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Education and Dissemination - Updated Issues and Requirements

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Summary:

Some preliminary background issues regarding Education & Dissemination were set out in the FENET proposal to the European Community and explored at the 1st NSC. After the contract was awarded, the Co-ordinator emailed all participants asking what they saw as the main Education & Dissemination issues. Input was also obtained from the NAFEMS' Education & Training Working Group.

These issues were explored and refined at the Annual Industry meeting in Wiesbaden.

As a result of these discussions, the topic for the first workshop was selected to be "Barriers to the Effective Use of Finite Element Analysis in Industry".

In this paper, the various inputs mentioned above are detailed.

Document History & Change Control Record

Issue	Date	Description or Change Summary
1	September 2001	**Outline Education and Dissemination Issues D5501** As presented and discussed at the Network Steering Committee, 27 & 28 September 2001.
2	November 2001	**Initial Education and Dissemination Issues D5502** Updated following NSC for presentation at 1st Annual Industry meeting
3	February 2002	**Education and Dissemination - Updated Issues and Requirements D5503** Updated to include discussions at Wiesbaden meeting

1 Preliminary Issues & Requirements

The proposal document identifies barriers to the uptake and effective use of finite element technology as being able to be grouped into two categories. These are:

1. Education and Training of key practitioners to the appropriate level
2. Exploitation and Dissemination of the technology. This includes particular issues concerning Quality Assurance, IPR and software validation and verification.

Four issues are then discussed and extracts from the Background for Technology Strategy plan are given below to help identify these issues.

1. Against this background there is a clear need for a forum comprised of academics, users and code developers, to discuss and debate the real needs of industrial users and how, and in what manner, they should be met.

2. There is also a requirement to examine the need for certification of engineers and accreditation of courses to a uniform standard.

3. There are a number of exploitation and dissemination issues that currently limit the effective uptake of analysis and simulation technology, two of the most important ones being QA and IPR.

4. A further issue, which is likely to become more important as simulation is integrated more closely with product development and other processes, is how Intellectual Property Rights can be preserved.

This clearly identifies four possible seminars

2 NAFEMS' Education & Training Working Group (ETWG)

The FENET proposal was discussed at the ETWG meeting at the beginning of September. The ETWG sees its role as:

Producing educational documents such as the 'How To Booklets'.
Running Seminars
Accrediting finite element courses
Overview of the Registered Analyst scheme.

This is distinct from the role of FENET's Education & Dissemination Group whose objective is to organise Workshops on particular issues and issuing the results of these Workshops as deliverables. It is anticipated that educational needs that are identified could be passed to the ETWG for action. Whilst the roles are clearly different, six possible seminar titles were identified. These are:

1. The different needs of Designers v Engineers in finite elements
2. The RA scheme and how it could fit more easily into the requirements in different countries. For example, should there be examinations?
3. A educational seminar on 'What went wrong?'
4. Distance learning needs
5. QA issues – verification and validation
6. What documents are available and what are needed? (Various levels were seen – Benchmark articles, Introductory Booklets, Primers, Case Studies, Workbooks, Benchmarks, Technical Papers)

3 Responses from FENET Membership

The first author also contacted, by email, all FENET participants. Some of the replies, which could be developed into workshops, are given below.

1. There is a need for a seminar as to how to model polymeric materials
2. A seminar to develop a set of 'business arguments' which make the benefits of simulation clear and easy to understand especially for SMEs.
3. Development of a simple set of procedures to make it easy to use simulation tools on a daily basis and to assure its quality for each kind of company
4. Development of global FEA standards for FEA groups working on similar topics in a global company. How is training organised, what materials are needed?
5. How to teach customers about FEA basics to prevent the misinterpretation of results.
6. How to obtain training budgets for FEA staff when software vendors sell 'push-button' solutions.
7. Development of an 'agreed checklist' for ensuring accuracy & quality of an FE analysis.
8. The supply of suitably trained graduates, particularly for SMEs.
9. Technology transfer from University to industry and also between industrial organisations.
10. What are industry's real needs?
11. Should we be moving to more web-based provision?
12. Master-classes.
13. The use of p-technology.
14. How to model?
15. Stochastic analysis.
16. Educational issues associated with the forefront of technology.
17. What has Europe to learn from the rest of the world?
18. How can engineers be taught a good understanding of what the results should be (i.e. how to obtain an engineer's feeling of how a structure behaves)?

4 Issues arising from Wiesbaden Meeting …..

This meeting provide a rich source of ideas requiring further follow-up. It was tentatively suggested that all FENET participants (and indeed the wider FE community) should be asked to respond to a focused questionnaire addressing the following :

4.1 Education and Awareness

- Is industry in your particular sector aware of the technology and the competitive issues involved?
- How widespread is its use?
- Are there any particular problems related to its use in the supply chain?
- Are there traditional barriers to uptake associated with practice and convention?
- Are then any issues associated with Analysts and Designers and the way that some software products are marketed and used?

4.2 Staffing FE Products

- Is getting the correct type of staff a problem … are numbers of applicants a problem or is it quality?
- What is sector practice in using full-time and contract staffing …. are there any issues here?
- In terms of staff retention are staff being attracted to move to other industry sectors?
- In terms of staff retention and recruitment are companies who actively use the technology, simply poaching from their competitors?
- Is salary a real underlying problem?
- Do SMEs have any particular salary/career structure issues?

- How widespread is company investment in Continuing Professional Development? Is this perceived as an issue in relation to effective use and awareness?
- Are there any good examples of effective use of mentoring, in terms of staff development? Is mentoring an issue?
- How is dissemination of best practice conducted within organisations? ..within your sector … across sectors?
- Is accreditation / registration of FE practitioners an issue within your sector. If it exists, is it seen as a barrier? If it doesn't exist, would it help provide more effective practitioners?

4.3 Cost of FE Products

- How affordable are FE Products? Presumably it is increasingly the case that for many organisations, the real costs are associated with staffing and software rather than hardware?
- How cost-effective are FE Products … is the business case easy across the sector and amongst all size/types of organisations?
- Is there a demand for pay-as-you-go that is not being satisfied? Would it be attractive to SMEs or perhaps they wouldn't have the appropriate staff anyway?

4.4 Functionality

- Are there any real software functionality issues that present a barrier to effective use …. not simply technical but also in relation to robustness and ease of use (once again the needs of SMEs may be different here).
- Are then any hardware issues … power, cost, openness, support for collaborative projects over the web (eg bandwidth) etc
- Is quality suspect in some areas? Is the lack of agreed effective benchmarks an issue in some areas?

4.5 Support (in the broadest sense)

- Is vendor support effective … available, timely and cost-effective?
- Is your sector well-served by consultants?
- Is your sector well-served by Industry/University Partnerships (basic and applied research, Integrated Graduate Development Schemes, Teaching Companies etc)
- Are there any issues associated with trends in delivery of support … hot-lines, FAQs, Internationalisation?
- Does the Web provide an effective means of support in your sector ….. newsgroups, discussion forums, sites etc?
- Any support issues related to NAFEMS?

4.6 Academic Perspective

- Is there a growing problem with graduate supply?
- Is there a general contraction in Science and Engineering in the University sector, brought about by falling students numbers, over-provision and even closure of areas?
- Has any changes in funding at undergraduate and postgraduate level had any effect on issues relating to the supply of well-qualified graduates and postgraduates?
- Is the changing educational scene, in terms of widening access, fees, less numeracy in school leavers an issue?
- Is there more that can be done to support the effective use of fea in the University sector?
- Does the web and the associated globalisation process provide a threat or an opportunity to resolve some of these issues?
- Getting a European perspective in this area is important.

5 Conclusions

It is clear that there are many Education & Dissemination issues affecting the uptake of f.e technology by industry. These will be explored in the Copenhagen workshop and the plan to address them further developed.