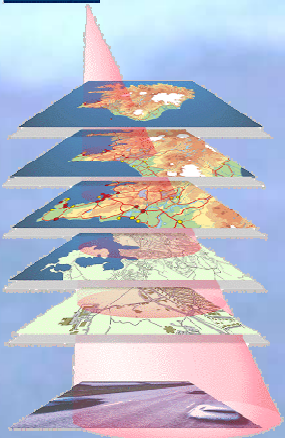




TrackWell VMS

Presentation in Barbados
March 27th 2008

TracScape



Agenda today

- **Introduction to TrackWell**
- **TrackWell VMS**
 - Overview
 - User interface applications
 - Platforms
 - System architecture
 - Vessel units
 - Implementation
- **Q/A at end of session**

TrackWell today

- **Founded in 1996**
 - Offshoot from The University of Iceland
 - History goes back to 1987
 - 26 employees in Iceland

- **Software development and systems integration**
 - Complete solutions for the customers
 - State of the art consultancy services, leveraging expertise and technical know-how

- **Solid international customer base**
 - Services operational in 14 countries, spanning five continents
 - Strong partnership forged with key customers and leading industry players

- **Subsidiary in Houston Texas – Trackwell ADS**
 - Partnership with e.g. Thrane & Thrane, Telenor, Tele Atlas and Inmarsat



Company Background

**Proven track record of providing solutions for mission-critical
Mobile Resource Management projects**



Air traffic control

- Radar Data Processing and Presentation System
- Monitoring all aircraft in the worlds second largest oceanic air sector



Search & Rescue

- Monitoring all Icelandic vessels
 - Coastguard
 - Directorate of Fisheries
 - Vessel Owners
 - Life Saving Association
- 112 / 911 automatic callout systems



Fisheries Control

- Enforcing international fisheries regulations
- Operational VMS
 - Iceland (1997)
 - UK (NEAFC, 1999)
 - SEAFO (2006)

TrackWell VMS - Overview

- **Developed in close cooperation with Coastguard and Fisheries Authorities**
- **In use since 1997 – continuous development**
- **Highly flexible and independent of communications systems**
 - Supports all the major types of vessel units concurrently
 - Already existing standard vessel units can be used
- **Main fields of usage**
 - Surveillance (Coastguard)
 - Fisheries Control (Coastguard/Fisheries Authorities)
 - Safety (Search And Rescue teams)
 - Resource Management (Coastguard, Vessel owners)



ICG VMS highlights

■ **Processes**

- 1.5 million position reports per day
- Hundreds of catch and activity messages per day

■ **All data stored in a database**

- 7 days of full data
- Data reduced to 10 minutes intervals and special events before archiving

■ **Synchronized with outside data sources**

- Official vessel registry
- Fishing license database (DoF)

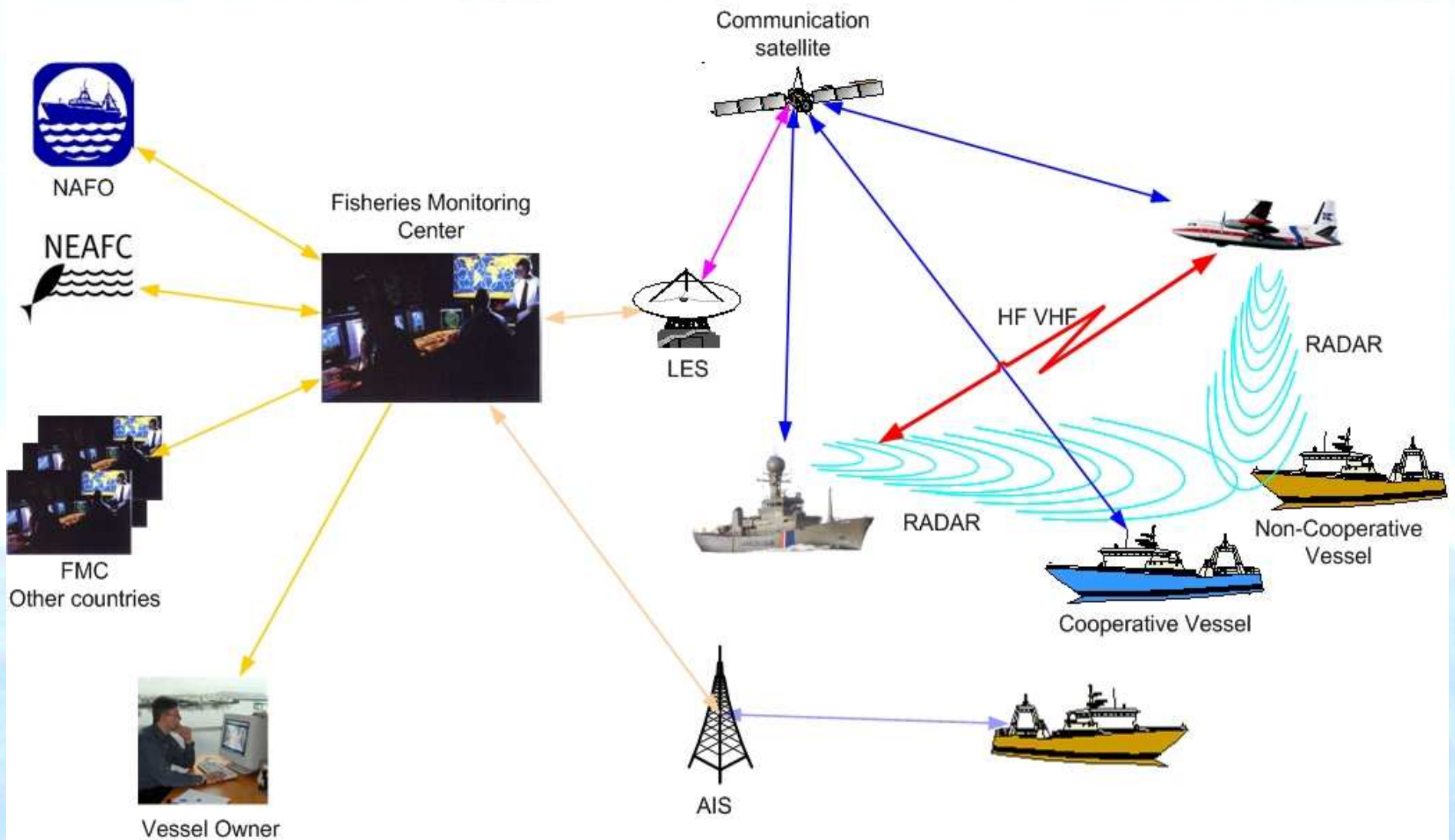
■ **Thousands of vessels registered**

- Automatic registration of foreign newcomers (e.g. AIS vessels)

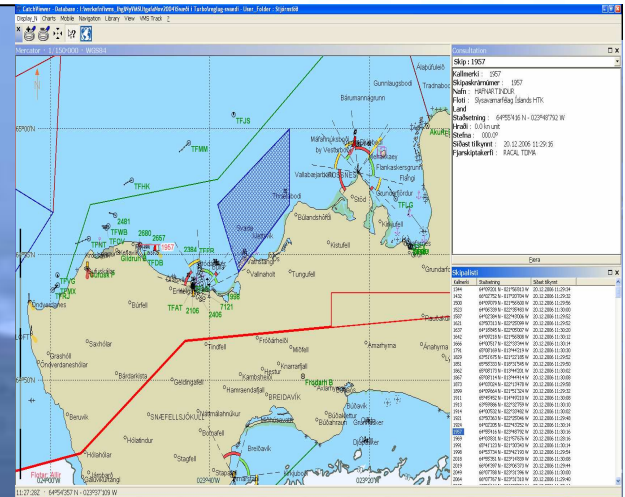
■ **Data accessible by patrol vessels and aircraft**

■ **A number of lists and reports on generated automatically**

TrackWell VMS - Overview



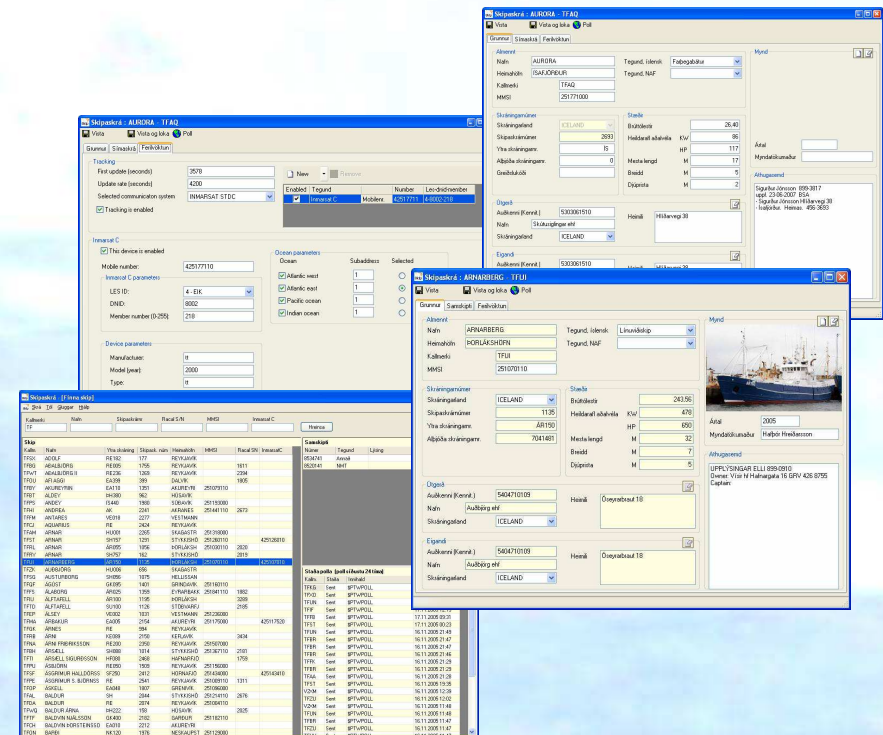
TrackWell VMS – Surveillance



- **Vessels are equipped with tracking devices (e.g. Inmarsat-C, Inmarsat D+, VHF/UHF, ARGOS, GPRS)**
 - Positions, speed, heading, timestamp and i.d. are received, processed, stored and displayed
 - Vessel owners pay for the tracking device and the communication cost
 - All vessels are tracked at all times while at sea
- **Geofencing – EEZ, harbours, closed areas**
- **Monitoring of message reception according to schedule**
- **Alerts generated in case of lacking reports, entry/exit events and possible infringement**
- **Data transferred to Inspection vessels and aircraft during operations**

Surveillance – Vessel registering

- **Vessel registry module**
 - Standalone or synchronized with official registry
- **Vessels have their own profiles containing**
 - Vessel Details (and registration)
 - Communication parameters
 - Update rate and positioning parameters
 - Fisheries license details
- **Polling and programing of reporting rate from vessels**



The screenshot displays the TrackWell software interface for vessel registration. It features several windows:

- Shipmaster - ALDEGJA - T140**: A form for entering vessel details such as name, registration number, and communication system.
- Shipmaster - ALDEGJA - T140**: A form for entering tracking parameters like first update seconds and update rate.
- Shipmaster - ALDEGJA - T140**: A form for entering device information like model number and manufacturer.
- Shipmaster - ALDEGJA - T140**: A form for entering communication parameters like radio channel and power.
- Shipmaster - ALDEGJA - T140**: A form for entering fisheries license details like license number and type.
- Shipmaster - ALDEGJA - T140**: A table listing registered vessels with columns for name, registration number, and status.

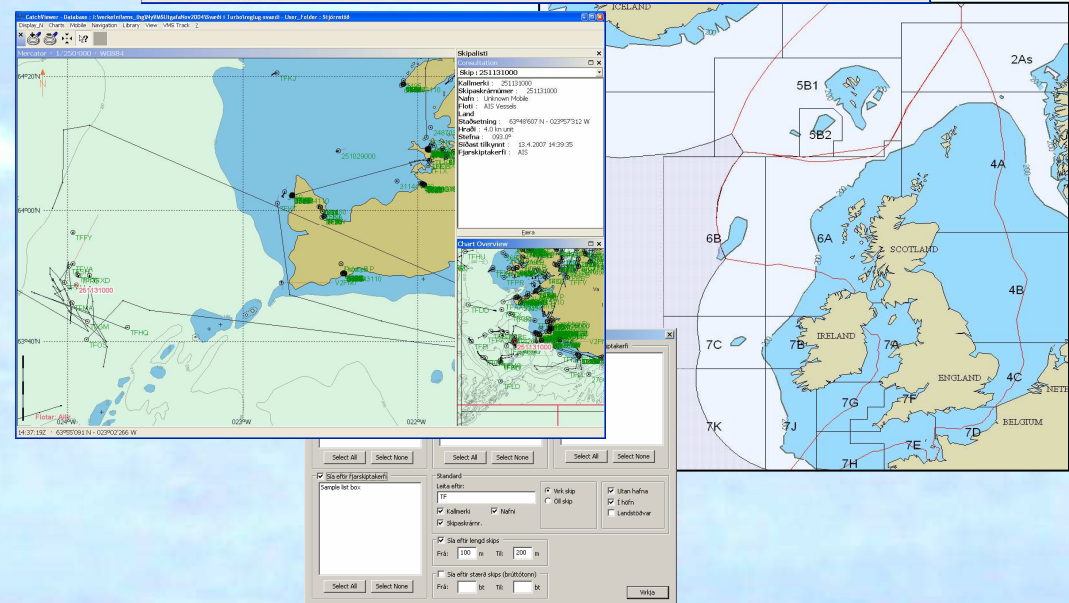
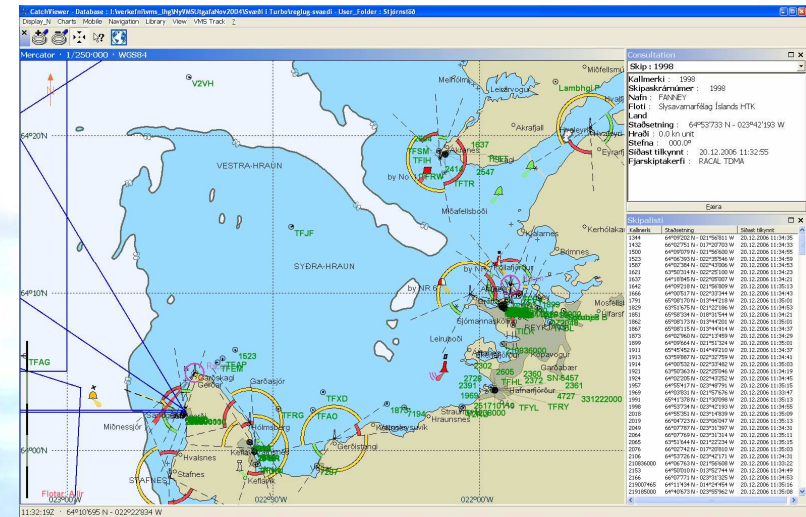
Surveillance – Map Interface

■ Many Configurable Map Tools

- Main Window and Overview
- Vessel Status and Detail Windows
- Map Actions and Measurements
- History Query
- Filter Function
- C-Map, S57, other map formats

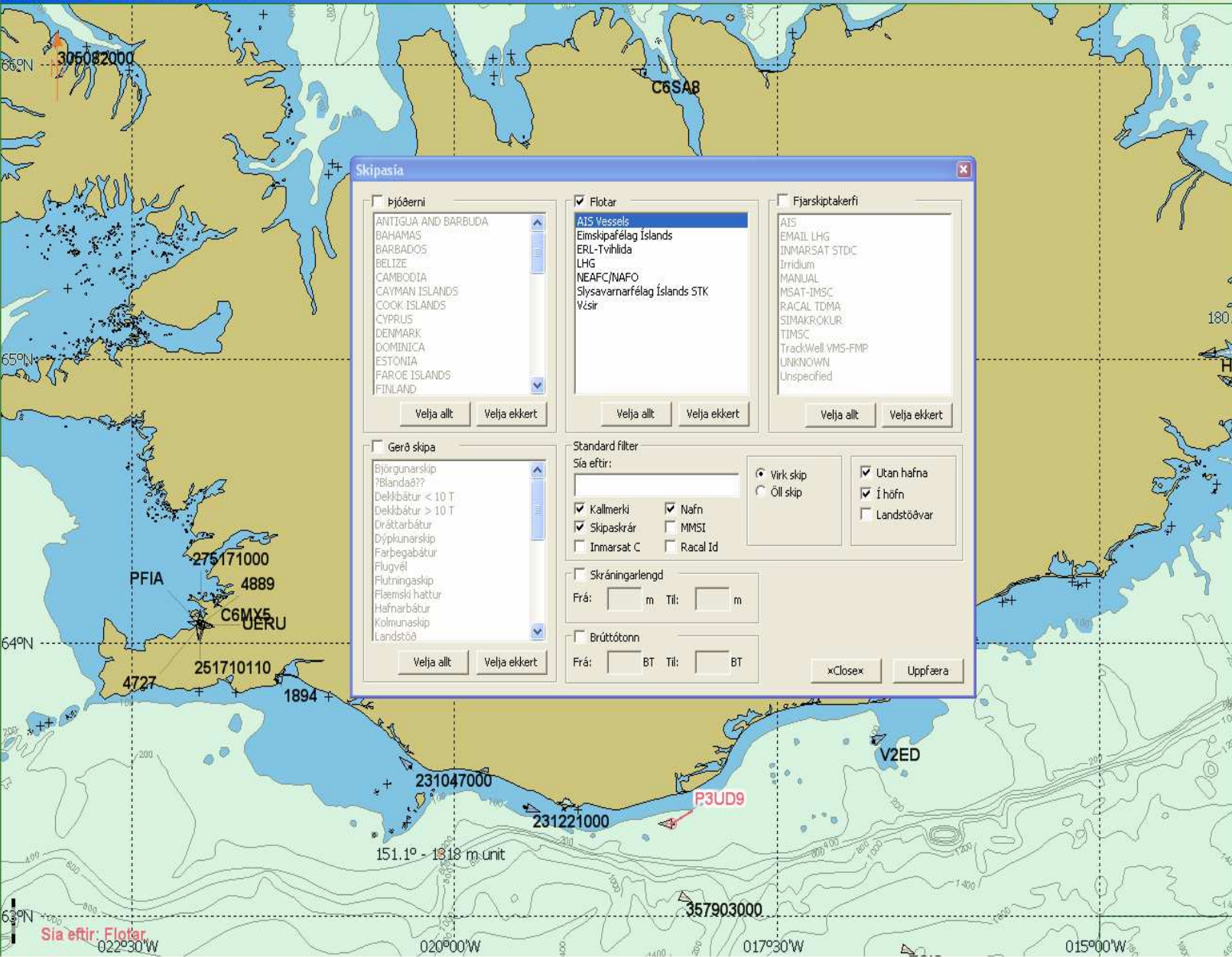
■ Specialized Maps

- EEZs
- Regulatory Areas
- ICES Areas
- Customer specific maps





Mercator · 1/1:500'000 · WGS84



Skipasía

Þjóðerni

- ANTIGUA AND BARBUDA
- BAHAMAS
- BARBADOS
- BELIZE
- CAMBODIA
- GAYMAN ISLANDS
- COOK ISLANDS
- CYPRUS
- DENMARK
- DOMINICA
- ESTONIA
- FAROE ISLANDS
- FINLAND

Velja allt Velja ekkert

Flotar

- AIS Vessels
- Eimskipafélag Íslands
- ERL-Tvíhliða
- LHG
- NEAFC/NAFO
- Slysavarnarfélag Íslands STK
- Vísir

Velja allt Velja ekkert

Fjarskiptakerfi

- AIS
- EMAIL LHG
- INMARSAT STDC
- Iridium
- MANUAL
- MSAT-IMSC
- RACAL TDMA
- SIMAKRÖKUR
- TIMSC
- TrackWell VMS-FMP
- UNKNOWN
- Unspecified

Velja allt Velja ekkert

Gerð skipa

- Þjörgunarskip
- ?Blandað??
- Dekkbátur < 10 T
- Dekkbátur > 10 T
- Dráttarbátur
- Dýplunarskip
- Farþegabátur
- Flugvél
- Flutningaskip
- Flaemski hattur
- Hafnarbátur
- Kolmunaskip
- Landstöð

Velja allt Velja ekkert

Standard filter

Sía eftir:

Kallmerki Nafn

Skipaskrár MMSI

Inmarsat C Racal Id

Skráningarlengd

Frá: m Til: m

Brúttótonn

Frá: BT Til: BT

Virk skip Utan hafna

Öll skip Í höfn

Landstöðvar

×Closex Uppfæra

Consultation

Skip : P3UD9

Kallmerki : P3UD9

Skipaskrárnúmer

Nafn : CEMSEA

Floti : AIS Vessels

Gerð skipa : Flutningaskip

Skráningarlengd : 0

Brúttótonn : 0

Inmarsat C : 0

MMSI : 210743000

Racal Id : 0

Staðsetning : 63°20'569 N - 018°18'879 W

Hraði : 9.0 kn unit

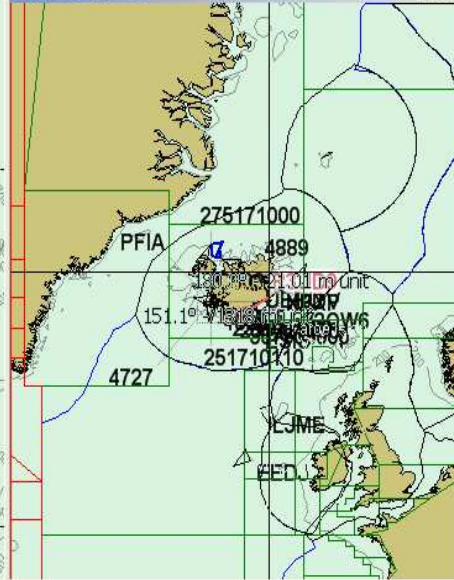
Stefna : 269.0°

Síðast tilkynnt : 1.3.2008 16:29:54

Fjarskiptakerfi : AIS

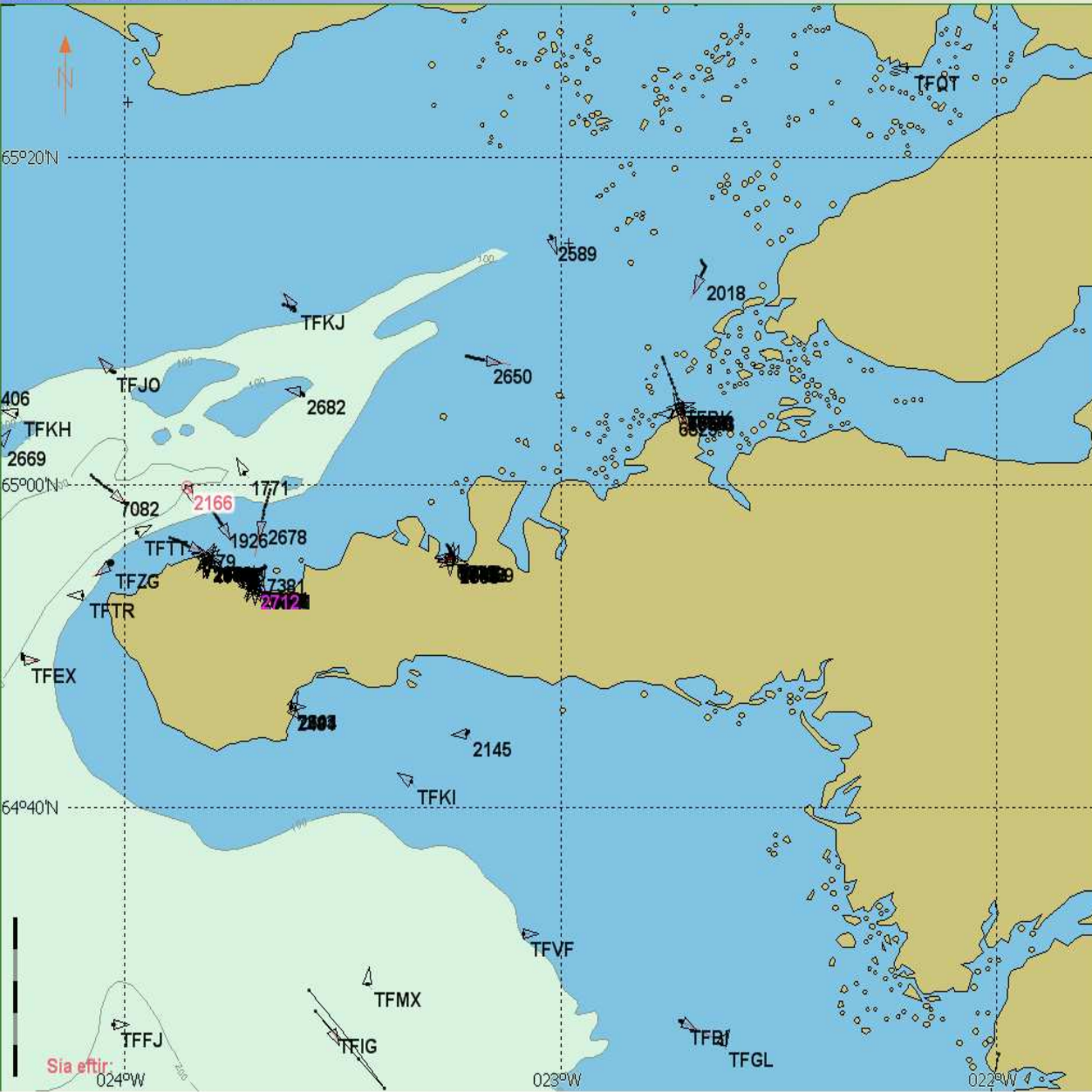
Færa
Check

Chart Overview





Mercator · 1/500'000 · WGS84



Consultation

Skip : 2477
 Kallmerki : 2477
 Skipaskrárnúmer : 2477
 Nafn : VINUR
 Floti : Slysavarnarfélag Íslands STK
 Þjóðerni : ICELAND
 Gerð skipa : Dekkbátur < 10 T
 Skráningarlgengd : 9
 Brúttótonn : 5
 Inmarsat C : 0
 MMSI
 Racal Id : 101860
 Staðsetning : 64°02'749 N - 022°22'351 W
 Hraði : 6.5 kn unit
 Stefna : 149.3°
 Síðast tilkynnt : 1.3.2008 16:31:52
 Fjarskiptakerfi : RACAL TDMA

Færa
 Check

Chart Overview

Skipalisti

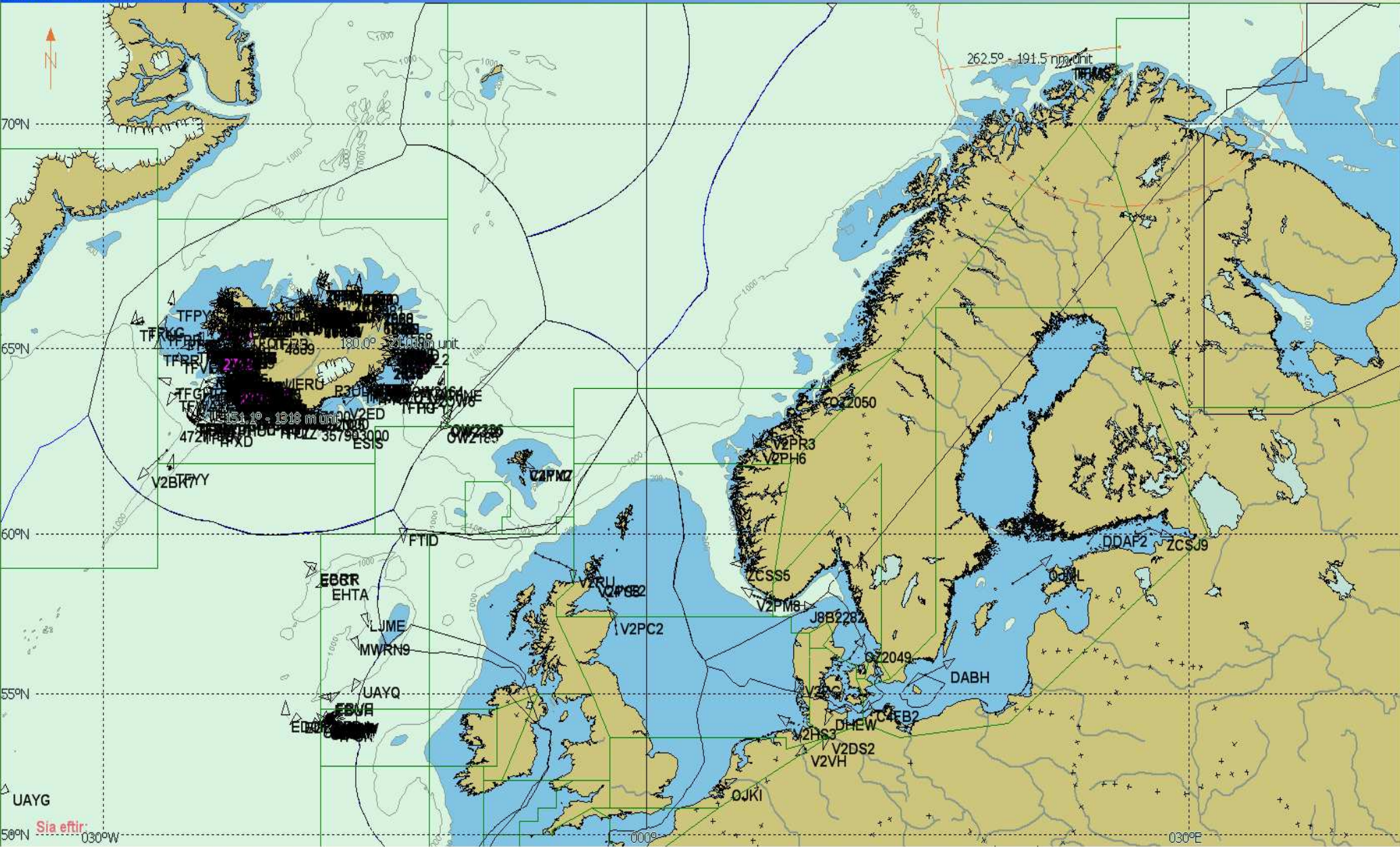
| Kallmerki | CS | Nafn | Skipa... | Staðsetning | Tími sta... | Received | Hraði | Stefna |
|-----------|----|-------------------|----------|----------------------------|-------------|-----------|----------|--------|
| 2090 | RA | BUGGA | 2090 | 64°55'449 N - 023°48'768 W | 12:36:54 | 12:37:26 | 0.0 k... | 171.2° |
| 2093 | RA | JÓN PÁLL | 2093 | 65°35'863 N - 024°00'271 W | 16:33:13 | 16:33:15 | 0.0 k... | 269.0° |
| 2102 | RA | BÁRA | 2102 | 64°55'420 N - 023°48'720 W | 16:32:57 | 16:33:29 | 0.0 k... | 180.0° |
| 2106 | RA | BERGVÍK | 2106 | 64°06'760 N - 022°55'779 W | 16:33:26 | 16:33:27 | 2.1 k... | 088.6° |
| 2125 | RA | FENGLUR | 2125 | 65°57'231 N - 018°11'161 W | 13:55:07 | 13:55:39 | 0.0 k... | 269.0° |
| 2129 | RA | TJALDUR | 2129 | 66°04'461 N - 018°39'304 W | 16:31:44 | 16:32:17 | 0.0 k... | 000.0° |
| 2145 | RA | KVIKA | 2145 | 64°44'613 N - 023°13'092 W | 16:32:35 | 16:33:07 | 2.0 k... | 265.4° |
| 2153 | RA | HEIÐRÚN | 2153 | 64°50'003 N - 013°52'730 W | 16:33:01 | 16:33:05 | 0.0 k... | 043.0° |
| 2166 | RA | SÆUNN EIR | 2166 | 64°59'873 N - 023°51'507 W | 16:32:51 | 16:33:23 | 0.2 k... | 156.0° |
| 2175 | RA | EYJÓLFUR ÓLAFS... | 2175 | 64°00'509 N - 022°33'369 W | 29.2.2... | 29.2.2... | 0.0 k... | 156.0° |
| 2178 | RA | INGIBJÓRG | 2178 | 64°55'372 N - 023°48'783 W | 16:32:21 | 16:32:53 | 0.0 k... | 180.0° |
| 2183 | RA | ÁRNÝ | 2183 | 64°14'938 N - 015°12'298 W | 16:33:14 | 16:33:17 | 0.0 k... | 176.1° |
| 2185 | RA | BLÍÐA | 2185 | 63°22'770 N - 020°11'063 W | 16:33:12 | 16:33:15 | 0.7 k... | 331.6° |
| 2189 | RA | ÁSMUNDUR | 2189 | 65°53'885 N - 019°25'181 W | 29.2.2... | 29.2.2... | 0.0 k... | 269.0° |
| 2198 | RA | ÞÓR | 2198 | 63°26'630 N - 020°16'262 W | 16:33:20 | 16:33:20 | 0.1 k... | 097.0° |
| 2225 | RA | GARÐAR | 2225 | 66°02'949 N - 023°30'540 W | 16:32:45 | 16:32:47 | 0.0 k... | 269.0° |
| 2238 | RA | EBBA | 2238 | 64°13'003 N - 022°56'859 W | 16:32:37 | 16:32:39 | 2.6 k... | 345.0° |
| 2240 | RA | VOGIN | 2240 | 64°09'206 N - 021°56'786 W | 14:40:15 | 14:40:46 | 0.0 k... | 180.0° |
| 2243 | RA | BRYNJA | 2243 | 64°53'848 N - 023°42'251 W | 15:42:54 | 15:43:27 | 2.3 k... | 141.2° |
| 2256 | RA | GUÐRÚN PETRÍNA | 2256 | 65°41'388 N - 021°30'062 W | 16:32:08 | 16:32:41 | 0.0 k... | 025.0° |

Sía eftir:

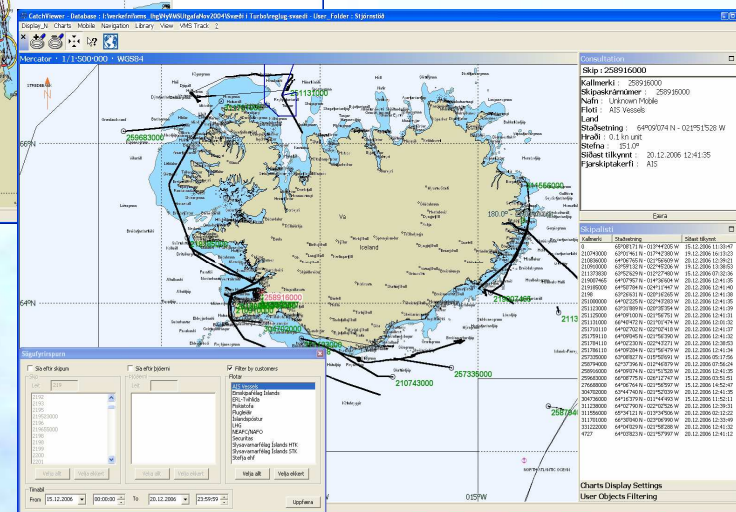
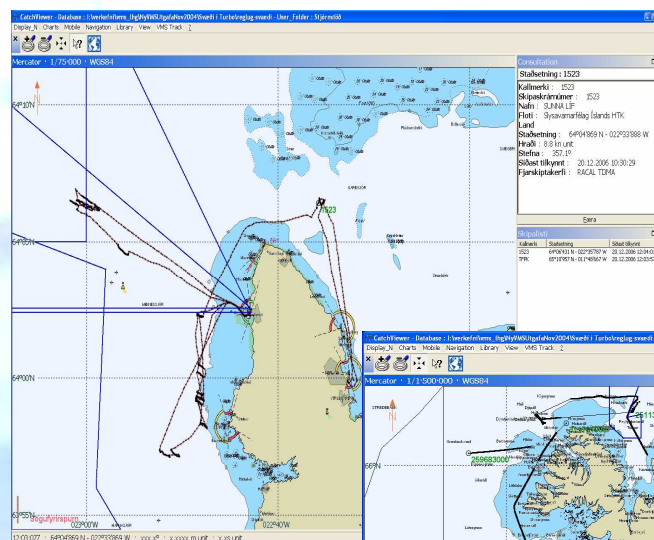
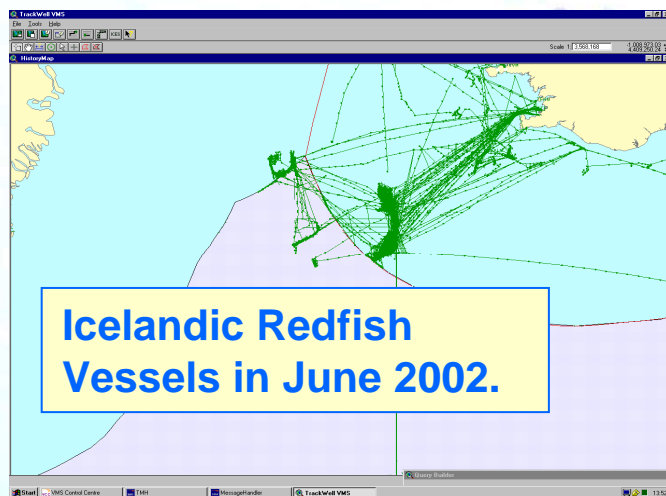
Fjöldi skipa: 648

Skipasía Excel

Virk skip < 32 kst
 Öll skip
 Utan hafna
 Í höfn
 Landstöðvar



Surveillance – History tracks



- **User selects vessels of interest and other parameters**
- **User selects date range**
- **Search returns a trail**
- **Trail detail window shows information related to individual points**

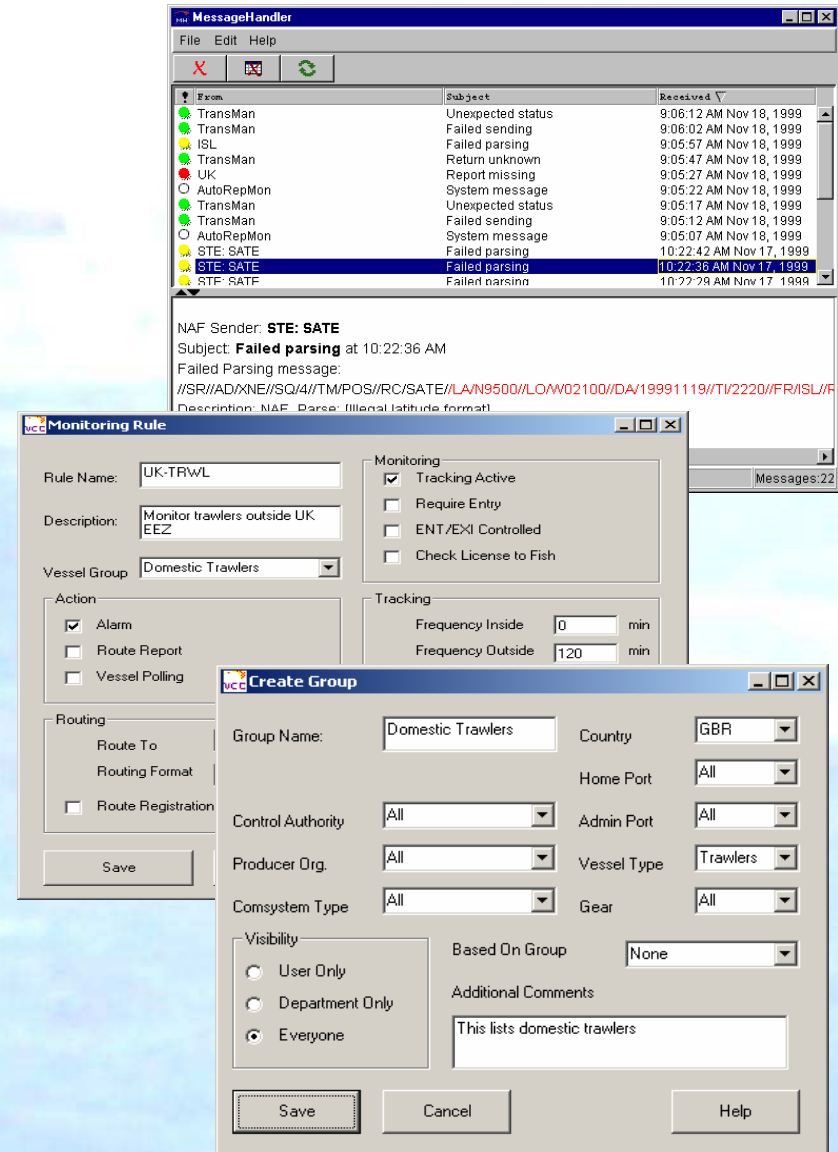
Surveillance – Monitoring and Alerting



- **Monitoring is a key feature**
 - Reception of position according to schedule
 - Geo fence - Entry into and Exit out of defined areas (EEZ, closed areas, harbors)
 - Speed and vessel characteristics
 - Validation of vessels' licenses and registration
- **Actions include**
 - Alert message generated (Message Handler, email, SMS, buzzer)
 - Vessel polled automatically
 - Positions, Entry and Exit messages forwarded

Surveillance – Monitoring and alerting

- **Alerts are:**
 - Stored in DB
 - Viewed in the Message Handler
- **User can:**
 - Filter alerts
 - Sort alerts
 - Copy alerts
 - Delete alerts
- **Event Engine**
 - Triggered by positions
 - Triggered by timing events
 - Tampering warnings received from mobile units



The screenshot displays three overlapping windows from the TrackWell software interface:

- MessageHandler:** A window showing a list of messages with columns for From, Subject, and Received. The selected message is from STE: SATE with the subject "Failed parsing" received at 10:22:36 AM Nov 17, 1999. The description indicates a parsing error: "Description: NAF_Parse: Illegal latitude format".
- Monitoring Rule:** A configuration window for a rule named "UK-TRWL". The description is "Monitor trawlers outside UK EEZ" and the vessel group is "Domestic Trawlers". It includes sections for Action (Alarm checked), Routing, and Tracking (Frequency Inside: 0 min, Frequency Outside: 120 min).
- Create Group:** A window for creating a group named "Domestic Trawlers" with country "GBR". It includes fields for Home Port, Admin Port, Vessel Type (set to "Trawlers"), and Gear. The visibility is set to "Everyone" and based on the group.

Fisheries Control - Overview

- **Fishing license management**
 - Licensed species, timeframe, days at sea
- **Full support for message exchange as required by Regional Fisheries Offices (NEAFC, NAFO, SEAFO, etc.)**
- **Full support for EU message exchange format**
- **Sophisticated Catch and Effort reporting system**
 - Electronic Log Books (certified by Directorate of Fisheries)
 - Now being installed in all Icelandic fishing vessels
 - Product Log
 - Fleet Manager (for the vessel owners)



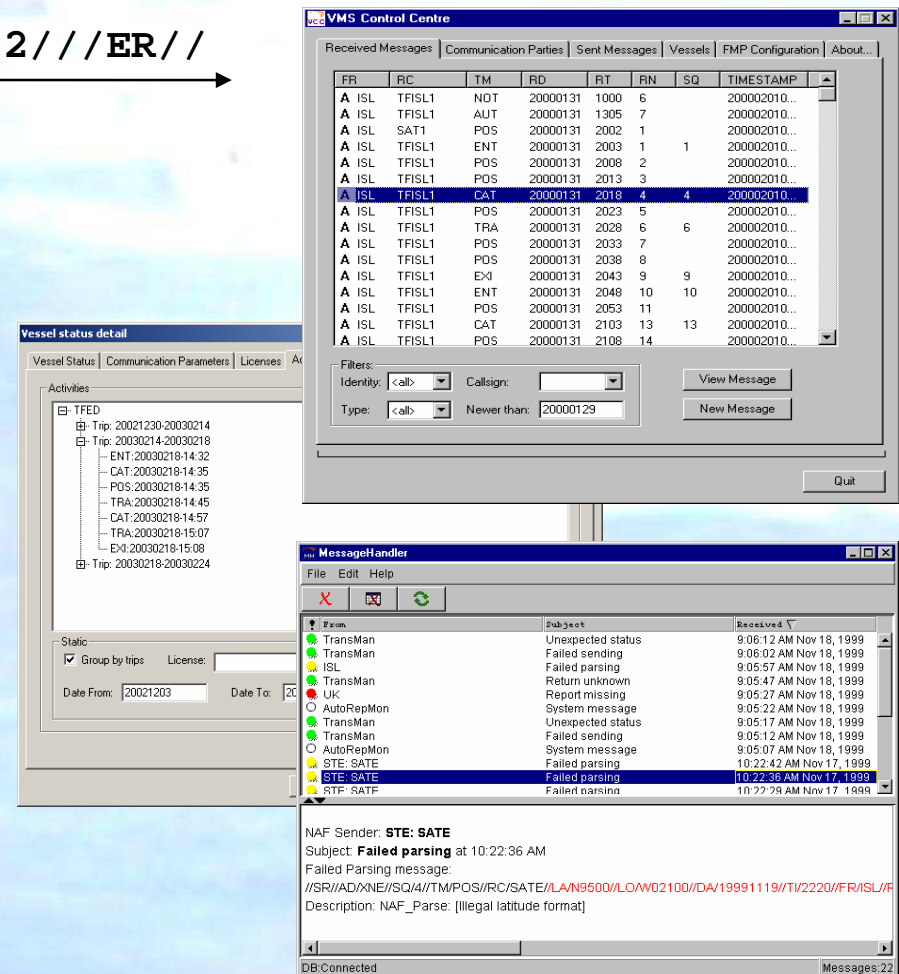
Fisheries Control – NAF message support

//LA/N6430//LO/W00459///ZO/XJM//ER//

//SR//AD/GBR//FR/NOR//TM/ENT//RC/TFXX//DA/20001028//

TM/RET//RC/TFXX/RD/20030312/RT/1432///ER//

- **Powerful NAF message validation**
 - Message syntax verification
 - Mandatory and optional fields
 - Record number/sequence number checked
 - Constrained values, e.g. ISO-3166 codes, Vessel types and Species
- **Catch data compared against licenses**
- **Catch by fishing trip calculations**
- **Fisheries related alerts presented in Message Handler**



VMS Control Centre

| FR | RC | TM | RD | RT | RN | SQ | TIMESTAMP |
|----|-----|--------|-----|----------|------|----|--------------|
| A | ISL | TFISL1 | NOT | 20000131 | 1000 | 6 | 200002010... |
| A | ISL | TFISL1 | AUT | 20000131 | 1305 | 7 | 200002010... |
| A | ISL | SAT1 | POS | 20000131 | 2002 | 1 | 200002010... |
| A | ISL | TFISL1 | ENT | 20000131 | 2003 | 1 | 200002010... |
| A | ISL | TFISL1 | POS | 20000131 | 2008 | 2 | 200002010... |
| A | ISL | TFISL1 | POS | 20000131 | 2013 | 3 | 200002010... |
| A | ISL | TFISL1 | CAT | 20000131 | 2018 | 4 | 200002010... |
| A | ISL | TFISL1 | POS | 20000131 | 2023 | 5 | 200002010... |
| A | ISL | TFISL1 | TRA | 20000131 | 2028 | 6 | 200002010... |
| A | ISL | TFISL1 | POS | 20000131 | 2033 | 7 | 200002010... |
| A | ISL | TFISL1 | POS | 20000131 | 2038 | 8 | 200002010... |
| A | ISL | TFISL1 | ExI | 20000131 | 2043 | 9 | 200002010... |
| A | ISL | TFISL1 | ENT | 20000131 | 2048 | 10 | 200002010... |
| A | ISL | TFISL1 | POS | 20000131 | 2053 | 11 | 200002010... |
| A | ISL | TFISL1 | CAT | 20000131 | 2103 | 13 | 200002010... |
| A | ISL | TFISL1 | POS | 20000131 | 2108 | 14 | 200002010... |

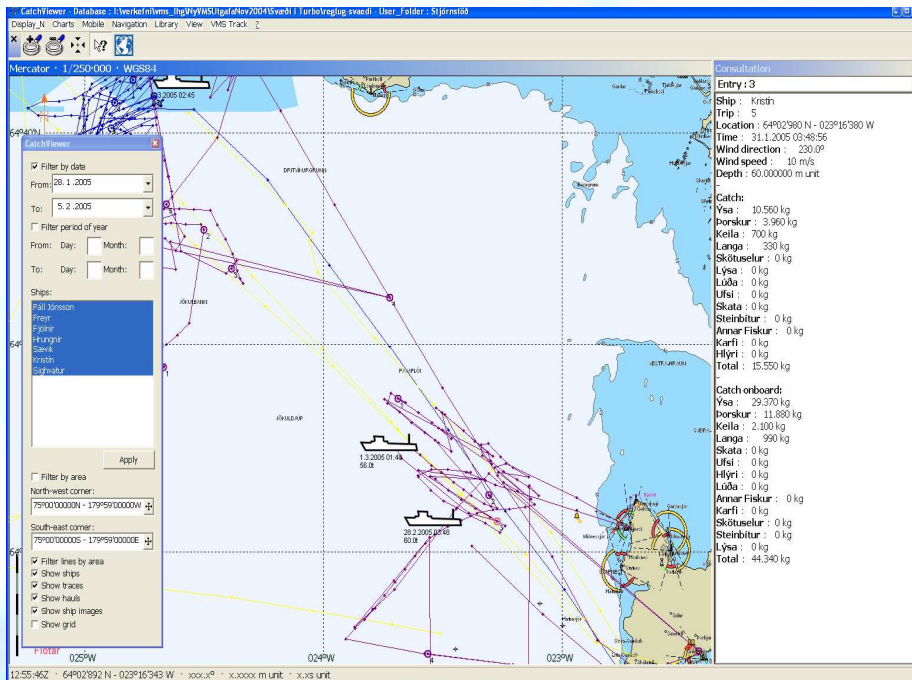
MessageHandler

| From | Subject | Received |
|------------|-------------------|--------------------------|
| TransMan | Unexpected status | 9:06:12 AM Nov 18, 1999 |
| TransMan | Failed sending | 9:06:02 AM Nov 18, 1999 |
| ISL | Failed parsing | 9:05:57 AM Nov 18, 1999 |
| TransMan | Return unknown | 9:05:47 AM Nov 18, 1999 |
| UK | Report missing | 9:05:27 AM Nov 18, 1999 |
| AutoRepMon | System message | 9:05:22 AM Nov 18, 1999 |
| TransMan | Unexpected status | 9:05:17 AM Nov 18, 1999 |
| TransMan | Failed sending | 9:05:12 AM Nov 18, 1999 |
| AutoRepMon | System message | 9:05:07 AM Nov 18, 1999 |
| STE: SATE | Failed parsing | 10:22:42 AM Nov 17, 1999 |
| STE: SATE | Failed parsing | 10:22:36 AM Nov 17, 1999 |
| STE: RATF | Failed parsing | 10:22:29 AM Nov 17, 1999 |

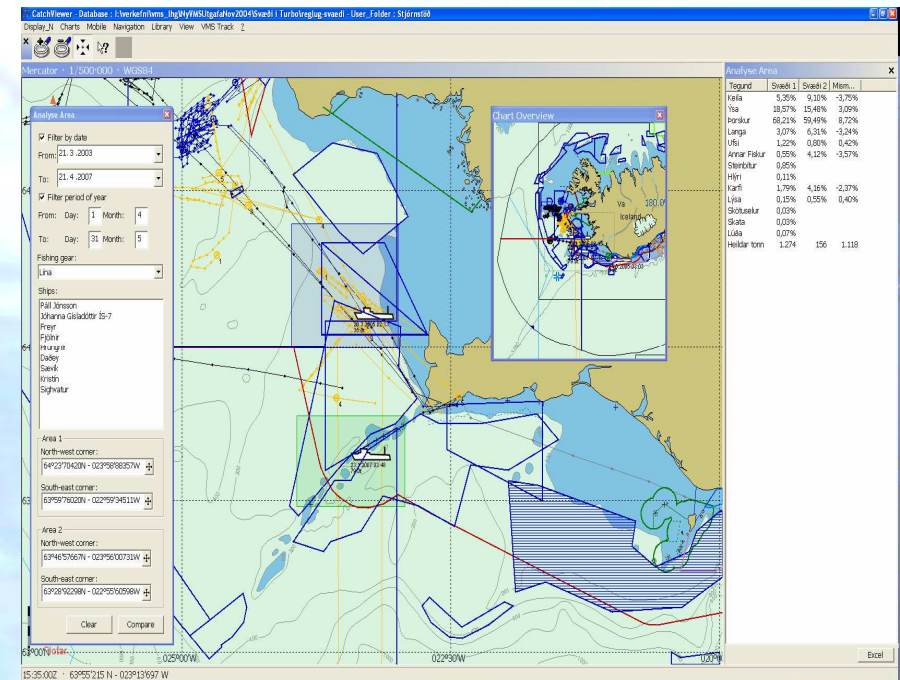
NAF Sender: **STE: SATE**
 Subject: **Failed parsing** at 10:22:36 AM
 Failed Parsing message:
 //SR//AD//XNE//SQ//4//TM/POS//RC/SATE//LAN9500//LO/W02100//DA/19991119//TV/2220//FR/ISL//
 Description: NAF_Parse: [Illegal latitude format]

DB: Connected Messages: 22

Fisheries Control – Catch and Effort Reporting System



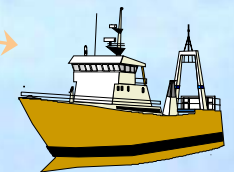
Analysis of trails and catch



Comparison of fishing areas

Safety At Sea

- **Mandatory reporting system for all Icelandic vessels**
 - Manual system established in the fifties
 - Automated in 1998
 - Combined with Coastguard's VMS in 2006
- **Shore based communications for smaller boats (VHF)**
 - Report in/out of harbour
 - Report position every 30 second
 - Alert generated after 15 minutes without report
 - Alert button on board vessels
- **Satellite system for the larger vessels**



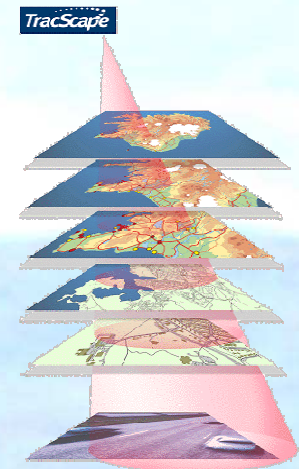
Resource Management

■ Surveillance craft

- All Coastguard vessels and aircraft are tracked at high report rate

■ Fishing fleet

- Vessel owners can have their position reports routed to their offices, into their Fleet Manager software
- Collect history data from their own vessels
- Detailed information on location, catch, weather, temperature, conditions of the catch, etc.
- Helps selecting good fishing grounds and avoiding bad ones





Fleet control

Selected fleet: Eimskipafélag Íslands main fleet

| Name | Phone# | Location | Time hh/mm | |
|---|----------|-----------------------|------------|--|
| <input type="checkbox"/> Cs VII | 9250098 | 51:52:45 N 4:24:33 E | 16:02 | |
| <input type="checkbox"/> Cs VIII | 9336244 | 60:09:24 N 24:54:19 E | 15:58 | |
| <input type="checkbox"/> Dalfoss | 9359628 | 62:28:09 N 6:08:24 E | 15:58 | |
| <input type="checkbox"/> Dettifoss | 10106-85 | 58:13:19 N 5:47:55 E | 16:10 | |
| <input type="checkbox"/> Doris Schepers | 9404065 | 53:31:16 N 9:57:43 E | 16:04 | |
| <input type="checkbox"/> Goðafoss | 9086796 | 62:00:09 N 6:46:07 W | 14:24 | |
| <input type="checkbox"/> Herjólfur | 9036088 | 63:26:46 N 20:15:36 W | 16:06 | |
| <input type="checkbox"/> Holmfoss | 35338619 | 64:55:24 N 23:15:06 W | 08:32 | |
| <input type="checkbox"/> Ice Bird | 8915524 | 59:08:45 N 5:16:04 E | 14:46 | |
| <input type="checkbox"/> Ice Crystal | 8915536 | 60:10:16 N 27:49:50 E | 14:26 | |
| <input type="checkbox"/> Ice Star | 8911504 | 6:26:43 N 3:22:52 E | 14:48 | |
| <input type="checkbox"/> Karin Schepers | 9404077 | 54:02:00 N 7:48:45 E | 15:48 | |

Mobile Record Information

General

| | |
|--------------|----------------|
| Name | Goðafoss |
| Type | Freight vessel |
| Description | |
| Phone number | 9086796 |

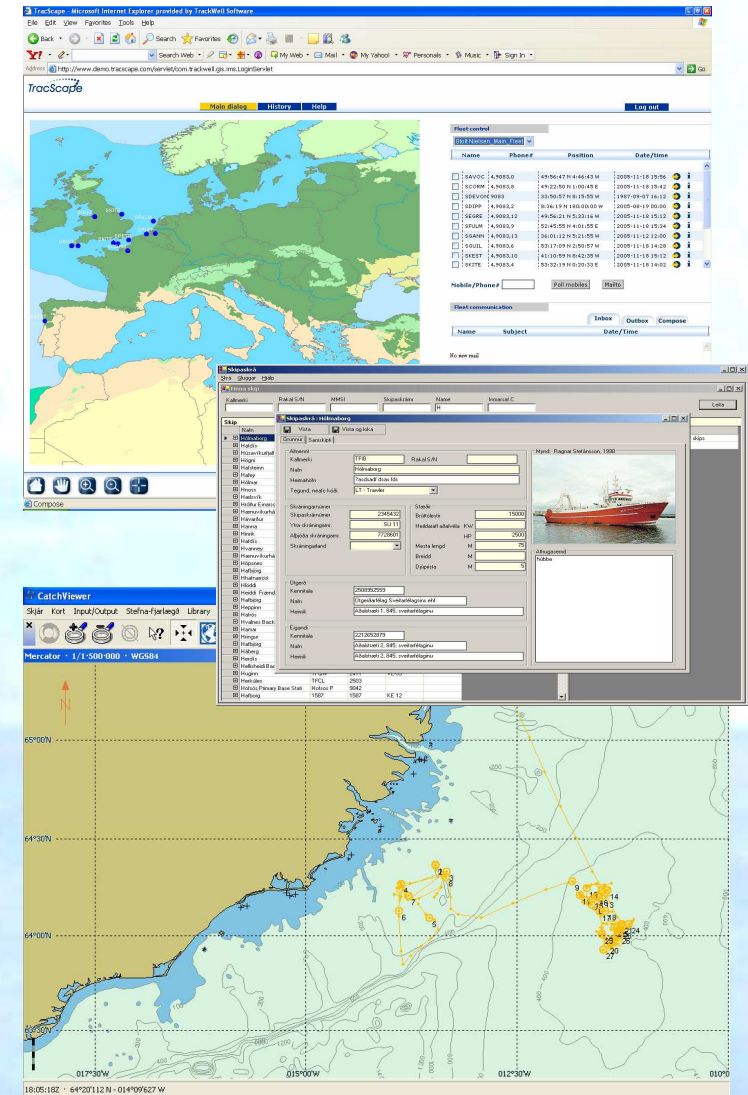


Last locations

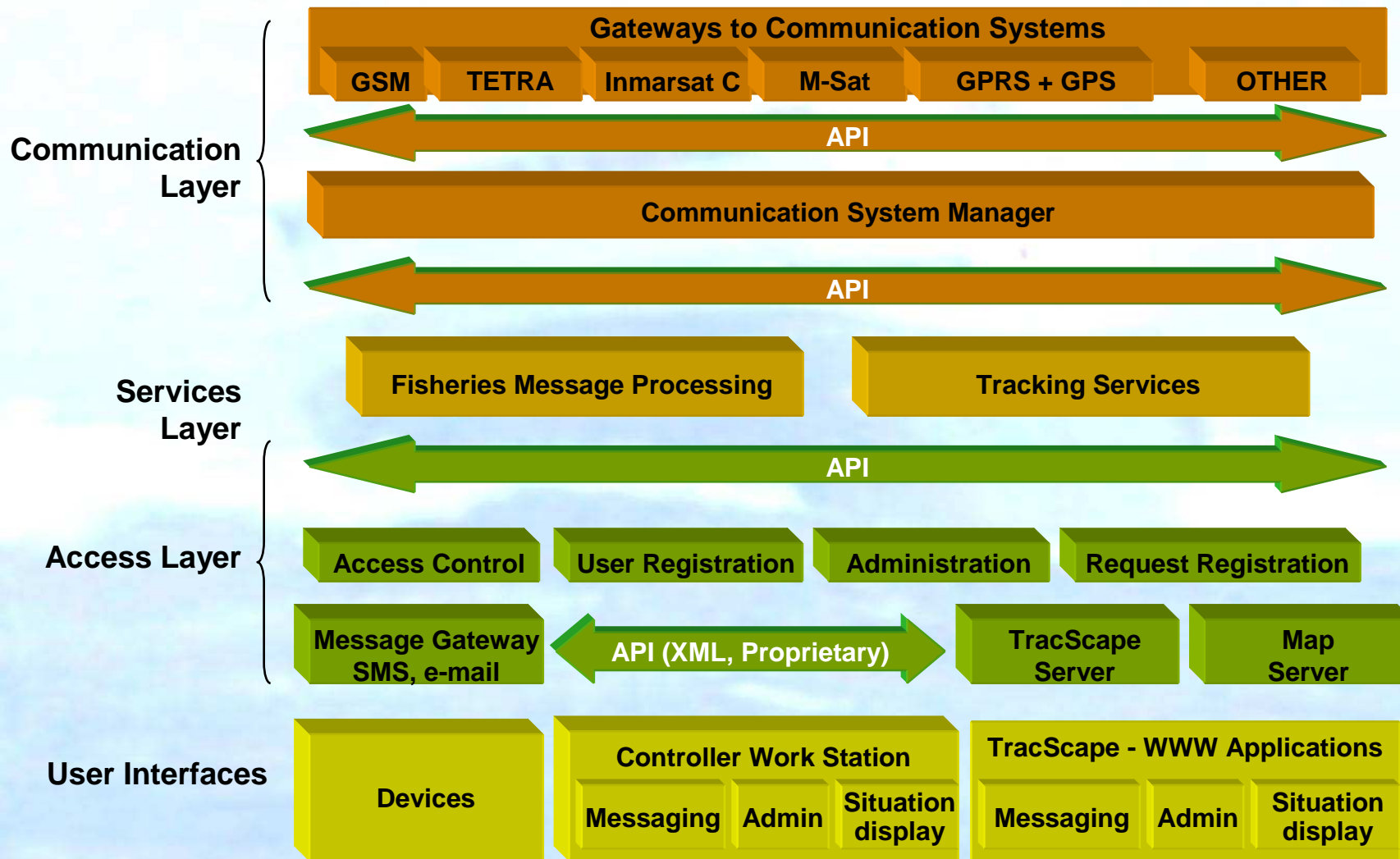
| Time hh/mm | Location | Speed |
|------------------|-----------------------|-------|
| 2008-03-01 06:28 | 62:25:21 N 11:13:28 W | 18 kn |
| 2008-03-01 08:26 | 62:17:33 N 10:00:09 W | 18 kn |
| 2008-03-01 10:26 | 62:09:07 N 8:47:24 W | 18 kn |
| 2008-03-01 12:24 | 62:01:12 N 7:37:19 W | 17 kn |
| 2008-03-01 14:24 | 62:00:09 N 6:46:07 W | 1 kn |

System Platforms

- **Server – Client model**
 - Server runs on most platforms (Unix, Linux, Windows)
 - Clients run on Windows PCs
- **Relational SQL database (Oracle)**
 - Customer has access to schema
- **Variety of User Interface Applications**
 - Desktop
 - Web based
- **Variety of reporting tools**
 - Crystal report
 - Compatible with MS Office tools
- **Supports most communications systems, concurrently**

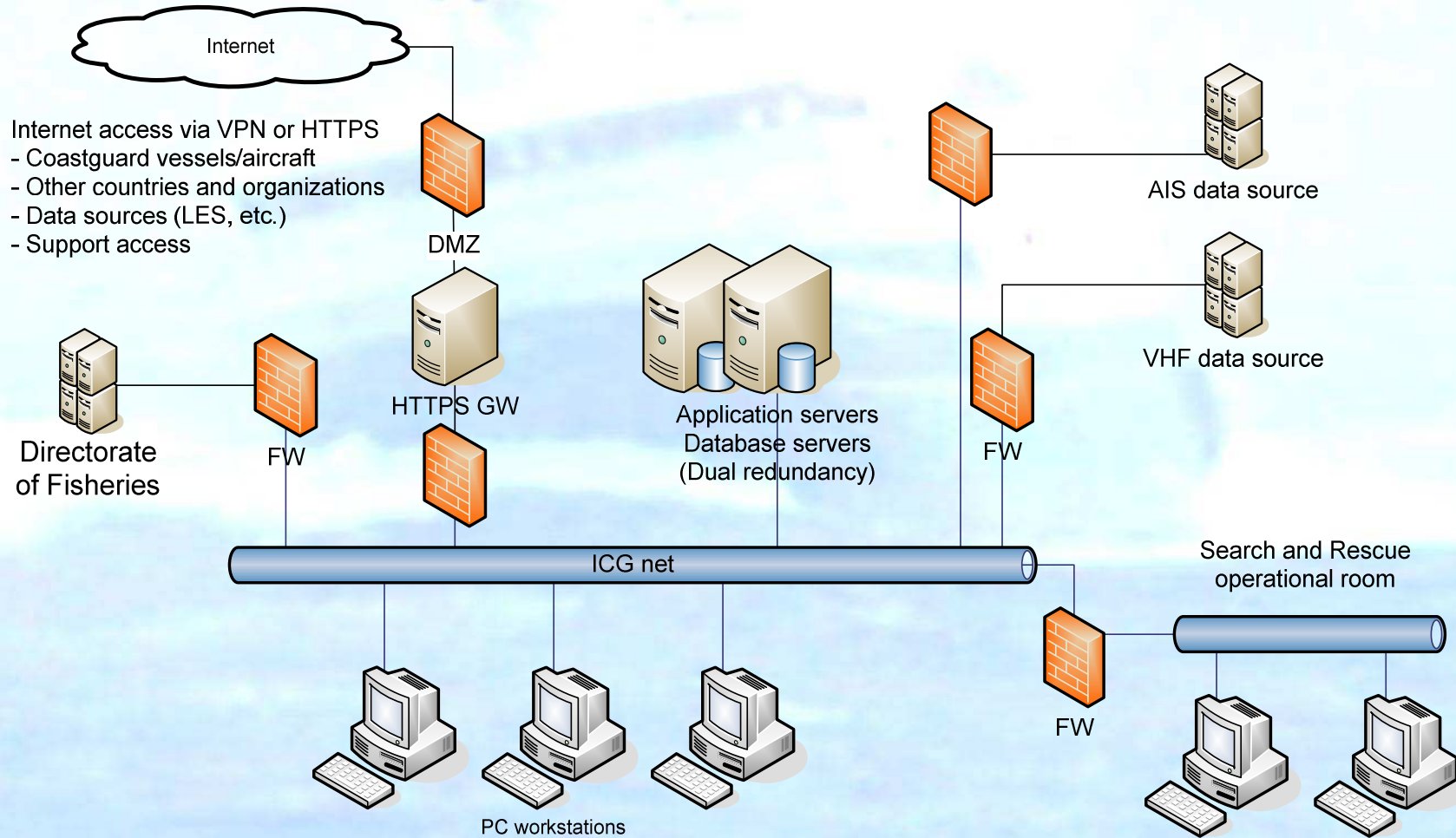


Application Server Architecture



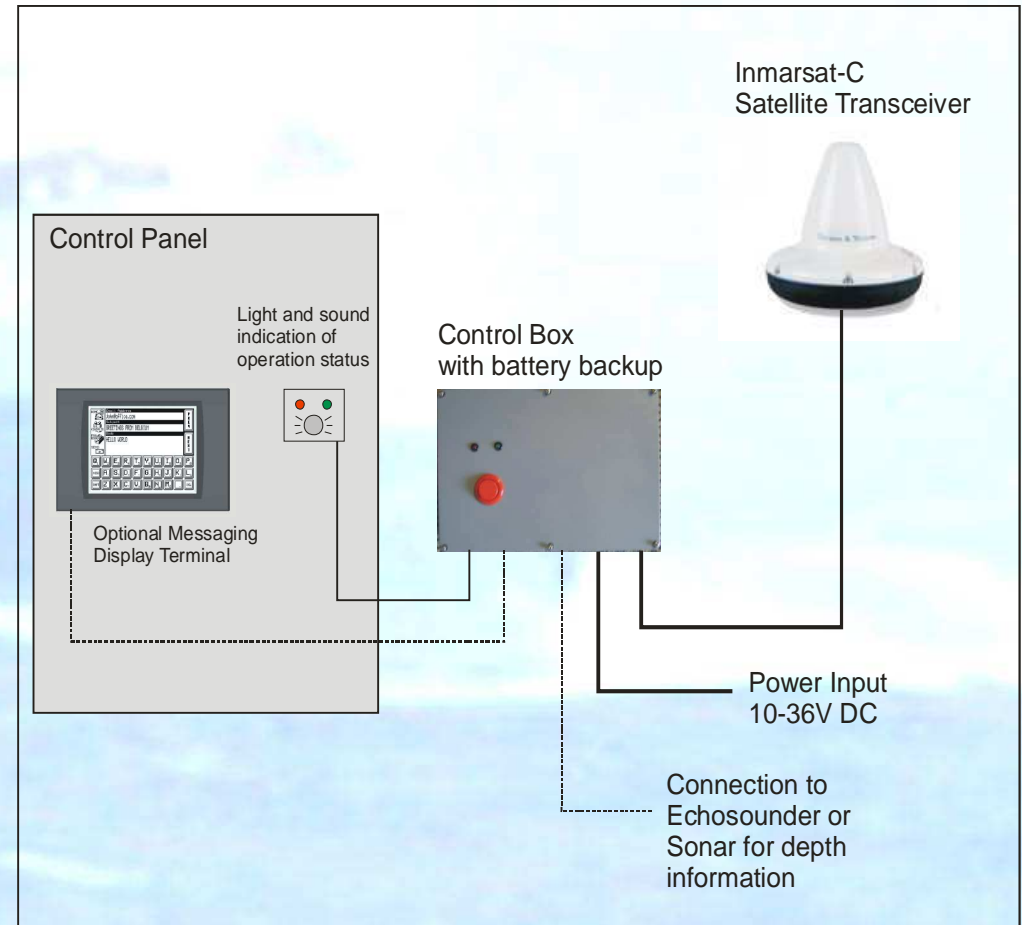
ICG VMS network

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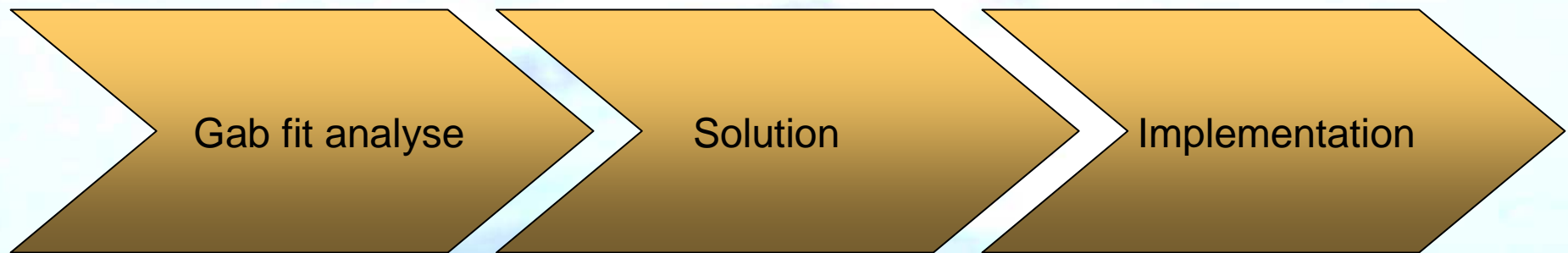


Vessel Units

- **TrackWell VMS supports most standard types of vessel units**
- **TrackWell ADS - Tamper proof solution available**
 - **Optional Display Terminal**
 - Input of catch data
 - General messaging
- **Domestic Partner for installation and maintenance**



Implementation procedure



Consulting team

- Customer
- TW
- Domestic Partner
- Specialists

Functionality modules

- General Surveillance
- Fisheries Control
- Safety
- Fleet Management
- Modifications/additions

Steps with customer

- Installation
- Configuration
- Testing
- Training
- Support and maintenance
- Long term marriage!

Implementation procedure

- **The VMS is just one piece of a large puzzle !!!**

- **The customer needs to provide:**
 - Legislation
 - Infrastructure to operate and monitor the VMS
 - Patrol vessels/aircraft
 - Means to detect non-cooperative vessels
 - Procedures to use the data to control the EEZ
 - Etc.

Support and service

- **TrackWell operates 24/7 service desk**
 - Mobile phone
 - support@trackwell.com
- **First line support by local partners or by customer specialists**
- **Second line support by TW or local partners**
- **Third line support by TW 24/7**
- **Support and maintenance contract**
 - Extensive monitoring of the system
 - Bug fixes and mainstream upgrade
 - Tailor made development on time and material basis or by fixed price offers



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