The Reasons to Succeed and to Fail a GNSS Network RTK Infrastructure Project
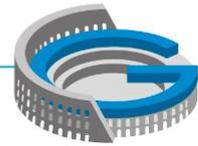
Joël van Cranenbroeck, Switzerland

Vincent Lui, Hong Kong

Scope (Business Plan)
Budget (Financial Plan)
Design, Implementation
Final Acceptance
Operations, Maintenance
There are reasons to succeed and reasons to
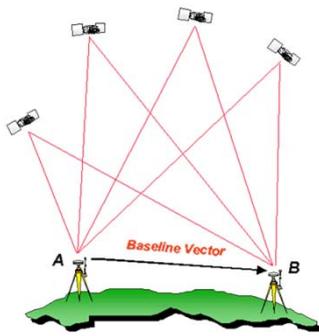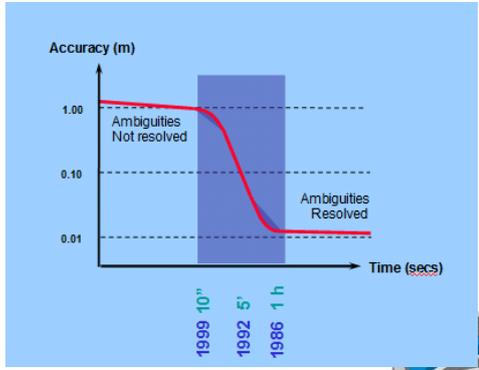fail like any other project …

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« Differential » GPS & GLONASS is the key for precise
positioning

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Open Sky - All in View Satellites

GNSS Choke Ring Antenna

Lightning Protection

Meteo Station for Weather forecasting

Tape targets for TPS monitoring

Stable Monumentation anchors in bed rock

Fence and Secured access

GNSS receiver, power supply, communication equipment, air conditioning, anti bug..
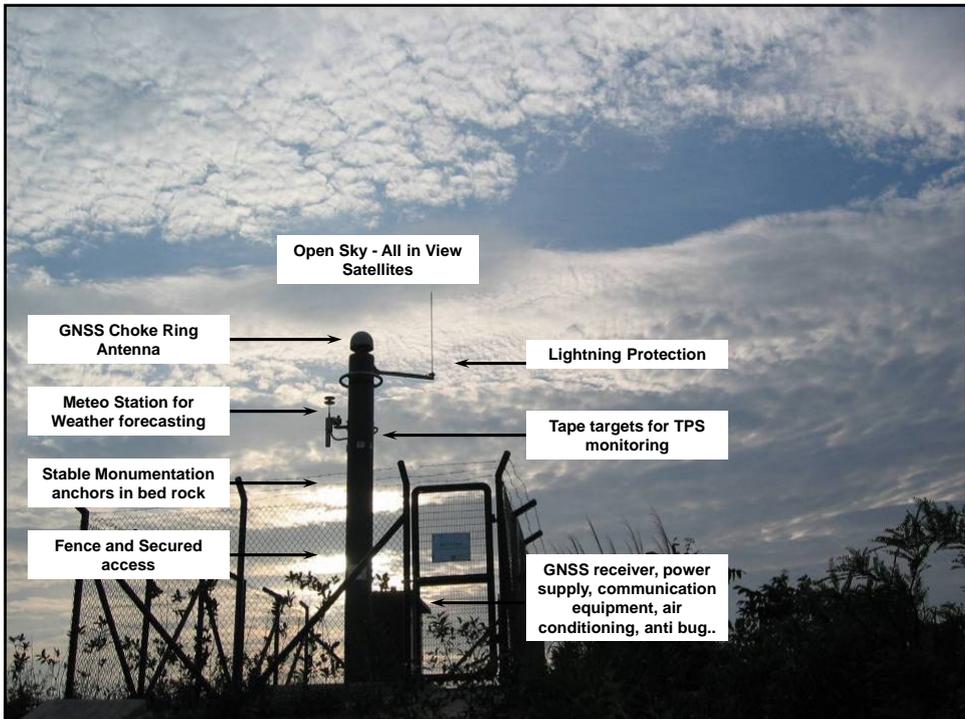
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Economical Justification …

Most of the GNSS Network RTK projects have been developed by the economical justification that an active geodetic network would reduce the cost of maintaining a traditional geodetic network where the maintenance of the benchmarks and the control survey were a significant part of the owner's budget.
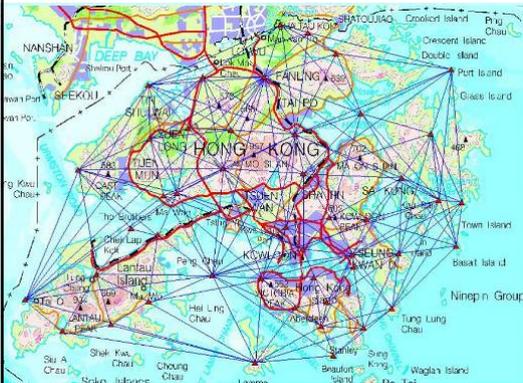
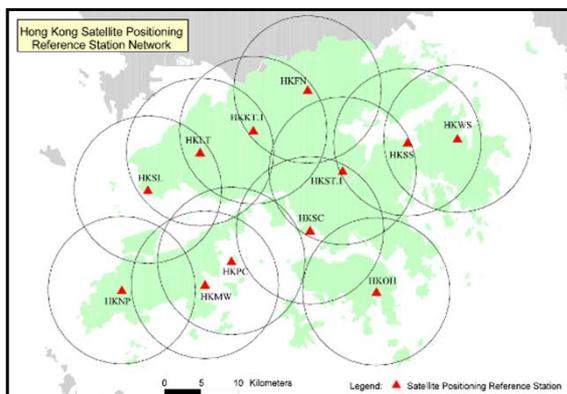Platinum sponsors: esri · Trimble

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Economical Justification …

Active GNSS Positioning Reference Station Network in Hong Kong

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Single Base GNSS Reference Station Products

RTK

Rapid Static

RTCM Broadcast

GIS DGNSS

RINEX Files

Static	:	**3 mm** (20 - 300 km)
RTK	:	**1 cm** (30 - 50 km)
Rapid	:	**5 mm** (20 – 50 km)
DGPS	:	**25 cm** (150 km)

Communication and GNSS Reference Station.

A GNSS Reference Station is a **"server"** of observations. (GPS + Tilts + Meteo)

A Post-processing rover user wants to **down/up load** RINEX files from a Web server (**FTP**)

The **Central Processing Facility** need to **control** the "server" parameters, to **collect** observations from the RS "server" <u>and</u> to re-distribute observations, corrections and positions.

A RTK rover user wants to combine in **real time** observations and corrections **from the air (wireless Internet)** for real-time position.

« *The GPS Network RTK of the Surveying and Mapping Institute of Kunming PR China is the basis infrastructure of our Digital City* »

Vice-Director WU Limin

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Questions …

- Is there still a future for such infrastructure ? and what would be the conditions to make them sustainable?
- What is the **real economy**? Is **selling corrections the only product** ? How users are prepared to **pay** for a service that could be still delivered by setting up their own local GNSS Base Station?
- How to deal with the **security** that most countries are concerned with in term of **releasing precise coordinates**?
- Will we be able to cope with the **new constellations signals**?
- Is **Precise Point Positioning** the technology that will make the GNSS Network RTK obsolete?
- **Hidden costs** ? and how **communication infrastructure** is affecting the overall operation?
- **Multiple applications (Value Added Services)** or only distribute corrections?
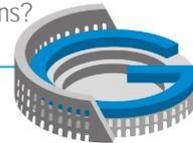
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The reasons to fail …

- The most important is to remind the sentence that "**how a project starts, a project ends**".
- If a GNSS Network starts without serious **investigation on user's needs** and **expected services** delivered in term of **accuracy** and **availability**, **reliability** and **format**, it will fail.
- If a GNSS Network starts without **reviewing and consulting with all the potential users**, it will fail.
- **Workshop, training, documentation, access to the network services, website, user's day**, … and … **publicity** !
- **Marketing** is certainly important and no one will be surprised to assist a failure when few people were aware about the proposed services.
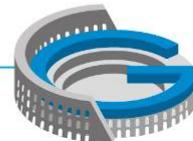
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The reasons to fail …

- **Communications** is one of the major reasons to fail as **no data, no correction**.
- **Improper coordinates** is another reason to fail.
- If the organisation in charge of delivering the associated services of a GNSS Network RTK infrastructure doesn't have **24/7 a call centre** with an **expert reaction to address the user's issues** or to **repair the system** in case of down operations, the project will fail.
- "Charging too much" or "Just for free". Organisations that has **no confidence in the deliveries** or **don't want to take responsibility**, will offer the **service for free** with the net result that if something is going wrong, after all **no one is paying for the service when it works**. On the other side, **charging too much will prevent people to consider the costs** if they **exceed** what they can manage themselves by using **a local GNSS Reference Station setup**.
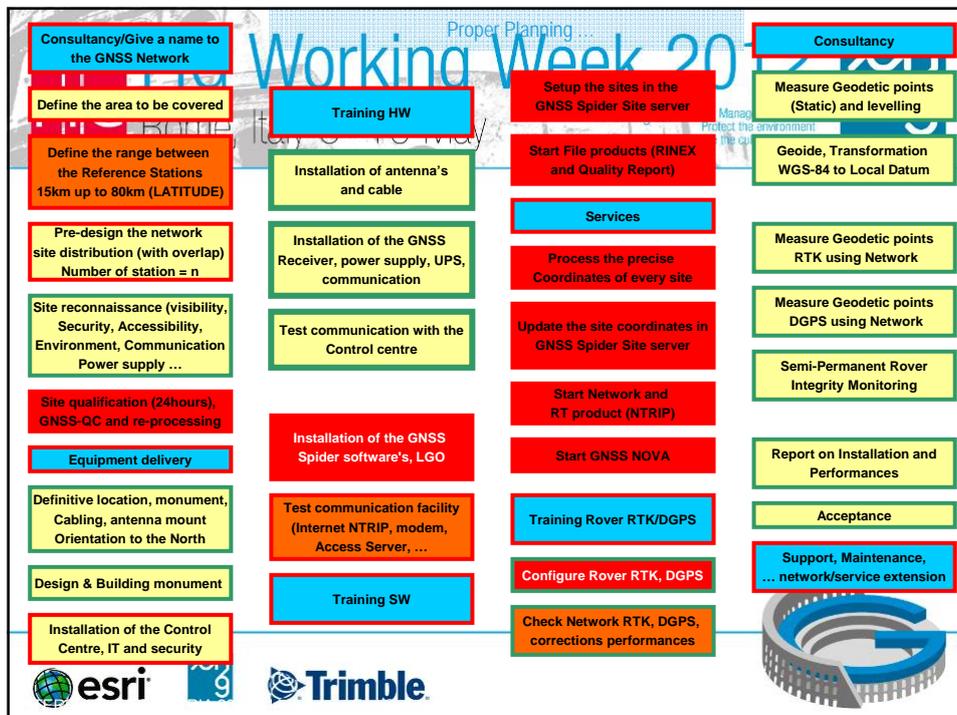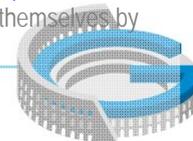
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Proper Planning …

Consultancy/Give a name to the GNSS Network			Consultancy
Define the area to be covered	Training HW	Setup the sites in the GNSS Spider Site server	Measure Geodetic points (Static) and levelling
Define the range between the Reference Stations 15km up to 80km (LATITUDE)	Installation of antenna's and cable	Start File products (RINEX and Quality Report)	Geoide, Transformation WGS-84 to Local Datum
Pre-design the network site distribution (with overlap) Number of station = n	Installation of the GNSS Receiver, power supply, UPS, communication	Services	Measure Geodetic points RTK using Network
Site reconnaissance (visibility, Security, Accessibility, Environment, Communication Power supply …)	Test communication with the Control centre	Process the precise Coordinates of every site	Measure Geodetic points DGPS using Network
Site qualification (24hours), GNSS-QC and re-processing		Update the site coordinates in GNSS Spider Site server	Semi-Permanent Rover Integrity Monitoring
Equipment delivery	Installation of the GNSS Spider software's, LGO	Start Network and RT product (NTRIP)	Report on Installation and Performances
Definitive location, monument, Cabling, antenna mount Orientation to the North	Test communication facility (Internet NTRIP, modem, Access Server, …	Start GNSS NOVA	Acceptance
Design & Building monument		Training Rover RTK/DGPS	Support, Maintenance, … network/service extension
Installation of the Control Centre, IT and security	Training SW	Configure Rover RTK, DGPS	
		Check Network RTK, DGPS, corrections performances	

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Project Leader: Joel van Cranebroeck **Project:** Deployment of 3 first AFREF Station **Date:** 01/31/08
Project Objective: Leica delivers 61 AFREF Stations

A proper project planning is needed !

#	Major Tasks	Owner / Priority
1	shipment of Leica AFREF pack to RCMRD Kenya	C B A A
2	RCMRD applies for IGS Site Name	C A
3	Validation of Internet connectivity and FTP push	C A
4	Monumentation and facility	C A
5	Installation and Training of RCMRD in Nairobi	A B
6	FTP RINEX files pushed to IGS data center	A B
7	Acceptance of the 1st AFREF station by IGS	B A
8	Press release by Leica and RCMRD	B C B
9	Official statement by RCMRD acting as AFREF facility	B A
10	Validation of Leica as AFREF standard compliant	A A
11	Brochure and marketing of Leica AFREF PACK	A C B
12	Training of Nigeria and Ghana by RCMRD on Leica	B A
13	shipment of Leica AFREF pack to RECTAS Nigeria	C B A A
14	Installation in Nigeria	B C A
15	FTP RINEX files to IGS data center and RCMRD	B A
16	Acceptance of the 2nd AFREF station by IGS	B A
17	shipment of Leica AFREF pack to Ghana	C B A
18	Installation in Ghana	B A
19	FTP RINEX files to IGS data center and RCMRD	B A
20	Acceptance of the 3rd AFREF station by IGS	B A
21	Proposal of Leica AFREF PACK to all AFREF countries	B C A A
22	Follow up and promotion, participation of AFREF works	C B A
23	Deployment of the remaining AFREF stations	C C A A
A	Shipment of Leica Donation	C A B
B	RCMRD First AFREF Station up and running	A B A
C	Validation of Leica Pack for AFREF	A C B A
D	IGS validation	B A
E	Leica as Standard for AFREF	A A A

AFREF LEICA TEAM

Project Completed By (months): février-07, mars-07, avril-07, mai-07, juin-07, juil-07, août-07, sept-07, oct-07, nov-07, déc-07, janv-08

Owners: Joel van C, Nicolas DeM, Derrick Page, RCMRD

Objectives: GNSS Stations Complete · System Operational · Leica as privileged AFREF provider

Major Tasks / Target Dates
Objectives
Costs
Summary & Forecast

Capital: 5 / 15
Expenses: 0 / 0
Other: 0 / 0

Budgeted / Expended

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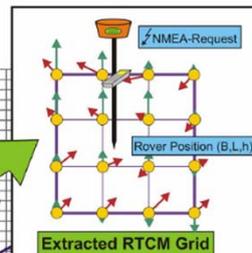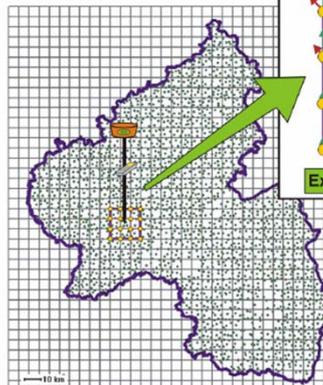« Glonass & GPS are just the tools to perform that kind of interaction from real to digital … »

MAR 25 2002

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Transformation from WGS-84 to Local Datum
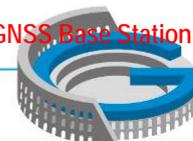

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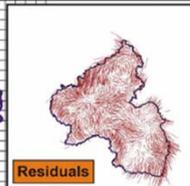
The reasons to succeed ...

- Identify the future customer's needs !
- Carefully design and planning of deployment (**hotspot strategy** vs full coverage)
- Consider "more" value added services than only "corrections"
- No concession about the coordinates (must match !)
- 24/7 ... not for surveyors ... but for farmers / emergency service / structural monitoring, etc !
- Be innovative in charging for products and services
- No rover RTK = No business ... Rental proposal ? Rover bundle with data product ?
- Gold rule : **1 GNSS CORS = supported by at least 10 – 15 GNSS Rovers**
- Cooperation with third party for generating profits out of the services
- Remember : customer always has the choice ... to setup his own GNSS Base Station ...
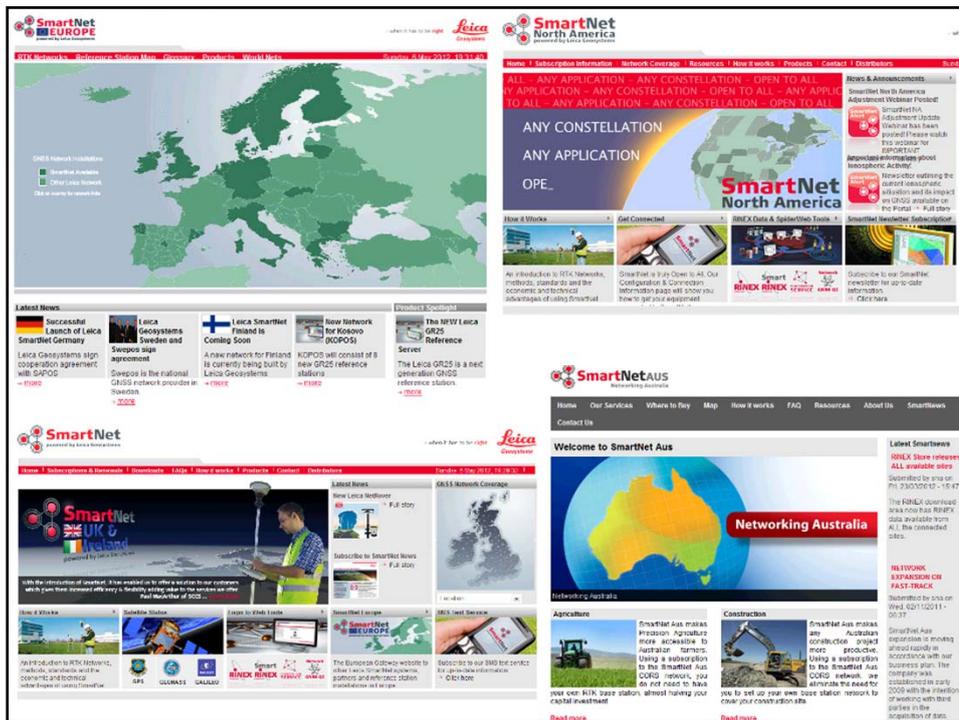
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Thank You Very Much for Your Attention

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