

Standards and Practices for GNSS CORS
Infrastructure, Networks, Techniques and
Applications

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Presentation Outline


- Drivers for Production of Guidelines
- Tiers of GNSS CORS
- Organisational Model Impacts
- Challenges
- The Guidelines
- Final Remarks



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A Clarification

- This presentation is based on the drafting of a document.
- The document is only in draft format and has not yet been approved by ICSM.
- The final version of the document will be guidelines, not standards.



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Drivers

- ICSM GTSC produce the “*Standards and Practices for Control Surveys*” also known as SP1, which is undergoing revision.
- The latest revision makes significant content and format to the document.
- GTSC recognises that GNSS CORS is playing an increasing role in control surveys, however previous versions of SP1 have not included the topic of GNSS CORS.
- SP1 to be split into a number of documents, an overarching “standards” document, and a series of subsidiary “guideline” documents.
- The GNSS CORS Guidelines are the first subsidiary document to be drafted.

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Tiered GNSS CORS

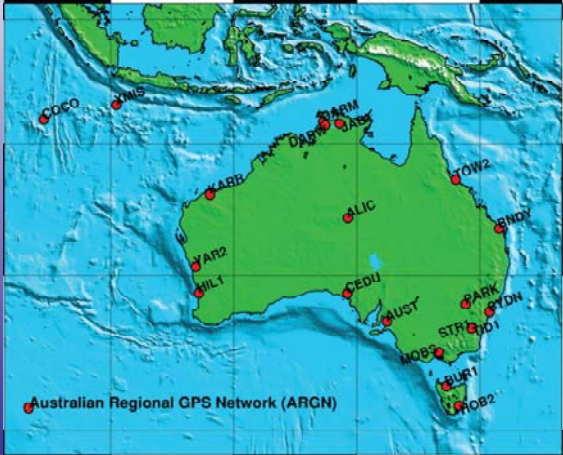
- The GNSS CORS Guidelines use the concept of Tiers of GNSS CORS (Rizos, 2008).
- The Tiers help to breakdown the requirements of a station based on the purpose of the station.
- The guidelines consider the first three Tiers, there are potentially more.
- Tier 3 GNSS CORS network operators are encouraged to install approximately 10% of their stations to Tier 2 standards and contribute the data from these stations to government agencies responsible for geodetic datum.

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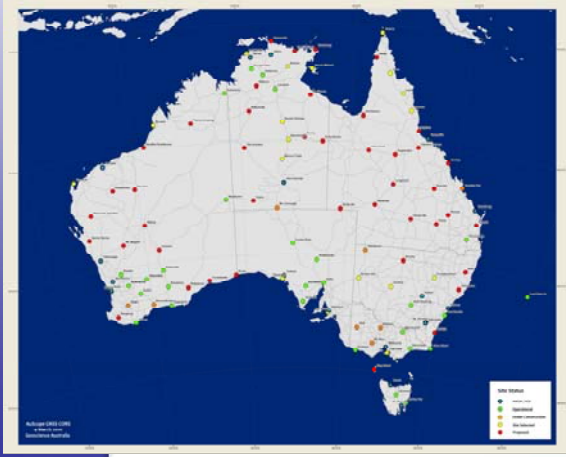
Tier 1

- Tier 1 stations are those that contribute to global geodesy through international cooperation such as IGS.
- The CORS in the Australian Regional Geodetic Network are examples of Tier 1 GNSS CORS.



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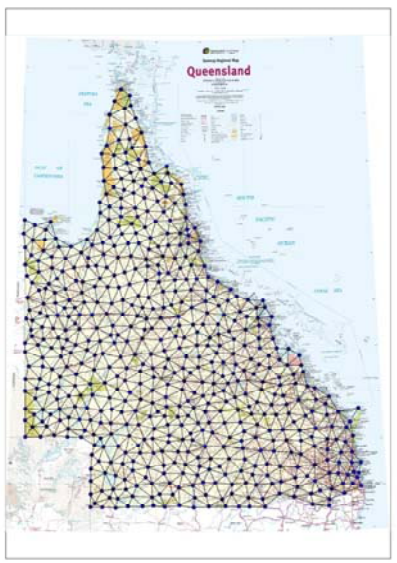


Tier 2

- Tier 2 stations are those that contribute to the primary national network.
- In Australia Tier 2 is currently being populated through the AuScope project.

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Tier 3

- Tier 3 stations include those that contribute to state and territory geodetic objectives and private industry networks.
- In Australia Tier 3 networks are being created by private industry as commercial services, and by state governments as datum realisation.



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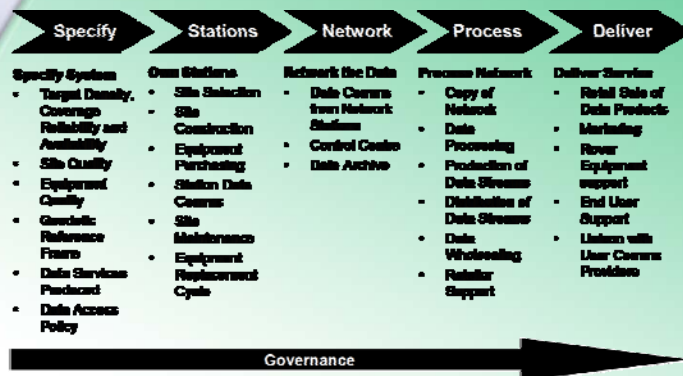
Organisational Model Impacts

- It may not be immediately apparent that an organisational model may impact on the production of guidelines for GNSS CORS.
- As the deployment of GNSS CORS in Australia involves multiple parties, and these parties often have different business needs, it becomes important to ensure that the guidelines allow for as many participants as possible.
- The aim is to minimise the duplication and expense of infrastructure, and maximise the number of potential applications.

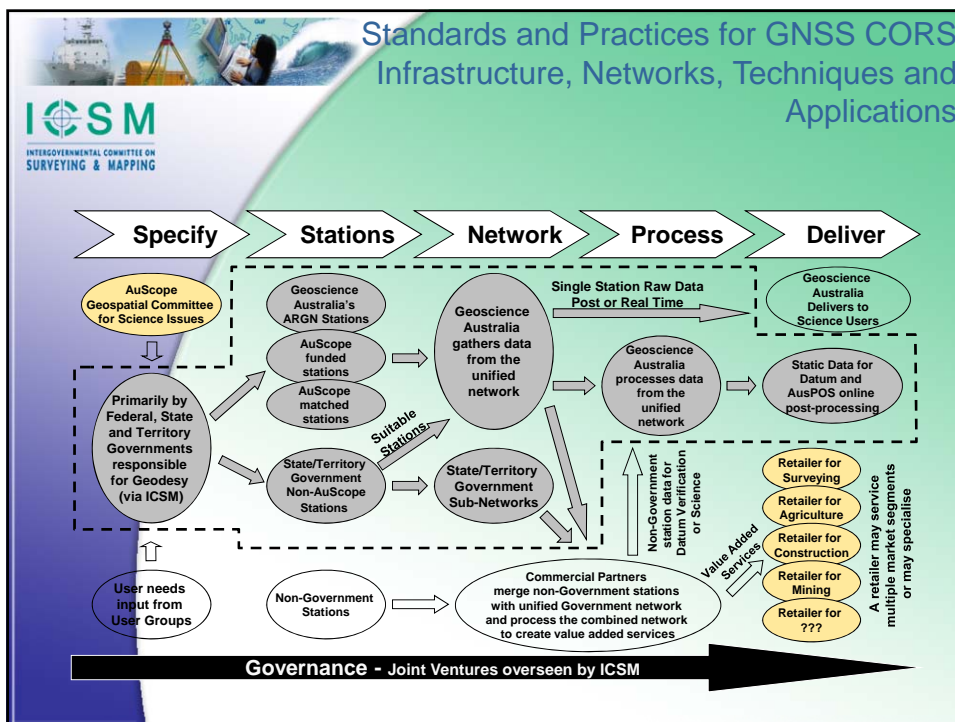
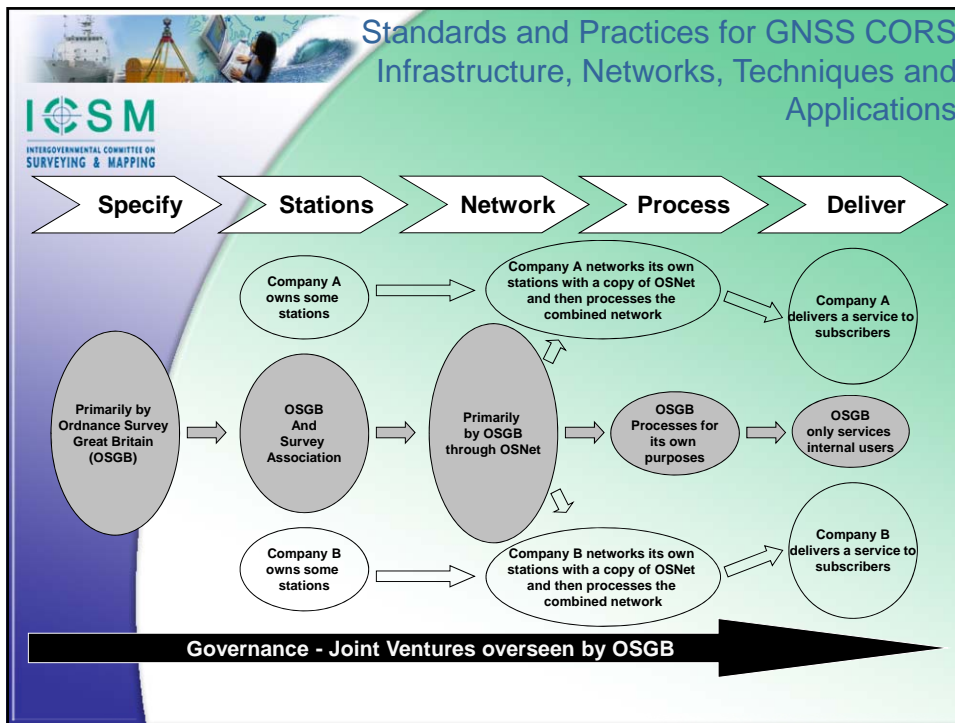



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A Model for Describing Organisational Roles in Precise Positioning Services
(Source: Higgins (2008))






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Challenges

- Existing documents outlining guidelines on GNSS CORS, CORS monuments, or CORS networks.
- Trying to produce guidelines that aid multiple parties in providing GNSS CORS infrastructure cooperatively and for multiple purposes.
- Appreciating that each site is different, though CORS operators need guidance in a general sense.
- Each recommendation has a cost implication on the construction of the site.
- We are setting these guidelines from the perspective of the spatial industry, yet the users of GNSS CORS are often outside of the traditional spatial industry, in construction, mining, agriculture and utilities.
- Ensuring that all systems are interoperable through a common realisation of the datum.
- Keeping the document current.



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The Guidelines

- The GNSS CORS Guidelines are split into two sections.
- The first section deals with **site establishment**.
- The second section deals with **site operation and maintenance**.



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Site Establishment

- Site establishment is further split into two section.
- The first section deals with **site selection**.
- The second section deals with **equipment selection**.



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Site Selection

- Site selection provides guidelines for potential GNSS CORS operators on issues such as:
 - site foundation,
 - sky visibility,
 - multipath issues,
 - site security,
 - radiofrequency interference sources,
 - power and communications issues.



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Equipment Selection

➤ Equipment selection provides guidelines for potential GNSS CORS operators on issues such as:

- Antenna type,
- Signal tracking,
- Power and communication,
- Remote configuration,
- Standard data protocols,
- On board logging,
- Additional sensors.



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Site Operation

- Site Coordination
- Stability Monitoring
- Data formatting
- Data access
- Metadata



Final Remarks

- The GNSS CORS Guidelines are in draft format and are being refined by the ICSM GTSC.
- The Guidelines are planned to be a subsidiary document to a revised SP1.
- It is hoped that the guidelines will enable multiple parties to have an understanding of the quality and capability of GNSS CORS.