

NEKS final report

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Final report for NEKS project: summary

The NEKS project in the North East of England resulted in a number of outcomes, the following being the most important:

1. Identification and mapping of the subsea technologies cluster [STC] for the first time
2. Creating basis for collaboration and networking within the sector
3. Establishing links between the subsea sector and: academia, local authorities and other organisations
4. Helped to raise awareness and identity of subsea sector in the North East
5. Helped to identify and address main issues the sector faces
6. Creation of a committee for Subsea North East as an administrative body to provide a platform for collaboration, networking and addressing a number of issues identified in the course of the project
7. Development of a new framework for identification and supporting embryonic clusters in the context of industrial demise

Identification and mapping of the subsea technologies cluster [STC]

The supply chain of subsea industry in the UK has been evaluated recently to be worth some £2.7 billion with prediction to reach £3.8 by 2008¹. Subsea UK, national organisation representing the sector, estimates the value of the subsea industry in the UK at some £4.5² billion with the estimated number of firms between 645 and 725³ and direct employment over 24000 people. Some 100 of the companies are located in the North East of England and we estimated that the total turnover of the sector in the North East might be oscillating around £0.9 billion. Despite the value of the sector and its impact on the local economy, subsea in the North East has never been identified or mapped before. Report included as appendix I presents detailed analysis of the subsea sector in the North East.

The identification of the sector, even though serendipitous, led to establishing more pronounced links with the local companies and authorities, resulting in initiating regular dialog and collaboration among companies, academia, relevant organisations and local authorities. Through the support actions of NEKS project, the dialog soon turned into regular meetings leading to a) identification of shared problems and opportunities of the sector and b) establishing a committee to represent the sector in the North East of England and address the identified issues. The main problems identified, and shared, by the sector are:

- lack of shared identity [rather than being subsea, companies would perceive themselves as belonging to oil & gas, offshore or fabrication industry]
- poor image of the sector [associated with either “dirty image” of oil and gas or “metal bashing” of shipbuilding] and the region [the North East is often perceived as industrial, not advanced economy]
- ageing workforce and shortage of specialists
- low levels of collaboration and technology transfers within the STC
- weak links to academia
- lack of critical mass [sector is not exposed enough to attract new people, new investments, new companies etc]
- lack of recognition by local authorities [prevents from accessing funding]

The main objectives of the committee are “to represent, strengthen and grow in the North East of England Subsea sector by:

- *Creating networking forums*

¹ Source: report compiled by Arthur D Little for Subsea UK

² Source: presentation by Subsea UK during the NEKS final conference, December 2005

³ Source: report compiled by Arthur D Little for Subsea UK

- *Enhancing the profile of Subsea businesses in the NE*
- *Furthering Subsea Innovation & Technology*
- *Developing appropriate Human Resources & Training for the future”*

At the time of closing the NEKS project, many organisational and administrative issues of the committee were still unresolved, however the following 4 issues were prioritised and some steps to address them taken:

- PR – to address the poor image of the sector and the region as well as the lack of identity
- Innovation & Technology – to look into the possibilities of increasing technological collaboration among companies and between the sector and academia
- Human Resources and Training – to address the problem of ageing workforce, to attract new, skilled workers to the sector / region, to develop a map of skills shortage
- Networking – to increase levels of networking and non-commercial collaboration among companies.

More detailed information on the committee establishment is included in the further parts of this report [in detailed description of deliverables as well as in Appendices].

[not sure if it is relevant and we want to give them the proposal – up to you!]

After analysing the problems of STC, we have concluded that some of the issues identified are common to embryonic clusters and, as a result, we have developed a proposal of a new framework for embryonic cluster identification and support. The framework is based on the assumption that a new, embryonic cluster cannot be identified by the traditionally adopted approaches [e.g. Standard Industry Codes] as these are based on the previous experiences. A more dynamic approach, combining theories of business ecosystems, social network analysis, evolution, modularity and architecture of knowledge would be more appropriate to address the problem of emergent clusters / sectors / technologies. Short summary of the proposal is included in Appendix II.

The following part of the report we presents the results of the dissemination phase of the NEKS project [i.e. deliverables D1-D3] as well as supplement report to accompany the Deliverable Report B.1 [released 31.08.2004].

Deliverables D.1 – D.2: Focus Group, Seminars and Workshops

The following focus groups / seminars and workshops have been organised for the Subsea Technologies Cluster in the North East of England.

1. Public Policy Focus Group, 22 February 2005, Newcastle-upon-Tyne

The main goal of the focus group was to evaluate the effectiveness of the existing public policies in facilitating innovation, clustering and knowledge sharing in the sector. During the meeting, representatives from firms, local authorities and support organisations discussed the challenges and opportunities for policy-making regarding the support of the subsea sector.

The following issues constituted the main discussion focus:

- raising the profile of the region and the sector
- addressing the training and skills shortages by designing and implementing joint training scheme
- increasing cooperation among companies in a number of non-competitive areas such as: sharing market intelligence, managing difficult customers, sharing health and safety best practice, machine floor subcontracting.

Attendees:

Industry representatives:

Neil Kirkbride	BelValves / British Engines
Charles Tompkins	CTC Marine Projects
Nick Tompkins	CTC Marine Projects
Roland Palmer-Jones	Penspen Integrity
Ian Diggory	Macaw Engineering
Terry Sheldrake	Wellstream
Ralph Manchester	SMD Hydrovision
Mark Jones	DUCO

Academia, Local Authorities and other relevant organisations:

Pierpaolo Andriani	Durham Business School
Frank Siedlok	Durham Business School
Fiona Whitehurst	CURDS – Newcastle University
Joseph Place	ONE NorthEast
Jack Hanwell	Northern Offshore Federation
Tom Cosh	Newcastle City Council
Allan Austin	Regional Services for Clustering [RSC]
Richard Brook	NaREC

Main Findings and Outcomes

Research carried out by the Durham Business School has indicated that the subsea technologies sector in the North East consists of around 100 companies, with a range of employment from 1 to over 500 employees. Many of the North East based companies have

⁶ Personal interviews, 2005.

built their success on a unique set of capabilities and are recognised as world leaders in their fields. The subsea sector is relatively new and its roots go back to the 60s when the exploration of the North Sea oil and gas started. A number of issues associated with the embryonic STC cluster have been identified:

The meeting constituted perhaps the first occasion in which policy makers, representatives from support organisations and STC sat around the same table to discuss subsea related matters. The meeting facilitated an honest discussion between the different STC stakeholders, but, most importantly, identified a series of areas (in terms of problems and opportunities) that need addressing. In particular the following points are important:

- raising the profile and awareness at the regional, national and international level
- designing and developing initiatives to create a common face for the STC group
- liaising with universities and regional authorities to address skills shortages
- developing a shared training scheme to address the skills gap and training difficulties
- increasing cooperation among companies in non-competitive areas of operations

Despite the sceptic approach of companies to technology sharing and cooperation in the areas on the new product development, a number of other fields for potential cooperation have been identified. The meeting created a promising basis for the future development and support of the subsea industry in the North East.

Full report from the meeting can be found in Appendix IV.

2. Subsea sector in the North East: preparatory meeting with Local authorities and support organisations [workshop] 12th May 2005, Newcastle – upon – Tyne.

This workshop was a continuation of the Public Policy Focus Group held on 22nd of February 2005 in Newcastle [Appendix IV] and was aimed to discuss feasibility and potential support for implementation of the ideas generated during that meeting.

Representatives from the relevant organisations were invited to participate and discuss their potential involvement in the next stage of the project and potential support for the STC. The meeting was divided into two parts focus on:

- a] discussion on the existing policies and potential overlaps with the subsea sector development
- b] developing action points to address the initiatives brought forward in February.

Attendees:

David Pridden, Subsea UK: head of the national body representing the subsea sector in the UK. Subsea UK have over a 100 members and is jointly supported by Department for Trade and Industry and Scottish Enterprise. The organisation developed a strategy for the future support for subsea sector in the UK in the coming years. The initiative of development and support for the Subsea Technologies Cluster in the North East has been acknowledged and supported by the organisation.

Tom Cosh, Newcastle City Council, head of Economic Development Department. The support from Newcastle City Council already proved to be instrumental in the development of the subsea cluster in the North East.

Jack Hanwell, Northern Offshore Federation [NOF] – trade association representing many of the companies from the subsea sector. The role of NOF to represent the Subsea North East has been considered.

Allan Austin, Regional Services for Clustering [RSC] – an organisation responsible for creation and development of many micro-clusters in the region. Instrumental in supporting the creation of the PEGASUS group that gave rise to the group of companies in the Pipeline Engineering.

Professor Atilla Incecik, Newcastle University, The School of Marine Science and Technology – unable to attend due to some previous arrangements. The marine department is the largest and broadest-based marine school in the UK and was involved into the creation of MSc in Pipeline Engineering course. The prospective involvement of the school in the future development of the subsea technologies cluster has been discussed during previous meeting with professor Incecik.

Pierpaolo Andriani, Durham Business School – NEKS project, Durham Business School

Frank Siedlok, Durham Business School – NEKS project, Durham Business School

Main Findings and Outcomes

During the workshop the following points have been discussed:

- potential support available from different organisations for the development of the subsea technologies cluster [STC] in the future;
- what are the possible support options offered by the existing public policies and how STC could fit into the existing policies;
- which initiatives proposed during the Public Policy Focus Group could be supported and are the most feasible;
- what would be the best form of representative body for the STC, what role could NOF and Subsea UK play in this matter;
- how to avoid any conflict to interests voiced by different organisations in supporting the STC;
- how to strengthen cooperation of STC with academia: possibility to create the centre of excellence for subsea in the region;

It has been agreed, that the support of local Regional Development Agency, ONE NorthEast, is crucial for the success of the project and further development of the cluster and some action should be taken to obtain relevant support.

In order to attract more support, the importance and the role of the North East subsea sector in the national and global market need to be highlighted and the involvement of the subsea in other than O&G industries should be highlighted [e.g. in the offshore renewables sector favoured by policy makers]. Another dimension is to explore the fit of subsea sector within the *science city* strategy adopted recently by the Newcastle City Council [how the overall strategy could support the subsea sector].

A need for one strong and clear voice for the whole subsea in the North East has been identified. Therefore the group should work as a unity and avoid any divides between regions/counties. The image and strategy of the subsea NE should be cohesive with the strategy/mission of Subsea UK.

Northern Offshore Federation [NOF], local trade organisation, agreed to undertake the role of mediator / representation of the subsea North East. Also the issue of collaboration between the academia and companies was addressed with a conclusion that collaboration should be strengthened and some steps should be undertaken ASAP as other universities are building their position in the marine sector. The strength of the University of Newcastle in the marine sciences is an asset to be used.

To address the above issues an action plan was created and it includes the following:

- To establish a committee to overlook strategy and implementation regarding the points above as well as maintain the communication among companies and institutions
- To create an action plan for the committee and the Subsea NE
- To organise a networking / formal launch of the committee event
- To create a vision for the sector for the next 20 years [project considered by the Subsea UK]
- To discuss the involvement of the Newcastle University in creating a centre of excellence in the NE.

Minutes from the meeting can be found in Appendix V.

3. Seminar: Subsea NE, 23 May 2005 Newcastle–upon–Tyne

Attendees:

Dave Stables	DUCO
Natasha Kahn	CTC Marine Projects
Rahmon Nassor	The MKW Group
Steven Pearson	Wilton Marine Services
Terry Sheldrake	Wellstream
Tony Trapp	The Engineering Business
Allan Austin	Regional Services for Clustering [RSC]
Atilla Incecik	Newcastle University
Fiona Whitehurst	CURDS – Newcastle University
Keith Melton	NaREC
Tom Cosh	Newcastle City Council
David Pridden	Subsea UK
Frank Siedlok	Durham Business School (Secretary)

The main goal of the seminar was to discuss the creation of a representative body for the STC. Invitations to all the companies mapped as belonging to the STC were sent. The event has been advertised on the web pages and newsletters of NOF, Newcastle City Council and Subsea UK. Additionally a short press article has been published in the local press. Three main points were on the agenda of the meeting:

- election of a representative body / organisation for Subsea companies in the NE
- formation of strategy / action plan
- discussion on collaboration between universities and companies to address skills shortage and strengthen science and technology platform in the NE

Prior to the discussion 2 presentations took place:

1. Results of the NEKS research: subsea technologies cluster in the North East presented by Frank Siedlok, Durham Business School. Presentation on findings regarding the STC and update on the NEKS project progress.
2. Subsea in the UK presented by David Pridden, Subsea UK. Presentation on main opportunities and challenges the sector is facing, needs and challenges of the sector at this time and in the future and the support for businesses offered by SUBSEA UK

These two presentations were aimed at a) informing the local companies about the subsea industry in the UK and in the North East; b) increasing awareness of the existing cluster in the NE; c) informing companies and policy makers about the opportunities and forecasts for the subsea sector.

After the presentations a general discussion took place to determine the need and structure of a subsea group in the NE. Contributions were made by all persons present and the session addressed various issues including:

- need for a single, representative body for the subsea sector in the NE that could address these issues and have some real impact upon regional policies
- role and affiliation to NOF and Subsea UK
- potential areas of public support for the STC
- raising the profile of the sector / region in subsea
- the shortage of skilled personnel and the need to bring additional, younger resources into the industry
- the need to facilitate innovation and technology transfer

As a consequence of the meeting, it has been agreed that:

- that there is a need for a single voice [a committee] for the sector in the NE for a number of reasons; dynamic growth of the sector, its increasing role in the on-going development of the North Sea and the future prospects and technology advancement being among the most important. The committee should not be too large, however, it should be ensured that all the respective parts of the sector are being represented [e.g. manufacturers, pipeline engineers etc]. Representatives from the local and national public bodies and from academia should also be included in the committee. A tentative committee have been elected to provide the single voice for the sector and to address the identified issues.
- it was agreed that the NOF should play a role in representing the subsea sector, however, the exact form of involvement need to be discussed further. Additionally, delegates agreed that the group in the NE should be a subset Subsea UK rather than NOF [NOF could take more organisational, facilitation role]. It was agreed that both the NOF and Subsea UK should be represented on the Committee.
- potential areas of public support should be taken into consideration when formulating strategies and action plans for Subsea NE. There are competing demands from different sectors and the regional policy makers need to choose who to support. Need for clarity of needs, objectives and plans, message from the sector [this is who we are, what we do, where we are and where we are going]. It was considered important that a representative from ONE North East should be involved and sit on the committee.
- a number of areas where raising profile could be beneficial for the industry was identified, including attracting workforce and retaining graduates, recognition leading to creating more opportunities, eligibility for public support and collective marketing.
- the role and involvement of the Newcastle University in the subsea technologies and subsea-related courses offered at present were discussed in relation to addressing skills shortage. The possibility of extending / copying the model applied to the MSc in Pipeline Engineering was discussed. As the course was very successful ever since its introduction, the university would be interested in extending this course into subsea, providing there is enough support from the sector and well defined needs / requirements.

As a result of the discussions a committee to represent the subsea sector in the NE was elected. The role of the committee at the beginning will be to define and address the needs of the sector, decide on the form of representation and liaison with other organisations. It has been also decided that:

- the committee should meet on a regular basis [once a month / every two months].
- Durham Business School, will initiate the first meeting of the committee and undertake the administrative tasks for the time being.
- On the first meeting the committee will decide on the statutory and organisational issues [objectives, form of representation, rotation of the chair, etc]. Also the need of employing someone on permanent basis for the secretarial job needs to be decided.
- There is a need to quantify the sector – a report on the size and importance of the sector in the NE needs to be compiled.

Minutes from the meeting are included in the Appendix VI.

4. **Committee for the Subsea North East – what next? 21st July 2005,**

Attendees:

Chris Braithwaite	Chairman - Wellstream
Alasdair MacDonald	DUCO
Natasha Kahn	CTC Marine Projects
Tony Trapp	The Engineering Business
Roland Palmer-Jones	Penspen Integrity
Steven Pearson	Wilton Marine Services
Michael Jones	SMD Hydrovision
Neil Kirkbride	Bel Valves
Cristine	Macaw Engineering
David Pridden	Subsea UK
Atilla Incecik	Newcastle University
Ian Brannigan	ONE North East
Tom Cosh	Newcastle City Council
Geoff Race	NOF
Pierpaolo Andriani	Durham Business School
Frank Siedlok	Durham Business School (Secretary)

This was the first official meeting of the committee and the local authorities, academia and regional organisations [representatives from ONE North East, Newcastle City Council, Subsea UK, Northern Offshore Federation, Newcastle University and Durham University] organised in collaboration with Northern Offshore Federation and Subsea UK. The main goals of the meeting were:

- to discuss and confirm the final size and composition of the committee
- to confirm / elect a Chairman and secretary for the committee
- to discuss and concur on the objectives, remit, structure and prospective sources of funding for the committee
- to further discuss the matter of how to increase collaboration with academia and how to address the training and skills issues.

There was a general agreement that most of the represented businesses are experiencing a significant growth [potential] at the moment, however, they are facing serious resource constraints due to shortage of available staff and production capacities. It would be one of the tasks for the committee to look into this issue.

It was agreed that in order to ensure proper representation from each subset of the sector the size of the committee would be 10-12 members and the final composition may change after defining the exact role and purpose of the committee and the role and contribution of each member. A chair of the Committee was elected. Also list of the main objectives for the committee was compiled and votes cast for the three most important to be addressed/considered first. Those are:

- poor profile and PR of the sector, region and lack of identity for the Subsea Technologies Cluster;
- innovation / technology aspect – how to strengthen collaboration and knowledge transfer in the region, access available funds for R&D and develop new testing facilities for the sector
- Human Resources and training – how to address shortage of skills at all levels and address low profile and image of the sector

A working group was agreed to confirm priorities and to develop terms of reference for the newly formed Subsea NE Group and present their findings for comments by the end of August 2005, prior to the next meeting on 14th of September 2005.

Additionally the following issues were discussed and decided upon:

- Latent role and liaison with the relevant organisations [i.e. ONE NorthEast, NaREC, Subsea UK, NOF] have been discussed. The discussion concerned mostly the possibility to use NOF or SUBSEA UK as an umbrella for the subsea technologies cluster [STC] in the NE. The following points were raised:
- NOF being a region-focused trade organisation embraces a wider spectrum of companies than just subsea, offshore or O&G. The stress is put on the region rather than any specific sector.
- SUBSEA UK is a sector-specific body concentrating on the O&G market, nationally focused with the main goal to champion subsea industry. David Pridden confirmed that SUBSEA UK would provide support to the STC whenever possible, however, it *does not plan to open an office in the NE*.

Depending on the merit and main goals of the committee, association with any of the existing bodies should be decided accordingly. When discussing roles of Newcastle City Council [NCC] and ONE North East, the regional development agency, it was pointed out that subsea “is not on the radar” at the moment – unlike renewable energy and nuclear decommissioning. NCC have supported SCT in the past and is willing to continue as long as it fits with the general development strategy, especially the Science City strategy. NCC is interested in *seeing the group embedded in the region [R&D, regional growth and investments]*. It has been pointed out that NaREC should play a significant role in R&D, testing and innovation. The possibility of fine-tuning NaREC’s facilities to meet needs of STC should be discussed. It was also stressed that there is a vast number of bodies and organisation in the region already – would creating another one make any sense?

Minutes from the meeting are included in Appendix VII.

5. **Workshop held with the committee for Subsea North East, 14th of September 2005, Newcastle - upon - Tyne.**

This meeting was a clear continuation of the previous workshops / meetings and the main goals were to:

- to discuss and concur objectives, priorities, final structure, remit and funding options for Subsea NE
- to discuss the closing conference for NEKS project and possibilities for the further research / work with the Subsea sector
- to create Working Groups to address the main issues and problems the sector is facing [training, skills & education, PR, Subsea Course / Academy]
- discuss an initial event to formally launch the group

It has been agreed that the establishment of the committee should contribute to better representation of the subsea sector in the North East, more intense collaboration among companies, more intense collaboration with academia, facilitate cluster's recognition and image, promote emergence of shared identity and lead to better public support.

Attendees:

Chris Braithwaite	Chairman - Wellstream
Alasdair MacDonald	DUCO
Roland Palmer-Jones	Penspen Integrity
Steven Pearson	Wilton Marine Services
Neil Kirkbride	Bel Valves
David Pridden	Subsea UK
Frank Siedlok	Durham Business School (Secretary)

The meeting has been opened with a presentation from David Pridden, CEO of Subsea UK, on:

- the most recent trends in the O&G market
- R&D spending trends [decrease]
- preliminary results of the study on testing facilities and trends commissioned by Subsea UK
- emerging opportunities for the region and sector created by the trends in O&G market and the feasibility of test centre in the NE
- problem of ageing workforce

Discussion followed the presentation, with the following outcomes:

- creation of the following vision of the Subsea NE:
“To provide a focussed industry vehicle in the North East of England to represent, strengthen and grow in the Subsea sector”
- agreeing on the main objectives of the Committee:
“to represent, strengthen and grow in the North East of England Subsea sector, especially by:
 - *Creating networking forums*
 - *Enhancing the profile of Subsea businesses in the NE*
 - *Furthering Subsea Innovation & Technology*
 - *Developing appropriate Human Resources & Training for the future”*

- Following the discussion from the previous sessions, the final structure of the Executive Committee was decided to ensure the best representation of all the subsea companies in the NE. The final should comprise of the following members:

Wellstream	Chris Braithwaite	COO
Duco	Ally MacDonald	MD
CTC Marine	Charles Tompkins - TBA	
Engineering Business	Tony Trapp	MD
Penspen	Roland Palmer-Jones	Operations Manager
Wilton Marine Services	Steven Pearson	Director
SMD	TBA	
Bel Valves	Neil Kirkbride	Chairman
Perry Slingsby	TBC	
Shepherd Offshore	TBA	
Subsea UK	David Pridden	CEO
Newcastle University	Prof. Atilla Incecik	Head of School of Marine Science and Technology
NOF	TBC	
Durham Business School	Frank Siedlok	Research Associate

At this stage the membership of some of the individuals still needs to be confirmed.

- The following has been decided in regards to Subsea NE:
 - Subsea NE is owned [represented??] by the Executive Committee comprising of:
 - Elected Chair
 - Vice – Chair
 - Representatives from member companies [senior positions, no substitutes]
 - Representatives from industry bodies and academia
 - Meetings of the committee [as a team] would be held quarterly
 - Events and guest speakers would be organised as required
 - Administration, Funding, PR and Events:
 - Durham University will take care of the current administration [meetings, Executive Committee administration]
 - Subsea UK would initially provide its PR services for the group
 - In regards to addressing the issues selected during the last meeting, the task were divided and each issue was assigned a leader to gather information on relevant issue.

Minutes from the meeting are included in Appendix VIII.

6. Subsea NE Committee Meeting, 30th November 2005, Newcastle upon Tyne

Attendees and apologies:

Chris Braithwaite – Chair	Wellstream
Julia Race	Newcastle University
Nick Tompkins	CTC Marine Projects
David Pridden	Subsea UK
Frank Siedlok	Durham Business School
Michael Jones	SMD Hydrovision
Neil Kirkbride	Bel Valves
Roland Palmer-Jones	Penspen Integrity
Tony Trapp	EB
Martin Anderson	PSS
Jack Hanwell	NOF
George Rafferty	NOF

The main focus of the meeting was placed on discussing and deciding on the following issues:

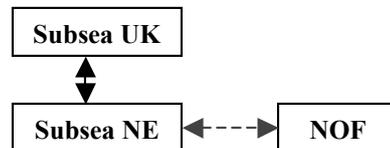
- liaisons with companies, organisations and RAs
- progress on addressing the four selected issues
- objectives, priorities and remit of Subsea NE [summary]
- final structure & funding options for Subsea NE
- feasibility of Subsea Technology Centre in the North East
- NEKS closing Conference

The meeting started by an update from attending businesses on the current business status. All members confirmed experiencing a busy period. Also, Newcastle University just set up a Centre of Excellence in Pipeline Engineering. The final structure of the Committee has been confirmed. It has also been agreed that the chair and vice-chair would be elected on annual basis.

The following issues have been addressed during the discussion:

- **PR approach:** Subsea UK will provide PR services for Subsea NE but the committee need to decide what is to be covered and what are the main goals of the PR efforts
- **Networking:** it has been suggested that an administrative vehicle would be needed for networking. The Committee held a meeting with NOF to discuss collaboration options and NOF becoming a main administrative vehicle for Subsea North East. This was proposed on the basis of a good reputation of NOF in providing support for NE companies and their administrative / organisational skills. One of the options discussed was Subsea NE becoming a club within NOF structures with large flexibility in setting up the direction of future development. This proposal was presented to the committee and the outcomes of the discussion are presented below.
- **Subsea NE Future:** After discussion between the Committee, NOF and Subsea UK, regarding the future of the Subsea NE, the following has been decided:
 - the strength of the committee is in the commitment at the senior level and it should be ensured to stay that way. Main goals of the committee are: to create a strong identity via networking; to address the issue of PR and to increase levels of collaboration and technology transfer among companies
 - Developing and projecting strong links with existing organisations [NOF, Subsea UK] would help in creating good image for Subsea NE. It has been pointed out that there is abundance of organisations / bodies in the NE and establishing a new independent, administrative body would not make sense.

- The committee feels that there is a need for someone to take the load of administrative work off [setting up and hosting meetings, minutes, communication and correspondence, etc] and using NOF as an administrative vehicle and umbrella organisation was considered. However, some concerns were voiced that Subsea NE might lose its identity by becoming NOF's club.
- Subsea UK opposed the idea of Subsea NE becoming a club of NOF as it poses a risk of industry fragmentation and would increase the difficulty of identity and PR management for both Subsea UK and Subsea NE. One of the statutory tasks of Subsea UK is to provide a single voice for and bring the subsea sector together. Formation of Subsea NE has already been perceived as a first step of fragmentation and regionalisation.
- It has been decided that Subsea NE would not become a club of NOF, however would retain strong affiliation with NOF and the following was proposed: **Subsea NE would be a recognised entity with declared affiliation with NOF and Subsea UK**
- It has been agreed that the merits and goals of Subsea NE are strongly correlated, which favours strong affiliation and close collaboration with Subsea UK. Through voting it has been decided that the committee should have **stronger affiliation with Subsea UK rather than “equal” affiliation with NOF and Subsea UK .**



- Subsea NE would be represented on both the Subsea UK and NOF executive boards

Minutes from the meeting are included in Appendix IX.

7. **Emergence of Subsea Technology Cluster (STC) in the North East of England – one day conference, 6th December 2005, Newcastle upon Tyne.**

This final conference, organised with support from Subsea UK, NOF and the industry, attracted some 60 participants from academia, industry and public policy makers [list of participants is included in the appendices].

The conference focused upon the formation of the Subsea Technology Cluster in the North East and the potential implications for public policies. On that day, the pioneers of the industry presented the story of emergence of the sector in the North East, followed by analysis providing better understanding of the process of emergence of embryonic clusters in the context of industrial demise and redundancy, and the role of public policies in the process. Subsea UK provided the latest update on the state of the subsea industry in the UK, its potential and predictions for the future.

In the second part two presentations addressed the problems associated with the response of clusters to adverse external shocks and industrial decline and with cluster in old industrial regions.

Based on the findings and conclusions stemming from the NEKS research, a new framework for identifying and supporting embryonic clusters emerging in the context of industrial demise was developed in the course of the project. The framework was proposed and discussed during the conference.

On that day the chair of the Subsea North East committee announced publicly for the first time the establishment of the **Subsea North East Committee**, its remit, goals and structure.

Finally, the discussion panel addressed the following questions:

- a. What were the critical factors and actions that lead to the emergence of STC?
- b. How can policy makers recognise the emergence of embryonic clusters?
- c. What type of policy initiatives are more appropriate to facilitate the emergence of new clusters during periods of industrial crisis affecting traditional pillars of the local economy?
- d. What are the major problems affecting STC as an embryonic cluster and how to address them?

Appendix I: Subsea in the North East: cluster analysis.



REGIONS OF KNOWLEDGE

NEKS – Networks, Knowledge Sharing and Cluster Development

Subsea in the North East –sector analysis.

October 2005

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The report presented below is a part of the results from the NEKS project. **NEKS (Networks, Knowledge Sharing and Cluster Development)** is part of the **Regions of Knowledge Pilot Action** launched by the Research Directorate-General of the European Commission in August 2003, aimed to develop and foster the knowledge economy in European regions through hands-on research, collaboration and a series of supporting actions aimed at developing clusters of knowledge-based companies. The project actively promotes dynamic involvement of local players in designing and shaping regional knowledge development models and is run simultaneously in Emilia Romagna [Italy], Midi Pyrenees [France] and in the North East [UK].

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I. Methodology

For the need of NEKS we adopted ego-based approach to map the network of subsea companies in the North East. The choice of this technique was dictated by two main factors: some of the main shortcomings of the existing mapping procedures and the characteristics of the subsea sector [i.e. emergent character of both the cluster and the technologies].

Starting from one of the key players [keystones] we reconstructed large part of the map of knowledge flow and supply chain in the region. UCINET and social network analysis tools and techniques were used to create and analyse the maps. The research was mostly carried out by employing qualitative methods – semi-structured interviews, focus groups and workshops with companies and other key players. In both constructing the map of companies, markets and technologies we adopted a “snowball” approach to identify the main players, markets and linkages in the network.

In total 43 companies were interviewed by the researchers, either in person, by phone or email [questionnaire + follow on questions]. Additionally other key figures were consulted and interviewed. Whenever possible the % of turnover directly related to subsea sector was used in assessing the total turnover by the STC [companies were asked what % of their turnover is directly related to subsea sector as in most cases subsea was just one of the markets / sectors served].

Assessment of the key players in the STC was based on interviews and market analysis [qualitative data rather than quantitative data were used].

II. Definitions

The hostile environmental conditions (e.g. high pressure, high temperature, acidity, high levels of corrosion) and the main markets served characterise the subsea technologies. Lack of broadly accepted definition of what subsea technologies are is another feature of the sector. Even the spelling varies according to the source [source: Subsea UK]. For the needs of this research we adopted the following definition:

”operations and processes that take place under the surface of the sea as well as sectors operating at the interface with the subsea technologies”

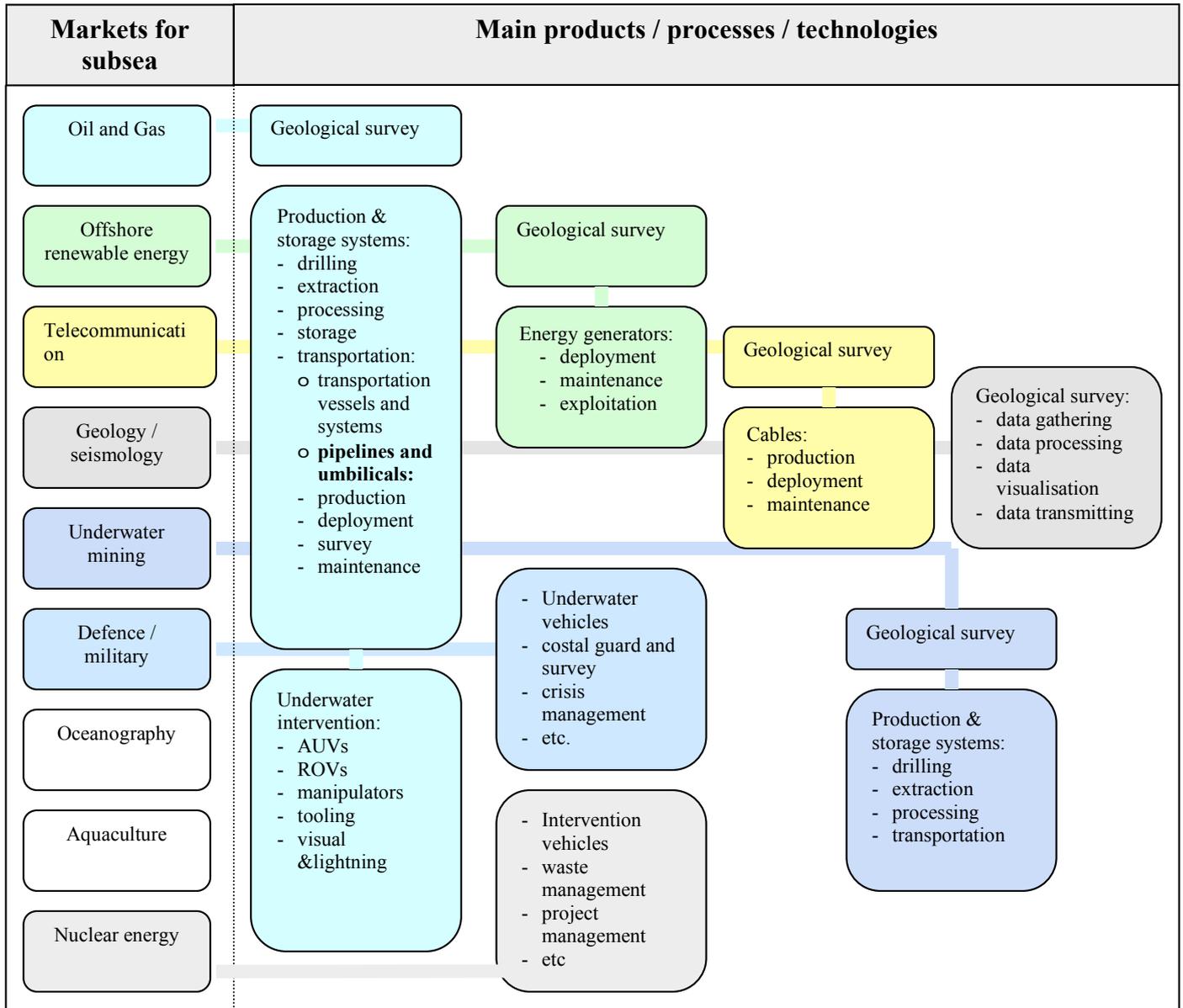
Subsea UK recently describes it as “related to or connected with activities [especially by the energy and marine industries] below the surface of the sea – subsea engineering”.

By keeping the definition rather broad and open we aimed to ensure that none of the important technology is excluded [e.g. interface technologies in most cases operate on the surface rather than under water]. To facilitate the understanding of the sector and to present the ample scope of the sector we tried, first, to identify the main markets and then group the main technologies. Figure 1 presents the main markets served by subsea technologies with some of the leading technologies / processes and products. For the needs of NEKS we grouped the subsea technologies as follows:

- subsea production, storage and processing systems: drilling equipment, manifolds, Christmas trees, subsea processing equipment, separation equipment, control equipment, etc
- pipeline engineering and umbilicals: production, deployment services and machinery, surveying services, corrosion management, maintenance [PIGs, remote intervention, chemical cleaning, etc].
- raisers and positioning systems: dynamic positioning systems, buoyancy systems, etc
- soil-related technologies: trenching, burying, ploughing equipment, geological and soil assessment and measurement [ploughs, trenchers, thrusters, deployment systems, towing tugs/barges, services]
- subsea intervention systems: remotely Operated Vehicles [ROVs], Autonomous Underwater Vehicles AUVs, vision and lighting equipment, tooling and handling equipment, control systems, etc.
- renewable energy systems: wave and tide power generators, offshore wind farms, power-transmission systems, etc.
- underwater control systems: software, hydraulics, robotics, tooling, control systems, etc.
- aquaculture related equipment: feeders, harvesting equipment etc.
- underwater mining equipment: drilling, excavation, recovery etc.
- submarine rescue equipment: rescue systems and vessels
- others:

It should be noted here that this list is not definite and each of the technology groups includes many related technologies, e.g. software, hydraulics, geological surveying technologies and equipment or data visualisation technologies normally not considered as subsea.

Figure 1. Main Subsea Markets, Products and Technologies.



III. Subsea roots

The subsea sector is relatively new and its roots go back to the 60s when the exploration of the North Sea oil and gas (O&G) started. At the beginning the North Sea development was dominated by heavy construction [e.g. platforms, rigs]. The North East, with its established excellence in engineering and infrastructure, was a perfect location for the engineering and manufacturing intensive stages of the O&G supply chain. According to some estimates, the North East is responsible for some 75-80% of early constructions in the North Sea⁶. However, During the development of the O&G sector the subsea started gaining more and more importance in the O&G exploration, as the production trends moved towards smaller and deeper fields and the economics of building fixed platforms became difficult to sustain. Tapping on the natural resources in these severe conditions required new, often bespoke, technologies and skills as well as relevant infrastructure for those technologies to be developed. Many of the North East based companies have built their success on a unique set of capabilities and are recognised as world leaders in their field.

The main factors leading to the emergence of subsea industry in the North East were:

- “slack” infrastructure, skills and workforce
- good access to river[s] and availability of land
- development of the nearby North Sea
- entrepreneurial [survival] behaviour of some key players
- some of the public policies introduced at the time [mostly related to Teesside Development Corporation, Tyne and Wear Development Corporation, North Tyneside Council and establishment of the Real Services for Clustering, Newcastle City Council]
- space availability for business expansion

IV. Results

Quantitative analysis

During the course of NEKS over 95 companies directly serving subsea market[s] in the North East of England were identified, out of which 43 were interviewed. We assume, however, that the total number of subsea companies may be larger as the sector is not identified by the SIC code, which makes the mapping exercise difficult. According to Subsea UK, an organisation representing subsea nationally, subsea industry in the UK totals about 400 – 500 companies employing around 40.000 people [15.000 directly and 25.000 indirectly]. These numbers, however, vary significantly according to different sources, with the estimate of the number of firms reaching over 800 nationwide. The revenue of the sector nationwide is estimated at a level of £5 billion a year, with a significant part of it comes from the North East [source: Subsea UK].

Subsea in the North East comprises of a diverse set of companies, both in terms of size and capabilities, spanning from one-man to over 1500 employees and from manufacturing to software development or sophisticated data visualisation technologies. 47 [??] of the local companies total among themselves over 10 000 employees; this number, however, may be largely misleading, as it does not present the size of workforce related to subsea only. The involvement in the subsea sector varies from 1% to 100%, which again, makes any estimates of the real size and impact of the sector in the North East extremely complicated task. Based on the available data on 50 companies and with adjustments done whenever possible, the estimated turnover for the last year exceeded £0.9 billion⁷ [that is around 15% of the national figure]. Considering that this number is derived from data on just half of the companies, and some of the largest players were not included, the total turnover would probably easily exceed £2.5 billion. The number above is purely indicative: as for basically everything related to the STC in the NE, no previous study or data is available in any form known to us.

Taking into account the main characteristics of STC, [i.e. lack of recognition on the local business map, embryonic character of the cluster, characteristics of the markets served, etc.] the above numbers may often lead to underestimation of the sector when compared with much larger, established sectors / clusters.

⁷ This number is calculated from the available data relative to 48 North Sea subsea companies with the data obtained either directly from the companies or from the Fame database and adjusted whenever it was achievable. In some cases companies provided data for the subsea activities only, in other cases we had the overall turnover together with some estimation about the subsea percentage of the total revenues. The assessment of the cluster's financial performance is rather difficult and requires some assumptions, e.g as most of the interviewed companies are operating on more than one market (see fig. 3), for the companies that didn't provide market breakdown, we have to estimate the relative weight of the subsea operations. Our sample covers a sample of 23 companies. Taking into account that our sample covers about 50% of the population, the real turnover number might be significantly higher.

Whilst analysing STC we have concentrated our efforts on assessing the world-recognised capabilities, innovativeness and connectivity of the member companies. We have gathered and analysed some information regarding the connectivity of the cluster's collaborative links and supply chain relationships. In particular, some 50% of components and 60% of services are being supplied by local companies, exhibiting the strength of the local supply chain. Figure 2 and 3 present the collaborative and the supply chain network among subsea companies in the NE. Some of the keystone organisations can be identified from the above the data analysis and graphs.

Figure 2: Collaborative linkages among subsea companies in the NE

Results based on 23 responses. Blue and red circles represent mapped companies, where red circles represent interviewed ones. Yellow and green circles represent other organisations [universities, research centres, trade organisations, etc.]. Each line represents a reported collaborative link with other company [e.g. collaborative NPD, joint research etc]. Data has been symmetries as the direction of the flow of information is not important here.

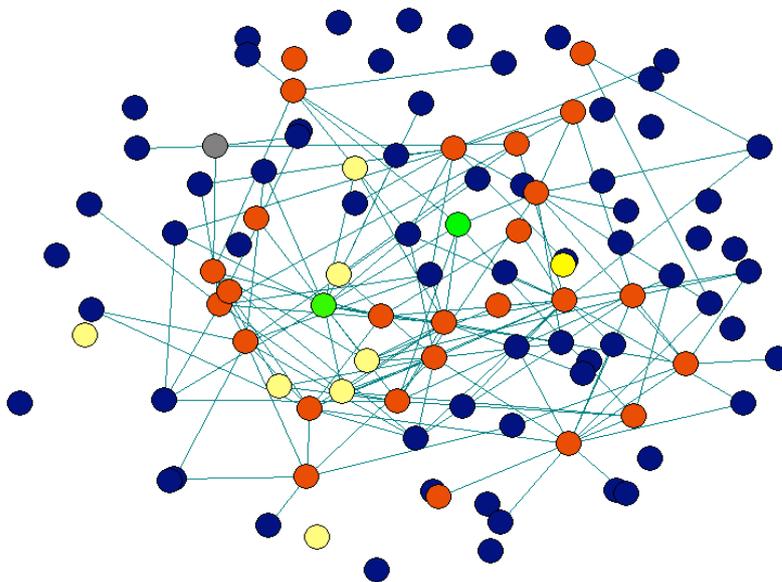
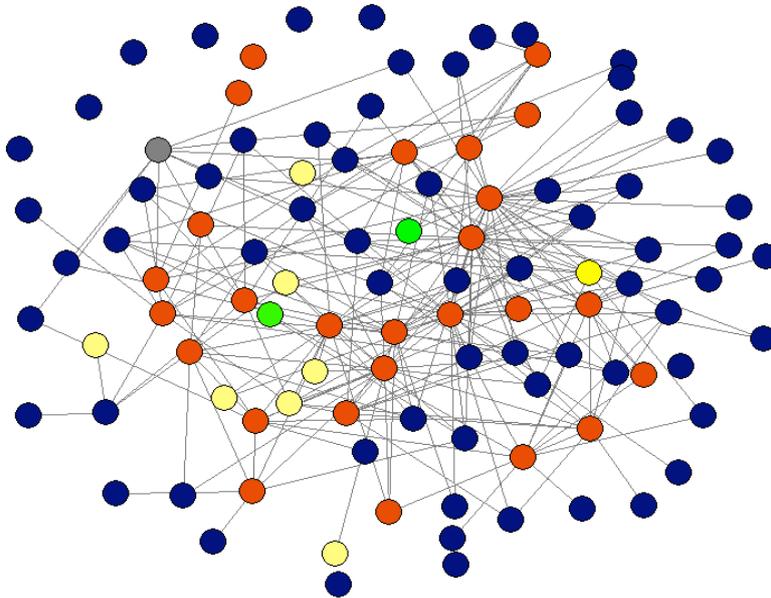


Figure 3. Supply Chain Linkages among Subsea companies in the North East
Results based on 19 responses. Blue and red circles represent mapped companies, where red circles represent interviewed ones. Yellow and green circles represent other organisations [universities, research centres, trade organisations, etc.]. Each line represents a reported supply-customer relationship. Again, data have been symmetries as direction of the relationship is of no importance.



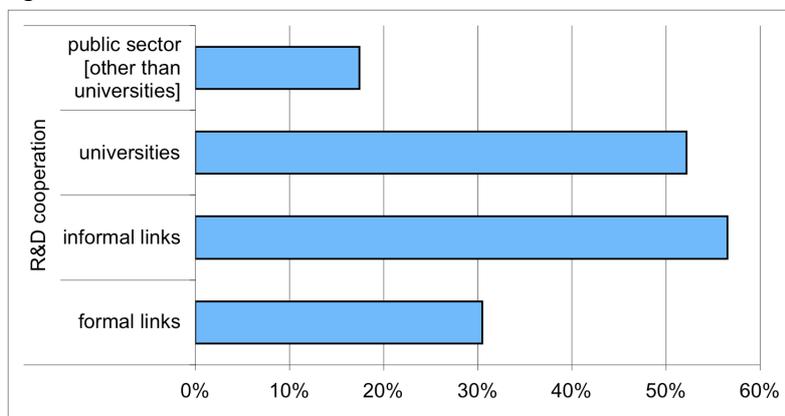
Taking into account that less than 30% [n=23] of companies have responded to the question, the network already is relatively dense, connecting majority of the nodes with some 138 collaborative linkages. This means that on average each of the respondents is engaged in collaboration with six other companies in the region. The number varies from none to 15 reported by one of the companies⁸ and 16 by one of the research organisations. Analysis of the collaborative linkages reflect the diverse approach to new product development and research within the STC, with some companies doing all the R&D in-house and some of them extensively preferring partnerships with other companies, external research centres and universities. This fact is also related to the different level of accessibility to test facilities by different organisations. Considering some reported cases of technology “leakage” and the tendency to secrecy in terms of R&D within the sector, the number of collaborative links seems rather high. Almost 60% of the interviewed companies claim to have some form of informal collaborative links devoted to the development of new technologies with other local companies. About 30% claim to have formal agreements and slightly less than 60% report to collaborate with universities [see Figure 4].

Analysis of the supply chain yields even more positive results, with some 240 supplier-customer linkages reported just by 19 companies [over 12 links per company on average, with 127 supplier links and 116

⁸ Interestingly, the structure and operations of this company resemble the structure of some of the “networked” companies with minimum assets and extensive network of collaborators.

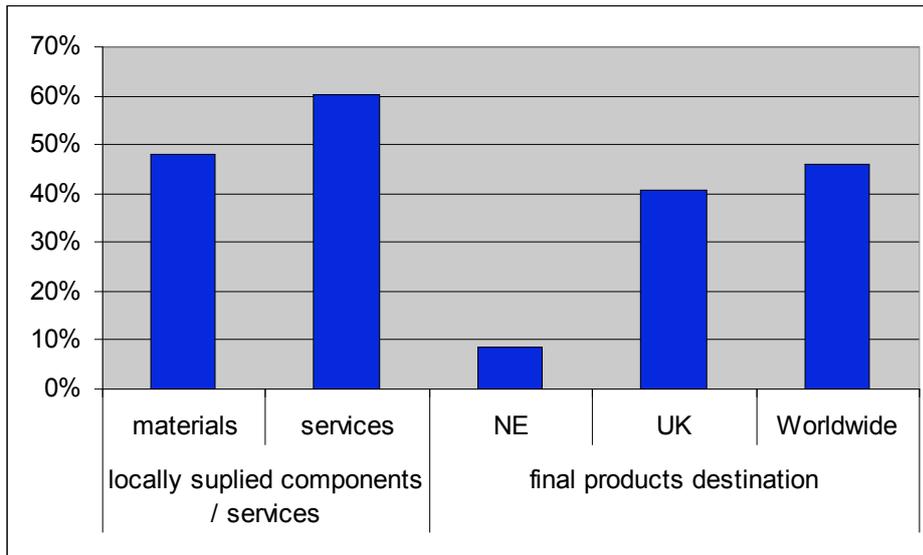
customer links reported]. One of the “keystone” organisations not only confirmed that there definitely is a subsea cluster in the North East but also confirmed that most of the new technologies they adopted have been developed and produced by local companies. Based on the responses from 18 companies, on average 48% of all the components and 60% of services are supplied to them locally. Considering that the 240 linkages are reported by less than 21% of companies, the network most probably is significantly richer. In our interviews it was pointed out numerous times that some of the materials / components cannot be supplied locally due to either lack of expertise or shortage of materials [e.g. some high-quality steel products, composites and new materials, etc]. In terms of destination of final products/services about 50% of it is exported globally, some 40% is sold nationally and only a small percentage, less than 10%, serves only the local market in the NE [based on 23 responses]. Graphical representation of the supply chain analysis is presented in Figure 5.

Figure 4. Collaborative links in R&D activities



Source: NEKS research

Figure 5. Supply chain analysis



Source: NEKS research

Qualitative analysis and the sector break-down

Oil & Gas is the largest destination market for subsea products and services, however all of the interviewed companies reported serving at least one more market. Table 1 presents the breakdown of served markets [reported by 28 companies], with O&G, renewables and telecommunication being the biggest beneficiaries of STC. Additionally to asking what markets do they serve at the present we asked which of those markets they consider as potential in the future. It is probably worth to notice the declining trend in serving O&G in the future [14% of respondents currently serving O&G do not see it as a future market] and a significant increase of interest in underwater mining [additional 17% of companies consider it as a future market] and renewables and defence [in both cases 14% more companies planning to move to this markets]. From the responses received, companies' low interest in renewables (recently lobbied by local authorities) is mostly caused by a) too much politics attached to this market b) instability and insecurity of the market c) low commercial returns from the market. However, over 30% of the STC companies are already serving the offshore renewable energies market and many more reported existing capabilities to enter this niche once it stabilises.

As for the fact of Oil&Gas being the main market for subsea technologies, the fact that around 40% of the UK offshore oil and gas production comes through the subsea wells, and the trend is growing [Subsea UK], should be highlighted. Projected 70% increase in deepwater prospects in the next few years [Westwood 2003] and the rapid diversification into the new and promising markets such as underwater mining or offshore renewable energy, illustrate even better the increasing value of the sector. Record-high

oil prices, political instability in the Middle East and growing energy demands already fuelled the development of subsea technologies, however, the trend is predicted to continue. The North Sea development already have been prolonged way beyond any previous predictions thank to the new subsea technologies. According to *Oil and Gas Journal*⁹ (OGJ), the five countries in the North Sea region had 14.8 billion barrels of proven oil reserves and proven natural gas reserves of 169.8 trillion cubic feet (Tcf) in 2005. The North Sea contains Western Europe's largest oil and natural gas reserves and is one of the world's key non-OPEC producing regions. The potential value of subsea technologies increases even more when considering that more than 70 percent of the Earth's surface is covered by oceans, that are vital source of both fossil and renewable energy and natural resources, and the constantly increasing energy demand.

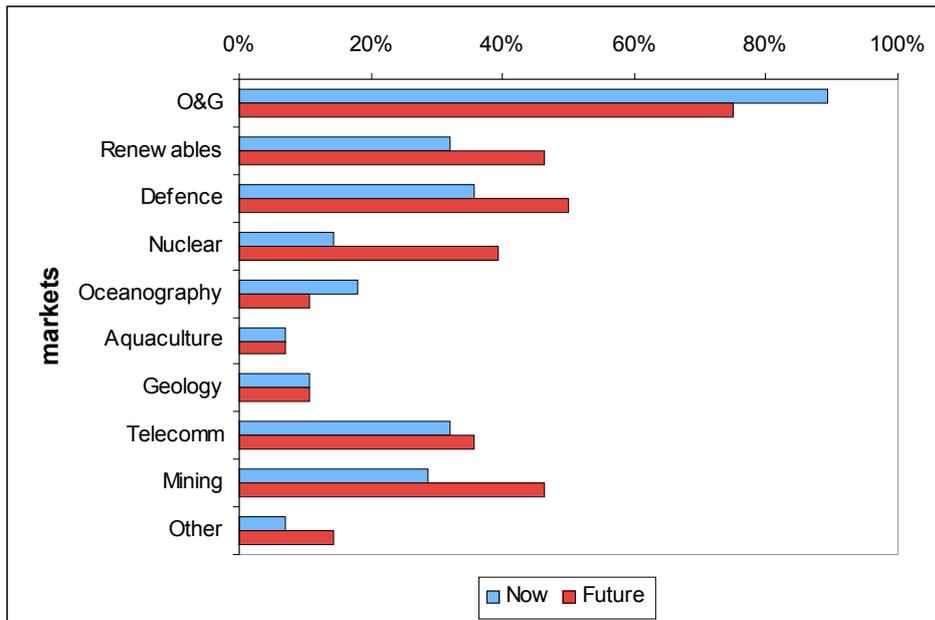
Table 1: Served and Potential markets for STC

Markets:	now	Future
Oil & Gas	89 %	75 %
Renewables	32 %	46 %
Defence	36 %	50 %
Nuclear	14 %	39 %
Oceanography	18 %	11 %
Aquaculture	7 %	7 %
Geology	11 %	11 %
Telecommunication	32 %	36 %
Underwater mining	29 %	46 %
Other [e.g. civil relieve]	7 %	14 %

Figure 6 shows the breakdown of markets served by subsea companies in the North East [based on 28 responses].

Figure 6: Markets served by STC

⁹ After the Energy Information Administration, accessible at http://www.eia.doe.gov/emeu/cabs/North_Sea/Full.html



Source: NEKS research

The cluster in the North East is formed around the following main groups of expertise:

- “flexible products” [production and deployment of flexible pipelines and umbilicals]
- soil-related knowledge: trenching, ploughing, earth moving equipment, survey and consulting services
- pipeline engineering [corrosion assessment, pipelines survey and consultancy, pipeline cleaning – PIGs]
- subsea constructions fabrication
- underwater intervention and control systems [ROVs, AUVs]

There is a significant knowledge base in Pipeline Engineering in the region with a potential to become Centre of Excellence in Pipeline Engineering¹⁰. The roots of the expertise go back to the existence of the British Gas research station [ERS] closed in 1995 and spinning out some 15 companies. The strength of the group is supported by setting up MSc in Pipeline Engineering in collaboration with Newcastle University – at the time the only such course. Significant part of the course is delivered by local companies, which adds a significant value to the course and the sector. This world-class expertise in pipeline engineering was pointed out to us numerous times during the research.

¹⁰ Statement based on interviews

World leaders in pipeline engineering, flexible burying and trenching, ROVs/AUVs, submarine rescue systems, flexible pipeline and umbilicals production are all located in the North East¹¹. What is more important, the knowledge base and R&D are also carried out locally in most cases¹². The region was a birthplace for many break-through subsea technologies with intelligent PIGs, subsea ploughs and trenches being just some of them. As aforementioned, the STC is a manufacturing centre for the subsea in the UK, if not in the word [based on interview with Subsea UK]. The list of the leaders in their fields include the following companies:

COMPANY	Worldwide recognised competence
Wellstream	World-class producer of flexible pipelines and solutions for liquid transportation.
DUCO	world leader in design, manufacture and installation of static/dynamic electro hydraulic umbilical systems, thermoplastic hoses low permeation and high collapse resistance hoses, steel tube umbilicals
Perry Slingsby	World-leader in the design and manufacturing of remote intervention technologies and equipment systems, ROVs, submarine rescue systems, submarine cable ploughs, tooling systems
SMD Hydrovision	World leader in production of subsea trenching systems, tractors, ploughs, ROVs, cable handling systems, jetting machines. Largest independent producer in the world.
CTC Marine	World-leading subsea contractor in trenching and installation of pipelines, cables, flowlines.
PII GE	World-class provider of pipeline assessment services, world leader in magnetic and resonance PIG development [?check?]
Pipeline Engineering companies [PEGASUS group]	World-class pipeline engineering services, pipeline integrity, assessment and consultancy providers
Tekmar	World-leading builders of TMS' and deployment systems (LARS). Also ROV TMS, ROV LARS, waterstop seals and pipeline repair clamps, please go to the menu button on the top left.
Pipeline Engineering and Supply	World-leader in the provision of pigging, isolation and joint testing systems and specialised related services, for the pipeline integrity

¹¹ Statement based on interviews and market analysis

¹² Statement based on interviews

	industry
Bel Valves	World-class manufacturer of the complete package of through conduit gate valve, actuator, controls systems, ball, check, globe and wedge gate valves.
Engineering Business	World class design, build and support services for the offshore oil and gas, submarine telecom, defence and renewable offshore power generating industries

All of the above companies are world-recognised suppliers of high-technology subsea products and specialist, knowledge intensive services.

VII. Challenges

During one of the recent presentations, Subsea UK described the industry as fragmented, mature and gently declining industry and identified the following challenges:

- Ageing workforce: average age 52!
- Parochial
- Cost conscious
- Driven and dependent on O&G industry
- Not recognised by Policy Makers
- Funding depending on Oil markets
- Risk of migration of the industry - Huston, Far East, Africa
- Declining R&D spending by major operators with major impact on Subsea R&D

The main challenges STC in the North East is facing are:

- profile: subsea industry is suffering from a “dirty”, “old” and “low-tech” image, partly as a legacy of Oil and Gas industry. Also the legacy of the North East projects the image of “heavy, dirty industry”
- lack of identity: most of the interviewed companies would not consider themselves as subsea – rather anything else [Oil and Gas, Energy, Manufacturing etc]
- shortage of skilled workforce: the whole O&G industry is currently experiencing shortage of skilled engineers. Long time span to train new graduates, depart of traditional training “hubs” like Pearson and bad image of the industry make addressing this issue extremely difficult. Pipeline Engineering companies tried to address some of this issues by setting up MSc in Pipeline Engineering and providing over 50% of the lectures. The early results are very promising

- lack of recognition as a separate industry by local authorities
- access to R&D and testing facilities and funds: expeditiously increasing demand for new technologies is not met by accessibility to R&D funds and test facilities
- fragmentation of the sector, low level of collaboration and networking

As a direct outcome of the NEKS project, a committee representing the subsea sector in the North East has been recently established by the local companies and authorities. This is already a good sign of increasing collaboration among companies. The committee, after identifying the main challenges, formed a number of working groups to investigate and address them. Also first cases of collaboration between some companies have been acknowledged.

Appendix II: A proposal of a new framework for embryonic cluster analysis.

Identification of Embryonic Clusters in the Context of Industry Demise – a New Framework

Pierpaolo Andriani and Franciszek Siedlok, Durham Business School

Please, direct any correspondence to: Franciszek.Siedlok@dur.ac.uk

Abstract

Traditional approaches to mapping industrial clusters often prove to be ineffective in identifying emerging clusters/sectors based on new (often undefined and unrecognised) sets of technologies and/or markets. A recent report by AIM Research¹³ illustrates some of the problems of this traditional approach, misallocation of resources, the opportunity costs of not supporting viable sub-clusters and the loss of potential market opportunities for regional firms and their workforces being some of the most common ones. To mitigate these risks for policy makers, drawing on the successful detection of the subsea technology sector [STC] in the North East of England, we propose a new approach for the detection of *emerging* clusters, or rather *business ecosystems*. We start from the assumption that a period of persistent crisis [severe industrial restructuring] generates environmental *enabling conditions*, such as skills redundancy, capabilities slack, migration of existing skills towards new applications, decoupling of technologies from fine-tuned applications, etc. The situation of crisis creates the conditions for existing capabilities to re-organise around emergent market opportunities and generate the context for the emergence of new aggregations of skills, technologies and organisations. Whether the process of re-organisation and regeneration takes place depends on a series of environmental, cultural and serendipitous factors. We support the idea that a better understanding of the dynamics of demise may help policy makers to adopt efficacious policies to influence the emergence of new sectors/clusters

In this paper we concentrate on two main aspects and then derive a new approach to detect embryonic clusters:

First, the situation sketched above is similar to the problem of emergence of new 'bodyplans' (Gould, 1990) after a mass extinction. In this paper we draw inspiration and ideas from evolutionary biology, discuss similarities between industrial and biological mass extinction and examine the potential to apply evolutionary biology frameworks and model to industrial geography (Jacobs, 2001; Mokyr, 1998).

¹³ Challenging Clusters. The Prospects and Pitfalls of Clustering.. AIM (Advanced Institute of Management) Research, September 2005

Second, one of the main theories underpinning the proposed framework is the cognition process of agents. Any agent's perceptions, inclusive of economic analysis tools, are regulated by sets of tuneable filters that determine what data are registered and how information and patterns are extracted from data. These filters, which rely on previous knowledge, values and preferences, shape our hypotheses and sometimes restrict [especially when exposed to radically new situations] the range of what we can recognise. Researchers face a dilemma: too much data and information cause overload; too little data/information cause missing relevant patterns (threats or opportunities).

In relatively stable environments the use of established methods, hypotheses and filters usually provides efficient solutions to most problems. However, difficulties arise in presence of a novel situation, often caused by technological change or social/market change in the operating environment. The same filters that previously increased the effectiveness of scanning process now prevent correct diagnosis and action. For instance SIC, or other commonly adopted codes for cluster mapping, act as filters based on previous experiences and do not recognise the rich and lively business ecosystem (clusters) that emerge around new sets of technologies and processes. The pertinent point is that SIC codes, based on officially recognised definitions of past economic activity and areas of economic analysis and used to classify the new economic activities, are slow to recognise and classify new emerging and dynamic technologies and processes.

Adopting the more dynamic business ecosystem approach (Iansiti *et al.*, 2004) ensures early filtering of weak signals [signatures] and identifying any patterns, whereas proposed mapping techniques would identify the keystone organisations and reconstruct and assess the existing social network. As clusters are often part of much larger, often global, ecosystem, this approach would also ensure that clusters spanning across multiple sectors, industries and markets and based on a mix of virtual and geographic space are not filtered out during the mapping process and are treated as a part of a larger and more complex business ecosystem. Adoption of the social network analysis techniques enables early detection of the *signatures*, reconstruction of the ecosystem, identification of keystone organisations and novelty exhibited by the cluster in comparison with existing clusters.

The table below highlights the main differences between existing and proposed methodologies

	Mapping of CLUSTERS	Mapping of Business Ecosystems
Approach	SIC codes	Weak signal detection - ecosystem signatures
Space	Traditional geographic space	Mix of geographic and virtual space
Main elements	- usually top-down approach to mapping - mapping based on SIC codes	- snowball / keystone approach to mapping - identification of niches, sub-systems and players - assessment of links and nodes
Quantitative or qualitative	mostly quantitative [no. of firms, turnover, employees]	Qualitative and quantitative assessment: search for keystone players and apply snowball techniques to find niche players and define ecosystem structure
Limits	"restricted" by filters based on past experiences	Scanning process enabling identification of emerging sectors / technologies /

Relationship with change	Not effective during times of radical change	Change treated as enabling condition for emergence of new sectors
Nature	Static	Dynamic

Gould SJ. 1990. *Wonderful Life: The Burgess Shale and the Nature of History*. Vintage: London
Iansiti M, Levien R. 2004. *The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability*. Harvard Business School Press: Cambridge: MA
Jacobs J. 2001. *The Nature of Economies*. Vintage Books: London
Mokyr J. 1998. *Neither chance nor necessity: evolutionary models and economic history*. Princeton University Press

Appendix III: Final Conference Programme and Participants List

Conference Programme

- 09.00 – 09.30** **Registration, Tea and Coffee**
- 09.30** **Welcome**
- 9.30 – 10.00** **Frank Siedlok & Pierpaolo Andriani, Durham Business School**
The Emergence of the Subsea Cluster in the North East
- 10.00 – 10.30** **Charles Tompkins, CTC Marine Projects**
The early days of the subsea industry in the North East – dynamics and enabling conditions
- 10.30 – 11.00** **Alan Reece, SMD Hydrovision**
Research, Academia and Business World: The story of SMD
- 11.00 – 11.30** **Coffee Break**
- 11.30 – 12.00** **Ian Diggory, MACAW Engineering**
The closure of Engineering Research Station and Emergence of Pipeline Engineering sector in the North East
- 12.00 – 12.30** **David Pridden, Subsea UK**
Subsea Industry in the UK
- 12.30 – 13.30** **Lunch Break**
- 13.30– 14.00** **Andy Cumbers, University of Glasgow**
Institutional Features, Path Dependencies and Regional Industrial Change: Comparing Mature and Embryonic Clusters in an Old Industrial Region
- 14.00 – 14.30** **Kerstin Wolter, Universität Duisburg, Essen**
The response of clusters to adverse external shocks and industrial decline
- 14.30 – 14.50** **Pierpaolo Andriani, Frank Siedlok, Durham Business School**
Identifying clusters in the context of industrial demise and redundancy: a new framework?
- 14.50 – 15.20** **Coffee Break**
- 15.20 – 15.40** **Chris Braithwaite, Wellstream**
Establishment of the Subsea North East
- 15.40 – 16.00** **Ian Brannigan, ONE NorthEast**
Existing clustering policies in the NE [tbc]
- 16.00 – 17.00** **Discussion Panel**
- 17.00 – 17.15** **Closing notes and end of conference**

**CONFERENCE ON EMERGENCE OF SUBSEA TECHNOLOGIES CLUSTER IN THE NORTH EAST
NEWCASTLE UPON TYNE, 6TH DECEMBER 2005**

Title	First Name	Surname	Organisation	Position
Dr	Pierpaolo	Andriani	Durham Business School	Senior Lecturer
	Frank	Siedlok	Durham Business School	Research Associate
	Charles	Tompkins	CTC Marine Projects	MD
Dr	Alan	Reece	SMD / Pearson Engineering	Founder /
Dr	Ian	Diggory	MACAW Engineering Limited	Director
	David	Pridden	Subsea UK	CEO
Dr	Andy	Cumbers	University of Glasgow, Department of Geographical and Earth Sciences	Senior Lecturer
	Kerstin	Wolter	Universität Duisburg-Essen	Lecturer
	Chris	Braithwaite	Wellstream International Limited	CEO
	Ian	Brannigan	ONE NorthEast	Cluster Team Manager

Title	First Name	Surname	Organisation	Position
	David	Shepherd	Advantica Flow Centre	
	Richard	Dodd	BEL Valves	Managing Director
	Alan	Holmes	Business Link Tees Valley	Innovation Advisor
	Gerry	Hayter	Business Link Tees Valley	Partnership Manager
	Jim	Walker	Business Link Tees Valley	Access to Finance Manager
	<u>Nigel</u>	Lane	Cold Drawn Products Ltd	MD
	Alan	Austin	Consultant	Consultant
	Nick	Tompkins	CTC Marine	General Manager
Dr	David	Hewitt	David Hewitt Associates	Managing Director
	Alasdair	MacDonald	DUCO	MD
	Keith	Herrmann	Durham Business School	Director of Programmes - Small Enterprise Development
	Krista	Roberst	Durham Business School	Executive Learning
Dr	Musfiq	Mannan Choudhury	Durham Business School	PhD Research Student
Prof.	Tony	Cockerill	Durham Business School	
	Janet	Tully	Durham University	Senior Research Associate
Dr	Nick	Rosser	Durham University	SPDRA
	Archie	Workman	Invest in Cumbria	Investor Development Manager

	Don	Beezer	New and Renewable Energy Centre Ltd	Director of Operations
	Vicki	Goodwin	Newcastle University	Researcher
	Brian	Leay	Newcastle City Council	
	Phillip	Levinson	Newcastle Tool & Gauge Ltd	Business Development Manager
	Fiona	Whitehurst	Newcastle University	
	Mark	Griffin	Newcastle University	Energy Consultant
	Swayan	Chaudhuri	Newcastle University	Researcher
	Geoff	Race	NOF (Northern Offshore Federation)	
	Jack	Hanwell	NOF (Northern Offshore Federation)	Manager - Training & Renewables
	Michelle	Cooper	North Star Equity Investors Ltd	
	Heather	Hunter	North Tyneside Council	Senior Manager Regeneration
	Gary	Scott	Northern Defence Industries Ltd	Director of Operations
	Karl	Ward	Northern Defence Industries Ltd	Supplier Network Manager
	Ray	Thompson	One NorthEast	Sector Specialist
	John	McGrath	Outokumpu Stainless Distribution	Commercial and Marketing Manager
	Roland	Palmer-Jones	Penspen Integrity	Consultant
	Martin	Anderson	Perry Slingsby Ltd	MD / CEO
	Dave	Bacon	Pipeline Engineering	Special Projects Director

	Andrew	Mcfarlane	R. Blackett Charlton Ltd	General Manager
	Graeme	Ratcliffe	RPC Group plc / Durham Business School	Finance Manager / Visiting Fello
Dr	Peter	Alan	SEtech (Geotechnical Engineers) Limited	MD
	Michael	Jones	SMD Hydrovision	Sales Director
	Steve	Sasanov	Subsea Engineering News	Editor
	Bill	Edgar	Subsea UK	Chair
Dr	Tony	Trapp	The Engineering Business	Managing Director
	Brian	Cocksedge	The Osmosis Partnership	
Dr	Ahmed	Abbas	University of Teesside	Head of Teesside Manufacturing Centre
	Philip	Jordan	Watson Burton LLP	Partner
	Chris	Pickering	Wellstream International	Manager SCM
<u>Dr</u>	Sally	Martin	Wellstream International	Manager Business Information
	Steven	Pearson	Wilton Marine Services Ltd	Director
	Allan	Southern		Business Development Manager

**Appendix IV: Minutes from the Public Policy Focus Group, Newcastle-upon-Tyne, 22
February 2005**

**NEKS – Public Policy Focus Group
Newcastle–upon–Tyne, 22 February 2005
Final Report**

**NEKS – Policy Focus Group
22 February 2005**

Attendees

Pierpaolo Andriani	Durham Business School
Frank Siedlok	Durham Business School
Neil Kirkbride	BelValves / British Engines
Charles Tompkins	CTC Marine Projects
Nick Tompkins	CTC Marine Projects
Roland Palmer-Jones	Penspen Integrity
Ian Diggory	Macaw Engineering
Terry Sheldrake	Wellstream
Ralph Manchester	SMD Hydrovision
MarkJones	DUCO
Fiona Whitehurst	CURDS – Newcastle University
Joseph Place	ONE NorthEast
Jack Hanwell	NOF
Tom Cosh	Newcastle City Council
Allan Austin	Regional Services for Clustering [RSC]
Richard Brook	NaREC

Apologies from David Pridden, Subsea UK

Executive summary

The focus group have been organised to address to main issues: to discuss existing innovation policies and to identify needs of the subsea technologies cluster [] in the North East, the following being the most prominent:

- raise the profile of the region and the sector
- address the training and skills shortages by designing and implementing joint training scheme
- increase cooperation among companies in a number of non-competitive areas such as: sharing market intelligence, managing difficult customers, sharing health and safety best practice, machine floor subcontracting.

A set of initiatives to address these needs has been proposed and will be further discussed with companies, policy makers and support organisations.

Background

NEKS [Networking, Knowledge sharing and cluster development] is a 2-year European pilot project undertaken by three different universities [Durham Business School [DBS], Almagest in Italy and ESC Toulouse in France] and aims at setting up an integrated series of supporting actions related to the development of clusters of knowledge-based companies.

NEKS main goals are:

1. to study the evolutions and networks of relations of selected clusters of knowledge based companies settled in the partner regions [part 1]
2. to facilitate the knowledge flow and innovation in the sector [part 2]
3. to assess the effectiveness and impact of public policy regarding the sector as well as general policies affecting innovation in the region [part 3].

The focal point of the research in the North East is subsea technologies sector [] - an emerging, however not recognized by policy makers, high-technology cluster serving a number of markets and incorporating a diverse mixture of technologies and capabilities¹⁴.

As a part of the dissemination phase a focus group on existing, as well as desired, policies affecting the research and innovation in the sector has been organised. The main goal of the focus group was to evaluate the effectiveness of the existing public policies in facilitating innovation, clustering and knowledge sharing in the sector. During the meeting, representatives from firms, local authorities and support organisations discussed the challenges and opportunities for policy-making regarding the support of the subsea sector

Main Findings and Outcomes¹⁵

1. Subsea Technologies Cluster [STC]

Research carried out by the Durham Business School has indicated that the subsea technologies sector in the North East consists of around 100 companies, with a range of employment from 1 to over 500 employees. Many of the North East based companies have built their success on a unique set of capabilities and are recognised as world leaders in their fields. The subsea sector is relatively new and its roots go back to the 60s when the exploration of the

¹⁴ Statement based on the results obtained through both interviews and focus group

¹⁵ **NOTE:** Below are presented the outcomes and opinions that stemmed from the discussion. In many cases these opinions are subjective and reflect the views of a single company, organisation or actor. These, however, are rich sources of understanding how the main actors perceive both the policies and needs for further development of the sector

North Sea oil and gas started. Tapping on the natural resources in these severe conditions required new, often bespoke, technologies and skills, as well as relevant infrastructure for those technologies to be developed. The subsea technologies sector developed around a crucial set of technologies with a wide range of markets, of which the dominant one is oil and gas [O&G].

2. Identity

When challenged with a question regarding whether the group of companies present at the meeting could be considered as a cohesive group or as having a common identity, the industry representatives agreed that they share a similar culture, face similar problems, threats and opportunities. It was agreed that, in order to maintain their position in the world market and withstand the effects of globalisation and recent changes in the O&G exploration trends, they need to work together as a group. Despite the fact that some of the companies are in competition, prospective cooperation in certain spheres of operations was identified as potentially beneficial.

3. Past and Existing policies

Generally, most of the members agreed that there are no contemporary policies designed for either the established industries, such as marine engineering, or for the newer industries such as subsea. Most of the industry has been shaped by 20 years old policies introduced and executed during the Thatcherism years and focused on building heavy engineering in the region [through the operations of the Development Corporations]. Most of the new policies, according to the companies, are aimed on *new and trendy* sectors [e.g. renewables¹⁶] rather than on the established ones. Another comments regarded the lack of stability and consistency of policies and organisations in the region. The ever-changing policies and goals combined with relatively frequent reorganisations of the regional development agency [RDA] hinder policy execution and create confusion within the public and businesses. As an example the case of clustering policies adopted by the ONE NorthEast and Scottish Enterprise have been compared, attributing the success of Scottish Enterprise to long-term consistency and commitment to the policies introduced.

It has been noted that there have been numerous other initiatives undertaken by various bodies that directly or indirectly have supported the subsea sector, e.g. Newcastle City Council sponsoring the MSc in Pipeline Engineering, Regional Services for Clustering creating PEGASUS, etc. These initiatives, however, cannot be considered as policies.

Additionally companies complained about the amount of bureaucracy, unclear rules and access to information. A possible solution could be a local subsea intelligence centre that would provide answers and directions to any problem / question.

4. Knowledge sharing and cooperation

The participants were aware of some initiatives aimed at facilitating knowledge transfer and cooperation among companies [e.g. various business parks]. There have also been some attempts to introduce e-commerce among the companies serving the O&G industry. However, these were seen as undermining the face-to-face, long-term relationships approach and playing into the hands of the Tier One Players.

It has been admitted during the meeting that some of the companies have cooperated in fields of bringing new products to the market, however, despite acknowledging the fact that there certainly were some benefits in sharing knowledge, the corporate barriers [e.g. IP issues, bespoke products, competition] and structure of the sector [i.e. tier 1, 2, supply chain structure] were perceived as too big to overcome. The general conclusion was that cooperative approach to innovation and technologies transfer would be difficult. Most of the participants, however, agreed that there are other fields they could cooperate and mutually benefit. The identified potential areas of cooperation are:

- introducing shared training scheme;
- raising the profile of STC in the Region and outside;
- sharing best practices, especially with regard to health and safety;
- subcontracting (for instance, machine tools);

¹⁶ the companies agreed that there is no commercial market for renewables and this sector is both too risky to invest and not yielding enough of commercial opportunities. It was also described as a political currency]

- gaining intelligence
- handling common customers and markets, especially the difficult ones;
- sharing trade opportunities [trade visits from abroad].

The first two areas will be discussed below in more detail as a significant amount of time was devoted to those two problems and potential solutions during the meeting.

5. Profile of STC

Participants agreed that the North East used to have an image of engineering centre of excellence. However, this image has been weakened over the last few years due to the demise of shipbuilding and steel industry. Most of the participants agreed that the region possesses real strength in infrastructures and skills, however, those need to be highlighted and further developed to meet the needs of the sector. Answering the question about the awareness and identity of the subsea group – most of attendees believe that there are certain, niche capabilities in the region but both the identity of the sector and the awareness of the world should be raised. The sector is aware that there is no chance to become the main centre of subsea technologies in the world; however, most participants agreed that they could build a strong image around the niche capabilities in the region.

It was agreed during the discussion that the policy makers and other organisations could help the subsea sector by raising the profile of the North East as a centre for subsea technologies and engineering. This would attract customers, more companies and increase job prospects and security in the region. Also the possibility of creating a centre of excellence in subsea technologies should be considered. It also has been agreed that there is a need for consistency and clarity in the policy and projecting the image.

Additionally the possibility and feasibility of creating a subsea group within NOF structures have been discussed. It has been brought to the attention that out of all the regional support organisations representing the sector, NOF is both the most widely known abroad and the most active in terms of supporting companies. Creating subsea group would raise the awareness of the existence of subsea capabilities in the North East. This issue should be discussed further in the near future.

6. Skills

Most of participants agreed that there is difficulty in attracting certain skills to the sector, one of the reasons for this situation being a low profile and lack of job security in the NE [unlike Aberdeen]. The big, local trainers, such as Pearson, are gone and most of the present companies agreed that they do not have capacity to train in-house [it is both too expensive and too big burden on the existing workforce]. From previous experiences, participating companies considered graduates to be unprepared to take up work directly after finishing their education, whereas schemes such as TCS [now Knowledge Transfer Partnership] are regarded as too much hassle with *setting up a specific project for the student*.

As a solution a few initiatives have been considered, financial help from the local authorities to increase employment being one of them. As a solution to the demise of the big trainers as well as lack of in-house capabilities, an introduction of a joint training scheme has been discussed. Attendees also discussed the possibility and feasibility of extending the MSc in Pipeline Engineering into a broader subsea course as a way to strengthen the region's profile and attract more engineers.

7. Role of Universities Research

Most of participants did agree that there is not much cooperation between universities and the business world. Companies generally are not aware of the research being done at local universities [they referred to the universities' work as *blue sky research*]. Firms pointed out that as their business consist mostly in problem solving, they work on a much shorter time scale than universities do. Therefore do not have time to wait for universities to come up with ideas. Consequently innovation and research in the STC is mostly driven by industry, not universities. Some participants pointed out that there seem to be lack of efficient links between the industry and universities. On the other

hand it should be noted, that the academia played important role in setting up the MSc in Pipeline Engineering – a fine example of cooperation between the industry and universities.

Conclusions

The meeting constituted perhaps the first occasion in which policy makers, representatives from support organisations and STC sat around the same table to discuss subsea related matters. The meeting facilitated an honest discussion between the different STC stakeholders, but, most importantly, identified a series of areas (in terms of problems and opportunities) that need addressing. In particular the following points are important:

1. raising the profile and awareness at the regional, national and international level
2. designing and developing initiatives to create a common face for the STC group
3. liaising with universities and regional authorities to address skills shortages
4. developing a shared training scheme to address the skills gap and training difficulties
5. increasing cooperation among companies in non-competitive areas of operations

Despite the sceptic approach of companies to technology sharing and cooperation in the areas on the new product development, a number of other fields for potential cooperation have been identified. All this created a promising basis for the future development and support of the subsea industry in the North East.

**Appendix V: Minutes from the Preparatory Meeting with Local Authorities,
Newcastle-upon-Tyne, 12th May 2005**

Subsea Sector in the North East: Preparatory Meeting with Local authorities and Support Organisations.

Newcastle-upon-Tyne, 12th May 2005

Attendees:

Pierpaolo Andriani	Durham Business School
Frank Siedlok	Durham Business School
David Pridden	Subsea UK
Tom Cosh	Newcastle City Council
Jack Hanwell	NOF
Allan Austin	RSC

KEY POINTS:

Background

The purpose of the meeting was to discuss the feasibility and potential support for implementation of the ideas brought forward during the Public Policy Focus Group held on 22nd of February 2005 in Newcastle. Therefore, representatives from the most important organisations supporting the subsea sector were invited to participate and discuss their potential involvement in the next stage of the project. The meeting was divided into two parts: during the first one the existing policies and potential overlaps with the subsea sector development were discussed, whereas the second part was devoted to formalising action points addressing the initiatives brought forward in February.

Minutes:

- the impact of the existing regional policies and the recent changes on the subsea have been discussed. The potential overlaps between the existing policies [e.g. supported by the new strategy 3 pillars] need to be identified and exploited;
- it has been agreed, that the support of ONE NorthEast is crucial for the success of the project and further development of the cluster;
- the importance and the role of the North East subsea sector in the national and global market need to be highlighted in order to attract more support. The role of the sector is often understated;
- the involvement of the subsea in other than O&G industries should be highlighted – e.g. in the offshore renewables sector favoured by policy makers;
- the strength of the subsea North East still lies in manufacturing [according to the Subsea UK *the North East is manufacturing centre for the UK subsea sector*];
- another dimension is to explore the fit of subsea sector within the *science city* strategy adopted recently by the Newcastle City Council;
- the North East should work as a unity and avoid any divides between regions/ counties. One strong and clear voice for the whole subsea in the North East is needed;

- NOF is willing to undertake the role of mediator / representation of the subsea North East. However, the image/identity of the subsea NE should be free of any language coming from NOF itself. Additionally the image and strategy of the subsea NE should be cohesive with the strategy/mission of Subsea UK;
- the collaboration between the academia and companies should be strengthened and some steps should be undertaken ASAP as other universities are building their position in the marine sector. The strength of the University of Newcastle in the marine sciences is an asset to be used. The possibility to create a “virtual” centre of excellence at the NU was discussed, however, commitment from the University will be needed.

To address the above issues an action plan for the meeting on 23rd of May has been created and it includes the following:

- establishment of a committee to overlook strategy and implementation regarding the points above as well as maintain the communication among companies and institutions
- creation of an action plan for the committee and the Subsea NE
- organisation of an event for the subsea North East [to be discussed]
- create a vision for the sector for the next 20 years [project considered by the Subsea UK]
- discuss the involvement of the Newcastle University in creating a virtual centre of excellence in the NE.

Appendix VI: Minutes from the Subsea North East Founding Meeting, Newcastle-upon-Tyne, 23rd May 2005

**Subsea North East - Founding Meeting
Jury's Hotel, Newcastle-upon-Tyne, 23 May 2005**

Attendees

Dave Stables	DUCO
Natasha Kahn	CTC Marine Projects
Rahmon Nassor	The MKW Group
Steven Pearson	Wilton Marine Services
Terry Sheldrake	Wellstream
Tony Trapp	The Engineering Business
Allan Austin	Regional Services for Clustering [RSC]
Atilla Incecik	School of Marine Science and Technology, Newcastle University
Fiona Whitehurst	CURDS – Newcastle University
Keith Melton	NaREC
Tom Cosh	Newcastle City Council
David Pridden	Subsea UK
Frank Siedlok	Durham Business School (Secretary)

Apologies from:

Pierpaolo Andriani	Durham Business School
Jack Hanwell	NOF
Martin Anderson	Perry Slingsby Systems
Peter Allan	Setech
Clive Marshall	Able UK Ltd
Ralph Manchester	SMD Hydrovision
Neil Kirkbride	Bel Valves
Steve Watkins	Rotork Gears
Ian Diggory	Macaw Engineering
Roland Palmer-Jones	Penspen Integrity
Willy Watson	Pipeline Engineering and Supply Co

MINUTES:

1. Welcome and update on the progress of the NEKS project - Frank Siedlok, Durham Business School. Presentation on findings regarding the subsea sector in the North East. Demonstrated the size and supply chain structure of the NE subsea sector. Over 100 companies present.
2. Presentation given by David Pridden, SUBSEA UK, on the subsea industry: main opportunities and challenges; needs and challenges of the sector at this time; the basis and potential support for businesses offered by SUBSEA UK.
3. A general discussion took place to determine the need and structure of a subsea group in the NE. Contributions were made by all persons present and the session addressed various issues including:
 - o Raising the profile of the sector / region in subsea
 - o The shortage of skilled personnel and the need to bring additional, younger resources into the industry
 - o The need to facilitate innovation
 - o Need for a single, representative body for the subsea sector in the NE that could address these issues and have some real impact upon regional policies
4. There were no objections to the proposal to formally establish a committee for the subsea sector in the NE. All delegates agreed that there is a need for a single voice for the sector in the NE for a number of reasons; dynamic growth of the sector, its increasing role in the on-going development of the North Sea and the future prospects and technology advancement being among the most important.
5. It was noted that the group should not be too large, ideally – 6-8 members to be most effective. These should include the following:
 - o A chairman figurehead – locally or nationally recognised individual
 - o Representatives from the key businesses but recognising the need to have representatives from large as well as small enterprises
 - o Representatives from local and National public bodies
 - o A representative from academia
6. The role of NOF in representing Subsea NE: it was agreed that the NOF should play a role in representing the subsea sector, however, the exact form of involvement need to be discussed further. Additionally, delegates agreed that the group in the NE should be a subset Subsea UK rather than NOF [NOF could take more organisational, facilitation role]. It was agreed that both the NOF and Subsea UK should be represented on the Committee.
7. Strategy for the subsea NE and public support: potential areas of public support should be taken into consideration when formulating strategies and action plans for Subsea NE. They need to be in line with regional policies and present clearly why these should be supported. There are competing demands from different sectors and the regional policy makers need to choose those to support. Need for clarity of needs, objectives and plans, message from the sector [this is who we are, what we do, where we are and where we are going]. It was considered important that a representative from ONE North East should be involved and sit on the committee.
8. Need for profile: the notion of raising profile was challenged. After a further discussion a number of areas where raising profile could be beneficial for the industry was identified, including attracting workforce and retaining graduates, recognition leading to creating more opportunities, eligibility for public support and collective marketing.
9. University's role in raising the profile and addressing shortage of skills: Professor Atilla's Incecik commented on the role and involvement of the Newcastle University in the subsea technologies and subsea-related courses offered at present. The possibility of extending / copying the model applied to the MSc in Pipeline Engineering was discussed. As the course was very successful ever since its introduction, the university would be interested in extending this course into subsea, providing there is enough support from the sector and well defined needs / requirements.

10. Election of a representative body: a committee to represent the subsea sector in the NE was elected. The role of the committee at the beginning will be to define and address the needs of the sector, decide on the form of representation and liaison with other organisations. The following people / organisations were proposed to sit on the committee:

- Wellstream [Gordon Chapman] – chair. tbc with Gordon Chapman.
 - CTC Marine
 - Duco [tbc]
 - Engineering Business – Tony Trapp
 - MKW Engineering – Rahmon Nassor
 - Wilton Marine Services – Steven Pearson
 - Representative from ONE [tbc]
 - Subsea UK
 - NOF
 - Newcastle University - Atilla Incecik
- Other decisions taken:
- The committee should meet on a regular basis [once a month / every two months].
 - Frank Siedlok, Durham Business School, will initiate the first meeting of the committee. The meeting should take place in the next couple of months.
 - On the first meeting the committee will decide on the statutory and organisational issues [objectives, form of representation, rotation of the chair, etc]. Also the need of employing someone on permanent basis for the secretarial job needs to be decided.
 - There is a need to quantify the sector – a report on the size and importance of the sector in the NE needs to be compiled.

**Appendix VII: Minutes from the Subsea NE Committee Meeting, Washington, 21st July
2005**

Subsea NE Group
Subsea NE Committee Meeting
Northern Offshore Federation, Washington, 21st July 2005

Attendees

Chris Braithwaite	Chairman - Wellstream
Alasdair MacDonald	DUCO
Natasha Kahn	CTC Marine Projects
Tony Trapp	The Engineering Business
Roland Palmer-Jones	Penspen Integrity
Steven Pearson	Wilton Marine Services
Michael Jones	SMD Hydrovision
Neil Kirkbride	Bel Valves
Christine Clausard	Macaw Engineering
David Pridden	Subsea UK
Atilla Incecik	School of Marine Science and Technology, Newcastle University
Ian Brannigan	ONE North East
Tom Cosh	Newcastle City Council
Geoff Race	NOF
Pierpaolo Andriani	Durham Business School
Frank Siedlok	Durham Business School (Secretary)

Background: The workshop was organised by Durham Business School as a part of the dissemination phase of the EU funded NEKS project. The main objective of the project is to facilitate knowledge flow, networking and collaboration in clusters of knowledge-intensive companies. Establishment of the committee should contribute to more intense collaboration among companies, facilitate cluster's recognition and image, promote emergence of shared identity and lead to better public support.

MINUTES:

2. Welcome note from Geoff Race, Frank Siedlok and David Pridden. Summary of the agenda and main points to be discussed.
3. There were no objections to the previously proposed chair for the subsea committee [Wellstream was proposed to lead the committee]. It was agreed and confirmed that Chris Braithwaite from Wellstream will chair the committee from now on.
4. Introduction of each of attendees together with companies backgrounds. Short presentation of the main merits of SUBSEA UK from David Pridden, of NOF from Geoff Race and of ONE from Ian Brannigan
5. Short summary of the state of the subsea industry by David Pridden. The main points highlighted:
 - The UK has many of the main subsea contractors and lead manufacturers. The NE has the second most important group of manufacturers in the UK although most of these represent 2nd tier suppliers and service companies.
 - The industry is extremely buoyant and growing rapidly. However, it has a number of issues the most significant of which is the shortage of personnel

- With increasing international opportunities, it was important that the subsea sector in the NE made clear their capabilities and received the maximum support from government agencies.
 - The subsea sector in the UK suffers from poor PR. This is particularly true for the NE of England
6. The presentation of the subsea sector made by David Pridden at the previous meeting will be circulated to all [Frank Siedlok]
 7. There was a general agreement that most of the represented businesses are experiencing a significant growth at the moment, however, they are facing serious resource constraints due to shortage of available staff and production capacities.
 8. It was agreed that in order to ensure proper representation from each subset of the sector the size of the committee would be 10-12 members instead of the previously agreed 6-8. The final composition may change after defining the exact role and purpose of the committee and the role and contribution of each member.
 9. Latent role and liaison with ONE / NaREC / Subsea UK / NOF have been discussed. The discussion concerned mostly the possibility to use NOF or SUBSEA UK as an umbrella for the subsea technologies cluster [STC] in the NE. The following points were raised:
 - NOF being a region-focused trade organisation embraces a wider spectrum of companies than just subsea, offshore or O&G. The stress is put on the region rather than any specific sector. .
 - SUBSEA UK is a sector-specific body concentrating on the O&G market, nationally focused with the main goal to champion subsea industry. David Pridden confirmed that SUBSEA UK would provide support to the STC whenever possible, however, it *does not plan to open an office in the NE*.
 - Depending on the merit and main goals of the committee, association with any of the existing bodies should be decided accordingly [Ian Brannigan pointed out, that in addressing skills constraints it may be wise to alliance with regional skills council]
 - When discussing roles of Newcastle City Council [NCC] and ONE it was pointed out that subsea “is not on the radar” at the moment – unlike renewable energy and nuclear decommissioning. ONE would want to see more money committed to the region therefore would advise that this committee should not get under any umbrella and concentrate on growth and innovation. The new strategy introduced by ONE is still in a fluid state, especially the energy pillar as research is still being carried out. Roles of sectors, bodies and clusters are still to be defined. NOF and NaREC fit into the 3 - pillar system.
 - NCC have supported SCT in the past and is willing to continue as long as it fits with the general development strategy, especially the Science City strategy. NCC is interested in seeing the group embedded in the region [R&D, regional growth and investments]. There is “an enormous amount of public money coming” together with the new strategy.
 - NaREC could play a significant role in R&D, testing and innovation. The possibility of fine-tuning NaREC’s facilities to meet needs of STC should be discussed.
 - Due to its legacy and characteristics, STC companies experience problems in accessing funds for R&D and innovation.
 - There is a vast number of bodies and organisation in the region already – would creating another one make any sense?

- ONE pointed out that before committing any resources a clear description of the direction of the group; its sustainability and commitment to further development [i.e. investment into innovation] need to be presented.

10. A list of the main objectives for the committee was compiled and votes cast for the three most important to be addressed/considered first.

- PR for the sector and the NE. Both the region and the O&G industry are associated with a ‘dirty, low tech’ image and, consequently, subsea companies suffer in terms of recruitment, public support, etc.
- Capability map for the STC together with assessment of present and future customers and markets, technologies, supply chain analysis, etc.
- List of available regional support, especially for innovation, R&D, development
- Establishing critical mass to lobby for subsea interests
- Human Resources – skills, training at all levels, attracting new skilled workers to the sector and the region
- Collaboration and networking in terms of R&D activities
- Leverage for SMEs - underwriting capability for smaller companies willing to take big projects and the regional supply chain.
- “River accessibility” – to address the threat of diminishing infrastructure, ensuring good access to the river for local companies
- Education:
 - educating the public about subsea, O&G, offshore activities
 - addressing the image of O&G industry [tied with PR]
 - adopting and extending the model for MSc in Pipeline Engineering to address training shortages and as a first step to create the “virtual centre of excellence”
- Tying to the Newcastle Science City strategy – public education about science, recruiting more students to science
- Technology, innovation and testing:
 - Creating an ACADEMY [based on the experiences of Shell, BP] for STC with NaREC acting as a test bed
- Export / promotional angle

11. Through a vote the following three points were selected to be priorities for the Subsea NE group:

- PR: regional, sectorial and identity for the STC
- Innovation / technology aspect: strengthening collaboration and knowledge transfer in the region, accessing available funds for R&D, developing new testing facilities for the sector
- Human Resources / Training aspects: addressing the shortage of skills at all levels, addressing the low profile and image of the sector

A working group was agreed to confirm priorities and to develop terms of reference for the newly formed Subsea NE Group. This working group will present their findings for comments by the end of August 2005. The working group consists of:

- Chris Braithwaite – Wellstream
- Alasdair MacDonald – Duco
- Neil Kirkbride – Bel Valves
- Michael Jones - SMD Hydrovision

12. Structure and funding options for the committee would be decided during the next meeting when the terms of reference are clarified. An event to formally launch the group would also be discussed during the next meeting.
13. Next meeting of the committee would take place on 14th of September, 9.30 and would be hosted by Wellstream. It has been decided that no substitutes for committee members would be accepted for the time being.
14. The role of observers and contributors has been addressed: the committee's main role is to represent and delegate work, observers are welcome to attend meetings and all companies are encouraged to actively get involved in any activities of the subsea group.
15. As part of NEKS to facilitate the PR strategy, DBS (Durham Business School) announced the intention to organise a conference on the emergence of the Subsea Cluster in the NE to be held in November/December. DBS invites the committee to collaborate on the conference.

Committee:

Chris Braithwaite	Wellstream	CHAIR
Alasdair MacDonald	DUCO	
Charles Tompkins	CTC Marine Projects	
Tony Trapp	The Engineering Business	
Roland Palmer-Jones	Penspen Integrity	
Steven Pearson	Wilton Marine Services	
Michael Jones	SMD Hydrovision	
Neil Kirkbride	Bel Valves	
David Pridden	Subsea UK	
Atilla Incecik	Newcastle University	
Jack Hanwell	NOF	
Frank Siedlok	Durham Business School (Secretary)	

Actions to be taken:

- Frank Siedlok to circulate David Pridden's presentation from the previous meeting
- David Pridden to prepare a presentation on subsea sector and prospective for the next meeting.
- Chris Braithwaite and the Working Group to address the chosen issues and distribute the findings by the end of August.

**Appendix VIII: Minutes from the Subsea NE Committee Meeting, 14th September
2005, Newcastle-upon-Tyne**

Subsea NE Group

Subsea NE Committee Meeting

Wellstream International Ltd, Newcastle upon Tyne, 14th September 2005

Attendees

Chris Braithwaite	Chairman - Wellstream
Alasdair MacDonald	DUCO
Roland Palmer-Jones	Penspen Integrity
Steven Pearson	Wilton Marine Services
Neil Kirkbride	Bel Valves
David Pridden	Subsea UK
Frank Siedlok	Durham Business School (Secretary)

Apologies:

Charles Tompkins	CTC Marine
Tony Trapp	EB
Atilla Incecik	School of Marine Science and Technology
Jack Hanwell	NOF

Background: The workshop was organised as an outcome of the previous workshops and seminars organised by Durham Business School as a part of the dissemination phase of the EU funded NEKS project. The main objective of the project is to facilitate knowledge flow, networking and collaboration in clusters of knowledge-intensive companies. Establishment of the committee should contribute to better representation of the subsea sector in the North East, more intense collaboration among companies, more intense collaboration with academia, facilitate cluster's recognition and image, promote emergence of shared identity and lead to better public support.

MINUTES:

16. Welcome from the Chair, apologies and introduction to the session
17. There were no comments on the previous meeting minutes
18. Remarks and discussion on the relatively low turn up. David Pridden reassured that this is not unusual for this industry and one of the reasons to account for this fact may be the late reminder / agenda. However, action to be taken by the Committee to assure that all the members are taking this initiative seriously.
19. Update on the Subsea industry by David Pridden, CEO of Subsea UK. The presentation included:
 - the most recent trends in the O&G market
 - R&D spending trends [decrease]
 - Preliminary results of the study on testing facilities and trends commissioned by Subsea UK [map of over 140 testing facilities worldwide, UK companies using some 100 of them. No ready and accessible facilities for large and high pressure equipment at the moment; there are three countries investing into subsea research centres at the moment, none of them being a prominent player in the market]

- Highlight on the emerging opportunities for the region and sector created by the trends in O&G market and the feasibility of test centre in the NE
 - Highlight on the problem of ageing workforce
20. Objectives, Priorities & Remit. The following were decided during the meeting:
- Vision of the Subsea NE:

“To provide a focussed industry vehicle in the North East of England to represent, strengthen and grow in the Subsea sector”
 - The main objectives of Subsea NE are:

“to represent, strengthen and grow in the North East of England Subsea sector, especially by:

 - *Creating networking forums*
 - *Enhancing the profile of Subsea businesses in the NE*
 - *Furthering Subsea Innovation & Technology*
 - *Developing appropriate Human Resources & Training for the future”*
21. Following the discussion from the previous sessions, the final structure of the Executive Committee was decided to ensure the best representation of all the subsea companies in the NE. The final should comprise of the following members:

Wellstream	Chris Braithwaite	COO
Duco	Ally MacDonald	MD
CTC Marine	Charles Tompkins(TBC – action by CBe)	
Engineering Business	Tony Trapp	MD
Penspen	Roland Palmer-Jones	Operations Manager
Wilton Marine Services	Steven Pearson	Director
SMD	TBA [Action by CBe]	
Bel Valves	Neil Kirkbride	Chairman
Perry Slingsby	TBC (Action by AMd)	
Shepherd Offshore	(AMd & CBe to meet)	
Subsea UK	David Pridden	CEO
Newcastle University	Prof. Atilla Incecik	Head of School of Marine Science and Technology
NOF	TBC (action by NKe)	
Durham Business School	Frank Siedlok	Research Associate

NOTE: representation from some of the companies needs to be discussed and confirmed with them.

22. The status of “observers” during the committee sessions was discussed. It has been agreed that their input was constructive and valuable during the previous sessions. It has been agreed that representatives from ONE and local councils should be invited to the sessions. A final list of observers to be compiled by NKe.
23. The following has been decided in regards to Subsea NE:
- Subsea NE is owned [represented??] by the Executive Committee comprising of:
 - Elected Chair
 - Vice – Chair
 - Representatives from member companies [senior positions, no substitutes]

- Representatives from industry bodies and academia
 - Meetings of the committee [as a team] would be held quarterly
 - Events and guest speakers would be organised as required [every 6 months?]
 - Administration, Funding, PR and Events:
 - Durham University [present nominee Frank Siedlok] will take care of the current administration [meetings, Executive Committee administration]
 - Subsea UK would initially provide its PR services for the group
 - Event management and administrative support – proposed NOF. TBC after further discussions with NOF
 - Sponsorship of events etc – to be further discussed
24. Meeting with senior staff from ONE North East to discuss the situation of subsea in the region, establishment of the Committee, potential funding, the role of NOF, the potential of setting up a test centre in the NE to be organised: CBe, AMc, DPr
25. FSi to help with the information package on the Subsea NE [results of the NEKS research]
26. In regards to addressing the issues selected during the last meeting, the task were divided and each issue was assigned a leader as follows:
 - Addressing the profile and PR [Regional, National and Identity]: DPn will take the lead through his PR organisation [Zoe Corsi, The BIG Partnership]
 - Human Resources & Training [Skills shortage, Profile & Image]: AMd together with NKi
 - Innovation & Technology [Strengthen collaboration, Knowledge Transfer, Funding, Testing Facilities]: RPJs to take the lead
 - Networking [Collaboration, Events, Collaboration]: NKE
 In each case the leader will gather comments from other Committee members and other parties.
27. The issue of further engagement and collaboration with local Chambers of Commerce has been discussed. NKi to explore the subject further.
28. The closing conference for NEKS project and the involvement of companies and organisations was briefly discussed. The members agreed to support the event and Subsea UK agreed to co-sponsor. An option to turn the conference into an annual event for the Subsea NE was proposed. Due to the time shortage the matter could not be discussed further. FSi would send more information and discuss the idea further with involved companies and organisations.
29. Next meeting to be held on 16th of November, 10 a.m. in Wellstream followed by a tour around Wellstream
30. Actions from 14th Sept 2005:

1	Contact CTC Marine	Chris Braithwaite
2	Contact SMD	Chris Braithwaite
3	Contact Sperry Slingsby	Ally MacDonald
4	Contact Shepherds Offshore	Chris Braithwaite & Ally MacDonald
5	Contact NOF	Neil Kirkbride
6	Consider Observers Status	Neil Kirkbride
7	Contact One North East (many subjects)	Chris Braithwaite lead
8	Consider Chair & Vice-Chair approvals and recommendations	Chris Braithwaite & Ally MacDonald
9	Information pack input	Frank Siedlok
10	Develop PR approach	David Pridden
11	Develop Innovation & Technology approach	Roland Palmer-Jones

12	Develop HR & Training approach	Ally MacDonald
13	Develop Networking approach	Neil Kirkbride

**Appendix IX: Minutes from the Subsea NE Committee Meeting, 30th
November, Newcastle-upon-Tyne**

Minutes from the Subsea NE Committee Meeting

30th November 2005

9.30–12.00

Wellstream International

Attendees and apologies:

Chris Braithwaite- Chair	Wellstream
Julia Race	Newcastle University
Nick Tompkins	CTC Marine Projects
David Pridden	Subsea UK
Frank Siedlok	Durham Business School
Michael Jones	SMD Hydrovision
Neil Kirkbride	Bel Valves
Roland Palmer-Jones	Penspen Integrity
Tony Trapp	EB
Martin Anderson	PSS
Jack Hanwell	NOF
George Rafferty	NOF

Apologies:

Tom Cosh	Newcastle City Council
Alasdair MacDonald	DUCO

Minutes:

- Update on the business status: all are experiencing a busy period.
- **Julia Race** will be a new representative of Newcastle University. Julia was freshly appointed to be in charge of the newly set up Centre of Excellence in Pipeline Engineering.
- Previous MoM and actions arising:

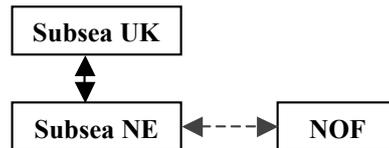
1	Contact CTC Marine	Chris Braithwaite	Nick Tompkins will be representing CTC Marine Projects on the committee. Charles Tompkins fully supports the initiative.
2	Contact SMD	Chris Braithwaite	John Reece expressed his support for the initiative; Michael Jones will be representing SMD Hydrovision on the committee.
3	Contact Perry Slingsby	Ally MacDonald	Martin Anderson agreed to represent Perry Slingsby Systems on the committee
4	Contact Shepherds Offshore	Chris Braithwaite & Ally MacDonald	Bruce Shepherds expressed his support and agreed to represent local shipyards on the committee
5	Contact NOF	Neil Kirkbride	A meeting regarding the affiliation and

			collaboration with NOF in the future was held with NOF. Results discussed below.
6	Consider Observers Status	Neil Kirkbride	Decision was taken to leave it as it is at the moment and come back to the issue in the future if necessary.
7	Contact One North East (many subjects)	Chris Braithwaite's lead	Decision was taken to wait until the committee decides on its structure, merits and goals.
8	Consider Chair & Vice-Chair approvals and recommendations	Chris Braithwaite & Ally MacDonald	Committee members will elect both Chair and Vice-Chair annually. Chris Braithwaite will continue as the Chair until summer 2006, when new election will be held.
9	Information pack input	Frank Siedlok	Sent to Neil Kirkbride for discussion, to be circulated with the minutes.
10	Develop PR approach	David Pridden	Discussed below
11	Develop Innovation & Technology approach	Roland Palmer-Jones	Discussed below
12	Develop HR & Training approach	Ally MacDonald	Discussed below
13	Develop Networking approach	Neil Kirkbride	Discussed below

- **PR approach:** Subsea UK is willing to provide PR services for Subsea NE but the committee need to decide what is to be covered and what are the main goals of the PR efforts. Committee decided that it is time to “go public”. Also the group should be oriented nationally rather than only regionally in its PR efforts and use all available “corridors of power” – UKOA, DTI etc. Subsea in the NE represents significant critical mass and an important part of the subsea sector, therefore should be recognised both nationally and internationally.
- **Innovation & Technology approach:**
 - After a visit in Norway it appeared that many of the technologies came from the UK [comment from RPs], confirming UK's strong position in the sector
 - RPs had a discussion with Tom Cosh and how the group could benefit from the Science City strategy – to be followed in the future.
 - RTC North offered a series of workshops for the group on future thinking / technology road-mapping etc. FSk to obtain some more details.
 - Possibilities to link up with universities [e.g. research students] – details to be obtained by RPs
 - The issue of involving operators in R&D programmes was discussed: closer look at the “deepstar model” and Norway approach should be taken.
 - BP plans to set up a “subsea centre of excellence” in Aberdeen – that may open a window of opportunity for technology development programmes and strengthen the industry in the UK.
 - There is a trend towards increasing collaboration between academia, operators, public bodies and SMEs in the USA, Australia, Norway and Brazil – this issue should also be addressed in the UK.
- **HR & Training approach:** Ally MacDonald will provide details upon his return

- **Networking:** an administrative vehicle is needed for networking. The Committee held a meeting with NOF to discuss collaboration options and NOF becoming a main administrative vehicle for Subsea North East. This was proposed on the basis of a good reputation of NOF in providing support for NE companies and their administrative / organisational skills. One of the options discussed was Subsea NE becoming a club within NOF structures with large flexibility in setting up the direction of future development. This proposal was presented to the committee and the outcomes of the discussion are presented below.
- **Subsea NE Future:** After discussion between the Committee, NOF and Subsea UK, regarding the future of the Subsea NE, the following has been decided:
 - the strength of the committee is in the commitment at the senior level and it should be ensured to stay that way [no replacements during meetings]. Main goals of the committee are: to create a strong identity via networking; to address the issue of PR and to increase levels of collaboration and technology transfer among companies
 - Developing and projecting strong links with existing organisations [NOF, Subsea UK] would help in creating good image for Subsea NE. It has been pointed out that there is abundance of organisations / bodies in the NE and establishing a new independent, administrative body would not make sense.
 - The committee feels that there is a need for someone to take the load of administrative work off [setting up and hosting meetings, minutes, communication and correspondence, etc] and using NOF as an administrative vehicle and umbrella organisation was considered. However, some concerns were voiced that Subsea NE might lose its identity by becoming NOF's club. DPn pointed out that the administrative load as such is minimal and should not pose a problem. Organisation of events is more demanding and could be outsourced to NOF, which has significant experience in that field.
 - Subsea UK opposed the idea of Subsea NE becoming a club of NOF as it poses a risk of industry fragmentation and would increase the difficulty of identity and PR management for both Subsea UK and Subsea NE. One of the statutory tasks of Subsea UK is to provide a single voice for and bring the subsea sector together. DPn stated that formation of Subsea NE has already been perceived as a first step of fragmentation and regionalisation. This may lead to discontinuation of funding for Subsea UK. In addition, Subsea UK cannot provide funding for Subsea NE via NOF, which has been previously proposed. Subsea UK strongly opposes the idea of Subsea NE becoming an NOF club, arguing that Subsea NE is an integral part of the subsea sector as a whole and it is crucial that the industry is using a single voice nationally and internationally. Some of the Committee members also expressed their concerns of becoming “too regional” and being perceived as a part of NOF.
 - It has been decided that Subsea NE would not become a club of NOF, however would retain strong affiliation with NOF and the following was proposed: **Subsea NE would be a recognised entity with declared affiliation with NOF and Subsea UK**
 - Subsea NE formally asked NOF for administrative support and Subsea UK for funding and support for relevant events and issues. Both NOF and Subsea UK agreed.
 - It has been agreed that the merits and goals of Subsea NE are strongly correlated, which favours strong affiliation and close collaboration with Subsea UK.
- **Affiliation:** To resolve the problem whether Subsea NE should be affiliated to NOF and Subsea UK at the same level [horizontally] or should Subsea UK be above Subsea NE and

NOF at the same level a vote was taken. **8 people voted for stronger affiliation with Subsea UK and 1 for “equal” affiliation.**



- **Subsea UK Board:** Subsea NE should be represented on the Subsea UK board – DPR to address the issue.
- **NOF:** suggested that Subsea NE should be represented on the NOF board: 2 committee members already sitting on the board of NOF which ensures good representation
- **Brochure:** Possibility to produce a post-conference brochure about subsea sector in the NE by using the NEKS project funds was proposed by FSk – to be discussed further.
- **Researcher:** Possibility to employ a dedicated researcher through the KTP [Knowledge Transfer Partnership] scheme to help in addressing some of the issues was proposed by FSk. FSk to provide more detailed information on the scheme and the idea.
- **Remit, structure and goals:** of the committee to be finalised by the next meeting. With this in mind CBe requested comments from all members on the previously circulated PPT document. Comments should be sent to CBs **before Christmas.**
- **“4 issues”;** Nominated leaders to fill the slides and circulate for comments. Ideas how to address the 4 issues to be presented and discussed during the next meeting.
- Next meeting will be held on 30th of January 2006, 10.00am, in Bel Valves and followed by a trip around the company at 2 pm (Post meeting note: There is a postponement of this meeting requested to early Feb 2006)
- Actions from 30th November 2005 meeting:

task	responsible	deadline
conclude on and formalise Remit, Goals and Structure of the Committee	CBe	
Send any comment regarding remit, Goals or Structure of the committee to CBs	All	December 23 Postponed to: December 31
Fill in and circulate for more comments the slides [from the previous meeting] on the 4 main issues	DPn, RPJs, AMcDd, NKe	
Circulate info on KTP for the group	FSk	
Provide more info on the workshops / seminars organised by RTC	FSk	
Circulate information pack	FSk	
Post Conference Brochure	FSk	
Representation on Subsea UK Board	DPn	