



## PERIODIC REPORT

Grant Agreement Number: PITN-GA- 2013- 607545

Project Acronym: **ForSEAdiscovery**

Project Title:

**Forest Resources for Iberian Empires. Ecology and Globalization in the age of Discovery (16<sup>th</sup>-18<sup>th</sup> centuries)**

Funding Scheme: Marie Curie, Initial Training Network, Programme PEOPLE

Periodic Report: 4<sup>th</sup>; Period Number: Second

PERIOD COVERED from: 01/02/2016 to 31/01/2018

Name, title and organization of the scientific representative of the project's coordinator:

**Dr. Ana Crespo Solana, Instituto de Historia, Centro de Ciencias Humanas y Sociales, Consejo Superior de Investigaciones Científicas (CSIC)**

Tel.: +34 916022329

e-mail: [ana.crespo@cchs.csic.es](mailto:ana.crespo@cchs.csic.es)

Project website address:

<http://forseadiscovery.eu/>

## Periodic Report

### PROJECT PERIODIC REPORT

<b>Grant Agreement number:</b>	607545
<b>Project acronym:</b>	ForSeaDiscovery
<b>Project title:</b>	Forest resources for Iberian Empires: Ecology and Globalization in the Age of Discovery
<b>Funding Scheme:</b>	FP7-MC-ITN
<b>Periodic report:</b>	2
<b>Period covered - start date:</b>	01/02/2016
<b>Period covered - end date:</b>	31/01/2018
<b>Project co-ordinator:</b>	
<b>Organisation PIC:</b>	999991722
<b>Organisation legal name:</b>	AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS
<b>Person in charge of scientific aspects:</b>	
<b>Title:</b>	Dr.
<b>First name:</b>	Ana
<b>Name:</b>	CRESPO SOLANA
<b>Tel:</b>	+34 91 6022329
<b>Fax:</b>	
<b>E-mail:</b>	programas.europeos@csic.es
<b>Project website address:</b>	www.forseadiscovery.eu

### DECLARATION BY THE PROJECT COORDINATOR

I, Dr. Ana CRESPO SOLANA, as co-ordinator of the project (607545, ForSeaDiscovery), hereby confirm that:

- The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;
- The project has fully achieved its objectives and technical goals for the period;
- The project Website is up to date.
- To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project and if applicable with the certificate on financial statement.
- All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 5 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

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## **1. PARTNERS of the ForSEAdiscovery Consortium:**

1. Dra. Ana Crespo Solana (ITN coordinator) *Centro de Ciencias Humanas y Sociales (CCHS) del Consejo Superior de Investigaciones Científicas (CSIC)*
2. Dra. Rosa Varela Gomes (Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa (FCSH-UNLA))
3. Dr. Ignacio García González (Universidad de Santiago de Compostela (USC))
4. Dr. Antonio Martínez Cortizas ((Universidad de Santiago de Compostela (USC))
5. Dr. Nigel Nayling (University of Wales Trinity Saint David (UWTSD))
6. Mr. Garry Momber (Maritime Archaeology Ltd (MALtd))
7. Dr. Ute Sass-Klaassen (Wageningen Universiteit (WU))
8. Dr. Catia Antunes (Universiteit Leiden (UL))
9. Dr. Jan Willem Veluwenkamp (Rijksuniversiteit Groningen (RUG))
10. Dr. Anne Poszwa (Université de Lorraine (UdL))

### *Associated Partners:*

1. Dr. Filipe Vieira de Castro (Texas A&M University)
2. Dr. Aoife Daly (Statens Museum for Kunst, Denmark)
3. Dr. Miguel San Claudio (Archeonauta S.L.)
4. Dr. Tomasz Wazny (Nicolaus Copernicus University, Poland)
5. Malcolm Dixelius (Dixit International)

María Luisa Bas Pardo (Project manager, Instituto de Historia, CSIC)





## **2. PUBLISHABLE SUMMARY**

In the Early Modern Age (16th-18th centuries) the construction of ocean-going ships was paramount to the development of cultural encounters in what became known as the Age of Discovery. In the case of the Iberian Empires, the establishment of new trade routes brought the need for armed merchantmen, galleons and smaller vessels, placing unprecedented demands on Iberian forests for the supply of construction timber. Forestry and sea power became inextricably linked, creating new geopolitical tensions, alliances and forest regulations. The main objective of this project is to increase the research background and experience of the research fellows through a combination of dedicated training in both transferable and research specific skills, and their participation in a truly multidisciplinary research project which combines historical, archaeological and wood-sciences methodologies in the study of the exploitation of Iberian and other European forest resources for shipbuilding during the Age of Discovery. During the project, research actions have focused on addressing specific scientific and technological objectives according to the three closely interdisciplinary work packages:

Archival research has been conducted in Spanish, Dutch and Portuguese archives in order to set and analysis patterns of demand for timber (particularly oak and pine) for Iberian shipbuilding are also being identified through examination and analysis of shipbuilding contracts (*'asientos'*), merchant networks, treatises and standards (e.g. *'ordenanzas'*). A multi-lingual thesaurus of Iberian shipbuilding terms, focused on ship timbers, has been developed and continues to be expanded as the terminology of different authorities are added. A relational database and Geographic Information System (GIS) has been designed to manage the diverse datasets being collected and synthesized including the journeys of ships and fleets which sailed from Spain and Portugal to the Americas and Asia; shipwrecks which have been identified as archaeological sites or in archival sources; architectural features of such shipwrecks; samples of timber coming from different sources (shipwrecks, historical buildings, and wood from living trees); and results of different types of analysis (dendro-analysis, isotope analysis, DNA analysis, etc.).

An archaeological diving team has been developed through a combination of assessment of fellows' diving qualification and competence, a period of intensive diver training leading to qualification (UK HSE SCUBA) as scientific divers, and a sustained campaign of archaeological diving and sampling of historic shipwrecks. Nautical diving campaigns have been undertaken in Spain, Portugal and United Kingdom on Iberian historic shipwrecks. Samples taken from these sites were passed to wood science fellows for dendrochronological analysis, and to provide those researchers developing new analytical approaches with control samples from shipwrecks with known origins (Bayonnaise, Magdalena). A team, working in collaboration with local archaeologists, undertook a detailed study of an early collection of ship's timbers in Esposende, Northern Portugal. This sub-project provided an opportunity to develop innovative 3D



digital approaches to recording and analysis, allowed targeted sampling for wood science, and, through running of an open summer school, access to this innovative work for other researchers and interested local volunteers. In the United Kingdom, timber samples were recovered from the Yarmouth Roads protected wreck, a suspected late-16th century Spanish merchant vessel. There has been very positive engagement with external archaeological projects with ForSEAdiscovery divers recovering timber samples from the Delta III wreck (Cadiz), the suspected 16th century Highbourne Cay shipwreck (Bahamas), and the Emanuel Point wrecks (Florida, USA). Throughout these research actions, public and journalistic engagement has been excellent leading to numerous opportunities for outreach of project objectives and actions, and the wider aspirations of the Marie Curie program to a wide, non-academic audience.

The third main groups of researchers, developing approaches to wood provenance, have been equally industrious carrying out sampling of living trees and historic buildings in targeted locations in the Iberian Peninsula where, historically, timbers were sourced for shipbuilding. Such sampling campaigns included black pine from central Spain and Andalusia; Scots pine from central Spain, and oaks from the Basque country, Eastern Cantabria, and Asturias. Core samples from these living trees were used to develop chronologies of ring-width and anatomical features with which to date material from Iberian shipwrecks. The chronologies produced were extended back in time through analysis of samples from historic buildings, reaching the beginning of the 14th century for the oaks in the North, and the 11th century for the pines. Studies on wood organic compounds using FT-IR and pyrolysis, Sr-isotopic and elementary composition of the wood and nearby soil and rocks, and DNA-analyses helped develop a set of techniques for improving wood provenancing. This historical material, together with that obtained in Southern Spain, and several samples from the first shipwrecks were the basis for the first methodological tests of the groups involved in organic and inorganic markers.

The project so far has been characterised by the multi-disciplinary approach with researchers training in each other's core disciplines, as well as their own, and participating in each other's research actions. Collaboration and interaction within teams has been encouraged to foster the skills needed for successful research career development. The project is developing a relational database to hold diverse data on historical shipbuilding in the Iberian Peninsula which will become a major research and heritage management tool in the future. In parallel, guidance on protocols and best practice (in areas such as archaeological diving and sampling practices) and the development of wood provenancing methods will foster scientific approaches in the understanding and protection of underwater cultural heritage wherever Iberian shipwrecks survive. These developments will have impacts within government policy, heritage practice (within both academic and commercial research environments), and more widely in terms of non-academic appreciation of the role of science in understanding our common maritime heritage.

Contact:

ITN Coordinator: Prof. Dr. Ana Crespo Solana, Instituto de Historia, Consejo Superior de Investigaciones Científicas, Calle Albasanz, 26-28, Madrid, Spain.

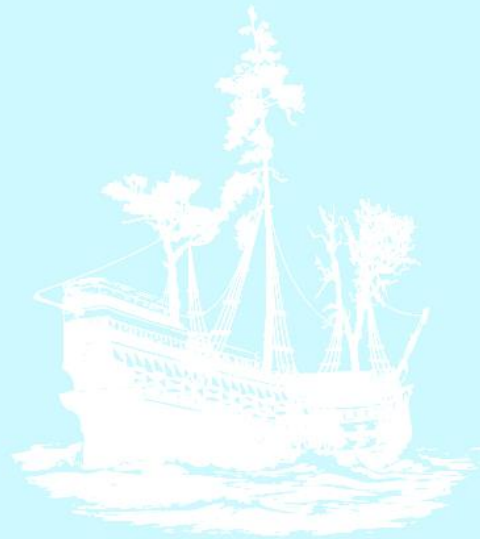
E-mail: [ana.crespo@cchs.csic.es](mailto:ana.crespo@cchs.csic.es)

Training Coordinator: Prof. Nigel Nayling, School of Archaeology, History and Anthropology, University of Wales Trinity Saint David, Llandrindod Wells, Ceredigion SA48 7ED, Cymru, United Kingdom.

E-mail: [n.nayling@uwtsd.ac.uk](mailto:n.nayling@uwtsd.ac.uk)

Scientific Coordinator: Prof. Dr. Ignacio García-González, Universidad de Santiago de Compostela, Campus de Lugo, Departamento de Botánica, Escola Politécnica Superior, 27002 Lugo, Spain.

E-mail: [ignacio.garcia@usc.es](mailto:ignacio.garcia@usc.es)







### **3. PROJECT OBJECTIVES FOR THE PERIOD February 1 2016 to January 31 2018**

#### **3.1. Comments:**

The project objectives for the reporting period February 1 2016 to January 31 2018, as included in Annex I of the Grant Agreement comprise scientific and technological objectives, and training objectives.

These objectives need to be seen within the broader research context of the project. In the Early Modern Period, wood was the first and most important natural resource for building and arming navies for the expansion and conquest of new territories, as well as for subsequent merchant operations. In this respect, the use and exploitation of forest resources over the modern period is comparable to the use of oil since the Industrial Revolution in terms of its strategic importance. This paradigm is especially important in the naval history of Spain and Portugal during the Early Modern Ages. It is this historiographical framework which delineates the **ForSEAdiscovery** project.

The **ForSEAdiscovery** project is situated within Atlantic history during the first global age and has a dual objective: to collect bibliographic and documentary information as well as other literature on naval construction and the use of timber within the political, administrative and economic framework in which the trade, distribution and utilization of forest resources was conducted in the Iberian empires; and to complement this with analysis of the archaeological evidence collected from Iberian shipwrecks, timber and other artefacts. Dendroarchaeology, complemented by a range of analytical techniques, has been applied to samples from selected shipwrecks that are thought to have been built in Iberian Peninsula. Dendrochronology has the potential to determine the year in which the trees used for ship timber production were cut, and also to determine the geographical origins of these parent trees. This adds value to historical knowledge of these shipwrecks and to validate the information from historical sources. It is important to know how timber trade networks were organized to deliver forest resources to shipbuilding locations. Given the wealth of information available in historical databases on how wood was transported from Northern and Eastern Europe to the Iberian Peninsula between the sixteenth to eighteenth centuries, it would be reasonable to suppose that we should identify at least a proportion of the timber found in shipwrecks as being of non-Iberian origin (through dendro-provenancing). Whilst dendrochronological approaches to historical dating and the provenance of timber have become widely applied in North-Western Europe, this has not been fully developed in the Iberian Peninsula. The **ForSEAdiscovery** project has sought to begin to address this problem through development of regional ring-width and anatomical chronologies for areas known to have supplied timber for shipbuilding during the early modern period, and to explore new, complementary techniques for provenance of timber through anatomical, isotopic and geochemical approaches. These have potential

application both within the Iberian context but also more generally in as analytical tools for dendro-provenance.

### **3.2. Scientific and Technological Objectives:**

- **STO1:** To create an inventory based on archival information of the sources of oak and pine used for shipbuilding in Atlantic Iberia during the Age of Discovery and European expansion (16<sup>th</sup> to 18<sup>th</sup> centuries) (WP1);
- **STO2:** To collate historical and archaeological information regarding construction features of specific ships in Atlantic Iberian shipyards and contemporary timber usage at a time of significant technological developments (16<sup>th</sup> and 17<sup>th</sup> centuries) (WP1 and WP2)
- **STO3:** To characterise the wood from those sources in terms of tree-ring patterns (ring width, pointer years), wood anatomy (species level) and geo/dendrochemistry (isotopes);
- **STO4:** To investigate how the supply of timber (both local supplies and imported timber) and its dynamic trade networks were organized (WP1 and WP3)
- **STO5:** To synthesize results from STO1 to STO4 to produce guidance on best practice for multi-proxy methods for the analysis and provenance of timber employed in 16<sup>th</sup> to 18<sup>th</sup> centuries wooden ships
- **STO6:** To develop a GIS-based model combining information from the different disciplines involved in the project (history, archaeology, wood provenancing) to provide a tool to study of the use of European forest resources for world exploration and European expansion between the 16<sup>th</sup> and 18<sup>th</sup> centuries (WP1, WP2 and WP3).

The main objective of this project is to increase the research background and experience of the fellows through a combination of dedicated training in both transferable and research specific skills, and their participation in a truly multidisciplinary research project which combines historical, archaeological and dendrochronological methodologies in the study of exploitation of Iberian and other European forest resources for shipbuilding during the Age of Discovery and European expansion. Specific training objectives for the project comprise:

### **3.3. Training Programme objectives (TOs) of *ForSEADiscovery*:**

- **TO1:** To develop and enhance independent thinking through the training process, to produce in this way creative researchers with excellent transferrable skills, including the ability to transform abstract ideas into influential outcomes, by being able to (i) conduct methodologically and ethically sound interdisciplinary research, (ii) obtain research funding, and (iii) present research results to professional and lay audiences.
- **TO2:** To provide academic, private and public-sector employers with researchers skilled in developing innovative concepts and able to apply a wide range of techniques and direct experience of interaction across disciplines and sectors.
- **TO3:** To create an active, life-long interdisciplinary network of young researchers whose personal contacts, support and expertise will help Europe to shape the future of research in the Humanities through the integration of disciplines from the Life Sciences.
- **TO4:** To cascade expertise and spread good practice throughout Europe by personnel exchange and delivering European researchers able to become independent researchers and leaders in research of Cultural Heritage in the near future.
- **TO5:** To make a career in History, Archaeology and Heritage studies more attractive to ESRs by delivering a well-structured interdisciplinary training programme, supported by leading international scientists in state-of-the art technology and research infrastructure which covers a portfolio of interdisciplinary techniques.

No recommendations were made on previous reports, so no responses are necessary.

### 3.4. Increasing the research backgrounds and experience of fellows:

The Table below indicates the individual research projects developed by each of the fellows. In some cases, these projects have led to the realization of a doctoral thesis. Fellow's final reports are available and attached to this Periodic Report.

Fellow	Research Project /PhD (if any)
Ana Rita Trindade (ESR1)	<i>Timber supply for shipbuilding in Cadiz in the early Bourbon Period (1717-1759): from regional forestry to importations</i> (PhD)
Maria Bastião (ESR2)	Portuguese Forest resources and timber supply in the Age of Discovery and expansion (AD 1500-1800)
Manish Kumar (ESR3)	Portuguese timber imports from the Baltic, 1669-1815: A study based on Sound Toll Registers Online
Germán Jiménez Montes (ESR4)	Trading Networks involved in Timber Trade: mechanisms and routes (Individual Project)/ <i>Supplying the enemy? North-European providers of timber in Seville from 1570 to 1598</i> (PhD)
Beñat Eguiluz Miranda (ESR5)	Reconstructing timber in Spanish-Atlantic shipbuilding - treatise and archaeology (Individual Project)/ <i>Atlantic Shipbuilding and the Iberian Bizcayan transition (1550-1650)</i> (PhD)
Adolfo Miguel Martins (ESR6)	Developing dendro-archaeological approaches in Nautical Archaeology: integration of ring studies, dendrochronology and timber morphology (3D CAD) for the reconstruction of past forestry practice and exploitation (Individual Project)/ <i>Reconstructing Trees from Ship Timber Assemblages Using 3D Modelling Technologies</i> (PhD)
Antonio Rochas Santos (ESR7)	<i>The Portuguese Forest and its association with Shipbuilding, during the 16th Century</i> (PhD)
Koldo Trápaga Monchet (ESR8)	Forestry, timber supply and military struggle in Portugal (c. 1560-1640) (Individual Project)/ <i>La reconfiguración política de la Monarquía Católica: la actividad de don Juan José de Austria (1642-1679)</i> (PhD)
Marta Domínguez Delmás (ESR9)	Development and implementation of a tree-ring data network for the assessment of the date and provenance of Iberian ship-timbers (Individual Project)/ <i>Forest History, Timber supply and Tree Rings. A dendroarchaeological approach to the study of Iberian cultural heritage</i> (PhD)
Linar Akhmetzyanov (ESR10)	Application of ecological wood anatomy for species determination and wood provenancing of oak and pine from Atlantic Iberia (Individual Project)/ <i>Provenancing of oak and pine wood from Atlantic Iberia by application of wood anatomical analyses</i> (PhD)
Mohamed Traore (ESR11)	Identification of Potential biomarkers of provenance of the wood from Iberian typology shipwrecks (15th to 17th centuries) (PhD)
Fadi Hajj (ESR12)	Geochemical fingerprinting of potential source areas of wood from shipwrecks (Individual Project)/ <i>Use of stable and radiogenic strontium isotopes to trace the provenance of wood:</i>



	<i>Application on wood from shipwrecks (PhD)</i>
Nathan Gallagher (ESR13)	A Methodology for Estimating the Volume of Baltic Timber to Spain Using the Sound Toll Registers: 1670-1806
Selina Ali (ESR14)	Digital data compilation and accessible archives: Developing models for sustainable research data.
Ignacio González Espinosa (ESR15)	Shipwrecks in the Iberian coasts during the 16th-17th Century. Vessels, provenances and routes
José Luis Gasch-Tomas (ER1)	Development and implementation of a GIS-based model for timber provenance and mercantile wood-trade routes
Sara Rich (ER2)	Research protocols for interrogation of shipwreck assemblages: recovery, documentation and analyses of structural ship timbers from in situ shipwrecks
Peter Groenendijk (ER3)	Provenancing timber from a multidisciplinary approach: dendrochronology, wood anatomy and geo/dendrochemistry

See also Fellow's secondment reports in attachment to this report and see also: <http://forseadiscovery.eu/content/fellows-scientific-activities>



## **4. WORK PROGRESS AND ACHIEVEMENTS DURING THE SECOND PERIOD**

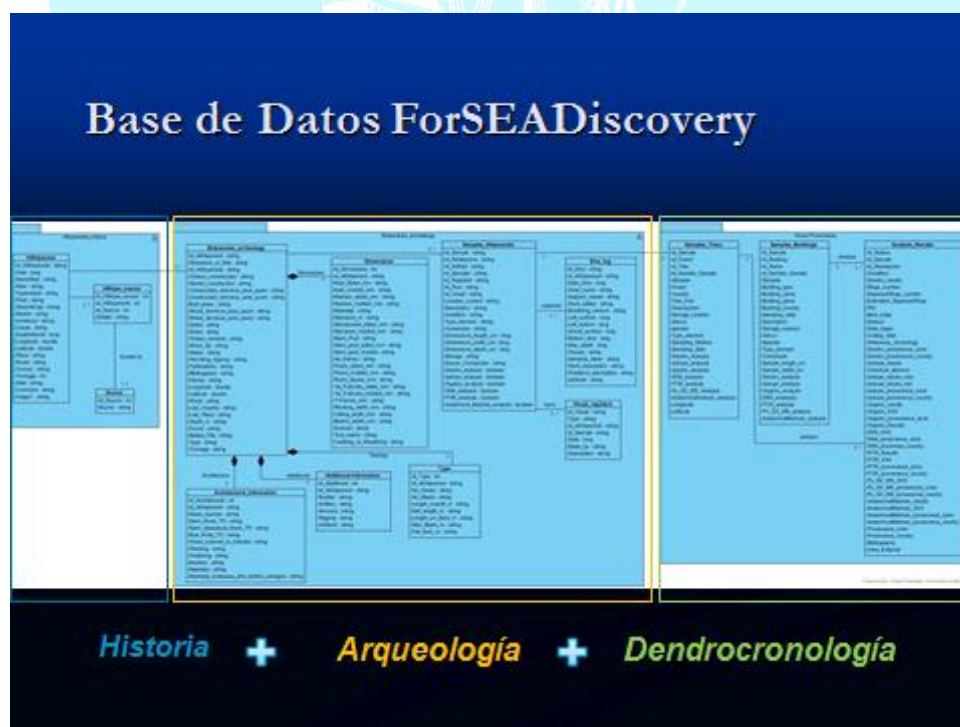
### **4.1. Scientific Activities by Work Packages according to Annex 1:**

#### **4.1.1. WP1: Historical Wood Supply and Dynamic Trade Networks**

The overall scientific progress of the WP1 has been based on the a) Contribution to the creation of an inventory based on archival information of the sources of oak and pine used for shipbuilding (16th-18th centuries). These data are very fragmented and a synthesis and analysis of this document is ongoing. Archives have been identifying with primary documents and a Catalogue of sources must be done in the future. B) Compilation of Historical sources. Archival research has been conducted in many Spanish and Portuguese archives, both national and regional, and also in Dutch archives complementing analysis of the Danish Sound tolls. Patterns of demand for timber (particularly oak and pine) for Iberian shipbuilding are also being identified through examination and analysis of shipbuilding contracts ('*asientos*'), treatises and standards (e.g. '*ordenanzas*'). Fellows of WP1 have collaborated with WP2 in the collation of historical and archaeological information regarding construction features for the Milestone number 2: Thesaurus of shipbuilding. The ER1 (working together with ER2 and ER3) has led the developing of a GIS-based model combining information from the different disciplines involved. GIS Technician hired by the ForSEAdiscovery project has been fundamental also to organize and check data; collecting and cross-checking information from previous databases, including the Soundtoll Register online, Crespo DynCoopnet data collection, Texas A&M (Filipe Castro).

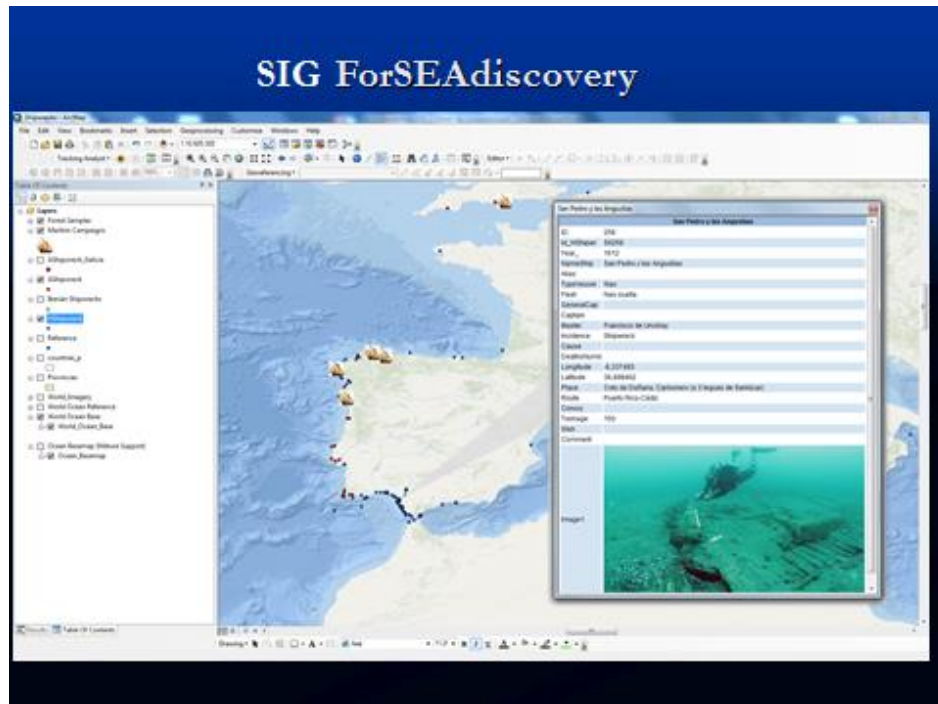
An important milestone (Deliverable number 4 of the WP1 as in the original proposal) to be achieved in the WP1 is the database: “Database of Historical information specific areas in Atlantic Iberia where oak and pine wood was logged to supply specific Atlantic Iberian Shipyards with timber for shipbuilding from the 16th to 18th centuries” The objective is to design a Conceptual Model to build a GIS where we can integrate historical cartography and maps by different regions, the historical information that tell us where the “Montes de marina” were localized with the dendrochronological information; Scanning and Digitizing Map Data (layers of historical maps and evolutive forestry maps by areas); the creation a Geodatabase and the implementation in a GIS. Cartography: thematic maps (scale, layers (forest) or attributes (oak, pine): We have compiled a cartographic material from both Historical cartography and maps available in geoportal of Spanish Ministerio de Agricultura, Alimentación y Medio Ambiente: Services WMS de Ecosistemas- Mapa Forestal de España.

The ForSEADiscovery Datamodel integrate data and historical cartography. The ForSEADiscovery database is currently been completed with a large volumes of data of many sorts: journeys of ships and fleets which sailed from Spain and Portugal to the Americas and Asia; shipwrecks which have been identified as archaeological sites or in archival sources; architectural features of such shipwrecks; samples of timber coming from different sources (shipwrecks, historical buildings, and wood from living trees); and results of different types of analysis (tree-ring and wood anatomical analyses, wood and soil Sr-isotope analysis and inorganic composition, and molecular biomarkers). Furthermore, we have started entering data in the main tables of the database: A. Ships (by exporting data from previous databases); B. Shipwrecks-History (Information about shipwrecks documented in written information; C. Shipwrecks-Archaeology (Data on archaeologically-documented shipwrecks and their construction characteristics; D. Timber samples. **See Table Exploitable Foregrounds in the Final Report**





A plan for the future is to develop a webmapping/Visualization software for GIS in accordance with GSDI (Global Spatial Data Infrastructure Association), INSPIRE (Infrastructure for Spatial Information in Europe), LISIGE (Spanish Laws about infrastructure and Geographic information System in Spain), OGC (Open Geospatial Consortium) and Open Access Declaration signed by CSIC.



#### 4.1.2. WP2: Nautical Archaeology and Shipbuilding

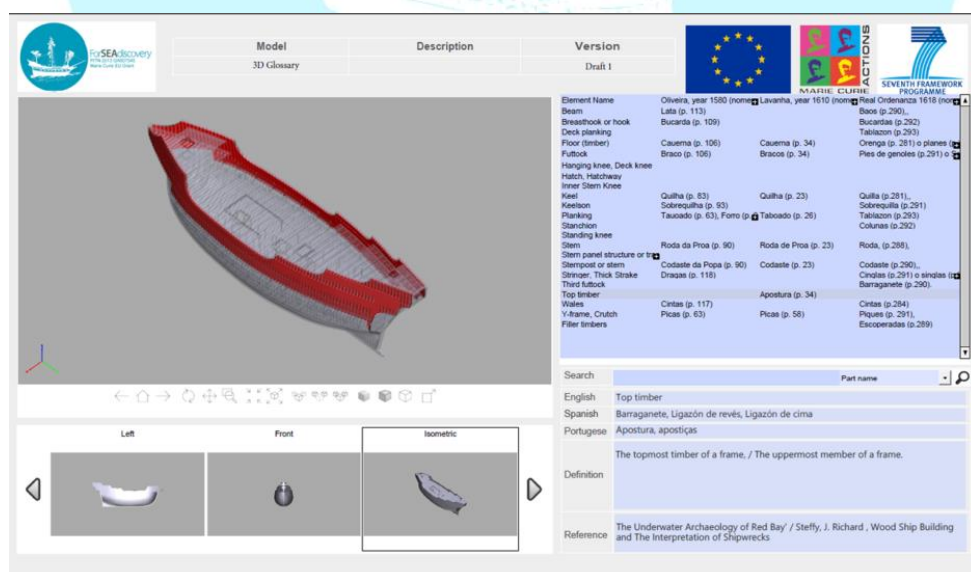
A multi-lingual thesaurus of Iberian shipbuilding terms, focused on ship timbers, has been developed and continues to be expanded as the terminology of different authorities are added. This has now been expanded to include a visual glossary of ship terms disseminated by associate partner TAMU. An innovative development has been the creation of a 3D PDF model providing an interactive learning object where key ship timbers of a ship model (consistent with early 16<sup>th</sup>-century ship architecture) can be highlighted in three languages (English, Spanish and Portuguese) and defined using a range of sources. An expanded geo-referenced database archaeologically identified shipwrecks of the early modern period has been compiled and disseminated on the web by associate partner TAMU. A relational database has been designed to manage the diverse datasets being collected and synthesised including the journeys of ships and fleets which sailed from Spain and Portugal to the Americas and Asia; shipwrecks which have been identified as archaeological sites or in archival sources; architectural features of such shipwrecks; and samples of timber coming from different sources (shipwrecks, historical buildings, and wood from living trees); and results of different types of analysis (dendro-analysis, isotope analysis, DNA analysis, etc.).

The archaeological diving team developed during the first half of the project, and now complemented by an additional fellow (ESR14), continued to advance their diving skills through field operations on additional historic shipwrecks in the United Kingdom. Further timber samples were recovered from the Yarmouth Roads protected wreck, a suspected late-16th century Spanish merchant vessel, in April and May 2016. Samples taken from this site were passed to wood science fellows for dendrochronological analyses, and to provide those developing new analytical approaches with control samples from shipwrecks with suspected Iberian origins. In June 2016, in collaboration with the archaeological diving company Mediterraneo Servicios Marinos S.L, samples were taken from the Delta III shipwreck in the approaches to Cadiz harbour. These samples were sent to USC for dendrochronological analysis and dated against Dutch/German chronologies indicating construction in the late 16<sup>th</sup> century. This is seen as a significant development indicating the utility of integrating dendro-archaeological sampling and analysis into commercial archaeology marine projects in Iberia. In July and August 2017, members of WP2 worked with the Connected Worlds: Highbourne Cay Shipwreck Project funded by the Institute of Nautical Archaeology and National Geographic to re-excavate and sample one of the earliest (suspected early 16<sup>th</sup> century) Iberian vessels yet found in the Americas (Bahamas). This represented an intentional strategy to integrate ForSEAdiscovery team members within relevant archaeological projects where dendro-archaeological capacity would both assist in delivery of those projects objectives and those of the ForSEAdiscovery project. In this instance, although excavation is not been completed, samples were recovered and in situ observation of the nature of the timber employed in the ship's construction undertaken. Due to the nature of the timber employed (immature oak trees with insufficient rings for dendrochronological analysis), samples were not forwarded to WP3 for analysis. Further diving operations were also undertaken with MA Ltd in 2017 by WP2 fellows primarily to develop their diving experience and competence on modern shipwrecks and prehistoric submerged landscapes.

Additional terrestrial and intertidal fieldwork was undertaken by fellows on prehistoric subfossil trees on the island of Islay, Scotland (in collaboration with University of Reading), on conserved early modern shipwrecks on display in museums (ESR6 in collaboration with associate partner DDK on the Bremen Cog, Germany and the Batavia, Australia); and the intertidally exposed, possibly 16<sup>th</sup> century shipwreck at Tankerton, Kent (through the UWTSD commercial arm UWLAS in collaboration with Wessex Archaeology and Historic England). These actions contributed towards the fellows' training in dendro-archaeological approaches and exposed them to research in a range of different environments including commercial and museum based projects.



Predominantly through the efforts of ESR14, selected data generated by the archaeological research actions on suspected Iberian ships has been compiled into an archaeological archive submitted to the Archaeology Data Service (UK). This work has been assisted by a grant of £15,000 from the Marine Environmental Data and Information Network (MEDIN). Data included in the archive (once inception has been completed) will include site specific reports, photogrammetric models, site photographs, dive operations documentation and dendrochronological reports on samples recovered for analysis. Throughout these research actions, public and journalistic engagement has been excellent leading to numerous opportunities for outreach of project objectives and actions, and the wider aspirations of the Marie Curie program to a wide, non-academic audience.



#### 4.1.3. WP 3: Wood Provenancing

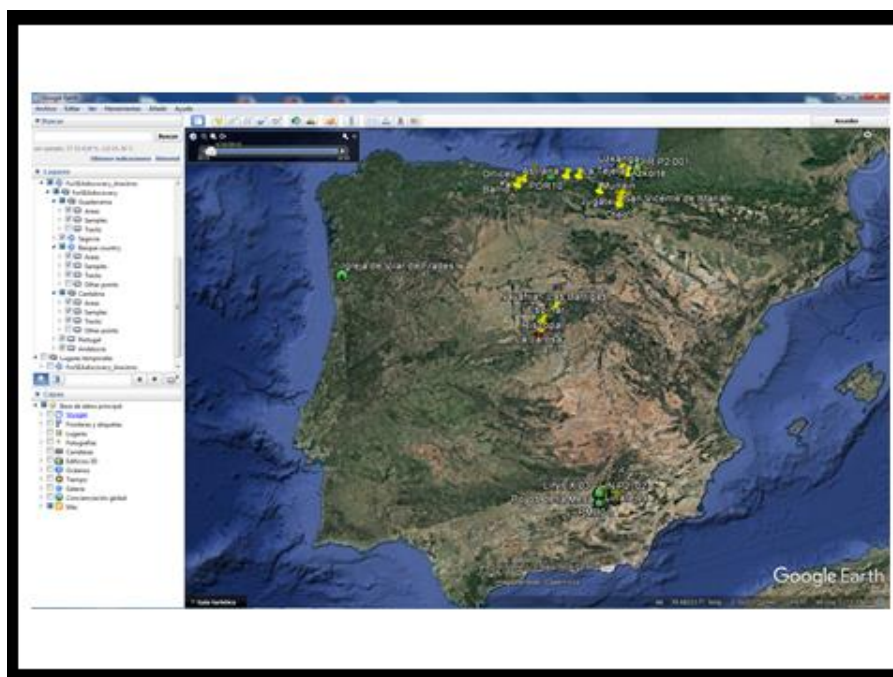
The third main groups of researchers, developing approaches to wood provenance, have been equally industrious carrying out sampling of living trees and historic buildings in targeted locations in the Iberian Peninsula where timbers were historically sourced for shipbuilding, or closer areas that could potentially be used to identify wood from source areas. Such sampling campaigns in 2014-17 included black pine from Central Spain and Andalusia, Scots pine from Central Spain; and oaks from the Basque country, Eastern Cantabria, and Asturias. Core samples from these living trees, and for Sr-isotopic and element studies from adjacent soil too, were collected to characterise the chemical composition of the wood and sites of origin, and to help develop ring-width and anatomical chronologies with which to date material from Iberian shipwrecks. The chronologies produced were extended back in time through analysis of samples from historic buildings in selected regions such as Andalusia (provinces of Granada, Huelva, and Sevilla, pines; 11th century); Central Spain (Segovia, pines, 15th century), as well as the Cantabrian area (Basque Country, Eastern Cantabria, and Asturias, oaks; 13th century). A great part of the living trees, and some of this historical material, together with several samples from the first shipwrecks were the basis for the first methodological tests of the groups involved in organic and inorganic markers.

##### 1. Information about sampling campaigns

The overall dendrochronological sampling campaigns were the following:

- Living trees buildings (pines)/– Andalusia (autumn 2014)
- Living trees (oaks) – Basque Country (spring 2015)
- Living trees/buildings (pines) – Andalusia (summer 2015)
- Living trees (oaks) – Basque Country (autumn 2015)
- Living trees/buildings (pines) – Central System (summer 2016)
- Buildings (oaks) – Basque Country (autumn 2016)
- Living trees/buildings (oaks) – Cantabria (autumn 2016)
- Living trees (oaks) – Asturias (spring 2017)
- Buildings (oaks and pines) – Portugal (autumn 2017)





Participants in each sampling campaign and the exact dates have been detailed in other documents.

The main sampling campaigns for the development of the chronology network took place between 2014 and 2016, during the main fellows' activities. However, the last sampling campaign of living trees, which took place in March 2017 in the reserve of Muniellos (Asturias) was of special interest. Scientific activities at this site are very restricted, and we had the opportunity of doing this during ForSEAdiscovery. This site was one of the main sources of timber for the Iberian Peninsula during centuries, which unfortunately prevented us from taking long chronologies at this site. However, it allowed us to extend the oak chronology network spatially, and also confirmed the need of getting wood from historical buildings in future dendrochronological research.

The last sampling campaign in Portugal was mainly performed in cooperation with the associate partners and combined with dissemination activities. The importance of wood importation in this part of the Iberian Peninsula was corroborated by this sampling action.

Two workshops on dendro-archaeology were held in Lisbon. The first, held on 11<sup>th</sup> April 2017 at the National Museum of Archaeology brought together academics, commercial archaeologists, museum and heritage professionals. Presentations on the ForSEAdiscovery project and best practice were followed by a practical session. Participants were encouraged to read the draft protocols and make comment to assist in the final publication of these as an Open Access output of the project. The second workshop was preceded by several days of site visits and sampling exercises at the stores of archaeologically recovered ship assemblages from Lisbon (Campo de Cebollas and Boa Vista) and in historically important buildings in Lisbon and Evora. A one-day public meeting was held under the auspices of the Associação dos Arqueólogos Portugueses (AdAP) at the Museu Arqueológico do Carmo, Lisbon on



10<sup>th</sup> November 2017. The meeting was opened by representatives of the AdAP, Ana Crespo-Solana as the ForSEAdiscovery network co-ordinator (CSIC), and Rosa Varela Gomes (UNLA). Presentations included papers by the scientists in charge for WP2 and WP3 and associate partners Aoife Daly (DDK) and Tomasz Wazny (NCU).

#### **4.2. Collaborative Research Actions involving multiple Work Packages**

The project has been characterised by a multi-disciplinary approach with researchers training in each other's core disciplines, as well as their own, and participating in each other's research actions. Collaboration and interaction within teams has been encouraged to foster the skills needed for successful research career development. The relational database is holding diverse data on historical shipbuilding in the Iberian Peninsula which will become a major research and heritage management tool in the future. In parallel, guidance on protocols and best practice (in areas such as archaeological diving and sampling practices) and the development of wood provenancing methods will foster scientific approaches in the understanding and protection of underwater cultural heritage wherever Iberian shipwrecks survive. These developments will have impacts within government policy, heritage practice (within both academic and commercial research environments), and more widely in terms of non-academic appreciation of the role of science in understanding our common maritime heritage.

Fellows and supervisors worked in multi-disciplinary teams across the work packages to prepare papers for the international underwater archaeology conference in Fremantle, Australia in December 2016 (see IKUWA 6 below). These papers will be published in due course in the peer-reviewed conference proceedings. See chapter "Dissemination activities" in this report" and

<http://forseadiscovery.eu/content/scientific-activities>



## **5. DELIVERABLES AND MILESTONES TABLE**

### **5.1. Recruitment table**



## DELIVERABLES AND MILESTONES TABLE

### RECRUITMENT

Fellow First Name	Fellow Surname	Recruiting participant	Type of Contract	Category	Location of origin	Gender	Family charges	Start date of secondment/recruitment	Duration of secondment / recruitment	End date of secondment/recruitment	Working time commitment	Full-time equivalent person-months covered during the reporting period	Declaration of Conformity submitted
José Luis	Gasch Tomás	CSIC	A	ER	ES-Spain	Male	Yes	01/12/2014	21	31/08/2016	Full Time	7	Yes
Ana Rita	Trindade	CSIC	A	ESR	PT-Portugal	Female	No	01/10/2014	36	30/09/2017	Full Time	20	Yes
Koldo	Trapaga Monchet	FCSH-UNL	A	ESR	ES-Spain	Male	No	01/10/2014	30	31/03/2017	Full Time	14	Yes
António	Santos	FCSH-UNL	A	ESR	PL-Poland	Male	No	01/09/2014	36	31/08/2017	Full Time	19	Yes
Ignacio	Gonzalez Espinosa	FCSH-UNL	A	ESR	ES-Spain	Male	No	01/07/2017	6	31/12/2017	Full Time	6	Yes
Mohamed	Traore	USC	A	ESR	ML-Mali	Male	No	01/10/2014	36	30/09/2017	Full Time	20	Yes
Peter	Groenendijk	USC	A	ER	NL-Netherlands	Male	Yes	18/05/2015	20	17/01/2017	Full Time	11.5	Yes
Marta	Dominguez Delmas	USC	A	ESR	NL-Netherlands	Female	No	01/09/2014	36	31/08/2017	Full Time	19	Yes
Adolfo	Martins	UWTSD	A	ESR	PT-Portugal	Male	Yes	01/09/2014	36	31/08/2017	Full Time	19	Yes
Selina	Ali	UWTSD	A	ESR	US-United States	Female	No	01/08/2016	18	31/01/2018	Full Time	18	Yes
Benat	Eguiluz	UWTSD	A	ESR	ES-Spain	Male	No	01/09/2014	36	31/08/2017	Full Time	19	Yes
Sara	Rich	MA Ltd	A	ER	BE-Belgium	Female	Yes	08/12/2014	24	07/12/2016	Full Time	10.25	Yes
Linar	Akhmetzyanov	WU	A	ESR	RU-Russian Federation	Male	Yes	20/08/2014	36	19/08/2017	Full Time	18.75	Yes
Maria	Bastiao	UL	A	ESR	PT-Portugal	Female	No	01/12/2014	12	30/11/2015	Full Time	0	Yes
Nathan	Gallagher	RUG	A	ESR	US-United States	Male	No	01/09/2015	12	31/08/2016	Full Time	7	Yes
Germán	Jiménez Montes	RUG	A	ESR	ES-Spain	Male	No	01/01/2015	36	31/12/2017	Full Time	23	Yes
Manish	Kumar	RUG	A	ESR	IN-India	Male	No	01/09/2015	24	31/08/2017	Full Time	19	Yes
FADI	HAJJ	UdL	A	ESR	LB-Lebanon	Male	No	01/09/2014	36	31/08/2017	Full Time	19	Yes

**No. of full-time equivalent months covered during this reporting period: 269.5**

**M - Months**

**RESR - Researcher**

**FAC B - Fixed amount contract B (%)**

RECRUITMENT																																				
Participants	R.1	R.2	R.3	R.4	R.5	R.6	R.7	R.8	R.9	R.10	R.11	R.12	R.13	R.14	R.15	R.16	R.17	R.18	R.19	R.20	R.21	R.22	R.23	R.24	R.25	R.26	R.27	R.28	R.29	R.30	R.31	R.32	R.33	R.34	R.35	R.36
CSIC	36	1					36	1		24	1					24	1			0						0			0						0	
FCSH-UNL	72	2			3		72	-1			0						0			0						0			0						0	
USC	72	2					72	2		24	1					24	1			0						0			0						0	
UWTSD	90	3					90	3			0						0			0						0			0						0	
MA Ltd		0						0		24	1					24	1			0						0			0						0	
WU	36	1					36	1			0						0			0						0			0						0	
UL	12	1					12	1			0						0			0						0			0						0	
RUG	72	3					72	3			0						0			0						0			0						0	
UdL	36	1					36	1			0						0			0						0			0						0	
Total	426	14			3		426	11		72	3			0		72	3			0			0			0			0			0			0	

R.1 : Foreseen months (ESR)

R.2 : Foreseen researchers (ESR)

R.3 : Foreseen Fixed amount contract B (%) (ESR)

R.4 : Implemented months (ESR)

R.5 : Implemented researchers (ESR)

R.6 : Implemented Fixed amount contract B (%) (ESR)

R.7 : Difference months (ESR)

R.8 : Difference researchers (ESR)

R.9 : Difference Fixed amount contract B (%) (ESR)

R.10 : Foreseen months (ER)

R.11 : Foreseen researchers (ER)

R.12 : Foreseen Fixed amount contract B (%) (ER)

R.13 : Implemented months (ER)

R.14 : Implemented researchers (ER)

R.15 : Implemented Fixed amount contract B (%) (ER)

R.16 : Difference months (ER)

R.17 : Difference researchers (ER)

R.18 : Difference Fixed amount contract B (%) (ER)

R.19 : Foreseen months (VS <10)

R.20 : Foreseen researchers (VS <10)

R.21 : Foreseen Fixed amount contract B (%) (VS <10)

R.22 : Implemented months (VS <10)

R.23 : Implemented researchers (VS <10)

R.24 : Implemented Fixed amount contract B (%) (VS <10)

R.25 : Difference months (VS <10)

R.26 : Difference researchers (VS <10)

R.27 : Difference Fixed amount contract B (%) (VS <10)

R.28 : Foreseen months (VS >10)

R.29 : Foreseen researchers (VS >10)

R.30 : Foreseen Fixed amount contract B (%) (VS >10)

R.31 : Implemented months (VS >10)

R.32 : Implemented researchers (VS >10)



*R.33 : Implemented Fixed amount contract B (%) (VS >10)*

*R.34 : Difference months (VS >10)*

*R.35 : Difference researchers (VS >10)*

*R.36 : Difference Fixed amount contract B (%) (VS >10)*

## 5.2. Comments about recruitment of fellows:

a) Recruitment of fellows: The recruitment process has been developed in full agreement with the European Code of Conduct for Recruitment of Researchers and Marie Curie guidance on best practice, assuring that the recruitment and selection process has been open, supportive and transparent.

During the second period of the project some fellows have needed to leave the project because they have found a full position in a university or research centre. Justification of leaving fellows is as follow:

1. Nathan Gallagher (ESR13): Terminated his contract early for personal reasons on August 30 2016
2. José Luis Gasch Tomas (ER1): On 1 September 2016 the ER1 José Luis Gasch Tomas left the project (two months before the original end of his contract) because he secured a full position in another institution.
3. Koldo Trapaga Monchet (ESR8): Left the project on April 2017 because he secured a full position in the Universidad Rey Juan Carlos de Madrid (Spain).

After the Annex 1 amendment signed in January 2016,

The contract for ER3 Peter Groenendijk was not extended as planned in the amendment. The reason for this was the fact that he secured a permanent position at the University of Campinas (Brazil), starting in February 2017. For this reason, he left Spain a couple of days after the first contract was finished.

New calls have been published worldwide in both EURAXESS and in the ForSEAdiscovery web page.

1. Extension of contract Manish Kumar (ESR3): On 30 August 2016 the ESR13 fellow, Nathan Gallagher, hired in the RijkUniversiteit Groningen (RUG) sent his resignation letter to the ForSEAdiscovery Consortium and left the project for personal reasons. As a result, the Consortium decided to extend the contract of the ESR3 fellow Manish Kumar in RUG. The extension of Manish Kumar' contract would completion of the information on early modern timber import into Portugal and other achievements that remained to be done by Nathan Gallagher. A justification letter was sent by their supervisor Prof. Dr. Jan Willem Veluwenkamp (RUG) to the ITN Coordinator on 16 December 2016. The contract of Manish was extended until 1 September 2017.

-Two new fellows were hired:

a) ESR14 Selina Ali: Career Development plans and Declaration of Conformity (sent and signed by Prof. Nigel Nayling and the fellow on September 2016 and signed by the ITN coordinator A. Crespo Solana on January 2017) has been properly updated. (See: <http://forseadiscovery.eu/content/esr14-selina-ali>)

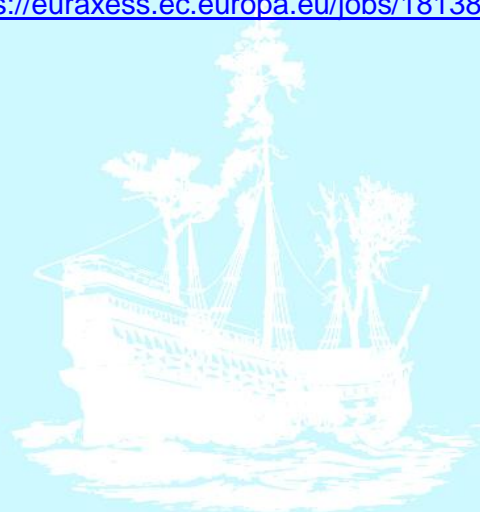
b) ESR15 Nacho González Espinosa: A new call was opened by the UNLA: On April 2017, the fellow Koldo Trápaga Monchet (ESR8) left the ForSEAdiscovery project because he secured a position at the Universidad Rey Juan Carlos (Madrid). Even

though that researcher had made an excellent contribution to the Project because he still had six months of employment contract, he had not completed the research he was engaged on. There was outstanding research required to meet the following milestones:

- a. To make an inventory of Portuguese shipwrecks by collecting data from the bibliography;
- b. GIS layer on Portuguese shipwrecks by integrating the aforementioned data;
- c. To collect data stored in both Portuguese and Spanish Archives regarding Portuguese forests and how they supplied timber for shipbuilding
- d. GIS layer on Portuguese forest management by integrating the aforementioned data.

Taking that into consideration, and after report properly to Project Officer, the ForSEAdiscovery consortium approved the opening of a new call for a Marie Curie Early Stage Researcher fellow (6 months contract) at the Universidade Nova de Lisboa (UNLA) in order to achieve the objectives intended for the Portuguese part of the Project.

The new call is here: <https://euraxess.ec.europa.eu/jobs/181382>





## 6. INTERNATIONAL CONFERENCES /EVENTS OPEN TO EXTERNAL RESERACHERS

Table.



## INTERNATIONAL CONFERENCES / EVENTS OPEN TO EXTERNAL RESEARCHERS

Event Number	Participant hosting the event	Type of Event	Month when the event took place	Start date of the event	End date of the event	Total number of researchers outside the network attending the event	Total number of researcher days for researchers from outside the network attending the event	Website of the event
1	UWTSD	Intensive Training Course and Network meeting (C6)	28	23/05/2016	28/05/2016	26	5	<a href="http://forseadiscovery.eu/courses/c6-dendroarchaeology-ships-prospect-and-practice">http://forseadiscovery.eu/courses/c6-dendroarchaeology-ships-prospect-and-practice</a>
2	UWTSD	IKUWA 6. The Sixth International Congress on Underwater Archaeology. Western Australian Museum	34	28/11/2016	02/12/2016	500	4	<a href="https://www.nauticalarchaeologysociety.org/content/ikuwa6">https://www.nauticalarchaeologysociety.org/content/ikuwa6</a>
3	FCSH-UNL	2. International Conference: Árvores, Barcos e Homens na Península Ibérica (Séculos XVI-XVIII),	35	25/01/2017	26/01/2017	55	2	<a href="http://forseadiscovery.eu/sites/default/files/attachments/documents/programa_-_seminario_lisboa_2017.pdf">http://forseadiscovery.eu/sites/default/files/attachments/documents/programa_-_seminario_lisboa_2017.pdf</a>

Total number of researchers outside the network attending the event	Total number of researcher days for researchers from outside the network attending the event
581	11

**Planned number of researcher days for researchers from outside the network attending the event: 0**

**Remaining number of researcher days for researchers from outside the network attending the event: -11**

**I declare that the events in category F for which a contribution is claimed did not give rise to a profit: Yes**

### Comments:

International Conferences /Event open to external researchers. List

Important note: Several Peer reviewed publications have been produced as a result of this events and dissemination.

1. Intensive Training Course and Network meeting (C6) Dendroarchaeology of Ships: Prospect and Practice (University of Wales Trinity Saint David, Lampeter, Wales, United Kingdom) 23-27th May 2016.

(See poster and program:



<http://forseadiscovery.eu/courses/c6-dendroarchaeology-ships-prospect-and-practice>)

2. International Conference: Árvores, Barcos e Homens na Península Ibérica (Séculos XVI-XVIII), Universidade Nova de Lisboa UNLA (Portugal). 26-27th January 2017. Papers:

- a. Ana Crespo Solana (CSIC): “El recurso natural más importante para la construcción naval: una aproximación medioambiental a la historia del comercio de la madera en la edad moderna”
- b. Ana Rita Trindade (Centro Superior de Investigaciones Científicas): “Os bosques da ira: conflito e resistência entre comunidades locais e a Marinha pelo uso dos recursos florestais andaluzes no século XVIII”
- c. Beñat Eguiluz Miranda (University of Wales, Trinity Saint David): Iberian Bizcayan shipbuilding and the transition of a transnational network, 1550-1650
- d. Manish Kumar (Groningen University): Portuguese timber imports from the Baltic, 1669-1815: Evidence from Sound Toll Registers Online
- e. Ignacio García González (Universidad de Santiago de Compostela): “Using Dendrochronology to access forest history in the NW Iberian Peninsula and applicability”
- f. Adolfo Miguel Martins (UWTSD): Reconstructing Trees from ship timbers: data analysis and schematics
- g. Koldo Trápaga Monchet (IAP-UNL): “¿Quién vela por los bosques del Rey? El cuidado de las coutadas y matas reales en Portugal para su conservación y aprovechamiento (1605-1640)”
- h. Rosa Varela Gomes (IAP-UNL), Mariana Almeida (IAP-UNL), Filipe Castro (Texas A&M University/IAP-UNL): A representação de barcos nos azulejos portugueses da Idade Moderna.
- i. António Santos (IAP-UNL): Trees for Ships. Forest Decrees from the Kingdom of D. Manuel I until the Kingdom of D. Filipe II (1495-1598)



## **7. MILESTONES**

### **7.1. Table MILESTONES**



## MILESTONES

Milestone no.	Milestone name	Due achievement date from Annex I	Achieved	Actual / Forecast achievement date
1	Project Website	31/01/2018	Yes	31/01/2018
2	Thesaurus of shipbuilding construction features with reference to timber characteristics observed in historic written sources and archaeological records completed	30/11/2015	Yes	30/11/2015
3	Demonstration sites selected, project designs agreed and all permissions for fieldwork obtained.	30/04/2016	Yes	30/10/2016
4	Database of historical information specific areas in Atlantic Iberia where oak and pine wood was logged to supply specific Atlantic Iberian shipyards with timber for ship building from the 16th-18th centuries	31/07/2017	Yes	31/01/2018
5	Establishment of a network of oak and pine tree-ring chronologies for dating and provenancing timber used in ships in the 16th-18th centuries	30/06/2017	Yes	31/01/2018
6	List of anatomical characteristics that allow reliable differentiation among respectively, deciduous oak and pine species and differentiation between stem and branch wood	30/06/2017	Yes	31/01/2018
7	Identification of biomarkers and	30/06/2017	Yes	31/01/2018

Milestone no.	Milestone name	Due achievement date from Annex I	Achieved	Actual / Forecast achievement date
	geochemical tracers for oak and pine species growing in the Iberian Peninsula in areas associated with Early Modern timber production for shipbuilding			
8	Characterization of the geochemical composition of the wood of timber-finds from shipwrecks	30/06/2017	Yes	31/01/2018
9	Data on suspected Iberian shipwreck sites collated and built into GIS-data model. GIS data model with historical information provided by the other research work packages	30/06/2017	Yes	31/10/2017
10	ForSEAdiscovery GIS datamodel	30/06/2017	Yes	30/06/2017

## 7.2. Comments about milestones

All deliverables, milestones, publications, scientific papers and related specific documents and permission for fieldwork are available in the web page: <http://forseadiscovery.eu/>

During the final part of the Project, the proposed milestones have been fulfilled and enhanced. Brief explanation of the Milestones according to Annex 1 (completed but with embargoes).

**MILESTONES 1.** Project website: [www.forseadiscovery.eu](http://www.forseadiscovery.eu)

**MILESTONE 2.** Thesaurus of shipbuilding construction features with reference to timber characteristic observed in historic written sources and archaeological records completed.

A multi-lingual thesaurus of Iberian shipbuilding terms, focused on ship timbers, was developed combining terminology used by contemporary authorities (Spanish and Portuguese) and English terms and definitions used in recent major archaeological works to meet the expected deadline in the Annex (November 2015). This continues to be expanded as the terminologies of different authorities are added. This has now been expanded to include a visual glossary of ship terms disseminated by associate partner TAMU. An innovative development has been the creation of a 3D PDF model providing an interactive learning object where key ship timbers of a ship model (consistent with early 16th-century ship architecture) can be highlighted in three languages (English, Spanish and Portuguese) and defined using a range of sources.

**MILESTONE 3.** Demonstration sites selected, project design agreed and all permissions for field work obtained.

On archaeological diving projects run by the ForSEADiscovery project in Spain, selected shipwreck sites were identified in Galicia (Bayonnaise, Magdalena and Ribadeo), project designs agreed and all permissions obtained by associate partner Archaeonauta S.L (ArchSL) before fieldwork commenced in 2015. Archaeological diving operations on the Yarmouth Roads protected wreck (United Kingdom) were undertaken in 2015 and 2016 with project designs and permissions completed through partner Maritime Archaeology Ltd before each campaign and in advance of the milestone deadline of April 2016.

Permissions fieldwork for sampling in forest (living trees) and historical building have been obtained too.

<http://forseadiscovery.eu/content/permissions-fieldwork>

**MILESTONE 4.** Database of historical information specific areas in Atlantic Iberia where oak and pine wood was logged to supply specific Atlantic Iberian shipyards with timber for shipbuilding from the 16<sup>th</sup> to 18<sup>th</sup> centuries.

(Embargoes for three years until fellows PhD completion. After that the database will be uploaded in the Digital Repository of CSIC)



The working organization of this milestone 4 has been focused in the Compilation of sources (with different formats, archives, literature, cartography, web pages and digital documents, etc.) to design a Conceptual Model. The Conceptual model is a type of abstraction that uses logical concepts and hides the details of implementation and data storage. They offer powerful concepts to the designers that provide getting the most complete specification from the real world. They are able to represent the real world through entities with its attributes and relations between them. We have scanned and digitized map data and created a Geodatabase. Geodatabases have a comprehensive information model for representing and managing geographic information. This comprehensive information model is implemented as a series of tables holding feature classes, raster datasets, and attributes in a Geographic Information System. The implementation of the geodatabase in a GIS of Iberian Forests is been developed. We are creating layers from the geodatabase data and use the spatial data infrastructures (SDI). It allow to exchange and sharing of spatial data between public organization and agency of spatial data community.

**MILESTONE 5.** Establishment of a network of oak and pine tree-ring chronologies for dating and provenancing timber used in ships in the 16th-18th centuries.. The chronology network has been completed, covering the main areas proposed at the beginning of the Project. At each of the three main areas, chronologies of living trees were developed, and in all of them they were complemented with samples from historical buildings. This allowed us reaching the 13th century for oaks in the north, 15th century for pines in the center, and 11th century also for pines in Southern Spain. Sample replication is also of big quality, especially for the north and the south, whereas site chronologies in the center showed a high degree of homogeneity, and therefore a big sample replication is not so necessary. Chronology data will be stored in a public repository; however, we will establish an embargo period of three years (to be discussed) in which only metadata will be visible, in order to finish the corresponding publications. Work on these scientific publications is still in progress.

**MILESTONE 6.** List of anatomical characteristics that allow reliable differentiation among respectively, deciduous oak and pine species and differentiation between stem and branch wood. This milestone is based on the same samples as the previous one, and has also been completed. A chronology network has been established for oak earlywood vessel features, as well as for blue intensity in conifers. The output of these chronologies will be the same way as for Milestone 5. However, both a reliable species and branch/stem differentiation proved to be practically impossible in view of anatomical features, although some attempts were done from ca. a million of vessel measurements in oak. Similarly, the analysis of branch and stem upon vessel characteristics did not appear to be reliable. However, the this milestone has been extended with the application of genetic analyses, not initially planned within the project, which appear to be more promising for species differentiation. In addition, the gap of this objective is also filled by some of the results included in Milestone 7 (Traoré et (2017), Wood Science and Technology).

**MILESTONE 7.** Identification of biomarkers and geochemical tracers for oak and pine species growing in the Iberian Peninsula in areas associated with Early Modern timber production for shipbuilding. The achievement of this milestone in the project has been highly satisfactory. However, the fact that most of these techniques have been newly

applied on this wooden material during this project let us proof their applicability, and show their potential for future investigations, but establishing a standard protocol to be applied systematically is beyond the scope of our present research. The outcomes for this Milestone are detailed in four peer-reviewed papers (Traoré et al., 2016, Spectrochimica Acta; Traoré et al., 2017, Wood Science and Technology; Traoré et al., 2017, Journal of Analytic and Applied Pyrolysis; Hajj et al., 2017, Journal of Archaeological Science); more publications are still in preparation.

**MILESTONE 8.** Characterization of the geochemical composition of the wood of timber-finds from shipwrecks. This Milestone is highly linked to the previous one, so that most comments for it also apply here. The outcome also corresponds to the previous publications, but specifically to Traoré et al., 2017, Journal of Analytic and Applied Pyrolysis.

**MILESTONE 9.** Data on suspected Iberian shipwreck sites collated and built into GIS-data model. GIS data model with historical information provided by the other research work packages.

<http://forseadiscovery.eu/gis>

**MILESTONE 10:** ForSEAdiscovery GIS data model

<http://forseadiscovery.eu/databases>

According to Annex 1 a list of deliverables has been completed during the second period:

**Deliverable 2.2.** Method statements for guidance on best practice and protocols for dendro-archaeological fieldwork, timber characterisation and data collation and presentation.

This has been published through Archaeopress as an open access epublication (pdf) and print version. See:

<http://www.archaeopress.com/ArchaeopressShop/Public/displayProductDetail.asp?id=%7BAF6DB4C2-390A-463C-A1ED-1CDA29DBD2EF%7D>

**Deliverable 2.3.** Site specific reports for dissemination and archive deposition for selected shipwreck sites. Selected data generated by the archaeological research actions on suspected Iberian ships has been compiled into an archaeological archive submitted to the Archaeology Data Service (UK). This work has been assisted by a grant of £15,000 from the Marine Environmental Data and Information Network (MEDIN). Data included in the archive (once inception has been completed) will include site specific reports, photogrammetric models, site photographs, dive operations documentation and dendrochronological reports on samples recovered for analysis.

**Deliverable 2.4.** Synthetic reports on efficacy of different scientific approaches to timber characterisation of Iberian Ships of the 16th and 18th century. Following consultation with potential user groups, through public dendro-archaeological

workshops in Lisbon in April and November 2017, draft protocols including information on techniques developed by the ForSEAdiscovery project were integrated in an open access epublication (also available in print) entitled “Shipwrecks and Provenance: in-situ timber sampling protocols with a focus on wrecks of the Iberian shipbuilding tradition”:

<http://www.archaeopress.com/ArchaeopressShop/Public/displayProductDetail.asp?id=%7BAF6DB4C2-390A-463C-A1ED-1CDA29DBD2EF%7D>

An abstract for a paper summarising these scientific approaches has been proposed for presentation at the 15th International Symposium of Boat and Ship Archaeology, Marseille, 22-27 October 2018. Peer review publication is planned for inclusion in the conference proceedings but also as a more substantial paper in the International Journal of Nautical Archaeology.

**Deliverable 4.10.** Dendroarchaeology of ships.- Practice and Prospect (C6). Training in TSRS. Training Course and Network meeting (UWTSD, May 2016). See programme and poster in:

<http://forseadiscovery.eu/courses/c6-dendroarchaeology-ships-prospect-and-practice>

**Deliverable 6.3.** Dissemination of research at international conferences and submission of original articles for publication: See Congresses & Workshops list.

Publications: <http://forseadiscovery.eu/results/publications>

**Deliverable 6.4** Participation in local outreach activities by individual Fellows and in documentaries and news items (achieved by all Full participants): Link to Fellows Scientific Activities webpage:

<https://forseadiscovery.wordpress.com/category/nautical-archaeology/>

<http://iberianautical.blogspot.com.es/>

<http://forseadiscovery.eu/news>

<http://forseadiscovery.eu/content/fellows-scientific-activities>

See also, in attachment:

- a. Fellows scientific report
- b. Fellows Secondment report

## ADDITIONAL INFORMATION

Fellows First name	Fellows Surname	Living allowance (€)	Mobility allowance (€)	Travel distance (km)	Travel allowance (€)	Career allowance (€)
José Luis	Gasch Tomás	38103.14	7816.00			
Ana Rita	Trindade	67882.08	13678.00			
Koldo	Trapaga Monchet	37443.74	10115.00			
António	Santos	54711.44	13727.50			
Ignacio	Gonzalez Espinosa	16882.91	4335.00			
Mohamed	Traore	64036.93	13678.00			
Peter	Groenendijk	56811.87	11125.19			
Marta	Dominguez Delmas	56052.48	11780.73			
Adolfo	Martins	75885.74	18528.67			
Selina	Ali	76608.00	16934.40			
Benat	Eguiluz	75934.27	13086.85			
Sara	Rich	90119.00	13647.00			
Linar	Akhmetzyanov	61644.55	13845.31			
Maria	Bastiao					
Nathan	Gallagher	23075.53	5100.90			
Germán	Jiménez Montes	75819.58	16760.10			
Manish	Kumar	62633.56	13845.30			
FADI	HAJJ	69853.00	15440.79			

### **7.3. Additional information about fellows and correctives action**

#### **CORRECTIVE ACTIONS:**

A number of fellows terminated their contracts earlier than anticipated. In these cases, details are provided in the section on recruitment. Corrective action was taken through three actions. Following the early termination, due to ill-health, of ESR2 and the associated withdrawal of partner University Leiden Annex 1 of the grant agreement was duly amended in January 2016, and a new call opened for ESR14 at UWTSD. Secondly, due to the early termination of ESR4, the contract of ESR3 was extended. Thirdly, due to the early termination of ESR8 at UNLA, a new call was opened for ESR15 at UNLA to complete outstanding tasks of ESR8.

Important note: there are some mistakes about recruitment in fellows: I have corrected Table 1. Can not edit tables 2 and 3: UNLA is three fellows (3) not 2.

Start date and end date in table 3 must be changed (but I cannot edit)

### **7.4. Social and Economic impact:**

The most immediate socio-economic impact has been on the fellows themselves. Many have secured positions in academic research as a key outcome of the research and training programme. In other instances, fellows are working in government positions influencing heritage policy, or have established non-profit organisations delivering research outcomes in a non-academic research environment.

Wider socio-economic impact beyond the academic environment may take some time to fully develop. Nonetheless there are, at this stage, encouraging signs. Within the archaeological and heritage spheres, dendro archaeological approaches have been promoted within development funded archaeology projects. Here commercial archaeological companies are the drivers in providing research where heritage assets (in particular archaeological shipwrecks and historic buildings) need informed management or are threatened by economic development such as the dredging of navigational channels in approaches to historic harbours (e.g. Cadiz harbour) or building developments located on historic waterfronts (e.g. Lisbon waterfronts). Positive interactions between the project and archaeological companies have demonstrated the need, and indeed desire, to integrate dendrochronological dating and analysis into project designs as a key tool during and following major excavations and other field interventions. Dendrochronological fieldwork on historic buildings in the Basque country has significantly enhanced and developed ring-width chronologies which will have a positive impact on the utility of tree-ring dating as a key tool for use by commercial dendrochronology laboratories. Wider interest in such approaches has also been promoted in other parts of Iberia including Galicia, Lisbon and northern Portugal. Outreach through the workshops held in Lisbon, and conferences in Esposende, have promoted the use of dendrochronological techniques and are influencing government heritage policy in Portugal.



Positive interactions have been achieved with complementary European research projects such as the INVISIBLE WOODS (PTDC/EPH-PAT/2401/2014) with its focus on dendrochronological survey of the structural woods of historic city centres of Portugal and ARIADNE (<http://www.ariadne-infrastructure.eu/>) where ontologies for effective archaeological data infrastructure will now include development in the areas of environmental archaeology including dendrochronology.

The project has developed a global profile particularly through its strategy of dissemination and outreach at international conferences. As a result, ForSEAdiscovery has successfully promoted a multidisciplinary approach to understanding Iberian historic timber supply and shipbuilding. This is demonstrated by the increasing number of externally driven research projects (both academic and commercially driven) where underwater cultural heritage assets such as Iberian shipwrecks are located. At present, positive collaborations have been developed with such projects in the United States, the Caribbean, Bermuda, Central America (Mexico, Panama) and South America (Colombia, Uruguay, ). Clear potential for further work has been demonstrated here and also in Africa (e.g. Namibia, Mozambique), India (e.g. Goa) and Asia (e.g. Manila) where Iberian shipbuilding developed and adapted as a result of European expansion, and where the multidisciplinary approach which characterises the ForSEAdiscovery project can play a positive role in academic research and informed cultural heritage management.

The utility of the Sound Toll Registers online project (<http://www.soundtoll.nl/index.php/en/over-het-project/str-online>), essentially a 'crowd' delivered community project hosted by an academic institution (RUG) and delivered by numerous volunteers has been highlighted by the degree to which the data made available through this project has enabled the ForSEAdiscovery project to examine the role, extent, and mode of timber trade between the Baltic and Iberia as part of the solution of timber supply for shipbuilding during the Age of Discovery. As well as utilising the outputs of such community driven research projects, ForSEAdiscovery has also shown that digital revolution in archaeological recording and visualisation can deliver outputs from our own archaeological endeavours which have immediate appeal to a non-academic audience. Three-dimensional models of shipwrecks and archaeological sites, very much accessible (and of interest to) this wider audience, has been demonstrated through production of site visualisations such as that of the Ribadeo galleon with its associated large Facebook group. One of the early stage research fellows has now established a spin-out not-for-profit organisation based in the United States collaborating with animation experts at UWTSD to deliver visualisation and serious games to meet the needs of this wider audience.

TABLAS

## 7.5. Publications

Publications: <http://forseadiscovery.eu/results/publications>

Information in the Participant portal.



## PRIVATE SECTOR STAYS (FOR EID ONLY)

Researcher	Stayed at	Start date of stay	End date of stay	Time Commitment	Full-time equivalent person-months covered during the reporting period
				Full time	0

## Summary per researcher

Researcher	Duration of recruitment within the reporting period	Person-months in PRIVATE sector within the reporting period	Percentage of time spent at PRIVATE sector within the reporting period
Adolfo Martins (birth date - 1975-04-25)	19.00	0.00	0
Ana Rita Trindade (birth date - 1983-03-02)	20.00	0.00	0
António Santos (birth date - 1987-06-19)	19.00	0.00	0
Benat Eguiluz (birth date - 1990-11-23)	19.00	0.00	0
FADI HAJJ (birth date - 1991-05-25)	19.00	0.00	0
Germán Jiménez Montes (birth date - 1991-02-26)	23.00	0.00	0
Ignacio Gonzalez Espinosa (birth date - 1990-04-09)	6.00	0.00	0
José Luis Gasch Tomás (birth date - 1984-07-19)	10.00	0.00	0
Koldo Trapaga Monchet (birth date - 1987-07-07)	20.00	0.00	0
Linar Akhmetzyanov (birth date - 1989-09-05)	24.00	0.00	0
Manish Kumar (birth date - 1987-09-11)	13.00	0.00	0
Maria Bastiao (birth date - 1982-01-24)	22.00	0.00	0
Marta Dominguez Delmas (birth date - 1977-10-05)	11.00	0.00	0
Mohamed Traore (birth date - 1990-09-19)	20.00	0.00	0
Nathan Gallagher (birth date - 1988-11-12)	13.00	0.00	0
Peter Groenendijk (birth date - 1984-01-04)	15.55	0.00	0

Sara Rich (birth date - 1980-09-01)	10.23	0.00	0
Selina Ali (birth date - 1992-11-03)	18.00	0.00	0



## 8. DISSEMINATION ACTIVITIES:

### 8.1. Outreach activities:

ForSEAdiscovery acknowledges the importance of training ESRs and ERs in communication skills in order to disseminate research and results of publicly funded research to society. The consortium is ensuring that the results will be made known to non-specialist audiences by the participation of ESRs, ERs and PIs in audiovisual reports (news-items, short documentaries) organised by Associated Partner 14, Malcolm Dixelius (Dixit International) as the individual research projects progress. Additionally, the ESRs and ERs will be engaged in other outreach activities that promote the public engagement of researchers with the broader public:

1. Dissemination of results to specialized audiences is being achieved through the attendance at established international conferences for specific research topics (e.g. International Association of Economic History, World History Association, IKUWA, ISBSA, EuroDendro, WorldDendro, etc). This gives the ESRs and ERs the chance to present their research, the ForSEAdiscovery project and themselves, enhancing the chances to expand and consolidate their network (see list of presentations and activities).
2. The development of a ForSEAdiscovery website (designed by Partner 1 and ER1) serves as the first platform to introduce the partners and their members to wider society. It also contains contact information, results and activities developed by the consortium. ESRs and ERs are responsible for updating the information related to each individual research project and the supervisor monitors the content on a regular basis.
3. Science fairs and oral presentations at universities and secondary schools. ESR and ER have participated in some presentation in local schools and at universities, targeting students in later stages of their education. This activity will help students in their decision-making process to choose a professional career.
4. Dissemination of results in the media: Throughout the research project activities, public and scientific events have been the subject of repeated appearances in the local and international press, on radio and on television.

See: <http://forseadiscovery.eu/news>

<http://forseadiscovery.cchs.csic.es/content/shipwrecks-around-finisterre-coru%C3%B1a>

<http://www.abc.es/cultura/20150216/abci-forseadiscovery-globalizacion-estudia-desde-201502161006.html>



5. Social networks (facebook: <https://www.facebook.com/forseadiscovery>)

Outreach and dissemination formed an integral part of the nautical archaeology research actions undertaken by the network in 2015. During diving operations in Finisterre, Viveiro and Ribadeo, Galicia (June 2015), repeated engagement with local and national journalists led to articles appearing in local and national newspapers (and their associated web pages), and radio and television programs with a focus on science as well as regional news items.

See: <http://forseadiscovery.cchs.csic.es/news>

Collaboration with local dive clubs allowed sports divers to observe our work. Divers from the Spanish Armada also dived on our excavations, observing both the diving protocols and scientific procedures employed. Work at the Spanish galleon in Ribadeo was carried out with the support of the local association which is fostering research and protection of this internationally important shipwreck. The association hosted a very well attended evening conference where the ForSEADiscovery network coordinator and associate partner spoke, explaining the scientific objectives of the network's work. An international fieldschool ("Esposende acolhe Escola Internacional de Arqueologia Náutica e Subaquática") was run during August 2015 at Esposende, Northern Portugal demonstrating innovative methods of ship timber recording and sampling. This collaboration with local archaeologists led to subsequent involvement in colloquia celebrating 30 years of archaeology in Esposende in November 2015.

Fellows have also developed two very interesting blogs:

<https://forseadiscovery.wordpress.com/category/nautical-archaeology/>

<http://iberianautical.blogspot.com.es/>

Videos on YouTube:

<https://forseadiscovery.wordpress.com/wp2/nautical-archaeology-video-playlist/>

## 8.2. Attendance and participation to International Conferences, Seminars and Workshop:

A list of relevant events is as follow. Please, see Fellow's Final Report for more information.

3. **IKUWA 6. The Sixth International Congress on Underwater Archaeology.** Western Australia Museum. 28 November- 2 December, 2016. Session organized by Nigel Nayling and Ana Crespo Solana, ***Floating forests / submerged forests: an environmental history of trees***  
Papers:

- a. Filipe Castro, "Ship sizes and wood scantlings"
- b. Adolfo Miguel Martins, Ana Almeida, Antonio Santos, Ivone Magalhaes, Filipe Castro, Jemma Bezant, Marta Dominguez, Delmas, Nigel Nayling and Peter Gronendijk, "Reconstructing Trees from Ship Timber Assemblages Using 3D Modelling Technologies: Evidence from Belinho in northern Portugal"

- c. Beñat Eguiluz Miranda, José L. Gasch-Tomás, Marta Domínguez Delmás, Miguel San Claudio, and Koldo Trápaga Monchet, "The Ribadeo Shipwreck (c. 1600) a multidisciplinary approach for an Iberian shipbuilding case study".
- d. Ana Rita Trindade, Sara Rich, Adolfo Martins, Mohamed Traoré & Nathan Gallagher, "From forests to the sea, from the sea to the laboratory: the Santa Maria Magdalena frigate".
- e. Sara Rich, Garry Momber and Nigel Nayling, "Maritime archaeological timber sampling: methods and results from the silty Solent"
- f. Aoife Daly, Marta Dominguez Delmás, Wendy van Duivenvoorde & Jeremy Green, "Timber for the Batavia"
4. 51st Annual Conference on Historical and Underwater Archaeology, International Society for Historical Archaeology Conference, Landscapes, Entrepôts and Global Currents: New Orleans (USA), January 3-6. 2018.
  - a. Nigel Nayling: "Highbourne Cay Shipwreck. Excavations Dendroarchaeology". Converging Worlds: Highbourne Cay Wreck Symposium.
  - b. Selina Ali, Julian Hainsworth, John Carroll, Richard Morgan, "The Past in Pixels: Exploring Heritage in Virtual Environments" Session Outreach and Engagement in Underwater Archaeology.
5. Conferencia Internacional: Humanidades Digitales Hispánicas. Sociedad Internacional, III Congreso Internacional: Sociedad, políticas, saberes, Málaga (Spain), 18-20 October 2017
  - a. Koldo Trápaga Monchet & María José García Rodríguez: "Los aprovechamientos forestales de los bosques portugueses desde una perspectiva cartográfica durante la Unión Ibérica (c. 1580-1640)",
  - b. Ana Crespo Solana, María José García Rodríguez, Ignacio García González. Nigel Nayling, José Luis Gasch Tomas, Peter Groenendijk, Sara Rich, Marta Domínguez Delmás, "Gis Application for an interdisciplinary Project in History, Maritime Archaeology and Wood Provenance (ForSEAdiscovery). Dissemination of the GIS Data model of the ForSEAdiscovery project"
  - c. International Conference: Ameridendro, Mendoza(Argentina) 28th March-1st April, 2016.
  - d. Domínguez-Delmás, Marta, Groenendijk, Peter, Akhmetzyanov, Linar, Alejano-Monge, Reyes, García-González, Ignacio. Unravelling timber supply for shipbuilding in Atlantic Iberia in the Early Modern Period by dendrochronology.
  - e. TRACE 2017. Tree rings in Archaeology, Climatology and Ecology. Svetlogorsk, Kaliningrad (Russia) 16th- 21st May, 2017. Akhmetzyanov, Linar, García-González, Ignacio, Groenendijk, Peter & Sass-Klaassen, Ute. What do vessels hide? Potential of oak earlywood vessels for dendroprovenancing
5. International Conference: EuroDendro 2017, University of Tartu (Estonia) 6th-10th September, 2017.

- a. Domínguez-Delmás, Marta, Groenendijk, Peter, Wazny, Tomasz, Alejano-Monge, Reyes, García-González, Ignacio. Is dendrochronology enough to establish the date and provenance of Iberian shipwreck timbers?
  - b. Wazny, Tomasz, García-González, Ignacio, Akhmetzyanov, Linar, Nayling, Nigel, Domínguez-Delmás, Marta, Groenendijk, Peter, Crespo Solana, Ana. The ForSEAdiscovery Project - How wood powered the Iberian World Exploration.
6. Dissemination of individual project:
- a. Koldo Trápaga Monchet: "How did contribute the royal forests of Portugal to sustaining the Spanish Monarchy (c. 1600-1640)?", in "Kings and Queens 6: in the Shadow of the Throne", Madrid, September 12-15<sup>th</sup> 2017
  - b. K. Trápaga Monchet: "Más madera": agentes y vías de provisión de madera para las flotas reales en Portugal (1598-1611)", for "IV Encuentro de Jóvenes en Historia Moderna: 'Nuevas perspectivas de investigación en historia moderna: economía, sociedad, política y cultura en el mundo hispánico'", Barcelona, 5-6 July 2017.
  - c. K. Trápaga Monchet: "How could the maritime struggle affect the environment of Portugal within a 'Composite Monarchy' (1601-1617)", in the International Conference "European Society for Environmental History: "Environment in areas of contact among states, economic systems, cultures and religions". Zagreb, Junio 28 – 2 de Julio.
  - d. K. Trápaga Monchet, F. Labrador Arroyo: "Beat the odds: coping with Portuguese and Spanish archival sources to study the Portuguese forested areas during the Iberian Union (1580-1640)", II conference of the Portuguese Network of Environmental History: "Environmental Changes in historical perspective", Lisbon, 4-6 mayo 2017.
  - e. Koldo Trápaga Monchet: "Who did protect Portuguese forests? Safeguarding and conserving forests belonging to the Crown in Portugal (1605-1640)", held at FCSH in Lisbon (27<sup>th</sup> January)"
  - f. Koldo Trápaga Monchet: "La ciudad de Lisboa como puerta hacia el mar: los sucesos de la nau Saõ Roque y la carrera de India (1602-1603)", held in Lisbon, January 23<sup>rd</sup> 2017 at 18:00 hours, as an activity of the "Comissão de Estudos Olisiponenses.
  - g. Koldo Trápaga Monchet: "El sustento del Imperio: los recursos forestales de Portugal para las armadas reales (1560-1640)", within the Seminary "Novas Perspectivas em História Moderna" organized by José Vicente Serrão, December 6<sup>th</sup> 2016, University of Tartu (Estonia) 6<sup>th</sup>-10<sup>th</sup> September, 2017Lisbon.
  - h. Beñat Eguiluz Miranda, Marta Domínguez- Delmás, Marta, Groenendijk, Peter, Wazny, Tomasz, Alejano-Monge, Reyes, García-González, Ignacio. Is dendrochronology enough to establish the date and provenance of Iberian shipwreck timbers?
  - i. Wazny, Tomasz, García-González, Ignacio, Akhmetzyanov, Linar, Nayling, Nigel, Domínguez-Delmás, Marta, Groenendijk, Peter, Ana Crespo Solana, Ana. José Luis Gasch-Tomás, Miguel San Claudio & Koldo Trápaga Monchet: "The ForSEAdiscovery Project - How wood powered the Iberian World Exploration
  - j. Ribadeo Shipwreck (c. 1600): A multidisciplinary approach for an Iberian shipbuilding case study", in International Conference: **Ameridendro**, Mendoza(Argentina) 28<sup>th</sup> March-1<sup>st</sup> April, IKUWA6, held



- at Western Australian Museum in Fremantle (Australy) November 29th 2016.
- k. Domínguez-Delmás, Marta, Groenendijk, Peter, Akhmetzyanov, Linar, Alejano-Monge, Reyes, García-González, Ignacio. Unravelling timber supply for shipbuilding in Atlantic Iberia in the Early Modern Period by dendrochronology
  - l. Koldo Trápaga Monchet, Javier Revilla Canora: "Forgiving and reincorporating 'faithful' vassals within the Spanish Monarchy: Naples, Catalonia, Portugal and Sardinia (1647-1679)", in Xlles Journées d'Histoire des Monarchies Ibériques. Réconcilier et réincorporer. Discours, cérémonies, pratiques", November 24-26. Valenciennes (France) – Kortrijk (Belgium).
  - m. Ignacio González Espinosa-"Timber for the royal shipyards in Portugal: Between self-sufficiency and northern supply" in International Congress, *The 17 provinces of the Low Countries and the Iberian Peninsula: New perspectives and methodologies*. Organisers: ForSEADiscovery, Faculty of Arts, N.W. Posthumus Institute. Date: 28-29 September, 2017. Groningen, The Netherlands.
  - n. José Luis Gasch Tomas, Public lecture "Shipbuilding and Globalization. Tar trade from the Baltic to the Iberian Peninsula in the 18th century", organized by the Department of History at the University of Groningen (The Netherlands), 21/03/2016.
  - o. Peter Groenendijk, Presentation: Zuidema, P. et al. 2016, Reconstructing growth trends from tree-ring data: can we account for biases? Association of tropical Biology and Conservation ATBC 2016, Montpellier – France
  - p. Ana Rita Trindade, April 2016 : XX congreso del AMEC, El caribe en el mundo dinámicas y reconfiguraciones. Veracruz, Mexico. Presentation of paper: "Maderas de Occidente: El empleo de maderas del Caribe en la construcción naval en Cadiz (1717-1759)", with Project Coordinator Ana Crespo Solana
  - q. Ana Rita Trindade, September 2017: The 17 provinces of the Low Countries and the Iberian Peninsula: New perspectives and methodologies. Faculty of Arts (University of Groningen), N.W. Posthumus Institute. Presentation of the paper: "Dutch merchants and shipmasters in the trade of timber to Cadiz in the early Bourbon period".
  - r. Germán Jiménez Montes, 14-15 April 2016, Utrecht (The Netherlands), N.W. Posthumus Institute and University of Utrecht: Presentation at Posthumus first seminar: Work in progress "Supplying the enemy? North-European suppliers of timber in Seville from 1580 to 1598"
  - s. Germán Jiménez Montes, June 2016 Lampeter (Wales), University of Wales - Trinity Saint David: Presentation at Postgraduate Research Group Seminar "Transnational Networks involved in Timber Trade during the reign of Philip II"
  - t. Germán Jiménez Montes, 30 September 2016, Groningen (The Netherlands), University of Groningen: Presentation at Groningen Joint Economic History seminar "Supplying the enemy? North-European suppliers of timber in Seville from 1580 to 1598"
  - u. Germán Jiménez Montes, 19-21 October 2016, Pisa (Italy), ESTER, Scuola Normale Superiore Pisa and Scuola Universitaria Superiore Pisa: Presentation at ESTER Research Design Course "Supplying the enemy? North-European suppliers of timber in Seville from 1580 to 1598"

- w. Germán Jiménez Montes, 19-20 October 2017, Marennnes-Oléron (France), University of West Brittany, University of Poitiers, and TRESOAR: Presentation at the 7th conference Sound Toll Registers Online “Notarial documents as a complementary perspective to the Sound Toll Registers : Baltic trade in Andalusia from 1570 to 1600”

**b. Workshops and Seminars (2016- 2018):**

1. Heritage & Environment Research Cluster Seminar Series. Building Boats and Bridges. University of Wales Trinity Saint David. Arts Building, Lampeter Campus. 20th April-18th May 2016. Presentations by Koldo Trapaga Monchet, Beñat Eguiluz Miranda, Adolfo Miguel Martins, Marta Domínguez Delmás, Antonio Rochas, Sara Rich, Ana Rita Trindade,
2. “Os navios ibéricos na expansão europeia: Tipologias e Tonelagens”. Presentation by Prof. Dr. Filipe Castro. Lisboa (Portugal). 31st October 2016.
3. ‘Y al fin fue al Agua’: *Formas de provisión de madera y construcción naval para las Armadas Reales en Lisboa (1589-1621)*”. Presentation by Koldo Trápaga Monchet, UNLA, 10th November 2016.
4. “La ciudad de Lisboa como puerta hacia el mar: los sucesos de la nau São Roque y la carrera de India (1602-1603)”, Presentation by Koldo Trapaga Monchet, UNLA, January 23 2017
5. The Adventure of the Armadas: An Historical and Archaeological Perspective. CCHS-CSIC. Madrid (Spain), 28 February 2017. Presentation by Ana Crespo Solana and Miguel San Claudio.
6. Building Bridges Seminar, Lampeter Campus – 9 of March, 2016:
  - a. Ali, S. and Martins, A. (2015) Digital Recording in Boat Archaeology.
7. NEXUS conference, Carmarthen Campus – 23/24 of March, 2016:
  - a. Martins, A.; Eguiluz-Miranda, B; Santos, A.; Trapaga Monchet, K and Rich, S. (2016) Multidisciplinary approach in science, how far may we go?
8. Research Cluster Seminars, Lampeter Campus – 11 of May, 2016
  - a. Martins, A. (2015) Engineering and reverse-engineering in wooden shipbuilding: The analysis of data collected from archives and seabed using a 3D CAD approach
9. Global Waters: Sustainability, Harmony and Awareness Day – 3 of October, 2016:
  - a. Martins, A. and Ali, S (2016) Ships, Trees and Water.
10. Adolfo Martin 3D digital recording and data processing (at Maritime Archaeology Trust) – 13/19 of July 2016

More information in: <http://forseadiscovery.eu/congressesworkshops>





## **9. PROJECT MANAGEMENT**

### **Comments**

According to Annex 1 the host institution and coordinator is the **Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC)**. As coordinator, the overall objective is the coordination and management of all technical aspects of the project (including dissemination and outreach activities). The management structure has followed the division of roles between the ITN Network Coordinator (Ana Crespo Solana), Training Coordinator (Nigel Nayling) and Scientific Coordinator (Ignacio García González). The management objectives during the second period has comprised:

1. Overall management and coordination of consortium meetings, workshops and activities and to prepare and continuously develop a plan for the use and dissemination of foreground.
2. Administration of human resources, including the recruitment of research fellows.
3. Financial management roles to provide financial and executive management and scientific and training coordination support.
4. To monitor ESR training and review and approve the inter-hosts institution exchanges through secondments of ESRs and ERs.
5. To maintain a project website for project coordination and dissemination of results (milestones, publications and deliverables).
6. To coordinate all reports and the completion of the Final Reports once the ITN is finished; to coordinate the annual review of fellows and the maintenance of progress records and the monitoring of project activities, milestones and deliverables.

The Network Coordinator has dedicated 80% of her full-time employment at the CSIC to the project, 50% to management tasks and 30% to the supervision of fellows and research. A full-time person has been employed by the project to assist the Network Coordinator with managerial and financial tasks.

One of the most important events took place just before starting the second period of the project with the Amendment associated with termination of University Leiden as a partner of the ForSEAdiscovery Consortium (November 30 2015) and the production of a new Annex 1 (January 14 2016).

During this period the impact of any changes due to the amendment and the departure of some fellows have been assessed and mitigated for by effective communication between all partners to alleviate any conflicts or problems and the agreement of alternative plans and corrective actions. Most partners have extensive experience in FP7 projects, and plans for use of foreground, and all of them have appropriate

personnel and mechanisms in place to ensure effective and efficient delivery of management of activities.

**Map: The ForSEAdiscovery Consortium (Marie Curie Initial Training Network 2014-18)**



Submitting of ForSEAdiscovery Reports:

The first ForSEAdiscovery progress report was submitted to the REA on March 6 2015. No recommendations were made following review of that report, and the ITN has maintained its focus on the research and training program defined in the grant agreement.

The Mid Term meeting took place in Madrid on December 18<sup>th</sup> 2015.

The consortium has favourably approved the audit of the first period. Form Cs, Financial Reporting and Periodic Report were submitted to the REA on November 14 2016.

A Progress Report was submitted to the REA on March 1 2017.

From a management perspective, the Project's planning status in 2016 and up to February 31 2018 is as follows:

- a) Change in the ForSEAdiscovery Consortium: On December 2015 Leiden University withdrew from the ForSEAdiscovery Consortium and returned the remaining funds to the Consortium after a formal request for termination of the participation of Leiden University as a beneficiary, and an amendment of Annex

- 1 of the grant agreement to reflect this change in beneficiaries and re-allocation of tasks and the associated fellow month resource within the budget.
- b) The reason for the withdrawal of the University of Leiden was extensively explained in the Amendment document and the associated letter from the Coordinator (Madrid, January 11 2016).
  - c) An amended version of Annex 1 of the grant agreement, in line with the proposal of the network's Supervisory Board, and documentation associated with the withdrawal of Leiden University were submitted alongside this formal request. Annex I was updated on January 14 2016 and it was registered with acknowledgment of receipt on January 26 2016.

Supervisory Board meetings and extraordinary meetings have been organized according to the Grant Agreement and updated Gantt chart:

- a. Extraordinary management meeting, Universidade Nova de Lisboa (Portugal), February 14 – 17 2016.
- b. Supervisory Board, Lampeter, University Wales Trinity Saint David, Wales (United Kingdom) 14- 17 May 2016.
- c. Extraordinary management meeting, CSIC, Madrid (Spain) August 30- 31 2016.
- d. Extraordinary management meeting, Maritime Archaeology Ltd. Southampton (United Kingdom) October 5- 10 2016
- e. Extraordinary management meeting, CSIC, Madrid (Spain), 7 December 2016.
- f. Supervisory Board meeting, CSIC, Madrid (Spain), April 3-4 2017.
- g. Extraordinary management meeting Universidade Nova de Lisboa (Portugal), November 8- 12 2017.
- h. Final Supervisory Board meeting, Madrid, CSIC (Spain), January 28- 31 2018.

Note: Travel and meeting costs for both extraordinary management meetings and those of the Supervisory Board have been split between categories 3 and 4, as both management and scientific organizational activities, and coordination of research and dissemination activities have been decided during the meetings.



## **10. FINANCIAL STATEMENTS –FORM C AND SUMMARY FINANCIAL REPORT**

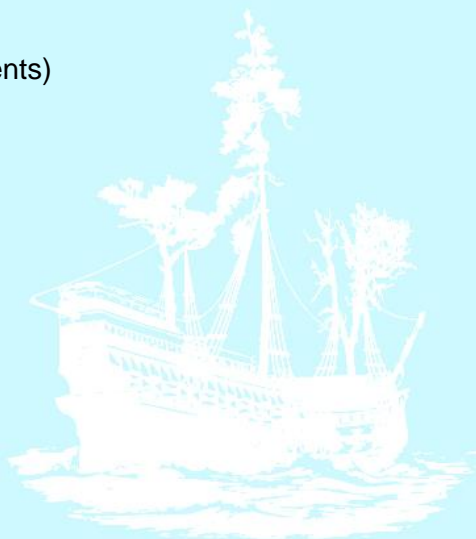
Comments:

1. Financial statement from each beneficiary: See Form C attached.

Note: Period from 01/02/2016 to 31/01/2018 for all partners except Universiteit Leiden that terminate on 30/11/2015. Amendment and new Annex 1 signed on January 2015 with the REA.

2. Summary financial report which consolidates the claimed Community contribution of all the beneficiaries in an aggregate form, based on the information provided in Form C (Annex VI) by each beneficiary.

Certificates (see attachments)



## CERTIFICATES

List of Certificates which are due for this period, in accordance with Article II.4.4 of the Grant Agreement.

Beneficiary	Organisation short name	Certificate on the financial statements provided?	Any useful comment, in particular if a certificate is not provided
1	CSIC	Yes	
2	FCSH-UNL	Yes	
3	USC	No	not required for indirect actions entirely reimbursed by means of lump or flat rates. Given that ITNs are entirely reimbursed by means of lump sums or flat rates and not through the reimbursement of costs, USC believe that the CFS is not necessary even if their cumulative requested EC contribution is higher than 375.000 euros.
4	UWTSD	Yes	
5	MA Ltd	No	
6	WU	No	
7	UL	No	Universiteit Leiden did terminate on November 30 2015. Amendment January 2016.
8	RUG	Yes	
9	UdL	No	



Attachments	
Name	
Date	

This declaration was visaed electronically by Ana CRESPO SOLANA (ECAS user name neresana) on