

Geospatial and GNSS CORS Infrastructure Forum

Kuala Lumpur, Malaysia 16-17 Oct 2016



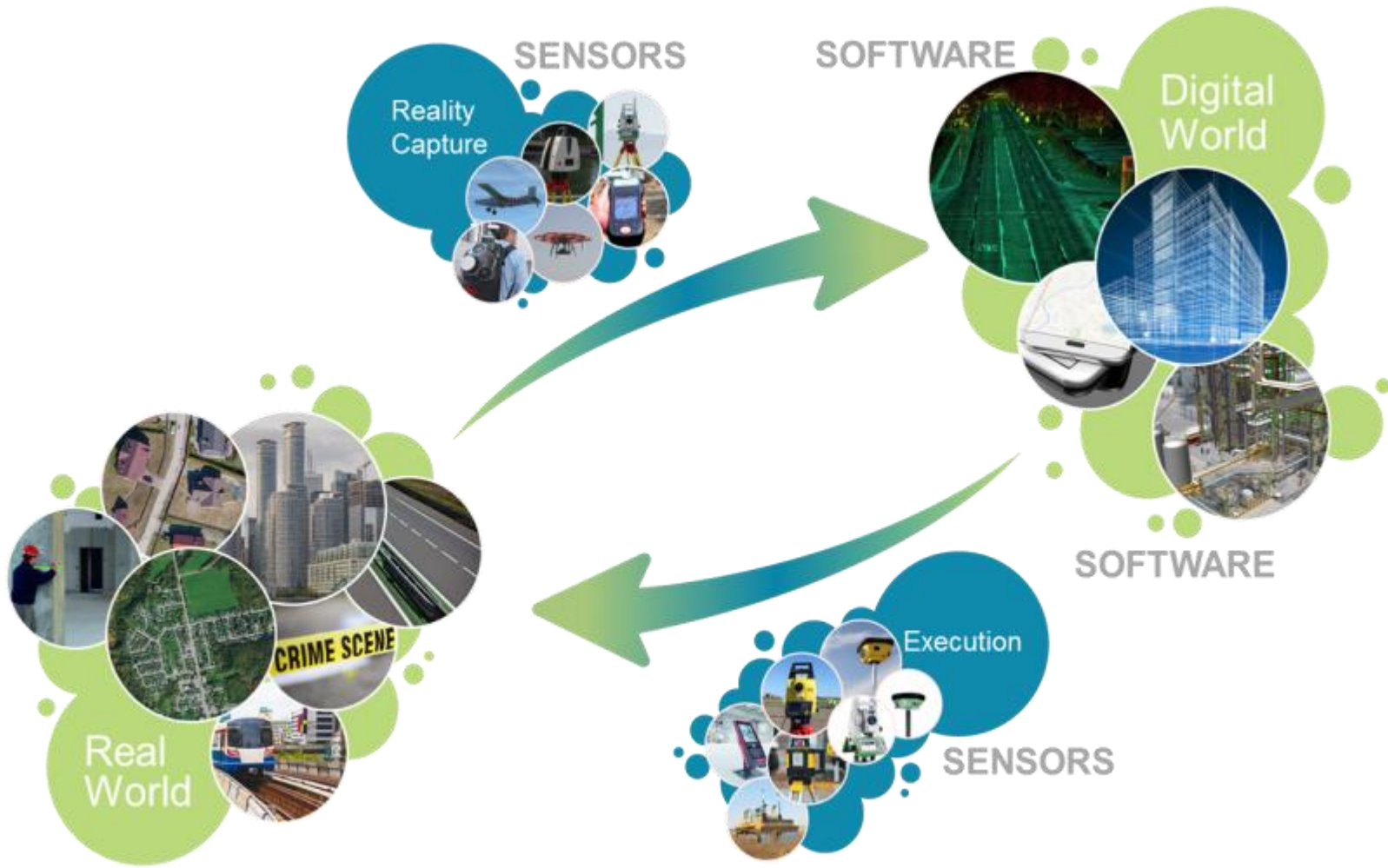
Role of Manufacturers to support Geodetic Infrastructure

Neil Ashcroft

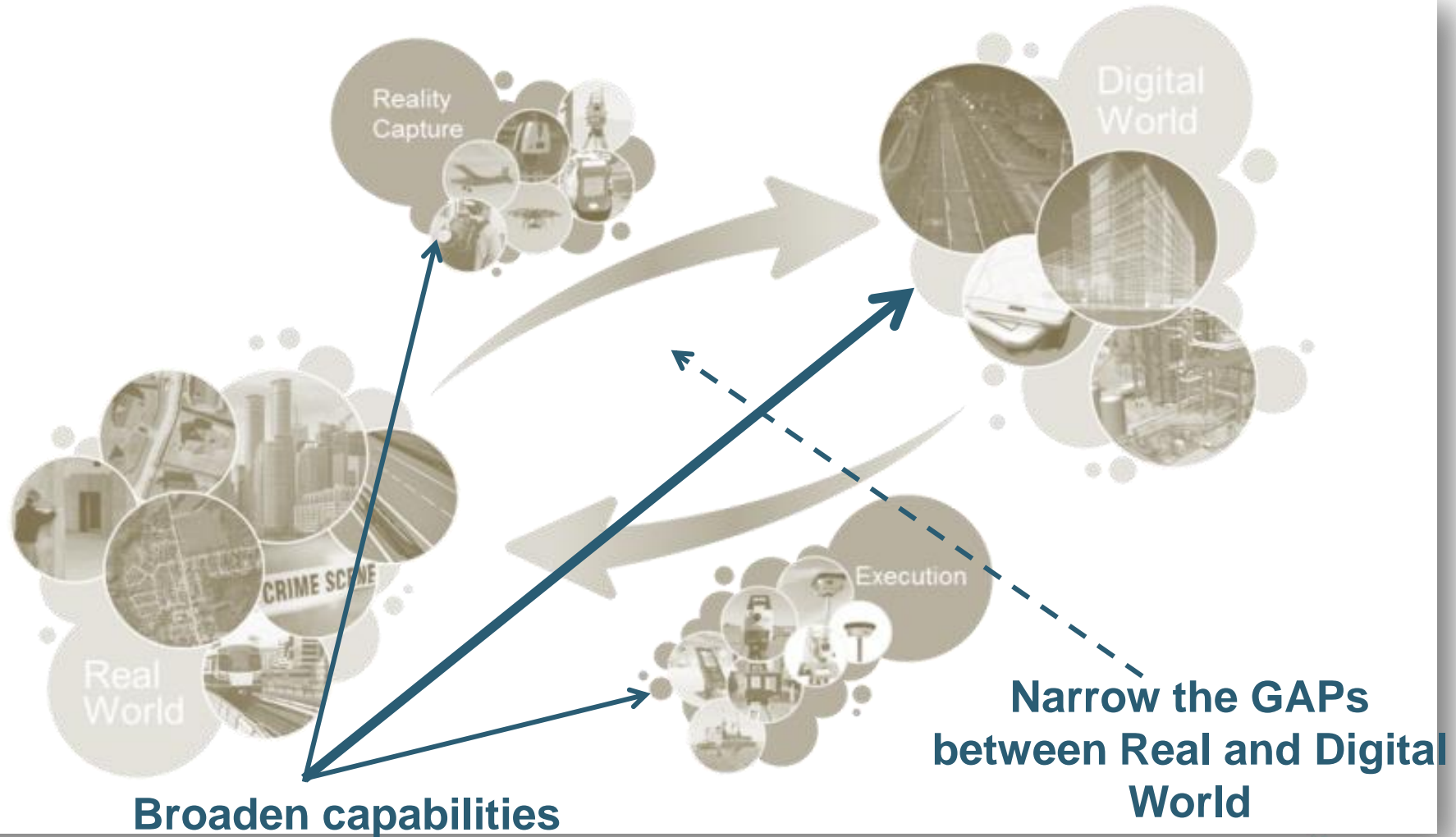
Leica Geosystems



Information Technologies



Hexagon's Corporate Strategic Direction



End User - Manufacturer Relationship

What is expected ?

- Deliver / Provide Appropriate products for Measurement tasks
 - Total Stations – Mechanical, Automated, Imaging...
 - GNSS – GIS, GPS, GNSS, Single Frequency, Multi Frequency
 - Laser Scanners – Fixed, Mobile
 - UAS
 - Lasers, Levels, Accessories etc
- Reliable products
 - Local Servicing and scheduled Maintenance, upgradability
- Usable products
 - Simple User Interfaces ... Customised User Interfaces
- Value for money
 - Cost of ownership
- Strong reliable partner...

GNSS Hardware – “Future Proofing”

1998	1999
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CRS1000 :

GPS : C1, P2

What can manufacturers do to further assist with CORS infrastructure ?

Respond to Requests For Information in order for you to put together a feasible operating CORS.

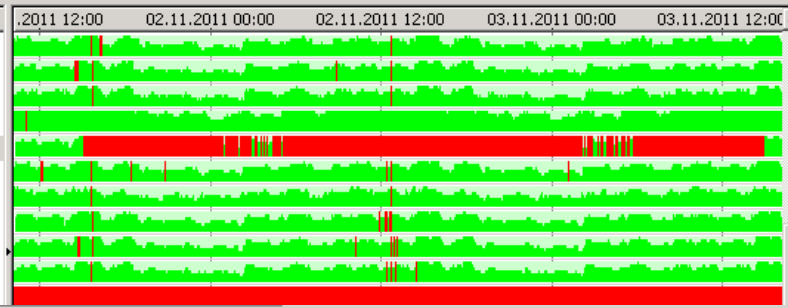
- Will provide detailed advice on what needs to be considered.
 - Monumentation, Communication, Power
 - Business Models

Some key points to consider...

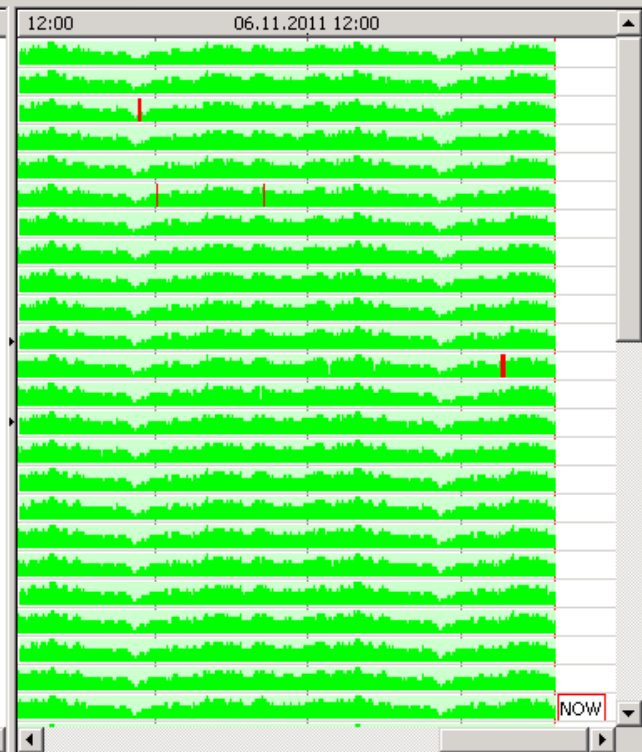
- GNSS Antennas should rarely be changed. Get antennas that are able to track all planned Satellite Signals now.
- Examine the upgrade path of GNSS Receivers to ensure they are upwards compatible with tracking appropriate Satellite Signals **WHEN** you need them.
- Get the GNSS receiver **to log native RINEX** on the sensor and FTP push to central archive store directly. Allows for greater manufacturer interoperability at the Central Server
- Reliable, Robust **Communication** system
- Set up front conditions that when Central Software has additional sites added there is a single fee, not manufacturer independent.
- ...

Communications

Site Name	Site Code	Comm Activity	Data Received [%]	Age [sec.]	Avrg. Age [sec.]
CRK-Mirani	MIRA	receive data	98.8	0.50	0.23
CRK-Proston	PROS	receive data	99.9	0.23	-0.04
CRK-TinCan Bay	TCBY	receive data	100.0	0.23	-0.06
GA-Townsville	TWNS	receive data	100.0	0.51	0.76
PRIV-Acland	ACL2	receive data	99.9	-0.01	0.00
PRIV-Broadm...	BMDW	receive data	100.0	0.43	0.47
PRIV-Canning...	CANN	no response	0.0	0.43	0.04
PRIV-Ensham	ENSH	receive data	100.0	0.01	0.03
PRIV-Gladstone	GLAD	receive data	99.9	0.22	-0.07
PRIV-Hervey ...	HBAY	receive data	99.9	0.04	0.03
PRIV-Jeebronilly	JEEB	connecting	0.0	0.00	0.00



Site Name	Site Code	Comm Activity	Data Received [%]	Age [sec.]	Avrg. Age [sec.]
DSE-Serviceton	SRVC	receive data	100.0	0.88	0.66
DSE-Nelson	NELN	receive data	100.0	0.12	-0.04
DSE-LindsayP...	LIPO	receive data	100.0	0.62	0.73
DSE-ManyaN...	MANY	receive data	100.0	0.73	0.59
DSE-Apsley	APSL	receive data	100.0	0.15	0.22
DSE-TelopeaD...	TELO	receive data	100.0	0.53	0.73
DSE-Strathdo...	STRH	receive data	100.0	0.75	0.63
DSE-Murrayville	MURR	receive data	100.0	0.44	0.03
DSE-YarraraS...	YARR	receive data	100.0	0.53	0.63
DSE-Goroke	GORO	receive data	100.0	0.29	-0.03
DSE-Merino	MRNO	receive data	100.0	-0.00	0.03
DSE-Portland	PTLD	receive data	98.9	-0.06	-0.01
DSE-NHill	NHIL	receive data	100.0	0.10	0.01
DSE-Merrinee...	MENO	receive data	100.0	0.53	0.63
DSE-Underbool	UNDE	receive data	100.0	0.40	-0.03
DSE-Balmoral	BALM	receive data	100.0	0.40	0.10
DSE-Rainbow	RNBW	receive data	100.0	-0.02	0.03
DSE-Hamilton	HMLT	receive data	100.0	0.32	0.06
DSE-Antwerp	ANTW	receive data	100.0	0.42	0.62
DSE-Mooralla	MOOR	receive data	100.0	0.94	0.63
DSE-Horsham	HRSM	receive data	100.0	0.43	0.00
DSE-Patchew...	PATC	receive data	100.0	0.69	0.73
DSE-Irymple	IRYM	receive data	100.0	0.06	0.00
DSE-PortFairy	PRTF	receive data	100.0	-0.02	0.05



The “Higgins” Model

Specify

Specify System

- Target Density, Coverage, Accuracy, Reliability and Availability
- Site Quality
- Equipment Quality
- Geodetic Reference Frame
- Data Services Produced
- Data Access Policy

Stations

Own Stations

- Site Selection
- Site Construction
- Equipment Purchasing
- Station Data Comms
- Site Maintenance
- Equipment Replacement Cycle

Network

Network the Data

- Data Comms from Network Stations
- Control Centre
- Quality Control of Raw Data
- Data Archive

Process

Process Network

- Copy of Network
- Data Processing
- Production of Data Streams
- Data Wholesaling
- Retailer Support

Deliver

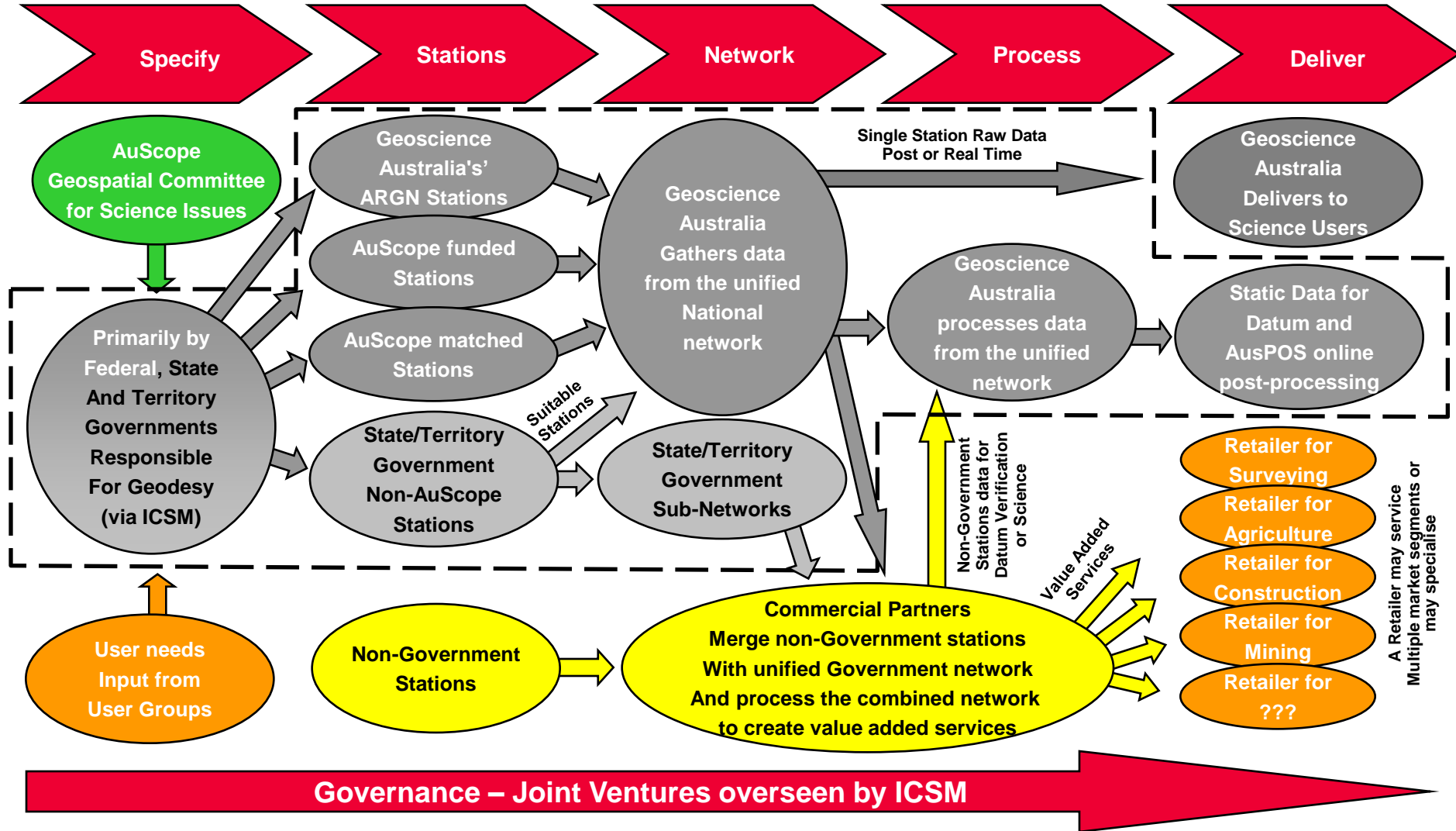
Deliver Service

- Retail Sale of Data Products
- Marketing
- Rover Equipment Support
- End User Support
- Liaison with User Comms Providers

Governance

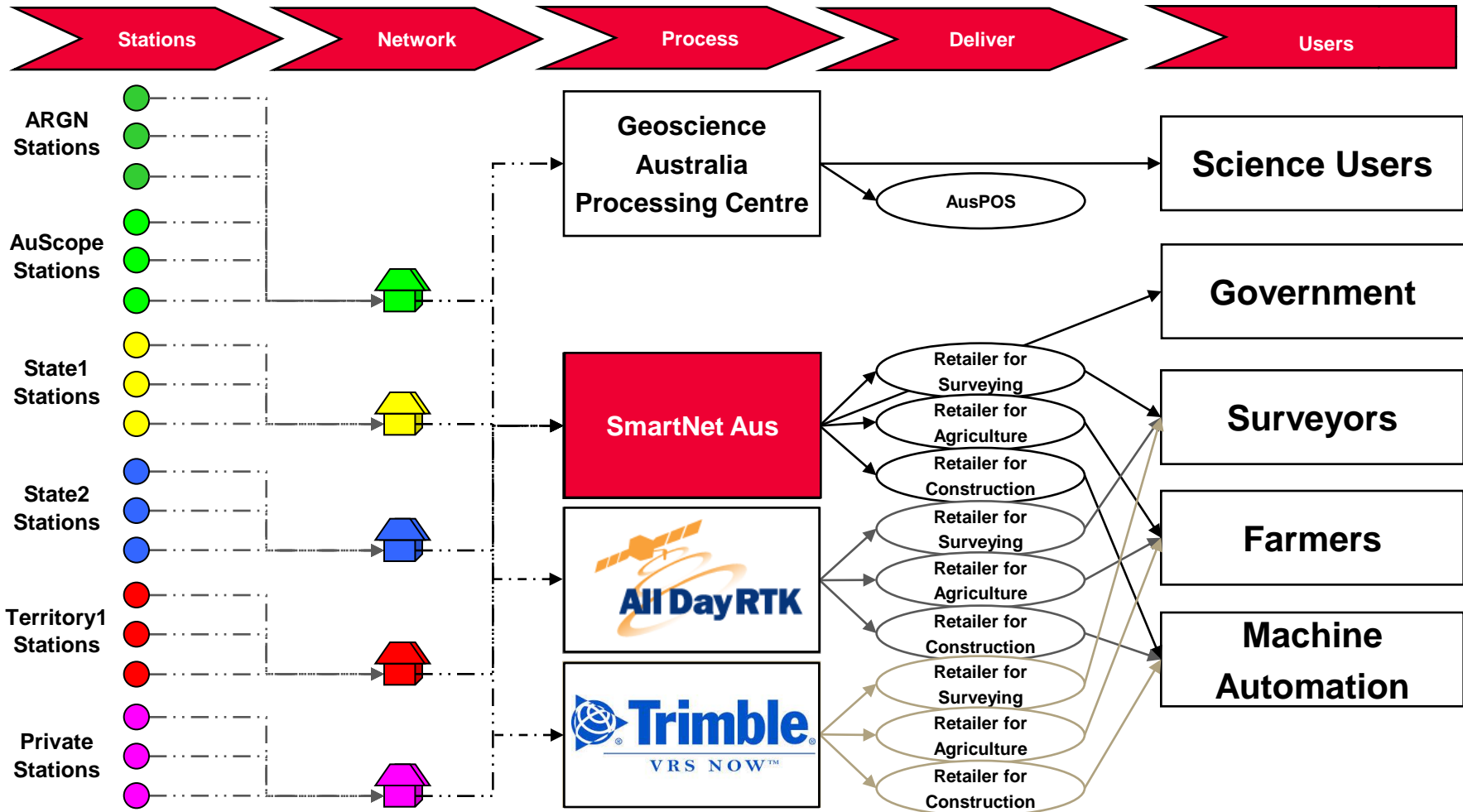
Courtesy of M.Higgins, DERM, QLD, Australia

The "Higgins" Model

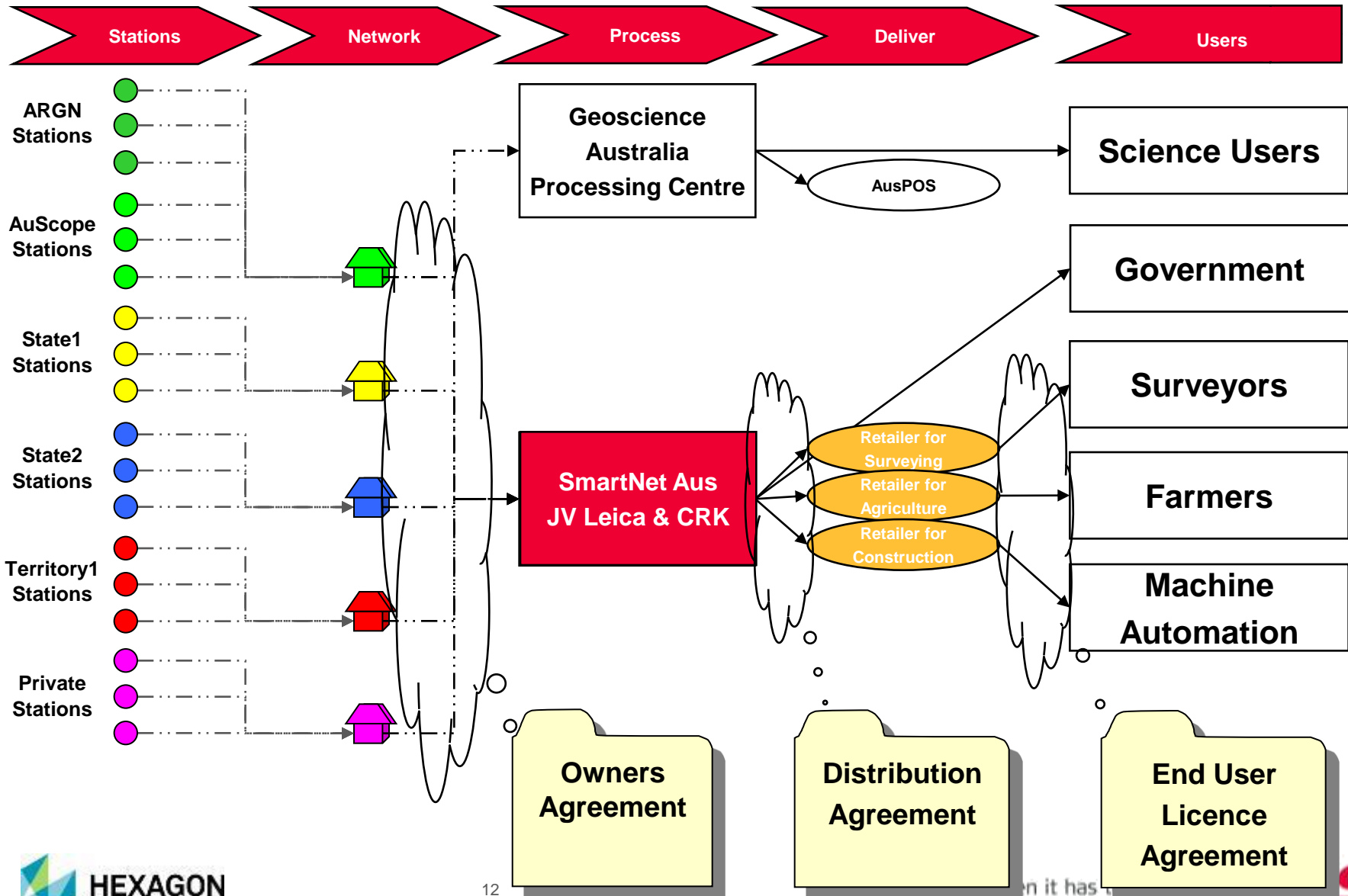


Courtesy of M.Higgins, DERM, QLD, Australia

Data Flow - Business Model



Agreements



Work Smart

Choose Leica SmartNet



Providing operational services



Managing Day-Day operations of a CORS Network through provision of Internet based GNSS Products:

- Monitoring of CORS Data Streams
- Real Time Streaming (RTCM) of Single Base and Network RTK services via NTRIP
- Providing RINEX download service and Coordinate computation through RINEX upload
- Sharing in the user generated revenue to owners and operators of infrastructure

SmartNet UK has been operational from Jan 2006 (10.5 years)

SmartNet AUS operational since Nov 2010 (6 years)

CORS Project References

Regional

Indonesia : BIG (Bakosurtanal & BPN)

Philippines : NAMRIA

Malaysia : JUPEM

Thailand : DPTC. MET Dept

Australia : Various

New Zealand : Various



This screenshot shows the SpiderWeb interface for the BIG project in Indonesia. The 'Home' menu includes Site overview, Register, Forgotten Password, Spider Business Center, Leica Geosystems, SpiderWeb, GPS Status, and Latest SmartNet Aus KML File. The 'Site overview' section shows a map of Indonesia with numerous green location markers. The interface includes a 'Jump to site' dropdown, a 'Map' search box, and a 'Login' form with fields for 'User Name' and 'Password', and a 'Remember me' checkbox.



This screenshot shows the SpiderWeb interface for the Australia project. The 'Home' menu includes Site overview, Register, Forgotten Password, Spider Business Center, Leica Geosystems, SpiderWeb, GPS Status, and Latest SmartNet Aus KML File. The 'Site overview' section shows a map of Australia with numerous green location markers. The interface includes a 'Jump to site' dropdown, a 'Map' search box, and a 'Login' form with fields for 'User Name' and 'Password', and a 'Remember me' checkbox.



This screenshot shows the SpiderWeb interface for the New Zealand project. The 'Home' menu includes Site overview, Register, Forgotten Password, Spider Business Center, Leica Geosystems, SpiderWeb, GPS Status, and Latest SmartNet Aus KML File. The 'Site overview' section shows a map of New Zealand with numerous red location markers. The interface includes a 'Jump to site' dropdown, a 'Map' search box, and a 'Login' form with fields for 'User Name' and 'Password', and a 'Remember me' checkbox.

This screenshot shows the SpiderWeb interface for the Australia project, featuring a legend for the location markers. The legend includes: Unassigned (represented by a red pin), Real Time Only (represented by a green tree), RINEX Only (represented by a blue tree), and RealTime&RINEX (represented by a green tree). The map shows Australia with numerous green location markers. The interface includes a 'Jump to site' dropdown, a 'Map' search box, and a 'Login' form with fields for 'User Name' and 'Password', and a 'Remember me' checkbox.

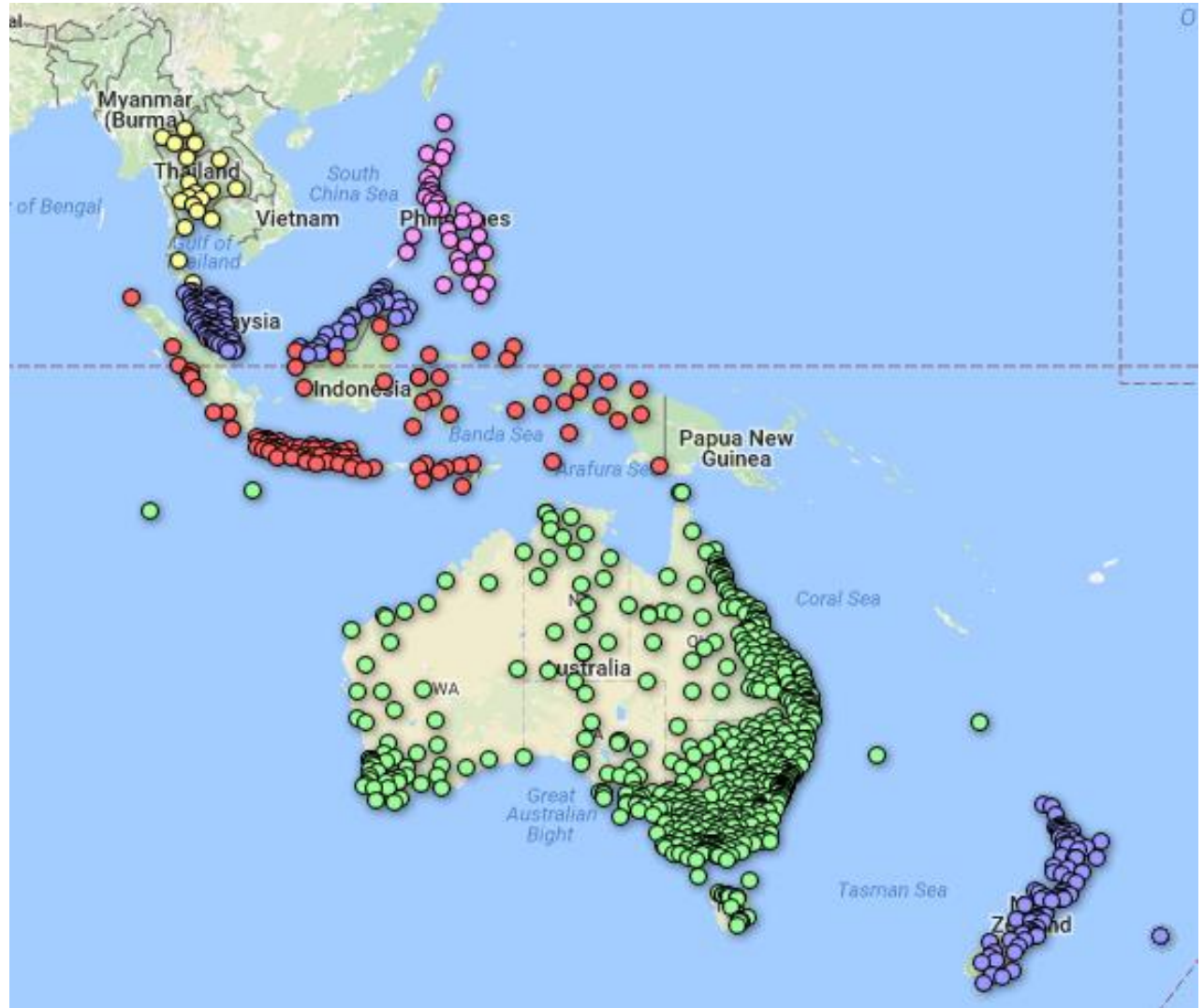
CORS Project References

Regional

916 Sites Managed with
Leica Spider Suite of
Software

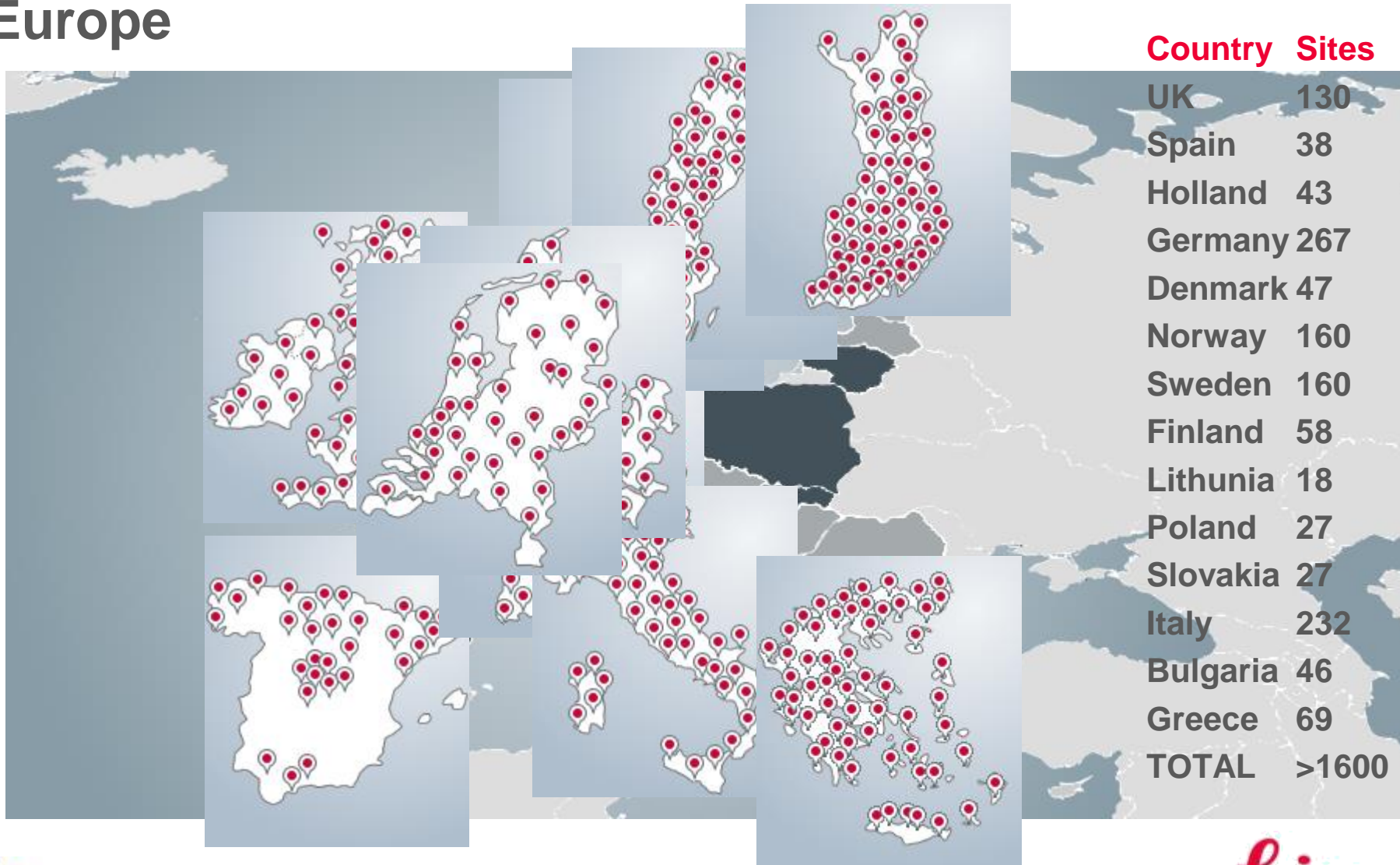
Jenoba in Japan

600/1300 Sites



CORS Project References

Europe



CORS Project References

Americas

>1,100 Sites

36 US States

8 Canadian Provinces

...Mexico coming soon

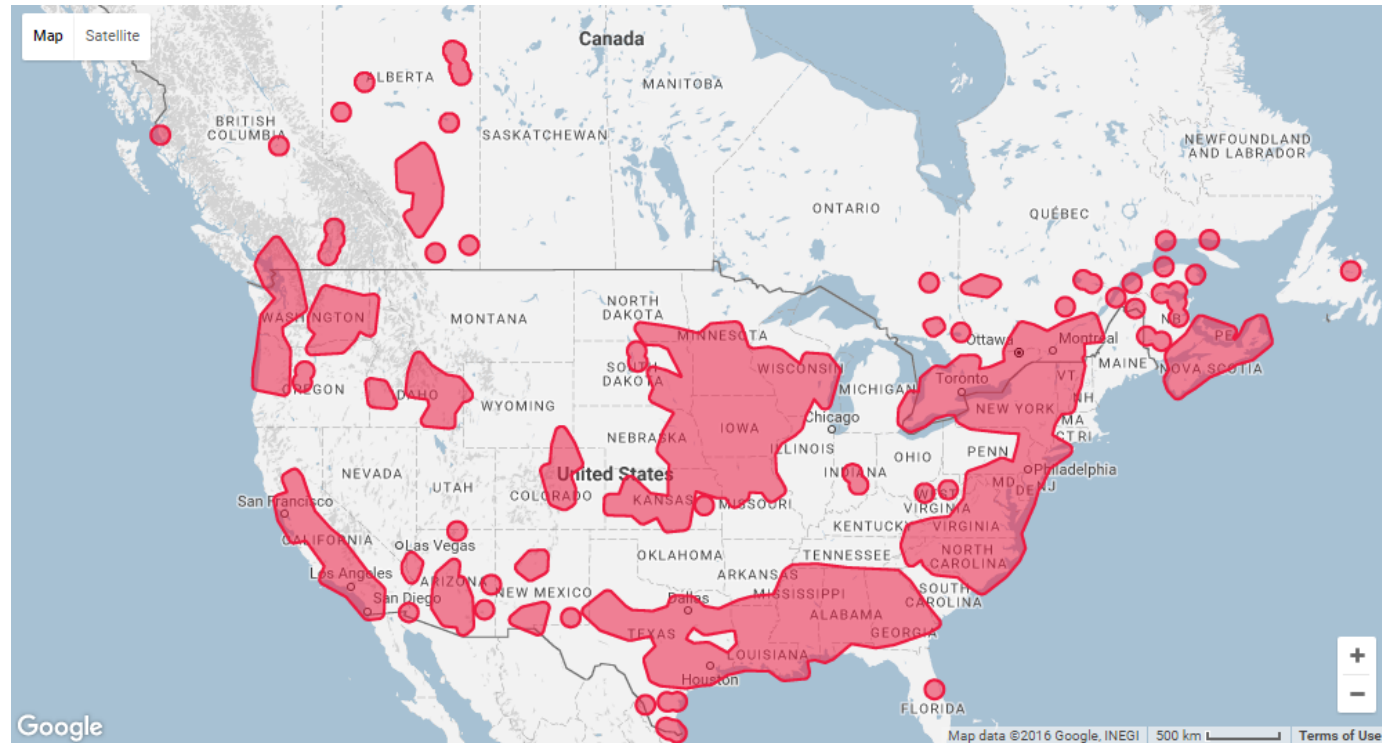


FIG / UN-GGIM-AP / JUPEM

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Thank you

