

Jonathan Davis | Business Development

DECEMBER 2017



Trimble: Mapping Everest



Agenda

- Trimble
- Geospatial Technology
- Mapping Mt Everest
- Reference Projects
- Discussion



Introduction

- Name: Jonathan Davis
- Position: Business Development
- Location: New Zealand
- Trimble: 18 years
- Background: Geomatics Engineer



Trimble: Transforming The Way The World Works

\$2.5B REVENUE | 8,600 EMPLOYEES | 39 COUNTRIES | 60 YEARS OF INNOVATION | 1,100+ PATENTS



Agriculture



**Building Design, Construction
& Operations**



**Civil Engineering &
Construction**



Geospatial



**Transportation &
Logistics**



Rail



Water Utilities



Forestry



Electric Utilities



Field Service



TRANSFORMING THE WAY THE WORLD WORKS

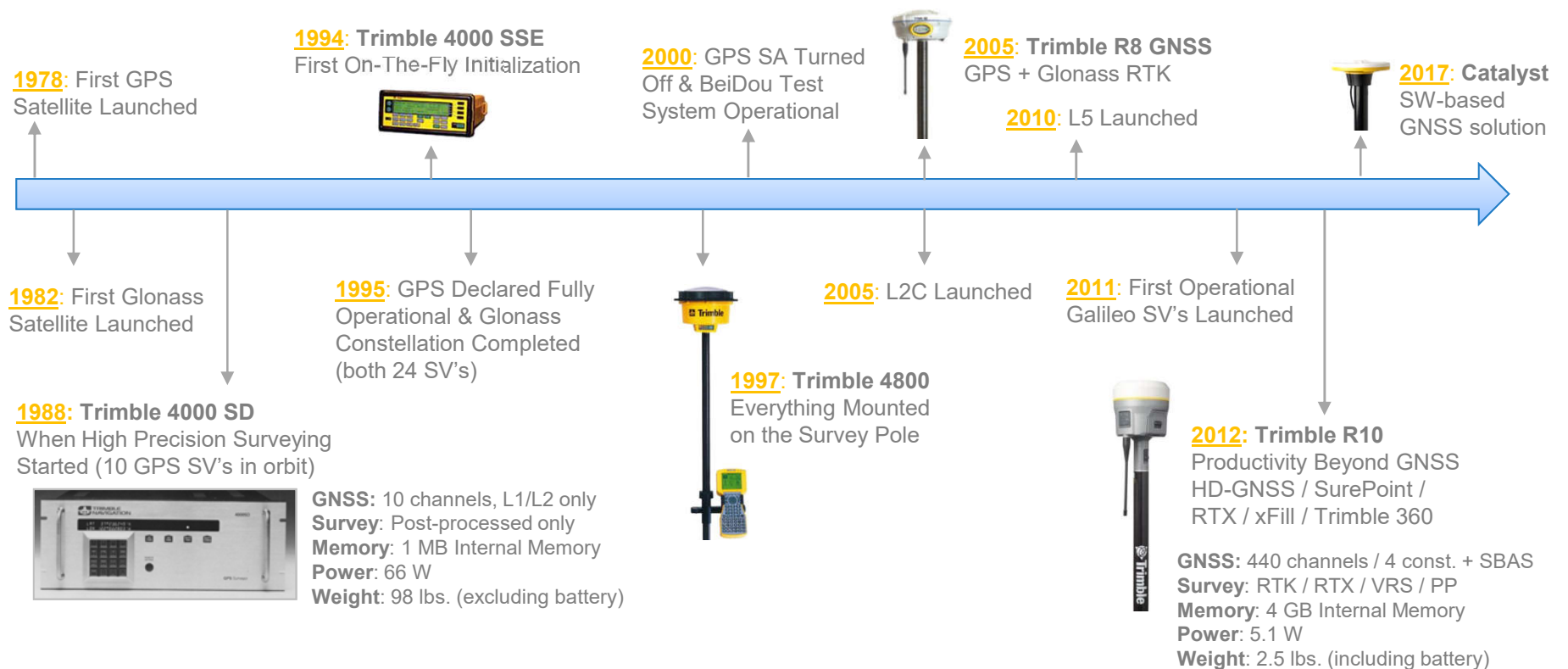


Technology

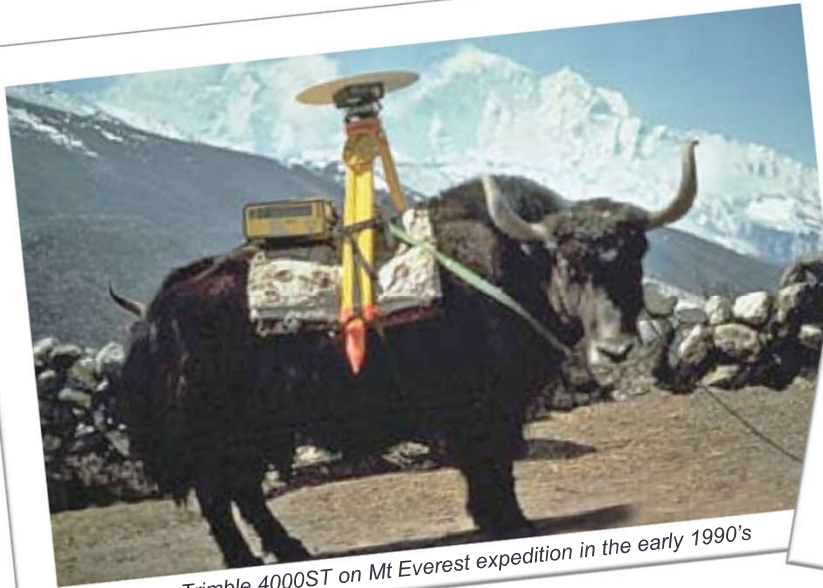


Technology

Evolution of Precision GNSS Technology



≡ Trimble in the Mountains!



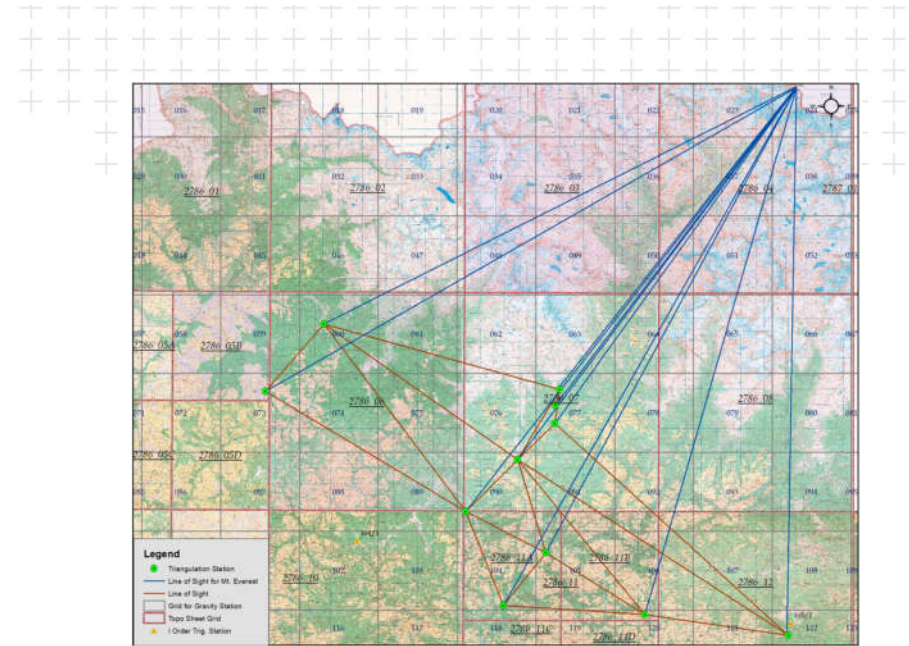
Trimble 4000ST on Mt Everest expedition in the early 1990's



Trimble R10 on Mt Cook expedition in 2013

≡ Mt Everest 2018

- Precise levelling
- Trig levelling
- Gravity survey
- GPS survey
- Data processing



DiNi Level



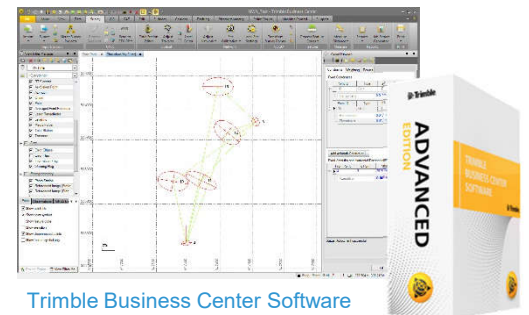
Trimble S9
Total Station



Trimble R9s
GNSS Receiver



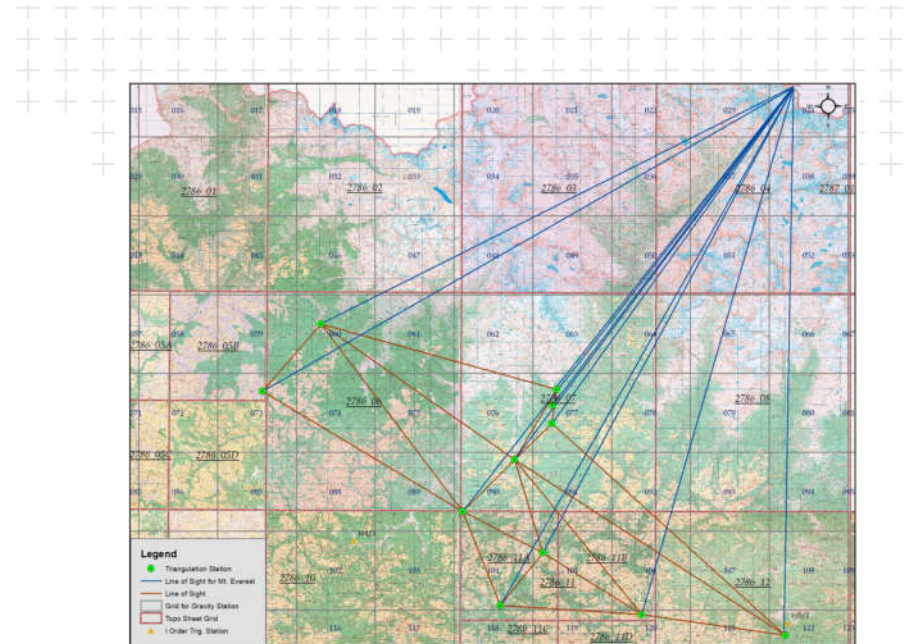
Trimble R10
GNSS Receiver



Trimble Business Center Software

≡ Mt Everest 2018

- Precise levelling
- Trig levelling
- **Gravity survey**
- GPS survey
- Data processing



DiNi Level



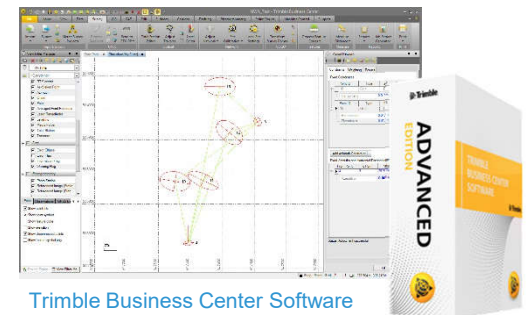
Trimble S9
Total Station



Trimble R9s
GNSS Receiver



Trimble R10
GNSS Receiver

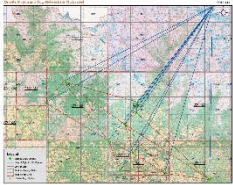


Trimble Business Center Software



GPS Survey



Phase	Suggested GNSS Equipment	Comment
Bench marks every 2km along the precise levelling route 	Trimble R9s GNSS Receiver Zephyr Geodetic Antenna Accessories 	- Trimble's premium 440 channel GNSS technology - Geodetic antenna to mitigate multipath across various environments - Flexible system (setup, user interface, logging, memory, power source etc.) - Data can easily be downloaded from the receiver or you can log directly to a memory stick.
12 network stations (4 continuously) 	Trimble R9s GNSS Receiver Zephyr Geodetic Antenna Accessories 	- Same as above - Modular system suits CORS setup since the receiver can be locked away and protected - Multiple power inputs provide for main and backup power supplies
Summit 	Trimble R10 GNSS Receiver Accessories 	- Trimble's premium 440 channel GNSS technology - Small and light weight fully integrated system; easy to fit several receivers in a backpack - Easy to use: program the logging session into the R10; one button press to power up and start logging once at the summit

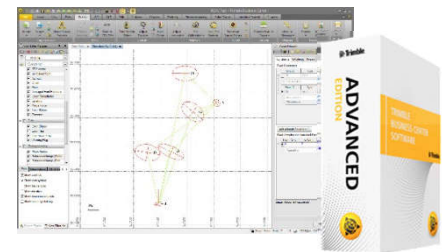
≡ Data Processing



- Trimble Business Center (spatial data processing software)
 - **Data Integration:** combine precise levelling, total station and GNSS data into one project (and a single network adjustment)
 - **Baseline Processing:** new “Pentea” engine for static processing has proven equivalent to the Bernese software, reported as achieving even slightly better performance for <200km baselines in a thesis at the Technical University of Munich
 - **Network Adjustment:** advanced network adjustment engine
 - **Quality Control:** extensive QA/QC tools



Technische Universität München



Trimble Business Center Software

HARDWARE

PHYSICAL

Dimensions (W×H)	11.9 cm x 13.6 cm (4.6 in x 5.4 in)	
Weight	1.12 kg (2.49 lb) with internal battery, internal radio with UHF antenna, 3.57 kg (7.86 lb) items above plus range pole, controller & bracket	
Temperature ¹⁰		
	Operating	−40° C to +65° C (−40° F to +149° F)
	Storage	−40° C to +75° C (−40° F to +167° F)
Humidity	100%, condensing	
Ingress Protection	IP67 dustproof, protected from temporary immersion to depth of 1 m (3.28 ft)	
Shock and vibration (Tested and meets the following environmental standards)		
	Shock	Non-operating: Designed to survive a 2 m (6.6 ft) pole drop onto concrete. Operating: to 40 G, 10 msec, sawtooth
	Vibration	MIL-STD-810F, FIG.514.5C-1

ELECTRICAL

	Power 11 to 24 V DC external power input with over-voltage protection on Port 1 and Port 2 (7-pin Lemo)	
	Rechargeable, removable 7.4 V, 3.7 Ah Lithium-ion smart battery with LED status indicators	
	Power consumption is 5.1 W in RTK rover mode with internal radio ¹¹	
Operating times on internal battery ¹²		
	450 MHz receive only option	5.5 hours
	450 MHz receive/transmit option (0.5 W)	4.5 hours
	450 MHz receive/transmit option (2.0 W)	3.7 hours
	Cellular receive option	5.0 hours



Reference Projects



Mt Everest in 1990/1999/2005/2012
(8,848m)



Mt Vinson in 2004
(4,892m)



Mt Kilimanjaro in 2008
(5,895m)



Mt Rainer in 2010
(4,392m)



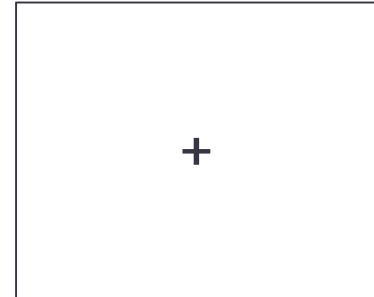
Mt Cook in 2013
(3,724m)



Barre Des Ecrins in 2014
(4,102m)



Denali in 2015
(6,193m)



Thank you!

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