The Changing World of National Mapping in Ireland

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ABSTRACT

The paper describes the step changes being made in Ordnance Survey Ireland, the 177 year old national mapping agency of Ireland, to ensure that it continues to meet the needs of its customers, its owner (the government) and its other stakeholders. The strong culture and heritage of the organisation provide great strength but also need to be adapted to allow the necessary flexibility and innovation as the organisation builds for the future. Initial, positive results are now becoming apparent and are described. The changes provide a valuable case study for many other organisations undergoing profound, rapid change.

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1. 1824-2001

Ordnance Survey Ireland (OSi) was established in 1824 to carry out a survey of the entire island of Ireland to update land valuations for land taxation purposes. The organisation was established (as it remains) in Mountjoy House in the Phoenix Park in Dublin. Six regional offices were added in the early 1990s. By 1846, the entire island was surveyed at a scale of 6" to 1 mile – the first country in the world to be entirely mapped on such a detailed scale. The survey and its staff were responsible for a number of advances in surveying practice, including Drummond's limelight and the use of bimetallic parallel bars to measure distances to a previously unattainable accuracy. OSi was at that time staffed and managed as part of the military. It has been under civilian control since the foundation of the State in 1922, but the Army Survey Corps provided some production staff for OSi until 1999.

A programme of implementing digital mapping technology into OSi commenced in the 1970s. The organisation is now one of the most technologically advanced in the world, with a completely digital data capture, manipulation and dissemination flowline, and the largest number of Digital Photogrammetric Workstations in any civilian organisation in the world.

OSi is currently a Civil Service Office within the Department of Finance. Until 1999, it shared administrative functions (and its Parliamentary vote) with the Valuation Office, a link which was broken to form OSi as a standalone organisation. The current staffing is about 300, of whom more than 200 are technical staff, with a steadily growing number in central and marketing activities. The age profile of the organisation is heavily skewed to the 40-50 age range, something typical of the Irish public sector due to various recruitment policies in the past. Until early 2001, there were very few technical staff under the age of 40. Most staff have worked in OSi for almost all of their working lives, and see it as a career. There is also a significant number of 'OSi families' where several members of one or more generations work (or have worked) in OSi. As in all Irish public sector organisations, the staff is heavily unionised, with 90%+ membership and unions expecting a strong voice in any discussions.

OSi's expenses in 2001 were approximately €19 million, with receipts of approximately €12.5 million. Cost recovery levels have risen steadily over the last few years, with the current level of approximately 65-70% being seen as generally sustainable into the future. As with many national mapping organisations, the main costs are staff costs and investment in new systems and technology. The Irish market for geographic information is limited and has not, to date, developed as rapidly as in some other European countries. OSi has multi-annual contracts with most significant organisations among central and local government and the utilities, as well as significant sales of consumer products to a wide range of individuals and organisations. Sales to commercial sectors such as navigation, financial and distribution

companies have however yet to materialise to any significant degree. Relationships with main customer groups are generally good, with interpersonal relationships being key (as in most business relationships in Ireland). OSi also currently holds the Presidency of EuroGeographics, the successor organisation to CERCO and MEGRIN, which brings together nearly 40 national mapping agencies from across Europe.

As can be seen, OSi has a long and proud history, recently celebrated to mark 175 years of the organisation. There is a strong pride amongst OSi staff (and customers) at the quality of the organisation and its products. The organisation and its name are, compared to comparator agencies, well-known. A recent advertising campaign for the breakfast cereal Weetabix featured a carrier pigeon consulting OSi's Dublin Street Guide (as the consequence of being Withoutabix!), a product which is therefore considered instantly recognisable. This tradition and pride instil a strong organisational culture, which provides the organisation with much strength. The challenge for the organisation in 2002 is to build on and adapt this tradition and pride in such a way that allows the organisation effectively to meet the rapidly developing requirements of the marketplace.

2. THE CURRENT SITUATION

OSi as an organisation has achieved a great deal in the last 177 years, and has generally responded effectively to customer and national needs. Large-scale mapping exists for the entire State, in paper and raster forms; and 1:50,000 data in paper, raster and vector forms. Recent years, however, have seen unprecedented levels of economic growth in Ireland, with large numbers of houses being built and infrastructure projects commenced. A rural resurvey programme was commenced in 1997, the decision having been made to create good quality mapping and so not to overhaul the original mapping. The current coverage of digital vector mapping of the State is as shown in Figure 1:

Coverage	Scale	Approx. Coverage	Current Revision Cycle	% now Complete
Urban areas	1:1,000	0.1m Ha	1 year	100
Suburban areas	1:2,500	0.5m Ha	5 year	90
Peri-urban areas	1:2,500	1.5m Ha	5 year	50
Rural areas	1:5,000	3.6m Ha	5 year	5
Remote areas	1:5,000	1.2m Ha	5 year	0
National	1:50,000	6.9m Ha	5 year	100

Figure 1: OSi vector mapping programmes

As can be seen in Figure 1, large-scale vector mapping of all urban and most suburban areas exists, but many rural areas currently have mapping available in raster form only. 1:50,000 mapping of the entire country also exists, along with street level mapping of the cities. Investment in technology such as Digital Photogrammetric Workstations, and pen computers

to replace the final non-digital part of the data collection flowline, have improved organisational productivity levels, but the completion of the vector mapping programme using OSi's own staffing resources is not feasible in the timeframe required by customers. In addition, the Government Office status of OSi provides particular constraints to the development of the organisation, and therefore to meeting increasing customer requirements.

In light of the challenges (and opportunities) facing OSi, it became clear that incremental change was no longer sufficient, and that in addition to step changes in technology (which the organisation has successfully accomplished throughout its history), an organisational step change was also required. A Government decision to this effect was made in the late 1990s. Such a change, however, required primary legislation, and therefore parliamentary time. The passage of the legislation was completed late in 2001. In parallel with the legislative progress, OSi has been preparing for its new Status, to ensure that it extracts the full benefits from it for all of its stakeholders, whilst avoiding any threats that may arise as a result of withdrawal from Government Office status. The remainder of this paper describes the response that OSi is making to meet more effectively national and customer needs. The response is bringing fundamental changes to the organisation and its relationships and can be best described under a number of headings:

- Organisational response
- Technical response
- Marketing response
- Cultural response.

Above and beyond these responses there remains one issue which is of profound importance to the organisation and which is not currently resolved, and that is the location of OSi's head office. The current location in the Phoenix Park provides a glorious setting, but in listed buildings which in their current condition are not suitable for the work of OSi. A Government decision on redevelopment or removal is therefore awaited, a decision which is linked into a wider Government programme of decentralising public service organisations. Inevitably, this issue is foremost in many staff and managers' minds throughout the change period.

3. OSi 2005

In best survey fashion, it is appropriate here to work from the whole to the part. A series of responses to OSi's challenges are underway. But where in general is OSi heading? The purpose of OSi is set down, for the first time in a coherent legislative manner, in the OSi Act 2001 (Ireland, 2001). This states that 'the general function of OSi is to provide a national mapping service in the State. In this regard, it shall operate in the public interest by creating and maintaining definitive national mapping and related geographic records of the State.' The Act then sets down that OSi's functions shall include all such tasks as necessary to fulfil its general function, including:

(a) 'To maintain and develop the underlying physical infrastructure which is needed to support mapping applications, including to maintain a national grid and the national geodetic and height frameworks and to link these to international systems

(b) To create and maintain for the entire State mapping and related geographic databases which have national consistency of content, currency, style and manner including for those areas which do not provide a commercial return on the activity

(c) To provide mapping and related geographic information to the public and private sectors in support of social, economic, legislative, educational, security, business and administrative functions and requirements

(d) 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

(e) To advise the Government… and other public sector organisations on matters relating to the policy and practice of survey, mapping and geographic information and on the development of national spatial database infrastructures

(f) To represent the State at international level on matters relating to mapping and geographic information

(g) To provide the necessary technical support to the Chief Boundary Surveyor in the performance of his or her duties in delimiting statutory boundaries and the delineation of such boundaries on maps

(h) To depict place-names and ancient features in the national mapping and related records and databases including the Irish language equivalent of place-names as advised by An Coimisiun Logainmneacha and declared in place-names orders…

(i) To protect Government copyright on OSi records, databases, products and published material including copyright on OSi records, databases, products and published material made prior to establishment day.'

The full text of the functions is set down here as, to the authors' knowledge, it is one of the few recent legal statements of what a national mapping agency exists for, and will therefore be of general interest.

Working within the framework of the OSi Act, the OSi management team has drawn up a Mission and set of corporate values within which all internal planning and operations sit. They are set out in Figure 2:

OSi's Mission is '***excellence in providing quality mapping and geographic information services to meet society's needs***'.

Key corporate abilities which OSi needs if the organisation is to fulfil its Mission are:

- ***Responsiveness*** – the ability to anticipate, adapt and meet effectively the changing needs of its stakeholders
- ***Enterprise*** – the skills and expertise to interpret, shape and meet the needs of the market
- ***Efficiency*** – productivity and effectiveness to ensure its commercial viability in a competitive environment
- ***Performance*** – all of the mechanisms required to deliver on the organisation's commitments

Figure 2: OSi's Mission and Values

Further, an internal vision statement has been produced that sets down key elements of OSi's development, including:
– A broader base of activity as the vector mapping programme is completed;
– A wider range of business relationships;
– Tailored training and development programmes;
– Increased innovation; and
– Increased organisational profile.

In addition, clear public statements have been made on what OSi's main output – its mapping data – will be like in 2005 (OSi, 2001). The developments will result, in 2005, in OSi's mapping data:
– having up-to-date national vector coverage
– underpinning spatial data infrastructures for the State
– being regularly revised
– being GPS compatible
– being derived from a true database
– being easily accessible to customers
– having coherent, simple pricing and licensing terms and conditions.

The responses described below provide the platform to achieve all of this. The activity will be of interest beyond Ireland, as other national agencies respond to the circumstances of the present and the future.

4. ORGANISATIONAL RESPONSE

Most fundamental in this area is the change of OSi's status, as a result of the OSi Act 2001, from a Government Office to a State Body (in general terms, a Government-Owned Company). Key consequences of this are as follows:

- OSi will have the status of a body corporate, able to undertake a wider variety of business relationships;
- Staff will no longer be civil servants (although the legislation explicitly protects all rights of existing staff – this has been a key issue of discussion during the development of the legislation);
- A Service Agreement with Government will cover those activities which OSi as national mapping agency is required to undertake but which are not fully cost-recovering; and
- A variety of taxation, legal and insurance issues require significant adjustment as OSi moves to corporate status.

The change of status for OSi received the support of all of the main political parries. With the OSi Act 2001 now law, the Minister for Finance may announce the establishment date of OSi as a body corporate. This is expected at an early date.

The immediate, practical consequences of the change are likely to be limited: it will be over months and years that OSi is able – in resource and development terms – to take advantage of the opportunities afforded by its new status. The organisation remains charged with the role of national mapping agency, and this role becomes clearer with the articulation of the Service Agreement with Government for national interest activities (which include maintaining the geodetic framework so that all positioning activity 'fits together', mapping the whole of the country to a consistent specification, and the work relating to administrative boundaries required under the Act). There has been some discussion within the public sector as to exactly what the Service Agreement should cover – but the Government has been quite clear that it does not cover 'free' mapping for public service customers – the principles of user-pays remains at the heart of Government policy in this regard. Other customers have raised concerns that OSi will now seek to profit-maximise without making appropriate balances for the national interest. This balance has therefore been explicitly made in OSi's mission, which refers to meeting *society's* needs [italics added]. Only time can fully assuage these concerns.

Another early benefit of the new Status will be greater clarity as to the range of business relationships into which OSi can enter. These include joint ventures, setting up subsidiaries for particular activities, and purchasing other organisations. Again, large numbers of such ventures are unlikely at an early date, but the new status will allow regularisation of existing relationships.

In this regard, the date of 2004 is very relevant – the anticipated date (subject to funding) of national coverage of vector mapping. It is from this time onwards that OSi can broaden its range of activities, although planning and consultation is already underway.

5. TECHNICAL RESPONSE

This strand has deliberately been taken next, instead of the marketing strand, as the reality is that it is currently technology that is enabling certain marketing responses, rather than

marketing driving production (again, this situation will change significantly when the vector mapping programme is complete).

It is of no surprise that very significant technical developments are underway – the pace of change is ever increasing, and cannot be put aside whilst a change of status is made. This section can only touch on a number of particularly significant issues.

Again working from the whole to the part, OSi is currently putting in place a new positioning infrastructure for Ireland. Recognising that geodesy and positioning do not stop at national borders, much of this programme is being completed jointly with OSi's sister organisations in Northern Ireland and Great Britain. The activity is described more fully in Morgan et al (2001) and Cory et al (2001). The result will be:

- An active GPS network of 16 stations on the island of Ireland (including three stations already in use by the Commissioners of Irish Lights for offshore Differential GPS), including Real Time Kinematic positioning capability in the greater Dublin area;
- A new geoid model for the whole British Isles that, initial tests suggest, will provide ample accuracy to replace tertiary levelling with GPS heighting methods; and
- A new, GPS-compatible coordinate system for the island of Ireland named Irish Transverse Mercator (ITM), with outputs also available in the existing Irish Grid (IG) or in Universal Transverse Mercator (UTM) at the customer's choosing.

These developments are all well underway and will be fully implemented during 2002. Although OSi has always sought to provide a geodetic lead, an innovation on this occasion was the amount of consultation and discussion with customers that took place during the development of the new arrangements. This centred not on the 'pure geodetic' issues but on the practical issues of transition, transforming existing data holdings, etc. The work is being formalised into a Technical Working Group which will consist of users, data providers and system developers, and which will meet regularly during 2002. The work has, however, brought the twin concerns (often expressed by the same individuals!) that OSi either isn't providing a sufficient lead, or isn't consulting sufficiently – it seems that national mapping agencies will never be able to succeed in this regard!

The main work programme for OSi for the next few years will be the completion of the national vector mapping. Coverage is planned to be complete in 2004 (funding permitting), by which time reduced revision cycles, as shown in Figure 3, will also be in place. Change-based revision cycles are also being investigated, as are other sources of information on where change has occurred.

Coverage	Scale	Approx. Coverage	Current Revision Cycle	% now Complete	Planned Revision Cycle
Urban areas	1:1,000	0.1m Ha	1 year	100	1 year
Suburban areas	1:2,500	0.5m Ha	5 year	90	1 year
Peri-urban areas	1:2,500	1.5m Ha	5 year	50	3 year
Rural areas	1:5,000	3.6m Ha	5 year	5	3 year
Remote areas	1:5,000	1.2m Ha	5 year	0	3 year

Figure 3: OSi large scale vector mapping programmes - plans

These changes, as with the data developments referred to below, have been developed with significant customer input through a face-to-face consultation exercise during the middle of 2001. We have made a determined effort, given the extent of the changes necessary, to consult widely with customers, and to provide feedback and progress reports, with a comprehensive Information Paper (OSi, 2001) having been published in September 2001 and regular updates to be provided during 2002.

The 2004 completion date will not be attainable with internal OSi resources; nor would it be sensible to recruit and invest in the necessary equipment to achieve all of the work in-house. Instead, with a time-limited programme, OSi has taken a mixed approach. Approximately 40 new mapping staff were recruited (on medium-term contracts) – this provided a needed boost to internal morale, in the absence of recruitment for some time, and provided new blood and new insights into the workforce. The second strand of the response has been to let contracts with five companies for the creation of 1:5,000 vector mapping. These contracts were let in the autumn of 2001 and will come fully on stream in early 2002. Despite understandable doubts amongst staff as to whether ‘anyone else can do the job’, initial results are very encouraging and, as in all contracting, the various parties are all learning from one another.

With vector mapping for the entire country now coming on stream, a key focus for OSi continues to be the development of a spatial data infrastructure (SDI) for the State. Earlier initiatives in this area have not come to fruition for a variety of reasons. The current work, however, has a stronger chance of success for two reasons: the amount of investment by most of the key data providers in the State over the last few years in digital technology; and the interest in the area (and the willingness to provide a lead) provided by the Department of the Taoiseach [prime minister], which sees the work as a key plank in its building of Ireland as an Information Society. With this strong, impartial leadership, Ireland has the potential to overcome some of the interdepartmental friction which has existed in some other countries. Broad consultation as to the most appropriate way forward is currently underway, with the intention of working both top-down (with the development of a national policy) and bottom-up (with proofs of concept and other studies, including for instance how to link Land Registry folio references with geographical coordinates). Real challenges remain, particularly as some of the key players are not currently full users of digital mapping. An example of successful

collaboration between data providers, however, already exists in the form of GeoDirectory, a national address database developed jointly by OSi and An Post [the post office]. The resulting product is owned jointly by OSi and An Post (and, once OSi is a body corporate, the activity will be set up legally as a joint venture).

In parallel with the completion of vector mapping, OSi is currently fundamentally overhauling its spatial data holdings to make them a true database, built up of spatial objects with object-level intelligence. The schema for this new database has been designed, and it is planned to move all existing data across into it in the first half of 2002. In parallel, all aspects of the data specification were reviewed with customers in mid-2001 and a number of changes are being introduced in a phased way, so that the new specification will apply by the time that national cover of vector mapping is complete. By that time, accuracy and quality statistics for all scales of mapping will also exist. Many of these developments will be tested through a GIS Test Bed in the town of Ennis, which will be set up early in 2002 and which will also provide a valuable test bed for SDI-related initiatives.

Underlying the new databases will be new or upgraded data collection, manipulation and dissemination systems, with the overhaul and replacement of a range of current systems. A key corporate decision in this work is that OSi will buy in standard, open systems, making the minimum amount of adaptation to meet the organisation's needs whilst ensuring that developments from a variety of sources can be seamlessly incorporated.

All of these developments will ensure that OSi remains a leading edge organisation, but one that will have a name for listening carefully to users' requirements.

6. MARKETING RESPONSE

As mentioned in the previous section, the marketing response is to some extent led by technical capability. Other developments are, however, market-led, including the creation of national colour orthophotography cover for the country – an earlier decision had been to create black and white orthos, but the market was clear in its call for colour.

The marketing activity of OSi continues to develop, and the move to State Body status provides a particular impetus. The development of OSi's databases is also providing new opportunities. In particular, it allows the development of an OSi Ecommerce service, which will enable customers, via the web, to view, select, pay for and download areas of mapping or photography. Marketing and market decisions will shape the exact nature of the service and the channels through which it is available, but it will free, in one large step, OSi's supply areas from servicing small orders, and will provide an invaluable tool in combating copyright infringement (lack of accessibility of data is one of the alleged main reason for this).

The Ecommerce service will also develop the services and formats available via OSi's Agents around the country, and provide a ready feed of up-to-date data for OSi's Licensed Partners developing applications and services. This richer channel mix will provide customers with

greater accessibility to OSi data in the formats or within the applications that they require. These changes have also required a fundamental review of OSi's pricing and licensing structures, to rationalise and simplify them in a number of ways. The increase in indirect channels to market has, however, inevitably led to some tensions between advocates and practitioners of the existing direct channels, something which will only be resolved over time and within a clear strategic framework as to which channel is to be used when. The starting point for this will always be customer requirements, whilst recognising organisational and longer-term issues.

Another area where technology continues to drive forward is in the world of the Internet, where national mapping agencies have traditionally (and rightly) been concerned with copyright infringement. OSi late in 2001 released a revised policy on the use of its mapping on the Internet, attempting to strike a balance between copyright protection and ease of use, thus allowing mapping to be used in a wider variety of situations. Early indications are that this policy is proving successful, although technology is inevitably already placing strains on it. A further challenge in the marketing area is to 'stretch' OSi's brand whilst retaining its core values and visibility. This is a challenge faced by many organisations. OSi will be both helped and hindered by the strength of its current brand, particularly in the consumer product area, and astute decisions by senior managers in the past to tie OSi into key national and local activities.

7. CULTURAL RESPONSE

Here again, the ordering of the sections of this paper has not been random. Although culture in many ways should lead, it is inevitable that it has to know first where it should be leading, and the market, technical and organisational responses therefore need to be reasonably clear before a coherent cultural response can be made. The challenges and apparent threats of the other responses also need to be explicitly addressed in the cultural response. These have included the concern that a significant number of staff were working themselves out of jobs as the vector mapping programme completed, and concerns around the loss of individual Civil Service status.

A significant internal communications programme therefore formed an early plank of the response, breaking down further the military imperative that information be passed only on a need to know basis. This programme has had a number of facets, including direct staff briefings on the major changes, the use of the corporate Intranet to spread information, the rejuvenation of management-staff Partnership programmes and forums, and the carrying out of a survey to determine the successes and failures of communications to date. An internal Communications Group, including union, staff and management representatives, is now in place and a programme of work has been approved. This will build on recent work to create a coordinated series of events and processes. The internal programme will also be tied into external communications, where the change of status of OSi will need to be explicitly marked in a structured way.

There has also been a need to strengthen the organisation's management. The programme of putting in place a full set of senior managers, and then of building a cohesive team from them, has continued through 2001 (with the need to add managers for functions previously undertaken by the Valuation Office). A key early focus has also been on middle management (an area traditionally underdeveloped in the Irish public service). These key change agents have been exposed to a number of training and development opportunities, including a structured programme at Dublin City University that provides the possibility of completing a degree-level management qualification. A significant amount of money for retraining and general development is being built into organisational budgets for the coming years.

More concrete elements have also been reviewed. Negotiations with unions as to the organisational structure within OSi, including grading, promotion, recruitment and pay levels, is currently underway to provide with organisation with the structures it needs to meet the challenges it faces. There are currently a number of practices within the organisation that are likely to be inappropriate to the future but which can only be removed by negotiation and collective agreement. A number of Government Offices which have already made the transition to State Body status have provided valuable insights into the challenges and opportunities, and OSi has learned from them.

Neither have the links between plans and performance been ignored. A performance management system is currently rolling out across the Irish public sector. OSi was ahead of this programme and was asked to pause its work to allow it to be integrated with the wider work, but the earlier work has proved invaluable, for instance in having developed an agreed set of competencies for OSi. Once this performance and development system has bedded in, the possible links to pay and other remuneration will be explored, at a pace agreed between management and staff interests. This process has also been supported by continuously developing planning processes, and improved management information systems.

A further critical element of the cultural response has been to develop a greater sense of innovation in OSi. To date, the heavy requirements of the mapping programmes have limited the time and energy put into developing for the future, but the planned completion of vector mapping cover provides a clear focus for determining what other activities OSi can switch on as the mapping programme ends. A variety of initiatives have been begun in this area, with free-thinking currently being the emphasis, and the linking and coordination of the various initiatives deliberately being left for several months. Significant ideas are already emerging from the activities, ideas that will stand OSi in good stead into the future. Slowly, therefore, the cultural response is removing many of the concerns as threats, and focusing more clearly on the opportunities that are there for OSi if it is willing and able to respond to them.

8. THE FUTURE

This paper has described the profound changes underway in Ordnance Survey Ireland. The result of this profound change will be an organisation that is more confident about the future (and yet still just as proud of the past), more outward looking (whilst still recognising the very

real strength of internal cohesion) and more innovative (whilst still recognising the very real benefits of coordination). The details of the change are being planned by the organisation in anticipation of market requirements and in response to technological developments and the requirements of the Government (OSi's owner). The challenge for OSi management has been to put in place a coherent programme of responses, as summarised in this paper, to adapt in the necessary time frame. The ultimate aim remains that OSi fulfils, as effectively as possible, its function and its mandate. It intends to do this by remaining a leading edge organisation which continuously develops its business, its staff and its data. OSi's continuing experiences in managing such a significant level of change will be of interest to many other organisations in a changing world.

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BIOGRAPHICAL NOTE

Iain Greenway joined Ordnance Survey of Great Britain in 1986 after completing an M.A. in Engineering at Cambridge University and an M.Sc. in Land Survey at University College London. During the late 1980s and early 1990s, he worked in geodetic and topographic survey, including short-term consultancies supporting land reform in eastern Europe. After completing an MBA at Cranfield University in 1994/95, which included a term studying at Macquarie University, Sydney, he worked for Ordnance Survey in strategic planning and pricing, sales and marketing, as well as completing a number of management consultancy inputs in Swaziland and Lesotho. He subsequently undertook a secondment to Her Majesty's Treasury, working on the improvement of public sector productivity in the UK.

Since the summer of 2000, Iain has been the Deputy Director of Ordnance Survey Ireland, responsible for much of the day-to-day management of a national mapping agency undergoing profound changes in status, structure, processes and culture.

Iain is a Chartered Surveyor (MRICS) and a member of the Chartered Institute of Marketing (MCIM). He is the head of the RICS delegation to FIG, and Chair of the FIG Task Force on Standardisation and of Working Group 1.2 (Business Practices). He is also a member of the Management and Editorial Boards of the journal Survey Review.