FIG Guide on Standardisation

How to enhance FIG's role in the process of creating and maintaining official standards

Revised Edition

FIG Task Force on Standards

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Contents

A. Introduction

A1. Purpose of this Guide

This Guide was created by the FIG Task Force on Standards, and has been updated by the FIG Standards Network, to assist the FIG Council, Commissions and Member Associations in their efforts to make a difference in standardisation activities. Standardisation activities can often seem complex or even impenetrable, and the Task Force and Network have seen one of their prime roles as filtering important information about standardisation activities and explaining how surveyors can be actively engaged in the processes.

A2. Background

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.

To give an idea of the scale of standardisation activities, the International Organisation for Standardisation (ISO) in 2004 had 149 national standardisation bodies as members, and 2,952 technical bodies (technical committees, subcommittees, working groups and ad hoc study groups). There were 14,941 ISO standards in print, amounting to 531,324 pages. 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.

Turning to the benefits of standards, research undertaken by the Technical University of Dresden and the Fraunhofer Institute for Systems and Innovations (available at www.din.de/set/aktuelles/benefit.html) 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.

Further work in the UK in 2005 (available at www.dti.gov.uk/iese/The_Empirical_Economics_of_Standards.pdf) found that 13% of the UK's economic growth between 1948 and 2002 could be attributed to standards.

The process of creating standards is a lengthy one – most ISO standards are under development for more than three years. 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.

For these reasons, standards are important to surveyors, and surveyors' involvement in standardisation can develop better standards in shorter time frames, improving the benefits that standards bring. In the last few years, FIG has given a focus to international standardisation activities and has significantly raised its profile in the area. Even in this limited time, the work has achieved concrete results. To give two examples:

- The ISO standards on testing calibrating survey instruments, unworkable for practising professionals, have been revised – in large part due to the continuing pressure and input of FIG, particularly Commission 5, and some FIG funding for individuals to attend relevant meetings;
- The proposed ISO work to create a standard for the qualification and certification of personnel in the geographic information area was turned into an informative report (ISO/TR 19122) due to FIG (and other NGO) pressure. The recommendations of that report, due to parallel FIG activity and input, recommend that the work is left to relevant international professional bodies. FIG's active input to the ISO work, rather than ignoring it, was a key factor in these developments.

This Guide has been created to allow FIG to build on these successes, and to focus its efforts and funds.

A3. Terminology

For the purposes of this Guide:

- **Official standards** are those created by authorised standardisation bodies, whether operating on a global, regional or national basis;
- **Legal standards** are those created by sub-national, national, supranational or international law; and
- ***De facto* standards** are documents such as regulations, industry standards and professional instructions.

B. FIG Policy

Standardisation activity is, as summarised in section A2, 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, FIG decided to place a greater emphasis on developing its work in the standardisation field, whilst recognising the limitations of what its 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 is 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:

1. 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
2. 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 dovetail the work of its Commissions and other bodies 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 (PI) workplans – these will include the creation of necessary information and explanatory material, and any relevant 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 closely with other international bodies representing surveyors, to ensure the most effective collective use of resources.

Since 1998, the FIG Task Force on Standards – and subsequently the FIG Standards Network – have provided 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 standardisation roles of the various elements of FIG's structure are described in more detail in Section D of this Guide.

C. FIG Strategies

This Guide explains the often complex and lengthy processes through which work items have to progress 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 250,000 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 of FIG's members. The respective roles and responsibilities of the key bodies in the standardisation arena are set out in ***Section C1 of this Guide***.

To achieve FIG's stated policy, FIG's Commissions need to work closely with the relevant standardisation bodies (including the Technical Committees of ISO) so that any informative or explanatory material that the Commissions 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. ***Section C2 of this Guide*** expands on this activity.

In addition, FIG needs to coordinate the inputs it makes to the creation and development of standards by the various standardisation bodies. ***Sections C3-C5 of this Guide*** cover this aspect of activity for ISO, the International Valuation Standards Committee (IVSC) and national standardisation bodies respectively.

Before drawing up Commission and Council work programmes, FIG should review the needs of the market in terms of published standards, 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 progressed 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). ***Section C6 of this Guide*** provides further guidance on this activity.

All of the above requires coordination of the development of Commission and PI 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 PIs, and greater coordination of effort, which will be facilitated through the strategic planning meetings of the Council and the Advisory Committee of Commission Officers (ACCO). It will also require ongoing collaboration with other international NGOs to ensure that the combined efforts are coordinated to best effect.

In short, FIG needs to continue to see itself, and its activity, 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).

C1. Current standardisation bodies and activities

In light of the numbers quoted in section A2, it will be no surprise that there is a very significant amount of standardisation activity underway, with large numbers of people and organisations involved. This section attempts to provide some information on the main players. It does not set out to reproduce all of the material available – see the list of contacts in Section E of this Guide for further information – but rather to provide FIG members with some pointers to the main players and their roles.

C1.1 ISO

ISO is a key player in international official standards. The International Organisation for Standardisation (ISO) is a world-wide federation of national standards bodies from 149 countries. ISO is a non-governmental organisation established in 1947 (at that stage, essentially to provide recommendations to members aimed at harmonising national standards). ISO's mission is to promote the development of standardisation and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing co-operation in the spheres of intellectual, scientific, technological and economic activity. ISO's work results in international agreements which are published as International Standards.

International standardisation began in the electrotechnical field: the International Electrotechnical Commission (IEC) was created in 1906. Pioneering work in other fields was carried out by the International Federation of the National Standardising Associations (ISA), which was set up in 1926. ISA's activities ceased in 1942 owing to the Second World War. Following a meeting in London in 1946, delegates from 25 countries decided to create a new international organisation 'the object of which would be to facilitate the international co-ordination and unification of industrial standards'. The new organisation, ISO, began to function officially on 23 February 1947. The first ISO standard was published in 1951 with the title 'Standard reference temperature for industrial length measurement'.

The lack of correlation between the official title when used in full, *International Organisation for Standardisation*, and the short form, *ISO*, should be explained. In fact, 'ISO' is a word, derived from the Greek *isos*, meaning 'equal', which is the root of the prefix 'iso-' that occurs in a host of terms, such as 'isometric' (of equal measure or dimensions) and 'isonomy' (equality of laws, or of people before the law). From 'equal' to 'standard', the line of thinking that led to the choice of 'ISO' as the name of the organisation is easy to follow. In addition, the name has the advantage of being valid in each of the organisation's three official languages – English, French and Russian. The confusion that would arise through the use of an acronym is thus avoided.

The official goals of ISO are to facilitate trade, exchange and technology transfer through:

- Enhanced product quality and reliability at a reasonable price;

- Improved health, safety and environmental protection, and reduction of waste;
- Greater compatibility and interoperability of goods and services;
- Simplification for improved usability;
- Reduction in the number of models, and thus reduction in costs; and
- Increased distribution efficiency and ease of maintenance.

The adoption of ISO standards is voluntary, but users tend to have more confidence in products and services that conform to International Standards. Assurance of conformity can be provided by manufacturers' declarations, or by audits carried out by independent bodies.

C1.2 National standardisation bodies

The members of ISO (national standardisation bodies) are often government-run or supported in part, in recognition of their work in supporting free competition, trade and public order. Their key tasks are the production of national standards where this will support the national economy and/or protect citizens, and the promotion of the use of relevant international standards – with the growth of global trade, the latter role is increasingly important and fewer national official standards are being produced. They are generally encouraged to cover part of their costs (including the costs of participating in ISO activity and creating national standards) through selling materials, offering certification services, etc.

C1.3 Other international standardisation bodies

ISO works closely with the ***International Electrotechnical Commission (IEC)***, particularly through their Joint Technical Committee (JTC) 1. A number of other international standardisation bodies exist, the most relevant of which for surveyors, in particular valuers and real estate advisers, is the ***International Valuation Standards Committee (IVSC)***.

The IVSC was founded in 1981 and its membership comprises professional valuation associations from around the world, with 52 countries currently represented. IVSC's objectives are *to formulate and publish, in the public interest, valuation Standards and procedural guidance for the valuation of assets for use in financial statements and to promote their world-wide acceptance and observance; to harmonise Standards among the world's States; and to make disclosures of differences in standards statements and/or applications of Standards as they occur.*

The IVSC is an NGO member of the United Nations, having been granted Roster status with the UN Economic and Social Council in 1985. The IVSC maintains liaison with other international agencies (for instance, the Organisation for Economic Cooperation and Development (OECD), the World Bank, the International Monetary Fund and the WTO), and with standardisation bodies such as the International Accounting Standards Committee (IASC), the International Federation of Accountants (IFA) and the International Organisation of Security Commissions (IOSCO). It also maintains contact with the European Group of Valuers' Associations (TEGoVA).

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The IVSC also collaborates with the Open Standards Consortium for Real Estate International (OSCRE) and its two regional members viz. OSCRE Americas, and PISCES (Property Information System Common Exchange Standards), the regional member for Europe, the Middle East and Africa. OSCRE and PISCES have developed an open industry Standard for real estate related e-commerce data exchanges. The IVSC in addition also maintains contact with the European Group of Valuers' Associations (TEGoVA).

In 2005 the IVSC published the seventh edition of the International Valuations Standards (IVS 2005), and there are ongoing revisions to the Standards.

The ***International Maritime Organisation (IMO)*** is a United Nations specialised agency which issues conventions, ratified by countries, to regulate worldwide maritime safety. As part of this activity, it establishes reference standards for electronic chart display and information systems (ECDIS) used by regulated shipping. These conventions reference standards created by the ***International Hydrographic Organisation (IHO)***, a scientific and technical organisation which creates international minimum standards covering hydrography and nautical charting. IHO is an intergovernmental organisation (IGO) not affiliated to the UN. The secretariat of IHO is called the International Hydrographic Bureau (IHB). The IHO publishes a Transfer Standard for Digital Hydrographic Data (commonly known as S57).

C1.4 Regional standardisation bodies

During the creation of this Guide, four regional standardisation bodies have been identified:

- Comité Européen de Normalisation (CEN);
- The Pacific Area Standards Congress (PASC);
- The European Group of Valuers' Associations (TEGoVA); and
- The North Atlantic Treaty Organisation (NATO).

CEN has become an important organisation with the growth of pan-governmental activity at the European level – many of its standards are referenced by European Commission documents. The procedures of CEN are similar to those of ISO, with similar outputs. ISO and CEN have worked closely together for some considerable time, and the Vienna Agreement sets out arrangements for each to ratify the other's work. Nearly half of all European standards are direct adoptions of ISO standards under these arrangements.

PASC is less developed than CEN, but in a similar way attempts to coordinate the development of standards in the countries around the Pacific. Its objectives include the following:

- To exchange information and views and initiate necessary actions to help ensure that international standardisation activities are properly coordinated on a consensus basis to meet world needs and foster international trade and commerce;
- To provide a geographically convenient forum for the countries and territories of the Pacific area to develop recommendations for communication to the international standards bodies, particularly ISO and IEC; and
- To form a consultative liaison with international and regional standards bodies to help them meet world needs in standardisation through communication of recommendations of PASC members.

The European Group of Valuers' Associations (TEGoVA) is an NGO based in Brussels and is a European umbrella organisation of national property valuation associations. Its main objective is the creation and dissemination of harmonised standards for the practice of valuation, for education and qualification of valuers, as well as for corporate governance and ethics. TEGoVA aims to support its member associations in the countries of the European Union, as well as in the emerging markets in central and eastern Europe, in the introduction and implementation of those standards.

NATO issues STANAGs (standardisation agreements) which have mandatory status for military authorities in the organisations' member countries. One of these, for instance, defines the Universal Transverse Mercator (UTM) coordinate reference system, which is widely used throughout the world. Another – number 7074, developed by the Digital Geographic Information Working Group (DGIWG) – sets the Digital Geographic Information Exchange Standard (DIGEST).

In general terms, the globalisation of trade and the world economy is reducing the role of such regional bodies. In addition, FIG and its Member Associations will be focusing at international and national level respectively; regional standardisation bodies are therefore not considered in any detail in this Guide. Further information on them can be found from the sources listed in Section E.

C1.5 Governments

Moving to the field of legal standards, national governments, in their role as protectors of the right to hold land (on which so much economic development and stability depends), are an important source of regulations for cadastral surveyors. As with official standardisation activities, such laws can lag significantly behind technical developments and, through setting input controls, can inhibit effective use of resources.

A whole raft of other legislation affects surveyors as business people and employers, for instance legislation on health and safety, taxation, etc. This Guide does not attempt to cover this type of regulation, where lobbying of government is most effectively completed at a national level.

Inevitably, the move to globalisation has also affected legislation, with the role of the European Union being the prime example and the requirements of the North American Free Trade Agreement (NAFTA) being another. At a global level, the OECD attempts to spread good practice around the world. In the surveying field, a number of organisations

attempt to ensure that organisations and nations work together to best effect. An example of this is EuroGeographics, which coordinates the work of European National Mapping Agencies.

C1.6 Companies

Commercial firms are becoming increasingly important in the development of de facto standards. Microsoft (MS) is a classic example – other software manufacturers need to ensure that their programs interface successfully with Windows and other MS products if they are to be successful. There are many, many other organisations setting, wittingly or not, *de facto* standards. Again, it is impossible for this Guide to cover these in any detail.

C1.7 Other international bodies

A number of other international bodies have an interest in standardisation activities. Of particular interest in the surveying arena are:

- ***The Open Geospatial Consortium (OGC),*** a commercial body representing the manufacturers of GIS hardware and software and the providers of geographic data. As its name suggests, the OGC is working towards the adoption of open standards, allowing the flow of data between different GI systems. In doing so, OGC works closely with other official standardisation bodies;
- ***The International Cost Engineering Council (ICEC),*** which has for a number of years been working in the area of standards and best practice – material on its website includes downloadable versions of standards-related documents developed by national associations and others*;* and
- ***The International Association of Geodesy (IAG)*** and the ***International Cartographic Association (ICA),*** which have both in recent years increased their focus on standardisation activities and adjusted their structures accordingly, and the ***International Society for Photogrammetry and Remote Sensing (ISPRS).***

C1.8 The World Trade Organisation

In all of the above discussion, the World Trade Organisation (WTO) is a very interested party.

The WTO, based in Geneva, has more than 145 governments as members, between them accounting for over 90% of world trade. It is the only international organisation dealing with the global rules of trade between nations. Its main function is to ensure that trade flows as smoothly, predictably and freely as possible. It does this through the creation of trade agreements, which are ratified by members' parliaments. The result is assurance: consumers and producers know that they can enjoy secure supplies and greater choice of the finished products, components, raw materials and services that they use. In addition, producers and exporters know that foreign markets will remain open to them. The result is, in theory, a more prosperous, peaceful and accountable economic world. Decisions of WTO are made by its members, at the highest level in a Ministerial Conference which meets at least once every two years; decisions are generally made by consensus (the more cynical would also point to the role of political horse-trading).

The missions of ISO and WTO point to their needing to co-operate – standards underpin free trade and they need to work together to achieve this. This is formalised in the Agreement on Technical Barriers to Trade (TBT), which sets out how international standards should be used by governments to facilitate trade. In practical terms, ISO and WTO jointly hold workshops such as those on standards in service industries in 1998.

C1.9 Publications

This Guide does not list all of the official and *de facto* standards which are of relevance to surveyors – if nothing else, the list would be out of date by the time it was completed. A few key standards are listed in Section E of this Guide, along with some sources of further information. The FIG website will be used to reference more current listings of key standards documents.

C2. Interpreting and promoting published standards

Standards will inevitably tend to be fairly dry documents, with lengthy glossaries and definition sections. The ISO figures quoted in section A2 give the average length of a standard (excluding some of the terminology lists) as about 35 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, a large industry has evolved to interpret the ISO9000 quality standards for businesses. We have also seen very large numbers of publications addressing what is a very concise standard. 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 note 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 was the ISO standards which existed on the calibration and testing of EDM total stations and other surveying equipment. The detailed requirements of the standards might have been appropriate for industrial metrology-type applications, or for the calibration of equipment by manufacturers and national laboratories, but they were almost certainly not relevant for the average land surveyor to undertake on a regular basis. To address this, FIG Commission 5 produced FIG Publication No 9 *Recommended procedures for routine checks of electro-optical distance meters (EDM)* to outline the tests that practitioners should carry out on their instruments. The spirit of this work has been taken forward in the revised standards in the ISO 17123 series, which define two sets of tests – one for the practitioner and the other for the calibration facility.

The moral of the above summary is that individual practitioners or firms should not generally attempt to interpret the implications of an official standard from first principles. In very many cases (as with *de facto* standards), businesses will be able to purchase

products certified as meeting the requirements. This will be of particular relevance where legislation, for instance health and safety laws, requires certain standards to be conformed to. In more specific cases, the services of a specialist adviser may need to be hired, if the implications of failing to meet requirements will have very significant consequences for the firm (for instance, possible law suits taken out by clients).

Alternatively, the surveyor's national professional association could be turned to. Such associations often have technical departments responsible for interpreting standards for their members, either as part of the membership subscription 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.

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 1998-2002 work of FIG's Working Group 3.3 in compiling a HABITAT Best Practice Database is another example of this type of activity. The FIG Surveyors' Reference Library is also now building a readily-available repository of information.

This element of FIG's work in standardisation will continue largely to be led by its Commissions and PIs, appropriately coordinated internally, with Member Associations and with standardisation bodies. This coordination is vital in ensuring effectiveness of activity in terms of content and timing.

C3. How FIG can influence the existing work programme of ISO

Annex A to this Guide provides further information on the operation of ISO. This section explains how FIG can influence the standardisation process to best effect; it cross-references to Annex A as necessary.

As explained further in Annex A2, the engine house of ISO is its Technical Committees (TCs). International organisations such as FIG can gain Liaison status (this status is explained further in Annex A4) and appoint individuals as Experts to relevant TCs and thus influence activity. It is vital, however, that liaison bodies are active – although the Internet is increasingly being used in the work of developing standards, the bulk of the decisions are still made when a Working Group of Experts meets in the same room. This means that FIG must be willing to fund Experts for the necessary travel (or source Experts who already have funding available), that Experts must have a realistic expectation of being able to prepare for and attend the meetings, and that FIG must prioritise key TCs rather than try to spread its budget of cash and Experts too thinly. To achieve this, the FIG Council, in consultation with other relevant NGOs representing surveyors, will need to

continue to oversee and coordinate the process of choosing which Experts should be funded for which activities, basing decisions on the importance to FIG and the surveying profession. The FIG Standards Network will advise the Council on such decisions.

The ISO TCs to which FIG currently has Class A Liaison status are:

- TC59 Sub-Committee 4 – Dimensional Tolerances and Measurements (currently dormant);
- TC172 Sub-Committee 6 – Geodetic and Surveying Instruments (Lead: Hans Heister); and
- TC211 – Geographic Information/ Geomatics (Lead: Iain Greenway).

C3.1 Gaining Liaison status

Being accepted as a Liaison organisation to a TC requires a formal request from FIG to the ISO Secretary-General, who will pass the request to the secretariat of the relevant TC with an instruction that it be voted on by full members of the TC. ISO will inform FIG of the result. FIG will then be required to appoint a named lead contact for the TC. This individual will have the authority, on behalf of FIG, to participate in plenary meetings of the TC and in Working Groups. In many cases, the lead contact will wish to work with a number of FIG Experts to the various activities; s/he can also nominate a representative to attend plenary meetings as necessary. A short report of activity is normally expected from Liaisons in advance of each plenary meeting. The TC will also appoint a lead contact from the TC back to the Liaison organisation. All TCs will periodically review the activeness (or otherwise) of Liaisons and will request the ISO Central Secretariat to delete those Liaisons who have been inactive.

Some TCs have developed additional frameworks for working with key Liaisons – the Open Geospatial Consortium (OGC), for instance, has signed a Co-operative Agreement with ISO TC211. For most of FIG's purposes, Liaison status provides all that is required, but other frameworks should be considered by the lead contact where necessary.

C3.2 FIG Experts

Experts are the central component in developing standards (further information on their role and responsibilities can be found in Annex A3). Much of the contact between Experts will be informal, based on the working relationships developed and attendance at international conferences etc.

It is vital that Experts know what is expected of them when they are appointed. The following is an outline of the expectations, which should be tailored as necessary and communicated by the lead contact when seeking Experts:

- To have expert knowledge in the field of work;
- To be willing to attend the relevant Working Group and editing committee meetings [insert an expectation of how many meetings are likely, and the likely locations and time period], funded by FIG if necessary [in setting the level of funding, FIG will wish to take into account other sources of funding available to the individual for the activity];

- To consult with the FIG Office and relevant FIG officers (in particular the relevant Commissions(s)) regularly and fully throughout the process of developing the standard, both to receive input from others, and also to ensure that the work of the Commission(s) continues in full knowledge of relevant standardisation activity; and
- To report [annually] to the lead contact on activity.

It is also vital that each lead contact to a TC remains active, attending plenary meetings, maintaining email contact with key players in the TC, and keeping FIG officers and Commissions informed of TC progress or issues. All lead contacts should therefore report annually to the General Assembly of FIG, with this reporting being coordinated by the FIG Standards Network.

The FIG Standards Network has 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.

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 – see Annex A3 for the detailed organisation of the standardisation process – declines as the drafting process progresses). This points to the requirement for the lead contact to maintain knowledge of possible Experts, and their field of expertise, and the need to maintain the currency of this knowledge. The relevant Commissions have an important role in encouraging individuals to become involved. 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 – the lead contact will need to remain aware of this possibility and take appropriate action, in consultation with the relevant Commission officers and delegates and heads of Member Association delegations to FIG.

C4. How the IVSC works and how FIG can influence its work programme

The membership of the IVSC comprises national valuation associations which represent their respective countries (for participation, a country must be recognised by the UN).

Management of IVSC's affairs is by a Management Board which is composed of a representative of each full IVSC member and of elected Board members. The IVSC as a whole meets at least once a year to ratify exposure drafts of valuation standards and related publications submitted by the Management Board, to receive the annual report of the Management Board, and to receive and ratify the financial statements relating to the IVSC.

IVSC's Secretariat is based at its International Bureau in London, while its operational headquarters are generally located at the offices of the IVSC Chairman.

International Valuation Standards were first published in 1985 and have since been amended on a number of occasions. The Management Board '*continuously engages in the consideration of new and revised Standards, and in Guidance where appropriate*'. The

Board actively solicits comments, questions and suggestions for future editions. The IVS (the 'white book') complements the related regional and national standards, although in this field we again see a growing importance of international standards to shape the detailed provisions of national standards, with the future relative importance of regional standards not being fully clear.

FIG, through the Commission 9 representative to the Standards Network, has developed a good working relationship with the IVSC Secretariat; however, the *modus operandi* of the IVSC is currently under review and although it is likely that there will the opportunity for FIG to become more involved with IVSC standard setting in the future, it will depend upon exactly how any restructuring evolves.

C5. How FIG member associations can influence the activity of national standardisation bodies

As explained in section C1.2, national standardisation bodies are generally partly funded by government. A good deal of their activity will be taken up with appointing Experts to international standardisation activities and reviewing developing international standards. Individual FIG members may be involved in this work, and it is indeed important for FIG's influence that it inputs at both national and international level.

This 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 often 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 a 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. The nature of this interchange will vary between situations, but the delegate should certainly provide information on the size of FIG's membership, the breadth of its work, and its links with key international bodies like the UN, the WTO and ISO in particular. S/he should include information on FIG activity in ISO TCs. A repository of such information, maintained so as to be current, needs to be easily available to FIG delegates; it will be maintained on the FIG web site, with the FIG Standards Network being responsible for its maintenance.

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. As mentioned in section C3.2, it will be important to recognise any potential conflicts between FIG and national positions, and to take full account of these when determining whether doubling up is appropriate.

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;

- National delegates to FIG's 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 FIG Standards Network 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 the responsibility of the FIG Standards Network.

C6. How FIG can propose new work areas for international standardisation

This section of the Guide concentrates on ISO, given the relative complexity of ISO's operations and procedures; submitting suggestions to IVSC is a considerably more straightforward process.

Section C1.1 has explained how 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 ISO 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 its TC211) in the area covered by FIG Commission 3. FIG Commission 4 has a particular link with the IHB, the secretariat of the IHO, which sets international standards on hydrography and nautical charting. Commissions 1 and 2 have a more general interest in professional standards (ISO 9000, for instance), where FIG's influence is likely to be very limited.

Some of FIG's other Commissions, however, are less well covered by ISO activity. As explained by sections C1.3 and C4, Commission 9 will have more interest in the work of IVSC, but Commissions 7, 8 and 10 may well be working in areas where there are not international standards, and where the Commissions believe that there should be.

ISO is open to the submission of documents by Liaison bodies (see Annex A4 for further information on ISO and Liaison status) for progressing to become international standards, as it recognises that the General Agreements on Tariffs and Trade (GATT) and on Trade in Services (GATS) require standardisation in other areas. 'Fast-tracking' is one particular formal process of taking a document developed by others and introducing it partway through the normal process of creating an ISO standard, thus reducing the time taken by the creation process. More usually, informal contact with relevant ISO Technical Committees (or, in the absence of a relevant TC, with Central Secretariat staff) will indicate the most effective means by which to introduce material. Such introduction will normally at some stage require the formal submission of a New Work Item Proposal (NWIP) by FIG or another proposer; this stage (explained further in Annex A3) will require the identification of a suitable person to lead the project to create the international standard.

Formatting the document to fit the requirements of ISO (as set out in its Directives – see the ISO web site for details) is not mandatory at submission stage, but reformatting will then be required during the standardisation process. A lesson of FIG's work to date on submitting material has been that documents created by FIG's Commissions and Permanent Institutions need to take into account the requirements of ISO at an early stage of their development, rather than attempting rewriting/ reformatting at a late stage.

D. Summary of roles within FIG

This Guide has outlined the working of standardisation bodies, and what FIG needs to do to influence standardisation activities effectively. This section summarises the responsibilities of particular FIG bodies and office holders.

D1. Council

- Ensuring that Commission, Task Force and Permanent Institution activity is coordinated with standardisation activity within FIG and beyond – this is of particular relevance as workplans are compiled
- Determining the level of annual funding for standardisation activities and the relative priorities of the different strands of activity
- Maintaining a profile within FIG for standardisation activity
- Ensuring that standardisation activity is covered as appropriate in MOUs and other links with other NGOs
- Advising the General Assembly of how standardisation activities within FIG should best be coordinated on an ongoing basis

D2. Standards Network

- Building and maintaining relations with the secretariats of standardisation bodies
- Proposing priorities on FIG's standardisation activities, including advising the Council on priorities for spending
- Setting up necessary Liaison relationships with standardisation bodies
- Ensuring that lead contacts to Technical Committees etc are in place
- Maintaining an information flow on standardisation to FIG members, including through the FIG website, and more directly to relevant Commission Officers
- Maintaining this Guide, and related material on the FIG website
- Working with other NGOs, within the framework of the MOUs signed by the Council
- Advising FIG's officers and members on standardisation activities as necessary

D3. Commission and Permanent Institution (PI) officers

- Ensuring that Commission/ PI workplans are appropriately linked with standardisation activities
- Publicising and explaining relevant standardisation work in newsletters etc
- Preparing advisory and explanatory material on published standards within their field of specialisation
- Maintaining knowledge of possible Experts to Technical Committees of standardisation bodies
- Discussing possible Commission/ PI work and outputs with the Standards Network before proceeding
- Providing a named individual as a member of the Standards Network

D4. Commission/PI members to the Standards Network

- Reporting regularly, in both directions, on the work of the Commission/PI and Network to ensure appropriate coordination
- Ensuring that Commission/PI work takes due account of standardisation activities
- Ensuring that the Commission/PI is represented at meetings of the Network

- Ensuring that standardisation work is reported on in Commission newsletters etc.

D5. Heads of Member Association delegations to FIG

- Reporting back to Member Associations on relevant standardisation activity
- Ensuring that the Member Association makes the necessary links with relevant national standardisation activities (including the national delegations to international standardisation activities) and describes FIG and its work to them
- Reporting on national standardisation activity to FIG's Commissions and the Standards Network, and seeking necessary FIG support in influencing that activity
- Sharing explanatory material created by the Member Association, with FIG
- Alerting FIG as to the level of knowledge amongst individual members of standards and standardisation activity, and advising on what informative and explanatory material is required

D6. National delegates to Commissions

- Maintaining contact with relevant individuals in their country who are involved with national and international standardisation activities
- Seeking out possible FIG Experts to standardisation activities (using, where possible, individuals who are already involved in the processes)

D7. FIG lead contacts to Technical Committees of standardisation bodies

- Submitting Liaison reports to the Technical Committee as required
- Submitting FIG material to the Committee for progressing as appropriate, under the guidance of the Standards Network
- Laying down Terms of Reference for FIG Experts to the Committee, finding relevant Experts, and managing their activity
- Ensuring that relevant FIG officers are kept informed of Committee progress, to allow dovetailing of activities
- Reporting as necessary to the General Assembly, via the Chair of the Standards Network, at least once a year

E. Further sources of information

A wide variety of further information with regard to standards is available, with the World Wide Web the key repository. This section generally confines itself to pointing to other web sites, recognising the speed with which information can change.

E1. International standardisation bodies

ISO has a comprehensive web site at www.iso.org. The site includes:

- A listing of all Technical Committees with their scope, working groups and national membership
- A listing of all national standardisation bodies (with direct links to their web sites)
- A large amount of material on the ISO 9000 and 14000 series of standards
- Further details of Technical Committees, including their business plans, via the 'members' part of the site (part of which is password protected)

ISO's postal address can be found on the letters at Appendix A to this Guide.

IEC's web site is at www.iec.ch

IVSC's web site is at www.ivsc.org. The site contains a range of relevant information on organisation, officers and publications. IVSC's postal address is 12 Great George Street, London SW1P 3AD, UK.

The ***IMO's*** web site is at www.imo.org

IHO's web site is at www.iho.shom.fr; the postal address of the IHB is 4 Quai Antoine 1er BP445, MC98011 Monaco Cedex, Principality of Monaco. The website includes the S57 transfer standard.

E2. Regional standardisation bodies

CEN's web site is at www.cenorm.be

PASC's web site is at www.pascnet.org. It contains a range of information on the organisation and its member bodies.

OSCRE's web site is at www.oscre.org

PISCES's web site is at www.pisces.co.uk

TEGoVA's web site is at www.tegova.org

NATO's web site is at www.nato.int. There is limited information on STANAGs. The Digital Geographic Information Working Group (DGIWG) can be found separately at www.digest.org, along with full information on the DIGEST standard.

E3. Other international bodies

All of the organisations listed in Section C1.7 have web sites, with addresses as follows:

- OECD: www.oecd.org
- EuroGeographics: www.eurogeographics.org
- OGC: www.opengeospatial.org
- ICEC: www.icoste.org
- IAG: www.iag-aig.org
- ICA: www.icaci.org
- ISPRS: www.isprs.org
- WTO: www.wto.org

E4. Key ISO TCs and standards

ISO TC211 (Geographic Information/ Geomatics) has a comprehensive web site at www.isotc211.org. The site includes the current version of the TC's work plan, encompassing a list of all proposed standards and their current state of development, as well as a Fact Sheet on each standard and a range of presentations on its current work. The TC211 Outreach Group also produces regular newsletters which can be accessed via the site. The scope of the TC is stated as *'standardisation in the field of digital geographic information'* with the aim of *'establishing a structured set of standards for information concerning objects or phenomena that are directly or indirectly associated with a location relative to the earth.'* The stated objectives of the TC are to:

- Increase the understanding and usage of geographic information;
- Increase the availability, access, integration and sharing of geographic information;
- Promote the efficient, effective and economic use of digital geographic information and associated hardware and software systems; and
- Contribute to a unified approach to addressing global ecological and humanitarian problems.

A related site, www.isotc211fgdp.info, run by the TC211 Focus Group on Data Producers (FGDP), contains a range of information, frequently-asked questions etc regarding the TC211 standards and their implementation.

ISO TC172 SC6 (Geodetic and surveying instruments) does not have currently have an independent web site but some information on the committee can be found at the main ISO site. The scope of the SC is stated as *'standardisation of terminology, requirements and test methods for geodetic and surveying instruments, their components and accessories'*. The SC is currently working on a series of standards numbered 17123, with sub-parts dealing with types of instruments (levels, theodolites, EDM, GPS etc).

Annex A: How ISO Works

This Guide has set out the central importance of ISO in standardisation activity. This Annex provides important background information and a guide to the terminology used, so that FIG officers and members can have confidence in their approaches to ISO. The bulk of the material in this section is drawn from the ISO Directives, which are available from ISO's web site (www.iso.org), and are presented here in a condensed and (hopefully) digestible form for a lay reader.

1. Technical Management Board

ISO is governed by a General Assembly of its member associations. This is supported by a Central Secretariat of about 150 permanent staff based in Geneva. The management of ISO's technical work is the responsibility of its Technical Management Board (TMB). The terms of reference and remit of the TMB include:

- Establishing Technical Committees and appointing their chairs and secretariats;
- Approving the scope and programmes of work of the Technical Committees;
- Ratifying the establishment of sub-committees by Technical Committees;
- Coordinating the overall technical programme, looking across Technical Committees;
- Monitoring the progress of technical work; and
- Reviewing the need for work in new fields.

2. Technical Committees

The engine house of ISO is its 190 Technical Committees. These are created, overseen and (where and when necessary) disbanded by the TMB. The TMB decides which country (national standardisation body) will supply the secretariat of each TC, and the secretariat nominates a Chairman who is appointed by the TMB. The TC's scoping statement, a key document which defines (and, by implication, limits) its field of interest, is approved by the TMB.

The members of each TC are the national standardisation bodies. For each TC, each national body will choose whether it wishes to be a voting (P) member, an observer (O), or not to participate. This will be a balance between the costs of being a member (in terms of the time and costs of being involved in the work) and the benefits in being involved as the documents are created.

3. The process of creating a standard

Working within its scope and under the overall management of the TMB, each Technical Committee will determine a work programme for the production (or revision) of the required standards and will set up Working Groups and Sub-Committees as necessary. This programme is communicated to the TMB and certain time limits exist (in particular, three years for completion of various stages of the work) which can only be over-ridden with the agreement of the TMB. These timescales are being progressively tightened to ensure the timeliness of the standards delivered.

New items of work are added to the programme for a TC (subject to its scope) through a vote by P-members on a New Work Item Proposal (NWIP). Success in such a vote requires both a majority of votes being in favour, and at least 5 P-members being willing to provide an Expert (a term used by ISO to signify individuals appointed by national standardisation bodies to create the content of an international standard) to be involved in the process.

The process of developing or revising standards moves through the following stages:

- Acceptance of the project as a work item by the TC;
- The creation of a Committee Draft (for consideration by the members of the TC) by Experts in the field under the leadership of a Project Leader appointed by the TC (this may require moving through a number of Working Drafts developed and reviewed by the Experts);
- The commenting and voting on this Committee Draft by the P members of the TC (again, this stage may take several drafts, until consensus – general agreement – is reached; the group of Experts will act as an Editing Committee to resolve the comments received);
- The formal voting and commenting ('enquiry') by all national member bodies within ISO on the Draft International Standard (DIS) which results from the TC review of the Committee Draft – at this stage, two thirds of votes must be positive and no more than one quarter negative. Comments may accompany the votes, and the Chairman of the TC is responsible for attempting to reconcile as many of the comments as possible[1];
- The formal approval of the Final Draft International Standard (FDIS) resulting from the 'enquiry' stage by all national bodies within ISO; the approval criteria are as in the vote on the DIS;
- The publication of the document as an International Standard (after correcting any textual errors found in the FDIS stage).

A key element in this process is the requirement for consensus to be reached before the document can move to each successive stage – this ensures wide agreement on the content but generally increases the time required for a document to progress through to a published standard. This lapse time leaves open the possibility that key players will have created their own *de facto* standards before the official standard is published. The use of fast-tracking of documents (see also Section C6) created by other organisations significantly shortens the development process, as such documents enter at the DIS stage. Another option open to the TC to produce documents in a timely manner is to use one of the other forms of document described in Section 5 of this Annex.

To assist in the process of developing and finalising International Standards, Working Groups of Experts will meet as necessary (but will conduct much of their business by email); and TCs will normally meet in Plenary Session (for formal business) periodically (often every 6 months during active development of material). All members of the TC are entitled to attend Plenary Meetings.

[1] If the DIS vote is 100% in favour, the document moves directly to IS, once the comments raised in the DIS vote have been resolved

4. Liaison bodies

To ensure the usability and acceptability of published standards, international bodies can be involved in the work of the TCs in addition to national standardisation bodies. These other bodies can gain Liaison status to TCs. Before this can be achieved, they must be registered with the ISO Central Secretariat; approximately 580 such bodies (including FIG) are currently registered. Any organisation on the list can then apply for Liaison status to a particular TC, with the P-members of the TC voting on the proposal and a majority of votes in favour being sufficient for approval of Liaison status. Organisations can apply for Category A Liaison (full involvement) or Category B (wish to be kept informed by being sent copies of reports etc). A sample letter for such an application can be found at Appendix A. Once approved as a Class A Liaison to a TC, the organisation has the full rights of any other member to participate in working groups and other TC meetings, and to comment on documents, but not to vote.

As you might expect, the really key players in the development of a standard are those Experts drafting and editing the document – it is here that most of the document text is created, defended and changed. Liaison bodies who are able to provide Experts who have the time and resources to be involved in the meetings can therefore have a profound impact on the development of standards. Those Liaisons who do not take an active interest and involvement in the work will have little impact on the process. This is a far more important factor than Liaison bodies not having votes.

5. Other publications

ISO has recognised the need to balance the time required to achieve consensus and develop a full ISO standard with the speed at which technology develops. In doing so, it has had to take account of the number of international documents which were becoming *de facto* standards. ISO therefore decided in the late 1990s to develop streamlined procedures which can be used at the discretion of Technical Committees (within certain procedural constraints) when speed of standardisation is a paramount consideration. The outputs are as follows:

- ISO Publicly Available Specification (PAS) – in essence the first Committee Draft stage described in Section 3 of this Annex. A PAS will not have proceeded through the TC stages of harmonising the Committee Draft, but will represent the consensus of the group of Experts;
- ISO Technical Specification (TS) – in essence the Draft International Standard described in Section 3 of this Annex, before the 'enquiry' stage when it is reviewed and voted on by all ISO national member bodies; and
- International Workshop Agreements (IWAs) which contain the result of discussions of participating parties in an open workshop environment.

PAS, TS and IWA documents must be reviewed by the TC every three years and, at the second such review, must either be withdrawn or revised to become full ISO international standards. These arrangements allow early publication of ISO material to meet market requirements, and also allow wide comment prior to the creation of a full international standard (something which may be particularly relevant in an immature market).

In other cases, the TC may feel that research and investigation, which should be published, is required before even a PAS can be created and published. In such instances, the TC needs to gain agreement from ISO's TMB for such activity, and the publication will be an ISO Technical Report which is purely informative. The detailed procedures for completing and approving Technical Reports vary slightly from standards, but the principle of consensus continues to apply.

Note that, until the late 1990s, there were three types of ISO technical reports. The previous types 1 and 2 no longer apply – they have been subsumed by PAS and TS. The old Type 3 report is the sole category of Technical Report remaining.

6. Reviews

ISO is becoming increasingly aware of the large number of standards in print, and that there have not been particularly stringent checks on the currency or degree of use of the documents. All standards are therefore required to be reviewed by the relevant TC every 5 years and a vote taken as to whether the standard should be confirmed, revised or withdrawn. If a standard is in use in a very limited number of countries, ISO can take the decision that its revision as an International Standard is not a priority activity. ISO is currently attempting to make a stronger linkage between positive votes for the approval of a standard by a national body, and the national body promoting the use of the standard.

Appendices

A – Sample letter applying for Liaison status

July 1999

Dr Lawrence Eicher
Secretary General, ISO
1 Rue de Varembe
CH-1211 Geneve 20
SWITZERLAND

Dear Dr Eicher

FIG Liaisons to ISO TCs

I write to request Class A liaison status for FIG to ISO TC172 SC6.

FIG (the International Federation of Surveyors) is a federation of national survey associations, currently consisting of nearly 80 full member associations from approximately 60 countries; additional countries are represented by observer and correspondent members, meaning that over 100 countries are represented altogether. Between them, the member associations represent 230,000 surveyors around the world. I attach a general information leaflet about FIG, explaining our constitution and so on. I also attach a copy of our last annual review which gives an overview of the wide range of work in which we are currently involved.

In its work, FIG has close contacts with many other international NGOs, and is for instance working at present on building further our links with UN bodies. Another task force, which I chair, has been coordinating our efforts in the area of standards (including but not limited to those of ISO), and we are active liaison members of ISO TC211. We also hold liaison status to TC59 SC4; in this and TC172 SC6, we have been actively represented for some years by Professor Jean-Marie Becker in his guise as a delegate from Sweden. I hope that this provides you with sufficient information to process our application for liaison status to TC172 SC6.

Many thanks for your assistance in this matter; I look forward to hearing further news of our application.

Yours sincerely

Iain Greenway
Chair, FIG Task Force on Standards