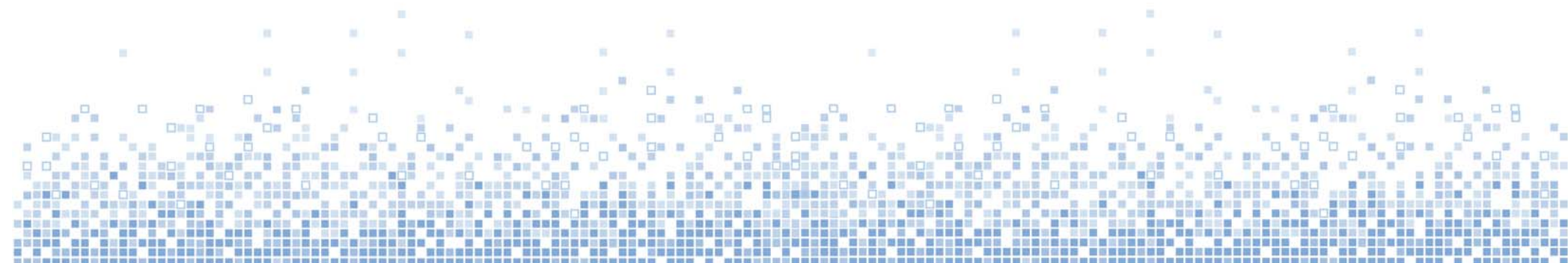# eLoran Maritime Service Provision: Initial Thoughts

By Dr Sally Basker, Professor David Last, Dr Paul Williams

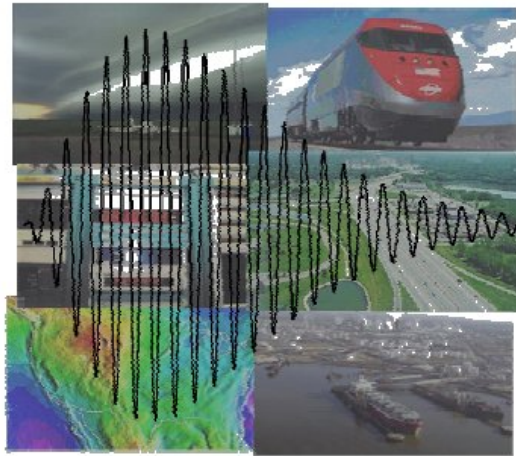Date: International Loran Association, Orlando, FL, USA, 17 October 2007

Declaring a radionavigation service "operational" – Facets of service provision

- Institutional
- Regulatory
- Commercial
- Operational
- Technology
- User

Loran Evaluation Report

Loran's Capability to Mitigate the Impact of a
GPS Outage on GPS Position, Navigation, and
Time Applications

Prepared for the
FEDERAL AVIATION ADMINISTRATION
**VICE PRESIDENT FOR TECHNICAL OPERATIONS**
NAVIGATION SERVICES DIRECTORATE

March 2004

Loran Evaluation Report – Maritime Harbor Entrance and Approach Requirements

Performance Requirements	Value
Accuracy (back-up)	20 meters, 2 drms
Monitor/Alert Limit (back-up) [24]	50 meters, 2 drms
Integrity (target)	3×10^{-5}/hour
Time-to-alert	10 seconds
Availability (minimum)	99.7%
Continuity (minimum)	99.85% over 3 hours

dLoran Operation –
Spatial and Temporal Variations
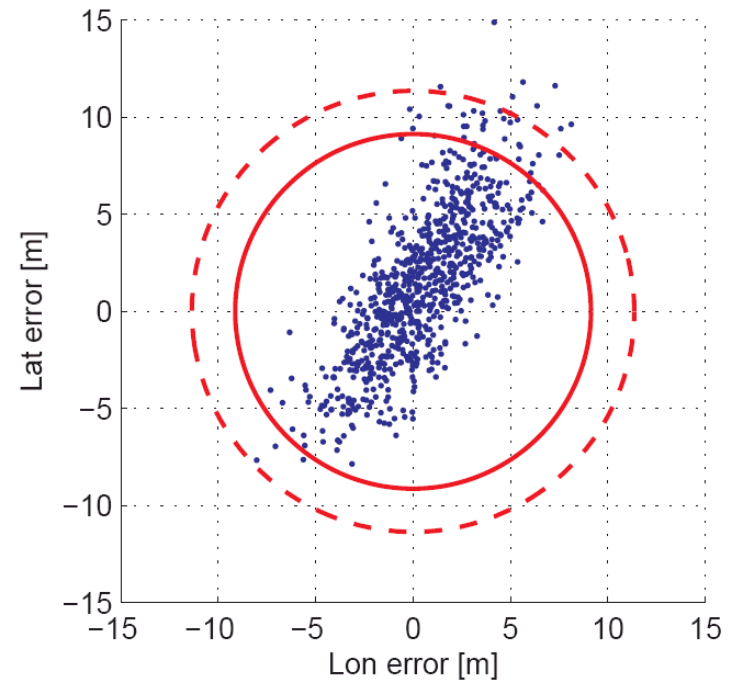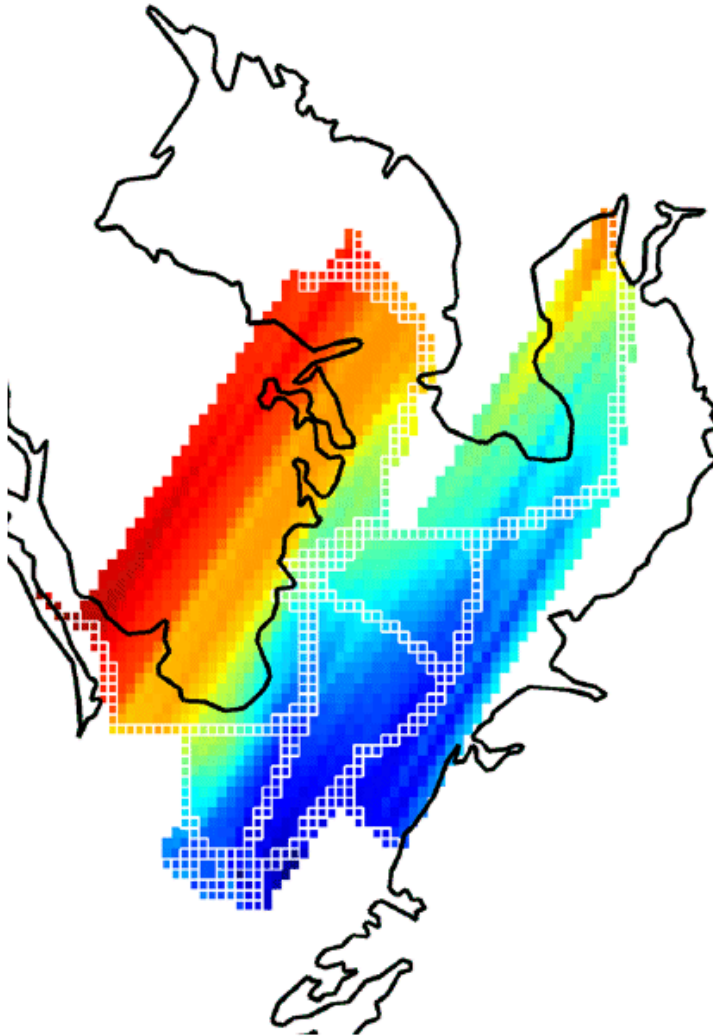
reference
station

user
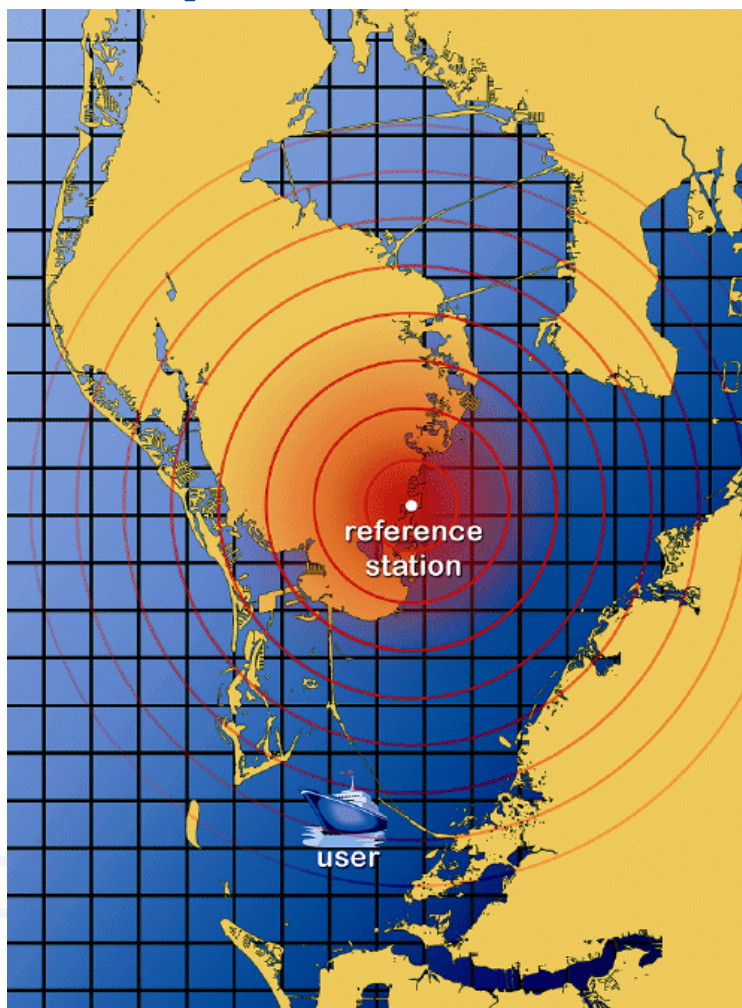
Picture: *Pelgrum, 'New Potential of Radionavigation in the 21st Century', Doctoral These, Delft University of Technology, Nov 2006*

US Coast Guard Academy dLoran

Wouter Pelgrum's dLoran

RESEARCH &
RADIONAVIGATION
GENERAL LIGHTHOUSE AUTHORITIES
United Kingdom and Ireland

Pictures: *Pelgrum, 'New Potential of Radionavigation in the 21st Century', Doctoral Thesis, Delft University of Technology, Nov 2006*

General Lighthouse Authorities' dLoran

Yellow line is difference between eLoran and DGPS positioning
Scale is 10 m/div

Pictures: *Data Gathering in Support of the GLA's "European eLoran Performance Evaluation", Final report REEL-TH-R03, Prepared for Trinity House*

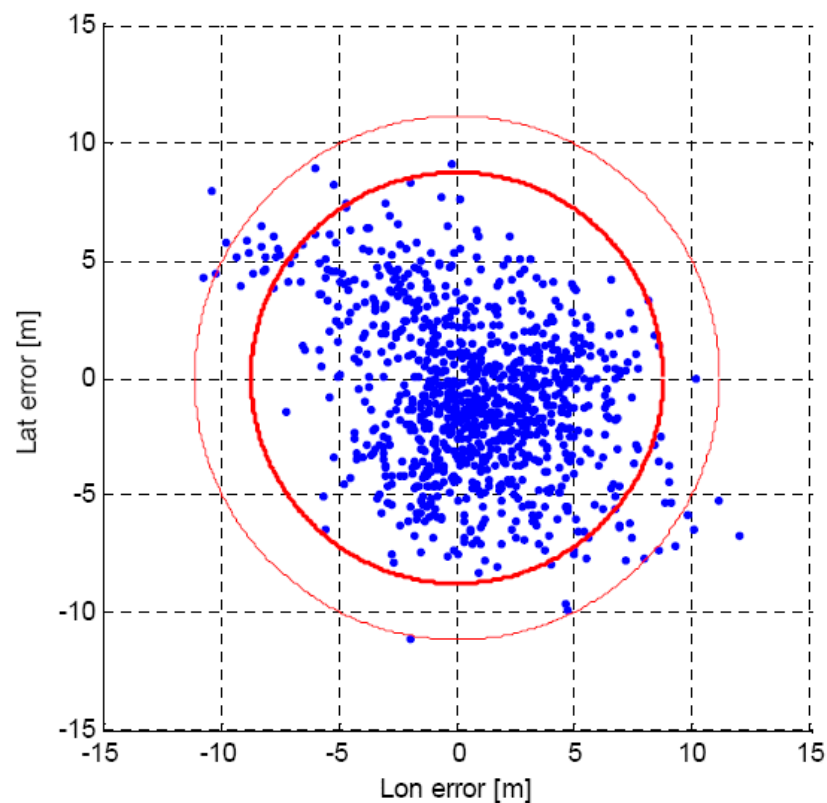# And the Blue Riband goes to:
The US Coast Guard Academy!

Picture: Johnson, Dykstra, Oates, Swaszek & Hartnett, 'Navigating Harbors at High Accuracy Without GPS: eLoran Proof-of-Concept in the Thames River', ION National Technical Meeting 2007, Session E3, Paper 5, 2007
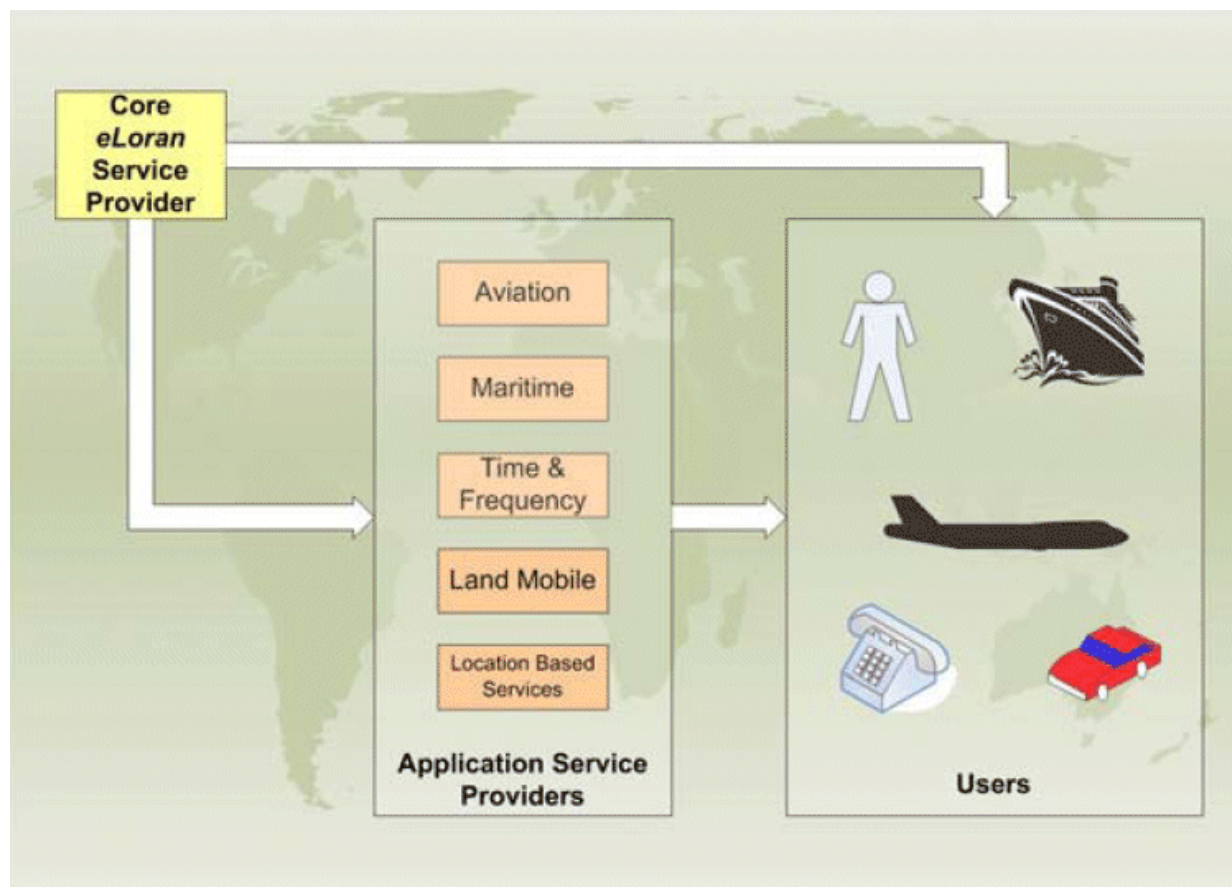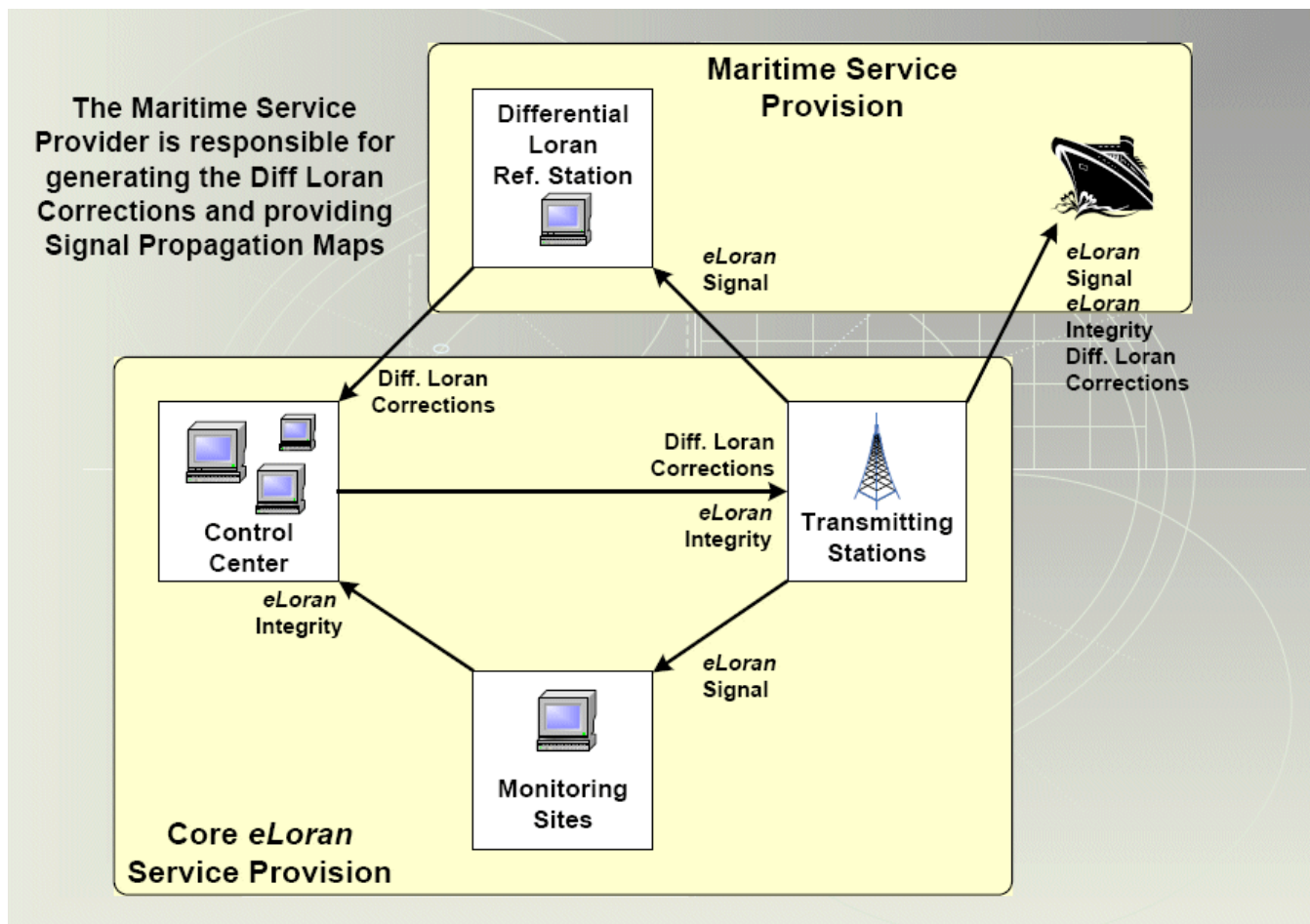
eLoran Definition Document

International

Loran

Association

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Enhanced Loran (*eLoran*)

Definition Document

Core eLoran Service

eLoran Service for Maritime Users

eLoran Service Definition Documents

Document	Description
Plan	Addresses policy, considers operational issues, presents a service description and identifies future developments. It may include a summary of user requirements that are met. Example: US Federal Radionavigation Plan
Performance Specification	Defines the level of performance including coverage that the service provider is committed to providing. It may take the form of a service level agreement. Example: US GPS SPS Specification
Interface Control Document	Defines the signal so that it can be accessed by user equipment. Example: GPS ICD-GPS 200

Declaring a radionavigation service "operational" – Facets of service provision

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Declaring a radionavigation service "operational" – Facets of service provision

- **Institutional** – **The political structures and their terms of reference**
- Regulatory
- Commercial
- Operational
- Technology
- User

Declaring a radionavigation service "operational"
– Facets of service provision

- Institutional – The political structures and their terms of reference
- **Regulatory – The legal environment**
- Commercial
- Operational
- Technology
- User

Declaring a radionavigation service "operational" – Facets of service provision

- Institutional – The political structures and their terms of reference
- Regulatory – The legal environment
- **Commercial – Service level agreement, performance, cost , risk**
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Declaring a radionavigation service "operational" – Facets of service provision

- **Institutional –** The political structures and their terms of reference
- **Regulatory –** The legal environment
- **Commercial –** Service level agreement, performance, cost , risk
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Declaring a radionavigation service "operational" – Facets of service provision
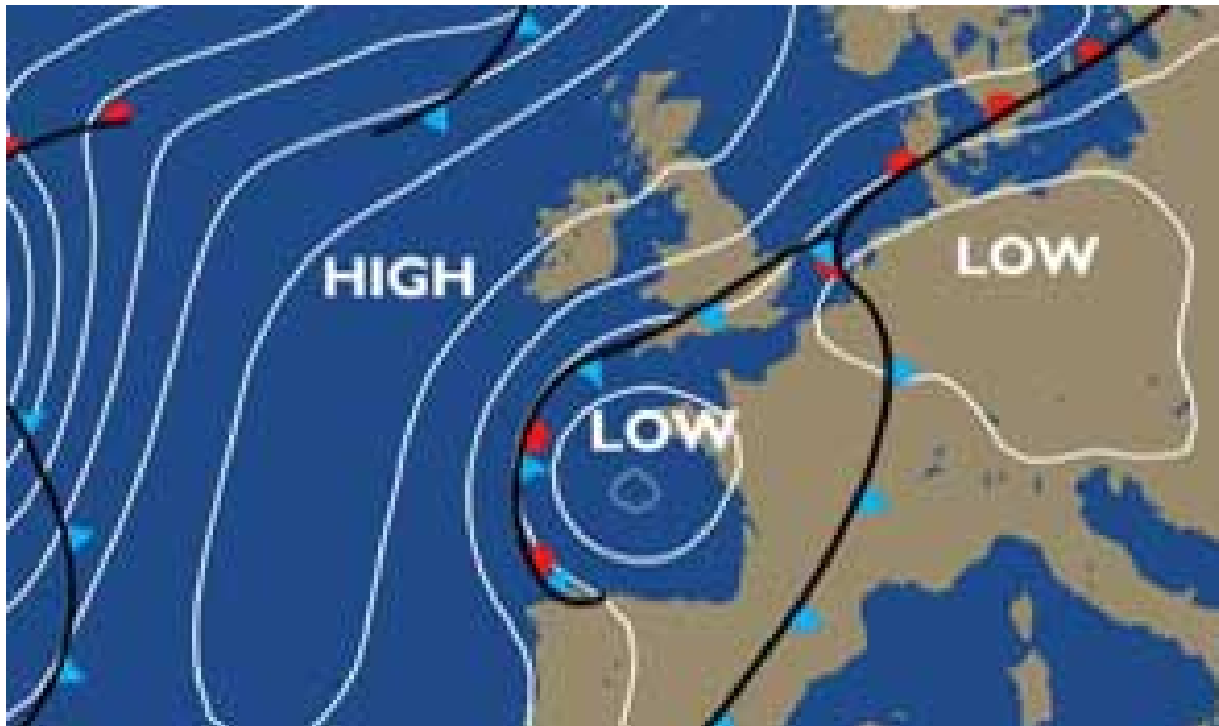
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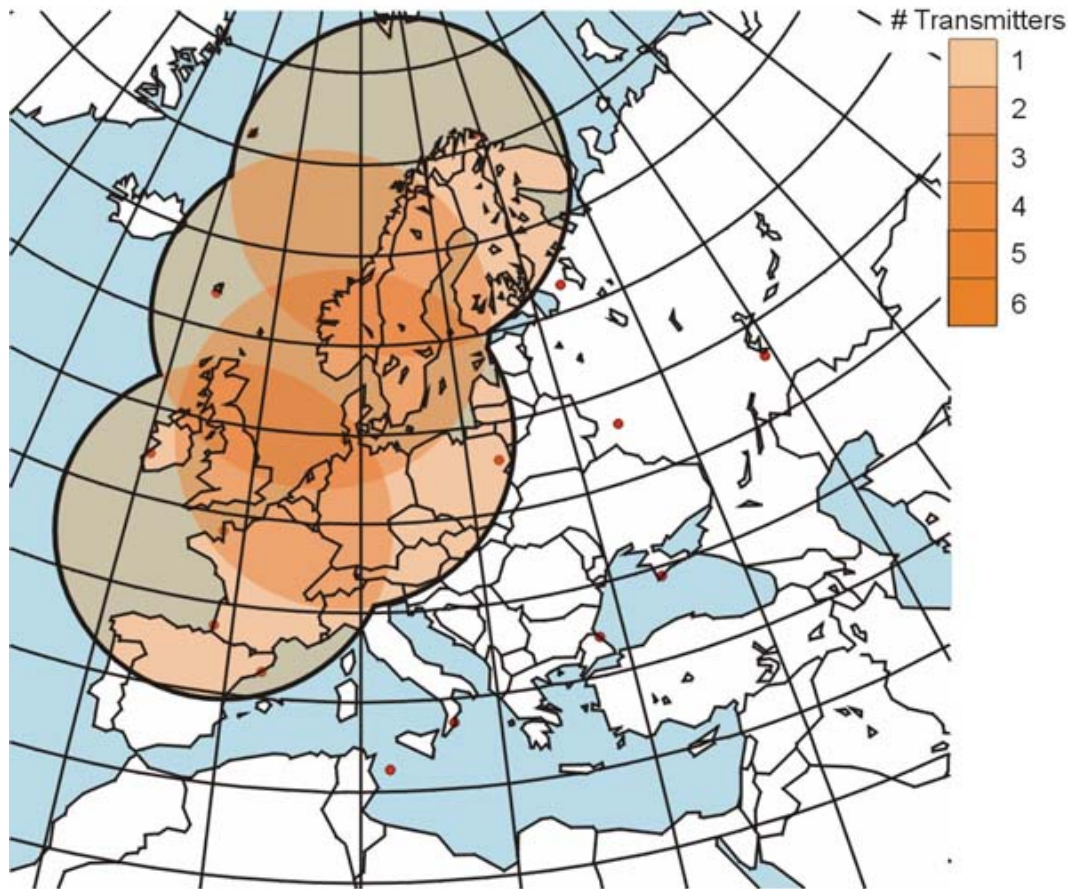
- Technology

- **User – All user aspects**

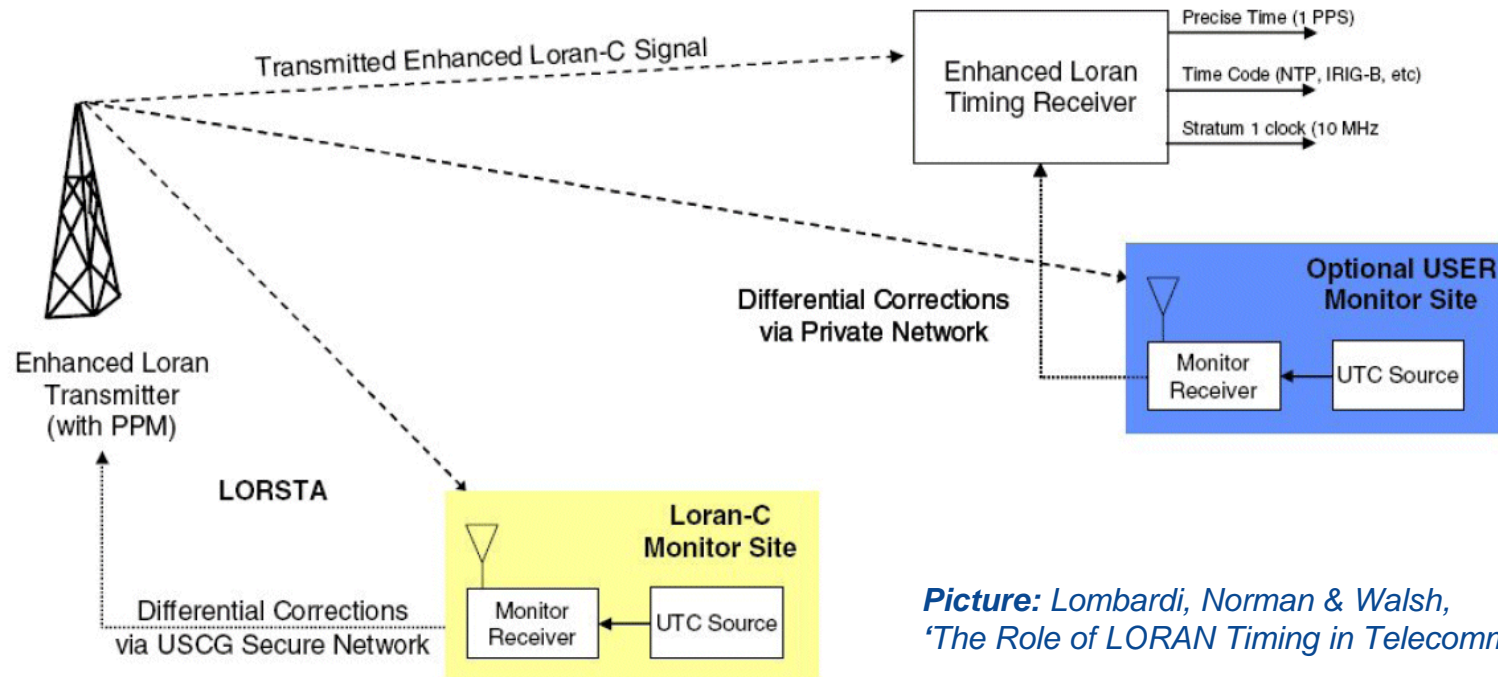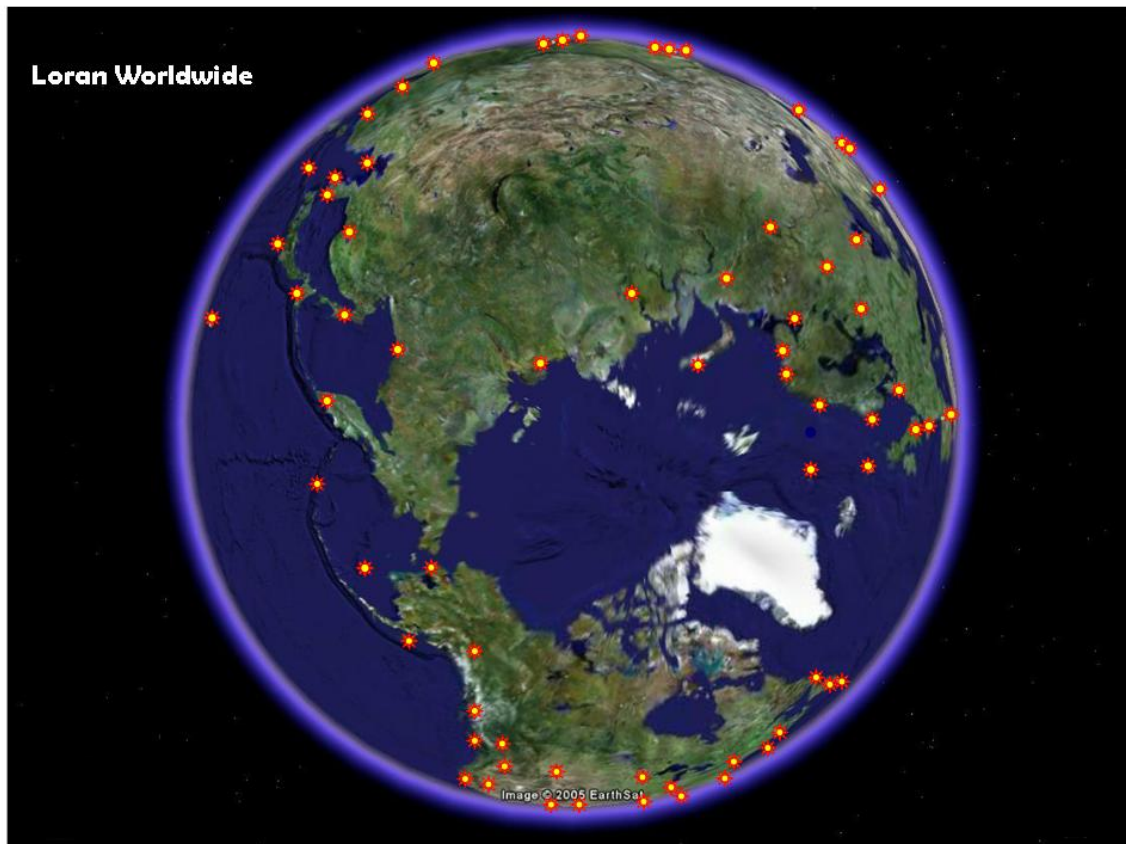# Coverage of Reference Stations?

Weather or not?

Data Channel Capacity?

Timing or *Navigation* Reference Stations?

Picture: Lombardi, Norman & Walsh, 'The Role of LORAN Timing in Telecommunications'

How many more Loran stations does Europe need?

Picture: Mitchell Narins,
US Federal Aviation Administration

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