Recommendations
Galileo is at the crossroad. Both the Commission and ESA must rely on a consistent Mid Term Plan and organization to achieve success and keep the momentum to continue to deploy the full constellation. Short term savings, although understandable in the context of the crisis, could damage the entire process and put into jeopardy the investments made by the Union and the Member States so far.

Long term and ambitious commitments in the months to come will generate important savings in the program and allow the markets to take up, bringing returns to the citizen and to the economy.

In the mean time the Commission should certainly provide a detailed lesson’s learnt on the procurement process that ESA has conducted in 2009/2010 and propose how to further improve and meet the European objectives of Galileo.

- A LONG TERM COMMITMENT FOR GNSS INFRASTRUCTURE
DEVELOPMENT AND CONTINUOUS SERVICE PROVISION
- Secure the necessary funding to achieve the timely availability, operation, full performance and evolution of the European GNSS systems
- Ensure and support seamless and sufficient industrial activities
- Implement an action plan to cover long term issues like operations, obsolescence management, system and missions evolutions, risk management, industrial and procurement, etc.
- In order to maintain the ambitious schedule the commission shall implement recommended risk mitigation measures like dual procurement in all critical work packages.
- Improve the governance, organisation and decision making processes in view of the systems exploitation

- DOWNTREAM BUSINESS AND APPLICATIONS
- Develop Innovations and Intellectual Property in Europe
  - Encourage European Industries to innovate and file patents
  - Support entrepreneurial programs
  - Support business development at national, regional and global markets
- Avoid signal access fees or charges possibly detrimental to markets
- Secure the necessary funding to achieve the timely availability, operation, full performance and evolution of the European GNSS systems
- Ensure and support seamless and sufficient industrial activities
- Implement an action plan to cover long term issues like operations, obsolescence management, system and missions evolutions, risk management, industrial and procurement, etc.
- In order to maintain the ambitious schedule the commission shall implement recommended risk mitigation measures like dual procurement in all critical work packages.
- Improve the governance, organisation and decision making processes in view of the systems exploitation

- INTERNATIONAL COOPERATION
- Support cooperation based on reciprocity.
- Develop policies to ensure that international cooperation is to the benefit of Europe.
- Safeguard IPR to European Industries

- LAUNCHERS
Galileo is an important aspect of European independence and sovereignty. The European launcher, Ariane 5 – capable of launching 4 satellites at a time – should be the core launcher for Galileo. Soyuz launchers, launched from Europe space port in Kourou, should complement Ariane 5. Next to strategic and technical reasons, there are also economic reasons: Ariane is produced in Europe and generates employment and tax return.

4.5. International Activities
International cooperation is a key feature for the success of Galileo on a global scale. The main international activities of the European GNSS Programmes are:
- to ensure Galileo compatibility and interoperability with other GNSSs,
- to further secure the needed GNSS frequency allocation,
- to establish worldwide GNSS standards,
- to ensure security of the space segment and network of ground stations, while:
  - keeping a stricter control of sensitive GNSS technologies developed thanks to European funding and
  - preserving European know-how, IP Rs and competitiveness.

An objective is to create global market opportunities for the European GNSS technologies and applications industries.

Some examples of open issues:
- access policy to governmental services for non-European partners,
- Industrial and IPR policy,
- a specific Galileo technology export control regime,
- ambitions and plans of China regarding frequencies and power.

1. Benefits of European Satellite Navigation Programmes for the Citizens and the Economy

Satellite navigation has become essential in day to day life and socio-economic prosperity. Today satellite navigation already builds the backbone of growing multi-billion-euro markets.

Led by the European Union, managed by the European Commission and implemented by the European Space Agency (ESA) Galileo will bring a new generation of global position and timing-based services for the benefit of road, maritime, rail and air transport, agriculture, telecommunications, fisheries etc. The improved accuracy and reliability of Galileo with its guaranteed service features which are tailored to user needs, will provide unparalleled service quality in global satellite navigation, positioning and timing.

Galileo and its precursor EGNOS enable a huge range of safety and liability critical services, applications and business opportunities in the navigation, positioning and timing markets.

Galileo will shortly realize Europe’s technological independence on positioning, navigation and timing products and services, already being at the origin of thousands of highly skilled jobs in Europe.

EGNOS and Galileo are both at the heart of Europe’s ambition to be the most competitive and dynamic knowledge-based economy. Together they stimulate:
- The European Geostationary Navigation Overlay Service augments the quality of GPS and Glonass signals in terms of accuracy and integrity. EGNOS consists of a constellation of 3 satellite navigation payloads in geostationary orbit above Europe and a network of about 50 stations. EGNOS is the first ever infrastructure owned by the Union. It is operational since the year 2009 and exceeds expectations.
- Galileo will be the first global Radio Navigation Satellites System specifically designed for civilian purposes which will provide Europe with a State of the Art and autonomous infrastructure. Galileo consists of a constellation of 27 satellites, with 3 active spares, guaranteeing signals availability and integrity. The satellites will be monitored and controlled by a worldwide network of ground stations and operated from two Control Centres based in Oberpfaffenhofen and Fucino.

About ASD EUROSPACE
- Eurospace was created in 1961 as the Association of European space manufacturing industry. It became ASD Eurospace, as the Space Group of ASD, in 2005.
- ASD Eurospace 51 member companies provide the backbone of the European space sector with the capacity to design, develop, produce and operate complete space systems (launchers and satellites) for commercial and institutional customers in Europe and the World.
- With a consolidated turnover of 4.7 B€ and employment of 30,500 in 2004, the European space manufacturing sector is a strategic asset for Europe.

Navigation Working Group
This position paper was prepared by ASD Eurospace Navigation Working Group. The Navigation WG is a forum where space industry can formulate its position with a view to presenting it to the authorities of the European Union, ESA and, more generally, all parties involved, public and private, whenever the evolution of the Global Navigation Satellite System programme makes it desirable. The Eurospace Navigation WG is currently chaired by Dr Helmut Blomenhofer (Thales).

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late the European industry, enhance technological in-
dependence and improve the GNSS performance for
users worldwide.

The development of satellite radio navigation is fully
in line with the Lisbon Strategy as well as its succes-
sor “EU2020” and other Community policies such as
transport policy as set out in the Commission’s White
Papers.


Since Galileo was launched, the global satellite navi-
gation landscape has changed. Competitors have be-
come stronger and the market has continued to grow.
The US NAVSTAR GPS (Global Positioning System) has
consolidated its world-wide leadership role. The Rus-
sian GLONASS is expected to reach its full operational
capability soon. Both Galileo (EU) and COMPASS/BEI-
DOU (China) are still under development. In addition
there exists several regional augmentation systems, a
concept invented with EGNOS in Europe in the early
90s, which are, either fully operational (EGNOS-EU,
WAAS-US, MTSAT-Japan), or about to be (Gagan-In-
dia).

European non-dependence on critical infrastructures is
of utmost importance. Galileo will however be compat-
ible and interoperable with GPS, GLONASS and possi-
bly COMPASS/BEDOU. Compared to the other GNSSs,
which are operated by the military, Galileo will be under
civilian control, thus becoming the new cornerstone
amongst the global navigation satellite system (GNSS)
for civil applications.

3. Programme Implementation and Development Framework

In 2007, the EC re-profiled the European GNSS pro-
grames by establishing a new legal and financial
framework for the period of 2008-2013.

The new framework budget includes the completion of
the Galileo IOV phase and the financing of the Galileo
deployment phase (Full Operational Capability - FOC)
until 2013 for the first part of the Galileo Services. This
budget also addresses EGNOS operations and pre-
paratory activities in relation to the exploitation of both
programmes. The total amount earmarked for these
activities is EUR 4,206 million, including EUR 400 mil-
lion made available from the Seventh Framework Pro-
grame for Research and Technological Development.

3.1. EGNOS

The EGNOS industrial Partners (50 industrial partners
in 11 Member States) are proud of what has been
achieved since the initial Contract award.

Thanks to the coordinated efforts of EC, ESA and Eu-
rocontrol together with the Industrial Prime and team,
EGNOS now offers unrivalled performances over the
ECAC area.

The Commission has recently managed the smooth
continuity of the program when taking the ownership,
managing the operations hand-over from the European
Space Agency on 1st April 2009 and awarding the op-
eration and exploitation of the system to the European
Satellite Services Provider (ESSP) in Toulouse.

EGNOS will help improve transport services and these vehicles © ESA

The EGNOS Open Service were then officially declared
operational to all “non safety critical” users on 1st Oc-
tober 2009. The ultimate milestone of System Certifica-
tion aiming at safety critical applications and aviation
in particular will be completed in fall 2010. On this oc-
casion, all the EGNOS signals will be declared fully op-
erational.

EGNOS has been designed as a multi-modal system
that benefits to a wide range of users. EGNOS complies
with availability, continuity and integrity requirements
derived from aviation standards.

3.2. Galileo

More than 1000 engineers and technicians are present-
ly working on the development of Galileo. Its progres-
sion also relies on the successful performances of the
Galileo In-Orbit Validation Elements (the GIOVE A and B
satellites) which are exceeding expectations.

Galileo will offer the following five services:
– Open Service (OS), a free service which aims mainly
at the mass markets. Its positioning accuracy will be
in the meter level which suits vehicle navigation and
location based services.
– Commercial Service (CS), an encrypted service of-
fering guaranteed accuracy at the decimetre level
for specialised and professional applications. This
signal will be made available on a fee-base to users.

– Safety of Life Service (SoL) will automatically inform
users within a 6 second time-to-alarm of any signal
failure possibly affecting its specified performance.
This signal will allow safety critical applications such
as aviation and other transport means on land and wa-
ter.
– Public Regulated Service (PRS) is dedicated to Gov-
ernment users. The signals will be encrypted and
are designed to be more jamming resistant. They
will be used for security, law enforcement as well as
for strategic infrastructure (e.g. energy, telecoms, fi-
nance).
– Search and Rescue Service (SAR): the SAR pay-
loads receive distress signals and transfers it to a
Rescue Coordination Centre. A return signal will be
sent back to the users advising that help is on the
way.

4. Current Challenges and Open Issues

Today, the Galileo In-Orbit Validation (IOV contract)
challenging industrial activities are in progress and the
first four satellites of the constellation are under manu-
facturing.

The contract for 14 Full Operational Capability (FOC)
satellites was awarded in January 2010, so that an ini-
tial operational capability will be reached by 2014 based
on 18 Satellites. The full capability needs 12 additional
satellites.

Europe must keep the momentum to roll-out the full
capability of the constellation and operation and ex-
ploration of the system to be broadcasted at full
performance world-wide. Long term commitments
and support are needed from the European Commis-
sion.

4.1. Budgetary Challenges

Galileo is presently entering in its most resources-de-
manding phase during which industry must count on
the Public Sector commitments.

The restructuring of the European GNSS programmes
implied a new budget, new rules and a new road-map.
It also meant a new organization and budget allocation.
Now that the first FOC contracts have been awarded,
the estimation for the complete constellation and the
ground segment shows a lack of about 1.5 billion Euros
(the latest contracts have not even been awarded yet).
This money available before 2011, in order to have a comple-
date in 2016. The Mid Term Review decisions on budgets are of ut-
most importance to meet both, programme schedule and
performances. Missing this milestone will unavoid-
able cause delays. The current Galileo budget will be
meaning additional costs and schedule because of in-
dustrial activities discontinuity and loss of competenc-
es. This would have a negative impact on the Galileo
markets acceptance and economical benefits.

Furthermore short term savings possibly found in slic-
ing, re-bidding or de-scoping industrial contracts will
undoubtedly turn into tremendous expenses in the fol-
lowing years. What is at stake is neither more nor less
the program success.

In addition, an average yearly budget of 750 to 800ME
per annum from 2014 to 2023 is identified necessary to
complete and operate Galileo and to develop its ap-
lications. For reference, the GNSS global market of
products and services was worth 124bn in 2008 and is
expected to double by 2030.

4.2. Galileo Competitive Environment

Considering the increasing competition, especially from
the US, Russia and China, full backing and ambitious
commitments from the European Union and Member
States are needed more than ever before.

4.3. EGNOS

Today EGNOS is operational and already serves non-
safety critical positioning applications. EGNOS is ex-
pected to be certified and to serve as a navigation
source in aviation and other safety critical transporta-
tion systems from year 2010 onward. Therefore the goal
must be to achieve certification for its operational use
in safety critical applications as soon as possible and
launch the first aviation services to airlines.

Open Issues and further challenges are
– Permanent operations
– Certification
– Full ICAO compliance
– Marketing
– Promotion of the Commercial Data Distribution
– Services (CDDS)
– Full EGNOS coverage in Europe
– Extension beyond Europe (with a focus on Africa)

4.4. Evolution and Post-FOC Studies

Possible scenarios and means for operation and ex-
ploration of Galileo after 2013 are to be identified. This
includes all commercial aspects of the exploitation as
well as the legal, contractual and financing structures of
the different exploitation models.

Some examples of open issues are
– access policy to governmental services,
– concept of operations,
– pricing policy,
– IPR policy,
– liability policy,
– exploitation policy,
– standards.