

1 Publishable executive summary

1.1 Project Summary

The scope of BASE² project is to support key EU policies and validate space technology for public services and applications having a key economic and social impact at Union level in the field of education (distance Learning).

The overall objective of this project is the implementation of an end-to-end system for tele-education applications, integrating broadband terrestrial networks with satellite broadband technologies. Aim of the project is to facilitate the sustainable provision of integrated tele-education services and applications to a large number of distributed interconnected sites over a variety of telecommunication infrastructures. Within the framework of the project the seamless integration and the interoperability of low-cost satellite telecommunications infrastructures with broadband terrestrial systems will be investigated.

1.2 Project Objectives

The BASE² (Broadband Access Satellite Enabled Education) project will address broadband access to educational resources by integrating satellite and wireline/wireless technologies on which innovative tele-education systems will be deployed. In the project's lifetime, the proposed solutions, although generic enough to enable their adoption and application in different contexts and economic sectors, will be validated in two different contexts involving agricultural and maritime communities.

In detail, the project will address the following scientific and technological objectives:

- (OBJ1) *Providing end-to-end integrated tele-education services and applications that can be delivered to a large number of sites and implement a variety of tele-education modes.* The aim of the project is to bring together a large number of users that can be grouped in a smaller or a larger number of sites. This places strong requirements on end-to-end tele-education applications considering that several educational modes are to be supported, including virtual classroom with full interaction, access to multimedia educational resources and specific sessions for collaboration among learners to exchange experiences in the context of their training.
- (OBJ2) *Delivering end-to-end network broadband infrastructure that will integrate wireless/wireline and satellite communication technologies to efficiently and cost effectively cover remote areas.* It is expected that DVB-S, DVB-RCS and VSAT technologies will be integrated with WiFi, WiMAX, LMDS, Fiber Optics, etc. In this way, communities in isolated areas that are adjacent to each other will be best supported by an integrated infrastructure of satellite and wireless or wireline technologies. This kind of distribution is often observed in rural communities but is also applicable to maritime when ships stay within a certain range from

wireless base stations. “Seamless” interoperability among satellite and wireless technologies is the ultimate target.

(OBJ3) *Deploying and operating educational content creation, management and delivery systems for different modes of learning (live virtual classroom, offline asynchronous learning) over different network technologies*. The process of educational content creation requires skills, infrastructure and efficient processes to be in place. It also requires smooth integration of content generation and content delivery infrastructures. Advanced content management and delivery systems will be smoothly integrated with content generation infrastructures in this project. Additionally, BASE² will build on current practices and calibrate the process of educational content generation, management and delivery over satellite and other network technologies to serve a variety of tele-education modes.

(OBJ4) *Validating the deployed tele-education systems and telecommunications infrastructure for communities of farmers distributed in remote areas and for maritime user communities*. A selected number of sites with larger or smaller user groups will be able to participate in trials and validation of the project results towards the project objectives. An iterative approach will be followed to guarantee best results. The efficiency of the BASE² approach to tele-education over satellite will be compared to other tele-educational approaches in different contexts during the trial and evaluation iterations of the project lifecycle.

1.3 List of Contractors

Partic. Role*	Partic. no.	Participant name	Participant short name	Country	Date enter project**	Date exit project**
CO	1	National Centre for Scientific Research “Demokritos”,	NCSR	GR	month 1	month 30
CR	2	Research and Education Society in Information Technologies,	AIT	GR	month 1	month 30
CR	3	Brunel University,	UBRUN	UK	month 1	month 30
CR	4	Fraunhofer Gesellschaft zur Foerderung der angewandten Forschung e.V.,	FhG FOKUS	DE	month 1	month 30
CR	5	Universidad Polytechnica de Madrid,	UPM	ES	month 1	month 30
CR	6	University of Cyprus,	UCY	CY	month 1	month 30
CR	7	General Confederation of Greek Agrarian Association,	GESASE	GR	month 1	month 30
CR	8	SUPERFAST DODEKA (HELLAS) INC.	SUPERFAST FERRIES	GR	month 1	month 30
CR	9	Hellenic Aerospace Industry S.A.,	HAI	GR	month 1	month 30

*CO = Coordinator

CR = Contractor

** Normally insert “month 1 (start of project)” and “month n (end of project)”

These columns are needed for possible later contract revisions caused by joining/leaving participants

Co-ordinator contact details :

Dr. Constantin Makropoulos

Division of Applied Technologies

National Centre for Scientific Research (NSCR), “Demokritos”

153 10 Agia Paraskevi Attikis, Greece

tel.: +30 210 65 14 544

+ 30 210 65 11 020

fax: +30 210 65 16 582

email: cmakr@dat.demokritos.gr

BASE² public website : <http://www.base2-project.eu>

1.4 Work performed and results achieved

On the 31st of August the third and last year of BASE², was concluded bringing this way the project to its end. During this last year a lot of significant actions have been taken in order to bring the project to a successful end; having fulfilled all its initial goals. Although WP1 “Service Definition and Content Creation” had finished since first year content was continuously added and updated contributing this way to both communities best information provision. Most of WP3 “Network Implementation” had finished since year 2 but the last technical integrations took place during this year. So the VS AT-SCPC link with the maritime vessel was realized during this year and also the WiFi link between NCSR and AIT over the mountain of Ymitos was set fully functional.

Having fully deployed the interoperable network the most significant part of the project, the users’ educational process was the main concern and occupation during this third year. So WP4 “Service Trials and User Validation” was the WP that dominated during this third year. The first small steps of this process had started in year 2 but now a great deal of effort was invested in the realization of real e-classes and on the evaluation and validation of the learning process. The technical achievement of the network deployment and its’ efficiency in serving this procedure was verified. The acceptance of this learning method by the users was investigated; the quality of the learning material was validated. Since the technical solution and the know-how were evolved and the e-learning seemed to work very satisfyingly these results had to be disseminated and overall solutions and plans for a further exploitation and implementation of these methods had to be discussed with possible interested parties. This was the job done in WP5 “Dissemination and Exploitation”.

By the end of year three which is the end of the project too it can be said that all the initial objectives of the project as planned at the beginning were achieved and the perspectives for a successful exploitation of its’ results in the future are really visible.

To summarize the results achieved this third year:

- Some last technical solutions were implemented contributing this way to the full deployment of the network used.
- A big number of trials were organized and took place during all this period.
- The whole platform was tested and validated.
- Network and s/w efficiency were estimated and technical modifications were implemented where performance could be enhanced.
- Users’ sense and ease of using such innovative processes was evaluated.
- Lots of users who did not have a prior relation with technology can be said to have gained a great useful experience.
- The quality of the content was validated and users’ demands on specific topics were registered, providing this way an experience on what kind of information can be interesting and beneficial for these communities.
- The effectiveness of e-learning was explored.
- Dissemination activities informed a lot of people on the achievements of this project.

- The future use and exploitation of the results and the implementation of all this know-how can be said to have been assured.

1.5 Expected end results

The networks are deployed and the interoperability between them is assured and tested. Adequate satellite bandwidth is provided, so high quality video lessons are delivered both online and offline to at least 4 tele-educational sites simultaneously. Tele-educational content has been generated, uploaded and is of high quality. Having used experts' studies and after fulfilling users' demands content is right to the point in Greek agrarians and maritime workers needs, satisfying the user groups it is intended to. So this creates the expectation of easy and cheap access for a large number of people of both communities to knowledge and issues critical to them.

The evaluation of the services provided to the communities that was carried out during all this third period, the validation of the content and the evaluation of users' acceptance and of the learning efficiency, provides an experience which can be exploited so that future platform implementations will very satisfi ngly cover learning needs of such remote communities.

It is expected that the tele-training of an initial number of users will establish a precedent and create a critical mass of remote agrarian and maritime users wishing to use the new technologies in order to educate themselves in useful subjects using alluring new means of training. Dissemination from this critical mass is to play a very active role in the wide spreading of e-learning to traditional layers of the Greek remote community, thus creating a positive side-effect to basic computer literacy in non-technologically privileged communities as well as providing high level professional training.

For the first time at least in Greek and Cyprus, an end-to-end system has been created through the convergence and interoperability of heterogeneous networks (VSAT, DVB -S, DVB-RCS) and broadband terrestrial networks (WiFi, WiMAX, xDSL), providing broadband access to remote areas and users. This has created in fact a backbone of satellite systems on which terrestrial networks connect in order to create a seamless network infrastructure system. In our case the services provided are educational services. However, this infrastructure can also be used for other purposes (eg. Telemedicine or access to knowledge datab ases for the isolated areas). Since the xDSL infrastructure for the remote areas demands an extensive investment for backhaul, the above scenarios appear especially alluring in Greece and other countries with many isolated areas, like agrarian mountain vil lages and dispersed islands.

Contacts with Greek ministries, peripheral authorities, local municipalities and interested investors create the expectation and belief that the project results will be soon adopted and exploited by the Greek state or in a for m of a spin off company in order to provide a wider range of services in a large number of regions.

Intentions for use and impact

The successful finalization of BASE² project has produced the technical know-how of the seamless interconnection between heterogeneous telecommunications systems, for the provision of tele-education services to remote agrarian and maritime community. The combination of low-cost satellite telecommunications infrastructures with the continually expanding broadband terrestrial systems are expected to constitute tele-education to remote areas – and not only in Greece and Cyprus – a very alluring solution to the increasing demands for training in every day's activities and life long learning. The intense evaluation process that was completed during the last period of the project brought e-learning for remote areas much closer to efficiency. From now on implementation weaknesses and difficulties are well known and efficient solutions are designed. All needed steps for a successful e-learning implementation are known and user needs are carefully addressed. This technical and educational know-how along with the produced tele-educational content can and is expected to lead to the foundation of a spin-off company that would provide relevant services to island and remote areas.