GNSS –sharing user experiences

- Eye opener, San Francisco Airport IT project

- Are we completely focusing on the early part of technology curve and what is the future of that strategy

- Cost of investment in GNSS vs. cost of use

- What is REAL-TIME GPS:
  RT-coordinates or (coordinates + RT-application)

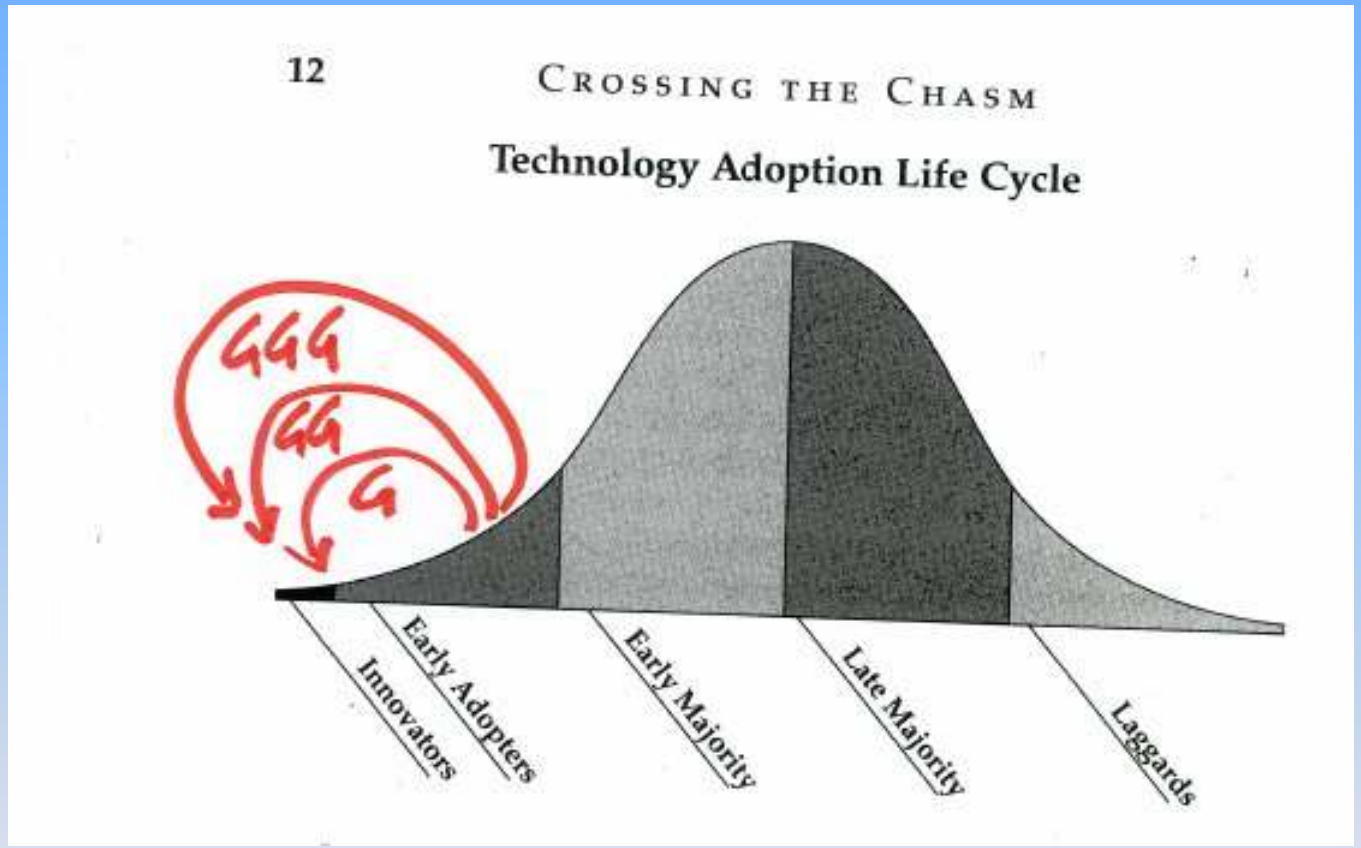
-Where is the money: case studies

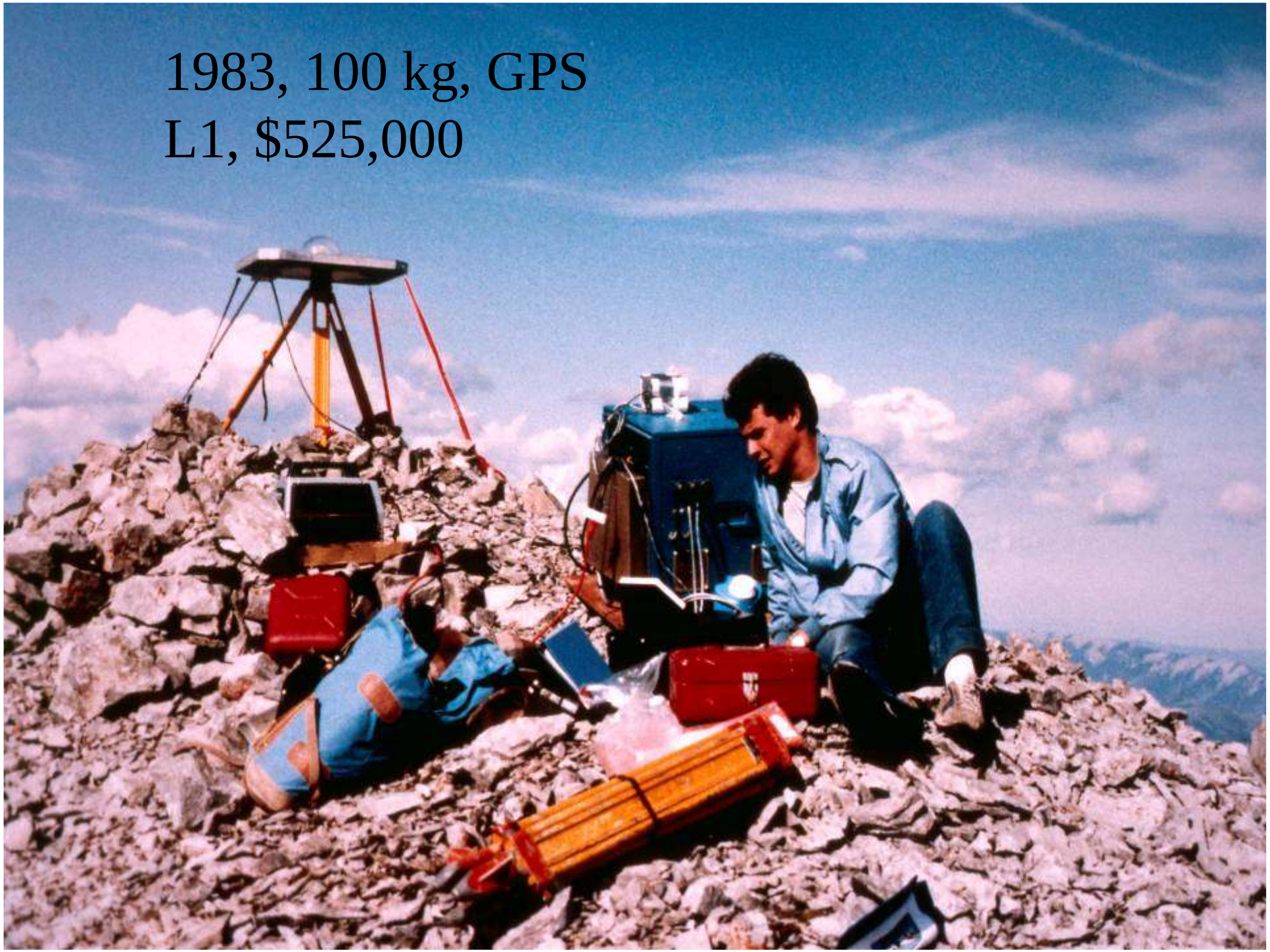
- Summary

SFO airport IT software project

-Does not have anything to do with GPS, but is used to help get focus on presentation correct.
-I had a professors in the USA, who was assigned to design a new IT system for the SFO airport, his name is Jeff...

Are we stuck in doing the same thing over and over again




1983, 100 kg, GPS
L1, $525,000

Dimishing returns in technology development

1982 Macrometer V-1000 100 kg $525,000
GPS L1, post processing

1986 Trimble 4000S 30 kg $95,000
GPS L1, post processing

1998 Javad Odyssey/Hiper 3 kg $15,000
RTK, VRS, internal GPRS, GPS+GLO L1+L2

2010 Trimble R8/ 2 kg $15,000
Javad Triumph
RTK, VRS, internal GPRS, GPS+GLO L1+L2+L5
(Galileo ?)

Dimishing return on technology (continued)

2000

2000

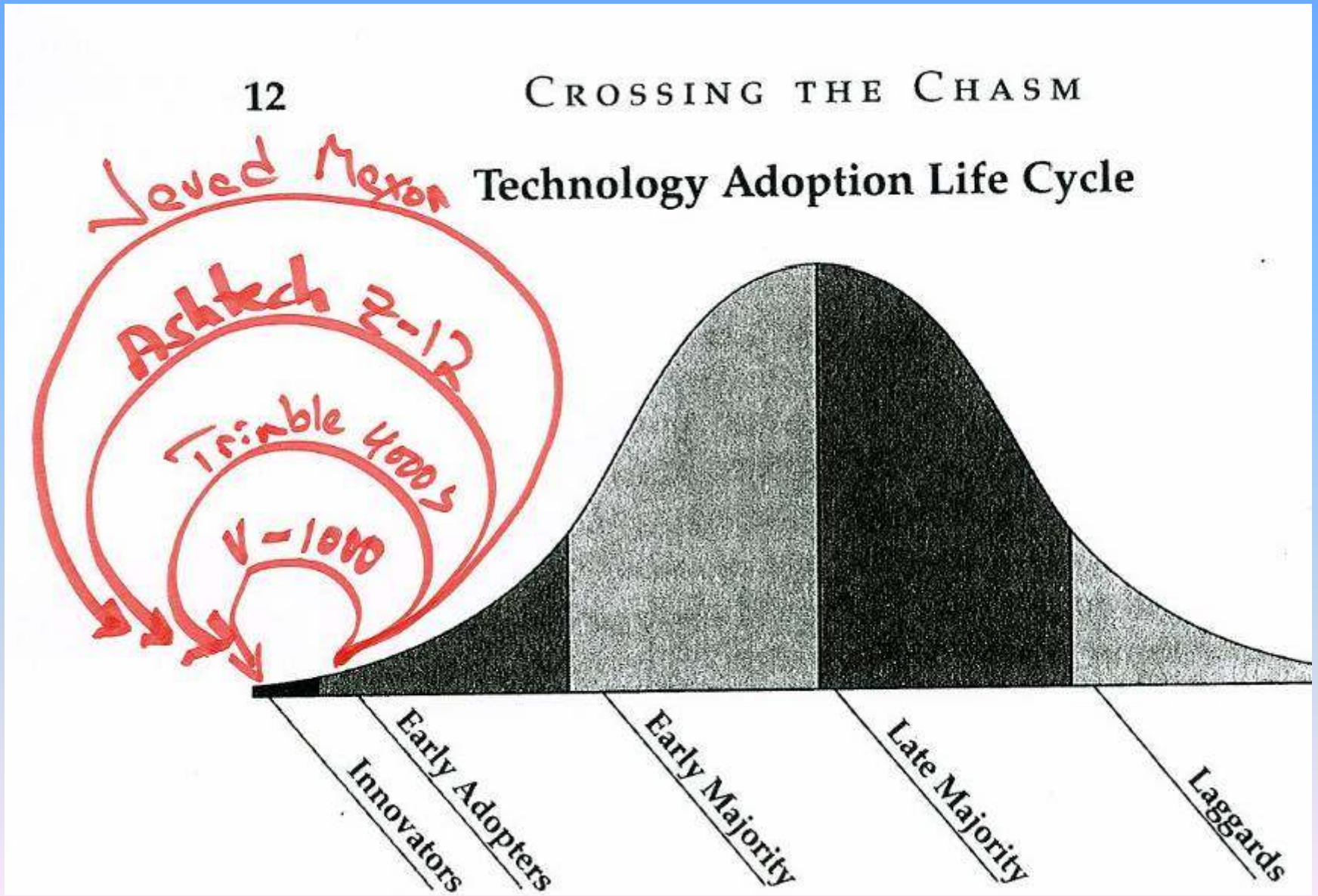
Very little progress?

2010

2010

From selling equipment to selling content ??

Stuck in the same loop myself



Cost of investment vs. cost of use (selling content)

In 1990's buying GPS was expensive (40,000 euros),
but using it was free (post processing or private base station)

In the 2000's buying GPS is inexpensive (10,000 euros)
but using it is expensive (VRS license fees)
(In Finland Trimble holds monopoly in VRS and price is
3,000 – 4,000 euros per year per license)

Over 5 year life cycle

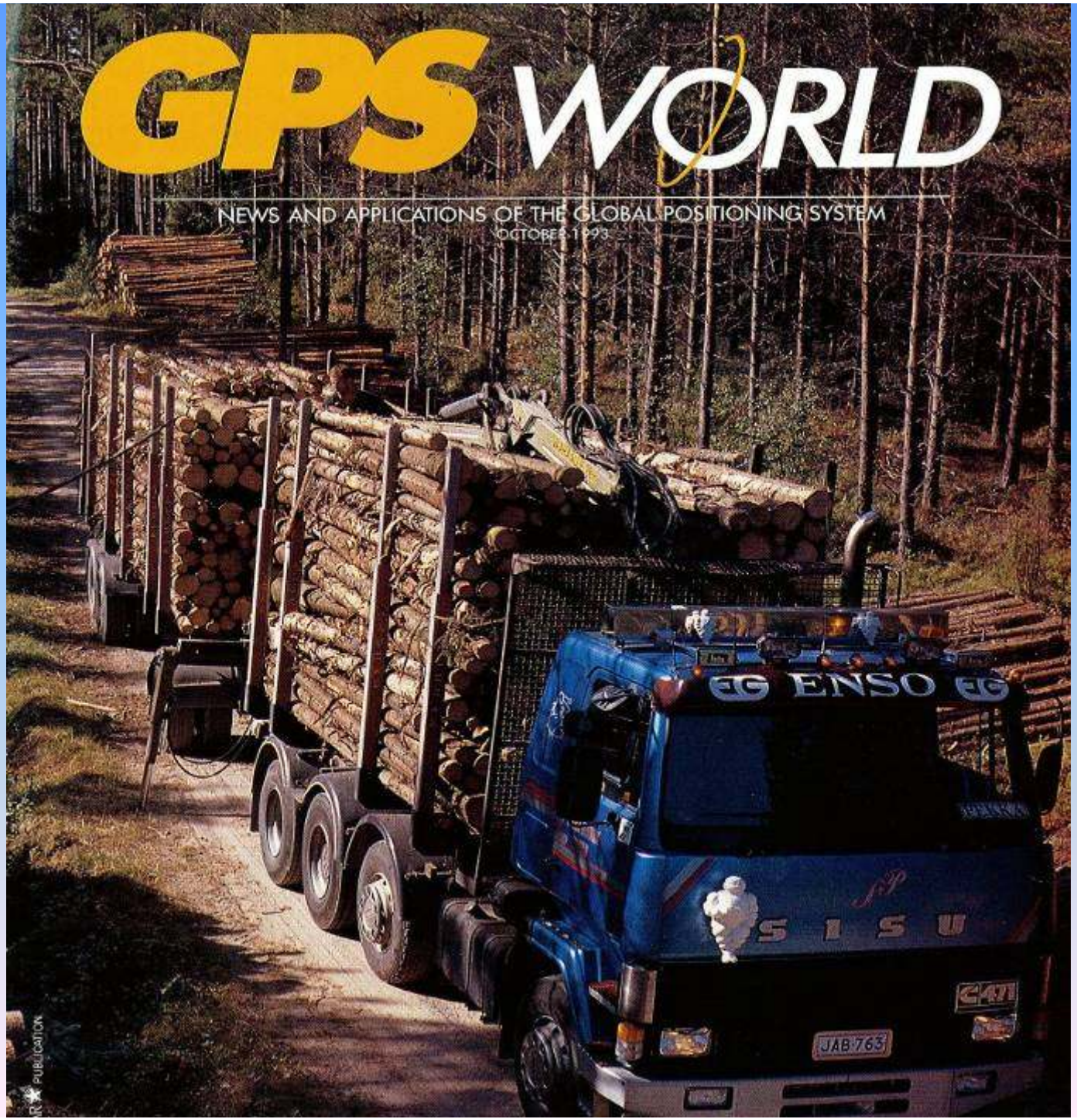
1) Manufacturer 8,000 euros
2) Dealer 2,000 euros
3) VRS provider 18,000 euros

Real-time GPS vs. REAL-TIME GPS

VRS is often thought of as real-time coordinates, and the measured coordinates are stored and live forever.

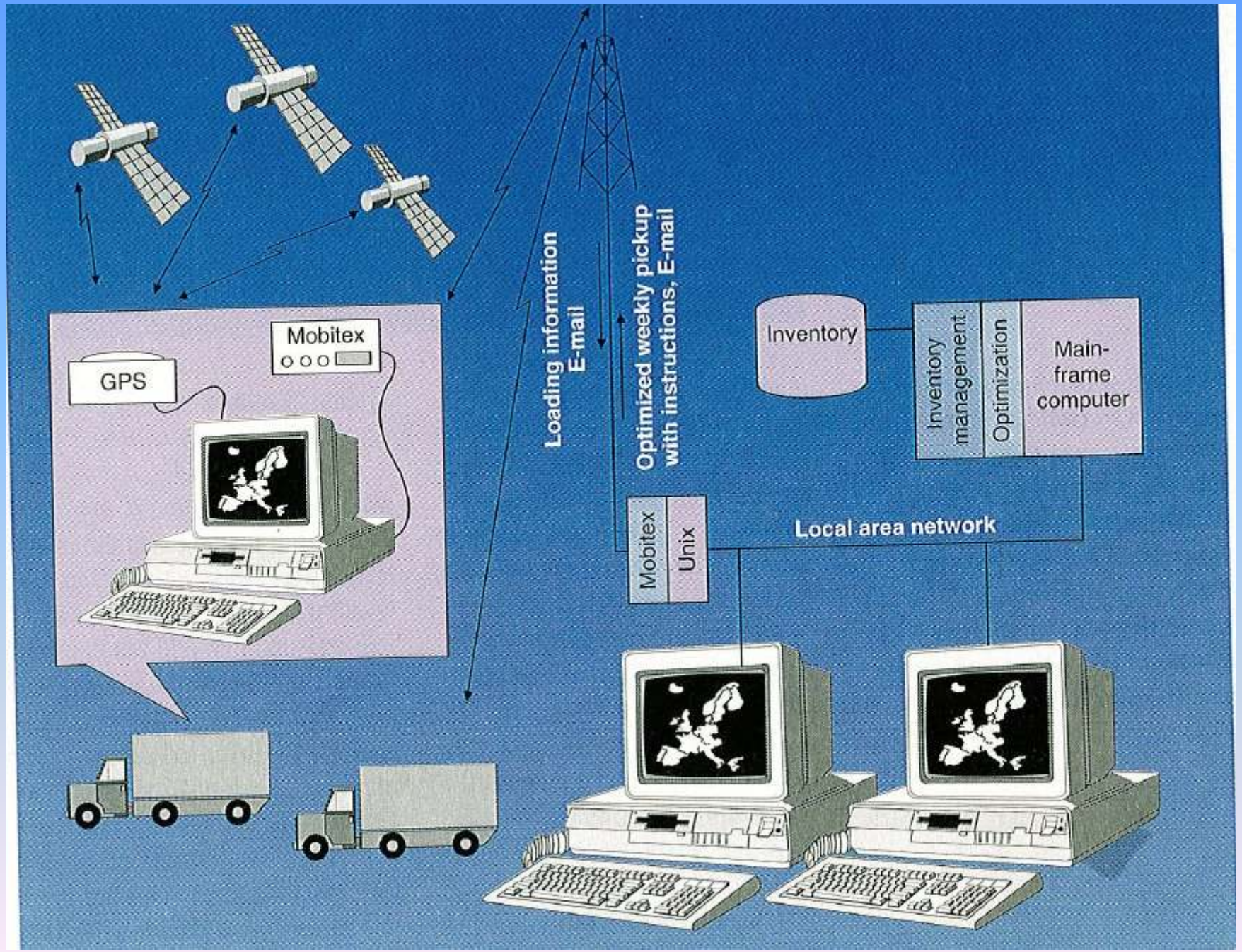
(SFO airport example, think in a new way)

REAL-TIME means measuring coordinates, which are used instantaneously by a Real-time application and then forever forgotten. They have no relevance once the moment has passed.



Case study
1993
Enso-Gutzeit


SISU
TRUCKER TEAM


GPS
Mobitex
Loading information
E-mail
Optimized weekly pickup
with instructions, E-mail
Inventory
Inventory management
Optimization
Main-frame computer
Mobitex
Unix
Local area network

Where was the money made ?

-Wood (=inventory) is bought standing up, paid at that time
-Small parcels scattered around the country, known to foremen who bought them.
-Amount of inventory 100 Meuros, interest rate 1992 10% (inventory high due to lack of control)
-New inventory level 50 Me, savings in interest expense 5 Me/year.
-GPS enabled the system, but money was made elsewhere (remember SFO airport)

P.S. Coordinate is only temporary, it ceases to have value once the logs have been picked up !

Case 2: Harbour crane RTK system for inventory control and last 30 cm steering

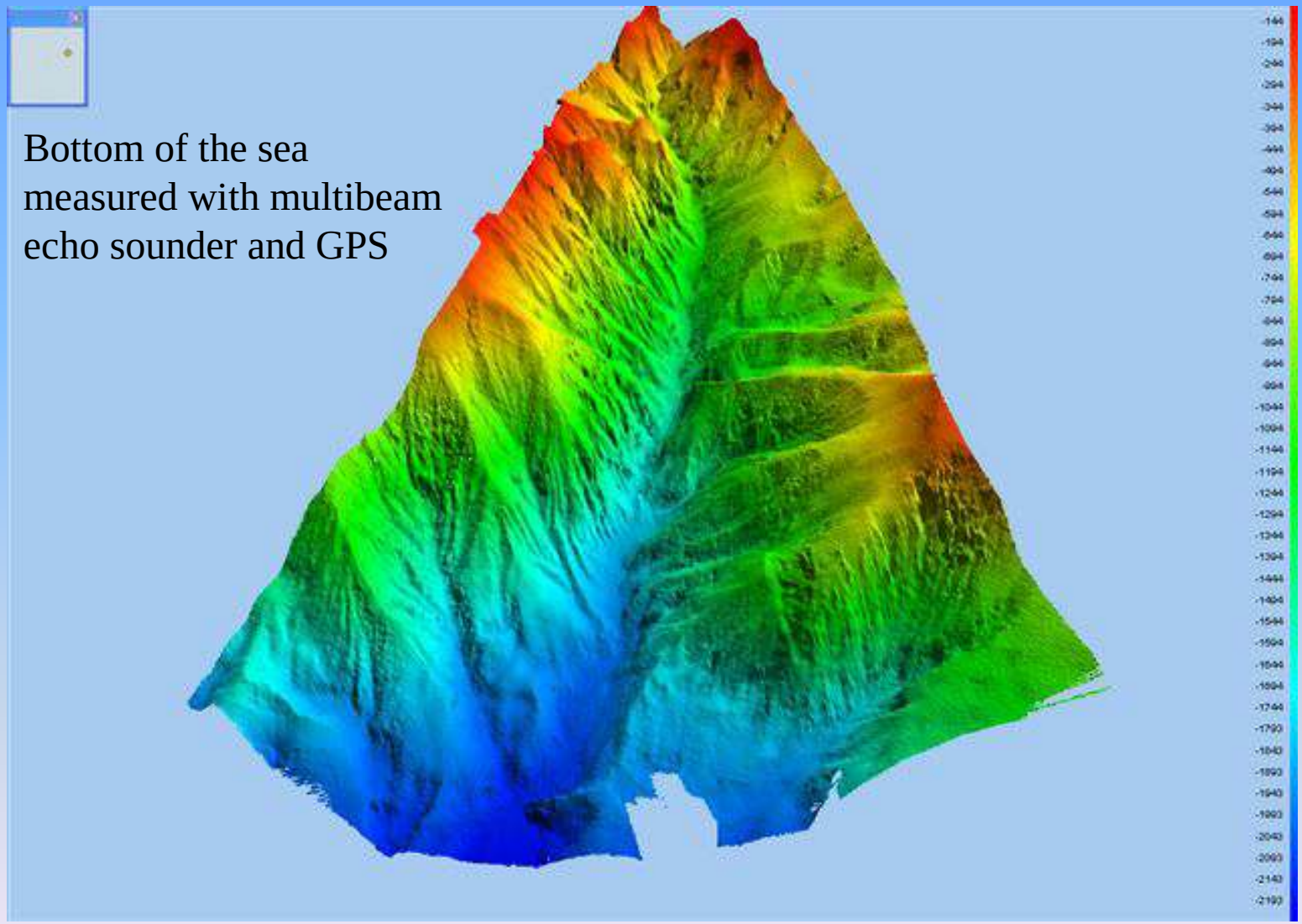
Dubai free harbour

- Block of 25 containers (each container 21 meter long), 1.5 km long block, 7 rows side-by-side (12,500 containers)
- 68 RTG cranes (Rubber Tire Gantry) working like ants, moving containers in-out and back in to blocks.
-Maintaining stack inventory with real-time system utilizing RTK, cable wire sensors and WLAN to send data back to inventory management software.
-Last 30 cm to assist the ”sledge pins” finding the corner holes in containers.
-Money is saved on fuel and maintenance, RTGs find container quicker, closest RTG can be given assignment, less wear on containers

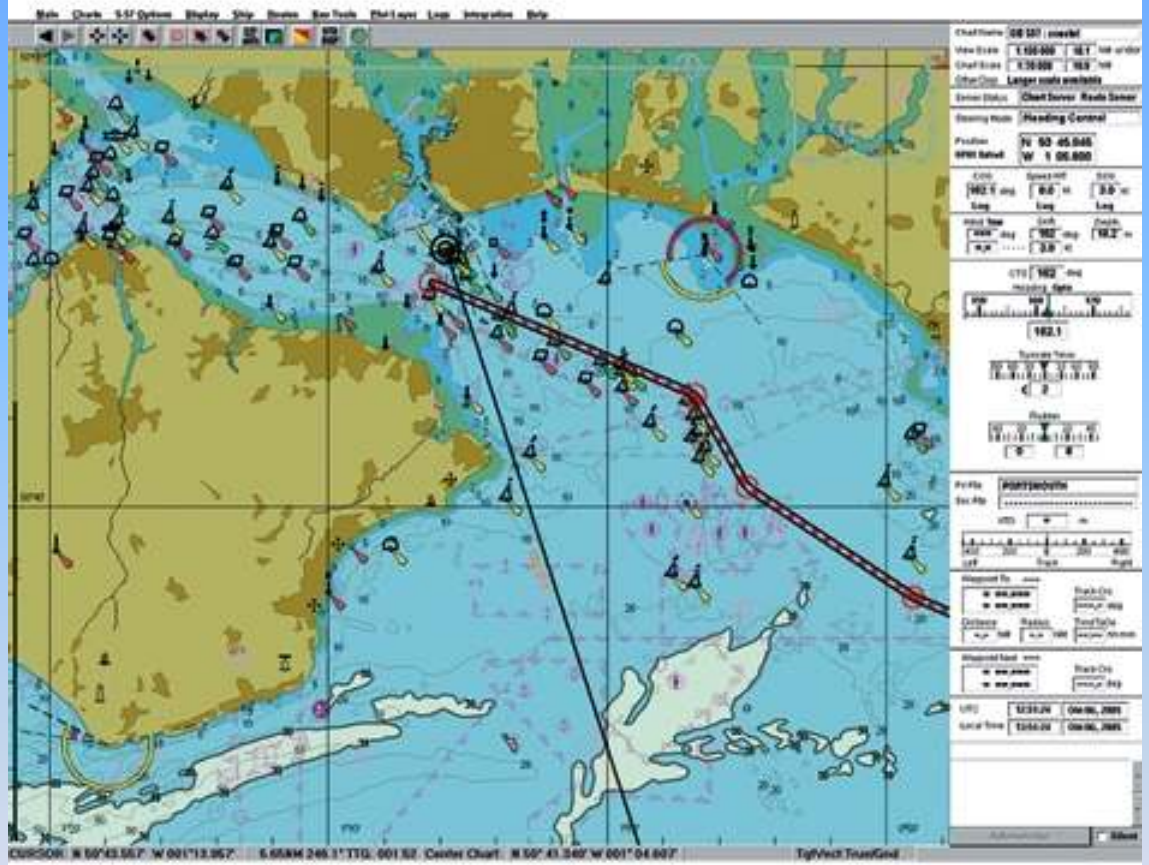
P.S. Harbour coordinate system can be arbitrary. Coordinate is only temporary, it ceases to have value once the container has been picked up !

Case 3: Dynamic Under Keel Water

Bottom of the sea
measured with multibeam
echo sounder and GPS

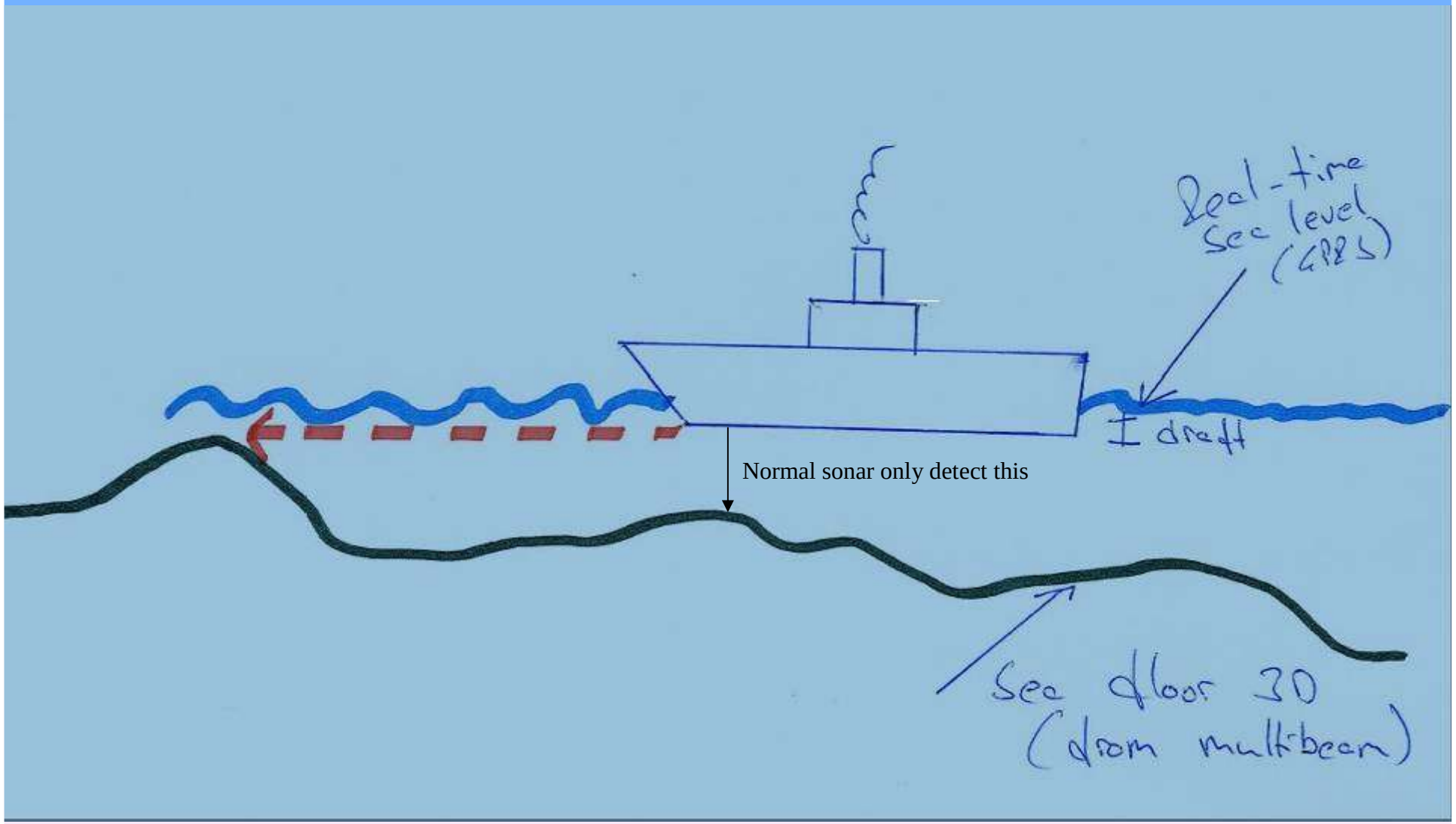


Conventional navigation thinking: From A to B



Let’s think again

Dynamic Under Keel Water forecasting system



Navigation to/from Port of Rotterdam

- Technical methods for improving navigation have improved, but our thinking has not (airport = airport).
-Port of Rotterdam, dredged deep in harbour pool, but shallow outside.
-Full ships in/out at high tide
-One more ship in/out per day with real time dynamic under keel water measurement system. (savings 80,000 euros /day)
-Thinking was changed from conventional use of seacharts into changed perspective (sideways) and real time data.

P.S. Coordinate is only temporary, it ceases to have value practically as soon as it has been computed !

Summary

-Think out of the box !!!
-I am not right in everything I presented, but if I made you think differently, that is good