CANEUS-Shared Small Satellites

CSSP (Collective Security, Safety, and Prosperity) International Workshop

October 20-22, 2010 | Marina di Carrara, Tuscany, ITALY

To Create a low-cost, internationally shared space based data collection and distribution backbone with exceptionally low barriers to entry for participating nations.

The CANEUS Shared Small Satellites CSSP (Collective Security, Safety, and Prosperity) International Workshop is the forum dedicated to fostering Global collaboration to create a concept for space-based communications infrastructure owned and operated by a multi-national cooperative. The capability envisions data extraction from position reporting systems and other distributed sensors to enhance partners' safety and security. The NATO Undersea Research Centre (NURC) will be hosting the event from October 20-22, 2010 in Marina di Carrara, Tuscany, ITALY.

The concept involves a network of simple ground terminals and nano-satellites to provide access to "unwired" places: open oceans, polar regions, jungles, and deserts. Access to the entire shared capacity is available to the partner nations that contribute materially to the constellation thus providing a significant return on the individual investment of any participating partner. The multi-national, shared infrastructure promotes cooperation, trust and encourages sharing of data to the mutual benefit of the partners.

Workshop participants will include military, maritime authorities and law enforcement agencies, government-sponsored "watchdogs", non-governmental, private voluntary, and international organizations, and industry.

Ultimately, the workshop aims to identify issues for the potential Concept of Operation and international cooperation framework. It will also explore the particulars of international technology developments and applications that complement and are enabled by such a capability, so that a comprehensive profile of international impact may be quantified. The workshop deliverables will help formalize an implementation and transition plan for the operational phase of this international, cooperative nano-satellite project.

One single platform for AIS and Data extraction, offering the following MAIN ADVANTAGES:

Global tracking of ships with:

- Higher level of accuracy
- Approximate real time information gathering
- Lowest possible cost to the end users

Data extraction capabilities for continuous monitoring of:

- Security in open sea and shallow waters
- Environment and pollution in "unwired" places such as Polar Regions and open oceans;
- Countries' exclusive economic zones;
- Fishing activities and violations;
- Borders and desert areas in support of safety and security

New level of international partnership between participants:

- Participating nations become part of a new global information network;
- Share data and assets among government agencies worldwide in support of global safety, security, environmental protection and economic growth

The Concept:

To-date, it has not been technically possible to establish a sufficiently affordable and transparent capability to allow all nations to participate in a cooperative program to collect situational awareness data from every place on Earth.

By using a global constellation, participating nations can collect and share data from the "unwired world" that then can be used to enhance the safety, security, economic development and environmental protection of each sovereign state.

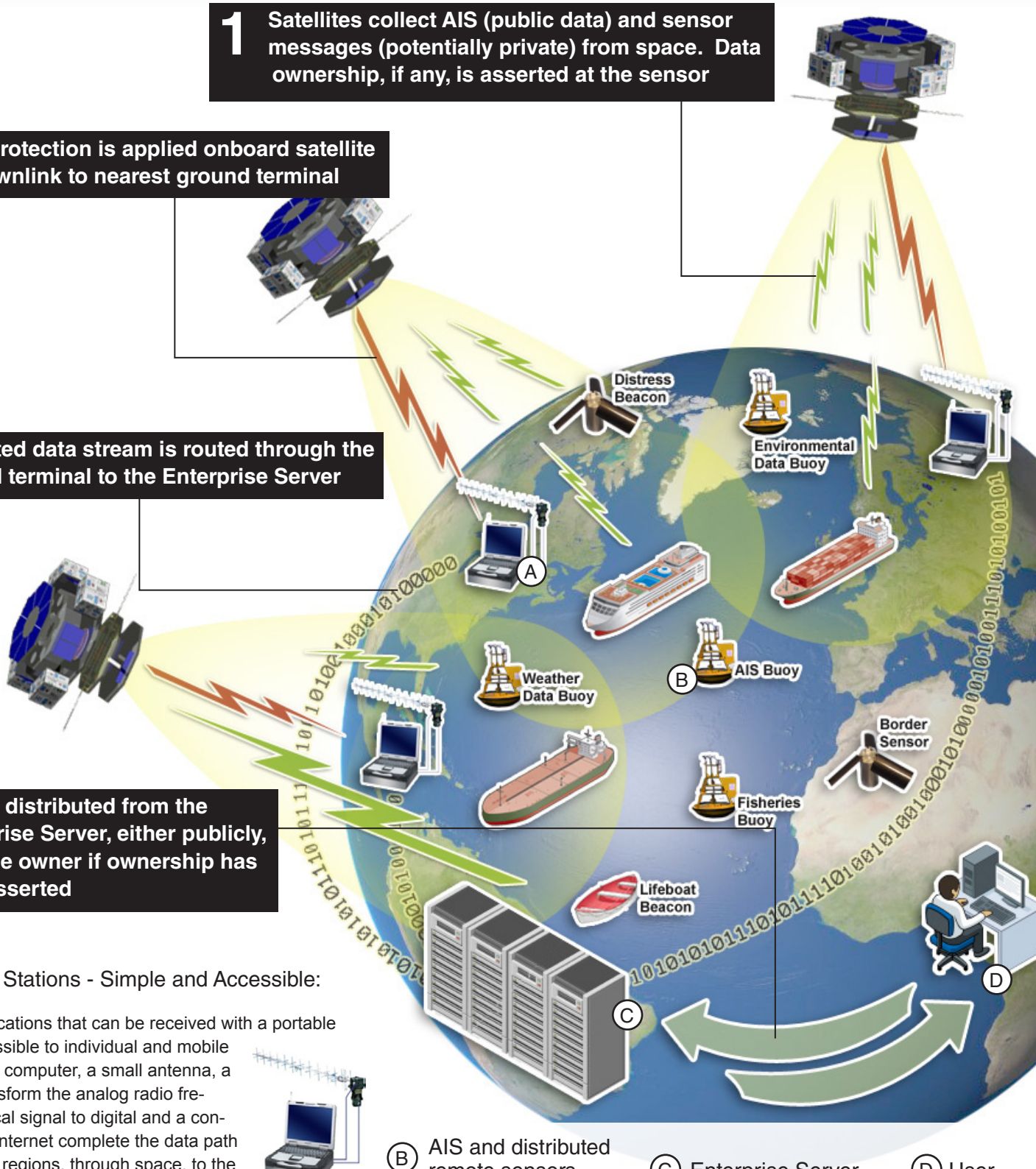
An international effort, in line with national security strategies that call for Cooperative Security to promote safety, security, protection of the environment, and global economic development

1 **Satellites collect AIS (public data) and sensor messages (potentially private) from space. Data ownership, if any, is asserted at the sensor**

2 **Data protection is applied onboard satellite for downlink to nearest ground terminal**

3 **Protected data stream is routed through the ground terminal to the Enterprise Server**

4 **Data is distributed from the Enterprise Server, either publicly, or to the owner if ownership has been asserted**



Ⓐ Ground Stations - Simple and Accessible:

UHF communications that can be received with a portable antenna, accessible to individual and mobile users: a laptop computer, a small antenna, a modem to transform the analog radio frequency electrical signal to digital and a connection to the internet complete the data path from "unwired" regions, through space, to the "wired" world.

Ⓑ AIS and distributed remote sensors

Ⓒ Enterprise Server

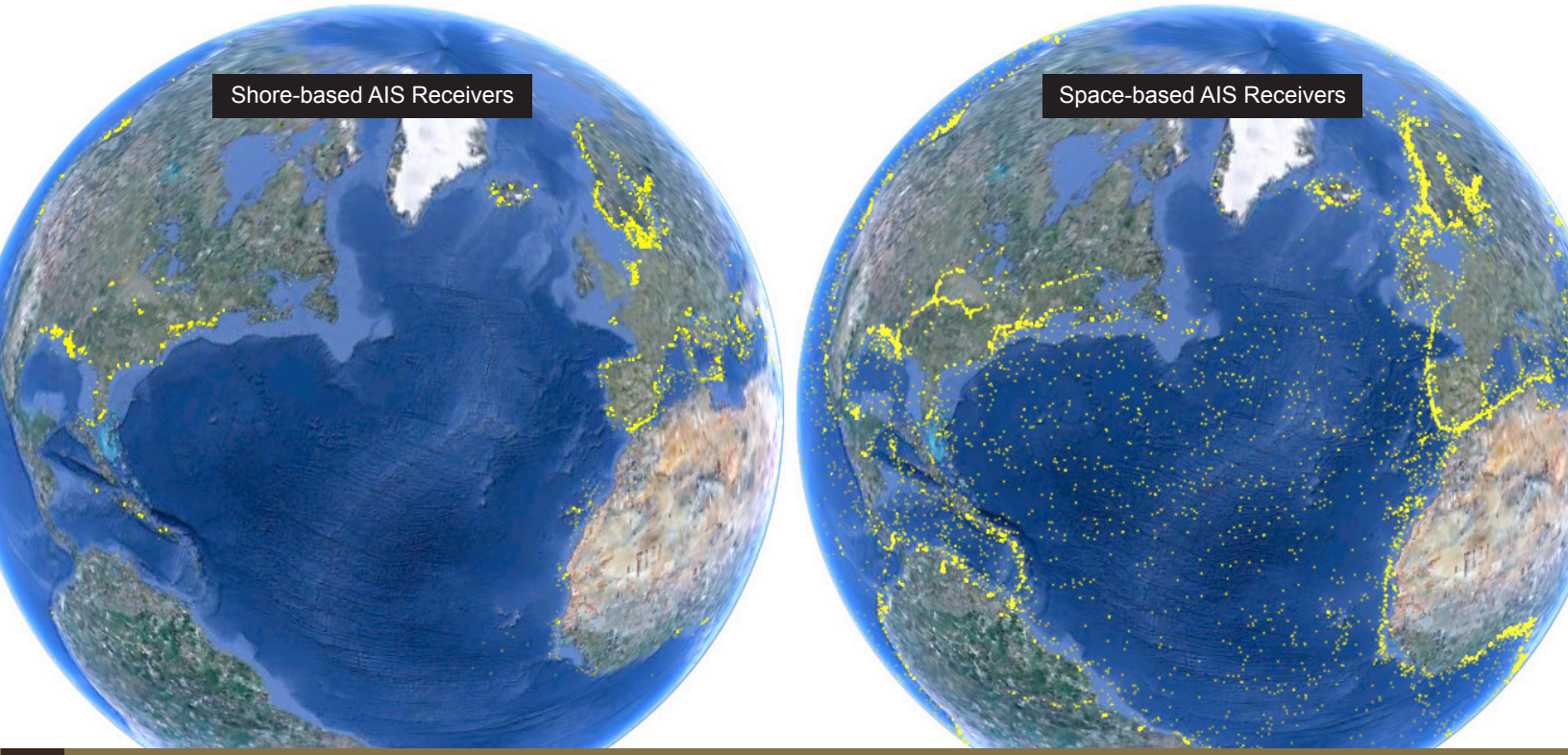
Ⓓ User

Existing and proposed commercial systems lack transparency for all international partners, being driven by profit incentives or hampered by classification and sharing issues inherent with intelligence collection. Instead of facilitating the ubiquitous exchange of information at the lowest possible cost, situational awareness derived from commercial or intelligence sources is enjoyed by the "haves" but unavailable to the "have-nots."

Nations without the ability or means to establish situational awareness in their "unwired" territories, including most of each country's Exclusive Economic Zone (EEZ), have little or no information about the illegal activities occurring there. There is no perceived need to address these unseen threats. Resource allocation and force structure decisions that would improve governance are starving for data.

"Effective AIS payloads and satellites can be constructed and launched quickly and affordably. AIS data collected from space complements shore-based receivers. As demonstrated from years of actual data taken from space and in spite of the numerous data collisions, it is possible to recover a significant number of AIS messages in real-time from space."

– Dino Lorenzini, SpaceQuest



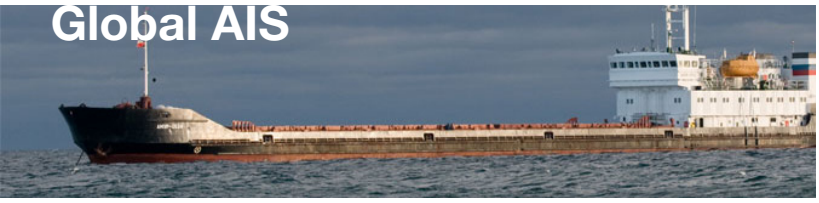
Fractional Ownership Model

In the collaboration model, multinational participants partner to deploy a constellation of relatively inexpensive nano-satellites and a network of small, moveable ground terminals that together create an efficient, persistent communications infrastructure. Partnership status in the Consortium of Member Nations is provided in return for investment in the system. Investment may be monetary or in-kind contributions such as launch services or ground station operation.

Each Consortium Member would be entitled to a share of the available bandwidth from the total constellation. The satellites would relay data from that nation's sensors to a ground terminal (which may be in another country), and from there to an enterprise server (in yet another country, perhaps) for distribution to the country owning the data. That country could then choose to share this information to enhance cooperation with the other Consortium partners and/or its neighbors who may not be participating.

Participating nations become part of a new global information network supporting safety, security, environmental protection and economic growth.

> It is certainly recognized that a global space partnership would have much broader capabilities than just the maritime domain, but many have recognized the critical vulnerabilities of the world's maritime assets and the potential huge economic impact their loss or significant impairment could generate, and thus the pressing need for much better awareness of the maritime domain.
>
> *– Guy Thomas, Science and Technology Advisor, United States Coast Guard*



DATA EXTRACTION

The format for AIS transmissions is standardized in International Telecommunications Union documents, and AIS frequencies are widely (though not universally) protected from non-safety broadcasts. For data from other sensors, standardization of the message format and protection of the carrier frequencies are both issues that are being, or should be addressed in a collaborative international forum.

DATA INTEGRITY AND SECURITY

Some of the data will be considered proprietary by the sensor owners. Commercial encryption either at the sensor or on-board the spacecraft, with "ownership" (in the sense of having the ability to decrypt data) is ascribed to the sensor owner.

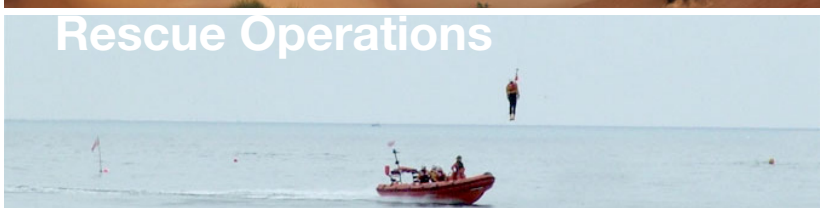
DATA DISSEMINATION

AIS data can be shared freely among CANEUS Shared Small Satellites participants, following the successful model of the Maritime Safety and Security Information System (MSSIS) that collects, combines, and distributes near-shore AIS data from over 50 countries around the world.

GOVERNANCE AND MISSION CONTROL

A consortium of participating nations involved in both decision-making and in the technical operations necessary to maintain the constellation and to maintain the flow of data. The general structure suggested would be an international governance board, supported by a program manager and a technical manager, with roles and responsibilities developed as participants join the consortium.

The ability to detect and monitor suspicious activity and to share that information will enable collaboration and cooperation among international partners to enhance their collective security, and more effectively direct limited assets.



Expected Attendees:

Over 120 World Expert "Invited Speakers"

90% of Global Satellite based AIS and Data Extraction industry representatives

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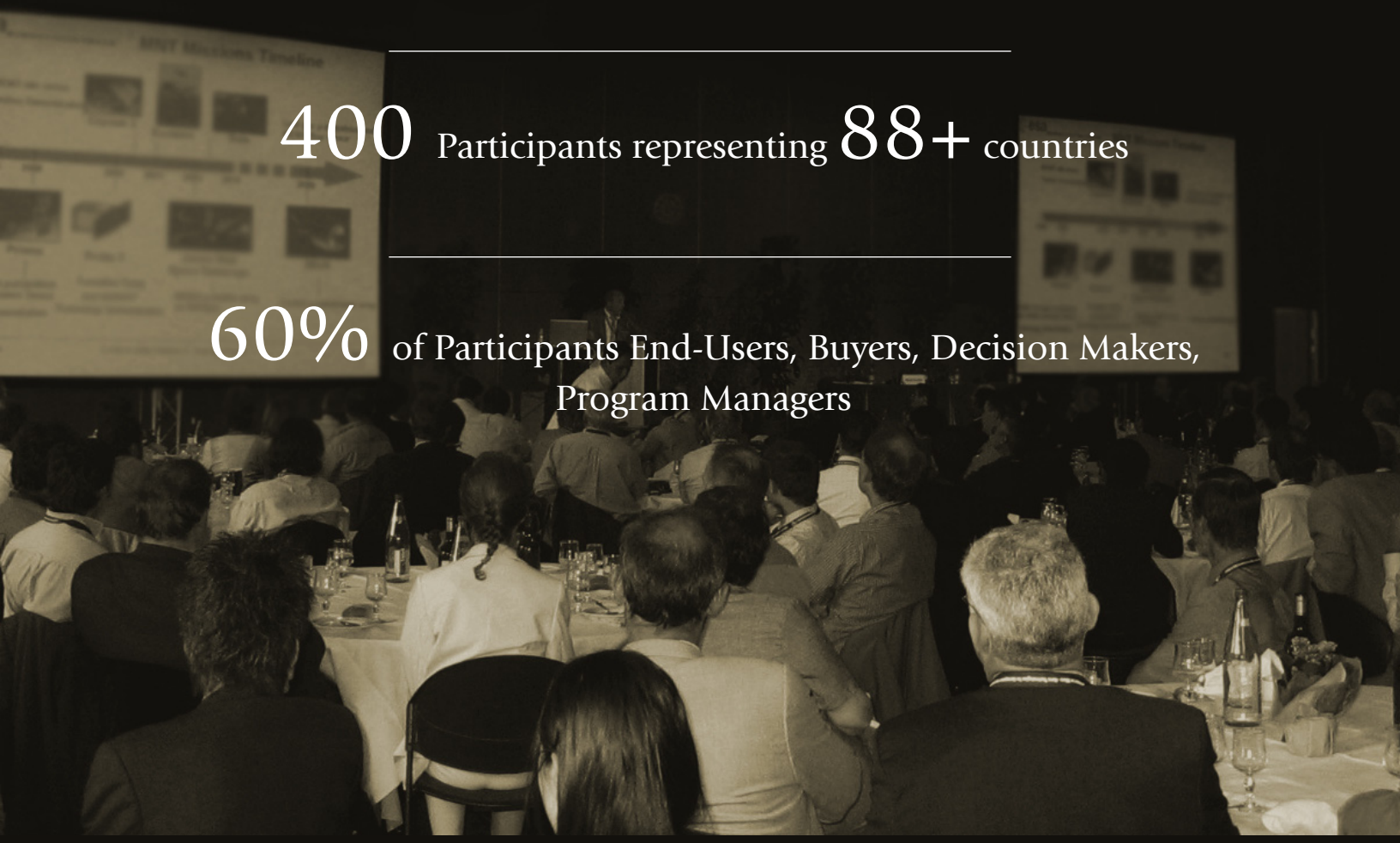
400 Participants representing 88+ countries

60% of Participants End-Users, Buyers, Decision Makers, Program Managers



The Shared Small Satellite concept presents low barriers to entry for developing countries wishing to become players in the space industry. Without bearing the high cost of launching satellites, government, commercial, and academic entities can be part of the team by focusing on manufacturing parts of the constellation or its launch components, on designing payload or satellite bus hardware, on writing control or data processing software, or on designing, building, or operating ground stations.

End-Users Interested in AIS and Data Extraction

1. Nation State Safety and Security Agencies, Maritime Authorities, Law Enforcement Agencies, Defense Agencies, Pollution / Environment Monitoring agencies, Search & Rescue Agencies, Government-Sponsored "Watchdogs", of Countries from around the globe.
2. Nations without the ability or means to establish space programs but have a need for situational awareness over their Exclusive Economic Zones.
3. Commerce, Transportation and Insurance Companies Involved with the Trade Routes of the World's Oceans, Seas, and Waterways

Small Satellite Infrastructure and Support Vendors

1. Satellite Manufacturers (including spacecraft, instrument providers, and their vendors);
2. Satellite Constellations to Host Communications Payloads
3. Launch Services Ground Support Services/Facilities, Sensor Suppliers/Services
4. Data Center Hardware suppliers
5. Data management, Data Aggregators /Distributors; Communications and Data Fusion Software Providers

Policy Makers and Regulators

1. Space Based International Cooperation Partnerships, Policy Think Tanks, Space Based Situational Awareness Consortiums (i.e. UN, NATO, IMO, ITU, IALA, ICAO, EC, APEC, Others)
2. National Space Agencies (30 Countries)
3. Legal Policies and Regulatory Bodies for Proposed Data Formats, Assigned Frequencies and Bandwidth
4. Financial Supporters (Private and Government), and International Funding Sources

International Space Systems and Operators

1. AIS and Data Extraction Related Program Authorities: Commercial, NGO's and Government Operated
2. Data Centers: both Commercial and Government Managed
3. Ground Support, Command and Control Centers
4. Data and Data Fusion Services such as the Maritime Safety and Security Information System (MSSIS)

We expect to receive 400 international experts and participants, representing stakeholders from all segments of the international space and maritime community, including technology providers, end-users, and policy-makers.

Benefits:

End-users

- Drive the AIS and data extraction requirements for a global small sat constellation that fulfills your agency or nation state's needs;
- Drive the requirements for a group buy of global AIS and data extraction satellite system assets;
- Drive the framework for a group buy of shared extracted and AIS data;
- Drive the definition of a global concept-of-operation for satellite based AIS and data extraction system that leverages your agency's or nation state's existing ground segment and space based assets;

Policy Makers and Regulators for AIS and Data Extraction

- Identify concerns, issues and new technologies that allow for a more up to date, streamlined and realistic plan/policy
- Policy makers will help define mechanisms and structures to facilitate international cooperation while at the same time using the international linkages to promote individual competitiveness and innovation. This event will identify near term actions that can demonstrate this shared small satellite model
- Design and implement policy/procedures that are in the best interest of both individual organizations but is in keeping with the Fractional ownership objective(s)

Partnering Countries

- Partnering countries will be able to benefit from the cost-effectiveness in collaborating with other consortium members.
- Partnering countries will be in a position to share data that can then be used to enhance the safety, security, economic development and environmental protection of each government department.
- Partnering countries will be at able to implement a cost-effective and efficient method of data sharing.
- Consortium member countries would be entitled to a share of the available bandwidth from the total constellation.
- Special recognition will be offered during the workshop, highlighting their contribution.

Exhibitors

- International technology providers and end-users specializing in areas closely related to the small satellite constellation and data extraction
- A broad range of exhibits covering the latest developments in several international space systems representing end-user applications, technology products, and business development organizations
- Extra 25 exhibit spaces allocated for "Country Pavilions" for those countries expressed interest in such collaborative concept.
- The CANEUS – Shared Small Satellite Workshop offers many opportunities to help your company or organization generate an excellent return on your partnership investment. We can provide products that benefit you before, during and after the workshop.

Small Satellite Infrastructure and Support Vendors

- Benefit of being at the birth of a fractional ownership concept resulting in meeting and exceeding the identified needs of the consortium members.
- Highlight technological abilities for AIS and Data Extraction
- Be solutions providers for consortium members
- Build brand awareness through various business partnership products

Program:

	DAY 1	DAY 2	DAY 3
AM	**International Space Systems Organizations, Needs and Lessons Learned**	**Program Factors covering Small Sat Constellation Systems and Technologies, Data Concepts and Data Formats**	**Program Validation**
08:15-08:30	**Plenary 1:** Workshop Welcome	**Plenary 3:** Program Overview	**Plenary 4:** Overview from previous day's input from the breakouts
08:30-09:00	**Keynote Address 1**	**Keynote Address 3**	**Keynote Address 6**
09:00-10:30	**Session 1:** Summary of International Space Systems Organizations for their AIS and Data Extraction Needs Representatives from: IALA, MSSIS, ESCAP, APEC, UN-Spider, Other UN sponsored project managers, NATO, and Theatre Commanders	**Session 5:** Program Factors covering Small Sat Constellation Systems and Technologies, Data Concepts and Data Formats **5A:** Small Sat Constellation Systems and Technologies / **5B:** Data Concepts / **5C:** Proposed data formats, assigned frequencies and bandwidth	**Session 8:** Validation and Embellishment of the Consortium **8A:** End Users / **8B:** Space Infrastructure / **8C:** Ground Support / **8D:** Services
10:30-11:00	Coffee Break	Coffee Break	Coffee Break
11:00-12:30	**Session 2:** International Agencies and Other AIS and Data Extraction Related Authorities Representatives from: GEOS, GMES (Kopernikus), DMC, Commercial Services	**5A (cont'd):** Small Sat Constellation Systems and Technologies / **5B (cont'd):** Data Concepts / **5C (cont'd):** Proposed data formats, assigned frequencies and bandwidth	**Session 9:** Validation of the Structure/Framework and Business Case for the Consortium **9A:** Validate/ Embellish AIS and x-data services assumptions / **9B:** Validate/ Embellish data gathering, data handling, data distribution assumptions / **9C:** Validate/ Embellish Structure/ Framework and Business Case for the Consortium
12:30-13:30	**Lunch**	**Lunch**	**Lunch**
PM	**Outstanding Issues and New Applications**	**Programmatic Issues**	**Program Implementation**
13:30-14:00	**Keynote Address 2**	**Keynote Address 4**	**Keynote Address 7**
14:00-15:30	**Session 3:** Outstanding Issues with Current AIS and Data Extraction Systems **3A:** Space Infrastructure / **3B:** Ground Support / **3C:** Services	**Session 6:** Policies, Regulatory Issues and Collaborative Framework Models **6A:** Legal Policies and Regulatory Considerations / **6B:** Funding Sources / **6C:** Collaborative Framework Models	**Session 10:** Debriefing and the Consolidation Consortia Profile Debriefing of Breakouts and Consolidated Consortium Program Profile; Validate Support from International Space Systems Authorities; Program Funding Sources
1530-1600	Coffee Break	Coffee Break	Coffee Break
1600-1730	**Session 4:** Lessons Learned and New Applications with Data Extraction Systems **4A:** Space Infrastructure / **4B:** Ground Support / **4C:** Services	**Session 7:** Consortium Proposed Scope, Structure, Roadmap and ROM Funding **7A:** Space Infrastructure / **7B:** Ground Support / **7C:** Services	**Session 11:** Workshop Deliverables Summary and Define Program Implementation Plan and Action Items
1730-1830	**Plenary 2:** Breakout Debriefing/Common Themes	**Keynote Address 5**	**Closing Remarks**
1830-2000	Welcome Cocktail	Evening Reception	

The Workshop is dedicated to the overarching theme of international collaboration in the development of an accessible data transport small satellite constellation. The workshops will also draft an implementation and transition plan for an enduring operational capability. To this end, sub-themes include:

1. **Needs assessment**

    - The State-of-the-Art in AIS and data exfiltration
    - capabilities as a baseline, followed by end-user requirements for short
    - term and long term data transport, and a glimpse into future capabilities:
    - Current capabilities
    - End-user Needs
    - Outstanding Issues with Current AIS and data exfiltration Systems
    - Lessons Learned
    - Technology Providers' Updates,
    - Exhibits

2. **Collaborative innovation**

    - Short Courses
    - Plenary sessions
    - Split sessions

3. **Policy and regulation**

4. **Concept Implementation Plan and Action Items**

    - Formation of Working Groups
    - Awards
    - Poster Sessions

Pre-Workshop Short Courses and Review of the State of the Art in International Space Systems

The objective is to bring the attendees up to date on key issues associated with the international space system, as well as case studies from such authorities, and regulatory issues. The short courses will include topical issues that will support the workshop sessions. It is hoped that knowledge acquired from these activities will allow participants to engage in informed discussions and decision-making during program definition and implementation planning.

Four topical Short Courses will be taught by world-class experts on the day prior to the opening of the event to allow participants to increase their awareness and understanding of key areas of the industry such as:

- Short Course 1 –Unattended sensors and signals, including AIS
- Short Course 2 –Small satellite design tradeoffs
- Short Course 3 –Policy and regulatory environment
- Short Course 4 –Sharing satellite capacity and controlling data dissemination

Exhibits

International technology providers and end-users specializing in areas closely related to the small satellite constellation and data extraction will participate in the exhibits. A broad range of exhibits covering the latest developments in several international space systems representing end-user applications, technology products, and business development organizations will be held concurrently with the Workshop sessions. 25 exhibit spaces are allocated for "Country Pavilions" for those countries expressing interest in such a collaborative concept.

Poster Sessions

Poster presentations will cover:

- Exciting early results from international space systems authorities for their AIS and data exfiltration needs for short term and potential long term requirements – include new applications not currently touch on.

- International Space Systems, e.g. GEOS, GMES (Kopernikus), DMS, IGMAS, MSSIS, ESCAP, UN-Spider, Other UN sponsored project managers, NATO, Theater Commanders, Commercial Services, Other AIS and data exfiltration related program authorities.

- Perspectives of end-users and stake-holders, including "lessons learned" from the implementation of space systems in AIS and data exfiltration applications. These include: government agencies; affected non-government agencies; satellite providers; satellite sub-system suppliers; launch services; ground support services/ facilities; data aggregators/distributors; sensor suppliers/services; communication Infrastructure Suppliers.

- Outstanding Issues with current AIS and data exfiltration systems, e.g. safety, security, privacy, infrastructure care and feeding cost, policies on data sharing, radiometry vulnerabilities, reliability, authentication Small Sat Constellation Systems and Technologies; AIS and data exfiltration Applications; proposed data formats, assigned frequencies and bandwidth

- Data management- Case Studies; sharing global AIS information on an open network environment; Concept of Open Global Maritime Data Sharing; Utilization of existing and future maritime information sharing systems.

- International collaborative Framework Models: Examples of international, cross-border collaborations leading to joint developments in Civil, Commercial, and Military Sectors, with legal policies and regulatory considerations

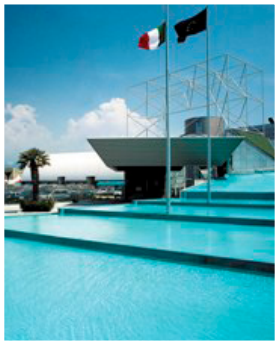
- US Caribbean AIS/MSSIS Initiative; other similar programs; e.g. International Association of Maritime Aids to Navigation and Lighthouse Authorities (IALA)

- Investment perspectives, both private and government

Venue:

Marina di Carrara, Tuscany, ITALY





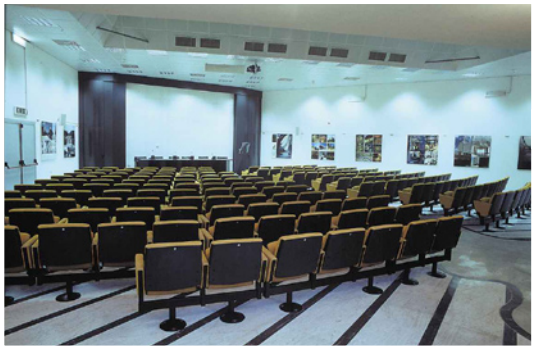
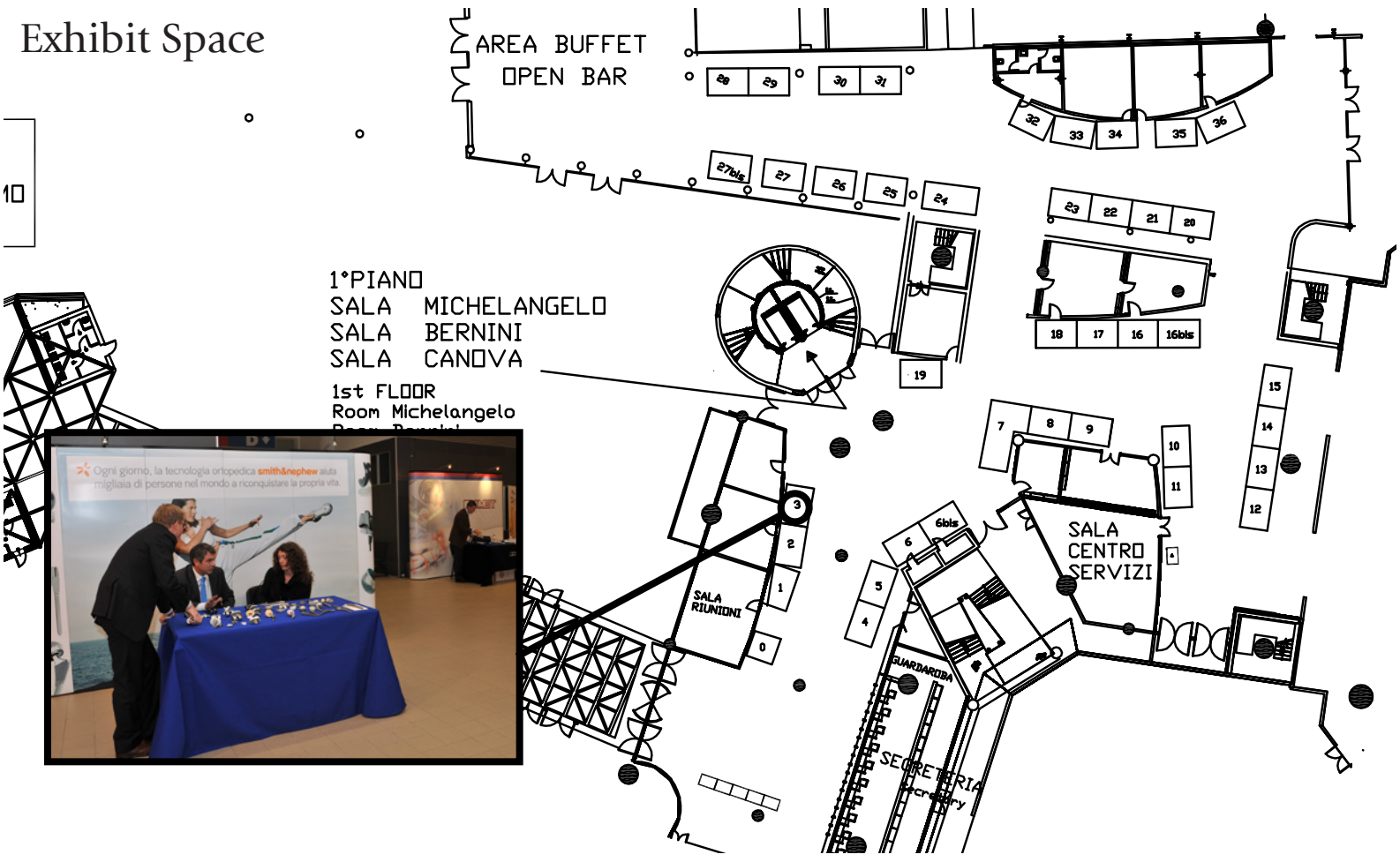



Exhibit Space



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Register:

Registration is now open. The early-bird registration fee is **€495** through August 20, 2010. Late registration fee is **€595**. To register and find out about the Inclusions and other details, visit:

www.caneus.org/cssp/register

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