

CHAPTER 6

BUILDING FUTURE BUSINESS PLANS IN PRACTICE

This chapter focuses on the ways and means to support the preparation of new business plans. It is stressed that increased profitability will most probably require a renewed capability to network at all levels of a company activity. Clues to validate such capabilities are given herein. As an example, one expands on the Google Earth case to suggest that two-sided networks will become an innovative source of business growth for EO companies in the future.

1. Background: the EO/GMES ecosystem as of now

The EO/GMES ecosystem is an **emerging industry** characterised by:

- **a significant number of university or public space agency- spawned start ups and SMEs** (mostly with less than 30 people), focusing on specific pieces of the R&D value chain (data processing, data interpretation, decision-making based on EO data)
- **the combined role of entrepreneur's personal equity and continuous public support to deliver services** that are not stabilised market-wise over a very long period of time (either due to knowledge improvement, as pure science generates applications, or due to customers' evolving needs)
- **a market developing know-how or knowledge that leans on earth observation data**, very often this know-how or knowledge has not been patented, and is very much dependent on the access to raw observation data (including timely availability and cost of acquisition over significant periods of time).

The industry is **growing and accelerating**¹, as shown by the indicators provided below.

Estimated overall employment (2004)	2,900 employees
Average EO-specific revenue per employee	€10 7k
Estimated total annual revenue for EO value adding activities (2002)²	€285 million
Average Revenue growth (2000-2002)	19.4% CAGR
Profitability (2002 average gross margin)	10.3%

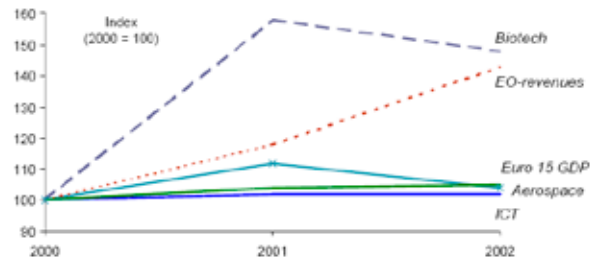
Basic indicators of EO service VA Industry³

¹ "The State and Health of the European and Canadian EO Service Industry" Technical report, September 2004, ESA, Booz Allen Hamilton, VEGA

² These revenues exclude primary sales of basic EO imagery (estimated at 25-30 million Euros per year).

³ GMES is partly funded by ESA and partly by EU ; Canada may contribute to the ESA GMES activities but not to EU GMES activities

The estimated total annual revenue is split into 78% sales (to public and private sectors) and 22% development financing (from national and international agencies). The average **industry revenue growth rate is ahead of several comparable industries**. But concentrated in a few large companies: 77% of the industry's growth came from just 6 companies, and almost half of that from just a single company.



EO growth against other industries⁴

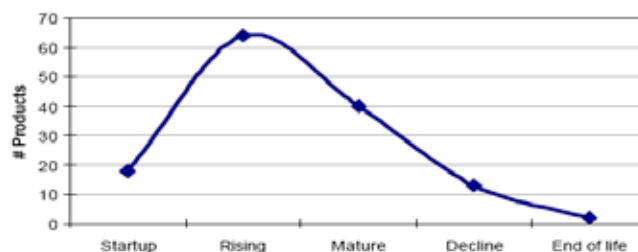
Overall, the **industry profitability has improved**, with an average gross margin of 10.3% in 2002 compared with just 1.8% in 2000: large VACs do not have higher gross margins (10.0% in 2002) than small VACs (10.7% in 2002), thus showing no direct link between profitability and scale.

A large part of the **demand for EO services comes from the public sector**. Public authorities and decision makers at all levels (regional, national, and international) are the primary users of EO services and products. Yet, the **demand for EO services is still fragmented**:

- decision makers at all levels are not yet convinced that services are reliable as to their quality and continuity;
- decision makers need to see from experience that those services will contribute to their organization's objectives to justify meeting the cost of their long-term operation, maintenance and renewal⁵.

The EO industry is characterised by **sophisticated products, constant technological innovations** and **ever-changing demand** as the market evolves. Although EO products exist at all maturity stages, the **majority of products are at a rising stage**, i.e. sales are growing and expected to continue to do so. This indicates that **the industry overall is in a healthy position**. However, the **percentage of products in a start up phase (approx. 10%) seems to be low** for an innovative industry (see below).

Interpreted survey data



Product Maturity⁶

⁴ Data normalized to the year 2000 = 100 points

⁵ EC Commission, GMES: From Concept to Reality , SEC(2005)1432

⁶ Five key stages of a product lifecycle are identified: **start-up** (the product is in its infancy); **rising** (sales are growing and expected to continue to do so); **mature** (sales have reached a steady state); **declining** (sales are reducing but still possible); **end of life** (sales have

The **EO industry is highly competitive**: only less than 10% of products and services have no competition or a single competitor. Competition exists between EO service providers as well as between traditional or non-EO alternatives. Moreover, it extends across world markets. In general, the European industry EO faces increasing competition from US companies⁷ who are supported by large government contracts for national security needs (ClearView, NextView), and global institutional operators such as NOAA & USGS.

II. The future ecosystem: trends for winning business models

This section argues that the anatomy of the earth observation ecosystem as depicted above must evolve in order to attract more investments, in a way similar to what is proposed in a recent paper for the biotech industry⁸. Why?

Although the above ecosystem anatomy may look quite similar to the anatomy of the software or semi conductor industry, its specific R&D features make it quite different from what is known in the software or semiconductor industry. As a matter of fact, it is more similar to the anatomy of the biotechnology industry:

- ***uncertainty is rooted in the limited knowledge of large scale interacting systems*** (for instance thermal currents in oceans, water vapour cycle in the atmosphere...): this is not the case in IT or semiconductor, where at the end of an innovation cycle, the product will work anyway (meeting more or less the expected performances);
- ***the process of environmental R&D cannot be split into pieces***: it requires a wide range of disciplines working together in an integrated fashion.
- ***the knowledge in the various disciplines is very often tacit or intuitive*** (since difficult to model): this makes collective learning very difficult.

This has indeed consequences on the evolution of EO/GMES markets:

- ***advances in modelling, space instrumentation have not significantly reduced the above uncertainty***. Under certain circumstances, it may have increased it because modelling results and measured data raise more questions than they give answers to the issues that EO is supposed to address (see for instance the Carbon cycle modelling),
- ***uncertainty translates into high, long-term risks which are difficult to monetize in the absence of strong IPR***: in the biotech sector people have used patents to monetize intellectual property. This helps bridge the funding gap between basic R&D and the costs of developing a solution that reaches the market. However, public equity markets are not able to value firms on the basis of their ongoing R&D projects. Adequate information must be made (compulsorily) available to sophisticated valuation techniques (like real options) in order to be able to value the company. However, most biotech companies are reluctant to give away know-how to outsiders based on the disclosure of whether their R&D project works. This is exactly what happens in the EO industry. Most of the companies built up internal know-how that cannot be patented. And overall, return on investments of these companies is still not timely

declined to a terminal point and effort is better directed elsewhere). The chart is based on a characterisation of the EO products interpreted by the VEGA study team.

⁷ Three of the most important US companies involved in remote sensing are: Digitalglobe, OrbImage, and Space Imaging, Inc. These companies operate satellites, provide a range of products and tend to operate through worldwide partnerships.

⁸ Gary Pisano “ Can Science be a business ? Lessons learnt from Biotech” Harvard Business Review, October 2006, page 114

phased with what venture capitalist expect from other sectors. The **system for monetizing intellectual property simply will not work** in the GMES area.

- ***Integration is a prerequisite for application, in many industrial areas***: many issues must be addressed at once, and the solutions must work as a whole *in fine*. There are two ways of achieving integration:
 - ✓ *Use market-reliant networks: experts integrate knowledge through alliances, licensing and collaborative R&D. This is the biotech sector approach;*
 - ✓ *Use all the needed pieces of a puzzle (vertical integration): this is what big pharmaceutical companies do in the biotech sector.*

For the first approach, strong IP protection is needed. In the EO sector, the IP regime is very complex and risky. And the knowledge is tacit, i.e. cannot be precisely described in writing. Hence, the pace of learning together is slow; this makes collaborative projects run out of money very easily.

- ***In the EO sector, what is known from R&D pales in comparison to what remains to be understood***. The ability to learn from past experience is still low because of the tacit nature of this knowledge. The learning of any SME active in EO is the aggregation of what individuals know and the insights shared by the teams. Very often this knowledge is not formalised and cannot be codified easily: sharing experiences in market-reliant networks takes time.
- **Overall, the EO R&D process faces productivity issues**. This analysis suggests that, as shown by profitability growth, new anatomies must be searched to make EO services more productive:
 - ✓ *new sales models (like two-sided network approach)*
 - ✓ *new organisations and alliances (to either package products faster or find clients with more recurrent needs).*

Such anatomies will have to cope with the typical R&D uncertainty and related high risks of the EO sector, to allow interdependent problem solving and to harness the collective experience of several scientific and engineering disciplines.

III. Building business plans in practice in the EO/GMES area

As detailed later on in Chapter 9, building a robust business plan relies on convincing arguments that structure the five **key pillars** onto which any business model must be built:

- **VALUE** (the **WHAT?**), which provides an overall view of a firm's offering that represents a new, distinctive benefit or value for its customers;
- **CUSTOMERS** (the **WHO?**), which refer to the market potential for that value and to how the company reaches its customers and keeps them with the proposed value;
- **MANAGEMENT** (the **HOW?**), which refers to the management of the company's resources necessary to deliver the firm's value;
- **NETWORKING** capability (the **WITH WHOM?**), which measures the management's willingness to favour **open rather than closed innovation**;
- **FINANCIALS** (the **HOW MUCH?**), which is the culminating point of a business model, which permits a focus on the specific components of a business model contributing to the company profitability (revenue/cost structure).

The following sections address the key invariant issues which will have to be faced in the next decade to strengthen each of the five pillars. They all deal with a reinforcement of networking capabilities, very often indeed at worldwide level.

Focused long term co-operations

In order to allow interdependent problem solving and to harness the collective experience of several scientific and engineering disciplines, existing and future EO players must emphasize **focused long-term collaborations** allowing the sharing of proprietary information, joint learning and more productive research. This leads to several common sense approaches to catalyze **cooperative growth, as it is implemented in the biotech sector**:

- **Engage in exclusive license agreements** between public laboratories and start-ups especially when the newly-born company must build the full capability to sell the highly novel service (and this capability does not exist elsewhere);
- **Support non-exclusive license agreements** with public laboratories when the technologies involved have several development paths (still uncertain);
- **Focus R&D agreements** between start-ups/SMEs and public research organisations that have the two **distinctive features to minimize R&D costs**:
 - **Cross-disciplinary research teams** to avoid fragmentation of the knowledge and faster integration to reach the market earlier;
 - **“Translational” research**, i.e. where basic science can be easily translated into a specific service opportunity by public R&D players.

Overall, EO R&D will require more and more integration of different highly interdependent disciplines. This integration is a prerequisite for industrial application. Hence, *business models with more vertical integration in the R&D and in the business alliances will be favoured*. Vertical integration⁹ requires a degree of scale which implies that established large EO companies can improve their position to become integrators of R&D developed by small VACs. There are indeed signs of vertical integration coming from the success of virtual globes. Vertical integration can be anticipated to continue in the future as part of the satellite operators' strategy. Yet, addressing very diversified markets will pave the way to other business approaches, like the ones tested in the EOLES R&D project funded by the EC from 2000 to 2002¹⁰.

Teaming with complementary service/data providers to create more value for the customer

In today's EO VA industry, teaming with complementary service providers is used to a limited extent to mitigate the impact of the lack of highly skilled resources, which constrains operations and sales activities, especially in SMEs. Consolidation among these smaller VACs may be vital to the industry's future health. They can develop new niche markets using collaborative approaches to reach novel horizons together at European, if not at world level. EO VACs could work together in order to strengthen individual EO offerings and, in particular, to collaborate with other service providers outside the EO industry to deliver more complete solutions. The development of the MASS (Multi-Application Support Service System) platform by SPACEBEL, under ESRIN funding, goes along that direction¹¹.

⁹ Vertical integration describes a style of ownership and control. The degree to which a firm owns its upstream suppliers and its downstream buyers determines how vertically integrated it is. Vertically integrated companies are united through a hierarchy and share a common owner. Usually each member of the hierarchy produces a different product or service, and the products combine to satisfy a common need.

¹⁰ B. Stévenot, Spacebel, private communication (2007)

¹¹ See <http://services.eoportal.org/>

Another key element of the GMES value network is data suppliers. Data supply is a key part of the VACs ability to deliver. Hence, companies must work in close co-ordination with their data suppliers to ensure this critical resource is optimised for them, securing access within appropriate agreements. In parallel, the interoperability of data supply should be promoted and the access to multiple sources of data (EO or in-situ or air-borne) should be organized and negotiated.

Network management

In value networks, interdependency between the network players is crucial: the performance of each GMES company increasingly depends on its capacity to influence assets outside of its own boundaries. There are two main dimensions that structure the behaviours and attitudes of the network manager:

- the level of benefits that it gets from value integration
- the level of control it has on the network for pricing and making transactions happen.

Creating and capturing value requires very often a **central firm** exploring the potential to create value for customers in a radically new way and shaping the external environment. This central firm brings together players with different assets and competences.

As a general rule, attention must be paid to the governance rules of inter-organisational ties in the value network: they have to maximise the jointly created value and ensure that the created value is fairly shared among the network participants, so that each of them find more benefits than working in competing business systems.

Value distribution

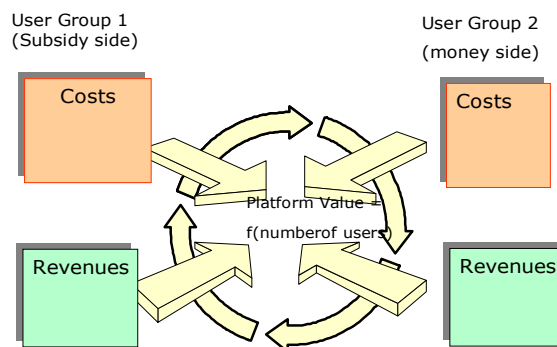
The viability of open business models is greatly dependent upon the **generation of value not only for the customer, but also for the network of firms that collaborate** to provide the product/service. Joint value creation is determined not only by the firm-level resources and aggregated competencies but also, and more important, on how effectively and efficiently resources are combined and governed at the network level. Therefore, **favouring value appropriation** by the different networks players **is a critical part of the business plan execution.**

Whereas major recent research studies have been focused on defining the determinants and measures of customer's value, there is little known about the value that is expected and delivered to firms through their participation in inter-firm networks. The value created has to be distributed among different participants (including the targeted customers). Value appropriation has to be also considered jointly with value creating at network level: the quality of the collaboration of the participants and the value-sharing among them determine how much value the network as a whole can create.

Value networks rely on long-term incentive structures to motivate participants: by joining the network, participants find that they are able to improve rather than working on their own. A general rule is to check that all players necessary for the smooth working of the value network find more benefits than working in competing business systems.

IV. A new promising approach: business plans relying on two-sided markets

Many EO/GMES business models fall into the category of **two-sided markets and networks**, which link markets from different sides of their customer networks through platforms.



There are **three key factors to be considered in designing business models in a two-sided market**:

1. **Pricing the platform**, i.e. determining which side should be subsidised, the degree of subsidisation and how much of a premium and for how long the other side would be willing to pay in order to have access to it. A price for each side of the market has to be chosen considering the impact on the other side's growth and its willingness to pay. As the number of "subsidy side" users is crucial to developing strong network effects, usually prices for this side are set below the level one would charge if the subsidy side were viewed as an independent market. On the contrary, the money side pays more than if viewed as an independent market.
2. **Managing the winner-take-all dynamics**: in some two-sided industries, only one company controls the platform (ex. eBay's auctions); in others, multiple companies share the dominant platform (ex. the DVD standard). When a network industry is likely to be served by a single platform, one must decide whether to share the platform with competitors or fight for its control.
3. **Facing the threat of envelopment by competitors**: A response to this threat is to change the business model, for example by switching or changing its money side (see the Google Map case against Microsoft) or finding new allies.

V. Conclusions

KEY FINDINGS AND PROSPECTS

- The EO based business will still involve a lot of new knowledge acquisition
- Hence, uncertainty is rooted in the RTD process since the process of “environmental” R&D cannot be split up into neat pieces, and the knowledge in the various disciplines is very often tacit or intuitive, which makes collective learning very difficult.
- This has the following consequences for GMES companies:
 - i) uncertainty translates into high, long-term risks
 - ii) integration is a prerequisite for application, in many industrial areas.
- Achieving integration requires the use of market-reliant networks and a trend toward more vertical integration
- Two-sided markets/networks, like the Google Earth model, should be studied to check that they can bring very rewarding ways of selling services based on Earth observation :
 - ✓ the end users would be left with very low purchase prices
 - ✓ the expert services would then be remunerated mostly from indirect “buy” effects from these end users

CHAPTER 7

THE PLACE OF EUROPE IN FUTURE WORLD COMPETITION

This chapter illustrates some of the on-going EU-supported networked research projects that will help new ventures succeed. It shows the networking activities that must be implemented to develop business models of interests at a European level, and the efforts to standardise upstream data for the downstream players.

1. The GEOLAND R&D network¹

Geoland (GMES products & services, integrating EO monitoring capacities to support the implementation of European directives and policies related to land cover and vegetation) aims at **developing and demonstrating a range of reliable, affordable and cost efficient European geo-information services²**, supporting the implementation of European directives and their national implementation, as well as European and International policies.

The products developed by GEOLAND use Earth Observation resources in combination with in-situ measurements, integrating them with existing models into pre-operational geo-information services. The GEOLAND service development and demonstration logic is closely linked to **user organisations** driving and reviewing each step and finally accepting the results after integration into their own environment. The user community currently involves 50 user organisations.

The project is structured into **three regional** and **three global observatories**, each of them supported by a core service providing basic geo-information inputs. An **Operational Scenario** is being established to define the geo-information infrastructure and satellite technology requirements to achieve a fully operational service.

GEOLAND Project structure



Source : <http://www.gmes-geoland.info/index.php>

¹ Source : GEOLAND web-site (<http://www.gmes-geoland.info/index.php>)

² Coordinator: Infoterra GmbH

GEOLAND **Regional Services**, focused on the **implementation of newly established European Directives**, are structured into: 1) a **Nature Protection Observatory** addressing the Habitats and Bird Directive, the Ramsar Convention, the Convention on Biological Diversity; 2) a **Water and Soil Observatory** addressing the Thematic Strategy for Soil Protection, and the Water Framework Directive; 3) a **Spatial Planning Observatory** addressing the European Spatial Development Perspective, and the European Spatial Observatory Network; 4) a **Core Service Land Cover** supporting the Observatories with cross-cutting land cover and land cover change products.

GEOLAND **Global Services** are directed towards the support of policies addressing Global Change and Sustainable Development, such as Natural Carbon Fluxes Observatory (ONC) addressing the UN Framework Convention on Climate Change; Food Security and Crop Monitoring Observatory (OFM) addressing the council regulations on Food Aid Policy.

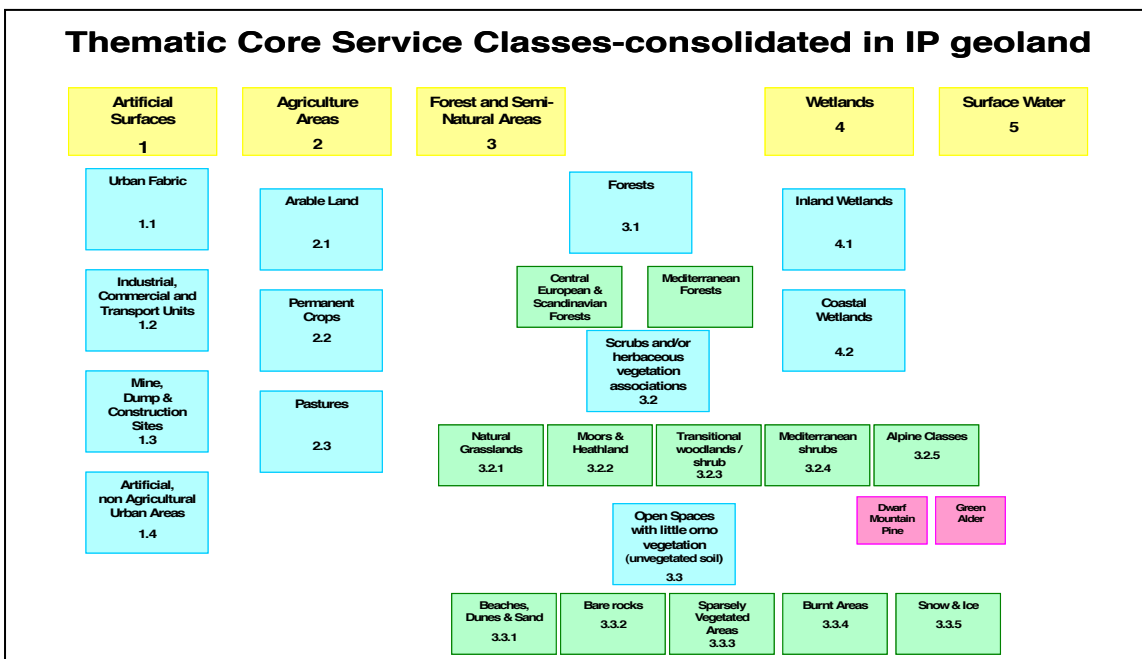
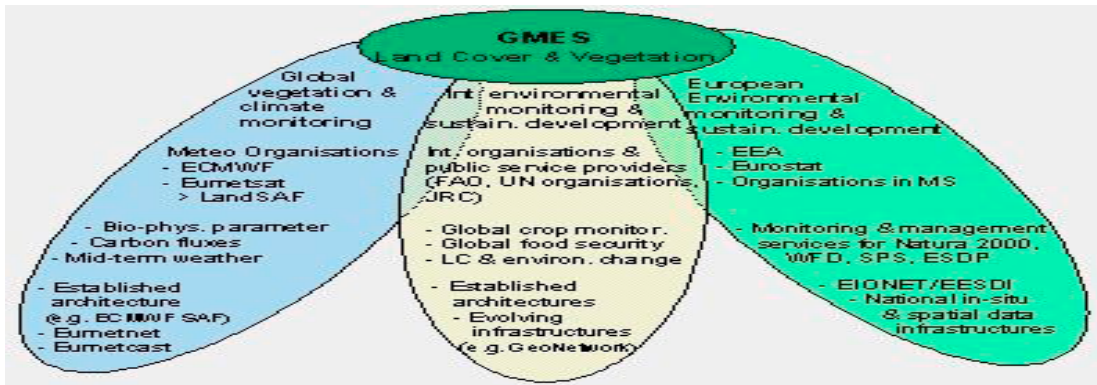
Two core services have been established serving the GEOLAND observatories:

- The **Core Service Generic Land Cover**, which provides GEOLAND regional observatories with harmonized, topical and geometric correct basic information on landcover. Reliable multi-purpose Land Cover data is the basis for a multitude of applications in **environmental management and spatial planning**.
- The **Core Service Bio-Geophysical Parameters (CSP)**, which supplies generic information on bio-geophysical attributes of land surfaces at regional and global scales to the global observatories within GEOLAND. The CSP products are spatialized parameters describing: the **vegetation**; the **radiative budget**; the **water cycle**. The users of CSP products are: Global Observatories within GEOLAND seen as precursors of GMES services (**Natural Carbon Flux**; **Food Security and Crop Monitoring**; **Global Landcover and Forest Change**); the national and international science community.

The **GEOLAND Operational Scenario** is branched into **three broad communities of geo-information demand and supply**:

- **Global vegetation and climate monitoring**: This community is driven by large European and national **meteorological institutions** (e.g. EUMETSAT, ECMWF), with established geo-information production and distribution architecture.
- **International environmental & sustainable development**: International Organisations and public agencies (UN, FAO, UNEP) are supporting the definition of the GEOLAND products on crop monitoring and food security, and land cover and forest change.
- **European environmental & sustainable development**: The subsidiarity principle determines a fragmented situation within Europe across sectoral policies (e.g. agriculture, environment, regional planning) and European to local levels of administrative mandates. Future organisation of European co-funding of GMES services in this domain could follow three principles: (1) direct European procurement to cover common European information needs; (2) European co-funding of national-level activities based on commonly agreed programmes; (3) INTERREG-type co-funding of regional authorities teaming-up to commonly procure geo-information services meeting European standards and quality guidelines.

GEOLAND Operational Scenario



II. The PREVIEW R&D network³

PREVIEW (PREvention, Information and Early Warning pre-operational services to support the management of risks)⁴ will provide new or enhanced information services for risk management in three thematic areas: **Atmosphere, Geophysics, Man-made**. Examples of services include: new early warning systems to better anticipate short-term risk (e.g., floods and landslides); crisis support services to allow more effective rescue operations (e.g. fire monitoring and rapid mapping); building 'risk maps' for different types of hazards, in order to improve prevention and preparedness measures. The service portfolio includes:

³ Source : PREVIEW web –site (<http://www.preview-risk.com>)

⁴ Coordinator : InfoTerra France

- **Windstorms** : Windstorm Risk Mapping; windstorm forecasting
- **Flood forecasting**: Medium-range plain flood forecasting; Short-range plain flood forecasting; Very-short-range flood forecasting; Northern flood forecasting;
- **Fires**: Fuel Parameters; Fire Danger indexes; Fire Meteo indices; Fires monitoring; Fire propagator; Fire damage assessment;
- **Landslides**: Monitoring of slow- moving landslides; Prediction of shallow rapid slope movements
- **Earthquakes & volcanoes**: Earthquake monitoring and damage evaluation; Volcanic monitoring and damage evaluation ;
- **Man-mades**: Dispersion forecasting of airborne Hazardous substances ;
- **General services**: Assets Mapping; Damage and disaster intensity assessment; Rapid Mapping.

The services are developed through extensive integration of space data, meteorological data, in-situ measurements, and exogenous data.

The provided services cover the risk management cycle, facilitating the exchange of information between all parties involved in the following phases: Prevention, Early warning, Crisis management, Post-crisis and recovery.

III. The MERSEA R&D network⁵

MERSEA (Marine Environment and Security for the European Area)⁶ aims at developing a European system for operational monitoring and forecasting on global and regional scales of the ocean physics, bio-geochemistry and ecosystems. The prediction time scales of interest extend from days to months. This integrated system will be the Ocean component of the future GMES system. At the core of the system is the collection, validation and assimilation of remote sensed and in situ data into ocean circulation models that allow for the self consistent merging of the data types, interpolation in time and space for uniform coverage, nowcasting (i.e. data synthesis in real-time), forecasting, and hindcasting, and delivery of information products.

The project develops **Marine Applications addressing the needs of both intermediate and end-users, whether institutional or from the private sector**, with the objective to:

- Improve the safety and efficiency of maritime transport and naval operations;
- Enable the sustainable exploitation and management of ocean resources (offshore oil and gas industry, fisheries);
- More efficiently mitigate the effects of environmental hazards and pollution crisis (oil spills, harmful algal blooms);
- Improve contribution to ocean climate variability studies and seasonal climate prediction and its effects on coastal populations;

⁵ Coordinator : IFREMER (« Institut Français de Recherche pour l'Exploitation de la Mer »)

⁶ Source: MERSEA web-site (<http://www.mersea.eu.org/>)

- Improve national security and reduce public health risks;
- Advance marine research with the aim to better understand the global climate, the ocean and its ecosystems.

The project will lead to a single **high-resolution global ocean forecasting system** shared by European partners together with a co-ordinated network of regional systems for European waters, which will provide the platform required for coastal forecasting systems. During the project, the main pre-operational systems will be transitioned towards operational status and three of the centres will converge on a single ocean model framework suitable for both the deep ocean and shelf-seas.

IV. What's next ?

There are still questions about the accessibility of the required information to build downstream applications.

As of to-day, there are still persistent risks in Europe that the information be locked-up by the main current stakeholders: large space companies and well established Research & Development Centers funded by public money, but trying to compete with industry. This is a key issue, which has to be dealt with by the EC and ESA in support of more sustainable business plans in the EO market.

IV. Conclusions

KEY FINDINGS AND PROSPECTS

There are on-going EU-supported networked research projects showing :

- the networking activities to be implemented to develop business models of interests at a European level
- the efforts to standardise upstream data for the downstream players.

There are still questions about the accessibility of the required information to build downstream applications.

There are still persistent risks in Europe that the information be locked by the main current stakeholders, viz.:

- large space companies
- well established Research & Development Centers funded by public money, but trying to compete with industry.

This is a key issue to be dealt with by the EC and ESA in support of more sustainable business plans in the EO market.

CHAPTER 8

EUROPEAN COMPANY PROFILES: SUCCESS STORIES

This chapter lists companies that are active in Europe on the EO/GMES segment, thus showing a panel of successful entrepreneurs selling knowledge intensive services in several sectors of the European economy.

Company Name	Country
<u>ACRI</u>	France
<u>Advanced Computer Systems ACS</u>	Italy
<u>ALTAMIRA INFORMATION</u>	Spain
<u>ARGOSS</u>	The Netherlands
<u>ATIS</u>	France
<u>born & partner GmbH</u>	Germany
<u>Brockmann Consult</u>	Germany
<u>CLS</u>	France
<u>DELPHI IMM GmbH</u>	Germany
<u>Deutsche Montan Technologie GmbH</u>	Germany
<u>EADS DS SA</u>	France
<u>EADS Fleximage SA</u>	France
<u>EFTAS</u>	Germany
<u>Envia Oy</u>	Finland
<u>ERA-Maptec Ltd</u>	Ireland
<u>Eurimage SpA</u>	Italy
<u>European Space Imaging</u>	Germany
<u>Eurosense</u>	Belgium
<u>FM-Kartta Oy</u>	Finland
<u>GAF AG</u>	Germany
<u>Gamma Remote Sensing AG</u>	Switzerland
<u>GEOAPIKONISIS LTD</u>	Greece
<u>Geographic Resource Analysis & Science (GRAS)</u>	Denmark
<u>Geospace GmbH</u>	Germany
<u>GeoVille GmbH</u>	Austria
<u>GIM</u>	Belgium
<u>HUGIN GmbH</u>	Germany
<u>I-MAGE consult</u>	Belgium
<u>InfoSAR Ltd</u>	United Kingdom
<u>Infoterra Ltd</u>	United Kingdom
<u>IPT informatica per il territorio srl</u>	Italy
<u>ISTAR</u>	France
<u>Kayser-Threde GmbH</u>	Germany
<u>Kell S.r.l.</u>	Italy

<u>KMMA-MRAC</u>	Belgium
<u>Kongsberg Satellite Services</u>	Norway
<u>Lantmäteriet/Metria</u>	Sweden
<u>MFB-GeoConsulting GmbH</u>	Switzerland
<u>NEO</u>	The Netherlands
<u>NOVELTIS</u>	France
<u>Novosat Ltd</u>	Finland
<u>NPA</u>	United Kingdom
<u>ORCHIS</u>	France
<u>Pandoro Value Added Services</u>	The Netherlands
<u>Planetek Italia</u>	Italy
<u>PRINS Engineering</u>	Denmark
<u>RapidEye AG</u>	Germany
<u>ReSe Applications Schläpfer</u>	Switzerland
<u>RSI</u>	Switzerland
<u>sarmap</u>	Switzerland
<u>SarVision BV</u>	The Netherlands
<u>Satellite Observing Systems Limited</u>	United Kingdom
<u>SciSys</u>	United Kingdom
<u>SCOT</u>	France
<u>SevenCs</u>	Germany
<u>SILOGIC</u>	France
<u>SIRS</u>	France
<u>SPACEYES</u>	France
<u>SPACEBEL</u>	Belgium
<u>Spot Image</u>	France
<u>SYNOPTICS remote sensing & GIS applications</u>	The Netherlands
<u>Teledata GeoConsult GmbH-srl</u>	Italy
<u>Tele-Rilevamento Europa - T.R.E. s.r.l.</u>	Italy
<u>Thetis S.p.A.</u>	Italy
<u>Vexcel UK</u>	United Kingdom
<u>VISTA Geowissenschaftliche Fernerkundung GmbH</u>	Germany

Source : ESA Earth Observation Market Development

CHAPTER 9

GOLDEN RULES TO LAUNCH NEW KNOWLEDGE-INTENSIVE SERVICES IN THE GMES AREA

This chapter provides golden rules to properly prepare and support the construction of business plan in the EO/GMES area. They are presented according to the business plan assessment techniques implemented by the INVESaT consortium, in order to provide the involved stakeholders with a common frame of reference to compare their opinions about the viability and attractiveness of any given business plan in that sector.

1. Background

A business plan¹ comprises:

- ➔ The **description of the value** of the service supply to one or several segments of customers
- ➔ The **strategy to be on the market** (including the architecture of the firm, the management, the network of partners for creating, marketing and delivering this value and the time to market)
- ➔ The **revenue and profit generation capabilities**, i.e. the capacity to generate profitable and sustainable revenue streams

Based on past approaches, such as the Gauntlet approach² or the Osterwalder and Pigneur's Business Model Ontology³, INVESaT uses five **key pillars** onto which any business plan can be built:

- 1) **VALUE** (the **WHAT?**), which provides an overall view of a firm's offering that represents a new, distinctive benefit or value for its customers;
- 2) **CUSTOMERS** (the **WHO?**), which refer to the market potential for that value and to how the company reaches its customers and keeps them with the proposed value;
- 3) **MANAGEMENT** (the **HOW?**), which refers to the management of the company's resources necessary to deliver the firm's value;
- 4) **NETWORKING** (the **WITH WHOM?**), the range of collaboration with other actors on the market
- 5) **FINANCIALS** (the **HOW MUCH?**), which is the culminating point of a business model, which permits a focus on the specific components contributing to the company profitability (revenue/cost structure).

Each of these pillars is addressed within a qualitative business plan assessment process available via the INVESaT web site and summarised in Annex 1. The questions preparing the assessment are now examined with the eyes of a GMES entrepreneur. Golden rules are given for the critical questions that are GMES specific. A promising business plan must address carefully such questions with answers adapted to the GMES background.

¹ Osterwalder and Pigneur (2004)

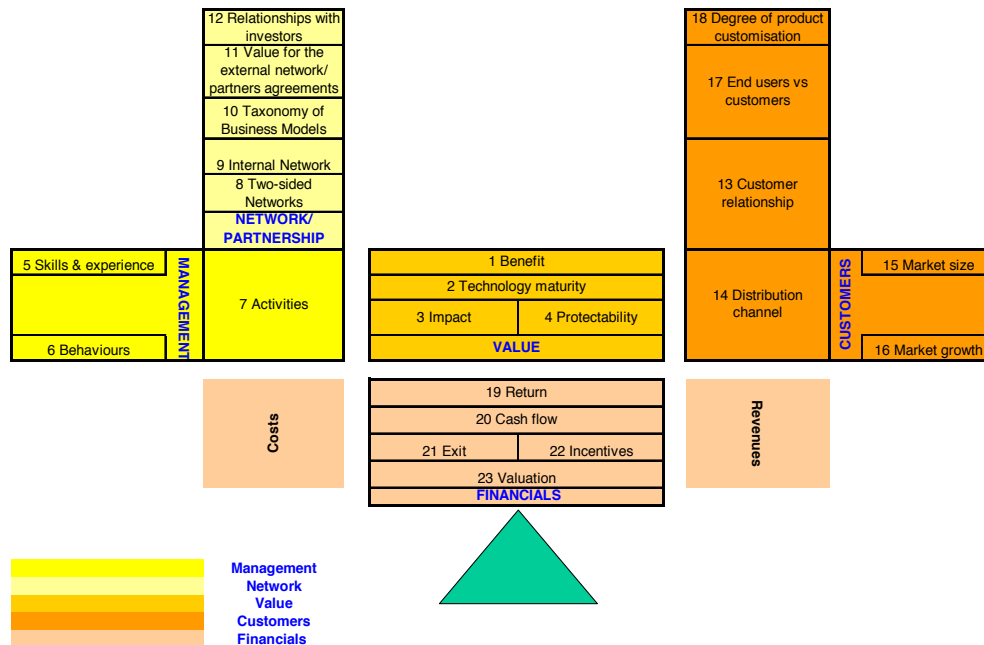
² The Gauntlet web site, The Library House, Cambridge

³ A business model ontology refers to what a business model actually is and of what it consists

II. The INVESaT approach

The INVESaT approach emphasizes that any **value proposition** is a balancing act between **costs** (management and network) and **revenues** (customers), as shown below.

The INVESaT approach to Business Plan description and comparison



What are the contents of each building block?

Value : The WHAT?

The Value refers to WHAT a firm offers to its target customer segments, representing a new, distinctive benefit or value for them. The key issues to be addressed by GMES companies under this pillar are:

- The *benefit*: the Unique Selling Proposition of the business activities, which explains the key benefits delivered to customers and differentiates the product from competing products (for instance, new or improved functionalities, lower price than competition, new services).
- The *technology maturity*: the stage of development of the used technology and data processing services (early, growth, mature, or declining stage).
- The *impact*: what makes the company's innovation a breakthrough (a new technology/product, an improved existing technology/product, a new service, an improved service, a combination of technology and service) and how the company's innovation compares to its direct or indirect competing solutions (strong differentiation versus small differentiation to direct competition).
- The *protectability*: the company's intellectual rights protection strategy (patent-driven, secrecy or copyright based), which is a key issue for GMES companies, whose services are often not patentable. Investors of all types prefer to invest in companies

with strong Intellectual Property Rights (IPRs),⁴ since IPRs are considered assets, representing a barrier to entry⁵

Customers : The WHO?

This pillar refers to:

- the customer or customer groups, whose needs are assumed to be satisfied by the firm's value proposition
- the market potential for the firm's proposed value
- the means used to reach customers and keep them with the proposed value.

GMES service companies must consider:

- *Market size and growth*⁶: market size⁷ estimation is difficult for science-based business models, especially when market prospects are based on breakthrough innovations⁸.
- *End-user vs. customer*: are services sold directly to end-users or to resellers?
- *Degrees of product customisation*: in the EO industry over 90% of the services show significant customisation or are customised for each delivery⁹. The drive for customized products should come from the customers rather than from the researcher's desire to innovate.
- *Distribution channels*: the network used by the firm to deliver its value proposition to the targeted customer segments. Nowadays, firms can expand their reach both because space and time become less relevant (web-sites are open 24hs/7¹⁰). This is an opportunity because this makes naturally fall a major obstacle to a company's growth (i.e. distribution networks), and a threat because barriers to market entry are lower and competition increases.¹¹
- *Customer relationship*: the way company acquires and retain customers. This involves building *trust and loyalty*. Crucial questions are: who are the *reference customers* and which customers have brought product validation steps?

Management: The HOW?

The Management Pillar refers to the management of the company's resources necessary to deliver the firm's value. In the GMES context, where firms are very labor-intensive, it refers to the *management of human resources*¹². Issues to be addressed are:

- *Skills*: the ability or talent of the company's key people to perform better than average. Are managers able to make quick decisions and take a managed risk in line with the time constants of the company activity?
- *Experience*: the management and the R&D team track record as well as the *management team's decision profile*. Balanced profiles help avoid poor decisions under adverse conditions.
- *Behaviors*, which cover the following aspects:

⁴ Kreisel J. (2007)

⁵ Barriers to entry are generally defined as a cost of entering a market that is already established. Entry costs are for example: marketing costs for gaining market attraction, accreditation costs, costs for human resources that are known in the market.

⁶ Market growth is the rate, usually expressed as a percentage per annum, at which the market is increasing in size

⁷ The part of the population (in size and value) with the economic capacity, requirement for, and access to purchase

⁸ The ISMA (Innovation Systemic marketing Analysis 360) methodology (CERAM, France) shows promising features, since relying on stabilizing processes that guarantee future value capturing.

⁹ ESA, Booz Allen Hamilton, Vega (2004)

¹⁰ Osterwalder A. Pigneur Y. (2002)

¹¹ Porter (2001) Strategy and the Internet, Harvard Business review, 79 (3), pp. 62-68

¹² Human resources are the people needed to create value with the other company's assets (tangible and intangible).

- *Motivation* (i.e. the reason(s) for engaging in a particular behavior), which can be strengthened by objective evaluations of human resources, and by making individuals accountable for performance and outcomes;
- *Climate*: how and by whom are decisions made, beyond the organization chart;
- *Identity*: the influence of the company's history on people and their sense of "belonging" to the company.
- *Activities*, i.e. the identification of the key activities performed inside or outside the company to deliver value to the customer.

Networking : With WHOM?

The Networking refers to the range of collaboration with other actors on the market. When a strong collaboration with other actors is established, we talk of open innovation. An innovation by a single actor is called closed innovation.¹³ GMES companies' success in coming with new value depends upon connecting with different partners. Companies have both *external networks* and *internal networks* to create and deliver their value to customers.

With regards to the *external network*, the key issues to be addressed are:

- *Two-sided network*¹⁴, where the first task is to determine whether the company's business can be conceived as a two-sided network
- *The choice of the Taxonomy of Business Models*¹⁵ the GMES company belongs to
- *Value for the external network*¹⁶, i.e. how are the firm's suppliers and alliance partners making value in doing business with the GMES company ("appropriability" of profits by the partners).
- *Partner agreements*, which can be either exclusive or non-exclusive agreements in sales and in distribution
- *Relationship with investors* (financial investors¹⁷, corporate investors¹⁸, private investors¹⁹), i.e. the frequency of the relations and the company's readiness to welcome new shareholders.

With regards to the *internal network*, the key issues to be addressed are:

- The *team reputation* and its capability of attracting other smart people
- The *vertical flow of information*, between management and business lines (marketing, R&D, etc.)
- The *horizontal flow of information*, between business lines
- The *exchange of information* between different functions (R&D, marketing, etc).

¹³ See: Center for Open Innovation , University of Berkely California (2006)

¹⁴ See Chapter 5 for a definition of Two-sided networks.

¹⁵ See pr. III of Chapter 9 for a description of the five taxonomies of business models.

¹⁶ See pr III of Chapter 6 for an in-depth description of the issues related to the external network management and value distribution.

¹⁷ Typically they include investing funds from banks, pension funds, endowments, insurance companies, etc primarily for financial returns. They can be independent (privately managed VC funds etc.) or captive (owned by banks, insurance companies, etc) players.

¹⁸ Typically they include investing funds from an industrial company/group, primarily for strategic reasons (such as window on technology) via a venture capital fund or on a case-by-case basis.

¹⁹Typically they include investing own funds based on various objectives. Private investors can be active or passive business angels or so-called high net-worth individuals

FINANCIALS : the HOW Much?

This is the culminating point of a business model, which permits a focus on the specific components contributing to the company profitability (revenue/cost structure).

Under this pillar, GMES companies must address:

- *Revenue model*: the ability of a firm to translate the offered value into money, i.e. revenue streams. Revenues can be made of different revenue streams with different pricing models²⁰, viz.: has the company multiple sources of revenue generation? What are the firms pricing mechanisms? Are these revenues depending on regulated tariffs?
- *Cost structure*: the structure of the costs (such as, labour/personnel, sales, marketing, and IRP costs) incurred by the firm in delivering its value to the customers. The cost structure sets a price tag on all resources, activities and partner network relationships that cost the company money²¹.
- *Returns*: the financial returns to attract private investors. Equity investors are capital gain oriented (investment–divestment), which translates into multiples (x-times money back) and into returns (ex. Internal Rate of Return).²²
- *Liquidity*: how long the company’s liquidity covers its payables.
- *Exit strategy*: the envisaged exit routes for investors (i.e. IPO²³, Trade²⁴, Buy –back ²⁵)
- *Incentives*: they are given to the management to avoid conflicting objectives with shareholders
- *Company Valuation*, i.e. the techniques used to determine the company value (discounted cash-flow valuation²⁶; relative valuation²⁷; real options valuation²⁸).

III. Golden rules for GMES markets

In the following section, the five pillars are addressed separately through a set of complementary questions, which are key to prepare the business plan assessment (see Annex 1).

For each of the five building blocks, **golden rules that apply for the EO/GMES markets** are emphasized based on the conclusions of the previous chapters. Thus, any future entrepreneur using the INVESaT assessment technique will be reminded of the few key issues that must be addressed in preparing a winning business plan.

1) Value proposition

The EO industry is extremely **diverse**. Its products and services may address many market segments:

- EO products and services have applications in support of important **public responsibilities**, including the management of natural resources, land cover and urban planning, weather forecast and climate change monitoring.

²⁰ Osterwalder A. and Pigneur Y. (2002)

²¹ Osterwalder A. and Pigneur Y. (2002)

²² See pr. III for a description of investor’s returns expectations

²³ The sale or distribution of a company’s shares to the public for the first time.

²⁴ Sale to an industrial or a strategic investor

²⁵ Buy-back of the shares of the company by its management

²⁶ It relates the value of an asset to the present value of expected future cash-flows on that asset.

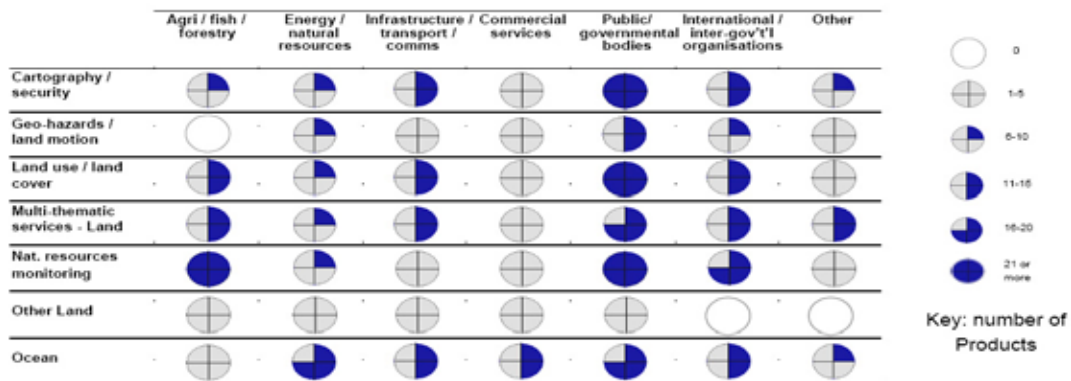
²⁷ It estimates the value of an asset by looking at the pricing of "comparable" assets relative to a common variable, like earnings, cash-flow, book value, or revenues

²⁸ It uses option pricing to measure the value of assets that share option characteristics

- from a **commercial perspective**, they can be used by a growing range of businesses, from insurance companies wishing to estimate the cost of a natural disaster, to farmers willing to apply precision farming techniques.

The table below combines the EO products, grouped in high level thematic areas, and the markets where these products are being sold²⁹. The majority of products and services are sold into several market segments and there is a clear link between certain types of customers and the products they are likely to buy.

Products versus Market Sectors

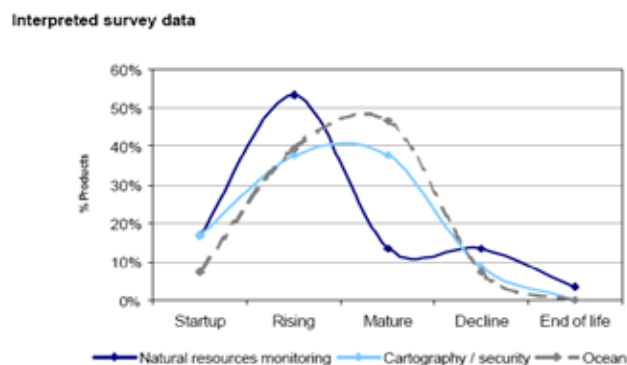


Source: ESA, Booz Allen Hamilton, Vega

To-day, three dominant portfolios of products represent over 60% of the total declared services and products (i.e. **natural resources monitoring; cartography /security; ocean**). These 3 main portfolios of products have a different degree of maturity:

- Ocean seems to be the most mature segment**, with about 50% of products in the mature stage.
- Cartography/Security is an established mature market**, with about 40% of products in the mature stage.
- Natural resources seem to be the least mature segment**, with the highest number of “Startup” and “Rising” products and services.

Product Maturity by Portfolios of Products

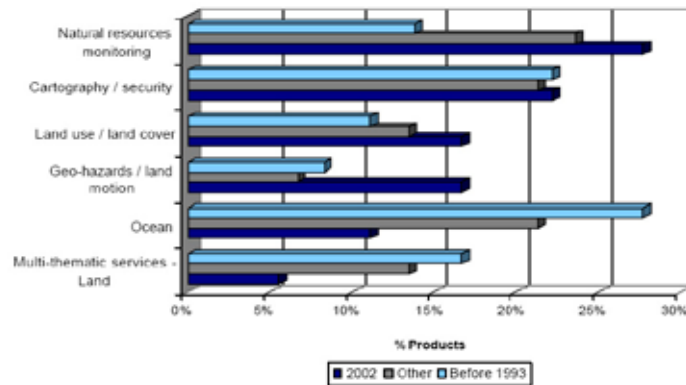


Source: ESA, Booz Allen Hamilton, Vega

²⁹ Source : ESA, Booz Allen Hamilton, Vega , “The State and Health of the European and Canadian EO Service Industry” Technical report, September 2004

These findings show that ocean and cartography products have been for much longer on the market than natural resource monitoring products, as shown by the chart below. Moreover, end users have different experiences in using these services.

Portfolios of products and services of different ages



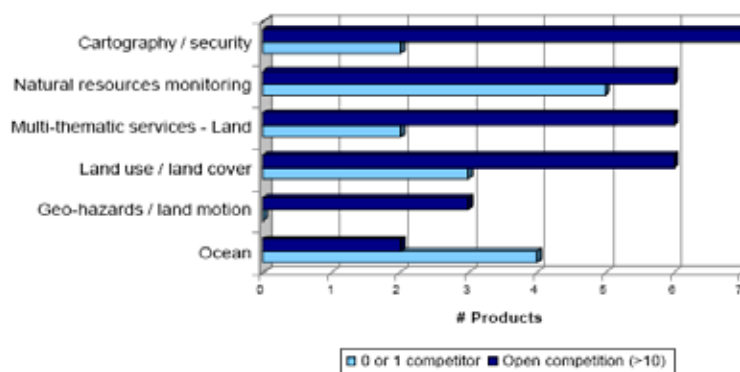
Source: ESA, Booz Allen Hamilton, Vega

The extent of direct competition varies across portfolios of products. There seem to be **3 kinds of services within the industry:**

- **services with a high degree of uniqueness where competition is weak** (e.g. Ocean).
- **services with a medium degree of uniqueness but with some open competition** (e.g. Natural resources monitoring),
- **services with a low degree of uniqueness and highly competitive**, i.e. open competition is much more common than single or unique competitor (e.g. cartography/security).

Portfolio of products comparison of high and low competition offerings

Survey data



Source: ESA, Booz Allen Hamilton, Vega

Questions to describe the value proposition	
Issues	Golden rules
Benefit	<p>The description of the Unique Selling Proposition must be concise and clear, giving non specialists a grasp of the expected benefits in simple terms, using understandable indicators of business performance for the clients</p> <p>Focus R&D agreements between company and public research organisations that minimize R&D costs:</p> <ul style="list-style-type: none"> • cross disciplinary research teams to avoid fragmentation of the knowledge and faster integration to reach the market fast, • translational research, where basic science can be easily translated into specific product/service opportunity by the public R&D players • comparison/alignment with technology readiness levels (TRL)
Technology maturity	<p>What is the stage of development of the technology you used?</p>
Impact	<p>What makes your innovation a breakthrough?</p> <p>How does your innovation compare to your direct or indirect competing solutions?</p> <ul style="list-style-type: none"> • Look for comparative advantage in price, quality and accessibility
Protectability	<p>What is your protection strategy?</p> <ul style="list-style-type: none"> • Accept exclusive license agreements with public laboratories only in the case where the newly born company must build the full capability to sell the product (and this capability does not exist elsewhere) • Accept non exclusive license agreements with public laboratories when the technologies involved have several development paths (still uncertain)
	<p>In case of a patent, what kind of patents have been applied for?</p>

2) Customers

The three typical features of business plans in the EO/GMES area are:

1) Balanced revenues from public and private customers

A self-sustaining company must show two main features:

- A proportion of revenues from public grants, R&D support, and other forms of subsidy that do not go over a reasonable limit (20%)³⁰;
- A balance of commercial product revenue from public (government) and private (corporate) customers.

Public clients can act as early adopters and groundbreakers, thus providing a stable demand for these innovative services. The participation of notable users, such as governments, can be especially important for attracting private companies. Moreover, public clients may help facing economic downturns, thanks to stable orders on topics of constant public interest (ex. meteorology).

However, diversified revenue sources are a necessary condition for the stability and sustainability of such revenues. The EO VA industry depends on public sector sales as the private sector uptake is low.

2) A mix of regional/national/international clients

The GMES industry includes:

- big players, able to address European or world-wide markets;
- small players focused on local niche markets, but with an increasing capability of understanding complex end-user's requirements in the EU-27 and beyond.

As market size and growth are major drivers for business, SMEs, willing to get into profitable long-term growth in the GMES area, **should operate at least Europe-wide**. To that purpose, SMEs should:

- **Address** in priority **regional markets that have a generic content** in EU27 (and most probably beyond), such as consistent monitoring of urban agglomerations, forest resource monitoring, precision farming, ground movement measurement for site engineering or pipelines integrity monitoring, etc.
- Join a **critical mass of players that develop together bundled, and possibly less costly, added-value services**. In particular, the participation of SMEs networks to the GMES consortia for the development of downstream services at regional level could help stimulate commercial domino effects from end-users in one region to end-users in another region.

³⁰ It is also important to establish a plan to decrease grants and subsidies over time.

Hence, the following key **factors should be considered by SMEs in order to get a good geographical mix of clients:**

- Demonstrated innovative capability already developed on regional markets
- **Willingness to operate at least on a Europe-wide basis**
- Willingness to go beyond a critical mass of players on added- value services through **collaborative efforts**
- Ability and willingness to implement **bundled GMES service supplies** within **SME groupings** to reach more customers with more global GMES applications
- Ability to **cross-fertilize expertise** with other GMES players in order to reach international clients.

3) Redefining customer segments, creating new segments or changing the buyer

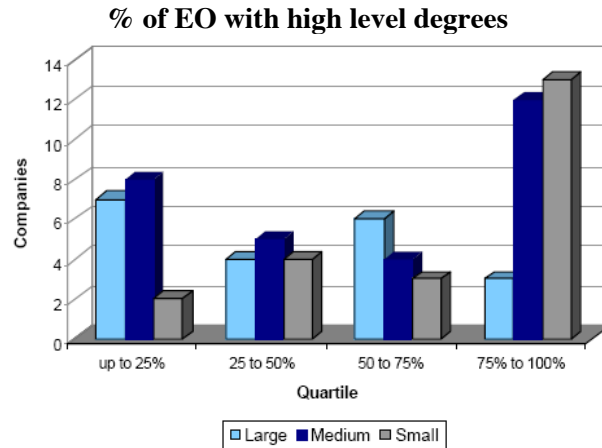
Last but not least, it should be mentioned that often even the most technologically-sophisticated companies generate superior shareholder value by focusing on unmet and overlooked customer needs rather than by focusing on technology alone.

Successful business models often tap huge unmet or overlooked needs by redefining customer segments, creating a new segment or changing the decision-maker within the existing customer base.

Questions on Customers		
Issues	Questions	Golden rules
End users vs Customers issues	Are your customers the end users of your product?	Provide evidence that after sales and maintenance services are an integral part of the supplied services
	Why is your current target market exciting?	
	What is your market's growth potential?	
Market Growth	Does your product create and capture new demand?	Study world market prospects whenever sales can be supported by the Internet or any other cost effective means
	What is the maximum size of your reachable market (in volume and in value)?	
	What is your current market share (in volume, value, %)?	
Market Size	What is the % of your export market over your current market share?	Potential clients that can be reached through direct channels by the company must cover at least the whole Europe
	How will your market share evolve over the next 3 years (in volume and in value)?	
Customer Relationship <i>Information Strategy</i>	Do you have any information strategy/tools for the collection and application of customer information?	Validate the persistence of two-sided networks to ease the sale process
	What are the validation steps customers have brought so far?	
	How many of your customers can be your reference customers?	
<i>Trust and loyalty</i>	Have you involved suppliers and customers during the entire product development process?	Validate the persistence of two-sided networks to ease the sale process
	What is your channel strategy to distribute your product?	
Channels		Validate the persistence of two-sided networks to ease the sale process
Degree of product customisation	To what degree are your products customised for different clients?	Validate the persistence of two-sided networks to ease the sale process

3) Management

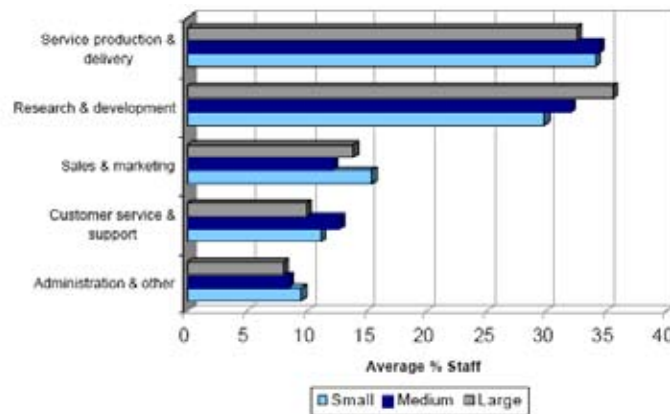
The dominant **profile of VACs** is typically a **small, specialised expert consultancy, offering niche services** with a high labour intensive content (similar in many ways to ICT or management consulting). In this context, VACs are highly specialised in terms of academic qualifications. Almost 60% of the ESA-funded study companies claimed that more than half their staff is educated to master degree or above³¹.



Source: Vega, Booz Allen Hamilton , ESA

The majority of staff effort is on R&D and service production, with smaller effort on marketing. Moreover, sales effort is typically led by senior executives, almost without relying on sales professionals. Their dual responsibility is an issue for small companies. They struggle to reach export markets cost-effectively and without endangering their other responsibilities.

Staff actives in business areas



Source: Vega, Booz Allen Hamilton , ESA

The above features indicate that the average team profile is characterised by highly qualified R&D people, who may lack key management abilities to ensure growth.

³¹ Small companies average 71% of staff with high qualifications, medium companies 56% and even large companies 47%. This may be a constraint to growth, as access to this level of skill is limited.

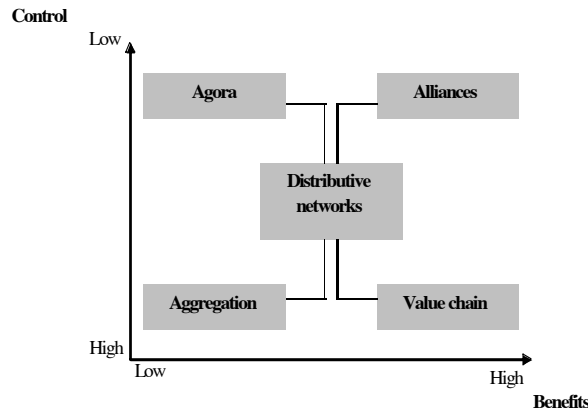
Overall, managers of VACs must exhibit a high flexibility to address four of the key challenges of GMES business:

- Manage R&D projects in relation with a continuously evolving client demand
- Take orders with minimal maturity and sales costs
- Network properly upstream (for R&D purposes) and downstream (to maximise added value)
- Generate enough cash flow to support R&D, marketing and sales activities.

Questions on Management/ Capabilities	
Issues	Questions
Skills	Do you have the best people in your field?
	Are managers able to make quick decisions and take a managed risk in line with the time constants of the company activity?
Experience	Has the management team done it before?
	Has the R&D team done it before?
	What is the track record of the management team?
	What is the track record of the other key members of the team?
	How would you define your management team's average decision profile?
Behaviours	
	Does your organisation have objective evaluations of human resources, based on clearly defined performance measures and assessments?
	Are your people performance measures and assessments based on individual, team or company results?
	Are individuals accountable for performance and outcomes?
	How and by whom are decisions truly made, beyond the organisation chart?
Identity	Are people influenced by the company's history?
	Have individuals a strong/low sense of belonging to the company?
	Golden rules
	Mix properly scientific and sales skills to show the team effectiveness at addressing the key business risks in a flexible manner
	Avoid the one man band syndrome, where decisions are taken primarily to meet high scientific standards rather than business growth
	Balance the team decision profile to address properly: <ul style="list-style-type: none"> • Complex customer demand with significant marketing and sales expenses • Cash-flow generation requirements to support intensive and continuous R&D activities
	Make sure that the whole management system is rewarding sales and profitability growth, rather than the scientific excellence of the services

4) Networking/partnerships

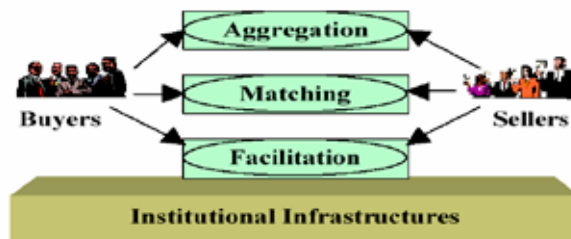
Based on value integration and the control over transactions, companies have the choice among five main business model taxonomies³², as depicted in the graph below.



The *horizontal axis deals with value integration*: the benefits gained by the user of the business model (either in terms of goods or services). Alliances and Value Chain maximise the benefits of value integration. The *vertical axis* deals with the level of control over pricing and flows of transactions.

Hence, five taxonomies can be identified:

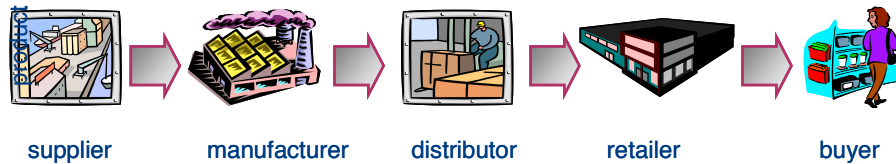
- **Agora:** Markets where buyers and sellers meet to freely negotiate and assign value to goods. Agora is a self-organising system. An auction might become a typical example of a market place for the sales of GMES raw data. Key features of this business model are dynamic pricing capabilities.



- **Aggregation:** one company positions itself as a value-adding intermediary between producers and customers, and leads in a hierarchical fashion. The aggregator takes the responsibility for selecting products and services, targeting market segments and setting prices. Aggregation is a highly hierarchical system: the Yoox Internet sale site is a typical example, which could be also an extreme mode of GMES data sales.

³² Tapscott et alia (2000)

- **Value Chain:** The context provider structures and directs a business network to produce a highly integrated value proposition. Key features of this business model are: process integration, supply chain management, product design. Typical examples in the IT sector are Dell computer, Cisco systems (integrator of software and hardware for personal computers or telecommunication systems).



- **Alliances:** It strives for high level of value integration, but without hierarchical control. Key features of this business model are creative collaboration for a common goal; rules and Standards. The business model subtypes are: research initiatives, development communities (free software community, such as Sourceforge.net)
- **Distributive networks** are probably those which best deal with telecom services sales and would apply to real time GMES operations

The networking activities must be in line with the chosen business plan strategy.

Questions on Networking/ Partnerships	
Issues	Questions
Two-sided networks	Can your business be conceived as a two-sided network?
	If yes, who are the two user groups?
	Which user group is your "money" side and which one is your "subsidy side"?
	Is one group of users more price sensitive than the other?
	Do you have any notable users? If yes, which ones?
Internal Network	Did you have any pre-existing relationships with prospective users?
	Is the team reputation capable of attracting other smart people?
	When does information flow vertically, between management and business lines (marketing, R&D, etc.)?
	When does information flow horizontally, between business lines? Is there a regular exchange of information between different functions (R&D, marketing, etc.)?
Taxonomy of Business Models you belong today	Which of the 5 types of business architecture is best describing your company Business Model?
	How are your suppliers making value with you in doing business? How are your alliance partners making value with you in doing business?
Value for the external network	Are you bound by exclusive partnership agreements in sales?
	Are you bound by exclusive partnership agreements in distribution?
Partner agreements	What type of investors are you in contact with?
	Do you have regular relations with the investor world?
Relationships with investors	Are you ready to welcome new shareholders in the future?
	Golden rules
	Evaluate the possibility of implementing two-sided markets to sell your services with higher profitability and potential wider audience
	Provide clues about transparent management rules (quality certification of the company can be a solution)
	Make sure that your business model addresses value integration and control over commercial transactions properly
	Indicate the possible routes for increased upside potential
	Stress how much freedom is left to act/re-act
	Address the ways and means implemented by the management to cover R&D and commercial risks properly based on solid management guidelines

5) Profitability/Financials

Two critical issues are at stake: cash flow and valuation.

Cash flow

The EO industry is characterised by highly sophisticated products, constant technological innovations and ever-changing demands as the market evolves, which lead to a high rate of product customisation. This implies that high cash-flows are key to ensure the business sustainability. However, there are indications that EO companies in all size ranges do have too little cash flows, in terms of current and quick ratios³³.

In the EO VA industry, whilst the trend is upwards, many companies remain below the ‘safe’ level of 1 (for the current ratio) and the industry remains below benchmarks. For example, current ratios for engineering companies in the EU are 1.5 and in the US 1.1, while the EO industry as a whole is 0.89.

By comparison, financial institutions (where a liquidity ratio may be defined as the ratio between its liquid claims and liquid liabilities) always have sufficient liquidity to meet foreseeable and conceivable payment liabilities over a specified period, or provide a buffer for unexpected developments. The ratio is usually calculated for four periods, namely liquidity within one month, from one and up to three months, from three and up to six months, and from six and up to twelve months. In particular, the ratio of liquid claims (cash receivables) to short-term liabilities (cash payables), which fall due or can be liquidated within the three-month period must not be lower than 1.

In the EO sector, a number of companies have such poor liquidity that just a few weeks lapse in revenues could result in a severe cash-flow crisis. As a rough indication, an ESA-funded study³⁴ assessed how many months without revenues the company could survive by paying its short-term liabilities out of its current assets, i.e. when its current assets are exhausted. Out of the 30 VACs, who supplied sufficient data to be analysed, 23 would exhaust their short term assets financing their short term liabilities within 6 months.

Valuation

Trying to value EO/GMES companies on the basis of R&D projects facing years of technical and commercial uncertainty is a daunting task: very often, the information provided by managers is not adequate. Most EO companies are reluctant to give away know-how to outsiders based on the disclosure of whether their R&D project works. With this information asymmetry gap, even the most sophisticated valuation techniques (such as real option) have limited use. However, full disclosure of all information, including financials, is mandatory in the investor due-diligence process, and therefore expected.

³³ Two liquidity ratios are used to assess the trends in the short term liquidity of a company:

- **the current ratio**, which is calculated as current assets, divided by current liabilities
- **the quick ratio**, which is calculated as current assets excluding inventories, divided by current liabilities.

These current and quick ratios illustrate a company’s ability to meet its short term obligations and withstand unexpected events; low scores create cause for concern.

³⁴ “*The State and Health of the European and Canadian EO Service Industry*” Technical report, September 2004, ESA, Booz Allen Hamilton, Vega

Moreover, the overall return on investment (ROI) of these companies is often not timely phased with what venture capitalists expect from other sectors. Venture Capitalists' (VC) return expectations (per deal) are typically above 50% p.a. (investor's view), especially since most investors maintain a portfolio (venture capital fund), which should reach a compound IRR of 25+ % p.a. Since funds are typically set up for a term of 10 years, investment needs to be made up to the 5th year of a fund and investments (per deal) must be realized (exited) within 3-6 years.³⁵ In other words, early-stage technology VCs aim at a fund multiple of 3 or more, respectively at deal multiples higher than 10 (or, e.g. more than half the fund volume)³⁶. Let us stress that the investor return on investment potential must not be confused with the NPV or IRR calculations of the company. Investor returns are solely determined by their cash-on-cash realization of an investment, which in turn yield different returns.

Also, the **publicly held configuration works only for companies with stable earnings whose prospects can be judged by investors transparently**. Public equity markets are not designed to deal with the challenges of science-based businesses. As a matter of fact, classical valuation processes face three issues:

- negative earnings from the start and sometimes for many quarters,
- absence of historical data on which forecasts can be based;
- lack of comparable firms in the same line and scope of business and of the firm being valued (this is compensated by discount factors applied within the valuation techniques, such as the price/earnings ratio)

Hence, EO start-ups and SMEs should rather **search for long-term strategic equity (from corporate investors)**, favouring corporate downstream users of the know-how as shareholders together with the founding entrepreneurs or serving a “window on technology” strategy of a corporate investor and thereby enabling for accelerated growth or more efficient distribution channels. This ensures a longer-term perspective as VC requirements in terms of returns expectations and exit time are somewhat relaxed for corporate investors business. Moreover, this allows quasi-public equity (shares publicly traded with the corporate investor owning a majority stake) in case of successful growth, the entrepreneurs and venture capitalists seeing the fruitful completion of their efforts when selling their shares on the stock market.

Finally, if the business has international potential, it is almost mandatory to get **several investors** on board (syndication), for instance in order to prepare market entry in another country, which might be enabled by the investor's network (see for example the RapidEye business case).

³⁵ In some countries VC investments only gain the acceptance of equity if the investment is made for 5 years or more. Thus when taking VC, the IFRS (International Financial Reporting Standards) requirements must be clarified.

³⁶ Source : INVESAT paper “Investor Perspectives” (2007)

Questions on Profitability/ Financial performance	
Issues	Questions
Revenue Model	Do you have multiple sources of revenue generation?
	What are your pricing mechanisms (including revenue elements that generate additional revenues, for instance via after sales and maintenance)?
	Are these revenues depending on regulated tariffs?
	If yes, who sets the regulations?
	What is the % of your international (Europe or outside Europe) sales on the overall sales?
Cost model	What are the sources of your revenues: public vs private?
	How much R&D investment represents in % of your revenues?
	What are the major components of the cost of goods sold (COGS)?
	What is the labour/personnel cost directly related to manufacturing?
	What are the key factors of your cost drivers?
	What are the sales costs as a % of your revenues (last year accounts)?
	What are the marketing costs as a % of your revenues (last year accounts)?
What are the IPR costs as a % of your revenues (last year account)?	
Returns	Do you have several providers on the goods purchased?
	What returns do you expect to bring to your investors?
Cash	For how long can your cash cover your payables?
	What is the exit strategy of the investors?
Exit	Are the management and investors pulling together?
	Do you use valuation techniques to value your company?
Company Valuation	If yes, which approaches to valuation do you use?
Golden rules	
Set revenues to support tough cash flow constraints due to high R&D needs	
Avoid public equity funding schemes when high R&D efforts are at stake; the publicly held configuration works only for companies with stable earnings that can be judged by investors transparently	
<ul style="list-style-type: none"> • Search for long term corporate equity, favouring corporate downstream users of the know-how as shareholders with the founding entrepreneurs. • Provide realistic levels of return to your investors! 	
Demonstrate the validity of your contingency plans in case of cash shortages	
Avoid buy-back in the first step	

ANNEX I

The INVESaT evaluation questionnaire aims at facilitating the assessment and comparison of GMES business cases, which have been studied based on the INVESaT ex-post questionnaire. Provided that all the questions raised in Chapter 9 have been answered properly, the evaluation questionnaire below allows a set of evaluators comparing their own opinion about a business plan and inferring improvement actions to reach an acceptable version which will be defended in front of investors.

The evaluation questionnaire consists in a set of 12 questions that address each of the five studied business plan pillars: *Value*; *Customer*; *Management*; *Financials*; *Network*.

These questions are reported below for each of the five pillars.

1.	Value
1.1	Is the claimed value consistent with the expected client portfolio demands?
1.2	Can this value be protected enough to prevent from copying?
2.	Customer
2.1	Are the client targets consistent with the claimed revenue and profit growth?
2.2	Are the proposed market channels consistent with the innovation features (client X market)?
2.3	What are the yearly growth rates of such promising markets?
3.	Management
3.1	Is the management team suited to address the business cash-flow requirements?
4.	Financials
4.1	What is the anticipated growth in revenues?
4.2	Is the financing structure attractive to VCs?
4.3	Are exit strategies for financial partners established?
4.4	Is the return potential exciting for investors?
5.	Network
5.1	Is the foreseen networking with outside partners in line with the future business challenges?
5.2	Is the network rewarded enough by the proposed business?

INVESaT Business case evaluation questionnaire

The key features of the “Value”, “Customer”, “Management”, “Network” pillars are assessed based on a probabilistic approach, i.e. the probability to meet the statement defined by the question.

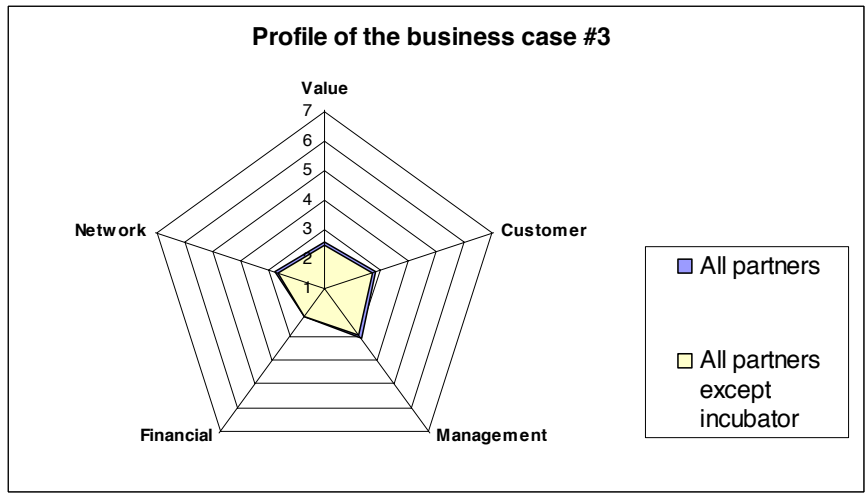
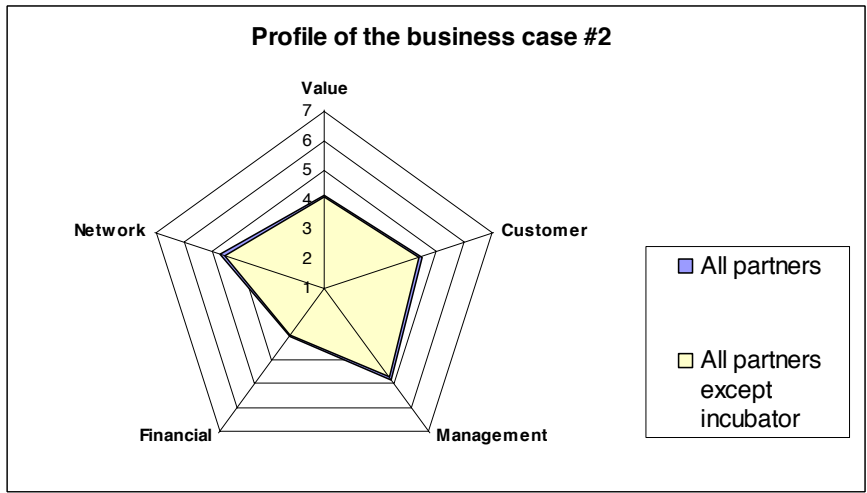
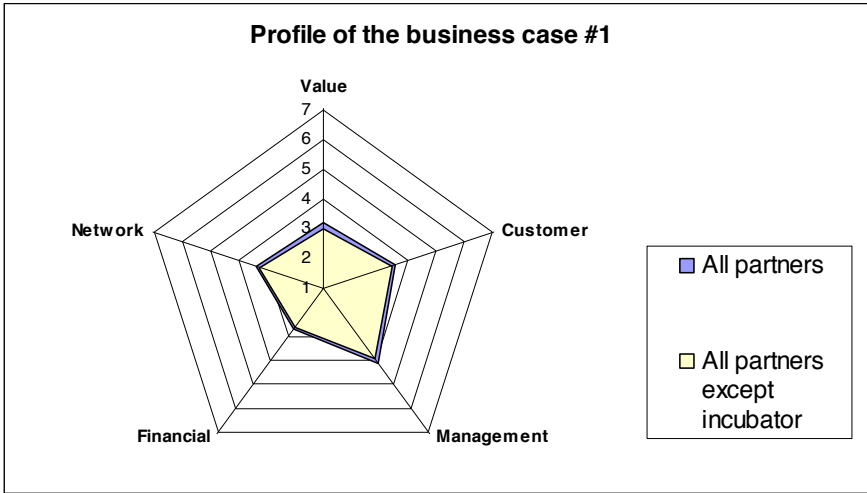
1	2	3	4	5	6	7
Not at all (10%)	Very unlikely (25%)	Quite likely (33%)	Likely (even, 50%)	Very likely (66%)	Close to optimal (75%)	The statement will be met with a 90% probability

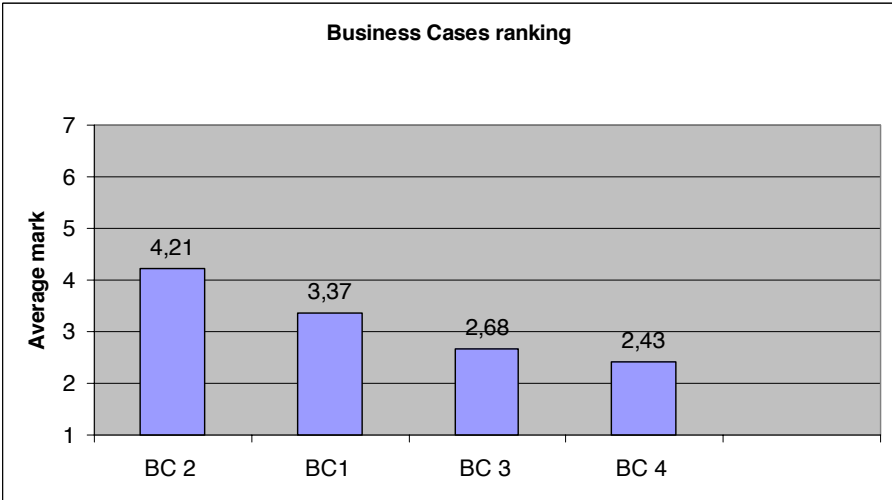
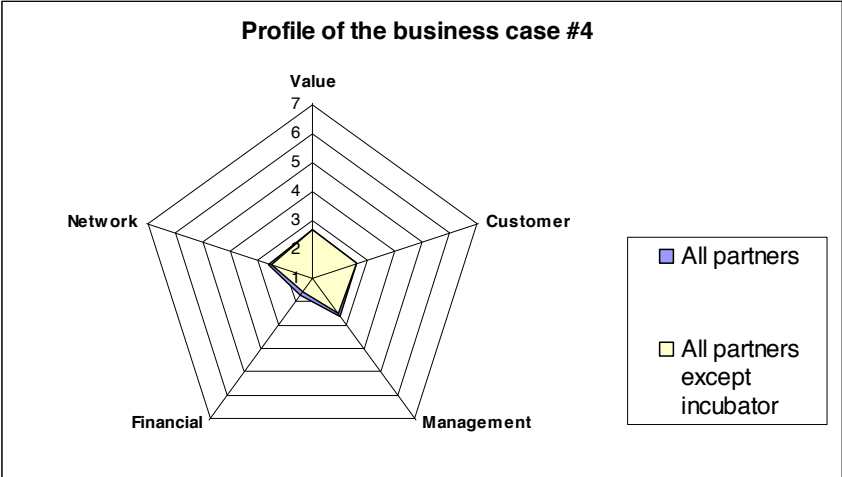
	1	2	3	4	5	6	7
4.1	<10 MEUR p.a	10-20 MEUR p.a	20-40 MEUR p.a.	40-60 MEUR p.a	60-80 MEUR p.a	80-100 MEUR p.a	>100MEUR p.a
4.2	No equity needs	Equity financing needs below 1 MEUR	Low equity ratio and medium revenue growth	Low or medium equity ratio + medium revenue growth	Medium equity ratio (10-30%: medium) + high revenue growth	Low equity ratio (equity ratio: <10%) + high revenue growth (> 60 MEUR p.a.)	Low equity ratio (equity ratio: <10%) + high revenue growth (> 100MEUR p.a.)
4.3	Majority shareholder (not founders + Management)	Minority shareholder (not founders + Mgmt) and independent entity or equivalent	Minority shareholder (founders are Mgmt) and independent entity or equivalent	Objective to establish independent entity or equivalent	Independent entity with clear management	Independent entity with clear management and anticipated trade sale	Independent entity with clear management and anticipated IPO
4.4	ROI <15%	ROI of 15-20%	ROI of 20-30%	ROI of 30-40%	ROI of 40-50%	ROI of 50-60%	ROI of >60%

With regards to the “Financials” pillar, the choice is among the following replies.

Based on the evaluation questionnaire, real-time voting sessions, using an electronic voting system, allow to collectively building *business case profiles*, with average scores for each pillar.

Four examples of ranking business cases profiles are provided below together.





BIBLIOGRAPHY

- BORDIA R., KRONENBERG E. , NEELY D. (2005),
“Innovation’s ORGDNA”, *Booz Allen Hamilton*, USA
- GRUNREICH D. (2007)
“GMES Fast Track Land Monitoring Core Service -Strategic Implementation Plan- Final Version, 24/04/2007“, *Land Monitoring Core Service Implementation Group*
- DELOITTE RESEARCH (2002),
“Deconstructing the formula for business model innovation-Uncovering value-creating opportunities in familiar place”, A competitive strategy study by *Deloitte Consulting and Deloitte & Touche*
- EISENMANN T., PARKER G., VAN ALSTYNE M.W. (2006),
“Strategies for two sided markets”, *Harvard Business Review*, 84, no. 10, pp. 92 -104
- ESA, BOOZ ALLEN HAMILTON, VEGA (2004),
“The State & Health of the European and Canadian EO Service Industry” Technical report, *European Space Agency Contract Report*
- EUROPEAN COMMISSION (2001),
Communication from the Commission to the Council and the European Parliament, “Global Monitoring for Environment and Security (GMES), Outline GMES EC Action Plan”, (Initial Period: 2001 – 2003), *COM(2001) 609 final*, Brussels, 23.10.2001
- EUROPEAN COMMISSION (2004),
Communication from the Commission to the European Parliament and the Council “Global Monitoring for Environment and Security (GMES): Establishing a GMES capacity by 2008 - (Action Plan (2004-2008)) », *COM (2004) 65 final*, Brussels, 3.2.2004
- EUROPEAN COMMISSION (2005),
Communication from the Commission to the Council and the European Parliament, “GMES: From Concept to Reality”, SEC (2005)1432, *COM(2005) 565 final*, Brussels, 10.11.2005
- EUROPEAN COMMISSION (2007),
“GMES –Status and Perspectives”, GMES Bureau, DG Enterprise H5, EC, presentation at the Space Info Day, 8 March 2007
- EUROCONSULT, HELIOS and BERTIN (2007),
“Assessment of the Downstream Value-Adding Sectors of Space Based Applications” – *Final Presentation, ESA HQ*
- GHIRON F. (2007),
“Business development from space infrastructures: The European Paradox. A down-to-earth vision of SMEs and incubators involved in the development of innovative business applications” *European Parliament, Mini-Hearing on Space “A European Space Policy: A new Approach to Industrial Policy”*

- HERNANDEZ D. (2004),
 “Possible scenario for future mission in Earth Observation”, *CNES, Acta Astronautica*, Vol. 56, Issues 1-2, January 2005, pp. 9-15, 4th *IAA International Symposium on Small Satellites for Earth Observation*
- KREISEL J. (2007),
Investor Perspectives, INVESaT paper
- OECD (2005),
Space 2030, Tackling Society’s challenges, Paris
- OSTERWALDER A., ONDRUS J., PIGNEUR Y. (2005),
 “Skype's Disruptive Potential in the Telecom Market: A systematic comparison of business models”, HEC (“Hautes Etudes Commerciales”) Lausanne Working paper, Preliminary draft, *University of Lausanne*, Switzerland
- OSTERWALDER A. , PARENT C. , PIGNEUR Y. (2004),
 “Setting up an ontology of business models”, *University of Lausanne*, Switzerland
- OSTERWALDER A. , PIGNEUR Y.(2002),
 “An e-Business Model Ontology for Modelling e-Businesses”, 15th *Bled Electronic Commerce Conference e-Reality: Constructing the e-Economy*, Slovenia
- PISANO G. (2006),
 “Can Science be a business? Lessons learnt from Biotech” *Harvard Business Review*, 84 n. 10, pp. 114-151
- RAPIDEYE (2006),
 “The Global geo-Information expert–Satellite–based ICT businesses accessing financing: Challenges and opportunities“, *RapidEye’s presentation*, Brussels
- TAPSCOTT D., LOWI A., TICOLL D. (2000),
 “Digital Capital –Harnessing the Power of Business Webs”, *Harvard Business School Press*, product 1933, 288 pp.
- VAN MOL B., RUDDICK K. (2004),
 ”The Compact High Resolution Imaging Spectrometer (CHRIS): the future of hyperspectral satellite sensors. Imagery of Ostende coastal and inland waters” Proceedings of the Airborne Imaging Spectroscopy Workshop - Bruges, *Royal Belgian Institute for Natural Sciences (RBINS)*
- VANHAVERBEKEN W., CLOODT M. (2005),
 “Open innovation in value networks”, *Department of Business Studies Hasselt University and Eindhoven Center for Innovation Studies, Eindhoven University of Technology*, in Chesbrough H., Vanhaverbeke W., and West J., eds., *Open Innovation: Researching a New Paradigm*. Oxford: Oxford University Press, pp. 258-281

Main web-sites:

- ESA, EODM (Earth Observation Market Development) database
- EADS
- GMES
- GEOLAND

- INVESaT Wiki
- MERSEA
- PREVIEW
- Spot Image
- Thales Alenia Space
- Telespazio
- The Gauntlet



‘Bridging the gap between **IN**novative enterprises and financial **InVE**stors
in the emerging ICT markets of **SaT**ellite applications’

PROJECT DESCRIPTION

Co-ordination action

Strategic background

In the ICT sector in the USA, Japan, or Europe, **innovative services** are already in use based on **large scale space-based investments**: they involve earth observation, telecommunication, navigation, timing and positioning satellites.

In combination with the advent of powerful handheld terminals and the demand for ubiquitous services, it is expected that info-mobility applications will reveal new sources of business in the years ahead, using in particular the **GMES, EGNOS and future GALILEO** systems to position any feature or user anywhere in the world within a range of a few meters. Hence, satellite based capabilities must be seen as new and unique opportunities for Europe to enhance economic development in the **knowledge economy**.

This growth potential has already been grasped by many small companies in Europe. Yet, the actual business growth rate for many European players appears below expectations when compared with the US experience following the launch of the GPS positioning system. Europe must therefore overcome **intrinsic barriers** to seize these new business opportunities faster and with more economic impacts.

Objectives of the INVESaT project

The overarching goal of the INVESaT project is to:

consolidate and disseminate in a coordinated way, the knowledge components that are required to stimulate and support more efficiently investments in innovative services which will make use of satellite capabilities in earth observation, navigation, timing, geo-positioning and telecommunications.

The above goal has been split into a set of five sub objectives:

- | | |
|----|--|
| O1 | To identify the critical generic and specific innovation financing features of SME-based business models which involve the applications of Europe’s satellite capabilities |
| O2 | To reinforce and extend the connections of the ESINET network with European investors willing to invest in innovative services making use of satellite capabilities |
| O3 | To develop and validate specific good practices, guidance materials and tools addressed to be used by entrepreneurs, incubators or investors willing to finance innovative services making use of satellite capabilities |

- O4 To disseminate and further validate the results towards the key stakeholders (ranging from companies involved in satellite development and operations, to regional investors or entrepreneurs that are examining the development of new and innovative services using these satellite capabilities)
- O5 To prepare and deliver policy lessons and recommendations regarding public-private partnerships that are able to use satellite capabilities, and their wealth of added value data flow to the benefits of the enlarged Europe.

INVESaT consortium

The INVESaT consortium is a group of complementary organizations involved in the stimulation and the support of innovative SMEs in the area of satellite based services. Most of them are members of the ESINET network.

CONSORTIUM	Participant organisation name	Country
Coordinator	European Business & Innovation Centre Network (EBN) www.ebn.be	Belgium
Expert partners	European Space Agency (ESA) www.esa.int	The Netherlands
	Capital High Tech (CHT) www.chtech.fr	France
	Joerg Kreisel International Consultant (JKIC) www.jkic.de	Germany
	Technofi S.A. www.symple.tm.fr	France
	D'Appolonia S.p.A. (DAPP) www.dappolonia.it	Italy
Incubating structures	"Centre International de Communication et d'Opérations Multimedia" (CICOM) www.cicom.fr	France
	Hermia Business Development (HERMIA) www.hermiayritysheitys.fi	Finland
	Hertfordshire Business Incubation Centre (HBIC) www.hertsbic.co.uk	UK
	Consorzio per l'AREA di Ricerca Scientifica e Tecnologica di Trieste (AREA) www.area.trieste.it	Italy
	Barcelona City Council Local Development Agency (Barcelona Activa) www.barcelonactiva.es	Spain
University	Business School of Finance & Management (HfB) www.frankfurt-school.de	Germany

For more info: www.invesat.com

