Ordnance Survey *Ireland*

Research Policy Initiative

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Preface

 I am very pleased to announce the launch of Ordnance Survey Ireland's Research Policy Initiative.

We hope this policy will help to advance the use of geospatial information by decision makers in government and industry. The Economic Value Study commissioned by OSi in 2014 identified public sector annual savings of €82 million per annum by using geospatial information. Our objective is to help this figure grow.

OSi plans, through its OSi Research Policy Initiative, to support the development of a fully functioning geospatial research and development community that is connected in both the private and public sectors, and focusses on the benefits for the end user. Research in key areas will help us, as the National Mapping Agency, to provide products and services in the most efficient and effective way possible. Such research can also lead to the development of new products that can help both public and private organisations achieve their objectives. Collaboration with the research and development community can only improve the way OSi implements our mandate, and meet our strategic goals.

Innovation has been at the heart of everything Ordnance Survey Ireland has done from its very inception. The OSi Research Policy Initiative continues this proud tradition, and we invite researchers to join us on this exciting journey.

Colin Bray
Chief Executive Officer
Ordnance Survey Ireland
May 2016

Introduction

This document is intended to explain the background to the GIS industry in Ireland, and the role of OSi in that sphere. It also explains the need for focussed, directed research in GIS and related fields. Finally, it indicates how OSi intends to support that research, in line with its mandate from Government.

Traditional mapping has been used for centuries to assist in the process of making key decisions. Military purposes provided the initial driving force for refining the accuracy, relevance and efficiency of early mapping. From the 19th century on, accurate mapping was also seen as being valuable for taxation, civil engineering, and the registration of property. Moving towards the current era, the development of computerisation led to digital mapping (often now referred to as 'spatial information' or 'spatial data') and Geographic Information Systems (GIS) heralded a new era in the use of mapping.

What is Spatial Data?

Generally speaking, spatial data represents the location, size and shape of an object on the Earth's surface such as a building, lake, mountain or road. Spatial data may also include attributes that provide more information about the entity that is being represented. Geographic Information Systems (GIS) or other specialized software applications can be used to access, visualise, manipulate and analyse geospatial data.[i]

In the strictest sense, a GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information (that is data identified according to their locations). Practitioners also regard the total GIS as including operating personnel and the data that go into the system.[ii]

Now, private companies and government agencies are recognising that by geo-referencing their internal databases, they extend the value and utility of their data. The cost of introducing and using good spatial data is more than offset by the savings made through better decisions.

The location of an event or activity is inherently relevant to most outcomes; using GIS, private companies can co-ordinate the movement of raw materials and products, target customers, and identify optimal retail locations. In government sectors, local authorities can identify areas of deprivation, or optimise the location of schools, hospitals or motorways.

Who We Are

Ordnance Survey Ireland (OSi) is Ireland's official National Mapping Agency. It was established in 1824 (as the Ordnance Survey Office) and became a State Body in 2002. OSi operates in the public interest by creating and maintaining the definitive national mapping and related geographic records of the State.

There is a growing recognition among decision-makers that knowledge and understanding of location is a key component in effective decision making. To this end, OSi has designed and developed a standardised, authoritative digital referencing framework that enables the consistent referencing and integration of data sets related to location. This framework, known as **PRIME2**, provides the means for unique referencing of objects. It enables greater integration and sharing, providing better analysis and decision making, optimising resources and delivering efficiencies.

OSi Mandate

Ordnance Survey Ireland is directed under section (2) *(d)* of the Ordnance Survey *Ireland* Act 2001: ***"to encourage and promote the benefits of the use of the national mapping and related databases and the development of products, services and markets to meet national and user needs".***[iii]

OSi is encouraged through this legislation to take the lead in the development of the mapping and related geographic information to the public and private sectors in support of social, economic, legislative, educational, security, business and administrative functions. This is further acknowledged in OSi's Statement of Strategy 2016-2018, where OSi states:

"OSi will establish product/service innovation partner initiatives for the development of new geospatial products and services in collaboration with private industry partners." [iv]

The Value of Spatial Information

In 2014, **Indecon International Economic Consultants** produced a report for OSi which independently assessed the economic impact and contribution of the geospatial industry to the Irish economy. The report shows that "*the sector plays an important role in the Irish economy in terms of output, employment and value-add. The sector directly employs over 1,600 people and supports employment of over 3,000. The direct value added of the sector is estimated to be over €69.3m and, when multiplier impacts are included, this is estimated to be over €120m.*" [v]

Direct Employment	1,677
Economy-Wide Employment	3,087
Gross Value Added	€126.4m

Annual Savings by Using Geospatial Data

The wider economic benefits from use of geospatial information are also significant, most notably the reduction in public sector costs, the economic value of time savings and the role of the geospatial sector in intensifying competition. (Indecon's) analysis below highlights the quantified size of such externalities: [vi]

Annual Public Sector Cost Saving	€82m
Economic Value of Annual Time Saving	€279m
Competition Benefits	€104m

Employment Opportunities

Data for 2014 shows that the geospatial industry employs 1,677 persons directly, with another 3,000 employed indirectly. IRLOGI (The Irish Organisation for Geographic Information) regards the geospatial sector as "*a major growth area … driven essentially by rapidly emerging technological advances and the fact that the very wide range of uses for geospatial information has hardly been tapped, not only in Ireland but globally as well. A great opportunity currently exists to develop an organised and comprehensive approach to realising the existing unlocked opportunities, as well as those which will without doubt materialise in the emerging future*" [vii]

The Need for Research

The Role of OSi

OSi has been involved in geospatial information for a long time – since 1824, in fact. We were the first organisation to survey an entire country at a large scale (1:10,560, or 6 inches to one mile). From then until now, we have remained at the forefront of technical research and development, seeking quicker, cheaper and more accurate ways of capturing data, processing it and outputting it. In the early days, we embraced every new technology as it emerged – more refined theodolites and measuring equipment, lithographic and copperplate printing, etc. We moved on to aerial photography (running at one stage the largest photogrammetric operation in the non-military sector worldwide). Not surprisingly, OSi was quick to adapt to computerisation, introducing a digital flowline for preparing paper mapping in the 1980's. By the 1990's, we were producing digital products to the public such as the 1:50,000 Discovery Series, and went on to supply large-scale (1:5,000, 1:2,500 and 1:1,000) digital mapping, giving 100% digital coverage of the State.

Innovation is an integral part of what we do. OSi supports the development of a fully functioning geospatial research and development community. In support of this we believe the research initiatives that we have now launched will encourage additional, advanced research.

For GIS to develop, we require investigation into new methods of capturing, storing, processing, presenting and analysing spatial data in more efficient and effective ways. This in turn will allow OSi to provide better, and more user-focused, products for both Government and private businesses.

Priorities in Research

As the State mapping agency, OSi is responsible for all the official statutory mapping issues such as maintaining the GNSS network, dealing with international matters such as mapping inland and offshore state boundaries, supporting the geodetic model, and representing the state at international forums. We also provide large scale mapping for property registration, engineering works, and our well-known tourist and leisure markets. We have a wide sphere of interests.

Currently, we have a particular focus on expanding the use of 3rd party data. OSi has created a new web service called GeoHive[viii], where authoritative agencies of the State can freely share their own spatial data. Here, users can mix various trusted datasets, to get a real understanding of a particular location. This frees people to concentrate on the decision-making challenge, without needing them to collect, manage and maintain their own basic geodata. OSi would welcome research into a deeper use of 3rd party data – to develop systems where external data can be integrated fully into existing workflows.

OSi Policy on Collaboration

OSi encourages collaboration amongst our fellow GI industry colleagues, and supports a partnership approach between businesses, government agencies, and educational bodies. Openness to sharing knowledge and co-ordinating of effort will lead to acceleration in growth and development. This principle is reflected in the OSi Research Policy.

OSi encourages research and development in the broader GI industry, whether it is in the public or private sector. There is a broad range of areas that would benefit from research, such as:

- New Markets for Products
- 3D Data
- Data Capture, Storage and Retrieval
- Artificial Intelligence

- Open or Linked Data
- Automated Devices
- The Internet of Things
- Digital Mapping Applications
- Digital Data Processing

OSi Supporting Research

OSi continually supports the academic community in using mapping and mapping related products as part of student courses and research. This is manifested through a number of different programmes, contributing to the growth of geospatial and Geographic Information System (GIS) academic courses.

We are intent on building relationships with key Universities and Institutes of Technology, and other research bodies. We expect that, by developing these links, we will foster a collaborative approach which will help OSi and researchers understand the common challenges we encounter, and identify possible solutions.

To further enhance the development of solutions to key challenges that OSi and the geospatial community face, we have launched the **OSi Research Initiative**. As part of this initiative we have identified a number of key topics and areas of research that we feel are of importance. While not exhaustive, these topics are central to the development of OSi's current operations and can help identify the best course for emerging technologies, and can lead to the provision of greatly improved services.

The OSi Research Initiative

OSi Mission Statement:

"***To create, maintain and provide the State's definitive mapping and geospatial information services to support citizens, business and government***."

With this in mind, OSi seeks to promote research and development in the Irish geospatial industry. We seek to co-ordinate, motivate, advise and support GI researchers in finding technical solutions and innovations to problems, and to develop new uses, products and markets for geographic data.

Current Priorities in Research for OSi

OSi is particularly interested in supporting research in the following specific areas:

1. **Change detection from remote sensed data against our spatial data holding (PRIME2)**

   We need to determine the difference between a set of remote sensed imagery and our spatial data holding (PRIME2) while conforming to the PRIME2 data model.

   We require the output to deliver the physical geometry of change.

   We are also interested in determining a classification of the changes detected e.g. vegetation changing to a paved surface.

2. **Automatic application of changed geometry to PRIME2**

   We need to determine how to automatically apply change to PRIME2 without affecting operational flowlines and conforming to the PRIME2 data model. Changed geometry will be supplied with appropriate tolerances.

3. **Positional accuracy improvement**

   OSi have moved from traditional scale-based data capture methodologies to a fully digital, seamless data capture methodology. OSi's aim is to improve the consistency of the absolute accuracy of PRIME2 data in line with our Global Navigation Satellite Systems (GNSS) active network.

OSi Research Initiative Categories

The **OSi Research Initiative**, launched in March 2016, is a welcome development in the field of geospatial information research in Ireland. OSi will provide funding to support research and innovation in areas of interest to OSi and the broader geospatial information industry. The programme comprises of two categories:

1. **Masters Degree Award** - up to five awards of €3,000 - €5,000 annually

2. **Postdoctoral Research Fellowship** - A biennial programme of sponsorship for two qualified PhD researchers
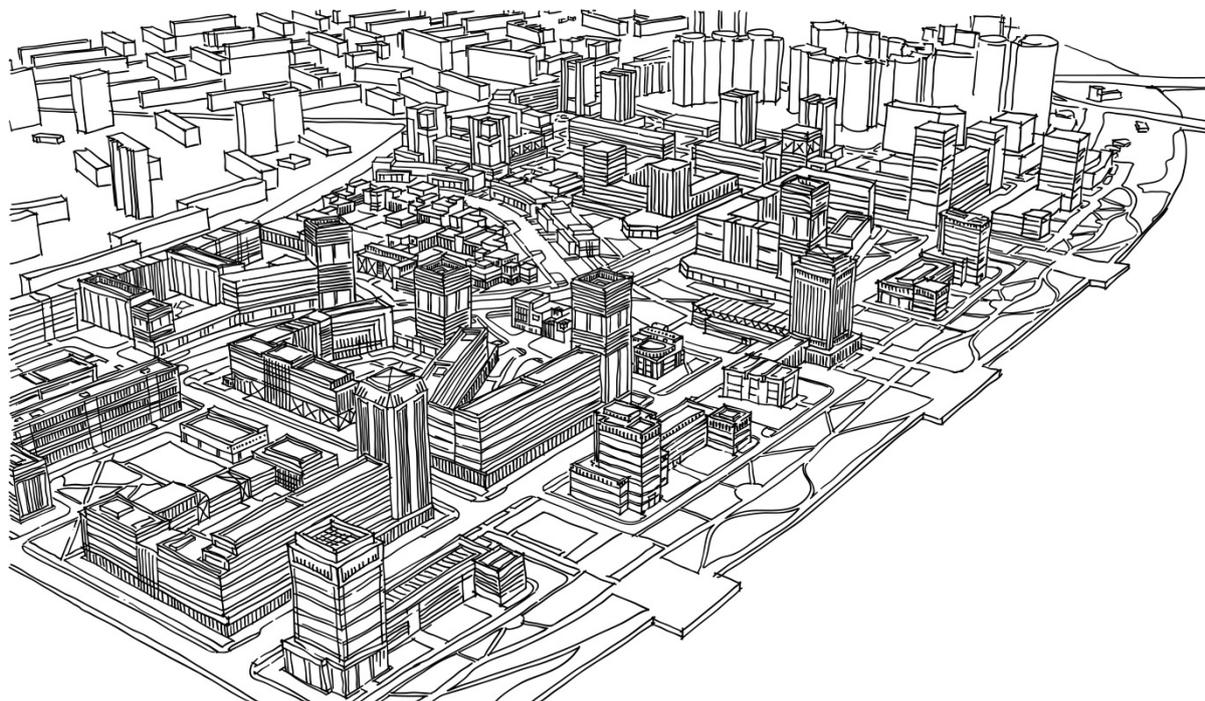
Aims of the OSi Research Initiative

- To promote geospatial research and innovation in Ireland
- To develop relationships between institutes of learning, OSi and the geospatial information industry, with a view to promoting further cooperation
- To provide support and resources for researchers and students who work on geospatial development
- To coordinate and prioritise research in key areas which are relevant to OSi's mandate

Objectives of the OSi Research Initiative

- To work with, and support, researchers in high-level projects relevant to the Irish geospatial industry
- To develop links with, and between, research bodies and private industry
- To identify common research needs among the geospatial information industry, and develop a shared strategy for addressing them

Benefits of the OSi Research Initiative

The initiative will:
- promote geospatial information research and innovation
- develop linkages between institutes of learning, OSi, and the geospatial information industry
- provide an impetus to advanced research
- coordinate the targeting and prioritisation of research in key areas

Operation of the OSi Research Initiative

The initiative will be administered by OSi's Business, Marketing and Communications Department and applications will pass through that department to the Academic Review Group. This group will consist of senior OSi staff, and relevant staff of third level institutions and the private sector. They will adjudicate on the academic merit of the candidates' submissions and will authorise payment of the awards.

Programme	Description	Duration
Masters Award	Successful candidates will have completed their Masters studies through a third level institution. Candidates will submit their Masters thesis, or similar substantial work, for review by the ARG. Those shortlisted may be called to give a presentation of their work. The successful works will be of relevance to the GI industry in Ireland, and to OSi. Those submissions which are considered to be of the highest standard will be awarded a sum not exceeding €5,000, to an annual maximum of 5 awards. In the event that no thesis is considered to be of the required standard, then no award will be made.	0 months
Postdoctoral Research Fellowship	This award is aimed at persons holding a PhD who will engage in full-time advanced research for two years on a specific topic. These topics will be of relevance to the GI industry in Ireland, and to OSi. The topic will be agreed in advance with OSi.	24 months

Glossary of Terms

- ARG – the Academic Review Group; a body which evaluates all research bursary submissions on behalf of OSi. The group consists of senior OSi staff, and relevant staff of third level institutions and the private sector.

- Biennial – an event that occurs every two years

- Bursary – an amount of money given to a person by an organisation, such as a university, to pay for them to study. (ref – Cambridge Dictionaries Online http://dictionary.cambridge.org/dictionary/english/bursary)

- EU – European Union

- GI – Geographic Information

- GIS – Geographic Information System

- IRLOGI - The Irish Organisation for Geographic Information

- OSi – Ordnance Survey Ireland, the official National Mapping Agency of the Government of Ireland

- PRIME2 - This is OSi's standardised, authoritative digital referencing framework that enables the consistent referencing and integration of national data related to location. This provides the means for GIS data users to accurately integrate and use multiple data sources. **PRIME2** also acts as the primary database for OSi geospatial data, and will be the source from which OSi will output its many products.

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[i] http://searchsqlserver.techtarget.com/definition/spatial-data
[ii] USGS http://webgis.wr.usgs.gov/globalgis/tutorials/what_is_gis.htm
[iii] Ordnance Survey Ireland Act, 2001
[iv] OSi Statement of Strategy 2016-2018
[v] "Assessment of the Economic Value of the Geospatial Information Industry in Ireland' By INDECON International Economic Consultants 2014
[vi] Ibid
[vii] Assessment of the Economic Value of the Geospatial Information Industry in Ireland' By INDECON International Economic Consultants 2014
[viii] www.geohive.ie