SEVENTH FRAMEWORK PROGRAMME

Report on Design of Public Event

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Abstract:

This document reports on the initial ideas and design of a public event aimed at schoolchildren; in this case schoolgirls. The objective is to enhance their understanding of telecommunications and the associated role of optics with a view to increasing their awareness of the possibility of a career in these areas. The concept is to hold an initial event at the University of Essex [UK], which can then be replicated in other institutions in their native language. During the event video links will be made to other partners to demonstrate the international flavor of research and development. The core of the event is a lecture which will seek to explain basic concepts using simple hands-on models together with examples of state of the art technology. Web pages will be established before the event and handout material prepared. A questionnaire will be distributed after the event to gauge reaction and point to changes in the format. Initially 120 girls (14/15 yrs old) will be involved.

Keyword list: education, telecommunications, optical networks

Clarification:

Nature of the Deliverable

R Report
P Prototype
D Demonstrator
O Other

Dissemination level of Deliverable:

PU Public
PP Restricted to other programme participants (including the Commission Services)
RE Restricted to a group specified by the consortium (including the Commission Services)
CO Confidential, only for members of the consortium (including the Commission Services)

Disclaimer

The information, documentation and figures available in this deliverable, is written by the BONE ("Building the Future Optical Network in Europe*) – project consortium under EC co-financing contract FP7-ICT-216863 and does not necessarily reflect the views of the European Commission*

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1. Executive Summary :

This document presents an outline for the "Schools Event" required to be staged as a deliverable of BONE. The event itself is to be held by October 2009.

The Technical Annex states that "*a high level public lecture will be organised which will address the general public and schoolchildren to explain the role of optics in telecommunications with the aim of promoting understanding and enthusing teenagers to think about a career in telecommunication. Specifically this will be done by designing an afternoon event that combines explanations with simple demonstrations; then [in a number of countries] the event can be staged in the local language at one of the partner institute*". At a consortium meeting several key aspects of the proposed event were discussed, for example age group of the children, structure of the event etc. Following this, discussions were held with a local girls school [close to the University of Essex] to understand the schools view of how such an event might best be organised. In this way a rough outline of the event was agreed as follows.

The event would focus on 14/15 yr female students [it is a girls school]. Likely numbers are 120 children plus adults (6-10). From a schools perspective it would need to be a full day visit [10am-3 pm]; this means refreshments (and expense!). The programme would involve the core lecture [Telecommunications using Light] together with lab visits and a chance to talk to (student friendly) researchers. A web page would be constructed prior to the event and suitable handout material developed. During the event there would be a chance to speak to researchers at other partner institutes in Europe and have some questions and answer opportunities.

The core lecture will last about 90 minutes and focus on Telecommunications and the increasing role of optics. It will focus on early and modern techniques of telecommunications and the reasons for the introduction of optics, together with some of the applications made possible due to the use of optical technology. The objective is to get over concepts using simple hands-on experiments [eg mirrors for switching light] and to back this up with glimpses of modern technology realisations through video, photos and microscopes. There will be an emphasis on question and answer.

The event will be followed by a questionnaire to gauge student reaction and learn lessons for the future and for similar events held in partner institutes.

During the event the main activities will be DVD recorded, including careful recording of the experiments so they can be seen in other institutions (at a later stage) which do not have the equipment to fully recreate events at Essex.

Currently the date for the event is set for July 2009.

2. Introduction

This document describes the outline design of a high level presentation on telecommunications and the role of optics to school children in the age group 14/15 yrs [following discussions within the consortium]. The objective is to stimulate their interest in this area of engineering with a view to influencing their choice of career path. The concept is to stage an event at one institution (in this case the University of Essex), which can then be replicated at other partner institutes in the native language. During the event video links to other countries would be used to show the international nature of our work and its social dimension in enabling friendships and working partnerships to be established across Europe. Following discussions within BONE as to the event format and objectives a school local to the University of Essex] school was contacted and agreed (very enthusiastically) to take part. In July 2009 120 girls aged 14/15 yrs will take part in the BONE event.

3. Event structure overview

At a consortium meeting several key aspects of the proposed event were discussed, for example age group of the children, structure of the event etc. Following this, discussions were held with a local girls school [close to the University of Essex] to understand the schools view of how such an event might best be organised. There was considerable enthusiasm from the school as the UK Government are now encouraging initiatives from schools to encourage pupils to take up Science and Technology careers [currently there is a downturn in such disciplines in the UK]. A rough outline of the event structure was agreed (with school and BONE) as follows.

Colchester County High School for Girls [http://www.colchestergirls.essex.sch.uk/] has 120 girls in the age bracket 14/15 yrs, who would visit the University on the same day. Because of this high number and because of school related timings [pupils need to return mid afternoon] it would be an all day event, ie arriving about 10am and departing about 3pm.

The day would be divided into the “Lecture” [Telecommunications using Light] [90 mins was thought to be the maximum] plus ancillary events such as Lab visits –talks in groups from student friendly researchers and lunch. Thus there are about 5 hours to fill, allowing 3 hours for Lecture + lunch, this leaves 2 hours for other activities. There will need to be two groups because of the numbers-this is pushing the limits in any case. The teacher made the following comments and suggestions concerning the event, which should:

- Promote the event via web page prior to the visit
- Have a competition [relating to the day’s events with a small prize (eg book token) –pupils are very competitive
- Prepare some handout material
- Allow plenty of opportunities for asking questions
- Get over the concepts-make it exciting

Main scheduled activities:

1. Orientation talk-BONE and its international flavour- handouts –competition- split into groups.
2. Lab visits with Researchers [about 6 groups needed as labs cannot support more than 20 persons] –activities need to be suggested
3. Lunch
4. Lecture [to be done twice] –opportunity to speak to other institutes via video links
5. Final comments + Questions & Answers-questionnaire

4. The core presentation "Telecommunications using Light"

The approach to the lecture is "hands-on" where possible and a mixture of simple concept demonstrations together with examples of real and current technology. The scope is as follows:

- Telecommunication's history and its evolution to current techniques, emphasising the increasing impact of optical technology and the difference between old and new [analogue to digital, copper to fibre etc].
- The main system elements in a telecommunication network (transmission, switching and control)
- The increasing diversity of applications and impact of telecommunications on supporting social advancement [health, science, environment].

The flow of the lecture is as follows:

(a) Historical perspectives

Origin of word:

Transmission of signals over a distance (Greek + Latin)

Why the interest (war, commerce ....

Main elements (transmitter, medium, receiver, switch, control)

Early techniques:

Drums, smoke, heliograph

(Digital photos, Martello Towers, semaphores)

Demos (speed issues etc- use mirrors later used in switching)

(b) Modern techniques:

Focus on guided media (not wireless etc)

History of telegraph

Transatlantic telegraph (1866)

(Digital photos: ships, limits of transmission speed, technical challenges (water ingress), data)

(Digital photos: of modern undersea cables infrastructure

Invention of Phone (speech transmission) (1876)

Coupling of Phone and Network

Need for switching [and control] as well as transmission

(Strowger [1891] story and early switches-show strowger switch from BT

Growth in demand and associated issues:

quantity and distance

copper cables (digital photo of large copper cable)

copper limitations (loss etc)

(c) Introduction of Optical Technologies (1970 onwards)

Transmission

Guided light & Optical fibre

History (light tubes to fibre)

How light travels in fibre & characteristics (eg low loss)

Light colour (s)

Conversion of light to/from electrical signal [laser and photodiode]

Modern transmission system (amplifiers ??-Einstein)

Concept demo using "tube fibres" and light sources

Real demo using plastic optical fibre and visible light source

Switching

To turn transmission systems into network we need switching

Current switch systems (electronic)

Good and bad points about electronics

Is it possible to directly switch light ?

Good and bad points about optical switching

Concept demo of optical switching

Show MEMs switch array and inner realisation

(d) Applications made possible by optical technology

Internet and global transmission

Live links to other partners

Science & Medicine (specialist applications)

Video of radio astronomy telescope arrays

Grid networking [Video]

Telemedicine

(e) Summary & Finish

Key messages to take away

Contact people for further information

Questions & Answers

Questionnaire

5. Associated activities & partner follow-up

In the period leading up to the event a number of activities need to be instigated as follows.

Design of handout material
Planning of video/web links to partners
Design (and fabrication) of hands-on experiments
Design of web page and associated competition

One of the partners [FER-Croatia] has indicated strong interest in hosting the event in a school close to Zagreb following the Essex trial. DVD recording of the event will be made to help with this continuation.

6. Conclusions

An outline of a "schools event" has been presented, which involves presenting a lecture on the role of optics in telecommunications. The event will initially take place at the University of Essex but is designed so that it can be transferred to other institutions as required. The day's activities will be recorded on DVD and a questionnaire introduced to obtain feedback on strengths and weaknesses.