# SURVEYORS AND STANDARDS – THE INTERRELATIONSHIP

*Iain GREENWAY, United Kingdom*

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## 1. INTRODUCTION

In early 1998, the then FIG Bureau set up a Task Force on Standardisation. This is a far from fashionable subject, and not one which appears in many dinner table discussions. It is, however, one which was becoming increasingly relevant to the surveying profession and one, indeed, which threatened to overwhelm surveyors if they did not make any ameliorating input. The Task Force was FIG's initial response, with a remit to understand the issue of surveyors and standardisation more clearly, and to advise the Federation how most effectively to become involved in and influence the complex processes. This paper sets out the importance of the issue, summarises the information gathered and conclusions drawn by the Task Force to date, and moves on to plans for the future. In the last three years, standards may not have become any more sexy, but their profile in the surveying community has risen a little. This trend is likely to continue with growing speed as certain key international standards are published and come into use.

## 2. WHY ARE STANDARDS IMPORTANT?

Official standards have always been important in production operations, with many originating in military activity: the ISO 9000 series of standards on quality management is a prime example of this spreading of military standards to the civilian world. Many surveyors have come across ISO 9000 and other official standards. Others will be very familiar with legal standards, for instance legislation on land registration and cadastral surveying. All of us are increasingly subject to *de facto* standards in all that we do – for instance, Microsoft personal computer operating software and TCP/IP standards on the World Wide Web. Standards, in all of these manifestations, are becoming increasingly important for surveyors (and, indeed, for all people).

To give an idea of the breadth of standardisation activities, the International Organisation for Standardisation (ISO) has 135 national standardisation bodies as members, and 2,867 technical bodies (technical committees, subcommittees, working groups and ad hoc study groups). At the end of 1999, there were 12,524 ISO standards in print, amounting to 356,427 pages. The current standard set includes:

- ISO 2172 – Fruit juice – determination of soluble solids content – Pycnometric method

- ISO 2729 – Woodworking tools – chisels and gouges
- ISO 6806 – Rubber hoses and hose assemblies for use in oil burners – specification
- ISO 8192 – Water quality – test for inhibition of oxygen consumption by activated sludge
- ISO 11540 – Caps for writing and marking instruments intended for use by children up to 14 years of age – safety requirements
- ISO 12857 – Optics and optical instruments – geodetic instruments – field procedures for determining accuracy

Turning to the benefits of standards, recent research undertaken by the Technical University of Dresden and the Fraunhofer Institute for Systems and Innovations (DIN 1999) found that:

- The benefit to the German economy from standardisation amounts to more than US$ 15 billion per year;
- Standards contribute more to economic growth than patents and licences;
- Companies that participate actively in standards work have a head start on their competitors in adapting to market demands and new technologies;
- Transaction costs are lower when European and International Standards are used; and
- Research risks and development costs are reduced for companies contributing to the standardisation process.

At a very practical level, the attendance of each delegate at this FIG meeting required standardisation in very many fields: in telecommunications, to ensure that our booking forms were received correctly; in aeronautics, to ensure that safe and efficient fuel was used in the aeroplane, and that it could dock at the gate on arrival; in IT, so that overheads could be projected successfully by speakers. Perhaps the difficulties caused by the lack of standardisation in some areas make the benefits more clear: how many times has anyone forgotten their international plug adapter and been unable to charge electronic equipment in another country? And how often have we all been frustrated (or worse) by the American insistence on using a different standard paper size (and a different measurement system) from the rest of the world?

Turning more specifically to the field of surveying, many of the disciplines within the profession have not to date been subject to *de jure* international standards. Some standards have existed for land survey instruments (for instance ISO 12857 cited above), but these have not been widely used. In the valuation field, national standards have long existed for the process of valuing a building. These are now being consolidated at an international level by the International Valuation Standards Committee (IVSC), in the first instance in IVS2000 published last year. For the suppliers and users of geographic information, however, 2001 will be a very important year, with the publication of most of the 20 or so standards in the series ISO 191xx, covering a broad range of issues relating to geographic information. A particular piece of work of the ISO Technical Committee (number 211) developing these standards is on the Qualification and

Certification of personnel, something which has the potential to override any agreements for mutual recognition/ reciprocity between FIG member associations.

At a specific and at a generic level, therefore, standards are important to surveyors. The German research referred to above shows the potential positive power of standards. Such positive results, however, do not occur without effort by the stakeholders of the field in question.

## 3. THE VOICE OF THE SURVEYOR

The process of creating standards is a lengthy one – many of the draft ISO standards on geographic information (19101 *et seq.)*, for instance, have already been under development for more than three years, and none have (at the date of writing) been published as international standards. This time scale has to be shortened in a world where technological developments are happening more and more frequently; as ISO recognises, standards will otherwise constrain development. The same difficulties can arise with legislation – the cadastral survey regulations of many countries prescribe methodologies which must be used, thereby often disallowing GPS methods.

The main participants in the process of developing standards are generally academics and public servants – people whose organisations can afford for them to spend time on, and travel to, the necessary meetings. In general, practitioners are present in much more limited numbers. This means that standardisation bodies will often have limited knowledge of other initiatives – they will assume a 'green field site' when in fact a good deal is already in hand. A particularly relevant current example for surveyors is the area of Spatial Data Infrastructures (at national, regional and global levels) – these will be profoundly impacted (for good or ill) by standards and it is therefore vital that there are clear links between the various professional and standardisation activities.

These difficulties are recognised by the various standardisation bodies and solutions are allowed for in their statutes. ISO, for instance, recognises Liaison bodies. Such organisations can participate fully in the process of developing standards, with the single exception that they do not have voting rights (whereas national standardisation bodies – the members of ISO – do have such rights). There are currently over 500 liaison bodies recognised by ISO, including Consumers International, the European Aluminium Association, the International Association of the Manufacturers of Stocks and Soups, and Visa International. In the surveying field, FIG, ICA, IAG and ISPRS are all registered as Liaison bodies and are active (to differing extents) in relevant ISO activities. Further details of the way in which ISO operates can be found in Greenway (2000) and in the draft FIG Guide on Standardisation (FIG 2001).

At this point, it should also be noted that international standardisation activity is becoming increasingly dominant, in an era of increasing international trade, over regional and national standards. This emphasises the growing role for international organisations such as FIG in inputting to the standardisation process – as opposed to doing this at the national or regional level.

The current ISO work on the Certification and Qualification of Geomatics Personnel provides an example of how surveyors can have a voice in the development of a concept – and of the limitations on the power of that voice. The concept behind the work item is one with which it is easy to agree – that, in an increasingly international world, the mobility of qualifications and certification is important. Following the rules of ISO, the Canadian national standardisation body prepared a proposal for a new work item to cover this field, leading to an international standard in the area. This was debated within the Technical Committee meetings, supported by some countries and opposed by others. It was strongly opposed by the professional survey bodies, on the basis that official standardisation risked fossilising the process (as with the cadastral legislation referred to above). Written submissions, however, have nowhere near the impact within ISO as being present at meetings, and lobbying. Many of the survey Liaison bodies were not present and their written submissions could therefore be more easily ignored.

The point at which significant change was introduced into the Canadian proposal – to develop an informative report rather than a standard – was a meeting of interested parties in Brighton, in the margins of the FIG Congress in July 1998. This meeting showed the importance of continued, personal lobbying to get points across, particularly bearing in mind that Liaison bodies do not have a vote at any stage of the standardisation process. In the ensuing postal vote, the proposal to set up such a work item was passed by 12 votes to 9 (many of the larger, active members voted against the proposal but smaller, non-active national standardisation bodies were not aware of the debate raised by the proposal and voted in favour). Once the working team was set, Liaison bodies again varied in approach. Some bodies chose to ignore the working group. FIG, however, felt that it was important to be a part of the discussions, shaping the process as much as possible whilst, in parallel, continuing its own work in the Task Force on Mutual Recognition chaired by Stig Enemark (see Enemark and Plimmer, 2000, for more information on this Task Force).

The working group is currently drafting a report (which is due by the autumn of 2001); one of its convenors is a regular attendee at FIG meetings and is a member of the FIG Task Force on Standardisation. FIG's presence has allowed us to make our case clearly, but our influence within the working group (as but one voice) is limited, and the final vote on accepting (or not) the report will be made by postal vote, with again organisations who have had no involvement (and very limited interest) holding key votes. The working group's progress and conclusions are summarised in Knoop (2001).

To date, therefore, surveying Liaison bodies to ISO have had limited effect in influencing the process. Such bodies are, however, recognised by key players as providing a useful input to the process. They are also, of course, key players in encouraging the use of standards when they are finally published. The reasons for limited impact include a limited understanding of the processes of ISO and how to influence them to best effect; a fragmentation of the surveying communities voice, with limited coordination between FIG, ISPRS and the other bodies; and not using even the full range of communications possible through the various internal FIG groups such as Task Forces, Commissions and Bureau. There has, perhaps, also been a tendency to give

up in the face of perceived lack of understanding of FIG's point of view by the ISO, without fully appreciating the situation as ISO (and the individuals involved) see it.

During 2000 and 2001, FIG (through the good offices of Commission 9) has also been working closely with IVSC, to gain a voice in the process of developing international valuation standards. IVSC is a much younger and less complex body than ISO, and more rapid progress has therefore been possible, with the professional surveying community seen as providing an important input to the process and being invited to do so. This will, hopefully, lead to a formal recognition of this role for FIG within IVSC but, as so often in international activity, formal recognition is often much less important than informal input and influence.

## 4. SURVEYORS AND STANDARDISATION – PROGRESS TO DATE

As described above, the FIG Task Force on Standardisation has spent much of the first three years of its existence understanding how ISO works (recognising that the scale and scope of ISO's operations dwarfs that of most other standardisation bodies). This has included active involvement in ISO Technical Committee (TC) 211 on Geographic Information/ Geomatics, attending meetings, commenting on work in progress, and reporting on FIG activity. FIG also has a longer history of involvement with two other ISO TCs covering the general field of survey instrumentation. Professor Jean-Marie Becker (Chair of FIG Commission 5) is actively involved in this work, attempting to simplify the current standards and make them more relevant to practising surveyors (for more information, see Becker et al, 2000).

In light of the learning to date, and recognising that FIG's funds are limited in the face of the vast range of standardisation activity in hand at any time, the Task Force has created a draft FIG policy for this area. This has been reviewed by Commission Chairs and by the Bureau but is not yet ratified by the General Assembly. The draft policy reads as follows:

'Standardisation activity is becoming of increasing importance to surveyors; indeed, the application of technical and professional standards is one element which sets professionals apart from others. In 1997, therefore, the FIG Bureau decided to place an emphasis on developing FIG's work in the standardisation field, whilst recognising the limitations of what FIG's resources could achieve.

Overall, FIG's aim in the field of standards is to assist in the process of developing workable and timely official and legal standards covering the activities of surveyors: FIG is one of the few bodies through which surveyors can formally be represented in international official standardisation activities. In so doing, FIG will be supporting its objective to collaborate with relevant agencies in the formulation and implementation of policies. FIG is also committed in its objectives to developing the skills of surveyors and encouraging the proper use of technology, activities which are becoming increasingly shaped by standards.

FIG will generally seek to ensure that *de facto* standards become official standards as technology matures, or at the very least that all relevant official, legal and *de facto* standards are produced in full knowledge of all other related material.

FIG sees the following roles for professionals in the standardisation process:

- Assisting in the production of workable and timely standards by proposing material which can be transformed into international standards (rather than relying on work developed by others) and by participating in the process of developing standards; and
- Disseminating information and creating explanatory material and guidance notes to ensure that all members of FIG are aware of the most recent standardisation activities, standards and regulations, and their implications for surveyors.

In supporting this policy, FIG will ensure that the work of its Commissions and other bodies dovetails with that of official standardisation bodies, to ensure that the greatest possible benefit for practising surveyors and their clients is achieved. This dovetailing will be reflected in Commission, Task Force and Permanent Institution workplans – these will include the creation of necessary information and explanatory material, and any planned output from any of FIG's bodies will be discussed with the relevant standardisation bodies before it is created. FIG will also seek to work with other international bodies representing surveyors, to ensure the most effective use of resources.

In the short-term, the FIG Task Force on Standardisation will provide the necessary coordination in planning of activity to achieve these goals, recognising that it is through the Commissions and Member Associations that most of the necessary work and liaison will be achieved. The structural arrangements within FIG for the medium-term coordination of standardisation activities will be determined in light of the decisions made on the future structure of FIG Commissions and Permanent Institutions.'

Working with ISO and IVSC, and within FIG, the Task Force has developed a draft Guide on Standardisation, to provide FIG officers and Member Associations with a clearer understanding of how they can influence the development of standards. The Task Force, in collaboration with FIG Commission 7, also proposed the FIG Statement on the Cadastre (FIG 1995) to ISO for fast tracking to become an international standard. Once we had understood the procedures for such a submission, and reformatted elements of the document to meet the ISO document structure, the Statement was submitted. It has not been accepted for fast-tracking, on the basis that it is a field generally covered by national legislation, so the Task Force is currently considering what other FIG material might be suitable for fast-tracking, taking forward the first of the two roles set out in the Policy. One active area at the moment is on determining how the FIG Multi-Lingual Dictionary can be consolidated to best effect with ISO terminology activity in the surveying field.

On the educational side, the Task Force has set up an area of the FIG web site and maintains it, providing information on current standardisation activities. The number of papers about standards activities at FIG meetings is also increasing, as the topic gains profile in the surveying community. Documents such as FIG Publication No 9 on the testing of EDMs (FIG 1994) is another example of the explanatory material which FIG produces.

In all of this, the Task Force is building on the results of questionnaire, completed by over 40 individuals ands member associations in 1999, which provided guidance on the key areas of standardisation on which FIG should concentrate.

At this stage, it is fair to say that FIG's increased focus on standardisation has created a higher profile for FIG within this field, and for standardisation within FIG. Much greater coordination of activity, within and beyond FIG, is however needed if the efforts to date are to build into meaningful, concrete progress.

## 5. NECESSARY ACTIVITY

As described in the previous section, some solid work has been done in a number of areas since the creation of the Task Force. Over the next year or so, there are a number of key tasks for the Task Force (and, through it, for FIG generally). The general areas are described in this section.

Standardisation work items have to progress through a complex and lengthy process before they become published standards. It is unrealistic for FIG, as one of many bodies representing professionals, to be able to control the progress of individual standards, and FIG will have to accept that many of its proposals for changing documents will not be accepted (although the general principle of consensus allows FIG to push home points on which it feels particularly strongly). Similarly, standardisation bodies will not readily accept new work item proposals unless there is a proven market need for them. FIG should, however, be well aware of the needs of its 230,000 individual members – a significant market – and can therefore expect standardisation bodies to listen to it. To achieve the greatest degree of success, therefore, FIG needs to coordinate its efforts, and to recognise the needs of the standardisation bodies as well as those of FIG's members.

### *5.1 Interpreting and promoting published standards*

Standards will inevitably tend to be fairly dry documents, with lengthy glossaries and definition sections. ISO figures give the average length of a standard (excluding some of the terminology lists) as nearly 30 pages. It is unlikely that the average person in the street or even the average professional has read any standards, or is aware first hand of their requirements.

Much more likely is that people encounter standards through either their practical manifestations (products created to conform to particular standards) or through advisers, part of whose role is to interpret standards. In recent years, we have seen a large industry

evolve to interpret the ISO9000 quality standards for businesses. We have also seen very large numbers of publications addressing what is a very concise standard of 20 short clauses. This shows both how complex standards can be (or be made – as with laws, the practical implications often emerge through 'case law'), and that there is no shortage of interpreters, as long as you are willing to pay money for their services.

It is also important to remember that, in most circumstances, a practitioner has the choice of whether to follow a particular standard or not. In many circumstances, a standard's detailed provisions will not be appropriate. One example of this is the very complex ISO standards which exist on the calibration and testing of EDM total stations and other surveying equipment (an additional problem in this area is the number of uncoordinated ISO standards; as mentioned in section 4, FIG is involved in activity to rationalise the situation). The detailed requirements of the standards may be appropriate for industrial metrology-type applications, or for the calibration of equipment by manufacturers and national laboratories, but are almost certainly not relevant for the average land surveyor to undertake on a regular basis.

For further advice, individual practitioners will often turn to their national professional association. Such associations often have technical departments responsible for interpreting standards for their members, either as part of the membership fees or for an additional fee. In turn, they will often look to international bodies to provide guidance to them, and so FIG and in particular its Commissions will need to ensure that they are fully aware of key standards and are able to provide timely guidance to FIG's Member Associations on necessary activity and priorities. In this way, FIG can provide a service to its Member Associations, can avoid duplication of effort at a national level, and will be well placed to feed back suggestions for improvement to the relevant standardisation body.

An area of particular activity over the coming year will be promoting and explaining to professionals the implications of the ISO 191xx set of standards on geographic information. These cover factors from terminology to referencing by coordinates. Further information on the developing work is available in the papers of Ostensen (1998), Knoop (1998), Slaboch (1998) and Hothem et al (2001). The Task Force continues to work closely with ISO TC211 to emphasise the importance of this activity (in addition to the completion of the standards) and determine how best FIG can support it.

Another role for national and international professional associations is the pooling of best practice, which may often be ahead of the content of standards. For instance, many professional institutions produce best practice material which can be used by all practitioners and clients as a basis for defining requirements. FIG is keen to spread knowledge of such documents, developed by individual member associations, throughout its membership. At an international level, the current work of FIG's Working Group 3.3 in compiling a HABITAT Best Practice Database is another example of this type of activity.

To achieve FIG's stated policy, therefore, FIG's Commissions, Task Forces and Permanent Institutions need to work closely with the relevant standardisation bodies

(including the Technical Committees of ISO) so that any informative or explanatory material that they create which supports the use of standards is produced at the appropriate time, has clear references to the relevant standards, and can be published and marketed in a coordinated way with the published standards.

### *5.2 Influencing the existing work programmes of standardisation bodies*

FIG needs to coordinate the inputs it makes to the creation and development of standards by the various standardisation bodies. This is both at international level (through FIG continuing to work with ISO and IVSC) and at national level (through FIG's member associations lobbying their national standardisation bodies).

At the international level, FIG (as a Liaison body to ISO) can appoint Experts to ISO's working groups. In this way, FIG has commented on a number of the key TC211 documents and has influenced ISO's work on optical instrumentation. Funds, however, are limited, and it will be vital to prioritise activity and not to spread resource too thinly.

Currently, the Task Force on Standardisation has taken on the task of maintaining contact, formally and informally, with the ISO Central Secretariat, to keep them informed of FIG plans and to understand how FIG can influence ISO activity to best effect; future organisational arrangements for this activity within FIG will need to be determined.

It takes time for individuals to understand the sometimes arcane ISO processes and language. It is also vital, if Experts are to have the greatest possible effect and influence, for them to be involved in the relevant drafting activity from the beginning (FIG's influence, in the absence of a vote, declines as the drafting process progresses). This points to the requirement to maintain a list of possible Experts, with their field of expertise, and the need to maintain the currency of the list. The relevant Commissions have an important role in publicising the existence of the list, and in encouraging individuals to join it. It is also important that the many FIG members who represent their national standardisation bodies in ISO activity are aware of FIG's requirements and views, as they can input views to the process without the need for FIG funding. Particular care will be needed where FIG and national needs may conflict.

Lobbying national standardisation bodies is an important role for national delegates to FIG Commissions, who should be made aware of current standardisation activity of relevance to their Commission, and should seek out the relevant contacts in their national body. National standardisation bodies will generally set up committees shadowing the work of each ISO TC. The leader of each committee will normally be a specialist in the field, although also someone with knowledge of how national and international standardisation activity works. It is important that the FIG delegate finds out who this person is, and works with them to gain maximum influence for practising surveyors.

Influence at a national level is crucial if FIG is to achieve as much as possible with its limited budget for standardisation activities. National activity will generally involve limited travelling expenses, and can double up with the necessary activities of the

member association in influencing standardisation activities. It is clear that, at present, FIG is insufficiently linked into this national aspect of activity. A number of elements need to come together to correct this:

- FIG Member Associations need to be made more aware of FIG's activities in standardisation. The lead responsibility here rests with heads of delegations to the FIG General Assembly, to communicate with the relevant officers and members of their Member Association;
- FIG delegates to Commissions need to be aware of the particular areas of standardisation activity which could affect them; the role here is for FIG Commission officers, both explicitly through their work programmes, and on an ongoing basis in their newsletters and other communications;
- Similarly, Member Associations need to provide information to FIG's Commissions and the Task Force on Standards (and its successor) as to relevant national standardisation activity, so that FIG can support the Member Association in influencing this activity;
- A bank of information should be maintained centrally by FIG, to be called on by delegates; this is currently the responsibility of the Task Force but future organisational arrangements are under consideration.

### *5.3 Proposing new work areas for international standardisation*

The work of ISO grew out of manufacturing. It is therefore of no surprise that the activities of the technical commissions of FIG (5 and 6 in particular) are well-covered by international standards, even if these at times are out of date or don't allow for new technology. Recent work around the world on national and global spatial data infrastructures has catalysed ISO work (particularly in TC211) in the area covered by FIG Commission 3 but has left open the possibility that such infrastructures will be adversely impacted by standards. FIG Commission 4 has a particular link with the International Hydrographic Bureau (IHB) and International Hydrographic Organisation (IHO), which set international standards on hydrography. Commissions 1 and 2 have a more general interest in professional standards, which are likely to be covered by ISO and other activities (ISO 9000, for instance), and where FIG's influence is likely to be very limited.

Some of FIG's other Commissions, however, are less well covered by ISO activity. Commission 9 will have more interest in the work of IVSC, but commissions 7 and 8 and the Ad Hoc Commission on Construction Economics (in conjunction with International Cost Engineering Council (ICEC)'s work on best practice) may well be working in areas where there are not international standards, and where they believe that there should be. These are therefore particular areas where FIG can consider the submission of material to ISO for fast-tracking, and the Task Force has been trying for some time to determine particular areas which might be suitable for this.

In this area in particular, but across its range of work, FIG should review the needs of the market in terms of published standards before drawing up Commission and Council work programmes, and should liaise with the Secretariats and Technical Committees of standardisation bodies over particular gaps in activity. Wherever possible, these gaps should be filled through the development of material by FIG, in close liaison with the

relevant standardisation body, so that the completed FIG work can successfully be fast-tracked to become a standard, and so that the timing of the production of FIG's deliverables fits with the needs of the standardisation body (and the market).

### *5.4 Coordination of activities*

All of the above requires discipline on behalf of FIG and its Commissions and Permanent Institutions, with appropriate coordination of the development of work plans so that FIG's work has the greatest possible impact in the world of standards. This may require a slightly greater planning horizon for Commissions and Permanent Institutions, and greater coordination of effort, which will be facilitated by the use of strategic planning meetings of the Council and the Advisory Committee of Commission Officers (ACCO). This will be particularly important over the next year, as work plans for 2002-06 are drawn up, and the Task Force will work to be involved in and influence the content of these plans. Also important over the coming year will be the determining of how the coordinating activities of the Task Force should be continued into the future – this is currently under consideration by the FIG Task Force on Commission Structure.

It is also important for FIG to co-ordinate its influencing and informative efforts with other international NGOs to ensure that the combined efforts are coordinated to best effect. This can probably best be achieved through the Memoranda of Understanding (MOUs) that FIG is developing with sister NGOs, following the disbanding of the International Union on Surveying and Mapping (IUSM), and the Task Force will continue to seek to ensure that standardisation issues are covered by such MOUs.

## 6. CONCLUSIONS

As can be seen in the previous sections of this paper, solid progress has been made within and beyond FIG in raising the profile of standardisation to surveying, and of surveying to standardisation bodies. Section 5 shows that there is much more work to be done – work in the standardisation area always seems to be a long haul, taking years rather than months. It is vital that FIG continues to build on what it has achieved so far, and the Task Force will be working to do this. A key plank in this activity will be the FIG Guide on Standardisation, which will be completed during 2001 and should provide a valuable resource to all of FIG's constituent bodies to work to best effect in the field of standardisation. Mobilisation of a range of bodies and individuals is vital to FIG's success in this critical area.

In essence, FIG needs to see itself, and the activity of all of its constituent parts, as part of a larger picture which includes key bodies such as the UN and its agencies, standardisation bodies and the World Trade Organisation (WTO). This has been a key theme of recent FIG Bureaux, and progress is now being delivered on a number of these fronts. As a result, the realisation is growing that surveyors need standards, and standards bodies need FIG – but the realisation is a fragile plant which needs continuing nurturing and attention.

**REFERENCES**


Becker, J-M., Heister, H. and Slaboch, V., 2000, New technical standards improving the quality in positioning and measurement, proceedings of the FIG Working Week, Prague

DIN (German Institute for Standardisation), 1999, Economic benefits of standardisation: summary of results, available at www.din.de/set/aktuelles/benefit.html

Enemark, S. and Plimmer, F., 2000, Mutual recognition of professional qualifications in the surveying profession, proceedings of the FIG Working Week, Prague

FIG, 1994, Publication No 9: Recommended procedures for routine checks of electro-optical distance meters (EDM)

FIG, 1995, Publication No 11: The FIG statement on the cadastre

FIG, 2001, draft FIG Guide on Standardisation, available on FIG web site

Greenway, I., 2000, Surveyors and Standardisation, proceedings of the FIG Working Week, Prague

Hothem, L., 2001 [paper in session 1 of Working Week – please add full authors and title when the paper is submitted]

Knoop, H., 1998, Standardisation, Co-ordination and Quality Management of Geographic Information, proceedings of the XXI FIG International Congress, Brighton

Knoop, H., 2001 [paper in session 1 of Working Week – please add title when the paper is submitted]

Ostensen, O., 1998, Spatial Data Infrastructures – the need for global standards, proceedings of the XXI FIG International Congress, Brighton

Slaboch, V., 1998, ISO and the Surveyor, proceedings of the XXI FIG International Congress, Brighton


Further information is available from the web sites of ISO (www.iso.ch), WTO (www.wto.org), FIG (www.fig.net), IVSC (www.ivsc.org) and ISO TC211 (www.statkart.no/isotc211)

## CONTACT

Iain Greenway
13 Hazelbury Park
Clonee
Dublin 15
IRELAND
Tel. + 353 1 802 5316
Fax + 353 1 820 4156
E-mail: igreenway@compuserve.com

## 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. A variety of posts in geodetic and topographic survey followed, 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 RICS delegate to FIG Commission 1, 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.