

"Fore-Sight"



"Fore-Sight"- Quarterly Newsletter of the Association of Surveyors of P.N.G.

PNG Surveyors Busy With Increased Work Activity & Other Issues

The recent increase in workload enjoyed by a number of surveying organizations indicates a general upturn in work activities. I am sure we all agree that this is a welcome turn of events. As some of the major planned projects come nearer to the development stage, we trust that this trend will continue and that not just surveyors will benefit, but other stakeholders and shareholders in the community at large.

Probably the only down side to this renewed work activity is that there seems to be less time for Association duties (hence this newsletter being originated in July last year and not finalized until now). The Editor does apologize that much of the news in this issue is well out of date.

2004 Survey Congress Well Attended

The 38th PNG Survey Congress held in Lae from the 8th to 10th July (2004) could well mark a turning point for the ASPNG. Over 60 delegates enjoyed a Congress well put together by Luther Sipson and his helpers and were privileged to some first class papers relevant to the topic: "Planning, Surveying, & Administration of Peri-Urban Customary Land in PNG for Economic Development".

The Keynote Address was given by Mr. Benson Nablu and set the stage for a lively Congress. A number of issues were highlighted using the experience of the Morobe Provincial Government with their initiative in developing a policy called the AHI Land Mobilization, launched by the Morobe Governor, the Hon. Luther Wenge, MP, on 15th february 2001. This policy was developed basically with the aim to assist the customary landowners of the Ahi villages to protect and use their land for proper Lae urban development. This not only protects them but allows them to meaningfully participate and benefit from their land. The concept is realized through a Land Trust - run and controlled by the landowners, while the other entity - the Lae Development Corporation, is comprised of other stakeholders such as a National Govt Representative, Lae City LL Govt Council, the local Chamber of Commerce, Dept of Works, etc who are the facilitators of development.

Some of the technical papers presented included :-

"My customary land & Me" (Wampar Landowners)

"Planning & Development Management in PNG: A View from Inner Space and Outer Time Dimension" (Willie Kokoba)

"GPS, Remote Sensing and GIS Technology, Decision Support Tools for Resource Development" (Raymond Bure)

"Lae-Nadzab Urban Development Plan 2002-2014" (Api Gima and Joe Mark)

"Transportation, Deposition and Quantifying of Sediment for Dredging at Lae Main Wharf" (Jones Taugaloidi)

"Construction of PNG's Napanapa Oil Refinery Project" (Masang Bangindo)

"An Agenda of Customary Land Issues in the Next Decade" (Wycliffe Antonio & Smyly Bannerman)

"An Overview of Customary Land Mobilization in Wampar Local Level Government, and Village Based Initiations" (Job Suat & Paul Massech).

The 2004 Survey Congress hosted ASPNG's 43rd Annual General Meeting and was supplemented by an active calendar of social events. Pictures from the Congress inside this issue.

Call for Papers - 2005 PNG Survey Congress - Theme: "Sustainable Land Utilization in PNG for Economic and Social Development and the Role of Surveyors and Allied Professionals".

Papers should wherever possible reflect the theme of the Congress and be relevant to surveying disciplines in Cadastre, GIS/LIS, Remote Sensing, Hydrography, Engineering, GPS, Education, HRD, Economic and Legal aspects relating to land utilization in PNG. A brief summary of your presentation and an abstract of 200 words about your paper should be forward by 30th April to :-

Mr. Poka Vagi, Editor, 39th Survey Congress.
Fax: (675) 327 6219 or via email to vagip@lands.gov.pg or kodawaras@lands.gov.pg

Volume 6, Issue 1
March 2005



RECENT EVENTS:

FIG Regional Conference: For Asia and the Pacific - Jakarta 3rd to 7th October, 2004

12th Australasian Remote Sensing & Photogrammetry Conference, Freemantle, WA, 18 - 22 October, 2004

Asian Conference on Remote Sensing, Cheng Mai, Thailand 3rd - 7th November (www.aars.acrs.org)

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News from ASPNG Council

by Masang Bangindo, Hon. Secretary / Treasurer

Before I begin, I would sincerely apologise to the council and the members of ASPNG for not getting the September and the December issue of the foresight out, part June issue with the 2004 invoices to members. This was mainly due to work commitments, which have kept me away for most of the second half of the year 2004.

Belated Happy New Year to all you members and your friends. This year 2005 brings to us another year of challenges, commitments and responsibilities.

Brief on last years 38th PNG Survey Congress in Lae.

It was a very enjoyable three days with a good number of papers presented and an unexpected turn out of members for the evening social events. We planned for less attendance but more turned up, but we were able to accommodate them. I guess we worry about the numbers attending but now we had to take care of the numbers. There were still plenty of drinks, even towards the end of the last night.

44th Annual General Meeting

The AGM started off with apologies from various members and Minutes of the 43rd Annual General Meeting and Financial Statement were accepted.

New Councillors for July 2004-June 2006, and their position.

Jones Taugaloidi	President Elect
Terence K Kuniaka	Vice President-
Stephen Low	Councillor
(for the next two years)	

The continuing Council Members are :-
Masang Bangindo Hon Sec / Treasurer-
Francis Posinau Councillor.

The ASPNG Council had the 239th Council Meeting held on the 6th of October 2004.

New Membership

The Council at its 239th meeting approved the following membership applications and we are pleased to announce the new members and their membership category. The new member's certificates will be presented during the 2005 39th Survey Congress in Port Moresby.

ASPNG welcomes the following new members :-

Corporate

Win Kuban
Gibson Cohllee
Paul Par Andepa
Micheal Koima Kiage
Cyril Aria Riavi
Maraga Max Gabutu
Lionel John Paisawa
Austin Siemu Sariwa

Associate

Raymond Francis Bure
Wilson Rarage
Joseph Aporo

Student

Albert Avaliso
Hasu Geani
Gibson Fefegao
Jago Tomothy
Reuben M Bingeding
Rodney Ragi
Kavale Bruno
Weikina Olupa Masiuna
Michael Mala
James Mathias
Livingstone Mathew Wauwe
Sinias Wai
Jonah Penias Madodo

Papua New Guinea Surveyors Board

New Registered Surveyor - The Surveyors Board at its 126th meeting of August 30th, 2002 registered Mr Tony Ilave (registration number 251 dated January 6, 2003) as a Surveyor under the Survey Act (Chapter 95).

Department of Surveying and Land Studies

It was an honour for me to talk to the Surveying Students about the Association and encouraged them to become student members of a professional organization such as ours. Students have been left in the dark and have not known that the association existed.

University Prizes to be awarded at the 2005 March Graduation

ASPNG, with its continuous support in encouraging students to achieve academic

excellence in their studies has donated K1, 000.00 to the academic board award of prizes of the PNG University of Technology. This is to be awarded to the (4) best students with the highest overall academic result throughout the various stages of their academic year. Once again, ASPNG is proud to be associated with the Department of Surveying and Land Studies in encouraging students to achieve high academic results.

ASPNG 2005 39th Survey Congress Theme

The theme for our 2005 39th Survey Congress is *"Sustainable Land Utilisation in PNG for Economic And Social Development, The Role of Surveyors and Allied Professions"*. Dates for the Congress will be 6th, 7th, and 8th of July 2005 and the venue will be at the Port Moresby's Holiday Inn.

The Congress Manager's Contact details:

Samuel Kodawara, ASPNG 2005 Congress Manager,
P.O.Box 233, Boroko 111, N.C.D., PNG, Ph: (675) 3013175, Fax: (675) 301 3299, Email: kodawaras@lands.gov.pg.

A "Call for Papers" has been sent out (see front page).

Survey Project Workshop 2005

This workshop is now planned to be held before the Survey Congress. Interested participants should contact the Secretary.

Thank you for your understanding regarding the late publication of this news.

Masang T. Bangindo
Hon. Secretary / Treasurer.

Contact Address
Association of Surveyors of PNG
P.O.Box 1392
BOROKO, N.C.D
Phone: + (675) 325 8322
Fax: + (675) 325 8813
Mobile: 687 6048
Email: aspng@daltron.com.pg or alsurveys@daltron.com.pg

Taim long pilai - 38th ASPNG Survey Congress



After a hard day's work, surveyors just love to party and socialize Above, ASPNG stalwart fellows Steve Low and Michael Larmer share a friendly moment with C.R. Kennedy's Survey Rep Ian Truscott (Ian is now a member of the ASPNG).



Right : The dancers in traditional dress stayed on to enjoy the evening ...



Right : Newly elected "El Presidente" Jones Taugaloidei celebrates his election-with a round of dancing ...



Above : Theodist's Shaun Pini making light of the evening with friends Richard Nawara and Guru Sibona

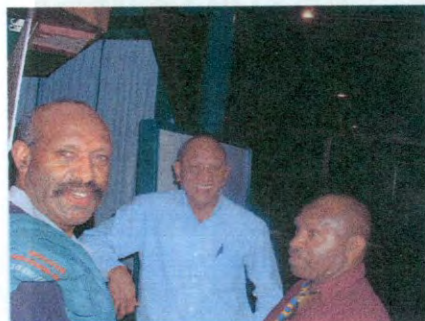


Above : Good buddies John Bavul and friend posing for the camera.





More of the 2004 Congress in Pictures ...



CPD SUPPLEMENT : Guidelines for Transformations between Local and Global Datums

Courtesy of the International Federation of Surveyors (FIG)

Introduction

Positions used for spatial data (latitude & longitude, also expressed as a grid coordinates) are the realisation of a reference surface known as the geodetic datum. The datum usually consists of one or more origin stations and a best fitting model of the earth (an ellipsoid). Positions in terms of the locally adopted datum are propagated through the country, with varying degrees of accuracy, by survey networks. In the past datums were generally based on one or more astronomically determined positions and the best model of the earth for the local area. However, With modern technology, such as the Global Positioning System (GPS), global datums are now readily accessible.

The World Geodetic System 1984 (WGS84) is used by the US Department of Defense for GPS and is suitable for charting and navigation. The International Terrestrial Reference Frame (ITRF) is a based on many GPS, Satellite Laser Ranging (SLR), Very Long Baseline Interferometry (VLBI) stations worldwide and is recommended by the International Association of Geodesy & PCGIAP for regional datums and scientific applications.

The difference between positions in terms of an individual local datum and positions in terms of a global datum may be of the order of several hundred metres, and may vary considerably even for a single local datum. If the local survey network has variable quality or does not have a continuous landmass, a country may effectively have a number of local datums, requiring a number of different transformations to the global datum.

With the increasing exchange of geographic information local and globally, positions need to be available in terms of both a local and global datums. The process of mathematically converting positions from one datum to the other is known as transformation.

Transforming Positions

There are a number of ways to mathematically transform positions from one datum to another, but they all require "common points". Common points are surveyed points that have known positions in terms of both the local and the global datum. The achievable accuracy of

the datum transformation will be determined by the number, distribution and accuracy of these common points and the transformation technique adopted. Generally speaking, the greater the accuracy required, the more common points are needed.

The common points chosen should be a good sample of the true relationship between the local and global datums. If the local survey network was entirely consistent and regular and was merely offset from the global datum, a single common point would be sufficient to determine this block shift. However, this is a highly unlikely scenario and the more irregular the local survey network, the more common points will be required. A good understanding of the local datum and survey framework is required before a datum transformation can be produced.

Obtaining Common Points

Ideally, global datum positions should be determined for the local datum origin points and the local survey network re-computed in terms of the global datum. Different locations could be used for the global positions, provided they were accurately connected to the survey network. After the re-computation, every point in the survey network would be a "common point" and, provided the new positions for the origin points were of suitable quality, would probably also give an improved survey network in terms of the global datum.

A re-computation of the survey network in terms of the global datum assumes that all the original observations are available, but this may not be the case. An alternative strategy would be to obtain sample common points at suitable existing survey network sites. These sites should be chosen to represent the characteristics of the network, so where the survey network is consistent only a few would be required, but where it is inconsistent, many more would be required. Of course any isolated areas (e.g. unconnected islands) would need their own set of common points. These common points are then be used to determine a transformation model for the other points in the survey network and the many derived spatial data sets that depend on the local datum but are not directly connected to the survey network.

It is wise to obtain far more than the mini-

mum number of common points. The redundant points will give a much better idea of the consistency of the survey network and the derived transformation parameters. A number of the redundant common points ("check points") can be reserved from the initial transformation modeling and later can be used as an independent check of the quality of the transformation process, by comparing actual and transformed positions. If the difference between the actual and transformed positions (residuals) is not acceptable, then (i) the derivation of the transformation process can be repeated using a different selection of common points, or (ii) more common points can be obtained, or (iii) a different transformation method can be used.

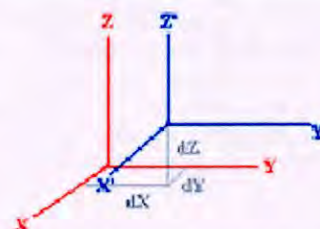
Transformation Methods

There are many ways of modelling the transformation between two datums, but those in commonly use include:

1. Molodenskys
2. 7-Parameter
3. Surface Fitting

1. Molodensky's Formulae

Molodensky's method is commonly used in hand-held GPS receivers and Geographic Information Systems (GIS). The formulae are simple, assuming that the transformation between the local and global datums can be represented by 5 parameters: a shift at the origin (the earth's centre of mass) along the earth-centred Cartesian coordinate axes (ΔX , ΔY , ΔZ); and the difference between the local and global ellipsoids (semi major axis and flattening). The origin shifts can be determined by an averaging of the same differences at each of the common points and the difference in ellipsoids is a simple subtraction of the ellipsoid parameters.



The United States Department of Defense WGS84 Technical report provides Molodensky parameters to transform between

many local datums and WGS84. However, the data on which these parameters are based may be very limited and the parameters may have limited accuracy.

Although it depends on the data used, the best accuracy that could be expected from this method would be perhaps 5 metres.

Molodensky System - Advantages

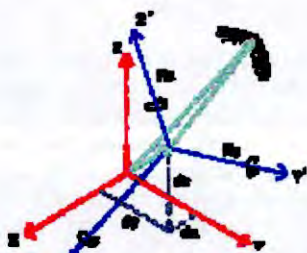
- Simple derivation
- Simple Application
- Available in GIS packages and hand-held GPS

Molodensky System - Disadvantages

- Assumes internally consistent networks
- Limited accuracy
- Derivation requires ellipsoidal heights

2. 7-Parameter Transformation

The 7-parameter method assumes a similarity relationship between the local and global datums. The common points are used in a Least Squares process to solve for 7 parameters which represent the relationship between the two datums: origin shifts at the earth's centre of mass (ΔX , ΔY , ΔZ); rotations about each of the axes (R_x , R_y , R_z); and a scale change between the two systems.



To be able to solve for these seven parameters a minimum of three common points are required, but in fact many more are needed to reliably model the relationship.

Even with many hundreds of common points, the results of a 7-parameter transformation may not be acceptable if the coordinates used are non-homogeneous. In this case, it may be possible to produce separate 7-parameter sets for sub-regions that are more consistent, but even this may not be satisfactory and for consistency, if not for accuracy, it may be necessary to use a more sophisticated method.

Again the accuracy of this method is limited by the data used, but the best that could typically be expected would be a metre or two.

7-Parameter System - Advantages

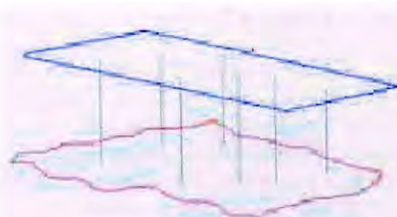
- Improved accuracy
- Used in many GIS packages

7-Parameter System - Disadvantages

- Assumes consistent networks
- Moderately complex derivation & application
- Requires ellipsoidal heights for both local and global positions
- Accuracy limited by network consistency

3. Surface fitting

If neither the Molodensky nor 7-parameter transformation methods are suitable it may be necessary to adopt a method that uses the difference in position at each common point to in effect fit a surface, which can then be used to interpolate the change for other points. This means that there will be a surface for the change in latitude, and another for the change in longitude.



Examples of this type of transformation are the Minimum Curvature method used in the USA (NadCon); the Multiple Regression method used in Canada; and the Collocation method used in Australia.

The Collocation method used in Australia caters for the datum transformation and also distortion in the local survey network, providing improved transformation for derived data sets. Where sufficient quality data has been used, transformation with an accuracy of better than 10 cm has been achieved.

Although initially mathematically complex, the results from this method can be presented to users as a simple file of shifts in terms of latitude & Longitude, on a regular grid, which can be used to interpolate the shifts for any other point. If this grid is provided in a well-accepted format (such as NTv2) the grid file can be immediately used in many GIS packages.

Surface Fitting System - Advantages

- Potentially very accurate
- Simple user applications can be provided
- Easy to integrate into GIS systems

Surface Fitting System - Disadvantages

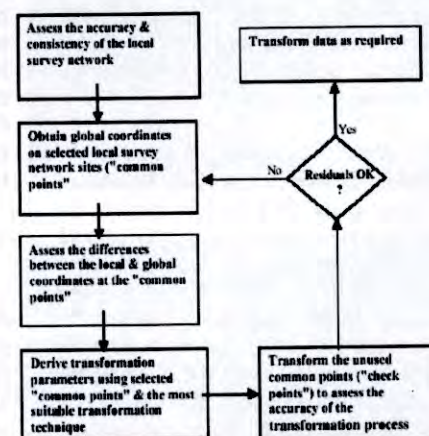
- Very complex to initially derive
- Many common points needed

Summary

The selection of a datum transformation method depends on the accuracy required and the number of common points available. For large consistent networks of a suitable standard, typical accuracies can be:

- Molodensky's formulae: 5 metres
- 7-parameter: 1-2 metres
- Surface fitting/Collocation: 0.1 metre

General Transformation Procedure



"Fore-Sight" acknowledges the information contained in this article was prepared by the International Federation of Surveyors for distribution on their electronic newsletter - Jan / June 2003 edition.



SURVEYORS' CPD QUIZ

The terms *directrix*, *focus*, *axis*, *vertex* and *double ordinate* are used in conjunction with :-

- A. An ellipse
- B. A sphere
- C. A parabola
- D. A circle

Answer "C" was the correct response to the last question.



Letters to the Editor

The Editor, Fore-Sight,
Fax : 0015 675 235 8813
E-mail : alsurvey@daltron.com.pg

Dear Editor,

Request for Publication in Fore Sight

The Australasian Hydrographic Society offers an Education Award each year. We would be most grateful if you could place this information in your publication.

The Australasian Hydrographic Society Annual Education Award

The Australasian Hydrographic Society offers an annual education award of \$2,500.00 AUD.

The award is open to students studying, or proposing to study, within a broad range of maritime surveying and engineering disciplines including, but not necessarily limited to, the following :

- Hydrography – Nautical Charting - Surveying at Sea
- Coastal Studies - Coastal Zone Management
- Offshore Resource Surveys and Management
- Port Development and Maritime Engineering
- Law of the Sea
- Marine Cartography

Closing Date is 10th December 2004

Application Forms are available from The Australasian Hydrographic Society Web Site - www.ahs.asn.au

For further information please contact

Capt. Daniel Fitzhenry
Australasian Hydrographic Society
Chairman - Education Award Panel
Ph : +612 9909 3437
Fax : +612 9953 8203
E-mail : fitzynet@bigpond.net.au

Please contact me at any time if I can be of further assistance.

Thanking You,

Yours sincerely,

Daniel Fitzhenry
Chairman Education Award Panel
Australasian Hydrographic Society
Friday 9th July 2004.

The following is taken from *Tasmanian Spatial News*, the Newsletter of the Spatial Sciences Institute, Tasmanian Region, Issue 3, June 2004 :-

DEFINITION OF A SURVEYOR

At its meeting in Morocco in November 2003, the FIG Council approved a proposal for an updated version of the definition of a "Surveyor". The Council has decided to put this proposal forward for adoption by the FIG General assembly in Athens May 2004.

According to the new proposal, a surveyor is a professional person with the academic qualifications and technical expertise to conduct one, or more, of the following activities :

- To determine, measure, evaluate and represent land, three-dimensional objects, point-fields and trajectories
- To assemble and interpret land, geographically and economically related information
- To use that information for the planning and efficient administration and management of the land, the sea and any structures thereon
- To carry out urban and rural development and land management
- To conduct research into and develop such practices

Reprinted from GIM International, FIG news page, February 2004.

Alan,

This may be of interest to the Editor of Fore-Sight.

I'm recovering from a badly infected ankle that put me on my back for 2 weeks - am still on crutches - hopefully will be fit in a couple of weeks.

Cheers for now,

Bill McKibben,
19/7/2004



NEWS from FIG



ASPNG FIG Coordinator Michael Larmer, has been busy with communications to FIG Director Markku Villikka in Denmark, and in seeking update reports from the various FIG Commission representatives in PNG. The results of these efforts is to try and lift our work rate and have increased interaction with FIG in 2004 - 2005.

Steven Low's FIG Report on Cadastre & Land Management (Commission 7) highlighted the fact that much knowledge and a sizeable amount of information can be gained by spending the right amount of time on the FIG website <http://www.fig.net> - individual ASPNG members are encouraged to contact this web site on a regular basis.

Bob Curley's FIG Report on Spatial Planning & Development (Commission 8) emphasized two main areas of involvement that have particular relevance to the South Pacific region - these being Disaster Mitigation (both man made and natural disasters), and the trend towards Urbanization. FIG have a working group in Commission 8 dealing with both these aspects.

Alan Dunley's FIG Report on Spatial Information Management (Commission 3) stated that this FIG Commission was quite pro-active and apart from regular e-mail contacts received a newsletter on CD every 6 months. The electronic newsletter contains a huge amount of data including technical papers and presentations covering many topics - many of them relevant to Papua New Guinea.

Reports from the representatives for Commissions 2 and 6 were not available at the time of going to press.

In other news, **Raymond Bure** has been appointed the new rep. for **FIG Commission 2** - Professional Education and **Alan Dunley** has taken over the role of **FIG activity co-ordination**.

FIG will be conducting their **3rd Regional Conference** in Jakarta, Indonesia, October 3 to 7, 2004. For those ASPNG members that may be interested in attending, you are urged to visit the conference web site at : <http://www.fig.net/jakarta/>

A representation at this FIG Regional Conference in Jakarta would really 'show the flag' for PNG. **Possibly our Surveyor-General could attend**

"Fore-Sight",
P.O. Box 1271,
Port Moresby, N.C.D.
Papua New Guinea



Phone: (675) 320 - 0231,
Fax: (675) 320 - 1539

Newsletter contributions
can be sent to the Editor
at P.O. Box 1234, Wai-
gani, NCD or via fax to
325 8813 or by e-mail
to :
alsurvey@daltron.com.pg

Members & Other News ...



PNG was well represented at the Athens Olympics by **Ryan Pini**, a son of the well known **surveying** supply firm **family at Theodist**. One of only four PNG athletes to compete at the games (and the only swimmer), Ryan achieved a personal best in one or two of his events and in doing so set new PNG national records. Despite this good performance he was unable to make his way into the medal haul. We look forward to Beijing when PNG might actually score their first Olympic medal.

Surveyor David Sinclair (Qasco Surveys Pty Ltd, Brisbane) enjoys receiving his copy of "Fore-Sight". His comment on an article in the last issue states : *"By the way, I was impressed with your words of philosophy on CEE PEE DEE in the latest ASPNG rag. It rang so true to me, as I have often thought of preparing a paper o that malignant subject, QA, but have been too scared to try. As you say, the topic can easily become booooring, but can also be seen as an important part of your management system, and even fun"*. Thanks for your continuing support David - Ed.

As one of our astute members pointed out, **Dan Fitzhenry** being a **hydrographic surveyor** would naturally have his e-mail address at **"bigpond"**.

Surveyor Bill McKibben has been laid up for a couple of weeks with an infected ankle and is still on crutches. We wish Bill a speedy recovery and look forward to more of his contributions (see *Letters to the Editor* re FIG's updated **"Definition of a Surveyor"**). Bill's still a bit crook (February 2005).

"Light Refreshments ..."

"Unusually heavy rains were experienced late June in Port Moresby" ...



.... 'And the roads suffered accordingly' !!!



Editorial Comment : 'Man Must Measure ...'

I must admit I'm still feeling a bit rueful about missing the Lae Survey Congress, but a shortage of 'the readies', and having a snooker mate 'go pinis' (literally) took its toll. The fact that I had an airline ticket and slept in and missed the flight is entirely another story - *damn alarm clock didn't get home from the disco until the aircraft was taxi-ing !!!* ... But on a brighter note, I've had an opportunity to read the papers presented there, and am somewhat captivated by the content and variety contained therein.

It is interesting to view the range of topics over the years that our Congress themes have addressed ; the way that papers are now presented ; and the way that surveyors are attending to various issues of the day. It would seem that less 'technical' papers are being presented (the papers presented in Lae this year by Jones Taugaloidi and Masang Bangindo were a refreshing exception). The emphasis seems to have subtly shifted to more esoteric issues that surveyors feel the need to address or to at least have some input. To a degree, this reflects the change in the themes we are now seeing that head

our surveying congresses, and perhaps rightly so. The updated FIG definition of a surveyor clearly states that part of a surveyor's *raison d'être* does cover land administration, management and development.

Not all surveyors agree, and I am reminded of a statement made by one of our colleagues : *" ... it seems they are losing touch with land surveying and venturing more and more into land administration"* And while this may be the case, and surveying still is the *science of measurement*, the move towards increasing community involvement and awareness by surveying professionals around the world is definitely gathering momentum.

Perhaps its more difficult for the older generation of surveyors (and I include my self in that category) to come to terms with this changing scenario. It would seem that this is the new challenge for our younger generation of surveyors. Whatever track you wish to follow, I believe there's still a basic philosophy for surveyors of all generations **'Man Must Measure'**.
- Ed.