

The Role of the European Institutes of Navigation (EUGIN) in Radio-navigation planning

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1. Introduction

After World War II Institutes of Navigation (IONs) were established in several countries (US 1946, UK 1947, Japan 1948, Australia 1949, France 1953, Germany 1954, Italy 1959); the objectives of these IONs were generally the same: *to encourage the creation and dissemination of knowledge, to co-ordinate information from all disciplines involved, to provide a forum for new developments and to further education and communication.*

From 1957 onwards, a series of conferences was held, at three years interval, jointly by the British, French and German Institutes of Navigation to discuss technical navigation issues. The separation of maritime traffic flows in highly congested areas was an issue of main concern. In 1964, the International Consultative Maritime Organisation (IMCO) accepted a submission prepared by the three IONs on traffic regulation in the Dover Strait. In 1968, a further report on the Separation of traffic at sea was accepted by the Maritime Safety Committee of IMCO.

The preparation and submission to IMCO of the reports on Traffic Separation gave an authoritative status to the IONs in the international navigation community. The International Association of Institutes of Navigation (IAIN) was established on 15 October 1975 and was given consultative status to the International Maritime Organisation (IMO) in 1976. Since then IAIN has been participating actively in the Subcommittee on Safety on Navigation, notably on issues of Routing procedures, Collision Avoidance Rules, passage planning and the use of radar and electronic positioning. The most recent submissions are: Appendix 1 “**Terms used in Global Navigation Satellite Systems (GNSS)**” to Resolution A.860(20) on Maritime Policy for a future GNSS in 1996 and a joint submission in 1999 with the International Association of Shipmasters and the International Pilots’ Association containing a proposal for the Navigation through the Strait of Istanbul, Strait of Cannakale and Sea of Marmora.

IAIN's influence was not confined to the maritime environment. In 1985 it was given consultative status in the International Civil Aviation Organisation (ICAO), where it actively participated in the Committee on Future Air Navigation Systems (FANS). A submission of IAIN on the world wide use of a common geodetic system was accepted by FANS.

IAIN has now 17 Members and 2 Associate Members, representing ten thousands of individual and corporate members world wide from industry, governments, academic community, and not in the least from users.

2. European situation

It is now over 50 years ago since the then British Institute of Navigation noted at its inaugural meeting on 12 March 1947 that ...*“European wide harmonisation of radio navigation systems was needed”*. This proposition has been put forward on a number of occasions since 1947, notably at NAV conferences of the Royal Institute of Navigation (RIN) in the late eighties and early nineties. Coincidentally, in the early nineties the IONs of the European Union decided to work more closely together in discussing navigation policy with her members. In order to have a European forum for satellite navigation developments, an annual Differential Satellite Navigation System (DSNS) - later renamed GNSS – conference was organised since 1991 by one of the European IONs with great success.

In order to be accepted by the European Commission as an official organisation, the IONs of the EU decided to establish an Association. A Constitution was written and - ruled by the Belgian Act of 1919 – the non profit making organisation “EUGIN” was registered in Belgium in 1997. Executive Members of EUGIN are recognised National (or Regional) Institutes of Navigation in the EU; EUGIN also comprises Honorary Members being persons or legal entities appointed by the General Assembly who are able to assist in achieving the aims of the Association.

The Founding Members of EUGIN are the IONs from France, Germany, Italy, Netherlands, Scandinavia and the United Kingdom. The IONs from Spain and Austria joined at a later stage and the Swiss ION has recently applied for Associate Membership.

The objectives of EUGIN are:

1. Consultancy and advice to European institutions in the fields of navigation, traffic management and related communications and training;
2. To start or favour, by whatever methods are possible, actions assisting in the development of pan European policies and strategies in the general fields of navigation and traffic management and in particular in the field of satellite navigation;
3. Foster co-operation and information exchange between its Members and competent authorities or organisations active in the above mentioned fields of expertise;
4. Provide information in its field of expertise to the public by organising conferences and symposia, publishing books and papers; and participating in electronic methods of data dissemination;
5. In general, to undertake anything which has a bearing directly or indirectly in whole or in part on EUGIN’s objectives as given, or would be liable to facilitate or aid their realisation.

3. EUGIN's activities

On the issue of the **first objective** – consultancy and advice to EU institutions – EUGIN operates prudently. In order not to compete with corporate members of Member IONs and with their members who are consultants, the EUGIN Council decided therefore not to bid or co-bid on tenders from European Institutions. Only when officially requested by e.g. the EC – usually preceded by thorough discussions with the EC and financially supported by a grant - will EUGIN get involved.

The major strength of EUGIN lies in its ability to organise workshops/conferences, free of political bias, on a European wide basis; focussing on a navigation topic of concern to a European Institution. EUGIN can illuminate the issues involved, highlight the driving factors, and give the pros and cons of the options for the way ahead.

Another way of giving advice and consultancy in European projects is by a request of a Consortium which has been assigned a European project. EUGIN now participates in a consortium for the ECUREV project, which aims to identify user groups outside the European Civil Aviation Conference (ECAC) area for the European Geostationary Navigation Overlay Service (EGNOS); EUGIN's institutional contacts are used here to the advantage of the project. EUGIN has also been requested to participate in a proposed project of the European 5th Framework programme called: "Galileo European Network of Experts to Support the European CommIssion "(GENESIS). The project proposes to set up a **thematic network** aiming at monitoring all GNSS research related activities, and steering 5th Framework Research and Technology Development (RTD) activities on GNSS.

In 1996 the report "*Proposed baseline of European Radio Navigation Plan*" (ERNP) was published. The project was initiated by the EC DG7 (Transport) and carried out by Booz-Allen & Hamilton with the support of several individual members of European Institutes of Navigation. It was followed by a project "*Implementation of the European Radio Navigation Plan*" (IMERP), carried out by EUGIN with a grant from EC-DG7. The reports were published in late 1997. As critical decisions on organisational issues of EGNOS had not yet been made and the green light for the Galileo project was not yet given by the European Transport Council, the results of the studies have not yet led to a EU decisive policy on the ERNP.

During several recent symposia European IONs have discussed the way ahead for European navigation infrastructure planning, notably during EUGIN's DSNS/GNSS conferences, RIN's NAV conferences and other national navigation conferences organised by European IONs. The national IONs have also played a major consulting role in the drawing up of national RNPs. The conferences, experience and know-how within EUGIN could therefore contribute in the coming years in the drawing up of a European Policy Plan on navigation infrastructure and harmonise it with RNPs in other parts of the world. EUGIN thus fulfils her **second objective**: assistance in the development of pan European policies and strategies in the field of navigation and traffic management.

In response to a request from the European GNSS Secretariat (EGS), EUGIN is prepared to organise Multimodal Education and Awareness Workshops in EU

countries. The aim is to make industry and users aware of the enormous potential of satellite navigation in combination with modern communication technology for transport, (precision) agriculture, geodetic applications, timing etc. As these workshops are consistent with EUGIN Objectives, an offer is made to the EGS to conduct these workshops in the coming year.

The DSNS/GNSS conferences organised since 1991 – later under the auspices of EUGIN – provide an annual forum where new developments in satellite navigation – notably the European developments in EGNOS and Galileo – are presented and discussed with the European navigation community. EUGIN fulfils there her objective of information exchange between her Members and providing a forum for information exchange. Above that, the conferences are extensively used to arrange parallel meetings of participants in European satellite navigation projects with or without the project supervisor(s) from European institutions.

The issue of **positioning** by satellite or terrestrial systems has dominated the discussion in the international navigation community in recent years. By the bombardment of conferences, reports, papers, etc. on issues of GPS and DGPS, Global Navigation Satellite System (GLONASS) and DGLONASS, Wide Area Augmentation System (WAAS) and Local Area Augmentation System (LAAS), EUROFIX, etc. other important and related elements which contribute to the safety and efficiency of navigation and traffic flows threaten to be underexposed, such as:

- the accuracy of navigational (electronic) charts in relation to the expected position accuracy of the future positioning systems;
- improved navigational displays, showing path prediction (using the dynamic model of the craft and predicted or measured external disturbances) and predicted consequences of control actions with safety margins;
- the issue of sole/primary means of navigation and single point failures; note:
 - interface of Global Maritime Distress & Safety System (GMDSS) to a single (D)GPS receiver for the transmission of the position in an emergency call;
 - interface of a single (D)GPS receiver to the automatic track pilot of ships;
 - the interface of a single (D)GPS receiver to the new Automatic Identification Systems (AIS) on board of ships, which transmit position, ground course and ground speed from that GPS receiver to other ships and Vessel Traffic Service (VTS) stations in the own ship VHF coverage area;
 - the interface of a single (D)GPS receiver with Electronic Chart Display and Information System (ECDIS) and the reliance navigators give to the displayed position, course and speed on ECDIS;
- procedures, equipment requirements and training requirements for navigational assistance in harbour approaches as alternative for remote pilotage and on board pilotage;
- training requirements for crews of ships with modern integrated bridges and aircraft using free flight routes;
- information exchange between ships/aircraft and VTS/Air Traffic Control (ATC), such as the provision of clearance on the basis of 2D+T/3D+T (free flight) passage plan.

EUGIN will discuss these issues with her members during symposia and workshops; when consensus is obtained on certain issues, the standpoints will be brought forward to competent authorities.

Considering the theme of this congress, EUGIN favours the availability of **redundant** radio navigation infrastructure - including external integrity monitoring - in order to obtain robust on board solutions. To avoid on board single point failures, **redundant integrated board systems**, where each system is able to perform integrity monitoring on the observations to detect and delete spurious observations caused by local interference/anomalies or receiver failures offer the best solution.