Endorsed by the Spanish Navy

3rd Annual

mast

Maritime Systems and Technology

Global Conference and Trade-show

Palacio de Congresos, Cadiz, Spain

Wednesday 12th to Friday 14th November 2008

Get the 360° Perspective on future maritime* security and defence

Capabilities, Concepts, and Technologies

Programme available on-site as 'user-friendly' pocket book

*Above and below the surface environments

www.mastconfex.com

Technical sponsors

IEEE · OES · International Federation of Hydrographic Societies · Naval Submarine League · OMG · DSO National Laboratories · Australian Government Department of Defence Defence Science and Technology Organisation · NURC · DGA · Ministère de la Défense · IET · SUT · CTM · Submarine Institute of Australia · TNO

Invitation from The Spanish Navy

"MAST hits the spot exactly. The event fills a critical gap in the Maritime Defence and Security Trade Show and Conference market across a Global perspective, and promises much for the future"
- Admiral Sir Ian Forbes, Deputy Supreme Allied Commander NATO (ret'd), Belgium

"I met new people and learned about new technologies, policies and strategies"
- Commander Graeme Rogers, Director, Major projects, Maritime HQ, Royal Australian Navy, Australia

"We see MAST as *the* venue for information exchange on current global maritime and security research and issues"
Rear-Admiral François-Régis Martin-Lauzer, Director, NATO Undersea Research Center (NURC), Italy

Admiral Miguel Beltran Bengiechea
Almirante Jefe del Apoyo Logistico
Armada Espanola

Dear MAST delegates,
The Spanish Navy has the great pleasure of supporting the third annual MAST conference and trade-show in Cadiz: a beautiful city framed splendidly by history, naval tradition, and captivations.

Tradition ascribes its foundation to Phoenician merchants from Tyro, as early as 1100 B.C. Greeks (Gadeiru), Carthaginians (Gadir), Romans (Gades), Visigoths, Muslims (Jerirat-Kadis), all contributed to its history until 1262, when Cadiz was re-conquered by the Christians and incorporated in the creation of the Kingdom of Spain. The waters of the Gulf of Cadiz saw the departure of the three Spanish Caravels sailing to the discovery of America in 1492, and have witnessed many historical European naval events over the centuries. Cadiz has been rebuilt many times and various cultures have influenced the city. Cadiz's rich history makes it not simply a city of monuments but a monument itself.

Walk through the historic city centre, and you'll experience the charm of this city, its beautiful squares, narrow streets, and an ambience, which invites you to relax and enjoy yourself: "Cadiz the Joyous" is often noted for having the most humorous people in Spain.

Cadiz and its region have always enjoyed close ties between the Spanish Navy, important harbour facilities e.g. Rota Naval Base, Headquarter of Admiral-of-the-Fleet, Logistic Arsenal and Marines Forces in San Fernando; the Puntales Naval Station; the Navy Observatory and the Hydrographical Institute. The Spanish Navy is proud to participate in organising MAST 2008, to create the essential forum for decision makers implementing and developing global maritime security policies. Additionally, MAST 2008 provides the perfect framework for addressing major technological challenges, offering a centre of knowledge and innovation exchange as an engine to meet our future operational requirements.

Our sincerest gratitude to the organisers: We wish MAST 2008 and its delegates every success, and excellent sea days for the future.

Joaquin Uguet
Chief Operating Officer, Indra, Spain
MAST 2008 Conference Chairman

Dear MAST 2008 Participants,
It is my great honour to invite you to take part in the third annual MAST Conference and Trade-show.

Since establishing itself as the first-in-class global forum for maritime security and defence leaders, MAST has grown rapidly and earned a worldwide reputation for **unparalleled content quality, and the senior-level (and multiplicity) of its participants** from international navies, government (and civil security) agencies, the r&d community, academia, and industry.

MAST's geographic diversity in both conference papers and participants – coming from **over 37 countries (from North America, South/Latin America, West and Eastern Europe, MENA, Asia and Pacific Rim regions)** – reflects how readily MAST has been accepted globally as ***the* annual working forum and showcase on maritime capabilities, concepts and technologies.**

MAST's wide global participation is testament to the unequalled reach, enthusiasm, effort and influence of the MAST committee, which I have the immense privilege of working with, to bring you **the most comprehensive, authoritative, and inclusive MAST event ever...**

The committee has been inundated with abstracts this year, receiving well in excess of 200 submissions: The resulting programme hereby presented in this brochure, is one that will give you the **complete perspective of future maritime security and defence environments, operational strategies and enabling technologies.**

With additional conference streams dedicated to undersea defence/security (and our active promotion to the undersea defence community to participate at the event), you will have a broader range of discussions, with a wider group of individuals at this year's MAST, than ever before.

MAST 2008 Chairman's welcome

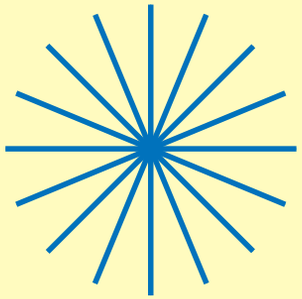
The Spanish navy and security agencies have been wholly supportive and enthusiastic to host MAST in Spain - most particularly (due to its naval and security significance) in Cadiz - and have invited many senior-level representatives to this showcase international event: Something I am sure you will find more than evident at the event.

Whatever your role (and domain) in maritime security and defence, take part in MAST 2008 and you are guaranteed to ***meet your global maritime information needs.***

Equally, you will ***meet international end-users, military planners, capability managers, procurement executives, attachés, and technologists*** - the full spectrum of maritime security and defence decision makers.

This year's trade-show will be much larger than last year's, and with MAST's "trade-mark" fully-inclusive social functions/networking, plus ship visits and demonstrations, and new features, you will find plenty to do outside the conference sessions - making MAST 2008 **your best networking and information event of the year.**

I look forward to welcoming you to beautiful and historic Cadiz this November (between Wednesday 12th and Friday 14th November), and extending Andalusia's renowned hospitality.



"As a direct result of international cooperation and collaboration enabled by MAST, the US and France have jointly developed technologies that improve information exchange capability"
- William Ormsby, Warfare Systems Engineer, Naval Surface Warfare Center, NAVSEA, USA

"We got a better understanding of the international maritime domain awareness community"
- Peter Smith, Director International Maritime Domain Awareness Programs, Raytheon, USA

"I held discussions with people at a level that would otherwise not have occurred"
Janis Cocking, Chief – Maritime Platforms Division, Defence Science & Tecnology Organisation (DSTO), Australia

"We got the full spectrum of up-dates and different viewpoints"
- Dr Marcello Zannini, Innovation Director, Calzoni, Italy

"I obtained good insight into competitor/ collaborator capabilities"
Tim Rabbets, Technical Manager, Maritime Combat Systems Engineering, QinetiQ, UK

The MAST Concept

MAST (MAritime Systems & Technology) is the unique annual senior-level, global maritime conference and trade-show **launched and run by renowned and respected government, r&d, academia and industry leaders,** to give you the full perspective on **future maritime security and defence concepts, capabilities, and enabling technologies.**

The third annual MAST conference will evolve the major **operational, policy and technical themes** introduced at the first two, develop core themes (e.g. maritime security) and again deliver **the definitive annual maritime forum** to comprehensively ***identify, discuss, and debate the major issues fuelling future capabilities and concepts, and driving platforms and systems development and deployment.***

You will find the programme engaging, absorbing, and varied (with keynote addresses, plenary speakers, and parallel streams of operations/policy and technical sessions), and in the adjacent **international trade-show**, world leading and innovative manufacturers and providers of platforms, systems and service will introduce you to their **future (and state-of-the-art) platforms, systems, products and services**.

MAST will unite you with a uniquely diverse global audience (three 'tiers' of maritime specialists: **Those that make, influence or evaluate, operational, policy/planning, procurement, production and/or research decisions)**. *See:* Who attends MAST? *right.*

MAST's inimitable, innovative programme and exclusive audience is equalled only by its organisers' dedication to integrating all event features and uniting *all* members of the audience e.g. by offering unique networking tools (such as MAST Contact Exchange), and complimentary social functions, promoting ***Total Audience Integration.***

If you only make one international maritime event this year:
Make it matter - ***make it MAST.***

Who takes part in MAST?

End Users
Military planners
Capability managers
Senior naval officers
Naval and trade attachés
Ambassadors
Procurement executives
Senior scientists
Technical Directors
Engineers
Researchers
Developers
Scientists
Technical specifiers
Industry executives

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Technical Conference Committee (TCC)

MAST's Technical Conference Committee (TCC) is probably the most renowned, respected and international team ever united to plan, direct and administer both the context and content of any such event.

Comprising senior-level government, MoD, R&D, academia, and industry leaders; the Committee meets regularly to agree the topics, content and general framework of the event (as detailed in this programme), adjudicate submitted abstracts, and coordinate invited speakers/ papers from contacts across their own, vast global networks.

As MAST moves from country-to-country each year, a committee member from the host country is appointed to chair the event.

The ongoing activities and support of the TCC are **your guarantee** that every MAST event meets the information and networking needs of its unique audience (senior-level specialists that make, influence or evaluate operational, policy, planning, procurement, production and/or research decisions) by the event: Making MAST **the essential annual gathering for global maritime security and defence leaders.**

Chairman:

Joaquin Uguet
Chief Operating Officer
Indra
Spain

Past Chairman:

Fabrizio Martello
Senior Advisor
Finmeccanica
Italy

2006 Co-Chairman:

Michel Accary
Director - Business Development
DCNS
France

Founding Chairman:

Jean-Luc Lambla
Vice President - Technology
Thales Group
France

Executive Advisors:

Rear-Admiral Francis de la Haye
Corporate Defence Advisor (Navy)
Thales
France

Charles Giacchi
Technical Director (ret'd)
Naval Surface Warfare Center, NAVSEA
U.S.A.

Bernie Myers
Adjunct Scientist
ONR (Office of Naval Research)
U.S.A.

Admiral Kate Paige
Special Advisor, Strategic Command Strategic Advisory Board, US DoD & President US DoD & Mark India LLC
U.S.A.

Admiral Ennio Piantini
Director General, Naval Armaments (ret'd)
Italian Navy
Italy

Admiral J. Guy Reynolds
President
Naval Submarine League
U.S.A.

Dr. John Sirmalis
Technical Director (ret'd)
Naval Undersea Warfare Centre, NAVSEA
U.S.A.

Members:

Commodore Luke van Beek
Defence Director
Mott MacDonald
U.K.

Rear Admiral Charles J. Beers
Vice President - Maritime Systems
Lockheed Martin Corporation
U.S.A.

Professor Rafael Bellido
Professor - Naval Combat Systems
Political University of Cartagena & Escuela Tecnica Superior de Armas Navales
Spain

Rear-Admiral Bertil Bjorkman
Ex-Swedish Defence Attaché to U.S.A. and Head of FMV (Swedish Defence Materiel Administration)
Sweden

Thierry Brizard
Vice President - Research and Technology
Thales Naval
France

Dr. Sérgio Parreira de Campos
Chairman
Empersa Portuguesa de Defesa (EMPORDEF)
Portugal

Alain Carof
Technical Director - Information & Security Systems
DCNS
France

Patrick Carnie
Maritime Research Co-ordinator
QinetiQ
U.K.

Janis Cocking
Chief - Maritime Platforms Division
DSTO (Defence Science & Technology Organisation)
Australia

Rear-Admiral Jacques Cousquer
Head - Naval systems and Architectures
Ministry of Defence/DGA
France

Captain Jan Dobkowski
Deputy Director - Research & Development
R&D Marine Technology Centre (CTM)
Poland

Dr-Ing Hans Dieter Ehrenberg
Director - Business Development
Atlas Elektronik GmbH
Germany

Professor René Garello
Professor - Image & Information Processing & JOAB Chair, ENST Bretagne & IEEE/OES-MTS
France

Lyn-Markus Giersch
Office for Defence Procurement (Naval branch)
Ministry of Defence/BWB
Germany

Dr Alan Hartley
Systems Consultant
BAE Systems (Insyte)
U.K.

Paul Lefebvre
Technical Director - Newport Division
Naval Undersea Warfare Center, NAVSEA
U.S.A.

Colonel (NS) NG Seng Leong
Program Director - Underwater Warfare

DSO National Laboratories
Singapore

Dr Miles Libbey
Director - Advanced Solutions
Lockheed Martin MS2
U.S.A.

Admiral Ferdinando Lolli
Director - Harbour Master's Office
Port of Genoa
Italy

Rear-Admiral François-Régis Martin-Lauzer
Director
NATO Undersea Research Center (NURC)
Italy

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U.S.A.

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Orizzonte Sistemi Navali
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TNO
The Netherlands

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Krylov Shipbuilding Research Institute (KSRI)
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U.S. A.

Henk Regtop
Technical Coordinator -
System Architecture, Demo. & Validation platforms
Thales Naval
The Netherlands

Vice-Admiral Ing Josè Juan Santa Ana Sala
Director - Naval Constructions (Ret'd)
Spanish Navy
Spain

Vice-Admiral José J. Sanjurjo
Director - Naval Constructions
Spanish Navy
Spain

Ralf Siegfried
Head of System Engineering
L-3 Communications ELAC Nautik
Germany

Terry Soame
Head - Engineering Capability & Technology
BAE Systems (Insyte)
U.K.

Timothy J. Troske
Technical Director – Port Hueneme Division
Naval Surface Warfare Center, NAVSEA
U.S. A.

Rear-Admiral Stephane Verwaerde
Deputy Chief of Staff – Plans and Programmes
French Navy
France

Captain Bo Wallander
Senior Adviser
Saab Microwave
Sweden

Topic teams

To ensure only the best papers make it into the conference programme, guarantee a good balance of papers for each core MAST topic area, and to manage the sheer volume of abstracts received each year, committee sub-groups are established, each coordinated by an assigned Topic Manager.

Topic teams receive all abstracts specific to their allocated topic area/speciality before the rest of the committee, allowing real-time evaluation of all submissions.

Operations & Capabilities
Rear-Admiral Francis de la Haye (Topic Manager)

Rear- Admiral Bertil Bjorkman
Janis Cocking
George McNamara
Francesco Noschese
Patrick Carnie

Maritime Security
Commodore Luke van Beek (Topic Manager)

Dr Miles Libbey
Jan Dobkowski
Vice-Admiral Ing Jose Juan Santa Ana Sala
Coenraad M. Ort

Platforms
Admiral Ennio Piantini (Topic Manager)

Professor Rafael Bellido
Rear-Admiral Jacques Cousquer
Patrick Carnie
Professor Alexander Pustoshny
Charles Reeves
Paul Lefebvre
Michel Accary

Systems
Dr-Ing Hans-Dieter Ehrenberg (Topic Manager)

Tim Troske
Admiral Kate Page
Lyn-Markus Giersch
Captain Bo Wallander
Alain Carof
Professor Rafael Bellido

Technology
Thierry Brizard (Topic Manager)

Coen Ort
Bernie Myers
Paul Lefebvre
Alan Hartley
Rear-Admiral François-Regis Martin-Lauzer

Topic areas as featured in the MAST 2008 Call for Papers:

MAST Interactive conference timetable: A programme *tailored to your needs*

We understand that **maximising the return on your time spent** at any event takes planning: Which conference sessions to take part in; which exhibitors to meet; which social functions invitations to accept; which ships to visits; what demonstrations to watch; what *pre* and *post* show business/networking meetings to attend; etc.

MAST's audience comprises representatives from distinct, specialist maritime sub-communities, with specific information requirements, that can be identified by domain (e.g. surface, undersea, air, land, space - and any combination thereof) as easily as they can by topic area.

Therefore MAST now offers you an interactive conference timetable facility that creates a **bespoke** plan of proposed session attendance, driven by **your specified domain(s) interests - a conference programme planned *just for you.***

As an example, if you specified your domain interest as purely undersea, the timetable *right* would result. Equally, you could specify any other domain (or combination of domains) and create alternative plans for session attendance: *Simply log onto:* **www.mastconfex.com/timetable.asp** *and select your domain(s).*

New! Undersea Defence/Security papers

MAST comprehensively covers major and evolving global issues surrounding maritime security and defence, and has therefore always featured some undersea-specific papers.

This year, following considerable demand for **one, fully inclusive global maritime security and defence event,** the committee encouraged experts in **undersea defence (technology and operations)** to submit papers. The response was astounding, and necessitated this year's addition of **two dedicated undersea defence conference streams.**

MAST now offers the undersea defence/security community a conference dedicated to discussing **undersea defence technology** (at the **system-of-systems/operational level)** and its contribution to global maritime security and defence.

Undersea-specific timetable

(Sessions containing papers related to undersea defence/security/ASW)

Wednesday 12th November	**0900 - 1030hrs**	**1: Official Opening and Keynote Session** *Including top level Spanish government/navy representatives; Rear-Admiral Anders Grenstad, Chief of Staff, Swedish Navy, Sweden; Rear-Admiral (ret'd) Jay Cohen, Head of Science and Technology Directorate, US Department of Homeland Security, United States*				
		Conference break and Refreshments/ Trade-show visiting time				
	1100 - 1230hrs			**2C: Platforms:** *Survivability*	**2D: Systems:** *Submarine USW Systems*	**2E: Technology:** *Underwater Technologies 1*	**2F: Technology:** *Advanced Processing 1*
		Conference break and Refreshments/ Trade-show visiting time				
	1245 - 1400hrs		**3B: Systems:** *Situational Awareness*	**3C: Platforms:** *New Ships*	**3D: Systems:** *Combat Systems Evolution*	**3E: Technology:** *Underwater Technologies 2*	**3F: Technology:** *Advanced Processing 2*
		Lunch/Trade-show visiting time				
	1600-1730hrs	**4A: Maritime Security:** *AIS (Automatic Identification Systems)*	**4B: Systems:** *Maritime Surveillance*	**4C: Platforms:** *Innovation*	**4D: Systems:** *Combat System Theory - Improvement*	**4E: Technology:** *Unmanned Vehicles*	
	1800hrs	**End of day one/Annual MAST Party**				
Thursday 13th November	**0900 - 1030hrs**	**5A: Maritime Security:** *Reducing the Cost of Maritime Security & Platforms*	**5B: Operations & Capabilities:** *Unmanned Operations*	**5C: Platforms:** *Design - New Solutions*	**5D: Systems:** *Open Systems Architecture*	**5E: Technology:** *Human Factors*	**5F: Maritime Security:** *Underwater Protection*
		Conference break and Refreshments/ Trade-show visiting time				
	1100 - 1230hrs	**6A: Maritime Security:** *Asymmetric Threat*		**6C: Platforms:** *Design - Special Tasks*		**6E: Platforms:** *AUV 1*	**6F: Technology:** *Architecture & Data Distribution 1*
		Conference break and Refreshments/ Trade-show visiting time				
	1245 - 1400hrs	**7A: Maritime Security:** *Asymmetric Threat - Countermeasures*	**7B: Operations & Capabilities:** *Future Capabilities*	**7C: Platforms:** *Design - Propulsion*	**7D: Systems:** *Ballistic Missile Defence (BMD)*	**7E: Platforms:** *AUV 2*	**7F: Technology:** *Architecture & Data Distribution 2*
		Lunch/Trade-show visiting time				
	1600-1730hrs	**8A: Maritime Security:** *Integrated Maritime Security Systems*	**8B: Technology:** *Countermeasures*	**8C: Platforms:** *Human Factors*	**8D: Systems** *Unmanned Vehicle Systems*	**8E: Technology:** *Communications*	**8F: Maritime Security:** *Architecture*
	1800hrs	**End of day two/Invitationonly receptions**				
Friday 14th November	**0900 - 1030hrs**	**9: Plenary/panel Session: Title t.b.c.** *Chaired/moderated by a senior level Spanish naval/maritime agency representative, the panel - to be finalised in Autumn - include: Rear-Admiral Jay Cohen, Head, Department of Homeland Security's Science and Technology Directorate, United States; Commodore (RN) Robert Mansergh, Deputy Director, US Second Fleet Combined Joint Operations From The Sea Centre of Excellence, USA*				
		Conference break and Refreshments/ Trade-show visiting time				
	1100 - 1230hrs		**10B: Technology:** *Subsystem Integration*	**10C: Platforms:** *Design - General 1*	**10D: Systems:** *Net-Centric C4i*	**10E: Technology:** *Maritime Domain Awareness*	**10F: Systems:** *Modelling & Simulation, Test & Evaluation*
		Conference break and Refreshments/ Trade-show visiting time				
	1245 - 1400hrs	**11A: Maritime Security:** *Lifecycle Considerations*	**11B: Technology:** *Weapons*	**11C: Platforms:** *Design - General 2*	**11D: Systems:** *Tactical Data Links*	**11E: Technology:** *Marine Mammals*	**11F: Systems:** *Navigation - Integration CMS, MSS*
		Lunch/Trade-show visiting time				
	1600hrs	**MAST 2008 Closes**				

MAST 2008 Conference timetable - All sessions

Wednesday 12th November

0900 - 1030hrs — **1: Official Opening and Keynote Session**

Including top level Spanish government/navy representatives; Rear-Admiral Anders Grenstad, Chief of Staff, Swedish Navy, Sweden; Rear-Admiral (ret'd) Jay Cohen, Head of Science and Technology Directorate, US Department of Homeland Security, United States

Conference break and Refreshments/ Trade-show visiting time

1100 - 1230hrs	**2A: Maritime Security:** *Maritime Situational Awareness*	**2B: Systems:** *New Ships - New Combat Systems*	**2C: Platforms:** *Survivability*	**2D: Systems:** *Submarine USW Systems*	**2E: Technology:** *Underwater Technologies 1*	**2F: Technology:** *Advanced Processing 1*

Conference break and Refreshments/ Trade-show visiting time

1245 - 1400hrs	**3A: Maritime Security:** *Littoral Surveillance*	**3B: Systems:** *Situational Awareness*	**3C: Platforms:** *New Ships*	**3D: Systems:** *Combat Systems Evolution*	**3E: Technology:** *Underwater Technologies 2*	**3F: Technology:** *Advanced Processing 2*

Lunch/Trade-show visiting time

1600-1730hrs	**4A: Maritime Security:** *AIS (Automatic Identification Systems)*	**4B: Systems:** *Maritime Surveillance*	**4C: Platforms:** *Innovation*	**4D: Systems:** *Combat System Theory - Improvement*	**4E: Technology:** *Unmanned Vehicles*

1800hrs — **End of day one/Annual MAST Party**

Thursday 13th November

0900 - 1030hrs	**5A: Maritime Security:** *Reducing the Cost of Maritime Security & Platforms*	**5B: Operations & Capabilities:** *Unmanned Operations*	**5C: Platforms:** *Design - New Solutions*	**5D: Systems:** *Open Systems Architecture*	**5E: Technology:** *Human Factors*	**5F: Maritime Security:** *Underwater Protection*	**5G: Technology:** *Surface Sensors 1*

Conference break and Refreshments/ Trade-show visiting time

1100 - 1230hrs	**6A: Maritime Security:** *Asymmetric Threat*	**6B: Operations & Capabilities:** *Ballistic Missile Defence (BMD)*	**6C: Platforms:** *Design - Special Tasks*	**6D: Systems:** *Communications Systems*	**6E: Platforms:** *AUV 1*	**6F: Technology:** *Architecture & Data Distribution 1*	**6G: Technology:** *Surface Sensors 2*

Conference break and Refreshments/ Trade-show visiting time

1245 - 1400hrs	**7A: Maritime Security:** *Asymmetric Threat - Countermeasures*	**7B: Operations & Capabilities:** *Future Capabilities*	**7C: Platforms:** *Design - Propulsion*	**7D: Systems:** *Ballistic Missile Defence (BMD)*	**7E: Platforms:** *AUV 2*	**7F: Technology:** *Architecture & Data Distribution 2*	**7G: Technology:** *Radar 1*

Lunch/Trade-show visiting time

1600-1730hrs	**8A: Maritime Security:** *Integrated Maritime Security Systems*	**8B: Technology:** *Countermeasures*	**8C: Platforms:** *Human Factors*	**8D: Systems** *Unmanned Vehicle Systems*	**8E: Technology:** *Communications*	**8F: Maritime Security:** *Architecture*	**8G: Technology:** *Radar 2*

1800hrs — **End of day two/Invitation-only receptions**

Friday 14th November

0900 - 1030hrs — **9: Plenary/panel Session: Title t.b.c.**

Chaired/moderated by a senior level Spanish naval/maritime agency representative, the panel - to be finalised in Autumn - include: Rear-Admiral Jay Cohen, Head, Department of Homeland Security's Science and Technology Directorate, United States; Commodore (RN) Robert Mansergh, Deputy Director, US Second Fleet Combined Joint Operations From The Sea Centre of Excellence, USA

Conference break and Refreshments/ Trade-show visiting time

1100 - 1230hrs	**10A: Maritime Security:** *Above Water Protection*	**10B: Technology:** *Subsystem Integration*	**10C: Platforms:** *Design - General 1*	**10D: Systems:** *Net-Centric C4i*	**10E: Technology:** *Maritime Domain Awareness*	**10F: Systems:** *Modelling & Simulation, Test & Evaluation*

Conference break and Refreshments/ Trade-show visiting time

1245 - 1400hrs	**11A: Maritime Security:** *Lifecycle Considerations*	**11B: Technology:** *Weapons*	**11C: Platforms:** *Design - General 2*	**11D: Systems:** *Tactical Data Links*	**11E: Technology:** *Marine Mammals*	**11F: Systems:** *Navigation - Integration CMS, MSS*

Lunch/Trade-show visiting time

1600hrs — **MAST 2008 Closes**

Session Chairmen

Session Chairmen are appointed by the MAST committee to assist with authors' requirements before and during the conference, and to moderate sessions to ensure the integrity of the MAST conference as a whole.

Not necessarily a Committee member, wherever possible Session Chairmen have expertise in the topic area of the session, coordinate the timing of presentations and encourage audience interaction, to give every delegate maximum value from taking part in MAST.

Appointed Session Chairmen as at 25th May were:

1A: Opening session/Keynote address
Joaquin Uguet

2A: Maritime Security: Maritime Situational Awareness
and
3A: Maritime Security: Littoral Surveillance
Ralf Siegfried

2B: Systems: New Ships - New Combat Systems
and
10D: Systems: Net-Centric C4i
Dr-Ing Hans-Dieter Ehrenberg

2C: Platforms: Survivability,
5E: Technology: Human Factors
and
8C: Platforms: Human Factors
Patrick Carnie

2D: Systems: Submarine USW Systems
and
7D: Systems: Ballistic Missile Defence (BMD)
Admiral (ret'd) Kate Paige

2E: Technology: Underwater Technologies 1
and
11E: Technology: Marine Mammals
Dr Paul Lefebvre

2F: Technology: Advanced Processing 1,
3F: Technology: Advanced Processing 2
and
5F: Maritime Security: Underwater Protection
Coenraad M. Ort

3B: Systems: Situational Awareness
and
4D: Systems: Combat System Theory - Improvement
Captain (ret'd) Bo Wallander

3**C: Platforms: New Ships**
Admiral (ret'd) Ennio Piantini

3D: Systems: Combat Systems Evolution
and
5C: Platforms: Design - New Solutions
Professor Rafael Bellido

3E: Technology: Underwater Technologies 2
and
6B: Operations & Capabilities: Ballistic Missile Defence
George McNamara

4A: Maritime Security: AIS (Automatic Identification Systems)
and
6A: Maritime Security: Asymmetric Threat
Commodore (ret'd) Luke van Beek

4B: Systems: Maritime Surveillance
and
10F: Systems: Modelling & Simulation, Test & Evaluation
Tim Troske

4C: Platforms: Innovation
and
7E: Platforms: AUV 2
Patricia Woody
(Naval Surface Warfare Center, United States)

4E: Technology: Unmanned Vehicles
and
10B: Technology: Subsystem Integration
Dominique Thubert
(Thales Underwater Systems, France)

5A: Maritime Security: Reducing the Cost of Maritime Security and Platforms
Rear-Admiral Stephane Verwaerde

5B: Operations & Capabilities: Unmanned Operations
Rear-Admiral (ret'd) Bertil Bjorkman

5D: Systems: Open Systems Architecture
Alain Carof

5G: Technology: Surface Sensors 1
and
6D: Systems: Communications Systems
Dr Alan Hartley

6C: Platforms: Design - Special Tasks
Charles Reeves

6E: Platforms: AUV 1
and
10C: Platforms: Design - General 1
Dr Lyn-M. Giersch

6F: Technology: Architecture & Data Distribution 1
and
7F: Technology: Architecture & Data Distribution 2
Thierry Brizard

6G: Technology: Surface Sensors 2
James Kelly
(Ex-Naval Undersea Warfare Center, United States)

7A: Maritime Security: Asymmetric Threat Countermeasures,
8F: Maritime Security: Architecture
and
11A: Maritime Security: Lifecycle Considerations
Dr Miles Libbey

7B: Operations & Capabilities: Future Capabilities
Ana Buendia
(Indra, Spain)

7C: Platforms: Design - Propulsion
and
11C: Platforms: Design - General 2
Professor Alexander Pustoshny

7G: Technology: Radar 1
and
8G: Technology: Radar 2
Jos Visser
(Thales Nederland, Netherlands)

8A: Maritime Security: Integrated Maritime Security Systems
Captain Jan T. Doblowski

8B: Technology: Countermeasures
Bernie Myers

8D: Systems: UAV Systems
t.b.c.

8E: Technology: Communications
Rear-Admiral Francois-Regis Martin-Lauzer

10A: Maritime Security: Above Water Protection
Rear-Admiral (ret'd) Charles Beers

10E: Technology: Maritime Domain Awareness
George Zvara
(Naval Undersea Warfare Center, United States)

11B: Technology: Weapons
Dr John Sirmalis

11D: Systems: Tactical Data Links
Francesco Noschese

11F: Systems: Navigation - Integration CMS, MSS
Michel Accary

Papers by Topic

Maritime Security – Above Water Protection
Session 10A – Friday 14th November: 1100hrs

An Interoperability Framework to Provide the "Common Maritime Picture"
Mr Hugues Sassier, ***Thales Alenia Space*****, Fran**
Maritime Security in Brown Waters
Vice Admiral Richard Börjesseon, ***Security Alliance Stockholm AB*****, Sweden**
Ship Protection within Littoral Waters – A French Navy Perspective
Rear-Admiral Stephane Verwaerde, ***French Navy*****, France**

Maritime Security – AIS (Automatic Identification Systems)
Session 4A – Wednesday 12th November: 1600hrs

Harbour-craft Identification and Monitoring System
Mr Edmund Ooi, ***ST Electronics (Info-Comm Systems)*****, Singapore**
Implementation of the ISPS Code and European Regulations in Spain – Special Measures for Passenger Ships.
Mr Francisco Javier Castillejo, ***Ministry of Development*****, Spain**
Modeling and Validation of Maritime Surveillance Performance
Dr Stefano Coraluppi, ***NATO Undersea Research Center (NURC)*****, Italy**
Space-based Automatic Information System (AIS) Solutions to the Simultaneous Access Issue
Mr Thibaud Calmettes, ***Thales Alenia Space*****, France**

Maritime Security – Architecture
Session 8F – Thursday 13th November: 1600hrs

Integrating Protection Systems for Potentially Dangerous Maritime Objects
CMS Artem Popko, ***Marine Bridge & Navigating Systems*****, Russia**
NAval Operation System for Maritime Safety and Security (NAOS MS2)
Mr Michel Morel, ***DCNS*****, France**
Service Oriented Architecture (SOA) for Maritime Surveillance
Mr Daniel Tiberghien, ***Thales Communications*****, France**
The Integrated Ship and Harbour Area Protection System Architecture
Dr Ryszard Rugala, ***R&D Marine Technology Centre (CTM)*****, Poland**

Maritime Security – Asymmetric Threat
Session 6A – Thursday 13th November: 1100hrs

Combating Maritime Asymmetric Threats
Mr kevin Cresswell, ***Control Risks*****, United States**
Global Border Management
Mr Juan González-Aller Rodríguez, ***Accenture,*** **Spain**
Maritime Security of Offshore, Coastal and Harbour Assets – The Australia Situation
Mr Michael Lonsdale, ***Thales Australia*****, Australia**
Maritime Situational Awareness in Homeland Security and Emergency Management – What Do We Really Know?
Dr Juan José Martínez, ***Indra Sistemas SA*****, Spain**

Maritime Security – Asymmetric Threat – Countermeasures
Session 7A – Thursday 13th November: 1245hrs

Container Security: The Final Information Frontier
Mr Doug Linman, ***Network Anatomy/NetCo*****, United States**
Countering Asymmetric Threats: Long Term Experimental Setup for ASymW (LEXXWAR)
Mr Joachim Kimpel, ***Ministry of Defence/BWB*****, Germany**
Deterrence as System Force Multiplier in the Defence Against Terrorism (DAT)
Dr Ronald Kessel, ***NATO Undersea Research Center (NURC)*****, Italy**
Latest Trends in Battlefield Identification – Mode 5, BTID, Blue Force Tracking
Mr Guillermo Monzón-Rodriguez, ***Indra*****, Spain**

Maritime Security – Integrated Maritime Security Systems
Session 8A – Thursday 13th November: 1600hrs

Addressing the Challenges of Systems-Of-Systems Integration in Maritime Safety and Security – The POSEIDON Project
Dr Jacek Skowronek, ***Thales Nederland*****, Netherlands**
Future Integrated Surveillance of Coastal and Maritime Areas – A Spanish Approach to Accomplishing Border Protection and Defence Missions
Engineer José A. Díaz, ***ISDEFE*****, Spain**
The Global Challenge of Information Exchanges within the Maritime Community
Mr Bernard Garnier, ***Thales Group (Naval Division)*****, France**

Maritime Security – Lifecycle Considerations
Session 11A – Friday 14th November: 1245hrs

Adaptive Logistics
Ms Lori Lindholm, ***Lockheed Martin MS2*****, United States**
Harmonising Technical Data and Learning Content Management with S1000D and SCORM
Mr Wayne Gafford, ***Department of Defence (Advanced Distributed Learning)*****, United States**
Improved System Operational Availability through Autonomous Data Communication and Analysis
Mr David VanBuskirk, ***Lockheed Martin*****, United States**
Improving Asset Management through Enhanced Decision Support Processes
Dr Lloyd Hammond, ***Defence Science & Technology Organisation (DSTO)*****, Australia**

Maritime Security – Littoral Surveillance
Session 3A – Wednesday 12th November: 1245hrs

New Generation Radar Systems for New Threats in Coastal Surveillance
Mr Marquis Emmanuel, ***Thales Surface radar*****, France**
New Radar Concept for Ship Security at Anchor
Mr Marquis Emmanuel, ***Thales Surface radar*****, France**
Passive Radar Protection for Ship at Anchor
Mr Jean-Philippe Brunet, ***Thales Group (Naval Division)*****, France**

Maritime Security – Maritime Situational Awareness
Session 2A – Wednesday 12th November: 1100hrs

Applied Data Fusion Techniques for the Integration of Port and Ship Security
Mr Martyn Dickinson, ***Servowatch Systems Limited*****, United Kingdom**
Enhanced Maritime Domain Awareness through Web-based Configurable Software
Mr Richard Dickinson, ***Lockheed Martin (Advanced Technology Laboratories)*****, United States**
Maritime Surveillance in the Network Centric World
Mr Dane Marolt, ***Northrop Grumman*****, United States**

Maritime Security - Plenary/panel Session
Session 9A – Friday 14th November: 0900hrs

Maritime Security – Reducing the Cost of Maritime Security and Platforms
Session 5A – Thursday 13th November: 0900hrs

How Can Through Life Capability Management Help?
Mr Michael Formosa, ***Jane's Information Group*****, United Kingdom**
Life-Cycle Cost – How to Minimise it
Mr Pablo Segovia Escobar, ***Indra Sistemas SA*****, Spain**
Procurement and Contracting Approach
Mr Alex Pape, ***Jane's Information Group*****, United Kingdom**
The Cost of Maritime Security & Platforms: Requirement Drivers
Commodore Luke van Beek, ***Mott MacDonald*****, United Kingdom**

Maritime Security – Underwater Protection
Session 5F – Thursday 13th November: 0900hrs

A New Approach to Underwater Critical Infrastructures
Mr Antonio Sanchez Garcia, ***SAES*****, Spain**
Harbour Shield- : A New Technique for Inspection of Vessels below the Waterline
Mr Frank Murphy, ***Battelle*****, United States**
High Performance Underwater Surveillance System for Coastal and Offshore Sites (AquaShield DDS)
Mr Dan Ben-Dov, ***DSIT Technologies*****, Israel**
Military Support of Civil Authorities for Harbour Security – Concepts and Technology for Countering Underwater Threats
Dr Augustinus Beckers, ***TNO (Defence, Security and Safety)*****, Netherlands**

Maritime Security - Keynote addresses
Session 1A – Wednesday 12th November: 0900hrs

Visit: ***www.mastconfex.com/timetable.asp*** *for the latest information on panel members and other contributors to this exclusive session on a core Maritime Security issue.*

NB: Pre-registered delegates will be able to submit questions ahead of the event, for the panel to address during the session.

Operations & Capabilities – Ballistic Missile Defence (BMD)
Session 6B – Thursday 13th November: 1100hrs

Increasing Onboard Firepower using Standard Warship Architectures
Mr Guy-François Mesnil, ***Thales Air Systems*****, France**
Potential Sea-Based Platforms for Europe/NATO
Mr HB Stevens, ***Lockheed Martin MS2*****, United States**
Sea-Based Missile Defense Analysis for Future UK Surface Combatants
Mr HB Stevens, ***Lockheed Martin MS2*****, United States**

Operations & Capabilities – Future Capabilities
Session 7B – Thursday 13th November: 1245hrs

Network Enabled Capability in the Maritime Environment
Commander Mikael Magnusson, ***Swedish Armed Forces*****, Sweden**
The "Tipping Point" Surface Combatant
Mr R. Robinson Harris, ***Lockheed Martin MS2*****, United States**
The Future of Naval Construction in Europe: Applied Research on Naval Platform
Mr Natalio Rodriguez, ***Association of the Spanish Naval Architecture (AINE)*****,Spain**

Operations & Capabilities – Unmanned Operations
Session 5B – Thursday 13th November: 0900hrs

Collaborative Unmanned Operations for Maritime Security
Dr Peter Drewes, ***Lockheed Martin MS2*****, United States**
Modelling Operational Effectiveness of USV Sensors
Mr Peter Cosgrove, ***Thales Underwater Systems*****, United Kingdom**
Unmanned Systems Requirements – The Road Ahead
Dr Gregorio Ameyugo Pérez, ***Indra Sistemas SA*****, Spain**

Platforms – AUV 1
Session 6E – Thursday 13th November: 1100hrs

Future French Navy Mine Warfare Capability
Rear-Admiral Stephane Verwaerde, ***French Navy*****, France**
Solid Oxide Fuel Cell (SOFC) for Unmanned Undersea Vehicle (UUV) Propulsion
Dr Louis Carreiro, ***Naval Undersea Warfare Center*****, United States**
The German Approach to Force and Harbour Protection and Possible Integration into Naval Systems – The AUV Family SEA OTTER Mk II and SEA WOLF
Mr Michael Rothenbach, ***Ministry of Defence/BWB*****, Germany**
UAVs for the 21st Century
Lieutenant Commander Jesus Ibarz, ***Spanish Navy*****, Spain**

Platforms – AUV 2
Session 7E – Thursday 13th November: 1245hrs

Adaptation of the Remote Multi-Mission Vehicle (RMMV) for Additional Unmanned Missions
Mr Marc Heller, ***Lockheed Martin MS2,*** **United States**
Low Cost Autonomous Underwater Vehicles for Oceanographic and Harbour Surveillance Missions
Eng Alexandre Sousa, ***Oceanscan,*** **Portugal**
Operations with Autonomous Vehicles in the Response to Maritime Incidents
Mr João Borges de Sousa, ***Porto University,*** **Portugal**
Recent Developments on Rockets with Gelled Propellants
Dr Karl Wieland Naumann, ***Bayern-Chemie,*** **Germany**

Platforms – Design – General 1
Session 10C – Friday 14th November: 1100hrs

Advanced Electric Ship Demonstrator:
Ms Deborah Naichajlan, ***Office of Naval Research (ONR),*** **United States**
Landing Craft – Simple Ships or Time for a Rethink? A Designer's Perspective
Mr Nick Noel-Johnson, ***BMT Defence Services,*** **United Kingdom**
Modelling Enhanced CO2 Absorption in Soda Lime at Low Temperatures and Elevated Pressures
Dr Tiang Hong Gan, ***Defence Science & Technology Organisation (DSTO),*** **Australia**
Modular Stabilized Weapon System Integration for Combatant Craft
Ms Jennifer Grimsley PE NA, ***Naval Surface Warfare Center (Carderock Division),*** **United States**

Platforms – Design – General 2
Session 11C – Friday 14th November: 1245hrs

Design and Build of a High-Speed Technology Demonstrator Vessel
Mr Andy Higgins, ***QinetiQ,*** **United Kingdom**
Electromagnetic Susceptibility Management – A Framework for Effective Exploitation of Electromagnetic Signature Management Systems
Mr Alastair Ballentine, ***QinetiQ,*** **United Kingdom**
Test, Evaluation and Computational Validation of High Performance Craft for Hydrodynamic Loading and Structural Response
Mr Brian Grimsley, ***Naval Surface Warfare Center (Carderock Division),*** **United States**
Uses of Commercially Chartered Heavy Lift Ships for Auxiliary Naval Operations
Mr David Jurkiewicz, ***Naval Surface Warfare Center (Carderock Division),*** **United States**
Creation of a Hull Surface Design Tool for Use in Solid Modelling
Mr Charles Forrest, Graphics Research Corporation, United Kingdom

Platforms – Design – New Solutions
Session 5C – Thursday 13th November: 0900hrs

Improving Anti-Corrosive Coatings Performance for Navy Vessels
Ms Gabriele Ferrari, ***TNO,*** **Netherlands**
Insulated Bus Pipe (IBP) for Shipboard High Power Distribution Applications
Mr Richard Worth, ***Naval Sea Systems Command,*** **United States**
Integrated Single Masts for Warships
Mr Denis Quiltu, ***DCNS,*** **France**
New Fiber-Metal Hybrid Laminated Material (MaLECoN)
Professor Juan C. Suarez, ***Universidad Politecnica de Madrid,*** **Spain**

Platforms – Design – Propulsion
Session 7C – Thursday 13th November: 1245hrs

Dynamic Management of Propulsion Plants in Naval Applications
Mr Giacomo Cherlo, ***Avio S.p.A.,*** **Italy**
IEEE Standards for Maritime Systems and Technology
Dr Yuri Khersonsky, ***Practice in Power Electronics,*** **United States**
Navantia's Ship Management System: COMPLEX (COntrol y Monitorizacion de PLataforma EXtensible)
Mr Francisco Panos, ***Navantia,*** **Spain**
System Integration for Naval Propulsion Systems
Mr Christoph Fenske, ***MTU Friedrichshafen GmbH,*** **Germany**

Platforms – Design – Special Tasks
Session 6C – Thursday 13th November: 1100hrs

Complex of Model Experiments and Calculations as Actual Procedure for Investigation of Dynamic Towing Systems
Professor Alexander Pustoshny, ***Krylov SRI,*** **Russia**
Fully Integrated, Automated Shipboard Oil Pollution Abatement Systems
Mr Stephen Hopko, ***US Navy (Naval Surface Warfare Center, Philadelphia),*** **United States**
Global Optimisation of Real-time Multi Platform Situational Awareness
Dr Hervé Fargetton, ***Ministry of Defence (DGA/CTSN),*** **France**
Output Feedback and Trajectory Tracking Control of a Gantry Crane
Mr Albert Ortiz, ***US Navy (Naval Surface Warfare Center, Philadelphia),*** **United States**

Platforms – Human Factors
Session 8C – Thursday 13th November: 1600hrs

Human Factors Integration for Sonar User Interfaces
Mr Olivier Rabourdin, ***Thales Underwater Systems,*** **France**
Managing the Human Element – Best Practice for Ship Operators
Dr Jonathan Earthy, ***Lloyd's Register,*** **United Kingdom**
Risk Reduction Methodology for the Manning of the Operations Room of a Frigate (With Reduced Crew)
M. Ludovic Martinet, ***Ministry of Defence (DGA),*** **France**
The Human Element in Ship Design, Build and Operation
Commodore David Squire, ***The Nautical Institute,*** **United Kingdom**

Platforms – Innovation
Session 4C – Wednesday 12th November: 1600hrs

A Notional Global Fleet Station Ship Concept Design
Dr Christopher Dicks, ***Naval Surface Warfare Center (Carderock Division),*** **United States**
Energy Harvesting for Shipboard Wireless Damage Control Sensors
Mr Albert Ortiz, ***US Navy (Naval Surface Warfare Center, Philadelphia),*** **United States**
Engine Diagnosis Centre for Spanish Navy
Mr Eduardo Ruiz, ***Navantia,*** **Spain**
Synergistic Assessment of Innovative Technologies for Improved Expeditionary Combat Operations
Mr Daniel Dozier, ***Naval Surface Warfare Center (Carderock Division),*** **United States**

Platforms – New Ships
Session 3C – Wednesday 12th November: 1245hrs

Advanced Tests and Optimisation Procedures for
Vice- Admiral José-Manuel Sevilla, ***Canal de Experiencias Hidrodinámicas de El Pardo (CEHIPAR),*** **Spain**
F125 Frigate Programme – Current Status and Technical Solutions for the Intensive use Approach
Mr Lyn-Markus Giersch, ***Ministry of Defence/BWB,*** **Germany**
German Frigate F125 programme – Platform System
Dr Tim Becker, ***Blohm & Voss Nordseewerke GmbH,*** **Germany**
The A26 Submarine Programme – The New and Cost Efficient Submarine for the Swedish Navy
Lieutenant Commander Mats Abrahamsson, ***FMV (Swedish Defence Materiel Administration),*** **Sweden**

Platforms – Survivability
Session 2C – Wednesday 12th November: 1100hrs

Analysis of Shipboard Survivable Firemain Systems
Mr Albert Ortiz, ***US Navy (Naval Surface Warfare Center, Philadelphia),*** **United States**
Fully Integrated FE-Analysis in Survivability Manager Application (SURMA)
Mr Roope Kotiranta, ***Surma Ltd.,*** **Finland**
Survivability Analysis of Shipboard Reconfigurable Systems
Dr Li Bai, ***Temple University,*** **United States**
SURVIVE and SURVIVE Lite – Recent Developments
Mr James Schofield, ***QinetiQ,*** **United Kingdom**

Systems – Ballistic Missile Defence (BMD)
Session 7D – Thursday 13th November: 1245hrs

2007 USN Ballistic Missile Defence (BMD) Flight Test Mission Results
Mr Mark Wood, ***Lockheed Martin MS2,*** **United States**
Aegis Modernization – Missile Defense & Other Warfare Missions
Mr Carl Bauer, ***Lockheed Martin MS2,*** **United States**
European Missile Defense Collaborative Tool
Mr William Miasek, ***Lockheed Martin MS2,*** **United States**
Maritime BMD Capabilities – A Roadmap for the Netherlands
Mr Michiel Beijer, ***TNO,*** **Netherlands**

Systems – Combat System Theory – Improvement
Session 4D – Wednesday 12th November: 1600hrs

A Pattern Language for Open Architecture Systems
Dr Peter Hammond, ***BAE Systems (Integrated Systems Technology),*** **United Kingdom**
Assessing Combat System Effectiveness – Statistical Methods
Mr Daniel Eling, ***Alion Science & Technology,*** **United States**
So Many Combat Systems, So Little Time (to Integrate)…
Mr Michael Wiseman, ***US Navy,*** **United States**
Tracking Based on Theory Applied to Pair of Plot
Mr Frederic Livernet, ***Ministry of Defence (DGA/DET/CTS),*** **France**

Systems – Combat Systems Evolution
Session 3D – Wednesday 12th November: 1245hrs

Enterprise Implications of a New Combat System Architecture for Major Royal Navy Surface Combatants
Mr John Spencer, ***Thales Group (Naval Division),*** **United Kingdom**
Evolution of Complex Systems
Dr Paul Gosling, ***Thales Underwater Systems,*** **United Kingdom**
Multi Platform Tactical Picture (MPTP)
Mr Felix Alvarez, ***DCNS,*** **France**
The User Meets the System – A True Open Architecture Approach
Mr Pär Rickard Hildingsson, ***Saab Systems,*** **Sweden**

Systems – Communications Systems
Session 6D – Thursday 13th November: 1100hrs

Advantages of DVB-RCS Access for Maritime Communications
Mr Nicolas Dubyk, ***Thales Alenia Space,*** **France**
Flexible Sharing of Visual Information amongst Geographically Distributed Stake-holders to Maximise Situational Awareness
Mr Jan De Maeyer, ***Barco NV,*** **Belgium**
Naval Force Intranet – Stand Alone System
Mr Jean-Luc Sandral-Lasbordes, ***Thales Land & Joint Systems,*** **France**

Systems – Maritime Surveillance
Session 4B – Wednesday 12th November: 1600hrs

Coastal Protection – Do Integrated Solutions Really Exist?
Mrs Anna Montuenga, ***General Dynamics Santa Bárbara Sistemas,*** **Spain**
Fusion of Naval Combat Systems and a Coast Bound Maritime Surveillance System to Achieve Total and Flexible Maritime Security
Mr Thomas Kunze, ***ATLAS Elektronik GmbH,*** **Germany**
Holistic Security Risk Management In Port Infrastructures
Mr Philippe Bouvier, ***Thales Security Systems,*** **France**
Security of Critical Maritime Areas – A Report on SOBCAH and SECMAR Projects
Mr Daniel Taton, ***Thales Underwater Systems,*** **France**

Systems – Modelling & Simulation, Test & Evaluation
Session 10F – Friday 14th November: 1100hrs

A Modelling and Simulation Tool to Measure Naval Task Effectiveness across all Warfare Domains
Mr Francesco Perra, ***Orizzonte Sistemi Navali,*** **Italy**
CAP: a tool for Concept Development and Experimentation
Mr Yves Lavaux, ***Thales Underwater Systems,*** **France**
Exploiting Synergies between Naval Operational Systems and Test, Evaluation and Training Ranges
Dr Lyn Owen, ***QinetiQ,*** **United Kingdom**
Naval Warfare Performance Simulation Techniques with Improved Modelling of Interaction with Environments
Dr Christian Audoly, ***DCNS,*** **France**

Systems – Navigation – Integration CMS, MSS
Session 11F – Friday 14th November: 1245hrs

Forward from the Sea – Taking the Geographic Information Challenge
Dip-Ing Peter Dugge, ***ATLAS Elektronik GmbH*****, Germany**
Warship Electronic Chart Display and Information System (WECDIS)
Mr Jose Antonio Lopez Berrio, ***Sainsel Sistemas Navales S.A.U.*****, Spain**

Systems – Net-Centric C4i
Session 10D – Friday 14th November: 1100hrs

Development of Secure Scalable Net-Centric Systems- A Proven Design Methodology
Mr Gordon Hunt, ***Real-Time Innovations, Inc.*****, United States**
Putting the Submarine at the Heart of Network Centric C4I – The Final Fathom
Commodore Patrick Tyrrell, ***Vale Atlantic Ltd*****, United Kingdom**

Systems – New Ships – New Combat Systems
Session 2B – Wednesday 12th November: 1100hrs

CMS with Integrated Tactical Data Link for German Frigate F125 programme
Dr Hans-Dieter Ehrenberg, ***ATLAS Elektronik GmbH*****, Germany**
Extending the Operational Effectiveness of Surface Combatants – Lessons Learned on the FFG Upgrade Programme
Mr Terence Warwick, ***Thales Australia*****, Australia**
German Frigate F125 programme – Mission System
Mr Gunnar Jürgensen, ***Blohm & Voss Nordseewerke GmbH*****, Germany**
SCOMBA Combat System
Mr Jose Espinal, ***Navantia*****, Spain**

Systems – Open Systems Architecture
Session 5D – Thursday 13th November: 0900hrs

Architecture Frameworks and Systems Engineering
Mr George Wallace, ***BMT Sigma*****, United Kingdom**
Enterprise Readiness Level Assessments
Mr William Ormsby, ***Naval Surface Warfare Center (Dahlgren Division)*****, United States**
Evolution of OSA in Warships
Dr Nik Moss, ***Thales Group (Naval Division)*****, United Kingdom**
Open Systems – How Closed is Open?
Mr Mark Thomas, ***Thales Underwater Systems*****, United Kingdom**

Systems – Situational Awareness
Session 3B – Wednesday 12th November: 1245hrs

Actionable Situational Awareness – The New C2
Mr Philip Bozzelli, ***Lockheed Martin MS2*****, United States**
Common Detection of Abnormal Behaviours & Analysis of Suspicious Events using I2C Interoperable Sensors & Information Sources
Mr Michel Morel, ***DCNS*****, France**
Maritime Situation Awareness: ISDEFE's Support of the Spanish Navy
Mr Victor Rodriguez Herola, ***ISDEFE*****, Spain**
Next Generation MDA from Today's Technology
Mr Anthony Edmonds, ***QinetiQ*****, United Kingdom**

Systems – Submarine USW Systems
Session 2D – Wednesday 12th November: 1100hrs

Advancements in Undersea Warfare Systems on Surface Ships
Dr Thomas Stottlemyer, ***Naval Undersea Warfare Center*****, United States**
COTS and Rapid Prototyping in Surface USW Systems
Mr Kyril Korolenko, ***Naval Undersea Warfare Center*****, United States**
Electronic Navigation Technology – Enabling Submarine Operations in Littoral Areas
Mr Robert Bush, ***OSI Geospatial*****, Canada**
International Submarine Integrated Combat System (ICS)
Mr Bob Harman, ***Lockheed Martin MS2*****, United States**

Systems – Tactical Data Links
Session 11D – Friday 14th November: 1245hrs

A New Approach to Tactical Data Link for the French Navy
Mr Pascal Ribeiro, ***Ministry of Defence (DGA)*****, France**
Concurrent Multi-link Operations and System's Enhancements in Support of New Tactical Data-link Requirements
Commander Manuel Martinez Ruiz, ***Department of Defence (JPEO-Joint Tactical Radio System-MIDS IPO)*****, Spain**
Heterogeneous Underwater Networks for Anti Submarine Warfare (ASW)
Ir Robert Been, ***NATO Undersea Research Center (NURC)*****, Italy**

Systems – UAV Systems
Session 8D – Thursday 13th November: 1600hrs

Joint Sonar and Video Sensing for an Autonomous Underwater Mine Disposal Vehicle
Mr Nicolas Mandelert, ***Thales Underwater Systems*****, France**
Networked Operations (with Neptus)
Eng Paulo Dias, ***FEUP*****, Portugal**
New NATO Standards for Unmanned Aircraft Systems
Ms Laura Casadevall, ***Indra*****, Spain**

Technology – Advanced Processing 1
Session 2F – Wednesday 12th November: 1100hrs

Detection of Low Level Modulated Signals – Application to Vocalisation Detection
Mrs Marie Géhant, ***Thales Underwater Systems*****, France**
Image Treatment in Electro-Optical Systems
Mr Tomás Jimeno, ***Tecnobit SL*****, Spain**
Improving Sensor Data Analysis Through Diverse Data Source Integration
Ms Jennifer Casper, ***The MITRE Corporation*****, United States**

Technology – Advanced Processing 2
Session 3F – Wednesday 12th November: 1245hrs

Bistatic Low-Frequency Active Sonar System Developments
Dr Pascal AM de Theije, ***TNO*****, Netherlands**
Bistatic Operations with Low Frequency Active Variable Depth Sonar – Practical Implementation of the SLASM System
Mr Christian Giroussens, ***Thales Underwater Systems*****, France**
Small Target Detection in Sea Clutter, Based on the Radon Transform
Mr Javier Carretero, ***Universidad Politecnica de Madrid*****, Spain**

Technology – Architecture & Data Distribution 1
Session 6F – Thursday 13th November: 1100hrs

Condition and Environment Sensing and Reporting System (CAESAR)
Mr Hal Tonthat, ***Naval Surface Warfare Center (Port Hueneme Division)*****, United States**
Patterns for Data-Centric Real-time Distributed Systems
Dr Angelo Corsaro, ***PrismTech*****, Italy**
Using Open Source Software for Naval Systems
Mr Mark Thomas, ***Thales Underwater Systems*****, United Kingdom**

Technology – Architecture & Data Distribution 2
Session 7F – Thursday 13th November: 1245hrs

Network Enabled – Interoperability Capabilities and Limitations
Mr Alexei Schandl, ***Naval Surface Warfare Center (Port Hueneme Division)*****, United States**
Secure Data Distribution
Dr Angelo Corsaro, ***PrismTech*****, Italy**
Supervision and Communication System (SCS)
Mr Vittorio Giuffra, ***ABB*****, Italy**

Technology – Communications
Session 8E – Thursday 13th November: 1600hrs

Automatic Waveform Parameters' Selection in Military HF Transceivers – Depending on Propagation Conditions and Type of Traffic being Generated
Mr Jan Cichy, ***R&D Marine Technology Centre (CTM)*****, Poland**
New Paradigm for Naval Tactical Communications
Ms Laura Casadevall, ***Indra*****, Spain**
State-Of-The-Art, Real World Acoustic Communications and Undersea Networks
Mr Dale Green, ***Teledyne Benthos*****, United States**
Submarine Satellite Communication Terminals – Systems and Evolution
Mr Pedro Elola, ***Indra Espacio*****, Spain**

Technology – Countermeasures
Session 8B – Thursday 13th November: 1600hrs

Adaptive Jammers and Decoy Systems
Mr Ryszard Kaminski, ***R&D Marine Technology Centre (CTM)*****, Poland**
EW in Maritime Surveillance Operations
Captain (SPN) G Cassinello, ***Indra Sistemas SA*****, Spain**
Integrated Anti-Ship Missile Countermeasures Development
Mr John Bednarz, ***Tactical Technologies Inc.*****, Canada**

Technology – Human Factors
Session 5E – Thursday 13th November: 0900hrs

Architecture Frameworks for Sonar User Interfaces
Mr Mark Thomas, ***Thales Underwater Systems*****, United Kingdom**
Collaborative Work Desktop for MSS Operation Centers – nuVa
Mr Andy Vooght, ***Thales Research & Technology (UK) Ltd*****, United Kingdom**
Knowledge Management for the Spanish Navy – UVICOA
Mr Alvaro de Salas, ***Indra Sistemas SA*****, Spain**
Remote Monitoring and Remote Diagnostics for Shipboard Systems Maintenance
Mr Joel H. Timm, ***Naval Sea Systems Command*****, United States**

Technology – Marine Mammals
Session 11E – Friday 14th November: 1245hrs

Compact Passive Acoustic Monitoring (CPAM) – Cost-effective Monitoring of the Presence and Behaviour of Deep-diving Whales
Mr Walter MX Zimmer, ***NATO Undersea Research Center (NURC)*****, Italy**
Detection of Blainville's Beaked Whale using Autonomous Underwater Gliders
Mr James A. Theriault, ***Defence R&D Canada Atlantic*****, Canada**
Marine Mammal Risk Mitigation Sea Trial (SIRENA 08)
Mr Jeffrey Haun, ***NATO Undersea Research Center (NURC)*****, Italy**
Passive Marine Mammal Detection Using the The Delphinus Array
Dr S.P. (Peter) Beerens, ***TNO (Defence, Security and Safety)*****, Netherlands**

Technology – Maritime Domain Awareness
Session 10E – Friday 14th November: 1100hrs

Coupling ASTON-ESCADRE and Ptolemy II-DSDF Simulation Frameworks for a Convenient Technico-functional Algorithms Test-bed
Mr Vincent Arnould, ***DCNS*****, France**
Improving Ship Detection using High Resolution Synthetic Aperture Radar (SAR) Images and Advanced Time-Frequency Processing Techniques (ATF)
Mr Marc Spigai, ***Thales Alenia Space*****, France**
Measure of Total Integrated System Survivability (MOTISS) Analysis of a Notional Surface Combatant Ship
Mr Grant Raisig, ***Alion Science & Technology*****, United States**
Modelling and Experiments on Search, Detection, and Retrieval Methods for Container Ships
Mr Frank Leban, ***Naval Sea Systems Command*****, United States**

Technology – Radar 1
Session 7G – Thursday 13th November: 1245hrs

Future Littoral Radar Performance
Dr Robert Marshall, ***Naval Surface Warfare Center (Dahlgren Division)*****, United States**
Naval Radars for the Littorals
Mr Gunter Menacher, ***EADS Deutschland GmbH*****, Germany**
Scalable Solid-State S-Band Radar (S4R(tm)) Demonstrator
Mr Travis Nix, ***Lockheed Martin MS2*****, United States**

Technology – Radar 2
Session 8G – Thursday 13th November: 1600hrs

High Resolution Millimeter-Wave Radar for Sea Target Identification
Mr Jose M. Muñoz-Ferreras, ***Universidad Politecnica de Madrid*****, Spain**
Over-The-Horizon Radar – An Introduction to WavE RAdar (WERA)
Mr Thomas Helzel, ***Helzel Messtechnik GmbH*****, Germany**
Spray-cooling of High Power Electronic Subsystems
Mr Colin Davies, ***GE Fanuc Intelligent Platforms*****, United Kingdom**

Technology – Subsystem Integration
Session 10B – Friday 14th November: 1100hrs

Craft Integrated Electronics Suite (CIESTM) – Summary of an Operational Programme
Mr Larry W. Wiley, ***Naval Surface Warfare Center (Carderock Division)*****, United States**
Innovative Techniques Developed within the Seawolf Mid-life Update (SWMLU) Programme
Mr Stephen Hall, ***BAE Systems (Integrated Systems Technology)*****, United Kingdom**
Integrated Sensor & Communication System
Mr Peter Stoffer, ***Thales Nederland*****, Netherlands**
Sonar 2087 – An Engineering Challenge in Platform Integration
Mr Philip Gwynne, ***Thales Group (Naval Division)*****, United Kingdom**

Technology – Surface Sensors 1
Session 5G – Thursday 13th November: 0900hrs

New Naval Off Axis Laser Warning Technology
Mr Vincent Mégaides, ***Thales Optronique*****, France**
Passive Radar for Maritime Surveillance
Mr Daniel Tiberghien, ***Thales Communications*****, France**
Threat Evaluation and Technical Responses using EW Digital Receiver-Based Sensors
Mr Carmela Barbero, ***Indra Sistemas SA*****, Spain**
Visual and IR Obscurants on Small Craft for Littoral Operations – A Craft Survivability Enhancement Program
Mr Richard G. Wilkie Jr, ***Naval Surface Warfare Center (Carderock Division)*****, United States**

Technology – Surface Sensors 2
Session 6G – Thursday 13th November: 1100hrs

Advanced Naval Infrared Search and Track System Prototype (SIRIO)
Dr Germán Vergara, ***Ministry of Defence/CIDA (Centro de Investigación y Desarrollo de la Armada)*****, Spain**
Early Warning and Identification System for NBC (SentrY)
Mr Jesús Madrid, ***Indra Sistemas SA*****, Spain**
Novel Nanotechnology-based Sensors
Dr Alfredo Rayms-Keller, ***Naval Surface Warfare Center (Dahlgren Division)*****, United States**
Passive Surveillance of Harbour and Coastal Area with Cameras
Mr Dann Laneuville, ***DCNS*****, France**

Technology – Underwater Technologies 1
Session 2E – Wednesday 12th November: 1100hrs

Combating the Modern Mine
Dr Andrew Bailey, ***Defence Science & Technology Organisation (DSTO)*****, Australia**
Countering the Underwater Threat with Proven 4D Acoustic Technology
Mr Angus Lugsdin, ***Coda Octopus Group*****, United States**
Electromechanical and Mechanical Properties of Piezoelectric Single Crystals for Naval Sonar Transducers
Dr Lynn Ewart Paine, ***Naval Undersea Warfare Center*****, United States**
Single Crystal Projectors for Compact, Broadband Sonar
Dr Harold Robinson, ***Naval Undersea Warfare Center*****, United States**

Technology – Underwater Technologies 2
Session 3E – Wednesday 12th November: 1245hrs

Automatic Detection and Tracking of Underwater Threats – Human Factors Technologies for Reduced Manning
Mr Matthias Conrad, ***L-3 Communications ELAC Nautik GmbH*****, Germany**
Effector sonar for applications in shallow waters
Mr Peter Kuhn, ***ATLAS Elektronik GmbH*****, Germany**
Enhancing Undersea Distributed Netted Systems (UDNS) Through Fiber Optic Sensing
Mr Joseph M. Monti, ***Naval Undersea Warfare Center*****, United States**
Virtual Environments for Assessment and Trimming of Underwater Acoustic Communication Schemes and Algorithms
Mr Jean-Michel Passerieux, ***Thales Underwater Systems*****, France**

Technology – Unmanned Vehicles
Session 4E – Wednesday 12th November: 1600hrs

Autonomous Systems for Oceanography, Hydrography, Homeland Security & MW
Mr Jean-Jacques Perlou, ***ECA Group*****, France**
Autonomous Vehicle Data Recording and Access – Real-world Scenarios
Mr Colin Davies, ***GE Fanuc Intelligent Platforms*****, United Kingdom**
Mine Counter Measure SAS – A Perspective from the First Generation at Sea Today
Mr Pierre Guthmann, ***Thales Underwater Systems*****, France**
Prototype Rechargeable Electric Propulsion System
Mr Stanley Polhemus, ***Naval Undersea Warfare Center*****, United States**

Technology – Weapons
Session 11B – Friday 14th November: 1245hrs

Advanced Multi-Influence Naval Mine – Spain's MINEA
Mr Antonio Sanchez Garcia, ***SAES*****, Spain**
High Power Laser Weapons in the Naval Domain
Mr François-Xavier Dolttau, ***Thales Air Systems*****, France**
Vertical Launch Anti-submarine Rocket (VLA) – ER White Paper
Mr Steve Firestone, ***Lockheed Martin MS2*****, United States**

Papers by Country/Organisation

Australia

Defence Science & Technology Organisation (DSTO)

Modelling Enhanced CO2 Absorption in Soda Lime at Low Temperatures and Elevated Pressures
Session 10C – Friday 14th November: 1100hrs

Improving Asset Management through Enhanced Decision Support Processes
Session 11A – Friday 14th November: 1245hrs

Combating the Modern Mine
Session 2E – Wednesday 12th November: 1100hrs

Thales Australia

Extending the Operational Effectiveness of Surface Combatants – Lessons Learned on the FFG Upgrade Programme
Session 2B – Wednesday 12th November: 1100hrs

Maritime Security of Offshore, Coastal and Harbour Assets – The Australia Situation
Session 6A – Thursday 13th November: 1100hrs

Belgium

Barco NV

Flexible Sharing of Visual Information amongst Geographically Distributed Stake-holders to Maximise Situational Awareness
Session 6D – Thursday 13th November: 1100hrs

Canada

Defence R&D Canada Atlantic

Detection of Blainville's Beaked Whale using Autonomous Underwater Gliders
Session 11E – Friday 14th November: 1245hrs

OSI Geospatial

Electronic Navigation Technology – Enabling Submarine Operations in Littoral Areas
Session 2D – Wednesday 12th November: 1100hrs

Tactical Technologies Inc.

Integrated Anti-Ship Missile Countermeasures Development
Session 8B – Thursday 13th November: 1600hrs

Finland

Surma Ltd.

Fully Integrated FE-Analysis in Survivability Manager Application (SURMA)
Session 2C – Wednesday 12th November: 1100hrs

France

DCNS

Multi Platform Tactical Picture (MPTP)
Session 3D – Wednesday 12th November: 1245hrs

Common Detection of Abnormal Behaviours & Analysis of Suspicious Events using I2C Interoperable Sensors & Information Sources
Session 3B – Wednesday 12th November: 1245hrs

NAval Operation System for Maritime Safety and Security (NAOS MS2)
Session 8F – Thursday 13th November: 1600hrs

Integrated Single Masts for Warships
Session 5C – Thursday 13th November: 0900hrs

Passive Surveillance of Harbour and Coastal Area with Cameras
Session 6G – Thursday 13th November: 1100hrs

Naval Warfare Performance Simulation Techniques with Improved Modelling of Interaction with Environments
Session 10F – Friday 14th November: 1100hrs

Coupling ASTON-ESCADRE and Ptolemy II-DSDF Simulation Frameworks for a Convenient Technico-functional Algorithms Test-bed
Session 10E – Friday 14th November: 1100hrs

Multi Platform Tactical Picture (MPTP)
Session 3D – Wednesday 12th November: 1245hrs

ECA Group

Autonomous Systems for Oceanography, Hydrography, Homeland Security & MW
Session 4E – Wednesday 12th November: 1600hrs

French Navy

Future French Navy Mine Warfare Capability
Session 6E – Thursday 13th November: 1100hrs

Ship Protection within Littoral Waters – A French Navy Perspective
Session 10A – Friday 14th November: 1100hrs

Ministry of Defence (DGA)

A New Approach to Tactical Data Link for the French Navy
Session 11D – Friday 14th November: 1245hrs

Risk Reduction Methodology for the Manning of the Operations Room of a Frigate (With Reduced Crew)
Session 8C – Thursday 13th November: 1600hrs

Ministry of Defence (DGA/CTSN)

Global Optimisation of Real-time Multi Platform Situational Awareness
Session 6C – Thursday 13th November: 1100hrs

Ministry of Defence (DGA/DET/CTS)

Tracking Based on Theory Applied to Pair of Plot
Session 4D – Wednesday 12th November: 1600hrs

Thales Air Systems

Increasing Onboard Firepower using Standard Warship Architectures
Session 6B – Thursday 13th November: 1100hrs

High Power Laser Weapons in the Naval Domain
Session 11B – Friday 14th November: 1245hrs

Thales Alenia Space

Advantages of DVB-RCS Access for Maritime Communications
Session 6D – Thursday 13th November: 1100hrs

Improving Ship Detection using High Resolution Synthetic Aperture Radar (SAR) Images and Advanced Time-Frequency Processing Techniques (ATF)
Session 10E – Friday 14th November: 1100hrs

An Interoperability Framework to Provide the "Common Maritime Picture"
Session 10A – Friday 14th November: 1100hrs

Space-based Automatic Information System (AIS) Solutions to the Simultaneous Access Issue
Session 4A – Wednesday 12th November: 1600hrs

Thales Communications

Passive Radar for Maritime Surveillance
Session 5G – Thursday 13th November: 0900hrs

Service Oriented Architecture (SOA) for Maritime Surveillance
Session 8F – Thursday 13th November: 1600hrs

Thales Group (Naval Division)

The Global Challenge of Information Exchanges within the Maritime Community
Session 8A – Thursday 13th November: 1600hrs

Passive Radar Protection for Ship at Anchor
Session 3A – Wednesday 12th November: 1245hrs

Thales Land & Joint Systems

Naval Force Intranet – Stand Alone System
Session 6D – Thursday 13th November: 1100hrs

Thales Optronique

New Naval Off Axis Laser Warning Technology
Session 5G – Thursday 13th November: 0900hrs

Thales Security Systems

Holistic Security Risk Management In Port Infrastructures
Session 4B – Wednesday 12th November: 1600hrs

Thales Surface radar

New Generation Radar Systems for New Threats in Coastal Surveillance
Session 3A – Wednesday 12th November: 1245hrs

New Radar Concept for Ship Security at Anchor
Session 3A – Wednesday 12th November: 1245hrs

Thales Underwater Systems

Detection of Low Level Modulated Signals – Application to Vocalisation Detection
Session 2F – Wednesday 12th November: 1100hrs

Joint Sonar and Video Sensing for an Autonomous Underwater Mine Disposal Vehicle
Session 8D – Thursday 13th November: 1600hrs

Security of Critical Maritime Areas – A Report on SOBCAH and SECMAR Projects
Session 4B – Wednesday 12th November: 1600hrs

Bistatic Operations with Low Frequency Active Variable Depth Sonar – Practical Implementation of the SLASM System
Session 3F – Wednesday 12th November: 1245hrs

Mine Counter Measure SAS – A Perspective from the First Generation at Sea Today
Session 4E – Wednesday 12th November: 1600hrs

CAP:a tool for Concept Development and Experimentation
Session 10F – Friday 14th November: 1100hrs

Virtual Environments for Assessment and Trimming of Underwater Acoustic Communication Schemes and Algorithms
Session 3E – Wednesday 12th November: 1245hrs

Human Factors Integration for Sonar User Interfaces
Session 8C – Thursday 13th November: 1600hrs

Germany

ATLAS Elektronik GmbH

Effector sonar for applications in shallow waters
Session 3E – Wednesday 12th November: 1245hrs

CMS with Integrated Tactical Data Link for German Frigate F125 programme
Session 2B – Wednesday 12th November: 1100hrs

Effector sonar for applications in shallow waters
Session 3E – Wednesday 12th November: 1245hrs

Fusion of Naval Combat Systems and a Coast Bound Maritime Surveillance System to Achieve Total and Flexible Maritime Security
Session 4B – Wednesday 12th November: 1600hrs

Forward from the Sea – Taking the Geographic Information Challenge
Session 11F – Friday 14th November: 1245hrs

Bayern-Chemie

Recent Developments on Rockets with Gelled Propellants
Session 7E – Thursday 13th November: 1245hrs

Blohm & Voss Nordseewerke GmbH

German Frigate F125 programme – Mission System
Session 2B – Wednesday 12th November: 1100hrs

German Frigate F125 programme – Platform System
Session 3C – Wednesday 12th November: 1245hrs

EADS Deutschland GmbH

Naval Radars for the Littorals
Session 7G – Thursday 13th November: 1245hrs

Helzel Messtechnik GmbH

Over-The-Horizon Radar – An Introduction to WavE RAdar (WERA)
Session 8G – Thursday 13th November: 1600hrs

L-3 Communications ELAC Nautik GmbH

Automatic Detection and Tracking of Underwater Threats – Human Factors Technologies for Reduced Manning
Session 3E – Wednesday 12th November: 1245hrs

Ministry of Defence/BWB

Countering Asymmetric Threats: Long Term Experimental Setup for ASymW (LEXXWAR)
Session 7A – Thursday 13th November: 1245hrs

The German Approach to Force and Harbour Protection and Possible Integration into Naval Systems – The AUV Family SEA OTTER Mk II and SEA WOLF
Session 6E – Thursday 13th November: 1100hrs

F125 Frigate Programme – Current Status and Technical Solutions for the Intensive use Approach
Session 3C – Wednesday 12th November: 1245hrs

MTU Friedrichshafen GmbH

System Integration for Naval Propulsion Systems
Session 7C – Thursday 13th November: 1245hrs

Israel

DSIT Technologies

High Performance Underwater Surveillance System for Coastal and Offshore Sites (AquaShield DDS)
Session 5F – Thursday 13th November: 0900hrs

Italy

ABB

Supervision and Communication System (SCS)
Session 7F – Thursday 13th November: 1245hrs

Avio S.p.A.

Dynamic Management of Propulsion Plants in Naval Applications
Session 7C – Thursday 13th November: 1245hrs

NATO Undersea Research Center (NURC)

Modeling and Validation of Maritime Surveillance Performance
Session 4A – Wednesday 12th November: 1600hrs

Deterrence as System Force Multiplier in the Defence Against Terrorism (DAT)
Session 7A – Thursday 13th November: 1245hrs

Marine Mammal Risk Mitigation Sea Trial (SIRENA 08)
Session 11E – Friday 14th November: 1245hrs

Heterogeneous Underwater Networks for Anti Submarine Warfare (ASW)
Session 11D – Friday 14th November: 1245hrs

Compact Passive Acoustic Monitoring (CPAM) – Cost-effective Monitoring of the Presence and Behaviour of Deep-diving Whales
Session 11E – Friday 14th November: 1245hrs

Orizzonte Sistemi Navali

A Modelling and Simulation Tool to Measure Naval Task Effectiveness across all Warfare Domains
Session 10F – Friday 14th November: 1100hrs

PrismTech

Patterns for Data-Centric Real-time Distributed Systems
Session 6F – Thursday 13th November: 1100hrs

Secure Data Distribution
Session 7F – Thursday 13th November: 1245hrs

Netherlands

Thales Nederland

Addressing the Challenges of Systems-Of-Systems Integration in Maritime Safety and Security – The POSEIDON Project
Session 8A – Thursday 13th November: 1600hrs

Integrated Sensor & Communication System
Session 10B – Friday 14th November: 1100hrs

TNO

Improving Anti-Corrosive Coatings Performance for Navy Vessels
Session 5C – Thursday 13th November: 0900hrs

Maritime Ballistic Missile Defence Capabilities – A Roadmap for the Netherlands
Session 7D – Thursday 13th November: 1245hrs

Bistatic Low-Frequency Active Sonar System Developments
Session 3F – Wednesday 12th November: 1245hrs

TNO (Defence, Security and Safety)

Military Support of Civil Authorities for Harbour Security – Concepts and Technology for Countering Underwater Threats
Session 5F – Thursday 13th November: 0900hrs

Passive Marine Mammal Detection Using the The Delphinus Array
Session 11E – Friday 14th November: 1245hrs

Poland

R&D Marine Technology Centre (CTM)

The Integrated Ship and Harbour Area Protection System Architecture
Session 8F – Thursday 13th November: 1600hrs

Adaptive Jammers and Decoy Systems
Session 8B – Thursday 13th November: 1600hrs

Automatic Waveform Parameters' Selection in Military HF Transceivers – Depending on Propagation Conditions and Type of Traffic being Generated
Session 8E – Thursday 13th November: 1600hrs

Portugal

FEUP

Networked Operations (with Neptus)
Session 8D – Thursday 13th November: 1600hrs

Oceanscan

Low Cost Autonomous Underwater Vehicles for Oceanographic and Harbour Surveillance Missions
Session 7E – Thursday 13th November: 1245hrs

Porto University

Operations with Autonomous Vehicles in the Response to Maritime Incidents
Session 7E – Thursday 13th November: 1245hrs

Russia

Krylov SRI

Complex of Model Experiments and Calculations as Actual Procedure for Investigation of Dynamic Towing Systems
Session 6C – Thursday 13th November: 1100hrs

Marine Bridge & Navigating Systems

Integrating Protection Systems for Potentially Dangerous Maritime Objects
Session 8F – Thursday 13th November: 1600hrs

Singapore

ST Electronics (Info-Comm Systems)

Harbour-craft Identification and Monitoring System
Session 4A – Wednesday 12th November: 1600hrs

Spain

Accenture

Global Border Management
Session 6A – Thursday 13th November: 1100hrs

Association of the Spanish Naval Architecture (AINE)

The Future of Naval Construction in Europe: Applied Research on Naval Platform
Session 7B – Thursday 13th November: 1245hrs

Canal de Experiencias Hidrodinámicas de El Pardo (CEHIPAR)

Advanced Tests and Optimisation Procedures for
Session 3C – Wednesday 12th November: 1245hrs

Department of Defense (JPEO-Joint Tactical Radio System-MIDS IPO)

Concurrent Multi-link Operations and System's Enhancements in Support of New Tactical Data-link Requirements
Session 11D – Friday 14th November: 1245hrs

General Dynamics Santa Bárbara Sistemas

Coastal Protection – Do Integrated Solutions Really Exist?
Session 4B – Wednesday 12th November: 1600hrs

Indra

Latest Trends in Battlefield Identification – Mode 5, BTID, Blue Force Tracking
Session 7A – Thursday 13th November: 1245hrs

New NATO Standards for Unmanned Aircraft Systems
Session 8D – Thursday 13th November: 1600hrs

New Paradigm for Naval Tactical Communications
Session 8E – Thursday 13th November: 1600hrs

Indra Espacio

Submarine Satellite Communication Terminals – Systems and Evolution
Session 8E – Thursday 13th November: 1600hrs

Indra Sistemas SA

Knowledge Management for the Spanish Navy – UVICOA
Session 5E – Thursday 13th November: 0900hrs

Early Warning and Identification System for NBC (SentrY)
Session 6G – Thursday 13th November: 1100hrs

Maritime Situational Awareness in Homeland Security and Emergency Management – What Do We Really Know?
Session 6A – Thursday 13th November: 1100hrs

Threat Evaluation and Technical Responses using EW Digital Receiver-Based Sensors
Session 5G – Thursday 13th November: 0900hrs

Unmanned Systems Requirements – The Road Ahead
Session 5B – Thursday 13th November: 0900hrs

Life-Cycle Cost – How to Minimise it
Session 5A – Thursday 13th November: 0900hrs

EW in Maritime Surveillance Operations
Session 8B – Thursday 13th November: 1600hrs

ISDEFE

Future Integrated Surveillance of Coastal and Maritime Areas – A Spanish Approach to Accomplishing Border Protection and Defence Missions
Session 8A – Thursday 13th November: 1600hrs

Maritime Situation Awareness: ISDEFE's Support of the Spanish Navy
Session 3B – Wednesday 12th November: 1245hrs

Ministry of Defence/CIDA (Centro de Investigación y Desarrollo de la Armada)

Advanced Naval Infrared Search and Track System Prototype (SIRIO)
Session 6G – Thursday 13th November: 1100hrs

Ministry of Development

Implementation of the ISPS Code and European Regulations in Spain – Special Measures for Passenger Ships.
Session 4A – Wednesday 12th November: 1600hrs

Navantia

Engine Diagnosis Centre for Spanish Navy
Session 4C – Wednesday 12th November: 1600hrs

SCOMBA Combat System
Session 2B – Wednesday 12th November: 1100hrs

Navantia's Ship Management System: COMPLEX (COntrol y Monitorizacion de PLataforma EXtensible)
Session 7C – Thursday 13th November: 1245hrs

SAES

A New Approach to Underwater Critical Infrastructures
Session 5F – Thursday 13th November: 0900hrs

Advanced Multi-Influence Naval Mine – Spain's MINEA
Session 11B – Friday 14th November: 1245hrs

Sainsel Sistemas Navales SAU

Warship Electronic Chart Display and Information System (WECDIS)
Session 11F – Friday 14th November: 1245hrs

Spanish Navy

UAVs for the 21st Century
Session 6E – Thursday 13th November: 1100hrs

Tecnobit SL

Image Treatment in Electro-Optical Systems
Session 2F – Wednesday 12th November: 1100hrs

Universidad Politecnica de Madrid

High Resolution Millimeter-Wave Radar for Sea Target Identification
Session 8G – Thursday 13th November: 1600hrs

Small Target Detection in Sea Clutter, Based on the Radon Transform
Session 3F – Wednesday 12th November: 1245hrs

New Fiber-Metal Hybrid Laminated Material (MaLECoN)
Session 5C – Thursday 13th November: 0900hrs

Sweden

FMV (Swedish Defence Materiel Administration)

The A26 Submarine Programme – The New and Cost Efficient Submarine for the Swedish Navy
Session 3C – Wednesday 12th November: 1245hrs

Saab Systems

The User Meets the System – A True Open Architecture Approach
Session 3D – Wednesday 12th November: 1245hrs

Security Alliance Stockholm AB

Maritime Security in Brown Waters
Session 10A – Friday 14th November: 1100hrs

Swedish Armed Forces

Network Enabled Capability in the Maritime Environment
Session 7B – Thursday 13th November: 1245hrs

United Kingdom

BAE Systems (Integrated Systems Technology)

A Pattern Language for Open Architecture Systems
Session 4D – Wednesday 12th November: 1600hrs

Innovative Techniques Developed within the Seawolf Mid-life Update (SWMLU) Programme
Session 10B – Friday 14th November: 1100hrs

BMT Defence Services

Landing Craft – Simple Ships or Time for a Rethink? A Designer's Perspective
Session 10C – Friday 14th November: 1100hrs

BMT Sigma

Architecture Frameworks and Systems Engineering
Session 5D – Thursday 13th November: 0900hrs

Graphics Research Corporation (GRC)

Creation of a Hull Surface Design Tool for Use in Solid Modelling
Session 11C – Friday 14th November: 1245hrs

Jane's Information Group

How Can Through Life Capability Management Help?
Session 5A – Thursday 13th November: 0900hrs

Procurement and Contracting Approach
Session 5A – Thursday 13th November: 0900hrs

Lloyd's Register

Managing the Human Element – Best Practice for Ship Operators
Session 8C – Thursday 13th November: 1600hrs

Mott MacDonald

The Cost of Maritime Security & Platforms: Requirement Drivers
Session 5A – Thursday 13th November: 0900hrs

QinetiQ

Electromagnetic Susceptibility Management – A Framework for Effective Exploitation of Electromagnetic Signature Management Systems
Session 11C – Friday 14th November: 1245hrs

Exploiting Synergies between Naval Operational Systems and Test, Evaluation and Training Ranges
Session 10F – Friday 14th November: 1100hrs

SURVIVE and SURVIVE Lite – Recent Developments
Session 2C – Wednesday 12th November: 1100hrs

Next Generation MDA from Today's Technology
Session 3B – Wednesday 12th November: 1245hrs

Design and Build of a High-Speed Technology Demonstrator Vessel
Session 11C – Friday 14th November: 1245hrs

GE Fanuc Intelligent Platforms

Autonomous Vehicle Data Recording and Access – Real-world Scenarios
Session 4E – Wednesday 12th November: 1600hrs

Spray-cooling of High Power Electronic Subsystems
Session 8G – Thursday 13th November: 1600hrs

Servowatch Systems Limited

Applied Data Fusion Techniques for the Integration of Port and Ship Security
Session 2A – Wednesday 12th November: 1100hrs

Thales Group (Naval Division)

Enterprise Implications of a New Combat System Architecture for Major Royal Navy Surface Combatants
Session 3D – Wednesday 12th November: 1245hrs

Sonar 2087 – An Engineering Challenge in Platform Integration
Session 10B – Friday 14th November: 1100hrs

Evolution of OSA in Warships
Session 5D – Thursday 13th November: 0900hrs

Thales Research & Technology (UK) Ltd

Collaborative Work Desktop for MSS Operation Centers – nuVa
Session 5E – Thursday 13th November: 0900hrs

Thales Underwater Systems

Modelling Operational Effectiveness of USV Sensors
Session 5B – Thursday 13th November: 0900hrs

Architecture Frameworks for Sonar User Interfaces
Session 5E – Thursday 13th November: 0900hrs

Open Systems – How Closed is Open?
Session 5D – Thursday 13th November: 0900hrs

Using Open Source Software for Naval Systems
Session 6F – Thursday 13th November: 1100hrs

Evolution of Complex Systems
Session 3D – Wednesday 12th November: 1245hrs

The Nautical Institute

The Human Element in Ship Design, Build and Operation
Session 8C – Thursday 13th November: 1600hrs

Vale Atlantic Ltd

Putting the Submarine at the Heart of Network Centric C4I – The Final Fathom
Session 10D – Friday 14th November: 1100hrs

United States

Alion Science & Technology

Assessing Combat System Effectiveness – Statistical Methods
Session 4D – Wednesday 12th November: 1600hrs

Measure of Total Integrated System Survivability (MOTISS) Analysis of a Notional Surface Combatant Ship
Session 10E – Friday 14th November: 1100hrs

Battelle

Harbour Shield- : A New Technique for Inspection of Vessels below the Waterline
Session 5F – Thursday 13th November: 0900hrs

Coda Octopus Group

Countering the Underwater Threat with Proven 4D Acoustic Technology
Session 2E – Wednesday 12th November: 1100hrs

Control Risks

Combating Maritime Asymmetric Threats
Session 6A – Thursday 13th November: 1100hrs

Department of Defense (Advanced Distributed Learning)

Harmonising Technical Data and Learning Content Management with S1000D and SCORM
Session 11A – Friday 14th November: 1245hrs

Lockheed Martin

Improved System Operational Availability through Autonomous Data Communication and Analysis
Session 11A – Friday 14th November: 1245hrs

Lockheed Martin (Advanced Technology Laboratories)

Enhanced Maritime Domain Awareness through Web-based Configurable Software
Session 2A – Wednesday 12th November: 1100hrs

Lockheed Martin MS2

Collaborative Unmanned Operations for Maritime Security
Session 5B – Thursday 13th November: 0900hrs

Scalable Solid-State S-Band Radar (S4R(tm)) Demonstrator
Session 7G – Thursday 13th November: 1245hrs

The “Tipping Point” Surface Combatant
Session 7B – Thursday 13th November: 1245hrs

International Submarine Integrated Combat System (ICS)
Session 2D – Wednesday 12th November: 1100hrs

Actionable Situational Awareness – The New C2
Session 3B – Wednesday 12th November: 1245hrs

Adaptive Logistics
Session 11A – Friday 14th November: 1245hrs

Adaptation of the Remote Multi-Mission Vehicle (RMMV) for Additional Unmanned Missions
Session 7E – Thursday 13th November: 1245hrs

European Missile Defense Collaborative Tool
Session 7D – Thursday 13th November: 1245hrs

2007 USN Ballistic Missile Defence (BMD) Flight Test Mission Results
Session 7D – Thursday 13th November: 1245hrs

Aegis Modernization – Missile Defense & Other Warfare Missions
Session 7D – Thursday 13th November: 1245hrs

Vertical Launch Anti-submarine Rocket (VLA) – ER White Paper
Session 11B – Friday 14th November: 1245hrs

Potential Sea-Based Platforms for Europe/NATO
Session 6B – Thursday 13th November: 1100hrs

Sea-Based Missile Defense Analysis for Future UK Surface Combatants
Session 6B – Thursday 13th November: 1100hrs

Naval Sea Systems Command

Insulated Bus Pipe (IBP) for Shipboard High Power Distribution Applications
Session 5C – Thursday 13th November: 0900hrs

Modelling and Experiments on Search, Detection, and Retrieval Methods for Container Ships
Session 10E – Friday 14th November: 1100hrs

Remote Monitoring and Remote Diagnostics for Shipboard Systems Maintenance
Session 5E – Thursday 13th November: 0900hrs

Naval Surface Warfare Center (Carderock Div.)

Craft Integrated Electronics Suite (CIESTM) – Summary of an Operational Programme
Session 10B – Friday 14th November: 1100hrs

Modular Stabilized Weapon System Integration for Combatant Craft
Session 10C – Friday 14th November: 1100hrs

Test, Evaluation and Computational Validation of High Performance Craft for Hydrodynamic Loading and Structural Response
Session 11C – Friday 14th November: 1245hrs

A Notional Global Fleet Station Ship Concept Design
Session 4C – Wednesday 12th November: 1600hrs

Synergistic Assessment of Innovative Technologies for Improved Expeditionary Combat Operations
Session 4C – Wednesday 12th November: 1600hrs

Uses of Commercially Chartered Heavy Lift Ships for Auxiliary Naval Operations
Session 11C – Friday 14th November: 1245hrs

Visual and IR Obscurants on Small Craft for Littoral Operations – A Craft Survivability Enhancement Program
Session 5G – Thursday 13th November: 0900hrs

Naval Surface Warfare Center (Dahlgren Div.)

Enterprise Readiness Level Assessments
Session 5D – Thursday 13th November: 0900hrs

Future Littoral Radar Performance
Session 7G – Thursday 13th November: 1245hrs

Novel Nanotechnology-based Sensors
Session 6G – Thursday 13th November: 1100hrs

Naval Surface Warfare Center (Port Hueneme Div.)

Condition and Environment Sensing and Reporting System (CAESAR)
Session 6F – Thursday 13th November: 1100hrs

Network Enabled – Interoperability Capabilities and Limitations
Session 7F – Thursday 13th November: 1245hrs

Naval Undersea Warfare Center

Enhancing Undersea Distributed Netted Systems (UDNS) Through Fiber Optic Sensing
Session 3E – Wednesday 12th November: 1245hrs

Prototype Rechargeable Electric Propulsion System
Session 4E – Wednesday 12th November: 1600hrs

Solid Oxide Fuel Cell (SOFC) for Unmanned Undersea Vehicle (UUV) Propulsion
Session 6E – Thursday 13th November: 1100hrs

Advancements in Undersea Warfare Systems on Surface Ships
Session 2D – Wednesday 12th November: 1100hrs

Electromechanical and Mechanical Properties of Piezoelectric Single Crystals for Naval Sonar Transducers
Session 2E – Wednesday 12th November: 1100hrs

COTS and Rapid Prototyping in Surface USW Systems
Session 2D – Wednesday 12th November: 1100hrs

Electromechanical and Mechanical Properties of Piezoelectric Single Crystals for Naval Sonar Transducers
Session 2E – Wednesday 12th November: 1100hrs

Single Crystal Projectors for Compact, Broadband Sonar
Session 2E – Wednesday 12th November: 1100hrs

Network Anatomy/NetCo

Container Security: The Final Information Frontier
Session 7A – Thursday 13th November: 1245hrs

Northrop Grumman

Maritime Surveillance in the Network Centric World
Session 2A – Wednesday 12th November: 1100hrs

Office of Naval Research (ONR)

Advanced Electric Ship Demonstrator:
Session 10C – Friday 14th November: 1100hrs

Practice in Power Electronics

IEEE Standards for Maritime Systems and Technology
Session 7C – Thursday 13th November: 1245hrs

Real-Time Innovations, Inc.

Development of Secure Scalable Net-Centric Systems- A Proven Design Methodology
Session 10D – Friday 14th November: 1100hrs

Teledyne Benthos

State-Of-The-Art, Real World Acoustic Communications and Undersea Networks
Session 8E – Thursday 13th November: 1600hrs

Temple University

Survivability Analysis of Shipboard Reconfigurable Systems
Session 2C – Wednesday 12th November: 1100hrs

The MITRE Corporation

Improving Sensor Data Analysis Through Diverse Data Source Integration
Session 2F – Wednesday 12th November: 1100hrs

US Navy

So Many Combat Systems, So Little Time (to Integrate)…
Session 4D – Wednesday 12th November: 1600hrs

US Navy (NSWC, Philadelphia)

Fully Integrated, Automated Shipboard Oil Pollution Abatement Systems
Session 6C – Thursday 13th November: 1100hrs

Analysis of Shipboard Survivable Firemain Systems
Session 2C – Wednesday 12th November: 1100hrs

Energy Harvesting for Shipboard Wireless Damage Control Sensors
Session 4C – Wednesday 12th November: 1600hrs

Output Feedback and Trajectory Tracking Control of a Gantry Crane
Session 6C – Thursday 13th November: 1100hrs

Papers by First Author

Lieutenant Commander Mats Abrahamsson
FMV (Swedish Defence Materiel Administration), Sweden

The A26 Submarine Programme – The New and Cost Efficient Submarine for the Swedish Navy
Session 3C – Wednesday 12th November: 1245hrs

Mr Felix Alvarez
DCNS, France

Multi Platform Tactical Picture (MPTP)
Session 3D – Wednesday 12th November: 1245hrs

Dr Gregorio Ameyugo Pérez
Indra Sistemas SA, Spain

Unmanned Systems Requirements – The Road Ahead
Session 5B – Thursday 13th November: 0900hrs

Mr Vincent Arnould
DCNS, France

Coupling ASTON-ESCADRE and Ptolemy II-DSDF Simulation Frameworks for a Convenient Technico-functional Algorithms Test-bed
Session 10E – Friday 14th November: 1100hrs

Multi Platform Tactical Picture (MPTP)
Session 3D – Wednesday 12th November: 1245hrs

Dr Christian Audoly
DCNS, France

Naval Warfare Performance Simulation Techniques with Improved Modelling of Interaction with Environments
Session 10F – Friday 14th November: 1100hrs

Dr Li Bai
Temple University, United States

Survivability Analysis of Shipboard Reconfigurable Systems
Session 2C – Wednesday 12th November: 1100hrs

Dr Andrew Bailey
Defence Science & Technology Organisation (DSTO), Australia

Combating the Modern Mine
Session 2E – Wednesday 12th November: 1100hrs

Mr Alastair Ballentine
QinetiQ, United Kingdom

Electromagnetic Susceptibility Management – A Framework for Effective Exploitation of Electromagnetic Signature Management Systems
Session 11C – Friday 14th November: 1245hrs

Mr Carmela Barbero
Indra Sistemas SA, Spain

Threat Evaluation and Technical Responses using EW Digital Receiver-Based Sensors
Session 5G – Thursday 13th November: 0900hrs

Mr Carl Bauer
Lockheed Martin MS2, United States

Aegis Modernization – Missile Defense & Other Warfare Missions
Session 7D – Thursday 13th November: 1245hrs

Dr Tim Becker
Blohm & Voss Nordseewerke GmbH, Germany

German Frigate F125 programme – Platform System
Session 3C – Wednesday 12th November: 1245hrs

Dr Augustinus Beckers
TNO (Defence, Security and Safety), Netherlands

Military Support of Civil Authorities for Harbour Security – Concepts and Technology for Countering Underwater Threats
Session 5F – Thursday 13th November: 0900hrs

Mr John Bednarz
Tactical Technologies Inc., Canada

Integrated Anti-Ship Missile Countermeasures Development
Session 8B – Thursday 13th November: 1600hrs

Ir Robert Been
NATO Undersea Research Center (NURC), Italy

Heterogeneous Underwater Networks for Anti Submarine Warfare
Session 11D – Friday 14th November: 1245hrs

Dr SP (Peter) Beerens
TNO (Defence, Security and Safety), Netherlands

Passive Marine Mammal Detection Using the The Delphinus Array
Session 11E – Friday 14th November: 1245hrs

Mr Michiel Beijer
TNO, Netherlands

Maritime Ballistic Missile Defence Capabilities – A Roadmap for the Netherlands
Session 7D – Thursday 13th November: 1245hrs

Mr Dan Ben-Dov
DSIT Technologies, Israel

High Performance Underwater Surveillance System for Coastal and Offshore Sites (AquaShield DDS)
Session 5F – Thursday 13th November: 0900hrs

Mr João Borges de Sousa
Porto University, Portugal

Operations with Autonomous Vehicles in the Response to Maritime Incidents
Session 7E – Thursday 13th November: 1245hrs

Vice Admiral Richard Börjesseon
Security Alliance Stockholm AB, Sweden

Maritime Security in Brown Waters
Session 10A – Friday 14th November: 1100hrs

Mr Philippe Bouvier
Thales Security Systems, France

Holistic Security Risk Management In Port Infrastructures
Session 4B – Wednesday 12th November: 1600hrs

Mr Philip Bozzelli
Lockheed Martin MS2, United States

Actionable Situational Awareness – The New C2
Session 3B – Wednesday 12th November: 1245hrs

Mr Jean-Philippe Brunet
Thales Group (Naval Division), France

Passive Radar Protection for Ship at Anchor
Session 3A – Wednesday 12th November: 1245hrs

Mr Robert Bush
OSI Geospatial, Canada

Electronic Navigation Technology – Enabling Submarine Operations in Littoral Areas
Session 2D – Wednesday 12th November: 1100hrs

Mr Thibaud Calmettes
Thales Alenia Space, France

Space-based Automatic Information System (AIS) Solutions to the Simultaneous Access Issue
Session 4A – Wednesday 12th November: 1600hrs

Dr Louis Carreiro
Naval Undersea Warfare Center, United States

Prototype Rechargeable Electric Propulsion System
Session 4E – Wednesday 12th November: 1600hrs

Solid Oxide Fuel Cell (SOFC) for Unmanned Undersea Vehicle (UUV) Propulsion
Session 6E – Thursday 13th November: 1100hrs

Mr Javier Carretero
Universidad Politecnica de Madrid, Spain

Small Target Detection in Sea Clutter, Based on the Radon Transform
Session 3F – Wednesday 12th November: 1245hrs

Ms Laura Casadevall
Indra, Spain
New NATO Standards for Unmanned Aircraft Systems
Session 8D – Thursday 13th November: 1600hrs
New Paradigm for Naval Tactical Communications
Session 8E – Thursday 13th November: 1600hrs

Ms Jennifer Casper
The MITRE Corporation, United States
Improving Sensor Data Analysis Through Diverse Data Source Integration
Session 2F – Wednesday 12th November: 1100hrs

Captain (SPN) G Cassinello
Indra Sistemas SA, Spain
EW in Maritime Surveillance Operations
Session 8B – Thursday 13th November: 1600hrs

Mr Francisco Javier Castillejo
Ministry of Development, Spain
Implementation of the ISPS Code and European Regulations in Spain – Special Measures for Passenger Ships.
Session 4A – Wednesday 12th November: 1600hrs

Mr Giacomo Cherio
Avio S.p.A., Italy
Dynamic Management of Propulsion Plants in Naval Applications
Session 7C – Thursday 13th November: 1245hrs

Mr Jan Cichy
R&D Marine Technology Centre (CTM), Poland
Automatic Waveform Parameters' Selection in Military HF Transceivers – Depending on Propagation Conditions and Type of Traffic being Generated
Session 8E – Thursday 13th November: 1600hrs

Mr Matthias Conrad
L-3 Communications ELAC Nautik GmbH, Germany
Automatic Detection and Tracking of Underwater Threats – Human Factors Technologies for Reduced Manning
Session 3E – Wednesday 12th November: 1245hrs

Dr Stefano Coraluppi
NATO Undersea Research Center (NURC), Italy
Modeling and Validation of Maritime Surveillance Performance
Session 4A – Wednesday 12th November: 1600hrs

Dr Angelo Corsaro
PrismTech, Italy
Patterns for Data-Centric Real-time Distributed Systems
Session 6F – Thursday 13th November: 1100hrs
Secure Data Distribution
Session 7F – Thursday 13th November: 1245hrs

Mr Peter Cosgrove
Thales Underwater Systems, United Kingdom
Modelling Operational Effectiveness of USV Sensors
Session 5B – Thursday 13th November: 0900hrs

Mr Kevin Cresswell
Control Risks, United States
Combating Maritime Asymmetric Threats
Session 6A – Thursday 13th November: 1100hrs

Mr Colin Davies
GE Fanuc Intelligent Platforms, United Kingdom
Autonomous Vehicle Data Recording and Access – Real-world Scenarios
Session 4E – Wednesday 12th November: 1600hrs
Spray-cooling of High Power Electronic Subsystems
Session 8G – Thursday 13th November: 1600hrs

Mr Jan De Maeyer
Barco NV, Belgium
Flexible Sharing of Visual Information amongst Geographically Distributed Stake-holders to Maximise Situational Awareness
Session 6D – Thursday 13th November: 1100hrs

Mr Alvaro de Salas
Indra Sistemas SA, Spain
Knowledge Management for the Spanish Navy – UVICOA
Session 5E – Thursday 13th November: 0900hrs

Dr Pascal AM de Theije
TNO, Netherlands
Bistatic Low-Frequency Active Sonar System Developments
Session 3F – Wednesday 12th November: 1245hrs

Eng Paulo Dias
FEUP, Portugal
Networked Operations (with Neptus)
Session 8D – Thursday 13th November: 1600hrs

Eng José A. Díaz
ISDEFE, Spain
Future Integrated Surveillance of Coastal and Maritime Areas – A Spanish Approach to Accomplishing Border Protection and Defence Missions
Session 8A – Thursday 13th November: 1600hrs

Mr Martyn Dickinson
Servowatch Systems Limited, United Kingdom
Applied Data Fusion Techniques for the Integration of Port and Ship Security
Session 2A – Wednesday 12th November: 1100hrs

Mr Richard Dickinson
Lockheed Martin (Advanced Technology Laboratories), United States
Enhanced Maritime Domain Awareness through Web-based Configurable Software
Session 2A – Wednesday 12th November: 1100hrs

Dr Christopher Dicks
Naval Surface Warfare Center (Carderock Division), United States
A Notional Global Fleet Station Ship Concept Design
Session 4C – Wednesday 12th November: 1600hrs

Mr François-Xavier Doittau
Thales Air Systems, France
High Power Laser Weapons in the Naval Domain
Session 11B – Friday 14th November: 1245hrs

Mr Daniel Dozier
Naval Surface Warfare Center (Carderock Division), United States
Synergistic Assessment of Innovative Technologies for Improved Expeditionary Combat Operations
Session 4C – Wednesday 12th November: 1600hrs

Dr Peter Drewes
Lockheed Martin MS2, United States
Collaborative Unmanned Operations for Maritime Security
Session 5B – Thursday 13th November: 0900hrs

Mr Nicolas Dubyk
Thales Alenia Space, France
Advantages of DVB-RCS Access for Maritime Communications
Session 6D – Thursday 13th November: 1100hrs

Dip-Ing Peter Dugge
ATLAS Elektronik GmbH, Germany
Forward from the Sea – Taking the Geographic Information Challenge
Session 11F – Friday 14th November: 1245hrs

Dr Jonathan Earthy
Lloyd's Register, United Kingdom
Managing the Human Element – Best Practice for Ship Operators
Session 8C – Thursday 13th November: 1600hrs

Mr Anthony Edmonds
QinetiQ, United Kingdom
Next Generation MDA from Today's Technology
Session 3B – Wednesday 12th November: 1245hrs

Dr Hans-Dieter Ehrenberg
ATLAS Elektronik GmbH, Germany
CMS with Integrated Tactical Data Link for German Frigate F125 programme
Session 2B – Wednesday 12th November: 1100hrs
Effector sonar for applications in shallow waters
Session 3E – Wednesday 12th November: 1245hrs

Mr Daniel Eling
Alion Science & Technology, United States
Assessing Combat System Effectiveness – Statistical Methods
Session 4D – Wednesday 12th November: 1600hrs

Mr Pedro Elola
Indra Espacio, Spain
Submarine Satellite Communication Terminals – Systems and Evolution
Session 8E – Thursday 13th November: 1600hrs

Mr Marquis Emmanuel
Thales Surface radar, France
New Generation Radar Systems for New Threats in Coastal Surveillance
Session 3A – Wednesday 12th November: 1245hrs
New Radar Concept for Ship Security at Anchor
Session 3A – Wednesday 12th November: 1245hrs

Mr Jose Espinal
Navantia, Spain
SCOMBA Combat System
Session 2B – Wednesday 12th November: 1100hrs

Dr Hervé Fargetton
Ministry of Defence (DGA/CTSN), France
Global Optimisation of Real-time Multi Platform Situational Awareness
Session 6C – Thursday 13th November: 1100hrs

Mr Christoph Fenske
MTU Friedrichshafen GmbH, Germany
System Integration for Naval Propulsion Systems
Session 7C – Thursday 13th November: 1245hrs

Ms Gabriele Ferrari
TNO, Netherlands
Improving Anti-Corrosive Coatings Performance for Navy Vessels
Session 5C – Thursday 13th November: 0900hrs

Mr Steve Firestone
Lockheed Martin MS2, United States
Vertical Launch Anti-submarine Rocket (VLA) – ER White Paper
Session 11B – Friday 14th November: 1245hrs

Mr Michael Formosa
Jane's Information Group, United Kingdom
How Can Through Life Capability Management Help?
Session 5A – Thursday 13th November: 0900hrs

Mr Charles Forrest
Graphics Research Corporation, United Kingdom
Creation of a Hull Surface Design Tool for Use in Solid Modelling
Session 11C – Friday 14th November: 1245hrs

Mr Wayne Gafford
Department of Defence (ADL), United States
Harmonising Technical Data and Learning Content Management with S1000D and SCORM
Session 11A – Friday 14th November: 1245hrs

Dr Tiang Hong Gan
Defence Science & Technology Organisation (DSTO), Australia
Modelling Enhanced CO2 Absorption in Soda Lime at Low Temperatures and Elevated Pressures
Session 10C – Friday 14th November: 1100hrs

Mr Bernard Garnier
Thales Group (Naval Division), France
The Global Challenge of Information Exchanges within the Maritime Community
Session 8A – Thursday 13th November: 1600hrs

Mrs Marie Géhant
Thales Underwater Systems, France
Detection of Low Level Modulated Signals – Application to Vocalisation Detection
Session 2F – Wednesday 12th November: 1100hrs

Mr Lyn-Markus Giersch
Ministry of Defence/BWB, Germany
F125 Frigate Programme – Current Status and Technical Solutions for the Intensive use Approach
Session 3C – Wednesday 12th November: 1245hrs

Mr Christian Giroussens
Thales Underwater Systems, France
Bistatic Operations with Low Frequency Active Variable Depth Sonar – Practical Implementation of the SLASM System
Session 3F – Wednesday 12th November: 1245hrs

Mr Vittorio Giuffra
ABB, Italy
Supervision and Communication System (SCS)
Session 7F – Thursday 13th November: 1245hrs

Mr Juan Gonzalez-Aller Rodriquez
Accenture, Spain
Global Border Management
Session 6A – Thursday 13th November: 1100hrs

Dr Paul Gosling
Thales Underwater Systems, United Kingdom
Evolution of Complex Systems
Session 3D – Wednesday 12th November: 1245hrs

Mr Dale Green
Teledyne Benthos, United States
State-Of-The-Art, Real World Acoustic Communications and Undersea Networks
Session 8E – Thursday 13th November: 1600hrs

Mr Brian Grimsley
Naval Surface Warfare Center (Carderock Division), United States
Test, Evaluation and Computational Validation of High Performance Craft for Hydrodynamic Loading and Structural Response
Session 11C – Friday 14th November: 1245hrs

Ms Jennifer Grimsley PE NA
Naval Surface Warfare Center (Carderock Division), United States
Modular Stabilized Weapon System Integration for Combatant Craft
Session 10C – Friday 14th November: 1100hrs

Mr Pierre Guthmann
Thales Underwater Systems, France
Mine Counter Measure SAS – A Perspective from the First Generation at Sea Today
Session 4E – Wednesday 12th November: 1600hrs

Mr Philip Gwynne
Thales Group (Naval Division), United Kingdom
Sonar 2087 – An Engineering Challenge in Platform Integration
Session 10B – Friday 14th November: 1100hrs

Mr Stephen Hall
BAE Systems (Integrated Systems Technology), United Kingdom
Innovative Techniques Developed within the Seawolf Mid-life Update (SWMLU) Programme
Session 10B – Friday 14th November: 1100hrs

Dr Lloyd Hammond
Defence Science & Technology Organisation (DSTO), Australia
Improving Asset Management through Enhanced Decision Support Processes
Session 11A – Friday 14th November: 1245hrs

Dr Peter Hammond
BAE Systems (Integrated Systems Technology), United Kingdom
A Pattern Language for Open Architecture Systems
Session 4D – Wednesday 12th November: 1600hrs

Mr Bob Harman
Lockheed Martin MS2, United States
International Submarine Integrated Combat System (ICS)
Session 2D – Wednesday 12th November: 1100hrs

Mr R. Robinson Harris
Lockheed Martin MS2, United States
The "Tipping Point" Surface Combatant
Session 7B – Thursday 13th November: 1245hrs

Mr Jeffrey Haun
NATO Undersea Research Center (NURC), Italy
Marine Mammal Risk Mitigation Sea Trial (SIRENA 08)
Session 11E – Friday 14th November: 1245hrs

Mr Marc Heller
Lockheed Martin MS2, United States
Adaptation of the Remote Multi-Mission Vehicle (RMMV) for Additional Unmanned Missions
Session 7E – Thursday 13th November: 1245hrs

Mr Thomas Helzel
Helzel Messtechnik GmbH, Germany
Over-The-Horizon Radar – An Introduction to WavE RAdar (WERA)
Session 8G – Thursday 13th November: 1600hrs

Mr Andy Higgins
QinetiQ, United Kingdom
Design and Build of a High-Speed Technology Demonstrator Vessel
Session 11C – Friday 14th November: 1245hrs

Mr Pär Rickard Hildingsson
Saab Systems, Sweden
The User Meets the System – A True Open Architecture Approach
Session 3D – Wednesday 12th November: 1245hrs

Mr Stephen Hopko
US Navy (NSWC, Philadelphia), United States
Fully Integrated, Automated Shipboard Oil Pollution Abatement Systems
Session 6C – Thursday 13th November: 1100hrs

Mr Gordon Hunt
Real-Time Innovations, Inc., United States
Development of Secure Scalable Net-Centric Systems – A Proven Design Methodology
Session 10D – Friday 14th November: 1100hrs

Lieutenant Commander Jesus Ibarz
Spanish Navy, Spain
UAVs for the 21st Century
Session 6E – Thursday 13th November: 1100hrs

Mr Tomás Jimeno
Tecnobit SL, Spain
Image Treatment in Electro-Optical Systems
Session 2F – Wednesday 12th November: 1100hrs

Mr Gunnar Jürgensen
Blohm & Voss Nordseewerke GmbH, Germany
German Frigate F125 programme – Mission System
Session 2B – Wednesday 12th November: 1100hrs

Mr David Jurkiewicz
Naval Surface Warfare Center (Carderock Division), United States
Uses of Commercially Chartered Heavy Lift Ships for Auxiliary Naval Operations
Session 11C – Friday 14th November: 1245hrs

Mr Ryszard Kaminski
R&D Marine Technology Centre (CTM), Poland
Adaptive Jammers and Decoy Systems
Session 8B – Thursday 13th November: 1600hrs

Dr Ronald Kessel
NATO Undersea Research Center (NURC), Italy
Deterrence as System Force Multiplier in the Defence Against Terrorism (DAT)
Session 7A – Thursday 13th November: 1245hrs

Dr Yuri Khersonsky
Practice in Power Electronics, United States
IEEE Standards for Maritime Systems and Technology
Session 7C – Thursday 13th November: 1245hrs

Mr Joachim Kimpel
Ministry of Defence/BWB, Germany
Countering Asymmetric Threats: Long Term Experimental Setup for ASymW (LEXXWAR)
Session 7A – Thursday 13th November: 1245hrs

Mr Kyril Korolenko
Naval Undersea Warfare Center, United States
COTS and Rapid Prototyping in Surface USW Systems
Session 2D – Wednesday 12th November: 1100hrs

Mr Roope Kotiranta
Surma Ltd., Finland
Fully Integrated FE-Analysis in Survivability Manager Application (SURMA)
Session 2C – Wednesday 12th November: 1100hrs

Mr Peter Kuhn
ATLAS Elektronik GmbH, Germany
Effector sonar for applications in shallow waters
Session 3E – Wednesday 12th November: 1245hrs

Mr Thomas Kunze
ATLAS Elektronik GmbH, Germany
Fusion of Naval Combat Systems and a Coast Bound Maritime Surveillance System to Achieve Total and Flexible Maritime Security
Session 4B – Wednesday 12th November: 1600hrs

Mr Dann Laneuville
DCNS, France
Passive Surveillance of Harbour and Coastal Area with Cameras
Session 6G – Thursday 13th November: 1100hrs

Mr Yves Lavaux
Thales Underwater Systems, France
CAP:a tool for Concept Development and Experimentation
Session 10F – Friday 14th November: 1100hrs

Mr Frank Leban
Naval Sea Systems Command, United States
Modelling and Experiments on Search, Detection, and Retrieval Methods for Container Ships
Session 10E – Friday 14th November: 1100hrs

Ms Lori Lindholm
Lockheed Martin MS2, United States
Adaptive Logistics
Session 11A – Friday 14th November: 1245hrs

Mr Doug Linman
Network Anatomy/NetCo, United States
Container Security: The Final Information Frontier
Session 7A – Thursday 13th November: 1245hrs

Mr Frederic Livernet
Ministry of Defence (DGA/DET/CTS), France
Tracking Based on Theory Applied to Pair of Plot
Session 4D – Wednesday 12th November: 1600hrs

Mr Michael Lonsdale
Thales Australia, Australia
Maritime Security of Offshore, Coastal and Harbour Assets – The Australia Situation
Session 6A – Thursday 13th November: 1100hrs

Mr Jose Antonio Lopez Berrio
Sainsel Sistemas Navales S.A.U., Spain
Warship Electronic Chart Display and Information System (WECDIS)
Session 11F – Friday 14th November: 1245hrs

Mr Angus Lugsdin
Coda Octopus Group, United States
Countering the Underwater Threat with Proven 4D Acoustic Technology
Session 2E – Wednesday 12th November: 1100hrs

Mr Jesús Madrid
Indra Sistemas SA, Spain
Early Warning and Identification System for NBC (SentrY)
Session 6G – Thursday 13th November: 1100hrs

Commander Mikael Magnusson
Swedish Armed Forces, Sweden
Network Enabled Capability in the Maritime Environment
Session 7B – Thursday 13th November: 1245hrs

Mr Nicolas Mandelert
Thales Underwater Systems, France
Joint Sonar and Video Sensing for an Autonomous Underwater Mine Disposal Vehicle
Session 8D – Thursday 13th November: 1600hrs

Mr Dane Marolt
Northrop Grumman, United States
Maritime Surveillance in the Network Centric World
Session 2A – Wednesday 12th November: 1100hrs

Dr Robert Marshall
Naval Surface Warfare Center (Dahlgren Division), United States
Future Littoral Radar Performance
Session 7G – Thursday 13th November: 1245hrs

M. Ludovic Martinet
Ministry of Defence (DGA), France
Risk Reduction Methodology for the Manning of the Operations Room of a Frigate (With Reduced Crew)
Session 8C – Thursday 13th November: 1600hrs

Dr Juan José Martínez
Indra Sistemas SA, Spain
Maritime Situational Awareness in Homeland Security and Emergency Management – What Do We Really Know?
Session 6A – Thursday 13th November: 1100hrs

Commander Manuel Martinez Ruiz
Department of Defence (JPEO-Joint Tactical Radio System-MIDS IPO), Spain
Concurrent Multi-link Operations and System's Enhancements in Support of New Tactical Data-link Requirements
Session 11D – Friday 14th November: 1245hrs

Mr Vincent Mégaides
Thales Optronique, France
New Naval Off Axis Laser Warning Technology
Session 5G – Thursday 13th November: 0900hrs

Mr Gunter Menacher
EADS Deutschland GmbH, Germany
Naval Radars for the Littorals
Session 7G – Thursday 13th November: 1245hrs

Mr Guy-François Mesnil
Thales Air Systems, France
Increasing Onboard Firepower using Standard Warship Architectures
Session 6B – Thursday 13th November: 1100hrs

Mr William Miasek
Lockheed Martin MS2, United States
European Missile Defense Collaborative Tool
Session 7D – Thursday 13th November: 1245hrs

Mr Joseph M. Monti
Naval Undersea Warfare Center, United States
Enhancing Undersea Distributed Netted Systems (UDNS) Through Fiber Optic Sensing
Session 3E – Wednesday 12th November: 1245hrs

Mrs Anna Montuenga
General Dynamics Santa Bárbara Sistemas, Spain
Coastal Protection – Do Integrated Solutions Really Exist?
Session 4B – Wednesday 12th November: 1600hrs

Mr Guillermo Monzón-Rodriguez
Indra, Spain
Latest Trends in Battlefield Identification – Mode 5, BTID, Blue Force Tracking
Session 7A – Thursday 13th November: 1245hrs

Mr Michel Morel
DCNS, France
Common Detection of Abnormal Behaviours & Analysis of Suspicious Events using I2C Interoperable Sensors & Information Sources
Session 3B – Wednesday 12th November: 1245hrs
NAval Operation System for Maritime Safety and Security (NAOS MS2)
Session 8F – Thursday 13th November: 1600hrs

Dr Nik Moss
Thales Group (Naval Division), United Kingdom
Evolution of OSA in Warships
Session 5D – Thursday 13th November: 0900hrs

Mr Jose M. Muñoz-Ferreras
Universidad Politecnica de Madrid, Spain
High Resolution Millimeter-Wave Radar for Sea Target Identification
Session 8G – Thursday 13th November: 1600hrs

Mr Frank Murphy
Battelle, United States
Harbour Shield- : A New Technique for Inspection of Vessels below the Waterline
Session 5F – Thursday 13th November: 0900hrs

Ms Deborah Nalchajian
Office of Naval Research (ONR), United States
Advanced Electric Ship Demonstrator:
Session 10C – Friday 14th November: 1100hrs

Dr Karl Wieland Naumann
Bayern-Chemie, Germany

Recent Developments on Rockets with Gelled Propellants
Session 7E – Thursday 13th November: 1245hrs

Mr Travis Nix
Lockheed Martin MS2, United States

Scalable Solid-State S-Band Radar (S4R(tm)) Demonstrator
Session 7G – Thursday 13th November: 1245hrs

Mr Nick Noel-Johnson
BMT Defence Services, United Kingdom

Landing Craft – Simple Ships or Time for a Rethink? A Designer's Perspective
Session 10C – Friday 14th November: 1100hrs

Mr Edmund Ooi
ST Electronics (Info-Comm Systems), Singapore

Harbour-craft Identification and Monitoring System
Session 4A – Wednesday 12th November: 1600hrs

Mr William Ormsby
Naval Surface Warfare Center (Dahlgren Division), United States

Enterprise Readiness Level Assessments
Session 5D – Thursday 13th November: 0900hrs

Mr Albert Ortiz
US Navy (NSWC Philadelphia), United States

Analysis of Shipboard Survivable Firemain Systems
Session 2C – Wednesday 12th November: 1100hrs

Energy Harvesting for Shipboard Wireless Damage Control Sensors
Session 4C – Wednesday 12th November: 1600hrs

Output Feedback and Trajectory Tracking Control of a Gantry Crane
Session 6C – Thursday 13th November: 1100hrs

Dr Lyn Owen
QinetiQ, United Kingdom

Exploiting Synergies between Naval Operational Systems and Test, Evaluation and Training Ranges
Session 10F – Friday 14th November: 1100hrs

Dr Lynn Ewart Paine
Naval Undersea Warfare Center, United States

Electromechanical and Mechanical Properties of Piezoelectric Single Crystals for Naval Sonar Transducers
Session 2E – Wednesday 12th November: 1100hrs

Mr Francisco Panos
Navantia, Spain

Navantia's Ship Management System: COMPLEX (COntrol y Monitorizacion de PLataforma EXtensible)
Session 7C – Thursday 13th November: 1245hrs

Mr Alex Pape
Jane's Information Group, United Kingdom

Procurement and Contracting Approach
Session 5A – Thursday 13th November: 0900hrs

Mr Jean-Michel Passerieux
Thales Underwater Systems, France

Virtual Environments for Assessment and Trimming of Underwater Acoustic Communication Schemes and Algorithms
Session 3E – Wednesday 12th November: 1245hrs

Mr Jean-Jacques Periou
ECA Group, France

Autonomous Systems for Oceanography, Hydrography, Homeland Security & MW
Session 4E – Wednesday 12th November: 1600hrs

Mr Francesco Perra
Orizzonte Sistemi Navali, Italy

A Modelling and Simulation Tool to Measure Naval Task Effectiveness across all Warfare Domains
Session 10F – Friday 14th November: 1100hrs

Mr Stanley Polhemus
Naval Undersea Warfare Center, United States

Prototype Rechargeable Electric Propulsion System
Session 4E – Wednesday 12th November: 1600hrs

CMS Artem Popko
Marine Bridge & Navigating Systems, Russia

Integrating Protection Systems for Potentially Dangerous Maritime Objects
Session 8F – Thursday 13th November: 1600hrs

Professor Alexander Pustoshny
Krylov SRI, Russia

Complex of Model Experiments and Calculations as Actual Procedure for Investigation of Dynamic Towing Systems
Session 6C – Thursday 13th November: 1100hrs

Mr Denis Quiltu
DCNS, France

Integrated Single Masts for Warships
Session 5C – Thursday 13th November: 0900hrs

Mr Olivier Rabourdin
Thales Underwater Systems, France

Human Factors Integration for Sonar User Interfaces
Session 8C – Thursday 13th November: 1600hrs

Mr Grant Raisig
Alion Science & Technology, United States

Measure of Total Integrated System Survivability (MOTISS) Analysis of a Notional Surface Combatant Ship
Session 10E – Friday 14th November: 1100hrs

Dr Alfredo Rayms-Keller
Naval Surface Warfare Center (Dahlgren Division), United States

Novel Nanotechnology-based Sensors
Session 6G – Thursday 13th November: 1100hrs

Mr Pascal Ribeiro
Ministry of Defence (DGA), France

A New Approach to Tactical Data Link for the French Navy
Session 11D – Friday 14th November: 1245hrs

Dr Harold Robinson
Naval Undersea Warfare Center, United States

Electromechanical and Mechanical Properties of Piezoelectric Single Crystals for Naval Sonar Transducers
Session 2E – Wednesday 12th November: 1100hrs

Single Crystal Projectors for Compact, Broadband Sonar
Session 2E – Wednesday 12th November: 1100hrs

Mr Natalio Rodriguez
Association of the Spanish Naval Architecture (AINE), Spain

The Future of Naval Construction in Europe: Applied Research on Naval Platforms
Session 7B – Thursday 13th November: 1245

Mr Victor Rodriguez Herola
ISDEFE, Spain

Maritime Situation Awareness: ISDEFE's Support of the Spanish Navy
Session 3B – Wednesday 12th November: 1245hrs

Mr Michael Rothenbach
Ministry of Defence/BWB, Germany

The German Approach to Force and Harbour Protection and Possible Integration into Naval Systems – The AUV Family SEA OTTER Mk II and SEA WOLF
Session 6E – Thursday 13th November: 1100hrs

Dr Ryszard Rugala
R&D Marine Technology Centre (CTM), Poland

The Integrated Ship and Harbour Area Protection System Architecture
Session 8F – Thursday 13th November: 1600hrs

Mr Eduardo Ruiz
Navantia, Spain

Engine Diagnosis Centre for Spanish Navy
Session 4C – Wednesday 12th November: 1600hrs

Mr Antonio Sanchez Garcia
SAES, Spain

A New Approach to Underwater Critical Infrastructures
Session 5F – Thursday 13th November: 0900hrs

Advanced Multi-Influence Naval Mine – Spain's MINEA
Session 11B – Friday 14th November: 1245hrs

Mr Jean-Luc Sandral-Lasbordes
Thales Land & Joint Systems, France

Naval Force Intranet – Stand Alone System
Session 6D – Thursday 13th November: 1100hrs

Mr Hugues Sassier
Thales Alenia Space, France

An Interoperability Framework to Provide the "Common Maritime Picture"
Session 10A – Friday 14th November: 1100hrs

Mr Alexei Schandl
Naval Surface Warfare Center (Port Hueneme Division), United States

Network Enabled – Interoperability Capabilities and Limitations
Session 7F – Thursday 13th November: 1245hrs

Mr James Schofield
QinetiQ, United Kingdom

SURVIVE and SURVIVE Lite – Recent Developments
Session 2C – Wednesday 12th November: 1100hrs

Mr Pablo Segovia Escobar
Indra Sistemas SA, Spain

Life-Cycle Cost – How to Minimise it
Session 5A – Thursday 13th November: 0900hrs

Vice- Admiral José-Manuel Sevilla
Canal de Experiencias Hidrodinámicas de El Pardo (CEHIPAR), Spain

Advanced Tests and Optimisation Procedures for
Session 3C – Wednesday 12th November: 1245hrs

Dr Jacek Skowronek
Thales Nederland, Netherlands

Addressing the Challenges of Systems-Of-Systems Integration in Maritime Safety and Security – The POSEIDON Project
Session 8A – Thursday 13th November: 1600hrs

Eng Alexandre Sousa
Oceanscan, Portugal

Low Cost Autonomous Underwater Vehicles for Oceanographic and Harbour Surveillance Missions
Session 7E – Thursday 13th November: 1245hrs

Mr John Spencer
Thales Group (Naval Division), United Kingdom

Enterprise Implications of a New Combat System Architecture for Major Royal Navy Surface Combatants
Session 3D – Wednesday 12th November: 1245hrs

Mr Marc Spigai
Thales Alenia Space, France

Improving Ship Detection using High Resolution Synthetic Aperture Radar (SAR) Images and Advanced Time-Frequency Processing Techniques (ATF)
Session 10E – Friday 14th November: 1100hrs

Commodore David Squire
The Nautical Institute, United Kingdom

The Human Element in Ship Design, Build and Operation
Session 8C – Thursday 13th November: 1600hrs

Mr HB Stevens
Lockheed Martin MS2, United States

Potential Sea-Based Platforms for Europe/NATO
Session 6B – Thursday 13th November: 1100hrs
Sea-Based Missile Defense Analysis for Future UK Surface Combatants
Session 6B – Thursday 13th November: 1100hrs

Mr Peter Stoffer
Thales Nederland, Netherlands

Integrated Sensor & Communication System
Session 10B – Friday 14th November: 1100hrs

Dr Thomas Stottlemyer
Naval Undersea Warfare Center, United States

Advancements in Undersea Warfare Systems on Surface Ships
Session 2D – Wednesday 12th November: 1100hrs

Professor Juan C. Suarez
Universidad Politecnica de Madrid, Spain

New Fiber-Metal Hybrid Laminated Material (MaLECoN)
Session 5C – Thursday 13th November: 0900hrs

Mr Daniel Taton
Thales Underwater Systems, France

Security of Critical Maritime Areas – A Report on SOBCAH and SECMAR
Session 4B – Wednesday 12th November: 1600hrs

Mr James A Theriault
Defence R&D Canada Atlantic, Canada

Detection of Blainville's Beaked Whale using Autonomous Underwater Gliders
Session 11E – Friday 14th November: 1245hrs

Mr Mark Thomas
Thales Underwater Systems, United Kingdom

Architecture Frameworks for Sonar User Interfaces
Session 5E – Thursday 13th November: 0900hrs
Open Systems – How Closed is Open?
Session 5D – Thursday 13th November: 0900hrs
Using Open Source Software for Naval Systems
Session 6F – Thursday 13th November: 1100hrs

Mr Daniel Tiberghien
Thales Communications, France

Passive Radar for Maritime Surveillance
Session 5G – Thursday 13th November: 0900hrs
Service Oriented Architecture (SOA) for Maritime Surveillance
Session 8F – Thursday 13th November: 1600hrs

Mr Joel H. Timm
Naval Sea Systems Command, United States

Remote Monitoring and Remote Diagnostics for Shipboard Systems Maintenance
Session 5E – Thursday 13th November: 0900hrs

Mr Hai Tonthat
Naval Surface Warfare Center (Port Hueneme Div.), United States

Condition and Environment Sensing and Reporting System (CAESAR)
Session 6F – Thursday 13th November: 1100hrs

Commodore (ret'd) Patrick Tyrrell
Vale Atlantic Ltd, United Kingdom

Putting the Submarine at the Heart of Network Centric C4I – The Final Fathom
Session 10D – Friday 14th November: 1100hrs

Commodore (ret'd) Luke van Beek
Mott MacDonald, United Kingdom

The Cost of Maritime Security & Platforms: Requirement Drivers
Session 5A – Thursday 13th November: 0900hrs

Mr David VanBuskirk
Lockheed Martin, United States

Improved System Operational Availability through Autonomous Data Communication and Analysis
Session 11A – Friday 14th November: 1245hrs

Dr Germán Vergara
Ministry of Defence/CIDA (Centro de Investigación y Desarrollo de la Armada), Spain

Advanced Naval Infrared Search and Track System Prototype (SIRIO)
Session 6G – Thursday 13th November: 1100hrs

Rear-Admiral Stephane Verwaerde
French Navy, France

Future French Navy Mine Warfare Capability
Session 6E – Thursday 13th November: 1100hrs
Ship Protection within Littoral Waters – A French Navy Perspective
Session 10A – Friday 14th November: 1100hrs

Mr Andy Vooght
Thales Research & Technology, United Kingdom

Collaborative Work Desktop for MSS Operation Centers – nuVa**Session 5E – Thursday 13th November: 0900hrs**

Mr George Wallace
BMT Sigma, United Kingdom

Architecture Frameworks and Systems Engineering
Session 5D – Thursday 13th November: 0900hrs

Mr Terence Warwick
Thales Australia, Australia

Extending the Operational Effectiveness of Surface Combatants – Lessons Learned on the FFG Upgrade Programme
Session 2B – Wednesday 12th November: 1100hrs

Mr Larry W. Wiley
Naval Surface Warfare Center (Carderock Division), United States

Craft Integrated Electronics Suite (CIESTM) – Summary of an Operational Programme
Session 10B – Friday 14th November: 1100hrs

Mr Richard G. Wilkie Jr
Naval Surface Warfare Center (Carderock Division), United States

Visual and IR Obscurants on Small Craft for Littoral Operations – A Craft Survivability Enhancement Program
Session 5G – Thursday 13th November: 0900hrs

Mr Michael Wiseman
US Navy, United States

So Many Combat Systems, So Little Time (to Integrate)…
Session 4D – Wednesday 12th November: 1600hrs

Mr Mark Wood
Lockheed Martin MS2, United States

2007 USN Ballistic Missile Defence (BMD) Flight Test Mission Results
Session 7D – Thursday 13th November: 1245hrs

Mr Richard Worth
Naval Sea Systems Command, United States

Insulated Bus Pipe (IBP) for Shipboard High Power Distribution Applications
Session 5C – Thursday 13th November: 0900hrs

Mr Walter MX Zimmer
NATO Undersea Research Center (NURC), Italy

Compact Passive Acoustic Monitoring (CPAM) – Cost-effective Monitoring of the Presence and Behaviour of Deep-diving Whales
Session 11E – Friday 14th November: 1245hrs

Papers Digest

Wednesday 12th November: 0900hrs

Session 1A: Official opening and Keynote addresses

Introducing the major themes for the three days of MAST, the 2008 Opening session and Keynote addresses will feature exclusive presentations from top level Spanish government/navy representatives; plus Rear-Admiral Anders Grenstad, Chief of Staff, Swedish Navy, Sweden; Rear-Admiral (ret'd) Jay Cohen, Head of Science and Technology Directorate, US Department of Homeland Security, United States. For the latest speaker updates visit: **www.mastconfex.com**

Wednesday 12th November: 1100hrs

Session 2A: Maritime Security
Maritime Situational Awareness

Enhanced Maritime Domain Awareness through Web-based Configurable Software

Ms Richard Dickinson, ***Lockheed Martin (Advanced Technology Laboratories)*****, United States**

Maritime domain awareness (MDA) of vessel traffic in a large operational area requires automated tools for watch-standers and analysts.

Additionally, the users must be able to tailor the tools to keep pace with changing operational needs. Under the U.S. Navy MDA Spiral 1 Program, Lockheed Martin Advanced Technology Laboratories is fielding web-accessible software that enables operators to assemble and manage intelligent agents that monitor live maritime data feeds to detect user prescribed conditions and analyze historic data. The tools are compliant with interoperability standards and realized in a service-oriented architecture, allowing external applications to invoke the analytic capabilities of the intelligent agents.

The software has been incorporated into daily operations at Commander, Naval Forces Europe/Commander, Sixth Fleet (CNE-C6F), and NATO CC-MAR, where operators are now able to transform an overwhelming amount of data into meaningful, actionable knowledge, resulting in improved situational awareness and successful maritime intercept operations.

This paper will describe the novel capabilities of the software and how it supports MDA activities in a web-based environment, and include an overview of the Defense Advanced Research Projects Agency (DARPA) program that was responsible for the development of the software and how the program applied technological innovation to user requirements to create an operational product.

Applied Data Fusion Techniques for the Integration of Port and Ship Security

Mr Martyn Dickinson, ***Servowatch Systems Limited*****, United Kingdom**

The monitoring of vessel movements within port limits and establishing proper identification, purpose and expectations is a critical role for any port control or security organisation.

Modern navigational aids can be used to identify and plot the approach and progress of ships and some leisure craft, but it is the unknowns and the unplanned movements that can go unnoticed or unchallenged, and could yet provide the greatest security risk. Port VTS, Transponder Systems and independent tracking systems can provide a visual indication of vessel movements, but in isolation they do not fully overcome the movement identification issues of craft in ports or busy waterways. In order to assess instant threat levels, analysis must be made of movement, extra-ordinary activities and visual target identification. Information systems are available to assist in a number of ways, but threats can take on very different characteristics. To support multiple applications for threat assessment against, for example, port terminals and infrastructure, shipping, high value marine assets and border security, making use of intelligent sensor data fusion takes analysis to more informed and integrated levels.

This paper will explain the methodology and application of these emerging technologies for application to issues of security in an uncertain world.

Maritime Surveillance in the Network Centric World

Mr Dane Marolt, ***Northrop Grumman*****, United States**

Surveillance of the open ocean and littoral zones has become more critical than ever.

With Nations facing the multiple challenges of simultaneously securing borders, stopping contraband and insuring that immigration problems are dealt with in accordance with National/International Laws, maritime surveillance represents a key sovereignty issue.

Current surveillance systems have served their purpose over many years but require significant modernization to support today's needs, which include new sensors and most importantly, the ability to generate, process, and disseminate vast amounts of information quickly in a networked environment.

Adding to this challenge, the ability to quickly determine which information is of value to act upon is paramount. Furthermore, one system does not meet all the requirements out there.

A layered system of surveillance coupled to a fused and secure decision making network is needed today, yet most nations are just considering these type of systems.

Further, National budgets are more constrained than ever, pushing Nations to more efficient and economical systems. A layered airborne maritime surveillance system is a good first step towards asserting National Sovereignty.

Wednesday 12th November: 1100hrs

Session 2B: Systems
New Ships – New Combat Systems

SCOMBA Combat System

Mr Jose Espinal, ***Navantia*****, Spain**

Combat Systems are rapidly changing: Massive introduction of COTS; and new asymmetric threats are typical examples. Funding and available development time is also changing… but typically downwards.

The response of both the Spanish Navy and industry to these challenges has been the SCOMBA development (Sistema de COMBate para Buques de la Armada – Spanish Navy ships Combat System).

SCOMBA is a Combat System family that is currently under development to meet the requirements of vessels such as LHD (Landing Helo Dock), BAM (Maritime Support Vessel) and BAC (Oil Replenishment Ship) all of them under construction for the Spanish Navy, being in that way the core for all future Spanish Navy Combat Systems.

The SCOMBA concept fully answers to the increasing requirements of modularity, flexibility and scalability. When there is no time and no money for errors it fulfils all these emerging needs, reducing at the same time ship's lifecycle support costs.

Extending the Operational Effectiveness of Surface Combatants – Lessons Learned on the FFG Upgrade Programme

Mr Terence Warwick, ***Thales Australia*****, Australia**
Aubrey Jarkey, Thales Australia, Australia

Thales Australia has developed a comprehensive upgrade programme for the Royal Australian Navy's (RAN) FFG Class which substantially improves both the offensive and defensive capabilities of the vessels.

This is one of the most sophisticated and extensive enhancements ever undertaken of a modern surface combatant.The upgrade includes: AAW and Automatic Self Defence capability involving vertically launched ESSM; Upgrading of fire control system and surveillance radar; Significant improvement of C2 system and operator consoles; Enhanced torpedo defence, ASW and mine avoidance capability; Enhanced electronic surveillance and decoy defence solutions; Provision of Link-16.

Key insights were gained over the period of the programme in the areas of: design solutions and acceptance methods; material condition of the ships and their supporting documentation; incremental development and integration; collaborative working arrangements between customer and suppliers.

The lessons learned, and to be presented in this paper by Thales Australia, can be transferred to any programme seeking to upgrade and extend the operational effectiveness of an existing surface combatant.

CMS with Integrated Tactical Data Link for German Frigate F125 programme

Dr Hans-Dieter Ehrenberg, *ATLAS Elektronik GmbH*, Germany

The frigate F125 for the German Navy is one of the first naval programmes which will incorporate a combat management system (CMS) with a multiple tactical data link system (TDL) integrated from the beginning.

This enables the vessels to be part of a network for secure and fast exchange of tactical data and for a real time display of these data on the Tactical Display Area (TDA).

Furthermore this parallel development greatly reduces the respective risk. The development of a powerful "user-centric" Human Machine Interface (HMI) in close co-operation with the customer was one of the additional main goals. Comprehensive digital picture analysis is a further novelty of the system. Besides the classical tasks of a CMS like weapon and sensor control including sensor data fusion and threat evaluation and weapon assignment, the CMS has special features for Anti-Asymmetric Warfare like "Automatic Target Recognition".

The CMS is based on open architecture according to the CORBA standard. The features as well as the development and experimental path of both systems, the CMS and the TDL are explained and evaluated.

The ergonomically optimized various OMADA-consoles designed especially for the F125 are shown. A demonstrator of the F125-CMS with ASymW-features ("LEXXWAR") has been designed in cooperation with the German Armed Forces Office for Technology and Procurement. It is the kernel of the NATO "Techdemo" Event (former "Harbour Protection Trials") - September 2008 in Eckernförde, Germany.

German Frigate F125 programme – Mission System

Mr Gunnar Jürgensen, *Blohm & Voss Nordseewerke GmbH*, Germany

The mission profile of the F125 has changed in comparison to previous German frigate programmes from a combat to a stabilization force profile.

As a result, the requirements of the platform system as well as the focus of the mission system capabilities have changed. Tasks like Gun Fire Support over long range, Support of Special Operations and long endurance in the area of operation (with an intensive use profile) have led not only to a different effector and weapon suite, but also to enhanced communication capabilities and extended automation of 'sensor to shooter' functional chains.

This new design has been shaped by a reduced number of operators in extremely long on-task cycles in an insecure environment. This caused design solutions like electronically supported detection and classification methods and optimized usability to operate the CS. Based on its primary mission capabilities the ship will be equipped with sensors like volume search radar.

It will support the maritime surveillance capability to match special recommendations of the capability to counter asymmetric threats. A Command Control and Information System, similar to the installation in the German MHQ, connects the Command Team or embarked teams (CTG Staff or Special Forces) to their respective headquarters enabling a strict separation of information domains.

The frigate will be equipped with a large number of communication lines to establish the required CTG capabilities to support the command ship role.

The LINK systems 11, 16 and 22 are integrated into the command and control system for tactical data exchange and ensure a high degree of interoperability with other military assets (joint and combined).

The command and control system will be delivered by ATLAS Elektronik and is based on the "Advanced Naval Combat System", using the CORBA Standard to establish an open software architecture. The weapons and sensors are interconnected via an Ethernet based redundant Integrated Board Network.

The IR surveillance and tracking system is especially developed to support the operator with IR detection capabilities and a complete surrounding picture to counter an asymmetric threat. For engagement the weapon arrangement is optimized with respect to no-fire zones. Seven small calibre guns are placed around the ship.

For tactical fire support a five inch gun system has been chosen as the artillery weapon system. The weapon performance will be supported by the Long Range Vulcano ammunition and the data exchange with joined forces – "combined fire".

Growth potential is foreseen to implement further weapon systems like remote-operated vehicle, diver detection sonar, electronic countermeasure system or laser warning system.

To enlarge the tactical picture and to support boarding operations, the ship has two organic helicopters in hangars with the required maintenance facilities.

This presentation will cover the mission systems specific of this new frigate type.

Wednesday 12th November: 1100hrs

Session 2C: Platforms
Survivability

Survivability Analysis of Shipboard Reconfigurable Systems

Dr. Li Bai, *Temple University*, United States

This paper will presents a novel probabilistic approach to analyze the survivability of a system.

We will show similarities and differences between survivability and reliability analysis. In a reliability model, we can describe a k-out-of-n:G system (k <= n), in which the component system is good only if any k or more components work. The system can also be configured into an initial k-out-of-n:G model with m backup components (0 <= m <= n). If the system cannot perform its intended function, the m backup components will be reconfigured with the remaining working components into a new form to sustain system function.

We will refer to such studies to calculate the system successful probabilities as the survivability analysis. In this paper, we will focus on the survivability analysis of a simple piping system. This study could potentially be used to analyse the survivability of power network systems, dependable secure computing systems, military reconfigurable information systems, and other large reconfigurable network systems.

Analysis of Shipboard Survivable Firemain Systems

Mr Albert Ortiz, *US Navy (NSWC, Philadelphia)*, United States

This paper will present a study for the shipboard fire main systems using a new probabilistic approach to analyze the survivability of a system.

Similarities and differences between survivability and reliability analysis will be compared. In a reliability model, one can describe a k-out-of-n:G system (k <= n), in which the component system is valid only if any k or more components function. The system can also be configured into an initial k-out-of-n:G model with m backup components (0 <= m <= n). If the system cannot perform its intended function, the m backup components will be reconfigured with the remaining working components into a new form to sustain system function. Academia refers to such studies to calculate the system successful probabilities as the survivability analysis.

This paper will focus on the survivability analysis of a shipboard fire main piping system. This study could potentially be used to analyse the survivability of power network systems, dependable secure computing systems, military reconfigurable information systems, and other large reconfigurable network systems.

SURVIVE and SURVIVE Lite – Recent Developments

Mr James Schofield, *QinetiQ*, United Kingdom

At last year's MAST Conference, QinetiQ presented an overview of the survivability assessment tool SURVIVE. This year's paper will focus on two recent areas of development; the completion of SURVIVE's recoverability module for surface ships and submarines and the release of SURVIVE Lite for concept designers.

The recoverability module simulates the response of crew and systems to damage. This allows, for example, assessment of damage control procedures, efficiency of fire fighting methods and manpower/automation tradeoffs. The effect of new technology insertion (e.g. Intelligent Fluid Systems) can be established and its behaviour examined in various scenarios.

SURVIVE Lite extends the assessment process to the concept designer's desk, allowing survivability to be considered from the earliest stages. The tool offers a rapid and user-friendly GUI, allowing concepts to be built, simulations undertaken, results analysed and design changes made in a matter of minutes. Compatibility with the full SURVIVE Suite ensures a seamless transition to more detailed assessments later in the design cycle.

Fully Integrated FE-Analysis in Survivability Manager Application (SURMA)

M.Sc. (Tech.) Roope Kotiranta, ***Surma Ltd.*****, Finland**

Finite element method has been an engineering tool for decades, and is beginning to replace the more simple methods used traditionally for structural analysis in the software dedicated to vulnerability and survivability assessment.

However, naval designers still lack a practical tool for seamlessly integrating this sophisticated technique with other aspects related to survivability of a naval vessel.

This paper will present the approach used in SURMA. The general principle behind the ideas described here lays in establishing a real two way communication between a modern ship product model and a full 3D finite element analysis software.

The product model acts as a backbone for the survivability assessment tool, offering also a highly detailed basis for the FE-analysis, in terms of both the structures as well as the loads. Thus the benefits of both tools can be fully utilized to assess a vessel's survivability.

Wednesday 12th November: 1100hrs

Session 2D: Systems
Submarine USW Systems

Electronic Navigation Technology – Enabling Submarine Operations in Littoral Areas

Mr. Robert Bush, ***OSI Geospatial*****, Canada**
Bryan Price, Offshore Systems Ltd, Canada

Naval operations continue to evolve with the changing geopolitical environment.

One constant however, is the need for flexible and capable assets to respond to sometimes unpredictable operational situations. Submarines provide a great deal of flexibility in response and have evolved operationally from cold war/blue water/lone wolf operations to today's independent or integrated operations in brown water littoral areas.

Submarine operations in littoral areas, particularly against a determined and alert opponent, present many challenges, including integrating safe navigational methods with tactical and operational objectives.

This paper will introduce technologies that leverage accurate and efficient navigation methods to enhance operational effectiveness. It will address the subject primarily from the conventional submarine perspective including Air-Independent Propulsion (AIP) fitted submarines, though many of the concepts apply equally to nuclear powered submarines.

The paper will describe the relationship between submarine navigation and how the development of advanced electronic navigation systems is coupled very closely with tactical employment.

Advancements in Undersea Warfare Systems on Surface Ships

Dr Thomas Stottlemyer, ***Naval Undersea Warfare Center*****, United States**

The Program Executive Officer for Integrated Warfare Systems, PEO IWS, Major Program Manager for Undersea Systems, has the responsibility for developing, testing, and installing Undersea Warfare (USW) systems on U.S. Navy Surface Ships.

Recently, a number of technological advancements have been made that have improved Surface Ship USW capability. These advancements have been in the areas of improved signal processing, hull-mounted and towed sensors, open architecture standards applied to system development, and rapid installation of commercial components with improved capability.

These improvements span the spectrum from early Research & Development activities with at-sea experimentation, to installation of systems aboard current U.S. Navy ships. This paper will present an overview of these advancements and discuss further planned improvements.

International Submarine Integrated Combat System (ICS)

Mr Bob Harman, ***Lockheed Martin MS2*****, United States**

Lockheed Martin's Integrated Combat System (ICS) is a flexible, modular command and control system, developed for retro-fit of international U-209 submarine fleets.

The U-209 ICS is adapted from the Spanish S-80 Submarine Combat Management and sonar system being developed by Lockheed Martin and Navantia. The first implementation of the U-209 retro-fit will be the modernization of the Brazil Tupi Class submarines.

The ICS product consists of the "core combat system" consisting of an integrated combat management system and sonar processing system. Other subsystems (periscope, ESM, radar, comms, etc) are procured as complete subsystems when required. The ICS is interfaced to all required U-209 subsystems, both procured and legacy, allowing mid life extension upgrades of previously stand-alone systems into a modern, Integrated Combat System.
There are no proprietary software interfaces, network elements or middleware and the ICS hardware can be technology-refreshed without software impacts. The modern weapon control hardware and software is easily adaptable to different weapons systems.

COTS and Rapid Prototyping in Surface USW Systems

Mr Kyril Korolenko, ***Naval Undersea Warfare Center*****, United States**

The current publicity for commercial-off-the-shelf(COTS), open architecture systems ARCI/APB (Acoustic Rapid COTS Insertion/Advanced Processor Build) being integrated into US Navy's submarine force, ignore COTS, open architecture products successfully integrated into US Navy's surface ships Undersea Warfare (USW) systems since the early 1970s , and is continuing today.

The submarine force has a formal process of inserting new technology into the fleet, while the surface force is still struggling to develop a formal transition process.

This paper will present here are a few examples of the US Navy's surface ship rapid prototyping initiatives that have been successfully integrated into fleet USW systems over the years.

Wednesday 12th November: 1100hrs

Session 2E: Technology
Underwater Technologies 1

Countering the Underwater Threat with Proven 4D Acoustic Technology

Mr Angus Lugsdin, ***Coda Octopus Group*****, United States**

It is widely recognised that the threat to our maritime domain is no longer limited to land based, above or on-water threats.
With well documented reports of terrorist organisations developing strategies to attack Western shipping targets and ports through underwater attacks there is an increased need to develop rapidly deployable and usable technologies that can significantly enhance a nation's capability to prevent and protect from such an attack.

CodaOctopus has developed a unique 4D or Real Time

3D sonar system as part of a US DoD development program that can be utilised by the typical port or law enforcement user.

This paper will deliver further details on the practical steps and some of the technologies used to develop a COTS product that can be used with limited training to significantly enhance underwater security. Particular focus will be paid to the utilization of technologies from the gaming industry and how these can be applied to practical uses in underwater security.

Combating the Modern Mine

Dr Andrew Bailey, ***Defence Science & Technology Organisation (DSTO)*****, Australia**
Mr David O'Connell, Thales Australia, Australia

Advanced sensors, integrated logic capabilities and stealth design characterise the modern mine.

Exponential developments in processing power and miniaturisation enable these weapons to run numerous algorithms and analyse multiple combined ship influences, including UEP and ELFE signatures. The packaging of logic and sensors into Target Detection Devices can make any mine 'modern'. Such systems are readily available off-the-shelf.

Low target strength mines, adverse environmental conditions, burial and high clutter density pose a serious challenge to mine-hunting.

The mine's ability to simultaneously analyse multiple influences, discriminate between targets and identify non-ship-like signatures has reduced the potency of traditional influence minesweeping systems.

A combination of MCM techniques is required to combat this growing threat: Mine-hunting systems capable of detecting and classifying stealth mines in challenging environmental conditions; Minesweeping systems producing authentic ship-like signatures; Mine jamming systems to increase the speed of MCM operations in time-constrained scenarios.

Single Crystal Projectors for Compact, Broadband Sonar

Dr Harold Robinson, ***Naval Undersea Warfare Center*****, United States**

The unique material properties of lead magnesium niobate (PMN)-lead titanate (PT) single crystals enable compact, broadband, high power sound projectors that cannot be realized using conventional ceramics.

This paper will highlight technology demonstrations at NUWC showing the significant advantage of single crystal in underwater acoustic applications. A sixteen-element array of single crystal tonpilz transducers provided three times the bandwidth of a comparable PZT ceramic array, producing as much as 15 dB of additional source level at the band edges with no change in amplifier.

A segmented cylinder projector, four times smaller than its ceramic counterpart, exhibited an unprecedented 2.5 octaves of bandwidth, with a flat frequency response over 1.5 octaves and no decrease in acoustic power output. It will also be shown that these technologies provide stable performance under high drive and duty cycle conditions.

Electromechanical and Mechanical Properties of Piezoelectric Single Crystals for Naval Sonar Transducers

Dr Lynn Ewart Paine, ***Naval Undersea Warfare Center*****, United States**

Compared to conventional electroactive ceramics, piezoelectric single crystals (piezocrystals) of the lead magnesium niobate-lead titanate (PMN-PT) system provide significant advantage for underwater sonar transducers.

The large electromechanical coupling factor of the piezocrystals provides a significant increase in transducer bandwidth. The superior strain energy density generates higher source level across the band, and the low Young's modulus allows considerably smaller transducers. This research on PMN-PT piezocrystals demonstrates that these payoffs occur even when the material is subject to navy relevant conditions such as electric fields of up to 2 MV/m, uniaxial mechanical compressive stresses up to 42 MPa, and a range of temperatures from 5 to 100 oC.

This paper will provide insight into the impact of these navy relevant electric fields and mechanical stress conditions on the electromechanical performance of piezocrystals with implications for sonar projector design. The mechanical strength of PMN-PT piezocrystals and the effect of electrical and mechanical fields on crack propagation will also be discussed with respect to mechanical stress conditions in a typical naval transducer.

Wednesday 12th November: 1100hrs

Session 2F: Technology
Advanced Processing 1

Improving Sensor Data Analysis Through Diverse Data Source Integration

Ms Jennifer Casper, ***The MITRE Corporation*****, United States**

Daily sensor data volumes are increasing from gigabytes to multiple terabytes.

The manpower and resources needed to analyse the increasing amounts of live and historical data are not growing at the same rate.

Improved data management techniques and analysis methods are needed to reduce an analyst's decision response time and enable more intelligent and immediate situation awareness.

This paper will describe the sensor data and analysis framework (SDAF) system built to provide analysts with the ability to pose integrated queries on diverse live and historical data sources, and plug in needed algorithms for upstream processing and filtering. The SDAF system was inspired by input and feedback from field analysts and experts. SDAF's core is comprised of an event driven service oriented architecture.

The paper will present SDAF's capabilities, implementation, and reasoning behind implementation decisions. Finally, lessons learned from preliminary tests and deployments are captured for future work.

Detection of Low Level Modulated Signals – Application to Vocalisation Detection

Mrs Marie Géhant, ***Thales Underwater Systems*****, France**
Gilles Gaonach, Thales Group, France

Passive sonar processing was developed to perform an optimal detection of stationary signals with standard Fourier methods.

Recent developments of fractional Fourier transform promise to give the same performances for frequency modulated signals. These filters are optimal for the detection of chirp signals, where the tone frequency varies linearly through the signal duration. Several methods actually permit the integration along frequency lines or curves in the time-frequency domain.
Different methods will be analysed by this paper (applied on marine mammals "whistles"): Fractional Fourier transform; Re-sampling; Dechirping.
Indeed, these narrow-band and frequency-modulated signals can be modeled as chirp signals. Results of vocalization detection with fractional methods will be presented in this paper.

Image Treatment in Electro-Optical Systems

Mr. Tomás Jimeno, ***Tecnobit SL*****, Spain**

Electro-optic surveillance systems have a predominant role in surveillance, in a wide sense, because they allow a remote and practically anonymous display of the spaces assigned to the surveillance mission.

Among the electro-optical sensors the most used are the ones based in CCV cameras (with reduced capability under night conditions because of its NIR sensitivity) and thermal or infrared cameras. In either of those fields there is a range of possibilities and each one of them can be used with advantages in a particular scenario.

Tecnobit is carrying out a wide and ambitious R&D&I internal program in order to develop our own image treatment algorythms technology to offer the most advanced electro-optical systems and sensors and also adapted to each case specific needs.

Under FLIR Algorithms we consider all those low level algorithms that can be achieved even at sensor level and

that aim to generate an IR origin image with features close to the black and white typical TV images, in other words with legibility and performance according to the ones produced with B/N TV cameras.

IRST Algorithms are a further step after FLIR algorithms. They belong to a family where Search and Track tasks over IR origin digital images basic algorithms are included.
Finally EO Algorithms are included among the high level tasks in an electro-optic system and they make possible more solid and exact solutions by means of the use of IRST combined algorithms.

Wednesday 12th November: 1245hrs

Session 3A: Maritime Security
Littoral Surveillance

Passive Radar Protection for Ship at Anchor

Mr Jean-Philippe Brunet, *Thales Group (Naval Division)*, France

When a ship is at anchor in a friendly harbour, the use of its main radar for auto protection creates problems.

Passive coherent location (PCL) sensors provide an significant complement to existing surveillance techniques. Integration in existing infrastructure is facilitated by the "no emission" nature of the sensor. The filtering technology used in PCL systems prevents integration problems in the ship environment as masts or walls. The environment identification algorithms allow a self calibration of the sensor, requiring no pre-existing knowledge of the electromagnetic environment. Commercial radio stations or TV stations are available in most countries making possible a precise localization and tracking of air or sea targets, even if they are considered as "difficult" for radar point of view (low RCS, low altitude…). When the number of broadcast sources is too low, the targets positions are not so accurate, but still useful in a situation awareness picture.

New Generation Radar Systems for New Threats in Coastal Surveillance

Mr Marquis Emmanuel, *Thales Surface radar*, France

In the past, a lot of classical marine radars usually designed for navigation purposes, were installed in coastal sites or harbor gateways with a primary mission to offer safety of Navigation and proper ship guidance.

Today, new concerns of very different nature are appearing. Consequently, more sophisticated equipment is needed to adapt to these changes and detect non cooperative objects such as small wooden boats, fast crafts (RHIB) or even light helicopters crossing blue borders at low altitude.
The new generation of coastal radars needs to provide today proper detection & tracking of very small non cooperative objects, a mission quite different to the one assigned to VTS sensors.

Thales is now introducing its new generation of Coast Watcher radars engineered for Coastal Surveillance. This family is composed of two main products: Coast Watcher 10, is a very cost effective radar solution for the detection of RHIB size boats in Coastal Waters. It can be deployed as a curtain of sensor along the shoreline on low elevation sites (< 50m); Coast Watcher 100, is a complete sensor solution for both air & surface object detection up to the radar horizon. This frequency agile & pulse modulated radar is based on solid state technology power and has the capability to process different kinds of objects, from small wooden boats in shallow waters up to high sea vessels at horizon limit or low altitude air objects. The Coastwatcher 100 can be installed on high elevation sites to benefit from long instrumented range and enhanced coverage.

This radar family is fully interoperable with AIS and Electro Optics Sensors, an essential element to recognize and classify detected objects, or even complement radar coverage with long range swimmer detection capability at night.

This family of sensors is a key advantage in the field of Coastal Surveillance, particularly when interfaced with adequate Maritime Surveillance Information Systems to provide mission tailored response for today's demanding requirements.

New Radar Concept for Ship Security at Anchor

Mr Marquis Emmanuel, *Thales Surface radar*, France

In the times of classical conflicts, the common military sea vessels were equipped with numerous radar sensors tailored for waging war at sea missions against similar threats.

The time of symmetrical fighting is over and recent events demonstrated the rising of asymmetrical threats on military vessels.

Despite having a real military effect assessed as small, the terrorist's attacks on military assets have a great psychological impact. The USS Cole attack is a good example of this trend. Moreover, vessels at anchor in friendly or neutral waters are usually having their active sensors and weapons offline, leaving the ships blinded, in a peace position. It is also understandable that large surface radar designed for long-range missile detection can't be activated in harbor to detect small sailing boats that could be a potential terrorist threat.

Thales is now introducing a new radar concept of short-range small target detection that can be used at anchor, inside harbor or at slow speed navigation and provides information of all very small ships surrounding the protected asset.

This concept is based on a specific signal/data-processing machine that is plugged onto the standard marine radar of the ships. This kind of marine radar is now mounted on all ships (IMO regulations) and can be kept running even at harbor position in neutral waters while not being considered as a hostile act by surroundings.

Thales implemented a specific small target security signal & data processing that provides sufficient early warning of incoming very small targets to the ships authorities while being a simple computer plugged onto the ships standard equipment. Neither nether new mast nor new antennas are needed to provide this security function onto a fleet of various vessels.

Wednesday 12th November: 1245hrs

Session 3B: Systems
Situational Awareness

Common Detection of Abnormal Behaviours & Analysis of Suspicious Events using I2C Interoperable Sensors & Information Sources

Mr Michel Morel, *DCNS*, France
Paul-Phillippe Gilles, DCNS, France

Maritime transport routes and thousands of commercial vessels are critical for the UE economy.

They are vulnerable to many types of threats, in particular to acts of terrorism aimed at causing human casualties, economic losses, or environmental damage.

In this context, current maritime infrastructure protection appeals three key observations: Ocean and short sea shipping transports are performed over wide maritime areas;
Global sea surveillance capabilities are far less developed than for land; Current overseas intelligence collection is dramatically poor.

Advanced security solution for maritime passenger, goods and energy transports must therefore be developed to improve EU critical maritime infrastructure protection.

The I2C project and demonstrator propose an innovative, user-oriented solution, able to handle a large quantity and heterogeneity of data, process them to detect and analyse abnormal behaviours and issue documented threat alerts coupled with action recommendations for an improved prevention and reaction.
To this end, four main research challenges will be met:

Interoperability of various sensors (conventional & long range radars, AIS, satellite imagery, cameras) and data fusion to generate a common operational traffic picture of the vessel tracks over wide maritime area; Interoperability of information & intelligence sources, and data fusion to generate a common operational enriched traffic picture of the vessel activities; Common definitions of abnormal behaviours and threats, and detection of abnormal behaviours in vessel tracks and activities through an innovative use of the AMAS (Adaptive Multi-Agent System) theory; Creation of an innovative Human Man Interface (HMI) dedicated to the end-users, to support suspect event analysis and information in a user-friendly, interactive multi-touch and multi-user surface, allowing more efficient responses and coordination processes.

Actionable Situational Awareness – The New C2

Mr Philip Bozzelli, ***Lockheed Martin MS2*****, United States**

The options for Command C2 are rapidly evolving. Operating personnel can now be fully engaged and have real time situational awareness and the ability to take action and interact instantly with their counterparts and leaders with a common updated situational awareness.

This paper will provide a look at fully interoperable C2 COMMs, finally here to provide interconnectivity between multiple communications media – cellular, wire line, VoIP (WiFi and WiMax), SATCOM and commercial and military radios. Local communications networks are not even required for this interoperable C2 COMMs which can go where no communications are available.

Local and remote data from sensors, cameras and field personnel can be connected into a single shared system with record and playback. Common Operating Pictures (COP) can now be real time distributed to hand held mobile devices including wireless PDAs for actionable situational awareness, protecting field personnel and critical infrastructure…the future of C2 today.

Next Generation MDA from Today's Technology

Mr Anthony Edmonds, ***QinetiQ*****, United Kingdom**

This paper will describe a concept for next generation Maritime Domain Awareness (MDA) capability which can be fielded from today's technology exploiting all available information to maximise awareness.

Level 2 data fusion from the military domain is being coupled to civilian port management applications to enhance understanding of maritime traffic. Testing self reported and sensed information for coherence is readily achievable. Exploiting patterns of behaviour to reduce operator workload, alerting commanders to emerging issues should be the norm.

Attention must be focussed on harnessing computers to complement, not replace, human strengths. This new concept integrates information from multiple sources into a single operational display, analysing this in real-time to identify risks, predict hostile behaviour, and flag where action is needed.

The system architecture enables new information streams to be incorporated as they become available. Additional operator tools can be linked as the operational need dictates.

Maritime Situation Awareness: ISDEFE's Support of the Spanish Navy

Mr Victor Rodriguez Herola, ***ISDEFE*****, Spain**

National security at sea is facing new threats, uncertainties, and challenges at every level.
There are several national organisations involved in maritime security and safety with different scopes and responsibilities but similar issues and similar information needs.

This cannot be seen as a national isolated challenge: NATO is supporting initiatives with respect to Maritime Situational Awareness (MSA) and, at European level, EDA is specifying a maritime information sharing framework under the Maritime Surveillance (MARSUR) initiative.

The Spanish Navy has started an initiative called "Conocimiento del Entorno Marítimo (CEM)", which aims to tackle missions related to surveillance and security in sovereign and national interest maritime areas.

This initiative relies on three pillars: The operational pillar – by setting up a maritime operations and surveillance centre (COVAM); The conceptual pillar – by identifying key national and international stakeholders, and information needs; The technical pillar, by identifying requirements for a situation awareness based system (SICEM) in support of COVAM activities and tasks.

This paper will describe the CEM concept, the work done by ISDEFE in support of the Spanish Navy on this respect, and its planned future activities.

Wednesday 12th November: 1245hrs

Session 3C: Platforms
New Ships

Advanced Tests and Optimisation Procedures for the LHD-type SNS "Juan Carlos I"

Vice- Admiral José-Manuel Sevilla, ***Canal de Experiencias Hidrodinámicas de El Pardo (CEHIPAR)*****, Spain**

This paper will describes all the tests and optimisation procedures completed by CEHIPAR on the new LHD type SNS "Juan Carlos I".

In the early design stages of the ship a hull forms optimization using CFD codes was performed, taking into account the specific conditions of the vessel. After the optimisation a complete set of hydrodynamic tests was done with this ship in order to know her performance.
The main tests to be described in this paper are: Resistance; Propulsion; POD´s analysis; Cavitation; Cavitation inception; Pressure pulses generated by the propulsion; Seakeeping analysis; Achievement of specifications for seakeeping conditions; Velocity lost due to the waves; Operative limits determination; Wave evolution in the dock; Landing crafts manoeuvring inside the dock; Manoeuvring; Crabbing; Crash stop; Study of the smoke and ventilation in the garage and the dock using CFD.

At the end of the paper there will be a description of the software for navigation and operation aid, developed by CEHIPAR specifically for this ship, based on the operational and dynamic model tests.

The A26 Submarine Programme – The New and Cost Efficient Submarine for the Swedish Navy

Lieutenant Commander Mats Abrahamsson, ***FMV (Swedish Defence Materiel Administration)*****, Sweden**

The A26 is the new and Cost Efficient Submarine Design for the New Security Environment.

The paper will present the ongoing A26 submarine programme: Its Scope, Time Schedule and Objectives.
The submarine main characteristics and some of the key technologies and systems that form the A26 concept will be briefly presented. The focus of the paper is the art of cost efficient submarine design and procurement.

F125 Frigate Programme – Current Status and Technical Solutions for the Intensive use Approach

Mr Lyn-Markus Giersch, ***Ministry of Defence/BWB*****, Germany**

This presentation will give an overview of the current status of Germany's F125 frigate program, focusing on the operational requirements and the technical solutions for the intensive use approach.

Stabilisation forces are designated for joint and combined operations of low or medium intensity and long endurance in the brought spectrum of peace keeping operations. The main task of the support forces is to support the reaction and stabilisation forces during mission preparation and conducting the mission.

It is expected that stabilisation operations will stay the primary missions of the German armed forces. So in consequence the F125 is the first weapon system which is strictly designed for this kind of operations.

The platform and weapon system shall be designed to realize intensive use and shall be operable with significantly less personal than the current frigates. To fulfil the technical requirements as well as the organisational aspects for later operation is a big challenge for the BWB and the German Navy.

The concept of intensive use and reduced manning aims on the increase of the availability of the ships and the reduction of life cycle costs.

German Frigate F125 programme – Platform System

Dr Tim Becker, ***Blohm & Voss Nordseewerke GmbH*****, Germany**

The new German frigate class F125 has a length of 143m and a weight of about 7000t. Its main tasks include participation in conflict prevention and crisis mitigation within international peace keeping missions.

Also required is the capability of participation in joint and

combined operations. The F125 can remain in an operational area for up to 24 months; about 3 to 4 times longer than other comparable frigates. At the same time the operational hours at sea with a specified 5000 hours per year are considerably higher than for other frigate classes.

The crew onboard an F125 (approximately 105)is very small for a frigate of that size. The F125 will be operated with a two-crew-concept: The entire crew will be swapped every 4 months. To meet these new requirements a considerable amount of new technical developments and concepts is required.

Wednesday 12th November: 1245hrs

Session 3D: Systems
Combat Systems Evolution

Multi Platform Tactical Picture (MPTP)

Mr Felix Alvarez, ***DCNS*****, France**

Multi platform tactical picture (MPTP) is designed to build a real time common tactical picture, from both fusion of raw detection delivered by force sensors and multi platform sensor management.

Thanks to sensors synergy and complementarity, the expected benefits from a MPTP capability will be significant, even in poor detection conditions areas regarding track consistency, continuity and accuracy. Adapted algorithms and particularly innovative pursuit filters make these improvements possible.

MPTP is designed as a core for a Cooperative Engagement Capability, and is intending to propose an alternative to the American CEC. It prefigures the next generation of CMS (Combat Management System), raising interoperability as a major function facilitating information exchanges within naval force and shore based centers as well. Interoperability and exchanges normalization between platforms is essential in the multi platform concept to deal with the multinational context interoperability.
First of all, The MPTP concept will be presented; Second, performances obtained on representative scenarios will be studied comparing MPTP and the legacy systems.

Enterprise Implications of a New Combat System Architecture for Major Royal Navy Surface Combatants

Mr John Spencer, ***Thales Group (Naval Division)*****, United Kingdom**
John Howarth, Lockheed Martin, United Kingdom; Jim Kongialis, Raytheon, United Kingdom; Tim Rabbets, QinetiQ, United Kingdom; Richard Smith, MBDA, United Kingdom.

The Modular Open Systems Architecture (MOSA) programme is a high profile programme, funded by the UK MoD, involving major organisations with combat systems expertise (BAE Systems, EDS, LM, MBDA, QinetiQ, Raytheon and Thales). The programme's main objective is to devise an architecture based on modularity and openness that will provide an affordable, flexible platform for future surface fleet combat systems.

It is also developing a migration strategy to define an evolution path from current systems and is contributing to the production of an enterprise model that will enable realisation of the benefits for MoD and Industry.

This paper will concentrates on the characteristics required of the enterprise, and their relationship with the technical architecture, and describe the architecture in terms of its composition and structure, showing how modularity and openness have been achieved. The implications of such drivers are assessed and the satisfaction of both MOD and Industry interests is addressed.

The User Meets the System – A True Open Architecture Approach

Mr Pär Rickard Hildingsson, ***Saab Systems*****, Sweden**

The backbone of true open architecture in a Combat Management System (CMS) is an open modular Human Machine Interface (HMI).

Decoupling the function modules from the HMI implementation and using publish subscribe mechanism over DDS will make bindings possible to every topic in runtime, and also changes of the actual HMI in runtime. The console software needs to be modularized in a way where the scripts defining the bindings are broken down into smaller pieces, as small pieces as single forms, or individual keys.

In the ongoing work with the 9LV Mk4 it will be possible to provide consoles including their HMI infrastructure as a Combat System level subsystem serving CMS and CCIS subsystems, from any supplier, on equal terms. This together with a new efficient development environment/method with Java, Eclipse and a Model driven development will really make the Mk4 HMI where the user meets the system.

Evolution of Complex Systems

Dr Paul Gosling, ***Thales Underwater Systems*****, United Kingdom**

Many Naval platforms already comprise extremely complex and sophisticated sensor and weapons systems. With current funding constraints governments already in possession of these systems are now finding it important to build upon the investment in these systems and to embark on an evolutionary strategy.

With modern architecture principles it is very clear that evolution of processing is well supported by open systems architectures and targeted enhancement of key functions. However evolutionary strategies can be constraining and it is important to evolve systems with a strong vision of the more distant future and in particular with a strategy for dealing with disruptive technologies.

This paper will consider the architectural principles and enterprise approaches necessary to successfully maintain capability in an incremental evolution strategy.

Wednesday 12th November: 1245hrs

Session 3E: Technology
Underwater Technologies 2

Automatic Detection and Tracking of Underwater Threats – Human Factors Technologies for Reduced Manning

Mr Matthias Conrad, ***L-3 Communications ELAC Nautik GmbH*****, Germany**
Markus Schäfer, L-3 Communications ELAC Nautik GmbH, Germany

On modern warships (like frigates or corvettes) it is increasingly common to reduce the number of crew members, meaning that one single operator has to monitor several sensors.

On the other hand peace making or peace keeping missions require operation in littoral areas with poor intelligence information. In these areas the platform has to be protected both against running on underwater obstacles like sandbanks or reefs and mine-like objects.

This complex operational issue requires high quality sensors which are able to detect these threats in time as well as intelligent and automatically working algorithms alerting the guard of a potential threat.

This paper will illustrate a new type of automatic detection and automatic alert algorithm for a mine and obstacle avoidance sonar for surface ships. The capabilities of this algorithm included in the navigation and detection sonar NDS 3070 VANGUARD as well as the test result from sea trials in the Kiel fjord will be presented.

Virtual Environments for Assessment and Trimming of Underwater Acoustic Communication Schemes and Algorithms

Mr Jean-Michel Passerieux, ***Thales Underwater Systems*****, France**

The availability of accurate and realistic simulation tools has a paramount importance in assessing underwater acoustic communications schemes and to trim algorithms before expensive in situ experiments.

This paper will address such a simulation tool based upon the Virtual ENvironment for Underwater Simulation (VENUS) [1]), initially developed by Thales Underwater Systems for the purpose of simulating Sonar Detection Performances and Time Series Simulation within complex environment.

In its current state this simulator takes as an input the signal transmitted by the emitter and computes the signals received on the hydrophones of the receiving array according to a given scenario (environmental conditions, emitter and receiver trajectories). It is therefore possible to simulate transmission of any acoustic modulation using the available communication algorithms.

The main capabilities of this tool are:
travelling emitter and receiver (including manoeuvres for

both); multi-paths (propagation delays and transmission losses being continuously updated according to actual locations of emitter and receiver); ambient noise (including ship noise, and possible jammer); range dependent bottom depth and nature retrieved from data base and location dependent sound velocity profile.

After a detailed description of the simulation tools, a few examples will be shown, up to assessed Bit Error Rate (BER) at the output of the reception chain. Focus will be laid upon transmission of low frequency PSK and DSSS communication signals [2] in environmental conditions corresponding to near Singapore coastal environment, reception on a large linear array, and fast moving emitter and receiver.

Enhancing Undersea Distributed Netted Systems (UDNS) Through Fiber Optic Sensing

Mr Joseph M. Monti, ***Naval Undersea Warfare Center*****, United States**
Dr. Vittorio Ricci/Dr. Phillip Ainsleigh, Naval Undersea Warfare Center, United States

In armed conflict, being able to communicate the right information in the right amount, to the right entity, at the right time, in the right form, and ultimately to place it to the right operational use, is the closest a nation can expect to having the ultimate military advantage over an adversary.

The military concept envisioned to achieve such an advantage in an undersea environment is called Undersea Distributed Networked Systems (UDNS). UDNS is the conduct of military operations using sensor, command and control, and influencer systems that are geographically dispersed and networked to generate an aware, flexible, and agile military system focused on the operational mission of a group or force of systems.Situational awareness is key to this concept, making sensing the foundation of UDNS.

In this paper, NUWC will present a vision for the future of anti-submarine warfare (ASW), whereby UDNS is enhanced through the use of fiber optic sensing technology. Conceptually, this type of system can also serve other non-military areas such as humanitarian response to natural disasters and scientific research.

The situational awareness from this type of system could be supplied with allies around the world to provide a rapid response capability for natural disasters.

Acoustic sensing has been the traditional sensing mechanism used in ASW; however, over-reliance on this method has allowed our adversaries to adapt over the years, and thus to mitigate the overwhelming advantage we once enjoyed.

The Navy has unique requirements that call for the use of non-traditional sensing techniques. The current maturity of fiber optic sensor technology demonstrates a strong potential to augment and enhance traditional undersea sensing techniques. Fiber optic sensing systems enjoy a number of attributes that are well-suited for the undersea environment, such as low weight, no moving parts, minimal circuitry, immunization from electromagnetic interference (EMI), reliability, no moving parts, and minimal space requirements. The inherent simplicity of fiber optic systems and their low weight to sensing ratio opens the door to the utilization of unmanned undersea vehicles (UUV) for both the towing and deployment of these systems.

Moreover, and particularly with respect to UDNS, these systems offer remote sensing capability and are low cost. Various scenarios will also be presented and discussed pointing to the potential benefits of fiber optic sensor systems within the UDNS construct. One scenario will be the development of a fiber optic sensor system with detection, classification, and localization capability to identify seismic disturbances to better respond to humanitarian events and provide an early warning system. The high strain sensitive nature of optical fibers provides for continuous sensing with high degree of spatial resolution, which leads to the low cost monitoring of very long distances…

Effector sonar for applications in shallow waters

Mr Peter Kuhn, ***ATLAS Elektronik GmbH*****, Germany**

The operation of sonar systems in shallow and/or confined waters requires special antenna designs and signal processing algorithms especially when used as sensors for underwater effectors like torpedoes or anti-torpedo torpedoes.

The parameters influencing the layout and design of the sensors are basically the physical dimensions of the effectors (size), their dynamical parameters (speed and turn rates), their energy capacity, but also the kind of dedicated targets and scenarios they are aimed for to be used with.

Therefore the requirements for the sensor incorporated in a anti-torpedo torpedo differs significantly from the requirements for a torpedo sonar, especially with respect to frequency range, signal processing capabilities and of course on manufacturing prices caused by the mechanical design of the antenna.

This paper will discuss and compare the operational advantages of a conformal array torpedo sonar with a wide horizontal panoramic view as used on the German heavy weight torpedo DM 2 A4 with the special advantages of the flat head sonar sensor installed on the anti-torpedo torpedo (ATT) SeaSpider of ATLAS Elektronik GmbH.

While the torpedo sonar is required to survey and track within a wide operational area with most likely more than one target, capable to counter counter-measures, the ATT is operated in just one sector against just one fast moving target.

Wednesday 12th November: 1245hrs

Session 3F: Technology *Advanced Processing 2*

Small Target Detection in Sea Clutter, Based on the Radon Transform

Mr. Javier Carretero, ***Universidad Politecnica de Madrid*****, Spain**

Small target detection in sea clutter is a challenging problem. This paper will present a novel and heuristic approach based on the application of the Radon Transform to a set of consecutive range profiles. The performance of the detection technique has been tested with real sea clutter data, acquired with a high resolution CWLFM (continuous wave linear frequency modulated) millimetre-wave radar demonstrator.

The results to be presented will show that performing the detection on the Radon domain makes the detection of very small targets possible while keeping the false alarm rate controlled.

Bistatic Low-Frequency Active Sonar System Developments

Dr Pascal A.M. de Theije, ***TNO*****, Netherlands**

The Royal Netherlands Navy (RNLN) is in the process of procuring a number of low-frequency active sonar (LFAS) systems for its frigates.

These systems will mainly be used for anti-submarine warfare and will have a monostatic as well as a bistatic capability i.e. one system that can make use of its own active transmission or of that from another system, miles away.

To allow this dual mode, TNO have developed an experimental LFAS system with very flexible communication and processing that allow the LFAS receiver to pick up any friendly source transmission and execute a proper bistatic processing, without the operator having to switch between the modes himself.

This concept has been demonstrated in a number of sea trials. If other friendly LFAS receivers are available, their information (at contact level) can also be merged by means of a multi-sensor tracking algorithm. In this paper TNO will present both theoretical and sea trial results.

Bistatic Operations with Low Frequency Active Variable Depth Sonar – Practical Implementation of the SLASM System

Mr Christian Giroussens, ***Thales Underwater Systems*****, France**
Ph. Boulet/V. Chevrier/S. Jespers, Thales Underwater System, France

Low frequency active variable depth sonar (LFA-VDS) on Surface Ship has proven to be a powerful mean to conduct ASW operations.

The operational use of SLASM system, developed in the beginning of the 90s for the French Navy, has proven its efficiency, especially in deep waters or in controlled shallow water areas.

Nowadays, for operations such as force projection, the submarine threat has also to be countered in hostile littoral areas, not necessarily well known, posing new challenges in terms of detection, classification and reaction time. In this context, tactical co-operation between various ASW assets

has become mandatory, and multi-static operations are a mean to multiply sensors efficiency. An operational demonstrator has been developed and installed on-board two SLASM-equipped frigates, in order to evaluate in real-time the effectiveness of bistatic arrangements, and draw key requirements for future systems.

Wednesday 12th November: 1600hrs

Session 4A: Maritime Security
AIS (Automatic Identification Systems)

Harbour-craft Identification and Monitoring System

Mr Edmund Ooi, ***ST Electronics (Info-Comm Systems)*****, Singapore**

The Harbour Craft Identification & Monitoring System (HMS) was developed to facilitate greater visibility of vessels to port authorities and security agencies. The system consists of a network of transponders with built-in GPS and GPRS antennas mounted on vessels and sending vessels' information via the local GSM/GPRS network to the monitoring centers.

HMS allows the centers and agencies to identify smaller vessels or craft heading towards them, in addition to their radar, infra red detectors and cameras. Early detection of unknown, non-HMS/AIS-equipped craft will provide more time for these ports and ships to mount preventive measures to evade terrorist attacks, sea-hijacks, piracy or any ill intent posed by these approaching craft.

The HMS system thus gives a better security operation by providing holistic maritime domain awareness in vessel visibility, better control & visual reporting, enhanced maritime safety & security and improved operation efficiency. The system also helps in data management by providing historical & statistical information readily available for auditing purposes, facilitating long-term strategic planning.

The Harbour Craft Identification & Monitoring System (HMS) has incorporated many innovative technologies including

- Electronic Navigation Chart (ENC) Display
- Centralized Information Database
- Surveillance Virtual Fence
- System Logging and Replay Function
- Mobile Monitoring Terminal
- Mobile Transponder
- Panic Button Security Alert
- Remote Over The Air (OTA) Configuration Update
- Protection Mechanism for Mobile Transponder

Modeling and Validation of Maritime Surveillance Performance

Dr Stefano Coraluppi, ***NATO Undersea Research Center*****, Italy**

NATO is pursuing research activities to exploit existing sensor systems in support of maritime surveillance efforts. In this domain, multi-sensor data may include automatic identification system (AIS) tracks, contacts from coastal radar, video, infrared imagery, and satellite-based sensors.

The NATO Undersea Research Centre (NURC) has significant experience in multi-sensor tracking and fusion technology for active sonar-based undersea surveillance. Recently, we have extended our distributed multi-hypothesis tracking (DMHT) technology so as to generate a real-time consolidated maritime (surface) surveillance picture, and we have applied these algorithms to sea trial data [1-2].

Future upgrades include the development of a fusion-on-demand capability to address the significant gaps and persistence in AIS track information [3]. As a parallel activity, we have initiated work in multi-sensor fusion modelling [4] to quantify surveillance performance and optimal sensor tasking as a function of available sensor assets.
This paper will introduce an enhanced model for multi-sensor surveillance performance, and provide validation based on simulated sensor data to which we apply automated tracking, data fusion, and anomaly-detection processing.
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[4] S. Coraluppi, M. Guerriero, C. Carthel, and P. Grignan, Fusion Performance Analysis for
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Conference (MAST 2007), Genoa, Italy, November 2007.

Implementation of the ISPS Code and European Regulations in Spain – Special Measures for Passenger Ships.

Mr. Francisco Javier Castillejo, ***Ministry of Development*****, Spain**

After the events of 11th of September 2001, there were adopted measures in all fields, with the aim of enhancing the security of personal and material property.

In maritime field, the International Maritime Organization (IMO) began the work required for the adoption of new standards for ships and ports.

Spain must also comply the requirements of the European Regulation No 725/2004, which increases the security measures for ships and port facilities. The purpose of this paper is to discuss how international requirements in security terms are implemented in Spain. In addition, because of Spain characteristics, the issue of ships security is particularly important in passenger ships, linking the mainland with the islands and the islands between them. As well as the specifics during "Operación Paso del Estrecho", security measures in this kind of ships, are a priority for the Spanish Administration.

Space-based Automatic Information System (AIS) Solutions to the Simultaneous Access Issue

Mr Thibaud Calmettes, ***Thales Alenia Space*****, France**
Hérvé Buret/Michel Monnerat/Laurent Diderot/Rémi Challamel, Thales Alenia Space, France

The direct reception by satellites of the VHF Automatic Information System (AIS) of commercial shipping has significant benefits in Open Seas compared to the more restrictive LRIT solution just entering into service.

A key issue of feasibility is the capability to manage all simultaneous emissions in busy ship lanes. In the current AIS system, the VHF messages collision avoidance mechanism is ensured by a time division technique so that each ship in a 20 Nm diameter circle uses different time slots. As this is about the range of AIS ship-to-ship transmission at sea, no messages overlapping can occur. But a space-based receiver has a much larger visibility circle, and then requires a method to discriminate two or more signals emitted in the same time slot as a necessary requirement before any demodulation or position evaluation – otherwise the AIS information would be lost.

A first solution is to distinguish the signals by spectral analysis, thanks to Doppler difference between two or more far sources. For closer sources, differences between the propagation delays may be used. An other innovative Thales Alenia Space proprietary technique allows to increase performance for even closer sources.

This paper will give technical details on these three separation techniques. It will also provides a performance evaluation, in terms of availability and positioning precision, in accordance with the space constellation and the ship density.

Wednesday 12th November: 1600hrs

Session 4B: Systems
Maritime Surveillance

Holistic Security Risk Management In Port Infrastructures

Mr Philippe Bouvier, ***Thales Security Systems*****, France**

With the emergence of new kind of conflicts, asymmetric threats using unconventional warfare tactics are the primary threats to the critical assets of the port infrastructure.

Determining the security risk is essential, since port authorities must understand the threats, what assets are most important to protect, and which of those important assets are most vulnerable to opponents.

For any vulnerability, the management shall manage risk by developing a strategy to deter incidents, employ countermeasures, mitigate the effects of an incident, and recover from an incident. Undertaking holistic security risk management ensures that minimum appropriate investments are directed into security solutions to reduce identified risks. In addition as there is integration between the security technology, organization and human factors, efficiencies can be gained whilst still remaining secure. As a result the level of security investment in the port infrastructure can be adjusted in accordance to the most efficient protection required.

Based on its experience in the military domain, Thales has adapted its methodologies and technologies to this specific civil environment, positioning Thales as a unique global security solution provider for port infrastructure.

Coastal Protection – Do Integrated Solutions Really Exist?

Mrs Anna Montuenga, ***General Dynamics Santa Bárbara Sistemas*****, Spain**

The main purposes of a coastal defence system is: to defend vital or strategic coastal assets (areas and points) from air and naval threats; to monitor maritime traffic to detect possible terrorist or illegal activities and co-ordinate the required response by Military Forces Commanders.

The challenge of achieving an effective coastal defence is how to cover both these symmetrical and asymmetrical scenarios, but…What are the feasible options today? This paper will discuss and debate the answer to this vital question.

Security of Critical Maritime Areas – A Report on SOBCAH and SECMAR Projects

Mr Daniel Taton, ***Thales Underwater Systems*****, France**

Thales Underwater System is participating in two major projects related to the Maritime Security & Safety domains: SOBCAH and SECMAR.

SOBCAH (Surveillance Of Borders, Coasts and Harbours) is an UE project (PASR 2005) project) with the objective to contribute to tangible and demonstrable improvements in surveillance systems.

Security needs taken into account include identification of existing and emerging threats, use of advanced concepts of Open Architecture and new technologies to enhance the global security capability. Using realistic scenarios a demonstration has been conducted in July 2007 – Port of Genoa (Italy) providing an operational environment for proving concepts developed within this programme.

Within the “Pôle Mer PACA” that is a French initiative of centre of excellence aiming at promoting innovative and world wide class projects, Thales Underwater System has been awarded as the leader of the SECMAR project (SECurity system to protect people, goods and facilities located in a critical MARitime area). SECMAR main objective is to provide security Command & Control staff with an integrated awareness picture for the “sea-side” area (above and under water). An experimentation period has been conducted in June 2007 – Port of Marseille (France) that demonstrate advantages of mixing SONAR, RADAR and ELECTRO- OPTIC sensors for detecting waterborne asymmetric threat approaching a critical area above or underwater asymmetric.

Both experiences place emphasis on the data fusion between above and below water surveillance sensors has a clear demand of a credible security solution of critical maritime areas, as well as an increased automation of the Command & Control layer to cope with day to day harbor activities.

Fusion of Naval Combat Systems and a Coast Bound Maritime Surveillance System to Achieve Total and Flexible Maritime Security

Mr Thomas Kunze, ***ATLAS Elektronik GmbH*****, Germany**

The main task of many national navies is the surveillance and control of the national waters from the territorial waters to the boundaries of the Exclusive Economic Zone (EEZ).

The number of naval units, the quality of the crews and especially the quality and capacities of the onboard sensors and effectors are, in many cases, the limiting factors to fulfil the above stated mission.

ATLAS Elektronik GmbH has developed and built over the last decades not only combat systems for surface ships and submarines, but is as well a supplier of coast bound maritime security systems. ATLAS is now able to provide a tailor made design, where the mobile combat systems of satellites, aircrafts and naval units – together with the content of data bases – are fusioned with a shore bound surveillance system with the goal to provide an efficient net-work of maritime security based on one common technology. The operations centre ashore uses – in real time -the sensor inputs from the relevant stationary and mobile units to continuously actualise a comprehensive situational picture. The respective partial situational picture is transferred to the mobile units to en-large their situational awareness.

The mobile units are controlled from the operations centre to provide sensor inputs from areas not “visible” from the shore sensors and to react to the orders of the centre. Such an integrated Maritime Security System can reduce the overall cost and efforts and is a future-oriented solution for the maritime security in the respective area.

Wednesday 12th November: 1600hrs

Session 4C: Platforms *Innovation*

Energy Harvesting for Shipboard Wireless Damage Control Sensors

Mr Albert Ortiz, ***US Navy (Naval Surface Warfare Center, Philadelphia)*****, United States**

A totally wireless shipboard Damage Control system requires that each sensor and communication node be supplied with sufficient power without connecting to the shipboard power system and without introducing excessive battery or other maintenance requirements.

An attractive alternative to this challenging problem is to supply the sensors and the sensor network with locally harvested power from ambient sources that would otherwise be wasted. One of the major limitations of currently available energy harvesting devices is their low power density, and uncertainties of availability, which requires that harvested energy be stored and managed judiciously. A possible solution is to store locally harvested energy in a capacitor or super-capacitor during the sleep mode of the sensor, and to use the energy during its active mode.

This paper will investigate energy management issues for energy harvesting devices, in particular, the relation between harvester power density, randomness of energy availability, sensor duty cycle, and energy storage capacity for efficient operation of sensor networks. The relation between the optimum capacitor size as it relates to source power randomness and sensor duty cycle will also be explored, and experimental and simulation results presented.

A Notional Global Fleet Station Ship Concept Design

Dr Christopher Dicks, ***Naval Surface Warfare Center (Carderock Division)*****, United States**
S.M. Howard, Ministry of Defence, United Kingdom; C. G. Kennell, Naval Surface Warfare Center (Carderock Division), United States

The Global Fleet Station (GFS) mission has emerging importance within United States Navy forward planning.

The mission fosters positive relationships with developing and allied nations by providing theater security cooperation, including operational training, support and humanitarian aid. Existing USN ships are currently deployed for these missions, but are often limited by inappropriate design features or high operating costs.

This paper will present a Center for Innovation in Ship Design concept for a notional GFS station ship. A notional, GFS specific, design study was required to allow operational requirements to be developed further and for comparison with current vessels. The design has a modular, re-configurable loading plan based around ISO TEUs (twenty-feet equivalent units), a well dock and a hanger. This flexible configuration provides one ship, capable of completing the variety of missions associated with GFS. The monohull design has used COTS equipment and merchant standards to reduce costs.

Synergistic Assessment of Innovative Technologies for Improved Expeditionary Combat Operations

Mr Daniel Dozier, ***Naval Surface Warfare Center (Carderock Division)*****, United States**

Processes for achieving synergistic technological improvements in future marine platform designs are challenging to conduct.

Traditional institutions concerned with finding and implementing new technologies are often organised vertically according to technology areas. New ideas, whose value can be assessed only when the ideas are considered from the viewpoint of several distinct technology areas, are often missed.

In this talk, a process for encouraging a more integrated approach to assessing new technologies on new marine platforms will be described. As a case study, a small selection of scientists and engineers with expertise in the disciplines of naval architecture and marine engineering were assembled into an Innovation Center team to identify innovative technologies for future expeditionary combatant craft. The talk will describe some of the resulting conceptual designs developed by this cross-disciplinary team effort.

Engine Diagnosis Centre for Spanish Navy

Mr Eduardo Ruiz, ***Navantia*****, Spain**

The Diagnosis Centre is part of the Engineering Department of Navantia's Engine Factory, and it is integrated in the Spanish Navy Engines Maintenance Program.

The aims of this Centre are: to increase equipment availability and reliability; to decrease equipment unavailability time; and to improve equipment performance and efficiency. Equipment behaviour studies can lead to modification of maintenance task procedures or periodicities looking for optimising aims listed before. Moreover a engine diagnosis can result in recommendations such as an earlier engine/auxiliary system inspection or an immediate engine stop.

To meet these objectives, specific software called "DINAMO" (Diagnosis de Navantia Motores) has been developed, which apart from containing a large engine parameters and fluids analysis database, is able to detect alarms, analyse parameters tendencies and study real engine brake power profiles.

The Spanish Navy uses access to DINAMO software through a server to get information such as reports, incident notifications, graphs of parameters or fluids analysis.

Wednesday 12th November: 1600hrs

Session 4D: Systems
Combat System Theory – Improvement

Assessing Combat System Effectiveness – Statistical Methods

Mr. Daniel Eling, ***Alion Science & Technology*****, United States**

Programs such as the Naval Simulation System, the Measure Of Total Integrated System Survivability, SURVIVE, ASAP, etc. produce a staggering amount of data regarding system combat performance.

Statistical methodology is essential for proper analysis. Many statistical methodologies gaining popularity in the evaluation of sports statistics can be adapted to analyze combat system effectiveness. This class of statistics attempts to adjust for environmental conditions and scenario context to find the true effectiveness of the system.
Regressions on combat systems characteristics can also be developed, determining their "value" in particular missions, both for independent units and through synergistic groupings with other platforms.

The "value" of various characteristics can be used to develop an Overall Measure of Combat System Effectiveness, for individual platforms or squadrons. Lastly, if Value Curves are developed for various performance parameters, they can be used to determine Performance Specifications for future combat systems.

Tracking Based on Theory Applied to Pair of Plots

Mr Frederic Livernet, ***Ministry of Defence (DGA/DET/CTS)*****, France**

Multi platform, multi radar, multi air target tracking close to the coast is becoming increasingly complex because of:
1. the large number of data (radar plot) due to the environment and the number of sensors generate a combinatorial explosion of possible associations of plots for each track; 2. the bias, errors positioning, sensors alignment, the data transmission delays between platforms, also strongly increase the possible number of false associations.

To manage the two constraints mentioned above, this paper will propose a new tracking based on graph theory applied to pair of plots. The results of this new tracking will be shown on a real multi targets and multi-platform (frigate and aircraft carrier) recorded scenarios in a difficult environment near the coast.

The performance of this tracking will be compared to the classical multi hypothesis tracking approach.

So Many Combat Systems, So Little Time (to Integrate)…

Mr Michael Wiseman, ***US Navy*****, United States**

As naval combat system technology evolves, the development spiral tightens, leaving less time to manage more change.

This becomes particularly apparent in the integration effort required to ensure safe and effective integration of the disparate systems that comprise the warfighter of the 21st century. In today's environment, this means that rapid development and deployment of combat systems mandates a similarly accelerated certification process.

Coupled with the increased complexity of the systems under test and reduced manpower / budget, it will simply not be enough to evolve our test methodology; rather, we must revolutionize it!

This paper will explore various test automation initiatives currently in development by the US Navy. Although special emphasis will be given to a pilot program called "Automatic Test-Retest" (ATRT), the common thread throughout the discussion of the topic will be this; that we must cause a fundamental change in the extent to which the "human in the loop" must collect and analyse data. In fact, we can't afford to stop there. We must also explore the possibility of automatically stimulating the combat system in order to use automation to conduct (and later analyse) selected test procedures.

Will humans be unnecessary to the assessment and certification of combat systems? I'm not worried about my job just yet. Even so, given the current environment, we have no choice but to let the computers do what they do best, and use the test engineers to do what only they can do. But be prepared to be surprised at where the line gets drawn!

A Pattern Language for Open Architecture Systems

Dr Peter Hammond, ***BAE Systems (Integrated Systems Technology)*****, United Kingdom**

Open Architecture is an area of considerable current interest in systems engineering, particularly in combat systems, as evidenced by major government/industry programmes such as MOSA and OACE.

Pattern languages are increasingly being used to capture recurring solutions to common problems. Patterns provide a vocabulary for engineers and other stakeholders to discuss candidate solutions, and thus form a guide to re-usable best practices.

This paper will look at patterns that emerge from, and contribute to, developing successful systems that demonstrate meaningfully open architecture. It will present a pattern language that has been developed as a result of recent work within BAE Systems, focusing principally on Systems Engineering aspects.

Wednesday 12th November: 1600hrs

Session 4E: Technology
Unmanned Vehicles

Autonomous Vehicle Data Recording and Access – Real-world Scenarios

Mr Colin Davies, ***GE Fanuc Intelligent Platforms*****, United Kingdom**

Unmanned vehicles now perform a range of strategic, operational, tactical and sub-tactical roles.

For each role a vehicle will typically carry two data recording subsystems, a Health and Usage Monitoring System (HUMS) and a mission data recorder. Naturally the functionality of each will vary across roles but the requirements for each are changing rapidly. In terms of HUMS then there is an increasing requirement to store application data snapshots. In the case of mission data recording then capacities are now commonly measured in Terabytes with multiple recording modes.

This paper will consider a number of real world mission scenarios in order to define the operational functionality required from a flexible data storage sub-system. The paper will then consider technological trends in the areas of data storage, compression and transmission before going on to consider a number of real world modular COTS solutions that put these technologies into use.

Mine Counter Measure SAS – A Perspective from the First Generation at Sea Today

Mr Pierre Guthmann, ***Thales Underwater Systems*****, France**
Didier Billon, Thales Underwater Systems, France

After summarizing the history of the synthetic aperture sonar technology development started in the 70s, this paper will present the main features and some images from the first sea trials of the tow SAS DUBM 44 that will enter in operation by the Marine nationale in France on 2008, and present its growth potential.

The paper will then look at the near future evolution of the SAS technology for implementation on-board AUVs, requiring highly integrated transducer, analog and digital electronic technologies, and additional processing for automatic target recognition and sonar registration for navigation.

Finally the limitation on the resolution vs. range performance will be explored.

Prototype Rechargeable Electric Propulsion System

Mr Stanley Polhemus, ***Naval Undersea Warfare Center*****, United States**

Costs associated with the exercise operation of thermal and conventional primary battery electric torpedo propulsion plants dictate a move to more affordable alternatives. Rechargeable electric propulsion offers a low cost option. Coupled with a no maintenance philosophy throughout the weapon, rechargeable electric propulsion can reduce exercise weapon turnaround costs dramatically.

Additionally, electric propulsion offers overall weapon effectiveness performance improvements.

The Naval Undersea Warfare Center in Newport, RI, USA, has been developing a prototype rechargeable electric propulsion system over the past seven years. Advances to the initial prototype system, which incorporates a high energy density Lithium Ion battery and a novel Integrated Motor Propulsor, are becoming operational. Results indicate an increase in performance relative to speed and endurance.

Autonomous Systems for Oceanography, Hydrography, Homeland Security & MW

Mr Jean-Jacques Periou, ***ECA Group*****, France**

ECA has developed a new generation of Unmanned Systems (Underwater and Surface) providing High definition mapping, Bathymetry, Sub bottom profiling, CTD probing for Civil and Defence applications.

This paper will describe the AUV ALISTER and the USV INSPECTOR which are two of the main tools developed by the company to provide complete solutions to the final User. The integration of these systems onboard a common platform will also be addressed.

Thursday 13th November: 0900hrs

Session 5A: Maritime Security
Reducing the Cost of Maritime Security and Platforms

The Cost of Maritime Security & Platforms: Requirement Drivers

Commodore Luke van Beek, ***Mott MacDonald*****, United Kingdom**

There is increasing concern amongst the Navies that their full aspirations for platforms and maritime security will not be realised.

In large part cost (rather than technology) is the limiting factor. Defence inflation is running well ahead of most country's norm and the time to procure new warships is increasing. In both of these parameters there are significant variations between countries.

This paper will examine the way requirements drive both the time and cost and by concentrating on those that are non-performance driving identifies considerations that have the most effect. By examining the cost of various maritime platforms and ships across the World it identifies lessons for all Navies and procurement agencies.

Life-Cycle Cost – How to Minimise it

Mr Pablo Segovia Escobar, ***Indra Sistemas SA*****, Spain**

Life Cycle Cost (LCC) is a function of many independent variables. From a mathematical point of view, obtaining the minimum of this function represents a very difficult challenge.

There are certain actions to be taken in to account to minimize the LCC, that is, to obtain a reasonably low and achievable LCC by the user.

To that end, it is necessary to know the cost generators. With this data, it will be possible to identify ways to reduce and to control the cost generators, depending on the life-cycle stage. Design options and/or configuration options can be chosen if the life cycle is in its early stage, and choosing the best technological methodologies during the service stage.

Indra's expertise in design, production and support of technological systems, helps it identify the associated costs of each life-cycle stage, and utilise new technologies and different scenarios of collaboration/association and developing "ad hoc" products and services which minimize LCC in every single stage.

Procurement and Contracting Approach

Mr Alex Pape, ***Jane's Information Group*****, United Kingdom**

Many models and examples exist of different approaches to the procurement of military capability.

Significant cost growth and time over runs in many countries have been well reported in the media. Many of these difficulties have been in the maritime arena allegedly driven by the nature of naval procurements (large, long, highly technical). Are these problems avoidable or do they merely reflect the nature of Defence procurement? A number of different contracting models have been employed and, as much of the work has been moved to Industry, the significance of different approaches is starting to be realised. Much of the debate has centred on risk transfer and incentivisation.

This paper will consider a number of contracting approaches, and give examples of where they have been used and explains the pros and cons of each.

How Can Through Life Capability Management Help?

Mr Michael Formosa, ***Jane's Information Group*****, United Kingdom**

For some while Navies have been struggling with the total cost of equipping and running their operations. Discussions about whole life costs and cost of ownership have led, in the UK, to the wider consideration of how much it costs to deliver capability over time.

Through Life Capability management (TLCM) seeks to address the perennial problem of balancing value for money, annual budgets and the most effective delivery of capability. Technology insertion, incremental acquisition and understanding support costs all form part of the debate. It is also essential to consider manpower, infrastructure and training costs in any such consideration. This paper will examine, from a UK perspective, how a number of these challenges can be addressed. It will examine the UK model and raises questions about its wider applicability.

Thursday 13th November: 0900hrs

Session 5B: Operations & Capabilities
Unmanned Operations

Collaborative Unmanned Operations for Maritime Security

Dr Peter Drewes, ***Lockheed Martin MS2*****, United States**

Lockheed Martin has been working on multi-domain unmanned systems autonomous solutions. The focus of the work has been to extend unmanned vehicles into useful partners in maritime security utilizing intelligent onboard

behaviours, collaborative control and efficient human-system interfacing in situations involving narrow and medium communications mediums.

This experimentation based research has provided the ability to command unmanned assets from various user locations and transition control between distant users. This has been combined with advanced onboard autonomy allowing high level complex missions to be executed without human intervention. The current experimentation schedule involves the use air/ground/sea based resources for intelligence and surveillance of riverine, port areas and potential additional interdiction areas.

This paper will present lessons learned in the various internal and external experiments and their applicability to the maritime security operations involving the efficient use of unmanned assets to increase the persistence and coverage of the modern war-fighter.

Modelling Operational Effectiveness of USV Sensors

Mr Peter Cosgrove, ***Thales Underwater Systems*****, United Kingdom**

The development of new technology sensors such as USV's and Remotely Deployed Systems (RDS) are potentially valuable assets for naval operations including ASW surveillance and force protection.

These unmanned sensors provide a low cost, highly capable system compared to traditional in-service equipment. Their use during conflicts could lead to a significant reduction in risk of human casualties by removing one or more ASW Frigates from the operational theatre.

Thales Underwater Systems has undertaken concept definition and evaluation (CD&E) studies to investigate their capability and military benefits. The main focus has been towards operations in the littoral environment and specifically ASW protection to an Amphibious Landing Task Group.

The paper will present studies that were undertaken using TUSL's UWB "battlelab", the Capability Assessment Platform, using generic assets operating in a generic representative location. The results demonstrate an effective surveillance screen can be maintained with a reduced number of ASW Frigates complemented by a small number of USV's.

Unmanned Systems Requirements – The Road Ahead

Dr Gregorio Ameyugo Pérez, ***Indra Sistemas SA*****, Spain**
Javier Barcala, Indra Sistemas AS, Spain

The need for unmanned systems in allied forces has risen markedly in the last few years, driven by the move towards frontiers and littoral operations and asymmetric warfare.
In these situations, unmanned systems can carry out missions as varied as ISR, anti-mine warfare, force and infrastructure protection without endangering personnel unnecessarily.

Highlighting Indra's efforts in the field of unmanned aerial, surface and underwater systems for military applications, our key stepping stones in the road towards more effective unmanned systems will include a better adaptation of sensors and platforms to the different harsh environments and improvements in data processing, robust, high-bandwidth communications to transmit ever-increasing amounts of data, and the integration of unmanned systems solutions into existing infrastructure and operating paradigms.

Working together with customers, universities and leading companies in the sector, Indra is leveraging its experience in key technological areas to develop unmanned system solutions that are more capable, interoperable and cost-effective.

Thursday 13th November: 0900hrs

Session 5C: Platforms
Design – New Solutions

New Fiber-Metal Hybrid Laminated Material (MaLECoN)

Professor Juan C. Suarez, ***Universidad Politecnica de Madrid*****, Spain**

New materials for shipbuilding, capable of satisfying the design and fabrication requirements for lighter structures that are in turn resistant, permit higher speeds of movement and lower energy consumption are needed.

Steel has a series of limitations that impede continued improvement in the line of constructing light, resistant and safe structures. Composite materials are light and resistant, but the manufacturing processes are more labour-intensive and costly; in addition they are very sensitive to damage from impact and can present problems of degradation of their mechanical properties through water absorption.

Fiber-metal hybrid materials combine the high resistance to impact and durability, and the versatile manufacturing of metals with a specific strength and stiffness in the direction of the fiber, as well as good resistance to fatigue, characteristics of the composites. This hybrid multilayered material is formed by layers of metal alternating with others of composite and structural adhesives, with improved in-service performance: The material is lighter, and the amount of weight reduction is based in the percentage of FRP used; The new material can designed to be isotropic or anisotropic; Fatigue behaviour can be improved due to the multilayer concept; Corrosion is kept confined in the outermost metal sheet, and is more efficiently controlled;
Impact strength is higher than in the case of composite materials, and it is also possible to use intermediate layers specifically suited to resist shock waves; Fire safety is improved because polymer is encapsulated between metal sheets; Noise damping is improved introducing some layers of sound adsorbing materials; Manufacturing is improved if compared with the composite materials, because metal sheets are used as tooling during the resin infusion and curing processes; Joining techniques are conveniently improved, combining adhesive joints for the inside layers with welds for the outer sheets.

We hold an Spanish patent on this material and its manufacturing system, with international extensions to more than thirty countries already underway.

Insulated Bus Pipe (IBP) for Shipboard High Power Distribution Applications

Mr Richard Worth, ***Naval Sea Systems Command*****, United States**
Dr Ruth H. Pater NASA, United States; Charles Smith, Northrop Grumman Shipbuilding, United States; Dr Sang-Hyon Chu, National Institute of Aerospace, United States

The commercial shipbuilding industry and the U.S. Navy have decreed that the aim of the "All Electric Ship" power system design will be for survivability and continuity of electrical power supply.

In general, ship service electric power and electric propulsion power requirements are approaching hundreds of megawatts. There are major challenges to the use of standard cable at medium voltage levels onboard due to cable stiffness, and cable bend radius requirements for distributing medium voltage power around the ship.

IBP is considered a more efficient medium & high voltage transmission line over cable for Integrated Power System (IPS) ships due to cable size, quantity, and installation time. There are technical issues that must be resolved before advocating the use of IBP onboard Navy ships.

This paper will present an overview of IBP technology, examine IBP technical issues and present probable solutions for Navy and commercial shipboard applications. One possible solution, that will be discussed in this paper, is a new extremely fire resistant RP 46/fiberglass composite insulated bus pipe (IBP) for shipboard applications. The new insulating material was selected in response to a need for an IBP that can withstand the Navy 3 hour gas flame circuit integrity test. The test is required as a part of the certification and qualification for use in U.S. Navy shipboard applications.

RP 46 was invented at NASA Langley for aerospace and space exploration applications. This matrix resin has the proven capability to withstand extremely high temperatures. Moreover, RP 46 has outstanding dielectric properties, outstanding mechanical properties, excellent moisture and chemical resistance and is significantly lightweight. Based on these features, RP-46 could prove to be an ideal high temperature resistant insulating material for high voltage, high power applications. The chemistry, processing, and insulation properties of RP 46/fiberglass composite insulated bus pipe will be presented.

Improving Anti-Corrosive Coatings Performance for Navy Vessels

Ms. Gabriele Ferrari, ***TNO*****, Netherlands**

For decades, protective coating formulations have been subject to various adaptations because of health and environmental matters.

The practical experience gained in the past cannot be directly used for new coating formulations. Modern coatings are uncertainly well performing, but in spite of extensive research, field testing and the availability of application knowledge and (testing) equipment during new building, often they do not meet the expectation.

In this presentation, examples of failures of modern coatings for the protection of different types of tanks in ships will be given.

Solutions are drafted for an optimal choice and maximal exploitation of properties. An overview of the appropriate maintenance strategies, as inspections, monitoring techniques and repair will also be presented.

Integrated Single Masts for Warships

Mr Denis Quiltu, ***DCNS*****, France**
Dr Patrick Parneix, DCNS, France

Treatment of asymmetric threats and maritime control become more and more important for ship operating in littoral environment. Integrated single mast procures a response offering 360° coverage for sensors and weapons.
DCNS has been working on a new concept of polyvalent integrated single mast for combatant ships for three years. Priority was given on low cost technologies and to the capability of the mast to host different possible sensors in relation with client's wishes. A full scale prototype is about to be tested with different real radar antennas (TRL 7).

After recalling the main interests of this concept, and the technical requirements and constraints it underlies, this paper will present the different options considered, numerical simulations, the validation process for composite materials and radome walls either for mechanical, environmental and radioelectrical point of view, fabrication of demonstrators and of a prototype radome.

Finally, an example of versatile integrated single mast for corvettes will be presented. Technical and economical performances will be discussed.

Thursday 13th November: 0900hrs

Session 5D: Systems
Open Systems Architecture

Evolution of OSA in Warships

Dr Nik Moss, ***Thales Group (Naval Division)*****, United Kingdom**

Open Systems Architectures (OSA) are the subject of much attention in Naval Systems, and naval customers are looking for reduced development and support costs, easier technology insertion, and more flexibility of use in the life cycle of the warship.
This paper will explore two aspects of this – the operational benefits which might be obtained in the modest sized fleets of all but the most affluent nations through increased use of modular combat systems to enhance and flex in short time scales warship core capabilities, and the way in which OSA might best facilitate these benefits of increased flexibility of warship roles and capabilities through the lifecycle of the platforms.

A fleet Operational Analysis model matches within geographical and time constraints globally deployed capabilities assessed against standing tasks and future, unpredictable emergent operational priorities.

The OA modelling is informed by current western navy tasking in the context of NATO and other operations, and an illustrative future frigate concept design using proven warship design metrics. Combat systems architectural implications and challenges to achieve these benefits using OSA methodologies (commercial and technical) will be discussed.

Enterprise Readiness Level Assessments

Mr William Ormsby, ***Naval Surface Warfare Center (Dahlgren Division)*****, United States**

An Enterprise Readiness Level (c) (ERL(c)) assessment methodology is promoted to establish the benefit and risk of inserting service oriented applications, technologies and knowledge sharing capabilities into particular operational environments.

The methodology results in a knowledge base of enterprise performance and suitability that can support infrastructure investment and deployment decisions. The knowledge base is a modification of the technology readiness level (TRL) measure to conform to the Network Centric Operations (NCO) paradigm. It provides an end-to-end performance measure of enterprise component interactions and behaviour including human-in-the-loop uncertainties that reflect realistic operations. Application of the ERL(c) assessment methodology to specific enterprise solutions has shown an expected increase in operational force agility, scalability and speed of decision-making that is needed to improve performance of stability operations.

Reuse of the methodology to a larger domain of operational missions, and the expected contribution to requirements validation; advanced capability discovery; and simultaneous development of tactics, techniques and procedures; "net-ready" and "community ready" service certification will be discussed.

Open Systems – How Closed is Open?

Mr Mark Thomas, ***Thales Underwater Systems*****, United Kingdom**
Lawrence Brown/Ian Walls, Thales Underwater Systems, United Kingdom

Military markets are making more use of Mainstream COTS and Standards within their products and in the development of those products.

One prime objective for customers is to enable third parties to contribute components, increasing innovation and competitiveness. To support this approach Middleware/Infrastructure must abstract domain applications from the rapidly changing technologies underneath, whilst permitting simple and efficient integration of third parties. Customers are looking for assurances that this Middleware/Infrastructure does not introduce "Lock-In" to a single middleware provider and expect such middleware to include as much COTS products as possible rather than bespoke developments.

This paper will examine various solutions to address the needs of a large real time system and discusses levels of independence (specification, api, library, model, etc) offered by the standards. The paper will also discuss the advantages and disadvantages, both to the users and providers of the middleware infrastructure dependent on the level of infrastructure content supplied.

Architecture Frameworks and Systems Engineering

Mr George Wallace, ***BMT Sigma*****, United Kingdom**

The UK Defence Industrial Strategy 2005 expresses MOD's determination to "work with Industry to provide battle winning capability to the front line and good value to the tax payer", and identifies three key themes necessary in achievement of this aim: Speed through decisiveness; Closer and more demanding industrial relationships; Breaking down barriers to innovation.
The Defence Acquisition Change Programme's shift of emphasis towards the procurement of stated capability rather than specific hardware has required that both the MOD and Industry enhance new methods of working.
The adoption of Enterprise Architecture frameworks as a means of identifying capability needs, specifying requirements and capturing candidate solution options is one such example.

This paper will highlight the links between the Enterprise Architecture Framework and the Systems Engineering Process; and the methods by which both may enhance the final product and identify benefits of the investment in MOD's R&D activities including the development of technology, systems, and architectures as well as design, test and evaluation by introducing structured methods of working.

Thursday 13th November: 0900hrs

Session 5E: Technology
Human Factors

Remote Monitoring and Remote Diagnostics for Shipboard Systems Maintenance

Mr Joel H. Timm, ***Naval Sea Systems Command*****, United States**

This paper will address Remote Monitoring and Remote Diagnostics for maintenance of Navy shipboard equipment.
Remote Monitoring and Remote Diagnostics are being used in a variety of systems within commercial industry from energy generation, banking, transportation and information technology. Remote Monitoring and Remote Diagnostics yields a new method for monitoring shipboard systems

health, remotely maintaining configuration management and remotely diagnosing system problems. Systems using these methods can effectively be used within the defense industry to reduce the number of man-hours spent on maintenance of shipboard equipment.

Methods and benefits of remotely monitoring equipment health, system configuration management and remote diagnostics will be presented. E-Prognostic testing results will also be presented.

Knowledge Management for the Spanish Navy – UVICOA

Mr Alvaro de Salas, ***Indra Sistemas SA*****, Spain**

The UVICOA programme, developed by Indra for the Spanish Navy, progresses the classic model of Naval Education & Training towards a model of Distributed Knowledge that incorporates important structural advances embedded in the concepts of Virtual University of the Navy (UVICOA) and Knowledge Management.

The activity of UVICOA is developed in three strongly interrelated fields: continuous learning anywhere anytime, structured access from a single point to all corporate knowledge sources, and advanced online collaboration.

The Knowledge Map is the key piece of UVICOA programme superseding what would simply be an e-learning system, or a documentary management system, or the definition of a relation of jobs vs. competences to crystallize in what we may describe as a Knowledge Management system that is able to respond to the following questions: What is there to be known?; Reason to know it?; Who must know it?; Who knows it?

Besides its corporate central deployment, the System is also replicated onboard the ships to allow the Units to benefit from it even when they are at sea. Along with local HW & SW replication onboard the ship, the advanced online collaboration tools provide remote support and data synchronization capabilities either on harbor or through the satellite link.

Architecture Frameworks for Sonar User Interfaces

Mr Mark Thomas, ***Thales Underwater Systems*****, United Kingdom**
Nick Davies/ Ian Walls, Thales Underwater Systems, United Kingdom

Modern Sonar systems generate increasing quantities and types of data. This needs to be presented to the various users of the system in an easy to use manner, through the use of a variety of User Interfaces.

This paper will explore the requirements for the development of the next generation of sonar User Interfaces (Flexible; rapid prototyping; multi-role; third party integration; re-use; modularisation etc) and how these requirements are met through the adoption of a component based Model View Controller (MVC) Architecture Framework and associated product policies.

The paper will present an Architectural Framework for Sonar User Interfaces consisting of a set of common services, standards, design concepts, components and configurations providing the means to integrate a set of software components together to create graphical applications, in an efficient and flexible manner.

Collaborative Work Desktop for MSS Operation Centers – nuVa

Mr Andy Vooght, ***Thales Research & Technology (UK) Ltd*****, United Kingdom**

In a Maritime Safety and Security system, the various Operation Centers share large amount of real time data of different types (text, pictures, voice, video, etc…).

Collaboration between the Operation Centers becomes rapidly tricky when data augment or when decisions must be rapidly taken. Crisis management is a typical situation where poor decisions can be taken by lack of mutual understanding between the centers.

In those difficult conditions regular workstations with their classical Man Machine Interface show obvious limitations. To provide a solution to this problem, Thales Research and Technology (UK) Ltd has developed nuVa – a hands-on, user-centric Collaborative Work Desktop nuVa allows the Operation Center crews to be immersed in a real-time, digital representation of a desktop working environment facilitating management of complex data and interactions with other centers.

nuVa combines high quality video and audio communications with an intuitive shared desk to allow the users to work together in real-time. Incorporating a familiar pen interface for writing/sketching and a standard keyboard for typing, Underpinning the concept of nuVa is the realization that any communications or data must be shared securely between all users, or subsets of users. nuVa incorporates a multi-layered security model that ensures participants can communicate in complete privacy. All flows of data between nuVa platforms are encrypted using the latest security technologies developed by Thales.

Additionally, nuVa allows different communication levels to be established, facilitating sub-groups of meeting participants to communicate and share data as an aside to the main session.

Thursday 13th November: 0900hrs

Session 5F: Maritime Security *Underwater Protection*

Military Support of Civil Authorities for Harbour Security – Concepts and Technology for Countering Underwater Threats

Dr Augustinus Beckers, ***TNO (Defence, Security and Safety)*****, Netherlands**

With an increasing amount of goods transported by water, maritime transport lanes and waterways are of great economic importance, and disruption leads to potential economic damage.

Inland underwater threats originate from explosives placed in harbours or from intruders with hostile intents. The Netherlands Maritime Forces are establishing mobile units for harbour protection.The tasks of these units will be described. To improve the current detection and intervention capabilities the introduction of new technologies is being investigated in national programmes, such as: Low frequency acoustic and non-acoustic detection of buried bottom objects; Computational assessment of underwater explosions effects on harbour infrastructure; Underwater vision enhancement; Non-lethal countermeasures against underwater intruders. This paper will discuss progress to date.

A New Approach to Underwater Critical Infrastructures

Mr Antonio Sanchez Garcia, ***SAES*****, Spain**

Since 9/11, we have faced a more complex environment and unsafe world. All nations and communities are united to reinforce their research and development resources, on the protection and security fields, to provide their citizens and critical infrastructures with a suitable degree of safety against potential terrorist actions.

Maritime transport represents a high percentage of global transport, therefore protection of approaches to harbours and internal harbour waters require of a special interest, even when these hostile actions are initiated and carried out from the sea.

In addition to established technologies, others are emerging to support the growth of necessities and capabilities required to allow more safety.

This paper will discuss different underwater threats and the platforms (e.g. unmanned vehicles), sensors and other means to be used, to detect, locate and counteract underwater threats as divers or small underwater vehicles.

Harbour Shield- : A New Technique for Inspection of Vessels below the Waterline

Mr Frank Murphy, ***Battelle*****, United States**
Dr. Donald Steinbrecher/Dr. Frank Chan/Mr. Bill Jankowski/Mr. Matt Tattersall/Mr. Joe Lanza, Navala Undersea Warfare Center, NAVSEA, United States; Dr. Lynn Faulkner/Mr. Brian Sikorsk, Battelle, United States

In 2007, the United States Naval Undersea Warfare Center, Newport (NUWCNPT) demonstrated the ability to acoustically image the underhull of a ship from a

fixed location while the ship was underway. This demonstration, performed in partnership with Battelle and EdgeTech, was a proof of concept for a larger maritime security development referred to as "Harbor Shield".

From the data collected during the demonstration, NUWCNPT has developed techniques to optimize image extraction from the single side-scan sensor deployed, and is beginning to explore designs for a single transmitter/multiple-receiver sonar system which has the potential to allow for the development of three-dimensional images of the underside of ships while underway. The Harbor Shield imaging concept, focusing on the inspection of moving ships from a stationary portal instead of using ROVs or other platforms to perform a mobile inspection of a stationary target has the potential to dramatically increase the inspection rates of shipping while reducing the impact of inspections on commerce.

High Performance Underwater Surveillance System for Coastal and Offshore Sites (AquaShield DDS)

Mr Dan Ben-Dov, *DSIT Technologies*, Israel

This paper will presents the AquaShield Diver Detection Sonar (DDS) System for complete underwater site security. The system is the first of its kind to be purchased and installed at a large energy terminal to achieve the essential perimeter surveillance required by critical coastal energy infrastructure.

A good deal of attention is currently being devoted to researching the best means for dealing with threats to coastal and offshore sites that are initiated from under the cover of bodies of water. The unique characteristics of underwater terrain and the wide variety of noise, activity and weather conditions make underwater surveillance a challenging task.

Systems designed to provide solutions to underwater threats, be they terrorism, theft or espionage, must provide minimal levels of performance that include a very strong ability to intercept and classify potential targets and respond effectively to all threats with a very low false alarm rate.

With its automatic detection, tracking and classification capabilities, the AquaShield DDS has been tested and proven itself to be an effective system for undersea site surveillance.

Thursday 13th November: 0900hrs

Session 5G: Technology
Surface Sensors 1

Threat Evaluation and Technical Responses using EW Digital Receiver-Based Sensors

Mr Carmela Barbero, *Indra Sistemas SA*, Spain

Threat evolution through Radar development (extension of modern waveforms, LPI/LPE radars, intrapulse modulation, ultra wideband radars, …etc) and the increasing warfare scenario complexity (high density scenarios, littoral warfare, coastal operation,…etc) result in a number of constraints that degrade current analog EW sensor performance.

In addition, new mission requirements (full operation on littoral areas, dense environments, special emitter identification capabilities,…etc) need improved technical characteristics able to perform the new needed functionalities.

As a response to these new necessities, the development of wideband Digital Sensors for Electronic Warfare arises.
It is therefore necessary to review future capabilities and new functionalities obtained through wideband digital-reception.

Passive Radar for Maritime Surveillance

Mr Daniel Tiberghien, *Thales Communications*, France

Thales Communications is currently designing a dedicated sensor for littoral and maritime surveillance which includes a decoder/direction finder of AIS transmission and a passive radar detector of ships and low altitude aircraft.

This will paper show how this offers further Intelligence at greater ranges against a large scope of targets.

Visual and IR Obscurants on Small Craft for Littoral Operations – A Craft Survivability Enhancement Program

Mr Richard G. Wilkie Jr, *Naval Surface Warfare Center (Carderock Division)*, United States
Richard G. Wilkie Jr, Naval Sea Systems Command, Naval Surface Warfare Center, Carderock Division, United States

The use of obscurants to improve craft/ crew survivability for US riverine craft has been well documented in recent years while fighting the global war on terrorism and anti-drug operations.

River bank ambushes occur frequently during riverine operations. The use of obscurants both defensively and offensively has proven to be invaluable in the support of riverine warfare. Small craft operating in littoral waters are also highly vulnerable to attack while operating close to shore lines (100 – 4000 meters) or from fast attack small craft. The weapons vary from direct fire weapons, such as 50 caliber machine guns and Rocket Propelled Grenades (RPG's) to longer range antitank missile systems.

Some of the anti-tank missiles utilize Infrared (IR) guidance seekers or are controlled via IR sights thus the need for IR and visual screening capabilities. Recent incidents between Iran and US and other countries, such as the UK, that are tasked with the protection of shipping lanes and oil platforms in the mid-east underscore the need for obscurants on small craft in littoral waters.

This paper will present an overview of one of the systems designed by NSWC CD for use on US riverine craft operating worldwide. The system utilizes non-developmental grenades and launchers developed for US Army armor vehicles which are controlled via a custom designed control panel. The obscurant system must be capable of providing a obscurant sheath sufficient in size and duration to allow manoeuvring of the craft to accomplish breaking lock with the combatants or accomplishing a mission task such as recovery of personnel from the shoreline. The system design must be simple to operate, yet flexible enough to accommodate rapid and dynamic changes in the conditions, such as positions of friendly craft, wind speed and direction while under fire.

New Naval Off Axis Laser Warning Technology

Mr Vincent Mégaides, *Thales Optronique*, France

Dealing with military and asymmetric threats represents a key issue for any military vessel. In order to support ship's self protection, the capability to detect laser guided weapons and fire control laser range finders could provide a decisive tactical advantage.

Classical in service laser warning system are efficient to protect airborne and land platform, but such equipments are not suitable to protect large military vessels unless to equip them with a large number of sensors.

In cooperation with ONERA, Thales has developed a new technology able to detect laser on the naval battlefield and able to protect large vessels with a reduced number of sensors. This technology is based on detection of the laser atmospheric diffusion, allowing capabilities to detect off axis the laser beam, to identify and to localise the point source.

This paper will describe this concept and the experimentation that has been realised through operational trials.

Thursday 13th November: 1100hrs

Session 6A: Maritime Security
Asymmetric Threat

Combating Maritime Asymmetric Threats

Mr kevin Cresswell, *Control Risks*, United States

"What's worse for America is the fact that most of the important straits and trade routes are controlled by Muslim Countries (Bosporus, Gibraltar, Suez, Malacca, Hormuz, Bab al-Mandab).

Likewise, the long history that Muslims have in maritime warfare and stressing Crusader commerce increases the possibility of returning to that form of jihad…" Abu Ubeid al-Qurashi Al Qa'ida- 13 February 2002.

Maritime infrastructure and commerce is the soft underbelly of all states. It can be attacked with little expense or endeavour. Generally, the maritime geographical environment selected for the adoption of such tactics will provide the attacker with a distinct advantage as sea control is synonymous with dominance of the maritime battle space.

This 'three dimensional' domain presents not only a medium by which these threats can move and hide weapons and operators, but also offers an array of

exciting potential targets that fit the terrorists operational objectives of achieving mass casualties and gaining maximum media impact whilst inflicting catastrophic economic harm. The trans-national, highly diverse, and largely unregulated shipping and cruise industries present large, attractive targets.

This paper – authored by former UK Defense Maritime Asymmetric Expert – will identify, and suggest mitigation for current threats from state and non-state actors…

Maritime Situational Awareness in Homeland Security and Emergency Management – What Do We Really Know?

Dr. Juan José Martínez, *Indra Sistemas SA*, Spain

The changing world order has created the necessity to spot maritime activities that may have an impact on security or emergency management and discriminate them from merchant shipping activities.

The maritime environment has traditionally been characterised by a limited coverage of traditional sensors (ie radars) and a looser and more decentralised control of maritime traffic plans, as opposed, for example, to air traffic management.

New solutions must include a combination of new sensors (satellite, or UAV imaging radars), collaboration and self-synchronisation of a network of assets and related C2 networks (Navy, Civil Guard, Air force), and the integration of a number of civil organisations and alert and environmental networks.

This will build the required Maritime Situational Awareness and intelligence on maritime traffic and activities in an operations centre that will become the base for co-ordination, command and control of the response to identified security or safety situations.

Maritime Security of Offshore, Coastal and Harbour Assets – The Australia Situation

Mr Michael Lonsdale, *Thales Australia*, Australia

This paper will describes the technical challenges facing providers of maritime security for the Australian region given its size, remoteness and increased security events in neighbouring regions.

Maritime security includes requirements driven by, insurance, laws/treaties (which define the legal framework for protection) and stakeholder needs (government authorities and private companies).

An Integrated Maritime Solution Model for the protection of maritime assets will be outlined including: System Architectures; Existing and Emerging Technologies used to build an actionable picture including Accurate Object Classification, Threat Identification, 3D track presentation using passive sensors only; Data Fusion and correlation central to development of a recognized maritime picture; Rapid response to threats.

The paper will contrast the experiences of other parts of the world, and provide recommendations to address these challenges and business constraints.

Global Border Management

Mr Juan González-Aller Rodríguez, *Accenture,* Spain

Globalisation and the threat of terrorism have ushered in a climate that demands high performance every time.

The need for more efficient, rapid, and open movement of travelers and goods coincides with heightened demands for more secure traveler and cargo identification prior to reaching and arriving at a country's borders.

The Accenture-led Smart Border Alliance is working with the US Department of Homeland Security (DHS) to design and implement the United States Visitor and Immigrant Status Indicator Technology (US-VISIT) program at more than 300 air, land and sea ports of entry.

Accenture is supporting the DHS US-VISIT program in implementing a layered border security solution that accurately and consistently identifies potential threats while facilitating the travel of legitimate individuals. Establishing a virtual border is a core component of this program, which aims to extend immigration and border management to points beyond and within the physical borders of the United States. Decision makers are then better able to distinguish security risks from legitimate individuals, stop them before they reach the United States and identify them while they are inside the United States.

Thursday 13th November: 1100hrs

Session 6B: Operations & Capabilities
Ballistic Missile Defence (BMD)

Increasing Onboard Firepower using Standard Warship Architectures

Mr Guy-François Mesnil, *Thales Air Systems*, France

Modern warships are increasingly based on Open Architectures, using Standard Building Blocks customised by software.

Some weapon system building blocks are include: Standard vertical missile launcher based on 22" firing compartments implementing the "Ready to fire" rounds concept; Multi-operation console; Multipurpose tracking radar.

In a world where navy budgets are decreasing, Open Architecture creates the opportunity to increase onboard firepower. From this observation, Thales Air Systems proposes the Naval Crotale featuring the mach 3+, small diameter VT1 (165mm) vertical launch missile to enhance current Surface Anti-Air Missile solutions.

Four VT1 missiles can be fitted in a 22" firing compartment instead of one Surface Air Missile, thus quadrupling the firepower. Firepower is multiplied by four, however the price is lower: the VT1 is a low cost, no maintenance missile, guided from the warship and using inexpensive electronics. The VT1 solution takes full advantage of reusing the existing Gun Tracker for target interception; no additional tracker is required, keeping the VT1 insertion cost even lower.

The current warship open architecture facilitates Crotale/VT1 installation onboard and its integration in the CMS, resulting in an optimised multi-layer defence solution.

Potential Sea-Based Platforms for Europe/NATO

Mr HB Stevens, *Lockheed Martin MS2*, United States

This paper is intended to highlight the potential for various sea-based assets in Europe/NATO countries to conduct either surveillance or engagement missions for BMD. It does not address whether the countries owing these assets have a BMD policy.

Currently, the US is the NATO member with sea-based missile defence capability, with the US Navy's Aegis destroyers and cruisers equipped with SPY-1 radars.

However two other countries in NATO, Spain and Norway, have ships equipped with the Aegis Combat System although they are not configured for BMD Both of these countries' ships could be modified for either surveillance or engagement.

Another potential sea-based platform for either surveillance or engagement is the United Kingdoms Type-45 destroyer with the SAMPSON solid state S-Band radar.

Other non-Aegis platforms in Europe also have potential for BMD. The Netherlands, Germany and Denmark are all procuring the Tri-lateral frigate with the SMART-L and APAR sensors.

Sea-Based Missile Defense Analysis for Future UK Surface Combatants

Mr HB Stevens, *Lockheed Martin MS2*, United States

The UK Missile Defence Centre (MDC) and US Missile Defense Agency (MDA) sponsored a study to determine the mutual benefits of integrating the UK Type 45 destroyer into the US Ballistic Missile Defense System (BMDS).

Lockheed Martin Maritime Systems and Sensors and BAE Systems INSYTE, collaborating on this analysis, will present initial findings in this paper. The study examined the Type 45 destroyer's ascent phase IRBMs and ICBMs detection and tracking capabilities, analyzing SAMPSON and advanced radar configurations. The ship would provide track data via Link 16 to the Aegis ship, to be passed to the BMDS.

Analysis determined the Type 45's ability to achieve required track accuracy in support of BMDS engagements with an Aegis Standard Missile 3 (SM-3) Block IA / Block IIA or a Ground-Based Interceptor (GBI). Two scenarios were examined: cuing BMDS organic radars, and executing engagement with only Type 45 data.

Thursday 13th November: 1100hrs

Session 6C: Platforms
Design – Special Tasks

Output Feedback and Trajectory Tracking Control of a Gantry Crane

Mr Albert Ortiz, ***US Navy (Naval Surface Warfare Center, Philadelphia)*****, United States**

Overhead cranes are commonly used to transport heavy loads in industries and offshore shipyards. Due to the nature of a crane's structure, there is no direct control over the position of the payload, which makes it difficult to control, and especially difficult to reduce the swing of the payload.

The objective of this paper is to design robust, fast, and practical controllers for gantry cranes. The controllers are designed to transfer the load from point to point using the shortest time. Concurrently, the payload swing is suppressed during the transfer process and completely vanishes at the load destination.

An output feedback control design and a dynamic trajectory control design are presented independently. The output feedback control is designed to move the load from point to point within one oscillation cycle without inducing large swings. The dynamic trajectory controller is responsible for making the trolley follow a reference position trajectory with minimum payload swing. Experiments were conducted to validate the controller performance. The implemented experimental results show excellent performance of an anti-swing control mechanism.

Fully Integrated, Automated Shipboard Oil Pollution Abatement Systems

Mr. Stephen Hopko, ***US Navy (Naval Surface Warfare Center, Philadelphia)*****, United States**

Oil pollution abatement (OPA) systems onboard U.S. Navy vessels have traditionally consisted of loosely integrated sub-systems that require a significant degree of training and manning to operate and maintain.

In an effort to improve reliability, maintainability, operability, and performance of shipboard OPA systems, and to ultimately reduce manning requirements, the U.S. Navy has successfully completed the design, development, and testing of a fully integrated prototype automated oil pollution abatement (AOPA) system that has been partially deployed. The AOPA system is a "smart" system that for the first time, utilizes modern control system technology, innovative programmable logic controller (PLC) programming, and complete system integration to provide effective and efficient means to automatically monitor, manage, prioritize, execute, and coordinate simultaneous shipboard oily waste transfer and processing operations.

The AOPA system consolidates sub-system control, standardizes oily waste management in a predictable manner, and eliminates subjective decision-making made by operators, while freeing up personnel for other tasks.

Global Optimisation of Real-time Multi Platform Situational Awareness

Dr Hervé Fargetton, ***Ministry of Defence (DGA/CTSN)*****, France**
Alain Bambouvert, Ministry of Defence/DGA/DET/CEP, France; Félix Alvarez, DCNS, France

The French Ministry of Defence/DGA has initialised "Multi Platform Tactical Picture" research plan to evaluate, with DCNS, different architectures of communication and fusion and to define a multi platform situational awareness capability.

The communication links between platforms are supposed to be High Data Rate network and conventional Tactical Data Link. The goal is to obtain coherent and precise situational awareness on the different naval platforms so that they could conduct multi platform engagements.

A key function is global optimisation, to determine sensors tunings, data to be exchanged through the different networks and fusion algorithm adaptation so that the multi platform situational awareness responds to the operational need whatever the composition of the force and the environmental conditions (coastal areas, meteorological conditions, clutters, jamming, …).

The solutions proposed by DGA and DCNS solve the problem of global optimisation in two phases, initial conditioning and dynamic real time adaptation.

Complex of Model Experiments and Calculations as Actual Procedure for Investigation of Dynamic Towing Systems

Professor Alexander Pustoshny, ***Krylov SRI*****, Russia**

Investigation of dynamic and hydrodynamic of towing systems by straight physic modeling is extremely complicated and almost impossible due to such factors as great length of system, relatively small diameter, the needs to take into consideration rigidity and unstable behaviour of the rope, complicated interaction with tug ship and its wake. That's why combination of calculations and full scale tests becomes the conventional steps in designing of such system.

This paper will demonstrate that model experiments on proper facilities keep their position as important part of general design procedure which helps to predict and to avoid various unfavourable situations before expensive real system is manufactured.

The paper will consider the problems and tasks which should be solved for effective and safe application of systems at various operational modes, including interaction with a tug ship in rough seas. Approaches and ways to solve these problems with help of combined model experiments and computational method will be discussed. It was shown that rational combination of experimental and computation methods open the door for effective designing.

Thursday 13th November: 1100hrs

Session 6D: Systems
Communications Systems

Flexible Sharing of Visual Information amongst Geographically Distributed Stake-holders to Maximise Situational Awareness

Mr Jan De Maeyer, ***Barco NV*****, Belgium**

In recent history the main problem that maritime security and defense decision makers faced was how to get as much information as possible into the control room.

Today however, the multitude of information entering the control rooms creates new difficulties: How to manage those dense visual information streams; how to share them with and distribute them to other stakeholders in an intelligent and flexible way; and how to create and share a common operational picture.

This paper will present an in depth analysis of the problem and describe our appropriate and unique solution to re-distribute all available information by all stake-holders, to all visualization surfaces in all networked locations with a few mouse clicks.

Naval Force Intranet – Stand Alone System

Mr Jean-Luc Sandral-Lasbordes, ***Thales Land & Joint Systems*****, France**

NFI-SAS is a stand alone system developed by Thales for seamless multi-platform communications over IP.

This stand alone system offers a wide range of applications, including cooperative work, voice over IP, database sharing, HF e-mail, visio conference, internet access, website ,any network facilities and can also be associated with an existing C2I.

For each platform, this system takes the form of a stand alone cabinet, offering represents an economical and intermediary step towards a full network centric warfare and benefits from the know-how and experience gained in the successful implementation of the RIFAN system for the French Navy and Sea 1442 for the Australian Navy.
NFI-SaS' main features are:

A very effective, standalone, accessible and dedicated system for all Navies and suitable for all types and sizes of ships combining Ease of integration, Scalability, Open Architecture, Connectivity, and Security. This set of features maximizes the availability of communications at sea, reducing operator workload and greatly improving the effectiveness of naval operations.

Advantages of DVB-RCS Access for Maritime Communications

Mr Nicolas Dubyk, ***Thales Alenia Space*****, France**
Christian Rigal/Olivier Autran, Thales Alenia Space, France

Until recently, VHF voice link was the only interoperable communication solution for enrolling aerial and surface units out of the military world in coordinated response to the various missions of maritime safety and security.

Today's wide availability of broadband communications is a breakthrough that allows the exchange of all necessary context information, sharing of the local operational picture, and supporting vital applications such as tele-medicine etc. This enables a step change in efficiency of at sea operation even from small units (Maritime Police, Search and Rescue boats, multi-purpose helos etc).

With a new version of the DVB-RCS standard dedicated to Satellite based Mobile applications has been released, this technical paper will present the advantages of using DVB-RCS+M standard in mobile domains, and more precisely in Maritime applications.

The performance of DVB-S2 waveform, the adaptation to many configurations (data gathering, shadowing, worldwide coverage in Ku-band and associated beam switchover) will be introduced together with a presentation of the Thales SatCom Maritime Terminal and its associated roadmap.

Thursday 13th November: 1100hrs

Session 6E: Platforms
AUV 1

Future French Navy Mine Warfare Capability

Rear-Admiral Stephane Verwaerde, ***French Navy*****, France**

The MW threat is becoming progressively more difficult to deal with as it evolves both towards more sophisticated threats (such as buried mines, stealthy mines and intelligent mines) but also towards "terrorist mines" or IEDs, which are simple to build and are widespread in use. The French navy's MW mission includes both French territorial water protection (civilian and military harbour approaches) and overseas operations (shallow waters for amphibious ops, choke points).

All present French MW assets will be decommissioned between 2015 and 2025, therefore new and integrated solutions will be required to address the threat post 2025.

Due to the improved reliability and capability of automated devices, it is likely that UAVs and USVs would have an important role to play in any future French MW system. This system will be modular and therefore able to be employed, to a certain extent, from both dedicated and non dedicated platforms.

Following the work done by FR, GE, IT and SW in 2005, which concluded in a common staff target (CST VII), these four nations have decided to launch in 2008 an EDA project type B in order to promote European cooperation in MW both at the government level but also between national industries. The modular aspect of future MW systems favours possible co-operation and also requires a high level of interoperability. These are the two challenges the EDA project type B must aim to achieve.

This paper will give a comprehensive overview of the French Navy's future Mine Warfare Capability plans.

UAVs for the 21st Century

Lieutenant Commander Jesus Ibarz, ***Spanish Navy*****, Spain**

There are several initiatives to define Maritime Tactical Unmanned Air Systems (MTUAS), both National and European, to which the Spanish Navy has proposed certain criteria for future acquisitions.

With most navies aiming to acquire this kind of system, there is a clear necessity for low cost MTUAS to be operated on board of different vessels for surveillance missions and maritime reconnaissance, and today's UAS capacities and performances justify its acquisition.

Systems developed will have to be modular architecture-based, flexible, open and, even though its main mission will be surveillance and identification in maritime scenarios, must have the capacity to support missions such as homeland security and terrorism, illegal immigration, drugs traffic, piracy, search and rescue, maritime contamination control, natural disasters, fires, nuclear alerts, frontiers, etc.
Although UAS using is relatively new and its employ concept still needs to be developed, some countries has already usage experience which is being shared in international forums between allied nations.

UAS Basic requirements for the Spanish Navy are the following: On board Automatic Take-Off and Landing (ATOL); All weather visual identification capacity and on line data link transmission; Modular System with growing capacity.

The Spanish Navy is keeping an eye on the UAS evolution and is performing studies to evaluate existing solutions.

The German Approach to Force and Harbour Protection and Possible Integration into Naval Systems – The AUV Family SEA OTTER Mk II and SEA WOLF

Mr Michael Rothenbach, ***Ministry of Defence/BWB*****, Germany**
Michael Rothenbach, Ministry of Defence/BWB (Koblenz), Germany

A common tool for providing protection against underwater threats in different scenarios is the deployment of AUV´s. These unmanned vehicles can be equipped with different sensors depending on their mission in order to detect, classify and even identify underwater threats.

Using a family of AUV´s of different size for different tasks but common mission planning and evaluation tools seems to be most appropriate for such complex tasks. The DEU demonstrators SEA OTTER Mk II and SEA WOLF fit into the family concept. Both vehicles are briefly presented here including first results from the recently accomplished NATO harbour protection trials in Eckernfoerde, Germany.

For the inspection in confined waters (harbour, berthed ship) a relatively small, but agile AUV like the SEA WOLF is preferred. It is able to hover and can also look at vertical structures (pier, dolphin, ship hull, etc.) with the appropriate sensor equipment.

A bigger AUV is necessary to carry a long range sonar and to offer a higher endurance. Such a vehicle is needed to survey the route into a harbour and helps to find mines efficiently.

Solid Oxide Fuel Cell (SOFC) for Unmanned Undersea Vehicle (UUV) Propulsion

Dr Louis Carreiro, ***Naval Undersea Warfare Center*****, United States**

A solid oxide fuel cell (SOFC) system is being developed by the U.S. Navy as a power source for the propulsion of unmanned undersea vehicles (UUVs).

SOFC-powered vehicles offer potential benefits of high electric conversion efficiency and increased energy storage compared with battery-powered vehicles, allowing for extended UUV mission times.

Other advantages include stealth operation, rapid refueling capability and operation using logistic-type fuels. However, the unique requirement of air-independent operation necessitates the storage of oxygen in an energy dense form, such as liquid oxygen (LOX), and the most effective way of accomplishing this has yet to be resolved.

In this study, an integrated SOFC system, consisting of a SOFC stack, fuel processor, high-temperature recycle blower, carbon dioxide scrubber and balance of plant components, is tested with synthetic diesel (S-8) fuel and pure oxygen. The system employs a unique high-temperature recycle of SOFC exhaust anode to increase system efficiency and fuel utilization.

Results of long duration tests demonstrate that SOFCs are a viable alternative to batteries and provide greater energy on both a mass and volume basis.

Thursday 13th November: 1100hrs

Session 6F: Technology
Architecture & Data Distribution 1

Condition and Environment Sensing and Reporting System (CAESAR)

Mr Hai Tonthat, ***Naval Surface Warfare Center (Port Hueneme Division)*****, United States**
Dr. Patricia Johnson, Millennium Engineering and Integration Company, United States; Jerry Bobo/Regina Powell, NAVSEA PHD (Air Dominance Department), United States

CAESAR (Condition and Environment Sensing and Reporting System) is a shipboard equipment and asset monitoring system whose future fleet operational objective is to continuously and autonomously monitor, record, and assess environmental conditions and equipment status; transfer the information ship-to-shore; and use the information for immediate or future design and reliability [maintenance] decisions.

Engineers at NAVSEA Port Hueneme (PHD) have developed CAESAR as an open architecture system, which interfaces with various COTS (commercial off-the-shelf) sensors, including fiber optic sensors, in addition to "new technology" sensors.

Because of the open architecture, each installation uses the type of sensors appropriate for the monitored equipment/asset and ship infrastructure.

Using Open Source Software for Naval Systems

Mr Mark Thomas, ***Thales Underwater Systems*****, United Kingdom**

An increasing number of Naval Systems are moving from proprietary closed systems towards open systems in order to meet the customer's objectives to avoid the potential of vendor lock-in.

Open Source software has often been based on standards with an increasing number of applications and systems being developed with, or based on, open source components. With an increasing number of companies adopting or supporting Open Source, it is clearly about more than just "free stuff" being developed for fun.

This paper will examine the suitability of open source software for use in the various activities in developing open systems, and describe the issues that need to be considered before their adoption.

The paper will discuss the OSS issues – where OSS can be used in Naval Systems, What types of OSS is available for use in Naval Systems, Compatibility, interoperability and suitability of OSS for Open Systems, and the issues surrounding licensing and support.

Patterns for Data-Centric Real-time Distributed Systems

Dr Angelo Corsaro, ***PrismTech*****, Italy**

The Data Distribution Service (DDS) for Real-Time Systems is a standard data-centric publish/subscribe middleware designed for addressing the data distribution challenges of those mission-critical systems where the right answer delivered too late becomes the wrong answer.

DDS has extensively and successfully proven its ability to address the most challenging requirements of highly distributed real-time mission-critical applications, such as air traffic control and management, combat management systems.

However, due to the relatively young age of this technology, the recurring patterns used by experts to architect and design DDS-based high-performance, deterministic, and scalable applications have, for the most part, escaped from being captured and shared with the user community.

This paper will capture these best practices and dispenses them in the form of architectural and design patterns, readily accessible and applicable for reuse. These patterns have been captured through the extensive practical experience acquired on the field by DDS experts.

Thursday 13th November: 1100hrs

Session 6G: Technology
Surface Sensors 2

Passive Surveillance of Harbour and Coastal Area with Cameras

Mr Dann Laneuville, ***DCNS*****, France**
Adrien Negre/Alain Bonnot, DCNS, France

In the last decade, increased concern about terrorism, drug peddling or stowaways has lead to study harbour or coastal area surveillance systems.

Information delivered by a collection of sensors is processed to achieve some tactical situation (tracks and classification) completed by detection of anomalous behaviour.

In this paper, we will focus on surface targets and propose to use a distributed camera sensor suite. Our approach is motivated by the fact that small boats, generally non metallic, are hardly detectable by radars, especially in coastal environment.

The first task of an automatic video based surveillance system is to develop a video extractor. The second task is then to fuse all detections collected by the different cameras to obtain 3D tracks. After discussing some architecture aspects including camera properties, network requirement and geographical position, we will show results obtained on real images with state of the art segmentation algorithms. We will finally discus algorithm aspects to fuse distributed passive information for track processing.

Early Warning and Identification System for NBC (SentrY)

Mr Jesús Madrid, ***Indra Sistemas SA*****, Spain**
Manuel Ruiz, Indra Sistemas SA, Spain

NAVAL NBC-SentrY represents an integral Point and Stand-off early warning and Identification System for Chemical, Biological and Radiological Threats in the vessel's surroundings.

The System is fully integrated into C4I ship systems and consists of three main modules: remote sensing stations for NRBC hazard Detection and Identification, a hardware network for the entire system, and HMS and Control Data Management and Processing Software.

Some specific NAVAL NBC-SentrY System features include: Timely detection and alarms of Chemical, Biological and Radiological warfare agents, TICS and LLR dissemination; Monitoring capabilities for both outside/ inside air and source water; Long distance Stand-off detection of Chemical hazards up to 5 Km; Real-time confirmed Identification of Biological hazards based on an automated process requiring no user intervention; Fully integrated into Command and Control Systems of the ship as well as C4I Army systems; NATO NBC-Message reporting and Hazard Prediction capabilities to increase CBRN situational awareness; Modular and scalable concept which readily facilitates future upgrades and makes the system valid for any type of ship; Robust design specifically intended for military marine use.

Novel Nanotechnology-based Sensors

Dr. Alfredo Rayms-Keller, ***Naval Surface Warfare Center (Dahlgren Division)*****, United States**

Exploiting the interactions between materials and electromagnetic radiation has made it possible to produce sensors that can tell us about changes on chemical (gases, ions or molecules), biochemical (molecules, macromolecules, organisms) or physical parameters (temperature, dust, displacement, acceleration, radiation, light, flow, etc).

The ability to accurately sense electromagnetic radiation (radars and infrared devices) changes in physical motion (inertial systems) as well as chemical and biological materials (medical diagnosis and avoidance of contaminated environments) is of paramount importance for the military.

Miniaturization of commercial and military sensors has been driven by the need of portability and the reduction in power consumption.

Nanotechnology-based nanostructured porous materials – composed by particles or fibers with profiles of 100 nano meters or less in at least one dimension – demonstrate novel or enhanced physical and chemical properties.

This paper will discuss and present data for the development of novel, efficient, and inexpensive nanostructured sensors.

Advanced Naval Infrared Search and Track System Prototype (SIRIO)

Dr Germán Vergara, ***Ministry of Defence/CIDA (Centro de Investigación y Desarrollo de la Armada)*****, Spain**
Dr. Fernando Sánchez Sanz, Ministry of Defence/ITM/CIDA, Spain

Sea Skimmer missiles and asymmetric threats represent a key issue for any naval vessel in various environments.

In order to support ship's self protection, Ministry of Defence/ITM-CIDA and Indra in collaboration with a group of Spanish universities have designed and fabricated an advanced prototype of Naval Infra Red Search and Track (IRST), according to preliminary specifications issued by the Spanish Navy.

In this paper we will present this naval missile-warning research platform based on IR imaging. We will focus on the most innovative aspects of the platform, namely, the IR sensor array and the processing subsystem. The sensor array is a 3-band Medium Wave-length InfraRed (MWIR) Quantum Well Infrared Photodetector (QWIP).

The processing subsystem is based on training-based image processing and detection algorithms. The SIRIO project (from the Spanish "Sistema IR para Investigación Optrónica") has analysed and evaluated the feasibility of innovative solutions and technologies for detecting subsonic sea skimmer (SSS) missiles at a range of at least 10 Km with a low false alarm rate.

Hyperspectral IR imaging is used for effective detection in maritime environments presenting very poor signal-to-clutter ratios. The project is funded by the Spanish Ministry of Defense, the Spanish Ministry of Science and Education, and Indra Sistemas. It is developed by the Centro de Investigación y Desarrollo de la Armada (CIDA), Indra Sistemas, Universidad Carlos III de Madrid, and Universidad Politécnica de Madrid.

Thursday 13th November: 1245hrs

Session 7A: Maritime Security
Asymmetric Threat – Countermeasures

Container Security: The Final Information Frontier

Mr Doug Linman, ***Network Anatomy/NetCo*****, United States**

Container Security and Container Content management has become the last information and systems frontier.

Technology has provided a path to more cost effective solutions to essentially be inside the container while enroute. The speech and its data will bring to light the current and near term solutions, their usefulness and their long term future as complete systems or complimentary systems to existing investments. CEO, Doug Linman has over 35 years in the ICT industry, and will discuss this perplexing issue and display the state of technology in this area.

Latest Trends in Battlefield Identification – Mode 5, BTID, Blue Force Tracking

Mr. Guillermo Monzón-Rodriguez, ***Indra*****, Spain**

Year after year, the number of allied countries participating in joint peace missions, humanitarian help missions or armed conflicts increases.

Unfortunately, during the recent years over 30% of the own casualties in these kind of missions was due to the so called “friendly fire”. Reducing these alarming figures must be a priority for all allied nations. To achieve this, the information about the situation and status of all the allied units participating in the operation theatre is key. Continued efforts to make the most sophisticated systems for acquiring and distributing the battlefield identification information available is essential (in real-time, under all kinds of climatic or visibility conditions, and with the required speed, range and reliability).

This is the fundamental mission of the Identification Systems for the military environment, which allow the identification of the units and the related information and the distribution to the other allied participants thought the dedicated Information Transmission Systems.

Amongst the most recent technologies for identification in the battlefield, is Indra’s Mode 5 (for A-A and G-A applications), and BTID (Battlefield Target Identification Devices, for G-G applications). One of the latest systems for transmission of information about identification and situation is Blue Force Tracking, BFT.

Deterrence as System Force Multiplier in the Defence Against Terrorism (DAT)

Dr. Ronald Kessel, ***NATO Undersea Research Center*****, Italy**

When military systems are brought into DAT and security operations, it is usually with a view to counter an attack in the moments that it is taking place.

In effect, the developer assumes that a particular mode of attack is underway and it must be countered with a high probability of success. In security more generally, however, it is common to speak also of deterrence – One’s defensive stance pays off significantly, that is, by deterring would-be attackers through their prospect of failure.

The effectiveness of many security systems can be explained in part by their deterrent effect.

In this paper, the effect of deterrence will be introduced into a model of overall system effectiveness. The effect can be dramatic, featuring as a force multiplier on the order of magnitude or more, including systems whose effectiveness is compromised somewhat, of necessity, to keep the number of false alarms serviceably low. The model underscores the differences in technology perspective and efficacy when developers turn from combat to security applications.

Countering Asymmetric Threats: Long Term Experimental Setup for ASymW (LEXXWAR)

Mr Joachim Kimpel, ***Ministry of Defence/BWB*****, Germany**

The changes in the political landscape at the end of the last century have brought about new operational scenarios for the armed forces of the NATO nations, including the Bundeswehr.

Future conflicts can predominantly be expected to be, like the present ones in the Iraq and Afghanistan, of a asymmetrical nature. Causes are (a. o.): Growing of population (fight for resources, refugees); The consequences of the climatic change; Religious wars; Wars of rebels and warlords.

The Federal Office of Defense Technology and Procurement (BWB) and the Bundeswehr Technical Centre for Ships and Naval Weapons (WTD 71) has been involved in different R&D projects focussing on topics important for DAT (Defence against Terrorism) since the beginning of the millenium. Since business at WTD 71 is rather trials and testing than fundamental research, our approach to the problems of AXW is rather down to earth. If we discover a knowledge gap for a certain sensor or the data processing that goes with it we will initiate fundamental research as a complement to the engineering work we are accomplishing.

We judge this as being an efficient way towards innovative solutions. And innovative solutions are quite certainly crucial for this ‘new’ kind of war.

LEXXWAR is a powerful and flexible modular R&D testbed to enhance our defense capability against terroristic and asymmetric attacks to be used at any place in the world for the validation of e.g. new sensors, techniques and weapons. It will not only be open to modifications and further improvements but this is its very purpose, bearing in mind that we must be prepared against a wealth of creativity on the part of our potential opponents.

(1.AXW, coined in similarity with terms like ASW (anti submarine warfare) by pointing out that war against terrorists cannot be confined to a single threat. Consequently the letter X is used to indicate the widespread nature of the threat since it often stands for something not clearly defined or even mysterious. Maybe NATO adopts it).

Thursday 13th November: 1245hrs

Session 7B: Operations & Capabilities
Future Capabilities

The “Tipping Point” Surface Combatant

Mr R. Robinson Harris, ***Lockheed Martin MS2*****, United States**

Lockheed Martin’s new Surface Combat Ship – based on the USN’s Littoral Combat Ship – introduces a flexible/stable/survivable blue/green water platform for international navies.

It is equally capable for blue water Major Combat Operations (MCO) and green water Phase 0/HA/DR missions. Designed from the start with an Open Architecture electronics backbone, it will be highly interoperable with own and partner navies and civilian agencies; with content from own-nation industries, if desired.

Unlike any other surface combatant available today, because of its modular design, it can be fitted/re-fitted/modernized easily for changing and evolving missions, e.g., ASW, ASUW, AAW, BMD, or HA/DR. Its structural design ensures survivability and needed size for desired weapons/capabilities. Moreover, this non-traditional semi-planing monohull affords not only speed and shallow draft but also it yields a remarkably large payload carrying capacity (payload fraction). This presentation will highlight the electronics (Open Architecture) and structural technological advancements that make Lockheed Martin’s new surface combatant a “Tipping Point” in the world of surface combatants.

Network Enabled Capability in the Maritime Environment

Commander Mikael Magnusson, ***Swedish Armed Forces*****, Sweden**

Sweden is currently participating in a multinational experiment on linking Maritime Operation Centre’s via service exchange using a federated approach. Sweden

contributes to the experiment with knowledge gained through six years of NEC development.

This presentation will address Swedish experiences from experimentation and NEC development in the fields of: Architecture and design; Service exchange using a federated approach.

The Future of Naval Construction in Europe: Applied Research on Naval Platforms

Mr Natalio Rodriguez, ***Association of the Spanish Naval Architecture (AINE),*** **Spain**

The military shipbuilding industry has a strategic character arising from the need that countries have for guaranteeing their naval operational abilities. These companies, regardless whether they are public or private, are strongly regulated by their governments, especially in export programs.

For military shipbuilders, a reduction in internal demand has been caused by budget concerns in western countries since the fall of the Berlin Wall which has forced them to develop an export activity in a globalized market with restrictions of diverse types such as the construction of the first of class FOC, the requirement of government buyers to obtain offsets for the total investment of the contracted program, a global offer that contemplates logistical support, training and instruction elements from the operative and maintenance point of view which means the need for institutional aid from the government and/or Navy, etc.

Shipbuilders in Europe will be affected by the evolution of European defense policy. As a consequence, the integration of military shipbuilding appears sure and irreversible.

Shipbuilders should be prepared to develop new projects that permit their Navies to respond successfully to missions derived from new threats. Future conflicts present the following traits: Wider spectrum; Asymmetric war; Conflicts far from bases; Multifunctional aspects; Multinational aspects; Extremely hostile environment.

Each of these characteristics means the incorporation of new technologies in the design of platforms and combat systems, with special consideration of the criteria necessary for the survival of the unit and its crew.

In this paper, conditions and trends shown and their influence on the organization and structure of European military shipbuilding will be analysed.

Thursday 13th November: 1245hrs

Session 7C: Platforms
Design – Propulsion

Navantia's Ship Management System: COMPLEX (COntrol y Monitorizacion de PLataforma EXtensible)

Mr Francisco Panos, ***Navantia*****, Spain**

Since 1989, Navantia (formerly Izar and Bazan) has incorporated Control and Monitoring Systems – developed by the Control Systems Department, from FABA Systems Division – in the ships built in its shipyards (both for the Spanish Navy and for the export).

The Systems under development for new Navantia construction programmes (surface and submarines units), constitute the third generation of the Ship Management Systems implemented by FABA.

This paper will illustrate the main characteristics that make COMPLEX one of the most advanced Ship Managements Systems, by the integration of the standard IPMS functions, Ship Control & Supervision, with other functions as Damage Control, Maintenance, BITE, Remote Control & Supervision, Automatic Data Send, On Board Training, Data Record, etc. (all presented to the operator in an Integrated Environment (HMI) with three types of views: 2D, 3D and DATA).

IEEE Standards for Maritime Systems and Technology

Dr. Yuri Khersonsky, ***Practice in Power Electronics*****, United States**

Electric Ship Technologies is identified by the IEEE Technical Activities Board (TAB) as one of the ten emerging technological challenges that cut across the fields of multiple IEEE societies as well as engineering societies outside IEEE.

The goal of this integrated initiative is to enhance technological advances and utilize all related applications by combining the collective expertise of various entities and engineering societies who otherwise individually address only part of overall problem. To address this challenge IEEE took following actions:

1. A bi-annual Electric Ship Technologies Symposium was established as the permanent forum for the exchange of broad spectrum of view points (end users, designers, manufacturers, etc,). It brings together the knowledge of the entire scientific and technical community by mixing traditional oral presentations with invited special panel discussions and standards working group activities. ESTS is co-sponsored by 6 IEEE societies and 2 councils with participations from ASNE and IMarEST;
2. IEEE Power Engineering Society PES extended activities of its working group i8 "Power Electronics Building Blocks Concepts" to develop new standard P1676 "Guide for Control Architecture for High Power Electronics (1 MW and Greater) used in Electric Power Transmission and Distribution Systems". PES continues its work on revising standards for Static voltage regulators and Medium Voltage Variable Speed Drives. It formed a new Marine Systems coordinating committee to collaborate with other IEEE societies in development of new standards for industry;
3. IEEE Industrial Applications Society IAS developed new IEEE Std. 1566- 2005 "Adjustable speed Drives above 500HP." It is revising IEEE Std. 45-2002 "Recommended Practice for Electrical Installations on Shipboard" and formed 3 new working groups for developing new P1662(tm) "Guide for the design and application of Power Electronics in Electrical Power Systems on Ships", IEEE Std. P1709(tm) "Recommended Practice for 1 to 35 KV Medium Voltage DC Power Systems on Ships" and IEEE Std. P1713(tm) "Electrical Shore-to-Ship Connections";
4. IEEE Power Electronics Society PELS formed working groups for the revision of IEEE Std. 1515 -2000 "Recommended Practice for Electronic Power Subsystems: Parameter Definitions, Test Conditions, and Test Methods" and IEEE Std. 1573-2003 "Recommended Practice for Electronic Power Subsystems: Parameters, Interfaces, Elements, and Performance"

This paper will describe the status of IEEE activities in the development of these new standards. It will also review active international standards applicable to commercial and military ships.

Dynamic Management of Propulsion Plants in Naval Applications

Mr. Giacomo Cherio, ***Avio S.p.A.*****, Italy**
Santino Crupi, PSC Engineering srl, Italy; Marco Manzo/D. Sturniolo/E. Sericola, Avio SpA, Italy

The requirements of Automation has changed considerably since origination. Awareness of having to adopt sustainable development behaviour drives Research & Development toward a position of environmental protection and energy conservation that requires processes optimisation.

The subject of this development is applicable to Propulsion Plants in Naval application equipped with Variable Pitch Propellers, which are managed through the concept of "Propeller Pitch / Main Shaft Revolution" Combined Control Laws.

The evolution of automation criteria and the coming of the computer age allowed "non-pre-arranged speed change manoeuvres", enabling the improvement of the ships dynamic performances and introducing the new concept, based on the dynamic management of the speed changes.
Today, this concept of steady state and combined control laws has to be replaced and evolve towards dynamic management of pitch / revolution, with an orientation towards minimising fuel consumption.

The Propeller Pitch / Main Shaft Revolution Management System, the results of which are presented in this paper, enables a potential magnitude of 20% or more reduction in fuel consumption. Thus, the proposed management system represents a remarkable added value to the Automation in Naval Propulsion Management application.

System Integration for Naval Propulsion Systems

Mr. Christoph Fenske, ***MTU Friedrichshafen GmbH*****, Germany**

Propulsion System Integration is today's buzz-word in governmental procurement programs for Naval vessels.

The reduction of risk, manpower and administrative effort is the driver for shipyards to shift this responsibility to their vendors, while the end users opt for holistic analysis of problems as well as single source logistics support.

On the basis of recent and current projects, this paper will present and discuss the potential scope of responsibility on products and services, e.g. definition and co-ordination of mechanical as well as automation interfaces, simulation of the manoeuvring behaviour of the vessel, layout of supply systems, single source responsibility for harbour and sea trials and integrated logistic services over the vessels' lifetime.

In conclusion, the paper will specify the conditions for successful system integration on naval vessels and discuss the chances and challenges for system suppliers.

Thursday 13th November: 1245hrs

Session 7D: Systems
Ballistic Missile Defence (BMD)

Maritime Ballistic Missile Defence Capabilities – A Roadmap for the Netherlands

Mr Michiel Beijer, ***TNO*****, Netherlands**

The changing threat environment due to the proliferation of ballistic missile technology throughout the world has led to a number of challenges for navies involved in Ballistic Missile Defence.

Additionally, the past decade has seen enormous developments in networking and communication technology, which will dramatically change the way coalition forces fight their wars.

This paper will start with an overview of the changes that Network Enabled Capabilities can bring to Maritime Ballistic Missile Defence, especially in the area of command and control, and coalition level interoperability. I will discuss new concepts for coordination mechanisms that can increase overall coalition effectiveness and efficiency.

These new operational concepts together with developments in sensor, shooter and command capabilities have to be incorporated in the maritime missile defence roadmap for the Royal Netherlands Navy. This roadmap depicting the near and far-term developments will be presented together with current and future ambitions.

European Missile Defense Collaborative Tool

Mr William Miasek, ***Lockheed Martin MS2*****, United States**

As the multi-national European missile defense capability evolves, analysis tools are needed. Models, simulations, and ground tests incorporate expanded weapon system coordination and threat complexity.

Government and industry have increasingly used individual tools for system design and acquisition.

Using IR&D funds, LM developed a unique solution, the Integrated Missile Defense Testbed, by adapting existing methods. IMDT integrates tools in an architecture simulating the BMDS to collaboratively evaluate BMDS performance. Design agents and system experts retain models and simulations, resolving proprietary issues while maintaining contractual controls.

The Defense of Europe analysis determined Aegis BMD and THAAD support for a GMD site. In addition, IMDT and other tools evaluated Aegis ship locations' defended area in conjunction with TPY-2, THAAD, and GMD.IMDT flexibility supports unequaled interaction among weapon system developers, improving systems analyses and the cooperative design, development, and integration efforts needed to field an effective multi-national European BMDS.

2007 USN Ballistic Missile Defence (BMD) Flight Test Mission Results

Mr. Mark Wood, ***Lockheed Martin MS2*****, United States**

In 2007, several flight test missions (FTM) were conducted aboard US Navy Aegis Ballistic Missile Defense (BMD) warships that comprise the sea-based element of the US Ballistic Missile Defense System (BMDS).

In FTM-11, an Aegis BMD cruiser simultaneously engaged a ballistic missile target and an anti-air warfare (AAW) target that simulated an attack aircraft. In FTM-13, an Aegis BMD cruiser simultaneously engaged two ballistic missile targets. In these two test events, Aegis BMD demonstrated the robust capability to conduct the BMD mission while exercising ship self defense, as well as the capability to defend against a short range ballistic missile (SRBM) raid.

This presentation will outline these successful Aegis BMD at-sea events and discuss highlights of the results.

Aegis Modernization – Missile Defense & Other Warfare Missions

Mr Carl Bauer, ***Lockheed Martin MS2*****, United States**

US Navy's comprehensive Aegis Modernization (AMOD) program will develop a highly scalable commercial off-the-shelf COTS-based computing and network infrastructure, integrating warfighting capabilities in an Open Architecture (OA) solution.

This may increase the USN BMD ships from 18 to 84 by 2020, and provide for expanded international naval forces BMD capabilities.

Aegis BMD is being integrated into the AMOD multi-mission Capability Upgrade 12 (CU12). CU12 integrates Aegis BMD 3.6 and Aegis BMD 4.0.1 capabilities using an affordable design that can pace the emerging ballistic missile threat. AMOD COTS Refresh 3 (CR3) will deliver a fully-certified weapon system beginning in 2011 for cruisers, and 2012 for destroyers. In addition to BMD capabilities, AMOD will incorporate Aegis Baseline 7 Phase 1R functionality and integrate the SPY-1D (MOD) Multi-Mission Signal Processor (MMSP), STANDARD Missile-6 (SM-6), the Single Integrated Air Picture (SIAP), and Navy Integrated Fire Control-Counter Air (NIFC-CA).

Thursday 13th November: 1245hrs

Session 7E: Platforms
AUV 2

Recent Developments on Rockets with Gelled Propellants

Dr Karl Wieland Naumann, ***Bayern-Chemie*****, Germany**
R. Stierle/J. Ramsel/K. Schmid, Bayern-Chemie GmbH, Germany

The basics on rockets that burn gelled propellants (RGP) were presented at the 2nd annual MAST Conference (2007). Since then, Bayern-Chemie and the German working group on RGP have continued their activities towards the demonstration of a fully integrated RGP, planned to be flight demonstrated in 2009.

In addition to mission-adapted thrust modulation, good insensitivity and low plume/trail signatures, special features of the BC RMG are "green" propellants, environmentally friendly exhaust products, and the possibility to build explosive-free rocket motors and re-usable rocket motors.

First test results on the vulnerability of the German RGP yielded encouraging results. The flight-test of a re-usable demonstrator for the launch of UAVs is planned 2008/2009. This paper will detail the progress made in 2007 and 2008 and pay particular attention to applications of special interest for navy users. Emphasis will be put on the progress on highly insensitive and versatile launch motors for UAVs.

Low Cost Autonomous Underwater Vehicles for Oceanographic and Harbour Surveillance Missions

Eng Alexandre Sousa, ***Oceanscan*****, Portugal**

Many Autonomous Underwater Vehicles are, traditionally, configured for a specific type of application, however each user has it's own requirements.

The Light AUV (LAUV) is a small, low-cost, torpedo shaped, vehicle made of composite materials (110x15cm) and is configurable for multiple operation profiles and sensor configurations. The LAUV facilitates the access to the ocean and to the integration of new technologies & user developments. The LAUV, developed by Porto University (Portugal), is described along with results from operational oceanographic and harbour surveillance missions.

The LAUV system has an advanced software tool set, including an Application Programming Interface allowing the user to develop dedicated applications, a publish/subscribe framework supporting multi-vehicle operations with mixed initiative interactions (operator in the planning and control loop) and a command and control framework compliant with inter-operability standards. The LAUV has been tested at sea, in harbours and in estuarine environments in Portugal and in the United States.

Operations with Autonomous Vehicles in the Response to Maritime Incidents

Mr. João Borges de Sousa, ***Porto University*****, Portugal**

The role of autonomous vehicles in emergency response to maritime incidents is far from being fully understood.

Technological advancements allow us to envision the design of systems which could have not been imagined before. But design is a process that greatly benefits from previous experience, in this case that of deploying autonomous vehicles as part of the response plans to maritime incidents. This paper will discuss roles for autonomous vehicles in the emergency response to maritime incidents, describes the framework developed by Porto University for their integration into existing response plans and present experimental results from a demonstration with unmanned vehicles from Porto University.

The paper will report on the deployment of the ASV Swordfish, of the LAUV AUV and the KOS ROV in a maritime incident scenario. This will be done in the context of the Maritime Incident Research and Innovation Network (MARINE) project funded by the Interreg III B Programme “Atlantic Area”.

Adaptation of the Remote Multi-Mission Vehicle (RMMV) for Additional Unmanned Missions

Mr. Marc Heller, ***Lockheed Martin MS2*****, United States**

The Remote Multi-Mission Vehicle is entering the US Navy inventory as part of the AN/WLD-1 Remote Mine-hunting System deployed on DDG51 Class, and Littoral Combat Ship (LCS) as part of the Mine Warfare (MIW) and Anti-Submarine Warfare (ASW) Mission Packages.

The RMMV is a robust semi-submersible, Snorkeler-class Unmanned Surface Vehicle system that can be adapted to a broad spectrum of new applications and missions. The RMMV provides all-weather low observable operations, high endurance, interchangeable mission systems with electronics and real time data transfer capability beyond line of sight.

This paper will address the unique characteristics of the RMMV, and it’s potential to host additional payloads and missions. These include sensors and systems for Maritime Security and Harbor Protection/Coastal Surveillance, other MIW and ASW sensors and systems, mast-mounted sensors, logistics modules, cascading vehicles, off shore oil field monitoring and patrol, and underwater pipeline inspection.

Designed for deployment from LCS and DDG-51 Class, as well as shore based or ships of opportunity, the RMMV can provide a significant off-board capability for Naval Combatant Commanders.

The principal RMMV issues to be addressed by this paper include: design characteristics; performance parameters and tactical advantages; additional payload and mission capabilities.

In conclusion: RMMV has demonstrated adaptability for additional missions such as Maritime Security and Harbor Protection/Coastal Surveillance; RMMV has unique performance characteristics that can be leveraged as a force multiplier with greater capability as a multi-mission platform.

Thursday 13th November: 1245hrs

Session 7F: Technology
Architecture & Data Distribution 2

Supervision and Communication System (SCS)

Mr. Vittorio Giuffra, ***ABB*****, Italy**
Stefano Michetti, Fincantieri SpA, Italy

The latest, most innovative Integrated Platform Management Systems are designed to achieve integration among various sub-system.

This allows total access to all information from any Operator Workstation, depending only on the profile of each operator, giving maximum flexibility and operability to the platform. Full integration is widely used by the Supervision and communication system(SCS).

SCS is not a control system, since it is not designed to directly control the Platform devices, but rather a sort of Information Management System, developed according to the requirements of a Marine environment, translating in an a Computer language during normal and emergency situation. SCS is a software layer designed in order to filter and distribute information and messages to the Platform Operators. One of its main goals is to improve communication between the different levels of the crew organization, in order to filter, share and distribute correct and unique information/requests.

Secure Data Distribution

Dr Angelo Corsaro, ***PrismTech*****, Italy**

The challenge of interoperable, real-time, and scalable data distribution in a mission-critical system, such as Naval Combat Management Systems, and Air Traffic Control/Management, has been addressed by standard like the OMG’s Data Distribution Service.

However, in an increasing number of operational and deployment scenario, data exchanges need to be secure. This paper will show how to achieve a security solution ensuring Information Assurance (IA) for all DDS-based cooperation and information exchange between the DDS nodes over untrusted communication infrastructures. The security solution allows the reliable separation of applications with different clearances deployed on different nodes in a way that ensures transparency to the applications, thus supporting full portability.

This solution provides QoS-enabled IA offering end-to-end security between all applications (distributed or co-located), including mandatory access control for all data flowing between applications and detailed security audit of application interactions.

Network Enabled – Interoperability Capabilities and Limitations

Mr Alexei Schandl, ***Naval Surface Warfare Center (Port Hueneme Division)*****, United States**

Naval, Joint and Coalition Capabilities and Limitations (C&L) use the latest network enabled technologies to deliver accurate, relevant and timely information to warfighters worldwide.

C&Ls describe how forces maintain a common, coherent, air picture from information gathered by individual units and sensors. C&Ls do not simply provide more information; they deliver the right information from multiple sources at the proper time, and present it in the proper format to aid decision making at different levels of command.

Open source software, smart web services, and collaboration with other agencies allows raw data to be collected, analyzed, filtered, transformed, and distributed with freely available publish/subscribe tools. The C&L uses XML/XML web services and XSLT to distribute information to Naval units via Forcenet and Joint/Coalition warfighters via the Global Information Grid. Keeping with Joint Vision 2020’s goal of information superiority, all C&L data is extensible as well as platform, language and software independent.

Thursday 13th November: 1245hrs

Session 7G: Technology
Radar 1

Scalable Solid-State S-Band Radar (S4R(tm)) Demonstrator

Mr Travis Nix, ***Lockheed Martin MS2*****, United States**
Joseph A. Haimerl/ Eric L. Karn/ Nicholas J. Romano/ Lockheed Martin MS2, United States

This paper will introduce Lockheed Martin’s S4R(tm) radar product line and its demonstrator.

The S4R(tm) Family of Radars is scalable to support various Anti-Air Warfare (AAW) and Ballistic Missile Defense (BMD) missions for platforms ranging from corvettes, frigates, destroyers, cruisers, amphibs, to aircraft carriers.

Solid-state antenna electronics bring new advantages to the surface combatant including improved reliability, graceful degradation, and enhanced sensitivity / operation in littoral clutter. These advantages enable the support of multiple simultaneous missions, including air surveillance, cruise missile defense, and BMD.

The S4R(tm) design is derived from the S-band antenna developed for the U.S. Navy’s next-generation destroyer and the Aegis Ballistic Missile Defense signal processor (MMSP). These open architecture designs, based on open standards and commercial components/parts, have been proven with the S4R(tm) demonstrator during live operation

target tracking with multiple antenna technologies including GaAs and SiC T/R modules.

Future Littoral Radar Performance

Dr Robert Marshall, ***Naval Surface Warfare Center (Dahlgren Division)*****, United States**

Meteorological circulations within 100km of land, such as the sea breeze, produce shallow atmospheric layers that place severe four dimensional engineering demands on naval radar.

Strong vertical gradients of temperature and humidity can abnormally refract radar energy along, into, or abruptly away from earth curvature. Detection blind areas, reduced horizon, folded land clutter and extended sea clutter can rapidly develop and impact radar performance. A single meteorological profile taken in the littoral battle space can lead to dangerously erroneous predictions of three dimensional radar performance and does little to warn radar operators of impending changes.

The International Exchange Annex, America, Britain, Canada, Australia, New Zealand, RF/IR/Visible working group is working with meteorologists from each country to create radar performance forecasts by combining mesoscale numerical weather prediction with radio frequency models. This paper will present technical results from this work and describe plans for a validation trial in the southern hemisphere.

Naval Radars for the Littorals

Mr Gunter Menacher, ***EADS Deutschland GmbH*****, Germany**

For Navies that do not just operate in blue water, sensors for the littorals will strongly support operation in brown water.

Regarding even the whole life costs EADS can deliver capabilities over the complete life cycle time. A well balanced radar family concept is the basis for mission success using technology insertion, as well as incremental function updates.

This paper will examine, from an EADS perspective, how a number of these challenges can be addressed. It will examine the EADS naval TRS radar family concept and how it is applicable for different missions.

Thursday 13th November: 1600hrs

Session 8A: Maritime Security
Integrated Maritime Security Systems

Addressing the Challenges of Systems-Of-Systems Integration in Maritime Safety and Security – The POSEIDON Project

Dr Jacek Skowronek, ***Thales Nederland*****, Netherlands**

Maritime Safety and Security (MSS) systems exhibit huge technical and systemic challenges, ranging from anomaly detection, visualisation, security, to integration and acceptance.

This paper will introduce the POSEIDON project, in which prominent scientific centres in the Netherlands are engaged together with Thales to address these challenges.

In the project, two forms of MSS systems are considered: coastal MSS systems, and deployed MSS systems, the latter exemplified by the recent maritime UNIFIL missions off the coast of Lebanon. The deployed MSS systems form additional challenges to system integration due (among others) short preparation time required and restricted access to shore infrastructures.

In that context, the project addresses three fundamental aspects of systems-of-systems integration:
Reliable detection and efficient visualisation of anomalies; Integration of disparate information sources using semantic web technologies, taking into account their differing security characteristics; Rapid integration of disparate subsystems, significantly shortening integration and acceptance times.

Future Integrated Surveillance of Coastal and Maritime Areas – A Spanish Approach to Accomplishing Border Protection and Defence Missions

Engineer José A. Díaz, ***ISDEFE*****, Spain**

The SIVE program was launched back in 1998 in collaboration with Spanish Guardia Civil to face the growing demand of Maritime Border Protection services due to the rise in cross-border of illegal activities in the Spain southern coastline.

This program aims to shield the south border of the European Union with the deployment of Mobile Units and Land Stations equipped with radar and optronic sensors, all linked to a Command Center.

In the military arena, the SCOP program has fulfilled the requirements of the Spanish Navy providing the technical means for Maritime Control and IMINT information gathering, and in southern Spain.

This paper will suggest an approach for an integrated surveillance of coastal and maritime areas, integrating the current Security-Border Protection and Defence IMINT Systems (SIVE and SCOP) as a whole infrastructure for global maritime control in the outer borders of the Mediterranean Sea and Atlantic Ocean. This System is conceived as part of the future European Border Surveillance System (EUROSUR).

The Global Challenge of Information Exchanges within the Maritime Community

Mr Bernard Garnier, ***Thales Group (Naval Division)*****, France**
Antoine Guillot, Thales Research & Technology, United Kingdom; Jean-Marie Lhuissier, Thales Group (Naval Division), France; Glyn Jones/Salvatore Rampino, Selex Sistemi Integrati, Italy

The European Maritime Policy (as endorsed by the EC Council of Dec13, 2007) demands that all member states – and possibly neighbouring countries – to move "towards a more interoperable surveillance system to bring together existing monitoring and tracking systems used for maritime safety and security, protection of the marine environment, fisheries control, control of external borders and other law enforcement activities".

Leaving aside the political challenge of this transformation of the currently extremely fragmented maritime stakeholders community mentioned above, as 27 Heads of State have formally endorsed this plan, this paper will focus on the technical challenge this "interoperability" represents.

Coordinating a recently contracted "Support Action" of the second Security Call of the FP7 EU Research and Technology funding scheme, named OPERAMAR, the authors will first clarify the current "Users Community" expectation in terms of interoperability and information exchanges.

In particular, it is most clear that most useful information is perceived sensitive and therefore cannot circulate openly, and information owners must remain the only deciders of the extent of visibility given to any third party (and the restriction are as strong from one agency to the next in the same country than across borders).

Enabling technologies from Thales and Finmeccanica groups leading an Industry Alliance to tackle this challenge (systems of systems architectures, common data models, information security, segregated access…) will then be presented and discussed.

Thursday 13th November: 1600hrs

Session 8B: Technology
Countermeasures

EW in Maritime Surveillance Operations

Captain (SPN) G Cassinello, ***Indra Sistemas SA*****, Spain**

The most constant and considerable threat for today's surface ships is that of the Anti-Ship Surface Missile (ASSM), let alone missiles from Airborne platforms.

Recalling HMS ''Sheffield" (Falklands War), USS ''Stark" (Gulf War) and more recently – in summer 2006 – the Israeli ''Saar V" being attacked by Hizbola guerrillas, prompt us to tackle the following tasks when at sea: A sustained EW Surveillance need; The appropriate assets and weapons to properly carry out the Mission ordered.

These considerations, amongst others, cannot be performed without a robust and reliable EW Electronic Support Measure (ESM) and Electronic Counter-Measures (ECM) capability, both essential for a successful Maritime Surveillance Operation.

EW is unquestionably a key pillar to support and contribute the accomplishment of the so called ASMD (Anti-Ship Missile Defence) raison d'être of a warship.

Adaptive Jammers and Decoy Systems

Mr Ryszard Kaminski, ***R&D Marine Technology Centre (CTM)*****, Poland**
Michal Kosiarz, Centrum Techniki Morskiej S.A., Poland

Anti-torpedo defence passive systems are extremely important for any ship's defence, and there is a long history of development of these systems.

The latest generation of jammers and decoys developed in the last decade known as adaptive systems have been developed in R&D Marine Technology Centre (CTM) and implemented on the Polish Navy ships.

The system consists of launcher, operator's console, jammers and decoys. The jammers and decoys generated a hydroacoustic signal in a wide frequency band. Parameters of this signal are either storage in a jammer and decoy memory or can be programmed by console operators at the launcher before their launching.

This paper will present both the composition of these system and results of sea trials.

Integrated Anti-Ship Missile Countermeasures Development

Mr. John Bednarz, ***Tactical Technologies Inc.*****, Canada**

The development of an integrated anti-ship missile countermeasure solution with soft & hard kill capabilities needs to be based on the integrated system's effectiveness under various engagement conditions.

Analytical tools designed for countermeasure development can be used to highlight the relationship between an integrated self-protection system's effectiveness against various threats and conditions.

Using high fidelity weapon system models interacting in dynamic simulated engagements allows users to experiment with various integrated strategies, tactics and techniques, while also supporting the definition and development of these systems. And albeit distasteful, it appears pretty obvious that littoral engagements need fully autonomous self-protection capabilities to cope within the reduced reaction time budgets and increased threat loads being anticipated.

This paper will highlight a readily available solution to experimenting with and evaluating these integrated system requirements using off-the-shelf modeling and simulation based analytical capabilities, and include a demonstration of the approach and some of the results our experimental effort provided in this domain.

Thursday 13th November: 1600hrs

Session 8C: Platforms
Human Factors

The Human Element in Ship Design, Build and Operation

Commodore David Squire, ***The Nautical Institute*****, United Kingdom**

The human element is a critical feature of all aspects of ship or system design and operation, both military and commercial.

Those who are involved in the design, build and updating of ships and their systems and in their operation need to be aware of the problems associated with onboard operations not only in terms of workplace design but also in respect to crew habitability and the education and training needs of the seafarer.

There are many stakeholders involved in the design of ships and their systems. Teamwork and communication at all levels, from concept to build, are essential to the success of any project.

This paper, presented by Commodore Squire, will describe the work done by the Nautical Institute/Lloyd's Register Educational Trust 'Alert!' project to improve the awareness of the human element in the maritime industry.

Human Factors Integration for Sonar User Interfaces

Mr Olivier Rabourdin, ***Thales Underwater Systems*****, France**
Jason Flyn, Thales Underwater Systems, United Kingdom

The demand for increased sonar performance and functionality has proven to be a challenge for defence equipment suppliers particularly in the area of User Interfaces.

Navies worldwide are reluctant to increase manpower; in reality the focus is normally on reducing manpower. This poses some challenging questions for the engineer: 1. How to intuitively present the vast amount of data to the operator?; 2. How to reduce the workload placed on the operator?; 3. How to minimise the amount of education and training required?; 4. How much automation is required before compromising the operator's basic skills?

This paper will describes how TUS is integrating Human Factors into the development of innovative user interfaces to meet the demand of the current and perceived future operator.

Risk Reduction Methodology for the Manning of the Operations Room of a Frigate (With Reduced Crew)

M. Ludovic Martinet, ***Ministry of Defence (DGA)*****, France**
Captain T. Gelle, French Navy, France; L. Bina, Ministry of Defence/DGA/CTSN, France; C. Bourseul, DCNS, France

This paper will present the three phases of the process conducted to allow the French Navy to operate its future Frigates FREMM with a highly reduced crew (focusing on the operations room).

During the feasibility phase, the Navy staff and the DGA conducted a detailed Technical & Operational Analysis, which demonstrated that it could be possible to reduce the crew to less than 50% of the "in service" ships provided that collective and individual work organisations were adapted and that coherent automatisms were installed.

For the risk reduction phase, the Navy staff and the DGA conceived a full scale dynamic mock-up tool of an operations room, the IBEO. This tool runs realistic operational scenarios and allows quantifying the work load of operators.

Five experiment campaigns have already been organised using the IBEO by the Navy, the FREMM Industry and the DGA. Each of these campaigns tested hypothesis of work organisation by warfare domains.

Finally, in the FREMM design phase, the results of the campaigns have been taken into account for MMI specifications. Once developed, MMI will be validated on IBEO.

The paper will show in detail the IBEO, the experiments, the results and conclusions.

Managing the Human Element – Best Practice for Ship Operators

Dr Jonathan Earthy, ***Lloyd's Register*****, United Kingdom**

In order to address the full range of risks that they, face ship operators (naval as much as merchant), must take a systems view of the ship and include the Human Element.

Lloyd's Register's "Human Element Best Practice for Ship Operators" is a framework that enables thorough, comprehensive and systematic consideration of the influence of the human element on safe and effective ship operations. The paper will present this view of best practice for ship operators and examine the special issues for navies and fleet auxiliaries.

Thursday 13th November: 1600hrs

Session 8D: Systems
UAV Systems

New NATO Standards for Unmanned Aircraft Systems

Ms Laura Casadevall, ***Indra*****, Spain**

UAS platforms are becoming a strategic reference in the actual military context. In every Unmanned System, the Data Link System is invested as a key element for control and data transmission.

Indra is developing a Data Link suite suitable for both control and intensive data transmission. The system will operate up to 200 Km in clear conditions (LOS) and up to 250 Km (BLOS) with relay. Data links System allows full-duplex transmission with low Bit Error Rate, Spread Spectrum EPM Protection and offers multiples interfaces (Ethernet, GbEthernet, Audio…). This design follows the NIAG Group's suggestions: the system will be composed by a dual link architecture, consisting of a High Rate Data Link (Primary Data Link) and a High Integrity Data

Link (Secondary Data Link), compliant with NATO standards (STANAG 7085 and 4660).

Joint Sonar and Video Sensing for an Autonomous Underwater Mine Disposal Vehicle

Mr Nicolas Mandelert, ***Thales Underwater Systems*****, France**

Today, autonomous, fire-and-forget munitions launched from the surface are under study for their potential use in future underwater mine warfare.

Without any human intervention, these would navigate towards a designated object, identify it, and destroy it if necessary. Since the weapon would self-destruct in the process, low-cost, off-the-shelf sensors are needed. However, a simple, mechanically steered sonar cannot alone allow for proper automatic target identification and terminal guidance.

As an alternative, Thales Underwater Systems is proposing a dual sonar/video sensing approach. Sonar is used for long to medium-range object detection and approach, and for preliminary object classification. Then, short-range approach, identification and attack are done with a standard video camera.

This paper will demonstrate the results of our perception algorithms on real data acquired at sea. It shows how the developed perception algorithms can provide the munitions mission management system a significant ability to track and destroy a mine autonomously.

Networked Operations (with Neptus)

Eng Paulo Dias, ***FEUP*****, Portugal**

Networked operations are becoming a major trend in what concerns operational scenarios involving humans, autonomous vehicles and systems.

In these operations systems from different vendors have to interoperate. This paper will present FEUP's C4I (Command, Control, Communication and Intelligence) environment, Neptus, and discuss the implementation of an inter-operability standard and illustrate the presentation with experimental results.

Neptus implements the NATO's STANAG-4586 standard to support networked operations of inter-operated unmanned vehicles in a mixed initiative environment (operators in the planning and control loops). Neptus supports concurrent operations. Vehicles, operators, and operator consoles come and go. Operators are able to plan and supervise missions concurrently. Additional consoles can be built and installed on the fly to display mission related data over a network. Neptus has a Console Builder application. This facilitates the addition of new vehicles with new sensor suites to Neptus. Neptus supports the control of several UAVs, AUVs and ASV concurrently.

Thursday 13th November: 1600hrs

Session 8E: Technology *Communications*

Automatic Waveform Parameters' Selection in Military HF Transceivers – Depending on Propagation Conditions and Type of Traffic being Generated

Mr Jan Cichy, ***R&D Marine Technology Centre (CTM)*****, Poland**

There are many cause of Radio transmissions disruption: multi-path; noise; fading; interruption by other transmissions (intentional or unintentional).

Various conditions can have a great impact on how well the radio waves propagate. Different waveforms can be used to reduce the impact of these conditions and transmission disruption on the transmission. Good propagation conditions allow use of high-speed waveforms, whereas poor propagation requires slow, but more reliable transmission methods.

The traffic type (voice, data transmission: broadcast, point-to-point, low-latency, high throughput) also demands the correct choice of waveforms and their parameters used for transmissions. No single waveform is applicable to all cases. Each one has its advantages and drawbacks.

In this paper, the algorithms used by waveforms to correct their parameters automatically will be discussed and also practical results of implementation in HF/VHF/UHF medium power transceivers (1,5 to 512 MHz) designed and developed by our company will be presented.

State-Of-The-Art, Real World Acoustic Communications and Undersea Networks

Mr. Dale Green, ***Teledyne Benthos*****, United States**

The realities of acoustic communications and undersea networks currently differ substantially from the expectations arising from forward-looking academic theory and investigation.

The issue is not that the fundamentals of communications theory do not apply, but rather the fact that the difficulties of the acoustic channel do not necessarily fit the assumptions underlying conventional applications of that theory.

This paper will describe many of the practical problems that have been addressed over the past ten years of modem development. Some of the issues addressed have an RF analog, but the severity of the channel and the combination of channel constraints and modem-platform operations makes acoustic communications a very different problem. In particular, we address these issues via their impact on physically small, battery powered, DSP-based, omni-directional modems. We will note that nearly all of these problems can be ameliorated through use of more capable modem infrastructure, but such infrastructure tends to be larger, much more costly, and harder to deploy.

New Paradigm for Naval Tactical Communications

Ms Laura Casadevall, ***Indra*****, Spain**

The Multifunctional Information Distribution System (MIDS) – Low Volume Terminal (LVT) is the current NATO terminal for Link16 digital data communications to fighter, surface combatant, and Command and Control (C2) host systems, used by Army, Navy and Air Forces.

Currently, Software Defined Radios (SDR) are taking a strategic position in the military communications world, with several benefits as networking interoperability, easier reconfigurability, and reduced develop and maintainability costs.

Based on the SDR concept, US government has planned the Joint Tactical Radio Systems (JTRS) program as the next-generation voice-and-data radio for use by the US military in field operations, built upon a Software Communications Architecture (SCA) an open-architecture framework that tells designers how hardware and software are to operate in harmony.

In this new scenario, the new brand of MIDS-JTRS terminals are the natural substitute of the current MIDS-LVT ones, which allows keeping the current MIDS capacities, and allowing the use of more waveforms, reprogrammable crypto, and all the benefits of the radio software.

Spain is developing its own National MIDS-JTRS program, based on the US one, including National developments. This program is part of the Spanish involvement in other SDR/SCA initiatives, both National and European, like TERSO, WINTSEC, SCORED, ESSOR…

Submarine Satellite Communication Terminals – Systems and Evolution

Mr Pedro Elola, ***Indra Espacio*****, Spain**

The aim of this paper is to present the Indra Espacio's solution for Submarine SATCOM, initially for the Spanish Navy, but now for other navies.

Indra Espacio started development of this brand of systems with the Spanish SECOMSAT Program, a Governmental SATCOM Network devoted to communicate different remote terminals to a metropolis hub station.

At the beginning and over the first Submarine SATCOM system, the main task was just system integration. A complex antenna design had been implemented in order to achieve radio-electrical performances but taking into account mechanical restrictions. The antenna subsystem is mounted over the telescopic mast and communications are established at periscope cote. This system has been integrated and is now in operation into the S-70 series Submarines.

The main contribution of this system is that allows a voice and data communications link with high degree of security by using satellite. The use of a spread spectrum modem increases its performances under jamming condition.

Thursday 13th November: 1600hrs

Session 8F: Maritime Security *Architecture*

The Integrated Ship and Harbour Area Protection System Architecture

Dr Ryszard Rugala, ***R&D Marine Technology Centre (CTM)*****, Poland**

Collecting data from various sensors and databases, and human originated information, and fusing its into RMP are the main challenge to support the Maritime Domain Awareness System.

There are many concepts focused on this problem in the world over. This paper will describe what particular elements of ship and harbour protection system architecture should be taken into account in the national concept. The reference models (RMs) to be considered in this aspect there are: US DoD Technical RM, The NOSE RM, NIIO RM and OSI RM very strong joined with proposed concept.

The idea is to integrate as much as possible all harbour's and ship's sensors, effectors (if any) and C&C systems to have complex protection system ready to use counter asymmetric threats.

Particular attention will be paid to the net-sensing, using the acoustic and non-acoustic underwater sensors, communication problems and data processing modules needed for rapid and precise assessment of threats to make ready the supporting tools for decision makers. Also important processes such as as information fusion, profiling, data mining and prognostics must be considered.

NAval Operation System for Maritime Safety and Security (NAOS MS2)

Mr Michel Morel, ***DCNS*****, France**
Paul-Phillipe Gilles, DCNS, France

Thanks to its experiences in Naval Operation Systems for the French Navy, DCNS has prototyped a distributed Communication and Information System (CIS) which allows processing of the Global Maritime Situation from several contributor nodes, and provides a tool-box to analyse the traffic and automatically detect suspect events (abnormal behaviours for instance).
The contributor nodes process sensor data such as AIS or Radars, databases such as Lloyd's Register or the MOU of Paris, and also formatted signals from Messages Handling System or Combat Management System on military ships.

The CIS NAOS implements new algorithms to compute correlation and compilation of the global situation at the synthesis node, and a cube indexation algorithm to find quickly mobiles or events (GRE) into a selected period of maritime traffic recorded in database. Automatic maritime situation assessment is performed through a rules-based engine which takes into account identification criteria, detection criteria, ship's cinematic parameters and ship's information such as detentions or inspections.

These rules allow real-time display alerts without pre-emption. Communications between NAOS nodes is performed through a "publish and subscribe" mechanism over large IP network, which can fit to a limited bandwidth, for instance for satellite communications.

NAOS is a performing and portable solution using COTS and civilian standards with high security level which can be fitted to existing Vessel Tracking System (shore-based or at sea), and enables to reduce working load of maritime surveillance operators by focusing automatically on major suspect events (abnormal behaviours for instance) and intelligent data retrieving for reports.

NAOS MS2 is offered for export by DCNS to shore centres, surveillance vessels as coast guards, either integrated with a Combat Management System or stand-alone.

Integrating Protection Systems for Potentially Dangerous Maritime Objects

CMS Artem Popko, ***Marine Bridge & Navigating Systems*****, Russia**
K. A. Smirnov/I. A. Moryakov, Maritime Bridge and Navigating Systems, Russia

The protection of maritime dangerous objects, especially oil & gas terminals, drilling & gaining platforms, and etc. – is a standard problem that requires non-standard solutions.
The latest investigations of these problem have commonly found that a basic and optimal structure, that provides a protection of problematic objects is Integrated Protection System (IPS). According to experts, this system must provide the optimal correlation of the following factors:
a) remote control of the guard facilities and detection equipment; b) forecasting consequence of probable threats; c) minimisation of technological and human risks; d) operative management and interaction with emergency services, maintenance and guardian units and armed forces. Also, IPS must be capable of controlling ships and aircraft (like a traffic managing system), and supervise a meteorological situation. All afore-mentioned factors necessitate the integration of IPS according to the principle "operator-facilities-ambience".

This report will detail the concept and measures for the complex integration of IPS. The general principles are: a) for information-technical part: possibility of computer modelling of the protected object and estimation of the efficiency of the guardian facilities and detecting equipment working; forecasting consequence of probable threats; constructive integration on base of the central control board of situational centre; forecasting and control of the technological risks; unceasing monitoring the condition surrounding ambience, by detecting equipment and condition of guardian facilities; comfort of system design with interfaces; b) for organizing-technical part: optimum location of protection zones and borders; "human-factor" management for object's protection; interdepartmental interaction of forces when the threat arises.

Marine Bridge and Navigating Systems has 17 years experience of management, design, manufacture and commissioning of IBS (for NAVY), ICS and IPS (Integrated Control Systems & Integrated Protective Systems) for maritime oil&gas objects, shore installations and units of infrastructure.

Service Oriented Architecture (SOA) for Maritime Surveillance

Mr Daniel Tiberghien, ***Thales Communications*****, France**

Facing terrorism necessitates a strong emphasis on air & maritime surveillance. In order to achieve the necessary cooperation between all involved civilian and military actors, their IT systems shall be able to interoperate at all levels: Shared semantic/ syntax; Shared interaction models, patterns and protocols.

Considering the heterogeneity of the partners and of their systems, such an interoperability is far from being reached today. Thales believes that the solution can come from Service Oriented Architecture (SOA) and Enterprise Service Bus.

SOA is a System of System integration pattern where the different systems interact thanks to service calls. Whilst this concept is not new, it has recently gained credibility thanks to wide adoption of Web Services technology.

Enterprise Service Bus is the key element of an SOA: It provides an integration, mediation and orchestration infrastructure for the different systems to connect to.

This paper will present the Thalea SOA Reference Architecture, its latest implementations and lessons learned. It will develop a maritime surveillance use case.

Thursday 13th November: 1600hrs

Session 8G: Technology *Radar 2*

Over-The-Horizon Radar – An Introduction to WavE RAdar (WERA)

Mr Thomas Helzel, ***Helzel Messtechnik GmbH*****, Germany**
Matthias Kniephoff/Leif Petersen, Helzel Messtechnik GmbH, Germany

The WERA system (WavE RAdar) is a shore based remote sensing system for monitoring ocean surface currents, waves and wind direction, that can also be used for ship detection and tracking.

WERA uses the lowest noise FMcw technique to provide highest temporal and fine spatial resolution for time critical applications. Results for various installations from all over the world demonstrate the features and flexibility of the system: high resolution monitoring (range cell size of 300 m)

over a range of 60 km or long range applications (more than 200 km) with 3 km range cell size.
For specific applications the technical performance depends on the site geometry, system configuration and the environmental conditions.
These aspects will be discussed to enable prospective users to evaluate this technology for their own application(s).

Spray-cooling of High Power Electronic Subsystems

Mr Colin Davies, ***GE Fanuc Intelligent Platforms*****, United Kingdom**

Radar and signal processing applications continue to benefit from advances in semiconductor technology.

There is a new factor coming into play though, with increased performance comes increased system level power and it is the need to get rid of this heat that as much as anything is beginning to stifle innovation on the part of system integrators.

This paper will provide an introduction to spray-cooling and its application. This revolutionary technology can support the power densities associated with new multi-core designs and processing shelf powers measured in KWs. What's more spray-cooling represents a highly cost effective solution when compared to alternative and physically larger solutions while at the same time it has the potential to offer increased reliability. The paper will also go on to show how spray-cooling is being successfully used in several major programs that are about to transition from laboratory to theatre.

High Resolution Millimeter-Wave Radar for Sea Target Identification

Mr Jose M. Muñoz-Ferreras, ***Universidad Politecnica de Madrid*****, Spain**

Nowadays, high resolution radars are reaching a great interest in the research community.

By transmitting a large bandwidth signal, they achieve a fine range resolution. A fine cross range resolution depends on a large variation of the aspect angle during the coherent processing interval.

In this paper, a high resolution millimeter-wave radar will be described and its capabilities for sea target identification explored.
The radar transmits a large bandwidth chirp, i.e. it is a linear frequency modulated continuous wave radar. The ISAR (Inverse Synthetic Aperture Radar) technique is used for the generation of images of non-co-operative targets. These images, if correctly focused, may usually outperform the traditional optical images in adverse atmospheric conditions. Improved focusing algorithms for the quality enhancement of these images will also be described. Real data from the sensor prove the viability of the technique for sea target identification.

Friday 14th November: 0900hrs

Session 9A: Plenary/panel Session: Title t.b.c.

This interactive session will unite an unique panel of international maritime security experts to debate a core MAST theme. Chaired/moderated by a senior level Spanish naval/maritime agency representative, the panel – to be finalised in Autumn – include: Rear-Admiral Jay Cohen, Head, Department of Homeland Security's Science and Technology Directorate, United States; Commodore (RN) Robert Mansergh, Deputy Director, US Second Fleet Combined Joint Operations From The Sea Centre of Excellence, USA

This session will also give delegates the opportunity to influence the direction of discussions by pre-submitting questions via the committee.

Friday 14th November: 1100hrs

Session 10A: Maritime Security *Above Water Protection*

Ship Protection within Littoral Waters – A French Navy Perspective

Rear-Admiral Stephane Verwaerde, ***French Navy*****, France**

French lessons learned during recent operations in Lebanon and in the North Indian Ocean are that asymmetric threats are increasing in littoral areas; requiring ships to possess an efficient self defence system. The threats are three dimensional (under the water, on the surface or in the air).

Theoretically, the self-defence measures required by a ship must be able to respond during a series of different phases (detection, identification, warning, coercion, neutralisation, destruction). Several factors have to be taken into account, such as Geographical , political, juridical and military aspects: Continuity of action (high seas, littoral waters, anchorage, port), poor detection in shallow water, poor manoeuvrability in vicinity of the coast or at slow speeds, mixed activities (sailing, fishing, merchant) Crisis level, weapon employment and military action in foreign territorial waters, Crew organisation, reactivity, efficacy, recording, control of action, ROE compliance, progressive effects and collateral damage.

Any solution to the self defence question is clearly heavily orientated towards an equipment perspective: new sensors, new effectors (both lethal and non lethal) and new systems will be required.

Developing current and procuring new equipment to improve the self defence capacity of our ships is a major topic for naval operations and an area of interest for co-operation among navies. Shared development inevitably implies reduced costs.

This paper will discuss proposed French Navy's future plans.

An Interoperability Framework to Provide the "Common Maritime Picture"

Mr Hugues Sassier, ***Thales Alenia Space*****, France**

Maritime Safety and Security (MSS) system requires the combination of information from different sources including satellite, aerial and terrestrial systems (AIS, LRIT, in-situ, coastal radar systems VTS,…).
Current EU requirements (EUROSUR, Blue Book…) call for seamless data exchanges and multi-role systems.
This paper will present the results of a scalable solution contributing to a future Information space where institutions, local authorities, data and service providers can collaborate and exchange information with no technical restraints.The proposed solution is based on a Service Oriented Architecture (SOA).
The strong advantage of this architecture is to generate information systems enabling the creation of applications as a combination of "services" and "data resources" without the knowledge of the underlying systems.

Maximal interoperability is guaranteed through compliance with the main current and emerging standards. The solution includes a set of generic services, standard data modelling components which facilitate the deployment on different MSS use cases.

A scenario will be used to illustrate port security monitoring, based on detection of ships using different sensors and combined with other useful information in an interoperable framework.

Maritime Security in Brown Waters

Vice Admiral Richard Börjesseon, ***Security Alliance Stockholm AB*****, Sweden**

Most of the world's population lives close to the coastline and most countries are dependant on sea-transports Merchant ships and even blue-water navies must occasionally enter harbours, or operate in the littoral zone.

Navy ships must have self-defence against hostile attacks. In the open sea they must rely on their own defence systems but what will happen in brown waters?

You have to control not only the air, the surface and the underwater volume but also the adjacent land area and share the operational picture with all units involved, military as well as civil.

You must have: Communication links that can distribute not only text but also pictures in real time and over long distances; Encryption systems that can protect secret information; Interoperability between own units, civil actors and other nations; Joint Mission Planning.

In the final paper and in the conference session, the current solution will be described.

Friday 14th November: 1100hrs

Session 10B: Technology
Subsystem Integration

Innovative Techniques Developed within the Seawolf Mid-life Update (SWMLU) Programme

Mr Stephen Hall, ***BAE Systems (Integrated Systems Technology)*****, United Kingdom**

The Seawolf Mid-Life Update (SWMLU) programme is a major update to the UK Royal Navy's principal Type 22 and Type 23 Frigate point defence weapon system. The update includes the addition of an Electro-Optic (EO) sensor as well as upgraded I and Ka band radars.

As part of the SWMLU development programme, a hierarchy of innovative validated test environments have been developed to exercise the system functions at appropriate levels of abstraction. This hierarchy ranges from 'hardware in the loop' representations of minor subsystem functions to statistical representations of major subsystems.

This paper will describe the SWMLU system in the context of the overall weapon system design. It further discusses the methodology used for model validation in both Radar and IR bands in order to provide a high fidelity integration and modelling suite, thus enabling a cost effective design and acceptance process to be realised.

Sonar 2087 – An Engineering Challenge in Platform Integration

Mr Philip Gwynne, ***Thales Group (Naval Division)*****, United Kingdom**

Low frequency active variable depth sonar (LFA-VDS) provides an unrivalled operational capability for ASW surface ships to counter a diverse post-cold war submarine threat in environments from traditional deep water to the littoral.

Installation and operation of crucial components of LFA-VDS systems (projector and receiver arrays and their handling systems) present significant engineering challenges particularly in the case of adaptation of existing platforms.
This is heightened by the clear trend of fitting LFA-VDS systems to smaller platforms. System design has evolved to provide required sonar performance whilst respecting platform structural and operational constraints. Sonar 2087 is the latest evolution of LFA-VDS to go into operational service, on RN T23 frigates.

The development successfully tackled these challenges in a programme characterised by the open style of collaboration between MoD and industry. The result is a potent operational system which provides an excellent basis for future capability evolution.

Integrated Sensor & Communication System

Mr Peter Stoffer, ***Thales Nederland*****, Netherlands**
Jos Visser/Willem Hol, Thales Group (Naval Division), Netherlands

On many naval ships it is common practice to switch some systems off before activating others, in order to avoid interference problems.

There is no easy and all-encompassing solution to this complex problem, but Thales Nederland has developed an Integrated Sensor & Communication System (ISCS) a mast that will accommodate, depending on the customer's specifications, all radars, IFFs, electro-optical sensors and several communication systems. The benefits of integrating all these systems in one deck structure are huge.

First of all, they are designed to operate simultaneously, so that all risk of interference has already been eliminated. Maintenance and repairs are very easy since all sensors can be approached from inside the mast. A crewmember can enter the mast from the deck below and perform his work sheltered in the protective interior of the mast.

And thanks to the absence of protective housings in the mast, all maintenance and repair activities are easier to perform. This reduces the crew's workload considerably. As the sensors and communication units in the ISCS structure are positioned close to each other, they do not need their own cooling and power supply systems. Instead, the ISCS has one central power and cooling capability for all units inside. ISCS is a modular concept.
Although Thales has developed several types of surveillance and tracking sensors that are optimised for operating in the ISCS, the customer may require the installation of other sensors. In such an event, Thales will assume the role of system integrator and make its expertise available to the customer so that the original advantages of an integrated sensor mast are maintained.

Craft Integrated Electronics Suite (CIESTM) – Summary of an Operational Programme

Mr Larry W. Wiley, ***Naval Surface Warfare Center (Carderock Division)*****, United States**
E. Gordon Hatchell, Naval Sea Systems Command, Naval Surface Warfare Center (Carderock Division), United States

Craft Integrated Electronics Suite (CIESTM) is the integration of traditionally separate craft systems into a central user interface that is designed to survive in a marine environment.

These systems include navigation, communications, situational awareness, and craft control/monitoring. From this interface a user can view radar information, GPS data, communicate intra- and inter-craft, access video from sources on- and off-craft, and be aware of the health of the craft. The system was designed to meet industry and military standards. This allows CIESTM to be scalable and flexible, and it does not need to be redesigned if new sensors or craft systems are required to be integrated after the system is installed into a craft. This flexibility also applies to mission load outs and evaluating new technologies.

CIESTM has the capability to share its Local Area Network (LAN), power, video distribution, communications, and GPS data with carry on equipment.

This paper will present an overview of the program that will show the latest Operations and Capabilities of combatant craft; most specifically in the area of integration of all functions of a craft that affect own craft and other operational units. The paper will discuss the operational qualities of the product and the technical requirements to produce these results. It will also discuss successes such as test craft turned into operational assets.

Friday 14th November: 1100hrs

Session 10C: Platforms
Design – General 1

Modelling Enhanced CO2 Absorption in Soda Lime at Low Temperatures and Elevated Pressures

Dr Tiang Hong Gan, ***Defence Science & Technology Organisation (DSTO)*****, Australia**

Soda lime and lithium hydroxide are the most commonly used carbon dioxide absorbents in submarines.

Their useable absorption rates and capacities are adversely affected at extremes of temperatures (~ 5°C) and pressures (>5 bar), with a reduction of up to 80% for soda lime. Insights from simplified chemical reaction – diffusion modelling of soda lime suggest that the complex temperature and pressure effects are controlled by several physical and chemical reaction sources. Both effects are less pronounced with lithium hydroxide, due to intrinsic differences in chemistry.

Enhanced absorption in soda lime may have overcome these adverse effects, showing pressure invariance at 20°C and relatively lesser temperature effects at elevated pressures. The findings of temperature and pressure variations have CO2 management implications for operational and disabled submarine scenarios. Results of reaction – diffusion modelling however suggest that the increased mass transfer and greater accessibility of reaction sites from faster dispersion of CO2 are insufficient to mitigate the reduction in useable absorption capacity due to severe depletion of catalyst in soda lime.

The results to be presented in this session, confirm the need for a more suitable catalyst to improve CO2 absorption under extreme conditions.

Advanced Electric Ship Demonstrator:

Ms Deborah Naichajian, ***Office of Naval Research (ONR)*****, United States**

This paper will address a specific technical way of introducing new technology into the fleet, demonstrating technology on a large scale and verifying design and analysis methods in accordance with the U.S. Navy's risk reduction policy.

To reduce risk for technology insertion for submarines, the Navy has operated large-scale models at the Naval Surface Warfare Center Carderock Division (NSWCCD) Acoustic Research Detachment (ARD), in Bayview, ID.

Under a program sponsored by the Office of Naval Research (ONR), a quarter-scale destroyer-sized test platform has been constructed and is being used as a technology demonstrator to provide data to improve ship design and analysis methods. This test platform, the Advanced Electric Ship Demonstrator (AESD) is being operated at ARD.

The platform, named Sea Jet, is based on an advanced, wave piercing hull form that was considered early in the DD(X) program. Sea Jet is constructed as a modular design that facilitates the installation and testing of multiple technologies. Small-scale testing for development of signature control technologies is severely constrained due to difficulty in replicating appropriate ship and system (propulsion) dynamics and in scaling of concepts. Sea Jet alleviates many of those concerns because it is a large scale model.

Sea Jet has completed the first in a series of technology demonstrations. The focus of the maiden application of the Sea Jet was been the demonstration of the Rolls Royce Naval Marine Inc (RRNMI), waterjet concept, named AWJ 21TM. The AWJ 21TM test program addressed many challenges and provided data in many areas. Preliminary trials provided data to assess manoeuvring performance and to compare against numerical predictions and small-scale model tests. Subsequent testing evaluated AWJ 21TM efficiency and acoustic signatures. The acoustic evaluation required tests to characterize Sea Jet self-noise to allow assessment of signatures from the AWJ 21TM waterjets. Self-noise due to machinery systems and other sources was determined or estimated from onboard vibration and off-board measurements. The data collected from these tests are being used in the development of design and analysis methods and to further understanding of ship acoustic radiation mechanisms in other ONR programs.

Tools and methods used to design the AWJ 21TM pumps have been evaluated using the data collected during the trial. The test program and data collected has also permitted verification of the thrust vectoring and reversing system developed as part of the AWJ 21TM propulsion system. The AWJ 21TM test has also provided preliminary data to assess an advanced motor drive system in a realistic environment. This data will allow improvement to motor drive models. The Sea Jet AWJ 21TM test effort has provided large-scale demonstration of a non-conventional propulsor concept for large combatants and has provided data and understanding to improve design and analysis methods across a range of systems for future ship designs.

The second Sea Jet technology demonstration is currently underway. The focus of this demonstration will be an assessment of the RIMJET propulsion pod. Sea Jet was modified by replacing the AWJ 21TM stern with a new stern that was designed for the RIMJET propulsion system.

The propulsion controller system was modified to control the RIMJET system instead of the AWJ 21TM waterjets. Installation of RIMJET has proven the modularity of Sea Jet is an affordable way to maintain a large scale model with multiple technology thrusts. In addition to obtaining hydrodynamic performance data, the RIMJET acoustic and magnetic signatures are being measured simultaneously to further the validation of signature prediction models. RIMJET is the next step to advance understanding and demonstrate physics in the areas of ship electric propulsion technologies and external podded propulsion.

Landing Craft – Simple Ships or Time for a Rethink? A Designer's Perspective

Mr Nick Noel-Johnson, ***BMT Defence Services*****, United Kingdom**

Are landing craft simple ships or should they be regarded as some of the most challenging designs in the marine environment, in terms of the balance between functionality, performance and safety?

This paper will propose that in order to make landing craft truly effective it is necessary to understand in more detail some of the unique challenges posed by their role.

We contend that these challenges are not fully understood, leading to unbalanced requirements and exposure of the operators to unnecessary risks.

This paper will discuss links between landing craft capabilities and the concept of operations and reviews the primary challenges and safety concerns in the design of the craft. Catalysts are proposed to encourage step improvements in landing craft technology, thus overcoming some of the traditional problems inherent in their design and meeting the capability requirement in a more cost effective way.

Modular Stabilized Weapon System Integration for Combatant Craft

Ms. Jennifer Grimsley PE NA, ***Naval Surface Warfare Center (Carderock Division)*****, United States**
Kent Beachy/David Fox/Richard Wilkie, Naval Surface Warfare Center (Carderock Division) Combatant Craft Division, United States

The US Navy's Naval Surface Warfare Center Carderock Division (NSWCCD) Combatant Craft Division (CCD) is leading a unique program to design, integrate and test a Remotely Operated Weapons System Module for rapid integration onto combatant craft including manned and Unmanned Surface Vehicles (USV).

The operational requirements for the system are to provide short range firing capability against a range of threats and permit small combatant craft the flexibility of maximizing payload reconfiguration options through a truly modular design and integration approach. The system will be remotely operated from the crew compartment or unmanned station for USV applications.

The technical requirements for the module design and installation necessitate flush-deck integration. This will provide significant advantages for a clear working deck for cargo handling and safety, minimal impact to crew visibility on manned craft, increase in reliability and maintainability of the weapon system susceptible to degradation from the marine environment, and will maintain craft signatures when required.

This two-year program is a rapid technology transition program initiated in December 2007 under the sponsorship of the Office of the Secretary of Defense (OSD) Acquisition, Technology and Logistics (AT&L). The objective of the program is to design, build and test a common prototype that will be integrated onto two different craft for proof of concept and extensive test and evaluation within the two-year timeline.

This program has direct technology transition to the US and Foreign Navies focused on littoral operations with combatant craft that require short range offensive and defensive fires capability. Lessons learned from this effort apply to programs looking at integration of weapon systems onto combatant craft and surface ship platforms where requirements for maintenance, clear deck operations, modularity and ship signatures are design drivers.

Friday 14th November: 1100hrs

Session 10D: Systems
Net-Centric C4i

Putting the Submarine at the Heart of Network Centric C4I – The Final Fathom

Commodore Patrick Tyrrell, ***Vale Atlantic Ltd*****, United Kingdom**

This paper will report on the recent UK submarine trial using an Openkast XML product to deliver a broadband capability over limited bearers to a deployed submarine.

The trial looked at ways of enhancing the submarine's

participation in the Network Enabled Capability (NEC).
Real-time situational awareness is maintained within a virtual submarine presence utilising a wide range of disparate sources.

Whenever the submarine establishes a link with its virtual self the following occurs: firstly, abbreviated C3 messages are pushed to the submarine in priority order; secondly, the submarine has the opportunity to reach back and mine information to support its mission objectives. This includes an immediate update of the current Common Operational Picture. Chat, SMS and white-boarding are available whilst the connection is live.

Development of Secure Scalable Net-Centric Systems- A Proven Design Methodology

Mr. Gordon Hunt, ***Real-Time Innovations, Inc.*****, United States**

As net-centric systems grow and integrate new systems and functionality as well as existing systems, it becomes clear that the net-centric environment will scale beyond any truly predictable bounds.

Worse, the ability to maintain, or indeed enhance, security within the net-centric environment is going to be severely challenged by the highly dynamic nature of a deployed net-centric system.

A “one-technology fits all” approach will not work, nor will leaving implementers to integrate individual protocols, applications, and systems one at a time. Advances in open standards are transforming the way in which secure net-centric systems are being designed and built. One proven and widely adopted approach uses a data-first, publish-subscribe methodology as a means to describe the net-centric environment independently of the current set of systems that defines it. But there are still security challenges. How does one leverage open standards, real-time distributed middleware, enterprise infrastructures, advanced filtering and event processing technologies, and disparate languages yet still provide the point-to-point security guarantees present in legacy systems?

This talk will demonstrate how to build open, secure, multi-technology net-centric systems, leveraging numerous examples of success in the US DoD, and European Defense organizations.

Friday 14th November: 1100hrs

Session 10E: Technology

Maritime Domain Awareness

Coupling ASTON-ESCADRE and Ptolemy II-DSDF Simulation Frameworks for a Convenient Technico-functional Algorithms Test-bed

Mr Vincent Arnould, ***DCNS*****, France**
Sebastien Dewe, DCNS, France

Despite the well-know advantages of distributed processing for intensive computations, simulation frameworks often fail to exploit them.

In particular, simulation frameworks that address the technico-functional/operational level often offer HLA or DIS features to insure interoperability at top level through distribution. But they do not provide any convenient mean to apply easily pipelining/parallelism techniques at the algorithm level.

This paper will present the DCNS SIS approach to enable that kind of tooling, in order to test our algorithms in a synthetic technicofunctional / operational environment, within a easy distribution automation, allowing better execution times by reducing makespans.

Therefore, the paper has four objectives:
To provide a quick summary of Simulation State of Art in order to introduce the context and stakes of getting usage of simulation frameworks;
To provides a focus on two simulation frameworks: ASTON-ESCADRE, for technico-functional and operational modelling and simulation (French DoD open source projects), and ADS (Automated Distributed Simulation) through Ptolemy II -DSDF (Distributed Synchronous Dataflow) (U.C. Berkeley open source project) for data processing algorithms modelling and distribution automating;
To present the DNCS SIS approach to perform efficient algorithms studying, tuning and perfecting in a synthetic functional / operational environment, by coupling heterogeneous simulation assets produced by these two frameworks.

In conclusion the paper will provide a quick introduction on current and future research projects (TSMPF, MOCA) that might get use of this multi-levels modelling and simulation tooling, and that deal with the MPEC problematic (Multi Platform Engagement Capabilities).

Improving Ship Detection using High Resolution Synthetic Aperture Radar (SAR) Images and Advanced Time-Frequency Processing Techniques (ATF)

Mr Marc Spigai, ***Thales Alenia Space*****, France**

In the field of maritime surveillance with remote sensing, satellite Synthetic Aperture Radar imagery presents many advantages.

It allows a high level of availably on large geographical areas whatever the weather (clouds) and the hour. These satellite radar sensors have been widely tested during past years and their interest for maritime surveillance has been proved in various projects (IMPAST, MARISS, …).

Most ship detection algorithms of radar images are intensity-based and they work generally well in low and medium sea-state but can suffer of poor performances when the sea condition degrades.

This paper will present an algorithm which is based on sub-aperture decomposition which analyses the behaviour (stable/instable) of image pixels during the acquisition time. This allows to separate boats from sea clutter with less sensibility to sea conditions. The algorithm which allows near real-time, largely automated processing with a low rate of false alarms will be presented along with an estimation of its performances from a representative radar images database.

Modelling and Experiments on Search, Detection, and Retrieval Methods for Container Ships

Mr. Frank Leban, ***Naval Sea Systems Command*****, United States**
Professor Gordon Parker, Michigan Technological University, USA; Professor Fotis Papoulias, Naval Postgraduate School, United States

In view of the need to ensure maritime shipping security, a system-of-systems study for maritime domain protection has been performed.

Research is underway to deploy inspection systems at sea, reducing the risk to port facilities. A key feature of this study is the detection and identification of dangerous materials aboard large container ships. While accuracy is paramount, the search rate must be maximized to reduce the disruption of legitimate commerce. The efficacy of statistical sampling versus 100% inspection has been heavily debated in the U.S. in the past 2 years.

Regardless of the outcome of this debate, it is likely that in the future the percentage of container inspections will increase from the current 5% and may involve containers already loaded on ships. This paper will include an overview of applicable sensory detection capabilities and presents them in the context of results from an appropriate search model.
The utility of cooperative autonomous robotic systems for this mission is discussed.

The other aspect that this paper addresses is the challenge of isolating and off-loading suspicious containers from ships prior to reaching a port facility. Specific technologies considered are special-use ship systems and autonomous container handling equipment.

Measure of Total Integrated System Survivability (MOTISS) Analysis of a Notional Surface Combatant Ship

Mr. Grant Raisig, ***Alion Science & Technology*****, United States**
J. Jones, Alion Science & Technology, United States

The Measure Of Total Integrated System Survivability (MOTISS) analysis program is currently capable of conducting total integrated survivability analyses of varying types of “targets”, including both surface ships and buildings.

Depending on the type of target in question, MOTISS determines the relevant processes from amongst its full range of capabilities to include in the analysis. Survivability implications for surface ships (including combatant, commercial, and private) vary depending on the type of ship being analyzed specifically with respect to how each aspect of total integrated survivability (susceptibility, vulnerability, and recoverability) is accounted for and determined.

When conducting a MOTISS analysis of a surface

combatant; susceptibility, i.e. countermeasures and signatures (radar, IR, acoustic, etc.) are key factors in determining threat selection and hit distributions. Vulnerability, the time dependant measure of the inability of a target to maintain some functional capability after a hostile attack or damage event is of equal importance when analyzing a combatant or commercial ship; however when analyzing a surface combatant there are factors to be aware of and accounted for that may not be present in a commercial or private ship, such as armor schemes and onboard munitions.

Recoverability is the key to survival for surface ships post damage event, specifically with regards to a surface combatant it is the key to obtaining and maintaining a desired degree of critical mission support when in hostile environments.
The main concern of a commercial ship post damage event will always be the safety of its passengers and crew; however for a surface combatant post event recoverability, must in addition to the safety of its crew, account for its ability to carry on with its intended mission.

MOTISS ßv2.0 currently has the necessary capabilities to support surface ship analyses including the ability to evaluate conditions of vital systems and components, mission requirements, and crew availability.

A MOTISS ßv2.0 surface ship analysis will require the implementation of the full range of MOTISS's current capabilities including threat generation, weapons effects determination (from blast, ballistic, etc.), progressive fire spread and flooding, network deactivation and reactivation, secondary detonation awareness, as well as personnel evacuation times and routes.

Within this paper, the authors will present the method of applying the MOTISS program to a notional surface combatant ship. An example MOTISS analysis for the evaluation, comparison and optimization of a notional surface combatant ship's total integrated survivability will be walked through from initial modeling to final results post-processing.

Friday 14th November: 1100hrs

Session 10F: Systems
Modelling & Simulation, Test & Evaluation

Exploiting Synergies between Naval Operational Systems and Test, Evaluation and Training Ranges

Dr Lyn Owen, ***QinetiQ*****, United Kingdom**

For the past six years QinetiQ has been conducting a highly successful open architecture research programme for the UK Ministry of Defence, covering Sonars, submarine C2 systems and open architecture alternatives for current submarine combat systems.

In parallel a research programme was being carried out to develop the Integrated Networked Test and Evaluation Capability (INTEC) architecture for the UK Test & Evaluation Ranges.
This combined work now been very successfully exploited in the form of a series of production Sonars for the Royal Navy and high integrity tracking systems for the T&E Ranges.
This paper will consider the very significant cost and capability benefits that will accrue from further synergies between operational and T&E systems, including more effective on-range training and the use of synthetic entities, common data management and data analysis schemes, reuse of common infrastructural and application components, faster upload of T&E results and many others.

A Modelling and Simulation Tool to Measure Naval Task Effectiveness across all Warfare Domains

Mr Francesco Perra, ***Orizzonte Sistemi Navali*****, Italy**

Until now, the Modeling & Simulation (M&S) activities of naval tasks across the main four main domains(AAW, ASuW, ASW, LAW) have been considered individually.

The consequences of this approach are: development of separated field of knowledge for each domain of warfare; considerable activity from government agencies and industry dedicated to develop detailed M & S tools for each areas of warfare; the lacking of models which tackle the four area of warfare in and integrated environment.

Current issues on naval concept of operations such as littoral warfare, joint operation, interoperability, influence on land and asymmetric threat, require M&S activities that integrate all domains.

This paper will propose such an M&S activity, presenting development of a tool which will evaluate the effectiveness of the four area of warfare.

In the framework of the tool following entities and related attributes are included: hierarchical tree relating mission, task, capabilities, functions, systems and subsystems; sub–systems and their attributes related to design parameter; geographical and environmental data related to the four area of warfare; the threats relevant for each task and their characteristics;the performance of the subsystems (detection, engagement, mobility); the effectiveness of a single ship in each naval task.
Naval task effectiveness is worked out using analytical and or simulation approaches and which use as input mainly subsystems performances facing specified threats.
The tool could represent: the starting point to develop knowledge related to four areas of warfare; an educational support in naval academies, agencies, universities; an useful asset to be used in conceptual design where effectiveness and cost are to be traded off; a set of models to be used in HLA simulations.

Naval Warfare Performance Simulation Techniques with Improved Modelling of Interaction with Environments

Dr Christian Audoly, ***DCNS*****, France**
Julien Botto/Alexandre Garnier, DCNS, France

Technico-operational simulations are often used to evaluate combat system performances of warships or naval systems. The latest topics of interest e.g. warfare operations in littoral areas, maritime safeguard, and defence against asymmetric threats, demand more accurate descriptions of the environment for simulations.

In response, this paper will present a method based on SEDRIS standards and adequate Application Programming Interfaces, to ensure an accurate description of the environment in the simulation and an actual coupling with the models included in the scenario (platforms, sensors, propagation, weapon systems..).

The paper will illustrate an example of application of the technique for in a particular scenario (radar detection of threats by a ship in a zone with elevated islands). The threats are surface vessels with possible missile launching, hidden by the islands. Detection can be improved by the use of an UAV as a remote sensor.

CAP:a tool for Concept Development and Experimentation

Mr Yves Lavaux, ***Thales Underwater Systems*****, France**
T. Cain/P. Cosgrove/ P. Sicilia, Thales Underwater Systems, France

Performance prediction models based on Monte Carlo approach are traditionally used to estimate CONOPS features. CAP, the Capability Assessment Platform, provides an extended option to assess new assets and sonars involved in a global scenario.

The theatre of operations, in CAP, can be a large maritime area where numerous actors manoeuvres in a coordinated way. A "man in the loop" capability is implemented to make operators interact with previously planned strategical operations, introducing that way tactics in the scenario. This topic makes this simulation tool provide real-time operational facilities for adapting kinematics (course, speed, depth) of one particular actor and even a full force deployment.

Performances of sonars are modelled in CAP when the contribution of platforms to the loss of sensors effectiveness is itself taken into account. CAP is made to support the dynamic evaluation of new concepts of operations. The trend is for CAP to become integrated seamlessly within Network Centric Warfare systems.

The ease of interacting with the model promote customers in having a live participation to the investigations of their concepts, making them more explicit.

Friday 14th November: 1245hrs

Session 11A: Maritime Security
Lifecycle Considerations

Improving Asset Management through Enhanced Decision Support Processes

Dr Lloyd Hammond, ***Defence Science & Technology Organisation (DSTO)*****, Australia**
L. Hammond/P. Kelly/J. Sikorska, DSTO, Australia

The drive to reduce whole of life cost and an insatiable appetite for availability is forcing a change in the Royal Australian Navy's maintenance strategy.

Rigid, calendar-based maintenance practices must transition to a more flexible condition-based maintenance regime utilising technologies based on emerging knowledge management capabilities.

To meet this requirement, the Defence Science and Technology Organisation (DSTO) have initiated a research program into 'efficiency and enhancement' aspects of operating practices and capability management processes of RAN platform systems.

This initiative includes a pilot program implementing data-driven decision making processes to provide Navy asset managers with an enhanced maintenance management capability for critical assets. DSTO have developed and is about to trial a web-based software tool that can access, abstract, refine and present information from existing disparate logistical data sets to enhance asset management decision making at all levels. These tools aim to reduce Navy maintenance costs and enhance platform system reliability.

Adaptive Logistics

Ms Lori Lindholm, ***Lockheed Martin MS2*****, United States**

As the nature of 21st Century warfare has evolved into an increasingly asymmetric, fast paced distributed battlespace, the need for dynamic information sharing has increased.

This challenge is made even more difficult due to the increasing trend toward joint, multi-agency and coalition operations in inhospitable environments with limited communications availability, inflexible supply chains, large support distances and a multitude of dissimilar support systems.

Over the last three years Lockheed Martin has been working to address these challenges through development of a net-enabled, easy to implement information sharing solution called Joint Adaptive Logistics or JALog. JALog is a systems solution that leverages existing communications, existing computing resources where available, legacy support systems and advances in commercial software technologies to create an Adaptable Information Sharing Network.

The requirements that drove the JALog development included the need to monitor & aggregate asset status, convert data into actionable information, distribute information in near real time, easily integrate with legacy systems, automate administrative tasks, provide Web based access and be modular, scalable, adaptable and affordable. To meet these requirements, JALog was designed as a self aware, distributed (nodal) service oriented solution that performs data aggregation, data mining / fusion and information distribution in accordance with user defined business rules.

JALog was also designed to be non-intrusive when integrated with legacy applications. Our overall goal in developing JALog was to enable the full benefits of Sense and Respond Logistics in the Operational Domain and to provide the warfighter with effective and efficient logistics support and a Logistics Tempo that keeps pace with the Operations Tempo.

Harmonising Technical Data and Learning Content Management with S1000D and SCORM

Mr. Wayne Gafford, ***Department of Defence (Advanced Distributed Learning)*****, United States**
Paul Jesukiewicz, Department of Defence (Advanced Distributed Learning), United States

The international S1000D technical data standards community has recognized the requirement to support technical training content intended for use in the Sharable Content Object Reference Model (SCORM).

SCORM is a collection of standards used for web-based e-learning developed by Advanced Distributed Learning (ADL), a division within the Office of the Secretary of Defense (OSD). During 2007, the S1000D training subcommittee developed key and fundamental proposals to support technical data and training content for the newest edition of S1000D.

This presentation will detail how S1000D version 4 supports training, including new learning-oriented information models, a SCORM-oriented aggregation model using native S1000D processing, instructional design codes for use in S1000D-based filenames, and guidelines for preplanning reusable data.

The presentation will also present learning content in S1000D and in its SCORM-conformant output. Emphasis will be placed on how the use of S1000D and compliance to ADL ensures that learning content is in sync with products and systems it supports throughout maritime system life cycles.

Improved System Operational Availability through Autonomous Data Communication and Analysis

Mr David VanBuskirk, ***Lockheed Martin*****, United States**

A logical step toward continuous improvements in system operational availability is through expeditious logistics support and reduced support response time.

One way to achieve this is in advancing the transmission (communication) of fielded system performance and logistics data and automating the subsequent supportability analysis and logistics response processes.

This paper will leverage the ongoing Maintenance Free Operating Period (MFOP) initiative currently deployed on the US Navy's Fast Attack Submarine fleet. Advancement in Remote Off Hull Maintenance Support (ROHMS) and Autonomic Logistics (AL) analysis will transform the off-hull data transmission and resulting logistics actions to be more automated (Autonomous Data Communication and Analysis) vs. a manual procedural based approach, thus enhancing the maintenance free detection and, if necessary, any logistics response techniques.

The ROHMS is a WEB based Supportability Engineering capability with a remote Support Services WEB site that has communication protocol links to the fielded MFOP tactical system agents that retrieve, perform pre-canned and /or custom analysis or raw data requests and transmit them back to the MFOP system life cycle integrator (LCI) real time via secure SIPRNET. Requests for customized raw data logs or analysis reports can be submitted via the ROHMS WEB at any time (even when the fielded system is out of communication). When the request is received by the fielded MFOP system the raw or processed data will be sent back, real-time, to the LCI without any manual interaction. As the data is received at the LCI it will be automatically loaded into the shore based database for further analysis by predetermined Intelligent Agents and Logistics Process Triggers. The real-time communications paralleled by autonomic logistics actions will result in Optimum and Timely support actions for improved System Operational availability.

Lockheed Martin are currently leveraging proven ability in this area and enhancing this capability to expand into other systems and platforms such as the Littoral Combat Ship (LCS).

Friday 14th November: 1245hrs

Session 11B: Technology
Weapons

High Power Laser Weapons in the Naval Domain

Mr François-Xavier Doittau, ***Thales Air Systems*****, France**
Laurent Faivre, DCNS, France

High Power Laser Weapon will shortly be operational on land battlefields, mainly for treating VSHORAD and SHORAD asymmetric saturating threats.
The Naval field is equally exposed to the same threat and will take advantage of using this type of weapon.
This paper will consider the issues for introducing a High Power Laser Weapon onboard a warship:
1. What are the operational situations in which the laser weapon will efficiently treat asymmetric threats? What are these threats?

2. What are the preliminary conceptual rules for engaging High Power Laser Weapon?

3. What are the technical constrains imposed by the naval environment: integration to the ship, protection against sea water, atmospheric perturbation (transmission , turbulence).

In addition it is worth analysing the pertinence of this kind of weapon to address classical air threats like helicopters, fast aircrafts, sea skimmers
Through this analysis it will be possible to establish the complete picture, and determine the various classes of threat /operational use/laser weapon architecture in the naval environment.

Advanced Multi-Influence Naval Mine – Spain's MINEA

Mr Antonio Sanchez Garcia, ***SAES*****, Spain**

Modern vessels benefit from innovative designs and sophisticated coatings to reduce the underwater influences they originate.
Major advances have been made in reduction of magnetic and acoustic emissions. As a result increasingly sophisticated mines have to be developed.

In this context MINEA has been developed, as the latest-generation multi-influence mine that apart from acoustic and magnetic, it also detects electric, pressure and seismic influences and incorporates a sonar emissions detector.

The advanced MINEA mine has been designed and tested based on the stringent operational and performance requirements defined by the Spanish Navy, and incorporates state-of-the-art signal processing algorithms implemented on reprogrammable microprocessors that allow the selection of specific targets and enhances its ability to identify and ignore minesweeping systems.

Three types of mines have been developed: cylindrical bottom mine, low profile bottom mine and moored mine. The exercise mine modality incorporates the capability of recording the detected influences, a recovering system and a ship-mine acoustic link.

Vertical Launch Anti-submarine Rocket (VLA) – ER White Paper

Mr Steve Firestone, ***Lockheed Martin MS2*****, United States**

The Navy has embarked on a strategic direction to deliver revolutionary combat capabilities within the Network - Centric Warfare (NCW framework).

This forward looking 21st Century ASW vision includes an integrated network of platforms, with on and off board sensors that utilize evolutionary precision standoff weapons. Lockheed Martin DSS Akron has participated within the USN's cross functional ASW planning teams and has presented the new VLA – Extended Range ASW weapon system. The concept was developed with Lockheed Martin's internal research and development funding and has undergone a significant amount of engineering work over the past two years.

This modified legacy Vertical Launch Anti-submarine Rocket (VLA) system increases the Navy's ASW standoff range and provides rapid response with increased accuracy (in flight target updates) for submarine engagements. The range has increased by 4 to 5 times while maintaining reuse of the existing VLA components. The VLA -ER concept achieves the extended range primarily thru the addition of deployable wings to the existing VLA missile. The wings are deployed after rocket motor separation enabling the torpedo payload and airframe to glide to ranges well beyond that of the current VLA missile. The VLA-ER also allows for communication links for updated targeting information during flight. The deployable wings and the vehicle control system adjust to updated target locations and compensate for winds during the glide phase, thus producing an improved splash point on the target.

It is envisioned that VLA-ER can be implemented through an Ordnance Alteration (ORDALT) to the existing VLA inventory and the existing VLA ground support equipment can be easily adapted to support VLA-ER.

The VLA -ER is also compatible with Navy air platforms by simply utilizing the 2nd stage configuration (deletion of rocket motor). This maintains a consistent common missile configuration that produces similar performance characteristics as the ship Launched version stated above.

Friday 14th November: 1245hrs

Session 11C: Platforms
Design – General 2

Uses of Commercially Chartered Heavy Lift Ships for Auxiliary Naval Operations

Mr David Jurkiewicz, ***Naval Surface Warfare Center (Carderock Division)*****, United States**

Many Navies require vessels to perform niche support missions such as Casualty Reception or Maintenance and Repair. However, the acquisition of these auxiliary vessels often requires a dedicated vessel.

Heavy lift vessels have been used by the marine industry to perform a variety of transport functions, with cargoes including offshore platforms and damaged ships. They also provide a unique capability to carry voluminous cargos on a large working deck.

This paper will present a Center for Innovation in Ship Design concept to use commercially chartered heavy lift ships to perform auxiliary operations. Modular payloads are developed that are envisaged to be installed and removed as operations require. This study focuses on three specific concepts that involve using a heavy lift ship to serve as a maintenance and repair ship, a modular casualty receiving ship, or a disaster relief ship.

Design and Build of a High-Speed Technology Demonstrator Vessel

Mr Andy Higgins, ***QinetiQ*****, United Kingdom**

Future Littoral Manoeuvre (LitM) operations demand a step-change in the speed payload characteristics of assault landing craft compared to current capabilities.

QinetiQ are the prime contractor to MoD for the development of an Innovative technology Demonstrator to de-risk such a craft.

This paper will describe the evolution of a design for a high-speed landing craft technology demonstrator craft from concept to build and presents the challenges encountered and solutions reached in complying with regulatory regimes while maintaining capability.

The paper will also describe the build of the vessel (to be delivered in Feb 2009), including balancing the demands of a demanding programme with the need to explore new design areas imposed by compliance with both regulatory regimes and dimensional constraints.

The paper will conclude with an overview of the proposed trials programme and an assessment of lessons learned.

Electromagnetic Susceptibility Management – A Framework for Effective Exploitation of Electromagnetic Signature Management Systems

Mr Alastair Ballentine, ***QinetiQ*****, United Kingdom**

The signatures and susceptibility of naval vessels change over time. Ship's staff are probably unaware of this change (and the associated tactical impact) unless some form of feedback (closed loop) system has been installed.

This information can then be linked to an onboard Tactical Decision Aid (TDA) to provide the Commanding Officer with an updated situational awareness of the tactical position.

For UW electromagnetic influences, the magnetic and electric signature control systems not only need to provide signature maintenance during a patrol or transit (i.e. throughout the life of the platform) they require efficient, cost effective setting to work procedures as well. Modelling and simulation tools/techniques and model-scale test-beds provide the ability to evaluate system concepts in real-time, early in the design cycle and offer the means to de-risk many aspects of the systems prior to installation on the vessel. A susceptibility management system needs to be able to accept inputs from various signature control/ monitoring systems (e.g. acoustic, magnetic etc.). The timely processing of this data into threat related tactical information accessible via tactical decision aids enables the command team to holistically manage the susceptibility of the platform.

This paper will provide an introduction to and demonstration

of a framework for a susceptibility management system. This will include demonstration of the numerical tools, the numerical work undertaken during their design and some of the closed loop (magnetic and electric) methods evaluated; real-time data from both test-beds will be used to illustrate the results and the type of tools required for the maritime warfighter to tactically exploit this information.

Test, Evaluation and Computational Validation of High Performance Craft for Hydrodynamic Loading and Structural Response

Mr Brian Grimsley, ***Naval Surface Warfare Center (Carderock Division)*****, United States**
Jennifer Grimsley/Heidi Plebani/Jason Updegraph/Evan Lee/Morgan Stafford, NSWC (Carderock Division) Combatant Craft Division, United States; Richard Scott, Frazer Nash Consultancy, United Kingdom

Over the past year, Naval Surface Warfare Center Carderock Division (NSWCCD) Combatant Craft Division (CCD) has conducted full scale testing at sea on several unique high performance hull forms the US Navy is evaluating for future requirements in littoral warfare operations.

The hull forms provide potential advantages for speed, seakeeping and ride quality, and weight savings from use of lightweight aluminium and advanced composites.
During the test program, CCD collected a substantial data set, including craft performance and hydrodynamic and structural response, for both calm water trials and performance in waves. In addition to assessing the craft's capability and advantages to meet future operational requirements, these data sets are also being used to validate analytical computational tools for the design and evaluation of high performance craft.

This multi-year program encompasses technology advantages in computational methods for Computational Fluid Dynamics (CFD) and Finite Element Analysis (FEA), full scale testing methodologies, and design and evaluation of high performance craft for littoral operations.

This 2008 update will highlight this year's accomplishments and contributions to the technical community of high performance craft and lay out the program's objectives for FY2009. Results from the test program and validation efforts will be reviewed. This program is jointly sponsored by Office of the Secretary of Defense (OSD), Office of Naval Research (ONR), NSWCCD Board of Directors (BoD), and United States Special Operations Command (USSOCOM). This program has direct benefit to scientists and engineers in the Research Development Test and Evaluation (RDT&E) community for high performance combatant craft.

Creation of a Hull Surface Design Tool for Use in Solid Modelling

Mr Charles Forrest, G*raphics Research Corporation,* United Kingdom

This paper will describe the development of a novel hullform generation technique for the Paramarine ship and submarine design system.

It will discuss the requirements that shaped the development of the technique in terms of the user interface, the underlying mathematical methods, the need to function in a parametric environment, and the importance of compatibility with the design system's extant solid modeller. Such requirements were assembled over many years using literature searches, application prototypes and user consultations.

General features of the design solution are described. The user interface is a key component of the system and enables a patchwise hull to be developed rapidly and intuitively. Surface objects are built up from curves and define a hullform in terms of a series of patches.
The curves are associative and use high-level parametric definitions in order to achieve the user's requirements. Use of the software for developing ab initio designs or re-creation of existing designs are discussed. Associated diagnostic and analysis capabilities will also be presented.

Friday 14th November: 1245hrs

Session 11D: Systems
Tactical Data Links

Concurrent Multi-link Operations and System's Enhancements in Support of New Tactical Data-link Requirements

Commander Manuel Martinez Ruiz, ***Department of Defence (JPEO-Joint Tactical Radar System-MIDS IPO)*****, United States**

Future military communications will be required to provide higher data capacity and wideband in real time, greater flexibility, reliability, robustness and seamless networking capabilities.

The next generation of communication systems and standards should be able to outperform in a littoral combat environment with a high density of civilian emissions and "ad-hoc" spot jammers.

In this operational context it is extremely important to ensure the proper performance of the information grid and to provide not all the available but only the required information in real time either by broadcasting or upon demand, with the best possible "quality of service".

Future tactical data link systems and standards should take into consideration the multimedia nature of most of the dispersed and "fuzzy" information available in the battlefield to correlate the ISR (Intelligence, Surveillance and Reconnaissance) components in a better way to contribute to the Network Centric Operations. Existing tactical data link systems and standards have being designed to convey mainly textual information such as surveillance and identification data, electronic warfare parameters, aircraft control information, coded voice.

New operational requirements, such as imagery and concurrent multi-netting, are demanding more bandwidth and greater flexibility. New capabilities like low latency IP networking and enhance throughput will be implemented in the following years, as well as new wideband coalition waveforms.

Furthermore it is extremely important to take the most advantage of the current data link systems and standards such as Link 16 and Link 22 by using both in a better coordinated way.

In order to allocate enough network bandwidth for imagery applications, we propose to improve Link 16 resource's allocation by sharing some data link responsibilities with Link 22 and through a better Link 16 network design process to eliminate some of the not required or redundant transactions. Link 16 provides a higher data rate but a very rigid network structure. On the contrary, Link 22 provides a lower data rate but a more flexible networking concept by the mean of Dynamic Time Division Multiple Access (DTDMA) protocol and the Mission Area Sub Network concept.

Also a better and more efficient image compression algorithm based on wavelets, such as JPEG2000 for still images and MJPEG2000 for stream video, is proposed. JPEG2000 produces a totally embedded code-stream that can be accessed randomly at the operational commander convenience. This capability allows a progressive transmission scheme based on quality, resolution, components and position. We propose to combine Link 16 / JPEG2000 error resilient techniques to implement a more robust error management mechanism by transmitting the most sensitive part of the compressed image with the maximum Link 16 anti-jamming protection (AJP) and the rest of the code stream with less AJP and at a higher data rate. A comparative analysis with the current Link 16 imagery implementation will be developed.

JPEG 2000 allows also developing a "Region of Interest" for applications such as targeting and damage assessment. Finally, for other capabilities like stream video, concurrent multi-netting and IP networking some system's enhancements and product's evolution are required to increase the data link flexibility and data rate availability. A performance analysis will be presented and a need for some Link 16 System's enhancements will be justified.

A New Approach to Tactical Data Link for the French Navy

Mr Pascal Ribeiro, ***Ministry of Defence (DGA)*****, France**
G. Carrier, Ministry of Defence/DGA/CTSN, France

This paper will present the French MOD background, work and new PRISME approach (Naval tactical data link integration program for navy ships) to manage and process Tactical Data Links (TDL) into the different French Navy Combat Management Systems (CMS).

The PRISME primary goal is to provide the same multilink/multinet TDL capability for all navy platforms with a single product called MONALISA (Naval tactical data links software module for tactical situation establishment and weapons management) developed for all CMS. To challenge quick and constant evolution of the technical, technological (open architecture) and operational aspects, the Navy and the DGA conducted: 1. PALADIN (Shore naval platforms to help integration of tactical data links) study including a multi-link demonstrator; 2. MONALISA feasibility study.

PALADIN aimed at defining new multilink/multinet TDL concepts, new MMI, new TDL functions and enabled to develop a multilink TDL demonstrator including link 22. MONALISA feasibility study showed the ability to develop a generic, modular, adaptable and maintainable product on COTS hardware and software and defined MONALISA, including function and design requirements.

The development of MONALISA started with the future FREMM frigates. By November 2009, this first version will implement: dual Link 11, Link16, Link16 by satellite, Link 22 and full data-forwarding.

This paper will focus on PRISME, PALADIN, MONALISA, and tests platform throughout.

Heterogeneous Underwater Networks for Anti Submarine Warfare (ASW)

Ir Robert Been, ***NATO Undersea Research Center*****, Italy**
D.T. Hughes NATO Undersea Research Center, Italy

NATO's research and technology objectives for anti-submarine warfare (ASW) include persistent scalable heterogeneous wide-area surveillance networks for the littoral environment.

Network and system requirements include communication bandwidth, command and control, sensor type, sensor autonomy, interoperability, interference, data fusion architecture, on-board processing, and for the operational level sonar frequencies, pulse types and bandwidths. Moreover, sonar performance prediction tools, rapid environmental assessment (REA) and tactical planning aids are crucial contributions to mission success.

In the last decades NURC has extensively researched multistatic active sonar both for ship- and buoy-based systems. In the coming years, NATO's emphasis for the underwater battlespace will shift towards networked solutions including both fixed and mobile sensor nodes. To facilitate this change, a research programme has been launched at NURC that employs both autonomous underwater vehicles (AUV) equipped with towed arrays and autonomous bottomed nodes that include a cocktail of both acoustic and non-acoustic sensors. All sensors can be linked in a communication network.

This paper will focus on NURC's present research in the field, highlighting: system design considerations, progress to date and a proposed roadmap for future development.

Friday 14th November: 1245hrs

Session 11E: Technology
Marine Mammals

Marine Mammal Risk Mitigation Sea Trial (SIRENA 08)

Mr Jeffrey Haun, ***NATO Undersea Research Center*****, Italy**
Kendra L. Ryan, US Navy, United States; Nicola Portunato, NATO Undersea Research Center, Italy

The SIRENA 08 sea trial, organized and operated by the NATO Undersea Research Centre (NURC) in May-June 2008, was an opportunity to test various marine mammal risk mitigation hardware, tools and techniques.

The primary objectives of the Sirena 08 sea trial were the following:Exercise newly developed habitat models of cetacean species as a predictive tool for their presence or absence. Deploy and utilize various types of passive acoustic technologies. Data from these devices, along with those from visual surveys, determined the location and abundance of cetacean species in the areas of interest and provided the data necessary to evaluate the habitat models.
Devices deployed included the NURC Compact Passive Acoustic Monitor (CPAM) on a towed body, a high frequency towed array; a high frequency hand deployable towed array; bottom mounted T-PODs and 2 oceanographic gliders mounted with passive acoustic monitors.

In addition, various signal processing algorithms were exercised along with some risk mitigation tools developed by several different organizations that were operated in an at sea environment for the first time to determine operability, accuracy of models, and potential of the systems as risk mitigation tools.

The final portion of the cruise involved locating and then placing non-invasive WHOI digital recording tags (D-Tags) on cetacean species of interest (beaked whales and pilot whales) allowing the collection of both behavioural and acoustic data from these animals.

Compact Passive Acoustic Monitoring (CPAM) – Cost-effective Monitoring of the Presence and Behaviour of Deep-diving Whales

Mr Walter MX Zimmer, ***NATO Undersea Research Center (NURC)*****, Italy**

The use of passive sonar prior and during sonar training exercises is a sensitive requirement for naval forces to protect marine mammals from potential negative impacts of high-power tactical sonar sound - Especially deep diving beaked whales seem sensitive to tactical mid-frequency sonar and as their own sound is well above 20 kHz and do not overlap with the frequency range of tactical sonar systems, special equipment for passive acoustic monitoring (PAM) may be required.

Beaked whales can only be detected over short distances requiring an increased effort both in monitoring time and hardware. An efficient approach is to integrate a compact dimensional hydrophone passive acoustic monitor (CPAM) system into low-cost underwater vehicles, whereby persistent autonomous monitoring of large areas calls further for long endurance systems. The presentation describes the challenges of long-term monitoring, the approaches chosen to implement CPAM on a variety of platforms, and reports on first results.

Detection of Blainville's Beaked Whale using Autonomous Underwater Gliders

Mr James A. Theriault, ***Defence R&D Canada Atlantic*****, Canada**
Donald Mosher, Defence R&D Canada Atlantic, Canada; Joey Hood, Akoostix Inc, Canada; Nancy DiMarzio Naval Undersea Warfare Center, United States

Development of robust practical systems for detection and localization of marine mammals poses many difficulties.

This is especially true for deep diving species such as the Blainville's Beaked whale (Mesoplodon densirostris) whose click frequency ranges from 20 kHz to greater than 40 kHz. Detecting such species requires careful sensor and electronics design, high sampling rates, and efficient low-power processing. A number of passive acoustic systems were deployed during a January/February 2006 beaked whale detection sea trial at the US Atlantic Undersea Test and Evaluation Center (AUTEC) in the Bahamas. These included a Slocum glider, broadband sonobuoys, over-the-side hydrophones, and a bearing array.

The detection performance is measured against ship-based visual observers and Marine Mammal Monitoring on Navy Ranges (M3R) passive acoustic detections obtained using the AUTEC bottom-mounted broadband hydrophones.

As M. densirotris vocalizes at high frequency during

deep foraging dives in excess of 500 meters, the efficacy of surface receivers and gliders to detect these animals in a downward refractive environment is investigated. AUTEC provides a dense field of sensors with a demonstrated ability to detect and localize animals. These data are used as a baseline.

As configured in early 2006, the gliders were able to detect but not localize animals. This paper will compare the detection performance of the glider system with the more extensive fixed hydrophone facility.

The performance of the glider employing a band-limited energy ratio detector versus a post-processing approach with a correlation detector will be compared.

Passive Marine Mammal Detection Using the The Delphinus Array

Dr S.P. (Peter) Beerens, ***TNO (Defence, Security and Safety)*****, Netherlands**
Frans-Peter A. Lam/Coen Ort, Netherlands Organisation for Applied Research (TNO), Netherlands

To protect marine mammals from potential negative impacts of high-power sound from tactical sonar, the use of passive acoustic monitoring prior and during sonar exercises is a sensitive requirement for naval forces.

Particularly deep-diving beaked whales seem sensitive to sound from tactical mid-frequency sonar. Beaked whales themselves use sound of frequencies well above 20 kHz, which does not overlap with the frequency range of onboard tactical sonar systems.

Therefore at TNO a dedicated passive towed hydrophone array system for marine mammal was developed. It consists of a MF-section up to 12 kHz that allows for beam-forming, and a three element UHF-section up to 150 kHz to which correlation techniques can be applied.

The latter is an essential upgrade to enable detection and localization of beaked whales and porpoises. Real-time signal processing and monitoring is implemented on standard PCs. The processing consists of a mature transient detection system and proto-types of classification and localization functions. The software has been tested in several sea-trials and was recently applied in two Controlled Exposure Experiments. In these experiments killer whales were tracked, tagged and exposed to controlled levels of sonar sound.

Friday 14th November: 1245hrs

Session 11F: Systems
Navigation – Integration CMS, MSS

Warship Electronic Chart Display and Information System (WECDIS)

Mr Jose Antonio Lopez Berrio, ***Sainsel Sistemas Navales S.A.U.*****, Spain**

WECDIS is the best tool to support tactical navigation based on the use of official electronic nautical charts (ENC/DNC). This is especially true for Littoral Warfare operations, where the integration of very detailed official land cartography with sea charts, AML (Additional Military Layers) and Warship Automatic Identification System (WAIS) used according to the corresponding NATO STANAG, can provide the highest operational benefits with the minimum cost.

A revision of the current status of the mentioned applicable technologies and systems to the tactical navigation according to the NATO operational rules will be made and supported by an on site life demonstration of an existing Spanish WECDIS.

Forward from the Sea – Taking the Geographic Information Challenge

Dipl.-Ing. Peter Dugge, ***ATLAS Elektronik GmbH*****, Germany**

As the focus of security concerns shifts to the coastal areas of the world, new challenges and opportunities arise for all parties involved – including military and police forces. All of them have to act in the coastal theatre as a whole, covering sea, land and air.

One aspect to be addressed is that of handling a wide range of geographical information products by means of a variety of existing and evolving charting tools. Currently all parties bring with them their traditional capabilities and tools to cope with the challenges of coastal areas.

Efforts are underway: a) to extend traditional tools to cover new environmental areas and; b) to create real "joint" systems.

Charting tools of sea, air and land forces all have their traditional focus of requirements and capabilities which differ strongly. This leads to strengths and weaknesses inherent to each of the existing approaches when it comes to cope with coastal missions.

Exercises such as NATO "HPT08" or German "Common Shield" offer opportunities to expose existing charting capabilities to the new "coastal" requirements.

This paper will present existing charting standards, their maintenance and technical applications. Furthermore an approach will be presented to handle land and air information as well as sea charts making use of the traditional flexibility of naval charting systems.

MAST "at a glance"

Tuesday 11th November

1600 - 1800hrs	Conference registration open
Time t.b.c.	Annual Admirals Buffet (invitation only) *sponsored by* ***Lockheed Martin***

Wednesday 12th November

0815hrs	Conference registration open
0900- 1030hrs	Official opening & Keynote addresses
0900 - 1800hrs	International trade-show open
1400 - 1600hrs	MAST 2008 VIP Lunch (invitation only) *sponsored by* ***Indra***
1100 - 1730hrs	Parallel conference sessions
Time t.b.c.	Annual MAST Party

Thursday 13th November

0815hrs	Conference registration open
0930 - 1800hrs	International trade-show open
1100 - 1730hrs	Parallel conference sessions
Time t.b.c.	Navy reception (invitation only)

Friday 14th November

0815hrs	Conference registration open
0900 - 1030hrs	Plenary/ Panel debate session
0930 - 1600hrs	International trade-show open
1100 - 1400hrs	Parallel conference sessions
1600hrs	Close of MAST 2008

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MAST 2008 International Trade-show

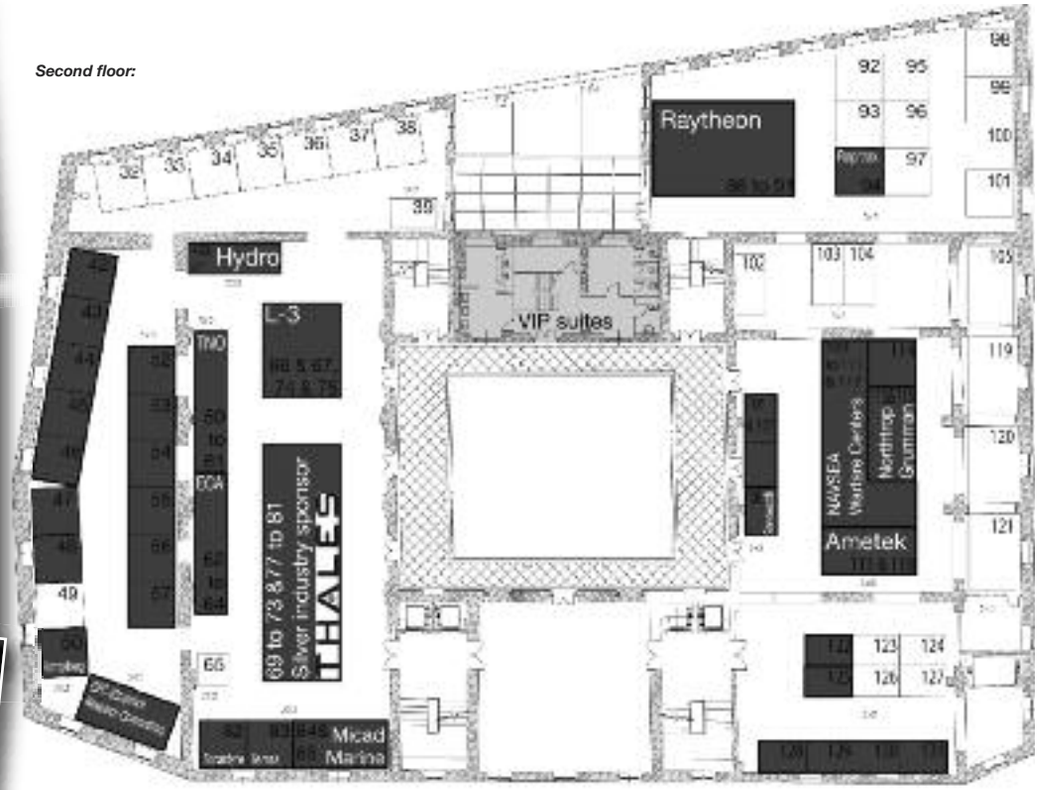
Adjacent to the conference rooms, the third annual MAST trade-show will take place, showcasing **future and state-of-the-art maritime security and defence platforms, systems, products, and solutions.**

Last year's event (Genoa, Italy showed **seven-fold growth** on the first (Nice, France), and this year's show is **even larger** still.

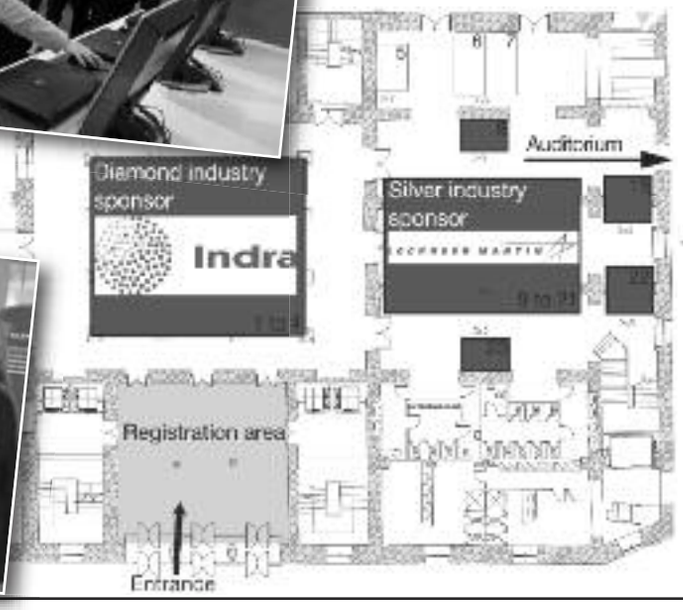
Time spent in the trade-show halls is richly rewarded, with exhibitors fielding their top executives and technologists to meet you and discuss your specific requirements: You will discover **the widest range of maritime (above and under water environments) security and defence platforms, systems solutions** presented by world leading international corporations, research labs, SMEs, academic institutions/associations and government agencies.

The floor plan (right) is correct only up to May 2008. The most up-to-date list of MAST 2008 trade-show exhibitors is featured on-line.

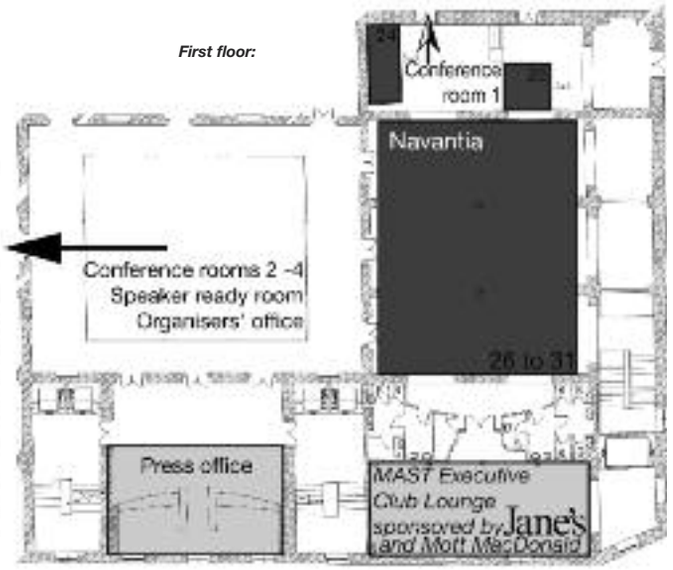
Second floor:



Ground floor/entrance level:



First floor:



At the time of going to press, confirmed exhibitors included: ***AMETEK SCP Inc., Calzoni SpA, ECA, ECA Sindel, Electronavale, GRC (Graphics research Corporation), Hydro Group plc, IEEE OES, Indra*** *(Diamond Industry Sponsor)****, IXSEA, Jane's Defence Weekly, Jane's Navy International, Jane's Strategic Advisory Service, Kollmorgen Electro-Optical, Kongsberg Maritime AS, L3 Communications ELAC Nautik, L-3 Communications Ocean Systems, Lockheed Martin MS2*** *(Silver Industry sponsor),* ***Micad Marine, Monch Publishing Group, Mott MacDonald, NATO Undersea Research Centre (NURC), Naval Forces, Naval Surface Warfare Center, Naval Undersea Warfare Center, Navantia, NAVSEA Warfare Centers, Northrop Grumman, Occar, Oceans 2009, Rapitrax, Raytheon, Reson A/S, Servowatch, Sonardyne International Ltd, Spanish Space R&D&I, Teledyne R&D Instruments Inc, Teledyne TSS, Terma A/S, Thales Group*** *(Silver Industry sponsor),* ***TNO, Defence, Security & Safety.***

If your organisation/company would like to exhibit, please contact Jackie Baron as soon as possible (e-mail: jackieb@eievents.biz, direct line: +44 (0)1892 824418, mobile: +44 (0)7900 263557). Stand rates (per metre^2) are as follows:

Space only (for exhibitors with self-build stands) - **450 euros/m^2**

Shell scheme package (includes carpet, named fascia board and lighting) - **465 euros/m^2**

Innovation zone package (for SME's and start-ups, includes a fully furnished 3m x 2m shell scheme stand) **- 2,000 euros**

NB: Stands are available in various areas/sizes and multiple areas can be combined to make one larger stand.

Exhibitor Workshops/Demonstrations

As at past MAST trade-shows, exhibitors will host workshops and demonstrations that spotlight their platforms, systems, products, and services and in line with discussions throughout the conference. Full details will feature at: **www.mastconfex.com/workshops.asp,** and in the on-site pocket book.

Evolutionary Award for Excellence - *your vote* counts

MAST's organiser - Evolutionary International Events - recognises the value of re-investing into the community which supports the event, and the importance of **perpetuating development and innovation** in the maritime sector to its supporters, partners, delegates, exhibitors and visitors alike.

Therefore every year, a fixed percentage of profits made from MAST by Evolutionary International Events, is donated as an award/bursory to an independently nominated academic or research organisation, from that year's host nation.

Nominations for Spanish maritime organisations are sought now: Delegates are requested to e-mail their nomination(s), with a brief explanation of why that organisation should receive the award, no later than Friday 19th September 2008 to: warrene@eievents.biz with subject headed "Annual award".

Official Social functions

Annual MAST Party

Free-of-charge to all delegates, exhibitors, authors/speakers, keynote and plenary speakers, committee members, and VIP's/invited guests, the MAST Annual Party always 'raises the bar' on typical event organisers' parties.

This year's party will have an Andalusian theme giving you the opportunity to enjoy traditional cuisine, entertainment, and drinks by the water's edge with your colleagues, customers and contacts.

"As the focal point of the week's ***fully inclusive networking functions****, and the best way to unwind after a hectic first day, the MAST's annual party is our way of saying 'thank you' for supporting MAST events"* - Warren Edge, Director MAST

"It's your party! So please enjoy the excellent food, entertainment, freely flowing drinks, and (of course) great company, all with our compliments"
- Jackie Baron, Director, MAST

MAST's tremendous growth means that each year's party is bigger and better than the previous one, so make sure you put this year's party in your diary - **Wednesday 12th November** (directly after the first conference and trade show day ends).

Invitation only functions

As those of you who took part in last year's event in Genoa know, several important official, but invitation-only functions and private VIP hospitality events take place during the week of MAST.

When compiling invitation lists, hosts use the MAST Community Membership and pre-registered delegates databases. Make sure you are *on the radar* to be invited to these VIP functions by **registering early.**

Ship Visits/water-based demonstrations

Once again, MAST intends to host several ships/boats in the harbour adjacent to the venue.

At the time of going to press, in harmony with some of the presentations to be given by navies in the MAST conference programme - it is intended to coordinate visits (and an

invitation-only reception) for pre-registered MAST participants onboard a yet to-enter-service AEGIS-equipped **F100 frigate**, and **US Navy destroyer.**

Details and booking forms will be posted on the website soon.

Networking facilities

There will be numerous networking opportunities during MAST 2008, but we aim to make the process easier, starting well ahead of the event itself...

MAST Contact Exchange Network is the free-to-join, 10,000 members strong (and growing), global network of maritime security and defence professionals.

If you are not already a member, need to update your user profile, or want to make contact now, simply log on to: **www.mastconfex.com** and follow the instructions. You can already plan your meetings with authors, delegates, exhibitors, visitors, etc for the event in November.

Official delegations

As a result of the increasing number of high profile MAST participants (Chiefs of Staff, key government officials, and senior trade representatives, etc.), this year MAST will host an official delegation programme **(sponsored by Mott MacDonald).**

Representatives of official delegations will be extended every courtesy during their time at MAST, and VIP tour hosts Mott MacDonald will make sure their time in the trade-show halls is well spent and enjoyable. This year delegations will have a access to the new MAST Executive Club Lounge.

Nominations to the official delegation programme can be made via e-mail to: warrene@eievents.biz

Lunch and refreshment facilities

MAST aims to exceed typical events' standards and give unparalleled value for money in every aspect, and lunch is no exception: For every day of registration, you will get **complimentary lunch and conference break refreshments,** and this year (to give you a taste of the variety and superb standards of Southern Spanish food) lunches served in the trade-show halls, you will experience an interactive dining experience like no other: Get a taste of Spain while you *talk turkey* with fellow delegates and exhibitors.

Happy hours

For the first time this year, as part of the organisers' commitment to creating *the* totally inclusive annual event, conducive to networking, making new contacts, and catching up with clients, **complimentary drinks will be served every afternoon** in the trade-show halls.

Opening Hours

MAST 2008 will be open during the following hours:

Conference areas:

Wednesday 12th November	0900 - 1730 hrs
Thursday 13th November	0900 - 1730 hrs
Friday 14th November	0900 - 1400 hrs

Trade show areas:

Wednesday 12th November	0900 - 1800 hrs
Thursday 13th November	0930 - 1800 hrs
Friday 14th November	0930 - 1600 hrs

In addition to these hours, the registration desk will open from 1600hrs until 1800hrs on Tuesday 11th November, and all from 0815hrs every day of the show.

Dress Code

The dress code for MAST 2008 is uniform or business attire, this may be relaxed to smart casual for the Annual MAST Party if you wish.

Cloakroom/toilet facilities

A secure cloakroom facility will be available on site and will be clearly signed, as will the toilets (close to all conference and trade show areas).

Photography/unauthorised recordings

Flash-photography or recording (audio or video) in any of the conference sessions is not permitted without the express prior consent of the organiser, and the organiser reserves the right to remove any delegate found making unauthorised recordings.

Conference proceedings (CD-Rom)

The Annual MAST Conference proceedings is the indispensable guide to all sessions that take place in the conference, and an essential addition to any maritime defence and security library.

One copy of the official conference proceedings CD-Rom is included in every delegate's pack (periodical updates are provided free-of-charge on-line).

Additional copies may be purchased from six weeks after the event (at 210 Euros each (upon e-mail request to Tracy Skinner: tracys@eievents.biz or by phoning +44 (0)1892 824418), or on-site from the registration desk during the event at just 150 euros.

Delegate package

MAST's organisers value your comfort during the event, but also respect your budgets, so the delegate package has been made as comprehensive as possible, and represents **exceptional value...** For every day of registration, your fee includes:

Attendance to all chosen conference sessions;
Lunch
Refreshments;
One ticket to the 2008 Annual MAST Party;
Official MAST 2008 delegate bag (containing MAST 2008 Conference Proceedings CD-Rom, programme pocket book, official MAST Pen, and pin/badge).

Delegate Fees and discounts available

Once again, **the price of delegate registration for three days has remained frozen at event launch prices,** ensuring MAST will be the best value conference you will attend this year.

Already giving you unparalleled value for such a senior-level authoritative, international event, 2008 **delegate fees can be made even lower,** depending on when you book, whether you have affiliation with one of MAST's Technical Sponsors (see those featured on the front of this brochure), and/or whether you are in active service or represent a government body.

At the time of going to press, most early bird discount places (a generous 30% discount on the three day rate, for the first 130 delegates, booking on-line) had already been taken, so **if you haven't already booked, please do so ASAP.**

NEW for 2008! - Student pass

Today's students are tomorrow's Military Planners, Chiefs of Staff, Technical Directors, etc. In line with MAST's philosophy of investing at the grass-roots level of the community that supports it, students will now be actively encouraged to participate at MAST events, with a heavily discounted - by nearly 75% - registration fee, *see below.*

	3 days	*2 days*	*1 day*
Regular rate:	990 euros	750 euros	450 euros
Early-bird (first 130 delegates only) - 30% discount:	700 euros	n/a	n/a
Government rate - 20% discount:	*792 euros*	*576 euros*	*288 euros*
Technical sponsor rate - 20% discount:	*792 euros*	*576 euros*	*288 euros*
Student three-days pass - 75% discount:	250 euros	n/a	n/aBook

now at: **www.mastconfex.com/register.asp**

MAST 2008 Conference delegate booking form

Please complete this form in full and return to: MAST 2008 Secretariat, c/o Evolutionary International Events, 58 Maidstone Road, Pembury, Kent TN2 4DE, UK

Fax number: +44 (0)1892 824418

Delegate package

The MAST delegate package represents unparalleled value and includes (for every day of registration): ***Attendance to all chosen conference sessions; Lunch and conference break refreshments; One ticket to the 2008 Annual MAST Party; Official MAST 2008 delegate pack (including high quality delegate bag, MAST 2008 Conference Proceedings, conference programme pocket book, official MAST Pen, and pin/badge).***

Please register me to attend the MAST 2008 Conference on the following days:

Wednesday 12th November ☐ Thursday 13th November ☐ Friday 14th November ☐

I will participate as:

Delegate (Regular) ☐ *Tick appropriate **Regular rate** below*

Delegate (Gov't/service) ☐ *Tick appropriate **Government rate** below*

Delegate (Technical Sponsor*) ☐ *Tick appropriate **Technical sponsor rate** below*

Student* ☐ *Tick Student three-days pass below*

Author and/or Session Chairman ☐
*Please state session no(s): ……) NB: Registration is free-of-charge for the day(s) of presentation(s). Tick appropriate **Regular/Government/Technical Sponsor rate** below for additional days*

Member of the press/media ☐ *Complimentary registration*

Must show student union/identity card or evidence of membership to either CTM, DGA, DSO, DSTO, IEEE/OES, IET, International Federation of Hydrographic societies (IFHS), Naval Submarine League (NSL), NATO Undersea Research Center (NURC), Object Management Group (OMG), Society of Underwater Technology (SUT), Submarine Institute of Australia, or TNO

	3 days	2 days	1 day
Regular rate	999 euros ☐	750 euros ☐	450 euros ☐
Government rate (20% discount)	799 euros ☐	600 euros ☐	360 euros ☐
Technical sponsor* rate (20% discount)	799 euros ☐	600 euros ☐	360 euros ☐
Student* three-days pass (75% discount)	250 euros ☐	*n/a*	*n/a*

Name prefix (Mr/Mrs/Dr/Adm) ..... First name .....

Surname ..... Job title .....

Organisation.....

E-mail .....

Address .....

.....

City/Town ..... County .....

Post/Zip code ..... Country .....

Phone (optional) .....

I enclose a cheque payable to Evolutionary International Events ☐

Please debit the credit card below for amount ..... euros ☐

VISA ☐ Mastercard ☐ American Express ☐

Card number .....

Expiry date ..... Security code .....

Name as on card .....

Billing address (if different to above) .....

City/Town ..... County .....

Post/Zip code ..... Country .....

Signature .....Date .....

Terms & conditions: 1. Payment must be made in full at time of booking; Delegate badge(s) - issued on-site - are non-transferable and must be displayed at all times to gain access to the conference areas. 3. The organiser reserves the right to change any aspect of the programme. If this is ever necessary the organiser will make every possible effort to communicate such changes with all delegates. 4. Cancellation policy: Any request for refunds - which must be received before 15th August 2008 - will be considered at the organiser's discretion, and will be subject to a 20% administration fee. 5. Should you be unable to attend the conference for unavoidable reasons, you may nominate a substitute delegate. 6. Delegate fees do not include travel or accommodation.

MAST 2008 accommodation booking form

Booking details

Family name ..... Name .....

Institution/company name .....

Street and City .....

.....

Postcode ..... Country .....

Phone ..... Fax .....

E-Mail .....

Method of payment (PLEASE PRINT INFORMATION CLEARLY)

Credit card

Type of card (American Express not accepted) …….…….....

Card number …….....

Expiry date ……..…….. CSC/ Security code ……...

Name on card .....……

Signature ……..... Date.....……...

Bank transfer

Send to: Emisan Congresos

BANESTO: IBAN ES50 0030 4129 3102 9775 1273

SWIFT/BIC: ESPCESMM

Please indicate full name and fax a copy to: 00 34 956 27 81 53

Complete and return this form (also downloadable from: www.mastconfex.com/accommodation.asp) to:
Attn: Amalia Ortega, EMISAN VIAJES Y CONGRESOS,
Avda. Ana de Viya, 3, Edificio Minerva, Oficina 315, 11009 Cadiz, Spain

Fax number: 0034 956 27 81 53

Please confirm my reservation as follows (tick appropriate box):

Hotel	Double room	Double room (single use)
Parador Hotel Atlantico****	☐ 157, 00 euros	☐ 116, 00 euros
Hotel Playa victoria****	☐ 136, 00 euros	☐ 106, 00 euros
Hotel Tryp Caleta****	☐ 130, 00 euros	☐ 120, 00 euros
Hotel Puertatierra****	☐ 115, 00 euros	☐ 93, 00 euros
Hotel Senator****	☐ 95, 00 euros	☐ 85, 00 euros
Hotel Barcelo****	☐ 95, 00 euros	☐ 85, 00 euros
Hospederia las Cortes***	☐ 85, 00 euros	☐ 75, 00 euros

NB: All hotel rates are in euros per room per night, including breakfast and 7% VAT.

Arrival date .....……..…….... Departure date ……..……..

Rate per night ..... euros

Total to pay ……. euros

Charges:

Upon receipt of your accommodation booking form, your credit card will be charged 25% of the total cost as a deposit, and a confirmation number will be faxed to you. On 17th September 2008 your credit card will be charged the remaining 75%

Cancellation policy/charges *(NB: All cancellations must be made in writing):*
Before 17th October you may cancel your reservation with no cost, and your deposit will be refunded to your credit card; **After 17th October 2008,** the following penalties will apply: **Up to ten days before first night of reservation -** One night charge; **Between nine and four days before first night of reservation -** 25% of the total booking value; **Three days (or less) before first night of reservation -** 100% of total booking value.

The venue

The MAST 2008 venue (Palacio de Congresos), a converted tobacco factory, boasts extremely high standards of both conference and trade-show facilities and is perfectly situated on the marina, adjacent to both the **navy and coast guard buildings.**

Address: Palacio de Congresos,
C/ Plocia S/N, 11006 Cadiz, Spain
Tel: +34 956 291 017
Fax: +34 956 291 018
E-mail: cadiz2000@palaciocongresos-cadiz.com
Website: www.palaciocongresos-cadiz.com

Cadiz – Europe's oldest town

Those of you familiar with Cadiz, will know there are few more sympathetic locations to host an international maritime defence and security event in the world.

Cadiz represents a strategic location for both the **Spanish navy** and **harbour protection agencies** and is neighboured by the **naval academy town of San Fernando**, the **US naval base of Rota,** the Bodegas of Puerto de Santa Maria/Jerez de la Frontera and golf resort of Chiclana, and the huge **naval and commercial shipyard** that is home to Navantia – all just a short fast ferry-ride away.

Travel - Getting to Cadiz

The nearest international airport is Jerez de la Frontera (just 15–20 minutes' drive away).

Jerez is served internationally either directly (for example from London Stanstead or Frankfurt with Ryanair), or via Spain's major airport hubs (Barcelona or Madrid).

Seville airport is approximately one hour's drive away.

Accommodation

There is a wide range of accommodation to suit all budgets (including a government hotel *not listed below*), many located just a few minutes' walk from the venue or on the 17km long Vittoria beach, with its powder soft sand and from where, on a clear day you can see the northern tip of Africa.

An official accommodation agent has been appointed to negotiate the lowest rates possible with the range of hotels and pensions on the Cadiz peninsula, and surrounding towns. Whilst there are many hotels on and around the Cadiz peninsula, we recommend the following hotels for MAST 2008 participants:

Hotel Playa Victoria ** (The MAST 2008 HQ Hotel)**
The Hotel Playa Victoria enjoys a unique location right on the seafront overlooking the Atlantic Ocean on one side and one of the main squares of the ancient city of Cadiz on the other.

You can dine in the onsite restaurant that serves typical Mediterranean dishes as well as international cuisine in a warm and pleasant ambience, or visit one of the many adjacent restaurants and bars (some directly on the beach). The hotel's bar is certainly a convivial meeting place.

Parador Hotel Atlantico ****

A four star luxury modern hotel on the promontory sheltering the famous harbour of Cadiz in southern Spain with impressive views over the Bay of Cadiz. The spacious and bright bedrooms that have been carefully decorated all have panoramic views of the sea and the busy entrance to the famous port of Cadiz. All rooms have air conditioning, telephone, cable television and a minibar.

As with all Parador group hotels, the restaurant specialises in the local dishes, in particular the fish and shrimp dishes. One of the closest hotels to the Palacio de Congresos.

Hotel Tryp Caleta ****
The Tryp La Caleta is located on the promenade along the well known Victoria beach. It is only 30 minutes from Jerez airport. All rooms are equipped with air conditioning/heating, bathroom with hair-dryer, satellite TV, direct dial telephone, minibar , safe and room service.

Hotel Puertatierra ****
Monte Puertatierra hotel in Cadiz, is just a few metres from the beach. It is a 4-star hotel, set in the historic, artistic and commercial centre of the city. Rooms are quipped with air conditioning, room service, telephone, minibar, safe, alarm clock, central heating, internet access, in-house movies, wake up service, satellite TV, non-smoking rooms and 24 hour room service.

Hotel Senator ****
One of the closest hotels to the venue, the Hotel Senator is a new hotel in the historical quarter of Cadiz.

The hotel offers a wide array of services including a buffet breakfast and buffet or a la carte restaurant. All rooms and common areas are equipped with free wifi.

Hotel Barceló ****
A newly-built hotel with a modern design and innovative architecture. Located in the heart of Cadiz at the main avenue of the city and also, close to the seafront promenade bordering the famous Victoria Beach. There is an à la carte restaurant specialising in rice dishes and fish from the Bay of Cadiz and a buffet breakfast. All rooms have TV, 24 hour room service, minibar, wifi and safe. Approximately 2 km from the Palacio de Congresos.

Hospederia Las Cortes ***
The Hospederia Las Cortes de Cádiz is a lovely three star hotel. Our restaurant menu offers only the best of our local gastronomy, you will be able to taste our typical "tapas" and wines. All the rooms have air conditioning, own bathroom and wc, hairdryer, direct dial telephone, radio, TV and minibar.

Please complete the fax back form *(right)* and return as soon as possible to secure your prefered hotel for MAST 2008.

Contact details and rates for all of MAST 2008's official hotels can be found on-line at:
www.mastconfex.com/accommodation.asp

"We discovered technologies and systems for maritime situational awareness capabilities"
- Claeys Lieven,
Business Development Manager,
BARCO NV, Belgium

"Keynote speakers were excellent"
Joel Timm,
Future Fleet Concepts Analyst,
NAVSEA, USA

"We had direct access to previously unknown and inaccessible contacts"
Sue Keyse,
Exhibition Manager, Janes Information Group, UK

Examples of MAST participants

(source: MAST 2007 and MAST 2006 registrations)

Ambassador of Finland	*Embassy of Finland (Rome)*	Finland
Associate Director C4ISR & IT	*US Office of Naval Research*	USA
Chairman	Seatrans Shipping Company	Pakistan
Chief of Staff	*Italian Navy*	Italy
Chief of Staff	Royal Thai Navy	Thailand
Chief of Staff (Capabilities)	*Royal Navy*	UK
Chief of Staff (Plans)	*Spanish Navy*	Spain
Comm Systems Engineer	*Government of Canada*	Canada
Commander	Hellenic Navy	Greece
Commander	*Polish Navy*	Poland
Counselor - Naval Strategic Center	*Argentinian Navy*	Argentina
Counsellor Defence Materiel	Australian High Commission	UK
Defence Attaché	*Australian Embassy (Paris)*	France
Deputy Director	Krylov Institute	Russia
Director, Major projects, Maritime HQ	Royal Australian Navy,	Australia
Deputy Supreme Allied Commander	Transformation, *NATO*	Belgium
Director	CSSC	China
Director of Naval Requirements	Royal Netherland Navy	Netherlands
Director - Naval Ship Engineering Center	*ROK Navy*	Korea
Director International Cooperation	*R&D Marine Technology Centre*	Poland
Director Strategy & Business Dev.	*Bayern Chemie*	Germany
Engineer	Israeli Navy	Israel
Engineering Manager	*ADS*	South Africa
Force Systems Manager	*Ministry of Defence/DGA*	France
General Manager	*Effect Ships International AS*	Norway
Head of Missile Systems	MBDA	France
Head of Naval Systems Engineering	*Oerlikon Contraves AG*	Switzerland
Lead Software Engineer	*Milsoft AS*	Turkey
Marketing Director	Navantia	Spain
Marketing Manager	Intersog Ukraine	Ukraine
Naval Adviser	High Commission of India	India
Naval Attaché	Russian Embassy (Rome)	Russia
Offshore Oilfield Security Officer	Critical Infrastructure Authority	UAE
Port Security Manager	Rotterdam	Netherlands
Principal Scientist - Naval Systems	Dstl	UK
Program Director - Underwater Warfare		DSO
Singapore		
Sales Manager	Terma	Denmark
Secretary General - Defence	Ministry of Defence	Italy
Senior Officer - Armaments	European Defence Agency	Belgium
Senior Scientist	FOI	Sweden
Staff Officer - Industry	Defence Material Organization	Netherlands

“Another great MAST: Fantastic growth in size of the trade-show and number of participants. The conference was extremely informative: Some presentations in particular were of enormous interest to DCNS”
- Kathryn Smyth,
Economic Intelligence and Marketing Officer,
DCNS, France

“Intensive networking outside the conference sessions”
Professor Manell Zakharia,
Naval College, Brest, France

“MAST introduced us to a major Thai contact that we have been trying to meet for ages”
John Miele, Director of Sales,
MiCAD Marine, USA

MAST 2009 - First announcement

We are delighted and honoured that under the championship of the **Swedish Armed Forces, The Swedish Defense Materiel Administration (FMV), The Swedish Defence Research Agency (FOI) and The Swedish Coast Guard,** the **fourth annual MAST** will be hosted in **Sweden** between **Tuesday 20th and Thursday 22nd October 2009.**

“For some time now, the international maritime community has been undergoing continual change, demanding new and/or adapted requirements for organisation, as much as **capabilities, tasks and technologies.**

New threats, and the **consequences of internationalisation,** set even higher demands on **global collaboration and cross-border co-ordination** (not only **between nations,** but also **between military and civilian authorities).**

Maritime security and maritime co-operation (in its various dimensions) can only become even more important in the future. In parallel, economic realities call for more efficient activities, not the least regarding future technical solutions: In Northern Europe this reality has, for some time now, characterised most nations' ambition to increase international collaboration across most areas of competence.

These factors in mind, you will find Sweden a most appropriate and welcoming venue for the fourth annual MAST Conference and Trade-show in once **again uniting MAST’s senior-level and global audience** to discuss and debate future maritime capabilites, concepts and technologies and achieving “Global Maritime Security Through Collaboration"

- Rear-Admiral (ret’d) Bertil Bjorkman - MAST 2009 Chairman

Market information partner **Official media partners**

Diamond industry sponsor

Silver industry sponsors

Special acknowledgement

We would like to extend our sincerest thanks and appreciation to both the Spanish Navy and the local government authorities whose invitation, official endorsement and logistical support has been ever present and has provided tremendous support at every stage of planning for the third annual MAST.

Supported by Agencia IDEA

Agencia de Innovación y Desarrollo de Andalucía IDEA
CONSEJERÍA DE INNOVACIÓN, CIENCIA Y EMPRESA

Endorsed by the Spanish Navy