of the Skills and Training programme of Chemicals NorthWest, including their manpower studies of 2002 and 2004. The information necessary to complete the questionnaire has been extracted and is incorporated in the Summary Tables 1 – 6 included in the main text of this report.

SECTION 1: Chemical Industry Background in NW England

N°		*Question*	*Information required*
1	*a)*	Provide a brief profile of chemical industry in the region	Approximate number of companies Approximate number employed Types of business functions carried out in the region eg production, R&D, sales and marketing, business management, research or innovation centres
		Answer & comment	
		• The North West is the largest regional centre for chemical manufacture in the UK, with almost 800 organisations. • There are 430 chemical manufacturers. – 147 basic, commodity manufacturers – 283 speciality, fine and pharmaceutical companies – Plus… – 220 companies provide specialist service support – 130 sales offices • The industry employs over 160,000 highly skilled people.	

	b)	What are the main sectors of the industry present in the region?	List the different sub-sectors of the chemical, pharmaceutical and related industries operating in the region in order of importance

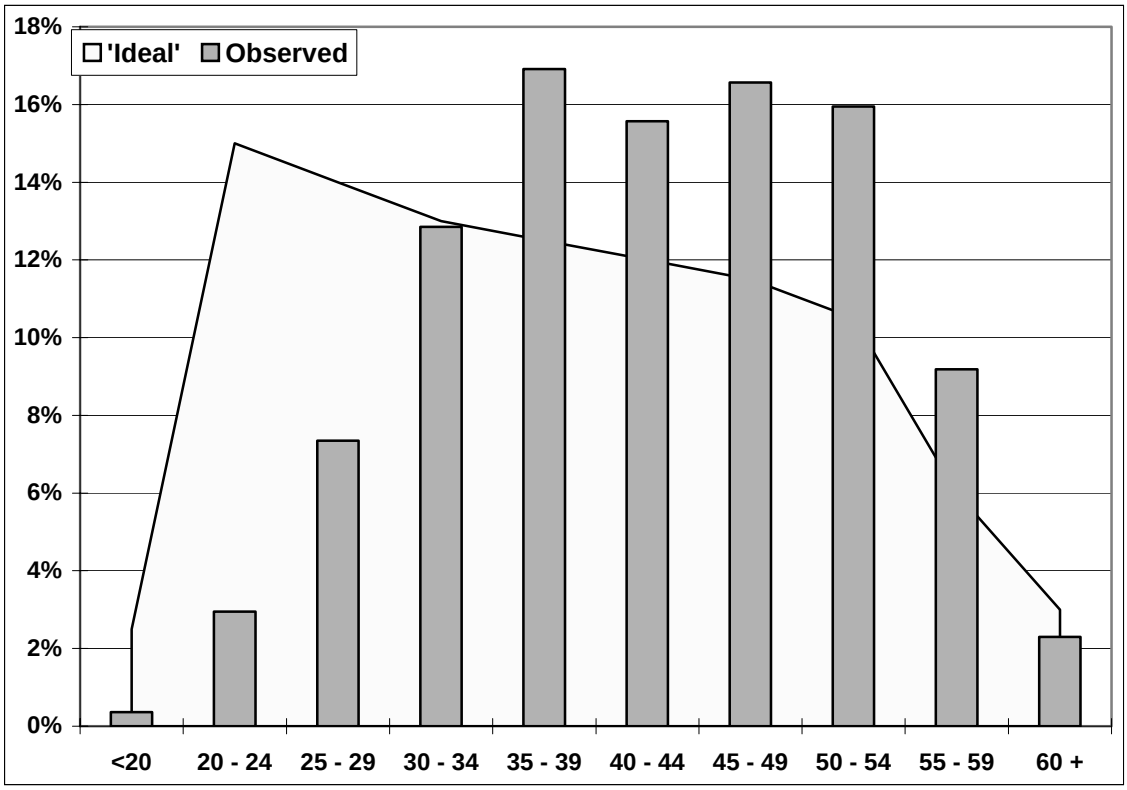
Answer & comment



	c	Provide a list of the types of jobs of most importance to the industry in the region	Types of job. Whether graduate, or non-graduate. If numerical data is included please provide a broad summary in a useful form. Do these jobs include those in important service industries for the chemical sector eg employees in the engineering sector providing maintenance and construction services?

		Answer & comment
		A key role for the Sector Skills & Productivity Alliances is to identify the key regional issues that the sector is facing, to summarise these and then to feed these into the Regional Skills Partnership and up to national level to inform the development of the Sector Skills Agreements. The Chemicals Sector Skills Alliance have debated and agreed that the following are the key five issues for Intervention. It should be noted that there are other areas of importance that do not need intervention. An example of this is Safety Health and Environment. This is key to the industry and well managed by the Industry so it does not feature in our work plans. 1 Issue – Significant changes in Industry Ownership The fragmentation of the Industry has changed the focus of the Industry from large long-term thinking companies to smaller Venture Capital-owned short term focussed companies. This results in a short term cost cutting culture that positions all costs including training as Variable. 2 Issue – Ageing workforce Exit from the industry for the future will be at a more rapid rate than new entrants can be attracted to the Industry with appropriate skills. 3 Issue – General technical skills shortages at level 2 &3. The aged workforce has been home grown within one company. On the job experience has traditionally been the way to develop skills. As a consequence there is a poor engagement of industry with training providers as traditionally they did not have to define requirements to external providers. With new investment in the Industry it is necessary to develop the skills in a formalised manner. This is critical for the industry's sustainability. 4 Issue – Attracting young people to the Industry. There is a need for more flexible models to deliver young people into the Industry with the requisite skills to be productive as soon as possible. 5 Issue – Shortage of relevant Graduates. The desirability of Science subjects is diminished in the current environment. Students perceive science as harder subjects and that the Chemical Industry is not a desirable Career option. This is creating a vacuum in the industry of fresh blood. This is coupled with issue 3 resulting in a stagnant workforce.

SECTION 2*: *Main skills and staffing problems			
N°		***Question***	***Information required***
2	***a)***	Does the industry have shortages of staff at present?	List important shortages and categories of staff involved
		Answer & comment	
		See above	
	b)	Does the industry have significant limitations in the levels or quality of skills at present?	List important skills limitations of existing staff
		Answer & comment	
		See above	
	c)	Are skills or personnel shortages forecast for the sector in future?	Indicate the type of skills and/or staff expected to be in short supply in future, and if possible on what timescale
		Answer & comment	

	d)	Is information available on workforce age profiles?	Data if available on age profiles either for the sector as a whole or for individual employee categories.
		Answer & comment	
		The overall Regional picture, covering all areas and job levels, is  	
	e)	Does the industry have particular problems in attracting and recruiting suitably qualifies young people?	Information on particular difficulties of this type.
		Answer & comment	
		It is clear that there has been little recruiting in recent times. The demographic profiles show very strongly that intakes of young people have been severely curtailed for many years. Industry has been contracting, making it possible for vacancies to be filled internally rather than approaching the market. Companies who did recruit have been able to access mature qualified people from other company redundancies rather than the traditional intake of young people.	

SECTION 3: Skills and training providers			
N°		***Question***	***Information required***
3	***a)***	What types of organisations exist in the region to provide supplies of skilled staff for the chemicals sector?	List the **types** of educationalists that exist eg universities, colleges, schools, specialist institutes, private sector training organisations, in-house training sections. A list of all providers is not required. Indicate if possible whether they provide generally trained personnel or specific types of skills training. Give an indication where possible of the level of training provided.
		Answer & comment	
		See Chemical Sector Skills report provided separately.	
	b)	Does the Chemical sector in the region depend on educationalists from outside the region, or are suppliers mainly local?	What types of personnel or training is provided by educationalists outside the region?
		Answer & comment	
		See Chemical Sector Skills report provided separately.	
	c)	Are regional or central government agencies involved in skills and training issues?	List the main such agencies involved
		Answer & comment	

SECTION 4: How are skills issues identified?			
N°		***Question***	***Information required***
4	***a)***	How do skills and training providers understand the needs of the chemical and related industry sectors?	Any general or specific methods used by educationalists or others
		Answer & comment	
		Contact through the regional Sector Skills and Productivity Alliance – see 4c) below.	
	b)	Are regular manpower or skills surveys performed?	Are such surveys carried out? For whom are they performed? Which organisation(s) initiate(s) them? Please give examples where possible.
		Answer & comment	
		Manpower and skills studies have been carried out in 2002 and 2004 for the sector in the UK North West on behalf of the Regional Chemical Initiative, Chemicals North West, and the regional Learning and Skills Council.	
	c)	Are there formal links between industry and relevant educationalists to address needs?	What such links, forums or discussion groups exist? Do they cover both private and public sector training and education providers?
		Answer & comment	
		A Sector Skills and Productivity Alliance has been set up, led by the Regional Chemical Initiative and including representatives of the industry, regional agencies, training providers etc to agree a strategy and action plans to address skills and training issues for the region's industry.	
	d)	Do schools, colleges and universities have other methods of determining the types and amount of education they provide that is relevant to the chemical sector?	List examples of such methods if they exist
		Answer & comment	

SECTION 5: Examples of skills solutions currently being implemented			
N°		***Question***	***Information required***
5	***a)***	Give examples of key programmes being implemented to meet the skills needs of the industry sector	
		Answer & comment	
		• Fourth year of continued funding for the 'Children Challenging Industry' project in the region. Directing a feasibility study to increase penetration of the scheme in industry. • Funding a complementary secondary schools programme in the Northwest. • Supporting career development activities including Catalyst Science Discovery Centre's (Widnes) 'World of Opportunities' careers resource. • Forming the Sector Skills & Productivity Alliance (SSPA). Chaired by Chemicals Northwest, this group brings together funding providers and links them with industry's needs. Members include the Learning & Skills Council, the Northwest Regional Development Agency (NWDA), Business Links and Cogent, the Sector Skills Council. • Endorsed the application for the UK's only Centre of Vocational Excellence for the chemical industry. 'ChemiCol' is now integrated into the action plan for the SSPA including apprentice sponsored programme and enhancement of NVQ's for the chemical industry. • Establishing a framework for pre-requisite skills and generic job descriptions (the 'skills escalator'), thus enabling skills funding to be directed to these core requirements. • Influencing the national agenda by contributing to the Chemistry Leadership Council Skills Network Group and being invited to join the advisory board of Cogent. • Supporting workforce development programmes including the Royal Society of Chemistry's Essential Skills Management programme. • Defining requirements for a Skills Academy to deliver workforce development training – in collaboration with the North East region. UK North West Sector Skills and Productivity Alliance action plans are provided separately.	

SECTION 6: Key future skills issues remaining to be addressed			
N°		***Question***	***Information required***
6	***a)***	Have future skills needs been identified that are not being addressed at present?	List the key needs of this type.
		Answer & comment	
		Yes the level 2 v level 3 debate continues with the LSC.	
	b)	Are plans in place on how these will be tackled in future?	List the methods which will be used to examine and solve these issues?
		Answer & comment	

ACKNOWLEDGEMENTS

We wish to thank the contributing regions for their support in completing the questionnaire, which has made this Study possible.

This work has been carried out on behalf of the Humber Chemical Focus and Tees Valley Joint Strategy Unit who have provided invaluable help and advice during the project. This Skills and Training topic has been co-ordinated by:

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