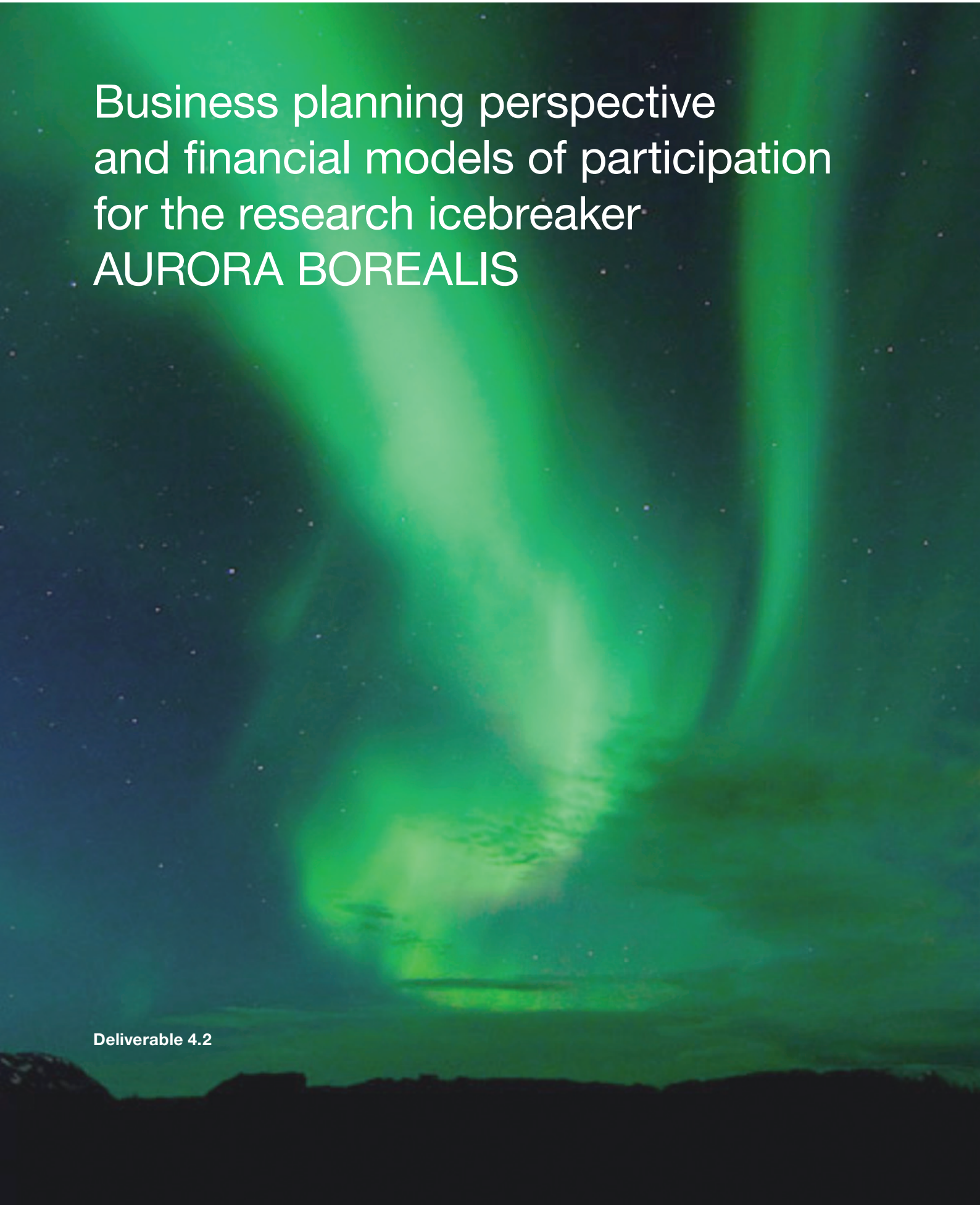

Business planning perspective and financial models of participation for the research icebreaker AURORA BOREALIS

Deliverable 4.2

Deliverable 4.2
Verified estimates on future running cost escalation, crewing and support of the vessel

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Acknowledgement:

The ERICON Management Team expresses its gratitude to all the members of the Financial Advisory Panel for their contribution to the document and their continuous support to the work of the work package 4 on financial models. Their interest in the project, open mind and availability allowed the publication of this document and the creation of innovative models for the construction and operation of the AURORA BOREALIS.
Their contribution has been greatly appreciated.

Foreword

This publication is the fruit of the work of the Financial Advisory Panel on recommendations on how the construction and operation costs of the pan-European vessel AURORA BOREALIS (AB) can be shared and the participation models could be shaped based on the concept of *juste retour*. In this document the focus lies on the financial approach on how to conceive participation models for a floating research facilities with no forerunner concept.

To modulate all necessary components it was necessary to interlink the discussions of Financial Advisory Panel, with those of Legal Advisory Panel as well as with the governance and proposal handling working groups and to coordinate the communication channels between those different expert groups and to transfer knowledge and best practices examples from one to the other.

It is important to note that other, non-financial criteria and *juste retour* modalities (such as voting and decision rights, flag and staff issues, supply and homeport, technology transfer, etc.) together with the legal structure of the research facility would have to be integrated into a master plan finalised according to the results of the negotiations and the composition of the future ERICON AB consortium.

The presented economical concepts must be intelligent and flexible enough to cope with any type of changes regarding the construction and operation of the vessel. The presented figures here in this document are based on the current estimated construction and operation costs (2010) and strongly related to the AURORA BOREALIS ship design developed based on the 2006 Recommendations of the German Council of Science and Humanities (Wissenschaftsrat), and with the very special requirement of the combination of a drilling and a non-drilling (oceanographic) operation modus. Any changes in the ship design or mission profile of the vessel e.g. down-scoping of the ship design or profile of this unique research vessel, would reduce the costs and the share number presented here, but not change the underlying concepts of how to share the construction and operation costs.

To adapt to changing economical environments, three different cost sharing models have been developed as a function of the level of financial weight carried by the Owners, the Users (Partners), and the end users (scientists): a 100 percent scientific-driven, a business and a mixed model.

As I wrote at the very beginning of my foreword, this document is a joint effort between the dedicated experts and collaborators and ERICON Management team and I would like express my gratitude to all of them. My special thanks go also to Julien Weber ERICON AB Financial Manager for his dedication and coordination efforts.

Dr. Bonnie Wolff-Boenisch
ERICON Coordinator

A view from Research Vessel Nathaniel B. Palmer

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View of the German research icebreaker Polarstern whilst traversing ice

1. Introduction

1.1 Background

The ERICON AURORA BOREALIS (AB) project was one of the 35 projects identified in the 2006 roadmap of the European Strategy Forum on Research Infrastructures (ESFRI) as a new Research Infrastructure of pan-European interest. It is currently the largest project in the Environmental Sciences. Funded by the European Commission for a duration of four years, the project generates the scientific, strategic, legal, financial and organisational frameworks required for advancing the decision-making process of national governments to commit financial resources for the construction and running of the European Polar Research Icebreaker AURORA BOREALIS.

The European Polar Board started the AURORA BOREALIS Project initiative early 2002. Ideas for a new type of research icebreaker were intended to provide the international polar research community with a new range of operational and technical capabilities, including scientific drilling within pack ice. These discussions were materialised in 2004 with a technical feasibility study performed by the University of applied Sciences Bremen and Hamburg Ship Model basin (HSVA) which was later presented to the German Council of Science and Humanities (Wissenschaftsrat). The Wissenschaftsrat is the highest German scientific advisory body to the Federal Government and the State (Länder) Governments; its function is to issue recommendations on the development of science and the university sector as well as to contribute to the safeguarding of the international competitiveness of German Science in the national and European system.

Following the Wissenschaftsrat's positive evaluation and recommendation to realise the AURORA BOREALIS in close collaboration with other European Countries, pending the solution of remaining open technical questions, the Federal Ministry for Education and Research (BMBF) granted funds to the Alfred Wegener Institute for Marine and Polar Research (AWI) to demonstrate the feasibility of the suggested technical features, the novel solutions required for the Polar Regions and to set up a European consortium of interested partner countries.

The AWI tasked Wartsila Ship Design Germany (WSDG) to work on the conceptual design of the ship and develop the current scientific and technical layout of the research vessel. The design variant is based on the recommendations of the Wissenschaftsrat and reflects the experiences of the current POLARSTERN research icebreaker together with the future logistical and technical demands of international polar scientists. The new and unique design of the AURORA BOREALIS integrates the concept of three different vessels: a research vessel, a drilling vessel and an ice breaker into one vessel, making her a new state-of-the-art polar research drilling vessel capable of operating year-round in all Polar Regions.

The ERICON project was launched in parallel with these technical developments in March 2008; funded by the European Commission at the level of 4,5 M€, the project ERICON is running for a duration of four years.

1.2 Context of the document

Following the outcome of the work on the estimates of the future construction and running costs of the vessel (see the report on **"Estimated building costs: general planning"** of 27th April 2009 for construction cost and deliverable 4.1 on ***"Verified estimates on future running cost escalation, crewing and support of the vessel"*** of August 2010 for the running costs), the work package 4 on "*Financial Frameworks, Resource Engineering and Cost Forecasting for Multi-Country Commitments to Construction and Operation"* sets out the possible cost-sharing model and model of participation for the construction and operations of the vessel.

The outcome of this task is the deliverable 4.2 on *"Initial business planning perspective document of construction costs shares and initial proposed models of participation."* The deliverable presents the first elements of a cost-sharing model and model of participation for both the construction and the operations of the vessel, emphasising the correlation between the financial contribution of the partners and their access rights to the vessel.

These elements will at a later stage be further developed and incorporated together with the outcome of the work on the governance, proposal handling and legal framework, in the business plan of the AURORA BOREALIS. The interrelation between the various components mentioned above is therefore not discussed in deliverable 4.2 but the key issues of the business plan are addressed.

1.3 Methodology

The preparation of this report followed a two-step approach. The first consisted of discussions and feedback on experience with representatives from the ERICON stakeholders and other research infrastructures to get a good understanding of the issues surrounding the cost-sharing model and model of participation. This involved for instance meeting with representatives from European XFEL and the Trieste synchrotron whose guidance and advice have been very useful to set up the general framework in which we developed the current cost-sharing model.

The second step involved discussions with the members of the Financial Advisory Panel based on the general guidelines defined in the first step to test the feasibility of the models identified.

The first step required the creation of a framework in which the cost-sharing model could be developed. To do so a close collaboration between the people involved in the work on the governance, proposal handling, legal structure and cost-sharing model was very important. Common workshops were organised to ensure a harmonised approach to these issues.

Once the framework was established, the members of the Financial Advisory Panel tested the robustness of the early concepts developed, creating the link with the operational aspects of the project.

The quality of the overall methodology has been validated by the close collaboration with TERRAMAR, a Norwegian consulting company working with the Norwegian Ministry of Finance, which guaranteed the overall quality of the process

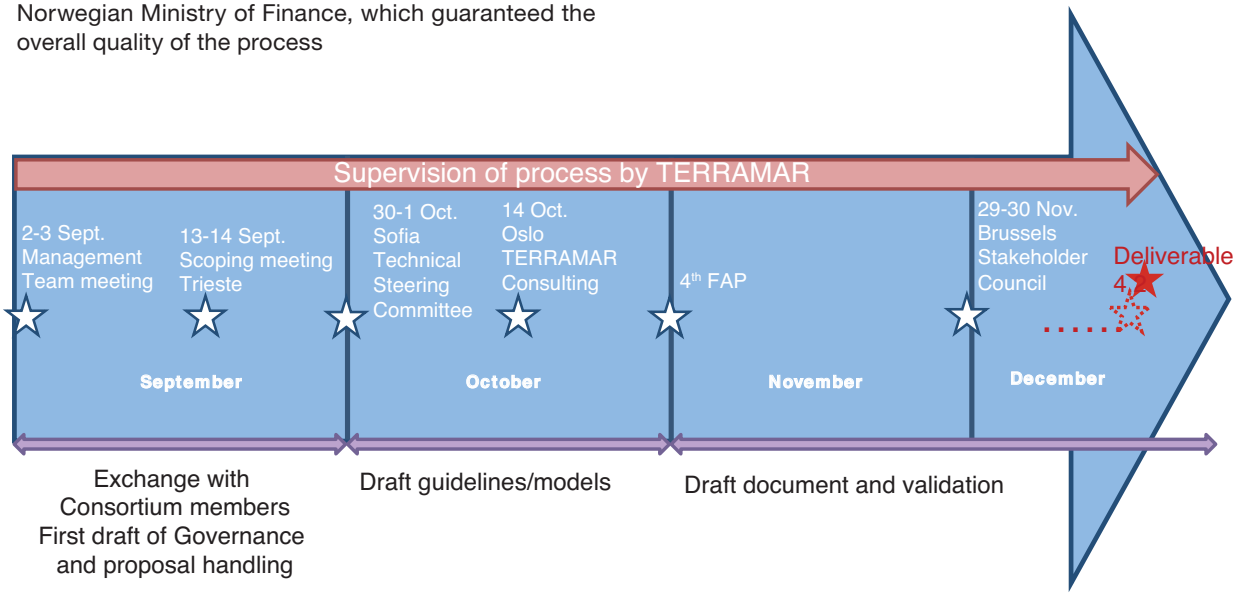

Figure 1. Overall timeline for the document

2. Background information

When establishing the cost-sharing model an important aspect is how the partners will assess its success. Partners will be looking at the benefits they receive in return for their financial contribution to the project to determine if there is a "*juste retour*" on their investment.

2.1 *Juste retour*

The interest of potential users of the AURORA BOREALIS in funding the vessel lies in their willingness to support scientists and advance research by enabling the collection of new, sound and reliable data. In return for their investment the partners expect to receive a fair benefit from the usage of the vessel.

In this context partners will assess the access they have to the vessel in comparison with the financial contribution they made to the construction and/or operation of the vessel. *"Juste retour"* is achieved when access to the facility is proportionate to the financial commitment.

The selection of the criteria applied to assess the use of the AURORA BOREALIS by a partner is sensitive. One could argue that access to the data (sediments, cores, water samples) collected by AURORA BOREALIS would be sufficient as this is the primary source of information and the basis of the work of the scientists. However this would mean that the data collected via the AURORA BOREALIS would be shared among partners thus reducing the incentive for investing more than the bare minimum in the vessel.

Another possible criterion could be the number of publications a scientist or a group of scientists publishes following their participation in an expedition. However this is biased given that two scientists who spend the same amount of time on the vessel may not publish the same number of articles.

A third alternative would be to assess the access the scientists representing a partner have to the vessel by measuring the time they spend on board.

The members of the financial advisory panel supported this suggestion and suggested that the number of days spent on board by the scientists representing a partner be used as the criterion for assessing "*juste retour"*.

The members of the panel also recommended using the number of scientific berths allocated to the scientists rather than the number of 'scientific days'. This is more specific as AURORA BOREALIS is offering 320 scientific days per year giving a total 19 200 scientific berths. Indeed 60 scientists on average can be on board at the same time.

To be fair and considered as *juste retour* by the partners, the number of scientific berths allocated to the partner country's scientists should be proportionate to their level of contribution.

2.2 Relationship between governance and proposal handling

"*Juste retour*" is not solely achieved through the cost-sharing model, but is influenced by several other elements that also impact on the perception the future funders have of their return on investment.

As already expressed the interrelation between the cost-sharing model, the proposal handling process and governance is here crucial as each is a control lever allowing adjustments between financial commitments, access to the facility and voting rights. The aim is to harmonise these three components to match the expectation of the partners for a *"juste retour"*.

The cost-sharing model and model of participation have been built in consideration of the governance of the project (both in the construction and operation phase) as well as the proposal handling system foreseen for the selection of scientific proposals.

This document should therefore not be analysed on its own but considered in the light of the governance, proposal handling system and legal structure considered for the vessel.

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3. Cost-sharing

In the course of this work, a clear differentiation has been made between cost-sharing and model of participation and the following definition should apply:

Cost-sharing:
"Multi-party arrangement under which the costs of the project are shared between the various categories of parties identified."

The deliverable 4.2 is presenting two different cost-sharing model, one for the operation and one for the construction of the vessel.

Model of participation:
"Determination of the level of contribution of each member from the same category."

Based on these definitions, the cost-sharing model determines the spread of the different costs components between the various categories of funders, whereas the model of participation sets the actual level of contribution foreseen for each of the members of a same category.

3.1 Running costs

Taking into consideration the differentiation presented above, the cost-sharing model for the running costs can be defined as the model(s) presenting the possible ways of spreading the main cost components of the running costs among the different categories of funders and users identified.

The model of participation on the other hand suggests the actual level of contribution expected from each member of the various categories.

It is therefore important to first identify the different categories of funders contributing to the running costs and secondly the main components of the running costs.

3.1.1 Category of funders

The categories of funders involved in the construction and operation of the vessel have been identified in the course of the work on governance, and a first definition has been proposed. These definitions are drafts and are likely to be refined based on the outcome of work on the legal structure of the project.

Owners:
States or other entities having the exclusive right to use, possess and dispose of the vessel in accordance with the terms of the AURORA BOREALIS International Agreement and other agreements entered into with a flag state. The owners are expected to contribute financially to both the construction and the operation of the vessel. Contribution to the running costs is expected to be pluri-annual.

Users:
States or other private or public entities having the right to use the vessel in accordance with the terms of the Vessel Sharing Agreement and other agreements. *Users* only contribute to the operation of the vessel.

Long Term Users:
Users engaged in a long term agreement (pluri-annual).

Short Term Users:
Users engaged in a short term agreement.

Partners:
The Owners and the Long Term Users

Scientists:
The *Scientists* are the scientific users of the vessel, regardless of whether they are from a Partner or not, or if their funds for ship time originate from funding agencies or institutions for granted and funded scientific programmes.

3.1.2 Categories of costs

The categories of costs comprising the running costs of the vessel, as well as their estimated values, have been identified in Deliverable 4.1 by the Financial Advisory Panel (FAP) and are as follows:

- The annual fixed costs (approx. 17 million €) comprise all cost items needed to keep the vessel permanently operational. The fixed costs includes: crew, maintenance, insurance, classification, management, administrative overheads, storage, etc.

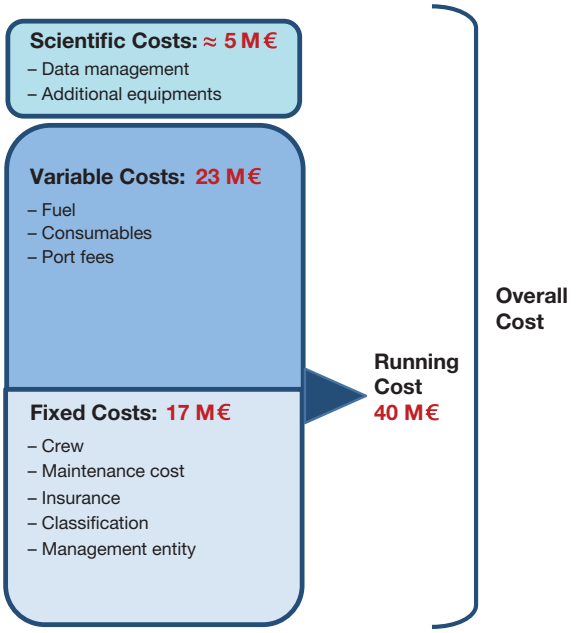


Figure 2. AB running cost: Overall Cost

- The annual variable costs (approx. 23 million €) comprise all cost items which are generated from the use of the vessel and which vary from one year to another: fuel, consumables, port fees, transportation of equipment, etc.
- In addition to the running costs, annual scientific costs of approx 5 million € have been identified and arise from the management of scientific data and additional scientific equipment handled by the scientists.

The combination of the running costs and the scientific costs is the **Overall Cost**.

3.1.3 Main cost sharing models

Three basic cost-sharing models have been identified at an earlier stage to represent the main concepts that could be drive the cost-sharing model for the operation of the AURORA BOREALIS.

These models differ from one another by the level of financial weight carried by the Owners and Users (Partners), and the end users (Scientists) (See **Figure 3**).

3.1.3.1 Main characteristics

The models represent different philosophies and can be outlined as:

- Model 1, Scientific Model: The scientists are free from the main financial constraints since funds are centralised to promote innovative and novel research. The running costs are fully funded from a mid- or long-term perspective by the Partners, the scientific costs by the Scientists.
- Model 2, Mixed Model: Trying to maintain a balance between a scientific and a purely economical model. The operations are partly funded from a mid- or long-term perspective, where the fixed operating costs are covered by the Partners, and the variable operating costs by the Scientists.
- Model 3, Economical Model; A model based on a pure economical approach whereby each end user pays for its actual use of the vessel. The operations are not funded from a mid- or long-term perspective, and the overall costs as well as the science costs are covered by the Scientists on a "pay as you go" basis.

3.1.3.2 Analysis

The three models have been analysed in the light of a set of criteria developed to measure the pertinence of the cost-sharing models presented. These criteria reflect the general aims of a cost-sharing model which is different from the notion of "*juste retour*".

- **Cost efficient management of AB operations**
  Does the cost-sharing model make the best use of the different sources of funding identified? Is the financial weight well balanced between the different parties identified, and in line with their funding capabilities?

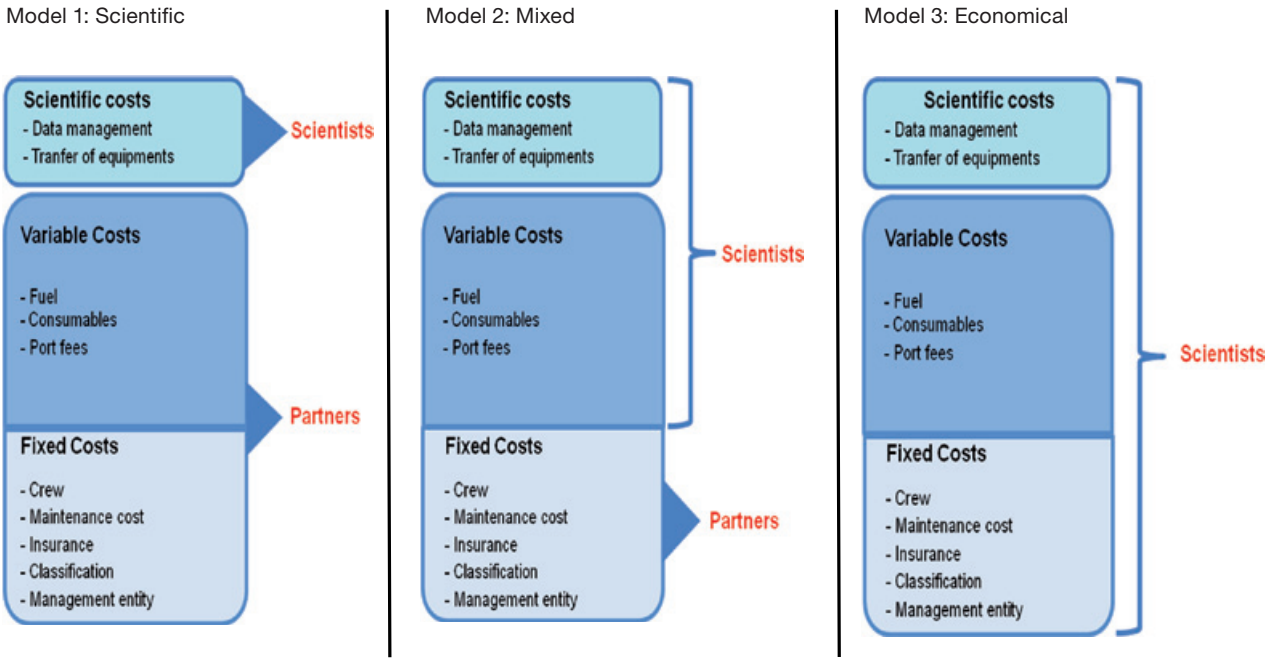


Figure 3. Cost sharing models, running cost

3. Cost-sharing

- **Cost efficient from the point of view of scientific demand**
  Does the cost-sharing model support an efficient use of the vessel (maximisation of usage)? Does it facilitate the partition of ship time between the different categories of scientists (field of expertise and nationality) in an optimal manner? Does the model encourage "smart" use of the vessel by the Scientists?
- **Predictable economic framework for operations in a mid- to long-term perspective**
  Does the cost-sharing model allow mid- and/or long-term perspectives regarding the financing of the operation of the vessel? Is the plural-annual funding of operations secured? Is there a risk of financial shortage? Are adjustments possible over the identified financial period (financial cycle)?
- **Simple, understandable and easy to implement**
  The cost-sharing model should be as simple as possible; clear and easy to understand for every party involved. The sources of funding, distribution of costs between the Partners and the Scientists, and related guidelines should be easy to define.
- **Financial risk management**
  The cost-sharing model should not only allow for adjustments, but should also put the financial risk on those who are best suited to handle it. The financial risk should be therefore be carried by those with the highest budget flexibility and financial strength.

Table 1 presents an analysis of three cost sharing models in the light of the criteria introduced above.

3.1.3.3 Outcome and recommendations

The members of the FAP recommend using Model 1 as the main cost-sharing model for the running costs. The experts argue that the use of this model is the only one securing the necessary level and predictability of funding to cover the total running costs for the entire period of operation, thus limiting the risk of funding shortage. In addition this enables the vessel operator organisation to make long-term plans for the maintenance and upgrades of the vessel through its expected lifetime.

Partners have better financial stability than the Scientists and can enter in to pluri-annual commitments. If the financial weight had to be carried by the Scientists, the entire operation of the vessel could easily be endangered by a single decision at the national or institutional level.

The issue of funding shortages has been identified as the primary financial risk to be encountered for the operation of the vessel and should be absolutely prevented.

This however does not mean that the other models should not be used at all during the lifetime of the project, but should be used as alternatives to complement the main cost-sharing model and used under specific circumstances only.

3.1.4 AURORA BOREALIS cost-sharing scheme

Taking in to consideration the recommendations of the FAP on the use of Model 1 as the main cost-sharing scheme for the operations of the vessel, the following guidelines have been developed. These guidelines integrate the basic concepts governing the AURORA BOREALIS cost sharing scheme and would have to be further developed before entering an implementation phase.

3.1.4.1 Main model

The specifications of the main cost-sharing model for the running costs of the AURORA BOREALIS have been developed taking into consideration that the level of financial participation of the partners should be reflected and proportionate to their access to the vessel.

Duration of operation

- The AURORA BOREALIS is operated for a minimum of 250 days and a maximum of 320 days per year.
- Funding for the minimum of 250 days of operation per year will be secured by the partners using Model 1.
- The partners will cover for the full fixed costs of the vessel and a pro-rata of the variable costs.
- The pro-rata of the variable costs is equivalent to the expected variable costs for 250 days of operation.

Additional operation time

- Partners willing to extend their use of the vessel beyond 250 days can do so by contributing additionally to the variable costs.
- The executive director supported by the ship operator will be in charge of the maximisation of the use of the vessel.

Fixed and variable costs

- The partners are covering the running costs of the vessel for a full year of operation, funding the entire fixed period and a percentage of the variable costs.
- In the pre-agreement phase, the amount of fixed and variable costs will be based on an updated version of deliverable 4.1 on the running costs of the vessel.
- The estimated value of fixed and variable costs serving as basis for the determination of the level of contribution needed for an entire funding cycle will be established and maintained by the logistics department of the AURORA BOREALIS legal entity.

Funding cycle

- Partners commit to contribute to the operation of the vessel for the duration of a *funding cycle*.

Table 1. Assessment of cost sharing models (+ positive / – negative aspects)

	Model 1 – Scientific	Model 2 – Mixed	Model 3 – Economic
1 Cost efficient operations	+ The Scientists only carry a light financial weight	+ The cost is spread over the two categories, Partners and Scientists	+ The Partners do not carry any financial weight
	– Only one category carries most of the cost – All the financial weight is carried by the Partners	– The main financial weight is carried by the Scientists	– Only one category carries the entire cost – The Scientists do not carry the entire cost
2 Cost efficient science	+ Secured long-term commitments, allowing flexibility to enable maximum scientific use of the vessel	+ Funding of fixed costs is secured over a long term + Importance of variable cost, encouraging smart use of the vessel by the Scientists	+ The scientific community is guaranteed to pay only for what they use + Favours collaboration between Scientists
	– Risk of funding less important investments and/or services – Less incentive for scientists to keep the variable costs as low as possible	– "Fuel demanding" projects are harder to finance	– Risk of facing financial shortages and be unable to "fill the gaps" in the annual cruise programme – Difficult to finance complex/ ambitious expeditions
3 Predictable framework	+ The long-term commitments of funds eases the long-term planning of vessel maintenance and upgrades + The risk of financial shortage to cover the running costs is more likely to occur	+ Long term financial perspective secured for the maintenance and upgrades of the vessel	
	– Flexibility in the short term can be difficult to achieve	– Sustainability of operations is not guaranteed – Flexibility in the short term can be difficult to achieve	– Total lack of mid- and long-term (+ 2 years) perspective – Risk of shortage in funding – Unplanned financial expenses will be impossible to handle
4 Simple	+ Model is simple and straight forward + Easy to implement once agreement of partners is secured	+ The crucial part of the costs is covered through a simple model	
		– The financing of variable costs can be complex – Model combining the issues of models 1 & 3	– Difficult to implement due to the number of scientists involved (and sources of funding)
5 Risk management	+ The risk is best carried by the Partners since Partners appear to be the strongest party financially	+ The funding of the vessel is secured by the strongest financial party	
		– The most unpredictable part of the cost is covered by the less financially robust party	– The scientific community is not in a position to carry the risk for cost overruns

- The duration of funding cycle is five years.
- Partners will commit to pay every year for the operation of the vessel for the duration of a funding cycle.
- The commitment will be formalised by the signature of a legal document. The exact nature of the legal document still has to be determined.
- The actual payment of the contribution will be made six months ahead of the operational year considered.

Adjustments

- Adjustments during a funding cycle are only aimed at making sure that the contributions of the Partners match their actual use and future needs of the facility.
- Partners willing to modify (reduce) their level of access rights to the vessel, and the corresponding financial contribution, can only do so if they have already identified a possible replacement willing to stand in for them.
- The transfer of access rights and related financial duties will be done under the supervision of the Governing Council.
- The adjustments will be organised in a way that limits the transfer of funds.
- Adjustment will be made as far as possible by using a bartering system.
- Compensation, extra-contributions or reduction of commitments would only be done in this respect.

Limitations

- Partners entering the project are allowed to set a maximum limit for their contribution (see model of participation).
- The limit can be per year or for the duration of a funding cycle.
- Regardless of the level of limitation chosen, the fixed costs should always be covered for the entire duration of the funding cycle.
- If the maximum limit is reached and the Partners are not willing to extend their contribution, then those Partners wishing to limit their contribution would have to agree to transfer some of their berth time to third parties or other Partners who are willing to cover these expenses.

Scientific costs

- The scientific costs are covered by the Scientists who are the end users of the vessel.
- Each scientific team is covers its own scientific costs.
- An estimate of the scientific costs expected for each expedition will have to be integrated in the main proposal for berth time.
- To support this estimate the ERICON consortium will provide scientists with a list of equipment and services provided free of charge on the vessel.
- Costs occurring in advance of an expedition and covered by the Partners will be charged back to the Scientists.
- Costs arising from the joint use of the vessel/scientific equipment by several scientific teams will be charged to each scientific team in proportion of their use of the facilities.

In-kind contributions

- In-kind contributions to the running costs of the vessel should, in line with the recommendations of the FAP, be kept as low as possible.
- In-kind contributions should only concern equipment and personnel onshore (e.g. staff and buildings for management, warehouse at logistical base, data management centre etc).
- Scientific equipment should only be considered as an in-kind contribution if critically needed by a number of other scientists.
- Guidelines and rules for in-kind contributions to the running costs of the vessel should be developed in a coordinated and consultative approach between all Partners.

3.1.4.2 Alternative cost-sharing models

Model 2 and Model 3 will be used as cost-sharing models for specific activities agreed by all Partners. The net income resulting from such activities will be fed into the contingency fund.

A list of potential activities funded under Models 2 and 3 are listed below; the list is not exhaustive.

Activities funded through Model 2:

- Activities resulting from pan-European-funded calls involving a larger community than the partners only. E.g. call funded by the EC or through a common pot between European countries.
- Exclusive usage of the vessel or equipment by one Partner to fulfill a mandatory national commitment. E.g. mapping of national waters ordered by a Partner's government, re-supply of an Antarctic or Arctic base, etc.

Activities funded through Model 3:

- Exclusive usage of the vessel by non-partners to perform a national activity. E.g. mapping of the Northern coast of Canada by Canadian authorities.
- Exclusive usage of the vessel by non-partners to perform a scientific expedition.
- Granting access to industry to support work on basic research. Industry may liaise with one of the Partner's universities/research institutes creating a public-private initiative.
- Granting access to the vessel to industry for commercial activities. E.g. leasing the vessel to a company drilling for its own purpose and using its own scientists/engineers.

In Model 3 the users of the vessel will be charged a day rate for the entire period of use of the vessel. The day rate may vary according to time of year, duration of the expedition or activities performed. The day rate will be based on the real cost plus a reasonable margin. The level of the margin still has to be determined and could include a fraction of the construction cost.

All activities funded via Models 2 and 3 would have to be agreed by the Partners in accordance with the voting procedure set out in the governance rules.

The percentage of berth capacity open to activities funded under Models 2 and 3 would have to be agreed by the Partners, and could vary from one year to another.

3.1.4.2.1 Contingency fund

Funding shortages have been identified by the FAP as the most critical risk for the project during the operational phase. To counter this problem, the creation of a contingency fund to enable the vessel operator to manage any unplanned expenses is necessary.

The contingency fund should be available from the beginning of the operation of the vessel and should be sufficient to cover most of the possible unexpected costs such as extra maintenance, repairs, variation in the price of fuel, etc.

- A significant contingency fund should always be available.
- The contingency fund will be created by an extra contribution added to the nominal contribution from each Partner for the first two years of operation.
- All savings or extra income resulting from the use of the vessel under Model 2 or 3 will be assigned to the contingency fund.
- All potential net incomes resulting from the use of the vessel beyond 250 days of operations will be fed into the contingency plan.
- If the level of the contingency fund reaches its maximum, all additional extra income will be incorporated in the reimbursement scheme.
- The contingency fund should at any time cover expenses resulting from the termination of the operations of the vessel, e.g. layoff pays for the crew, lay up of the vessel, sales costs, etc.

3.1.4.2.2 Costs increase

- The level of contribution of each partner will be calculated based on an updated estimate of the fixed and variable costs foreseen for the funding cycle.
- This estimate will be provided by the logistic department of the AURORA BOREALIS legal entity.
- A calculation of the real costs incurred during the first three years of the funding cycle will be made after year three.
- If the real costs are higher than the estimated costs, appropriate adjustments will be integrated in the contributions to years four and five.
- If the running costs still increase between the end of year three and the end of the funding cycle, this increase would be covered by the contingency fund.

3.1.4.2.3 Unexpected events

- Expeditions can be shortened or cancelled due to unexpected events.
- Unexpected events can either be technical (e.g. a broken engine), scientific emergencies (e.g. subsea volcano, earthquake) or natural hazards.
- Scientists who suffer loss of science days will be offered new cruise opportunities.

3.2 Construction cost

The cost-sharing model for the construction costs differs from the cost-sharing model for the running costs as in the latter the various categories of funders identified will not be differentiated according to the timing of their contribution but by the nature of their contribution.

Indeed, owners can participate in the construction of the vessel through: direct cash contribution, indirect cash contribution (grants, EU funds) or in-kind contribution. Each payment mean can be used exclusively or combined with the two others resulting in the identification of three categories of funders for the construction cost of the vessel.

The ERICON project is supporting the potential funders in their balancing of the various means and has developed several tools (in-kind matrix, favourable legal framework), which are briefly presented in deliverable 4.2, but will be further developed in the business plan.

3.2.1 Categories of funders

During funding of construction the type of contribution is likely to be different from one partner to another allowing the identification of three categories:

Funders contributing in cash only:
Countries participating in the construction of the project by means of a financial contribution. The funding can either be direct (e.g. country's owns assets) or indirect (e.g. European grants as structural fund). For more information about the possible source of indirect financing and structural funds in particular, *see* **Annex 3** *Note on Structural Funds.*

Funders contributing through in-kind only:
Countries participating in the construction of the vessel through an in-kind contribution, e.g. a country committing to build a part of the vessel according to the technical specifications required in exchange of shares in

the ownership of the vessel. The part built by the partner will have a calculated monetary value. The number of shares obtained in return will be proportionate to the cash value of the part built.

Funders contributing in cash and in-kind:
Countries participating in the construction of the vessel using a mixed approach combining contribution in cash and in-kind; the ratio of the cash versus in-kind and the actual cash value of the overall contribution can vary.

The overall cost-sharing model for the construction will only be completed when the entire cost of the vessel is covered by the partners. To do so, countries should assess their interest in the project and identify the type of contribution they favour. The ERICON project is supporting the funders in this process by providing them with: an in-kind matrix presenting the different components of the vessel and their related cost equivalent, a legal framework favouring the exemption of procurement law, and a support to future owners in securing structural funds for the construction of the vessel.

These three elements are briefly described below and will be further developed in the business plan.

3.2.2 Cost components: in-kind matrix

3.2.2.1 Concept

The in-kind matrix is a document presenting, according to the technical specifications of the vessel, her main parts and their estimated value. The document also provides examples of a European companies capable of building some of the parts. The matrix will help future owners to identify their interest and how their national maritime industry could participate in the construction of the vessel.

Each country listed in the matrix will not necessarily participate via in-kind contribution. If several countries are interested in providing the same part of the vessel, arbitration between the potential funders would have to be performed in order to come up with a homogenous cost-sharing model.

The AURORA BOREALIS in-kind matrix is available as **Annex 1** *In-Kind Matrix*.

The implementation of the in-kind matrix and its integration in the cost-sharing model is only possible if the partners can control the awarding of the contracts for the construction of the vessel. To do so the construction of the vessel should avoid the use of call for tender and be exempt from European public procurement law.

3.2.2.2 Implementation

There is a likelihood that the implementation of an extensive in-kind contribution policy for the construction of the vessel could prove to be difficult and counterproductive. Indeed the use of in-kind contribution would increase significantly the complexity of the construction of the vessel and raise technical issues which would have to be handled by the selected shipyard. A direct consequence could be that no shipyard would be willing to take these risks and/or that the insurance costs for the shipyard would be prohibitive. In the long run instead of facilitating the construction of the vessel, an extensive use of in-kind contribution is more likely to make it more difficult and increase its overall cost.

The members of the financial advisory panel therefore recommended the use countertrade instead to solve these issues and still provide incentives for national industries.

Under these circumstances states interested in contributing to the construction of the vessel via in-kind contribution would enter in contract with the country of the awarded shipyard and negotiate together possible countertrade agreements for their industry.

Countertrade can be broadly defined as: *"transactions which have as a basic characteristic a linkage, legal or otherwise, between exports and imports of goods or services in addition to, or in place of, financial settlements."*[1]

There are various types of countertrades, the most common being offset, counter purchase, tolling, barter, buyback and switch trading. For the purpose of the construction of the AURORA BOREALIS indirect offsets, counter purchase and barter would be the most feasible tools to set up these exchanges. A definition of these terms is made below.

Indirect offset:
The purchaser requires suppliers to enter into long-term industrial (and other) co-operation and investment but these are unconnnected to the supply contract and may be either defence related or in the civil sector.

Counterpurchase:
A foreign supplier undertakes to purchase goods and services from the purchasing country as a condition of securing the order. There will be a contract for the principal supply and a separate agreement to cover the counterpurchased goods. Both contracts are paid in cash. The value of the counterpurchase undertaking may vary between 10% and 100% (or more) of the original export order.

Barter:

In a barter deal, goods are exchanged for goods – the principal export is paid for with goods (or services) from the importing market. A single contract covers both flows and in the simpler case, no cash is involved.[2]

1. Fisher College of Business, Ohio State University: www.cob.ohio-state.edu/citm/expa/countertrade.html
2. For more information on countertrade, please consult: http://www.londoncountertrade.org/countertradefaq.htm

3.2.3 European procurement law

European public procurement law regulates purchasing by public sector bodies and certain utility sector bodies of contracts for goods, works or services. The law is designed to open up the EU's public procurement market to competition, to prevent "buy national" policies and to promote the free movement of goods and services[3]. Public procurement laws are harmonised at the European level by two directives: directive 2004/17/EC for the water, energy, transport and the postal service sector and directive 2004/18/EC on the coordination of procedure for the award of public work contracts, public supply contract and public service contracts[4].

From a general point of view, European public procurement law only applies to public bodies which are issuing a contract as a contracting authority, and if the contract is above a certain level.

The exact conditions of application of public procurement law and their impact on the construction of the AURORA BOREALIS are described in **Annex 2** *Memo on Procurement Law (2010).*

The impact of public procurement law should be carefully considered and differs according to the status of the legal structure issuing the contracts. Further information on this topic is addressed in the course of the work on the legal framework of the project and is presented in deliverable 6.1 on the legal entity considered for the ownership of the vessel.

A coherent cost-sharing model for the construction of the vessel would be difficult to achieve under public procurement law as countries with a strong maritime industry would be in the position to get an economic benefit from the construction of the vessel without contributing financially to her construction.

3.2.4 Structural Funds

Contribution to the construction of the vessel is also possible using Structural Funds. Structural Funds are a tool from the EU supporting the cohesion policy to overcome regional economical disparities within the EU and represent a major part of EU spending. Their general aim is to *"reinforce economic and social cohesion by redressing the main regional imbalances through support for the development and structural adjustments of regional economies."*[5]

Every European region is eligible for Structural Funds, either under the convergence objective (support regional economy to meet the EU average), or the regional competitiveness and employment objective (reinforcing competitiveness, employment and attractiveness).

Research infrastructures in particular are eligible for funding under **"Research and development Infrastructures and centres of competence in a specific technology" of DG REGIO (Code 02)**. Ten Billion Euro are available under this code.

To benefit from these funds, a strong interaction between the future owners of the vessel the maritime industry and the decision makers at the regional level is needed. The allocation of funds is made based on specific criteria which vary from one region to another. It is therefore important to liaise with the authorities in charge of Structural Funds at the national and regional level to make sure that these criteria favour the involvement of the maritime industry.

For more information, see **Annex 3** *Note on Structural Funds (2010).*

3.2.5 Summary

To achieve a well-balanced cost-sharing model for the construction of the vessel is difficult and cannot be performed at this stage. Beside the influence of the future legal structure created for the construction of the vessel (in relation to procurement law), a coherent cost-sharing model can only be achieved once the future owners have identified how they would like to contribute to the construction. The information provided in this document is therefore aimed only at supporting them in this decision.

Bow of the U.S Coast Guard icebreaker POLAR SEA in channel McMurdo

3. Source: http://www.out-law.com/page-5964
4. For more information on the directives, please consult: http://ec.europa.eu/internal_market/publicprocurement/legislation_en.htm
5. http://ec.europa.eu/regional_policy/sources/docoffic/official/regulation/newregl0713_en.htm

4. Model of participation

The model of participation for the AURORA BOREALIS should reflect the interest of the potential partners in the project. Defining this interest at this early stage is difficult, and for this reason deliverable 4.2 only sets a series of recommendations and proposed scenarios to be considered when implementing the final model of participation.

The model of participation for the construction and operation of the vessel should reflect the interest of the partners in participating in the two different funding phases.

Notification
For the course of this exercise and to facilitate the understanding of the examples, all calculations have been made using the members of the ERICON consortium on 1st October 2010 as hypothetical partners. The use of these countries as working example does not reflect the real names and number of countries likely to support the project. ***The list of countries is used for hypothetical calculations only***.

4.1 Running cost

4.1.1 Rational

As already expressed in paragraph 2.1 "*Juste retour*", partners fund the operation of the vessel to guarantee access to the facility for their scientists.

Given that the level of financial contribution of each partner is proportionate to this interest, it is important to try to quantify the scientific interest.

4.1.2 Possible criteria to assess the scientific interest

An ideal way of doing so is via the expression, by each partner, of the number of scientific berths they are willing to use every year. Where the sum of these expressions exceeds the total berth capacity available, partners would have to enter a discussion and agree on the distribution of the scientific berth capacity available. Each partner would then pay for its percentage of the use of the vessel.

N.B.: The AURORA BOREALIS is offering a scientific berthing capacity of around 19 200 days, spread over 320 days of operation, every year.

In the absence of expression of intention, alternatives criteria must be applied to evaluate the scientific interest of the partners.

The criteria presented below are not restrictive and each criterion could be refined if implemented. The various examples should be used to illustrate the magnitude of financial commitment each partner could undertake.

4.1.2.1 Scientific activity: the International Polar Year (IPY) expression of intent

In early November 2004, the polar community was invited to submit to the IPY International Programme Office brief Expressions of Intent (EoI) for IPY activities. The international Programme Office received over 1100 EoI which have been entered in an online database accessible at http://classic.ipy.org/development/eoi/index.htm

These EoI are a good indicator of the interest of the European scientific community for Polar research.

Table 2. Percentage of Expression of Intent for a country of the consortium received for the IPY expression of intent.

Country	Expression of intent all fields		Expression of intent marine/icebreaker	
	Number	Percentage	Number	Percentage
Belgium	12	3,04%	5	3,03%
Bulgaria	0	0,00%	0	0,00%
Denmark	54	13,67%	13	7,88%
Finland	18	4,56%	4	2,42%
France	30	7,59%	10	6,06%
Germany	52	13,16%	24	14,55%
Italy	58	14,68%	26	15,76%
Netherlands	18	4,56%	5	3,03%
Norway	78	19,75%	42	25,45%
Romania	1	0,25%	0	0,00%
Russia	74	18,73%	36	21,82%
Total Consortium	**395**	**100,00%**	**165**	**100,00%**

The table below shows the number of expressions of intent per country and the related percentage as the total of EoIs sent by the countries that are members of the ERICON consortium. The table presents both the overall number of EoI (covering all scientific fields and polar areas) as well as a more detailed analysis focusing on those proposals with a marine component and/or requesting the use of an icebreaker as an implementation platform.

4.1.2.2 Scientific publications: publications on cold environment

The number of publications by scientists has been discussed as a possible indicator to assess *"juste retour"* but was not considered best suited for this purpose. Nevertheless, the number of publications could be a relevant tool to be used for the model of participation in the running costs of the vessel.

The data below are from "*Bibliography on Cold Regions Science and Technology"* of the American Geological Institute. The database is funded in part by the National Science Foundation and the US Army Cold Regions Research and Engineering Laboratory and includes: *"references to scientific and engineering research […], and the impact of human activity on cold environments"*.[1]

The data used for this exercise cover 60 537 publications over the past ten years, including publications originating from the IPY EoIs. For the purposes of this document, the country of the home institute of the main author has been used as the key criterion.

1. For more information and to browse the database please consult: http://www.coldregions.org/dbtw-wpd/coldz/coldzA.htm

Table 3. Number of publications addressing cold regions since 2000. Source: American Geological Institute

Country	Publications on cold environment	
	Number	Percentage
Belgium	359	2,04%
Bulgaria	23	0,13%
Denmark	739	4,21%
Finland	1 165	6,63%
France	1 880	10,70%
Germany	3 961	22,55%
Italy	1 651	9,40%
Netherlands	633	3,60%
Norway	1 958	11,15%
Romania	48	0,27%
Russia	5 145	29,30%
Total Consortium	**17 562**	**100,00%**

4.1.2.3 Conclusion

The table below gives an overview of the three criteria suggested to indentify the interest of the partners in the vessel.

Despite the differences between each of the criteria, the table is a good instrument to identify the magnitude of the financial effort foreseen by each partner and the balance between small and big contributors.

The definitive scope of each criterion would have to be refined if used for the final model of participation; but

Table 4. Comparison of the three scientific criteria

Country	Expression of intent all fields	Expression of intent marine/icebreaker	Publications cold environment
	Percentage	Percentage	Percentage
Belgium	3,04%	3,03%	2,04%
Bulgaria	0,00%	0,00%	0,13%
Denmark	13,67%	7,88%	4,21%
Finland	4,56%	2,42%	6,63%
France	7,59%	6,06%	10,70%
Germany	13,16%	14,55%	22,55%
Italy	14,68%	15,76%	9,40%
Netherlands	4,56%	3,03%	3,60%
Norway	19,75%	25,45%	11,15%
Romania	0,25%	0,00%	0,27%
Russia	18,73%	21,82%	29,30%
Total Consortium	**100,00%**	**100,00%**	**100,00%**

at this stage, EoIs with a special emphasis on marine proposals and proposals requiring the use of an ice-breaker would seem to be those reflecting the likelihood of greatest use of the vessel.

As already stressed, the figures presented above are not meant to reflect the exact reality and should be used for making working assumptions only.

4.2 Construction costs

4.2.1 Rationale

Using the same approach as applied for running costs, one should identify first what would be the advantages for a partner to invest in the construction of the vessel, and therefore look at the benefit a partner would get from the construction of the vessel.

This benefit should be related to the construction of the vessel only. Advantages resulting merely from the existence of the vessel (e.g. additional political weight for countries owning the vessel) or her use (e.g. additional scientific capacity) should not be considered.

Bearing this in mind, the main benefit that would accrue to a partner from participating in the construction of the vessel is the possible spin-off for its industry. These spin-offs would be secured due to the implementation of a building strategy as presented in paragraph 3.2.2 *Cost components: in-kind matrix*.

Even if controlled, these spin-offs are likely to go to those countries with the strongest maritime industry. The level of financial contribution of each partner to the construction of the vessel should therefore reflect the strength of the partner's economy.

4.2.2 Possible models

A range of indicators are available to assess the economic growth of a country. The producer price index, the consumer price index and the unemployment rate, to name a few, are all indices that could be used to assess and compare the economic robustness of countries. However the index most commonly used for this purpose is Gross Domestic Product (GDP) which aggregates the value added by economic activity within a country's borders.

GDP is widely recognised as the best indicator to assess the economic status of a country and is used in for several research infrastructures and European and international institutions to calculate the financial contribution of the partners.

The table below presents the GDP of each country of the consortium both in value and as a percentage of the sum of the GDPs of all the countries of the consortium.

GDP has been used here as an example of one of the possible criteria which could be applied when setting the model of participation for the construction cost of the vessel.

Several other indices could however also be considered. The strength of the maritime industry in particular could be a valid alternative but has not been analysed in this document due to the lack of reliable pan-European (Russia included) data available at the time.

Table 5. GDP of the members of the consortium

Country	2010	
	Value in billon $	Ratio in %
Belgium	461,331	3,92%
Bulgaria	44,843	0,38%
Denmark	304,555	2,59%
Finland	231,982	1,97%
France	2555,439	21,73%
Germany	3305,898	28,11%
Italy	2036,687	17,32%
Netherlands	770,312	6,55%
Norway	413,511	3,52%
Romania	158,393	1,35%
Russia	1476,912	12,56%
Total	**11759,863**	**100%**

Source: International monetary fund October outlook: http://www.imf.org/external/pubs/ft/weo/2010/02/weodata/download.aspx

5. Investment *vs* access

The Financial Advisory Panel recommended that the level of contribution of the partners should reflect their access rights to the vessel. This can only be implemented if we set up first a mechanism to evaluate the level of financial contribution of each of the partners.

The financial commitments are spread over the life cycle of the vessel. The life cycle of the AURORA BOREALIS can be broken down into four funding phases: two construction phases and two operation phases. The number and type of partners as well as their level of contribution varying from one to another.

5.1 The four phases of the lifecycle of the vessel

The four phases identified and the approximate level of investment considered for each is the following (**Figure 4**):

- **Phase 1**, Construction: investment 800 M€, duration 3 years
- **Phase 2**, Operations prior midlife refurbishment: investment 40M€/year, duration 15 years
- **Phase 3**, midlife refurbishment: investment cost 100M€, duration 1 year
- **Phase 4**, operations following midlife refurbishment: investment 40M€/year, duration 15 years

Ideally the level of the financial participation of a partner in the project should be assessed according to the sum of its contributions to all the phases. However, this can only be achieved if partners commit for the entire lifetime of the vessel from the beginning (construction included).

In the absence of such information, alternative solutions should be developed to address this issue.

5.2 Phases considered

The level of financial commitment of the partners should impact directly on their access to the vessel. Access to the vessel is only possible during phase 2 and phase 4 while the vessel is at sea. The level of contribution of the partners to these two phases should therefore directly impact on their access rights to the vessel. Phase 2 and 4 are the reference phases for the calculation of access rights to the vessel.

In order not to penalize the partners who contributed to the other phases (1 and 4) and also integrate their commitments in the calculation base, commitments made to the construction and refurbishment phases will be spread evenly over phase 2 and 4. The spread of these commitments prevents an imbalance of their impact early in the life cycle of the vessel. Indeed the construction costs represent an important part of the total contributions made to the vessel during the early life of the vessel but are only marginal towards the end of the vessel's active operation.

Similarly, participation in the mid-life refurbishment will be spread over the second 15 years of operations (phase 4) identified above. See **Figure 4**.

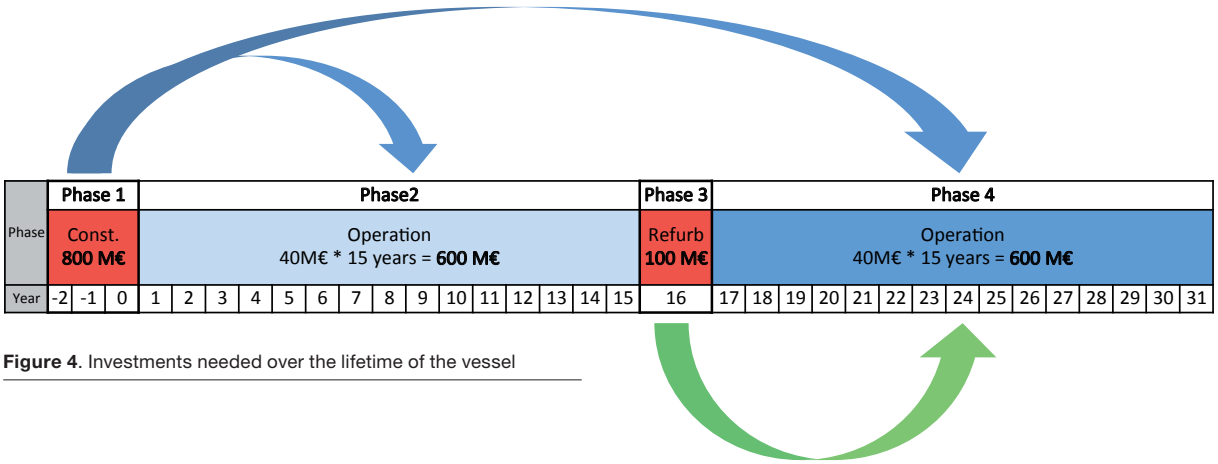


Figure 4. Investments needed over the lifetime of the vessel

5. Investment *vs* access

5.3 Funding cycles

As partners are unlikely to commit to the operations of the vessel over a long period of time (twice 15 years in this case); phase 2 and phase 4 are broken down into smaller time periods called funding cycles. In line with the cost-sharing model of the running cost introduced in paragraph 3-1.4.1 Main Model, funding cycle, each funding cycle lasts five years, thus creating six funding cycles instead of the two operation phases (2 and 4) identified earlier. The length of a funding cycle corresponds to the basic duration of the commitment of the long-term users to the operation of the vessel. Access rights to the vessel are now calculated according to the commitments made to each funding cycle.

Consequently and to be in line with the rational developed in 5.2 Phases considered, commitments to the construction cost and the midlife refurbishment are spread evenly over the different funding cycles (6 for construction and 3 for the midlife refurbishment) as presented in **Figure 5**.

Contributions to the construction cost and/or the midlife refurbishment are crucial for the existence of the vessel. These contributions, even if "one shot" investments, call for a significantly higher amount of funding compared to amount needed for the running costs of the vessel. Contribution to any of these therefore provides access rights to the facility for:

- The lifetime of the vessel for the contribution to the construction costs, 30 years
- For the remaining lifetime of the vessel for the contribution to midlife refurbishment, 15 years

Contribution to the running costs on the other hand only secure access rights to the facility for the duration of the funding cycle considered.

The level of financial commitment of a partner is therefore determined for each funding cycle. This level is fixed for the entire funding cycle but can vary from one cycle to another. The formula used to calculate the contribution is presented below.

The different funding cycles over the lifetime of the vessel as well as the spread of the construction cost and the mid-life refurbishment are presented in Fig. 5.

$$\frac{\text{Contrib. to construction cost}}{\text{total number of FC}} + \text{contrib. to current FC} + \frac{\text{contrib. to refurbishment}}{\text{number of FC after refurbishment}}$$

FC= funding cycles

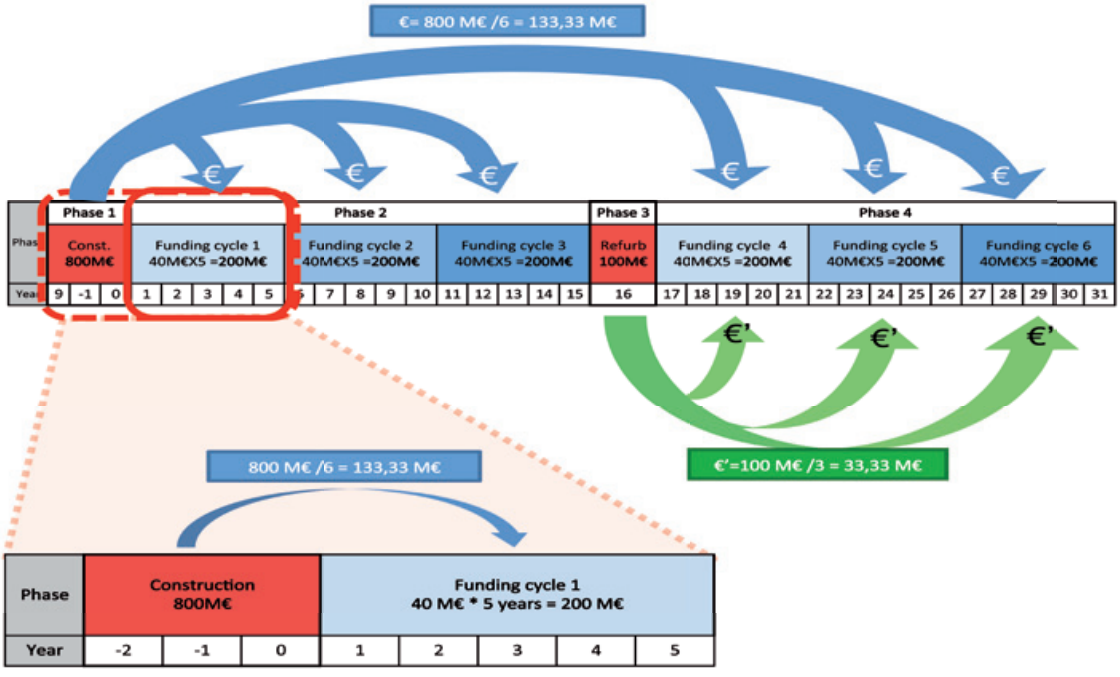


Figure 5. Funding cycles over the lifetime of the vessel

5.4 Financial simulation on 3 different scenarios

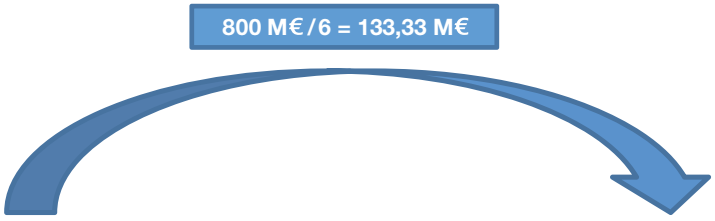
Based on the principles introduced above, three basic scenarios representing the possible contributions of a partner have been simulated:

- Scenario 1: contribution to the construction and running costs
- Scenario 2: contribution to the running costs only
- Scenario 3: contribution to the construction cost only

The aim is to assess the percentage of scientific berth granted to the partner, in the light of its financial contribution. A differentiation will be made between the scientific berths granted for the duration of the funding cycle (resulting from temporary contribution to the running costs) and to the ones granted for the lifetime of the vessel (resulting from contribution to the construction costs).

Table 6. Scenarios of financial participation for financial simulation

	Contribution to construction costs	Contribution to running costs per year
Scenario 1	60 M€	4 M€/year
Scenario 2	0 M€	4 M€/year
Scenario 3	60 M€	0 M€/year



Phase	Construction 800 M€			Funding cycle 1 40 M€ × 5 years = 200 M€				
Year	-2	-1	0	1	2	3	4	5

Figure 6: Focus on the split of the construction costs over a funding cycle for calculation purpose.

5. Investment *vs* access

FC= Funding Cycle • CC=Construction cost • RC=Running cost

Scenario 1

Total contribution to RC for the FC	200 M€	(40 M€×5 years)
% of contribution CC spread over 1 FC	+ 133,33 M€	(800 M€/6 cycles)
Base	333,33 M€	
Country's contribution to RC for the FC	20 M€	(4 M€×5 years)
% of country's contribution to CC spread, spread over 1 FC	10 M€	(60 M€/6 cycles)
Base for country	30 M€	

% of scientific berth capacity for one country for one funding cycle = $\frac{30\ M€}{333{,}33\ M€}$ = **9%**

Under scenario 1 the partner will be entitled to:
- 3% of the scientific berth capacity for the lifetime of the vessel as contribution to CC
- 6% for the duration of the funding cycle as contribution to RC

All together this means 8640 scientific berths over 5 years or **1728 scientific berths** per year for 5 years; and after the end of the funding cycle, **576 scientific berths** per year for the lifetime of the vessel.

Scenario 2

Total contribution to RC for the FC	200 M€	(40 M€×5 years)
% of contribution CC spread over 1 FC	+ 133,33 M€	(800 M€/6 cycles)
Base	333,33 M€	
Country's contribution to RC for the FC	20 M€	4 M€×5 years)
% of country's contribution to CC spread, spread over 1 FC	0 M€	(60 M€/6 cycles)
Base for country	20 M€	

% of scientific berth capacity for one country for one funding cycle = $\frac{20\ M€}{333{,}33\ M€}$ = **6%**

Under scenario 2 the partner will be entitled to 6% of the scientific berth capacity for the duration of the funding cycle meaning 5760 scientific berths over 5 years or **1152 scientific berths** per year for 5 years.

Scenario 3

Total contribution to RC for the FC	200 M€	(40M€×5 years)
% of contribution CC spread over 1 FC	+ 133,33 M€	(800M€/6 cycles)
Base	333,33 M€	
Country's contribution to RC for the FC	0 M€	(4 M€×5 years)
% of country's contribution to CC spread, spread over 1 FC	10 M€	(60 M€/6 cycles)
Base for country	10 M€	

% of scientific berth capacity for one country for one funding cycle = $\frac{10\ M€}{333{,}33\ M€}$ = **3%**

Under scenario 2 the partner will be entitled to 3% of the scientific berth capacity scientific for the duration of the lifetime of the vessel meaning **576 scientific berths** per year.

As mentioned in section 5.3 *Funding cycles*, the amount invested for the construction provides access rights to the vessel for her lifetime. The level of access rights is subject to modification according to the investment made during the midlife refurbishment.

5.5 Overview and shares

The table below provides an overview of the financial simulation presented in section 5.4. Based on this simulation the minimum level of contribution per partner required to participate in the running costs and the construction costs have been set.

The sums are of 2/3 of a million euro (or 666 666 €) per year for 5 years for the running costs, and 20 M€ for the construction costs. These levels of contribution would guarantee to the partner 1% of the scientific berth available on the vessel. This percentage of scientific berth will however only be granted for the duration of one funding cycle for the running cost whereas it would be allocated for the lifetime of the vessel in the case of a contribution of 20 M€ towards construction costs. There is no indicative level of commitment for the midlife refurbishment.

The two minimum levels set above are absolute minimums. A partner already contributing to the construction of the vessel for 20 M€ or more and willing to participate in the running cost of the vessel would still have to pay at least for 666 666 € per year for the duration of a funding cycle.

Table 7. Overview and minimum level of commitment

	Contribution to construction cost	**Contribution to running cost per year**	**% of berth capacity allocated per FC**
Scenario 1	60 M€	4 M€/year	9%*
Scenario 2	0 M€	4 M€/year	6%
Scenario 3	60 M€	0 M€/year	3%**
Minimum contribution to the Running cost	0 M€	**666 666 €/year** for 5 years	**1%**
Minimum contribution to the Construction cost	**20 M€**	0 M€/year	**1%***

* 6% of berth capacity for the duration of the funding cycle and 3% for the lifetime of the vessel.
** for the contribution to the construction cost, the % of berth capacity is allocated for the lifetime of the vessel.

Table 7 shows that, over a funding cycle, a contribution to the running costs of the vessel is granting a partner with more scientific berths than the same level of contribution to the construction cost.

However the scientific berths allocated in relation to the contribution to the running costs are granted for the duration of a funding cycle only, whereas the ones related to the contribution to the construction cost are granted for the lifetime of the vessel.

Potential partners should therefore consider their priorities before investing and decide whether they are more interested into a limited but permanent access to the vessel or a significant access to the facility but for a temporary period only.

A good analysis of their long term scientific needs would guarantee the partners with the best return on investment and allow them to set up a sound investment strategy.

6. Conclusion

Deliverable 4.2 provides an overview of the financial framework, the cost-sharing model and model of participation for the research icebreaker AURORA BOREALIS in the light of her current design. The deliverable also sets the minimum level of commitment required for participating in the construction and the running costs. This, together with the related percentage of scientific berth capacity allocated in return, should provide potential partners with sufficient information to move towards a decision on financing the construction of the vessel and its operations.

However these decisions cannot be taken on the sole consideration of these financial models and further elements, such as the weight of each partner in the governance of the project, should also be analysed when taking this decision. Details of the proposal handling system or the way scientific priorities are set are also important and should be considered together alongside the financial framework to guarantee the maximum level of return on investment to the partners.

From a broader perspective, the development of these models around the common concept of *juste retour* making a clear differentiation between the scientific and the industrial interest, allows the integration of any kind of potential partner, public or private. The cost sharing model of the running cost is a perfect example of this flexibility, where the possibility to shift between the scientific, the mixed and the economical model at any time during the funding cycle, guarantee a smooth integration of any type of partner. These models are therefore attractive for a large number and partners are more likely to commit for an extended period of time. This innovative approach promoting a maximization of the access to the facility, offers them with a strong return on investment without jeopardizing the scientific dimension of the project. The combination of these particular elements is crucial to secure the long term operations of the vessel.

Furthermore the flexibility of these models and the robustness of their founding principles make them easily transferable. In a context of increasing international collaborations and the development of several European of research infrastructures, these models could serve as a base for consideration for any other polar and marine research infrastructure either single sited or distributed.

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In-kind Matrix : Main components and cost

	Estimated value of ship building cost for constructional groups - AURORA BOREALIS -				
Lfd.Nr.	**Term**	**Cost in detail in €**		**Group cost (€)**	**Remarks**
1 a	**Ship's hull**	180 000 000,00			Including all tanks
1 a	**Deck house,**	30 000 000,00			Complete equipment
1 a	**Structural elements**	50 000 000,00			
	Decks Equipment				Complete equipment
1 b	**Anchorage, Bollards**	500 000,00			
1 b	**Mooring winches**	1 000 000,00			
1 b	**All the cranes**	15 000 000,00			
1 b	**Lifeboats, Davits**	1 200 000,00			Complete equipment with life-rafts
1 b	**Ice searchlights**	300 000,00	**Cost group 1 :**	293 000 000,00	Complete equipment
2	**Propelling plant**				
2 a	**Rudder, Propeller**	6 000 000,00			Complete equipment
2 b	**Steering gear**	4 000 000,00			Complete equipment
2 c	**Stern tube seal**	1 200 000,00			Complete equipment
2 d	**Bow- and stern-thruster**	16 000 000,00	**Cost group 2 :**	27 200 000,00	Included 4 thruster only for DP-system
3	**Main Engine plant**				
3 a	**All the Diesel engines**	32 000 000,00			Complete equipment
3 b	**All the Generators**	5 000 000,00			Complete equipment
3 c	**Traction motors**	3 000 000,00	**Cost group 3 :**	40 000 000,00	Complete equipment
4	**Auxiliary machinery**				
4 a	**All the Boilers, compl.**	6 000 000,00			Complete equipment with pipes, valves etc.
4 b	**All the Pumps, compl.**	12 600 000,00			Complete equipment with pipes, valves etc.
4 c	**All the coolers, compl.**	2 500 000,00			Complete equipment with pipes, valves etc.
4 d	**All the heaters, compl.**	1 800 000,00			Complete equipment with pipes, valves etc.
4 e	**All separators,compl.**	1 200 000,00			Complete equipment with pipes, valves etc.
4 f	**All the Compressors**	500 000,00			Complete equipment with pipes, valves etc.
4 g	**Sewage plant, compl.**	2 500 000,00			Complete equipment with pipes, valves etc.
4 h	**Control engineering**	2 000 000,00			Complete equipment with pipes, valves etc.
4 i	**Tank gauge, compl.**	400 000,00			Complete equipment with pipes, valves etc.
4 j	**Bilge separator, compl.**	800 000,00	**Cost group 4 :**	30 300 000,00	Complete equipment with pipes, valves etc.

	Estimated value of ship building cost for constructional groups - AURORA BOREALIS -				
Lfd.Nr.	**Term**	**Cost in detail in €**		**Group cost (€)**	**Remarks**
5	**Electric plant**				Included all cables, wires etc.
5 a	**Electric prime movers**	2 000 000,00			Included main switchboard + emergency switb.
5 b	**All the AC converters**	2 000 000,00			
5 c	**All the DC converters**	1 000 000,00			

5 d	All the Transformers	2 000 000,00			
5 e	Automation aboard ship	10 000 000,00			
5 f	Remote control plant	10 000 000,00			
5 g	Switching + measurer.	2 000 000,00			
5 h	Lighting, compl.	4 000 000,00			
5 i	Batteries, compl.	200 000,00	**Cost group 5 :**	33 200 000,00	
6 a	Navigating instruments	5 000 000,00			
6 b	Bridge control stand	3 500 000,00	**Cost group 6 :**	8 500 000,00	
7 a	Accommodation, compl.	8 500 000,00			
7 b	Sanitary facilities	2 500 000,00	**Cost group 7 :**	11 000 000,00	
8 a	Basic research equipm.	45 000 000,00			
8 b	Drilling equipment	60 000 000,00			Complete equipment
8 c	All research winches	8 000 000,00			Complete equipment
8 c	Equipment f. Seismic	10 000 000,00			Complete equipment
8 d	Equipment f. Geology	5 000 000,00			Complete equipment
8 e	Equipment f. Oceanog.	3 000 000,00			Complete equipment
8 f	Equipment f. Deep sea	10 000 000,00			Complete equipment
8 g	Equipment f. Biology	3 000 000,00			Complete equipment
8 h	Equipment f. Glaciol.	2 000 000,00			Complete equipment
8 i	Equipment f. Meteorol.	2 000 000,00			Complete equipment
8 j	Equipment f.Hydroacu.	10 000 000,00			
8 k	Equipment f.laborator.	8 000 000,00	**Cost group 8 :**	166 000 000,00	Complete equipment
9 a	Equipment f. Helicopt.	2 000 000,00			
9 b	Equipment f. Heliport	600 000,00	**Cost group 9 :**	2 600 000,00	

	Estimated value of ship building cost for constructional groups - AURORA BOREALIS -				
Lfd.Nr.	**Term**	**Cost in detail in €**		**Group cost (€)**	**Remarks**
10	**Further plants**				
10 a	**Ventilation plant**	10 000 000,00			Complete equipment
10 b	**Stabilizer plant**	2 500 000,00			Complete equipment
10 c	**Trim system**	3 500 000,00			Complete equipment
10 d	**Medicinal rooms**	1 500 000,00			Included complete equipment
10 e	**Special rooms**	10 000 000,00			like galley, mess-rooms, lecture-rooms etc.
10 f	**Environment technology**	20 000 000,00			All systems, included Tier III conversion
10 g	**Insulation**	15 000 000,00	**Cost group 10:**	62 500 000,00	Complete equipment
11	Forward cost	10 000 000,00	**Cost group 11:**	10 000 000,00	
		Total cost group 1 - 10 :		**684 300 000,00**	*

* The total cost group are not equal to the construction cost of the vessel because some elements as the shipyards fundamentals : management, finances, insurances, designing, planning, tests, trials etc. and other margin of uncertainity are not integrated here.

Annex 1. In-Kind Matrix

In-kind Matrix : Example of main components and potential suppliers

Lfd.Nr.		Type of equipements	company name	Country	Comments
1a	Main structure	Ship's hull Deck House Structural elements	Antwerp shiprepair NV	BE	Only as subcontractor
			Bulyard / Varna	BG	Only as subcontractor
			Keppel Fels Baltech	BG	Only as subcontractor
			Blohm + Voss Shipyards	DE	
			ThyssenKrupp Marine	DE	
			LloydWerft Bremerhav.	DE	
			Aalborg Industrie A/S	DK	Only as subcontractor
			Sevilla shipyard	ES	Only as subcontractor
			Construcciones navales	ES	Only as subcontractor
			STX Finland OY	FI	
			Fincantieri	IT	
			Keppel Verolme	NL	
			ICH Merwede	NL	
			Damen shipyards	NL	
			STX Norway	NO	
			Bergen Group ASA	NO	
			Ulstein Verft/ Group	NO	
			STX Europe	RO	Only as subcontractor
			DMHI / Mangalia	RO	Only as subcontractor
			Santierul Naval Const.	RO	Only as subcontractor
			Admiralty Shipyard St.P.	RU	
			Baltic Shipyard St.Petg.	RU	
			Kockums AB	SE	Only as subcontractor
			Gotaverken Cityvarvet	SE	Only as subcontractor
1b	Decks equipment	Anchorage, Bollards Mooring winches All cranes Lifeboat, Davits Ice searchlights	Palfinger Bulgaria	BG	
			Neuenfelder Maschinenfab.	DE	
			Liebherr International	DE	
			Palfinger Germany	DE	
			Hatlapa	DE	
			Rotzler	DE	
			Mac Gregor	FI	
			Palfinger France	FR	
			Palfinger Italy	IT	
			MELCAL cranes	IT	
			BLM ship cranes	IT	
			National Oilwell Varco	NO	
			Hydra Pro	NO	
			NDM winches	NO	
			GMC Group	NO	
			Huisman	RO	
			Liebherr International	RU	

			Mac Gregor Sweden	SE	
			Liebherr International	UK	
			Palfinger UK	UK	
2	**Propelling plant**	**Rudder, Propeller Steering gear, Stern tube seal Bow and Stern Thruster**	Mecklenb. Metallguss	DE	
			Hatlapa (Becker Rudder)	DE	
			Wärtsila Propellers	FI	
			Sea of solution	NL	
			Roll Royce	NO	
			Ulstein Group	NO	
3	**Main Engine plant**	**All the Diesel engines, All the Generators, Traction motors,**	MAN ship power	DE	
			Wärtsila Ship power	FI	
4	**Auxiliary machinery**	**All the Boilers, compl. All the Pumps, compl. All the coolers, compl. All the heaters, compl. All separators,compl. All the compressors Sewage plant, compl. Control engineering Tank gauge, compl. Bilge separator, compl.**	Alfa Laval	All	
			GEA	All	
			ABB	All	
			SIEMENS	All	
			Alstholm Power	DE, IT, DK, ES, FR, UK, NL	
			Veolia	RU, NO, IT, DK, FR, UK, NL, BE, SE	
			Allweiler AG	DE	
			ThyssenKrupp Marine S.	DE	
			BehrensPumpen	DE	
			KSB AG	DE	
			Bornemann Pumps	DE	
			L-3 SAM Electronics	DE	
			DVZ group	DE	
			ROCHEN	DE	
			Grundfos A/S	DK	
			IRON A/S	DK	
			Aalborg- industries	DK	
			SBS Regional Office	DK, IT	
			Bombas Azcue Pumps	ES	
			Pentax	IT	
			Jowa Marine B.V.	NL	
			Jowa Norge A/S	NO	
			L-3 Valmarine AS	NO	
			Kongsberg Norcontrol	NO	
			Sperre Industri AS	NO	
			Tamrotor Marine Comp. AS	NO	
			IMO Pump AB	SE	
			Dawson Downie lamont	UK	
			Wildbore Pumps	UK	
			Mono Pumps LDT	UK	
			Hamworthy	UK	

Annex 2. Memo on Procurement Law (2010)

The following memo provides an overview of European procurement law and focuses on its impact on the awarding procedure for the construction of the AURORA BOREALIS. The document presents the different procedures existing and how they impact on the contracting phase.

The document should be used as a tool to assess the impact of procurement law on the construction of the vessel and identify ways of mitigating it. A limitation of the influence of procurement law, or an exemption from it, would favour the use of in-kind contribution in the cost-sharing model of the vessel.

1. Aim

European public procurement law has been designed to support a free and competitive Europe-wide market by opening the EU's public procurement market to competition. This is achieved through the regulation of the purchasing by public sector bodies and certain utility sector bodies of contracts for goods, works or services. The law prevents "buy national" policies and promotes the free movement of goods and services. Public procurement laws are harmonised at the European level by two directives[1], directive 2004/17/EC for the water, energy, transport and postal service sector and directive 2004/18/EC on the coordination of procedures for the award of public work contracts, public supply contract and public service contracts.

2. Coverage of the Regulation

The Regulation applies when three main pre-conditions are met. The conditions are attached to the characteristics of the contract and define:

- The legal status of the contacting authority
- The nature of the contract (public or private)
- The value of the contract

Each of these elements will be further developed below in order to see whether they would be met for the AURORA BOREALIS.

2.1 Legal status of the contracting authority

Procurement law only applies if the procuring body is a "contracting authority" as defined in the rules (Article 1,9). The definition given in the directive is wide and includes central government, local authorities, associations formed by one or more contracting authorities and other "bodies governed by public law".

The legal entity created for the management of the construction of the AURORA BOREALIS is likely to be a contracting authority in the meaning of the directive. Indeed the entity will involve and will be managed by ministries and/or research institutes acting on behalf of ministries which are all governed by public law (article 1,9).

The legal status of the entity and the fact that it has been created under private law rather than public law will not impact on the status of *"contracting authority".* The key element considered is the source of funding. If the entity is *"financed, for the most part, by the State, regional or local authorities, or other bodies governed by public law…"* (Article 1,9,c), it will then be a contracting authority.

2.2 Nature of the contract

Procurement law is applicable if the contract is a public works, services or supplies contract. But the contract can also be a mixed contract (e.g. for the supply and maintenance of an item).

The contract for the construction of the vessel will be a *public work contract* in the light of the definition given in the preamble (10) of the directive 2004/18/EC.

Indeed the tasks performed for the construction of the vessel all fall under the scope of Annex 1 of the directive and especially class 45.21 *"General construction of buildings and civil engineering works"*. The contract for the construction of the vessel will therefore be subject to directive 2004/18/EC and will be considered as a *work contract* with potentially some services contracts attached to it.

2.3 Value of the contract

In order to prevent the application of relative constraining rules to small contracts, the directive sets the minimum value of the contract which should be considered for its application. The estimated value is considered net of VAT. The directive should apply if the value equals or exceeds the relevant financial threshold**.**

The current thresholds are:

- 4 845 000 € for the procurement of works
- 125 000 € for the procurement of supplies and so called Part A services by Central Government bodies (state)
- 193 000 € for the procurement of supplies and Part A services by other public sector bodies

1. For more information on the directives, please consult: http://ec.europa.eu/internal_market/publicprocurement/legislation_en.htm

With a foreseen construction cost of around 800 M€, the contract concerning the construction of the vessel will exceed the minimum levels set in the directive.

A breakdown of the contract into several smaller ones can be considered depending on the nature of the work performed, e.g one contract for the final design of the vessel and another for the construction.

However a breakdown of contracts into smaller ones with the sole intention of reducing the overall value of each contract should be avoided as the directive expressly and strictly prohibits such behaviour.

The AURORA BOREALIS complies with the three pre-conditions listed above; the contracting authority should therefore advertise the contract in the EU's Official Journal and follow the procedural rules set down in the Regulation.

3. Type of procedure

Contracts caught by the Regulation must be advertised by way of an OJEU notice, i.e. a standard form notice placed in the EU's Official Journal.

The selection process following the publication will then, depending on the choice of the contracting authority, either be an open procedure or a restricted procedure. These two procedures are the general ones and can be applied without restriction.

Two other alternative procedures are also possible: the competitive dialogue and the negotiated procedure, but these can be applied only under specific conditions.

Paragraph 3.1 below, *"Procedures which can be used without restriction"*, describes, for information, the open and restricted procedures. These are however not the most favourable for the AURORA BOREALIS. The negotiated procedure and competitive dialogue are more appropriate and are desccribed in 3.2*, "Procedures applicable under specific circumstances"*

3.1 Procedures which can be used without restriction

3.1.1 Open procedure

This procedure is often used for the procurement of commodity products which do not require a complex tender process in order to be purchased. No negotiation with the tenderers is permitted but there are no restrictions under the Regulations as to when the procedure can be used.

Under this procedure all interested parties can submit a tender in response to the OJEU notice. This means that anyone responding to the OJEU notice can ask to be sent a copy of the contract documents. So candidates will not only provide any information requested by the contracting authority as part of a short listing or 'selection' exercise, they will also submit a tender at the same time. However this does not necessarily mean that everyone's tender will be evaluated. The authority can evaluate all tenders if it wants to, but it can also decide only to evaluate the tenders of those candidates who meet the selection criteria that the authority has set.

3.1.2 The restricted procedure

All interested parties may express an interest in tendering for the contract but only those meeting the contracting authority's selection criteria will be invited to do so. Candidates answering an OJEU notice should therefore first submit any information required by the authority as part of its selection stage. Candidates who get through the selection stage will then submit a tender when invited to do so by the authority.

No negotiation with the tenderers is permitted but there are no restrictions under the Regulations as to when the procedure can be used.

3.1.3 Open *vs* restricted

The awarding of contracts under the restricted procedure allows better management of the whole process by the contracting authority and would be preferable for the AURORA BOREALIS. Indeed, in an open procedure the contracting authority does not control the level of information shared with potential applicants. All the technical information necessary for an interested candidate to apply would have to be public which could be damaging for the entire process.

An open procedure for the construction of the AURORA BOREALIS is therefore not recommended.

However neither of the two general procedures is best suited for the construction of the vessel as its complexity would require extended exchanges between the contracting authority and the applicants to solve the technical, financial and legal issues surrounding the project.

3.2 Procedures applicable under specific circumstances

To address this issue two alternative procedures have been set up by the directive. These procedures favour a more in depth exchange between the contracting authority and the applicants but can only be used under specific conditions.

3.2.1 The competitive dialogue

This relatively new procedure introduced by the Regulation has the advantage of allowing the input of those participating in the tender process.

All interested parties may express an interest in tendering for the contract but only those meeting the contracting authority's selection criteria will be invited to do so.

During the dialogue tenderers are able individually to discuss all aspects of the contract with the contracting authority. Solutions are worked up with each tenderer on the basis of the ideas and proposals put forward by that tenderer. There can be no 'cherry-picking' by the authority of the best bits of various individual solutions, except with the **consent of those concerned**. Once the dialogue has generated potential solutions to the authority's requirements, the remaining tenderers are invited to submit a final tender based on their individual solutions. The best tender can then be selected, but there is limited room for any further changes to be made once submitted.

3.2.2 The negotiated procedure

There are two types of negotiated procedure. Under the negotiated procedure **without** prior advert, the contracting authority is not required to issue an OJEU notice and may negotiate directly with the supplier of its choice. Under the negotiated procedure **with** prior advert, however, an OJEU notice must be published.

All interested parties may express an interest in tendering for the contract but only those meeting the contracting authority's selection criteria will be invited to do so.

Under the negotiated procedure with prior advert, tenderers are invited to negotiate the terms of the advertised contract with the contracting authority. The Regulations do not set out any rules to govern the conduct of negotiations, which means that the contracting authority can, within certain parameters, establish its own procedures for the negotiation and tender stage.

3.2.3 Competitive dialogue *vs* negotiated procedure

3.2.3.1 Conditions of applicability

Competitive dialogue

Article 29 of the directive states *"In the case of particularly complex contracts, Member States may […] use of the competitive dialogue in accordance with this Article."* The notion of *complex* contracts is further developed in the EC explanatory note on competitive dialogue which describes a contract as complex when the contracting authorities are not *"objectively able to define the technical means… capable of satisfying their needs or objectives and/or – are not objectively able to specify the legal and/or financial make-up of the project."*[2]

In the light of the technical, financial and legal issues surrounding the project, it is reasonable to consider that the contract for the construction of the vessel will fulfill both of these criteria. The use of the competitive dialogue is therefore possible for the awarding of the contract for the construction of the AURORA BOREALIS.

Negotiated procedure

The conditions justifying the use of a negotiated procedure are listed under Article 30 of the directive, for the procedure with prior publication, and Article 31 for the procedure without prior publication. The criteria set in Article 31 are too restrictive and the AB will not be able to use a negotiated procedure without prior publication.

Article 30(1)(d) however states that a negotiated procedure with prior publication of a contract notice is possible: *"in respect of public works contracts, for works which are performed solely for purposes of research, testing or development and not with the aim of ensuring profitability or recovering research and development costs."*

Taking into the consideration the purpose of the AURORA BOREALIS, which is a multi-disciplinary platform aiming at supporting polar research, and the fact that the vessel is not meant to be operated in a commercial way, the use of the negotiated procedure for the awarding of the contract for the construction of the vessel is possible and should be considered as an option.

3.2.3.1 Advantages

Both the competitive dialogue and the negotiated procedure have obvious advantages which would be useful in the implementation of an integrated cost-sharing system, including in-kind contributions.

Competitive dialogue

Competitive dialogue would allow direct interactions with the applicants in order to refine their offer and see how they could meet the needs of the contracting authority. However this dialogue should be individual and still lead ultimately to a competitive call for tender.

The real advantage of competitive dialogue, however, lies in the possibility to deviate from this general rule and enter, with the consent of the applicants, into a multiparty negotiation to identify how each applicant could participate in the project.

This behaviour, also referred as "cherry picking", describes the situation where the contracting authority would pick the best aspects of each of the applications

2. Explanatory note – competitive dialogue – classic directive http://ec.europa.eu/internal_market/publicprocurement/explan-notes_en.htm

and end up with a custom-made solution. This scenario would be very favourable for the AB as it would guarantee a fair control on the allocation of the contracts, thus favouring the use of in-kind contribution.

In order to be effective this option would need the consent of all the selected applicants. This could be made possible by stipulating in the tender notice that acceptance of the invitation to participate implies consent.

Negotiated procedure

In the negotiated procedure the contracting authority consults the contractors of its choice and negotiates the terms of the contract (technical, administrative or financial conditions) with one or more of them.

The contracting authority is therefore able to act in the same way as a private economic operator not only when awarding the contract, but also during the prior discussions. The only requirement is that the contracting authority should *"adopt an active approach in determining the terms of the contract, such as prices, completion deadlines, technical specifications and guarantees"*[3] and comply with the rules of good administrative practice.

The contracting authority would have to select the candidates it invites to take part in the negotiated procedure from those presenting the qualifications specified in the notice it has published. The qualifications would have to be those provided by Articles 24 to 29 of the directive (contractor's personal standing, economic and technical capacity, etc) but cannot be in relation with the candidate's country of origin.

The use of the negotiated procedure for the AB would make it possible to enter into direct negotiations with only a restricted number (or one single) of shipyards. The contracting authority thus has control over the entire awarding process and could easily implement, through negotiation, the cost-sharing model developed with the partners.

3.3 Conclusion

From the four possible procedures (open, restricted, competitive dialogue and negotiated) the negotiated procedure is by far the one providing the contracting authorities with the most flexibility in the management of how the contract is awarded for the construction of the vessel.

Only the negotiated procedure would allow an effective implementation of the cost-sharing model agreed with the partners and the use of in-kind contribution.

The call for tender for the construction of the vessel should take advantage of the use of the negotiated procedure with prior publication under the conditions of Article 30 (1)(d) of the directive. However, if this is not possible, an alternative way should be found to limit or suppress the influence of public procurement law.

4. Exemption from procurement law

The exemptions to directive 2004/18/EC are listed under section 3 and mainly related to the field of the contracts concerned (telecommunications, defense, etc) or the fact that the contracts are following other procedures.

Article 15(c) states: "*This Directive shall not apply to public contracts governed by different procedural rules and awarded: pursuant to the particular procedure of an international organisation.*" According to this article, if the contracting authority is an international organisation, all its contracts are exempt from procurement law.

One of the only ways of obtaining exemption from procurement law for the AB would therefore be that the structure acting as contracting authority to have the status of an international organisation.

4.1 Contracting authority as international organisation

To assume the status of international organisation in the meaning of Article 15(c) of the directive, the AURORA BOREALIS legal entity (acting as contracting authority) should be created by means of an international treaty. However the process leading to the signature of an international treaty can long and protracted.

4.2 European Research Infrastructure Consortium (ERIC)

An alternative to the status of international organisation in the meaning article 15(c) of the directive is to create a European Research Infrastructure Consortium (ERIC).

ERIC has been created by COUNCIL REGULATION (EC) No 723/2009 of 25 June 2009[4] and is a new legal structure dedicated to the management of big research infrastructures. This new legal framework guarantees future ERICs with various advantages: limited liability, exemption from VAT and other excise duties as well as exemption from procurement law.

Exemption from procurement law is mentioned in alinea 10 of the Council Regulation and states:

3. Guide to the Community rules on public works contracts, p. 29 http://ec.europa.eu/internal_market/publicprocurement/guidelines_en.htm

4. ERIC Legal framework http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=eric

"The ERIC should also benefit from certain exemptions as an international organisation for the purpose of applying Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004…"

A legal structure with the status of an ERIC is therefore exempt of public procurement law.

5. Conclusion

A "direct" exemption from procurement law via the article 15(c) of the directive seems to be the ideal scenario for the implementation of the cost-sharing model of the AURORA BOREALIS and an effective use of in-kind contribution. The two options for creating an international organisation or an ERIC are both advantageous and will be further analysed in deliverable 6.1 of the project on the "*List of recommended scenarios for legal implementation structure to be used on the facility".*

In both cases the entity having the status of international organisation or ERIC will be the contracting authority for the construction phase and the one owning the vessel thereafter.

Should the creation of an ERIC be impossible and the construction of the vessel therefore become subject to public procurement law, the contracting authority would still be able to use the negotiated procedure.

The use of the negotiated procedure would also be beneficial for the implementation of the cost-sharing system foreseen for the vessel but would require close monitoring of the process.[5]

5. For more information on the negotiated procedure, please consult: http://www.publicprocurementguides.treasury.gov.cy/OHS-EN/HTML/index.html?5_1_what_is_the_negotiated_.htm

Annex 3. Note on Structural Funds (2010)

1. What are structural funds?

a. General aim

Structural funds are an EU tool supporting the cohesion policy (i.e. the policy which intends to overcome regional economic disparities within the EU) and represent a major part of EU spending. Their general aim is to *"reinforce economic and social cohesion by redressing the main regional imbalances through support for the development and structural adjustments of regional economies."*

b. Main objectives

The structural funds have three main objectives:

- **Convergence Objective**

This objective covers regions whose gross development product (GDP) per capita is below 75% of the EU average and aims at accelerating the economic development of these regions. The priorities under this objective are human and physical capital, innovation, knowledge society, environment and administrative efficiency.

- **Regional Competitiveness and Employment Objective**

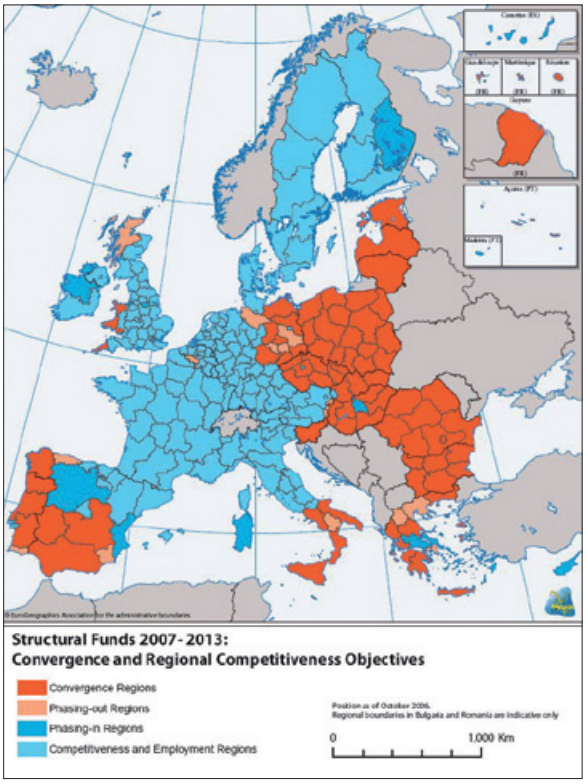
This objective covers all regions of the EU territory, except those already covered by the Convergence Objective. It aims at reinforcing competitiveness, employment and attractiveness of these regions. Innovation, the promotion of entrepreneurship and environment protection are the main themes of this objective.

- **Territorial Cooperation Objective**

This objective aims to promote cooperation between European regions, as well as the development of common solutions for issues such as urban, rural and coastal development, economic development and environment management. The objective comprises three strands:

– cross-border cooperation
– transnational cooperation
– Interregional cooperation

The convergence regions are those that receive most of the funding but some structural funds are available to all regions.



c. How much money is available for research infrastructures?

The amount dedicated to structural funds for the 2007–2013 period is around 277 billion € in total for all EC countries. Out this sum 86 billion € are available for innovation and research.

Research infrastructures in particular are eligible for funding under **"Research and development Infrastructures and centres of competence in a specific technology**" of DG REGIO (Code 02). Under this particular code, the total amounts available are the following:

- 7.34 Billion € for Convergence
- 2.30 Billion € for Competitiveness and Employment
- 42.11 M € for European Territorial Cooperation

These sums are however not solely dedicated to research infrastructures but are also open to other research related activities.

Annex 3. Note on Structural Funds (2010)

d. What kind of funds exists?

The three Objectives mentioned above are supported by the different funds summarised below:

- European Regional Development Fund (ERDF)
- European Social Fund (ESF)
- Cohesion Fund

Objectives	Structural Funds and instruments		
Convergence	ERDF	ESF	Cohesion Fund
Regional Competitiveness and Employment	ERDF	ESF	
European Territorial Cooperation	ERDF		

Objectives, Structural Funds and instruments

- **The European Regional Development Fund (ERDF)**

The ERDF supports programmes addressing regional development, economic change, enhanced competitiveness and territorial co-operation throughout the EU. Funding priorities include research, innovation, environmental protection and risk prevention, while infrastructure investment retains an important role, especially in the least-developed regions.

- **The European Social Fund (ESF)**

The ESF is for strengthening competitiveness and employment by helping Member States and regions to adapt the workforce, their enterprises and entrepreneurs with a view to improving the anticipation and positive management of economic change, in particular by promoting lifelong learning and increased investment in human resources, the development of qualifications and competences, the dissemination of information and communication technologies, e-learning, eco-friendly technologies as well as the promotion of innovation and business start-ups.

- **The Cohesion Fund**

The Cohesion fund is for Member States whose gross national income per capita is below 90% of the EU average. The Cohesion Fund contributes to interventions in the field of the environment and trans-European transport networks. It applies to Member States with a gross national income (GNI) of less than 90% of the community average, which means it covers the new Member States as well as Greece and Portugal. Spain will be eligible for the Cohesion Fund on a transitional basis

e. Structural funds – instrument at the regional level

The main characteristic of structural funds is that they are handled at the regional level. The European Commission negotiates and approves the operational programmes proposed by the Member States and allocates resources.

The Member States then appoint a **Managing Authority** which manages the programmes through the selection of the projects fulfilling the set objectives. The Managing Authority varies from one country to another and can either be a national, regional or local public authority or a public/private body.

The Managing Authority is the **key interlocutor** for all information relating to and applications for structural funds. The list of Managing Authorities country per country can be found at:

http://ec.europa.eu/regional_policy/manage/authority/authority_en.cfm

f. What is the selection process?

The selection process to apply for structural funds varies from one region to another. Applicants need to contact the relevant Managing Authority and/or consult the relevant web-sites for information on calls for proposals, eligibility, funding conditions and award procedures (e.g. ongoing application and project selection, calls for proposals on specific topics or competitions with fixed deadlines, etc).

The project selections criteria are agreed by each operational programme's Monitoring Committee and are published (e.g. on Managing Authority websites). Projects will be evaluated according to these criteria.

It is important to note that a research infrastructure project submitted to a structural funds programme will not only be judged on its scientific or technological quality **but also on its likely contribution to the socio-economic development of the Member State or region.**

What about AURORA BOREALIS?

1. Is the AURORA BOREALIS eligible for structural funds?

DG Research together with DG Regio assesses projects of the ESFRI roadmap to validate their eligibility to apply for structural funds.

This however does not mean that they would be granted such funds, only that the regions of the stakeholders identified have some structural funds available.

For AURORA BOREALIS out the three main objectives of the structural funds, the members of the consortium are eligible for only two: **convergence and competitiveness**.

The list of the stakeholders and the type of fund and the level of funding available are summarised in the table below.

2. What happens next?

Two different approaches should be considered depending whether AURORA BOREALIS wants to apply for the structural funds allocated for the 2007–2013 period or prepare for the next phase, which is 2014–2020.

a. The current structural funding period, 2007-2013:

National and Regional Operational Programmes for this period are already set and entities willing to apply for structural funds would have to verify that their projects meet the criteria of these programmes. The different lists of programmes as well as the list of regional Managing Authorities are available on:

http://ec.europa.eu/regional_policy/atlas2007/index_en.htm

Country	City-region	Organisation	Total budget available for research and development infrastructures and centres of competence in a specific technology
Convergence			
Bulgaria	Sofia	BAI	54 400 000 €
Romania	Bucharest	FAR	241 377 573 €
Competitiveness and employment			
Belgium	Bruxelles	FNRS	47 605 939 €
Finland	Helsinki	MERENTUTKIMUSLAITOS	85 703 780 €
	Helsinki	AKER ARCTIC Technology OY	
France	Paris	CNRS	489 027 466 €
	Strasbourg	ESF	
	Plouzane	IPEV	
Germany	Bonn	BMBF	313 136 549 €
	Bremerhaven	AWI	
Italy	Roma	CNRS	99 249 959 €
	Roma	PNRA	
Netherlands	Den Haag	NWO	39 622 000 €

The amounts mentioned in the table above are available for all ESFRI projects, in competition with other research related activities.

Annex 3. Note on Structural Funds (2010)

b. The next phase, 2014-2020

For the 2014–2020, it is important to first understand how the priorities for the 2007–2013 structural funding period have been set at both national and regional level.

i) National level: the National Strategic Reference Framework

National Strategic Reference Framework (NSRF) establishes the main priorities for spending the EU Structural Funds a Member State receives between 2007 and 2013; each Member State has its own NSRF. The National Framework is a requirement of the Structural Funds Regulations for 2007–2013, and establishes the high-level strategy for Structural Funds Operational Programmes in the Member State for that period. The document provides an overview of the economic strengths and weaknesses of the Member States regions, and sets out the approach to future structural funds spending across the Member State.

ii) Operational Programmes

An Operational Programme (OP) sets out Regions' priorities for delivering the funds. Although there is Regional flexibility, a Region's priorities must be consistent with their Member States NSRF. There is an Operational Programme for each Region in the EU. These OPs, just like the NSRF, have to be adopted by the Commission before any implementation.

The exact process for the next phase is still uncertain but it is foreseen that a similar approach will be implemented.

It is therefore important for AURORA BOREALIS to lobby the Managing Authorities to make sure that the interests of the project are reflected in the NSRF and Regional Operational Programmes.

3. And practically?

The lobbying activities needed for AURORA BOREALIS are not as straightforward as for other projects. Indeed as being neither a distributed nor a single-site infrastructure, it is difficult to identify who to approach and what to push for.

The solution is to identify for all the current and future participants in the project (stakeholders, shipyards, manufacturers, research institutes, etc) involved either in the construction and/or operation of the ship, and define **THEIR** interest and how **THEY** could benefit from the implementation of the ship.

The approach should not be global but a succession of single coordinated initiatives.

A practical example for the AURORA BOREALIS would be the interaction between a stakeholder and a shipyard to discuss their potential interest for the project. This discussion could culminate in a letter of interest from the shipyard and be addressed to the Managing Authority.

The letter would emphasise the benefits resulting from the construction of the vessel and the shipyard's involvement in the process. The benefits described should meet the general objectives of the structural funds and could be, for instance, employment of skilled labour, the development of new technology improving the competitiveness and attractiveness of the company through their participation in this innovative project…

As a result the Managing Authority could eventually adapt its regional operational programme to make sure that the activities and/or the project described in the letter of interest are integrated.

In the course of the funding of the construction of the ship, the stakeholder could then apply for structural funds by sending a request to the Managing Authority under the condition that the company which sent the letter of interest or another company from the region is involved.

This is merely one example, but it illustrates the type of interaction which could be implemented. Other initiatives involving other industries and partners are also possible.

This is the right time for such initiatives as discussions on the next cohesion policy are currently taking place. It is important to ensure that the AURORA BOREALIS and the research infrastructures in general are included in those discussions.

All scientists help to install the ITAC (Ice-Thetered Acoustic Current Profiler) station

Arctic and Antarctic Research Institute (AARI), Russian Federation

Aker Arctic

Aker Arctic Technology Incorporated (AARC), Finland

Alfred Wegener Institute for Polar and Marine Research (AWI), Germany

Belgian Federal Science Policy Office (BELSPO), Belgium

Bundesministerium für Bildung und Forschung (BMBF), Germany

Bulgarian Antarctic Institute (BAI), Bulgaria

Consiglio Nazionale delle Ricerche (CNR), Italy

Centre national de la recherche scientifique – Institut national des sciences de l'Univers (CNRS-INSU), France

European Consortium for Ocean Research Drilling (ECORD), France

European Science Foundation (ESF), France

Romanian Antarctic Foundation (FAR), Romania

Finnish Meteorological Institute (FMI), Finland

Geological Survey of Denmark and Greenland (GEUS), Denmark

Institut Polaire Français Paul Émile Victor (IPEV), France

Management Unit of the North Sea Mathematical Models / Royal Belgian Institute of Natural Sciences (MUMM / RBINS), Belgium

Netherlands Organisation for Scientific Research (NWO), The Netherlands

Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS), Italy

Programma Nazionale di Ricerche in Antartide (PNRA SCrl), Italy

Finnish Environment Institute (SYKE), Finland

University of Bergen (UiB), Norway

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