

# INFOMAR Phase 1 Post- Project Evaluation

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A report for GSI/MI  
March 2016  
Issue 1



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# Executive Summary

## Introduction

The **IN**tegrated Mapping **FO**r the Sustainable Development of Ireland's **Ma**rine **R**esource (INFOMAR) programme is a joint venture between the Geological Survey of Ireland (GSI) and the Marine Institute (MI). It concentrates on creating a range of integrated mapping products of the physical, chemical and biological features of the seabed in the near-shore area.

The programme is funded by the Irish Government through the Department of Communications, Energy and Natural Resources. Phase 1 of the programme (2006 – 2015) aimed to map 26 bays and three priority areas of seabed. Phase 2 (2016 – 2025) will map the remaining coastal and mid-water areas. The programme aims not just to manage the acquisition and publication of data, but also to support data use and the delivery of value added research. Overall the programme aims to contribute to economic growth, healthier ecosystems and increased engagement with the sea.

## Aims of this evaluation

Risk Solutions was commissioned to carry out a post implementation evaluation of Phase 1 of the INFOMAR programme to provide a high level overview of the outputs and impact of the INFOMAR Phase 1 programme and make recommendations for improving the Programme to assist in planning Phase 2.

This was a light touch review, drawing on stakeholder, staff and management interviews, a user survey and review of documents, including INFOMAR Activity Reports and the 2013 interim evaluation of the programme by PWC<sup>1</sup>.

## Findings

### Phase 1 achievements

We find that the INFOMAR programme is widely recognised and respected, with many commentators highlighting the achievements of the programme both within Ireland and internationally.

Despite a radical budget cut, surveying has continued and the programme has largely achieved its Phase 1 aspirations in terms of mapping and data interpretation.

INFOMAR has used innovative approaches to improve the quality of the data collected, upgrading equipment and software throughout the life of the programme, implementing new approaches such as UAV photogrammetry surveying solutions and exploring novel approaches such as UAV-mounted bathy lidar<sup>2</sup> to cover shallower 'white ribbon' areas.

The programme is internationally recognised, leading to benefits in terms of collaboration on major international hydrographic projects such as INIS Hydro, the Atlantic Ocean Research Alliance and EMODnet, an enhancement of the reputation of Ireland's hydrographic surveying industry and of Ireland as a marine nation.

The safety record of the programme is excellent – it is recognised that surveying operations are potentially high risk, and managers and surveyors are empowered to make decisions putting safety first, rather than for example being pressured to complete data acquisition in less than ideal conditions.

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<sup>1</sup> [http://www.infomar.ie/documents/2013\\_PwC\\_Infomar\\_Evaluation\\_Final.pdf](http://www.infomar.ie/documents/2013_PwC_Infomar_Evaluation_Final.pdf)

<sup>2</sup> Lidar – 'light detection and ranging' – is a surveying technique using laser reflected light. This equipment can be mounted on airborne drones to create bathymetric models in shallow water inaccessible to boats.

Feedback from users of the data is generally very positive. INFOMAR data is used in a variety of industries, particularly fisheries development, oil and gas exploration, laying cables and pipelines, offshore wind and wave energy development, and tourism. It is also essential for the fishing fleet, for lifeboats and for shipping in general to navigate Ireland's waters. INFOMAR data is a key tool for environmental protection, and plays a significant role in enabling Ireland to fulfil its obligations under EU Directives such as the Habitats Directive and the Marine Strategy Framework Directive.

There is no doubt that the programme is delivering value for money – it has achieved a great deal on a very limited budget. This is recognised by stakeholders and international colleagues, and was explored in some detail in the PWC evaluation. However, the cuts in funding have had deep implications for the programme, and these must be addressed going forward if Phase 2, and the programme as a whole, is to deliver to its full potential.

### Looking forward

The cuts to funding were accommodated in Phase 1 in a number of ways, principally:

- a lack of recruitment and promotion – particularly in GSI, and
- a reduction in the time and effort originally allocated to 'value added' activities i.e. those activities designed to ensure that the data is accessible to, and used by, a wide range of stakeholders.

This has had three main impacts; it has led to:

- a significant reduction in the time given to both strategic and tactical planning,
- slower and less widespread delivery of benefits from the data to non-expert and particularly non-government users than hoped, and
- lost opportunities to leverage wider benefits arising from the presence of a strong body of practical hydrographic surveying /mapping expertise in Ireland

Our analysis of stakeholder views has provided no very clear steer on priorities for mapping in Phase 2. Both an online user survey and surveys at two seminars run by INFOMAR tended to agree that the West and South is the priority mid-water area, and that Mayo/Galway and Donegal are the priority coastal areas. However, as there is no very clear steer, it would be perfectly legitimate for practical and logistical considerations to drive the programme's priorities.

Looking forward we believe there is a risk that Phase 2 of the programme will be unable to achieve all that is wanted or needed under the current level of funding.

Even if funding is restored, or restructured, to meet the funding gap, the scope and objectives of the INFOMAR programme should be reassessed, and priorities and plans revisited, if maximum value is to be obtained from the programme.

### Recommendations

We have made a number of recommendations for INFOMAR to consider going forward. These address:

- Strategic priorities and planning for Phase 2
- Issues arising from constraints imposed by funding cuts on senior management time
- Managing programme-critical resource
- Governance of the programme, organisation of the Technical Advisory Committee (TAC) and developing closer ties with industry
- Continue to build a strong team ethos and efficient ways of working across the programme teams
- Branding, external communications and awareness
- Data accessibility, and
- Maximising the INFOMAR legacy.

## Table of Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
	Aims of this evaluation	1
	Context of the review	1
	Methodology	2
	Structure of the review findings	2
<b>2</b>	<b>INFOMAR Impact</b>	<b>3</b>
	Impact of INFOMAR	3
	Accessibility and usefulness of data and products	5
	Awareness of the INFOMAR brand	7
<b>3</b>	<b>Management &amp; oversight of the Programme</b>	<b>8</b>
	Progress against plan	8
	Planning	11
	Skills shortages and critical resources	12
	Team working	13
	Quality assurance of outputs	14
	Governance	15
<b>4</b>	<b>Conclusions and Recommendations</b>	<b>17</b>
	Conclusions	17
	Recommendations	18
	<b>Annex A: Data Sources for the Evaluation</b>	<b>23</b>
	<b>Annex B: On-Line Survey of INFOMAR Data Users</b>	<b>26</b>
	<b>Annex C: Findings from INFOMAR Stakeholder and Geoscience Seminars on Phase 2 Priorities</b>	<b>30</b>

## Acknowledgements

We are grateful for the helpful and open discussions we have had with staff at all levels from the GSI and the MI, with their contractors, with members of the INFOMAR Board and the Technical Advisory Committee and with other stakeholders in INFOMAR. We particularly thank Archie Donovan and Tommy Furey for their cooperation throughout the conduct of this evaluation. The findings of this report reflect the views of the Risk Solutions' project team, who remain responsible for any errors or omissions.

# 1 INTRODUCTION

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- 1.1 The **IN**tegrated Mapping **FO**r the Sustainable Development of Ireland's **Marine Resource** (INFOMAR) programme is a joint venture between the Geological Survey of Ireland (GSI) and the Marine Institute (MI). It concentrates on creating a range of integrated mapping products of the physical, chemical and biological features of the seabed in the near-shore area.
- 1.2 The programme is being funded by the Irish Government through the Department of Communications, Energy and Natural Resources as part of the National Development Plan, 2007 – 2013. Phase 1 of the programme (2006 – 2015) aimed to map 26 Bays and three priority near-shore sea bed areas. Phase 2 (2016 – 2025) will map the remaining areas. The programme has three key objectives:
- Data acquisition, management and interpretation: To contribute to the management of activities and resources in Irish inshore areas by completing a comprehensive mapping and data interpretation programme for defined priority areas and bays
  - Data integration and exchange: To establish processes and procedures to create a mechanism for the enhanced integration of marine survey data and the dissemination of data and information products to policy makers, academia, private sector and the public
  - Deliver value added research: To deliver a range of value added opportunities linked to user demands, commercial markets and external funding sources – as part of this INFOMAR provide grants to organisations to encourage industry & research partnership and collaborative applications, particularly where there is future scope for commercial opportunities, growth and/or jobs.
- 1.3 Overall the programme aims to contribute to economic growth, healthier ecosystems and increased engagement with the sea, in line with the aims of 'Harnessing our Ocean Wealth'<sup>3</sup> in which the INFOMAR programme has been identified as Key Action 23.

## Aims of this evaluation

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- 1.4 Risk Solutions was commissioned to carry out a post implementation evaluation of Phase 1 of the INFOMAR programme to:
- Provide a high level overview of the outputs and impact of the INFOMAR Phase 1 programme
  - Carry out an evaluation, including stakeholder feedback, on the proposed Phase 2 programme (starting in January 2016)
  - Make recommendations for improving the INFOMAR Programme to assist in planning Phase 2 (2016 – 2026)
- 1.5 This was a light touch review, drawing on stakeholder, staff and management interviews, a user survey and review of documents, including INFOMAR Activity Reports and the 2013 interim evaluation of the programme by PWC<sup>4</sup>.

## Context of the review

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- 1.6 Funding of €4 million per annum was allocated to the INFOMAR programme for the period 2006 – 2008. The INFOMAR programme was subsequently incorporated into the National Development Plan (NDP) 2007 – 2013, under the Enterprise, Science and Innovation Priority

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<sup>3</sup> *'Harnessing our Ocean Wealth, An Integrated Marine Plan for Ireland', Irish Government, July 2012*

<sup>4</sup> [http://www.infomar.ie/documents/2013\\_PwC\\_Infomar\\_Evaluation\\_Final.pdf](http://www.infomar.ie/documents/2013_PwC_Infomar_Evaluation_Final.pdf)

in the Geoscience sub programme, with the same annual budget of €4 million, i.e. projected to €28 million to 2013.

- 1.7 Since initial estimates were developed, Ireland has experienced major macro-economic changes. The Irish financial crisis, characterised by an 8.3% cumulative fall in GDP and 8% rise in unemployment since 2008, has led to a total required fiscal adjustment between 2008 and 2014 of approximately €30 billion. As a result, the annual INFOMAR programme budget was reduced by 16% in 2009 and by a further 10% reduction in 2010. A budget provision of €3 million was made in 2011 – 2015. Targeted programme outputs were not, however, reduced.
- 1.8 A key element of the review was therefore to consider how the reduction in funding had impacted delivery of Phase 1 and implications of this for Phase 2.

## Methodology

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- 1.9 To carry out this review we:
- Conducted interviews with senior management and staff from GSI and MI, contractors, Board and Technical Advisory Committee (TAC) members and data users. In total we spoke to 34 individuals.
  - Conducted an on-line survey of users of the INFOMAR website.
  - Requested and received a written submission from the UK Hydrographic Office (UKHO).
  - Reviewed documentation provided to us by the INFOMAR management team.
- 1.10 Interview topics were informed by the construction of a programme logic model, illustrating how INFOMAR inputs and activities are intended to lead to outputs and impacts. This model built on the original constructed by PWC and the INFOMAR team to inform the 2013 evaluation. The programme logic model is provided in Annex A along with a list of people whose views have contributed to our study, and the full list of documentation we reviewed.

## Structure of the review findings

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- 1.11 We have structured the review findings as follows:
- In Section 2 we discuss the impact of INFOMAR programme
  - In Section 3 we discuss the management and oversight of the programme, including our findings in the areas of:
    - progress against plan to-date for each of the three main objectives
    - programme planning
    - critical resources
    - team working
    - quality assurance, and
    - governance
  - In Section 4 we present our conclusions and recommendations. Throughout the main body of the report, recommended actions are **emphasised**, and these are then brought together in the recommendations part of Section 4.

## 2 INFOMAR IMPACT

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### Overview

There is no doubt that the INFOMAR programme is delivering value for money – it has achieved a great deal on a very limited budget.

The programme is widely recognised and respected, with many commentators highlighting the achievements of the programme both within Ireland and internationally.

INFOMAR data is used by a wide range of public and private sector organisations and also by academia to support research.

It supports fisheries development, oil and gas exploration, laying cables and pipelines, offshore wind and wave energy development, and tourism. It is also essential for the fishing fleet, for lifeboats and for shipping in general to navigate Ireland's waters.

INFOMAR data is a key tool for environmental protection, and plays a significant role in enabling Ireland to fulfil its obligations under EU Directives such as the Habitats Directive and the Marine Strategy Framework Directive.

The programme is internationally recognised, leading to benefits in terms of collaboration on major international hydrographic projects such as INIS Hydro, the Atlantic Ocean Research Alliance and EMODnet, an enhancement of the reputation of Ireland's hydrographic surveying industry and of Ireland as a marine nation.

Feedback from users of the data is generally very positive. They consider the data of high quality, comprehensive and useful. Responses from our survey, and examination of the website however suggest that the presentation of the data and products could be improved, to increase accessibility and reach, in particular for the non-expert user.

The team is very resource constrained and a more strategic approach to the value added activities, focusing on those with highest impact and most reach, may help improve impact.

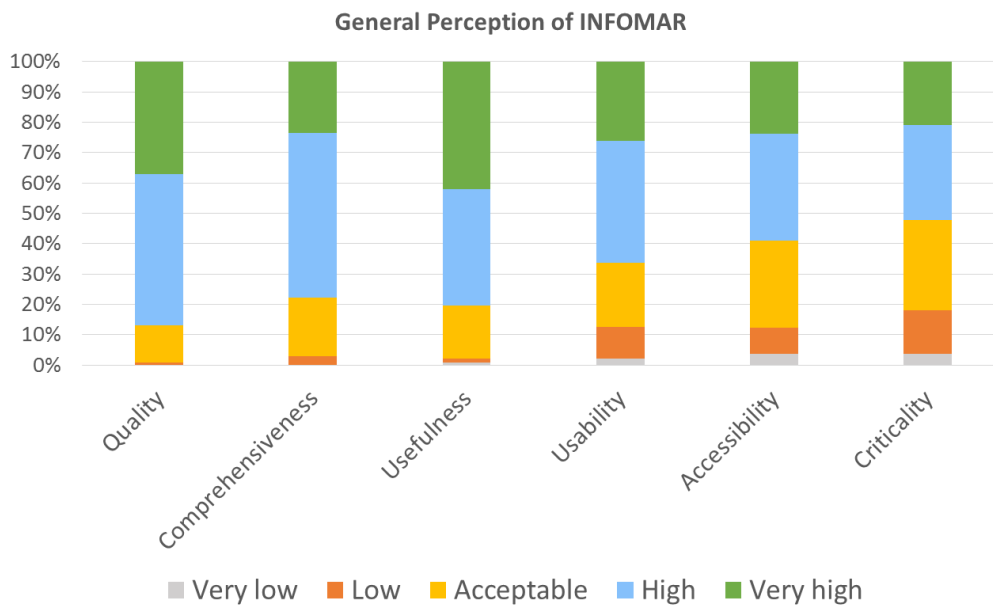
The requirements for the users of data to acknowledge INFOMAR as the data source should be simplified and made more impactful to encourage users to comply.

## Impact of INFOMAR

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### Direct impacts

- 2.1 INFOMAR data is used in a variety of industries, particularly fisheries development (spawning ground protection/ habitat mapping), oil and gas exploration (understanding the seabed) and also for laying cables and pipelines, offshore wind and wave energy development, tourism (understanding the coast, development of new marinas, leisure boats, shipwreck exploration for diving). Examples of these include the Westwave site for renewable energy, which used INFOMAR data to identify the best location for the device, and the new transatlantic US – Ireland telecoms cable - INFOMAR data was used to aid the decision-making on cable routing.
- 2.2 It is also essential for the fishing fleet, for lifeboats and for shipping in general to navigate Ireland's waters. A PhD fisheries scientist at the MI is researching the benefits of incorporating multibeam data into conventional stock assessment techniques to improve management approaches.
- 2.3 INFOMAR data is a key tool for environmental protection, and plays a significant role in supporting the Habitat Directive and the Marine Strategy Framework Directive. INFOMAR seabed maps are integrated, standardised and harmonised with other maps of European seas from other nations and made available to EU policy makers and researchers.
- 2.4 Figure 1 provides an overview of perception of INFOMAR data and products based on our user survey.



**Figure 1: Overview of INFOMAR data and projects**

Source: Online User Survey Conducted by Risk Solutions, 2016

## Wider impacts of the programme

### Education and outreach

- 2.5 The INFOMAR programme provides a unique opportunity to inspire a generation of young people to seek their living from Ireland's marine resources. INFOMAR has made a considerable effort to increase its engagement with education over recent years. The activities undertaken, while abundant and diverse in approach, can be somewhat ad-hoc. They include:
- Hosting around 200 transition year students at the MI to give them practical experience of marine survey work
  - Getting involved in SMART (Strategic Marine Alliance for Research and Training) School to teach higher education students practical skills using seismic and hydrographic instruments on board the larger vessels
  - Giving seminars at Universities and assisting students with MScs and PhDs
  - Developing apps aimed at providing educational resources for school teachers
  - Going into Primary schools and working with children at all levels to interest them in the marine environment and surveying
  - Attending events such as the BT Young Scientists Exhibition, the Science Fair at Galway, SeaFest and the National Ploughing Championships
  - Going on national television and local radio when surveying locally to inform local people about their activities and purpose.
- 2.6 The impact of this work would be improved with **a more strategic approach, aiming effort at those activities with the most reach (Recommendation 1)**. For example, **contributing to developing materials to support delivery of the curriculum, rather than working with individual schools and classrooms (see Recommendation 19)**.
- 2.7 There has been considerable discussion internally about how best to support the development of a formal qualification in hydrography within Ireland – there is demand, but students from Ireland currently have to study abroad for this qualification. The INFOMAR vessels could support the practical aspects of such a course, but the rest of the educational materials and course delivery would need to be provided by an academic institution and **we recommend that INFOMAR consider identifying a university partner to develop such a course**

**(Recommendation 18).** This might eventually lead to an increase in e.g. Cat A hydrography skills, which are in short supply in Ireland and internationally.

#### **Social media and the web-site**

- 2.8 INFOMAR does not have a professionally managed twitter feed or website – there is currently one person responsible for uploading information to the website and on twitter, where INFOMAR uses the twitter handle @followtheboats with 732 followers. The twitter feed is updated every few days. There is an INFOMAR Facebook page with 501 likes. The website looks somewhat old-fashioned, the most recent news update is from September 2015 and press release from November 2015 and responses from our survey (see below) suggest that the presentation of the data and products could be improved. **We recommend that, as part of current plans to review and improve the web-site, that the accessibility of the data and products is reviewed, particularly from the perspective of the non-expert user (Recommendation 17).**

#### **International reputation**

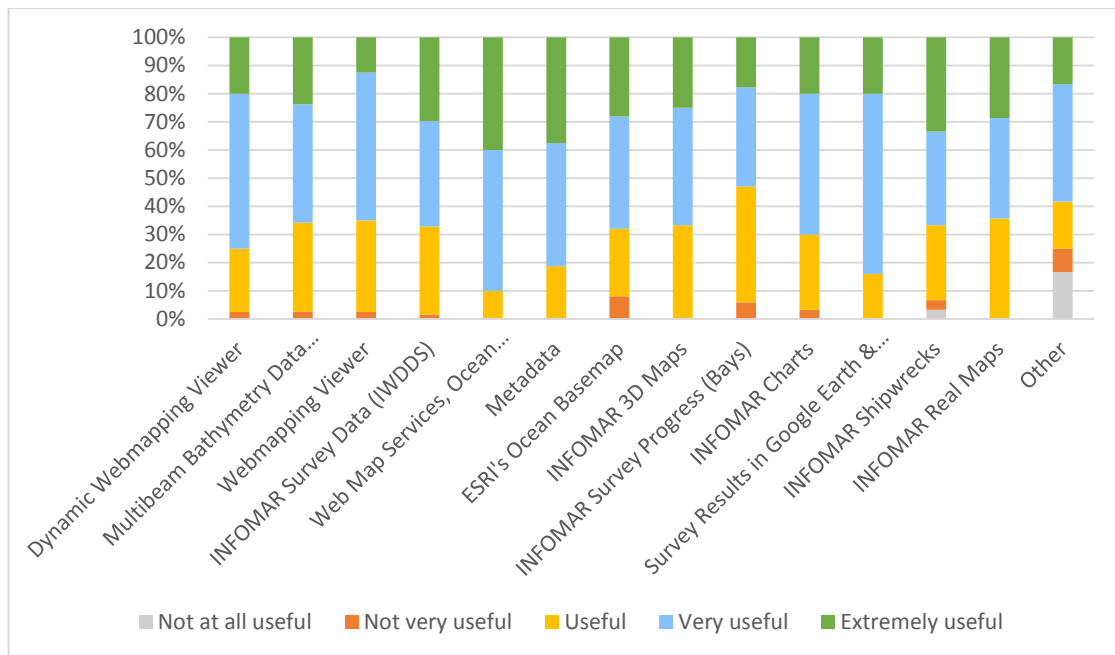
- 2.9 Within the programme INFOMAR has developed a core of people with a knowledge base that is recognised internationally as cutting edge. This international reputation is such that students from abroad will spend 6-8 weeks per year as unpaid interns simply to gain the practical experience on offer. This reputation has been used to facilitate the delivery of the EU and wider international projects mentioned above. INFOMAR staff also attend international seminars and conferences, and present peer reviewed papers. Recently a group from Canada has visited the programme to see how they operate. **It might be possible to make more of this expertise, as the demand for greater development of marine resources around the world increases**, and provide services to other countries on a commercial basis, but at present resources are too limited for this to be a viable option **(Recommendation 20).**

## **Accessibility and usefulness of data and products**

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### **Expert users**

- 2.10 The representatives of government bodies with potential need for INFOMAR data who sit on the Technical Advisory Committee are generally very happy with the data produced, and are convinced it has far-reaching impacts and value for e.g. the fisheries, tourism, oil & gas exploration and aquaculture industries.
- 2.11 The view is that for people who understand data manipulation the data is accessible in the wide variety of formats that most would expect to see, is being used by them and is of great value. Findings from our on-line survey support this view, with all the products available on the INFOMAR site being graded as Extremely or Very useful by at least 55% of respondents with very few 'Not Very Useful' responses, as shown in Figure 2 below.



**Figure 2: Usefulness of the INFOMAR data and products**

Source: Online User Survey Conducted by Risk Solutions, 2016

2.12 Data is also being used commercially by companies who have the specialist staff to make best use of the data, as well as by universities and academics to support research.

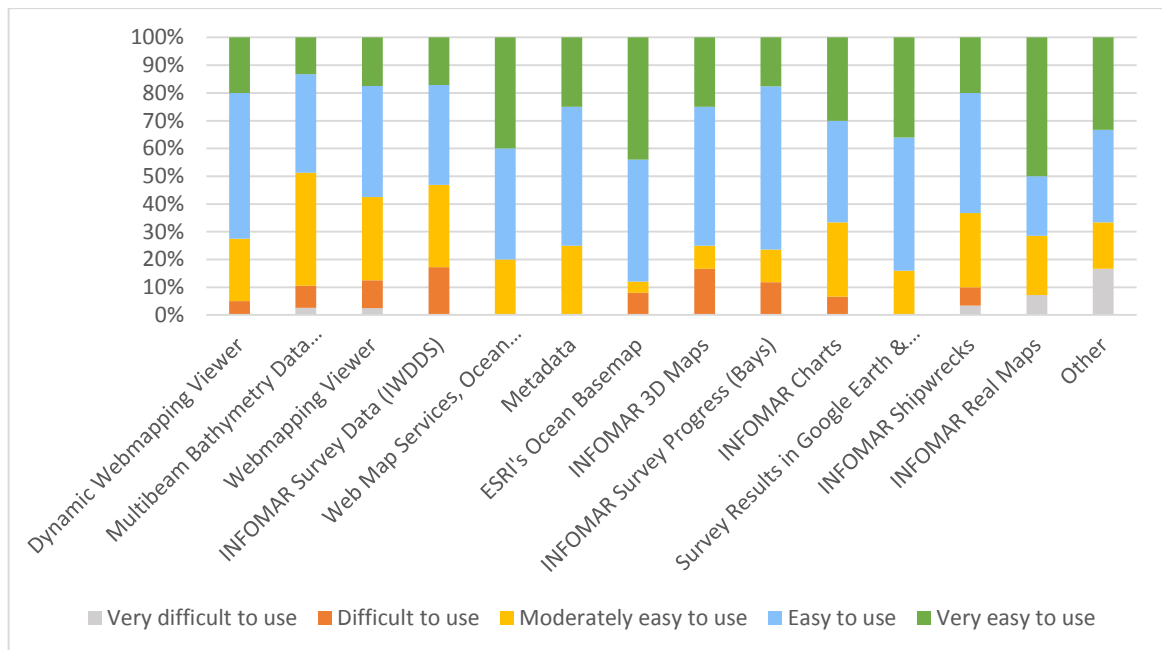
**Non-expert users**

2.13 For the non-expert user the data can be trickier to work with. However most of the survey respondents we spoke to had successfully used the data. There were some issues with formats, scale, coverage and data accuracy (i.e. the precision needed). There was also some support for the concept of local apps being available for e.g. fishing vessels, although no-one we spoke to had as yet tried the existing apps.

2.14 Only a few respondents rated the data as difficult or very difficult to use, as indicated in Figure 3 below. The products rated as having the lowest reported usability and accessibility in the on-line survey were:

- INFOMAR Survey Data (IWDDS)
- INFOMAR 3-D Maps, and
- Webmapping Viewer (although this was also spoken of very favourably by some of our interviewees)

2.15 Because only a very few respondents described products as difficult to use, we do not consider this is a major issue, however we do recommend that **the presentation of products expected to be useful for the non-expert user is reviewed as part of the review of the web-site (Recommendation 17).**



**Figure 3: Ease of use of INFOMAR data and products**

Source: Online User Survey Conducted by Risk Solutions, 2016

## Awareness of the INFOMAR brand

- 2.16 The INFOMAR programme has a strong reputation, particularly internationally in the field of seabed mapping where INFOMAR is recognised as cutting edge. This has led to the involvement of Ireland in a number of international projects that would not otherwise have occurred, for example the INIS Hydro project. However there is some concern within the programme team that the INFOMAR brand is not always acknowledged to the extent that it should be. The programme team would like to see INFOMAR always credited for its work. **We recommend that protocols for referring to, and crediting, INFOMAR achievements are agreed between GSI and MI (Recommendation 15).**
- 2.17 In addition, although there are requirements for the users of data to acknowledge INFOMAR as the data source, giving INFOMAR a credit and enhancing its brand image, the way this requirement is presented via the website is complex and difficult for lay users to clearly interpret. It is likely that many users would simply ignore the terms and conditions, and for others these may even put them off using the data. **This presentation should be simpler and steps should be taken to make it easier for users to add INFOMAR logos to their work (Recommendation 16).**

## 3 MANAGEMENT & OVERSIGHT OF THE PROGRAMME

### Overview

The fact that against a background of deep cuts, INFOMAR has largely met its surveying and data interpretation objectives in Phase 1 is testament to management and staffs skills and dedication to the programme.

The two organisations involved in INFOMAR, GSI and MI, have worked well together, and in particular recent joint working on surveying in the field has encouraged greater team cohesion across the two organisations.

Innovative approaches have been used to improve the quality of the data collected, upgrading equipment and software throughout the life of the programme and the safety record of the programme is excellent.

Cuts to funding have resulted in significant pressures on management time, delays in data processing and less progress against 'value added' activities than hoped. There has been:

- a significant reduction in the time available for both strategic and tactical planning,
- slower and less widespread delivery of benefits from the data to non-expert and particularly non-government users than hoped, and
- lost opportunities to leverage wider benefits arising from the presence of a strong body of practical hydrographic surveying /mapping expertise in Ireland

Looking forward we believe there is a risk that Phase 2 of the programme will be unable to achieve all that is wanted or needed under the current level of funding. The scope and objectives of the INFOMAR programme need to be reviewed and priorities and plans revisited. Gaps in critical resources have been identified and must be addressed as a matter of urgency, along with succession planning for the GSI programme manager. A number of areas where delivery management could be improved have also been identified.

- 3.1 Programme management is provided jointly by GSI and MI with a joint programme manager being appointed by each organisation, who work together, focusing on their own areas of particular capability, to deliver the programme.

Oversight of the programme is provided by the Board and the Technical Advisory Committee.

### Progress against plan

#### Completion of surveys

- 3.2 The general consensus is that progress on survey completion has been very good, particularly given the challenging financial environment within which the programme has been carried out.
- 3.3 The original plan for Phase 1 to map 26 bays and three coastal areas was a clear objective, which could be measured, and therefore provided a focus for activity. This objective was not reduced in light of budget cuts. The impact of this was that in some areas, while baseline mapping was undertaken, some additional aspects of the programme may not be fully completed as originally intended. In particular, there have been areas where the amount of detail obtained, for example in terms of groundtruthing, environmental mapping and biological sampling, has been less than would have been possible with full funding. The impact of this will be on seabed and habitat classification.
- 3.4 The foreshore 'white ribbon' is difficult to survey and takes a long time, and the definition of how shallow a survey should or could be carried out (for example within the intertidal range) has remained an open question. New techniques such as use of UAVs could improve coverage of already-surveyed bays, but the additional expense of both collecting and processing the very detailed data, would need to be justified by the added value it would

deliver. In addition there may be opportunities to piggy-back on other surveys, such as the fisheries surveys, which could be recruited to provide a platform for INFOMAR sampling during their down-time (e.g. at night). Sharing and consolidation of data from surveys and sampling carried out by other organisations for other purposes, such as oil and gas exploration, would also benefit the overall national programme. **We recommend that the programme managers include consideration of the costs and benefits of these approaches as part of their strategic planning (Recommendation 1).**

- 3.5 In addition to the original target, some extra surveying work has also been brought forward from Phase 2. This was undertaken through engaging in competitive research initiatives, and to support industry and other organisations' mapping priorities. For example, a significant area of the west coast that was outside the original Phase 1 requirement was mapped to underpin the development of an ocean renewable energy sector.
- 3.6 The safety record of the programme is excellent – it is recognised that surveying operations are potentially high risk – and managers and surveyors are empowered to make decisions putting safety first, rather than for example being pressured to complete data acquisition in less than ideal conditions. **We recommend that senior management should continue to make time to join teams working on both the small boats and larger vessels so that they continue to understand operational constraints (Recommendation 4).**

### Completion of data processing and integration

- 3.7 The INFOMAR team takes the surveyed raw data and has to carry out considerable processing to both turn this into maps of the seabed, showing water depths, contours, and texture (in a variety of useful formats) and integrate it with other data for example on geology of the seabed, biological samples, to create habitat maps etc.
- 3.8 Originally maps were simply produced as pdf files that users could print out. However demand rapidly expanded to include data that the end user could manipulate themselves, for example as GIS layers. The UKHO produces electronic and data charts from the data, which are used by all shipping for navigation. This data must be produced to a specific standard (see Hydrography skills section below).
- 3.9 The processing of data has lagged behind the surveying. In particular the shallower the water the longer and more complex the data processing, so there are delays between carrying out the surveys and making the data available to the end users. These delays were highlighted in the PWC evaluation report, and much effort has been put into catching up with the backlog, but there is still a time lag of 9-12 months between surveying and publication.
- 3.10 The need for more complex integration of survey data with other datasets continues, to provide more useful data for environmental purposes, or to assist the oil and gas or fisheries industries. The current approach to data processing and integration, of fitting it in during the non-surveying months, no longer seems fit for purpose. This is particularly true where a range of activities e.g. maintaining surveying equipment on small boats, logistical planning of surveys and also carrying out data processing all fall on the shoulders of the same staff during the winter months. In addition, longer term development concepts such as enhancing the usability of the website and improving the quality of the user interface almost certainly fall to the same individuals. Organisation of work is discussed further under *Delivery planning and efficiency* below

### Value Added Activities

- 3.11 The PWC report highlighted the need for INFOMAR to put more effort into the Value Added elements of the work, which had been neglected in favour of the data collection and integration activities. Following from this INFOMAR employed a consultant on a one-day per week basis to explore business development opportunities for the programme. The consultant produced a comprehensive report with a large number of recommendations for actions and

activities to be undertaken to boost the impact of the value added services<sup>5</sup>. However, while some elements of the programme of activity recommended by this report have been progressed, the full range of activities has not proceeded. In part this was because some elements were not within the programme remit and also because of lack of resource in terms of the requisite funding, skills (marketing and business development, product development etc) and time available to make this happen.

- 3.12 There are, however, a large number of activities that are ongoing and fall under the Value Added banner, including EU research project activities, a programme of funded research (see next) and activities related to providing infrastructure and upskilling support to external bodies, outreach activities, events and conferences, media activity, press releases and publications. The number and diversity of these has increased since the publication of the PWC report. **There is scope to improve the focus and co-ordination of these activities in order to increase their impact (Recommendation 1).** It may also be the case that there are further gains to be made through partnering with external organisations who have the skills that INFOMAR lack internally, to increase the effectiveness of the value added work.

### Impact of research projects

- 3.13 INFOMAR funds a series of research projects, which are procured through a series of competitive grant aid research calls. During Phase 1 INFOMAR delivered around 20 research projects, totalling in value around €500k, during each research call. In many cases the support provided by INFOMAR was intended to act as seed funding to help companies potentially spin off commercial applications based around the INFOMAR datasets. About half of the projects reportedly ultimately generate a valuable output, for example the integration of data into a coastal geoscience guide, and the use of autonomous boats for shallow water mapping. The majority of funding goes to University-led teams, although the INFOMAR management team has successfully incorporated scoring criteria to promote research and SME collaboration on initiatives to encourage more applied and commercial outputs.
- 3.14 One funded project resulted in the development of the prototype INFOMAR Diving App for Android phones. The take-up of this has been poorer than anticipated, due to their being greater demand for an iPhone equivalent<sup>6</sup>. Having outsourced the development, and without long term provision for updating the app over time, further development and expansion to other tourism products has been constrained. Enterprise Ireland will support companies with 7-15 employees, but for smaller companies starting up there is a gap in support. INFOMAR does not currently have the capability to fill this gap and take research projects on towards successful commercial development.
- 3.15 INFOMAR uses the evaluation criteria as a tool to help select those projects likely to have maximum impact, and experience has indicated that having industry involvement in a project is an effective approach. **It may be possible to adjust the focus of the research calls for example to support longer or larger scale projects, or focusing calls on particular themes that might result in greater impact. The programme managers should continue to explore these options (Recommendation 1).**

### Leveraging external research finding

- 3.16 INFOMAR has been involved in a number of international projects over recent years, which between them have provided around €300-400k of funding per year. These projects include: EMODnet, TELLUS Border Project, MESH, MESH-Atlantic, JIBS, INIS Hydro. This funding can provide for additional staff time over and above the baseline government funding of the programme, but will also bring with it specific additional research and deliverables that are outside the primary INFOMAR objectives. However it is also instrumental in increasing

<sup>5</sup> INFOMAR Value Added Services & Impacts Assessment Report, DBICs, 2015

<sup>6</sup> Compass Informatics have recently developed the iPhone version of the app for INFOMAR, which is currently going through the Apple App Store approvals process.

INFOMAR's reputation and enabling the INFOMAR programme experience to be shared more widely.

## Planning

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- 3.17 The programme has achieved most of what was originally envisioned in Phase 1 through the hard work and dedication of staff and management. However, management time is stretched, layers of management have been removed, and there has been no opportunity to recruit or promote staff into management positions. This has had a particular impact on planning.

### Programme planning and priorities for Phase 2

- 3.18 Funding cuts in Phase 1 resulted in an emphasis on delivery of mapping at the expense of value added activities and to a lesser extent data processing and publication.
- 3.19 As part of the evaluation we analysed feedback from stakeholders on priorities for mapping for Phase 2. Our analysis has provided no very clear steer. Both the online user survey carried out as part of this review, and the stakeholder surveys run by INFOMAR tended to agree that the West and South is the priority mid-water area, and that Mayo/Galway and Donegal are the priority coastal areas. The results are presented in Annex C.
- 3.20 As there is no very clear steer, it would be perfectly legitimate for practical and logistical considerations to drive the programme's priorities.
- 3.21 As the programme moves into Phase 2, the challenge will be to strike an appropriate balance between the amount of time and resources spent on collection and processing of data, and the activities required to ensure that the data can be accessed and used by those who will extract most benefit from it. Such activities often require specialist skill sets and knowledge that are outside the INFOMAR team's core competencies. **Ways must be found to ensure such activity is stimulated and sustained by the appropriate organisations, initiatives and individuals, whether from within or outside INFOMAR (Recommendation 1).** We expect that the Inter-Departmental Marine Co-ordination Group (MCG) will be able to provide valuable support in facilitating partnerships with appropriate organisations and initiatives.

### Delivery planning and efficiency

#### Small boats

- 3.22 The large vessels for the mid-water work are self-contained and come with crews who carry out all maintenance requirements. The small boats are crewed by the survey teams themselves, although generally piloted by a contracted boat driver, and maintained as far as possible by them over the winter months. Despite this there are always issues with equipment which can lead to loss of availability of 1 – 2 months of the surveying season. There are some procedures in place for this maintenance, but these are not always followed due to lack of engineering and management time. We would recommend that, as part of an overall review of tasks, roles and responsibilities within the team (and in preparation for handover of overall programme management responsibilities due to retirement of the GSI programme manager), **this task is given to a small, managed team to ensure it is prioritised and carried out in a timely manner each year (Recommendation 14).**

#### Coastal surveys

- 3.23 There are some efficiency issues with the coastal surveys that could potentially be reduced with additional staff time to oversee and manage the process, particularly the logistical side such as contacting harbour masters in advance, identifying sources of fuel for the boats, identifying and booking accommodation as required, provisioning the boats etc. Staff on board work very long hours and don't necessarily have time or energy at the end of a working

day to drive to the next survey location to work on logistical matters – these should ideally be arranged in advance, once the programme of survey locations has been agreed, at least provisionally.

### Planning of data processing and integration

- 3.24 There is no doubt that the processing and posting of data lags behind the surveying of the seabed. There are a number of legitimate reasons for this, however without processing and then publishing the data the surveys have little value, so it is clearly critical that this problem is addressed. While the team have managed to reduce the backlog that had built up and was highlighted in the PWC report, there is still a delay of up to a year between survey and data production.
- 3.25 Data processing is generally carried out in the winter months when there is no surveying work, primarily by the same staff. There have been some trials of processing the mid-water surveys on board ship at the time of surveying, which have been successful, but is not a practical solution for the teams conducting coastal surveys. A more effective (but potentially costly) approach would be to have a small, managed team of dedicated data processors working throughout the year, to avoid the creation of a backlog, which would be supplemented by the survey teams over winter. This could be achieved through recruiting additional staff or re-phasing the surveying to extend the overall programme beyond 2026. This approach would have the advantage of providing additional resource to support 'value added' activities (see *Value Added Activities* above).

## Skills shortages and critical resources

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- 3.26 The team is rich in geologists and marine scientists who are very capable of carrying out the required surveys, and processing and integrating the data produced. Regular training is undertaken to increase the skills of the team, and to take on board advances in instrumentation and software. However the team is short of management time, hydrography skills, data processing resource (to keep pace with the surveying programme) and potentially other specific technical skills including:
- the environmental and biology skills needed to fully integrate the survey data with other types of information and interpretation to provide more useful environmental and habitat datasets, and
  - the skills needed to deliver the value added elements of the programme - marketing and business development, product development etc.
- 3.27 These shortages have arisen largely due to the financial crisis and the consequent reduction in INFOMAR funding and the lack of promotion and recruitment within the civil service, which has particularly affected GSI, who as a result have become heavily dependent on contract staff.
- 3.28 The MI has recently had permission to employ three more permanent staff, and these posts have now been filled. The GSI is also now hoping to open up two further permanent positions, and are in the process of interviewing for these. The hope is that these appointments will help alleviate management pressures, and provide resource to support value added activities among other things.
- 3.29 Succession planning, hydrography resource and reliance on contractors present particular challenges, which must be tackled as part of the overall strategic planning for Phase 2. **The programme managers need to make time for strategic and tactical management activities (Recommendations 3 and 5).**

### Succession planning

- 3.30 The programme manager for GSI is due to retire within two years. The GSI programme manager is currently responsible for a great deal of the day to day organisation, administration and also longer term planning for the INFOMAR programme on the GSI side. Due to the lack

of promotion and recruitment within the civil service, there has been little opportunity to develop a range of potential candidates from whom to choose a successor. There is currently only a single staff member within the INFOMAR team who is of an appropriate grade, and his skills are already in short supply within the programme, and would be even more stretched were he to take on the programme manager role. DCENR/ GSI has now agreed to add two staff posts to the INFOMAR programme, one at a lower level and one a grade below the programme manager (so with potential to replace him in due course). GSI is currently in the process of interviewing a panel of six individuals from which to fill these posts. However it is not clear that someone new to the INFOMAR programme would be in a position to take on the management role within the timeframe envisaged.

- 3.31 The lack of promotions has also had an impact on more junior staff – INFOMAR take on people at a low level and provide them with valuable training and experience. However there are no opportunities to promote them within the programme, so these skilled young people will move on to jobs elsewhere (often abroad) taking their experience with them, and leaving INFOMAR to train up another set of young people. This is good for the individuals who are trained and can go on to better opportunities, but it is poor value for INFOMAR and potentially for Ireland if their skilled population takes up opportunities overseas.

### Hydrography skills

- 3.32 The INFOMAR team includes only one Cat A hydrographer (and the only Cat A hydrographer in Ireland). His skills are therefore critical to the achievement of key programme objectives. There is no formal plan to build more Cat A hydrographer capacity, as there is nowhere to obtain this qualification within Ireland, and current INFOMAR team members who might be interested in acquiring such a qualification are too busy working on the programme to devote time to further education at this formal level. In addition, the recent requirement that the UKHO has imposed to provide confidence values for data (CATZOC categorisation) has put further pressure on ensuring the data quality and the need for qualified staff to sign off the data produced. It is unclear where supplementary Cat A hydrography support will come from, but **it would be beneficial to the robustness of the programme and the longer term future of hydrography in Ireland if these skills were increased (Recommendation 7).**

### Use of contractors

- 3.33 GSI has relied particularly heavily on the use of contractors with longer contracts (e.g. 3 years). Contractors can bring a number of benefits, such as flexibility, and dedication to the task because they may feel a need to 'prove' themselves at all times. However contractors do not necessarily have any loyalty to the programme as a whole, are not in a position to take on management responsibilities and each contractor attracts their own burden of management time because each one needs a staff member as a line manager.
- 3.34 In addition the procurement process (at GSI in particular) seems to be very rigid, providing little scope for INFOMAR to select more experienced individuals over those with lower day rates, which can have a detrimental impact on the effectiveness and efficiency of task completion and impacts on management time. **When formulating the next procurement framework we recommend the programme managers give consideration to the use of specific competence criteria or other mechanisms to pre-qualify potential contractors, working with their procurement team to ensure the rules in place are optimised to the benefit of the programme as a whole (Recommendation 6).**

## Team working

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### Programme management

- 3.35 The INFOMAR programme is a joint programme between the GSI and the MI, and the two organisations have their own separate teams of staff working on the programme, with

programme management responsibility shared between two senior people, one from each organisation. The organisations are not co-located – the GSI is in Dublin while the MI is in Galway, over 200km away. It is clear that working closely together is essential to the programme's success, and the programme managers have a good working relationship, relying primarily on telephone and email communications as well as face to face meetings. The teams of staff have traditionally worked less closely together, although over the past year MI staff have joined GSI staff conducting coastal surveys on small boats, and this has fostered a greater team spirit across the organisations, which is very welcome. **We recommend that ways to continue joint working, now the immediate operational imperative for this has passed, should be developed (Recommendation 12).**

- 3.36 The two organisations are responsible for different aspects of the surveying. The MI, which has its own larger vessels, conducts the mid-water (deeper water) surveys, while the GSI carries out the coastal surveying activities using smaller boats. Planning and budgeting has created some friction. **The development of a long-term strategic plan would make this process even more transparent to all parties (Recommendation 1 and 2).** However there is much goodwill from both organisations, along with pride in the programme, which helps to keep the team working well together – at an operational level they consider that at present things have never been better.

### Information sharing

- 3.37 There are some issues around sharing of information across team boundaries. GSI, as a governmental organisation, has specific requirements with regard to integrity of its network and data security which can pose a barrier to easy electronic sharing of information with an external body such as MI. We believe these barriers are surmountable, as we have successfully engaged in projects requiring sharing information with UK government departments, but it is important to speak directly with IT staff in the relevant department to understand what the security requirements are and what solutions may be available. Having an internal e-forum to share planned activities and experiences, for example of school visits, demonstrations at science festivals or particular survey situations may enhance the effectiveness of the team across the organisations. **We recommend effective methods are found for sharing knowledge and experiences within the team, particularly across the organisational boundary (Recommendation 13).**

## Quality assurance of outputs

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- 3.38 INFOMAR undertakes quality control and quality assurance on the programme's data. The quality of the data and outputs produced by INFOMAR is secured through the training of staff, both formally and on the job, to generate data to required standards. The standards for new equipment and new methods are built in when developing and testing these. UKHO have worked with INFOMAR personnel to share QA procedures and expectations for use of data in nautical charts, and INFOMAR personnel then work to these. Although INFOMAR is not a research project, members of the team do seek to publish some of their findings in peer reviewed journals and this provides an additional degree of scrutiny and assurance.
- 3.39 Quality of data is perceived internally to have increased since the start of the programme, due to improvements in equipment sensitivity. UKHO find that they often have queries when they receive data, although recognise that this is to be expected with complex datasets.
- 3.40 Quality of hydrographic mapping must ultimately be signed off by a Cat A hydrographer. Currently there is only one individual qualified to this level in the INFOMAR team (and in fact in the whole of Ireland) and this individual is heavily involved in managing day to day operations of the INFOMAR programme. This will undoubtedly put a strain on the ability of the programme to publish Cat A data to UKHO. **Recruiting or training up additional Cat A hydrography resource, and focusing this resource on providing quality assurance should be a priority for the programme (Recommendation 7).**

## Governance

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### Role of the Board

- 3.41 The Board, which meets quarterly, is chaired by the DCENR Departmental Assistant Secretary. Two other members of the Board also come from DCENR (including a financial advisor co-opted from KPMG) and the remaining members comprise the Director of GSI, the CEO of MI, and the joint programme managers. Other members of the INFOMAR management team attend the Board meetings on an *ad hoc* basis to provide information as needed. Chairmanship of the Board has recently changed hands, and the new Chair has been in post since early 2016.
- 3.42 The Board focuses on the progress of data gathering, budget and also on health and safety of the operations, which members tell us is taken very seriously. The Board has also recently implemented more detailed scrutiny of the activities of the programme, via the Activity Report<sup>7</sup>.
- 3.43 Discussions at Board level can be robust, and this may be due in part to lack of preparation time between managers and directors to ensure everyone is aware of progress and budget plans in advance of Board meetings. There is some concern that the Board may be getting too involved in the detail of programme operations, rather than taking a fully strategic perspective. This may be partly the result of concerns over the limited management time available to oversee the programme.

### Role of the Technical Advisory Committee (TAC)

- 3.44 The Terms of Reference of the TAC state that it is to provide advice on methods, implementation of those methods, establish evaluation tools and develop criteria for selecting plan options as well as reviewing plans, technical materials and strategies, technical feasibility of plans, resource requirements and environmental issues. In practice these terms of reference do not appear to be being entirely fulfilled. The reasons for this are:
- The TAC meetings are sometimes poorly attended, without enough continuity of attendance of members from meeting to meeting
  - TAC members suggest that meetings are held irregularly and without sufficient notice to ensure attendance
  - TAC members have suffered under the cuts following the financial crisis of 2008 and have come under more pressure within their day jobs so have less time to devote to INFOMAR issues
  - External (non-TAC) stakeholders with specific interests can have a direct line of communication with the INFOMAR team and refocus priorities without discussion at the TAC.
- 3.45 For those TAC members who attend, the meetings can be useful, enabling them to steer programme priorities in the direction of their interests, and it also provides a useful forum for sharing of ideas.
- 3.46 **We recommend that the terms of reference are revisited and reworked to better reflect the activities expected of the TAC and that measures are taken to encourage attendance (Recommendation 8 and 9).**
- 3.47 Industry/non-governmental stakeholders are not represented on the TAC and this probably is appropriate. However, **the programme does need to develop closer ties with industry, to generate greater awareness of industry's needs within the programme, and greater awareness of the programme and its potential benefits within industry** (both in terms of end users and data integration/product developers) **(Recommendation 10)**.

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<sup>7</sup> For example "INFOMAR 2014 Activity, Progress & Plans", INFOMAR Management 31/12/2014

### Activity Reporting

- 3.48 Following the PWC evaluation report, which recommended that INFOMAR “ensure that future INFOMAR strategies are designed in such a manner as to support mid- and end-term evaluations, focusing on clear statements of targeted annual activity and incorporated quantified indicators of inputs, outputs and impacts”, the management team at INFOMAR has put together an annual Activity Report. While not intended to be a comprehensive report on programme activity, it provides a very useful summary of activities and progress in each of the three programme areas. However it does not take the further step of commenting on the impacts and wider value of these activities, which would be particularly useful in relation to the data integration and value added workstreams. **We recommend that the INFOMAR team capture and communicate information on the economic impact of INFOMAR and other benefits for example tracking new research jobs and funding attracted (Recommendation 11).**

## 4 CONCLUSIONS AND RECOMMENDATIONS

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### Conclusions

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#### Phase 1 achievements

- 4.1 We find that the INFOMAR programme is widely recognised and respected, with many commentators highlighting the achievements of the programme both within Ireland and internationally.
- 4.2 Despite a radical budget cut, surveying has continued and the programme has largely achieved its Phase 1 aspirations in terms of mapping and data interpretation.
- 4.3 INFOMAR has used innovative approaches to improve the quality of the data collected, upgrading equipment and software throughout the life of the programme and implementing new approaches such as UAV photogrammetry surveying solutions and exploring novel approaches such as UAV-mounted bathy lidar<sup>8</sup> to cover shallower ‘white ribbon’ areas.
- 4.4 The programme is internationally recognised, leading to benefits in terms of collaboration on major international hydrographic projects such as the Atlantic Ocean Research Alliance, an enhancement of the reputation of Ireland’s hydrographic surveying industry and of Ireland as a marine nation.
- 4.5 The safety record of the programme is excellent – it is recognised that surveying operations are potentially high risk, and managers and surveyors are empowered to make decisions putting safety first, rather than for example being pressured to complete data acquisition in less than ideal conditions.
- 4.6 Feedback from users of the data is generally very positive. INFOMAR data is used in a variety of industries, particularly fisheries development, oil and gas exploration, laying cables and pipelines, offshore wind and wave energy development, and tourism. It is also essential for the fishing fleet, for lifeboats and for shipping in general to navigate Ireland’s waters. INFOMAR data is a key tool for environmental protection, and underpins the Habitats Directive and the Marine Strategic Framework Directive.
- 4.7 There is no doubt that the programme is delivering value for money – it has achieved a great deal on a very limited budget, and this is recognised by users and international colleagues, as well as being supported by the PWC analysis. However, the cuts in funding have had deep implications for the programme, and these must be addressed going forward if Phase 2, and the programme as a whole, is to deliver to its full potential.

#### Looking forward

- 4.8 Cuts to funding were accommodated in Phase 1 in a number of ways, but principally through:
- a lack of recruitment and promotion – particularly in GSI, and
  - a reduction in the time and effort originally allocated to ‘value added’ activities i.e. those activities designed to ensure that the data is accessible to, and used by, a wide range of stakeholders.
- 4.9 This has had three main impacts, it has led to:
- a significant reduction in the time given to both strategic and tactical planning,
  - slower and less widespread delivery of benefits from the data to non-expert and particularly non-government users than hoped, and

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<sup>8</sup> Lidar – ‘light detection and ranging’ – is a surveying technique using laser reflected light. This equipment can be mounted on airborne drones to create bathymetric models in shallow water inaccessible to boats.

- lost opportunities to leverage wider benefits arising from the presence of a strong body of practical hydrographic surveying and mapping expertise in Ireland
- 4.10 Our analysis of stakeholder views has provided no very clear steer on priorities for mapping in Phase 2. Both an online user survey and surveys at two seminars run by INFOMAR tended to agree that the West and South is the priority mid-water area, and that Mayo/Galway and Donegal are the priority coastal areas. However, as there is no very clear steer, it would be perfectly legitimate for practical and logistical considerations to drive the programme's priorities. However, looking forward we believe there is a risk that Phase 2 of the programme will be unable to achieve all that is wanted or needed under the current level of funding.
- 4.11 To meet the funding gap the scope and objectives of the INFOMAR programme should be reassessed, and priorities and plans revisited, to maximise the value obtained from the programme. This exercise should be undertaken even if funding is restored.

## Recommendations

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### Strategic priorities and planning

- 4.12 INFOMAR's overall aim, as one of the Key Actions identified in 'Harnessing our Ocean Wealth' is to: "contribute to economic growth, healthier ecosystems and increased engagement with the sea". That is the emphasis is on delivering the most impact from mapping, rather than the most comprehensive map.

1. It is timely now as INFOMAR moves into Phase 2 of the mapping programme to establish a set of priorities for the programme in the form of a **strategic plan**. We recommend that the programme managers jointly develop the plan, and that it is formally endorsed by the Board.

The plan needs to strike an appropriate balance between the amount of time and resource spent on collection of data, and the activities required to ensure that the data can be accessed and used by those who will extract most benefit from it.

This does not mean that the INFOMAR programme should devote significant core resource to the 'value added' activities that will achieve this. Such activities often require specialist skill sets and knowledge that are outside the INFOMAR team's core competencies. Ways must be found, however, to ensure that such activity is stimulated and sustained by the appropriate organisations, initiatives and individuals, whether from within or outside of INFOMAR.

Items to consider in developing the priorities and plan include:

- The scope of the mapping programme:
  - The priority areas to survey - our analysis stakeholders' views have revealed no very clear priorities in terms of which areas to survey, but has helped establish some broad priorities (see Programme planning and priorities for Phase 2 above)
  - The extent of shallow-water/ white ribbon surveying, the amount of groundtruthing and biological sampling to carry out etc, based on balancing the cost of collecting and processing data and its potential value to stakeholders
  - The extent to which opportunities can be developed to link with e.g. fisheries surveying vessels to provide a platform for INFOMAR sampling during their non-surveying time at sea (at night), or to improve the co-ordination and integration of sampling programmes already undertaken by e.g. oil & gas or fisheries developers to provide a central database of information managed by INFOMAR.
- The scope of value added activities including:
  - The extent to which other partners, with the skills and knowledge can and should be responsible for sector/application specific tools and apps, how to

stimulate such activity and ensure it is sustained, and the level of support required from within INFOMAR to ensure success. We expect that the Inter-Departmental Marine Coordination Group will be able to provide valuable support in facilitating partnerships with appropriate organisations and initiatives. (See also 8 below with respect to industry liaison.)

- How INFOMAR research funding can be targeted to achieve greater impact and sustainable results e.g. by focussing on particular themes in each call, requiring proposals to include sustainability plans, supporting longer term or larger projects.
  - The scope of broader awareness raising and educational activities (see also 18 and 19 below)
2. Differences in for example, how funding is handled and different constraints on e.g. recruitment and promotion within the two parent organisations, inevitably leads to some elements of independent planning and decision-making by the two programme managers. It is important that the strategic plan is delivered as a joint document that recognises these different constraints and freedoms.

**The following recommendations should be considered in the context of the strategic plan and the extent to which they are accommodated should be determined within the plan.**

### Management time

- 4.13 Constraints on staff numbers, recruitment and promotion, especially within the GSI, has led to a situation where a high proportion of day to day activities are delivered by contract staff. This provides for a flexible and responsive workforce, but has a number of implications. The most serious of these has been the burdens this has placed on management time dealing with short term tactical decisions at the expense of longer term strategic planning and oversight activities.
3. The programme managers need to make time for:
    - developing and maintaining relations with strategic partners
    - developing and reviewing the strategic plan (see 1 above)
    - oversight of delivery of the strategic plan to ensure effective and efficient delivery
    - developing ways of capturing and sharing INFOMAR methods and processes and broader corporate knowledge (corporate memory) - (see also 12 below), and critically
    - succession planning for the GSI programme manager's retirement and to maintain critical resource (in particular Category A hydrography resource – see 7 below).
  4. Senior management should continue to make time to join teams working on both the small boats and larger vessels. Team members interviewed praised the programme's commitment to health and safety and their recognition that the teams work in a potentially very dangerous environment. The concern was that unless the management team refreshes their personal knowledge of the working environment, and the pressures inherent in the team's commitment to complete mapping on schedule bring, from time to time, they may inadvertently add to those pressures.
  5. Resource needs to be found to address shortfalls in management and supervisory grades within GSI and the potential impact of this on efficient planning (e.g. for deployment of the small boats and quality assurance - see 7 and 14 below).
  6. GSI should explore with their procurement team, the scope for procuring more experienced boat drivers and other contractors, rather than relying on only the cheapest available, to reduce supervisory needs, reworking of surveys and alleviate pressures on management time.

## Programme critical resource

7. It is of particular concern that the programme only has one hydrographer qualified to Cat A standard. The quality of INFOMAR data and products depends critically on this resource. A plan is urgently required to address this. We suggest that every effort should be made to maintain this resource as staff members, rather than contractors, as the responsibility of the quality of INFOMAR's products ultimately rest with the INFOMAR programme. UKHO currently produces hydrographic charts for Irish waters, and has recently tightened their data quality requirements. If they were no longer to produce the charts, Ireland currently has no national resource that could take on this role, so there needs to be a wider conversation with the Department of Transport, Tourism and Sport around this issue (see also 16 below).

## Governance

- 4.14 Governance is provided by the INFOMAR Board and the Technical Advisory Committee (TAC). The ability to co-opt external, independent experts to the Board add a stronger financial 'edge'. The TAC, comprising as it does representatives of public sector customers of INFOMAR outputs, fulfils an important role, and is broadly considered to deliver this successfully.
  8. The terms of reference of the TAC should be reworked to better reflect the activities expected of the TAC.
  9. There are issues with attendance at TAC. Measures should be taken to improve attendance. Improving planning of meetings, providing more notice in advance of dates, times and locations and agenda/ papers for discussion may help attendees to plan attendance into their day job more reliably. In addition where attendance from an organisation is consistently low, they should be encouraged to identify a representative who can attend more reliably.
  10. Industry/non-governmental stakeholders are not represented on the TAC and this probably is appropriate. However, the programme does need to develop closer ties with industry, to generate greater awareness of industry's needs within the programme, and greater awareness of the programme and its potential benefits, within industry (both in terms of end users and data integration/product developers). Ways of developing champions for the programme within industry, perhaps via representative organisations, should be developed. This might take the form, for example, of an annual event, perhaps aligned with the annual seminar, coupled with some more frequent targeted activity such as facilitated workshops and newsletters, focused specifically on representative organisations.
  11. For both monitoring and communication purposes INFOMAR should collect additional information on programme performance - focusing particularly on impacts. The Activity Reports are a positive step forward to programme board and should now be extended to capture and communicate information on the economic impact of INFOMAR and other benefits for example tracking new research jobs and funding attracted.

## Organisational issues

- 4.15 The INFOMAR team is made up of personnel from two different public sector organisations, with different cultures, systems and ways of working, and fundamentally different areas of responsibility. In addition, much of the programme is delivered by contractors on relatively short term contracts.
  12. The period of working together on the small boats in particular helped cement the team. More ways of joint working, now the immediate operational imperative for this has passed, should be developed.
  13. Effective methods are needed for sharing knowledge and experiences within the team, particularly across the organisational boundary. Currently a fund of valuable information

is not being shared or used effectively, and may be lost as people move on. Information includes, for example, contact details and summaries of interactions with:

- INFOMAR processes and methods
- coast guards, pilots and fishing boats – invaluable for planning future operations
- actual and potential data users – invaluable to both capture key performance information such as benefits realised from data, research funding leveraged, citations index and inform product development

INFOMAR should consider the best way of capturing and preserving this information. Information could be shared using a collaboration tool (such as SharePoint) or a customer management system, or combination of both. The best solution will depend on the precise need, and would need to work across both GSI and MI systems. The specification and implementation of a system can take from two months to six months, elapsed time.

14. Consideration should be given to the organisation of teams, particularly with regard to data processing and small boat operations. Constraints on staffing levels have meant that teams are generally under-resourced and reliant on contracted staff. In particular there is a lack of on-shore support and management/supervisory levels with implications for the efficiency of planning and delivery of activities. We recommend the development of small managed teams, cross organisational where applicable, responsible for delivery of key activities. A small, dedicated INFOMAR data processing and integration team should be established to work all year round, to be supplemented as appropriate by other team members when they are not directly engaged in carrying out surveys or maintaining equipment.

### Messaging and awareness

- 4.16 INFOMAR has a clear brand and care is taken to ensure that all outputs of the programme are clearly branded. However, this branding does not always survive third party processing or communication of programme successes within the host organisations above INFOMAR management levels.

15. GSI and MI both need to ensure that communications about INFOMAR, or based on INFOMAR data, clearly acknowledge INFOMAR, a joint programme of GSI and MI.
16. INFOMAR needs to critically review the way requirements to acknowledge INFOMAR as the source of data is presented on the web-site and data downloads. The concern here is that the clear message that the source of data must be referenced is lost in legalese. High profile, repeat offenders, should be informed in writing of the requirement, and assurances sought that future publications will comply.

### Data accessibility

17. Responses from our survey, and examination of the website suggest that the presentation of the data and products could be improved, to increase accessibility and reach. We recommend that the website is updated to provide a more modern interface, and that the ability to search for and identify the most relevant datasets and products is improved.

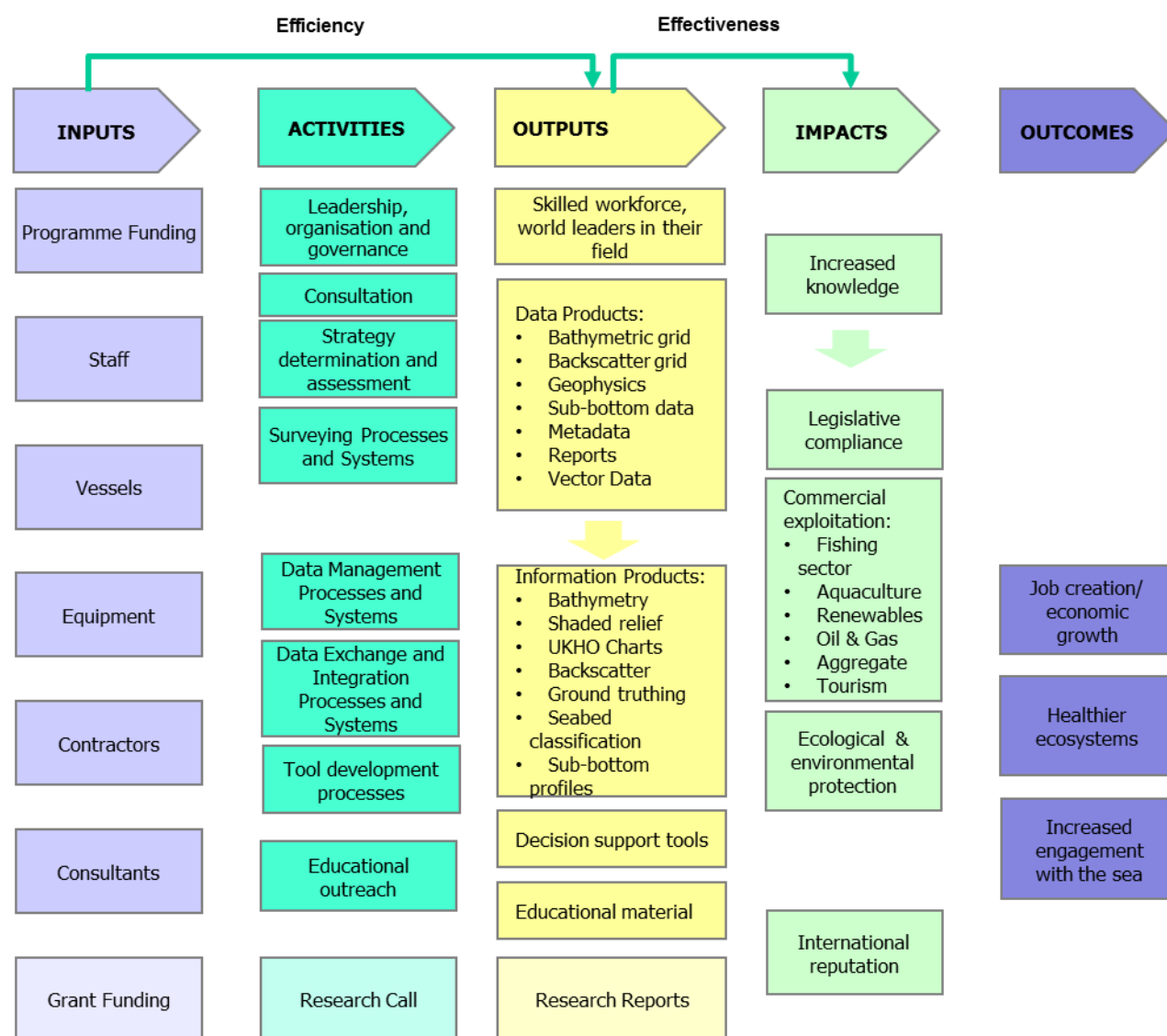
### INFOMAR legacy

18. There is currently no higher education institution based in Ireland offering courses in hydrography. Given the shortage of resource in this critical area, there would appear to be an opportunity for INFOMAR to build a lasting legacy. INFOMAR is in an ideal position to provide practical experience for students studying in Ireland if a course could be established. The course is not something INFOMAR can provide itself. A clear preferred university partner needs to be identified that is able and willing to develop and deliver such a course for which INFOMAR can provide the practical elements.

19. INFOMAR staff, on an *ad hoc* basis, carry out school visits to raise awareness of the ocean among school children. Such activities will have value for the staff and children involved, but to have a real impact needs to be delivered on a national scale, tied into the curriculum and existing programmes, and delivered through teaching packs and tools supplied to teachers, not by individuals. This is not something INFOMAR can do in isolation. INFOMAR should work with the Marine Co-ordination Group to establish how the programme can support educational initiatives, building on their experience to date.
20. INFOMAR has developed a unique resource of skills and experience in practical marine surveying and seabed mapping using a wide variety of cutting edge techniques. This is widely recognised internationally, such that students from abroad will spend 6-8 weeks per year as unpaid interns simply to gain the practical experience on offer. INFOMAR has the opportunity to formalise this arrangement and is developing a field-based training certificate. We recommend that a strategy is developed to use this expertise longer term to deliver direct assistance to other countries round the world looking to set up similar programmes to INFOMAR.

## ANNEX A: DATA SOURCES FOR THE EVALUATION

### Programme logic model



### People Interviewed

Name	Affiliation	Stakeholder role
Michael Manley	DCENR, Departmental Assistant Secretary	Former Chair of Board
Koen Verbruggen (KV)	GSI, Director	Board
Peter Heffernan (PH)	MI, Chief Executive Officer	Board
Michael Hanrahan (MH)	PAD / DCENR, Petroleum exploration specialist	Board

<b>Name</b>	<b>Affiliation</b>	<b>Stakeholder role</b>
Tommy Furey (TF)	MI, Joint programme manager	Board/ INFOMAR management
Archie Donovan (AD)	GSI, Joint programme manager	Board/ INFOMAR management
David Hardy (DH)	GSI	INFOMAR management
Sean Cullen (SC)	GSI	INFOMAR management
Fergal McGrath (FMCG)	MI	INFOMAR team leader
Fabio Sacchetti	MI	INFOMAR team leader
Captain Robert McCabe	Director of Operations and Navigation, Commissioners of Irish Lights	Technical Advisory Committee
Captain Declan Black	Department of Transport, Tourism and Sport	Technical Advisory Committee
Karl Brady	Underwater Archaeology Unit, Department of Arts, Heritage and the Gaeltacht	Technical Advisory Committee
Nicolas Chopin	Bord Iascaigh Mhara	Technical Advisory Committee
Andy McGill	General Manager, Surveying & Remote Sensing, Ordnance Survey Ireland	Technical Advisory Committee
Benen Dallaghan	Bord Iascaigh Mhara	Technical Advisory Committee
Charise Mc Keon	GSI	Wrecks/ IT servers manager (Geologist)
Xavier Monteys	GSI	Research manager (Geologist)
Maria Judge	GSI	EU projects and research (Contract Geological specialist)
Janine Guinan	GSI	EU projects and research (Contract Geological specialist)
Ronan O'Toole	GSI	Geological vessel party chief (Contract Geological specialist)
Mick Gillooly	MI	Director of Ocean Science & Information Services
Kevin Sheehan	MI	Geophysicist
Vera Quinlan	MI	Data Processor
Deirdre O'Driscoll	MI	Data Analyst
Eimear O'Keeffe	MI	Habitat Mapper
Frank O'Brian		Emergency Services
Gill Scott		Environment
Yves Pastol		Defence (France)
Fergal Guilfoyle	Treanbeg Marine Consulting	Agriculture, forestry and fisheries
Jakub Czarcinski	Providence Resources plc	Petroleum Exploration

Name	Affiliation	Stakeholder role
John O'Connor		Transportation
Eogan Kieran		Energy and Water

## Documents Reviewed

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Harnessing our Ocean Wealth, An Integrated Marine Plan for Ireland, Irish Government, July 2012

INFOMAR Activity Report 2013

INFOMAR Activity Report 2014

INFOMAR External Evaluation, PWC, 2013

INFOMAR Marine Mapping Study Options Appraisal Report: Final Report, PWC, 20 June 2008

INFOMAR Organogram November 2015

INFOMAR Technical Advisory Committee Terms of Reference and Membership, 2015

Minutes of Board Meeting, 2012 – 2015

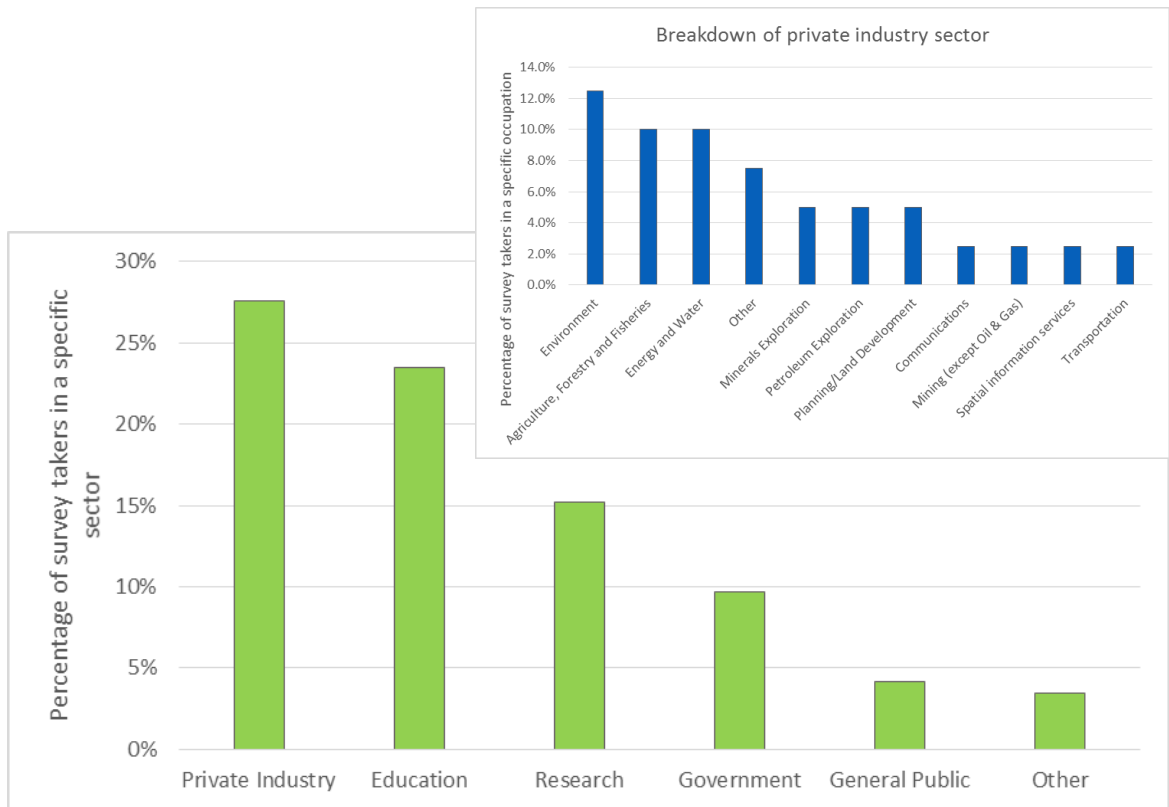
SEA CHANGE, A Marine Knowledge, Research & Innovation Strategy for Ireland, 2007 – 2013

SEA CHANGE, PART II, Marine Foresight Exercise for Ireland, 2007 – 2013

## ANNEX B: ON-LINE SURVEY OF INFOMAR DATA USERS

We invited 1980 to participate in an on-line survey of their experience of INFOMAR. Participants were invited from an email list of data users provided by the programme. Over the course of three weeks we received 146 responses. Of those who opened the email, 25% have responded to the survey (so there may have been an issue with SPAM filters affecting the reach of the survey or out-of-date emails, especially as the list included users who last accessed the web-site some time ago).

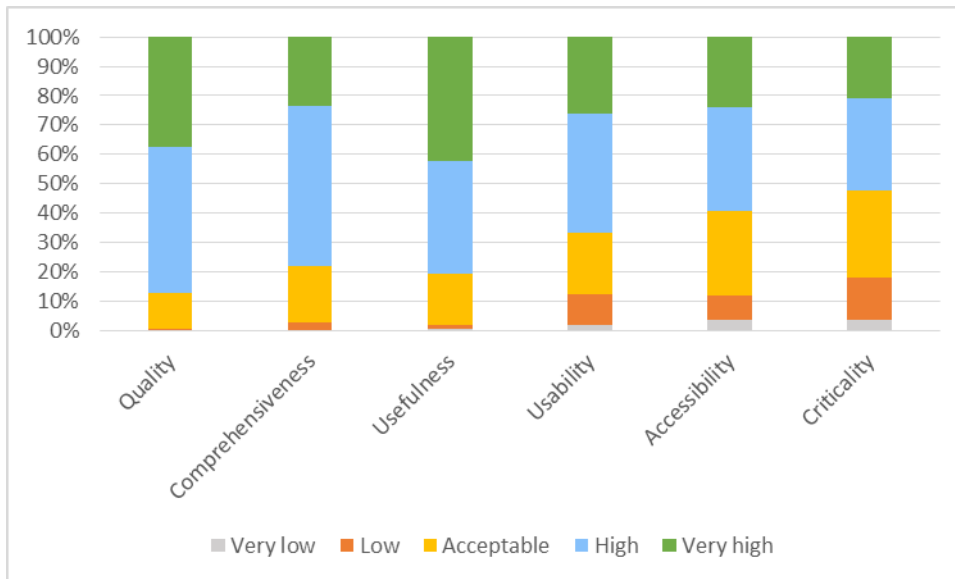
We then conducted short interviews with seven of the respondents, selected using random stratified sampling from the set of respondents who had indicated they would be happy to be interviewed.



**Figure 4: Breakdown of responses to survey by sector**

Source: Online User Survey Conducted by Risk Solutions, 2016

There was an encouragingly good response from private industry and education. Unfortunately when we broke down the Industry sector we found no response from the tourism sector. 8% of respondents have no sector identified in the database.

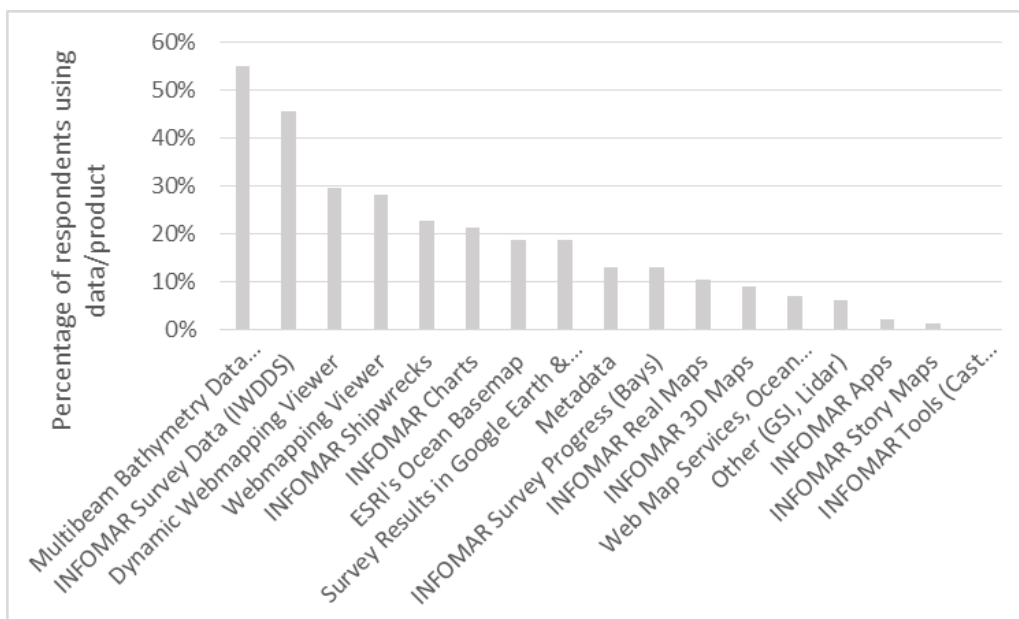


**Figure 5: General perception of INFOMAR data and products**

Source: Online User Survey Conducted by Risk Solutions, 2016

There was an encouraging response from users of data with 80% or more of participants scoring INFOMAR data and products as high or very high in the areas of quality, comprehensiveness and usefulness. Usability and accessibility still score highly, but not as well, reflecting perhaps feedback from interviews that the data and products can be less accessible for the non-technical user.

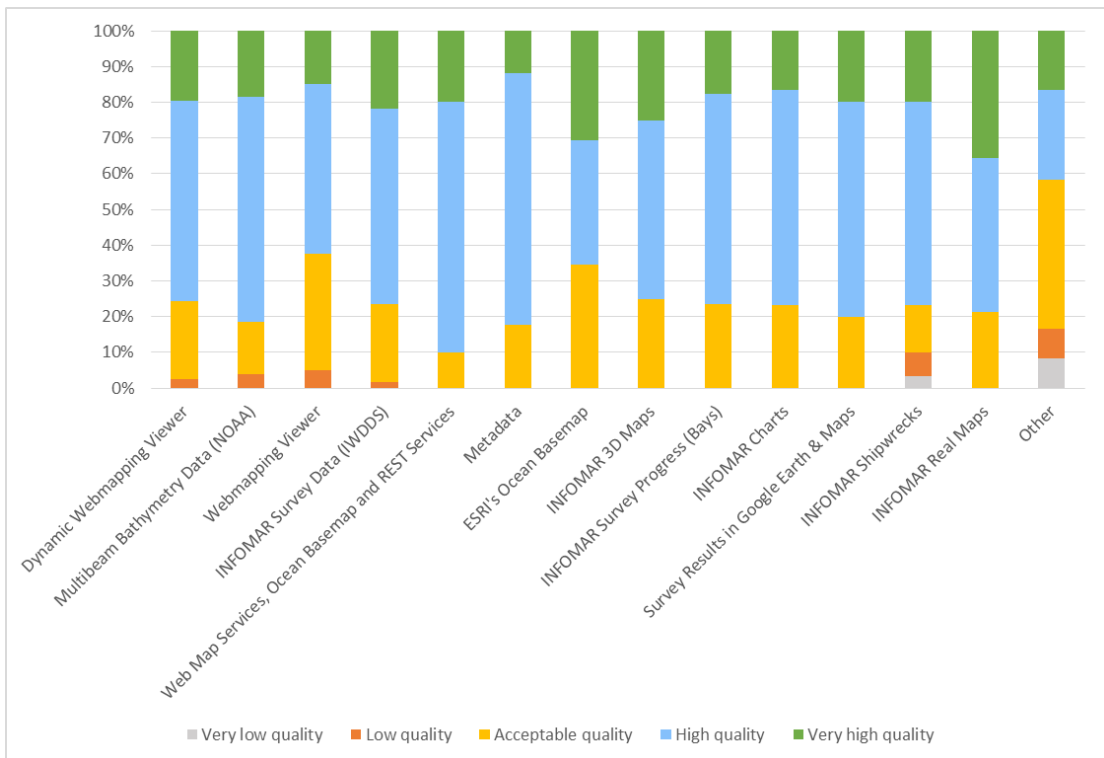
Conversations with users highlighted that the more non-technical users struggled to identify the right data, and found search facilities on the web site poor. Of those who contacted INFOMAR directly for help, some then found the data provided straightforward. One user struggled to work with the data as he was supplied with a large number of individual files covering the area he was interested in and these needed to be stitched together by himself, which he struggled with. Would have preferred to be able to specify a geographical area and then be provided with all the relevant data for that area in a single file.



**Figure 6: Data and product popularity, measured as percentage of respondents who had used them**

Source: Online User Survey Conducted by Risk Solutions, 2016

The most downloaded data according to survey users are the multibeam bathymetry data and the INFOMAR survey data (IWDDS), and the most used products are the webmapping viewers and the shipwrecks data. We have not weighted this usage according to how long the data or products have been available from the website.



**Figure 7: Quality of INFOMAR data and products**

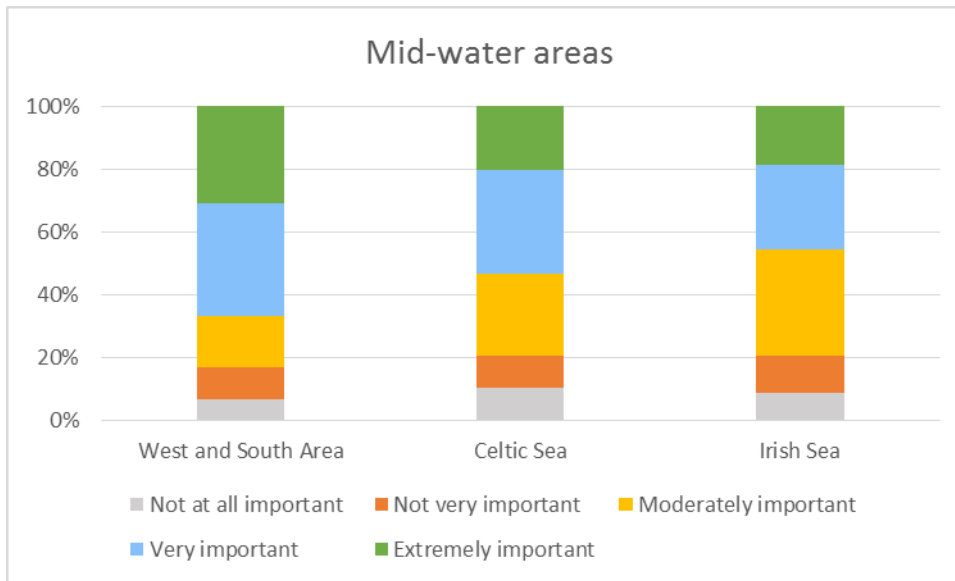
Source: Online User Survey Conducted by Risk Solutions, 2016

The quality of the data and products is generally considered high or very high by users. Very few respondents considered any of the data or products to be of low or very low quality. Product usefulness and ease of use are discussed in the main body of the report.

**Priorities for Phase 2**

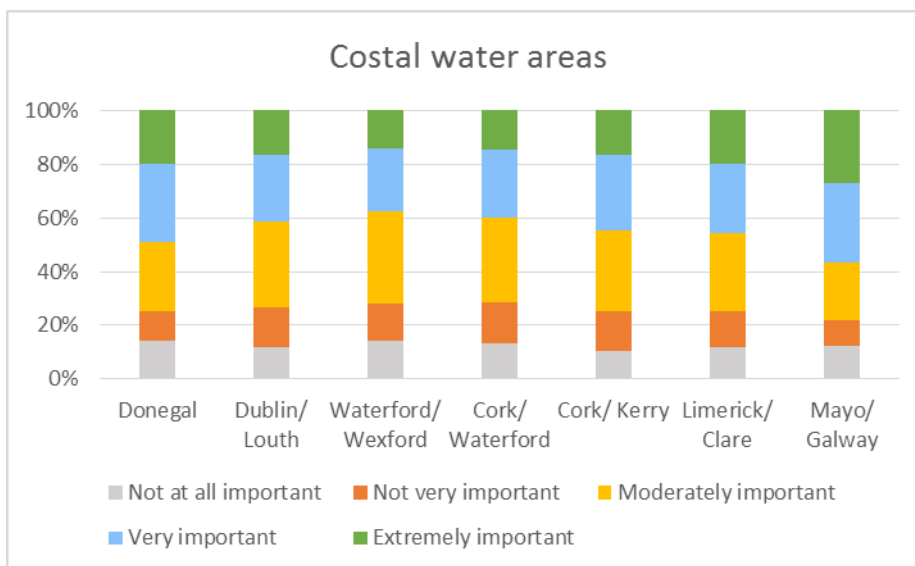
We asked the on-line survey respondents to grade the proposed Phase 2 mid-water and coastal mapping areas in terms of their importance. Rather than asking them to provide a ranking we asked them to identify for each area how important they thought it was. The findings are shown in Figure 8 and Figure 9. The west and south area received the most 'Extremely important' and 'Very important' combined responses for the mid-water areas. This is in agreement with the priorities identified in the stakeholder survey conducted by INFOMAR (see Annex C). Mayo/ Galway and Donegal received the highest 'Extremely important' and 'Very important' combined responses for the coastal water areas. While Mayo/ Galway was considered top priority by around 20% of stakeholders in the INFOMAR survey, that survey indicated higher priority for the Dublin/ Louth area.

Very few respondents suggested that any areas were of low or no importance.



**Figure 8: Assessment of mid-water priorities for Phase 2, on-line survey respondents**

Source: Online User Survey Conducted by Risk Solutions, 2016

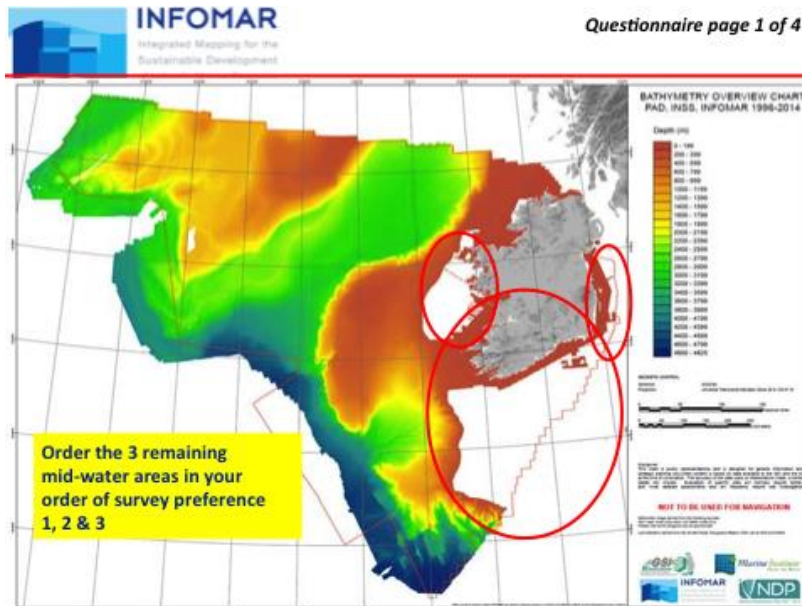


**Figure 9: Assessment of coastal priorities for Phase 2, on-line survey respondents**

Source: Online User Survey Conducted by Risk Solutions, 2016

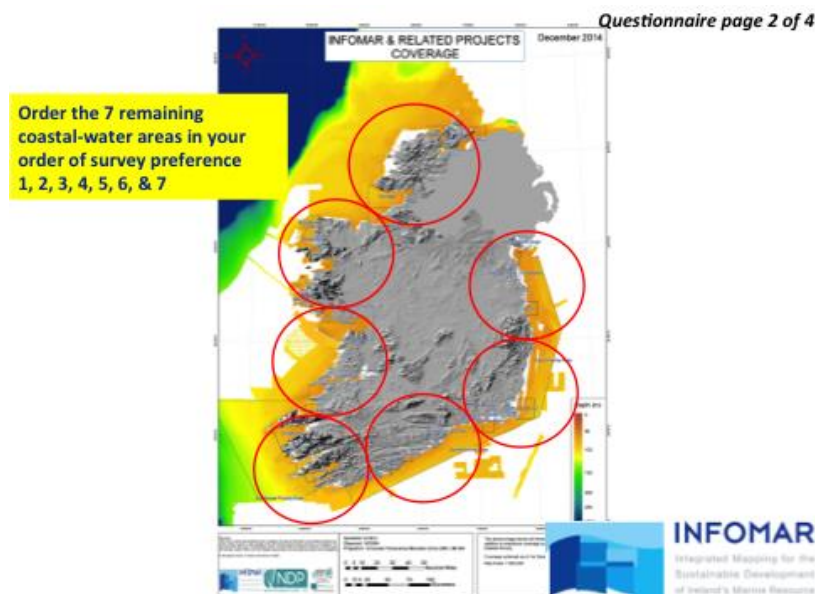
## ANNEX C: FINDINGS FROM INFOMAR STAKEHOLDER AND GEOSCIENCE SEMINARS ON PHASE 2 PRIORITIES

We were provided with survey returns from two stakeholder seminars held by INFOMAR. The geoscience seminar provided 25 returns and the other stakeholder seminar provided 52 returns. The respondents were provided with pictures showing the three mid-water areas and seven coastal water areas being considered for Phase 2 mapping, and asked to rank them in order of priority using a simple numbering system. In addition they were asked to rank the programme objectives, although many respondents did not complete this part of the survey. The images presented to respondents are shown in Figure 10 and Figure 11 below.



**Figure 10: Mid-water priority image from questionnaire**

Source: INFOMAR, 2015



**Figure 11: Coastal water priority image from questionnaire**

Source: INFOMAR, 2015

We identified the three mid-water areas as:

- West and south area
- Celtic sea
- Irish sea.

We identified the seven coastal water areas, clockwise from the top of the image used, as:

- Donegal
- Dublin/ Louth
- Waterford/ Wexford
- Cork/ Waterford
- Cork/ Kerry
- Limerick/ Clare
- Mayo/ Galway

We attempted to rank the areas using the means of the scores for each one. The results of our analysis are shown in Tables 1 and 2 below. It is clear from the scores that there is not much difference between the three mid-water areas. The West and south area is preferred for first place by just over 1/3 of respondents in both groups.

For the seven coastal areas, again there is not much variation between the overall mean scores. However in terms of preferred first places, Dublin/ Louth and Mayo/ Galway come out as preferred by the most people, while Cork/ Kerry and Cork/ Waterford have the fewest stakeholders considering them top priority.

The findings are not very conclusive, but tend to agree with the priorities from the on-line survey of respondents.

**Table 1: Results of Mid-water prioritisation**

	Midwater areas for priority		
Responses	West and south area	Celtic Sea	Irish Sea
<b>INFOMAR Seminar Phase 2 Priorities</b>			
Mean	1.8	2.0	2.2
Standard deviation	0.7	0.8	0.9
% of first places	37%	31%	33%
<b>Geoscience Seminar Phase 2 Stakeholders</b>			
Mean	1.9	2.0	2.1
Variance	0.7	0.5	0.7
Standard deviation	0.8	0.7	0.9
Number of first places	10.0	7.0	8.0
% of first places	38%	27%	31%
Mean (all respondents)	1.8	2.0	2.2

Source: Risk Solutions analysis of INFOMAR data

**Table 2: Results of Coastal water prioritisation**

	Coastal water areas for priority (clockwise from top)						
Responses	Donegal	Dublin/ Louth	Waterford/ Wexford	Cork/ Waterford	Cork/ Kerry	Limerick/ Clare	Mayo/ Galway
<b>INFOMAR Seminar Phase 2 Priorities</b>							
Mean	3.7	3.6	3.8	4.6	4.6	4.2	3.5
Standard deviation	2.2	2.4	1.6	1.7	1.9	1.7	2.0
% of first places	23%	27%	8%	6%	8%	2%	21%
<b>Geoscience Seminar Phase 2 Stakeholders</b>							
Mean	4.8	3.8	3.7	4.0	3.8	3.8	4.1
Variance	5.1	5.1	3.8	3.6	3.0	3.8	4.2
Standard deviation	2.3	2.3	1.9	1.9	1.7	1.9	2.0
Number of first places	3.0	7.0	4.0	2.0	2.0	3.0	5.0
% of first places	12%	27%	15%	8%	8%	12%	19%
Mean (all respondents)	4.1	3.7	3.8	4.4	4.4	4.1	3.7

Source: Risk Solutions analysis of INFOMAR data