Comprehensive Industry Survey

A study into the State and Health of the European EO Services Industry

Final Report

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Industry Survey:

Report on the State and Health of the European EO Services Industry.

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1. Introduction

The EO Services industry in Europe provides geo-information information products based on satellite data. It embraces various elements of the supply chain from the supply of data coming from owned or licenced satellites, to downstream service providers comprising value-adding industry which turns the satellite data into information products and geographic information (GI) service providers which supply information based on the VA products.

The previous survey on the state and health of the industry was conducted in 2007/2008 using data for the year 2006. A lot has changed in the industry in that period and it was time to update this data and provide a new view on the status of the industry.

Amongst those changes has been the launch of a number of new satellite systems, often privately owned, offering new sources of data, as well as progress towards the launch of the GMES Now Copernicus) Sentinel satellites and many developments in technology such as “the cloud” and crowd sourcing. The period 2006 -2012 has also seen the financial and economic crisis that has affected many businesses and public activities including the scale of public budgets. Our goal is not to address each of these effects *per-se* but to look broadly at the industry and how it is evolving.

The actual survey was carried out in the period November 2012 to March 2013 with a total of 133 companies providing some substantial response to our request. The data we gathered was then analysed and the results are presented in this report.

The survey provides new results and insights into the shape and health of the European and Canadian EO services companies. It identifies the issues that they face and the concerns that they have. It also presents a picture of a vibrant sector which is growing and changing.

The data collected forms a rich database of industry parameters and views. It will serve as the basis for further analysis going beyond the questions that we have specifically addressed in this report.

Our goal will be to update this survey on a regular basis and some of the questions that are been asked have been done so with this objective in mind; namely that we shall be able to build up a series of trends as a result of future surveys.

We should like to thank the representatives of every company that took the time to respond and hope that you agree with our view that the picture resulting is a very interesting one; rich in data and information. We should also like to thank ESA for their continued support in the work which will be a valuable resource for the future.

2. Methodology and Responses

2.1. Overview

The survey was conducted between December 2012 and March 2013. A general indication of the methodology is represented in Figure 2-1.

The previous survey conducted in 2007 was used as a starting reference as far as possible to establish some continuity in measurements. Whilst the final report from the previous survey was not published, we had access to the preparatory material, the published executive summary and some raw datasets.

A set of indicators was prepared as a starting point which defined what we were looking to measure. The indicators were used to prepare a full list of questions and to ensure that all issues would be addressed. We should note that once the questionnaires had been prepared we revisited the list of indicators on several occasions. In a final revision of the questionnaires, to reduce the potential length of time required to respond, some indicators were dropped. We used experts coming from EARSC members to review the set of indicators and the initial questionnaires.

The questions were then formulated in two categories which we refer to as the "core" and "full" surveys. The goal of the core survey was to have a set of questions to be filled in by the respondent on-line. The questions were primarily numerical and the approach allowed respondents to prepare their figures off-line. The full survey was conducted by telephone interview and contained more questions of an open nature where discussion would aid and clarify the response.

We first tested both questionnaires on a selected few companies representing a limited number of the EARSC directors.

The next step was to send an e-mail to all 365 companies inviting them to complete the core survey. Reminders were sent on 2 occasions. As part of the core survey we asked companies whether they would be ready to complete the full survey interview which we followed up if positive.

As will be explained later, part-way through the process we adapted the core survey as a result of the returns received. In the course of the core survey we called many companies to encourage their participation, to clarify their input and / or to ask for some specific data.

Once all the data had been collected it was left to analyse the results and prepare this report. Some of the detailed aspects are discussed further.

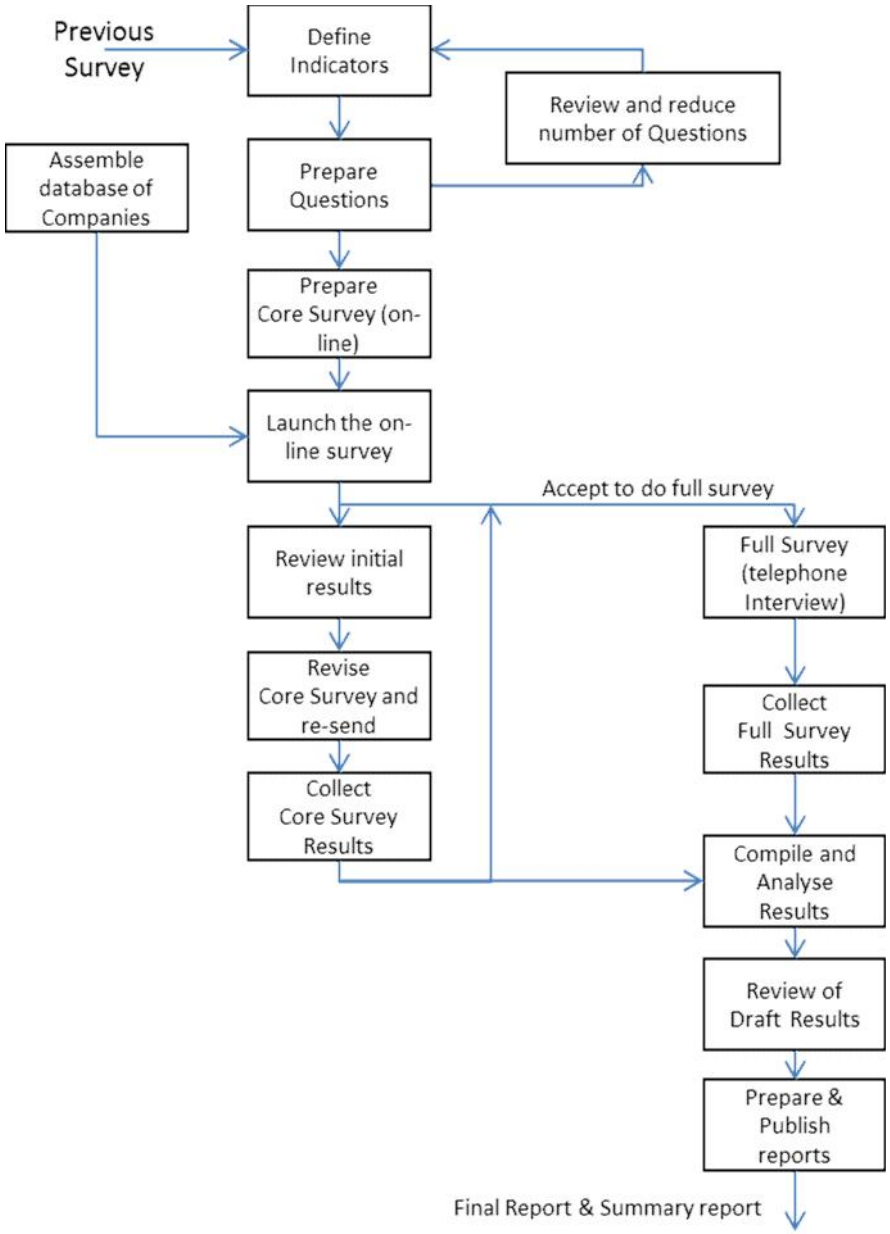


Figure 2-1: Survey Methodology

2.2 Database of Companies

In the preparation up to the launch of the survey, we compiled a database of EO companies. The names were collected by a systematic review of projects and actions undertaken by National agencies, ESA and the European Commission as well as names collected from the attendance list of relevant conferences and workshops. We also contacted national focal points who reviewed our list and/or provided a known list for their country. In each case, we examined the company web-site to establish with reasonable certainty that their business activities lay within the scope of the survey.

Further, as part of the survey, we included a snowball question in which we asked each respondent to name 5 other companies in their home country which could be asked to participate. In fact we had very few new leads from this snowball survey indicating that we had good coverage in our database. At the time of the survey launch this contained 365 company names all of which had been validated.

2.3 Survey Questionnaires

The survey questionnaire was constructed based on a list of indicators established at the start of the study. This list is essentially that used to construct the charts in this report.

The indicators were gathered into groups and were reviewed against the information contained in previous surveys. At the outset, the full list contained 71 indicators which were later reduced to around 50. Each indicator could require data from several questions and could also be analysed in different ways, necessitating a careful review of the information required to be collected.

On the basis of the information required the questions were formulated; in each case trying to be as accurate and unambiguous as possible. Despite this, some questions were still found later to have led to ambiguous results which required clarification.

During the preparation of the questionnaires, we were very conscious of the time that would be required for a responder to complete the survey whether on-line or through phone interview. As a result a number of indicators were eliminated.

The questionnaire was divided into 2 parts; the core survey, which addressed mainly numerical data, and the full survey which was addressing strategic or softer data. The latter was more suited to an interview approach whilst the former was left for companies to complete in their own time allowing them to assemble their data in advance.

The core (on-line) survey was launched in two versions. The first version gained a quick and early set of responses but many of these contained completed company details and no further data. In consequence, we reviewed the questionnaire and despite causing us further work with the later data analysis, we re-constructed the questionnaire to make

it less daunting on entry and easier to respond to. We also simplified the financial questions so that if companies wished they could enter their figures in a range of values rather than giving a precise revenue number or profitability.

This revised questionnaire worked and whilst we had 105 companies open the first core survey with 60 going on to complete it, of the 78 companies that opened the second core 73 went on to provide useful data. Indeed 18 of the companies that had earlier abandoned the first core then went on to complete the second core survey.

The full statistics are shown in Table 2-1

2.4 Data Gathering

An on-line tool called Survey Monkey (www.surveymonkey.com) was used for the on-line data gathering and also for collecting the data from the full survey interview. In the latter case, the responses were entered by the interviewer. It proved to be an excellent tool providing many features to aid both the data gathering and data analysis and giving easy access to the data results. We were able to extract results easily into an excel spread-sheet which permitted easy access to intermediate results and to some quick graphical charts that were useful for discussing some of the findings.

Survey monkey also provides tools for managing the distribution list for questionnaires. Once entered, the list is managed automatically with unique URLs being sent to each target respondent. One problem with survey monkey we suspect, but have no proof, is that some of the requests to participate in the survey ended up in spam folders.

Responses to the core survey were monitored and after around 2 weeks a first reminder was sent. After around 6 weeks, we re-launched the on-line survey with the second core which triggered a second wave of responses. Nevertheless, for some companies personal contact was required to “encourage” them to complete the return.

At the end of the on-line survey we asked if they would be willing to participate to the full survey and if so, we contacted them to set up a date and time for the full interview.

As indicated, the full survey was conducted through a telephone interview which generally lasted around 40 minutes. We managed to obtain 54 full interviews which we consider to be a good sample.

The statistics of the responses are summarised in the table below.

- The first line “Completed Company Details” shows all those companies which have opened the on-line survey (core 1 or core 2) and entered company details. These were validated in our database and include some companies that opened core 1 without going any further but often went on to complete core 2.

- The "completed survey" shows how many responders then went on to complete each of the surveys. There is no overlap between core 1 and core 2 in this respect.

- The final line "provided employee information" is where a company has provided at least the minimum information of the number of employees. In other words, this total of 133 is the total number of companies with data included in this report.

	Core 1	Core 2	All Core	Full
Completed Company Details	106	78	184	
Completed Survey	60	61	121	54
Provided Employee Information	60	73	133	

Table 2-1: Statistics of the returns

Of the 106 responses to the Core 1 questionnaire, 28 were essentially blank in that all that was provided was the company name and address and 18 were duplicated with the Core 2 questionnaire ie the company had responded to core 2. Removing these left us with 78 unique and 60 valid and unique responses.

For the Core 2 questionnaire, 7 responses were not valid out of a total of 80 that had replied leaving a total of 73 "useful" responses and a full total of 133.

2.5 Data Analysis

The first step has been to clean the responses of all duplicate and non-valid entries at the company level ie a very limited number of responders that did not meet our definition of a company or which are outside the geographical region to be covered. This step was done before arriving at the numbers shown in Table 2-1 above.

The numerical data in the analysis (especially that used for employee numbers and revenue calculations) was carefully validated. In some cases we had to change Euros to kEuros which had been asked for (but the error was evident based on the number of employees) and in a few cases, where data was ambiguous or missing, the company was contacted to clarify the entry. However, the large majority of responses were clear.

2.6 Quality of responses.

The total number of responses to the request to complete the survey was 166 (184 total less 18 duplicates). Of these 133 gave valid and "useful" responses.

Data for some of the indicators in this report was collected only from the full survey (for example on age and gender profile, internal processes, R&D) which came from a sample of 54 companies. This sub-sample of 54 companies that agreed to continue from the core and complete the full survey is considered to be representative of the complete population as represented by the data collected from the 133 companies. In order to verify that this sample is representative of the overall population, we have taken two measures:

1. The activity profiles (see Section 5.2) for the full survey sample only was compared with that of the whole population. The results are shown in Chart 2-1 below. We would not expect a perfect alignment, but the percentages from each of the activity types are closely comparable between the core and full surveys. This shows quite a good correlation and hence we conclude that the full survey sample is a good representation of the total company population.

2. The distribution of company classes (ie size of company) is compared for the full set of responders and the sub-set responding to the full survey. These are shown in Chart 2-2 and Chart 2-2 and show a good correlation.

Hence we conclude that our sample of 54 companies which make up the full survey is representative of the full population of 133 companies that are included in the core survey.

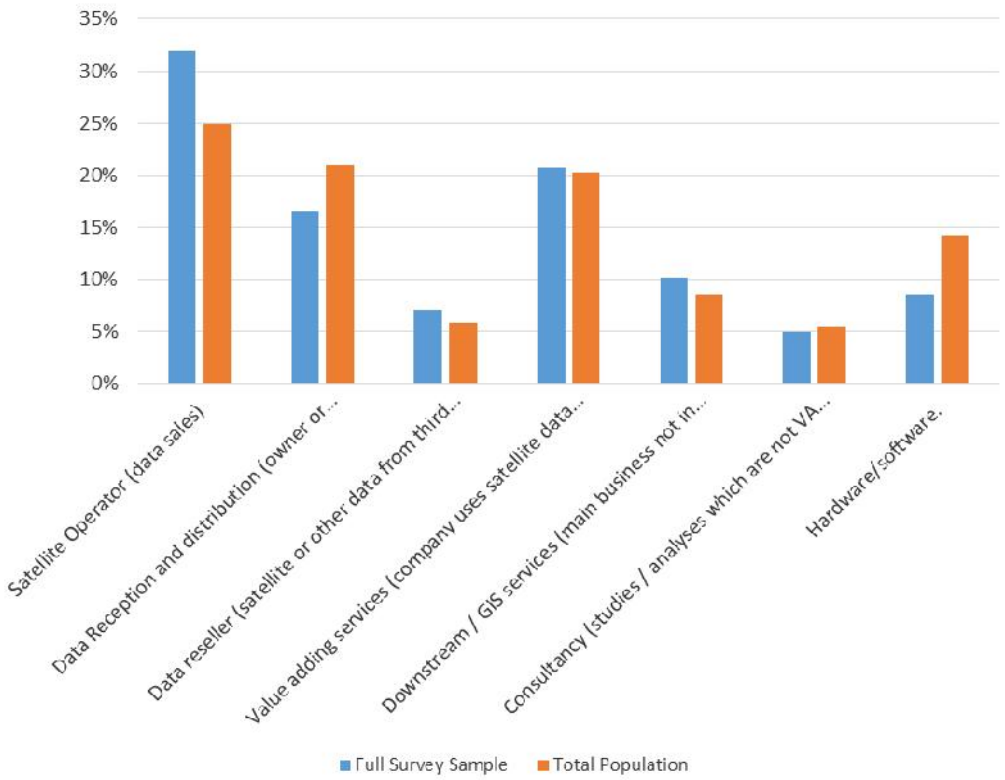


Chart 2-1: Comparison of the full survey population with that for the total response

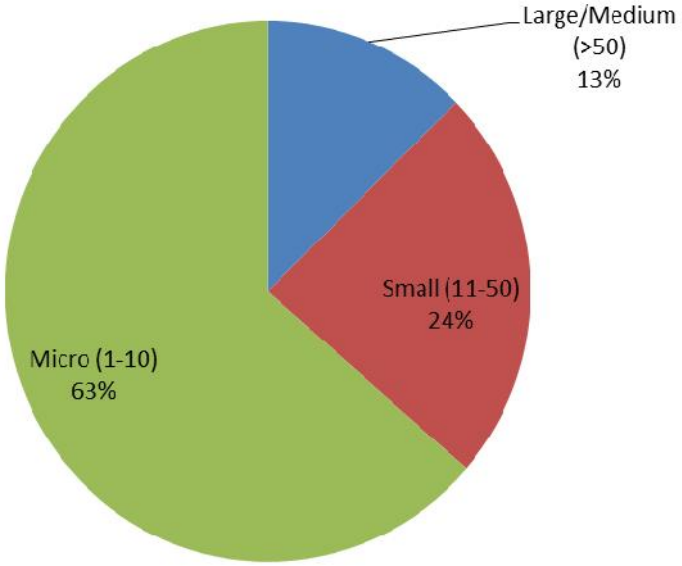


Chart 2-2: Distribution of companies in the full survey

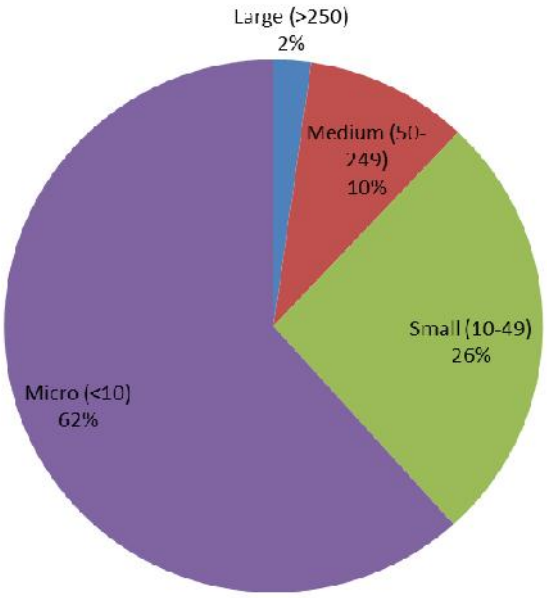


Chart 2-3: Distribution of Responding Companies

2.7 Summary and Comments

- The process which we have used to gather the data used in the survey proved quite robust and we have a high proportion of responses obtained from the total population.
- The database of companies assembled in preparation contained 365 names which had been validated as being relevant to our survey.
- The combined electronic (on-line) survey and full (telephone interview) was effective and gave good and robust results.
- Survey monkey has proven to be an appropriate tool to use.
- The on-line survey must be adapted to lead responders into the questions and not frighten them with difficult questions to start with.
- The full survey set of responders is a good representation of the total population of responders.
- Companies have been willing to respond to the survey launched by EARSC and have been generous with their time to provide the data.

3. Industrial Landscape

3.1 Total Number of Companies

We sent e-mails using survey monkey to all of the 365 companies in our database. Of these, only 11 bounced with a domain failure which we have subtracted from the total as we cannot be sure they are active; leaving us with a total of 354 companies.

For some industry figures (revenues, employment numbers etc) we shall extrapolate from the responses we have received up to a full population. We could use the corrected number from our database ie 354 but as we cannot be absolutely certain that all these are valid, we decided to be prudent and to deduct 10% from this number.

This leaves a total of 319 companies that we consider are active in the domain of EO data and this is the number used in the analysis as representing the total number of EO service companies in Europe and Canada.

Since the survey was launched, further names have been collected and at the time of publishing this report, our database contains the names of over 400 validated companies.

3.2 Geographical Distribution of Companies

Companies were asked to identify themselves in the survey with their contact details and in particular their country of origin. This was verified against the pre-information gathered on each company in our database (with our database updated if necessary).

Chart 3-1 shows both the number of companies identified and invited to respond to the survey and how many responded in each country. The total population of companies identified is 354 and the total number of responses is 133. Unsurprisingly, the largest number of companies can be found in countries which have a history of investment in space activities; France, Germany, UK and Italy. But this is changing and the largest number in 2012 are to be found in the UK (a trend which starts between 2003 and 2006) with Italy second and Germany third whereas in 2003 France and Germany were found to be dominant. Strong growth has also taken place in Spain, Netherlands, Belgium and Austria. Today, we also find that there are companies spread throughout Europe with at least one company in almost every country.

The rate of responses corresponds broadly with the number of companies identified.

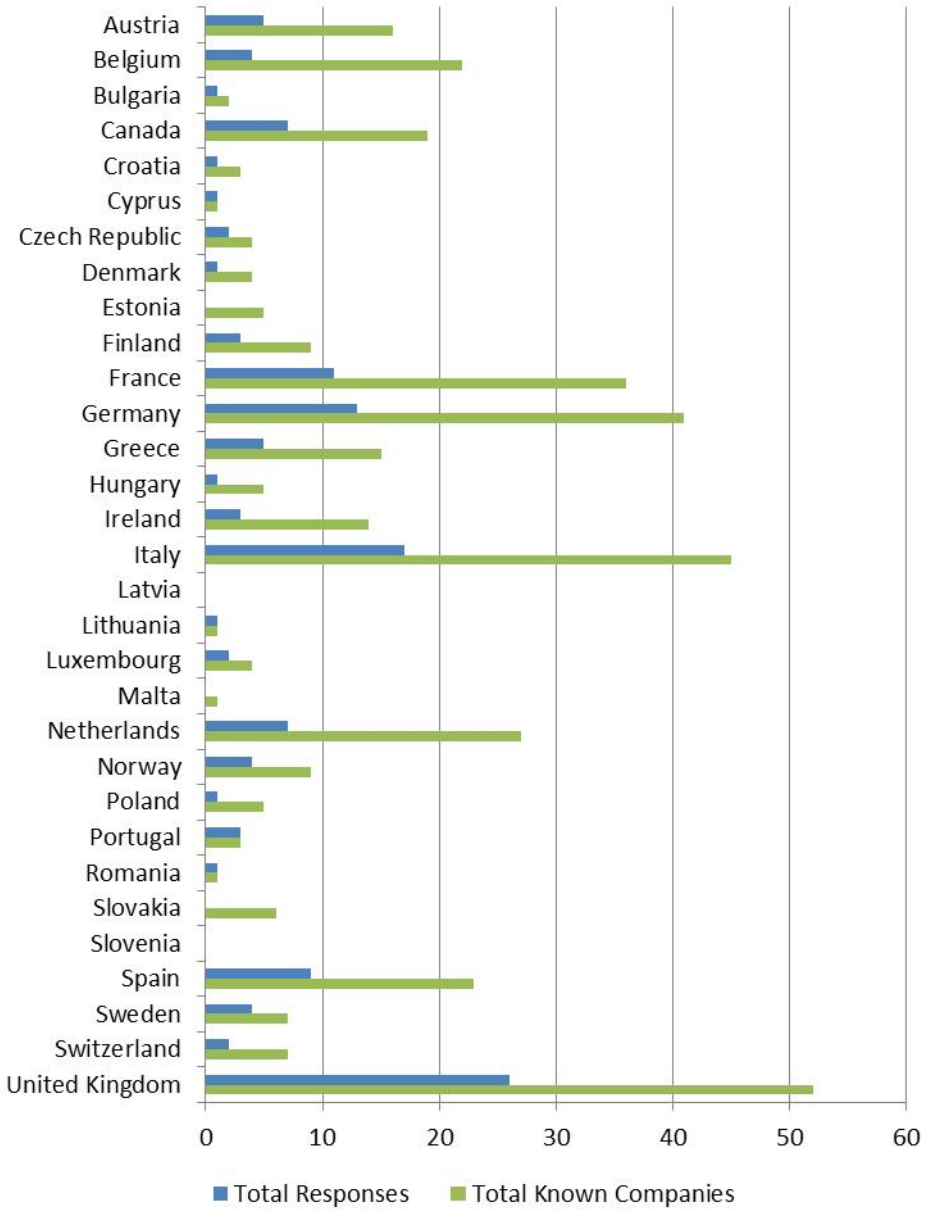


Chart 3-1: Geographical distribution of companies

Companies were also asked to confirm that they were working with EO products and/or services. It is worth repeating here the definition of the scope provided to responders:

Scope of the survey: we are seeking to include all companies for whom satellite-derived EO data is part of their business. These may be satellite operators, EO service providers, or internal service departments inside companies engaged in an entirely different business e.g. oil & gas, insurance, construction etc.

We cast the net wide, but the response we had was certainly strongly focused on the suppliers of products and few internal service departments. We include some companies that are involved in GI services provision as will be seen later.

3.3 Size Distribution of Companies

We then asked each company how many employees they had. To emphasise that we are looking for EO service companies we asked each for their total number of employees and then for the total engaged in EO services. This information was then used to classify the companies, or groups within companies, in terms of size in bands.

Company's replies have been classified according to the number of employees using the bands recognised by Eurostat and internationally:

Company definition	Employees
Micro Enterprise	1 – 9
Small Enterprise	10 - 49
Medium Enterprise	50 - 249
Large Enterprise	> 250

Table 3-1: Definition of company classes.

The results comparing the classifications for EO and total employees are shown below. A total of 112 companies gave both pieces of information requested. In the absence of evidence to the contrary where no "total" was given separately from the EO employee number, the EO employee number has been taken.

Company definition	All Employees	EO Employees
Micro Enterprise	68	33
Small Enterprise	38	34
Medium Enterprise	18	13
Large Enterprise	9	3

Table 3-2: Classification of companies.

We used the results earlier to validate our samples and Chart 2-3 shows the distribution of responding companies based on their EO employees using the 2012 figures. Of these, 62% are micro enterprises with less than 10 employees.

As explained in section 3.1 we consider that the total population of EO service companies in Europe and Canada is 319. We also consider that we know all the companies with more than 50 employees and that they are included in our 133 responders. Therefore, all the additional 186 companies are either small or micro enterprises, which we shall distribute in the same proportions as the small and micro-enterprises in the response. Chart 3-2 shows the resulting total distribution.

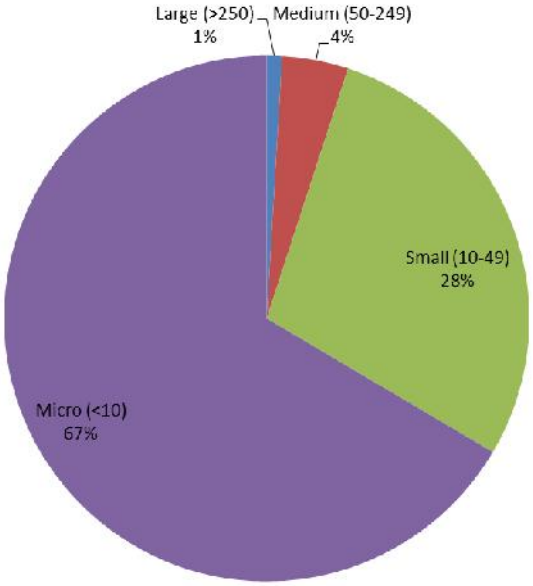


Chart 3-2: Spread of all companies in classes for 2012

The EC definition of small, medium and large companies was introduced in 2011. The last survey used a different classification and hence to aid comparison, the split of companies using this older definition is also provided (Chart 3-3). Note that this is based on the total population of companies ie 319.

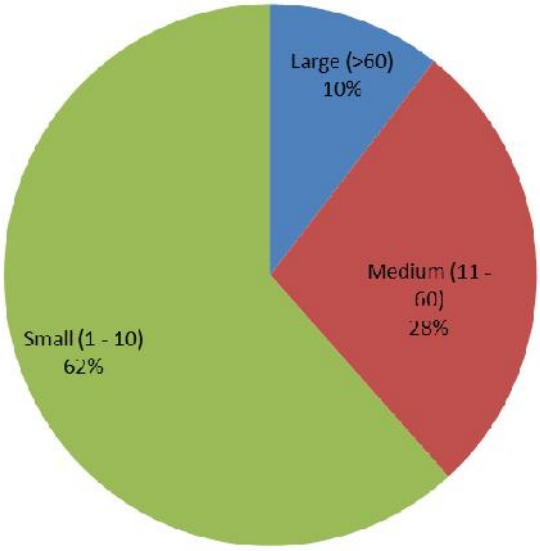


Chart 3-3: Spread of Companies in Classes for 2012 (2006 definition of classes)

To get a better picture of the evolution of companies by class, and to include data from 2003 into the overall picture, we chart the percentage of the total companies from the responding population for each of the surveys.

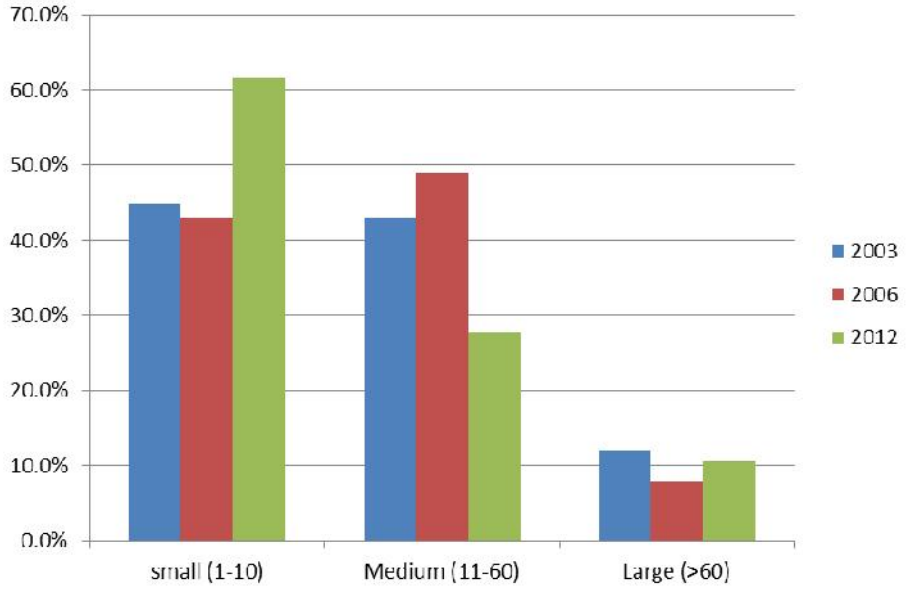


Chart 3-4: Comparison of companies in each class for 2003, 2006, 2012

Chart 3-4 shows the number of companies falling into each class for each survey year. The number of large companies has remained quite stable and small. However, it would seem that the percentage of micro-enterprises has increased whilst the small/medium ones have decreased. We do not see that medium size companies have converted to large ones hence this either reflects an under-sampling in this (micro) class in previous surveys or a significant change in distribution as a result of company failures and creation of start-up companies. We would not rule out the latter explanation although we are more inclined to believe the former one since the progression from small to medium to large in the 2012 data looks more likely.

In our survey, we asked responders to report the year of creation of their company and the number of employees for each of the previous 5 years. We use this to establish an historic picture. Chart 3-5 shows the number of companies from our full sample of 133 companies that were active in each of the previous 5 years. This leads us to a picture of a growth in the number of companies with time with the number of companies growing steadily over the last 5 years. Note the bar in Chart 3-5 for 2012 corresponds to the distribution given earlier in Chart 2-3.

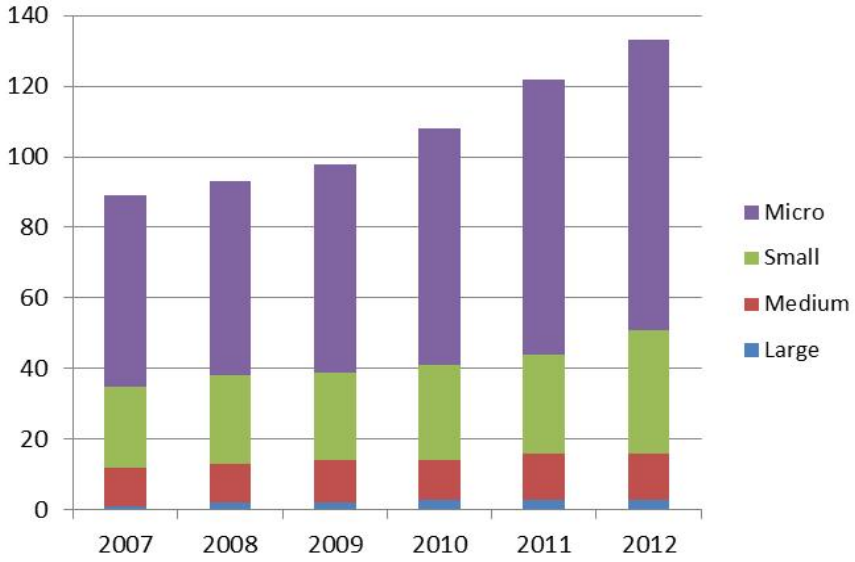


Chart 3-5: Classification of the total companies in the response

To explain further the methodology:

We established a table showing the number of employees for each company in each year. Where the company had given this information directly it was rather straightforward. For others we had to make some estimates and assumptions.

- For example some companies gave numbers for 2011 and not for 2012. In this case we assumed that the number was unchanged between the two years.
- The responders in the Core 2 survey were only asked for data for 2012 (revenues and employees) plus a view on whether their business had grown or shrunk weakly or strongly over the period of the last 5 years. In this case, we used the information to project backwards to cover the previous 5 years (strong decline=-10%pa, weak decline=-3%pa, weak increase=3%pa, strong increase=10%pa).
- The companies were also filtered based on their date of formation so that employee and revenue numbers were only included after the creation date given.
- Companies in each class size could then be counted for each of the years.

Now to look at the historic total population we need take the additional companies that we consider exist into consideration. The total of 186 additional companies in 2012 is reduced by 8% for each year (see section 3.5) and the result is added to the actual numbers from the responses shown in Chart 3-5. This leads us to Chart 3-6 below which show the total company population classifications over the last 5 years.

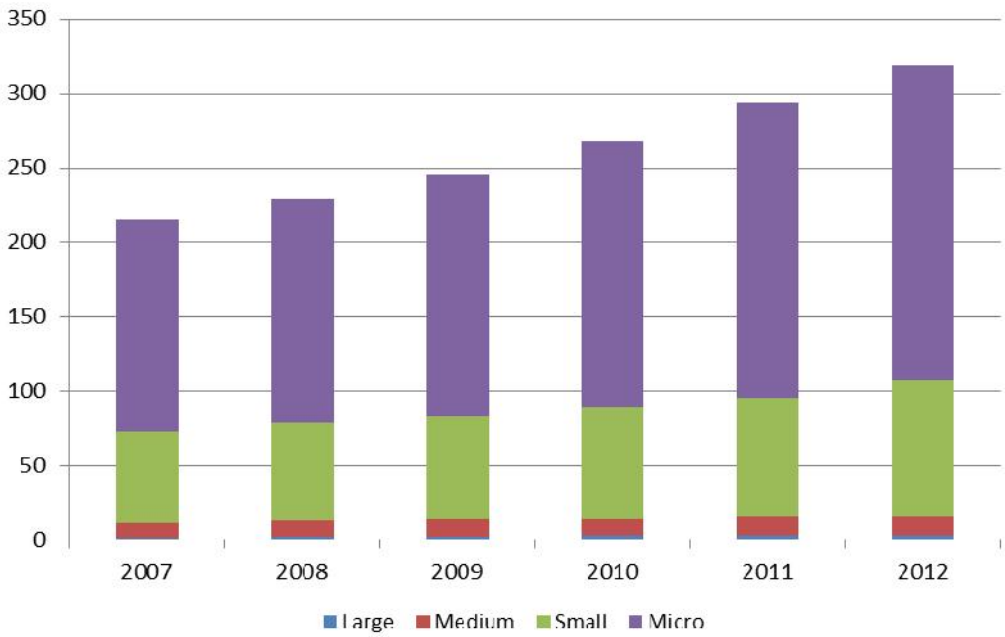


Chart 3-6: Total Number of Companies 2007 - 2012

These figures will be used later in projecting an historic picture of employment and revenues for the 5 year period.

3.4 Consolidation

We wish to gather a picture of how concentrated or dispersed is the sector. We have seen the large number of micro-enterprises but we wish to understand something about ownership across the sector. We had asked companies about their ownership and the results are shown in Chart 3-7.

Table 3-2 shows that many of the responders are often part of a larger organisation ie a department or business unit in a company. We asked companies to tell us how they were owned; the categories are clear in the chart.

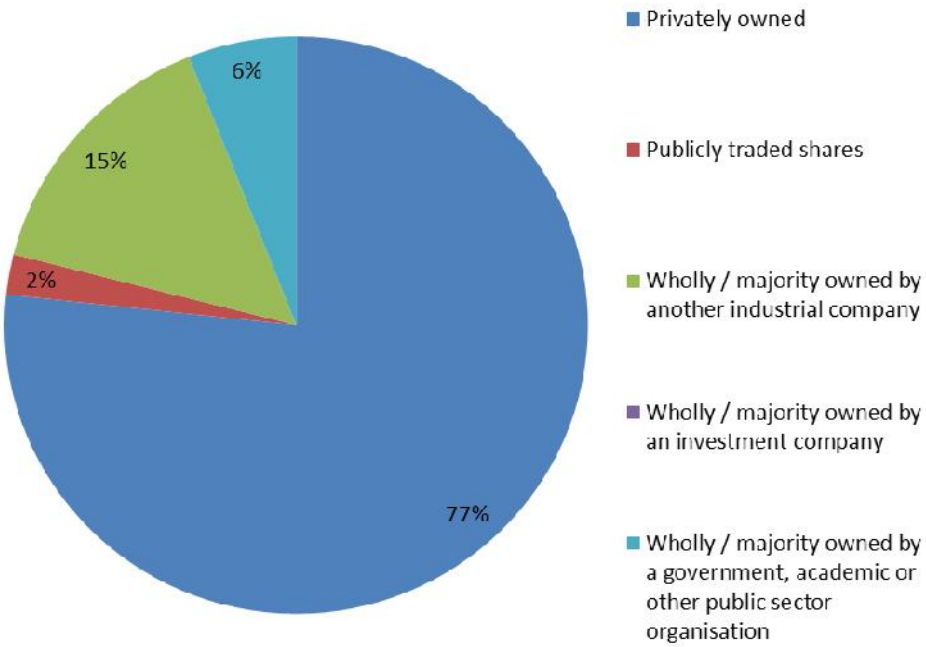


Chart 3-7: Companies Ownership

Over 75% of the companies are privately owned supporting the view, coupled with the large proportion of small and micro-enterprises, that these are start-ups in a sector that is relatively new and immature. Only 2% are publicly traded although this does not take account of the situation where they are industrially owned and the parent is publicly traded. This is certainly the case with the two largest companies in the sector. There is a small but significant number which are owned by public bodies although they do trade as companies.

We hope to be able to monitor this in future to see how the pattern changes with time and if, as it develops, the structure will change with companies consolidating into larger groups or it remains dispersed with many small, individually owned.

In future, it may be interesting to also establish if the companies are owned/managed by their founder(s).

3.5 Age of companies

Companies were asked in which year they were formed; both in their current form, and in an earlier form if this has changed ie by merger. In the case of the latter question, there were few responses and the results are not significant. The chart shows the number of companies that have been formed in each year based on this data. It shows the net rate of formation of companies; net because we cannot tell how many

companies have failed in any one year or that have been taken over by another company.

We have used these figures to calculate an average rate of company creation over the period 2000 to 2012 which we shall use later. The average rate comes out at 10% from 200 to 2012 but only 8% over the last 5 years. The figure of 8% has been taken in the estimation of "missing" employees (see Section 3.3 & 4.1).

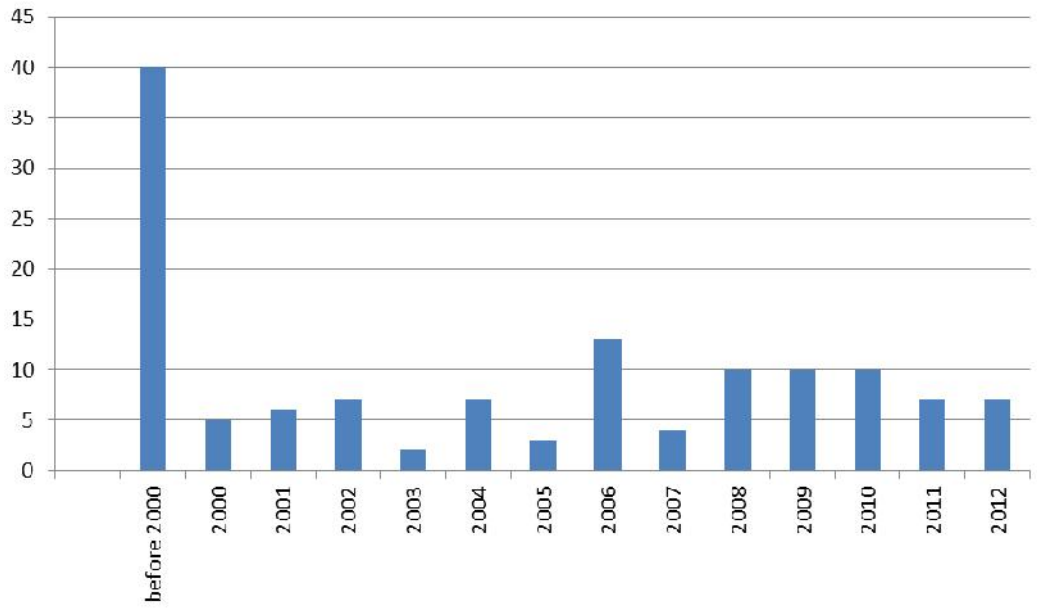


Chart 3-8: Number of companies formed in a given year

3.6 Commentary

- We found that the total number of EO service companies in Europe and Canada in 2012 is at least 319.
- There has been a steady growth in total company numbers from 216 in 2007 to 319 in 2012 at an average annual growth rate (cagr) of 8.1%.
- The sector is dominated by micro-enterprises with some 67% of the total having less than 10 employees.
- Most growth is seen in the micro-enterprises.
- The number of large organisations (in line with the last 2 surveys and not the Eurostat definition) with more than 60 employees has remained stable.

4. Employment

4.1 Employees

One of the key factors concerning any sector is the number of employees it has. We wish to know the total for each year covered by the survey

To calculate the total number of employees in the EO services companies we have used a methodology based on adjusting or extrapolating from the figures we have for the total number of companies. The methodology we have used is:

1. We take all the companies that have provided numbers of employees for 2012; a total of 119.

2. For those that have given employee numbers for 2011 but not for 2012, we have used this figure to arrive at a total of 133 companies providing valid and "useful" responses.

3. From the total population of companies in the EARSC database, we have assumed that 10% are not in the EO services business and have reduced the total from 354 (365 less 11 eliminations) to 319. This means that we consider the total number of EO service companies in 2012 to be 319 and that we extrapolate employee numbers and revenues based on the calculated 186 companies not included in the survey returns.

4. From our knowledge of the industry we believe that we have captured all those companies that have more than 50 employees providing EO services and hence the remaining 186 are therefore all either small or micro sized enterprises.

5. We have assumed that the distribution of these enterprises is the same as in the actual sample which means that 56 (30%) are small and 130 (70%) are micro-sized.

6. The average number of employees per company in each size class has been calculated from the actual returns. The results are:

Company Class	Average Employees
Large & Medium	155
Small	22
Micro	3

Table 4-1: Average number of employees by company class

Note, since the number of large companies is very small, the average is taken for the merged class of large and medium together – but this is presented for information and is not used in the estimation since we consider that their data is already fully included.

Following this method leads us to calculate the total number of employees in the sector in 2012 as 5087.

What if our assumptions are wrong? The Chart below shows the effect of changing the ratio of small – micro and of using a total company population of 354 (ie not scaled back by 10%) or a smaller population of 284 (scaled back by 20%).

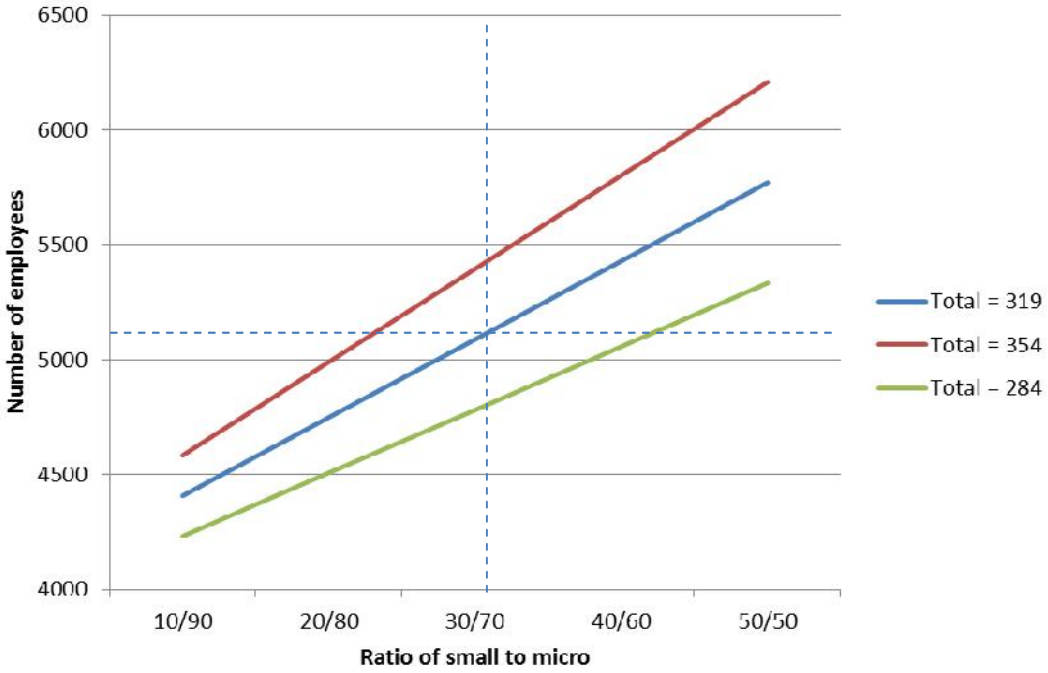


Chart 4-1: Sensitivity Analysis of Total Employment.

Changing the total population by +/- 10% alters the estimated number of employees by 200. If the ratio of small/micro companies changes by 10%, it increases or decreases the number of employees by around 350. So for the baseline 319 companies and a ratio of 40:60, the total sector employment would be 5431 and if the ratio were to be 20:80, the number of employees is 4749. Remember that our central result is 5087 based on 319 companies and a 30:70 ratio.

7. The above methodology allows us to calculate the total number of employees in 2012. To find historic results we start from the number of companies in each year calculated and shown in Chart 3-6 and use the same basis for calculating employee numbers each year.

   It is possible that this underestimates the total population since it does not take account of any company that did exist in a previous year but has disappeared in the meantime. We do not have accurate data to make this calculation and hence have chosen to ignore the effect which is likely to be small especially since (a) it will most likely be smaller companies that would have failed (b) where a company has been acquired, the total number of companies will change but the number of employees does not since mostly they should figure in the new owners' return.

8. The total additional number of employees are hence calculated:

Calculation of total employees:	2012	2011	2010	2009	2008	2007
Total reported	3465	3375	3138	2827	2452	2151
Number of companies reporting	133	122	108	198	96	89
Number of missing companies	186	171	160	147	136	127
Number small (30%)	56	51	48	44	40	38
Number micro (70%)	130	120	112	103	96	89
Additional employees	1604	1485	1375	1268	1174	1092
Total Employees in the Sector	5087	4860	4513	4101	3631	3242
Percentage of actual/calculated result	68.1%					

Table 4-2: Calculation of Total Sector Employment

Chart 4-2 shows the resulting total sector employment together with the additional data point for 2006 which reported a total of 3000 employees in the sector.

The total number of employees (3465) coming from reported returns represents about 68% of the considered total (5087). In the 2006 survey this ratio was 55%. Figures for intermediate years are not provided since these have been extrapolated from the 2012 value. The only "true" numbers are 2006 and 2012 whereas the others are calculated back from 2012.

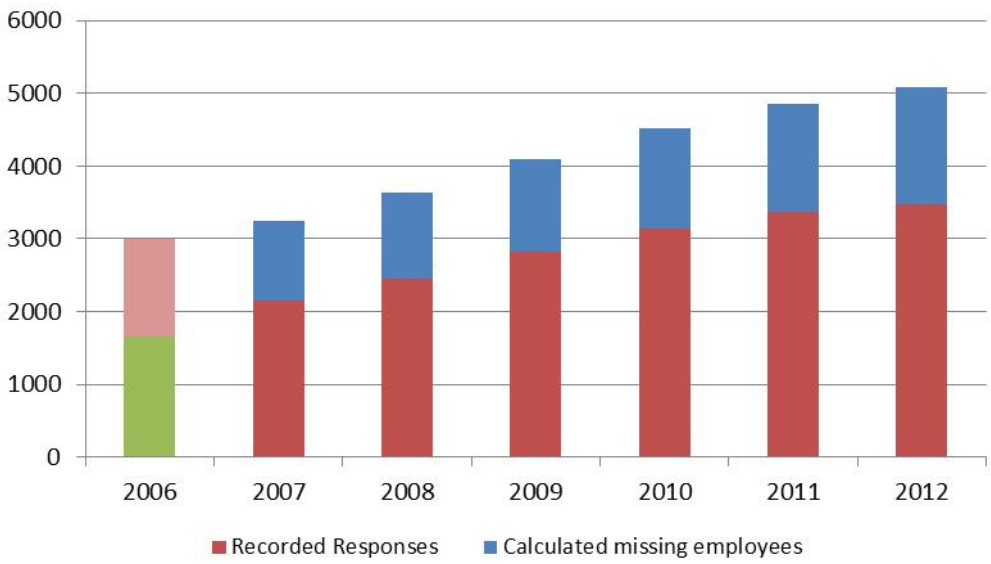


Chart 4-2: Total Sector Employment

Nevertheless the basis of the calculation looks to be quite good since the results look remarkably consistent with the 2006 survey. If we take the average growth rate (cagr)

which is 9.2% over the period and project the 2006 number, the difference in 2007 is only 36 employees. We had been expecting a significant challenge to reconcile the data from 2006 with that which we gathered. Therefore we are surprised but very pleased with this continuity of data.

To extend the comparison, for interest, we plotted the 2012 results against the 2006 figures extrapolated to the number of employees in 2012 ie we took the figure of 3000 for 2006 and projected that at 9.2% growth rate. In Chart 4-3, we plot this against the results shown above (in Chart 4-2). Note this does not validate the 2012 number but shows that our method used for backward projection looks to be quite consistent with the 2006 survey given the small deviation between the curves.

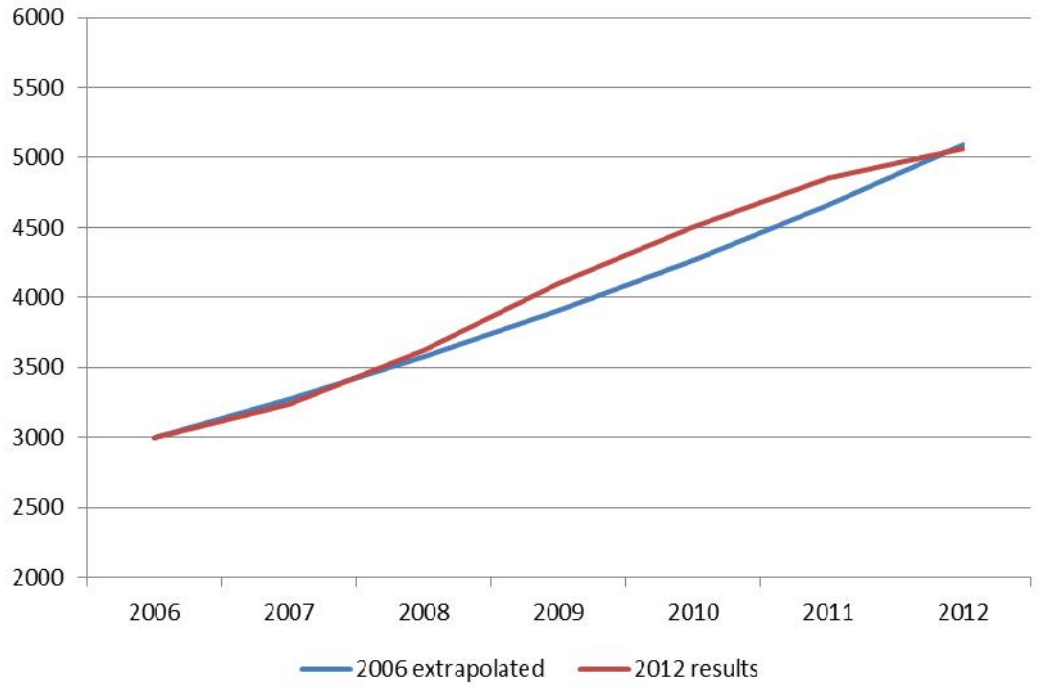


Chart 4-3: Comparison of 2012 results and 2006 extrapolated Figures

Note, based on our results we would estimate that there were around 206 companies in existence in 2006 which is 35% more than were included in the 2006 results (152). We can only assume that it has been an easier task for us to gather together a list of companies throughout Europe and Canada than was the case in 2006/2007.

4.2 Employees by Country

The chart shows the number of employees working in each country. Clearly, we have no knowledge of the distribution of the additional employees so this is based upon the actual returns so only includes the figures from the companies that responded.

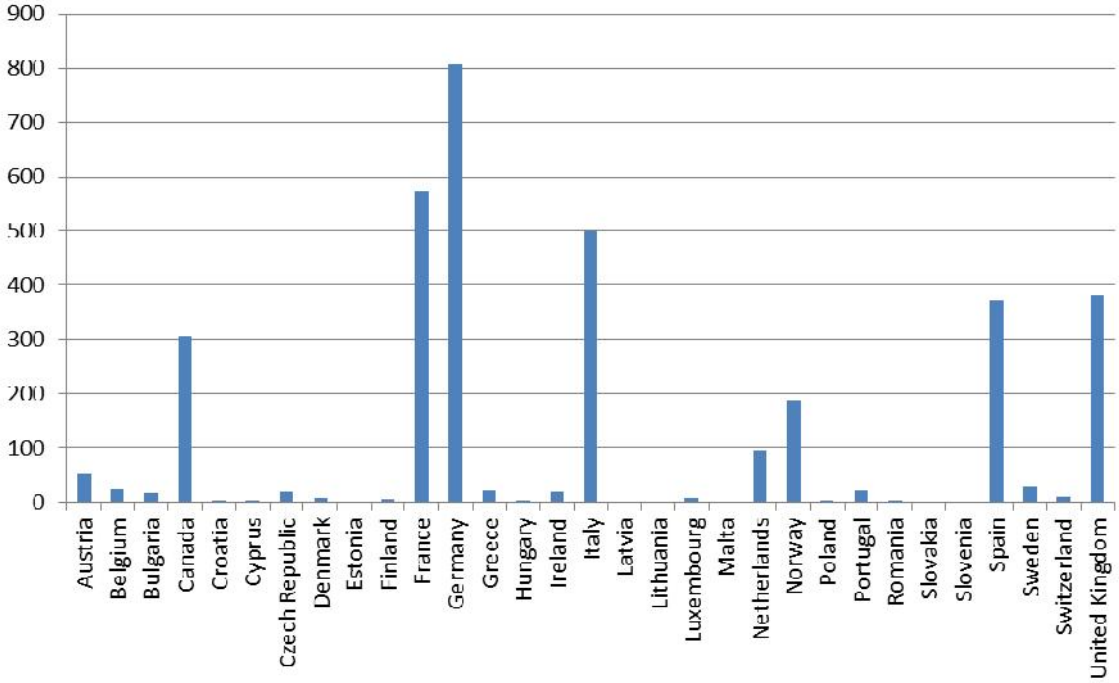


Chart 4-4: Number of reported employees in each Country

It is noticeable that whilst Germany has the largest number of reported employees, the largest number of companies is in the UK. For interest, we calculate the average number of employees per company for those reporting from which we can see that In Germany and France and to an extent Italy, Spain and Canada large companies appear to dominate with the average company size between 40 and 60 persons whilst in the UK there are many small companies with an overall average of just 15 employees.

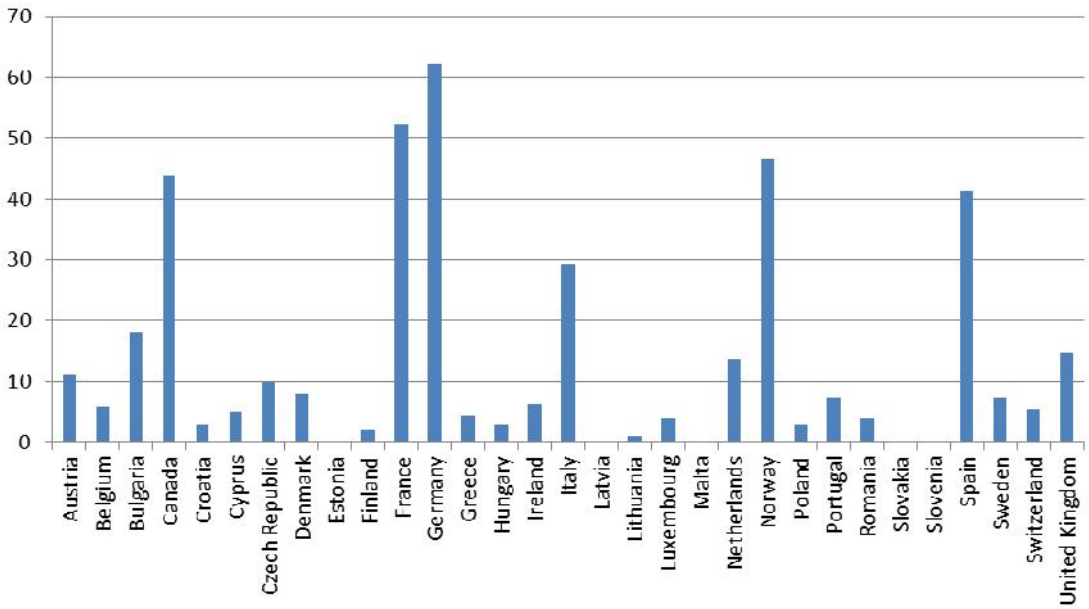


Chart 4-5: Average number of employees in a Company

4.3 Employment Distribution amongst company classes

We have used the data to calculate the relative importance of each company category to employment in the sector. The following chart shows the total numbers of employees split according to company size. This is shown for the total population of 319 companies.

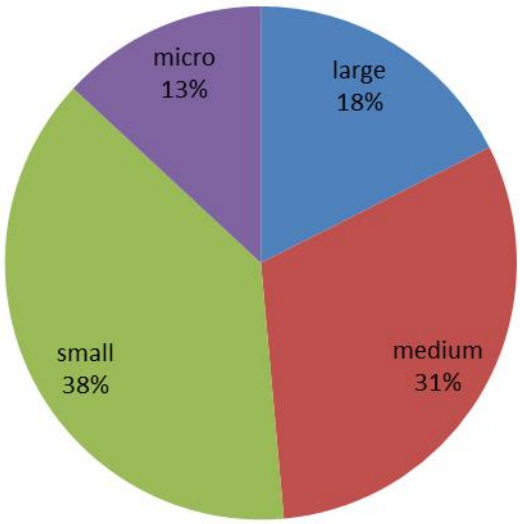


Chart 4-6: Distribution of Employees by Company Class

Nearly 75% of the employment force are with small and medium sized companies with the class "small" (10-50 employees) the strongest contributer to employment. Despite having 67% of the companies, the micro company class only employs 13% of the work-force.

Conversely, representing only 1% of the total the large companies employ 18% of the workforce and the large and medium combined (16 companies) employ nearly 50%. Whilst the creation of new micro-enterprises is an important first step, creating the conditions whereby they can subsequently grow is even more important.

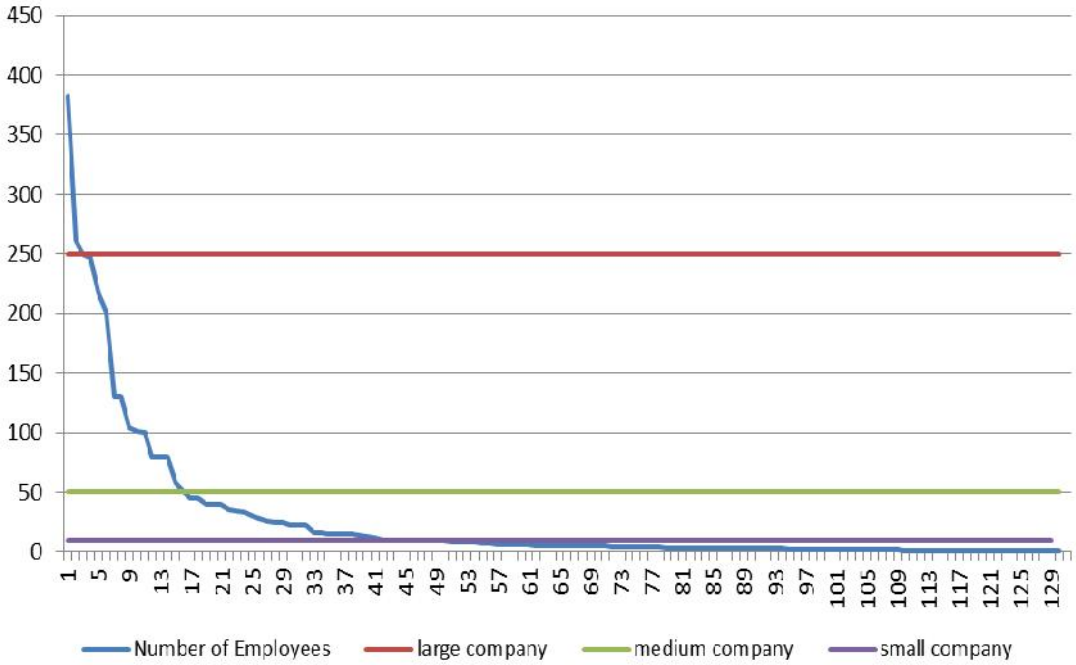


Chart 4-7: Distribution of employees

Chart 4-7 simply plots the number of employees in each company ordered from largest to smallest. Overlaid are the thresholds for small, medium and large enterprises. Only 16 companies in Europe and Canada employ 50 or more employees emphasising the nature of the sector which is dominated by small and micro enterprises – clearly illustrated in Chart 4-6.

4.4 Qualifications

Chart 4-8 shows the percentage of the workforce that is qualified to different levels. This is calculated based on the actual numbers; companies were asked separately about the percentage in each category and their total number of employees which together were used to calculate the percentage figures.

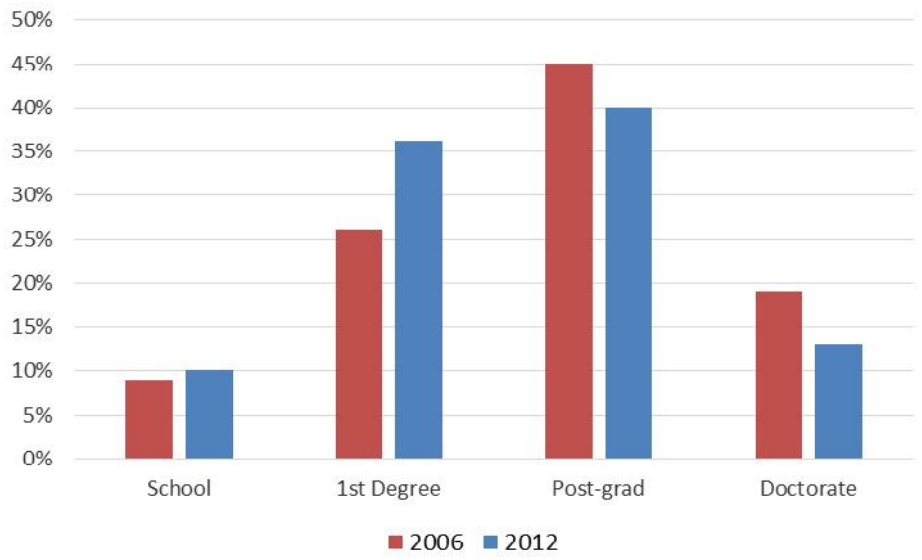


Chart 4-8: Qualification Levels in the EO Services Industry

The level of qualification in the sector is clearly very high with 90% of the work-force university graduates and over 50% holding higher degrees. However, it is not unexpected given the nature of the work and the skills required. There is a small, but perceptible shift to lower qualifications since 2006 but all still university trained.

4.5 Age profile of employees

Companies were asked to place the percentage of their employees that were aged in certain bands. The results are shown in Chart 4-9 for all companies in the sample together with results from the previous survey. Note that these are indicative only since, between 20 and 50 different bands were used the last time.

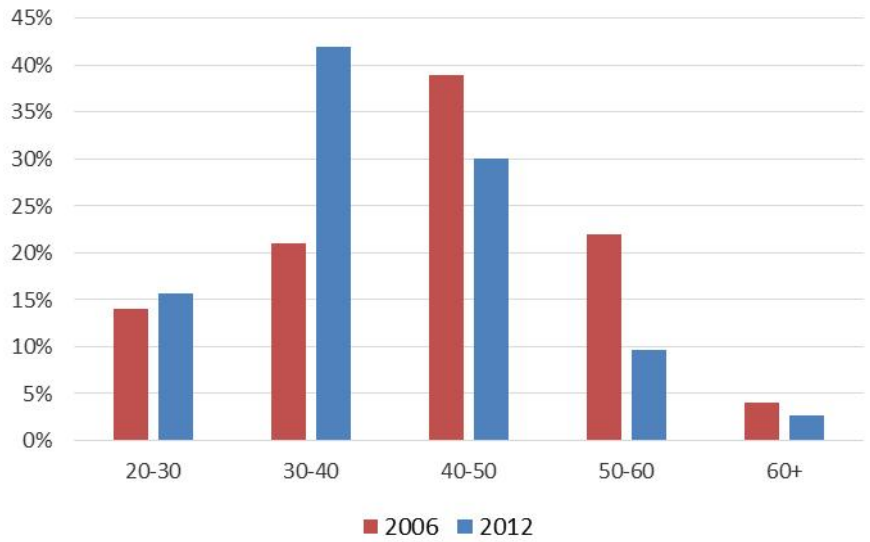


Chart 4-9: Age Profile of the EO Services Industry

Nearly 50% of the work-force is in the band 30 – 40 years old with the next highest band 40 – 50 years. In the chart we have taken the closest bands to those used in 2012 which does indicate a difference as the age peak has moved down in age. We can be sure that the number of employees over 50 years old has reduced in favour of younger colleagues. Based on the band percentages, we estimate the median age to be around 38 – 39 and the peak to be slightly lower than this.

It is encouraging for the future that there are more employees in the lower age band of 20-30 than in the upper bands of 50-60 and over.

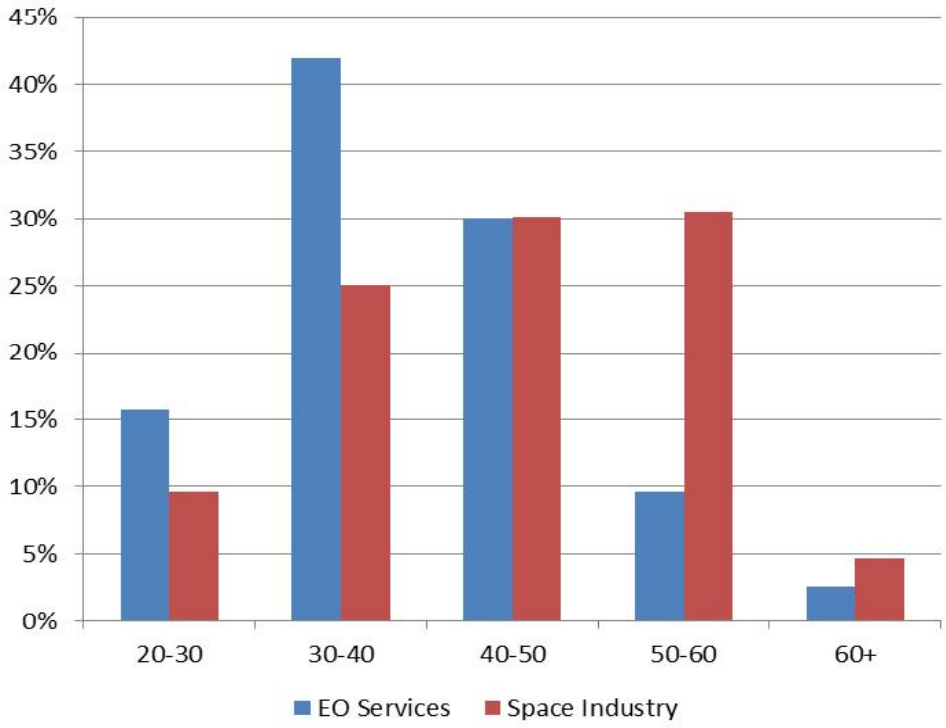


Chart 4-10: Comparison of the Age Profile between EO Services and Space Manufacturing Industries

Comparing with the space manufacturing sector as shown in Chart 4-10, the age profile is older with an average age of 44[1] and the employment peak is around 54 representing an industry which has grown up earlier, through the 70's and 80's, and has hence an older workforce.

4.6 Gender profile of employees

The balance of male and female employees is shown in Chart 4-11. Companies responded that 33% of their workforce is female which compares with 30% in 2006.

[1] Eurospace Industry Facts and Figures 2012.

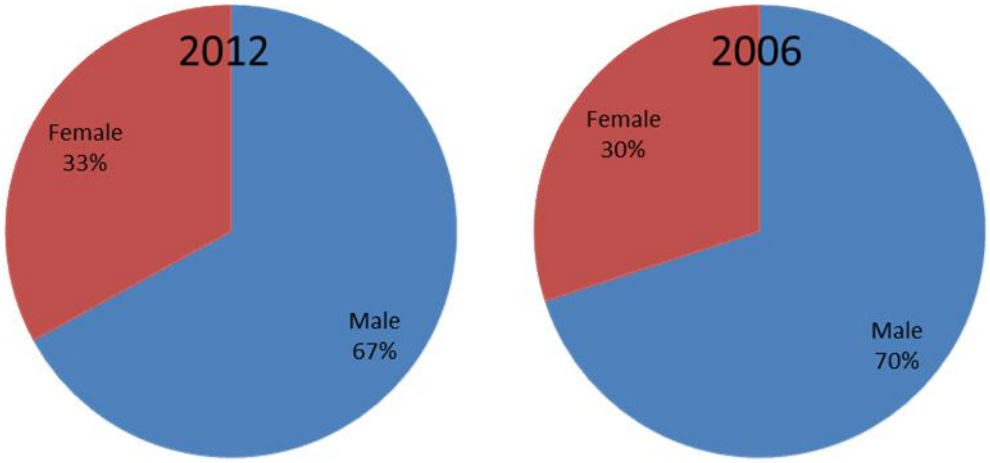


Chart 4-11: Gender Balance in the EO Services workforce

Whilst the growth is good, we still find this result rather surprising. When attending conferences it is rare to find other than a large majority are men. At some point, it could be interesting to look further at this result and at the type of work being carried out by female staff.

4.7 Employment Optimism

Companies were asked about their views on employment over the next 12 months. We felt that this period is long enough to gather a view of the overall industry optimism; longer than 12 months would be too far off to gather meaningful results.

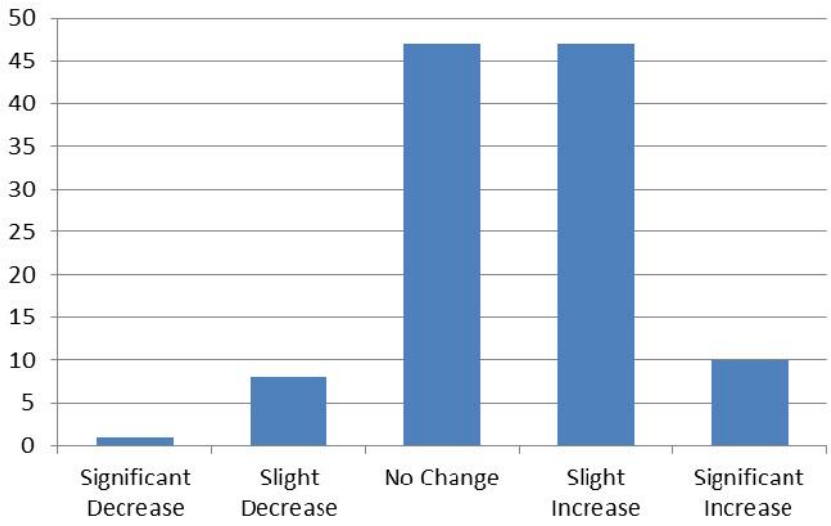


Chart 4-12: Company view of 12 month Employment prospects

This degree of optimism will be tracked in future surveys and in order to try to establish a "trackable" measure it is useful to generate an index.

The responses have been weighted between -5 and +5 so that the number in each category is first multiplied by the weight before the total is summed and divided by the total population. This gives an index of employment of optimism that stands at 1.07 in 2012 which could be considered mildly optimistic.

Chart 4-13: Employment Optimism Index

In 2006 a similar question was asked albeit with a 2 year horizon. Taking the results from 2006, the index of employment optimism stood at 2.31 which would be strongly optimistic. At the time only 3% of the responders were negative and 3% were "don't know". In the 2012 survey we did not offer a "don't know" category but 21 out of 133 chose not to respond. Of the rest, 9 or 8% gave a pessimistic answer.

The difference is no doubt due to the intervening economic crisis but is at odds with the growth figures we are seeing elsewhere. An industry growth rate of around 10% is quite respectable and should engender a greater degree of optimism. But when we look deeper (Chart 5-3) we can perhaps see more clearly. The older companies have felt the crisis whilst it is the newer ones which have contributed to the growth rate. With this insight, it is perhaps more easy to understand why there is caution. Companies have been scarred and are hence are more cautious. We shall track this index with great interest in future years.

4.8 Comments

- The total number of employees in companies selling EO services in 2012 is estimated as 5087.
- The total employment in the "industry" is certainly larger since those employed in internal service departments are not included. In addition, employment in public sector bodies is significant. We have no results to offer on either of these metrics but hope to be able to gather both in future surveys.
- The annual growth rate of employment over the last 5 years has been 9.2% p.a.
- The level of optimism in the industry remains positive with the index set at 1.07 but companies remain wary after the economic crisis of the recent years.
- Employment in the industry is 90% graduates or with a higher degree.
- 33% of employees in the sector are women.

5. Financial Performance

5.1 Revenues

Revenue figures were collected in the core (on-line) surveys. The approach between the 2 versions (ie Core 1 and Core 2) differed and required some data manipulation to place them into the same form. The main difference comes in the manner in which they are used to calculate the historic revenues over the previous 5 years.

We had asked companies to provide their revenues for their last financial year. In core 1 this was explicit because companies were asked to fill in boxes against each year, in Core 2 we asked for the last available (most recent) financial year. All the responses were included under 2012 which meant that in a few cases 2011 and 2012 are identical.

Where no revenues were given but companies had provided their number of employees (in 8 instances), we used this as the basis to calculate revenues based on the average revenue per head for a micro or small sized company (see section 5.4).

In Core 2, we had also given companies the option to enter their revenues into one of a set of pre-determined ranges (ie €100k to €200k). If this option was chosen we cross checked against a calculation of revenues per head to validate the entry. If the calculated number fell within the range, we took this. If the calculated number fell outside the range, then we used the extreme of the range which was closest to the calculation.

This gave us a figure for revenue from the responding companies (133) of €568m for the FY 2012.

To project this to the full population of companies, we use the employment figures calculated in Section 4. To recall, we are using 319 as the total population of companies and we are spreading the additional ones (186) across the small and micro categories of companies in the same ratio as in our survey sample (which is 30:70). To then calculate revenues for these additional companies, we use the average revenue per head according to the class of company.

This leads us to a total revenue figure for the sector of €757m for the FY 2012. This is an unconsolidated number ie it takes the total sales revenues of all the companies and does not make any adjustment for sales between companies. Indeed, we did look at this in the survey and asked companies to provide us with both their revenues from sales to other EO service companies and the amount of the sub-contracting they do in the sector. The results gave us a figure of under €50m of intra-sector sales which is also somewhat confirmed by the value of data sales (see chart Chart 5-6) where we see only 8% of data sales ie around €15m are going to EO service companies; leaving some €35m as being contracted between VA providers.

How sensitive is this number to the assumptions that we have used?

Chart 5.1 below shows the sensitivity of the revenues to the assumption made concerning the split of unknown companies between small and micro sizes. The baseline revenues (€757m) are calculated on a split of the 186 additional companies in the ratio 30:70 between small and micro sizes. This ratio is the same as that in the core survey where this information is available based upon the actual responses.

If instead of assuming the same ratio we take a ratio 10 points in either direction ie 20:80 and 40:60, the results are as shown in the chart. Note we have gone to the further extreme by also including the 10:90 and 50:50 splits.

If the split is biased towards the small companies ie 40:60 then the number of employees and the revenues both increase. This is due to the higher average number of employees and the higher average revenues per head found in the small companies compared to micro ones. Similarly, a reduced number reduces the employees and revenues.

A similar analysis is done for the case that the total population of companies is +/- 10% on our central number of 319.

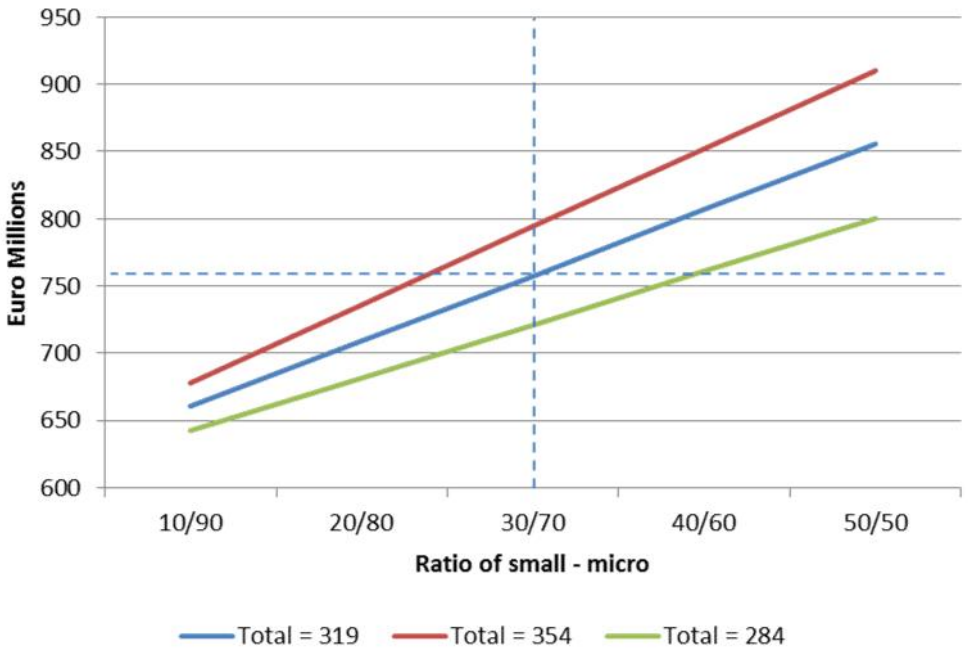


Chart 5-1: Sensitivity of 2012 Revenues to the Ratio of Small and Micro Companies

For an increasing split the revenues projected are €807m whilst for a decreasing split they are €709m. So a 10% shift gives rise to around €50m change in the total sector revenue.

For +/- 10% changes in the total EO service company population, the revenue alters by about €37m ie between €720m and €794m around the central case. More probably,

given the increasing number of companies in our database, a figure of €800m would not seem unlikely.

Historic Revenues:

We then look to use the baseline number for 2012 as the basis for calculating the historic revenues for the previous 5 years.

In core 1 we asked for the revenue numbers for each of the years 2007 to the last available financial year. In core 2 we asked for revenue numbers for the last financial year and whether these had changed strongly over the last 5 years. Based on the response to the second part we projected backwards to obtain 5 year figures. The full methodology we used was:

1. Take actual revenues from core 1 for the last 5 years. Use 2011 figure for 2012 if the latter was missing. Use these numbers to calculate the average revenue per head and group these by company class (calculated from employee numbers).
2. Take the actual figure for the last FY from core 2 where this was provided. Where no figure was given or it was given in a range (as an option) we first calculated the possible revenues based on number of employees and the average revenue per head and compared this to the range indicated. We then took the calculated figure compared it to the range and kept it if it fell within the range. If it fell outside the range indicated we took the edge of the range that was closest to the calculated figure.
3. Figures for the previous 5 years are then calculated based on the number of employees. In the very few instances where these are not available the revenues are back-projected corresponding to the case decided for 2012.
4. Assemble the 5 year revenue data for core 1 and core 2 into a single database where they could now be validly analysed.
5. For the additional companies that we consider exist but did not reply (see #4.1) we took the same approach as for employees. We assumed that the companies were distributed between small and micro enterprises on the same basis as the returns received and used the revenue per employee and the number of employees to calculate the "additional" revenues.

The results are shown in the following charts. Chart 5-2 shows the total revenues for each year. In blue are the reported returns and in red the additional revenues calculated. The additional revenues are based on the employment numbers given in section 4.1 where the methodology for calculating the additional / missing employees was explained. To calculate the revenues we have used the reported figures to calculate the average revenue per employee based upon company size. This is explained in section 5.4.

In 2006 survey the total revenues were calculated as being €412mcompared to the €757m in 2012. Other years have been calculated also from the employment numbers and use the average revenue per employee.

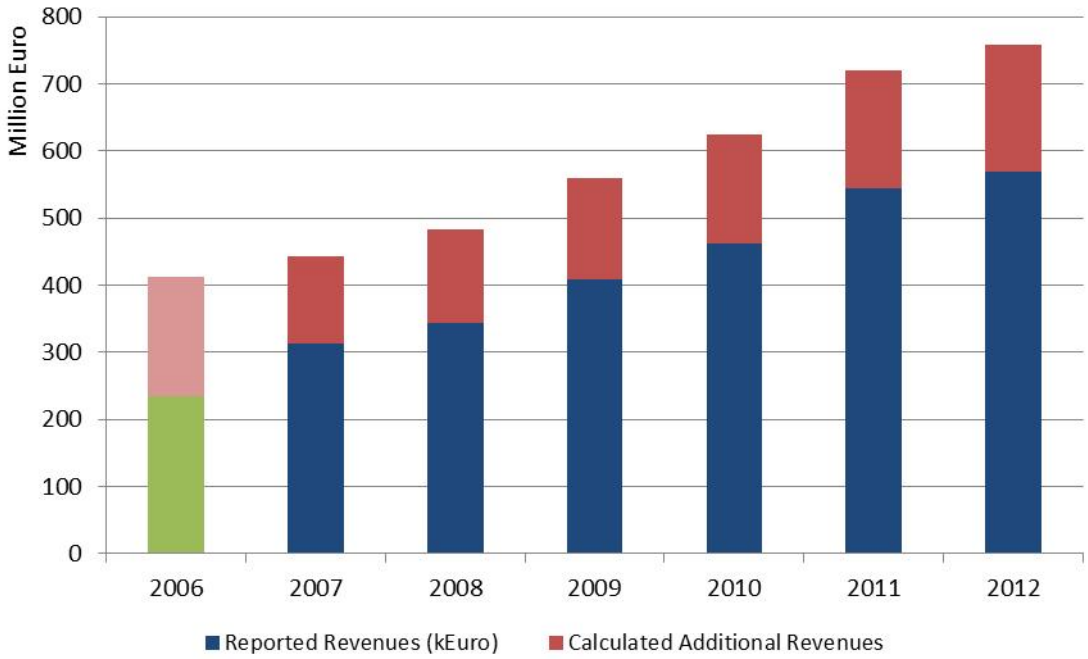


Chart 5-2: Sector Annual Revenues

The total of actual reported revenues as a percentage of the total is 75% for the most recent data and only slightly less for previous years. This compares with the last survey where actual reported revenues were 56% of the estimated total sector revenue.

Note that the two fixed sample points are in 2006 (last survey) and 2012 where we have a large number of actual responses. The values in between are calculated and largely depend upon the rate of formation of companies that comes from the actual returns. The results seem to be rather consistent but intermediate values are nevertheless estimations.

Taking the 2006 and the 2012 data points, we calculate a CAGR over the 6 year period of 10.7%.

In the workshop we held with industry representatives in late June, a participant commented that the growth looked too smooth and did not take into account the financial crisis of 2008 that had certainly hit his company. This led us to look at the data we had to see whether we could see this effect and what conclusions could be drawn.

In the Core 1 survey we asked companies for actual revenues over the period 2007 to 2012. Some 49 companies responded to this of which 25 had existed prior to 2006 and hence had been in business for the whole period of the survey whilst a further 24 companies had been created during this period. We took these figures and calculated

the corresponding revenue totals for the first and second groups. The results projected onto the total revenue figures are shown in Chart 5-3.

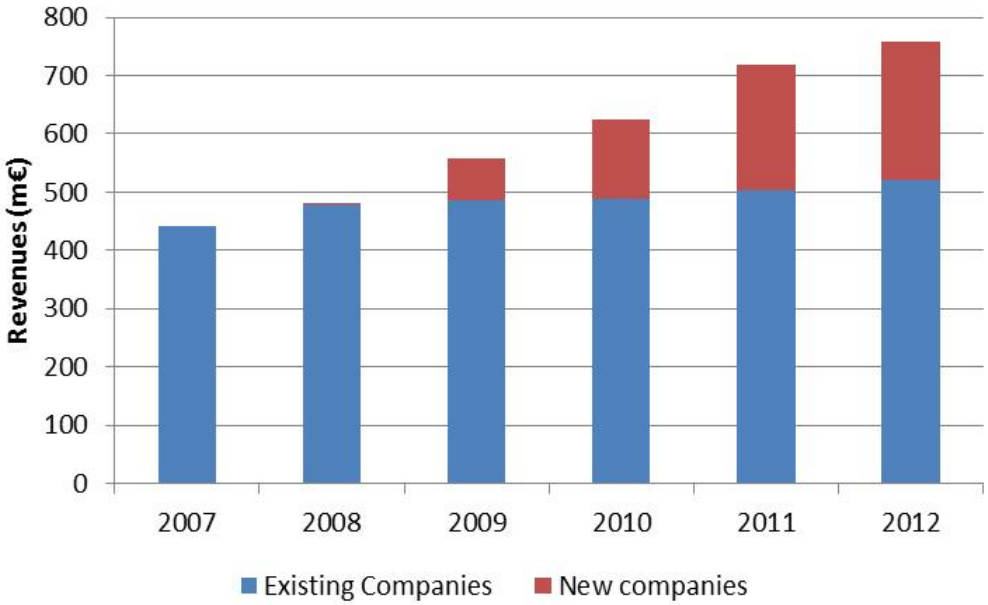


Chart 5-3: Revenue growth, reported numbers for old and new companies.

The results show that, for companies that existed in 2007 and before, they did indeed see a slowdown in revenues (shown in blue in the chart); even an actual reduction in 2011 - and 2012 revenues have barely recovered to 2010 levels. However, new companies (shown in red) formed during the period have shown good growth in revenues and more than compensate for the downturn in the rest.

A significant portion of the revenues represented by the red portion comes from companies with new business models. It supports the view that, during a crisis, new companies are formed which creates the conditions for renewed growth once the crisis has passed. In this case they are mainly satellite operators which have started sales in the period (see also Section 5.2). When a future crisis arises, no doubt a similar effect will be seen but that time it will not be data sales but another new business area which drives the growth.

What about the companies that operated throughout the 5 years? Is there any difference visible between the different company classes? In Chart 5-4 we take the limited data that we have which represents the 25 companies which reported figures for each of the financial years. The CAGR has been calculated simply as a linear figure between 2007 (ie the first year covered by the 2012 survey) and 2012 and the result plotted as a scatter for each of the company classes; 1=micro, 2=small, 3=medium & large.

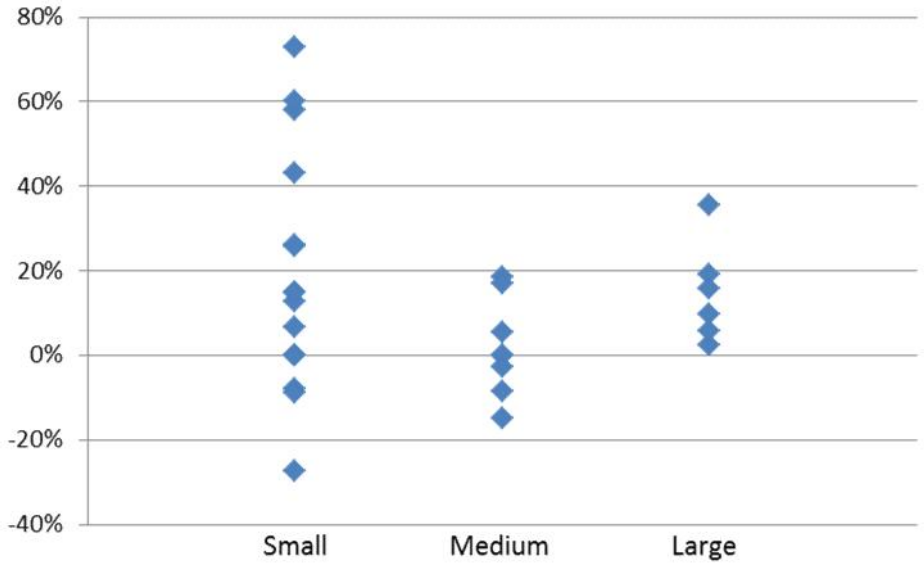


Chart 5-4: CAGR from 2007 to 2012 for different company sizes

It would be wrong to draw firm conclusions based on this limited data but there is a much larger variation in performance for the micro companies than there is for other classes. It would also appear that large and medium companies are more robust than the smaller ones but this can only be taken as an indication and should not be considered a firm result due to the limited data available.

The contribution of the different classes of company to the total sector revenues is shown in Chart 5-5. This takes the 2012 calculated revenue figures and assigns them according to the class of the company; large, medium, small, micro. It corresponds to the full population of companies ie 319 and a total revenue base of €757m.

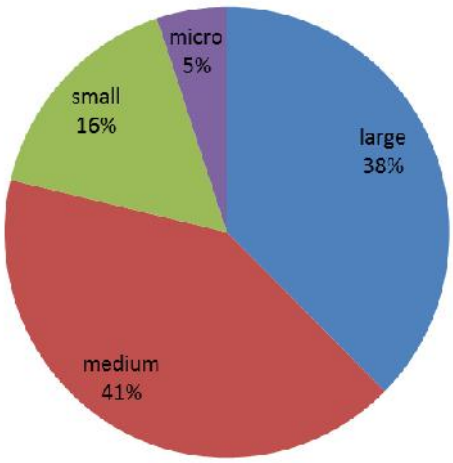


Chart 5-5: Sector distribution of 2012 Sector Revenues by Company Size

The result shows that companies in the medium class which have between 50 and 249 employees contribute 41% of the sector revenues; marginally higher than that of the large companies at 38%. The micro class companies only contribute 5% of revenues despite comprising 67% of the total number of companies; again re-enforcing the view stated earlier that although creating micro-enterprises is important, creating the conditions for them to grow is even more important.

5.2 Revenues by Activity

Chart 5-6 and Chart 5-7 show the total revenues split by type of activity (using 2012 figures). Seven classes of activity were included and responders were asked to provide an estimate of the percentage of their revenues that arose from each type of activity. The total revenues covered by the actual, reported split of activity was €549m or 72.5% of the estimated revenues. For the value chain explained, see the Glossary.

Some companies declined to give an estimate and these, together with the additional revenues from non-responding companies, have been extrapolated. We consider that we have had responses from all the satellite operators selling primary data and the ground station operators. We have taken the other 4 categories and allocated the calculated additional revenue between them in the same proportion as in the direct responses.

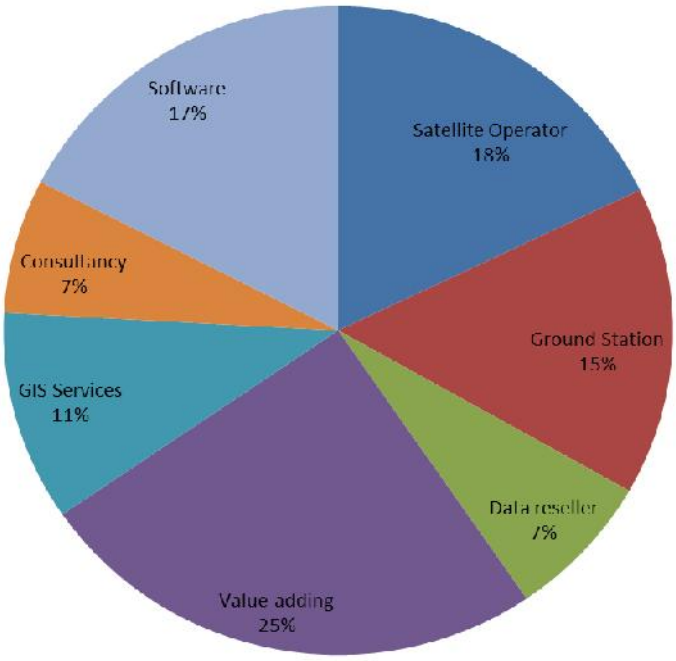


Chart 5-6: Split of sector revenues by class of activity

Chart 5-6 above, shows the percentages of sector revenues coming from each class of activity. There is a rough balance between the total from the satellite operators and the value-added / downstream companies each with around 35% of total revenues.

The absolute figures are shown in Chart 5-7 which also perhaps more clearly shows the result of the assumptions. The figures in blue are the reported figures from the survey responses which represented 73% of the calculated total. Those in red are from companies which reported their revenues but declined to give a split by activity. The figures in green are those calculated according to the methodology described above and which have been distributed in-line with the reported figures.

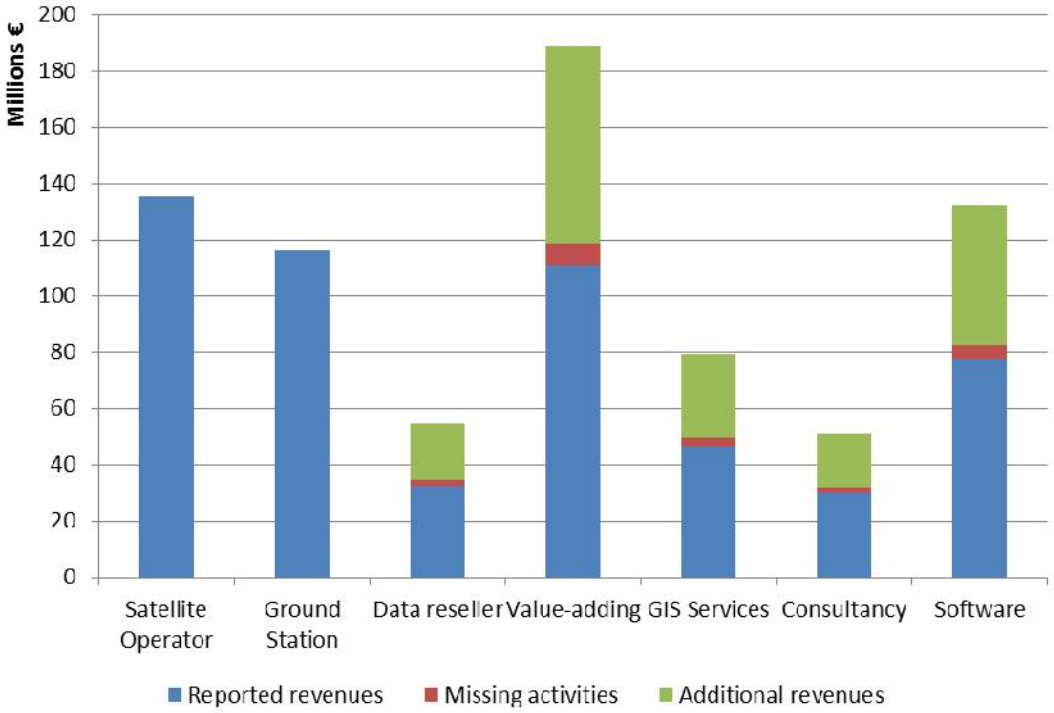


Chart 5-7: Revenues by Activity

The revenue total in 2012 was €757m compared to €412m in 2006. However, in order to make any comparisons of the different activities with the 2006 survey we need to reconcile our results with the categories that were used then[2]. The previous survey only identified data sales as a single category where we have broken this down into 3 categories. In addition, 2 categories of software sales were used. Comparison is further complicated by not having access to the source data; nevertheless, from the final report we are able to re-create Chart 5-8 shown below giving the percentages in each type of activity covered by the survey.

[2] Data sales, information product/service sales, software development services, software licence resale, consultancy, other.

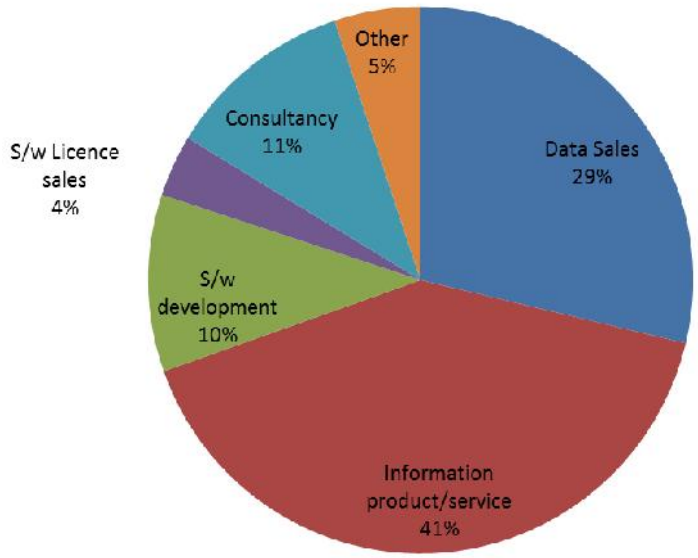


Chart 5-8: Percentage split of Activities from 2006 Survey

We now group our (2012) results so as to be consistent with the 2006 results using the percentages shown in Chart 5-8 with the total revenues of €412m. This gives us the results shown below in Chart 5-9.

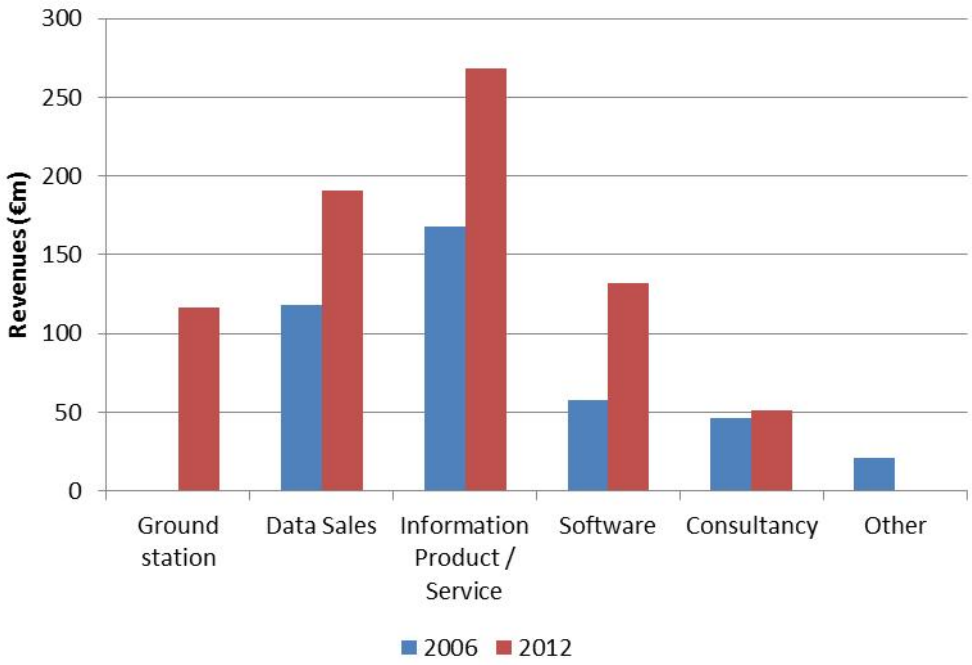


Chart 5-9: Comparative split of activities between 2006 and 2012 surveys

Note that we have separated the revenue coming from ground station operations for this comparison. We showed earlier that the main growth has come from new companies entering the market during the crisis period and these are mainly driven by new satellites being launched; the main ones being Rapideye (in 2009), Deimos 1 (2009), Terrasar-X (2007), Cosmo (2007) as well as a number of other missions and new VHR resolution satellites from the US. Consequently, the ground station operations business which is quite tightly linked to the satellite operators was quite small in 2006.

We now observe that there has been similar absolute growth in data sales, information products and software whilst the consultancy activity has remained fairly stable. Looking at growth rates we find that:

- Data Sales: The total in 2012 is €306m compared to €118m in 2006 which is a cagr of 17.3%. However, this does include the ground station operators. If we take out this activity then we arrive at a cagr for pure data sales of 8.3%.
- Value Added: For the information products we find €268m in 2012 increased from €168m in 2006 ie a cagr of 8.1%.

This covers the period of the economic crisis and we have observed a lot of companies having difficulties during this time. We look forward to seeing how these results will compare in the future.

5.3 Profitability

A total of 63 companies provided some profit measure either in absolute or in percentage terms for the last financial year. These are shown as a distribution chart of profit for each company in order in Chart 5-10.

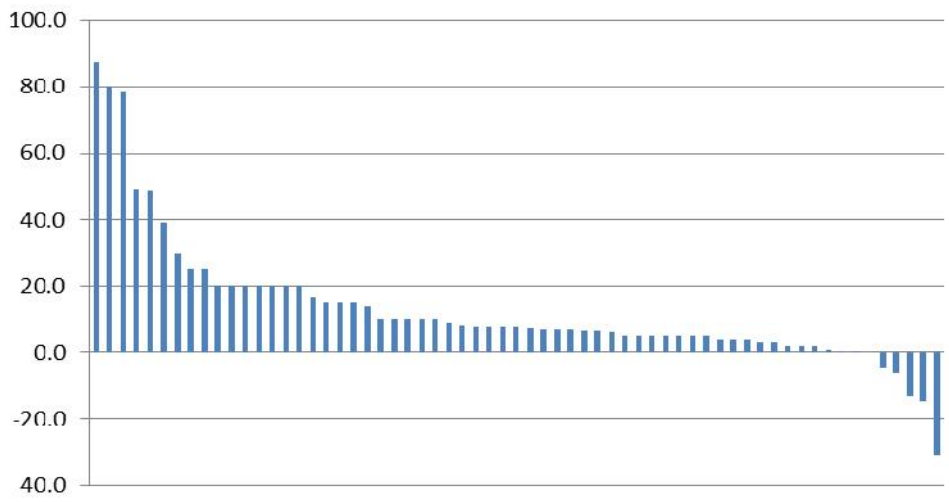


Chart 5-10: Company Profitability

Most companies are in profit with the exception of a small minority showing significant losses. The large profit percentages are misleading since these all relate to small companies which are probably declaring profit before salaries are taken.

An alternative calculation has been made which overcomes largely this effect and also accounts for the variation in company size. We have taken the profit figures and revenues for these companies and used them to calculate a total profit figure for the sample.

These companies have combined revenues of €110m representing just 20% of the total sample of returns. The profitability as a weighted average over this set is 8% which we consider is the best measure we can obtain from the data collected.

5.4 Revenue per Employee

The total revenue for each company was taken and divided by the number of employees to come up with an average figure. Some outlying figures were excluded and the rest charted according to the size of the company. Hence three figures are given for the 3 classes of company (large and medium are merged).

Company Size	Average Revenue per head (kEuro)	
	2012	2006*
Large and Medium (>50 employees)	158	272
Small (11 – 50 employees)	133	109
Micro (1 – 10 employees)	74	65

Table 5-1: Average revenues per employee.

*In 2006, the study came up with comparable figures for the revenue per head but for a different size split (see Section 3.2).

5.5 Revenue Optimism

In the same way that we asked companies what their expectations were regarding employment in 12 months' time, we also asked them what their expectation were regarding revenues. Again they were asked if they were expecting strong or weak growth or a strong or weak reduction.

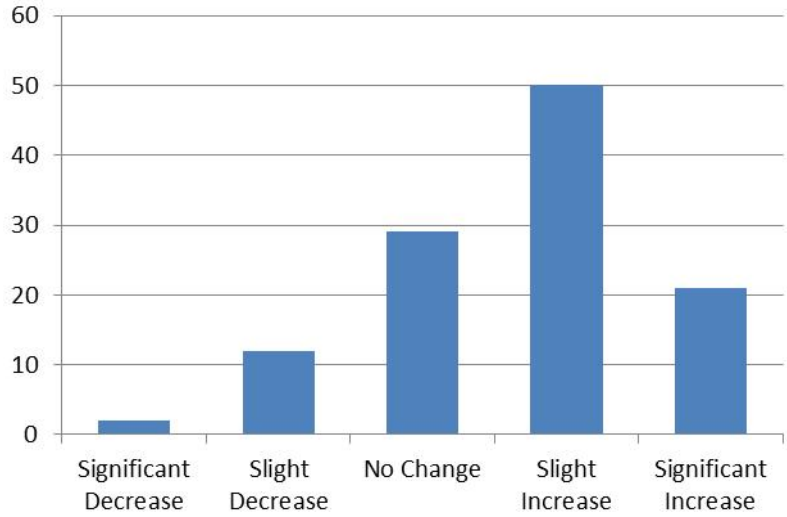


Chart 5-11: Company Revenue Optimism

The results are coming out as mildly optimistic with an optimism index at 1.43 on the scale of -5 to +5.

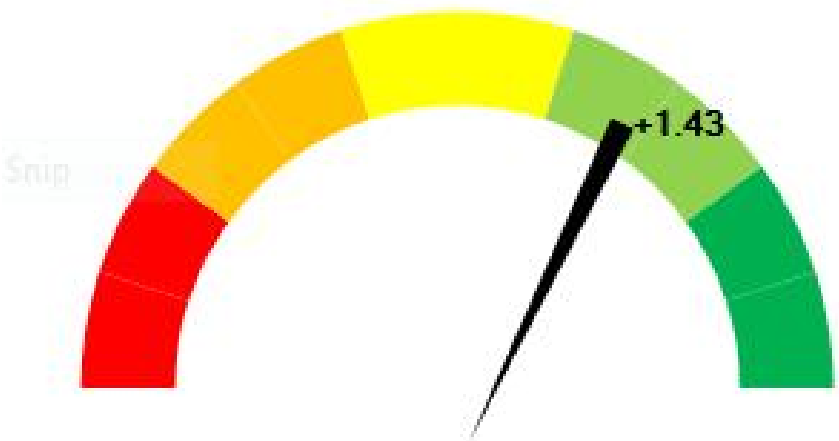


Chart 5-12: Revenue Optimism Index

The results shown in Chart 5-12 are slightly more optimistic than those for employment; whilst the employment optimism index stands at 1.07, the index for revenues stands at 1.43. This is still much more cautious than at the time of the 2006 survey when only the employment views were taken and as reported earlier the index was at 2.79.

A higher index for revenues than for employment is to be expected. To take on one additional staff is a quantum step for a company, especially where the existing headcount is low (micro-enterprises) whilst it is possible to foresee increased revenues more easily.

5.6 Comments on Financial Performance

- The total sector revenues from the EO services sector in 2012 are estimated as being €757m an increase from €412m in 2006 and representing an overall compound annual growth rate for the sector (cagr) of 10.7%.

- The financial crisis starting in 2008 has caused loss of revenues for those companies that were active before it started. Nevertheless, the growth in overall revenues was sustained by new companies being formed with new business models. In this case, a number of new satellites were launched with the subsequent data sales driving the overall growth.

- Revenues from data sales have risen from €118m to €190m in the period an annual growth rate of 8.3%.

- The geo-information services business covering the value-added products / services and the downstream products / services has also increased over the period from €168m to €260m. The average growth rate for the value added services sector is 8.1%.

- With the launch of a number of European commercial EO satellite systems; TerrSar-X, Cosmo, Rapideye and Deimos as well as the US Digital Globe and Space Imaging (now merged), the business of operating ground stations has greatly increased from almost nowhere to €116m.

- The industry is quite optimistic regarding future growth with the index standing at 1.43.

6. Market Structure

6.1 Introduction

Here we look at the EO services market which we characterise in 4 ways:

- Type of customer; whether they are in a commercial or public sector activity.
- Geographical location to understand how sales are split around the world
- Customer activity; this is structured according to the area of activity of the customers' organisation
- Thematic view; which is structured according to a classification of the products and services which are being offered.

In the latter two cases which correspond to the same products and services but looked at in two different ways, EARSC has developed a taxonomy which has been used as the basis for the two splits.

6.2 Type of Customer

In the first instance we look at the type of customers that are served; categorised by the type of organisation in which they sit. Companies were asked to provide an estimate of the percentages of their revenues that come from each type of customer. We received 100 valid responses to this question representing 72% of the recorded revenues and 54% of the total calculated revenues.

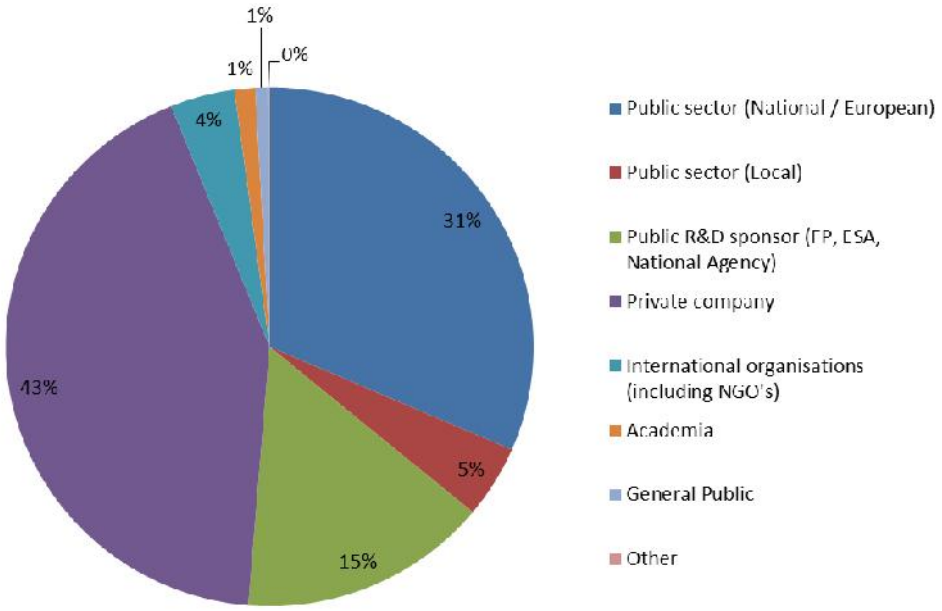


Chart 6-1: Revenue split by type of customer

Over 50% of the revenues are coming from public sector customers at all levels of public administration and including R&D agencies. Surprisingly, 43% come from commercial customers (private companies) a higher figure than has generally been reported before and the highest single segment.This is an encouraging response as it provides evidence of good commercial take-up of EO services.

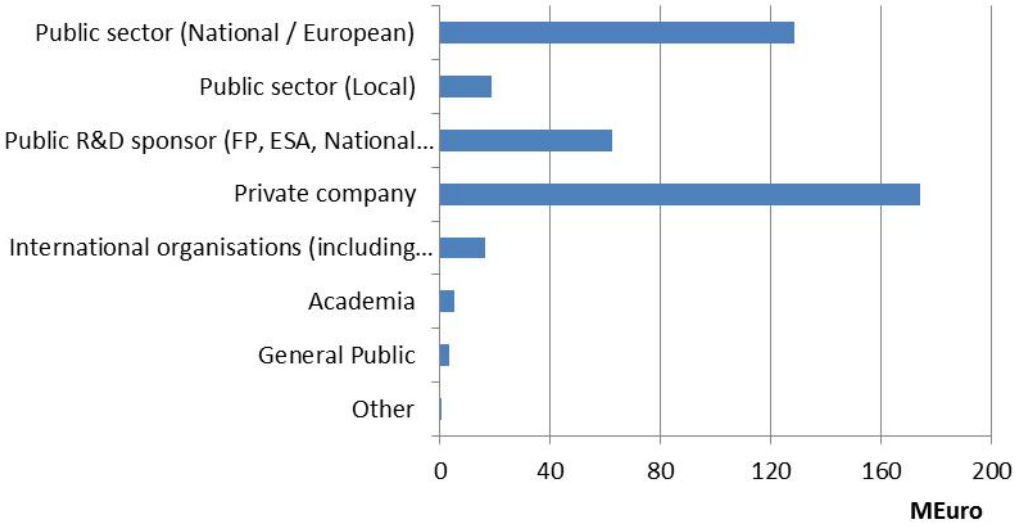


Chart 6-2: Revenues (reported) by customer type

The actual reported revenues are shown in Chart 6-2. The total revenue covered by the responses to this question is €407m.

We have some comparable data from the 2006 survey which we can use. The Chart 6-3 shown below is an approximation to the results that we have compiled. In 2006, questions were based around a limited number of products ie the top 3 selling products for each organisation. This means the result is not directly equivalent to our question which was based on the company total revenues. Nevertheless, it is close enough to make a comparison worth doing and which is then shown in Chart 6-4. The comparison is made in terms of percentage of sales to each type.

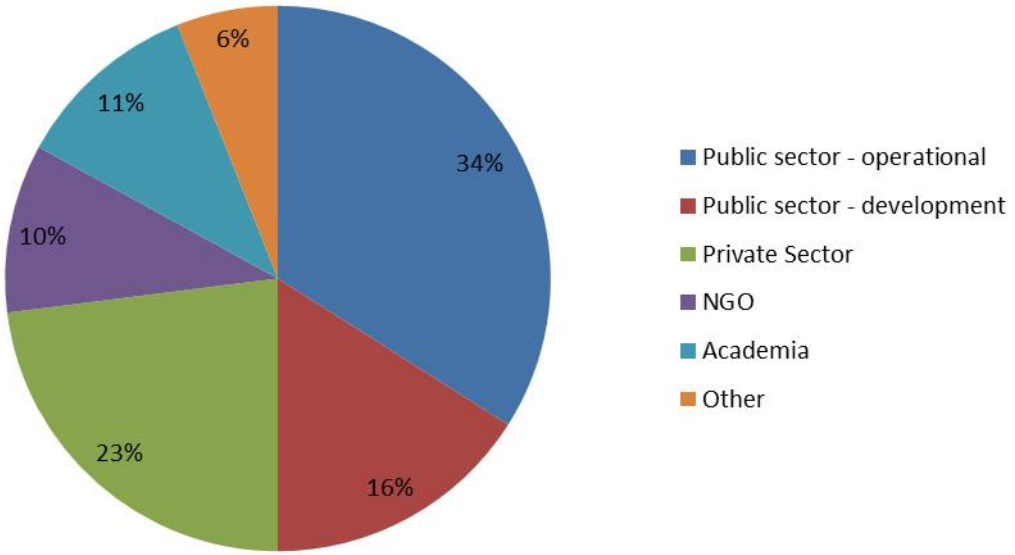


Chart 6-3: Split of customer types in 2006

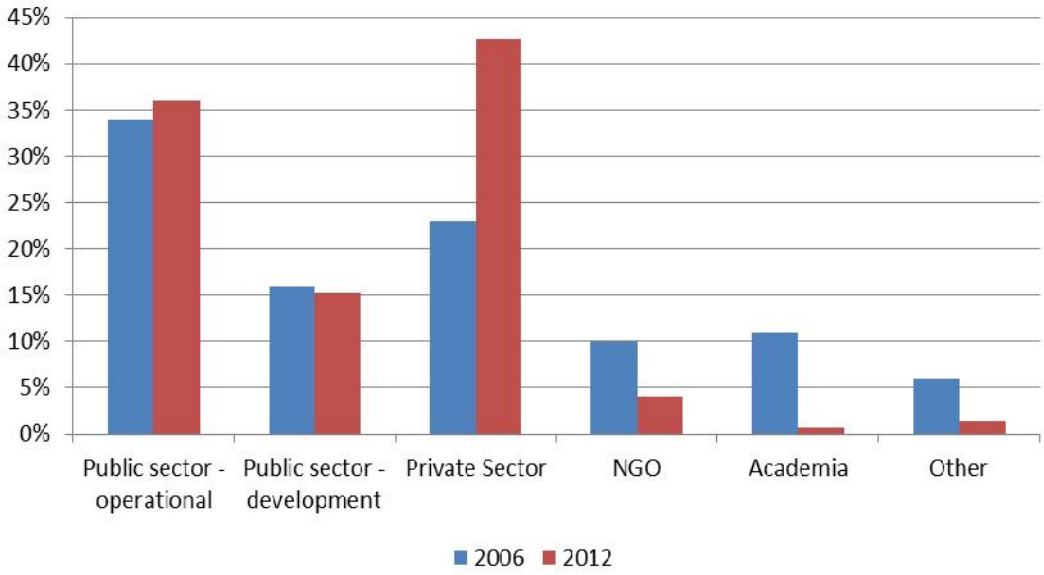


Chart 6-4: Comparison of Customer Type between 2006 and 2012

We see that the relative importance of the public sector has stayed fairly constant whether as an operational customer or an R&D sponsor. Although there is evidence of a small increase in the former – which we welcome - and a small decline in the latter, the statistical significance is weak. There is a much stronger trend when it comes to the private sector which has increased significantly as a share of the market – even more so

in absolute terms – and a fall in both NGO and academia. The latter is presumably following the trend to open data. In the case of the NGO market, there is a 25% fall in real terms from €40m to €30m.

6.3 Geographical Distribution of the Market

Companies were asked to provide estimates of the percentage of their revenue that came from customers based in the defined geographical regions. The resulting breakdown of revenues by geographical source is shown in Chart 6-5.

It shows the dominance of home markets and the relatively low revenue coming from exports outside of Europe. Just 25% of revenues come from outside home markets (including Europe as a whole). One third of revenues are coming from customers in the company's national / domestic market whilst 39% are coming from Europe (other than home market). A further 11% are coming from North America (including the Canadian companies covered by the survey) leaving 14% coming from the rest of the world.

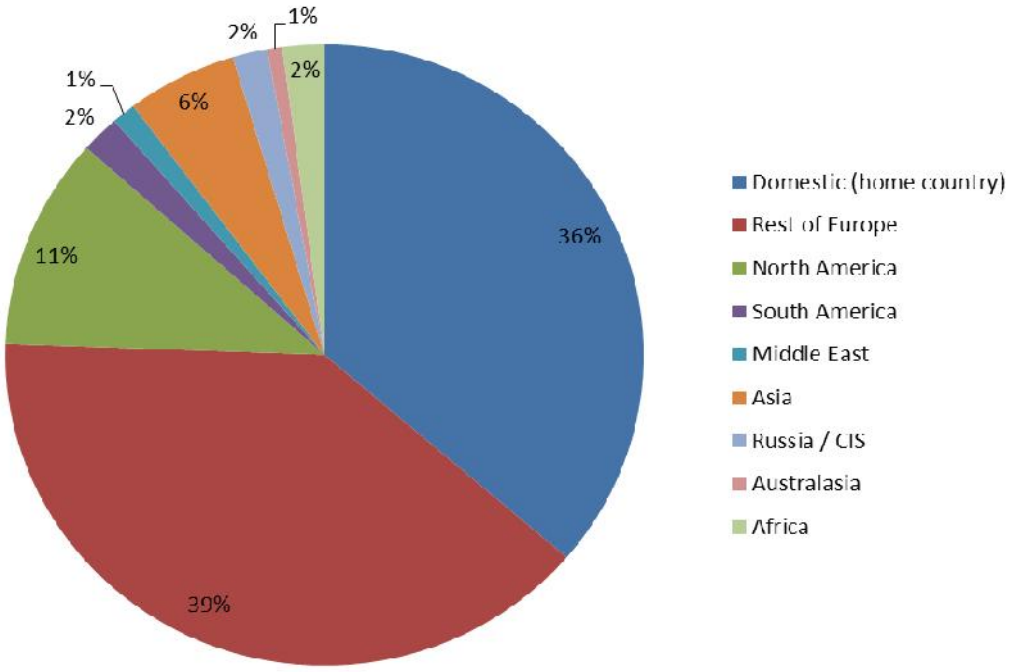


Chart 6-5: Breakdown of revenues by geographical region

The companies responding to this question had combined revenues of €408m ie 72% of the reported revenues or 54% of the total calculated revenues. The breakdown of the actual figures is given in Chart 6-6.

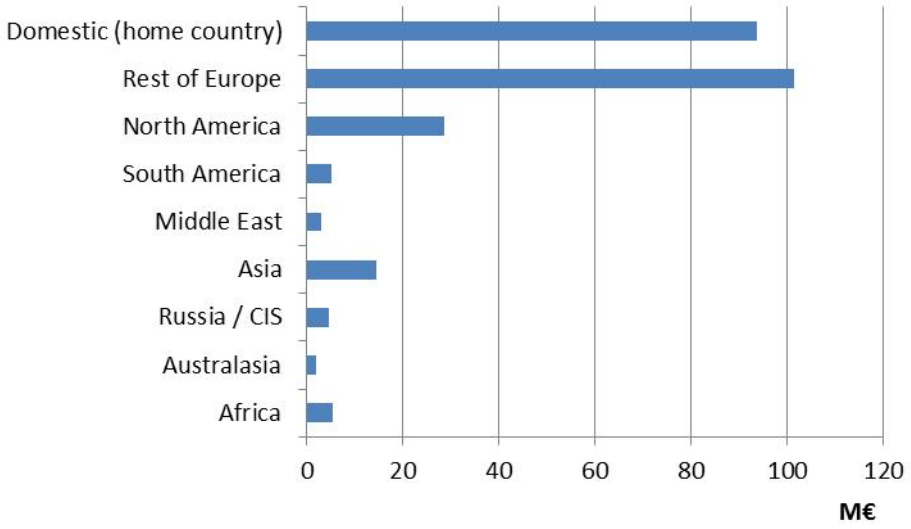


Chart 6-6:Reported revenues by geographical region

In 2006, the focus on products means that the geographical split of revenues is not fully representative and we find significant differences between that result and previous surveys. Nevertheless, we have taken the results from 2006 to compare with 2012 as shown in Chart 6-7.

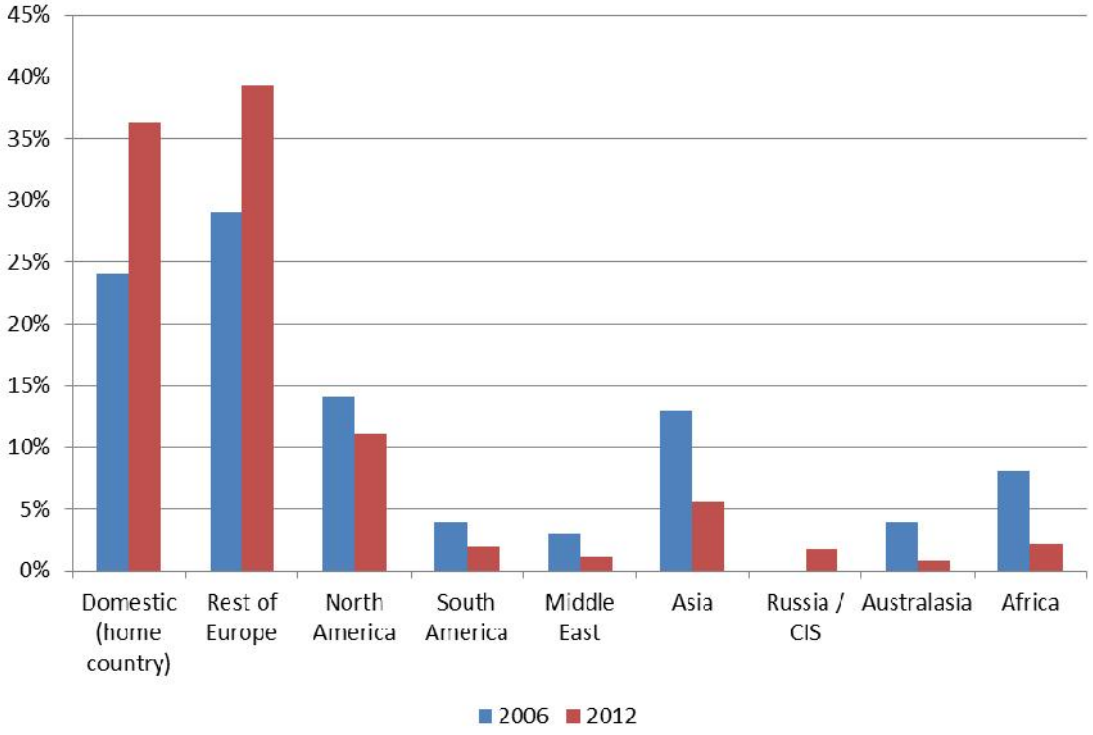


Chart 6-7: Comparison of Geographical Revenues

The share of the market coming from exports seems to have fallen significantly from 32% in 2006. Nevertheless, in the survey of 2004 (data from 2002), the export share of the market was reported as being 15% which is rather close to our finding of 14%. We are inclined to believe that the figure of 32% in 2006 was an anomaly created by the focus on a few products.

6.4 Activity by Market Segment

Companies were asked to estimate the percentage of their revenue that came from each market segment defined. The segmentation comes from the EARSC EO Services Taxonomy.

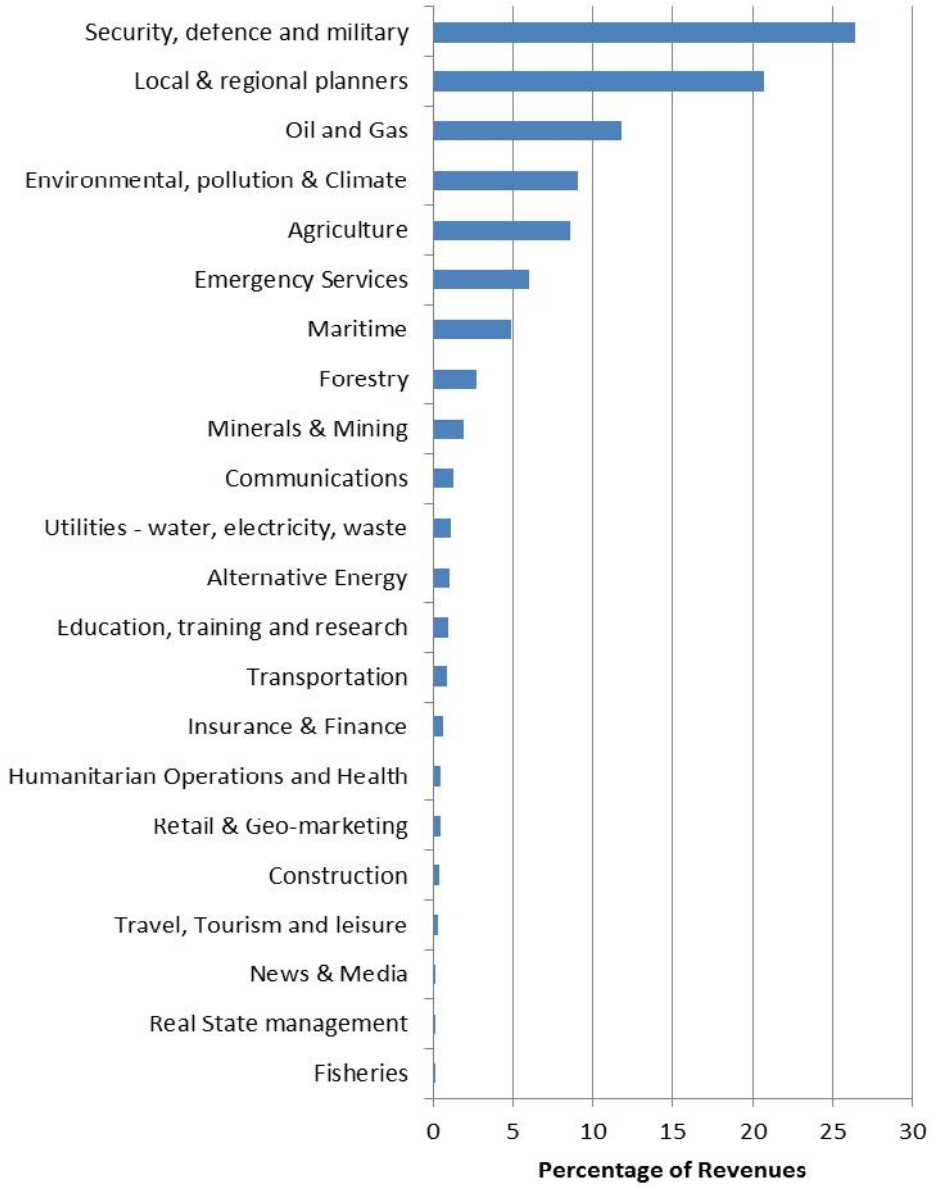


Chart 6-8: Percentage Revenues from each Market Segment

The results are shown in Chart 6-8 in descending order of importance. The values represent the percentage of the total sector revenues coming from the defined market segment based on the reported values.

Security and defence represents the largest segment with local and regional planners second and the oil and gas industry third.

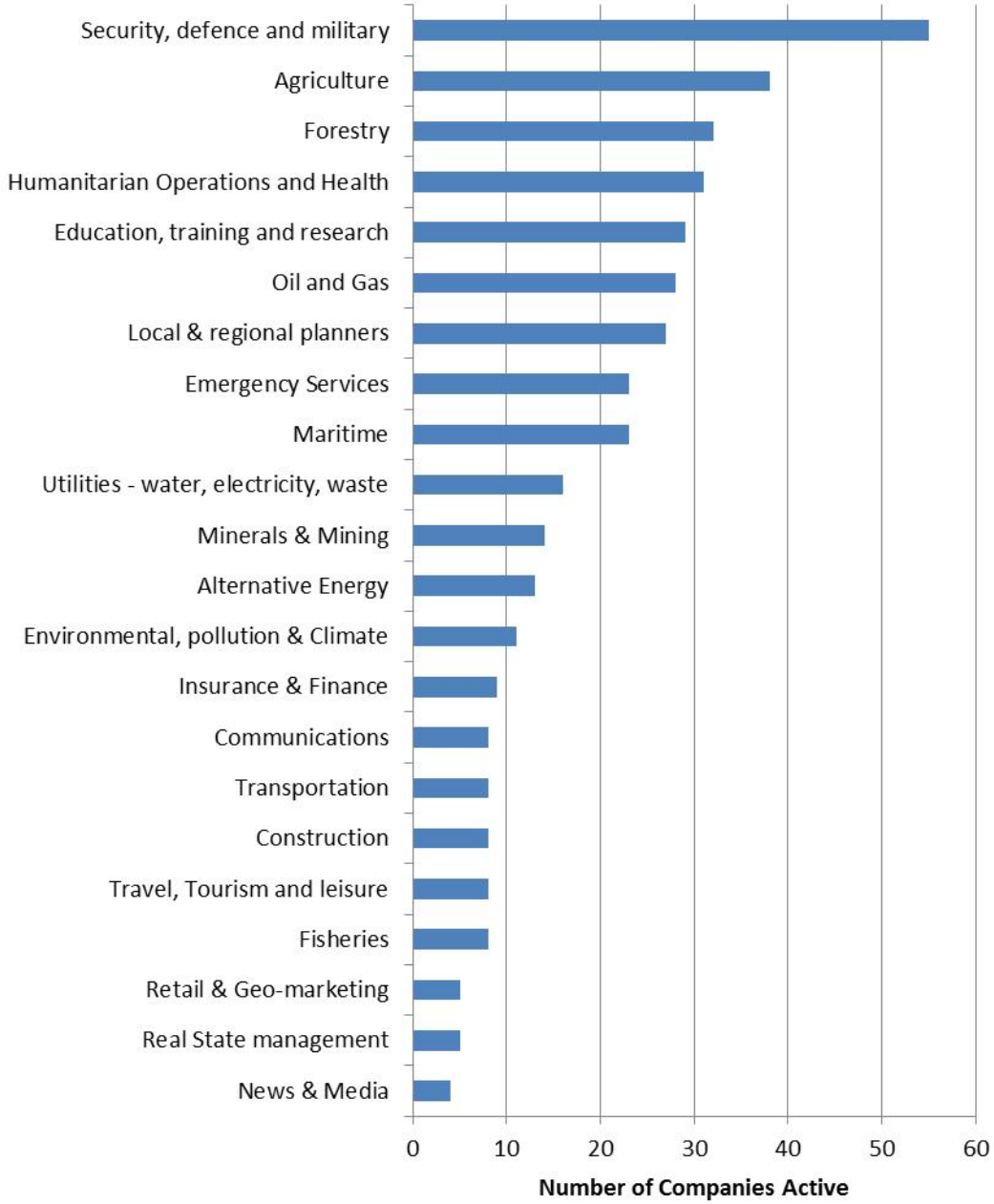


Chart 6-9: Number of companies from responding population active in each segment

Chart 6-9 shows the data plotted as the number of companies which are active in each of the market segments. Since multiple answers were permitted it would not be accurate to scale this to the total calculated number of companies so in this case the

total population is 98 companies that gave valid responses with reported revenues of €391m.

The result shows again the security and defence sector as being the most addressed. This may be indicative of the national interests since the total only represents 2 companies per EU member state (recognising that not all states are represented).

The second and third most active are agriculture and forestry, 2 traditional sectors where again national interests are quite strong under the EU CAP.

The final chart in this section takes the third cut of the data and shows the number of companies that are active in more than one market sector.

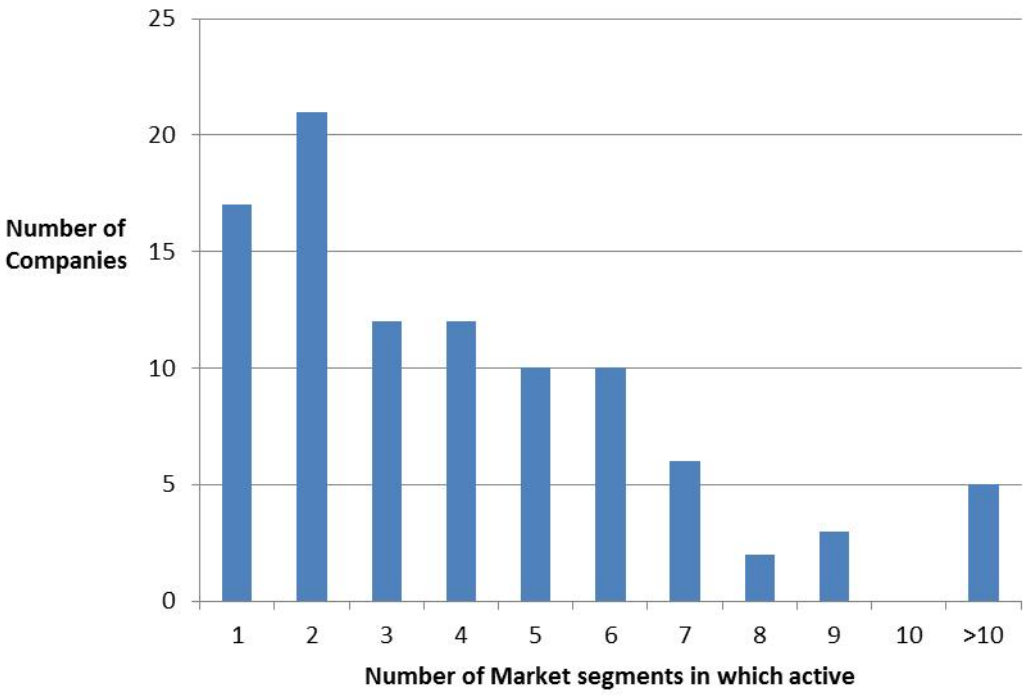


Chart 6-10: Number of Market sectors in which companies are active

Thus Chart 6-10 shows that 17 companies are active in only one market sector whilst 5 say they are active in more than 10 sectors. The median comes out at fractionally over 3 sectors.

6.5 Activity by Thematic Segment

We then look at the market by thematic segment the definitions for which are taken from the EARSC Taxonomy and given in annex 2. The number of valid responses in this case was 80.

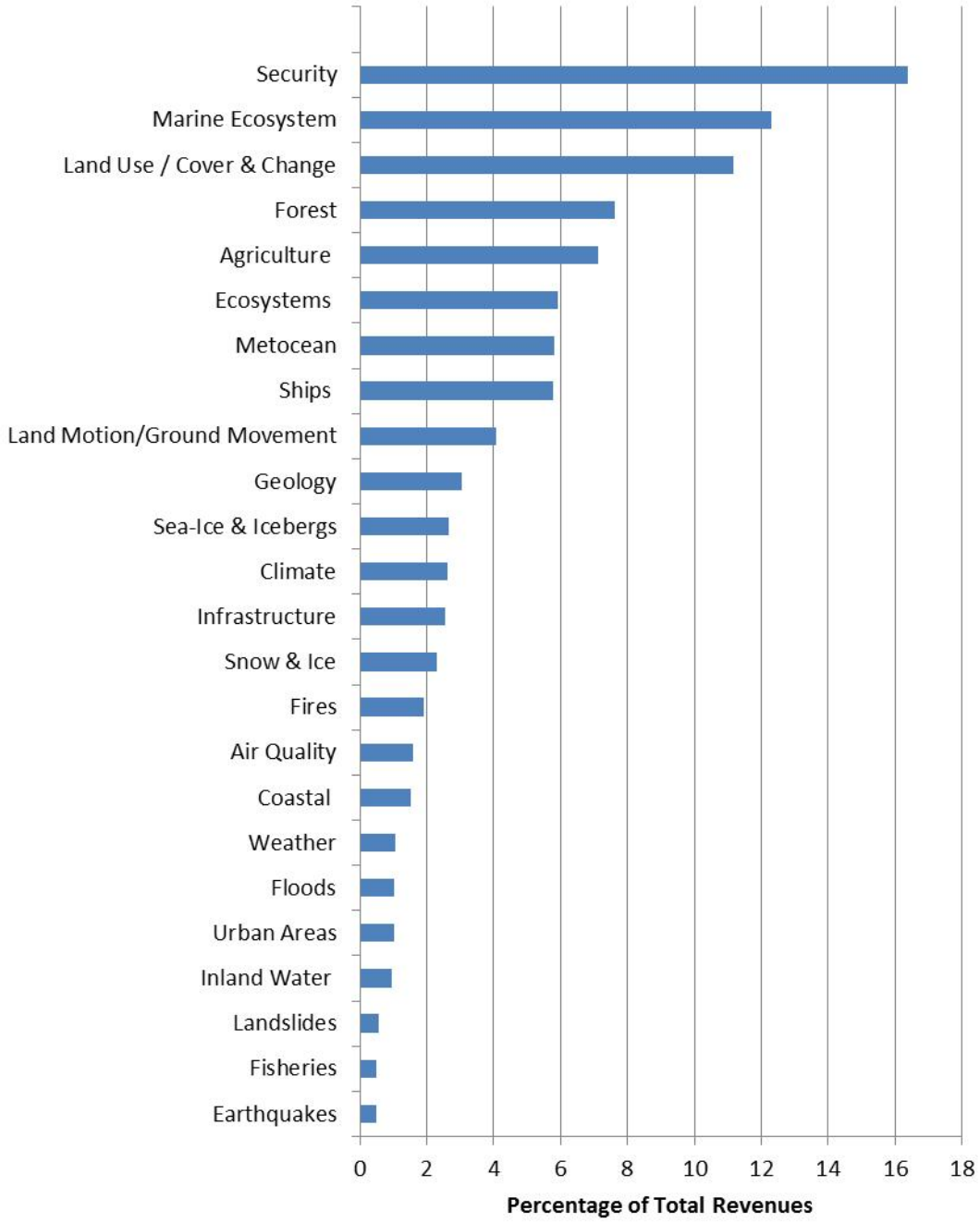


Chart 6-11: Percentage of revenues coming from each Thematic Segment

The results are calculated by taking the revenues attributed to each segment and expressing these as a percentage of the total relevant revenue; the total in this case being €200m. The low figure may indicate that it is hard for some companies to attribute their sales in this way. We believe that this indicator showing the importance of the various thematic segments is a useful measure but, in future, we shall need to examine whether there is a way in which the percentage of returns can be improved.

Especially for a large company with significant revenues it must be difficult to assess which products are generating how much revenue across a large span of business.

Given the similarity between the market segment and the thematic segment perhaps it is not too surprising that the most highly rated is security. To illustrate, if we take the second rated, agriculture, then a thematic product here can serve several different market segments in industry, public sector, International markets etc. Nevertheless, the profile is strikingly different from 2006 when land cover and ecosystem monitoring were the two most highly rated.

We then take the same returns and calculate how many companies declare themselves active in each segment. The results probably understate the reality since as mentioned above, the larger the company and the more segments that are addressed, the harder it will be to give a meaningful breakdown of the revenues.

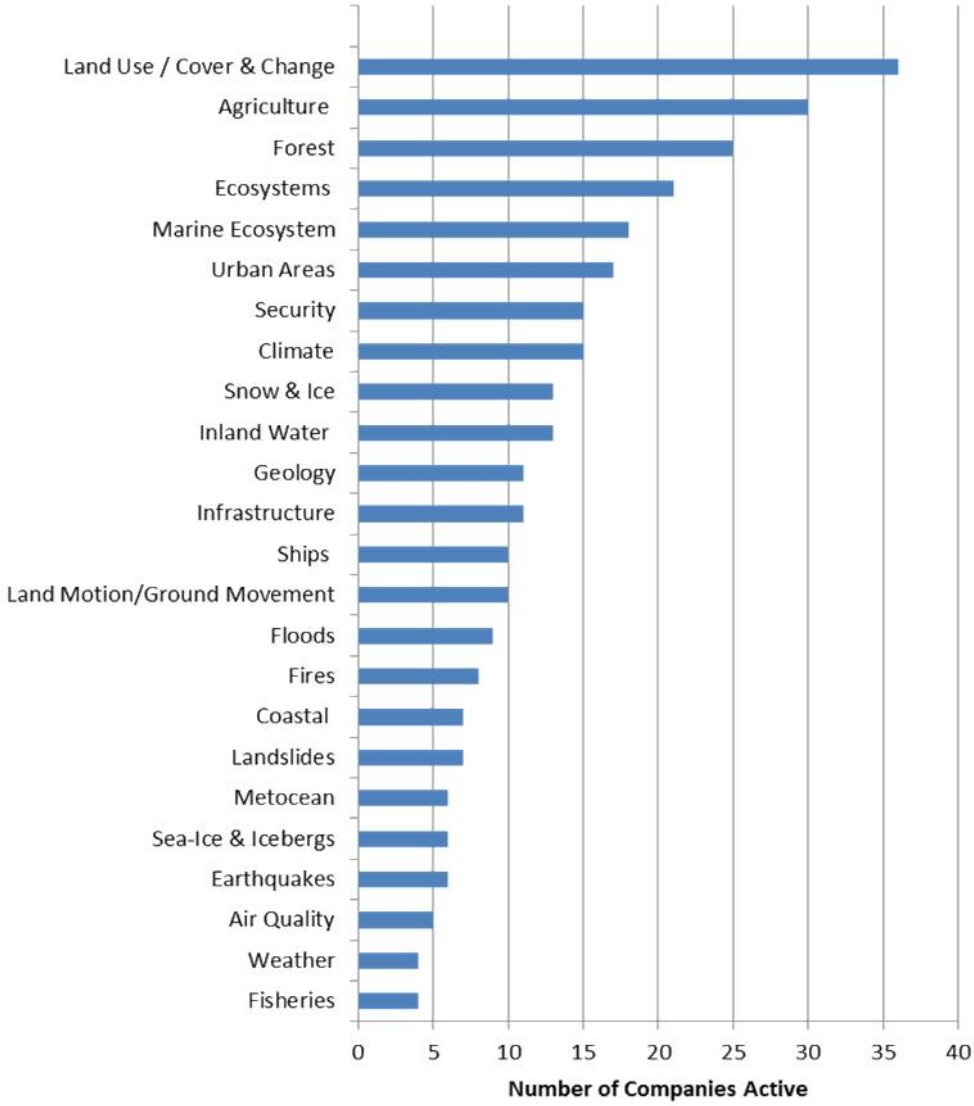


Chart 6-12: Number of companies active in a thematic area

Nevertheless, the result in Chart 6-12 gives an idea of the diversity of thematic sectors that are being addressed.

The final Chart 6-13 shows the distribution of companies addressing more than one thematic segment. The median comes out at slightly under 3 so not unduly diversified although there is a long tail where companies are active in many thematic segments; which must not be easy given the domain expertise required to do this.

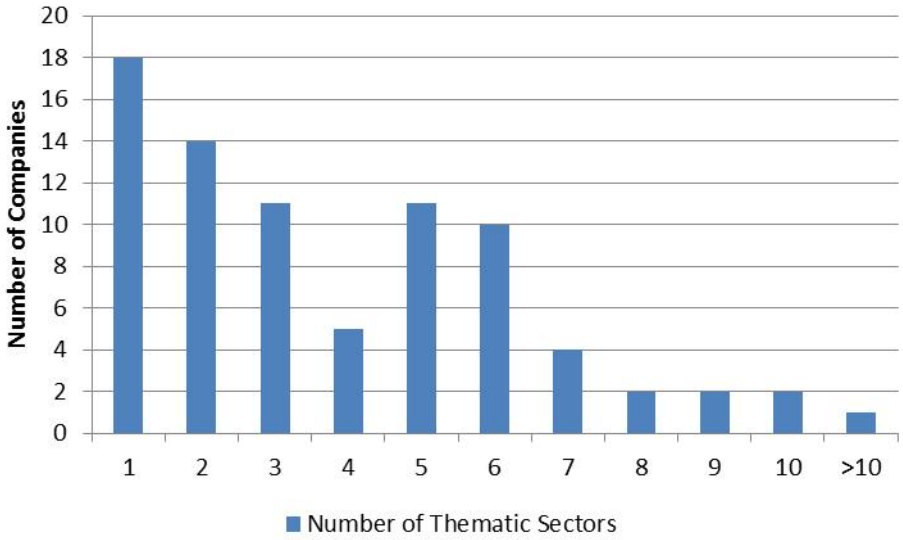


Chart 6-13: Distribution of companies addressing multiple thematic segments

6.5 Sales Success

We asked companies what they considered to be the main factors that translated into sales success. Companies could provide up to 3 reasons. We deliberated on whether we should include price as a factor since it was likely to be quoted by many responders. In fact the leading factor is the technical performance of the product - although price does come second.

Chart 6-14 shows the responses with technical performance and price closely followed by a previous business relationship and specialist domain knowledge as the key factors.

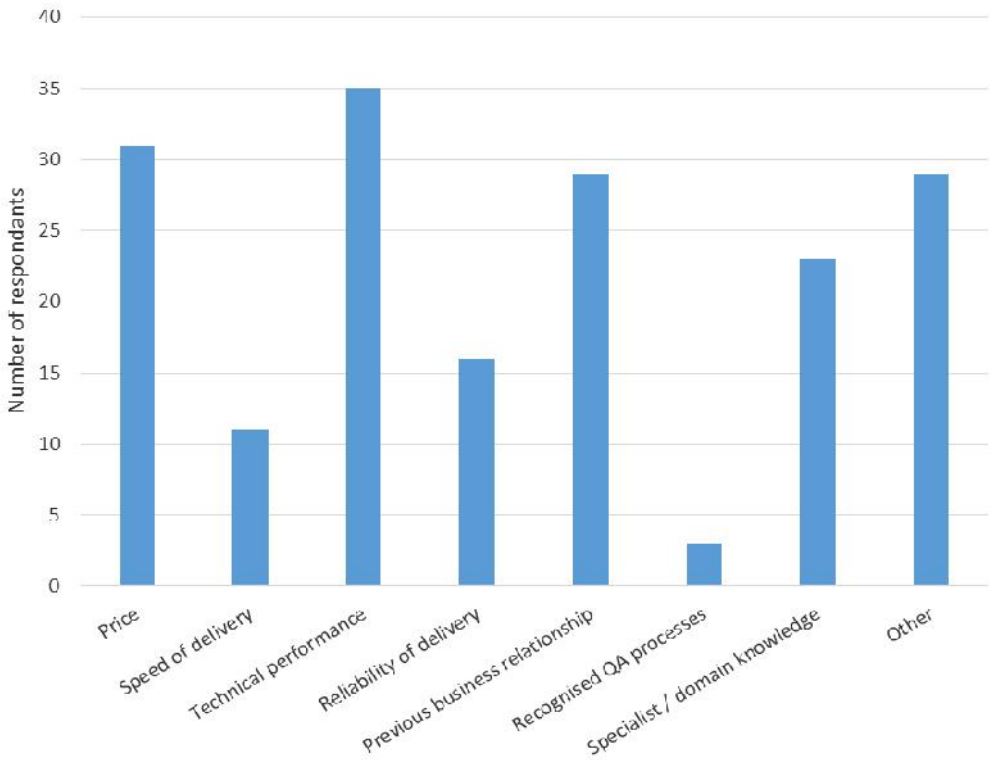


Chart 6-14: Sales Success Factors

Some of the comments received were:

- All are equally important it depends on the customer
- Reliability of delivery is first and the rest are weak.
- If the customer is public then price is dominant, if they are commercial then reliability (and speed) of delivery are paramount.

The need for specialist domain knowledge and a previous business relationship were emphasised by a number of responders. This is interesting in relation to the number of thematic and market segments tackled by many companies where these two factors are of primary importance.

6.6 Contract Sizes

We wanted to get an idea of how concentrated or extended business is so we asked companies how many contracts they received over the last 12 months and what percentage of revenues did the largest of these represent.

We first used the number of contracts together with their total revenues to calculate the average size of contract.

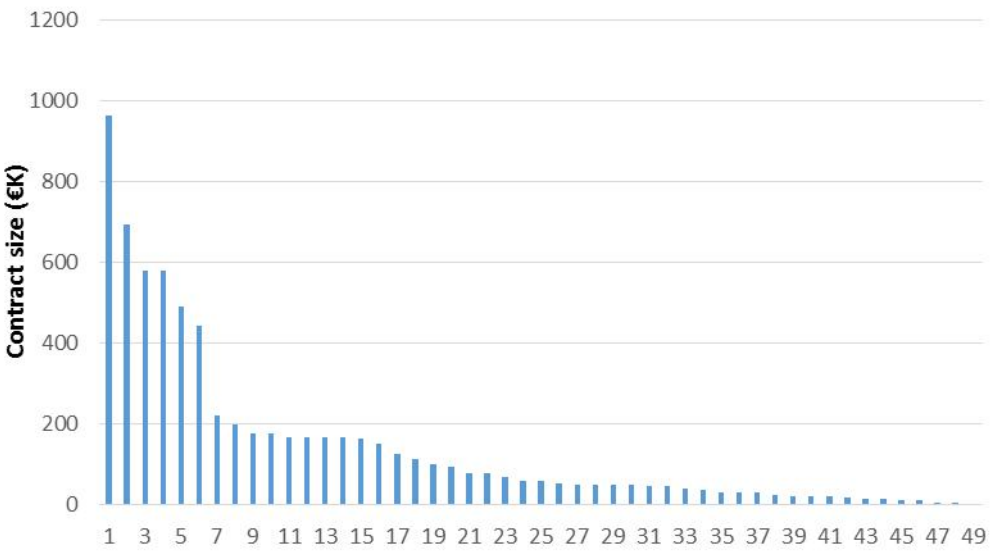


Chart 6-15: Average Contract Sizes

The data suppliers had the largest number of contracts but their average size was not out of line with the rest of the responders. The median value for contract size from our sample of 54 companies is €51K.

We then asked companies what %'age of their revenues were represented by the single largest contract. The results vary enormously. One company is working entirely on one contract so the figure is 100%! Others are distributed under 10%. The median largest contract size would appear to be around 25% of the annual revenues.

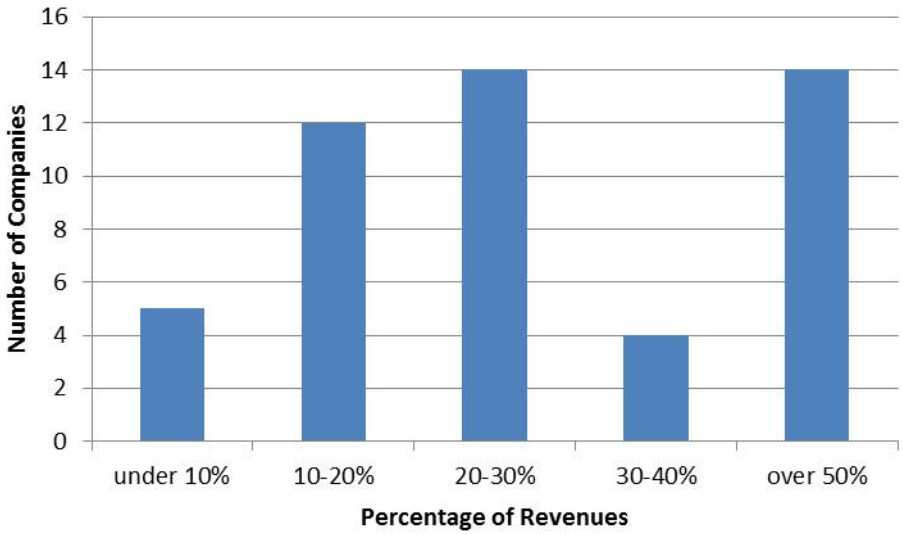


Chart 6-16: Distribution of Largest Contract Sizes

The average contract size was also calculated for each of the company size categories (the medium and large categories were combined), with the results shown below. The results are perhaps not surprising with the smaller companies having smaller contract sizes, but do highlight the very high granularity of business being undertaken by many of the companies in the sector.

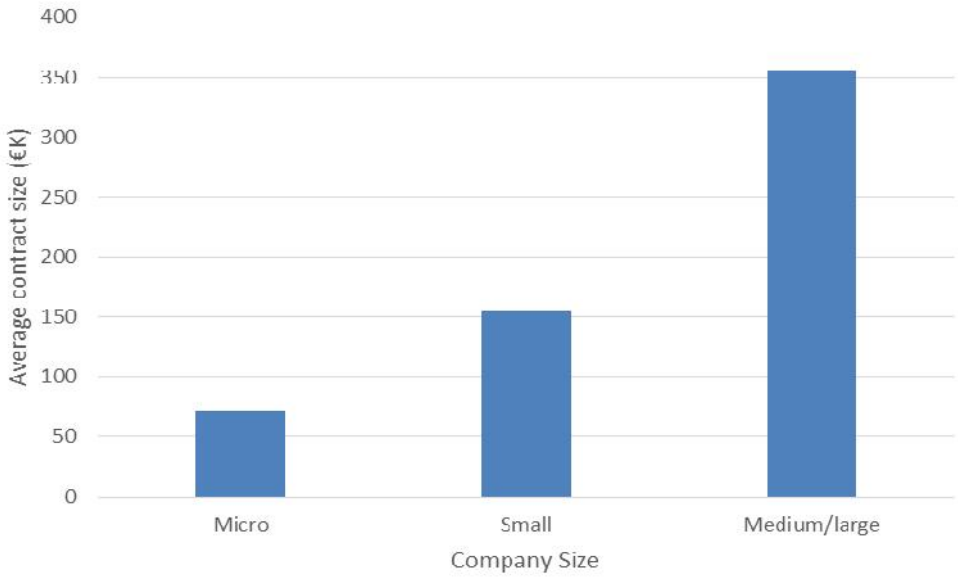


Chart 6-17: Average contract size by company size

6.7 Contact's role in customer organisation

A measure of the maturity of a market is how customers go about procurement. R&D activities will be through contacts in the R&D departments whilst mature industries will have a standardised procurement process.

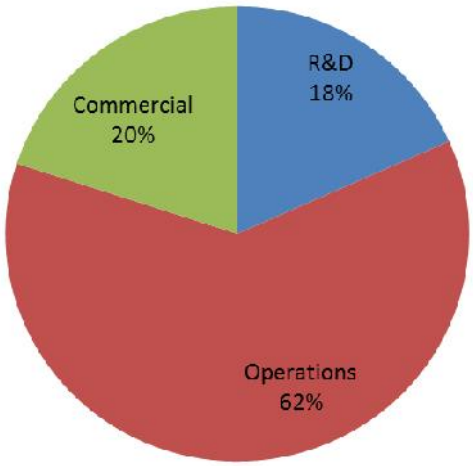


Chart 6-18: Role of Primary Customer Contact

We could not develop a precise response to this question without asking companies to do a lot of background research and hence we asked companies to try to give an indication of where most of their clients sit in the customer organisation.

The results are shown in Chart 6-18 and show a strong bias towards "operations" with only a small minority indicating the commercial or contracts department. It is encouraging that operations is showing as being more heavily preferred than R&D.

In the future we might hope that there is a trend towards buying coming from a commercial department indicating a maturation of the industry and a more standardised approach.

6.8 Summary and Comments

- EO sales to private sector customers has increased significantly in the last few years whilst sales to public sector customers has also increased in-line with the overall market but rest flat in percentage terms.
- A company's domestic or home market is still the most important although sales in Europe (for European companies) are also very significant. Overall, 75% of the sector revenues are coming from Europe.
- The export market (excluding North America) represents 14% of company revenues.
- Companies are rather diversified in the market sectors that they address and the thematic areas which they cover.

7. Supplier Structure

7.1 Introduction

This part of the report is looking at the structure of the industry and the way in which companies work together. The definitions for the activities are given in Annex 1.

7.2 Activity of Companies

We asked companies to give us the percentage of their revenues coming from each type of activity. The results are shown in Chart 5-7. We can also see how many companies report in each one. The total population of valid responses to this question was 111.

The results show a strong dominance by value added and consultancy. We tried to give clear definitions here making the distinction between bespoke products and one off projects to distinguish consultancy.

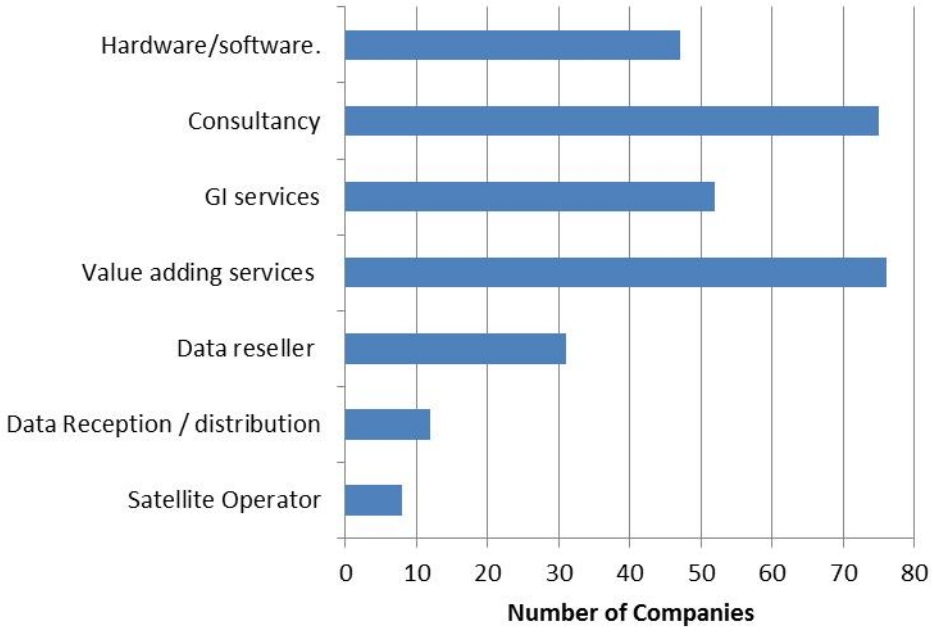


Chart 7-1: Percentage of companies reporting in each activity

We can also use the data to analyse the degree of vertical integration in the industry. We can look at the number of activities which each company undertakes and then count how many each is in. The results for this are shown in Chart 7-2 where we show the number of companies present in 1 activity, 2 activities etc. It tells us that 22 companies are only engaged in 1 of the activities we have defined whilst 4 companies claim to be active in all 7.

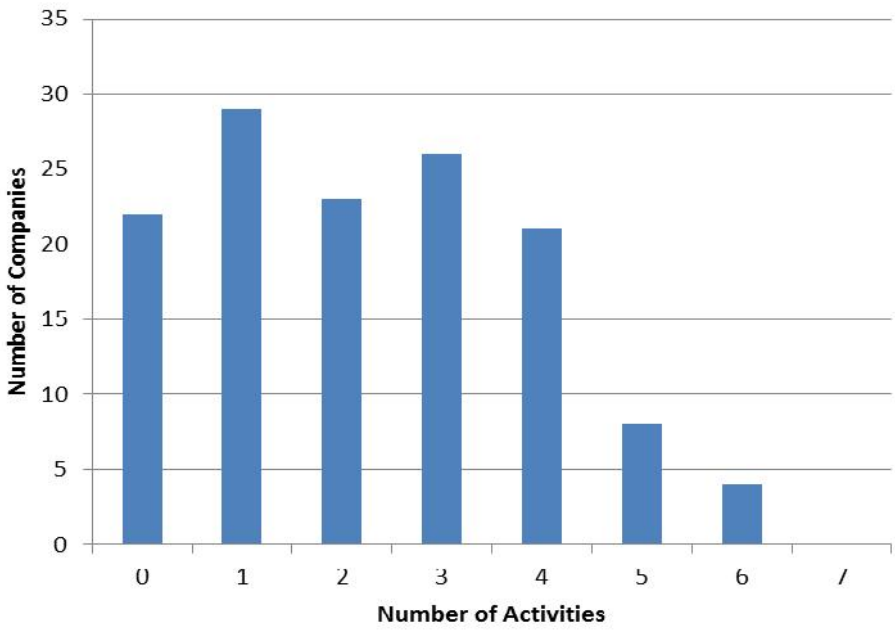


Chart 7-2: Companies in different activities

We can also take a narrower definition and look more specifically at whether companies are engaged in both data sales and in value added activities including downstream and whether either resells data from other satellites. This gives us some measure of the degree of vertical integration in the sector.

- Out of 81 companies in VA or GI services, 27 are also data resellers
- Out of 8 satellite operators, 5 are also in the VA services segment and 5 (not all the same ones) resell data from other satellites.
- Out of the 15 companies that either operates a satellite or a ground station, 10 are engaged in providing VA services.

7.3 Data Suppliers

For the companies active in data supply, we asked which types of data accounted for which proportions of their revenues. Suppliers were asked to give answers in ranges. The mid-points of these ranges were used to cross-multiply against each company's overall revenue to give an overall indication of revenues associated with each data type.

The results confirm that revenues are strongly correlated with data resolution, and dominated by optical data, with two-thirds of all revenues coming from high or very high resolution optical data. The revenues associated with radar data are 17% in total. The high resolution radar category did not exist, commercially, at the time of the 2006 survey so we know that this is an entirely new revenue stream.

In 2006, Radarsat-1 was operational as were SPOT-4 and SPOT-5 all offering commercial services. Also the ERS-2 and Envisat both operated by ESA were supplying radar imagery with some commercial sales via Eurimage. Since then, SPOT-6, Pleiades 1 & 2, Rapideye, Deimos-1 and various satellites in the DMCii constellation have been launched offering optical imagery, whilst Cosmo (4 satellites) and TerraSar-X (2 satellites) now provide SAR imagery. These, and imagery from other international systems is greatly changing the market for satellite imagery and the regular and reliable availability of imagery is opening up new applications and new customer markets.

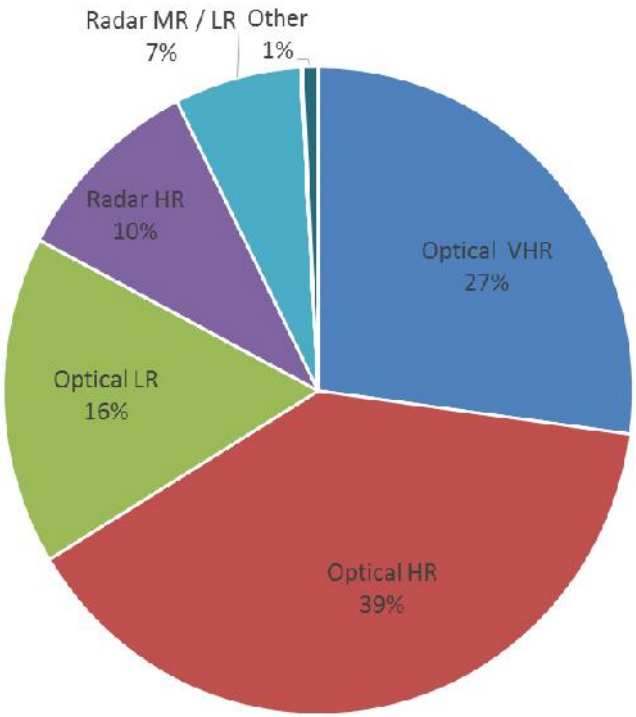


Chart 7-3: Types of Data being sold

Data suppliers were also asked to state what type of customers were buying their data. Again companies were asked to provide percentage a range for the amount of revenue associated with each customer type and the mid-point of this range was cross-multiplied by each company's revenues to get an overall weighted percentage for the whole survey.

The results shown in Chart 7-4 indicate that data sales customers are dominated by public sector institutions, with 72% of the revenues in total coming from the public sector. Surprisingly only 8% of the revenues are shown coming from commercial EO service providers but with 16% coming from commercial non-EO suppliers. This seems to show a lot of activity inside other commercial entities which presumably includes value-adding. To what extent do customers (commercial) buy the data which is then made available to service providers to perform value-adding?

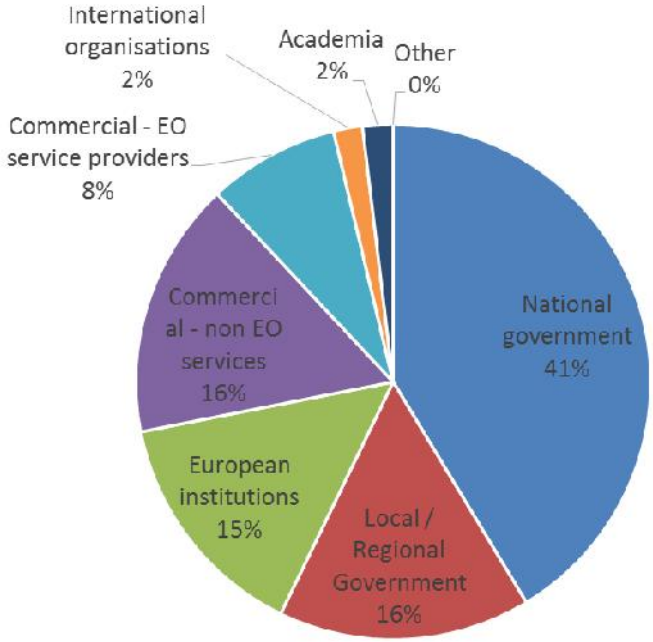


Chart 7-4: Customers for Satellite data

The relatively low level of sales to other commercial EO service providers (8%) is somewhat surprising. It represents around €15m of data sales which for €260m of value-added and downstream services represents an extremely high value-adding activity. Note that this includes the data reseller's activity. This cannot be the whole picture.

A significant part of the value-adding revenues are coming from companies (especially the two largest) which are also selling data. We are not picking up the value of internal data sales in our figures. A further part of the revenues is coming from free data. From our returns, around 12% of the reported revenues or €68m are driven by free data and another part is coming from data bought but not included in our figures ie non-EU sources. But even accounting for these three factors we still find the value of data sales to VA providers rather low.

It does however support another result where we found the value of consolidated sales quite low.

7.4 Value-Adding

We asked companies a number of questions regarding their EO value adding activities to determine the relative importance of different input data types to their business, and what type of customers they were selling their services to.

Firstly, concerning data types, we sought to understand what kinds of data and types of supply were driving most of the downstream business. It will be quite subjective since not many organisations measure this directly but over the sector the estimates provide a good indication. Companies were asked to estimate as a percentage the relative contribution each of the data types makes to their overall revenues.

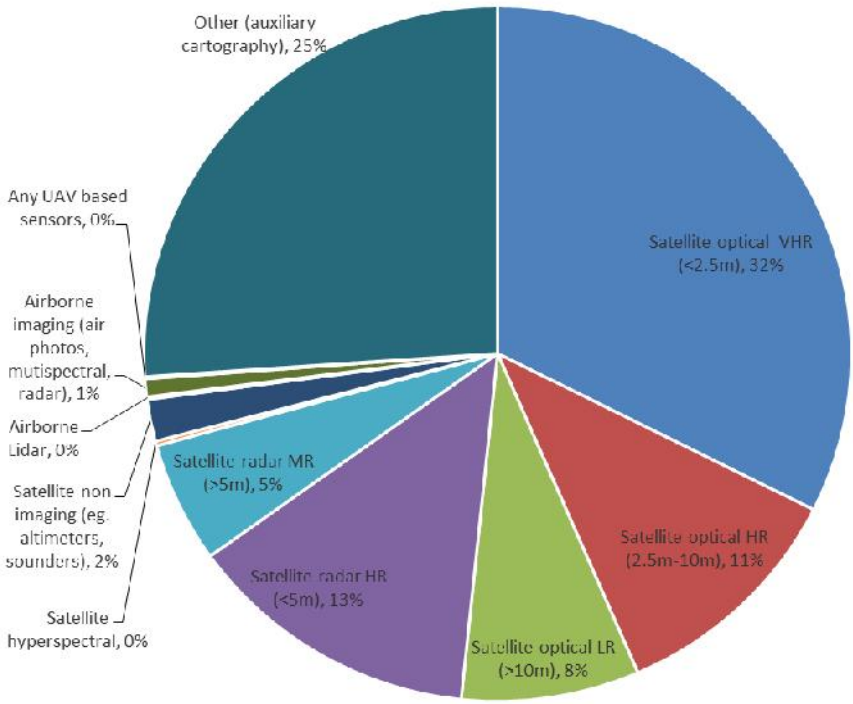


Chart 7-5: Value-added revenue dependence on data types

The favoured data types correspond closely with the sales made by data suppliers (section 7.3). The absolute percentages are somewhat different, because in this case, suppliers also include non-satellite data that contributed to their revenues. However, within the satellite EO derived revenues the figures here show that about three quarters was due to optical data (with VHR optical being the biggest contributor) and about one quarter due to radar data.

We then sought to understand from a similar perspective the importance of delivery speed on the value-adding business. Companies were asked to estimate the percentage of their business which depends on data being delivered in the proscribed time-scales.

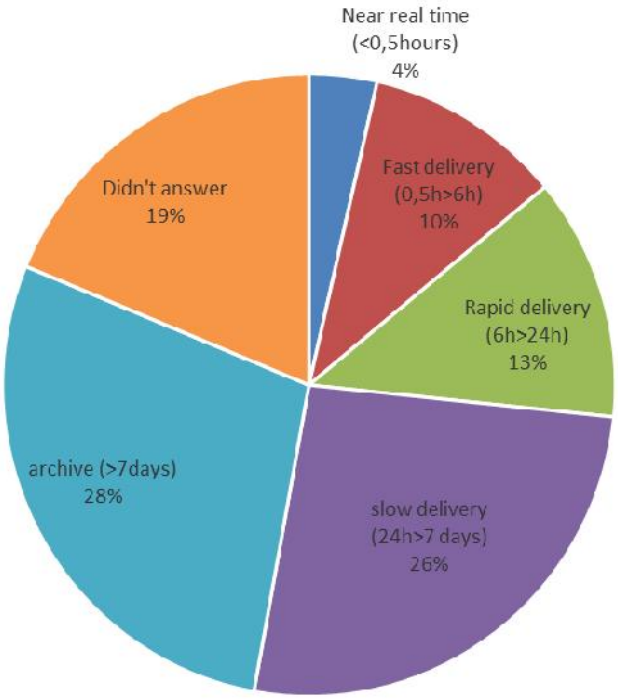


Chart 7-6: Value-Added revenue dependence on data delivery speed

The results regarding delivery speed are perhaps a little surprising, showing that despite advances in EO ground segments, most revenue is still associated with slow or archive delivery products. What we cannot tell from these results is if restricted availability of fast delivery products is holding back the market, or whether there is simply not a huge demand for very low latency data delivery. Another possibility is that for emergency services, a lot of the work is carried out in public sector bodies. This would not show up in this part of the survey as we did not make a distinction in this question between the data providers and the value-adding companies.

7.5 Importance of Free Data

Given the discussion taking place over the appropriate data policy for GMES / Copernicus and whether the data should be free and open, we thought it would be interesting to understand how much of the current business depends on data which is free, coming from public sector sources. We therefore asked companies to estimate the percentage of their overall revenues which depended on free data.

The average response calculated in revenues from the companies responding to the full survey (54) is 12% of the total revenues or €68m are based on free data.

How does this vary amongst the large and small companies? Chart 7-7 shows the breakdown into the ranges we offered to the companies according to company class.

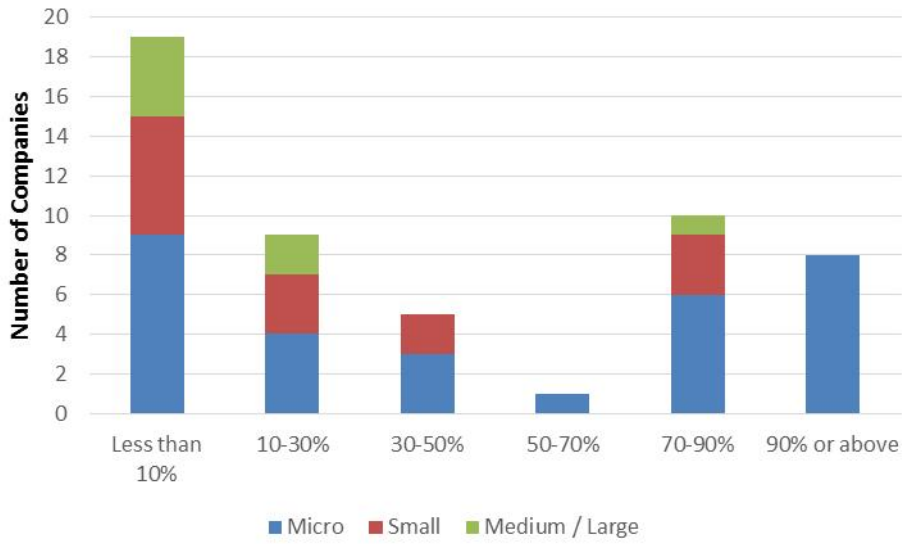


Chart 7-7: Revenues based on Free Data

The results show a distinct increase in the use of free data amongst the micro companies and to a lesser extent the small ones which supports the principle that it is SME's generally that can benefit from and can exploit free data sources.

7.6 Product Diversity

We looked at the number of products that companies offer. Note that as elsewhere, we tried to focus the responder's attention on products as opposed to consultancy. The definition of a product is given in the Annex 1. Companies were asked to provide a number for the number of products which they offered to customers.

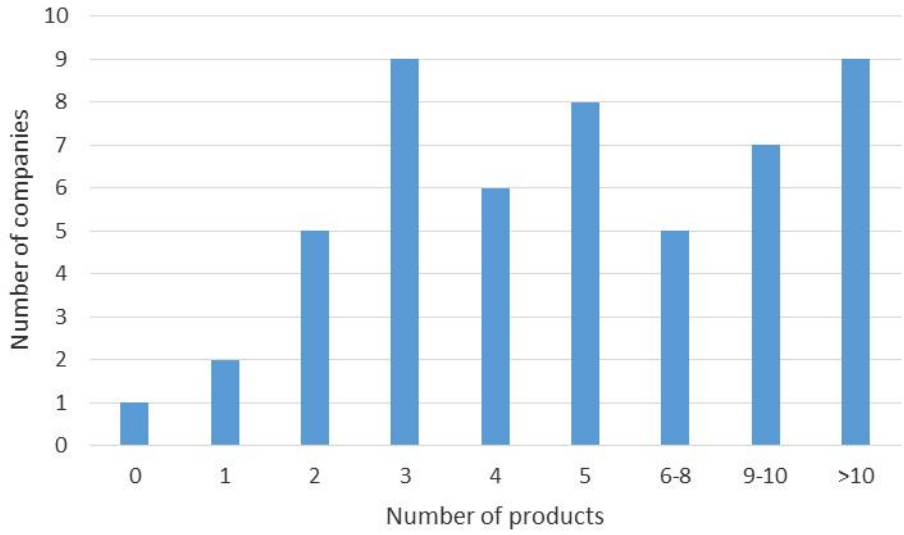


Chart 7-8: Number of Products Offered

Whilst it is not surprising to have a "0" result, it is perhaps more surprising or encouraging that there is only 1 company reporting it. We consider that it is indicating a company offering only consultancy or bespoke products. The weighted mean response comes out at 6.46 products as an average.

7.7 Summary and Comments

- There are 8 satellite operators covered in the survey, 12 ground station operators and 31 data reselling companies.
- We project 128 companies involved in value-adding or downstream services and a further 75 offering consultancy services.
- Not all companies are vertically integrated but many are.
- Optical data still represents the large majority of sales with 82% share of the market.
- Radar sales have reached 17% share of the market.
- Only 8% of data sales go to EO service providers with 16% going to other commercial (private) customer. Some 72% of the sales are to public customers.
- Only 25% of the market is for data delivered within 1 day of its capture.

8. Internal Practices

8.1 Introduction

Here we examine a number of processes that govern the internal running of the business. These include looking at some of the internal sales processes but particularly at quality management and certification.

The question of industry conformance to recognised international standards is being examined and some of the questions are aimed at informing this discussion. For example, the findings were available in time to use at the EARSC workshop looking at Industry certification held in Frascati on 15th/16th April 2013.

8.2 Quality Management Systems

We asked companies if they had a QMS in place and if so, does it conform to ISO9001 or any other standard. The results are shown in Chart 8-1.

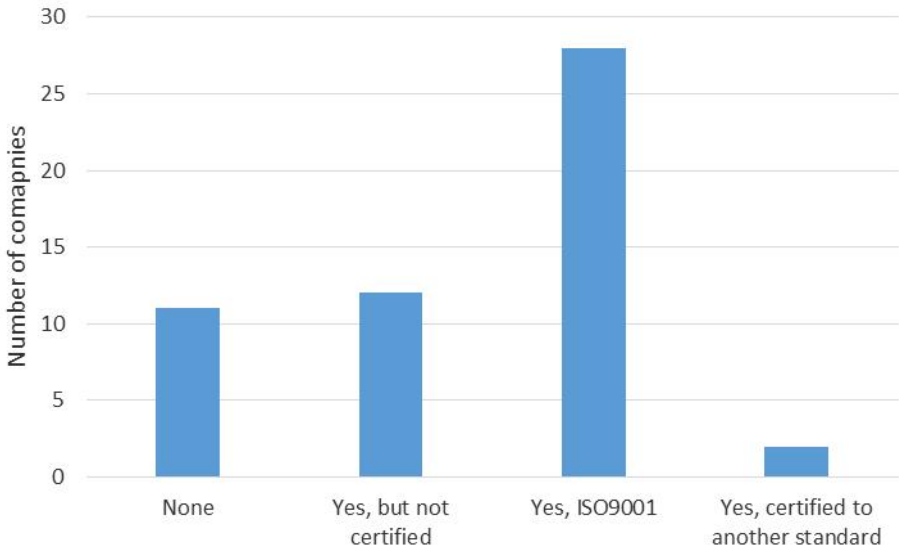


Chart 8-1: Companies with a QMS in Place

The response is quite solid with over 50% of the companies having an ISO9001 conform QMS in place and all but 20% having some form of QMS. Note that this is from a sample size of 53 companies and this result cannot be applied to the whole company population.

We then asked those that had replied no, why they had no system in place? A response was given by 13 companies compared to the 11 that had replied they had no system in place and the results are shown in Chart 8-2.

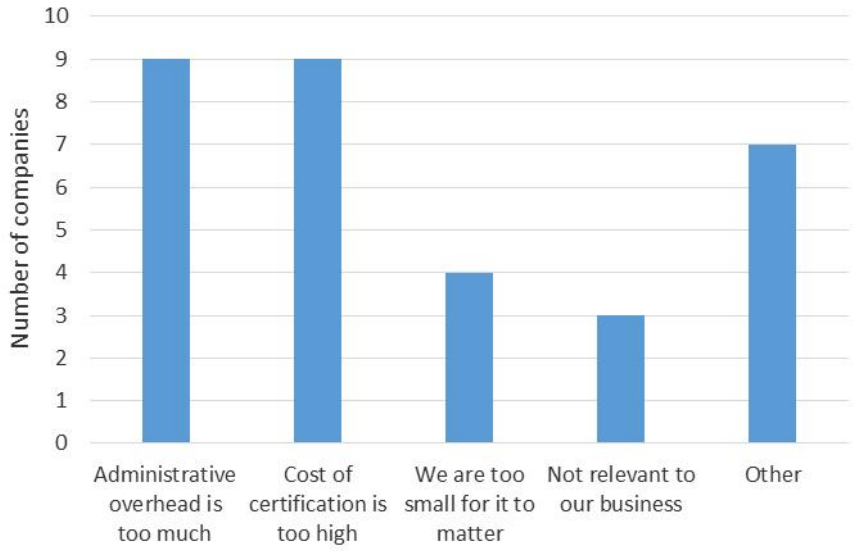


Chart 8-2: Reasons why companies do not have a QMS

The perception is that the cost is too high and /or the administrative overhead is too great. A number of companies said they are too small or that it is just not relevant for their business. To look into this further, we split the responses by company size category, with the results shown below. All of the medium / large companies and 86% of the small companies have an ISO certified QMS system, but the picture amongst the micro companies is very different, with most of them having no system at all, or one which is not formally certified.

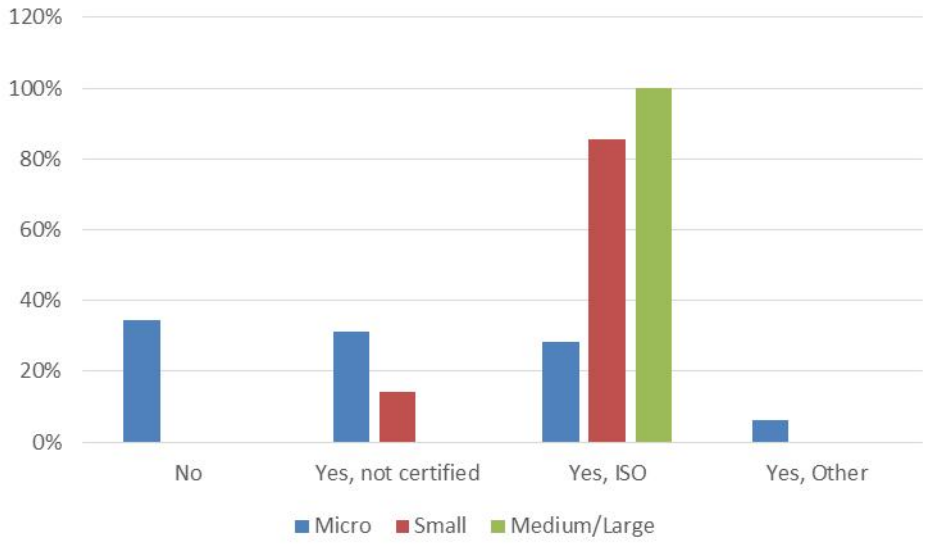


Chart 8-3: QMS systems in place split by company size

8.3 Specification of Products.

The way in which the products that companies offer are specified is also a measure of the maturity of the sector and of the customers. The options given to companies for the response were:

- By the customer, in detail, covering all requirements
- By the customer covering product objectives
- By reference to international / sectoral standards
- By you as defined in documentation available to the customer
- By you as defined in internal documentation
- Not applicable

As products become defined by companies themselves or to external standards it shows a maturing of the industry towards an operational status whilst customer defined products will tend to be more bespoke and consultancy.

The results are shown in Chart 8-4 with a strong dominance for specification by the customer. Of course the question is asking for a general approach so it will apply to the majority of each company's products and not all of them. In this respect it is indicative whilst not being precise. 51 companies answered the question.

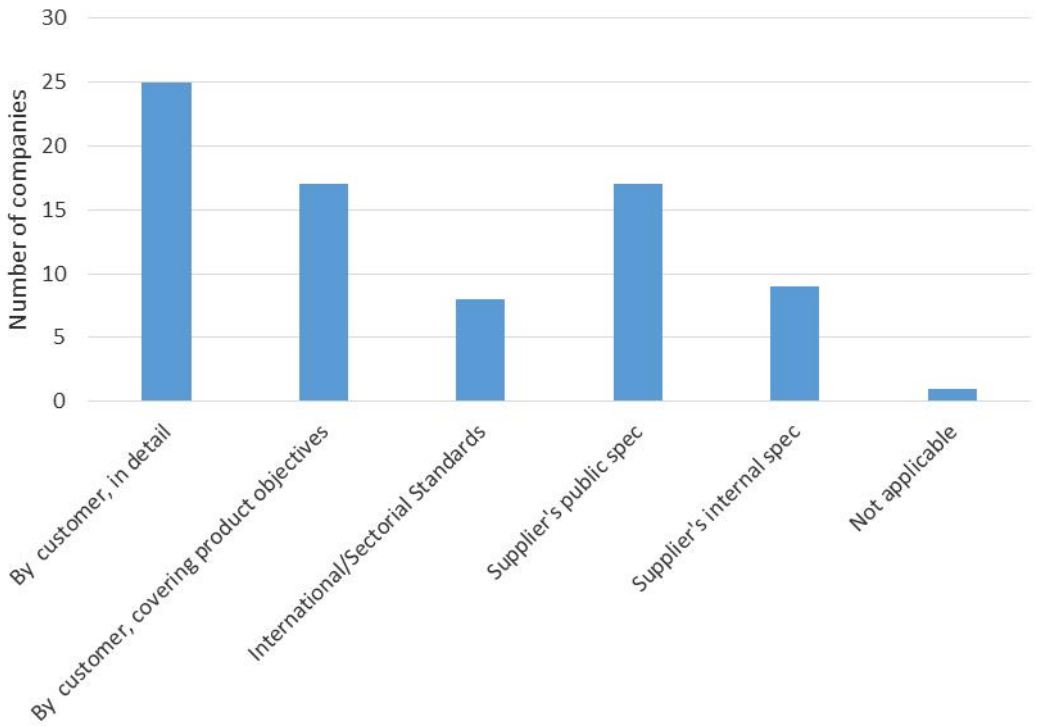


Chart 8-4: Specification of Products

8.4 Testing of Products

We simply asked companies how their products were tested. The options they were given were:

- No formal testing
- By you internally
- By you and your customer together
- By you and your customer separately
- By an independent third party
- Other (please specify).

The responses given by 52 companies (with a total of 86 answers as companies gave more than one) are shown in Chart 8-5.

No company reported that they do no formal testing and the large majority were tested by the company and the customer either together or apart. A number of responses indicated testing by a third party and a few comments stated that this is becoming increasingly requested.

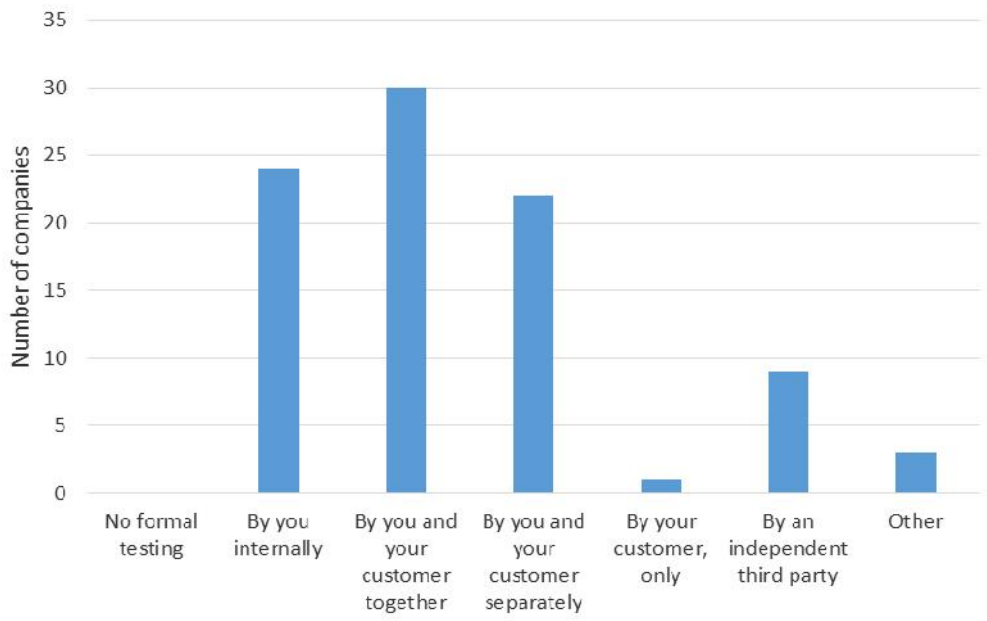


Chart 8-5: Testing of Products

8.5 New products and Customers.

We wanted to look at how much of the business is coming from new customers and how much from existing ones. At the same time we can examine also whether they are buying new products or re-purchasing existing ones, so we asked companies to estimate the amount of their revenues that come from each one of the 4 options.

The results shown in Chart 8-6 demonstrate the importance of repeat business and that an existing product sold to an existing customer accounts for over 50% of the companies' revenue.

Indeed only 5% of business is coming from sales where both product and customer are new.

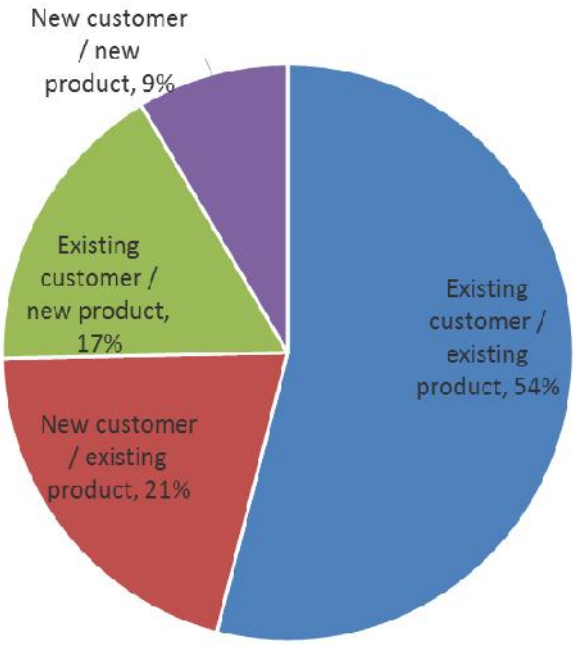


Chart 8-6: New products and customers

8.6 Capture of New Business.

New business is of course the lifeblood of enterprises and capturing it can be a challenge. Understanding what companies are doing and would like to do better can help guide action by both the public sector and by supporting bodies such as EARSC.

We asked companies which methods they found the most effective. The results shown in Chart 8-7 indicate the importance of prior business relationships and how this dominates new business acquisition. Responding to tenders also comes high up the list. Trade shows and trade missions come low on the list and in consequence, this may be an area to address. A relatively low level of business through partnering is perhaps a surprise.

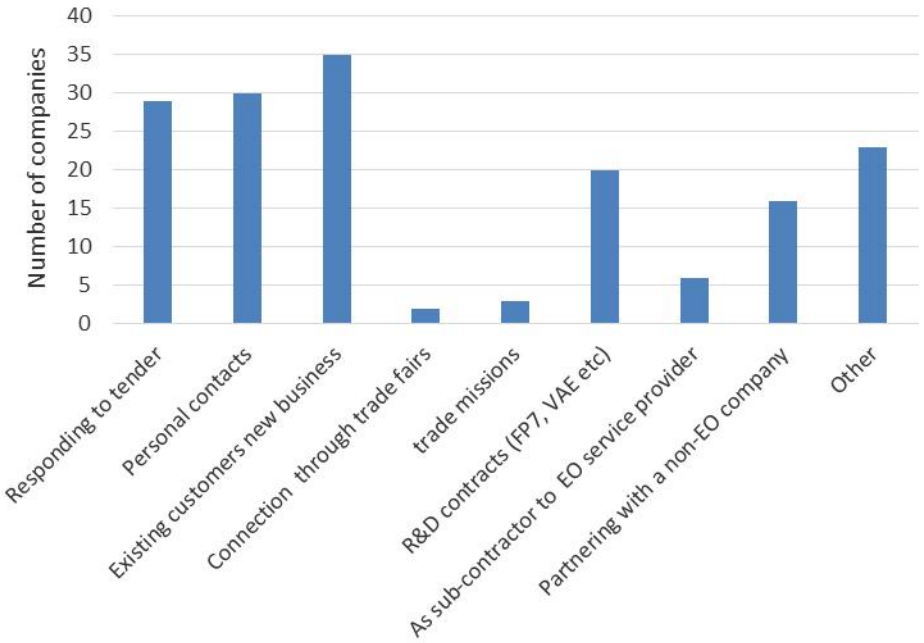


Chart 8-7: Methods of new business capture

Some of the comments reflected the relative importance of each channel to the company and often the importance of personal contacts was emphasised. There seems to be a growing awareness of the possibility of business through partnering with non-EO companies and it was noted that the channel may well depend on the maturity of the company.

As well as the methods, we looked at the amount of effort that is dedicated to new business capture. We decided that, rather than ask about spend in € which possibly many companies do not have any records on, we would focus on the time spent. We were also conscious of the difficulty for some firms to distinguish between business development and actual sales (which we consider as the formal part of the process (contracts, invoicing etc). Therefore we asked them to estimate how much staff time as a percentage of the total company was being spent on EO-related business development.

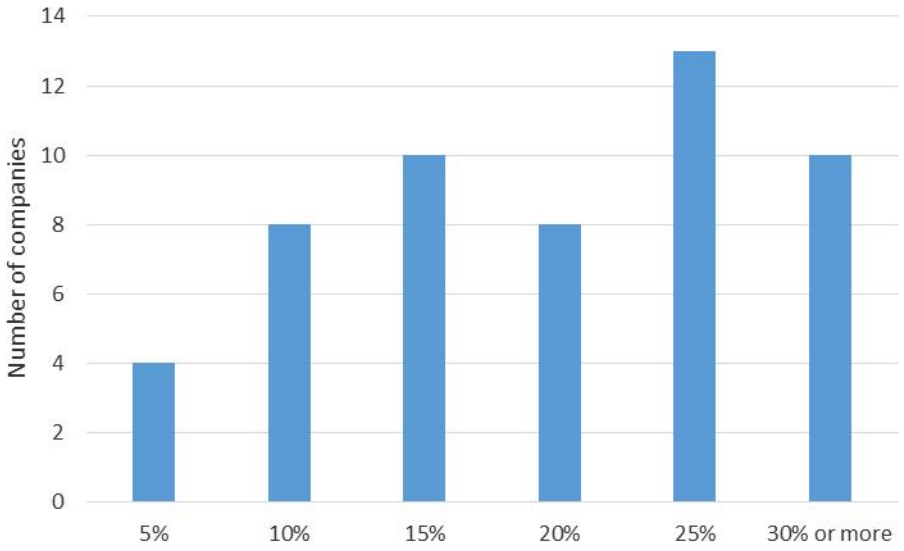


Chart 8-8: Staff effort devoted to Business Development

The results shown in Chart 8-8 show a surprisingly high amount of effort is considered as being devoted to business development. The median figures is around 18% which itself seems rather high but with 23 companies reporting 22.5% or higher (they were asked to give the figure closest to their view so 25% represents a range of 22.5% to 27.5%), it seems that the overhead to the company of capturing new business is high. This could be an indication of an immature business sector where customers are insufficiently aware of the benefits EO products can offer.

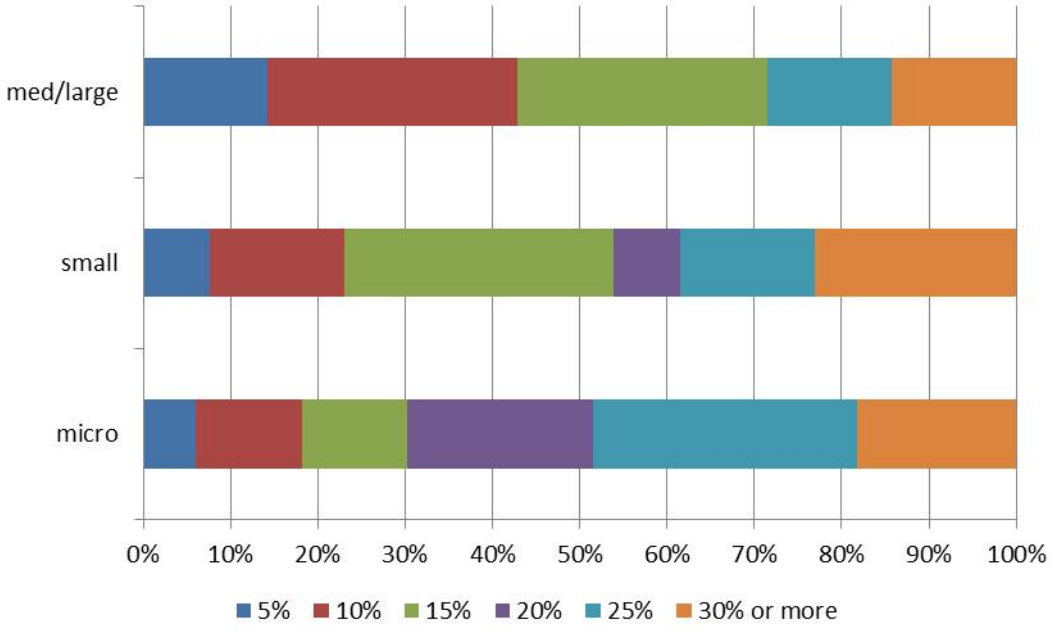


Chart 8-9: Percentage of effort being spent on business development

An analysis of the data shows that the smaller companies spend slightly more effort on business development than the larger companies. For micro companies the modal answer was 25%, whereas for medium and larger companies it was 10-15%.

8.7 Comments.

- Whilst almost all larger companies have a QMS in place, most of the micro-enterprises have not yet incorporated one in their working practices.
- In the workshop held in April 2013, commercial customers from the oil and gas industry are starting to look for more standardised procurement practices which leads EARSC to look to establish a set of industry guidelines.
- Public sector customers are not yet at the stage to examine or require standard procurement practices which would help the industry develop.
- The large amount of effort reportedly spent by the companies on developing new business is perhaps a reflection of a lack of maturity in the market which should be addressed.

9. Research and Development

9.1 Introduction

It is very important to understanding the amount of R&D investment being made in the industry. We consider EO services to be still a relatively young industry which is moving from an R&D environment and focus to become more operational. We have looked at how standard products are across the sector and how customer organisations procure their services. A high level of R&D is indicative of an industry under development.

9.2 Internally Funded R&D (R&D Intensity)

R&D intensity is a well-recognised measure of the amount of investment taking place in an industry sector. It measures the amount of self-investment by companies as a percentage of their revenues.

In order to get a picture in which we could distinguish between companies own R&D investment and R&D coming from external sources we asked each company in the full survey to provide two figures: the amount being spent annually on R&D as a percentage of their revenues and how much in kEuro they were receiving from outside agencies or sponsors. Recognising that companies do not always make a clear distinction between these two and that R&D grants are sometimes considered as contracts, the questions were introduced with the following statement:

Spending on R&D comes from two sources; internal R&D and sponsorship or projects from public sector support programmes; typically these are the EC Framework Programme, ESA activities and national R&D. There may be other sources through local actors or from other policy focused funds ie SME's. We need to be able to show the total being spent on R&D as well as the amount of self-funded R&D. Please consider the original source of the funds so that if this is coming through another EO services (or other company) then please consider the original source of the funds.

A total of 50 companies gave us responses with a distribution as is shown in Chart 9-1.

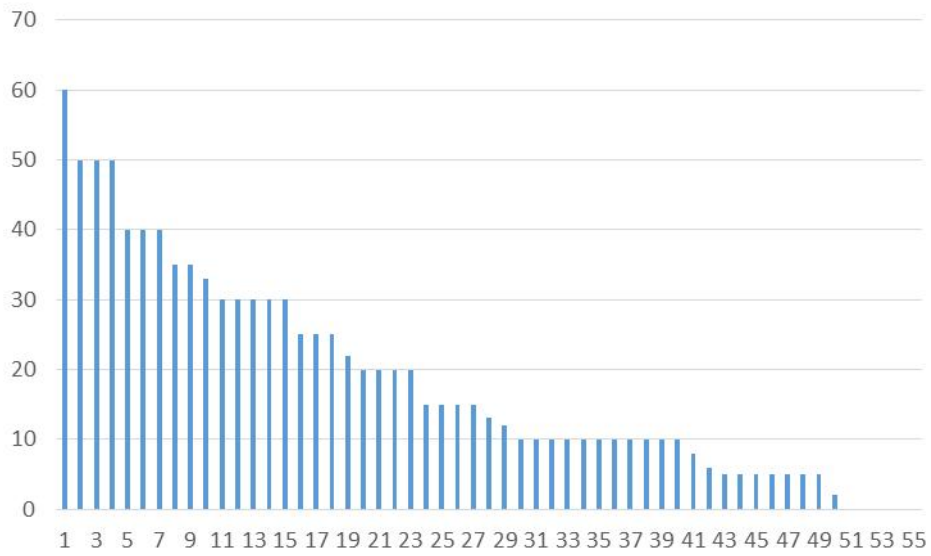


Chart 9-1: Annual own R&D spend as a percentage of revenues

The very high numbers for the R&D intensity are in general coming from small or micro companies with revenues less than €1m. Some of these are start-ups where heavy investment is to be expected in the early years.

Taking the figures provided and placing them into ranges, yields the result shown in Chart 9-2.

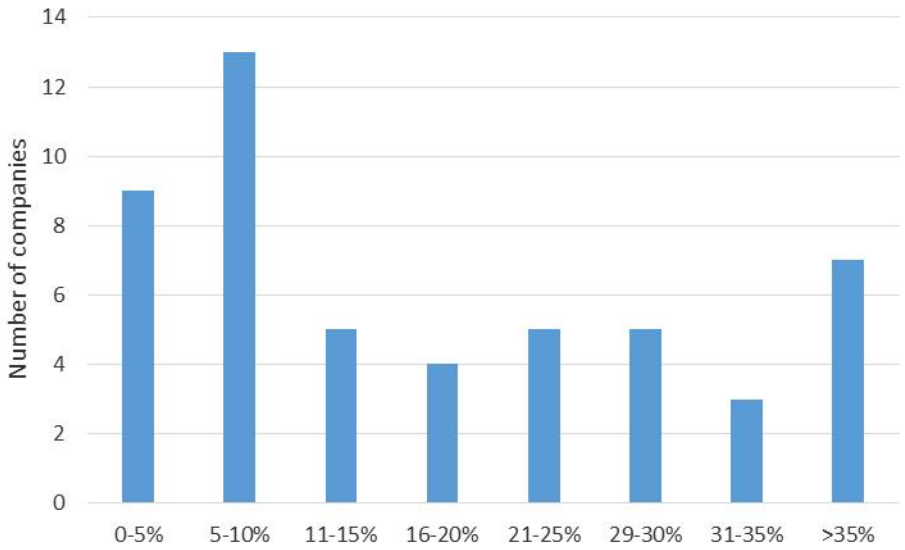


Chart 9-2: Internal R&D spend as a percentage of revenues

If we take the percentages given and weight them according to the revenue of each company we obtain an R&D intensity of 7%. The total revenue reported by the 50 companies was €366m or around 64% of our reported revenues and 48% of our estimated total industry revenue. The total R&D invested by our sample is €25.6m and

if we scale this relative to the total industry revenue of €757m, we arrive at a total industry investment of around €53m.

How does this compare with other sectors? Table 9-1 below shows the comparison for the top 7 ranked industrial sectors in Europe taken from the European Commission *2012 EU Industrial Scorecard*. At 7%, the EO services sector ranks highly above the Aerospace and defence sector but below the software and computer services industry which could be considered the closest two sectors for comparison.

Industrial Sector	R&D Intensity
Pharmaceuticals and Biology	14.7%
Technology Hardware	14.2%
Software and Computer services	10.6%
Leisure Goods	7.1%
Aerospace and Defence	6.0%
Electronic and electrical equipment	4.9%
Automobiles and parts	4.9%

Table 9-1: Comparison of Industry R&D Intensity in EU

How does this result compare with previous surveys? In the last survey, it was reported that the average R&D spend was 27.5% as a percentage of the EO revenues - a very high figure - and it was noted that large companies are spending less than 10% whilst a high proportion of small and medium companies were spending "more than half their staff effort on R&D".

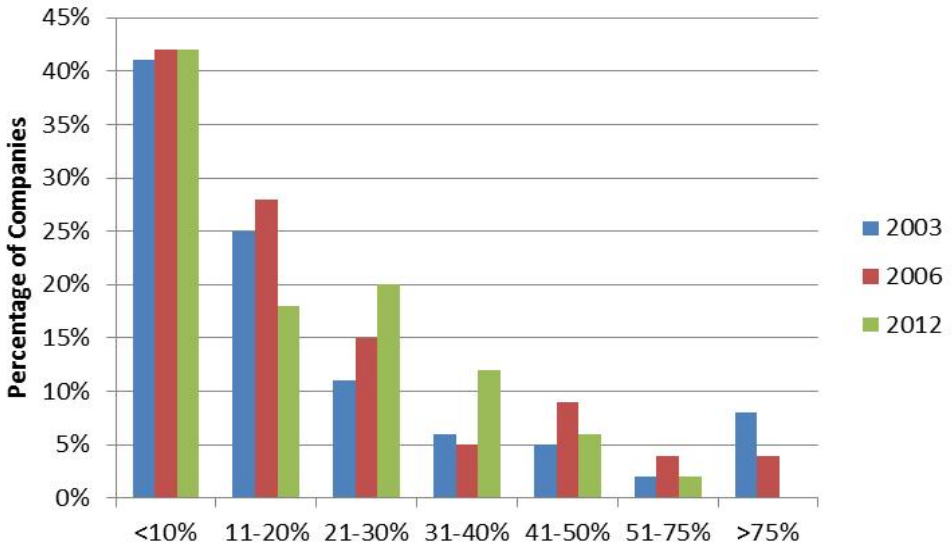


Chart 9-3: Comparison of R&D spend from Previous Surveys

Chart 9-3 shows the comparison with the results from 2003 and 2006, with 2012 figures placed into the same ranges. The percentage of companies spending 10% or less seems

quite fixed, whilst in this survey we do not find the extremes of companies spending more than 75% of their revenues on R&D.

9.3 Externally Funded R&D

Turning to the external funding, our 50 responders reported total R&D funding coming from external sources of €25.9m. It seems rather convenient that this is almost identical to the internally funded R&D meaning a 50:50 ratio of R&D funding sources. We also asked about the sources of the external funds with the results as shown in Chart 9-4.

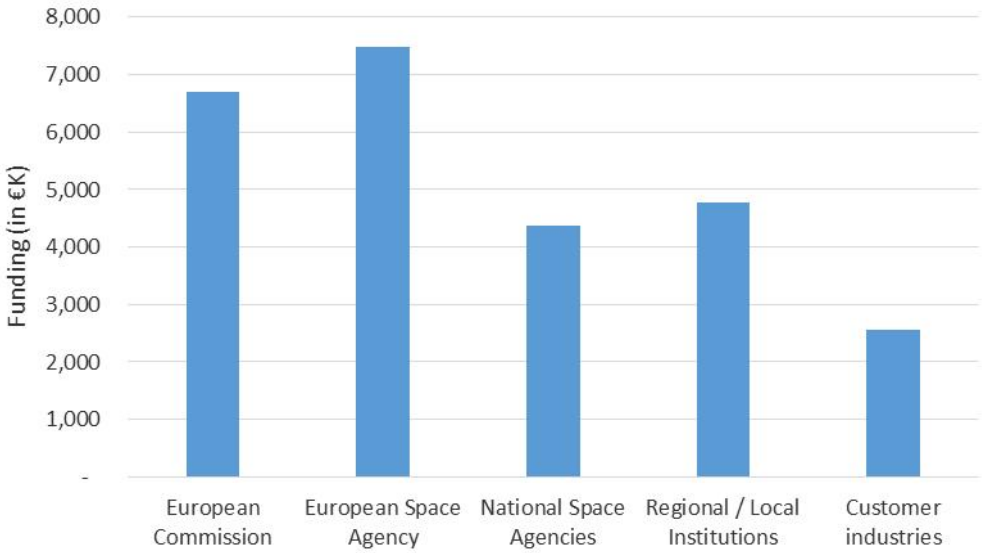


Chart 9-4: Sources of external R&D funds

The European Commission (Framework programme) and ESA are the two largest sources but with strong support also coming from regional and local institutions and a good proportion from customer industries.

We have also tried to look at these figures from the perspective of how much is being spent by the main R&D sponsors that could have been captured by the survey.

Firstly, the EC is making R&D funds available from the Framework Programme 7. There are primarily 2 relevant funding lines within FP7; the environment and space themes. The former is running at around €10m per annum for projects with an EO component and with around 30% going to industry. The space theme is running at around €120m per annum which is covering all space activities. If we assume that around 1/3rd is linked to EO and also that 1/3rd is going to industry, then we get an annual spend of around €12m going into the EO sector. Taking the two lines together comes close to the €14m implied from our survey. In this we are assuming that companies assume that funding under the GMES Initial Operations is not R%D funding. Furthermore, it is perhaps unlikely that much of the funding from this source reached industry in 2012.

Overall, the corrected figure of €14m from FP7 does not look a too inconsistent with the likely actual spend in this period.

Historical comparisons have proven not to be possible since the previous survey did not collect the external R&D funding sources by revenue but only by the number of organisations accessing each source.

9.4 Products under development

We also looked at how many products each company has under development. Here the definition of a product is crucial and we introduced the question with the text:

> *What do we understand by "product"? In this case it is something which may be sold to many customers. It can be specified and described in a brochure or technical specification and is reproducible. A product can be a service which could be consultancy or regular delivery of individual products.*

The responses are shown in Chart 9-5 with a median of 2.

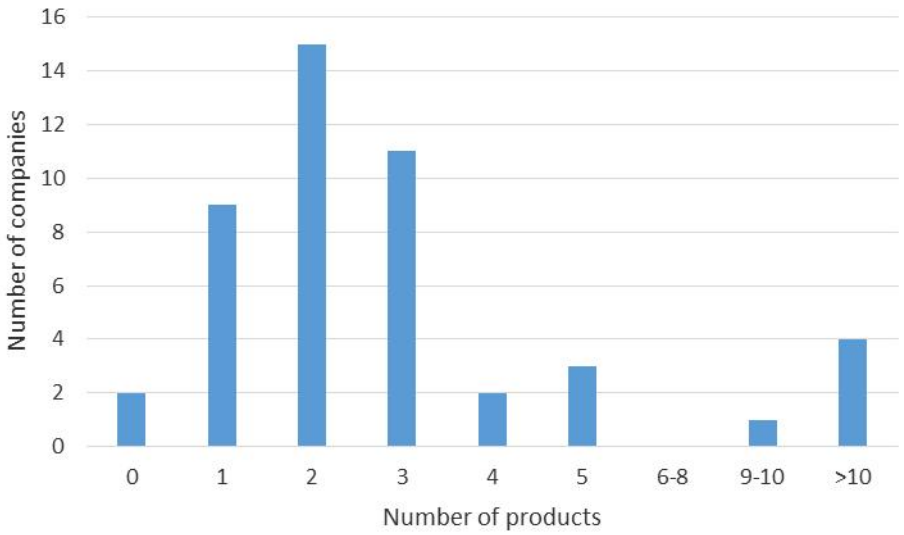


Chart 9-5: Number of Products under Development

9.5 Product development Time

How long does it take companies to realise the benefits of their R&D investment? We asked each one to provide a general value of how long it takes them to get a new product to the market?

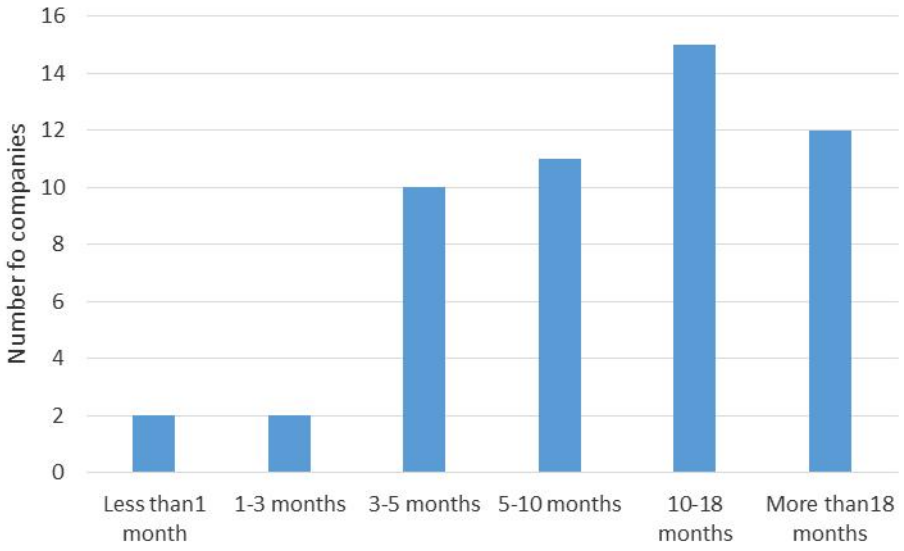


Chart 9-6: Time to develop a new product

The results shown in Chart 9-6 indicate a time of around 12 months is the typical duration. No measure is taken of the difference between an entirely new product and one that is an evolution; this was left entirely to the company to factor into their reply. Nor did we investigate any reasoning as to why it takes this time; which could be a result of international collaboration in Framework projects.

We would like to look at the historical evolution of this measure but in the last survey, much longer development times were counted (1 year or less, 1 to 3 years, 3 to 5 years, 5 to 10 years, over 10 years). In our view, for EO products this is far too long a development time and is taking into account many prior factors. The large number of responses of over 18 months could suggest that a further category split should be introduced in future surveys but overall we would be expecting development times to be falling, reflecting a more mature market that is becoming less R&D focused.

9.6 Comments

- The R&D intensity in the industry is around 7% which compares quite well with similar industry sectors.
- As a new and growing sector the level of external R&D funding at €26m approximately matches the level of total internal investment.
- Historical comparison of R&D investment from external sources has not been possible due to a lack of financial information from the previous surveys.

10. Strategic Issues

10.1 Introduction

In this section we take a look at some of the strategic issues that the industry faces.

10.2 Growth

We asked companies where they saw the best opportunities for future growth in their EO services businesses and reasons why. They were given a number of options based around the market structure and the results are shown in Chart 10-1.

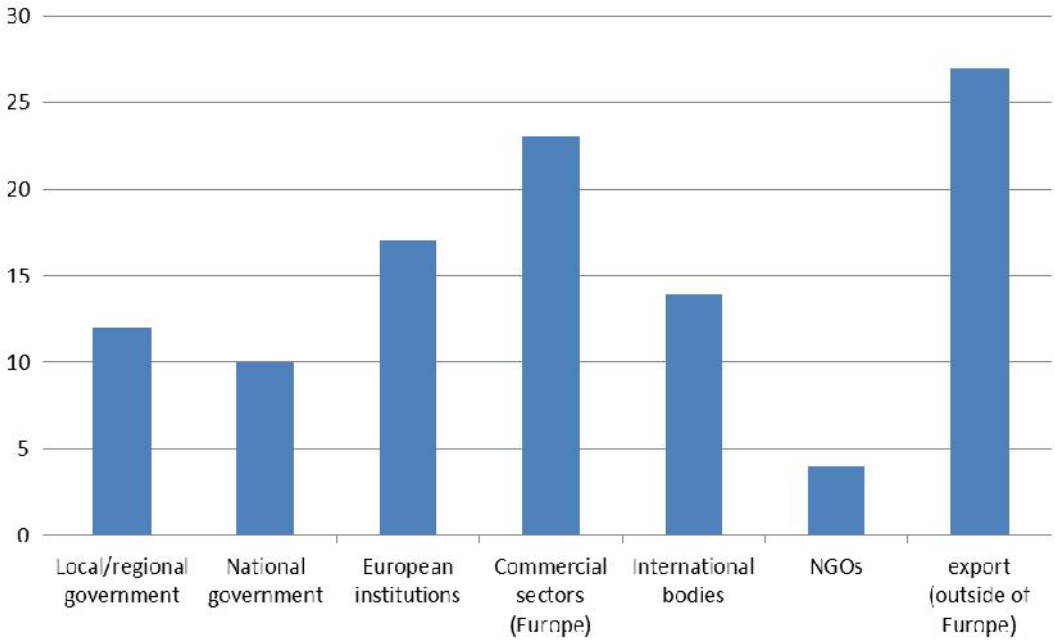


Chart 10-1: Future growth opportunities

The results show a preference for exports as the main growth vector with commercial customers – not limited to Europe – as the second preference. Several companies commented that local and regional actors do not have any budget. GMES/Copernicus is mentioned several times as being an enabling factor.

Turning to the barriers, we asked companies to select the three most significant barriers to growth that they face. In many ways this is a mix of barriers and threats. The options and results are shown in Chart 10-2.

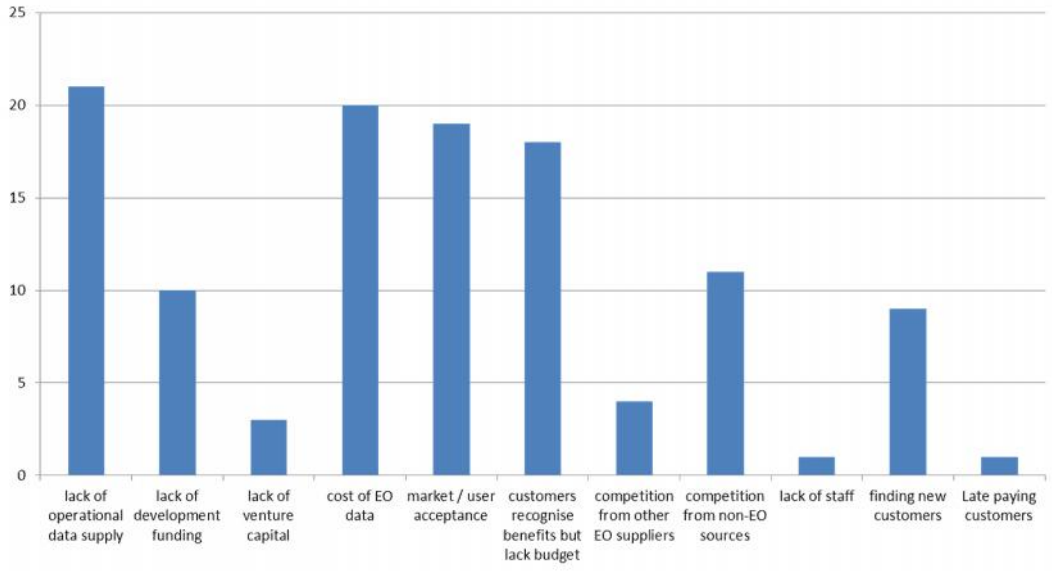


Chart 10-2: Barriers (and threats) to growth

The top 4 reasons given are: the lack of an operational data supply, the cost of the data when it is available, the problem of getting potential customers to accept and recognise the value in EO products and to allocate budget to pay for them. It is reassuring that companies do not much report a lack of staff, of venture capital, or of late paying customers as being serious issues. At least we can conclude they are less problematic than the others already mentioned.

It is not surprising that the service companies complain about the cost of data and since they dominate the sector in terms of number of companies then it is also unsurprising that this features highly in the response to this question. Since it is the raw material for their products we can usually expect this factor to feature highly in any survey.

Regarding the lack of operational data supply, the increased and increasing number of data sources, including the future Copernicus system, goes a long way to address this issue. There is a paradox here in that service companies look for both more data and at lower cost. Given the high cost of satellite systems, this suggests a problem for the future unless smaller and lower cost satellites become more numerous. It also suggests fragility in the business model for the whole supply chain that may become more apparent – and problematic - in the future.

Regarding the customer acceptance and lack of budget, here we believe that there is work to be done to give greater exposure to the types of information that can be generated using EO data and to create more awareness of the information services.

10.3 Competition

We asked companies to select where they think the greatest risk of competition coming from over the next 1 to 5 years.

Answers were quite diverse but most (60% of the responders) cited local competition from other EO companies. (An apology here to companies in Canada who corrected us by citing competition from other Canadian EO companies). Several of the data suppliers expressed concerns about the Sentinels and data coming from them as being a serious threat. In addition, quite a number of the responders cited institutional bodies as being a serious threat. Substitute technologies got a few mentions eg. UAV's, UAS, and ground based radars. One responder pleaded for an opening of his local market for mapping which was currently monopolised by the public sector body and in different ways this was echoed by others.

The large internet players only got one mention and we had deliberately placed this question before we reached the one concerning Google Earth later in the survey.

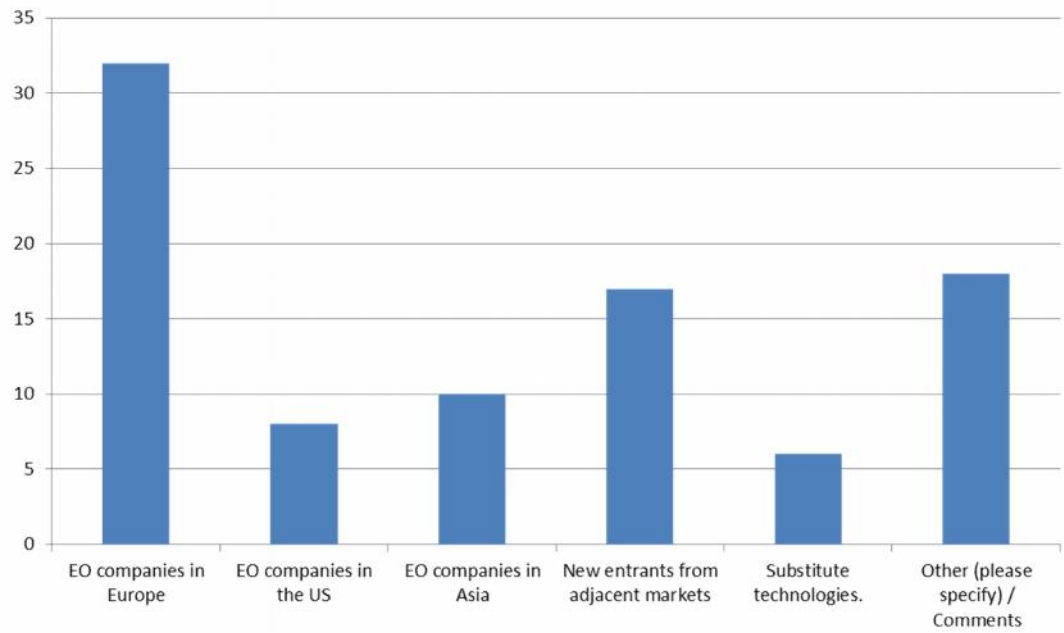


Chart 10-3: Sources of competitive threat

If we look at how companies perceive the threat and if there is any differentiation between the company classes we see no striking differences other than it is larger companies that fear most the threat of international competition.

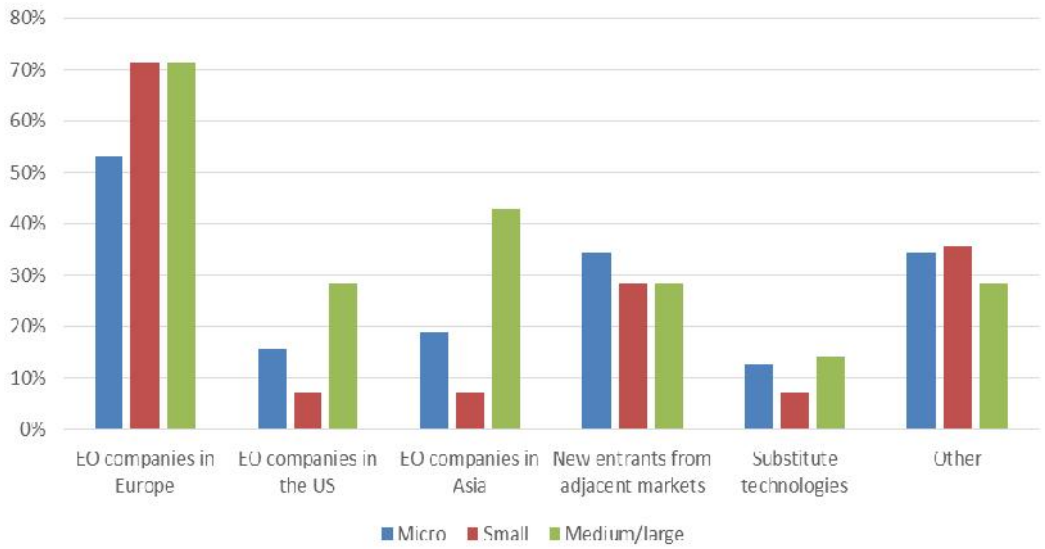


Chart 10-4: Classification by company size of Threat perception

10.4 Public / government support

The development of the EO services sector, as indeed the whole space sector, is closely linked to government policy. This reflects the strategic nature of the information provided and that the origins lie in national security surveillance activities. Here we were more concerned with the potential for public sector (government) action to help the industry develop.

We asked companies where they think public support should be focused and the responses show a diversity of views. The responses can be divided into 2 categories;

- R&D where the view is that it should be focused on thematic applications (ie applied research rather than fundamental), integration with other data sources and trials with users.
- Awareness-raising in public and private markets as well as promotion of the capabilities of the sector.

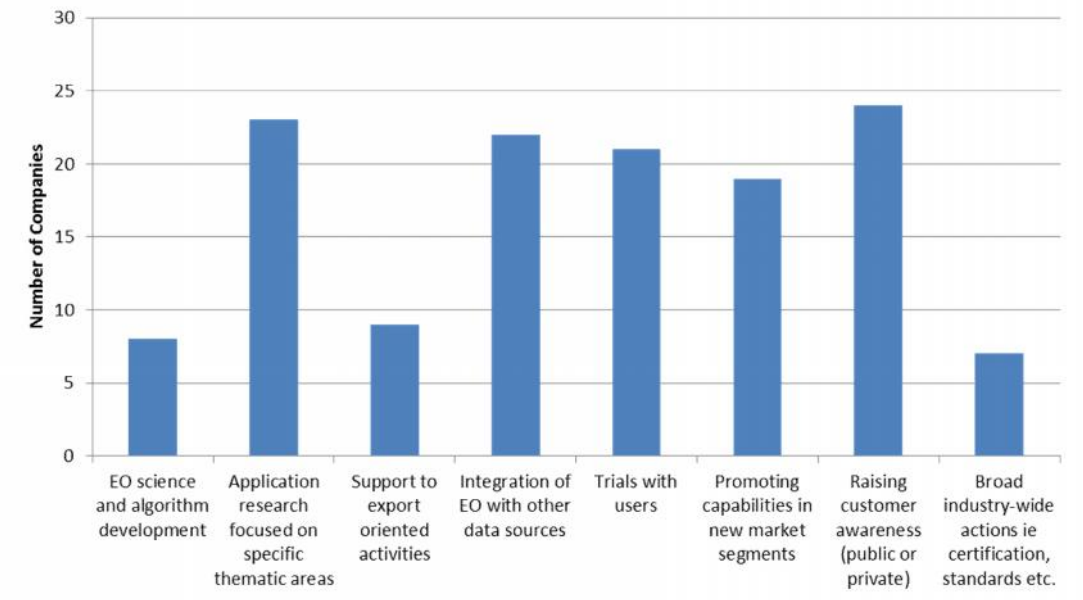


Chart 10-5: Public Support Activity

If we look at these responses categorised by company size we can discern a difference between these two categories of response; larger companies are tending to favour wide-market focused actions whilst the smaller companies look more towards research focused support.

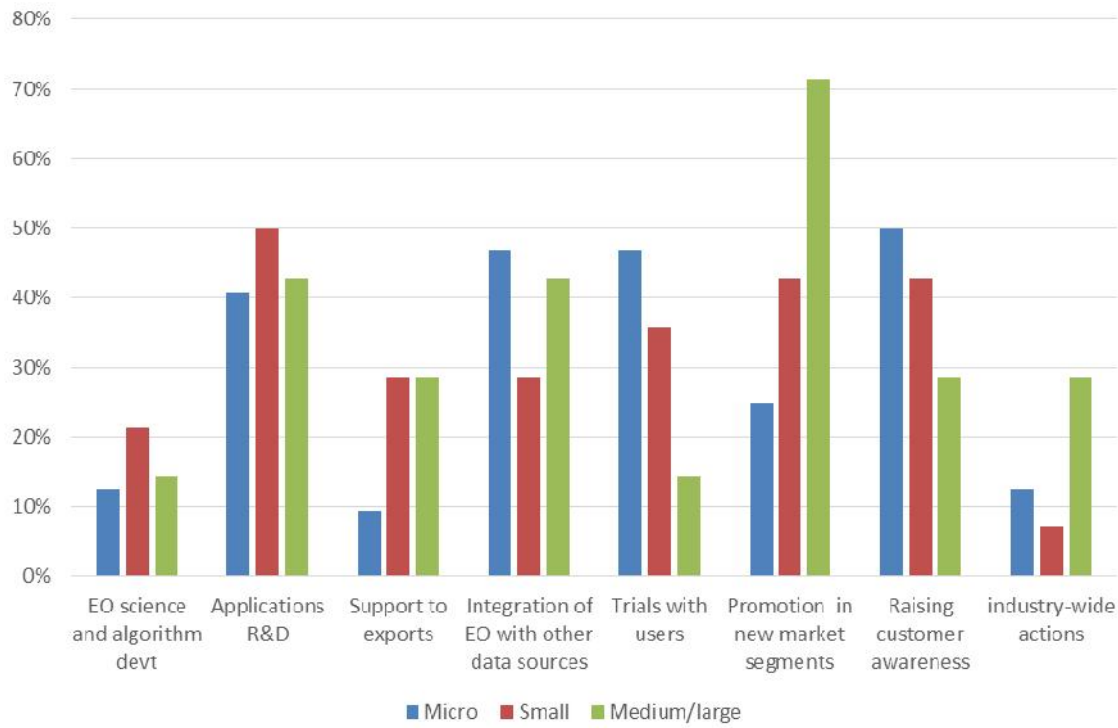


Chart 10-6: Percentage expressing support for each appropriate public support actions

10.5 Impact of Google earth

The introduction of Google Earth in 2001 has greatly challenged the EO services businesses. But has it's impact been positive or negative? Colloquially, most companies say that it has been positive as it rasies awareness of what the technology can offer. At the same time it does not challenge professional tools since it is very open for use. We asked companies to rank their view of the impact of Google Earth on their business on a scale of -5 to +5 (negative meaning a negative impact).

The views confirm the colloquial response with mostly positive answers. Any comments were mainly to re-inforce the view that it's effect is through raising awareness so that potential customers know more about EO services. Some concerns awere expressed about raising expectation of all free data whilst two smaller companies mentioned that they had clients who did now prefer to use Google Earth under some circumstances.

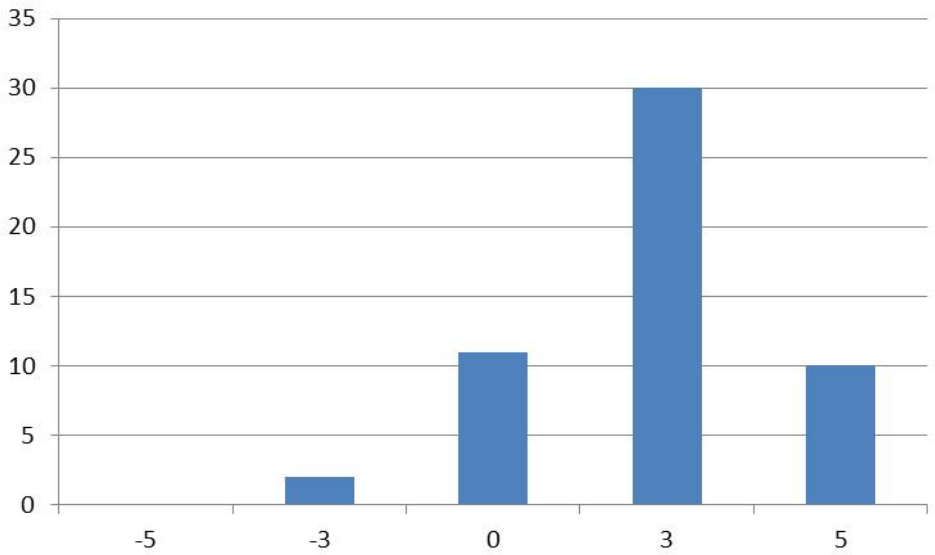


Chart 10-7: Google Earth impact on Business

Overall though the index for GoogleEarth stands at +2.53 which is a rather positive value. The question may be repeated in the future depending on the evolution of the tools offered by Google ie use of Copernicus data?

Chart 10-8: Google Earth Impact Index

10.6 Impact of mobile technology

Whilst the previous topic was rather backward looking, we then took a newly emerging technology and asked how this was perceived to be impact on business; we asked about the current impact rather than anticipated impact.

The results shown in Chart 10-9 are more ambivalent than for the impact of Google Earth; but they are still quite positive. There was only one negative response but many who considered that it would have no affect on their business.

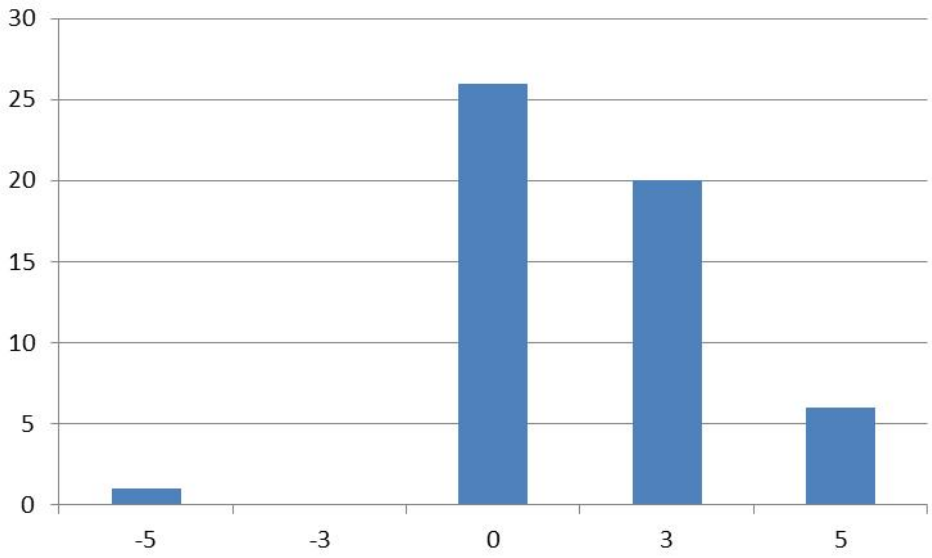


Chart 10-9: Impact of Mobile Technology on Business

Comments included that the impact could be through the use of crowdsourcing as a means of gathering complementary data or it could be through mobile applications using EO products and services. Most companies recorded that they are watching what evolves before taking any decisions. The Mobile Technology index stands at 1.6.

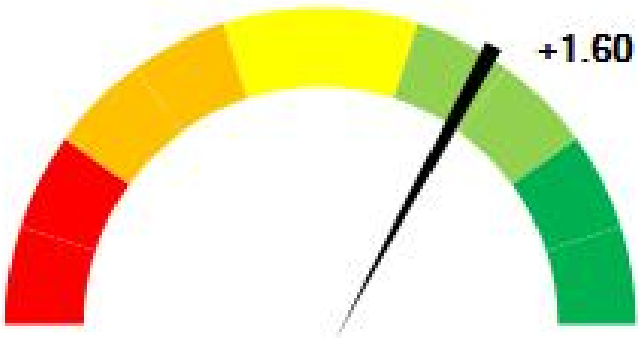


Chart 10-10: Mobile technology index

10.7 Impact of GMES

GMES (now Copernicus) is a major European programme which will have a strong impact on the market. How strong and in what way, views vary according to the type of activity and markets. Nevertheless, as a source of data and as a stimulus for customers of EO services, it will have a large impact. We asked a series of questions regarding the size and nature of the impact anticipated by the industry.

a. Impact of GMES in the past

The programme for GMES (Global Monitoring for Environment and Security) started in 1998 with the Baveno manifesto. With the first Sentinel satellite launch due later this year it will start to move from its pre-operational into its operational phase.

We asked companies to estimate the impact on their business in the past and also looking to the future; both on a scale of -5 to +5.

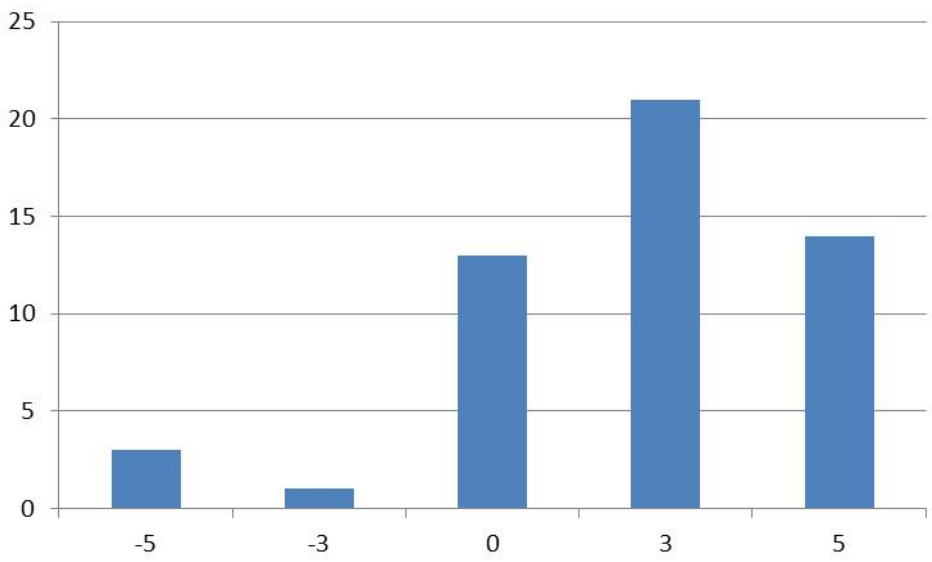


Chart 10-11: Past Impact of GMES

The past impact is considered to be quite positive with an index of 2.21. However, responders were often critical with respect to the time taken to implementation and on the data policy.

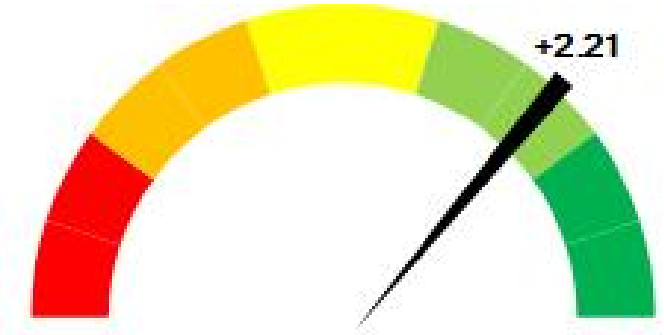


Chart 10-12: GMES Past Impact Index

b. Impact of GMES in the Future

Looking to the future, the industry is more positive although the comments above are still applied (regarding data policy especially). Many of the data suppliers are critical or at best nervous about the impact that a free and open policy may have. All look to Copernicus as being a source of revenues for data to complement that coming from the Sentinels ie through the contributing missions. Significant investment is required to ensure that the GMES potential can be realised through business.

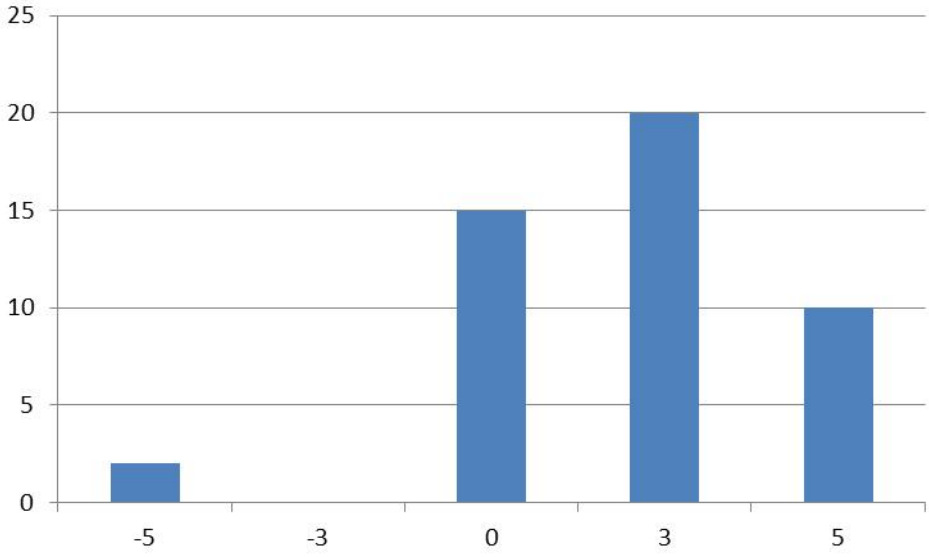


Chart 10-13: Expected Future impact of GMES

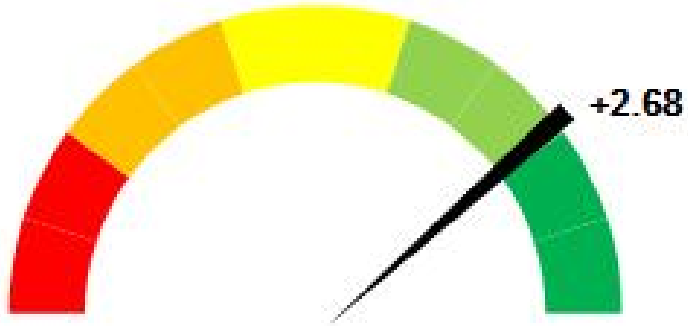


Chart 10-14: Future Copernicus Impact Index

c. Opportunities from GMES

We asked the companies to identify where they thought the opportunities coming as a result of GMES would be. We said that it could be from European funding for the programme, as a result of the data that will be generated by the Sentinels of from in-situ sources or it could be from the downstream services that would result.

The results are shown in Chart 10-15 with the largest proportion, nearly 50%, believing that the main opportunity will come from the access to Sentinel data and with 80% of the responders stating that this was seen as an opportunity (companies were allowed more than one response). However, there were some very strong reservations expressed about how this was going to work in practice and with a few companies citing previous negative experiences in this respect.

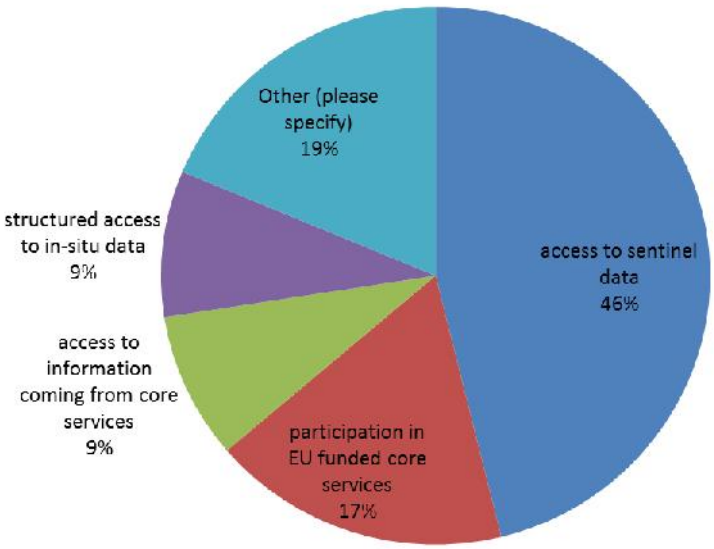


Chart 10-15: Opportunities arising from GMES / Copernicus

d. GMES Sector Priorities

We asked the companies which of the GMES services held most interest for them in terms of business?

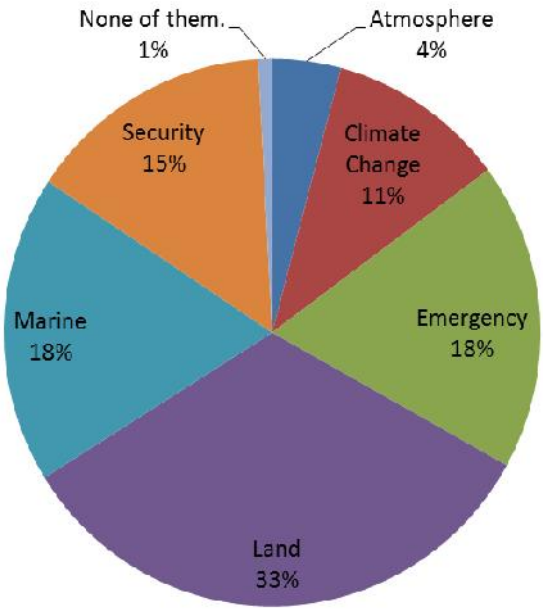


Chart 10-16: GMES Services Interest for business

Clearly and unsurprisingly the land service holds the most interest and the atmosphere service the least. These reflect the degree to which each is open to private business and also the extent to which products may be taken into other markets – which led to the last question.

e. GMES market opportunities.

The key way in which industry can exploit the data and services to be generated by GMES is though using them to develop business in new markets. This may be by selling products based on those got the European public customer to either commercial customer or to public or commercial customers outside Europe (export) or it may be by benefiting from the interest generated with European public customers to do more business with them.

The views of the companies are represented in Chart 10-17 where the highest number believes that they will benefit from EU public customers.

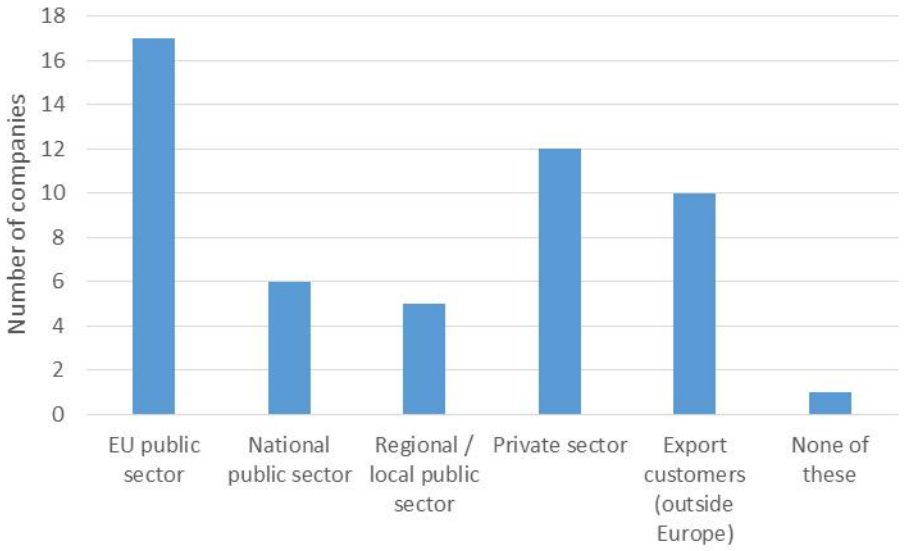


Chart 10-17: Customer defined market opportunities

10.8 Comments on Strategic Issues

- The EO services business is a highly strategic sector where the interests of public and private sectors interact closely.
- Generally companies are optimistic for the future and see several areas that can drive growth.
- We have not tried to separate the strategic issues for the different parts of the value chain ie data supply and geo-information services which may well be a subject for future examination in more detail.
- Overall, companies see the opportunity to grow in export markets and our earlier finding that less than 15% of business is done in exports suggests that indeed this has room to grow.
- GMES / Copernicus is seen as a programme which can drive growth especially through the access to the new Sentinel data – addressing the concern some companies expressed that lack of operational data is a barrier to growth.
- Some of the data suppliers are far less optimistic concerning Copernicus where they perceive a threat to their business model from the availability of large, free datasets with technical characteristics not so far from their current systems' performance.
- Mostly, companies fear competition from existing (or new) EO service providers in based in Europe (for European companies) and in Canada for those located there.

- Companies still look very much towards public support for the sector in both sustained R&D and in raising awareness of what EO services can offer. This corresponds with the results of views on barriers to growth where customer awareness featured highly.

- Google has so far been perceived as having a beneficial impact on their business. However, as this is published, Google is seeking to expand its presence through offering easy access to many EO data sets as well as tools for their analysis and processing. Companies are unsurprisingly concerned but recognise that this may be beneficial or harmful for the business and will be a subject for future enquiry and discussion.

11. Role of Trade Associations

11.1 Introduction

The industry survey was conducted by EARSC with ESA sponsorship. Gathering and maintain a knowledge of the industry it covers is a core activity for a trade association such as EARSC to master. Indeed many of the companies we talked to expressed satisfaction that it was EARSC performing the survey as they saw it as a legitimate activity.

We did take the opportunity to gather some pieces of information of direct relevance and which can help our future strategy; beyond that coming from the knowledge of the industry gained as a result.

11.2 Membership of Trade Associations

Firstly we investigated which other organisations / representative bodies the companies belong to. Logically, many belong to national associations as well as to EARSC. Unfortunately we did not distinguish whether these were EO service associations or not. Apart from BARSC in the UK, we are unaware of other EO service dedicated organisations in Europe hence we believe that the answer relates to space or aerospace associations which exist in most of the countries.

Fourteen companies do not belong to any body and of the others there is no clear trend. A few belong to EARSeL, Eurographics or Eurospace and a few are members of NEREUS and the OGC.

In Canada, the geomatics association is mentioned.

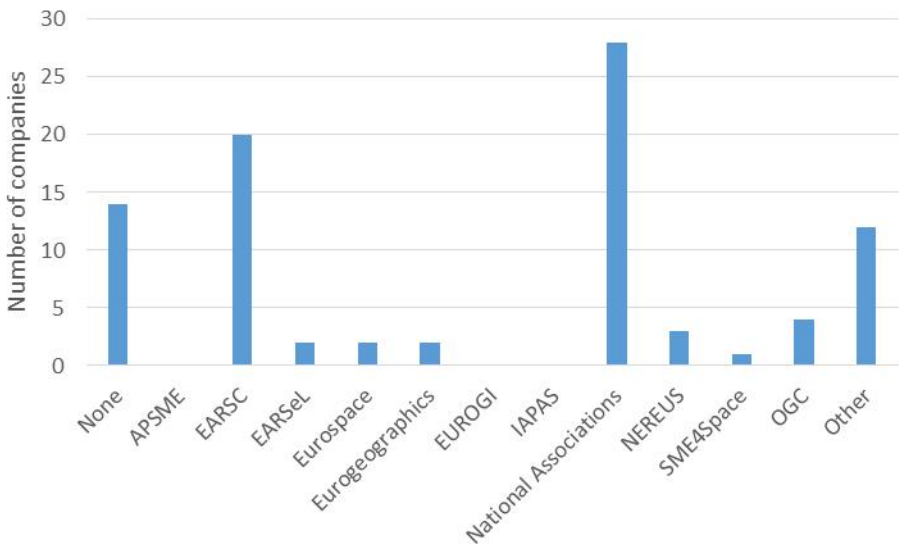


Chart 11-1: Membership of Representative Bodies

11.3 Benefits of Membership of Trade Associations

We asked what benefits companies perceived as coming from being a member of a trade association like EARSC. The results show a distinct orientation towards business information whether of general market intelligence or specific to EO programmes.

Further down the list come market access type activities.

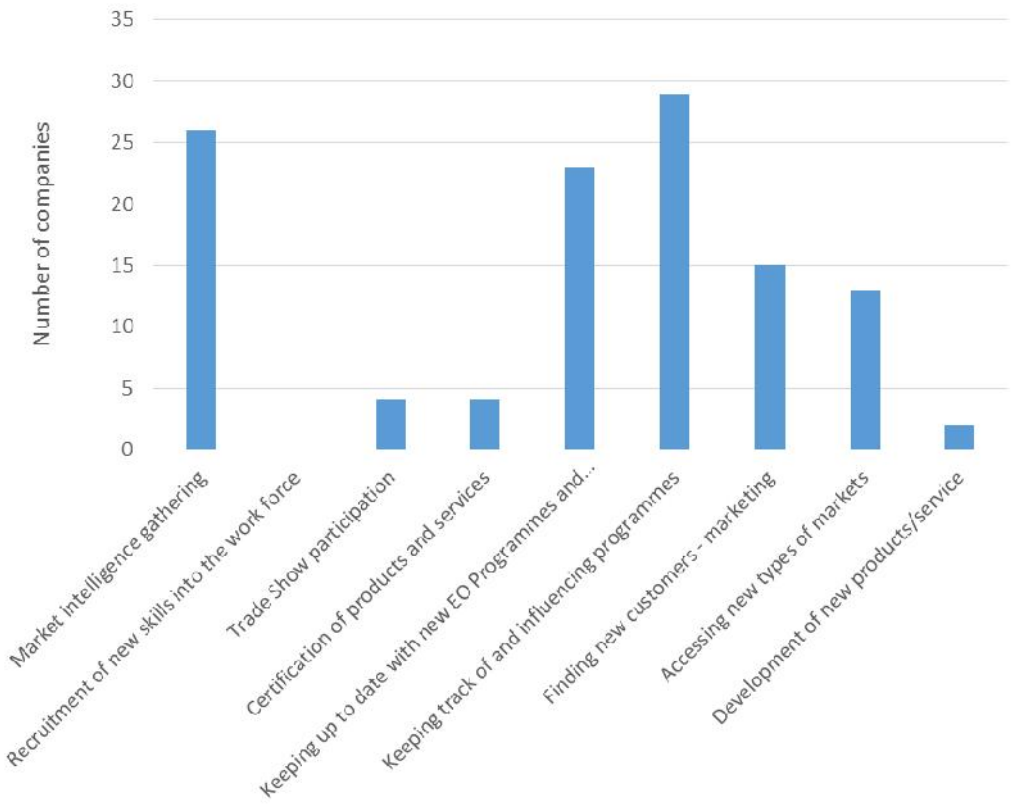


Chart 11-2: Benefits of Trade Asociation membership

11.4 Key Issues for EARSC to Tackle

We then tried to understand the companies views on what could be the key issues for EARSC to work on. Companies were allowed to provide up to 3 responses out of the 6 possibilities.

Top of the list comes GMES / Copernicus and making sure industry is positioned to be able to access and exploit the operations phase. Certainly this was an issue at and around the time of the survey and EARSC had organised several meetings looking at data policy and the access to data. Hence it is fair to say that companies were sensitised to potential problems. Nevertheless, as a major European programme, and with Canadian interests it is clearly a dominating factor.

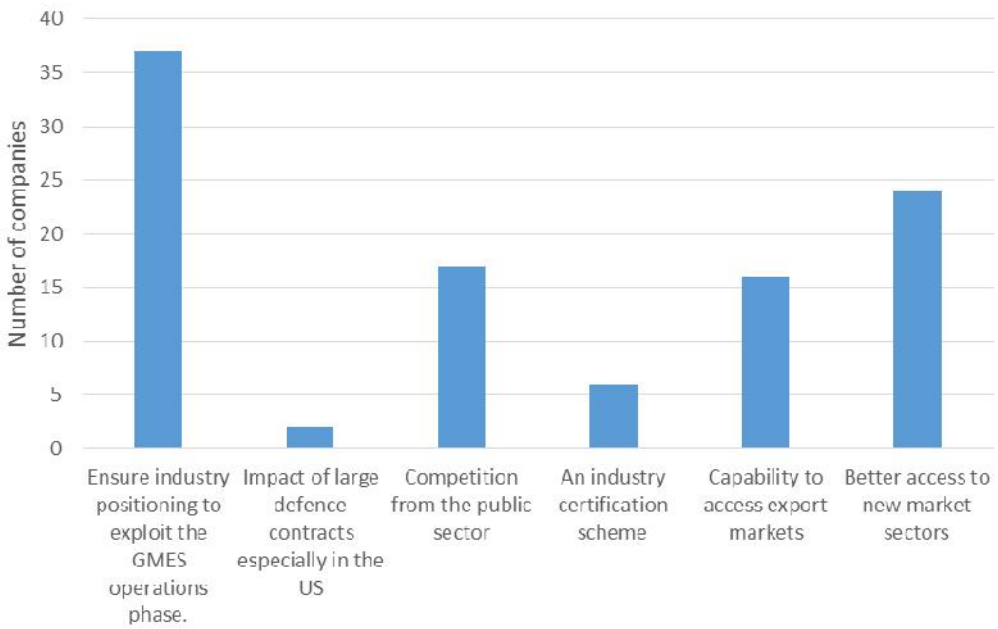


Chart 11-3: Key issues for EARSC to tackle

11.5 Comments on the Role of Trade Associations

- EARSC is recognised as the European body representing the sector with a role to promote the sectors interests.
- Providing market intelligence and influencing new programmes some out as important priorities for the Association to tackle.
- The importance of GMES / Copernicus has been recognised and companies look to EARSC to help them position to exploit the European investment and deliver on economic growth and employment.
- Concerns over the customer awareness of what the sector can offer suggest that helping companies to enter new markets and to find new customers is also an important role.

12. General Comments and Conclusions

The industry survey has provided a very rich source of data on the European and Canadian EO services industries which has been used to generate the analysis and the charts in this report. It shows a growing industry employing some 5000 people throughout Europe and Canada.

We also anticipate that the dataset will serve to support further analysis against specific questions which may be posed and to support industry facts and figures in the future.

- We wish to use this as the start of a regular analysis of the industry with a target to generate a report once every 2 years. This will be a shorter survey than the one just undertaken but will address a number of key trends. We anticipate repeating a full industry survey in around 5 years.

- The survey has covered the industrial EO services sector but has missed some important elements that should be covered in the future.

    1. Firstly, the employment figures should be complemented with those of public sector bodies operating using EO data. The sector is a particular mix of public and private actors and our survey has deliberately only looked at the private side which was our clear priority.

    2. Secondly, on the private side we have only looked at those companies which are supplying services to others. There are many organisations which are using EO data as the basis for analysis within their own organisation ie as internal service departments. We should have liked to have included these in our survey but were not able to this time around. A future survey should address this part of the sector.

    3. Thirdly, we consider that we have considerably under-sampled the downstream part of the value chain. Companies using GIS in which EO data has already been embedded should outnumber those working in the value-adding services part of the chain. We do not see this from our results and consider that a further effort is needed to go down the value chain and find more of the companies operating there.

- Overall, the survey has fulfilled our objectives to understand what the EO services sector looks like, how it is evolving and what the issues are that it is facing. We look forward to revisiting it in 2 years' time to see how it will have changed.

Annex 1: Definitions

At this annex some of the more relevant definitions will be addressed in order to provide some common understanding to the industry survey. Notice that some definitions have been extracted form the Vega/ESA 14/02/2008 study and are marked accordingly.

Company: A company is a legal entity owned by shareholders which has a business objective to make a profit. We include companies that may be owned by government bodies if they publish accounts and have a profit objective.

Consultancy: Consultancy involves any advisory activity that is not directly related to an added-value product or service delivery. (Vega Report 2008)

Data: in the context of this study, data is a digital steam coming from one or more sensors (mainly satellites) that are then used as the basis for processing into information. EO data is that data related to the measurement of parameters associated with the Earth.

Data providers (data suppliers): EO data providers distribute raw data from their own or other satellite systems. Initial processing on raw data, such as radiometric correction and geometric correction is usually carried out to correct for any distortion due to the characteristics of the imaging system and imaging conditions. See also Satellite Operator.

Data Processing Services: service type converting available data into easy, accessible and available format

Data types from data providers: Some definitions below will help us with the understanding what type of data companies are supplying.

- Low and medium: Satellite data with low and medium resolution are characterized by spatial resolution at hundreds of meters down to a few tens of metres. We have taken a cut-off between medium and high resolution imagery of 20m.
- High: Satellite data with high resolution are defined by spatial resolution less than 20m but higher than 2.5m.
- Very high: Satellite data with very high resolution of less than 2.5m.
- Radar: Radar data is coming from a SAR (Synthetic Aperture radar). The performance of radar systems is not yet as high as those from optical systems hence we take a threshold between high and medium resolution of 5m and between high and medium resolution of 20m.
- Airborne: This data, which can come from a number of different sensor types, should be requested when high speed and high precision image collection is needed.
- UAV's (Unmanned airborne vehicles) or RPAS (Remotely piloted aircraft systems) are becoming increasingly common. In terms of data they do not differ significantly from conventional airborne systems excepting that the quality will generally be lower due to payload limitations.

Downstream: This is used to refer to the part of the value chain delivering information services. We make the distinction between "value-adding" and "downstream" to separate those companies which are dealing directly with data coming from EO satellites ie EO data and those working

with derived products in which EO data has been used. The distinction is expected to become more important for future surveys where we anticipate to analyse further down the value chain.

EO geo-information services company: A company using EO data coming from satellites in any of its products however small that might be. Hence it could be doing 99% of its business using airborne or ground based data and only 1% based on EO data but its figures for geo-information services will be included 100% in the survey. On the other hand only the business of a company concerned with geo-information services will be included. Hence a company doing 99% of its business in satellite manufacturing and only 1% in geo-information services, would only have 1% of its figures included in the survey.

Earth Observation related Services: The term EO-related services is taken to mean any geo-spatial information service activity which in some way involves data coming from EO satellites (including meteorological satellites) ie any satellite with one or more sensors that measure parameters coming from the earth's surface or atmosphere. The involvement may be direct ie processing or distributing imagery or indirect ie consultancy based around knowledge of the imagery or its use. It starts from the point where imagery is transmitted to the ground so it does include reception and processing of imagery but does not include construction of ground stations or the satellites delivering the data. Note that it includes all geo-spatial information services activities where satellite EO data has been used and so extends to downstream information processing of geospatial information where data being used has been derived from EO imagery possibly in combination with other data types.

Ground Station Operator: This is an organisation which is providing the service of “data reception” by operating the equipment necessary to control and to acquire data from EO satellites. They may be doing this for their own satellites or under contract to a satellite operator or other 3rd party.

Market Sector: A definition of categories into which different customers can be placed. In other words, categories in which customers are undertaking the same type of business activity.

Public sector operational: This includes all public organisations with a continuous operational responsibility for managing something. This includes organisations such as police, fire, environment agencies and meteorological agencies etc.

Public sector development: This includes all public organisations with a one-off project responsibility or for creating new services for assessment. These will often be the source of R&D funds or grants.

Quality Assurance: It refers to the planned and systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled.

Quality Management System: A QMS is the QA system used by a company to assure its processes.

Raw Data Sales: Service type which sale of data collected on source which has not been subjected to processing or any other manipulation

Remote sensing: Remote sensing is used to obtain information about objects. Data is collected with an instrument an then analysed. The instrument used is not in direct contact with the object. The platforms used are located "at a distance" from the earth's surface (for example, aircraft and satellites).

R&D Activity: R&D activity is typically in developing concepts into real saleable services or products and making them ready to be sold in the commercial market. It will also include significant work to update a product or service method so that it may be offered in the future in a different form to the current. In this case R&D does not include market research which is part of the marketing and promotion activity.(Vega Report 2008)

R&D intensity: is the ratio between R&D investment and net sales of a given company or group of companies. At the aggregate level, R&D intensity is calculated only by those companies for which data exist for both R&D and net sales in the specified year. (Source=EU Industrial R&D Scorecard)

Revenues - Turnover: Is the income that the company receives from its normal business activities usually from the sales of EO data or value added activities to their customers.

Satellite Operator: An organisation which is operating one or more EO satellites which either they own or they operate under license with the owner (which may be a government or public sector body)

SME´s: "SME" stands for small and medium-sized enterprises – as defined in EU law: EU recommendation 2003/361. The main factors determining whether a company is an SME are:1) number of employees and 2) either turnover or balance sheet total. These ceilings apply to the figures for individual firms only. A firm which is part of larger grouping may need to include employee/turnover/balance sheet data from that grouping too. (Source)

- Micro: 0-9 employees < €2 million
- Small: 10-49 employees (includes micro) < €10 million
- Medium-sized: 50-249 employees < €50 million
- Large: over 250 employees €50 million+

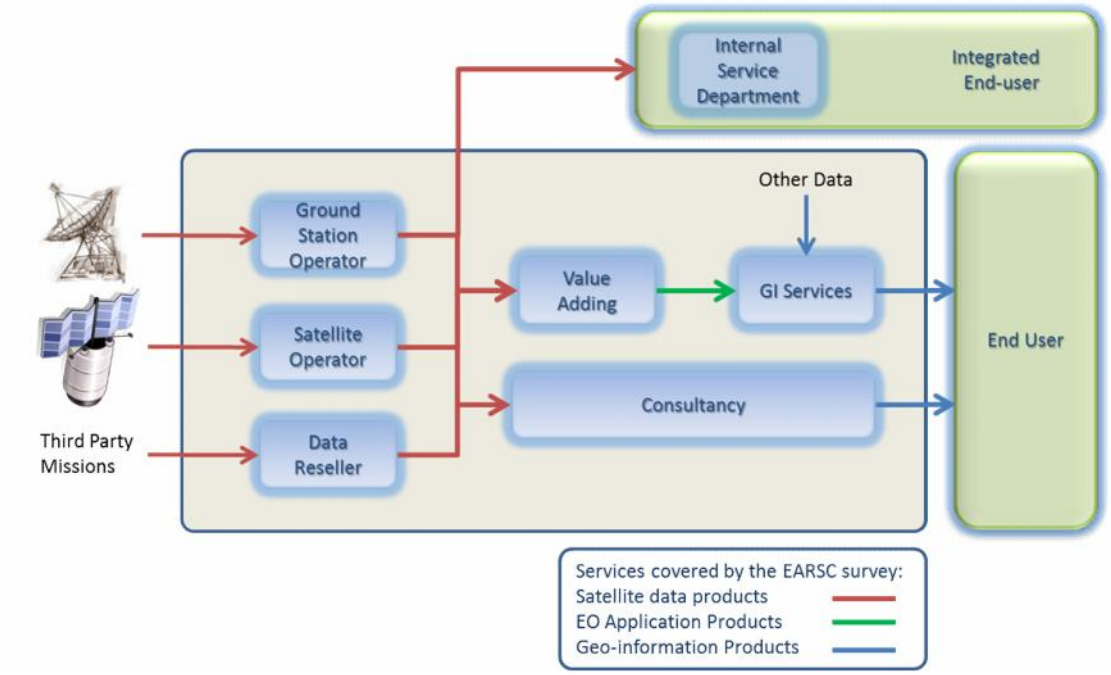
Services types (EO): The generic (i.e. not market or thematic area specific) service component(s) of an end to end EO service that are provided: (data processing, raw data sales, value added data sales, software development services, consultancy, information product, service sales, software license resale)

Software Development Services: service type which includes all that is involved between the conception of the desired software through to the final manifestation of the software, ideally in a planned and structured process

User: A user is an individual or organisation that uses an EO product or service. They might not necessarily pay for the service however e.g. funded to use the service as part of an institutionally funded study (Vega Report 2008)

Value Adding: The EO Value Adding sector is the group of companies that processes the raw or semi-processed data from the remote sensing instruments, and converts the data into information that is commercially useful to end users

Value Adding Companies: are companies that work with raw or semi-processed data from remote sensing instruments, and convert the data into information that brings value to end-users.

Value Adding Services: are defined as any business process meeting any of the following criteria: enhancing or upgrading the space signal; targeting specific end-users with dedicated applications; combining several applications at once.

Value Chain: Earth Observation industry composes a unique value chain that provides various information to the customers. The whole EO value chain includes EO system providers, system operators, data providers, value-adding, GI Services, research Institutes, non-EO service providers and customers. In this survey we are only concerned with companies that supply or work with EO data in some form.