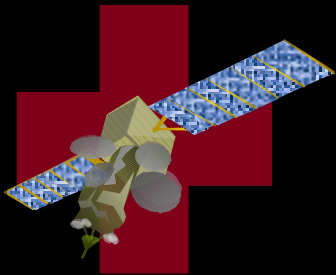


Overview of the ESA Telemedicine Initiative



Francesco Feliciani

Telecommunications Department - ESTEC
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E-Mail: Francesco.Feliciani@esa.int



ESA is an inter-governmental organisation with a mission to provide and promote - for exclusively peaceful purposes - the exploitation of :

- space science, research & technology
- space applications

ESA achieves this through:

space activities and programmes

- long term space policy
- a specific industrial policy
- coordinating European with national space programmes

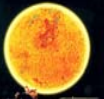
Staff on 30 Jul 2003:1922

- Establishments
- Offices
- ESA Ground Stations
- Ground Stations used by ESA
- Ariane Downrange Stations



ELDO (1962), ESRO (1962), ESA (1973)

All Member States participate in activities and a common set of programmes related to space science (mandatory programmes)



In addition, members chose the level of participation in optional programmes

▪ **Manned Space Flight**



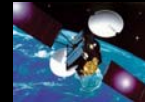
▪ **Microgravity Research**



▪ **Earth Observation**



▪ **Telecommunications**

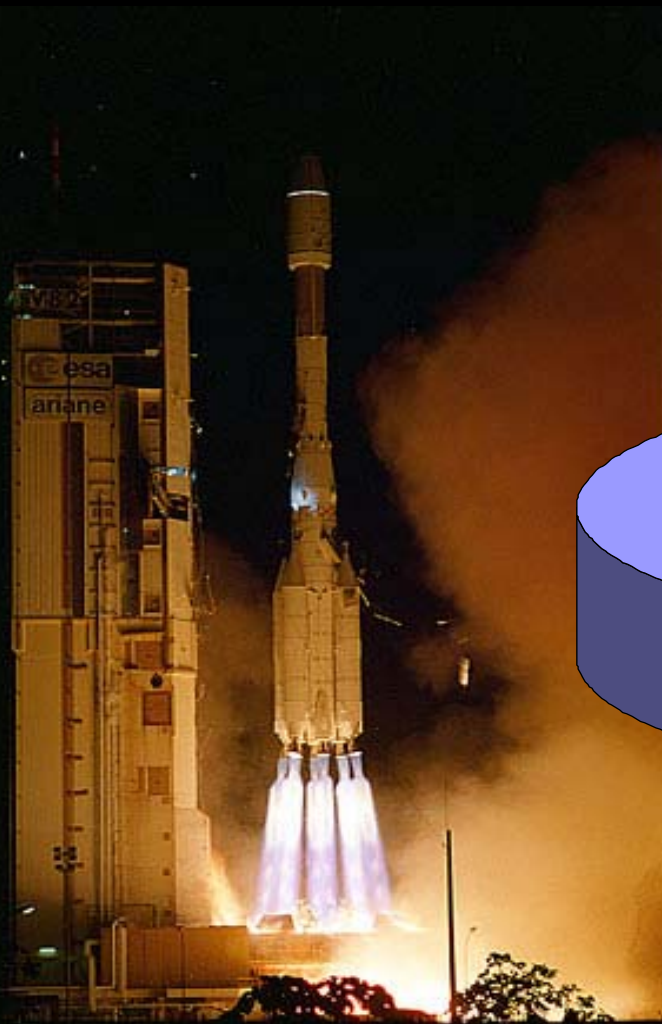


▪ **Navigation**



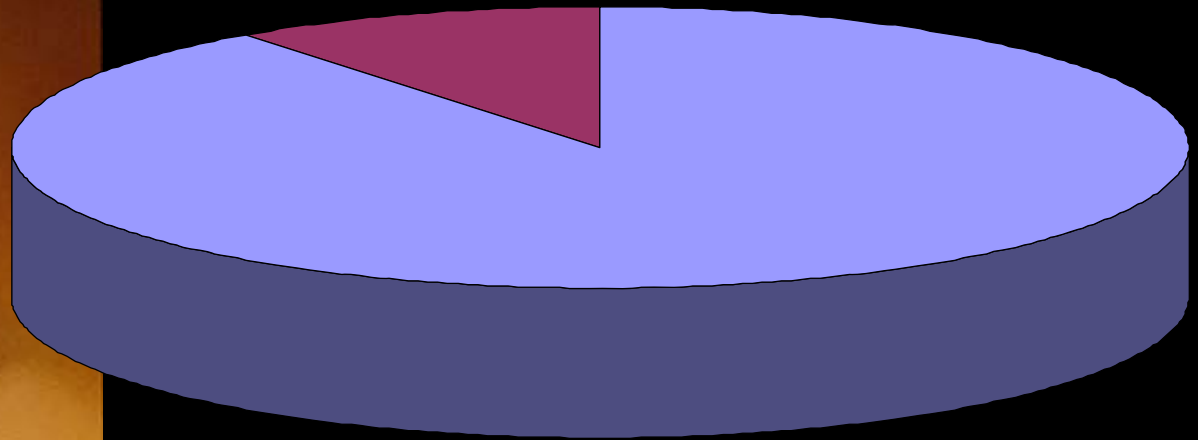
▪ **Launcher Development**





©arianespace

Launches for Non-Telecom Satellites: 16



Launches for Telecom Satellites: 139

Total Launches of ARIANE 4 in the period 1988-2003: 155

The World of the End Users



Telemedicine /
Medical Education

Relief of Disaster/
Emergency

Distance Learning

e-Government

Infomobility

The World of the Satcom Technology (HW, SW, TERMINALS, SYSTEMS)



- **In the ICT (Information and Communications Technologies) area, Applications are the bridge between the World of the End Users and the World of Technology**
- **Applications represent the ultimate good for which the End Users are willing to pay the bill (NO APPLICATIONS = NO BUSINESS)**
- **In the value chain that brings Applications to the End Users, i.e.**

Subsystems > Systems > Services > Applications

the Satcom infrastructure is a commodity to transfer bits

- **The market of Satcom based Services and Applications is larger than the association of the markets of satellite manufacturing, launch services, lease/sale of capacity and ground segment**

- **Beyond DTH TV broadcasting (nowadays well consolidated), market opportunities exist for new Satcom based Applications and Services**
- **Whenever integral part of a problem solving solution for the User Community, Satcom can become a driver for the launch of new Applications and Services**
- **This requires a shift of focus from Satcom as a carrier of bits to Satcom as vertically integrated in an end-to-end solution**
- **A specific line to support Satcom based Services and Applications opportunities has been introduced in 1997 as part of the ARTES Programme**
- **Area of Applications is today vital for satellite telecommunications growth**
- **ESA has built up an outstanding experience in the Applications arena**
- **In the period 1998-2004, ~110 Applications Projects have been launched for a total value of 150 MEUR (mostly funded 50% by ESA)**
 - 60% of the projects contracted to SMEs
 - 50% of the projects contracted to new entrant into ESA Telecom

Telemedicine/ Medical Education

- *SHARED (I)*
- EUROMEDNET (I)
- MULTIMED (UK)
- SECOM (UK)
- EMN (CH, D)
- SANTTSUR (UK) I-DISCARE (F, I, N)
- IEMN (CDN) • Telecare (CDN)
- MIST (CDN) • HIS (D)
- WEBGMS (I) • NESAs (I)
- SM@RT (I) • SKYNURSE (I)
- SKYMED (I) • TEMOS (D, F)
- *HPS (UK)* • REACH (CDN)
- *DELASS (F, D)*
- *TELANY (I, N)*
- MAYFLOWER (I, N)



Satcom Networks Systems & Services

- DESNET (I)
- SKYPLEXNET (I)
- WEB-SAT (IRL)
- SATXPRESS (D)
- *SWB (IRL)*
- CollaBOD (CDN)
- eWAVE V.S. (D)
- *Freetimers Int. (UK)*
- *Wired Ocean (UK)*
- *Broadband in the Sky (B)*
- *SDS (B)*
- *ILSE (A)*
- *Fusion St. (IRL)*
- *World-Link (I)*
- *RTI-TV5 (L)*
- EODIS (I)
- BARRD (UK)
- *Pacific Skies (NL)*
- HOST (GR)
- BB to Train (UK)
- *INDIGO (UK)*



B2B / B2C

- ABARIS (UK)
- SUNRISE (UK)
- *MULTIMAP (UK)*
- JUPITER (NL)
- VERDI (F, CDN, I)
- MRSTREAM (UK)
- E-SCREEN (I, UK)
- *D-CINEMA (B)*
- ESEMAR (I)
- *IMPSAT (UK)*
- *S@Commerce (I)*
- *TV Snapshot (L)*
- *EDIBS (A)*
- MeCA (CDN)
- Multi-PID (UK)
- *S@Commerce (I)*
- *SATMODE (L)*
- *SatServ (N)*
- *BizSmart (GR)*
- BrandTV (UK)
- Sat-n-Surf (L)



Infomobility

- GWAS (CDN)
- *WICOR (D)*
- *Mobile WS (NL)*
- *Wireless IbdN (F)*
- *I4S (F)*
- *MoMoSat (D)*
- *PERUSE (IRL)*
- *MUTIS (A)*
- *In Flight Reporting Tool (IRL)*
- AeroFleet (D)
- BIRDCOM (I)



Relief of Disaster/ Emergency

- *REMSAT (CDN)*
- *EMERGSAT (F, E)*
- *REMSAT II (CDN, E)*
- *SASS (D)*
- *I-GARMENT (P)*
- *SARFOS (CH)*



Community Information Services

- RCST (CDN)
- CROCUS (I, NL)
- TV Beyond 2000 (F)
- Mediaspace (F, SP)
- *MAMS (IRL)*
- Space For Science (F)
- *TESEO (I)*
- *SAT@ONCE (L)*
- *DISaV (I)*
- *SILC (D)*
- *My Home T.TV (NL)*
- *OTV Ch. (UK)*
- *Lift Ch. (IRL)*



Distance Learning

- *ESPRESSO (UK)*
- *HERMES (I)*
- *MODUS (I)*
- *TRAPEZE (B, UK)*
- *HAMLET (I)*
- *SchoolSat (B, IRL)*
- *ESMEE (I)*
- *e-Learning DVB (IRL)*
- *SchoolCast (IRL)*
- *eLearning DVB (IRL)*



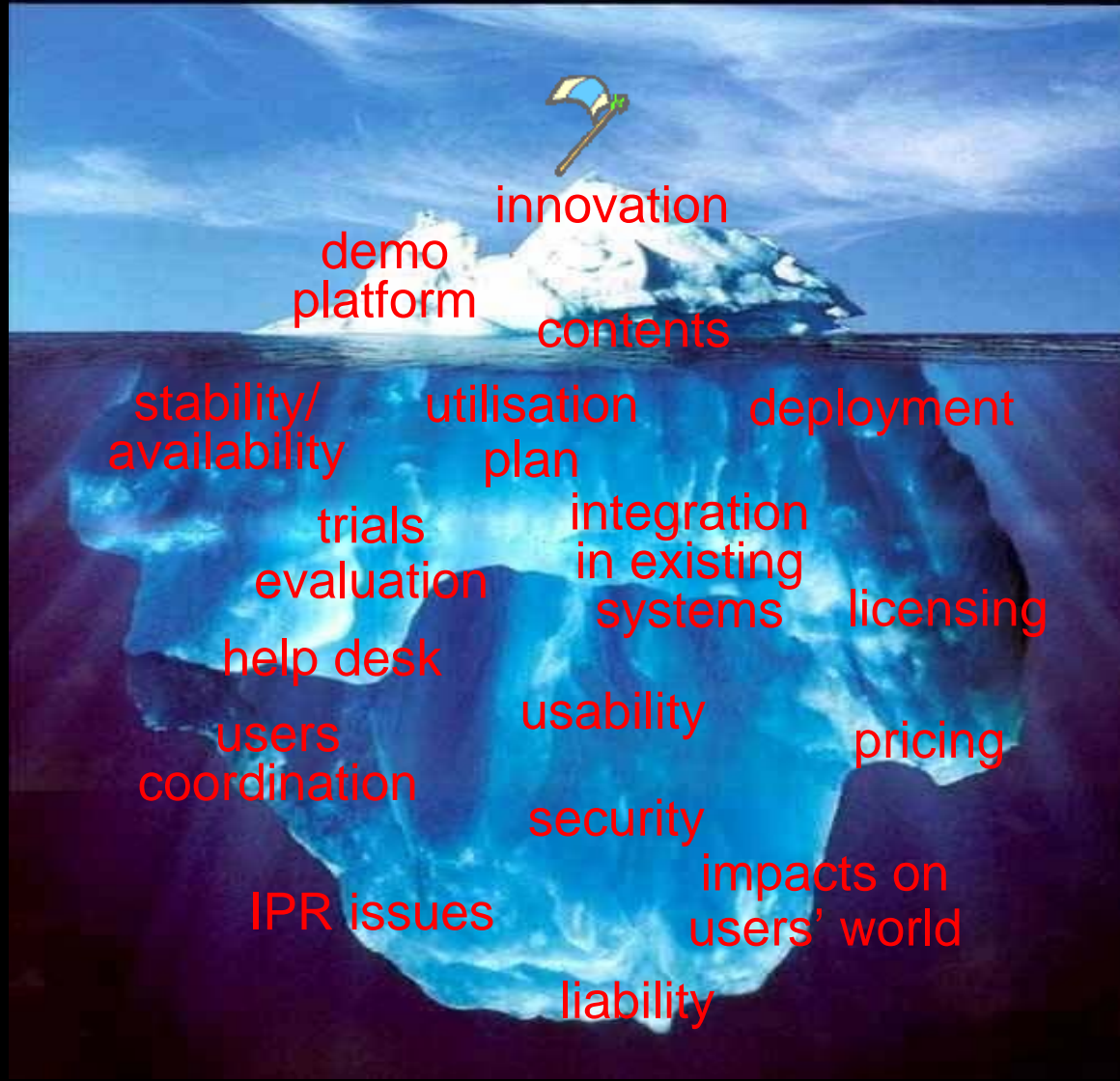
e-Government

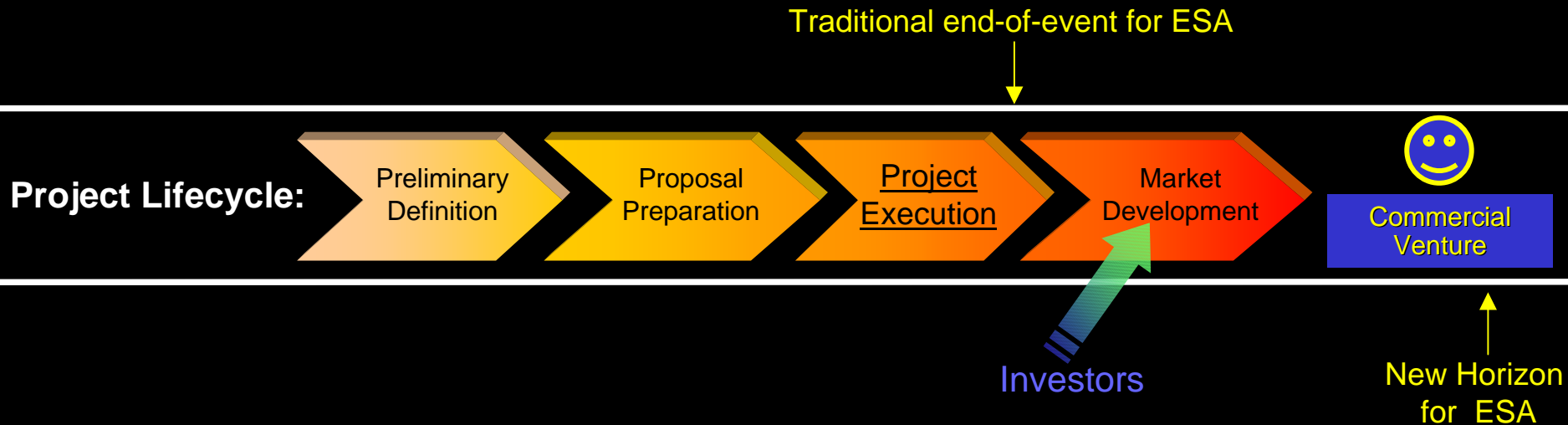
- e-regSAT (I)



**Exploring
Feasibility:**
Look, it works!

**Exploring
Sustainability:**
Get it, it's worthwhile!

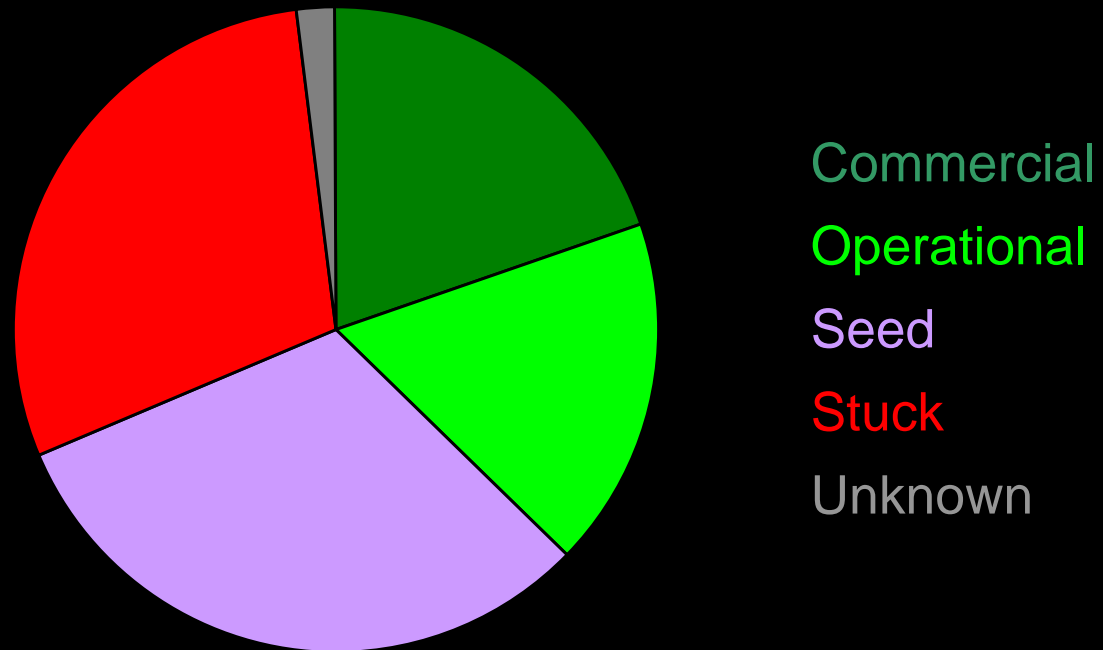




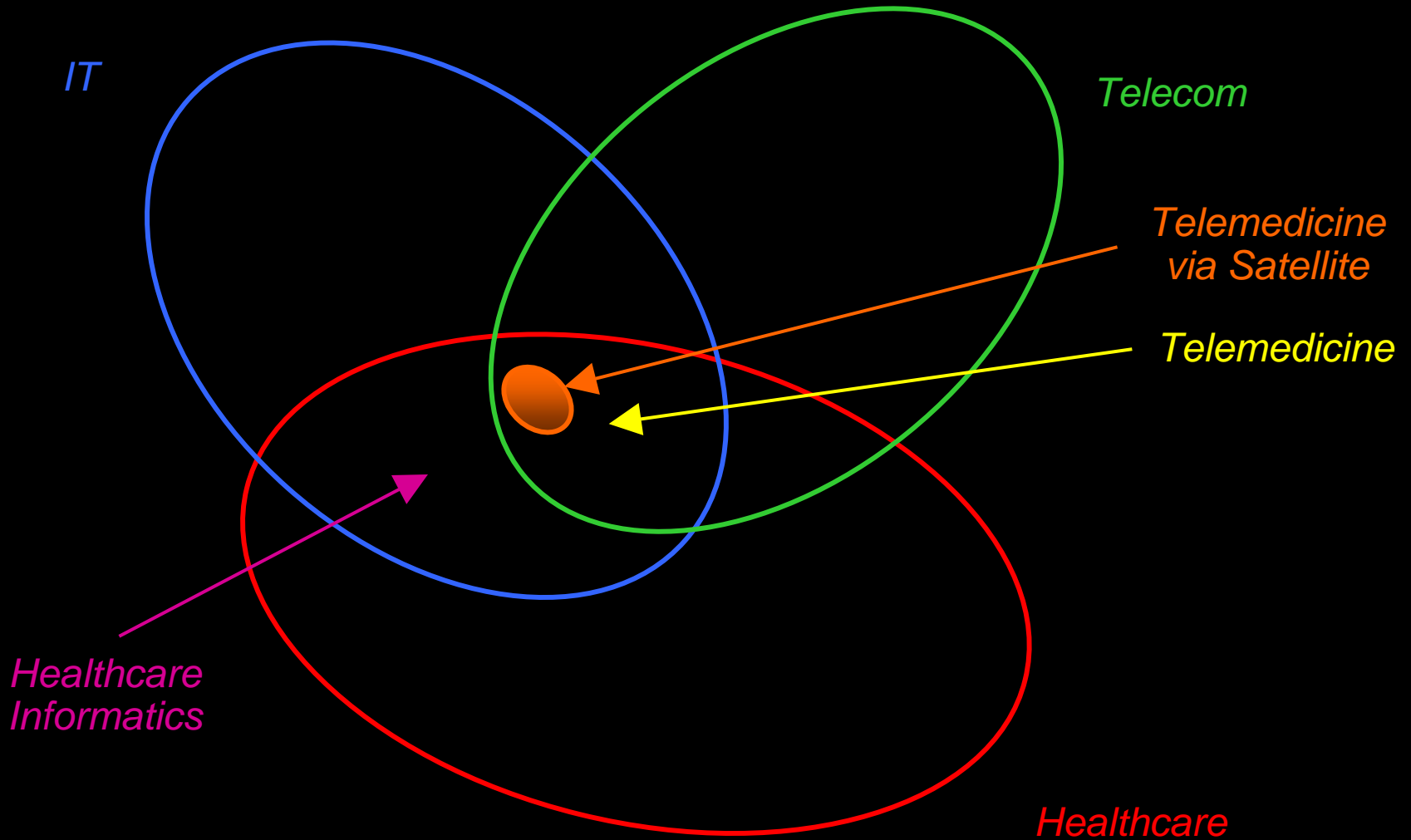
Evaluation Approach

Success Criteria: successful completion of the contract,
Tangible Outcomes (*New Technologies/Products developed, Markets accessed, Customers Base, Production Volume, Licenses, Employment*)

Intangible Outcomes (*Acquisition of New Methodologies / Procedures / Know How / Linkages / Partnerships generated*)



Out of 51 Applications Projects Concluded



Telemedicine via Satellite: Stuck at the Starting Blocks?

- The market for Telemedicine systems and services is very large, and to a large extent still untapped
- Satellite Communications can play a crucial role for Telemedicine
- Starting from 1996, several exploratory activities launched by ESA through Telecommunications Programme Elements (i.e. ARTES 3, 4 and 5) to develop the role of Satcom in Telemedicine
- They addressed opportunities not yet mature for a fully operational deployment, due to a number of barriers, as indicated during the ESRIN Telemedicine Symposium of 2003

e.g. Technical / Operational Immaturity, Lack of Consolidation of the Demand, Resistance to Changes, Lack of Legal and Financial Framework

Emergency Consultation

- *SECOM (UK)*
- *IEMN (CDN)*
- *MIST (CDN)*
- *DELTASS (F,D)*
- *TELANY (I, N)*
- *I-DISCARE (F, I, N)*
- *NESA (I)*



Distributed Environment for Medical Simulation

- *MULTIMED (UK)*



High End

- *DELTASS (F,D)*



Teleconsultation and Tele-Homecare

- *SHARED (I, A)*
- *EUROMEDNET (I)*
- *RCST (CDN)*
- *Telecare (CDN)*
- *TEMOS (D,F)*
- *REACH (CDN)*



Clinical Research & Access to Patient Multimedia DBs

- *WEBGMS (I)*
- *HERMES (I)*
- *TELANY (I, N)*



Continuing Medical Education

- *EMN (CH, D, F)*
- *SANTTSUR (UK)*
- *MAYFLOWER (I,N)*
- *SM@RT (I)*
- *SKYMED (I)*
- *HPS (UK)*
- *HIS (D)*
- *SKYNURSE (I, R)*



Satcom Peculiarities → Telemedicine Areas ↓	High Mobility, Communications in Emergency and Disaster Situations	Broadband Access from Underserved Areas	Multicasting/ Dissemination of Multimedia Contents	High Capacity / Fast Deployment for Temporary Use
Hi-End		+	+	+ +
Distributed Environment for Medical Simulation			+ +	+ +
Emergency Consultation	+ +	+		
Teleconsultation		+ +		+ +
Clinical Research			+	
Access to Patient Multimedia DBs	+	+ +		
Continuing Medical Education		+	+ +	


- **Medical Associations:** UEMS (F), GIMEMA (I), RCoS (UK), AOGOI (I)
- **Hospitals:** OP2000 (D), San Raffaele (I), ISMETT (I), Bristol Medical Simulation Centre (UK), Clinical University Centre of Sarajevo (BH), Reparto Sanità Centrauro (I), Deutsche Bundeswehr (D), IDI (I), Victor Bebes Hospital (R), Aziende Sanitarie Locali Veneto Region (I), Private Hospital Gurgaon/Delhi (India), Lawson Health Research Institute (CDN)
- **Pharmaceutical Companies:** Bayer (I), Pfizer (I)
- **Telemedicine Service Providers:** Telbios (I), TETRA (CDN), Centre for Travel Medicine - COR (D), Russian Telemedicine Foundation (Russia)
- **Healthcare Content Providers:** EMN (CH), Healthtrack (UK), Real Media (D), Professional TV (D), SMM (I), University of Perugia (I)
- **Communication in the Healthcare Sector:** Sudler & Hennessey (UK)
- **Research Centres:** JR (A), CNES (F), Padova Ricerche (I), MEDES (F), NST (N), CRC (CDN), DLR(D)
- **Manufacturers of Medical Device:** Medtronic (I), Ortivus (S)
- **Manufacturers of Telemedicine HW/SW Solutions:** March Networks (CDN), Kell (I), ColabNet (CDN), MS&I (F), Telemedicine Technologies (F), Vaasah (CDN)
- **Telecom Operators:** Fantastic (CH), Telecom Italia (I), Telespazio (I), Deutsche Telekom (D), Telesat (CDN), Elsacom (I), NDSatcom (D), Eutelsat (F), Plenexis (D)
- **Satcom Industry:** Alenia (I), Alcatel (I), EADS (F), EADS (D)
- **Consultancies in Satcom:** ESYS (UK)

Need to Move Beyond the Exploratory Phase

- **The socio-economic effects of Telemedicine become tangible only when Telemedicine becomes integral part of the healthcare operational environment**
- **Only at that point healthcare stakeholders will gather evidence of the benefits, and will accept Telemedicine**
- **There is a need to complement the supply-driven approach (pushed by those who sell Telemedicine) with a demand-driven approach (pulled by those who buy Telemedicine)**
- **Need to supplement R&D Activities with Pilot and Operational Development**
- **Final objective: making satcom a key element in the provision of eHealth and Telemedicine services**


ESA Telecommunications: Medical Care from Space: Telemedicine - Microsoft Internet Explorer

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Telecommunications

European Space Agency



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Medical Care from Space: Telemedicine

The prospect of using satellite communications technologies and associated connectivity services in support of Telemedicine is the reason why the ESA Department of Telecommunications is actively pursuing activities in this challenging domain since 1996.

The integration of Telemedicine into the working environment of healthcare professionals can only be pursued through an intensive process of awareness building among the user community and the stakeholders of the healthcare system.

The projects launched so far have provided a valuable contribution in this direction and have allowed to identify and explore new technical solutions and applications with clear potentials to become part of the future Telemedicine practices.

The following list identifies the areas of Telemedicine and the respective projects activated in the ESA ARTES programme (the participating countries appear in square brackets):

Broadband, Highly Interactive Applications projects:	DELTASS (3D Simulation component) [F, D]
Distributed Environment for Medical Simulation projects:	MULTIMED [UK]
	SECOM [UK]
	IEMN [CDN]
	MIST [CDN]
	DELTASS (Mobile Field Hospital and Search and Rescue component) [F, D]
Emergency Consultation projects:	TELANY (Emergency component) [I, AT]

02 Feb 2004 08:43

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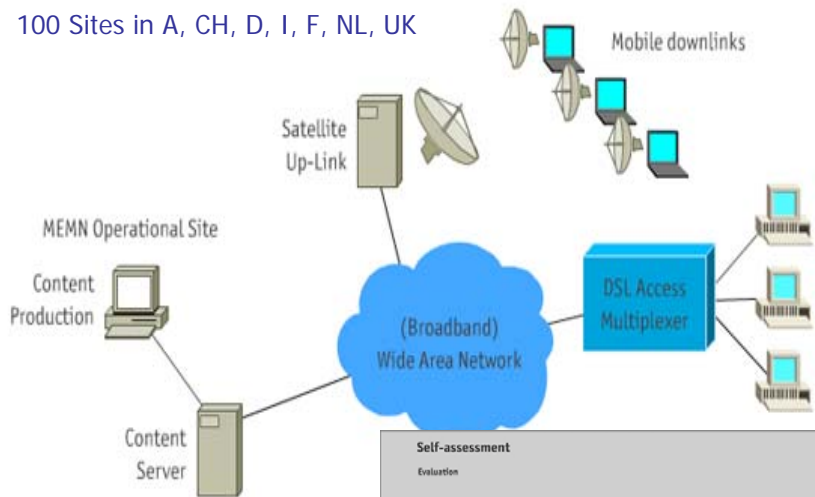
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Related Links

- Telemedicine via Satellite in the Information Society Programme and Presentations >
- Telemedicine system tailored for European rescue workers >
- Distant doctors make their rounds via satellite >
- Expert care for patients via satellite telecommunications >
- Modus tele-learning to provide long distance University courses >
- SANTTSUR wins UK Telemedicine and Telecare Award! >
- New MIST project to improve delivery of satellite-based services to marine users >
- SANTTSUR presentation wins Telemed '02 International Conference >
- Demonstration of DELTASS Emergency Telemedicine System at SITEF 2002 >
- Medics demonstrate treating disaster victims via satellite >

100 Sites in A, CH, D, I, F, NL, UK



emn.net - Microsoft Internet Explorer

Tools Help

sa User Segment Telecommunications European Space Agency

User Support Office New Media Centre Special Interest Groups

17 Sep 2003 15:16

Project Management

- Project Support
- Resources for projects

Content

- Project Objectives
- Features
- Project Plan
- Key Issues
- Expected Main Benefits
- Current Status

Images

- emn.net - www.emn.net [figure 1]
- emn.net - System Architecture [figure 2]
- emn.net - Evaluation of on-line questionnaires by Horten Centre for Applied Medical Research, Z|rich. [figure 3]

Contact

- J. Winistorfer

EMN - European Medical Network [CH]

Deutsche Telekom [D]

UEMO [CH]

UEMS [D]

Karger Libri [CH]

How to ask a clinical question?

Part 1: Information: What is my patient's problem?

Age & sex: 50 year old male

Previous history: coronary artery disease, hypertension, hypercholesterolemia, peripheral vascular disease

Family history: mother died with MI prior to age 60, father died with MI prior to age 60

Clinical examination: weight 85kg, height 175cm, blood pressure 140/90, heart rate 80bpm, clear lungs, normal bowel sounds

particular disease. The patient is slightly obese and has a blood pressure of 140/90 mmHg. His cholesterol is elevated and his chest X-ray shows a small infiltrate in the right lung. The patient also has a history of angina pectoris and has been treated with nitroglycerin. He has no other symptoms at the moment.

Self-assessment Evaluation

You failed 2 correct answers out of 9 questions. Click to go to a list to carefully check where you went wrong and look up on the respective sections in Part 1 of the course.

Question 1 Your answer is/was wrong	Question 6 Your answer is/was correct
Question 2 Your answer is/was correct	Question 7 Your answer is/was wrong
Question 3 Your answer is/was correct	Question 8 Your answer is/was correct
Question 4 Your answer is/was correct	Question 9 Your answer is/was correct

The Role of Innovation in Health

Combining fu

- Computed Tomography, Magnetic Resonance, and X-ray generate anatomical images
- Good anatomy detail of most internal organs
- Nuclear Medicine provides physiological images
- Shows how an organ functions
- Reference: physiologic changes are often detected long before anatomic changes occur
- Combining both images shows which part of an organ malfunctions

Hypertension: Strategies for 2001 and Beyond

EMN

Welcome to SKYMED

Day Case Anaesthesia

Factors affecting infusion rates

- Patient factors
 - Age
 - Weight
 - ASA status
 - Anxiety
- Anaesthetic factors
 - Premedication
 - Supplementary drugs (eg nitrous oxide)
 - Dose and rate of induction dose
 - Use of (effective) LA
- Surgical factors
 - Degree of surgical stimulation
 - Depth of anaesthesia required

ESA Telecommunications: SKYMED - Microsoft Internet Explorer

esa User Segment Telecommunications European Space Agency

ESA Home User Support Office New Media Centre Special Interest Groups

17 Sep 2003 15:19

Project Management

- Project Support
- Resources for projects

Content

- Project Objectives
- Features
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Images

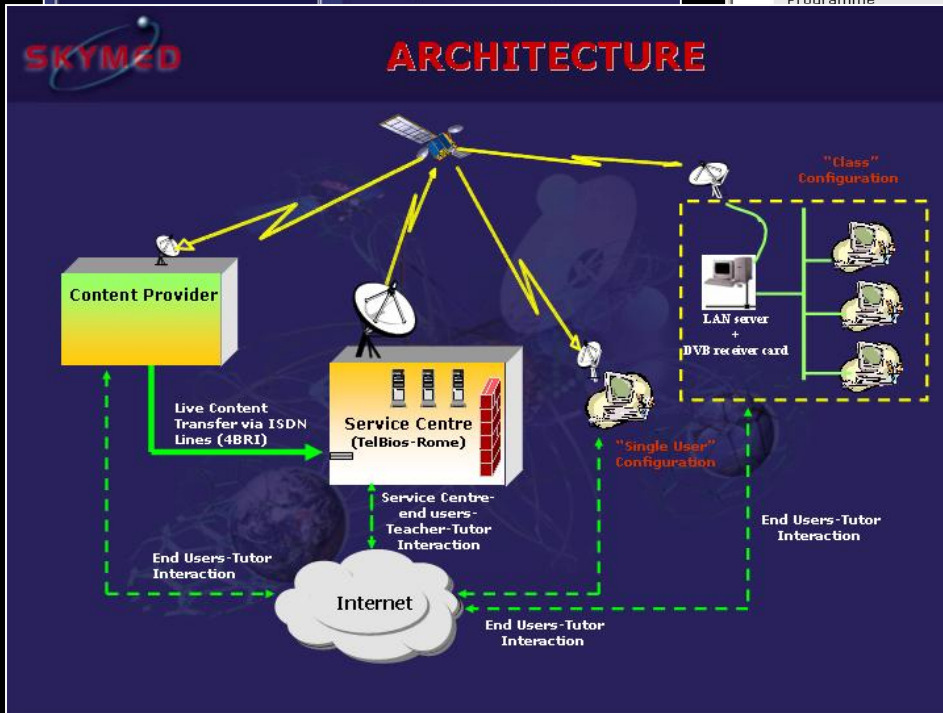
- SkyMed Operational Context
- SkyMed Architecture

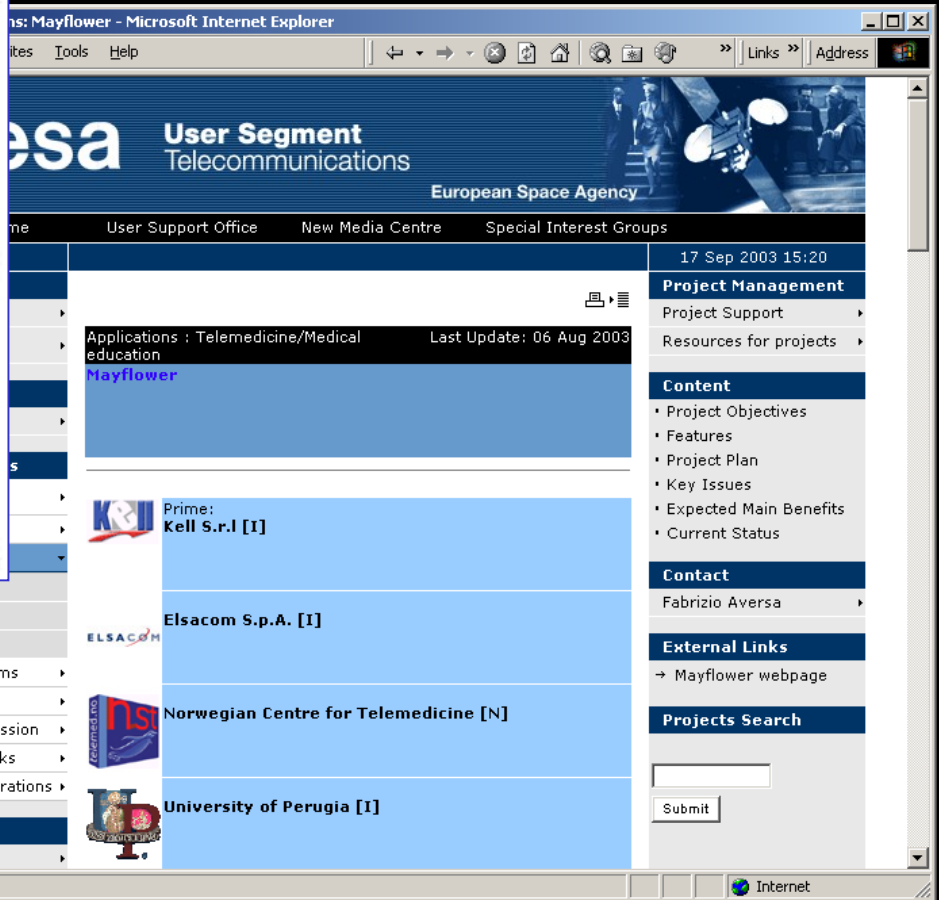
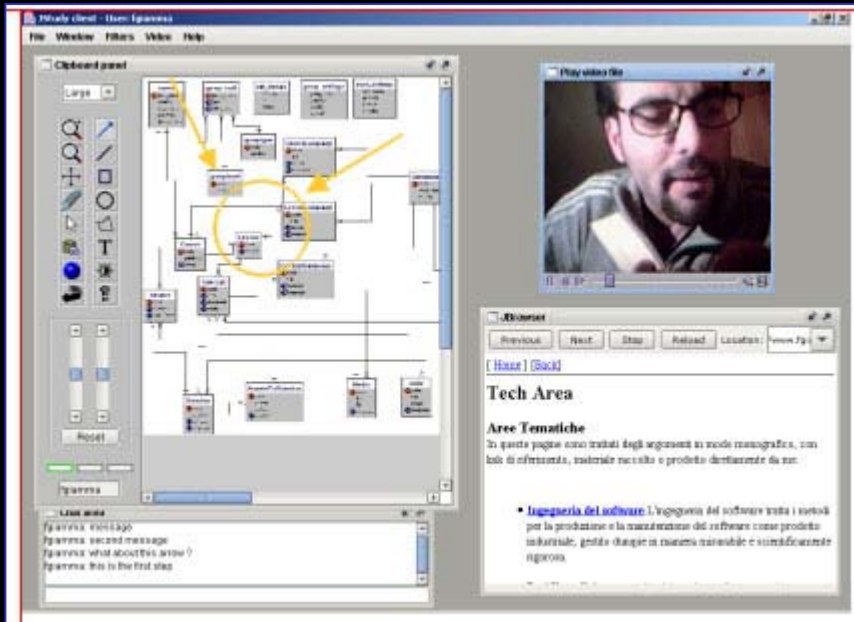
Contact

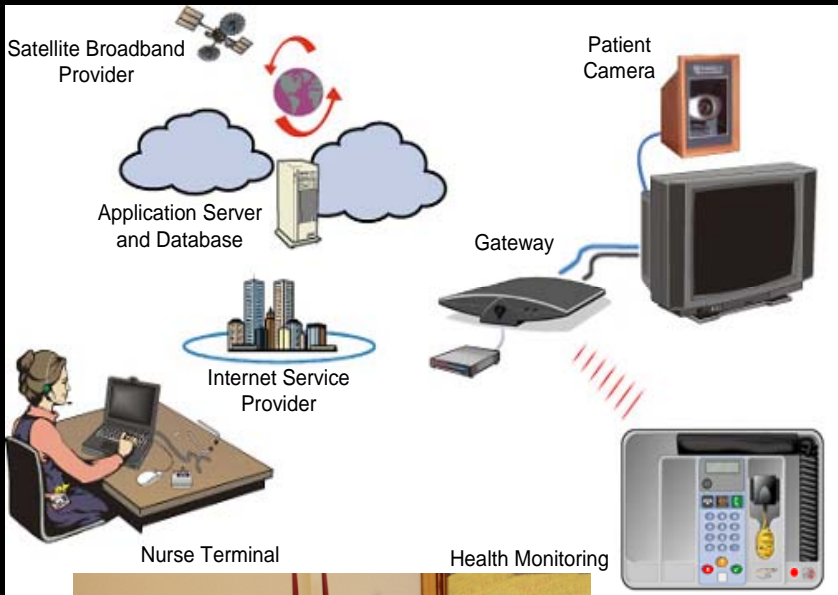
Project Manager: Lina Colitta
Andrea Mason

Documentation

- SkyMed presentation
- SkyMed: An Integrated Solution for On-line and







Windows: TeLeCare - Microsoft Internet Explorer

Address: <http://telecom.esa.int/telecare>

esa User Segment Telecommunications
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Project Management

Why login? | Project Support | Resources for projects

Content

- Project Objectives
- Features
- Project Plan
- Key Issues
- Expected Main Benefits
- Current Status

Contact

Abdul Lakhani | Christine Woronczuk

Telesat Canada [CDN]

March Networks Corporation [CDN]

Project Objectives

This program supports the commercialisation and deployment of the March Networks home telehealth solution to be delivered over two-way satellite networks. This solution enables remote nursing visits and vital sign monitoring through fully interactive voice, video and data transmission, and will target healthcare service delivery in rural and remote areas.

Services

- Documentation
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Done | Internet



ESA Telecommunications: DELTASS - Microsoft Internet Explorer

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Content

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- Current Status

Images

DELTA System Architecture >

Contact

Applications : Telemedicine/Medical education Last Update: 13 May 2003

DELTA



 **CNES [F]**

 **MEDES [F]**

 **SPACEBEL [B]**

 **Alcatel Space [F]**

 **SRU OP 2000 [D]**

News Archive

Done Internet



Great potentials in terms of:

- **better utilisation of healthcare system resources**
(infrastructures, assets, people)
- **improve reach of healthcare services**
(e.g. Tele-assistance for elderly people)
- **reduce indirect cost for patients**
(e.g. avoiding cost incurred by patients to move into the healthcare structure when not strictly needed)
- **opportunity of CME**
(e.g. the guidelines of the Italian ministry of health foresees that 80% of CME will be based on distance learning, 20% on traditional on site event like congresses)

HOWEVER

High barriers exist in terms of:



- **lack of awareness**

(Telemedicine is still largely an untapped area, where the immaturity of the demand and the lack of a consolidated offer get often stuck in a vicious cycle)

- **resistance to changes in the healthcare organisation** (lack of incentives, conservatory approach of healthcare professionals, chronic lack of resources and time, patients sometime perceive Telemedicine as a “surrogate”)

- **difficulty in providing evidence of Telemedicine benefits**

(Telemedicine is not healing in itself; its effectiveness is influenced by a number of external dependencies that have nothing to do with the Telemedicine)

- **lack of a reimbursement scheme**

(partly linked to the previous point)

- **tight dependencies with generic healthcare informatics policy**

(Telemedicine becomes fully exploitable only when associated to an integrated informatics healthcare system)

- **lack of a coordinated approach**

(the many barriers make extremely difficult the uptake of initiatives beyond exploratory pilot projects with local characterisation)

Key Requirements for Telemedicine Activities sponsored by ESA:

- 1. Provide evidence of the added value to the end users**
- 2. Coexist with traditional medical practise**
- 3. Elaborate a roadmap on how to get integrated into the healthcare organisation**
- 4. Serve existing paths of communications among healthcare professionals rather than inventing new ones**
- 5. Be tackled in a holistic, end-to-end approach involving the different actors (from the patient to the political stakeholder)**
- 6. Maintain a business oriented vision to foster the self-sustainability of the initiative**



<http://telecom.esa.int>

Francesco.Feliciani@esa.int