



SeaDataNet Network Monitoring Services: Features & Statistics

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SDN Network monitoring system

Scope: To keep track of the operational status of SDN infrastructure.

- ❖ **Modules** : Network units need to be constantly monitored for slow or failing components and notifications are sent to the network administrator and the local administrators, for example by email, in case of outages.
- ❖ **Availability Reporting:** Creation of periodical reports on availability of system components as well as of total system availability. Helpfull to estimate components having availability issues. It is a prerequisite in case of signing a Service Level Agreement.

Outcome: HCMR has implemented an SDN Monitoring System that monitors and reports the availability of the SDN services. The monitoring engine is based on open source software (Nagios)



Benefits of SDN network monitoring

- ❖ Monitoring in real time and alerting when incidents are detected so the administrators are able to correct them as soon as possible.
- ❖ In a longer term, identification of critical components within widely distributed systems and to update them to improve their robustness.
- ❖ Information for the users and stakeholders of the system on the overall availability of provided services.
- ❖ Specially by the production of the messaging system for the administrators the monitoring system is a “live” component of SeaDataNet acting as valuable tool to improve the overall availability of whole platform.



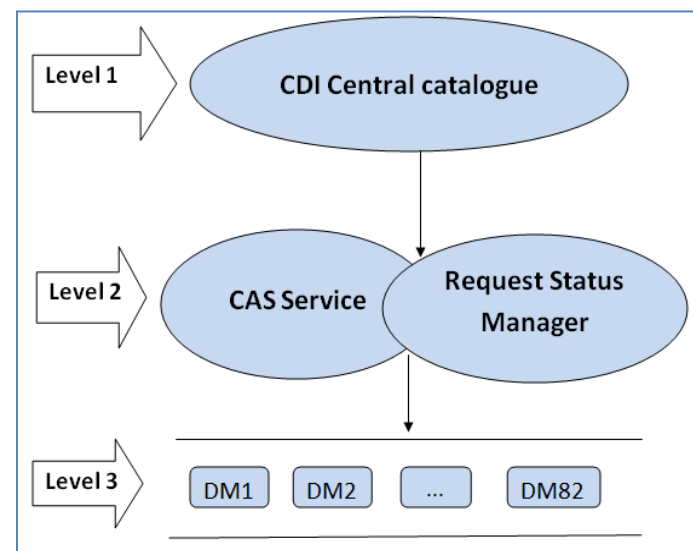
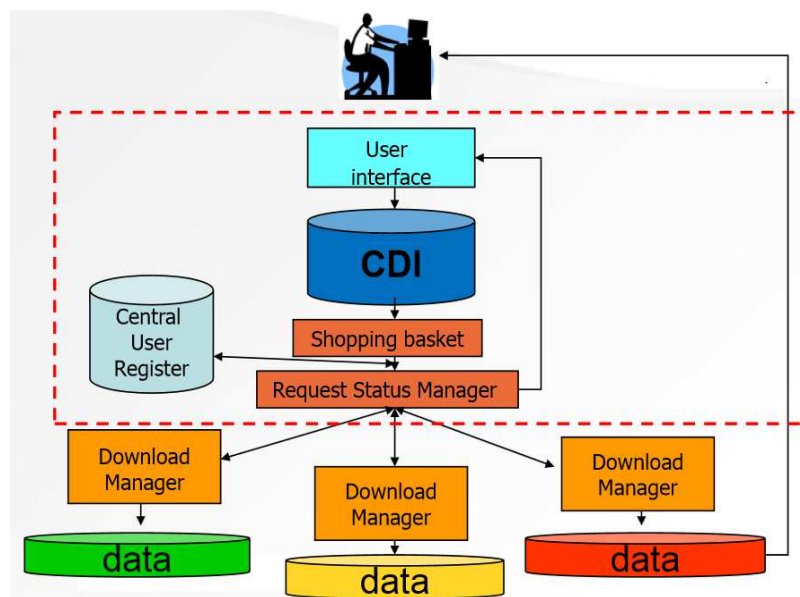
Monitored Services

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

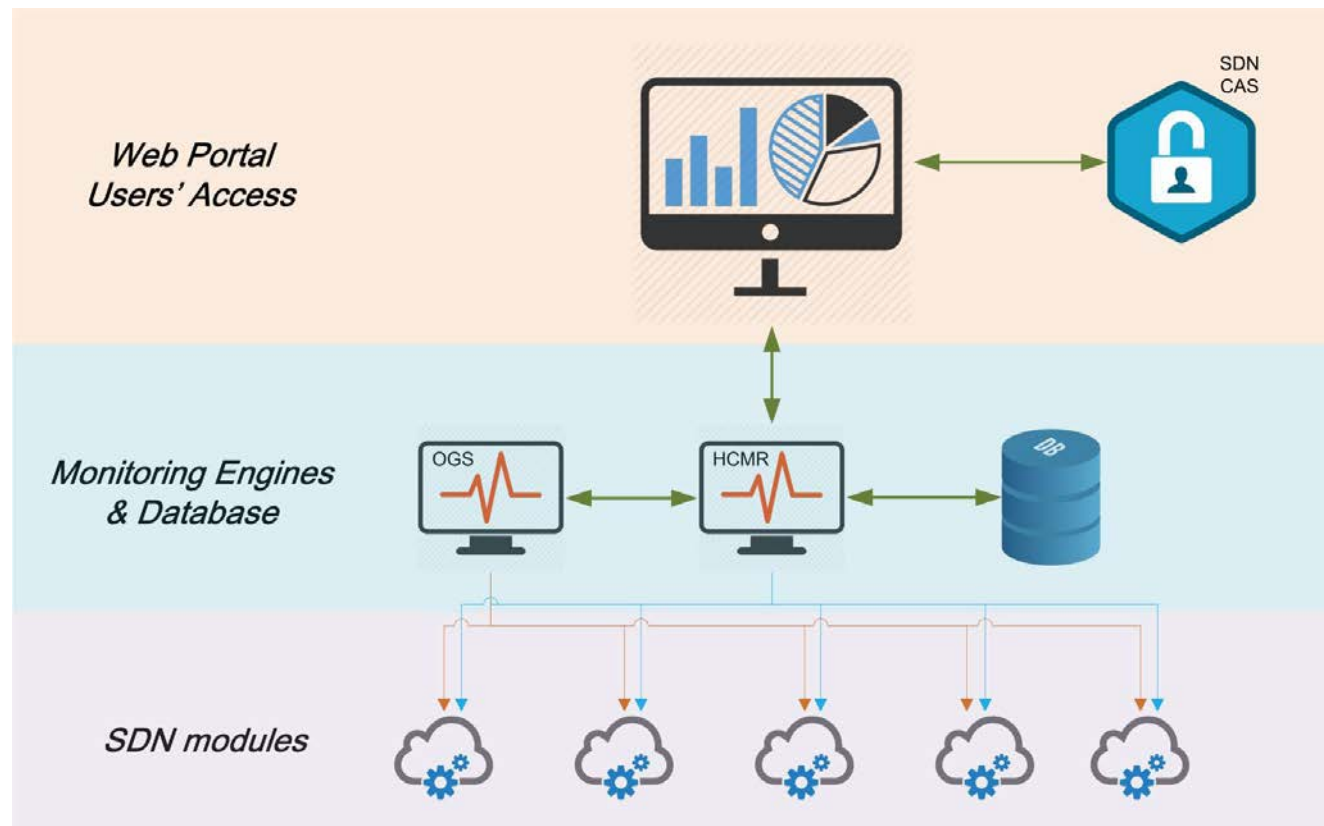
- ❖ The **Core services**, which are centrally-based provided services:
 - Common Data Index (CDI) portal
 - European Directory of Marine Organisations (EDMO) portal
 - European Directory of the initial Ocean-observing Systems (EDIOS) portal
 - European Directory of Marine Environmental Research Projects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

- ❖ The **Local services**, which are services provided by the partners' locally situated infrastructures .
 - 86 Download Managers supporting SeaDataNet (49), GeoSeas, UBSS and EMODNet-Chemistry-Bathymetry projects

“Data Access Services” Architecture and the adopted Monitoring Scheme

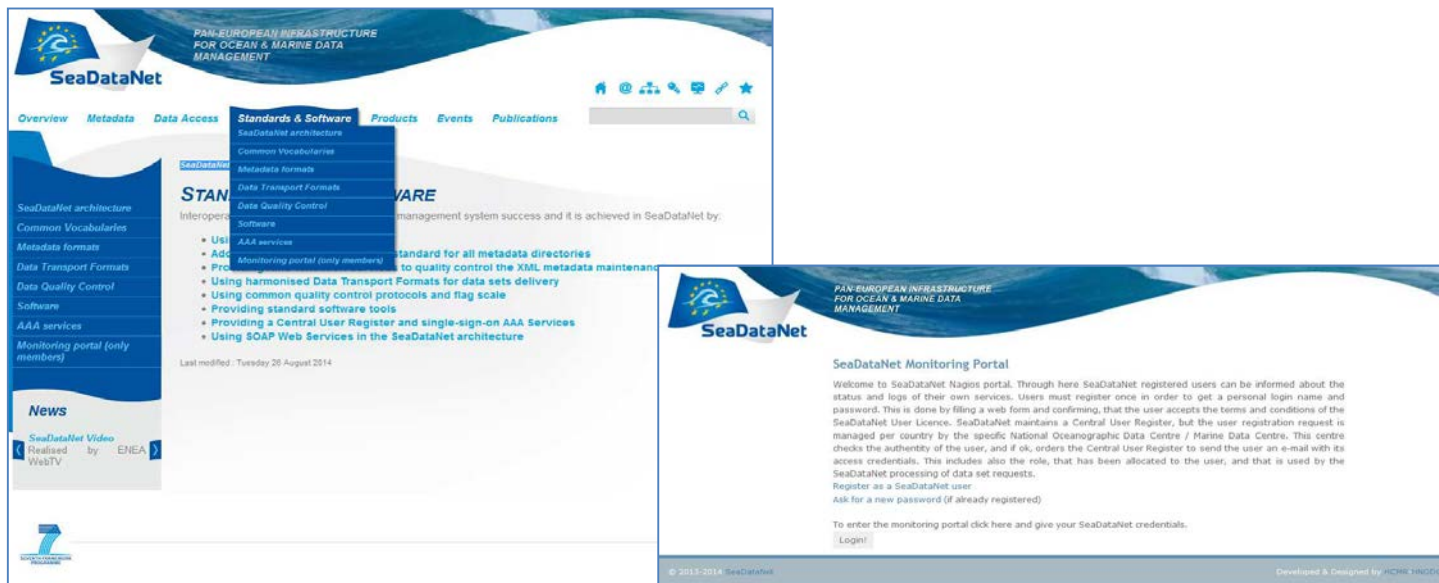


Monitoring System Architecture



SDN Monitoring Portal

- ❖ A user-friendly monitoring web portal is developed in order to give access to local administrators (members only) of the SeaDataNet components to view detailed logging information of their own service(s) outages (DOWN status) and report their unit(s) availability (UP status).
- ❖ Access via SeaDataNet portal: <http://www.seadatanet.org/>



SeaDataNet

PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT

Overview Metadata Data Access Standards & Software Products Events Publications

SeaDataNet architecture
Common Vocabularies
Metadata formats
Data Transport Formats
Data Quality Control
Software
AAA services
Monitoring portal (only members)

News

SeaDataNet Video
Realised by ENEA
WebTV

STANDARDS & SOFTWARE

SeaDataNet architecture
Common Vocabularies
Metadata formats
Data Transport Formats
Data Quality Control
Software

Interoperability

Standard for all metadata directories to quality control the XML metadata maintenance

- Using AAA services
- Adding Monitoring portal (only members)
- Providing standard software tools
- Providing a Central User Register and single-sign-on AAA Services
- Using SOAP Web Services in the SeaDataNet architecture

Last modified: Tuesday 20 August 2014

SeaDataNet

PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT

SeaDataNet Monitoring Portal

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 License. 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.

Register as a SeaDataNet user
Ask for a new password (if already registered)

To enter the monitoring portal click here and give your SeaDataNet credentials.

Login

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Developed & Designed by IMDIS H2020



On-line map visualization

The screenshot displays the NagVis web interface for a monitoring network. The left sidebar contains a navigation menu with the following sections:

- Monitoring Network**
 - About the portal
 - Document Library
 - [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**
 - Ask for a new password
 - Change your personal info
 - Sign-out user *sb30fad!*

The main map area shows a geographical map of Europe and the Mediterranean region. Numerous green checkmarks are placed over various cities and ports, indicating that the services at those locations are operational. The interface includes a top navigation bar with the NagVis logo, 'Open' and 'Actions' dropdowns, and a user menu with 'Choose Language' and 'Need Help?' options.



Downtime events (alerts)

- ❖ Reports services outages on a user defined period of time (service name, when started, when finished, duration and information about the cause of the downtime).

Monitoring Network

- About the portal
- Document Library
- 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

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

Contact

Alerts Summary

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

Select Type: Service Next

Select service from the criteria below:

Select service: All

From:

To:

[View Alerts](#)

Alerts Details

Number of Alerts: 51

Service	Date Event Started	Date Event Ended	Status Information	Duration
UMG Download Manager	2014-03-06 21:23:23	2014-03-07 00:43:18	CRITICAL - Socket timeout after 10 seconds	03:19:55
ENEA Download Manager	2014-03-05 10:24:10	2014-03-05 12:55:03	CRITICAL - Socket timeout after 10 seconds	02:30:53
NGU Download Manager	2014-03-05 02:00:57	2014-03-05 08:01:02	No route to host	06:00:05
IGS Download Manager	2014-03-04 21:22:56		CRITICAL - Socket timeout after 10 seconds	
IGEWE Download Manager	2014-03-04 15:06:08	2014-03-06 08:46:07	No route to host	41:39:59
INSTM Download Manager	2014-03-04 11:05:29	2014-03-06 13:45:22	CRITICAL - Socket timeout after 10 seconds	50:39:53
CYOC Download Manager	2014-03-04 10:54:39	2014-03-04 11:34:38	HTTP CRITICAL: HTTP/1.1 403 Forbidden - string 'OK' not found on 'http://www.oceanography.ucy.ac.cy:80/dm/index.html' - 1602 bytes in 0.229 second response time	00:39:59



Service availability index (uptime)

- ❖ % Uptime for each of the services individually on a defined period of time

Monitoring Network

- About the portal
- Document Library
- 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

- Ask for a new password
- Change your personal info
- Sign-out user *sb30fad1*

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:

Availability of **Ankara University Download Manager** service for the specified period is **99.11%**
Availability of **BGODC-IOBAS Download Manager** service for the specified period is **100%**
Availability of **BGR Download Manager** service for the specified period is **100%**
Availability of **BGS Download Manager** service for the specified period is **99.11%**
Availability of **BODC Download Manager** service for the specified period is **100%**
Availability of **BRGM Download Manager** service for the specified period is **100%**
Availability of **BSCS Download Manager** service for the specified period is **37.38%**
Availability of **BSH Download Manager** service for the specified period is **100%**
Availability of **BSTU Download Manager** service for the specified period is **100%**
Availability of **CDG-CNRS Download Manager** service for the specified period is **96.69%**
Availability of **CDI homepage 1** service for the specified period is **100%**
Availability of **CDI homepage 2** service for the specified period is **100%**
Availability of **CNR Download Manager** service for the specified period is **99.27%**
Availability of **CSR homepage** service for the specified period is **100%**
Availability of **CYOC Download Manager** service for the specified period is **99.9%**
Availability of **Common Vocabularies** service for the specified period is **99.93%**
Availability of **DEU-IMST Download Manager** service for the specified period is **70.29%**
Availability of **DHMO Download Manager** service for the specified period is **97.44%**
Availability of **EDIOS homepage** service for the specified period is **100%**
Availability of **EDMED homepage** service for the specified period is **100%**
Availability of **EDMERP homepage** service for the specified period is **100%**
Availability of **EDMO homepage** service for the specified period is **100%**
Availability of **EGK Download Manager** service for the specified period is **99.51%**
Availability of **ENEA Download Manager** service for the specified period is **92.32%**
Availability of **EPA Download Manager** service for the specified period is **100%**



Global availability indicator

- ❖ Definition: The percentage of time in a specific period that a system composed of several services is up and running.
- ❖ SDN network is an integrated system of separate services. A critical event (service down) in a system node is possible to isolate other network nodes leading to loss of the availability (uptime) of larger network parts or service types.



Global Availability: Method Analysis

The method followed to calculate the Global Availability Index in case of SeaDataNet can be described as follows:

- ❖ Division of the whole system in operational modules, single services whose uptime is measured by the monitoring portal.
- ❖ Definition of dependencies between these modules to formulate the influence of each module's availability (uptime) against the whole system.
- ❖ Definition of a weight coefficient for each module indicating its involvement in the total system productivity).



Data Access Services - mathematical 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_i): estimated delivered CDIs for each local service (Download Manager)
 - s_i value: uptime of each local service

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



More reability

(False Alarms detection system)

- ❖ **False Alarms:** The Monitoring System gives status CRITICAL (downtime) to services that are not in reality DOWN (e.g the monitoring system is DOWN).
- ❖ **Why there are?:** Because the sependent systems chain is not available.
- ❖ **False Alarms Detection System scenario:** to cross check the critical events provided by the two Monitoring Systems (installed in different premises) in order to detect and avoid false alarms.
- ❖ **Prompts:**
 - no false notifications to the partners
 - establishment of a more reliable SDN Monitoring system
 - more reliable statistics.
- ❖ **Method:** Json queries



SeaDataNet availability

The five 9 approach

Level of availability	Availability target
Commercial	99.5%
Highly available	99.9%
Fault resilient	99.99%
Fault tolerant	99.999%
Continuous	100%

SeaDataNet services availability: 98.43% – 100%



SeaDataCloud:

Network Monitoring in cloud environment

New system will have the following characteristics:

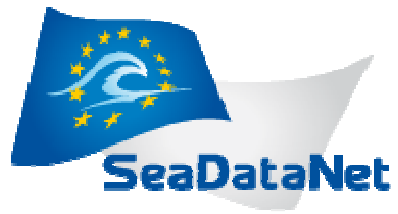
- ❖ Same monitoring engine (Nagios)
- ❖ Similar mathematical formula for total availability index
- ❖ Similar users schema
- ❖ High availability and reability implementation (HCMR & OGS)

- ❖ New Web UI
- ❖ Enhanced reporting system
- ❖ Connection with external services (CMDBs, Service catalogs)
- ❖ Direct management of SLAs
- ❖ Monitoring of related cloud services as well



SeaDataCloud Network Monitoring out of the box features

- ❖ Monitoring of replication process between data centres and central cloud services
- ❖ Well-functioning of the data shopping process
- ❖ Statistics of use of metadata services
- ❖ Statistics of data request transactions
- ❖ Statistics of use of advanced services
- ❖ Statistics of users of all services



Thank you!

<http://www.seadatanet.org>

