Baltic Large-Scale Computing

Report on Market Demand for LSC

Version 1.00

Priority 1: Innovation

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Executive summary

The main aim of WP2 is to perform research being the basis for exploiting the Baltic Large-Scale Computing Environment and to promote widely its use. The WP results will allow for adjustment of the environment's functionality to market demands for LSC services and institutional capacities to provide such services, with specific focus on the Baltic region. Individual activities will identify and analyze barriers for use of LSC and will propose ways to eliminate them. The results of this WP will be used and combined with the results of other WPs to communicate and promote achievements of the project in relation to identified problems.

The objective of the task 2.1 is to encompass study and analysis of market demand for large scale computing among SMEs (and R&D centres) in the Baltic Sea region.

The objectives that are planned to be achieved in task 2.1 as described in the proposal are:

- To identify appropriate SMEs who can be potential users of LSC and improve their competitiveness and business with the help of these services.
- To build or acquire a database with contact details to SME, in all countries involved in the research (all partners).
- To carry out a Computer Assisted Web Interview (CAWI) survey to be completed by the SMEs to assess their current scenarios on the use of LSC.

This deliverable includes the description of work done in the task 2.1 and will be provided at 9th month of the project. This deliverable describes how common is the usage of computation and analytical services (including LSC) among SMEs, current model of using such services by SMEs, current deficiencies of LSC solutions, needs of SMEs in respect to computing and analytical solutions, barriers of using LSC services by SMEs.

The study will be realized implementing a survey method, more precisely using computer assisted web interview (CAWI) technique. CAWI survey is carried out with on-line standardized questionnaires to complete by the respondent. The first step of performing the study is defining research design (e.g. research questions, sampling) and tools to gather the data. Due to the quantitative nature of the study, the questionnaires will mainly contain closed questions with predefined answers, but also semi-open questions, extended with the ability to enter individualized opinion.

The results from the survey will be the basis upon which we build further measures to be taken to engage SMEs to utilize the LSC services.

We will draw conclusion from the task 2.1 to design a road map for the smooth running of the project.

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List of abbreviations

1	CAWI	Computer Assisted Web Interview
2	CRM	Customer Relationship Management
3	EU	European Union
4	GDP	Gross Domestic Product
5	HPC	High-performance computing
6	LSC	Large-Scale Computing
7	PRACE	Partnership for Advanced Computing in Europe
8	SHAPE	SME HPC Adoption Programme in Europe
9	SME	Small and Medium Enterprise
10	WP	Work Package

1. Methodology

LSC refers to all computations that need high processing power or memory capacity. LSC assists researchers in solving complex problems in variety of different areas like meteorology, bio-engineering, ship building, structural calculations, nanotechnology, software development, finance etc. This selection of LSC applications show that it can play a very important role for many small and medium scale enterprises and research institutions across the Baltic sea region and beyond.

Small and medium-sized enterprises (SMEs) are considered to be the backbone of the European economy. SMEs have a major contribution to the European competitiveness and are responsible for value added across European economies and employment generated. SMEs account on 99.8 percent of the total number of enterprises and 66.65 percent of total EU employment in the EU28.[1]

Since LSC is a highly technological tool, it might not be suitable for a large number of SMEs. The idea incorporated here is to find SMEs and research institutions in specific domains that are close to the use of large-scale computations or can be potentially benefited from its use. The contacts to SMEs were obtained through business and professional associations, enterprise parks, dissemination workshops organised by the project members and online surveys.

The process to fulfil the objectives of the task is as follows:

1. A study is carried out with the help of online surveys to find out the current scenarios of SME with the use of LSC services.
2. Reach as many SMEs as possible that can be benefited from the use of LSC: Not all SMEs are aware of the advantages associated with the use of LSC services or lack of sufficient knowledge for the adoption and use of such services. The search was to identify SMEs that would profit from the integration of LSC services in their value chain from the BalticLSC platform.
3. SME database is built up and surveyed with the help of CAWI. Only those SMEs that show a positive feedback for the incorporation of LSC services in their business are assessed in order to see if they can be benefited from the LSC use.
4. From the survey, output data is gathered and cleaned and studied to refine understanding of the SME market demand for the LSC services.
5. The results will be presented for every country separately and they will also be summarized in the context of similarities and differences between markets. Based on results obtained, recommendations for developing BalticLSC environment in accordance with the needs of its potential SME end-users are carried out. It is worth pointing out that the recommendations will be trans-national so they will allow for adjusting the service to expectations of every Baltic market included in the project. Recommendations will refer to such areas as:
    - potential interest in BalticLSC environment scale
    - how the product should be designed to attract maximum uptake
    - what functionalities are used by SMEs most often
    - what scenarios the product should provide to allow users to perform computations and analysis on the base of their own skills
    - what model of providing the service will be the most convenient one for SMEs

In addition, defining the barriers that restrain SMEs from taking advantage of LSC services will allow to design BalticLSC environment in a way that will eliminate or at least reduce these problems.

[1] 2018 SBA Fact Sheet and Scoreboard

1.1 Reaching SMEs

Out of millions of SMEs working across Europe, only those SMEs with business sectors that can potentially enjoy the benefits of LSC are identified and reached out in the Baltic sea region through the project partners. The business domains that are contacted can be found in the annexure II.
The means to contact SMEs include existing CRM tools, workshops organised in partner countries, BalticLSC.eu Website, emails, social media like Facebook, Twitter and LinkedIn.

1.2 Interest of SMEs in LSC

SMEs who wanted to improve their business and competitiveness through the use of LSC showed interest by giving a positive feedback to the online survey questionnaire, by acknowledging to attend follow up workshops and training sessions and by participating in any BalticLSC dissemination events.

1.3 Precursory assessment of LSC use by SMEs

The responses of the interested SMEs are recorded, and an analysis is carried out. Technological partners from the project are also involved in the assessment of the results. The challenge is to find SMEs that can clearly gain advantage with the help of LSC services and to use these results as source of information for the design of LSC hardware and software platform to make it easier for SMEs to utilise the services across the Baltic sea region.

1.4 Analysis of Case

All the necessary information is gathered and analysed along with the help of technological partners. This will aid in the preparation of a business model for the continuity of the BalticLSC environment throughout the duration of the project and beyond.

2. Previous experiences

SMEs, representing more than 99 percent business in the EU, are considered to supply a significant job and economic growth. Independent study has stated that industries that leverage high-performance computing (HPC) could help Europe's GDP in 2020 increase by 2-3 percent by enhancing their products and services.
Therefore, some projects and ideas have been initiated to implement the access of the HPC to SMEs: Sesame Net, PRACE SHAPE, Fortissimo, etc.

According to Jürgen Kohler (senior manager, NVH CAE & vehicle concepts at Mercedes-Benz) in his keynotes at ISC 2015 conference, there have been some reasons why SMEs are not so interested in HPC. He suggested some questions which should be considered regarding to this matter:

- Was there not enough HPC expertise or skills in computer modelling and simulation?
- Was there a need for simulation techniques?
- Was there a financial issue among SMEs and do they need financial support in order to access to HPC? etc.

From the Sesame Net report "D5.1 SME Demands and Needs October 2016" there are mentioned some barriers:

- Internal adoption or engineering skills are limited.
- Development and MS Windows environment are needed.
- An easier usage is required. A high-performance connection for big data otherwise a local system is needed.
- A cluster is difficult to implement (what to buy, make and configure it).
- Advising for HPC and HPC experts are required.
- Hardware resources under peak workloads are lacked.
- Problem with software licenses (especially when licensing software remotely when a third-party hardware is used).
- Low bandwidth connections.

According to the report of PRACE SHAPE in 2013, there are some barriers mentioned:

- High operational cost
- Experts/ professionals are lacked.
- There were not enough resources.
- High risk involved.

The Fortissimo projects also recorded some barriers:

- High operational cost (the first time of using).
- Lack of experts.
- There were not many successful cases in the past.
- Problem with the resource access of computing and software.

According to Steve Conway, IDC Research Vice President, HPC, the main difficulties to adopt HPC are:

- Understanding is insufficient
- "Strategic fit" software is lacked.
- The problem of finance.

Here are some the needs and demands of small and medium scale enterprises to adopt the Large scale computing services based on the desktop research:

- Business intelligence and analytics
- Storage and Backup solutions

- Web based e-mail services
- Online office software
- Reduced downtime
- Customer Relationship Management
- Enterprise resource planning system
- Resource optimization
- Resource availability
- Software developing and testing tools
- Computer networks
- To solve complex innovation and technology problems
- Sustainable development

3. SME market demand and needs (online survey)

The online survey is considered very important and the first step is to have the contacts with SMEs. The biggest target of the online survey is not to make a deep analysis of LSC but to identify the demands and needs of SMEs for LSC with the aim of connecting SMEs with the use of LSC.

The SMEs involved in the online survey are classified in three categories:

a. SMEs with no need for LSC: they do not have knowledge about LSC or they do not have the demand on this matter.
b. SMEs with interest: they do not use LSC but they have the interest in using this product.
c. SMEs currently using LSC: they are using it in any form.

Our targeted SMEs are the ones in b) and c), the ones in a) are only considered if they want to keep contact with our project for further information/ updates.

The online survey aims to find out the current and future needs of SMEs and institutions in different industries and research areas in the Baltic Sea Region to perform complex computations. This online survey plays as a main tool to gather the feedbacks from SMEs thanks to its advantages:

- **Non-intrusive**: the online survey is very convenient and not intrusive or time-consuming, compared to other survey methods (interview, calls, on-paper surveys, etc.)
- **Accessible**: the survey is made online and public in the website of the projects, which is easy and fast to access from computers or smart phones with Internet connection. One good point is that the online survey is written in non-technical language, so participants do not need to have deep computing knowledge to complete the survey.
- **Brief**: the survey is not long (requires no more than 10 minutes to complete) without complicated, unclear, very technical questions.

The survey includes five different sections with totally 38 questions:

1. **Section 1: Current use**: this section aims to collect the information about the need and interest of SMEs about Large Scale Computing, computing resources, current data process, also the information about used computer programs/ software, experience and current usage of supercomputing.
2. **Section 2: Training**: this section helps provide not only the information about how the LSC can help SMEs to develop their business but also the information about SMEs' interest of general and tailored trainings or staff trainings.
3. **Section 3: About the company**: provides information about the companies and the respondents: their based country, number of employees, business sector, R&D functions, annual turnover, expectation of LSC and the roll of the respondent in the company.
4. **Section 4: BalticLSC project**: this section gathers the information about the interest to attend more activities of the project: receiving the result of this online survey, updated newsletter, participating in a follow-up interview, training courses, collaborating with LSC centres on pilot R&D projects.
5. **Section 5**: **Contact details**: provides the contact information of the respondent including name, email address, phone number, company name, website.

The platform used to conduct the survey is Google Forms and the survey is published in the project's website https://www.balticlsc.eu/survey/

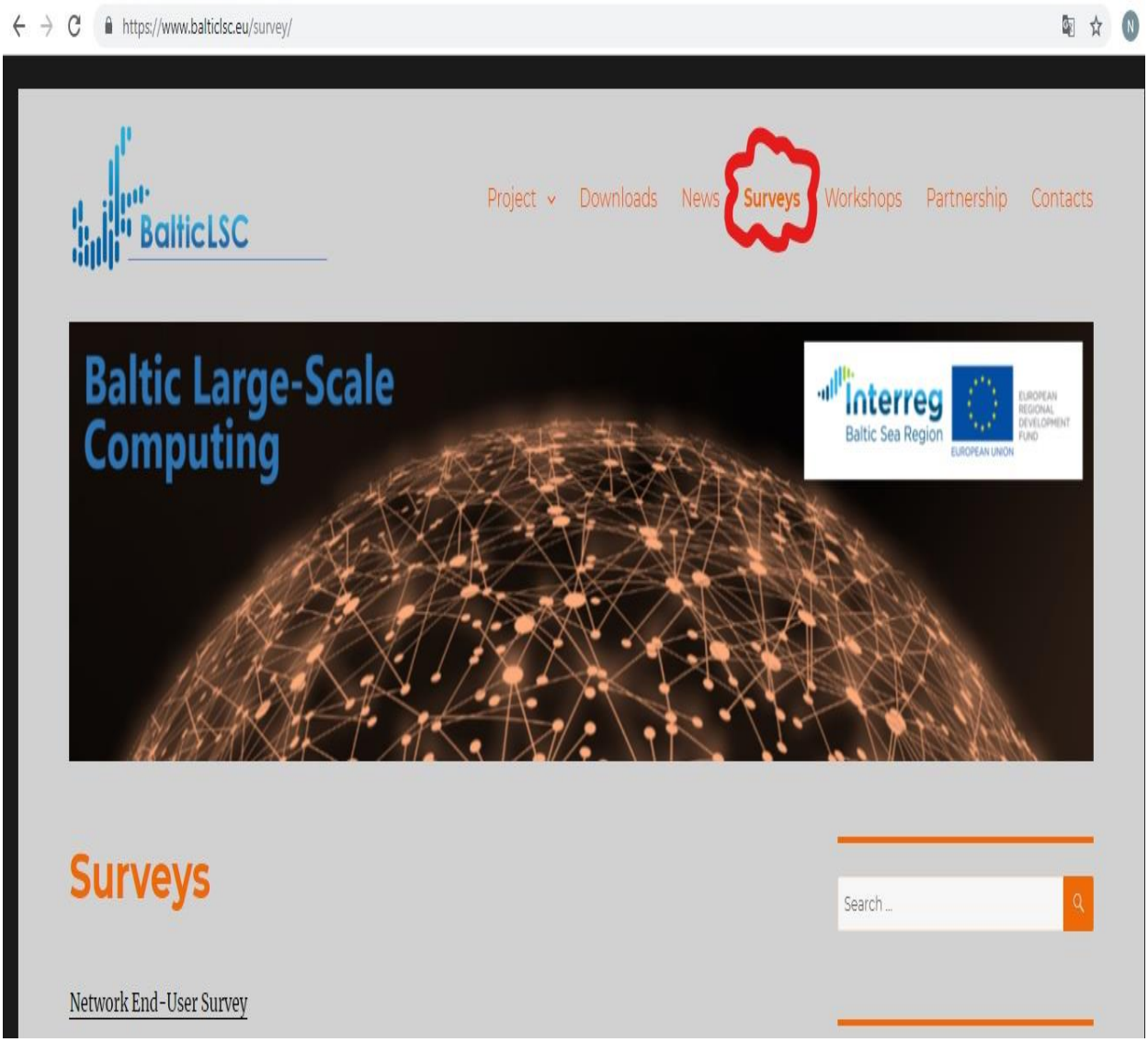

Figure 1: BalticLSC project webpage and the link to the online survey

Then choose the *Network End-User Survey* section

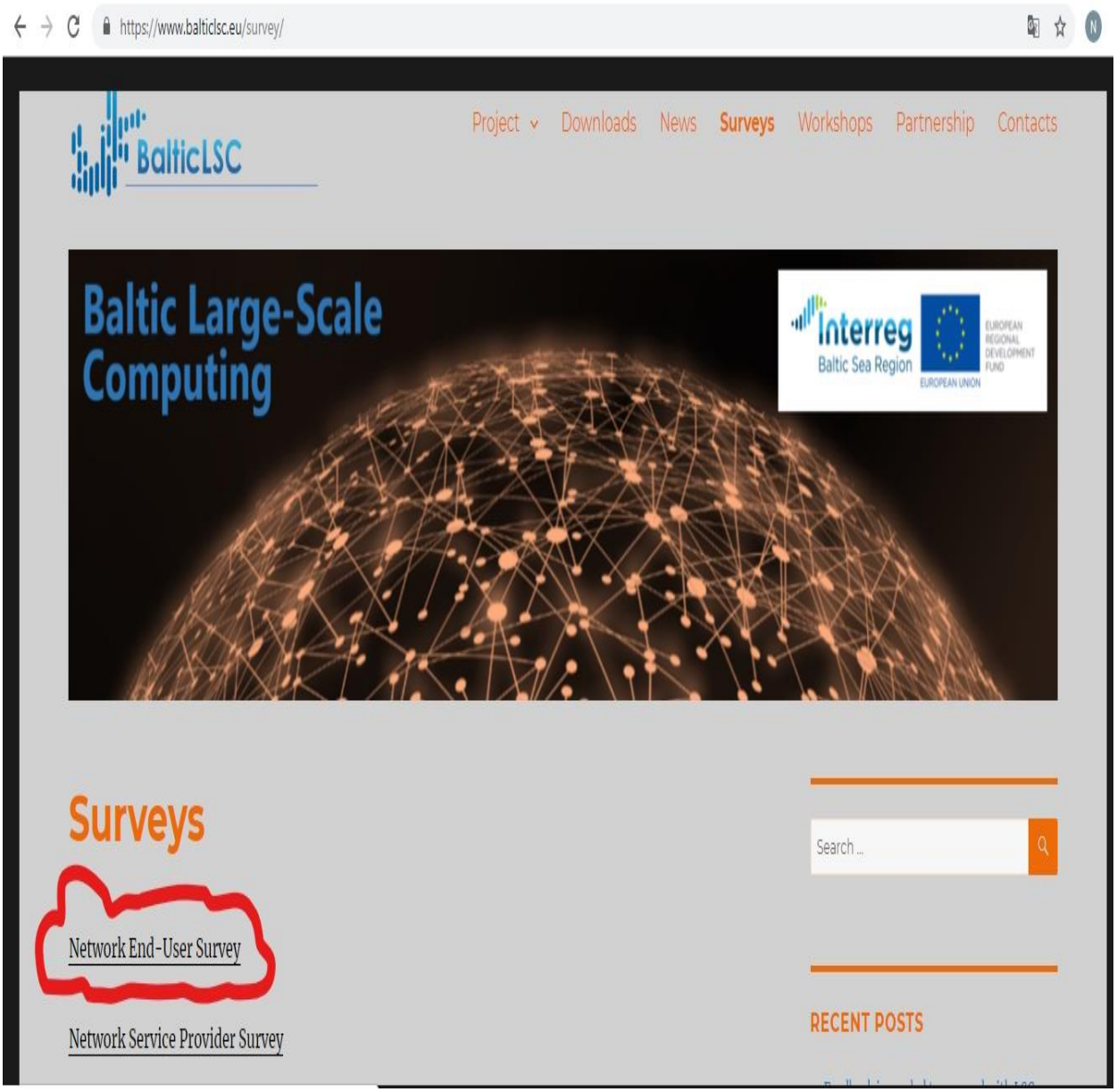

Figure 2: Link to the online survey for SMEs

3.1 Dissemination efforts

Dissemination at the Baltic Region level was undertaken by Baltic Large-Scale Computing partners. Each partner in the project disseminated the online survey to its contacts in its geographical area. Each partner built their SMEs contact lists based on their own network that would have an interest in LCS with the minimum requirement of 200 companies to identify the potential companies through the online survey. The response requirement for each country is minimum 30 replies/ country.

Below is the overview of the efforts performed by partners:

EurA AG sent email in both existing contact lists in CRM system and the new contact lists collected from open online sources such as company's website, business directories, social media network like LinkedIn.

Municipality of Vejle (Denmark) sent the questionnaire through their Green Tech Center with 500 members (in 150 different companies); however, they cannot fill in the names and companies because of GDPR, which does not allow GTC to share their members information. They also talked to two of the Danish cluster organisations (CLEAN and Energy Innovation Cluster) to send out the questionnaires as well.

Lithuanian Innovation Center sent over 150 emails the end-user's questionnaire and got 16 responses.

Tartu Science Park Foundation (Estonia) sent out the survey for end-users to 130 contacts.

3.2 Results

The online survey started at March 2019 till the end of the project with some potential change added (if any) during this period. However, the available feedback from the online survey is already used to analyse for the SMEs demand in this report. A weekly update is published so that every partner can have an overview of how the survey and responses are going on.

In general, in the period from May 20, 2019 to October 2, 2019, there are 22 responses for the end-user survey.

Below is the analysis of the responses from the online survey:

Section 1: Current Use

Do you want to significantly increase capacities to create new innovative data-intense and computation-intense products and services?

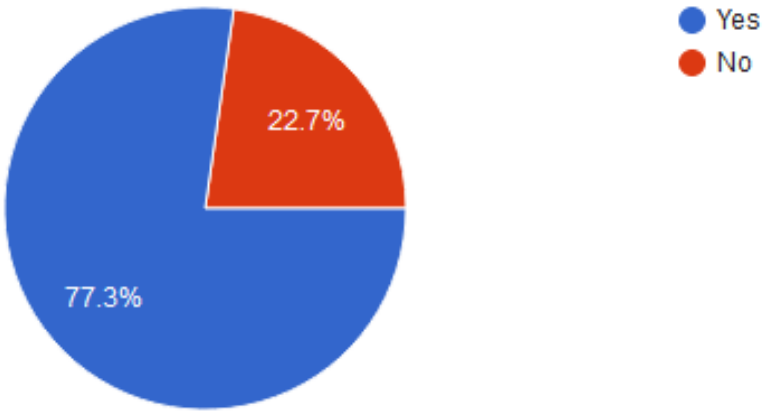

Figure 3: potentiality of increasing capacities at SMEs

From 22 responses there are nearly 78 percent of the answers stating that they want to significantly increase capacities to create new innovative data-intense and computation-intense products and services and 22.7 percent “no” answers. This is a good sign at the beginning that the LSC project may get the attraction from the SME customers and those 78 percent positive answers may become the potential customers of LSC project.

Does your enterprise make use of computer programs to predict, analyse, simulate, model and study the behaviour of your products and processes?

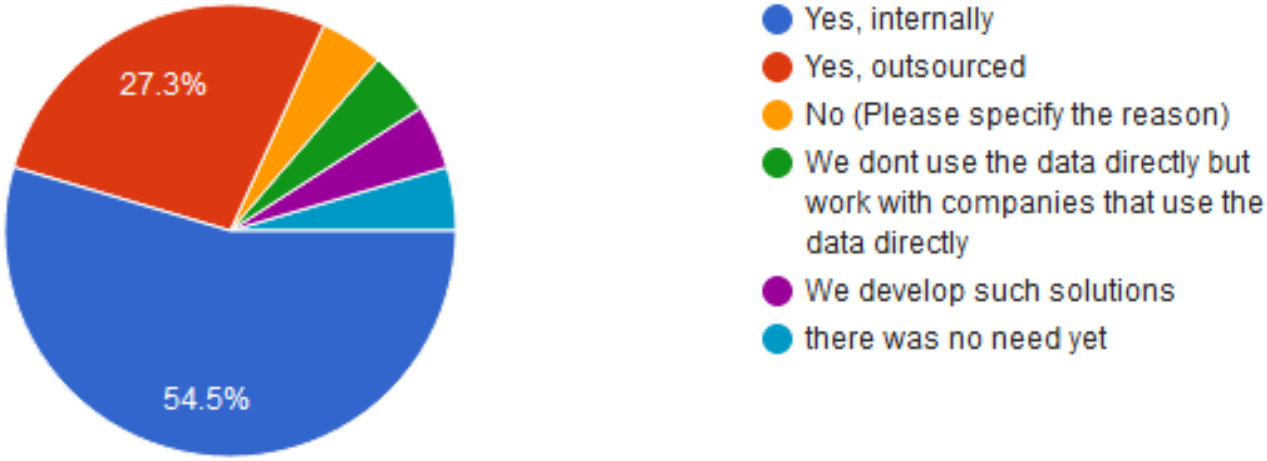

Figure 4: usage of computer programs at SMEs

More than half of respondents fed back that they have internal resources to predict, analyse, simulate, model and study the behaviour of their products and processes. 27.3 percent of SMEs use the outsourced resources to support them with this. The rest companies answered with no resources, working entities with data, developing such solutions and no need of such computer programs.

How do you prefer to store the data related to your products and processes?

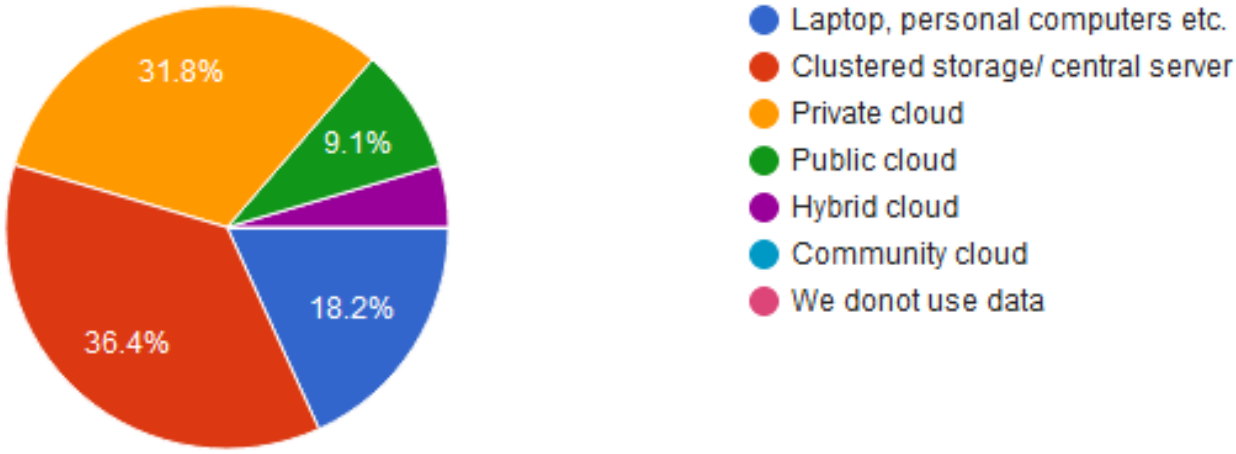

Figure 5: data storage solution at SMEs

Clustered storage/ central server was chosen by 36.4 percent of the SMEs to store their data, 31.8 percent using their private cloud, 18.2 percent store their data in their laptops, personal computers, etc.

The rest use public cloud and hybrid cloud as their data storage solutions. The way of SMEs to store data could be reference of the current market and also a reference for the LSC project to determine the potential services to provide to SMEs.

Do you want to use the Internet to store and move data securely, related to your products and services?

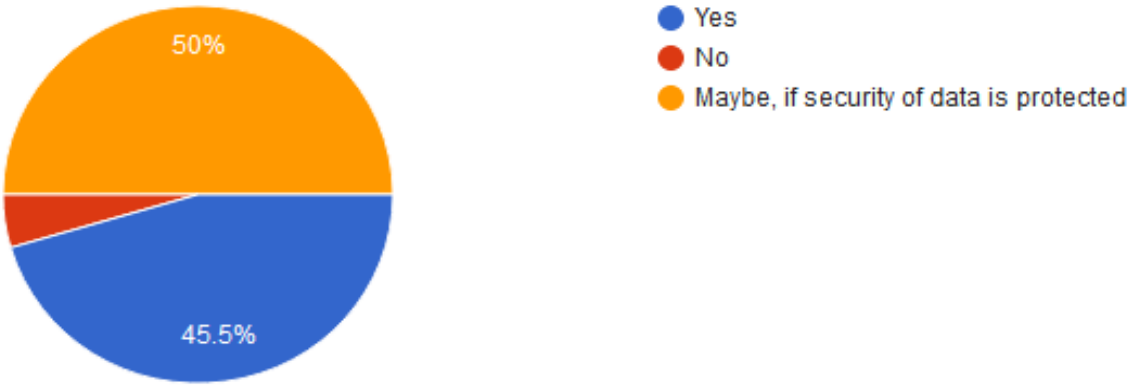

Figure 6: the need of Internet usage at SMEs

Nearly a half of the SMEs want to use the Internet to store and move data securely, related to their products and services, the rest reply as maybe, if security of data is protected and small amount of feedback was with no result. The positive feedback is good sign for the potentiality of using LSC products from the SMEs.

Does innovation of new products and services in your company often require solving large computation problems?

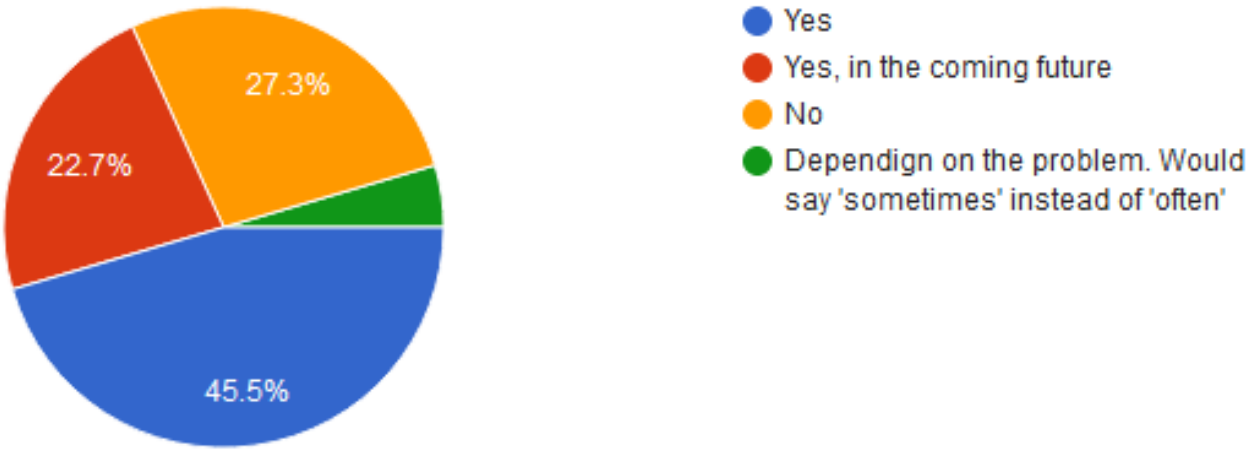

Figure 7: the need of large computation at SMEs

The innovation of new products and services in 45.5 percent of the SMEs often require solving large computation problems. 22.7 percent of SMEs think that this large computation related requirement will happen in the future. 27.3 percent of the feedbacks was with no and the rest think that it depend on the problem but would be “sometimes” instead of “often”. This provides us a good sign to have more discussions with the SMEs about large computation matters.

Have you considered speeding up time-to-market processes by using faster or more computing resources?

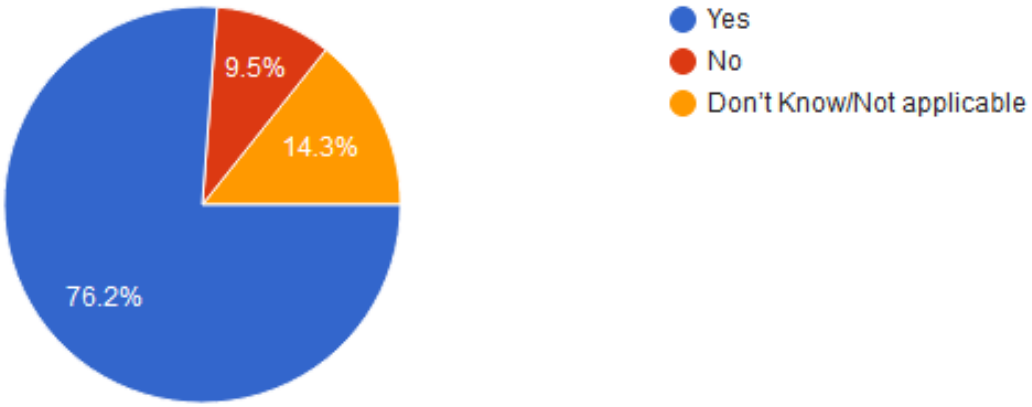

Figure 8: the need for speeding up time-to-market processes at SMEs

76.2 percent of the respondents have considered speeding up time-to-market processes by using faster or more computing resources. 14.3 percent do not know, or the computing resources are not applicable. The rest have not considered about this. From this result we can conclude that there is possibility for the SMEs to consider using the products and services of our LSC project.

Would you consider outsourcing data processing, data analysis and computation, computation prediction, etc., to a remote company or institution?

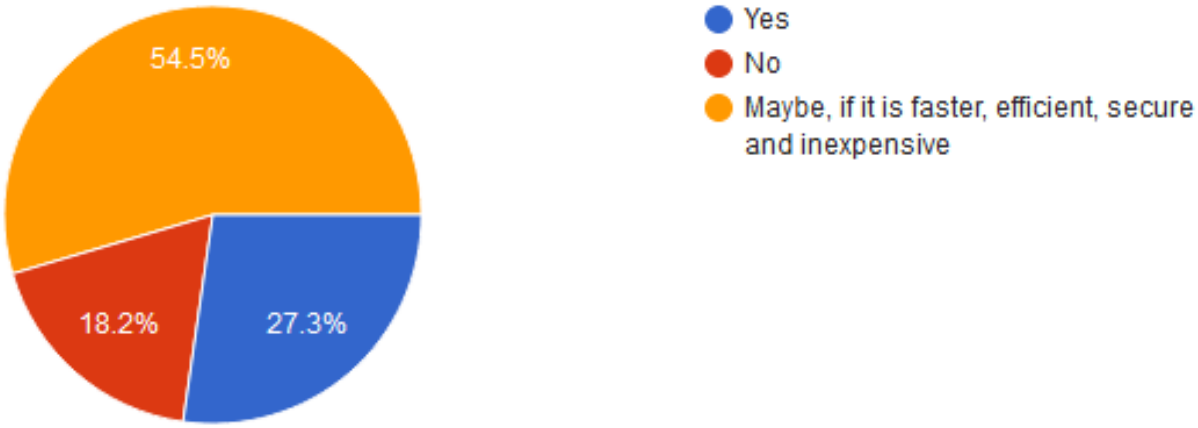

Figure 9: outsource of data processing at SMEs

There is 27.3 percent considering outsourcing data processing, data analysis and computation, computation prediction, etc., to a remote company or institution. 54.5 percent may consider about this, if it is faster, efficient, secure and inexpensive. 18.2 percent do not have any consideration.

Does your enterprise make use of Large-Scale Computing services?

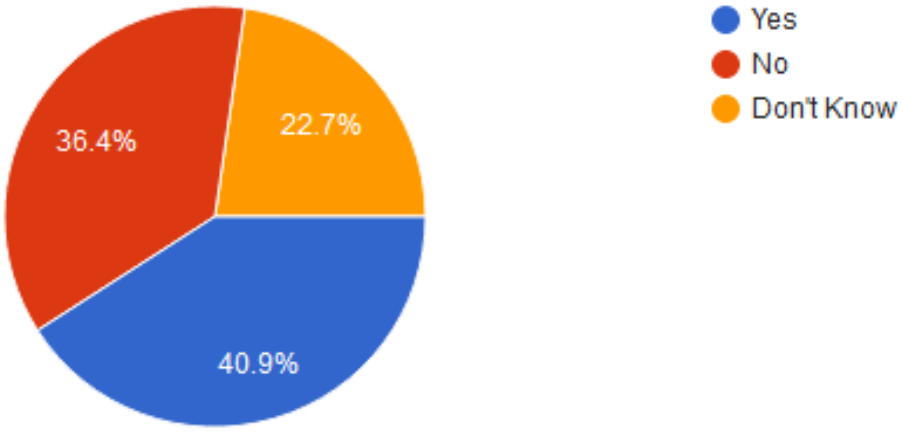

Figure 10: usage of LSC services at SMEs

40.9 percent of the SMEs use Large Scale Computing services, 36.4 percent do not use, and 22.7 percent do not know about it. With the SMEs which use Large Scale Computing services, we can discuss with them about extra services or their satisfaction in using such services. With the SMEs which answers "no" and "don't know" will be still invited to the workshops (upon agreement) so that they have more information about the advantages of LSC services.

What is the reason of not using the LSC services?

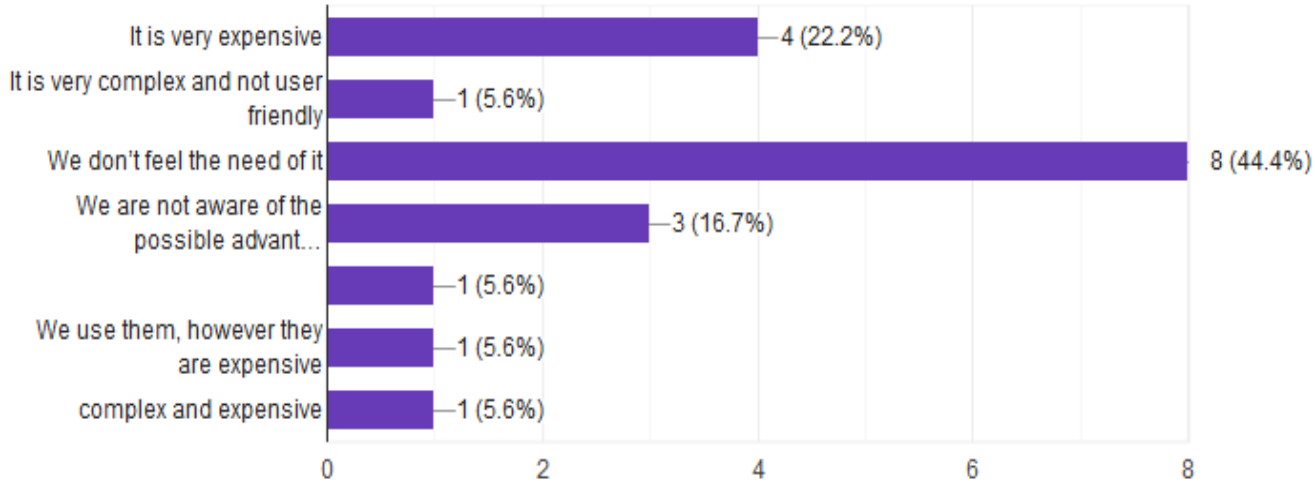

Figure 11: reasons for not using the LSC services at SMEs

44.4 percent of the SMEs explain for the reason of not using LSC services is that they do not feel the need of it. 22.2 percent thinks that it is very expensive. 16.7 percent are not aware of the possible advantages. 5.6 percent claim that it is very complex and not user friendly. 5.6 percent is using it, but it is very expensive. From here we can consider some methods in providing our LSC services to ease the problems of SME. For example: a pay-per-use service so that LSC service is not too expensive to purchase, more workshops with information about the applications of LSC services in operation and innovation, training programs etc.

If you are using LSC services, who is the provider of LSC services?

Figure 12: providers of LCS services to SMEs

Only 13 answers were obtained for this question, in which 46.2 percent of the feedback state that they are using LSC services from a global/large company, 30.8 percent are using this service from a research institution, 15.4 percent from SME and 7.7 percent answered "N/A" as they have responded "don't know" in the previous question. From this question we can have an overview about our competitors.

If you have opted LSC services, have you identified any barriers or scope of improvement in their usage?

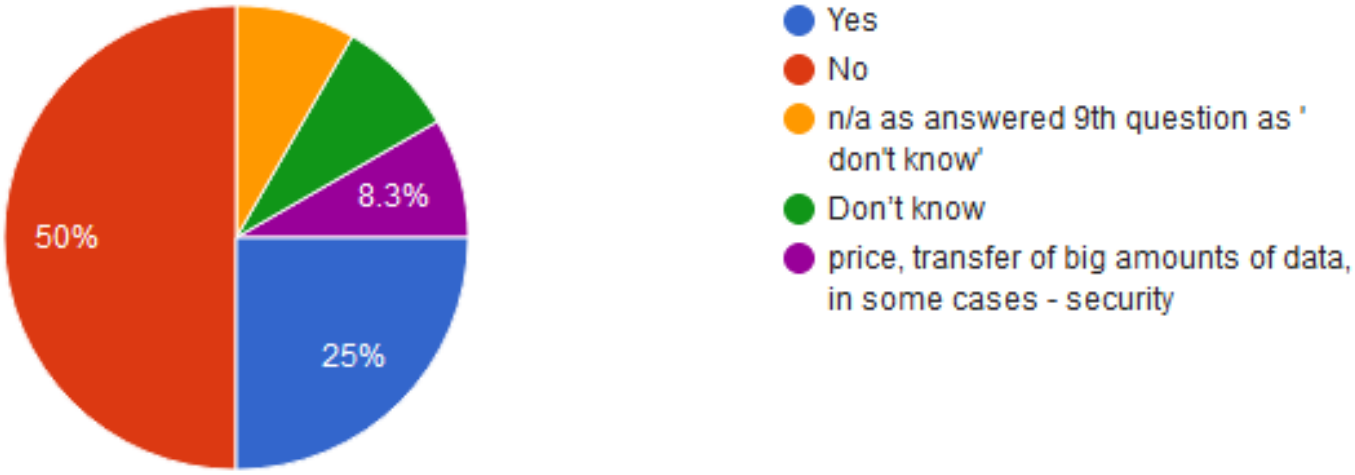

Figure 13: barriers or scope of improvement LSC services at SMEs

50 percent of the SMEs have not identified any barriers or scope of improvement in their usage of LSC services while 25 percent claim that they discover something. 8.3 percent point out price, transfer of big amounts of data, in some cases – security. The rest provide "N/A" answer. This can be considered for the improvement of our LSC services to be more competitive in the market.

Have you had any experience working with external LSC service provider?

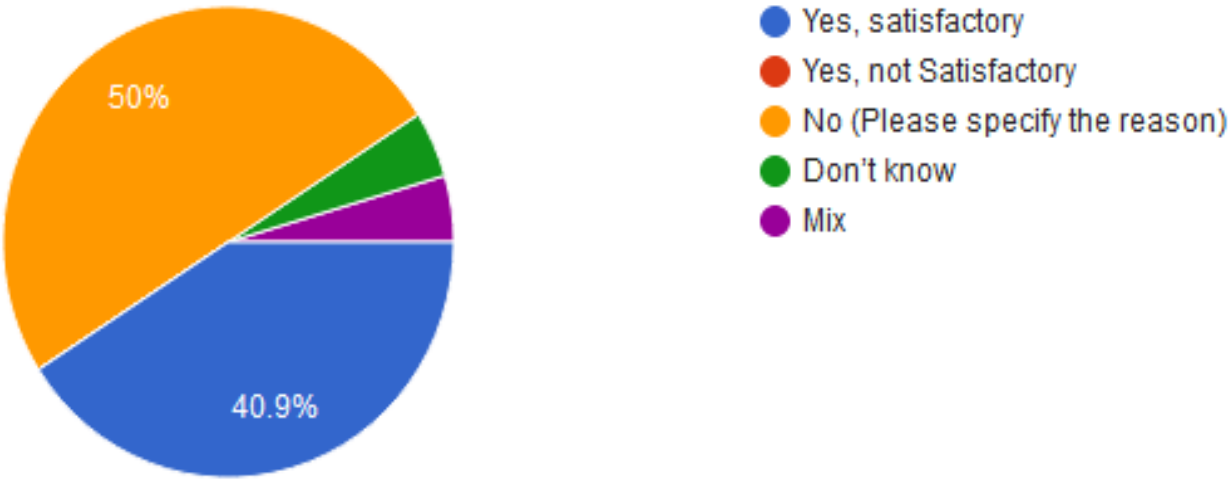

Figure 14: SMEs' experience working with external LSC service provider

While 40.9 percent of the responses have satisfactory experience with external LSC service provider, 50 percent have no experience and the rest responded with "no" and "mix" answers.

What kind of software applications do you use?

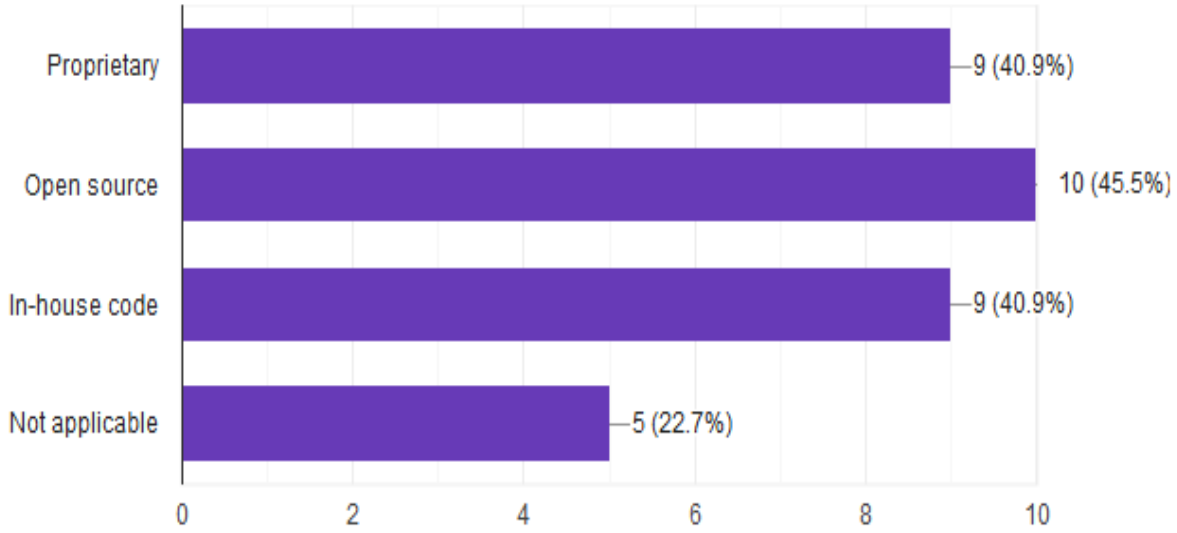

Figure 15: software applications at SMEs

Open source software applications were used by 45.5 percent of SMEs. In-house code applications were used by 40.9 percent of SMEs. 40.9 percent of them use proprietary and 22.7 percent do not use. The result should be taken into account for developing the applications and appropriate products in our LSC project.

What is the hardware infrastructure you use?

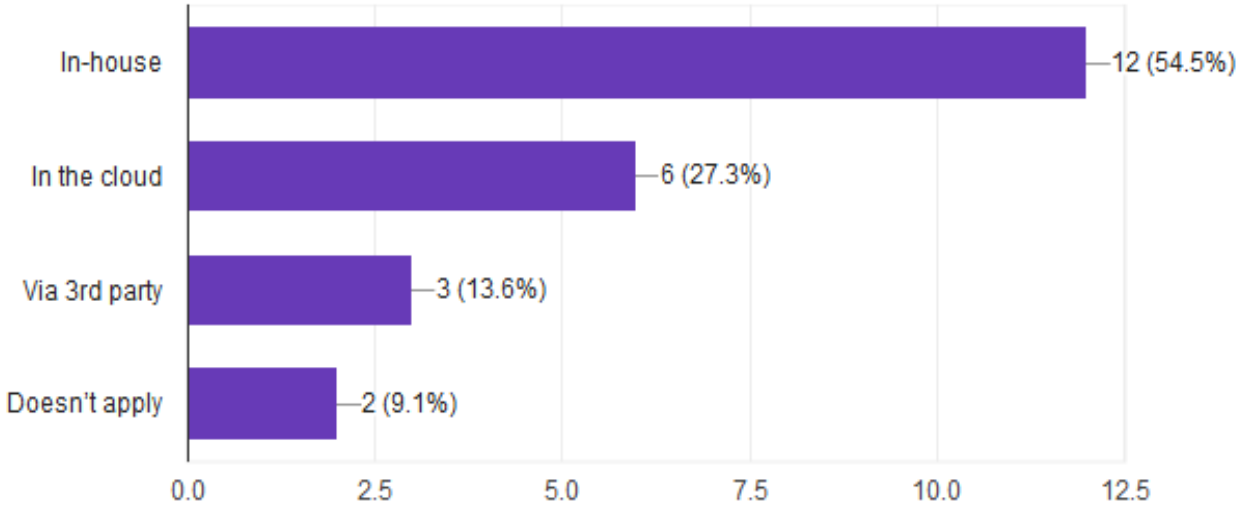

Figure 16: hardware infrastructure at SMEs

54.5 percent of the SMEs use in-house hardware infrastructure while 27.3 percent use in the cloud infrastructure. The minority use the infrastructure via third party or do not use. The result should be again taken into account for developing the applications and appropriate products in our LSC project.

Will you consider working with larger or more complex models/data if you had more external LSC infrastructure?

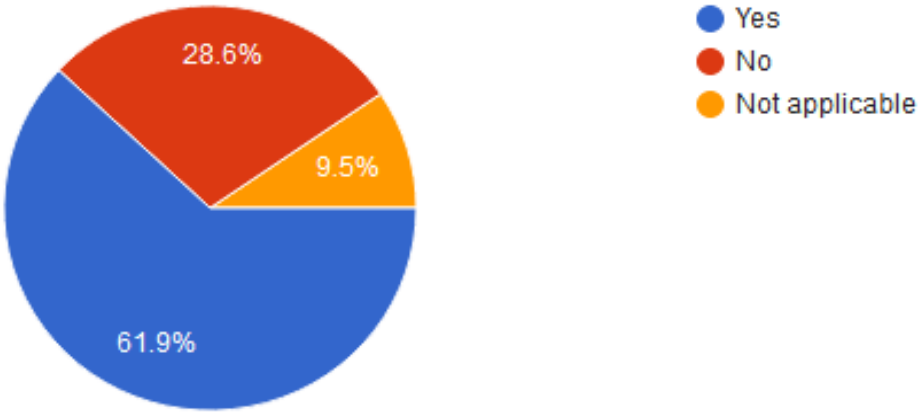

Figure 17: potentiality of applying larger data with external LSC infrastructure

61.9 percent of the respondents agree to consider working with larger or more complex models/data in case of more external LSC infrastructure, 28.6 percent will not consider while the rest 9.5 percent responded with "not applicable". From here we can see that there is a potentiality to launch our services to the market.

Does your enterprise need help in modelling in order to develop a product or service that could require LSC, in order to be competitive?

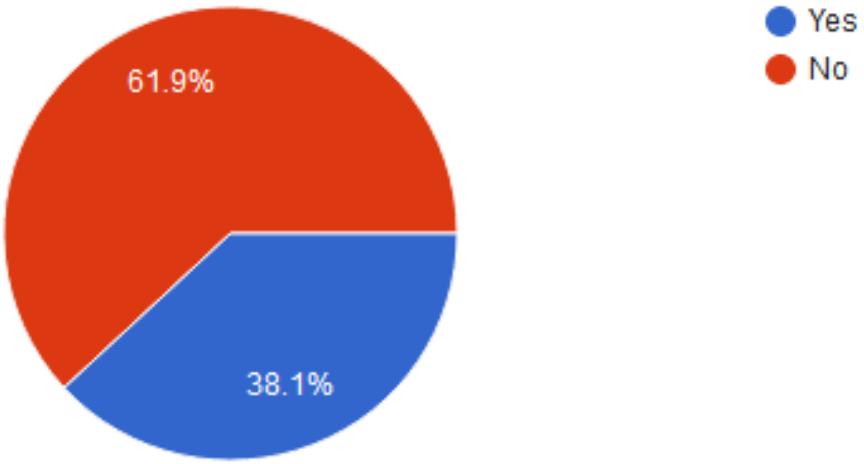

Figure 18: need of LCS for modelling and development

38.1 percent of the SMEs need help in modelling to develop a product or service that could require LSC so that they can be competitive while 61.9 percent do not need. The result of positive feedback is not so large, but there are still the potential customers for our LSC project.

Does your company need help in setting up LSC services or infrastructure?

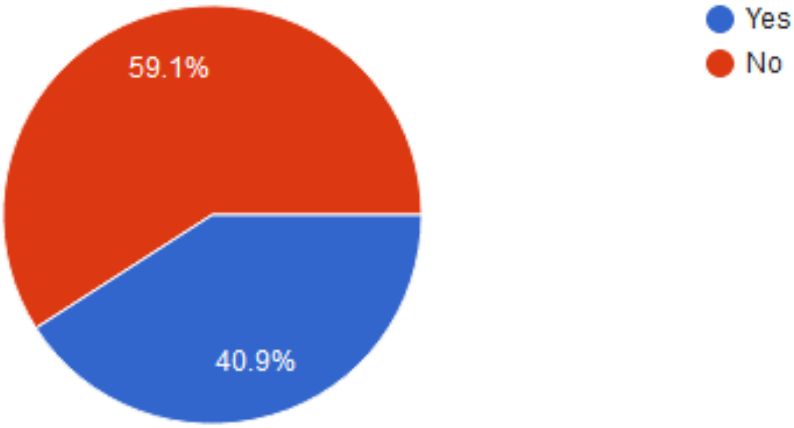

Figure 19: need of setting up LSC services or infrastructure

40.9 percent of the SMEs need help in setting up LSC services or infrastructure while 59.1 percent do not need. Once again, the positive responses are not too much, but if we have more discussions with these SMEs about LSC services, we still have a chance to gain many possible clients.

Section 2: Training

Estimate to what extent BalticLSC (developing own computation applications with easy to use LSC services) can help your business (1 to 6 is from "not much" to "very likely")

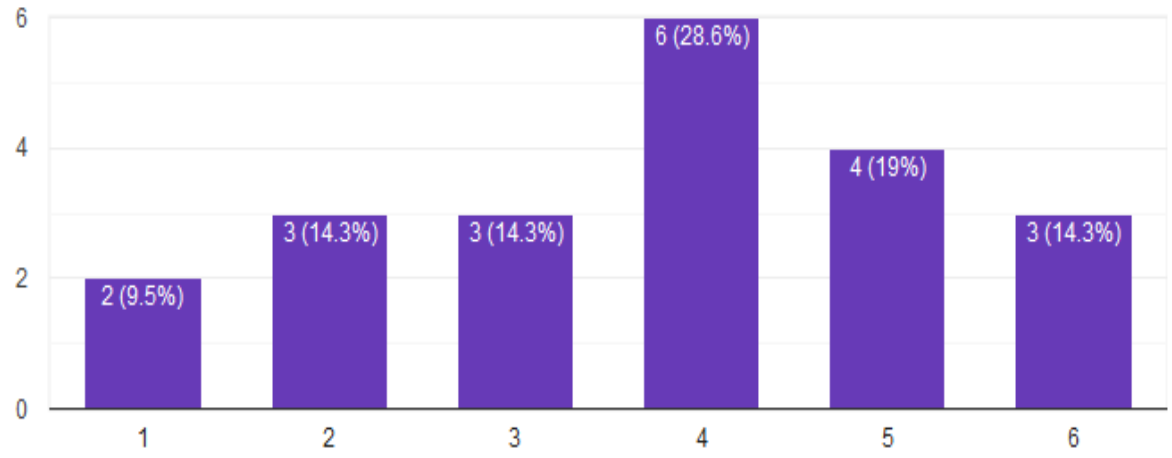

Figure 20: estimation of the help from BalticLSC

From the score of 1 to 6 as "not much" to "very likely", 28.6 percent responded with 4, 19 percent with 5, 14.3 percent for each level with the levels 2, 3 and 6 and only 9.5 percent with 1. The potentiality for developing LSC project is once again clear after this question.

Do you want to be a member of active community of LSC providers and users distributed trans-nationally?

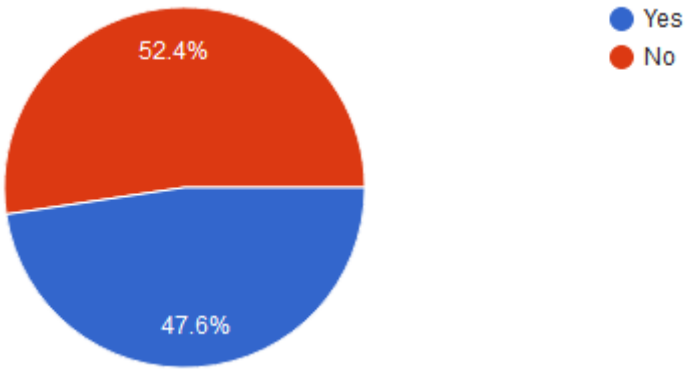

Figure 21: SMEs wanting to be a member of LSC community

47.6 percent of SMEs want to be a member of active community of LSC providers and users distributed trans-nationally. The rest does not want. From those SMEs which answered with "Yes", we can invite them to join the community and workshops in the near future and they are definitively our project's potential clients.

Would you consider setting up own LSC centre at your company with optimal hardware and easy-to-use software?

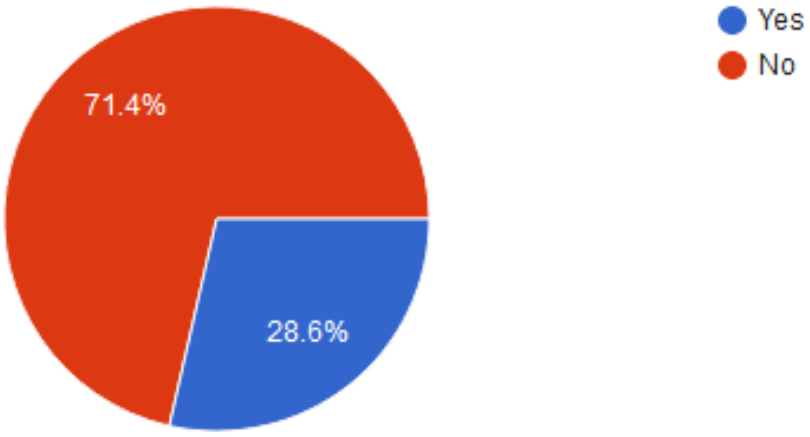

Figure 22: setting up own LSC centre at SMEs

Almost SMEs (71.4 percent) do not want to set up own LSC centre at their company while 28.6 percent would consider about it. The number 26.3 percent is not big. But explaining the potential to setting up own inexpensive LSC centre with easy to set-up infrastructure would be of interest.

Is your company interested in information or training about possible applications and potentials of LSC?

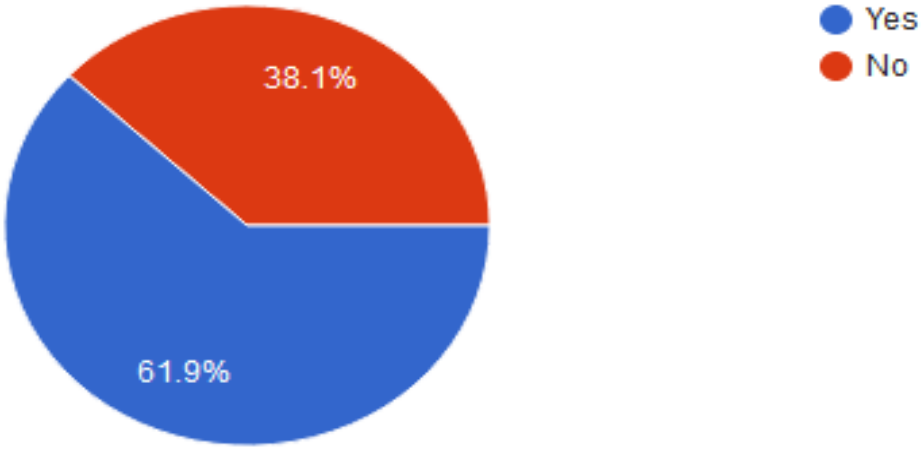

Figure 23: interest of SMEs in information or training

While there are 61.9 percent of the SMEs are interested in information or training about possible applications and potentials of LSC, the rest of 38.1 percent are not. From this question we can conduct further contact with the "positive" SMEs to invite them to our future events/workshops and even our LSC meetings/discussion.

Would your company be willing to take advantage of LSC training tailored to the business sector of activity you operate in?

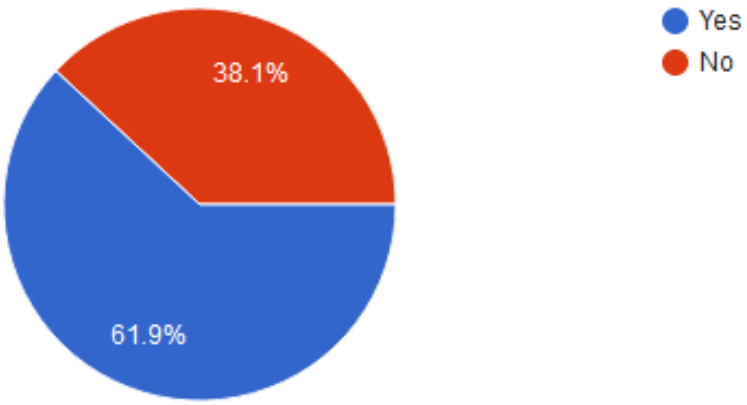

Figure 24: SMEs willing to take advantage of LSC training tailored to their operation

61.9 percent of the answers state that they are willing to take advantage of LSC training tailored to their business sector while 38.1 percent state negative responses. As we can see from this result, the potential customers are identified for later approach and discussions.

Are you aware of available supercomputing training courses/ services in your region/country?

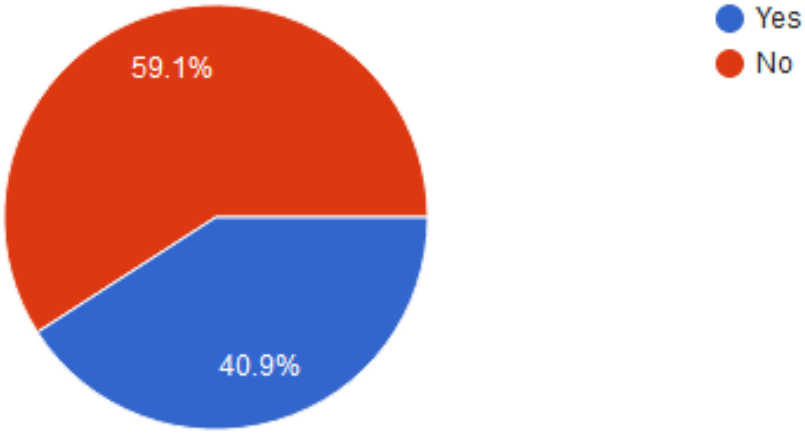

Figure 25: training courses/services in the region

Only 40.9 percent SMEs are aware of available supercomputing training courses/ services in their region/country.

Does your staff require training in the area of supercomputing (Big Data, Machine learning etc.)?

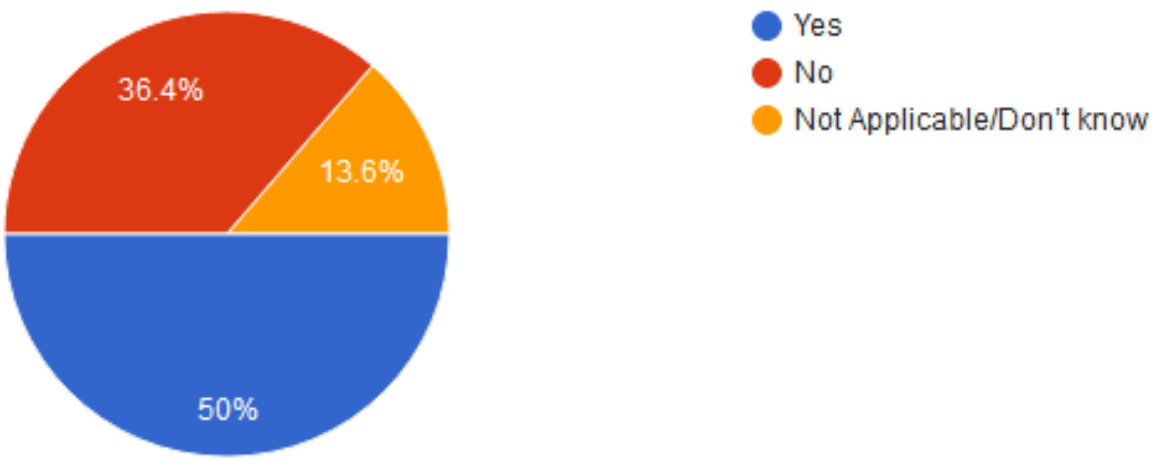

Figure 26: training for staffs at SMEs

50 percent think that their staffs need training in the area of supercomputing (Big Data, Machine learning etc.) while 36.4 percent do not think so. The rest claim of being not applicable/don't know. This is for us to consider about the part of our services: to provide training to SMEs.

What are the specific supercomputing areas in which your staff require training? Only answer this question if the following conditions are met: Answer was 'Yes' at question (Does your staff require training in the area of supercomputing?)

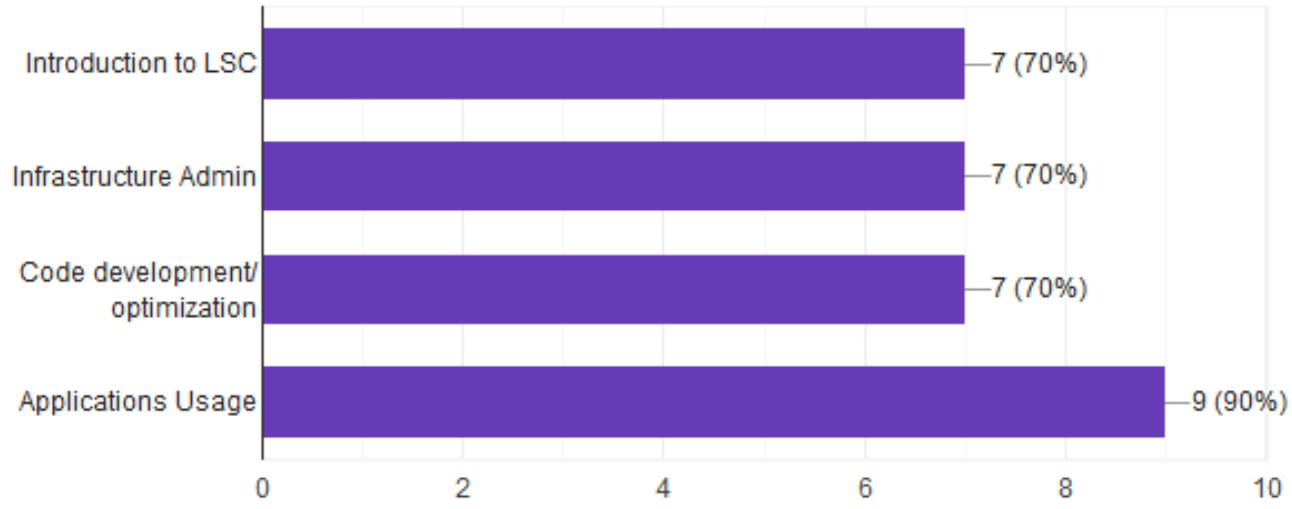

Figure 27: staff training area at SMEs

From only 10 responses for this question, 70 percent would like to have introduction to LSC training for their staffs, the same 70 percent need the training about Infrastructure Admin, also 70 percent need Code development/optimization training and significantly 90 percent need the applications usage training. Further details can be discussed in the meetings about the fields/programs/applications we need to train the staffs, etc. This enables us to design our training sections in the future.

Section 3: About the company

Initial expectations - Select what are your initial expectations from the BalticLSC.eu Network. Please try to select at most 5 of the options (the most important for you).

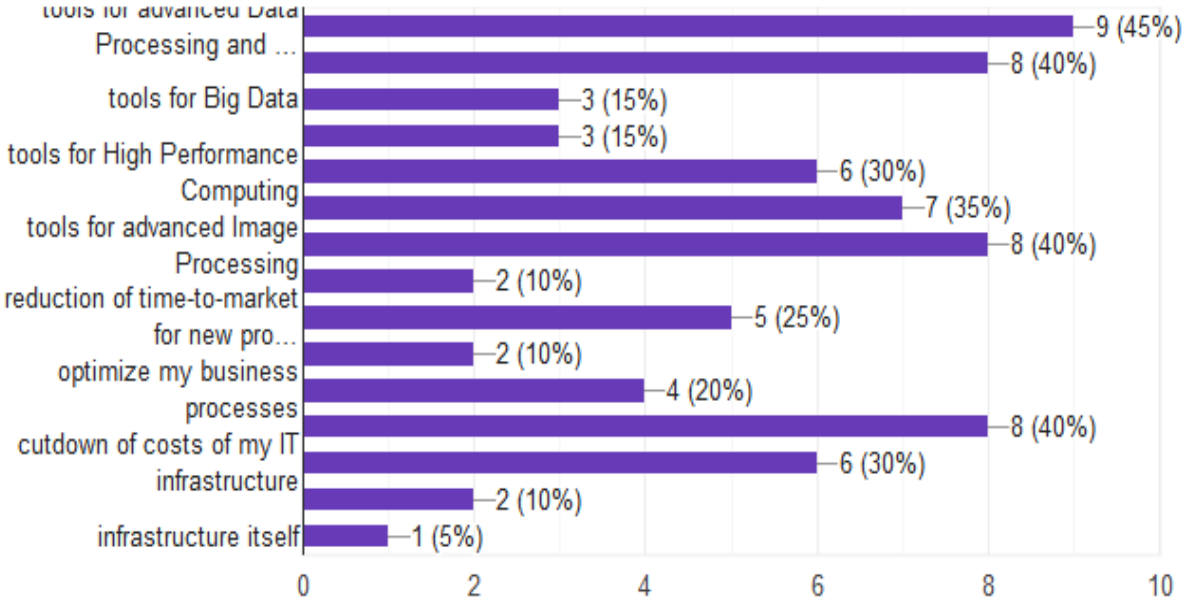

Figure 28: SME's initial expectations from the BalticLSC.eu Network

There is not so difference between the expectation for tools for advanced Data Processing and Data Mining, tools for Business Intelligence, tools for advanced Image Processing, storage for large amount of data with the percentage of vote from 40 percent to 45 percent. The second largest expectation fall under tools for High Performance Computing, tools for Mathematical Modelling and Calculations, cutdown of costs of my IT infrastructure with the percentage of vote from 30 percent to 35 percent. This is a good source for us to consider which application and programs we should provide to customers, which should be focused, which should be the key development of our project.

Do you have a R&D Department?

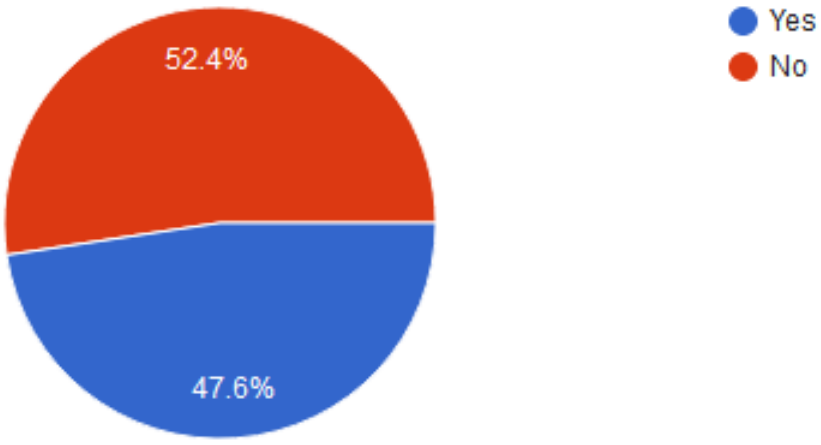

Figure 29: R&D at SMEs

The results for this question are 47.6 percent SMEs with R&D Department while 52.4 percent not.

Number of employees in your company

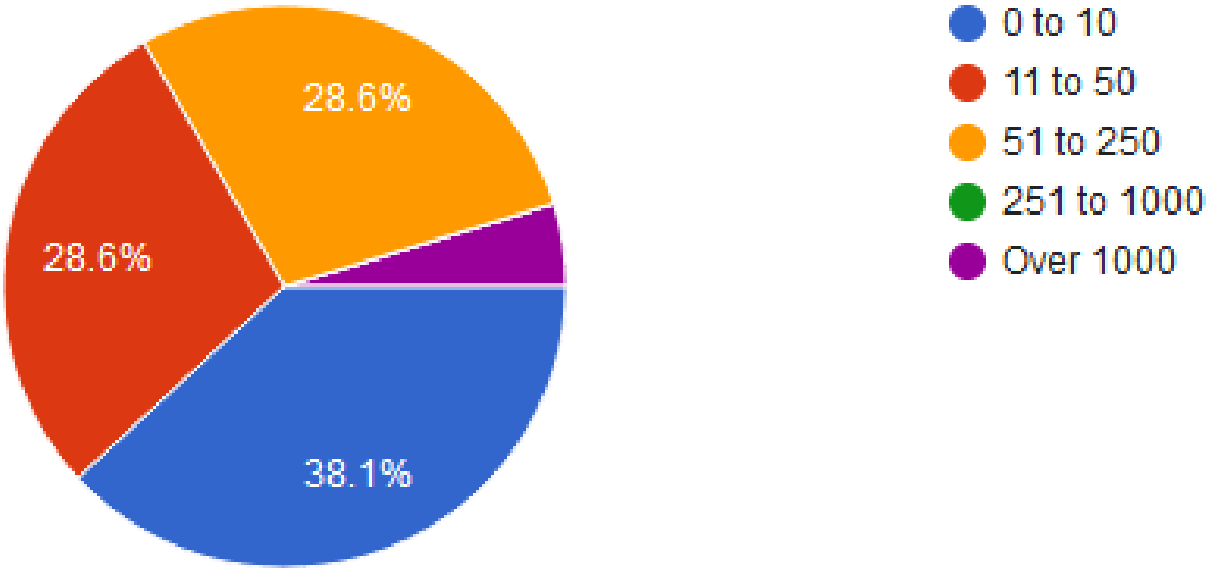

Figure 30: company size at SMEs

As the target customers are SME, it is reasonable to see that 38.1 percent of the companies has 0-10 employees which are mostly start-ups, 28.6 percent has 11-50 employees being small scale companies and 28.6 percent employs 51-250 staffs being medium scale companies.

What is the approximate turnover of your company?

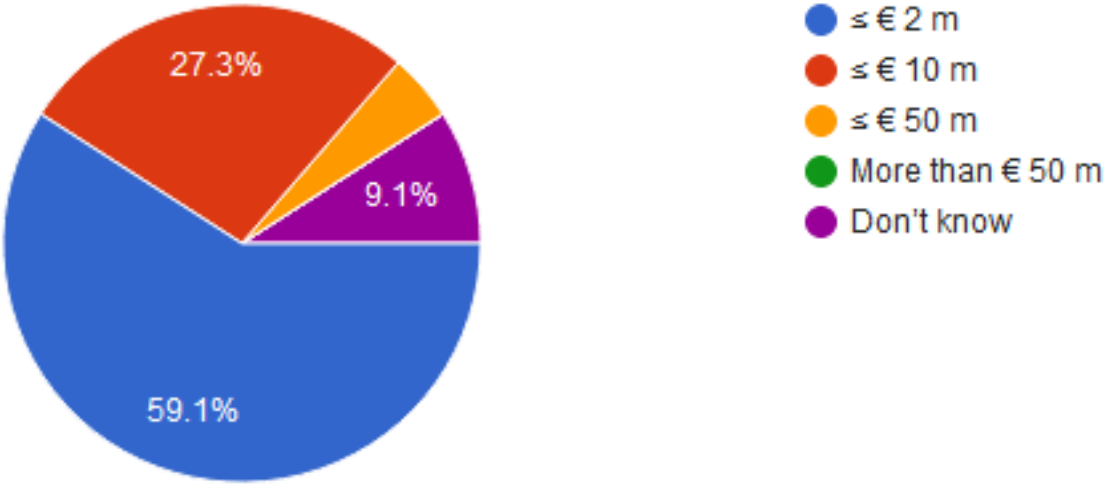

Figure 31: SMEs' turnover

59.1 percent of the SMEs has the turnover under EUR 2 million while 27.3 percent earns under EUR 10 million. The rest feedback with "don't know" or under EUR 50 million.

Your role in the organisation?

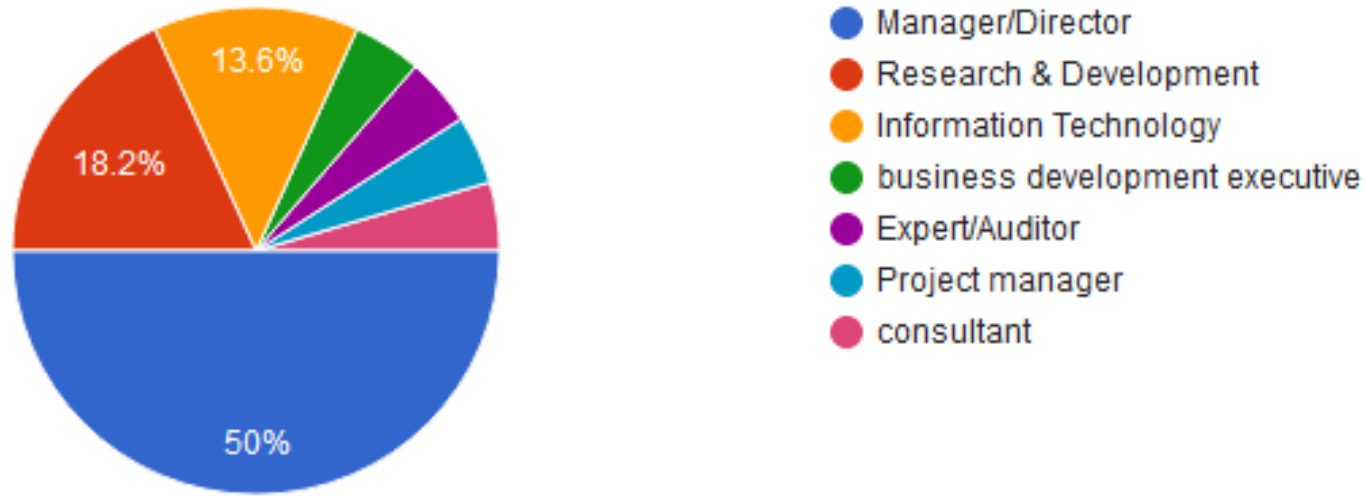

Figure 32: roll of the respondents at SMEs

The feedback of this survey is performed by 50 percent from manager/director of the SMEs, 18.2 percent from Research & Development department and 13.6 percent Information Technology department. Other respondents are business development executive, Expert/Auditor, project manager and consultant.

Section 4: BalticLSC project

Given that BalticLSC is a project aimed at helping SMEs use Large Scale Computing, would you be interested in finding more about what LSC can do for your company through: Please choose all that apply:

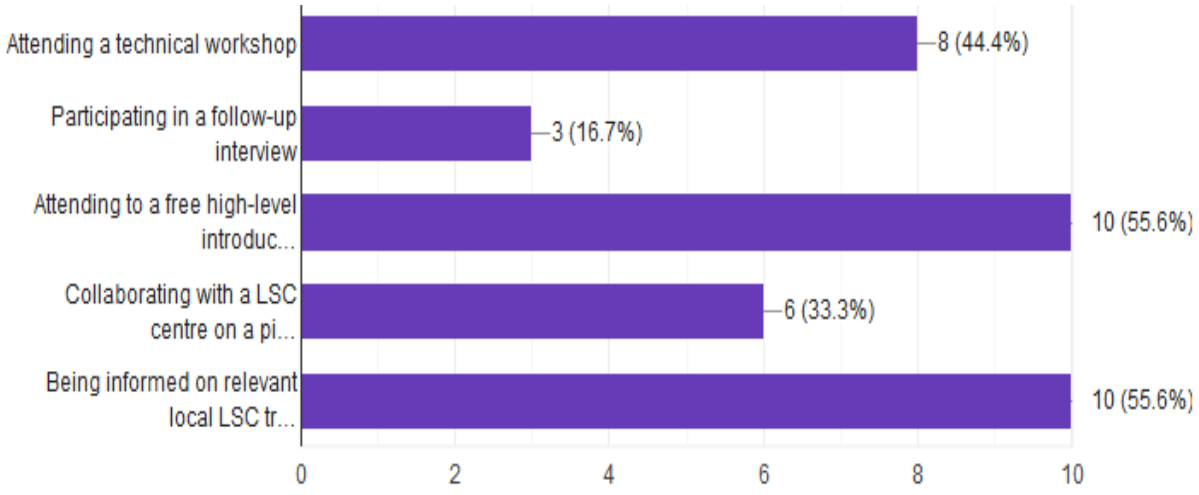

Figure 33: SMEs' activities for LSC knowledge

44.4 percent of SMEs would like to attend in a technical workshop, 55.6 percent would like to attend in a free high-level introductory event to LSC and be informed on relevant local LSC training courses. Also, a collaboration with LSC centre on a pilot R&D project and participation in a follow-up interview are expected by 33.3 percent and 16.7 percent, respectively. This is a useful source of information for us to design about action plans and sections in our workshops/events.

Workshop participation - Would you like to actively participate in our next local (in your country) workshop in 2019/2020?

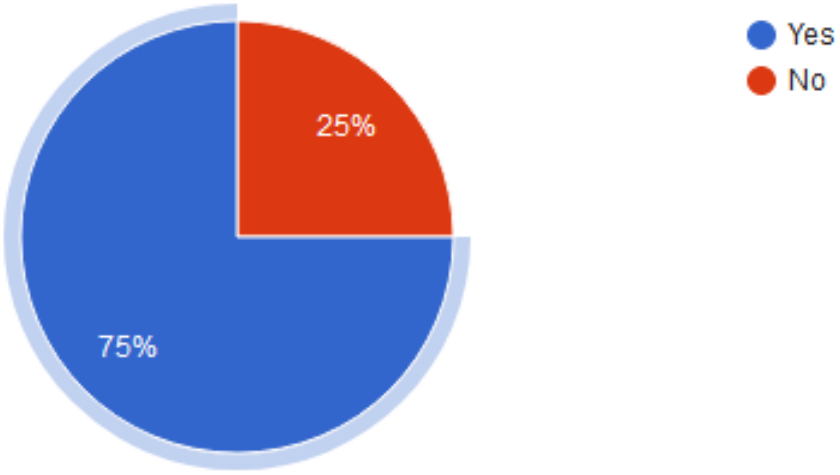

Figure 34: SMEs' workshop participation

75 percent of the respondents would like to attend the local workshop in 2019/2020. The rest 25 percent would not.

Would you like to receive the results of our survey?

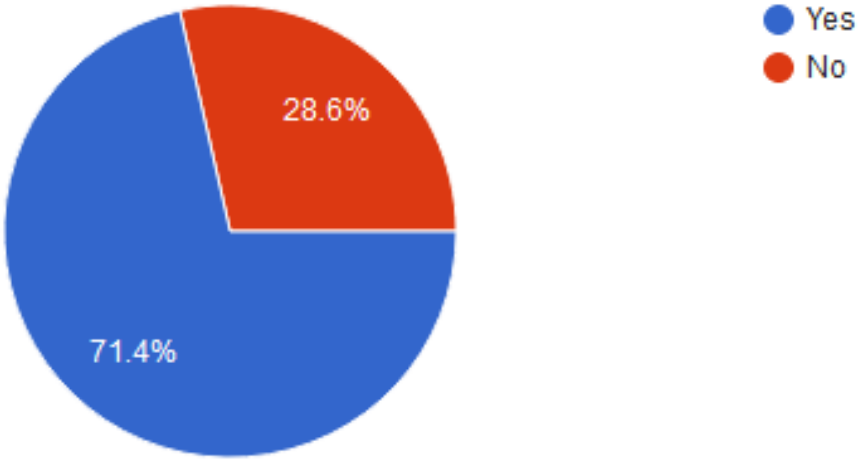

Figure 35: SMEs receiving the results of the survey

66.7 percent of SMEs would like to receive the result of this survey while 33.3 percent would not.

Potential case study - Do you have any specific topic, project or concept that you could share as a case study for the BalticLSC.eu Network?

no
No
Production of annual agriculture environmental stress layers for the Baltic Sea region (or EU, etc.), based on dense time series of Sentinel satellite data.
Video editing in cloud
The application Mindsum Lietuva which helps with sleeping and stress problems
probably yes
At this moment no.
none
Data processing with HPC-Infrastructure / mixed architecture systems.

Figure 36: Potential case studies proposed by SMEs

Some of the topics, project or concept were shared as a case study for the BalticLSC.eu Network include: production of annual agriculture environmental stress layers for the Baltic Sea region (or EU, etc.), based on dense time series of Sentinel satellite data (examples of above-mentioned LSC products are published by GEOMATRIX UAB on http://maps.landimage.info/mapstore), video editing in cloud and the application Mindsum Lietuva which helps with sleeping and stress problems, data processing with HPC-Infrastructure / mixed architecture systems.

3.3 Lessons learnt from the online survey

After some first experience and some feedbacks for the survey, we sum up with some changes for a better method:

Section 5: Contact details: in this section the respondent's name, email address and company name are required. This is for further contact with the SMEs for the projects and related activities such as funding offer, detailed clarification, training, etc. However, some SMEs may do not want to disclose contact information to avoid advertisement, chasing emails, etc. Therefore, we should provide clear explanation for the contact detail requirement.

Hard copy version of the survey should be introduced: for some SMEs, their need for LCS only rises after the meetings or workshop about LSC, so it is also convenient for them to fill out the survey right at the meetings or workshops. This is also a good way to capture more SMEs with LCS interest for further projects.

Repeat of the survey: as the needs of SMEs for LSC products and services change over time, the survey should be conducted from time to time during the lifetime of the project so that we can obtain the actual information about market need of SMEs.

4. Barriers identified

Below are the initial barriers which were identified during the survey so far:

- Lack of expertise about LSC
- The questionnaire is still so long which requires time of SMEs to complete.
- Feedbacks from the survey indicate that LSC services are very expensive, very complex and not user friendly
- Many SMEs do not feel the need of LSC services, or they are not aware of its possible advantages.

All these above-mentioned barriers will be discussed to find out a solution to minimize them.

5. Conclusions and further actions

SMEs in different sectors can also be benefited from LSC, from biotechnology, marine engineering, ship design to weather forecasting, spatial planning, and so on. However, there are many constrains which make SMEs more difficult in accessing LSC usage. Those barriers are already mentioned in the above sections of this report. The aim of this report is to make an analysis about the SMEs in the Baltic Sea Region with their needs and problems with LSC, to support for the purpose of connecting SMEs and LSC providers together.

After the analysis of the online survey, there are some further actions that are suggested for consideration:

- More contacts to SMEs in the Baltic Region so that there will be more potential SMEs for LSC project. One way to do this is research for more contact information of SMEs in online sources and send more invitation to the online survey/events of the LSC project.
- Try to use the contact network of LSC providers and research centres to reach more potential SMEs. This needs of course the approval of those LSC providers and research centres before any action is taken.
- Organize workshops/events for LCS providers and SMEs to meet, this may increase the LSC need of SMEs after having more information about LSC in the workshops/events.
- Create two levels of questionnaires. The first questionnaire is designed with general questions and contact information sections which helps to identify whether a SME has the interest in LSC. Then, if the SME shows its interest, we can invite them to the second questionnaire to get more details about LSC implementation.
- In general, contribute to increasing the knowledge about LSC and how it may be used in SMEs to increase growth by easing processes, shortening time to market, increasing innovation level etc. That is partners in the Baltic LSC project should focus some of their efforts to inform SMEs at conferences, exhibitions, workshops and all kind of events with access to SMEs of relevance. At the same time try to get information out in the press/media, social media etc.

ANNEX I: The SMEs Online Survey

BalticLSC.eu Network End-user Survey

LSC has the ability to handle large amounts of data and perform complex calculations. It is an essential tool for addressing various scientific, industrial and societal challenges. Innovative businesses (especially small companies and start-ups) such as ship design, marine engineering and biotechnology, require access to LSC to process large quantities of data.

The aim of the survey is to find out the current and future needs of companies and other institutions operating in different industries and research areas and in different Baltic Sea Region countries to perform complex computations. This includes the usage of technologies like artificial intelligence, numerical simulations, complex (big) data analytics, machine learning, optimization, image processing and many other.

There are 38 questions in this survey.

Section 1: Current Use

Do you want to significantly increase capacities to create new innovative data-intense and computation-intense products and services?
O Yes
O No

Does your enterprise make use of computer programs to predict, analyse, simulate, model and study the behaviour of your products and processes?
O Yes, internally
O Yes, outsourced
O No (Please specify the reason)
O Other:

How do you prefer to store the data related to your products and processes?
O Laptop, personal computers etc.
O Clustered storage/ central server
O Private cloud
O Public cloud
O Hybrid cloud
O Community cloud
O We do not use data

Do you want to use internet to store and move data securely, related to your products and services?
O Yes
O No
O Maybe, if security of data is protected

Does innovation of new products and services in your company often require solving large computation problems?
O Yes
O Yes, in the coming future
O No
O Other:

Have you considered speeding up time-to-market processes by using faster or more computing resources?

O Yes
O No
O Don't Know/Not applicable

Would you consider outsourcing data processing, data analysis and computation, computation prediction, etc., to a remote company or institution?

O Yes
O No
O Maybe, if it is faster, efficient, secure and inexpensive

Does your enterprise make use of LSC services?

O Yes
O No
O Don't Know

What is the reason of not using the LSC services?

O It is very expensive
O It is very complex and not user friendly
O We don't feel the need of it
O We are not aware of the possible advantages
O Other:

If you are using LSC services, who is the provider of LSC services?

O Global/Large company
O Research institution
O SME
O Other:

If you have opted LSC services, have you identified any barriers or scope of improvement in their usage?

O Yes
O No
O Other:

Have you had any experience working with external LSC service provider?

O Yes, satisfactory
O Yes, not satisfactory
O No (Please specify the reason)
O Other:

What kind of software applications do you use?

O Proprietary
O Open source
O In-house code
O Not applicable
O Other:

What is the hardware infrastructure you use?

O In-house
O In the cloud

O Via 3rd party
O Doesn't apply

Will you consider working with larger or more complex models/data if you had more external LSC infrastructure?

O Yes
O No
O Not applicable

Does your enterprise need help in modelling in order to develop a product or service that could require LSC, in order to be competitive?

O Yes
O No

Does your company need help in setting up LSC services or instrastructure?

O Yes
O No

Section 2: Training

Estimate to what extent BalticLSC (developing own computation applications with easy to use LSC services) can help your business.

	1	2	3	4	5	6	
Not much	O	O	O	O	O	O	Very likely

Do you want to be a member of active community of LSC providers and users distributed trans-nationally?

O Yes
O No

Would you consider setting up own LSC centre at your company with optimal hardware and easy-to-use software?

O Yes
O No

Is your company interested in information or training about possible applications and potentials of Large-Scale Computing?

O Yes
O No

Would your company be willing to take advantage of LSC training tailored to the business sector of activity you operate in?

O Yes
O No

Are you aware of available supercomputing training courses/ services in your region/country?

O Yes
O No

Does your staff require training in the area of supercomputing (Big Data, Machine learning etc.)?

O Yes
O No
O Not Applicable/Don't know

What are the specific supercomputing areas in which your staff require training? Only answer this question if the following conditions are met: Answer was 'Yes' at question (Does your staff require training in the area of supercomputing?)

O Introduction to LSC
O Infrastructure Admin
O Code development/optimization
O Applications Usage
O Other:

Section 3: About your company

* Required

In which country is your company based? *

……

What sector does your company operate in?

O Agriculture, forestry and fishing
O Mining and quarrying
O Manufacturing
O Electricity, gas, steam and air conditioning supply
O Water supply; sewerage, waste management and remediation activities
O Construction
O Wholesale and retail trade; repair of motor vehicles and motorcycles
O Transportation and storage
O Accommodation and food service activities
O Information and communication
O Financial and insurance activities
O Real estate activities
O Professional, scientific and technical activities
O Administrative and support service activities
O Public administration and defence; compulsory social security
O Education
O Human health and social work activities
O Arts, entertainment and recreation
O Other service activities
O Undifferentiated goods- and services-producing activities of households for own use
O Activities of extraterritorial organisations and bodies
O Other:

Core business - In up to three sentences please specify what kind of services or products your company is offering. Please concentrate on these areas that are (or you think can be) supported by advanced computing.

……

Initial expectations - Select what are your initial expectations from the BalticLSC.eu Network. Please try to select at most 5 of the options (the most important for you).

O Tools for advanced Data Processing and Data Mining
O Tools for Business Intelligence
O Tools for Big Data
O Tools for Customer Relationship Management
O Tools for High Performance Computing
O Tools for Mathematical Modelling and Calculations
O Tools for advanced Image Processing
O Tools for Product Design and Optimisation
O Reduction of time-to-market for new products
O Forecasting of the market needs
O Optimize my business processes
O Storage for large amount of data
O Cutdown of costs of my IT infrastructure
O Cutdown of costs of my IT staff
O Other:

Do you have a R&D Department?

O Yes
O No

Number of employees in your company

O 0 to 10
O 11 to 50
O 51 to 250
O 251 to 1000
O Over 1000

What is the approximate turnover of your company?

O ≤ € 2 m
O ≤ € 10 m
O ≤ € 50 m
O More than € 50 m
O Don't know

Your role in the organisation?

O Manager/Director
O Research & Development
O Information Technology
O Other:

Section 4: BalticLSC project

Given that BalticLSC is a project aimed at helping SMEs use Large Scale Computing, would you be interested in finding more about what LSC can do for your company through: Please choose all that apply:

O Attending a technical workshop
O Participating in a follow-up interview
O Attending to a free high-level introductory event to LSC
O Collaborating with a LSC centre on a pilot R&D project
O Being informed on relevant local LSC training courses

Workshop participation - Would you like to actively participate in our next local (in your country) workshop in 2019/2010?

O Yes
O No

Would you like to receive the results of our survey?

O Yes
O No

Potential case study - Do you have any specific topic, project or concept that you could share as a case study for the BalticLSC.eu Network?

……

Any other comments - Here you can write any other comments, remarks, thoughts regarding the BalticLSC.eu Network.

……

Section 5: Contact Details

* Required

Data about yourself and your company

Your name: *

……

Your email address: *

……

Your phone number:

……

Your company name: *

……

Webpage address:

……

ANNEX II. List of business sectors contacted

Construction
Wholesale and retail trade; repair of motor vehicles and motorcycles
Information and communication
Financial and insurance activities
Professional, scientific and technical activities
Administrative and support service activities
Education
Human health and social work activities
Business development support
Space