



*PAN-EUROPEAN INFRASTRUCTURE
FOR OCEAN & MARINE DATA
MANAGEMENT*

WP2.4 Monitoring

Angelos Lykiardopoulos, Stavroula Balopoulou, Sissy Iona (HCMR-HNODC)
Menashè Eliezer (OGS)

*SeaDataNet II – final plenary meeting
16-17 Sep 2015, Brest, France*



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A. Overview of the Monitoring System



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What is network monitoring?

The term **network monitoring** describes the use of a system that constantly monitors a computer network for slow or failing components and that notifies the network administrator in case of outages.

In the fields of SDN, network monitoring service monitors through Internet the SDN services (web pages, DMs, etc) to confirm that they are accessible and available, notify persons in charge to take action in case of service failure and keep statistics.



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Benefits of monitoring

- ✓ Monitoring presence is crucial when implementing widely distributed systems over the Internet.
- ✓ Is also more and more a commitment for some projects funded by the European Commission like Research Infrastructure project (DG-Research) or Global Monitoring for Environment and Security (GMES - DG_Industry).
- ✓ In real time, to be able to alert when incidents are detected and to correct them as soon as possible;
- ✓ In a longer term, to identify critical components within widely distributed systems and to update them to improve their robustness;
- ✓ To provide continuous information about the overall availability of provided services.
- ✓ As statistics, to inform the consortium of the usage of services, portals, websites etc.
- ✓ The WP2 monitoring activities will also give input to the coordination by OGS of the WP7 scientific access services.



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Network Monitoring Plan

↓
Phase I: Services Inventory & Upgrade Nagios

↓
Phase II: First Monitoring Services (web pages, servers status)

↓
Phase III: Plugins, configuration of Web services, web forms, CAS

↓
Phase IV: Development of Download Manager plugin

↓
Phase V: Design & Development of Monitoring portal

↓
Phase VI: Definition & Development of Global Availability Indicator formula

↓
Phase VII: Messaging System (email) to notify local administrators

↓
Phase VIII: Establishment of second monitoring center

↓
Phase IX: Services usage monitoring

✓ Testing with Pilot Partners
✓ Examination of first monitoring data
✓ Monitoring all partners services

✓ SDN CAS authentication
✓ Features for reporting monitoring results
✓ Version of Download Manager (in cooperation with IFREMER)

MARIS: script to provide HCMR portal with RSM statistics needed for the formula

OGS identical Nagios False Alarm Detection System



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Monitoring System

- All phases were completed, successfully.
- Last developments
 - False alarm detection system (crosscheck with OGS nagios system and confirm or reject a critical events),
 - Addition of version of Download Manager at the portal,
 - New feature=>Global Availability Indicator that shows the whole infrastructure's % uptime during a selected period of time.



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Monitoring System: Services

The SeaDataNet components that are monitored are divided into two groups of services:

- ✓ The **Core services**, which are centrally-based provided services:
 - Common Data Index (CDI) portal
 - European Directory of Marine Organisations (EDMO) portal
 - European Directory of the initial Ocean-observing Systems (EDIOS) portal
 - European Directory of Marine Environmental Research Projects (EDMERP) portal
 - European Directory of Marine Environmental Data Sets (EDMED) portal
 - Cruise Summary Reports (CSR) portal
 - SeaDataNet homepage
 - SDN Central Authentication Service (CAS)
 - Common Vocabularies Web Services
 - Request Status Manager (RSM).

- ✓ The **Local services**, which are services that are provided by the partners' infrastructures.
 - 86 Download Managers supporting SeaDataNet, GeoSeas, UBSS, EMODNet-Chemistry and EMODNet-Bathymetry projects



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Monitoring System: Web portal

- ✓ The Monitoring Portal is an **online web interface** that can be accessed by **members only** either via the <http://seadatanetnm.hcmr.gr/portal> URL or via the **SeaDataNet website** (<http://www.seadatanet.org>) under the **Standards & Software** menu and as an icon at the top right of the page, next to extranet icon.
- ✓ **Members are:** people whose SDN service(s) is(are) monitored by the system (e.g. Download Manager), who are set by their organization as responsible for this(these) service(s) up and running smoothly, have obtained a SeaDataNet user ID.
- ✓ The portal provides users the capability to:
 - search and access a variety of detailed information about their own servers and services status and logs,
 - view on map all SDN services status of operation (availability),
 - record and show the history of their services operation status (statistic reports),
 - calculate % service uptime (availability indicator),
 - calculate a global availability indicator (% uptime of the whole network)

The screenshot shows the SeaDataNet website interface. The top navigation bar includes 'Overview', 'Metadata', 'Data Access', 'Standards & Software', 'Products', 'Events', and 'Publications'. The 'Standards & Software' menu is expanded, showing sub-items like 'SeaDataNet architecture', 'Common Vocabularies', 'Metadata formats', 'Data Transport Formats', 'Data Quality Control', 'Software', and 'AAA services'. The 'Monitoring portal (only members)' link is highlighted with a red circle. Another red circle highlights the extranet icon in the top right corner. The main content area displays a list of standards and software, including 'STAN' and 'WARE', with a list of bullet points detailing various services and tools. The footer includes the SeaDataNet logo and the text 'Webmaster'.

The screenshot shows the SeaDataNet Monitoring Portal login page. The page title is 'SeaDataNet Monitoring Portal'. The main content area contains a welcome message: 'Welcome to SeaDataNet Nagios portal. Through here SeaDataNet registered users can be informed about the status and logs of their own services. Users must register once in order to get a personal login name and password. This is done by filling a web form and confirming, that the user accepts the terms and conditions of the SeaDataNet User Licence. SeaDataNet maintains a Central User Register, but the user registration request is managed per country by the specific National Oceanographic Data Centre / Marine Data Centre. This centre checks the authenticity of the user, and if ok, orders the Central User Register to send the user an e-mail with its access credentials. This includes also the role, that has been allocated to the user, and that is used by the SeaDataNet processing of data set requests.' Below the welcome message, there are two links: 'Register as a SeaDataNet user' and 'Ask for a new password (if already registered)'. At the bottom, there is a login form with a 'Login!' button. The footer includes the SeaDataNet logo and the text '© 2013-2014 SeaDataNet' and 'Developed & Designed by HCMR-HNODC'.



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Monitoring Portal: Important features

- ✓ **“Latest Critical Events”** => reports the “hard critical events for the last 7 days” of the user’s service(s) showing duration and detailed state information.
- ✓ **“Alerts Summary”** => reports the “hard critical events for a selected period of time” of the user’s service(s) showing duration and detailed state information.
- ✓ **“Service Availability Indicator”** => % uptime of an individual service at a specific period of time.
- ✓ **“Global Availability Indicator”** => Data Access Services: refers to the Data Access & Download Service (CDI) and calculates the % total uptime of all its related services (Seadatanet homepage, SDN CAS, Request Status Manager and 86 Download Managers).
- ✓ **“False Alarm Detection System”** => in case of an event a notification email is sent to local administrators including the status of the monitored service by both monitoring systems (HCMR & OGS).



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“Data Access Services” - Global Availability Indicator formula

- The seadatanet.org, [CAS authentication](#) and [Request Status Manager](#) services play a critical role to the overall data availability of the network.
 - If they are not functioning (**OFF**) then the availability is **NULL**.
 - When seadatanet.org, [CAS authentication](#) and [Request Status Manager](#) are actually functioning properly (**ON**) then the Availability is calculated based on the equation below that consists of the following factors:
 - s_j value: the uptime of each of the above three services
 - evaluation coefficient (w_j): estimated delivered CDIs for each local service (Download Manager),
 - s_i value: uptime of each local service.

$$\text{Availability} = \begin{cases} 0, & \text{seadatanet.org/CAS authentication/Request Status Manager OFF} \\ \sum_{j=0}^3 s_j \sum_{i=0}^n w_i s_i, & \text{seadatanet.org/CAS authentication/Request Status Manager ON} \end{cases}$$



Monitoring Network: List of services

Monitoring Network

- About the portal
- Document Library
- View all services on map

Current State

- Services
- Service Groups

State Reports

- Total Availability Index
- Service(s) Availability Index
- State Breakdowns (Availability)
- State History (Trends)

Alerts Reports

- Latest Critical Events
- Alerts Summary
- Alerts Histograms

[Add other service\(s\)](#)

[Add your Service](#)

List of monitoring services

The portal's services are divided into two groups of services:

- The **Core services**, which are centrally-based provided services.
- The **Local services**, which are services that are provided by the partners' infrastructures. Such service is "Download Manager" (DM).

The total 101 services and their starting date (being monitored for the first time) are the following:

Core Services			Local Services			
#	Service	Starting Date	#	Service	Version	Starting Date
1	CDI homepage 1	2012-06-29 21:00:00	1	Ankara University Download Manager	<1.4.5	2012-06-27 12:11:37
2	CDI homepage 2	2012-06-29 21:00:00	2	BGODC-IOBAS Download Manager	1.4.6	2012-06-29 21:00:00
3	CSR homepage	2012-06-29 21:00:00	3	BGR Download Manager	<1.4.5	2012-06-29 21:00:00
4	Common Vocabularies	2013-11-27 12:36:49	4	BGS Download Manager	<1.4.5	2012-06-29 21:00:00
5	EDIOS homepage	2012-06-29 21:00:00	5	BMDC Download Manager	<1.4.5	2014-11-25 14:46:26
6	EDMED homepage	2012-06-29 12:54:33	6	BODC Download Manager	<1.4.5	2012-06-29 12:53:23
7	EDMERP homepage	2012-06-29 21:00:00	7	BRGM Download Manager	<1.4.5	2013-07-15 17:47:34
8	EDMO homepage	2012-06-29 21:00:00	8	BSCS Download Manager	<1.4.5	2012-06-29 21:00:00
9	Geoseas Godiva Service	2013-03-07 13:45:58	9	BSH Download Manager	1.4.6	2012-06-30 21:00:00



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Monitoring Network: SeaDataNet Download Managers

Monitoring Network

- About the portal
- Document Library
- [View all services on map](#)

Current State

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- State History (Trends)

Alerts Reports

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- Alerts Summary
- Alerts Histograms

Add other service(s)

- Add your Service

Account

- Ask for a new password
- Change your personal info
- Sign-out user *sb30fad!*

NagVis Open Actions User menu Choose Language Need Help?

The map displays the following locations with green checkmarks: London, Edinburgh, Dublin, Galway, Cobh, Liverpool, Southampton, Bristol, Plymouth, Oostende, Brno, Orleans, Plouzané, Barcelona, Madrid, Amadora, Portugal, Lisboa, La Spezia, Trieste, Pisa, Spilimbergo, Ancona, Rijeka, Dubrovnik, Piran, Split, Zadar, Athens, Izmir, Istanbul, Ankara, Trabzon, Tbilisi, Georgia, Kerch, Sevastopol, Odessa, Constanta, Sinop, and others. Blue stars mark other locations like Trondheim, Oslo, Helsinki, Riga, Vilnius, Moscow, and Obninsk.



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State Reports -> Service Availability Index

Monitoring Network

- About the portal
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- View all services on map

Current State

- Services
- Service Groups

State Reports

- Service(s) Availability Index**
- State Breakdowns (Availability)
- State History (Trends)

Alerts Reports

- Latest Critical Events
- Alerts Summary
- Alerts Histograms

Add other service(s)

- Add your Service

Account

- Change your personal info
- Sign-out user *sb30fad!*

Calculate Availability Index

This form calculates in real-time the availability of a service in a specific period of time on percentage basis.

Select:

From:

To:

Select service & time period and press "Calculate"

Service Availability Index: %UP state of a single service.



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Alert Reports -> Latest Critical Events

Monitoring Network

- About the portal
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- Service Groups

State Reports

- Service(s) Availability Index
- State Breakdowns (Availability)
- State History (Trends)

Alerts Reports

- Latest Critical Events**
- Alerts Summary
- Alerts Histograms

Add other service(s)

- Add your Service

Account

- Change your personal info
- Sign-out user *sb30fad1*

Latest Critical Events

Select to view the latest critical events of your host/service.

Select Type:

Select service from the list below:

Select service:

➤ Select type “**Service**” & one or “**All**” service(s) from the list.
➤ Press “**View Alerts**”.

Latest critical events report: describes the critical state (“**DOWN state**”) of service(s) for the last 7 days.



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Alert Reports -> Alerts Summary

The screenshot shows the 'Alerts Summary' page on the SeaDataNet portal. The left sidebar contains a navigation menu with 'Alerts Summary' highlighted in a red box. The main content area has a form for selecting alert criteria, including a 'Select Type' dropdown set to 'Service', a 'Select service' dropdown set to 'All', and date range fields for 'From' (2014-09-01) and 'To' (2014-09-09). A 'View Alerts' button is visible below the form. Two blue callout boxes with arrows provide instructions: the top one points to the 'Service' dropdown and 'Next' button, and the bottom one points to the 'Alerts Summary' link in the sidebar.

Monitoring Network

- About the portal
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- View all services on map

Current State

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State Reports

- Service(s) Availability Index
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- Alerts Summary**
- Alerts Histograms

Add other service(s)

- Add your Service

Account

- Change your personal info
- Sign-out user *sb30fad!*

Contact

Alerts Summary

Select to view the summary of alerts of your host/service.

Select Type: Next

Select service from the criteria below:

Select service:

From:

To:

➤ Select type “**Service**” and press “**Next**”.

➤ Then select one or “**All**” service(s) from the list & time period.

➤ Press “**View Alerts**”.

Alerts Summary report: describes the critical state (“**DOWN state**”) of service(s) for a specific period of time.



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State Reports -> Global Availability Index

Monitoring Network

- About the portal
- Document Library
- View all services on map

Current State

- Services
- Service Groups

State Reports

- Total Availability Index**

Calculate Global Availability Indicator

This form calculates in real-time the Global Availability Indicator for the "Data Access Services" on monthly basis for the last 12 months.

Type of Availability Indicator:

From: To:

➤ Select month and year from calendar

➤ Press "Calculate"

Global Availability Indicator: calculates the % uptime of all Data Access Services (SDN homepage, CAS,RSM and DMs) for a specified monthly period within a year .



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False Alarm Detection System

- ✓ Status-json plugin of Nagios has been installed at OGS monitoring system. This plugin gives the status of each monitored service as shown by OGS system.
- ✓ A script has been developed to send notification emails to local administrators when critical events occur that include status as shown from both monitoring systems HCMR and OGS and it is as follows:

➤ ***** Nagios *****

Notification Type: PROBLEM

Service: ICES Download Manager

Host: ICES Server Address: 89.104.200.100

State: CRITICAL

Date/Time: Sun Sept 13 11:49:34 EEST 2015

Additional Info: No route to host

OGS CHECKED THE STATUS OF SERVICE AND CONFIRMS THE ALERT

Description given by OGS monitoring service for ICES/CRITICAL:

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B. Monitoring Report of the last year



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What is being monitored until now?

A total of 160 services are currently being monitored:

- ✓ 11 SeaDataNet Services,
- ✓ 2 GeoSeas Services,
- ✓ 46 SeaDataNet Download Managers,
- ✓ 24 GeoSeas Download Managers,
- ✓ 21 UBSS Download Managers,
- ✓ 43 EMODnet Chemistry Download,
- ✓ 13 EMODnet Bathymetry Download Managers.



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Monitored Services statistics

In the next slides, statistics are presented about the availability results of the 160 services derived from 7 service groups. The results are presented per service group and refer to a monitoring period of approximately 12 months (from 01-09-2014 to 01-09-2015).

The 7 service groups are:

- ✓ SeaDataNet Services
- ✓ GeoSeas Services
- ✓ SeaDataNet Download Managers (SeaDataNet DMs)
- ✓ GeoSeas Download Managers (GeoSeas DMs)
- ✓ UBSS Download Managers (UBSS DMs)
- ✓ EMODnet Chemistry Download Managers (EMODnet-Chem DMs)
- ✓ EMODnet Bathymetry Download Managers (EMODnet-Bathym DMs)



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'SeaDataNet Services' results from 01-09-2014 to 01-09-2015

Service	Starting Date	% Time OK	% Time Critical
Common Vocabularies	27/11/2013 12:36	99.598% (99.598%)	0.402% (0.402%)
cas_service	29/11/2013 13:42	99.618% (99.618%)	0.382% (0.382%)
CSR homepage	29/6/2012 21:00	98.531% (98.531%)	1.469% (1.469%)
CDI homepage 1	29/6/2012 21:00	99.919% (99.919%)	0.081% (0.081%)
CDI homepage 2	29/6/2012 21:00	99.912% (99.912%)	0.088% (0.088%)
EDIOS homepage	29/6/2012 21:00	99.919% (99.919%)	0.081% (0.081%)
EDMERP homepage	29/6/2012 21:00	99.917% (99.917%)	0.083% (0.083%)
EDMO homepage	29/6/2012 21:00	99.900% (99.900%)	0.100% (0.100%)
Request Status Manager	26/02/2015 22:00	100.000% (100.000%)	0.000% (0.000%)
EDMED homepage	29/6/2012 21:00	99.897% (99.897%)	0.103% (0.103%)
SeaDataNet homepage	15/6/2012 21:00	99.805% (99.805%)	0.195% (0.195%)
Average		99.729% (99.729%)	0.271% (0.271%)



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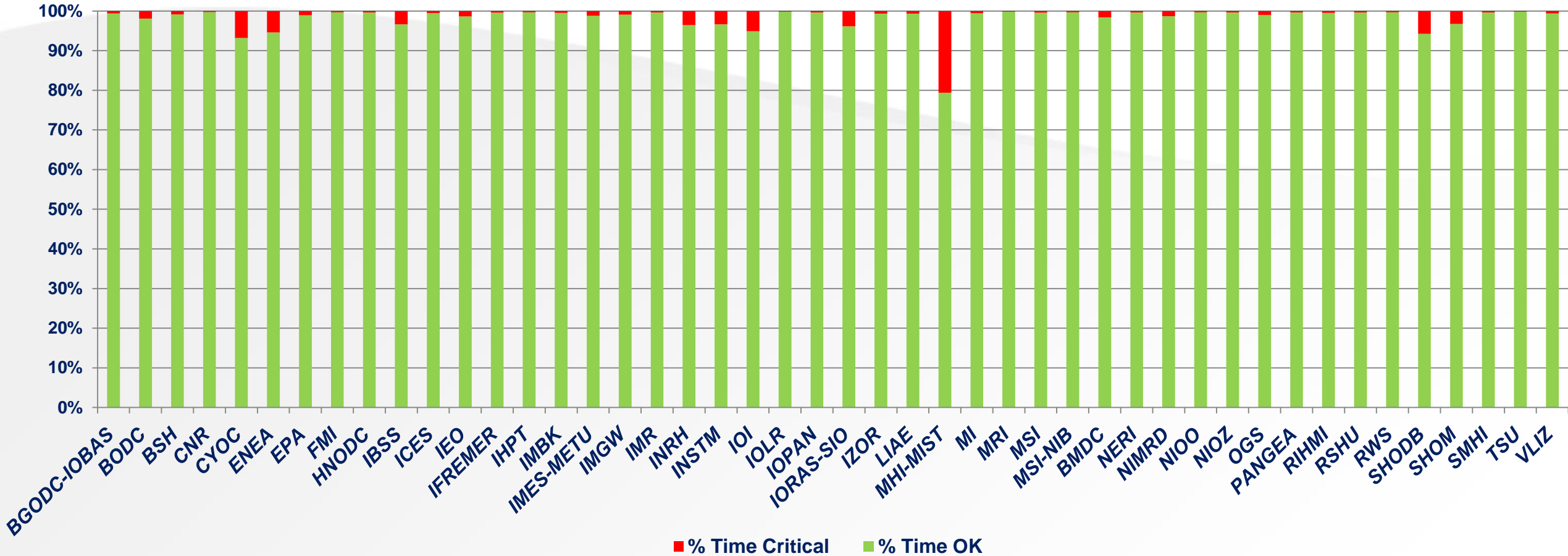
'GeoSeas Services' results from 01-09-2014 to 01-09-2015

Service	Starting Date	% Time OK	% Time Critical
Geoseas Godiva Service	7/3/2013 13:45	99.354% (99.354%)	0.646% (0.646%)
Geoseas Thredds Service	7/3/2013 13:46	99.360% (99.360%)	0.640% (0.640%)
Average		99.357% (99.357%)	0.643% (0.643%)



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'SeaDataNet DMs' results from 01-09-2014 to 01-09-2015



Average: 98,19% 1,81%

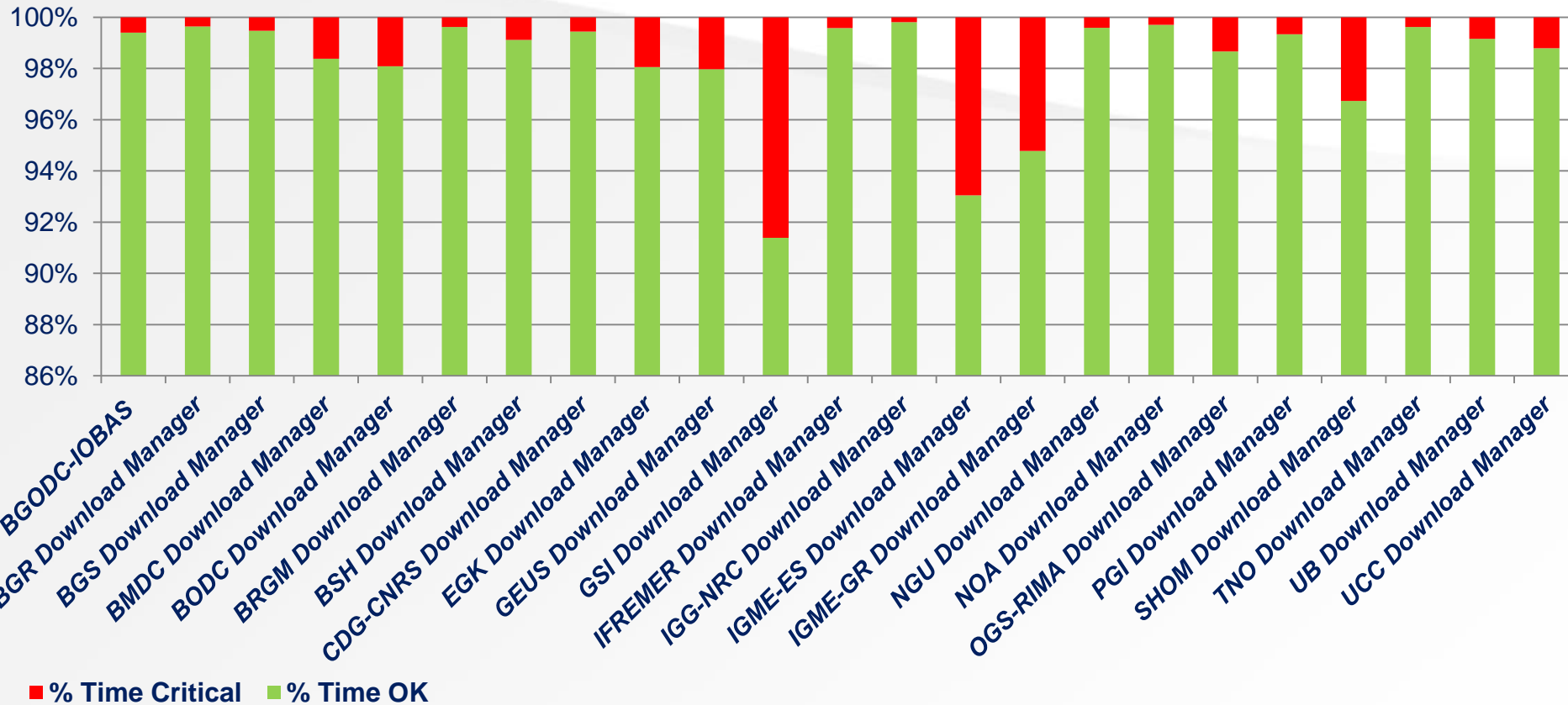
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'GeoSeas DMs' results from 01-09-2014 to 01-09-2015



Average: **98,23%** **1,77%**

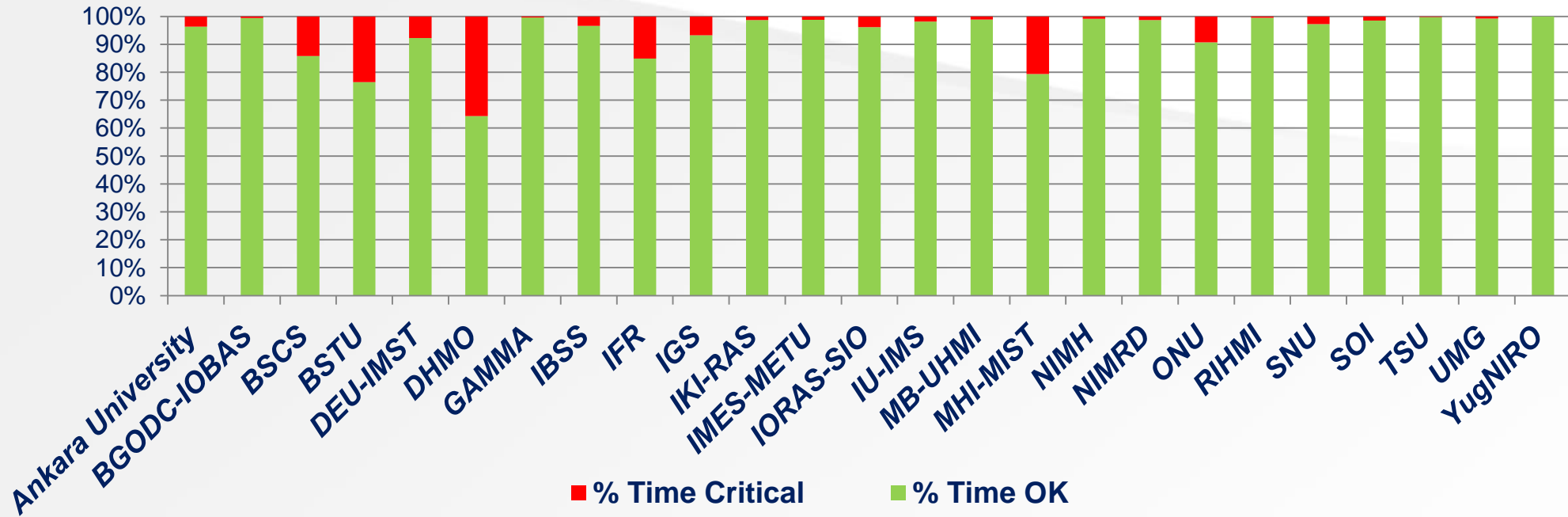
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'UBSS DMs' results from 01-09-2014 to 01-09-2015

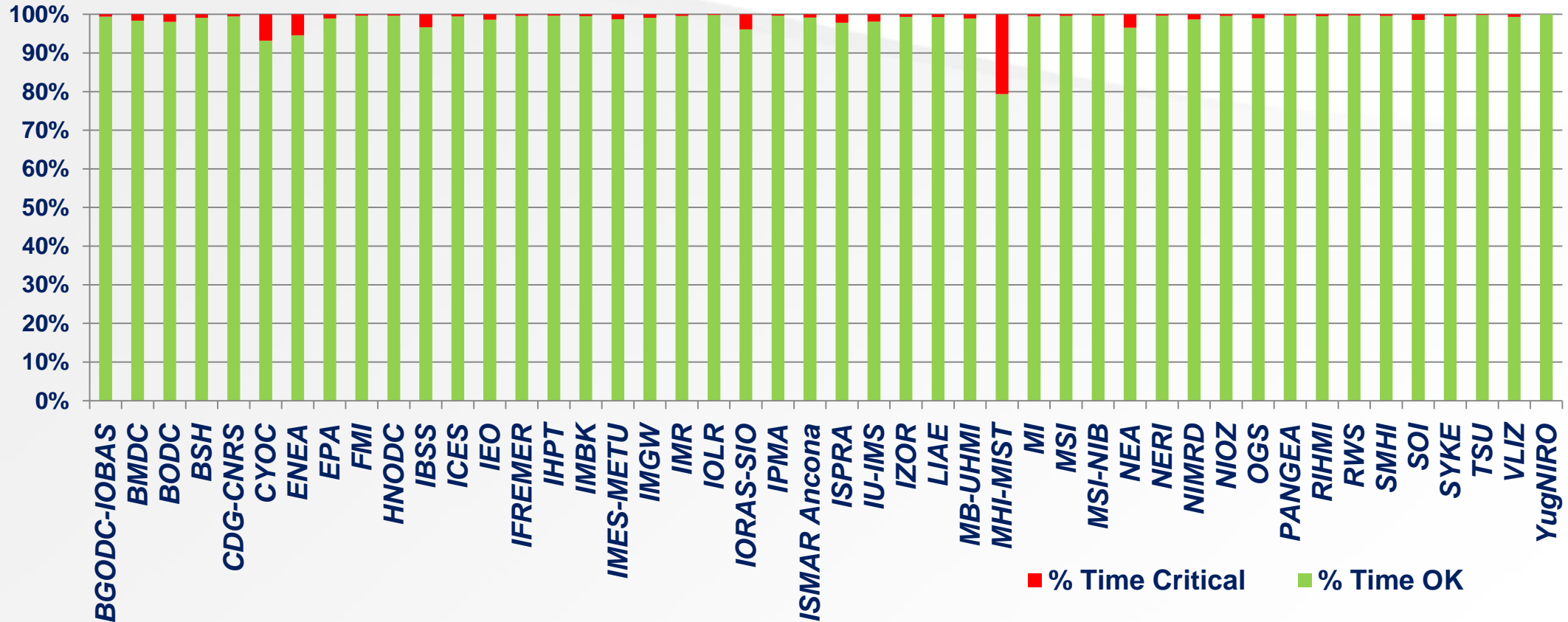


Average: **93,68%** **6,32%**



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'EMODnet-Chemistry DMs' results from 01-09-2014 to 01-09-2015

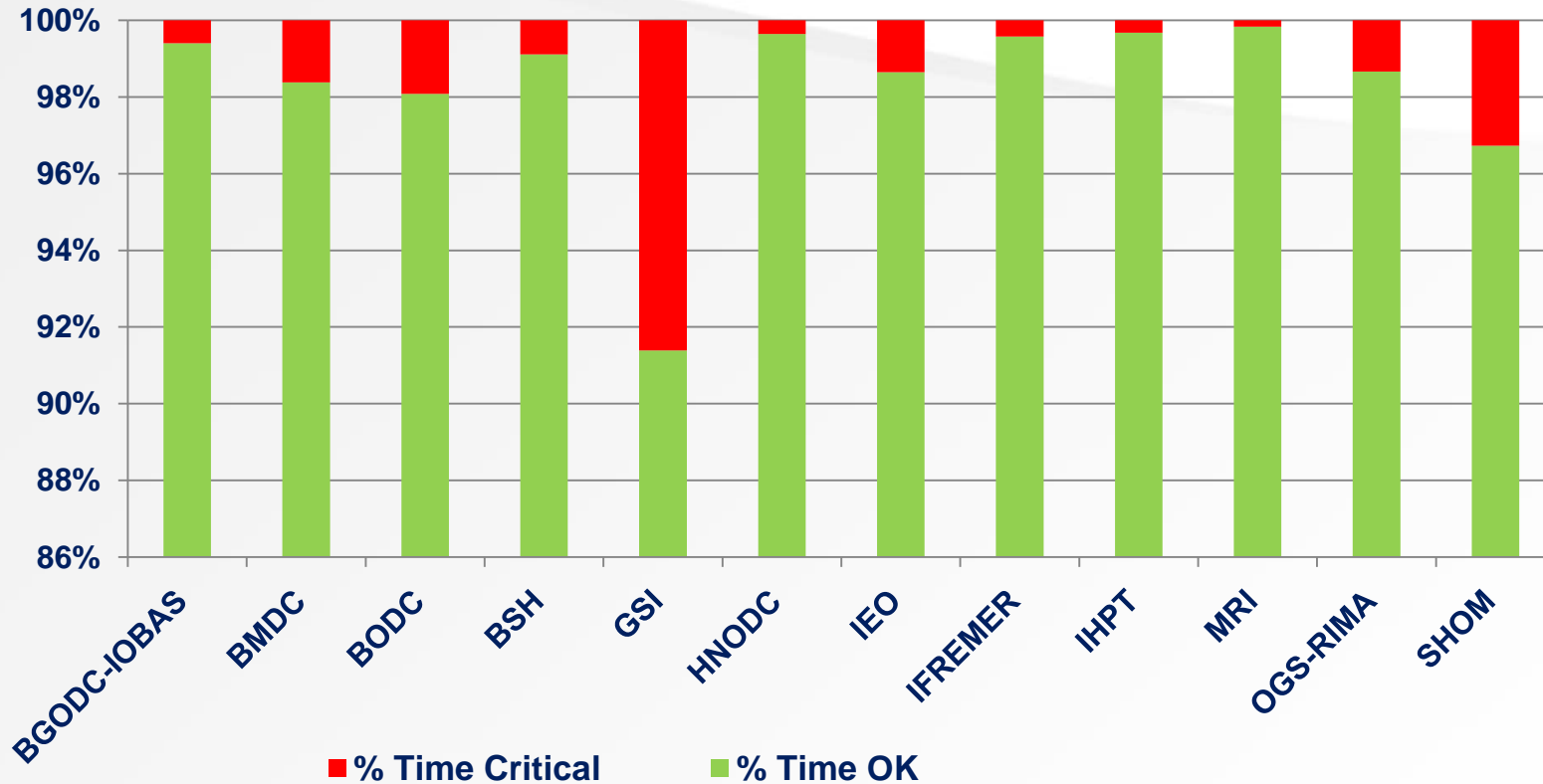


Average: 98,51% 1,59%



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'EMODnet-Bathymetry DMs' results from 01-09-2014 to 01-09-2015



Average: **98,26%** **1,74%**

C. RSM Statistics



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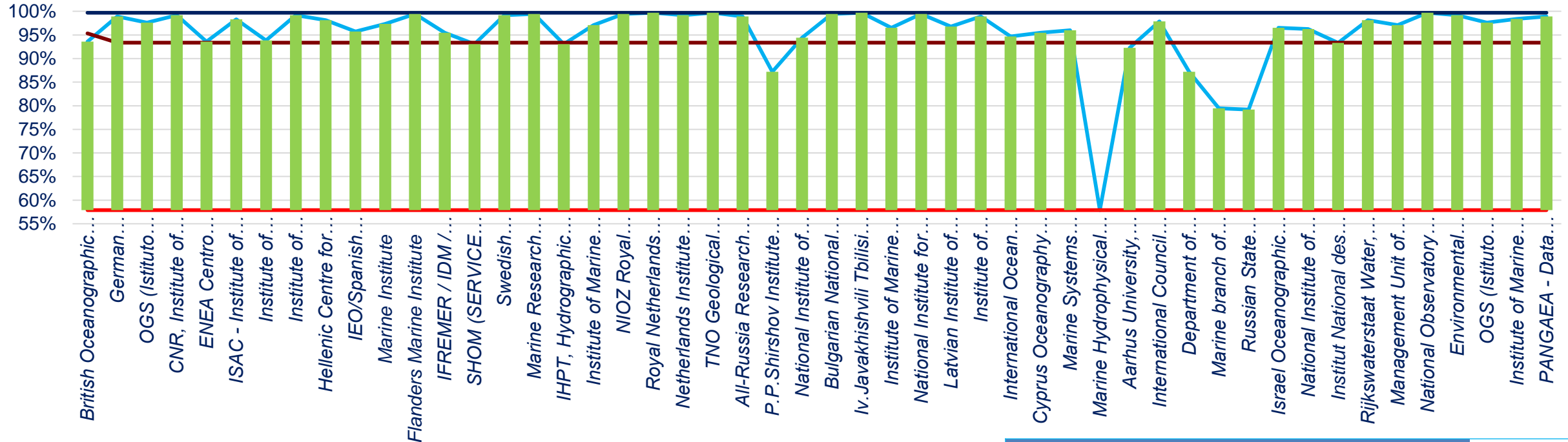
Operational performance of the infrastructure

- ✓ MARIS robot verifies that the Download Manager's are capable of handling shopping requests made via the CDI portal.
- ✓ Test results are for the period 01-09-2014 -> 14-09-2015.
- ✓ The SDN2 forth year annual metrics report will provide more details.



Robot monitoring of CDI shopping process (01-09-2014 until 14-09-2015)

% successful robot orders for SDN partners



— % successful robot requests per partner
— % Max of successful requests

— % Average of successful requests
— % Min of successful requests

01-09-2014 until 14-09-2015	
Average of the percentage of successful requests	95,34%
Maximum of the percentage of successful requests	99,73%
Number of organisation with 100% result	0
Minimum of the percentage of successful requests	57,87%



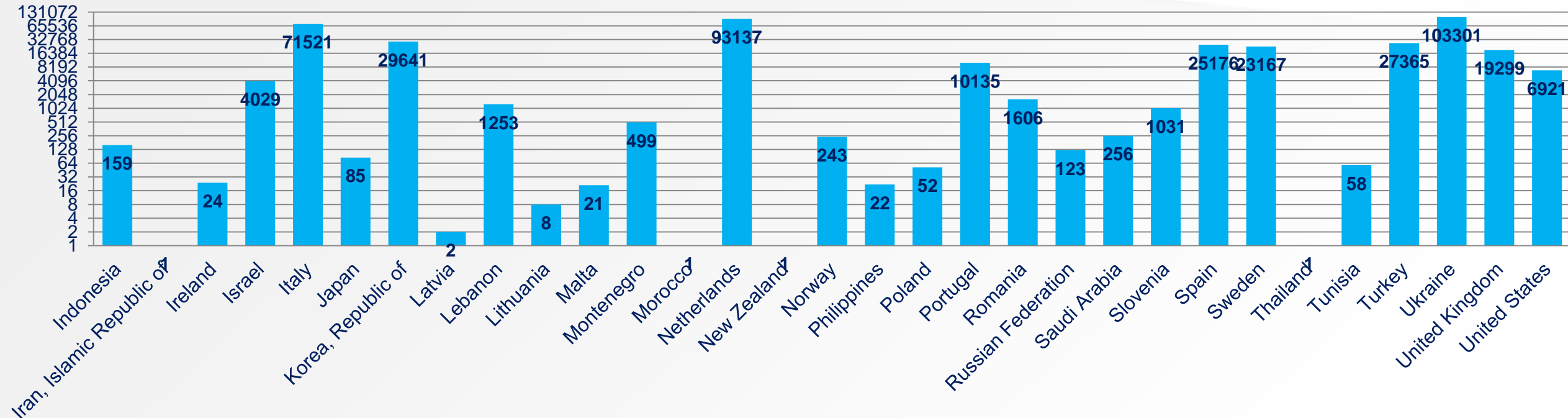
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Data requests (01-09-2014 until 14-09-2015)

- ✓ Results for 1 year: Requests for data files made to countries that have submitted data to the CDI portal.

Requests by country



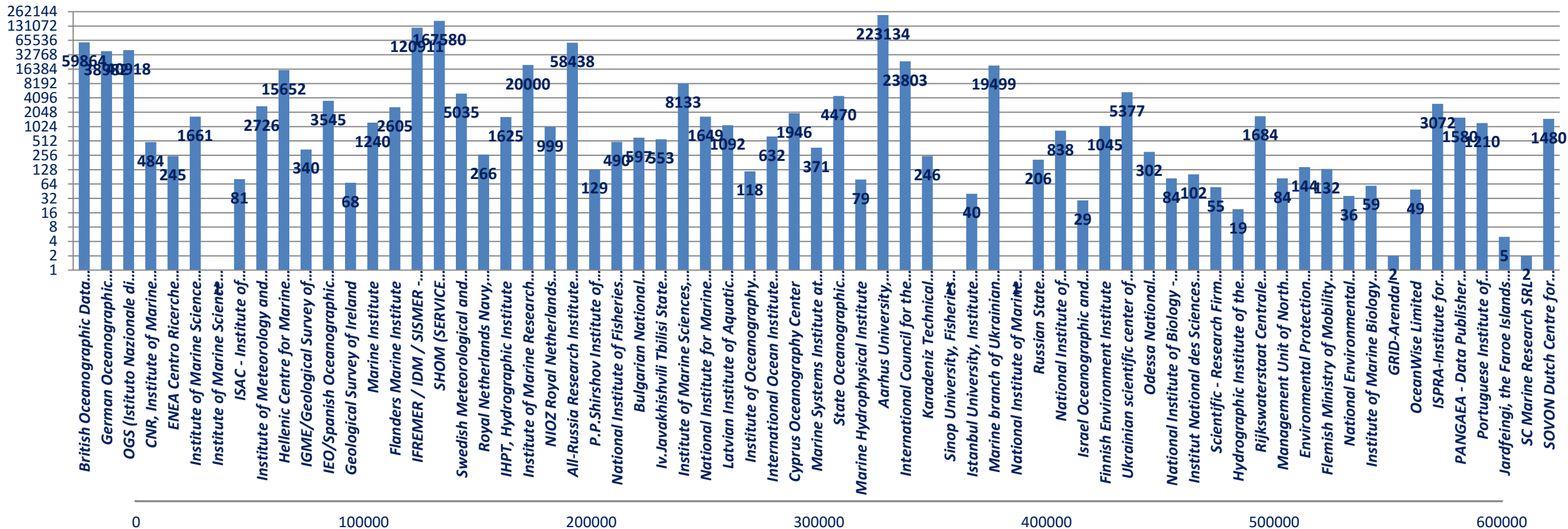


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CDI submission (01-09-2014 until 14-09-2015)

Total No of CDIs by partner





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THANK YOU!