The ABC of *x,y,z* - 21 Principles for Consideration by Surveyors and Other Geospatial Professionals

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Key words: principle, tenet, principle-based-practice, story-telling

SUMMARY

The authors consider the nature of underlying truths that may apply to surveyors and all spatial scientists, regardless of their field of endeavor or employment circumstances. Drawing on and expanding previous work, a set of practice principles is proposed in three themes: **A**pplication (of the sciences), **B**ehaviour (conduct) and **C**ontext (business or research environment). The authors have taken the work forward to the professions,particularly young professionals, with encouraging results. Methods of sharing and propagating the work are discussed. In light of these experiences, it would be appropriate to rename 'Principles' as 'Questions' as questions invariably lead participants from the abstract to the tangible by way of story-telling. Story-telling, the most ancient form of communicating, sharing knowledge and understanding, has its place in modern professional development.

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1. INTRODUCTION

In previous work (Byrne and Kelly 2005) the scope, identity and composition of the Spatial Sciences was examined. The primary theme of that paper was that the various branches of surveying and the spatial sciences are bound by a common set of principles. A set of proposed principles was published as 'The ABC of x,y,z'.

The authors were encouraged by the reception given to their work, particularly from young professionals. The experiences gained from workshops and other presentations since the original work have provided useful insights in to how the concept of principle-based-practice might be encouraged in future.

The aim of this paper is to share the original work and recent experiences in Australia with an international audience, recognising that any take up-or adaptation will require modification to reflect national, institutional or cultural differences from those from in which the work was born.

2. THE 'WHO', 'HOW' and 'WHY'

2.1 The 'Who'

This work has been focused on practitioners of the 'spatial sciences' – those who undertake the first nine functions of the eleven defined by FIG as being those of a surveyor. (FIG 2004) The Spatial Sciences are performed, managed and taught by large and small local, national and international corporations, government agencies at all levels, individuals and partnerships; and by teaching and research institutions. The work is done by qualified scientists, administrators, teachers, researchers, technicians and, in some circumstances, people with low-level skills and education.

The roots of modern surveying and spatial sciences lies in the great explorations , navigations and mapping expeditions of the 18th and 19th centuries. When we consider how the basic principles of the spatial sciences may have been shared and passed on in previous times, it is not too outrageous to suggest that it happened around the campfire, in the mess or at the office, or in the course of the work which was more likely done less frenetically and with less distraction than today.

2.2 The 'How'

The changes in surveying and the spatial sciences are most easily demonstrable through the changes in the technologies. The technology shifts have brought with them the separate IT strand of the spatial sciences – Geoinformatics and GIS. The result of these developments has been in higher quality and faster delivery. Spatial information has never been more affordable. More is being made, sold, and used.

Two shifts in the technology continuum are particularly pertinent to this discussion. The first is in the tools becoming less transparent, less tactile, as analogue has given way to digital. Modern professionals or technicians rely on equipment that contain algorithms and sensors to which they have no direct access. The second shift is in many of the tools being available to others without the foundation in the sciences. GPS is an example of an 'everyman's' tool.

In the space of one professional lifetime, education of surveyors and spatial scientists has become almost exclusively the responsibility of universities and technical colleges. Curricula are defined in discrete learning 'units' that can not be practicably connected with any philosophical glue.

2.3 The 'Why'

It is an interesting phenomenon in the spatial sciences that we rarely define ourselves in terms of the 'why'. Definitions are typically by function. FIG (FIG 2004) defines the surveyor by function alone. Hydrographic surveying, for example, is not commonly defined as: providing the information and infrastructure *upon which the safety of ships and mariners depends.* Cadastral surveying is not defined as: providing the framework *which underpins the human settlement process and upon which the financial security of many citizens depends.* When the 'why' is considered, the consequences and costs of our mistakes and shortfalls become apparent.

2.4 Questions Arising From The 'Whom', 'How' and 'Why'

- Given the importance of our work or, more importantly, the potential cost of our failure, what are the fundamentals, the tenets, the principles, that we need to observe to ensure success for ourselves and satisfaction of the needs of others?
- How can principles be passed from the experienced to the less experienced?

3. STANDARDS, SPECIFICATIONS, PROCESSES

To understand the concept of Principle, it is useful to look first at other parameters that are familiar in applications of the Spatial Sciences.

Standards attempt to regulate behaviours and products, defining limits within which behaviours or products will conform. Almost every product can be compared to a standard.

Specifications and Standards are similar. Specifications may be 'process-oriented' or 'outcome-oriented', or a mix of both. Specifications provide a statement of buyers' expectations. Specifications may refer to standards.

Processes define the steps to be taken. They should be designed by people who understand the technologies and the end requirements. Processes are changed as improvements are realised or technologies change. Good processes are based on underlying principles.

4. PRINCIPLES

Technological change persists. The transmission of knowledge has moved from workplace to classroom. Government-financed training has lessened. Employees are less likely to enjoy long term working and learning relationships within corporations. Technologies tend to opacity and frequent change. Competition is unlikely to lessen. These trends put pressure on organisations and individuals as they strive to succeed. They provide more reason than ever to revisit and to consider fundamental Principles.

Principles, tenets or fundamentals? The words are interchangeable. We chose 'Principle' because of its familiarity, disregarding its many other meanings and applications. For the purpose of our work we take 'Principle' to mean:

- *a rule or standard of action or behaviour;*
- *a basic truth, law or assumption; or*
- *a doctrine or tenet.*

4.1 Another View of Principles

As these thoughts emerge, Principles start to be seen as laws we should always consider. Another way of understanding Principles is to imagine being involved in litigation, in the witness box, answering questions from a well prepared barrister:

"We have already established that you are an experienced and respected surveyor. We have also established that my client's reliance on the information you provided has cost him considerably. You have demonstrated that you have followed established processes in your work. So, tell me, what fundamental, what tenet, what principle of your profession and your science did you overlook to bring you to this unhappy place today?"

4.2 The ABC Themes

Principles may be grouped to address the issues of the 'how', 'who' and 'why' in three themes:

Application - the 'how' of the science and technology

Behaviour / Conduct – the 'who', relationships with stakeholders - client, community, employer, colleagues

Context – the 'why', the business 'how', communication with client and user.

A set of proposed principles based in these themes is summarised below and then expanded in the following sections.

Application	**Behaviour** (Spatial Sciences Institute 2003)	**Context**
1 First, consider the whole	**1** 1st responsibility is to the community	**1** Confirm the client and interested others
2 Know the tools	**2** Act well and with honesty	**2** Define the objective
3 Consider contributing errors	**3** Stay within competence	**3** Be aware of external constraints and expectations
4 Record defining parameters	**4** Develop and maintain knowledge and skills	**4** Assess and share the risks
5 Beware the bounds of convention	**5** Act in the interests of client or employer	**5** Define the critical terms
6 Build proof into the process	**6** Inform clients and employers	6 Test processes against project scope
7 Engage the user	**7** Reveal conflict of interest	**7** Attribute contributions by others

5. PRINCIPLES of APPLICATION

The Principles of Application accommodate the laws, theories and rules of the underlying sciences. While the sciences remain unchanged so, too, will the principles, regardless of changes in technology. Principles are proposed:

5.1 First, Consider The Whole

This principle may be stated in other ways: Work From the Whole to the Part, Start With the End in Mind. Considerations of scale, congruence and design demand observance this principle.

'Working from the whole to the part" is a well recognised surveying principle – working within the control system, extrapolating from the longest baseline. Interpolation contains errors, extrapolation grows them. The principle seems self-evident. Yet, it is not always easy to apply. Modern measuring technologies are such that the 'whole' – the control system - may be found deficient. The assembled parts may be more accurate than the 'whole'. This may require the surveyor to consider changing the 'whole' to fit the 'parts', raising questions of other data which are related to the 'whole', and other users who rely on the data. Resolving issues arising from non-congruence of the parts and the whole demands wise professional judgment.

Considering the part-within-the-whole is essential for the maker of any set of spatially related information. Design wisely precedes creation. Without a clear vision of the 'end', the exercise will be compromised.

Remote sensing specialists and GIS developers consider "part' and 'whole' when assessing the scope and scalability requirements of the project or phase. Scalability impacts

infrastructure requirements such as computational intensity, data storage capacity, data administration and network requirements. Professional judgment based on experience will indicate an optimal solution given the client's vision, budget and risk aversion. The practitioner reflects on the part (current project specific requirements) and the whole (parallel complementary or future projects).

5.2 Know The Tools

This principle is more important than ever before. Within half of a lifetime, the tools of our professions have become opaque, automatic, capable of high rates of production. Modern tools are subject to improvement and change on a regular basis. New versions appear. Surprises lurk. Maker's claims require validation. The tools must be capable of delivering the results required.

The imperative to 'know' the tool on which one relies can be understood when imagining the earlier barrister's question. It would be wise for the professional to not rely only on a manufacturer's claim without ascertaining that the tool performs as expected, and is calibrated.

As the tools become more opaque, their workings not so well known, the necessity for empirical methods of testing and calibrating increase.

5.3 Consider and Analyse Contributing Errors

In most applications there will be an expected accuracy of object in space. Errors come from a number of sources. Errors need to be assessed and analysed as part of the design process.

Photogrammetrists assess and propagate the contributing errors of ground control, aerial GPS control, aerial triangulation, camera and capture to design their processes to achieve objective accuracy. Remote sensing scientists consider raw or pre-processed data from various sensors with varying resolutions in analysing land change phenomena. GIS implementers, in integrating data of variable thematic and spatial standards, consider the resultant reliability to be expected by the user of the merged information.

Experienced professionals may do this instinctively. There are traps . The processes and technologies that contribute errors are ever in change. Some new technologies improve accuracy or precision, others worsen them. It is sensible to consider each error separately.

In a competitive, litigious and time - sensitive world, surveyors and spatial scientists will heed this principle to ensure that their process designs are not so robust as to well exceed the target, be price - uncompetitive or delivered late; or, more importantly, that they do not fail to achieve the required accuracy.

5.4 Record the Defining Parameters

Today's spatial data becomes tomorrow's evidence of change. Spatial Reference Systems are amended, corrected and changed. In Australia we are fortunate to have a spatial reference system of the high quality. Yet, lurking in it are residual mistakes and deficiencies. Many other countries are not so fortunate, having reference systems in transition, or even decay. Some countries have crustal movement that defies the notion of a stable reference system. Attributing a spatial data set with only the name of map grid and geodetic datum is inadequate if this principle is to be honoured. Reference to specific monuments and their ordinate values can overcome this deficiency. Hydrographic surveyors' descriptions and recordings of Chart Datum parameters provide a good example for honouring this principle.

Environmental projects of state and national significance are establishing baseline data sets for current and future analyses. Due to the magnitude of these projects, future users working at the local scale need to confirm the integrity of the data for their scale of project, as the surveyor checks the origin of his coordinates. The range of defining parameters - spatial, spectral, temporal - is a reflection of the diversity of the work of surveyors and spatial scientists.

Adherence to this principle is supported by the increasing use of metadata with sets of spatial information. More of our work consists of adding to or building on existing data, making this principle more pertinent as this trend continues.

5.5 Beware The Bounds of Convention

This principle may otherwise be stated: "avoid foisting the unconventional on the client or the user"; or "beware of letting your innovation become another's confusion". It reminds the practitioner to remain aware of convention.

This principle covers almost all parts of the spatial scientist's professional life. It can be applied to records, physical monuments, drawings, maps, reports. It may be better understood by considering some of the conventions we take for granted. This principle gives a reminder that surveyors have clients from many industries and communities, each with its own language, jargon and conventions. A mine surveyor would be ill advised to change the thirty year – established vertical reference datum of a mine to the national datum without good reason and careful consultation.

This principle is probably most important in the field of geo-visualisation or cartography and the employment of symbolisation. Consider a fanciful revision of the symbols for the channel markers on a hydrographic chart! Having said this, strengthened or improved conventions would not evolve without critical review and continual improvement.

5.6 Build Proof Into The Process

Users expect reliability and accuracy. Understanding this, surveyors make provisions to ensure expected levels of reliability and accuracy are achieved.

Proof of achievement comes from the external check. Redundant measurements built in to the process provide confidence in the process and a measure of proof. Repetition does not constitute proof. The external check stands alone because it can reveal failure to detect some hitherto overlooked blunder or systematic fault.

The remote sensing scientist producing land clearing maps for court should incorporate both spatial and attribute redundancy. Surveyors routinely 'close' between control and compare new measurements with adjacent or previous surveys, so providing the external check.
Many organisations now use third party independent checks of mapping. There is no proof without the external check. Consider again the probing, well-briefed, barrister!

5.7 Engage The User

This principle is based on the notion that all of the foregoing is relevant only if the outcome is understood by the user.

Modern methods of creating data move toward virtual reality. High resolution terrestrial and aerial sensors give the potential for virtual 3D worlds. Yet the existing paradigm for geo-visualisation is grounded in the assumption that abstraction is needed for achieving insight (ICACI 2003). There is tension between the data (the truth) and the designer of the information. This is recognised in The Principles of Cartographic Design (Cartographic Society 2002) some of which are drawn on here:-

How is the user engaged? If not by a virtual world, engagement will be enhanced by:

- Hierarchy With Harmony - important things should look important and the most important should look most important
- Simplicity From Sacrifice, Clutter to Clarity – as in music, the spaces are as important as the notes. Clarity, and so engagement, can be achieved by leaving out that which may be left out without compromising the themes to be transmitted, by the use of symbol and generalisation without altering the effective truth.

Fra Mauro, a Renaissance cartographer to the Court of Venice, imagined in 'The Mapmaker's Dream' (Cowan 1997) reflects on the purpose of his craft as a Cartographer: *the craftsman's task is to extract a form from what has been given to him, and to make of it something that appeals to the heart as to the mind.*

Engagement of the user goes beyond spatial information to the language of the user. Scientific jargon, unexplained acronyms and legal terms may baffle. Metadata (5.4) are unlikely to provide engagement with a user other than another professional. Two codes are needed – our technical language for our colleagues and peers, and the common language of the user.

Of all the Application Principles, this one relies most on professional judgment and experience, even intuition, and a sound foundation of knowledge.

6. PRINCIPLES of BEHAVIOUR

Professional societies have Codes of Ethics. Most share a common base of the values of competence, truth and social justice. The following section is drawn from the Code of Ethics of the Australian Spatial Sciences Institute (Spatial Sciences Institute 2003). The separate sections reflect tenets of the code. Ethical dilemmas occur when one tenet of the Code can not be honoured without apparent breach of another. In a professional life, ethical dilemmas will inevitably surface.

6.1 First Responsibility Is To The Community

The welfare and rights of the community come before professional, personal or sectional interests. The community includes employees, colleagues, all other people. The tenet reminds us that the professional needs to be aware of the wider consequences of actions and advice. Sometimes the objectives of a client and community interests may be different, creating a dilemma.

6.2 Act Well and With Honesty

This tenet hardly needs explanation. A professional is not expected to receive payment from more than one source for the same service, unless revealed. Under this tenet, a professional would be expected to not damage the reputation of others, or seek to supplant another already engaged by a client.

6.3 Stay Within Competence

This tenet would seem self-evident. However there are occasions when the assignment requires the professional to try new methods or develop new processes. Principle 7.4 requires informing clients of risk. In a technology-based profession, it is easy to imagine this Principle leading to a dilemma.

6.4 Develop and Maintain Knowledge and Skills

Any professional is expected to stay up-to-date and adequately skilled; and to encourage staff to do the same. Most professional societies have measurable CPD programs intended to keep members informed and competent.

6.5 Act In The Interests of Client or Employer

The professional is expected to take an active interest in the interests of the client or employer. It is only when these interests clash with other principles that dilemmas arise. This

tenet reminds us that every professional, regardless of employment circumstances, has a client. Identification of the client is considered in 7.1. Confidentiality of employer or client information is expected.

6.6 Inform Clients and Employers

The professional not only looks out for the interest of the client or employer, but also informs the client about risks, potential difficulties, matters that may impact on interests - issues of environment, regulation, law or relationship.

6.7 Reveal Conflict of Interest

The professional is careful to reveal any conflict of interest – real or apprehended. Any external relationship which may be seen to compromise the impartiality or objectivity of a professional is best disclosed at the start, or as soon as it becomes evident. A common saying is: ”if conflict of interest is questioned, it probably exists”.

7. PRINCIPLES of CONTEXT

The Principles of Context guide surveyors in their communications and immediate relationships in carrying out their work. The Principles of Context and Conduct will be found to overlap. They may be expected to change as society and relationships between its sectors change. Principles are proposed:-

7.1 Confirm The Client and Interested Others

There is always a client, regardless of one’s employment status. If we consider that the Client is the one to be satisfied by our actions or our product, it will become apparent that identification of the client is not always as simple as may at first appear. The client is not necessarily the one who pays. There may be a multiple client, or common clients. They may have different objectives. There may be other interested parties. Cadastral surveyors are familiar with the need to take into account the rights and needs of adjacent title holders.

So the question “who is the client?’ followed by “are there other interested parties?” will allow this principle to be honoured.

7.2 Define The Objective

As with the preceding principle, this one is seemingly simple, yet deceptively difficult to practice. The Objective may be better termed the ‘Business Objective’. It is the answer to the “why” question. Asking the “why” question is, by itself, a skill that does not arrive without practice. Determining the objective is an essential skill of a practitioner. If the objective is defined and satisfied, other complaints, criticisms and perceived shortfalls will fall away.

It is one thing to define an objective and another to know it has been achieved. Agreeing at the start how the outcome will be judged is wise. If the objective is subjected to a reality check, ambiguity of conformance at the completion of the project will be greatly diminished. It is sensible to document the Objective, the scope, deliverables and timing and have the client sign off before proceeding.

The ability to define the objective with the client is arguably the skill that will best foster sound business relationships.

7.3 Be Aware of External Constraints and Expectations

This principle may fall in to the category of "it goes without saying". We include it nonetheless.

There are branches of the Spatial Sciences community that already work within the constraints of external authorities. Cadastral surveyors work within planning and land registration laws, regulations, guidelines and codes. Engineering surveyors are aware of engineering design standards. Mining surveyors are bound by regulations that are principally safety– related. Hydrographic surveyors understand that their work will be scrutinized by a higher authority and relied on by many. The spatial scientist rarely does work without being in the shadow of some external authority. These shadows can be legal, financial, political, technical or ethical. Some are implied in other parts of this work

In contrast to the work of the various surveying branches mentioned here, a GIS developer, remote sensing scientist or cartographer does not require license or accreditation to operate.

Remote Sensing specialists working on a statewide, baseline vegetation mapping project operate in the shadow of current 'technical best practice' in preprocessing, analysis and accuracy assessment. There are no statutes or guidelines or requirements to lodge this information in connection with land title. (This may change in future when biota rights become more well defined and concern for the environment escalates.)

It is not difficult to imagine a time when the work of spatial scientists other than surveyors will be more regulated, more subject to external constraint. The practitioner would be wise to remain aware of the ever-present external constraint of 'reasonable standards of practice'.

7.4 Assess and Share The Risks

There is always risk of failing to meet technical or time requirements; of finding unknown circumstances in a greenfield site; of atmospheric or physical conditions frustrating the mission. There may be a risk of not being able to find all the underground services. Access to the site may not be granted, or the planning authority may refuse the application.

If the risks are identified at the start there will be less likelihood of dissatisfaction or dispute when the possible becomes reality. There are times in professional life when "I told you so" has to be said, preferably not in those words.

7.5 Define The Critical Terms

This principle might otherwise be called "agree on a common technical language". While others of the contextual fundaments apply equally well to many other disciplines and industries, this one is nearer to being exclusive to the spatial sciences.

There is a word in our lexicon that is particularly problematical - "accuracy". By itself it has little other meaning than 'nearness to the truth'. It has no specific meaning in error discourse. Yet it has been and still is used to define the spatial quality of our work. It might variously be interpreted as Standard Error or RMS, or as 'the error unlikely to be exceeded', or 'tolerance'. A factor of three separates the extremes. Finding and adopting common definitions of error which have less chance of ending in client dissatisfaction have been discussed (Jonas and Byrne 2003).

Until industry expressions of error are standardised, and even well after, this principle remains one to be kept in mind always.

7.6 Test Processes Against Project Scope

Having defined the objectives, the scope and the processes to achieve them; and having shared the excitement of being awarded the contract; the work starts. On projects that last over long periods it is not unusual for objective and scope to be reconsidered and adjusted. If the spatial professional does not consider the chosen processes against the new scope or timeline, there is a possibility of not delivering to specification, on time or to budget. The effects of incremental scope change must be considered and compensated. This principle might be re-named "Beware of Scope Creep".

7.7 Attribute Contributions By Others

Easily overlooked and likely to become more common as data sets are more available and accessible, it is important to attribute the authorship or provenance of all data used. This is not only demonstrates good manners and respect for others, it may avoid embarrassment, or even claims for damages, should data from other sources be found deficient.

8. PRESENTING AND EXTENDING THE WORK

The first public presentation of 'The ABC of x,y,z' (Byrne and Kelly 2005) generated an encouraging level of enthusiasm among younger professionals. (The emergence of 'Young Spatial Professionals' as an energetic and influential part of the surveying and spatial sciences community in Australia is a noteworthy story of its own). Consequently, workshops and presentations were undertaken in four Australian states in the following year.

The first lesson came from the young professionals: make a ‘pocket edition’. Almost immediately one page versions of the work were made. One compiled in question form is appended here.

As presentations and workshops developed, lessons were learned:

- An effective way of presentation is to adopt a Socratic approach in which it is expected that all the wisdom will be found within the group, not the presenter. Depending on the level of experience and maturity of the group, ‘elders’ may be invited to contribute.
- This approach requires the leader to be an enquirer.. Each point of discussion may be commenced with a question such as “what does this mean to you?” This allows the Principles as proposed here to become agenda items.
- The physical environment for these discussions is important. Small rooms with chairs in an arc or circle, with no tables, have proved to be effective. An auditorium, designed to focus attention on the presenter alone, is not suitable, even counter-productive.
- In the majority of sessions held so far, participants have shown an interest in focusing mainly on the behavioural principles – ethics. This has been accommodated by getting the group to consider and resolve ethical dilemmas and using their considerations to evolve a dilemma resolving process.
- Not all participants can be expected to be comfortable with a non-instructive environment. Some have expressed a preference for a mix of tutorial and dialogue. This is a reminder of the challenge for the presenter: to be not authoritative while controlling the process, to be aware of the vulnerability of each participant, to acknowledge the value of the mishap or mistake, to share stories without imposing his or her values.
- In recognition of the likelihood of each participant gaining different benefits from the exercise, and the value of each better understanding the other, participants have completed short journals before leaving. The recorded points and observations made have been assembled and circulated, without disclosure of origin, by the presenter.

From this last point, the value of the work has been confirmed. One of the most common comments has been in relation to every professional, regardless of occupation or station, having a client and the occasional difficulty of identification of the client. For many the Contextual Principles have been identified as being particularly useful. Younger participants have remarked on their better understanding of the complexity of the demands of professional life. Others have found stimulation in coming to terms with the abstract nature of Principles, particularly those of ethics. The authors have been encouraged to hear that versions of the ‘pocket edition’ have appeared on office walls; and that dilemma-resolving processes developed in the workshops have been used in real-life circumstances.

The most memorable line of feedback came in the words: " 'the ABC of x,y,z' will add to my confidence in standing up to my boss".

8. REFLECTION

The principles as have emerged through this work are not clear laws or rules which any person involved in the spatial sciences can be expected to follow. Simple in their framing and written in the abstract, Principles depend on expert knowledge and experience in their application. In other words, the principles lead us to the domain of the professional. They separate the professional from the 'average' practitioner or the layperson.

Being constructed in abstract terms, Principles defy codification. They can have many meanings. The question: "how can Principles be passed from the experienced to the less experienced?" was asked earlier. And having being compiled by just two authors (with the help of their reviewers), the Principles proposed here are not authoritative, yet have not been challenged so far.

Recent experiences of discussing Principles in a collegiate or 'workshop' environment lead us to think that the Principles can be nurtured and carried on by the asking of the simple question of each of the participants: "what does this principle mean to you?" Answers may be initially based in the abstract but will shift to experience – stories which illustrate meaning. The many shared answers allow the sharing of wisdom, embedding Principles in the consciousness of the group members.

"The Ten Canoes" (de Heer 2006), a remarkable film of myth, metaphor and cautionary tale, set in Arnhem Land in Australia's far north, provides a useful analogy. Firstly, the story is not short. Learning occurs during the story as well as its conclusion. Secondly, the sharing of a story raises a wide number of related issues and achieves a range of outcomes depending on the life experiences of the listener. For some, the story refreshes the listeners' lessons of the past; for others, the story provides new insight into aspects of life not fully considered.

Sharing the 21 Principles in the way described here is about as close to the campfire conversation that we can expect to get in the 21st Century. In light of our experiences, it would be appropriate to rename 'Principles' as 'Questions' as questions invariably lead from the abstract to the tangible by way of stories.

Story-telling, the most ancient form of communicating and development of understanding has its place in modern professional development.

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BIOGRAPHICAL NOTES

Peter Byrne commenced surveying in 1960 and stood down from his position of Managing Director of AAM Surveys Pty limited, an Australian surveying and mapping company, in 2001. He represented his profession as President of the Institution of Surveyors Australia and Vice President of the Federation Internationale des Geometres (FIG). While maintaining his interest and involvement in the spatial sciences, he practices as an arbitrator, mediator and conciliator.

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APPENDIX

The ABC of *x,y,z* : 21 Questions
Pocket Edition

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Application

1. **Is The Project Part of a Whole?**
   Is there a 'whole' that needs to be kept, or is the project its own 'whole'? Is the end in mind at the start?
2. **Have I Mastered the Tools?**
   Or are there surprises still in store? Have they been checked and calibrated?
3. **Are The Contributing Errors Known? Understood?**
   Have they been analysed so that the cumulative effect is known?
4. **What Are The Defining Parameters?**
   Have they been passed on to the future user?
4. **Have I Stepped Out From the Bounds of Convention?**
   Is there a surprise lurking for the user?
5. **Can I Prove My Results?**
   Redundancy? External check?
6. **Will They (the Users) Be Engaged?**
   Or will they be confused, or not properly enlightened, or alienated?

Context

1. **Who is the Client? Are There Other Interested Parties?** (Can I define 'client'?)
2. **What Is the Objective?**
   (the answer to "why?")
3. **What Are The External Restraints, Laws, Regulations, Expectations of Others?**
4. **Have The Risks been Assessed? Have They Been Shared With the Client?**
5. **Are The Critical Terms Clear? Agreed?**
   (Particularly the terms by which the work will be assessed or tested. Clarify vocabulary.)
6. **Have I Checked The Processes Against Project Scope?** (at the start and from time to time)
7. **Are There Contributions By Others?**
   (to be honoured and recorded)

Behaviour

1. **Am I Discharging My Responsibility To The Community?**
   (the welfare and rights of the community which come before responsibility to the profession, sectional or private interests or to other members)**;**
2. **Am I Acting Well, With Honesty?**
   (with integrity, dignity and honour to merit the trust of the community and the profession);
3. **Am I Competent To Do This? Do I Need External Assistance or Expertise?**
4. **Am I Doing What I Should to Develop, Stay Relevant and Encourage My Colleagues Likewise?**
5. **Am I Acting In The Interests of Client or Employer?**
   (without compromising any other of these points);
6. **Should I Inform My Client or Employer?**
   (of the economic, social, environmental or legal consequences which may arise in relation to a commission);

7. Is There A Conflict of Interest?
(If the question is asked, or even considered, there usually is, or at least the apprehension of , Cof I!)