



E-Navigation in China

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The background ...



Content

- Development and Efforts in China
- Relevant Work in DMU



Development and Efforts in China



Development and Efforts in China

- Started from the Digital Aids to Navigation in the 1990s, a variety of digital beacon based applications have been established and have already begun to take shape
- A series of applications, including maritime information systems, aerial information systems, ship reporting systems, GMDSS, RBN/DGPS, AIS, VTS, beacon-based remote sensing and control systems, etc. have been set up, that have provided strong technical support for China's coastal maritime safety



Development and Efforts in China

- To 1999, the RBN / DGPS station chain was built covering the coastal, and remote sensing and control based on telemetry buoy system was also built in several key waters
- By 2005, China Maritime Safety Administration has built a network of coastal AIS, basically covering the coastal navigable waters and the lower reaches of the Yangtze River



Development and Efforts in China

- Multiple coverage of AIS for traffic-intensive waters, key waters and complex waters was implemented
- By the end of 2008, China built a total of 28 VTS, 20 DGPS stations, 94 AIS base stations
- The construction of inland waterway AIS network is undergoing currently

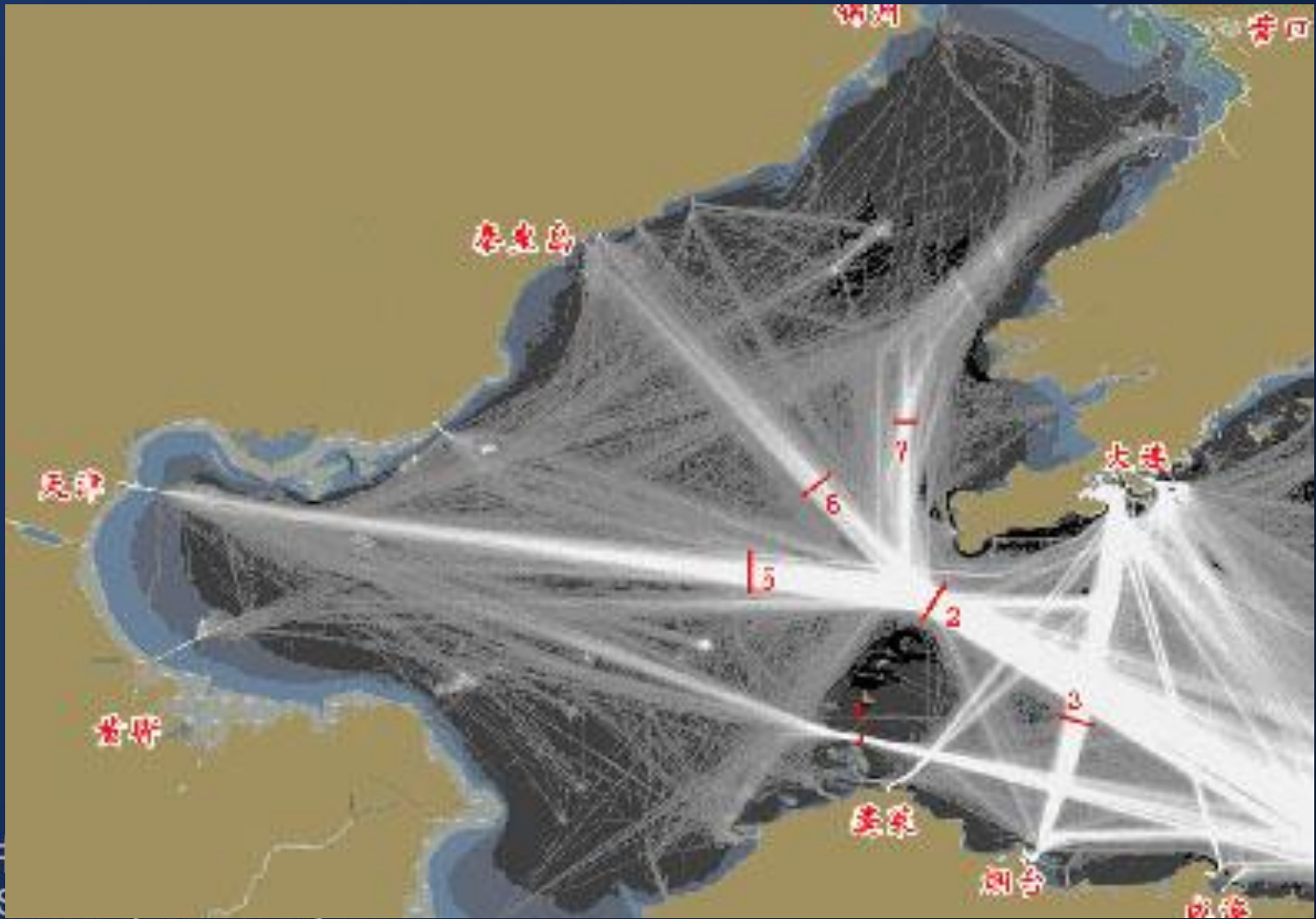


Development and Efforts in China

- In March 2012, China formally implemented the National Seafarers Competency Exam and Certification Rules, which clearly established the electrical and electronic staff positions
- Several maritime colleges opened specialties for electrical and electronic staff and the graduates are well accepted widely by the maritime industry



AIS Vessel's Track in Laotieshan Waterway

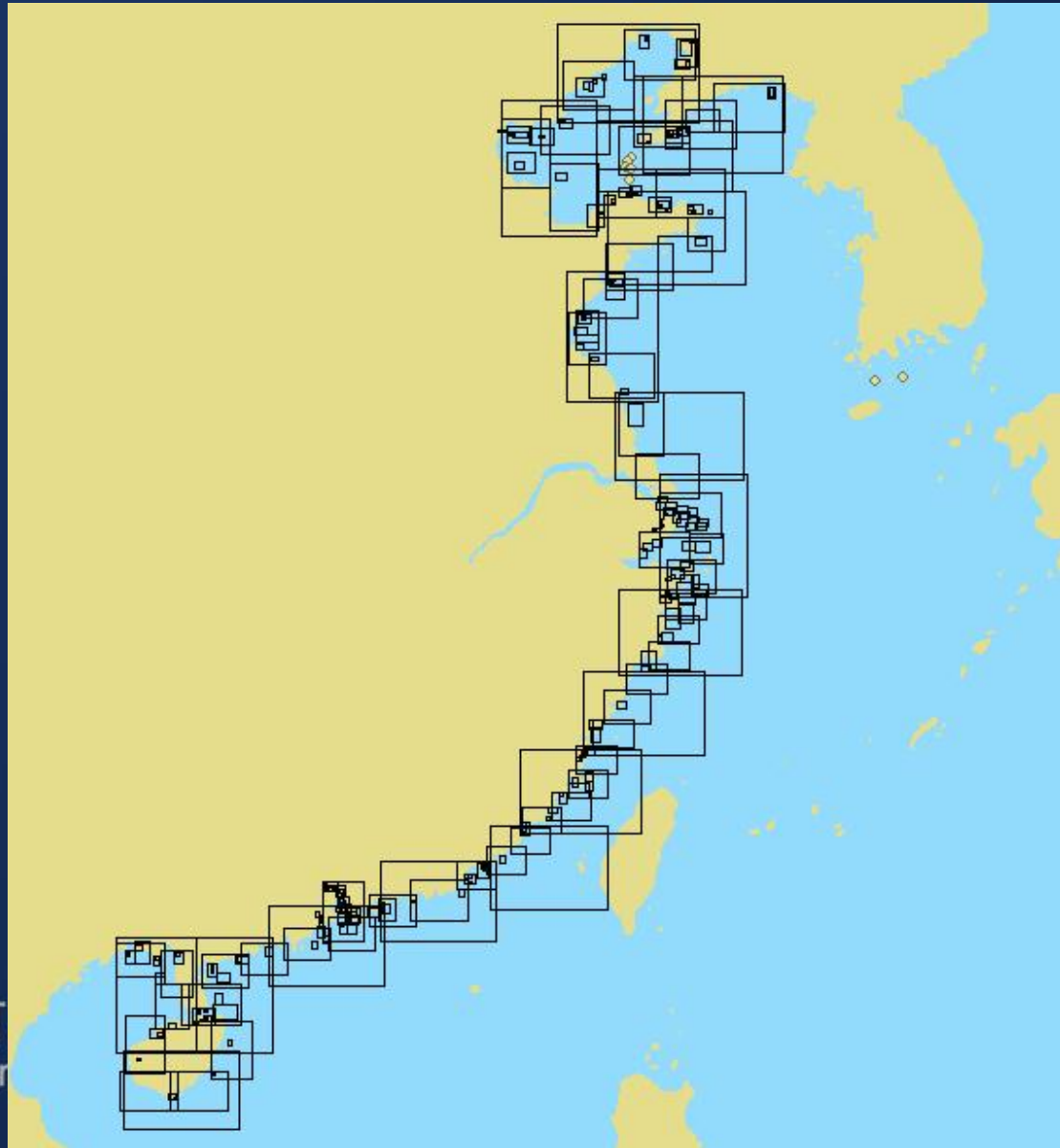


Development and Efforts in China

- Since September 2008, the Maritime Bureau of Ministry of Transportation has officially offered electronic charts for the nation's coastal ports and channels, that is in line with international standards
- By 2010, full coverage of electronic chart to China's coastal has been achieved



Electronic Chart Coverage of China's Coastal



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Development and Efforts in China

- Some strategic issues for future e-navigation have been raised by the Ministry of Transportation and experts
 - Strategic planning for the e-navigation development
 - Expand the research and application of AIS
 - Space-based AIS
 - R mode AIS
 - The second generation AIS
 - GPS differential correction information broadcasting by AIS
 - ...



Development and Efforts in China

- Some strategic issues for future e-navigation have been raised by the Ministry of Transportation and experts
 - Promote information technology for maritime safety systems
 - Expand electronic chart coverage
 - Strengthen hydrological data publishing and application
 - Strengthen the research on three-dimensional, multi-dimensional data
 - ...



Development and Efforts in China

- Some strategic issues for future e-navigation have been raised by the Ministry of Transportation and experts
 - Integrate the existing systems, unify standards, expand compatibility
 - Make full use of the network and information resources, expand the scope of services for the integration of the local (dedicated) systems to become a integrated maritime safety information system
 - Set up a national IRIT data center
 - Promote ECDIS industry
 - Develop ECDIS training, training equipments, exam certification systems
 - Pay close attention to the development of the industry, revise the curriculum for maritime colleges and training institutions
 - ...



Relevant Work in DMU



Where we are



Dalian

- 1 hour from Beijing or Seoul
- economic center in northeast China
- 1.6 million urban population
- one of the 'most livable cities'



DMU Overview

- Founded in 1909
- 286 full-professor, over 1000 academic staff and 25,000 students
- Most prestige and largest maritime university in China
- One of the top 100 universities in China – National 211 Program
- Sponsored by the Ministry of Transportation
- Dalian Campus of the World Maritime University (WМУ)



Colleges & Departments

- Navigation College
- Marine Engineering College
- Information Sci. & Tech. College
- Transportation Management College
- Transportation & Logistics Engineering College
- Law School
- Environmental Science and Engineering College
- Humanities and Social Sciences College
- School of Foreign Languages
- Joint program with WMU on maritime safety and environmental management
- ...



Research Facilities

- National Key Engineering Research Center for Navigation
- Two full mission ship-handling simulators and one engine room simulator



Research Facilities

- Two ocean-going training vessels
 - Teaching and training
 - Test bed for research in nautical science and marine engineering



Relevant Projects

- Research on e-navigation policies and key technologies
 - Policies for e-Navigation implementation
 - Standard system for e-Navigation
 - Design of e-Navigation testing and testbed



Relevant Projects

- Research on key technologies of AIS

- AIS core processing chip technology
- Automatic testing of AIS terminals
 - Automatic testing platform construction for the Maritime Safety Administration of China and the China Classification Society in 2014
- Theories for AIS-R mode positioning technology



Relevant Projects

- Research on Chinese Beidou satellite navigation system

- Development of chips for receiver of the Beidou satellite navigation
- International standards for implementing Beidou navigation system
- Testing of Beidou satellite navigation for AIS



Relevant Projects

- Development of maritime search and rescue simulator



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Relevant Projects

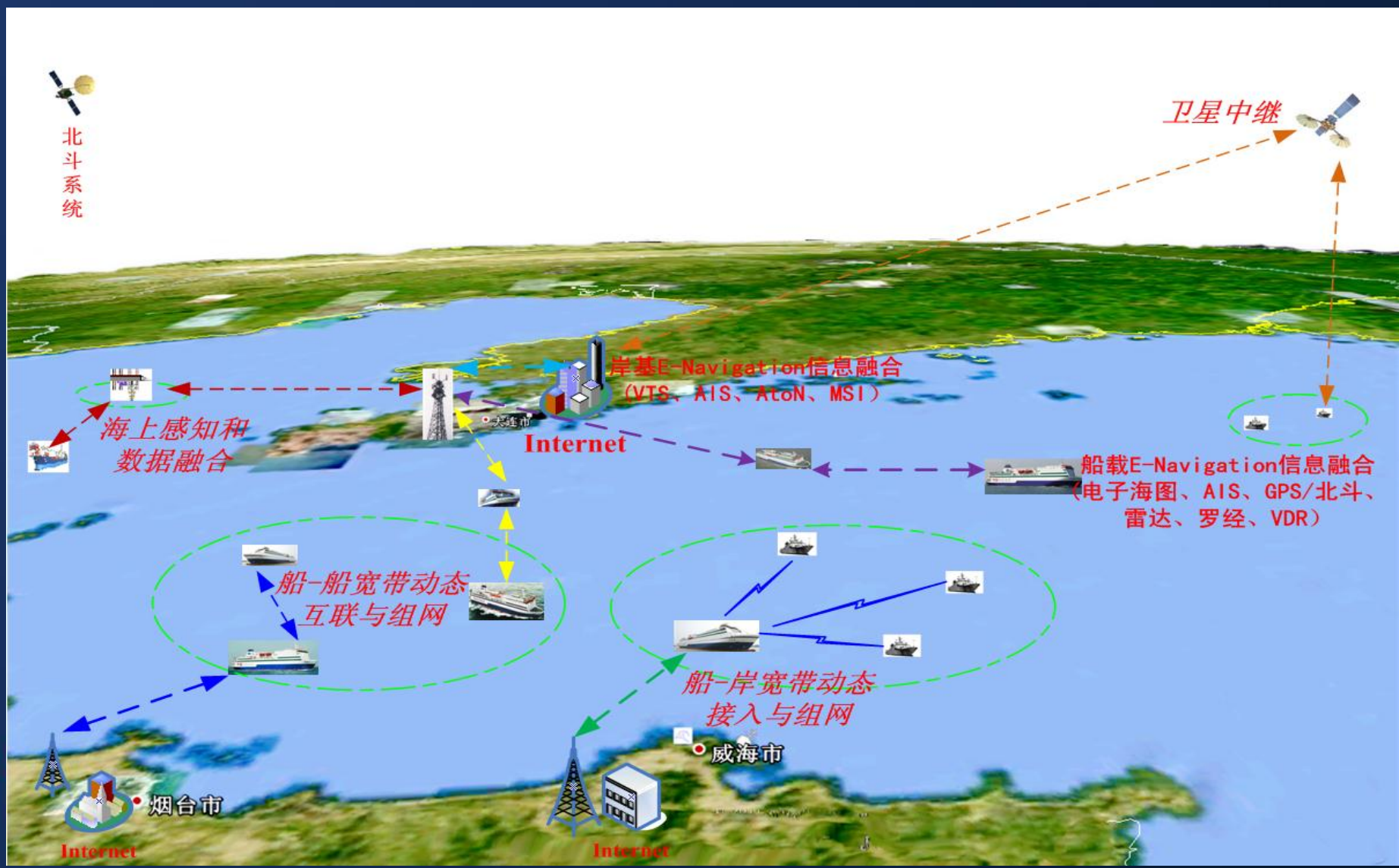
- Development of maritime search and rescue simulator

- Mathematical models for ship motion
- Visualization and virtual-reality system
- Interactive techniques based on boatmanship equipments
- Multi-ship architecture



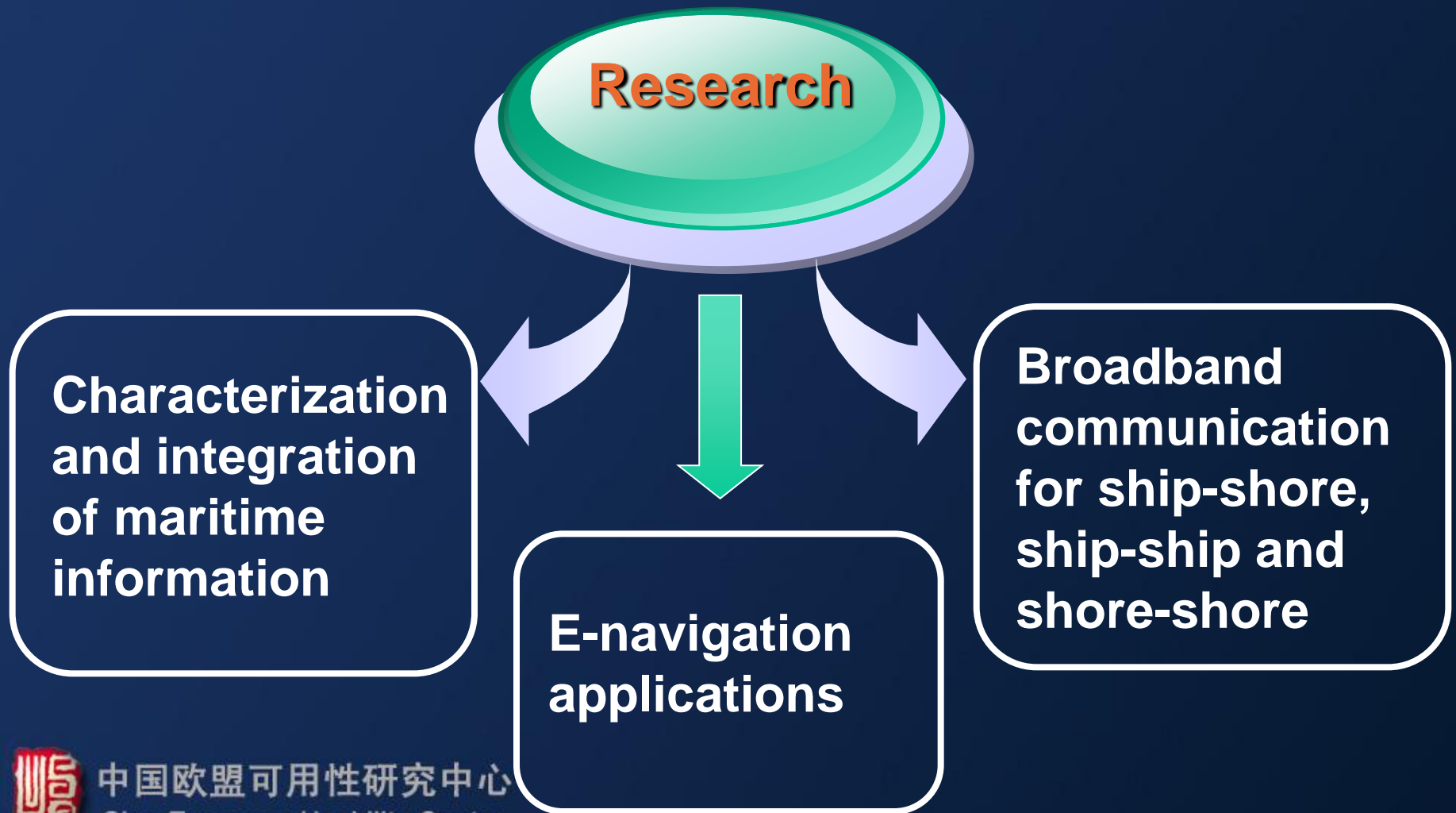
Relevant Projects

- Coastal broadband wireless communication and demo applications for e-navigation



Relevant Projects

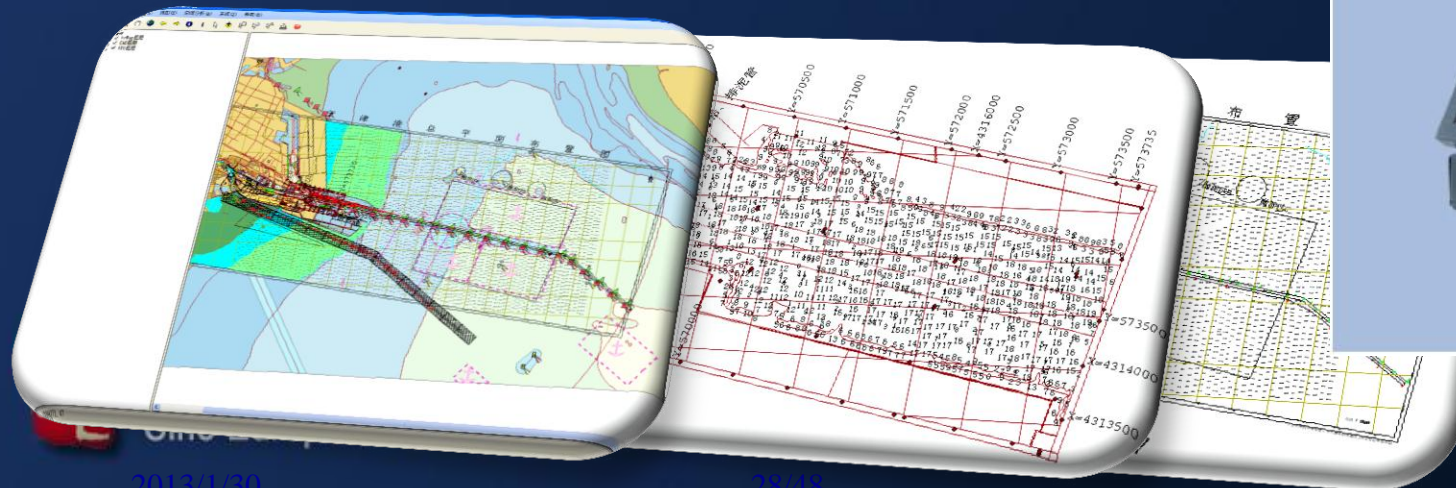
- Coastal broadband wireless communication and demo applications for e-navigation



Relevant Projects

- GIS platform for marine mapping data sharing

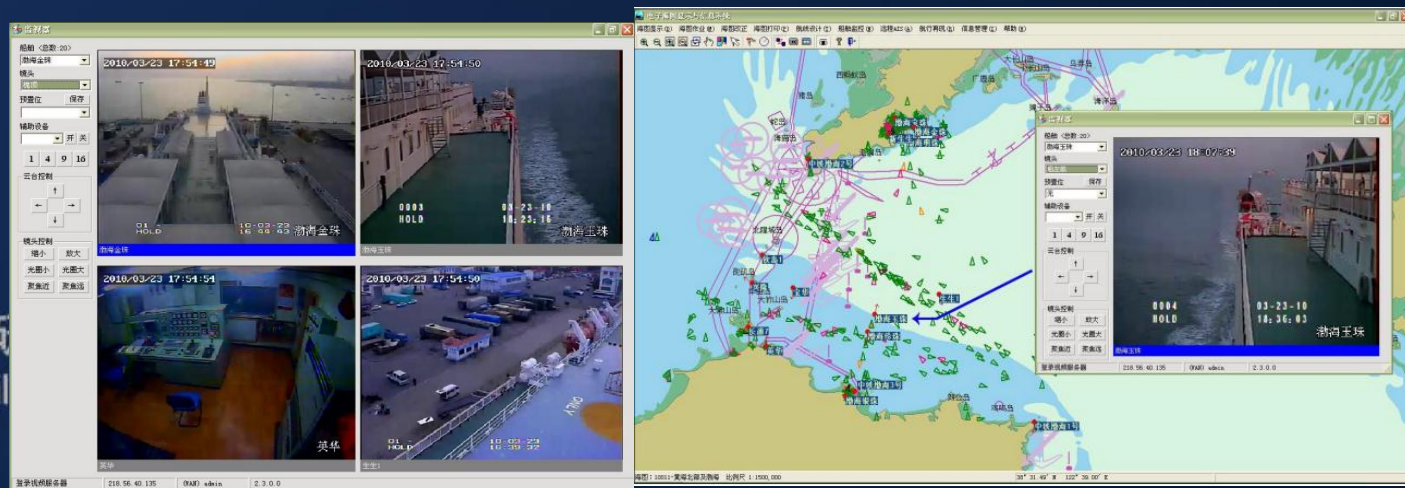
- Automatic conversion from the electronic chart to general geographic information
- Superimposed display and operation at the same time of a variety of resources, such as HPD, CAD and MAP data
- Improved manipulation functions and tools for electronic chart, including: zooming, roaming, panoramic view, scaling, attribute customizing, querying by layers, space estimation etc.



Relevant Projects

- Development of ship dynamic video monitoring system

- Based on GPS, AIS and ship-shore communication technology
- Ship dynamic queries, tracking, track playback
- Short message communication and two-way voice conversations with the ship
- Real-time ship-shore transmission of ship video/audio information via wireless routing, such as 3G, CDMA, maritime satellite etc.



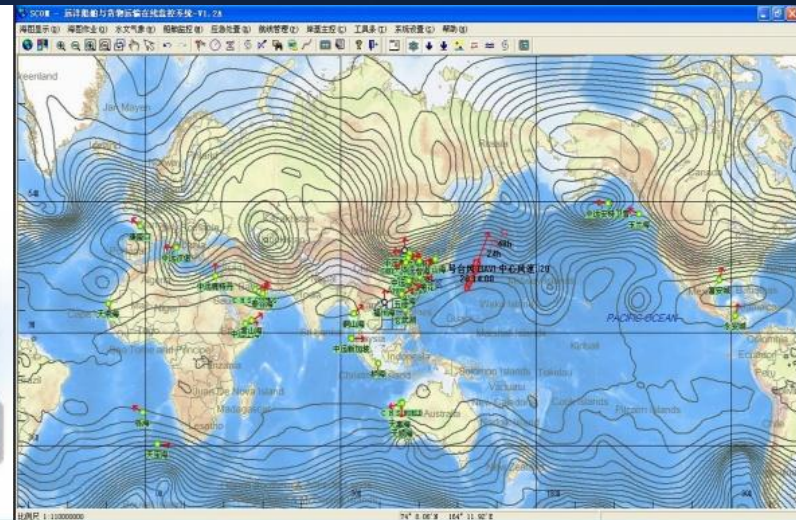
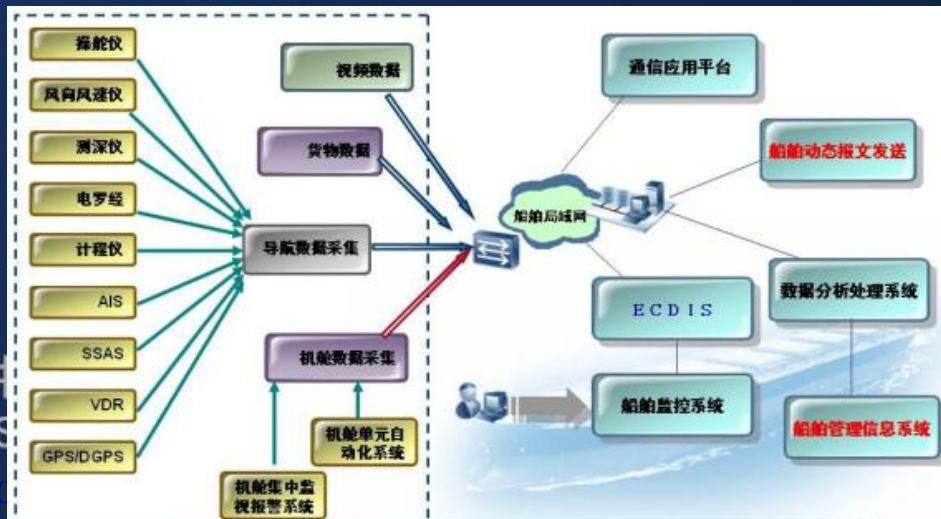
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Relevant Projects

- Development of online monitoring system of ocean-going vessels and cargo transportation

- Ship polymorphic data acquisition and online analysis
- Ship navigation safety risk warning
- Ship-shore communication optimization
- Deployed in more than 40 ocean-going ships



Relevant Projects

- Maritime human-machine interaction research

- Sino-European Usability Center - SEUC
 - Founded in 2000
 - Supported by EU and Chinese government
 - Focus on human factors and usability in ICT applications
 - Full-functional usability lab



Relevant Projects

- Maritime human-machine interaction research



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Relevant Projects

- Maritime human-machine interaction research

- Research on culture issues in electronic chart interaction
 - Map design: A way-showing experiment in Sweden and China using maps in different orientations
 - Collaboration between Chalmers University of Technology and DMU in 2011



CHALMERS



Relevant Projects

- Maritime human-machine interaction research

- Research on culture issues in electronic chart interaction
 - Way-showing using the egocentric 3D map showed faster decision times and generated less errors than traditional north-up and head-up maps.
 - Some potential cultural differences were discovered, however the 3D map seem to overcome these to a large extent, a potential for “accessible design”





Thank you

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