

Managing **offshore wind farms** in a single software application



Consolidating all the necessary information in one place boosts efficiency, safety and operational awareness in the control room.

SYSTEMATIC



Efficient management of offshore wind farms requires an armada of skilled, carefully vetted personnel, advanced-technology tools and equipment, and costly specialist vessels and helicopters. Accurate, reliable and timely information about all of these is vital for safe, profitable operations.

Any offshore wind operations and maintenance hub has to deal with vast amounts of complex information from many different sources. This data can include weather forecasts, power price forecasts, sea wave height, wind turbine performance, status of navigational aids, operations schedules for both vessels and helicopters, and scheduled work orders – to name just a few. And the number of offshore wind turbine installations is only moving upwards, as are their size and technical complexity.

O&M staff normally have to access these many types of information using proprietary software from each supplier, most featuring a particular, non-standard user interface. This in turn means a lot of different skills are needed to operate the many software configurations – and it's very expensive to train control room and marine coordination staff to operate multiple IT systems.

What if you could access all the operating information you need in one place?

What if these many information sources could be drawn together and presented in one place?

With a single sign-on, and a consistent, easy-to-use interface, regardless of the type of information and where it comes from?

Drowning in information?

Marine coordination software as your central information hub

Marine coordination software is designed to provide a map-based situational overview and to alert operators when something isn't as it is supposed to be. This is crucial for efficient, safe and reliable offshore wind farm operations.

Systematic SITE software delivers these key capabilities as standard, but operators can also use it as the primary information hub for multiple wind farms. Several major offshore wind farm operators, including Ørsted and Vattenfall, already use the SITE software for marine coordination.

This Ebook describes how the SITE software, along with custom integrations to third-party information providers, can provide control room staff and marine coordinators with a powerful central information hub for managing virtually all aspects of offshore wind farm operations.

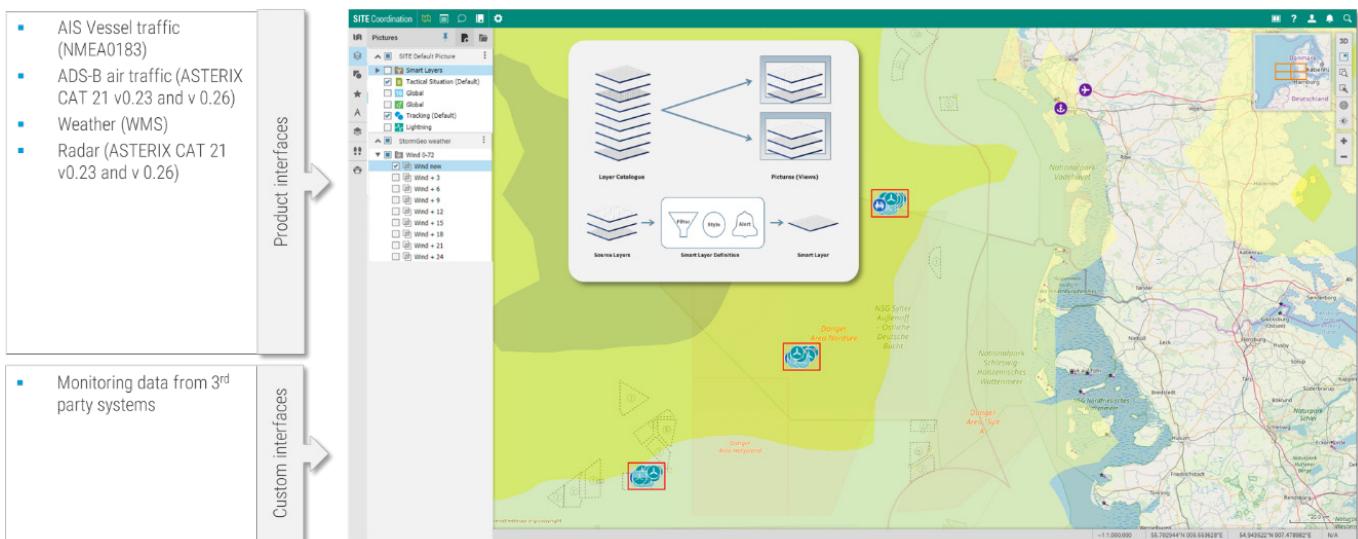
Secure, user-friendly integrations using multi-layer maps and a bullet-proof programming interface

Efficient offshore wind O&M hubs are always looking for new ways to streamline processes still further. IT systems featuring an integrated, seamlessly coordinated software setup can support this with process execution automation and one-stop information hubs.

But building information hubs and automating processes involves multiple big steps. The first being to make sure information flows automatically and 100% reliably between the many different IT systems and proprietary software packages, and that the display of information from a multitude of information sources is consolidated into as few user interfaces as possible. This significantly reduces the need to train O&M control room and marine coordination staff to operate many different IT systems – some of which may be from a long way back.

When data is well organised, the next step is to introduce process automation using software robots to take over routine, standardised data entry, evaluation and decision-making tasks previously carried out manually.

In the coming sections, we will introduce you to functionalities and interfaces that are centrepieces in establishing SITE as a central information hub, and continue with examples of integrations that can provide you, your staff and colleagues with a single access point for the information you all need to plan, implement and monitor O&M activities effectively.



The map displayed in SITE comprises multiple map layers. You can toggle all these layers on/off depending on how much information users need to see at the same time.

SITE provides you with layers in five categories:

- Private Layer:** special, user-created layers that are only visible to the owner and creator of the layer
- Feed Layer:** read-only layers that contain the raw data received from a sensor or a service
- Situation Layer:** shared by all users
- Smart Layer:** layers that contain the filtered result of one or more input layers
- Geospatial overlay:** Layers with geospatial features such as weather or sea wave data

Multi-layer map



Whenever a user of SITE executes a particular functionality or alters the status of a specific offshore asset, a user interface code calls for a specific action via an application programming interface (API).

This API is a tried-and-tested part of SITE, as a standard, out-of-the box functionality – ready for day-to-day use. It is available for integrators to implement a wide range of process automation capabilities.

APIs are available for specific functions that include:

- **Personnel administration**
Including managing base data, wind farm invitations, access card printing, etc.
- **Planning execution and monitoring**
Create transfer requests and monitor execution of plans, etc.
- **Situation tracking**
Tracking where people are, when they change location and logging their location histories
- **Vessel and helicopter administration**
Managing different means of transport to and from site, including vessels and helicopters

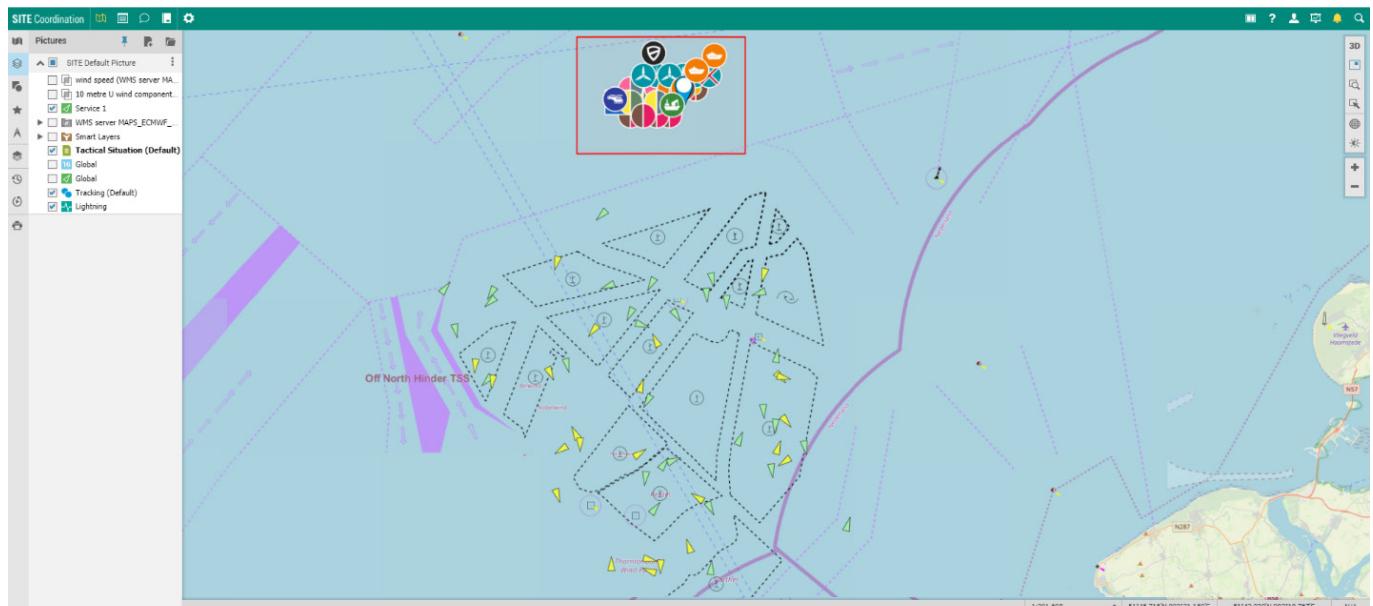
Use of the SITE API is protected by industry-standard role-based access permissions, authenticated and authorised using the same mechanism as for end users. Technically speaking, access is dealt with using JWT tokens obtained from a Keycloak identity provider or by SSO. OAuth2 and OpenId are used as connect tokens.

The SITE API

Why data integrations matter in offshore wind operations

The following examples show how you can use SITE data interfaces and APIs to build integrations that significantly reduce the number of different IT systems in your control room.

This makes it much easier for control room staff to quickly access and act upon information from many different data sources, with less likelihood of duplicated effort, inaccuracies or mistakes that could be dangerous and/or costly.



SITE data interfaces accept the most commonly used formats for the AIS tracking of vessel traffic and the ADS-B tracking of air traffic. The data imported into this interface is displayed on the map layer for vessels and helicopters.

The interface for received AIS data accepts NMEA0183 format via TCP/IP connections, including AIS-PLB 'man overboard' messages.

The interface for received ADS-B data accepts ASTERIX CAT21 V0.23 or V0.26 and Planevision JSON formats via UDP/IP connections.

Vessel and helicopter tracks



Wind speed forecasts, as provided by services such as StormGeo, can be imported directly into SITE as map overlays in WMS format.

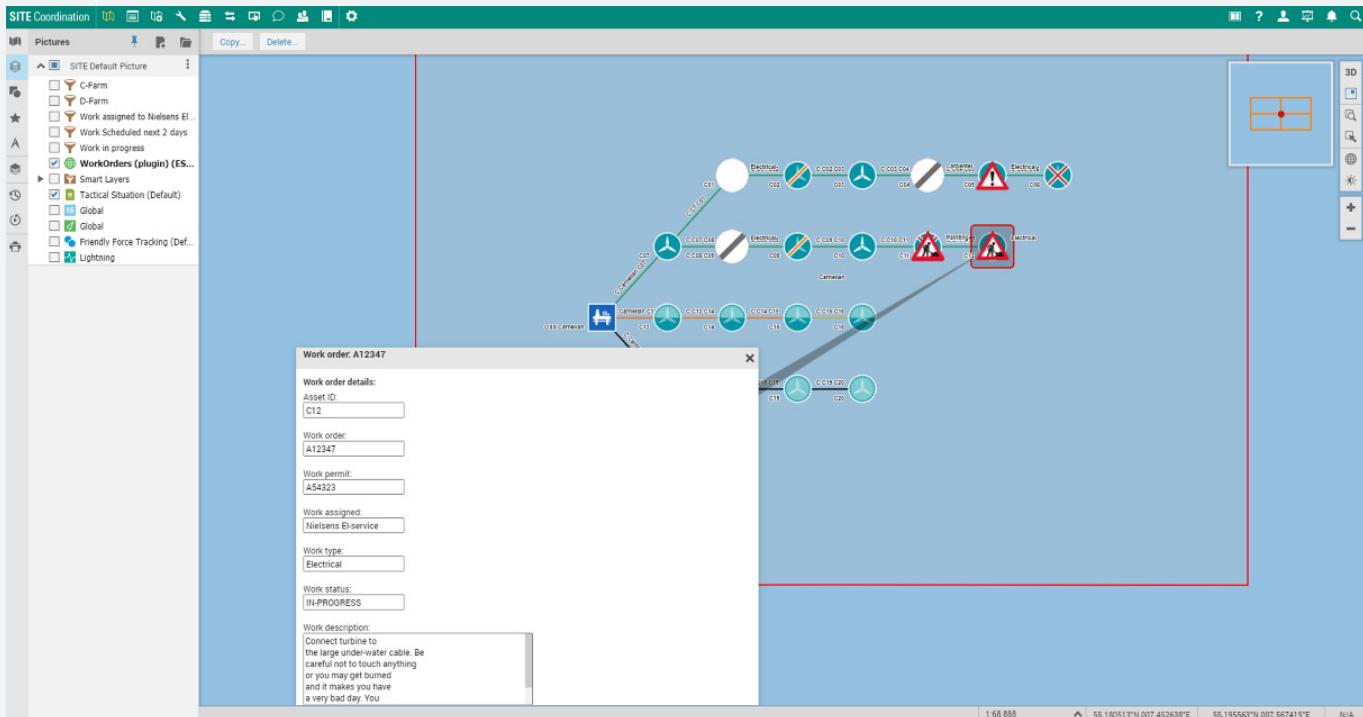
If your preferred weather forecast agency can provide forecasts with granularity down to the location of each wind turbine, these can also be accessed from the map – with just a simple click on the symbol for each specific wind turbine. It only requires a URL from the weather data provider, and a one-off configuration for each asset on the map.

Weather forecasts

In some regions of the world, offshore wind farm operators are required to use radar to monitor activity at sea.

Radar surveillance

With SITE, images delivered by radar in ASTERIX CAT v. 21, v 23 or v 26 format can be displayed as a map overlay.



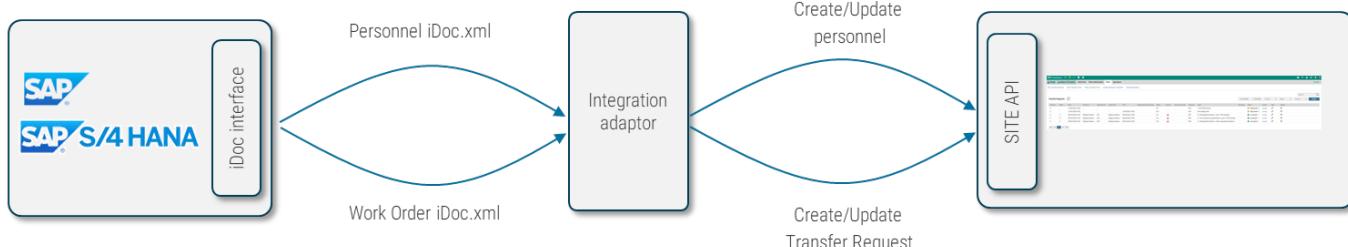
Easing the process around work orders

Marine coordinators need easy access to reliable information about service work orders to ensure effective transport planning. If all this information is buried in different systems, control room personnel must constantly switch back and forth between the many software applications, and often have to retrieve and copy in information manually.

With an integration between SITE and e.g. a SAP Plant Maintenance system, the tedious process of copying work

order information to transfer manifests can be automated. Integration adaptors can be made to automatically create transfer requests in SITE based on work orders released in SAP. This saves time in busy marine coordination centers and eliminates the errors that operators make when working under time pressure.

While this type of automation can bring efficiency gains that many O&M managers need, SITE can take you a step further towards integrations like this. When creating the transport plans from the work orders, the SITE map allows you to see which asset locations work orders are planned for. Finding this information in the right place at the map just becomes a matter of turning on the work order map layer to create map overlays that display all the appropriate service work order information. Smart layers can be designed to show (for example) only the work orders currently scheduled, or those pending for the following week.

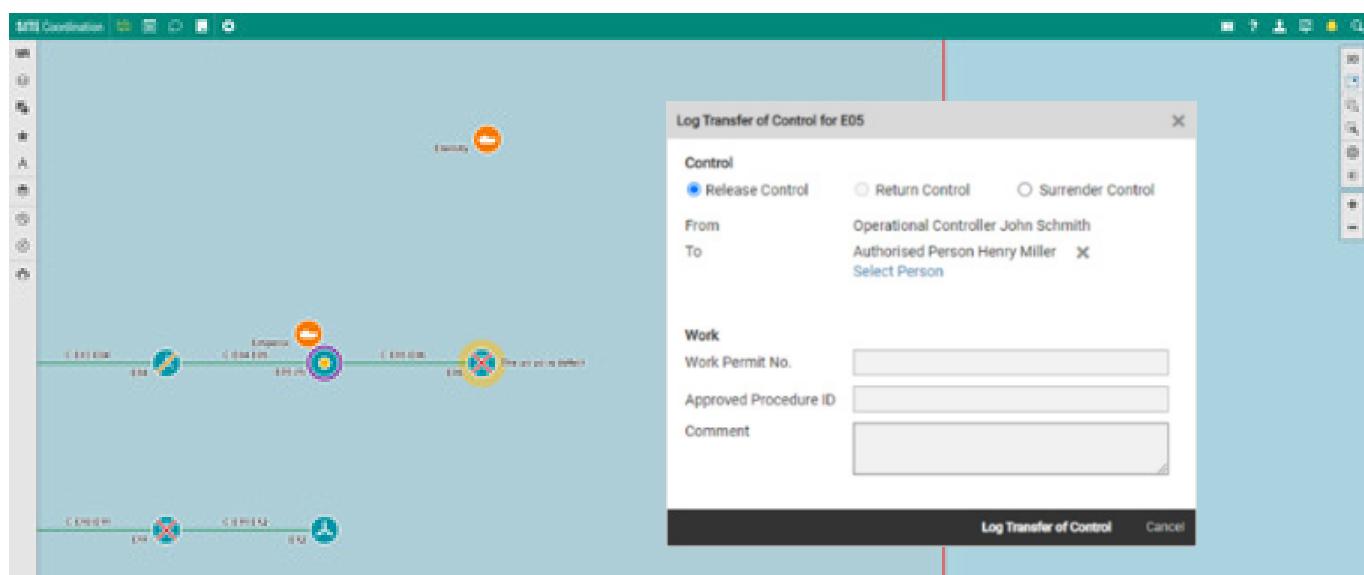




Monitor **power** **production** data in real time

Power production is the cornerstone of all offshore wind farm operations, so it's only natural that marine coordinators can also use SITE to monitor real-time data about power production.

Using SITE, you can easily access map overlays that display power output as well as any other relevant data that can be retrieved from SCADA systems installed on site.



Visual presentations of 'transfer of control' procedures

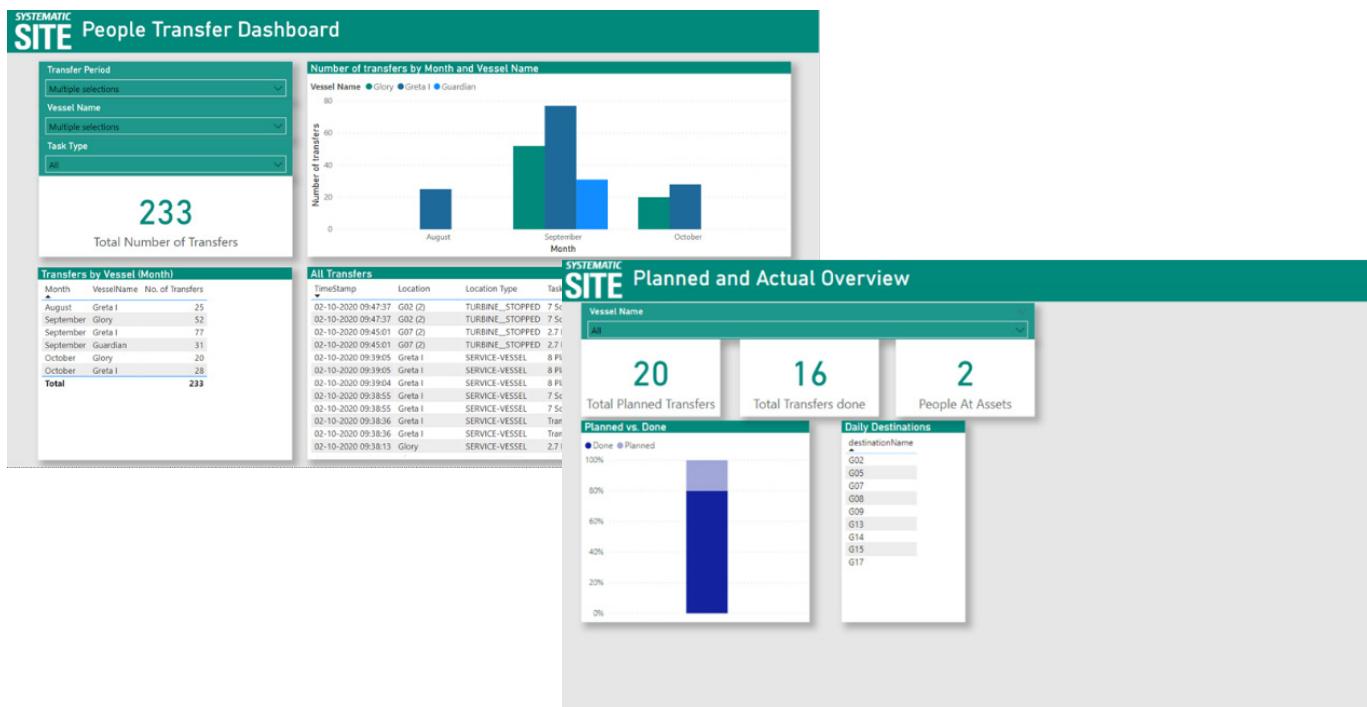
Adhering to regulations is crucial to maintaining safety offshore. The 'transfer of control' procedure, as specified in the Wind Turbine Safety Rules (WTSR), can be implemented by presenting the current status on map layers in your SITE software.

When Authorised Technicians (AT) request transfer of control from the Operational Controller (OC), the OC works with the SITE map layer in dedicated to this particular purpose. The OC clicks on the turbine where the AT is currently present and automatically receives a dialogue report where he/she can log the transfer. All 'transfer of control' operations are logged and can be retrieved, should the need arise.

Ensuring an updated access equipment register

Safe access to offshore assets is as much about the condition of the access equipment as it is about HSE-related staff qualifications. To monitor and manage access safety, marine coordinators need to have accurate, up-to-date and reliable information about any defects in access equipment. If you don't have such crucial information when planning transfers, you may be faced with a risk of vessels and personnel showing up at a wind turbine only to have to return again because safe access was impossible.

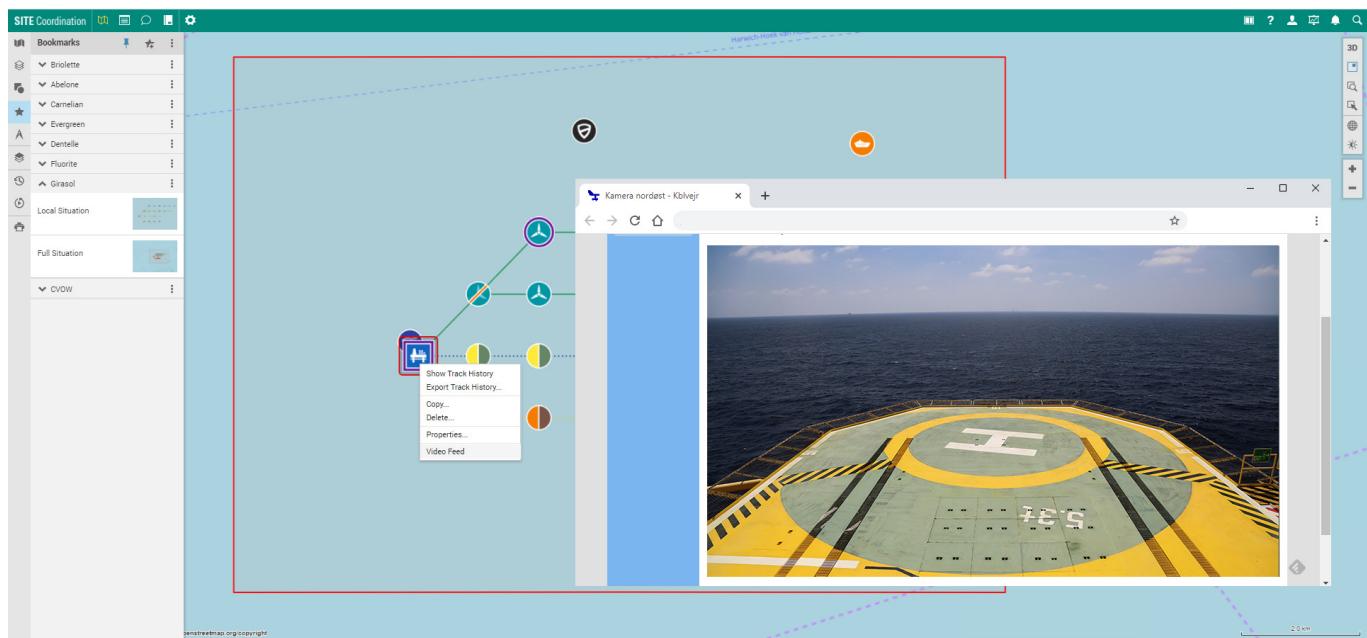
Combining SITE with even the simplest digital register over access equipment makes it possible to retrieve and display information about the condition of relevant access equipment. It's easy to establish a safety asset equipment map layer to mark and illustrate any registered defects associated with access equipment. Once the marine coordinator is informed about such defects, he/she will bring up the asset dialogue and change the status of the specific safety asset to 'defect'.



Dashboards created with built-in business intelligence tools are becoming increasingly important for reporting and keeping an eye on whether operations are progressing according to plan and in line with forecasts.

When used in combination with specialist tools like PowerBI, the SITE API enables your business intelligence team to create a wide selection of dashboards to meet the specific practical needs of your O&M managers.

Dashboards



CCTV cameras deployed onto offshore assets are there to keep coordinators in your O&M hub fully informed about what's happening when vessels are approaching wind turbines and other installations, or when helicopters are landing on OSS helipads.

With SITE, feeds from CCTV can be assigned to each of the offshore assets and brought up on your monitor with just a single click.

CCTV integration

Alarms												
Severity	Current Signal	Status	Occured	Description	Source	Wind Farm	Type	Processed by	Processed at	Acknowledge	Shelve	Note
Alarm	Active	⚠️ Un-acknowledged	28-06-2019 07:35	No data received from man over board	SN 123123-B	Abelone	MOB	-	-	Acknowledge	Shelve	
Warning	Active	⚠️ Un-acknowledged	28-06-2019 07:01	No data received from AtoN	SN 456781-C	Briolette	Data interface failure	-	-	Acknowledge	Shelve	
Notification	Active	⚠️ Un-acknowledged	28-06-2019 06:07	High temperature in rack 3 at OSS	Rack 3 at OSS	Carnelian	Temperature warning	-	-	Acknowledge	Shelve	
Alarm	Active	✓ Acknowledged	28-06-2019 18:39	Storm warning for east North Sea	-	Dentelle	Weather forecast warning	Robert Schmidt	28-06-2019 18:45	Acknowledge	Shelve	
Warning	Active	✓ Acknowledged	28-06-2019 14:20	High temperature in rack 7 at OSS	Rack 7 at OSS	Evergreen	Temperature warning	Angelica Brown	28-06-2019 14:49	Acknowledge	Shelve	
Warning	Active	✓ Acknowledged	28-06-2019 11:56	No data received from service vessel Maria	Service vessel Maria	Flourite	Communication network failure	Richard Breum	28-06-2019 12:13	Acknowledge	Shelve	
Warning	Active	✓ Acknowledged	28-06-2019 15:39	No data received from service vessel Hope	Service vessel Hope	Girasol	Communication network failure	Mary Johnson	28-06-2019 15:56	Acknowledge	Shelve	
Warning	Normal	⚠️ Un-acknowledged	27-06-2019 22:47	No data received from Ørsted AIS feed	-	Girasol	Data interface failure	Angelica Brown	27-06-2019 23:08	Acknowledge	Shelve	
Alarm	Normal	⚠️ Un-acknowledged	28-06-2019 03:51	High temperature in rack 5 at OSS	Rack 5 at OSS	Briolette	Temperature warning	-	-	Acknowledge	Shelve	
Alarm	Active	— Shelved	28-06-2019 02:49	High temperature in rack 8 at OSS	Rack 8 at OSS	Evergreen	Temperature warning	Robert Schmidt	28-06-2019 03:01	Acknowledge	Shelve	
Alarm	Normal	✓ Acknowledged	28-06-2019 12:45	High temperature in rack 3 at OSS	Rack 3 at OSS	Dentelle	Temperature warning	Angelica Brown	28-06-2019 12:56	Acknowledge	Shelve	
Alarm	Normal	— Shelved	28-06-2019 10:03	High temperature in rack 2 at OSS	Rack 2 at OSS	Abelone	Temperature warning	Robert Schmidt	28-06-2019 10:17	Acknowledge	Shelve	

Conducting offshore operations safely relies heavily on control room personnel being informed about malfunctions of equipment installed, with no undue delay if situations change.

Even relatively simple things like a cardinal buoy moving out of position or AIS AtoN sensors that have stopped transmitting can quickly turn into a myriad of different alarms and systems that need to be monitored and used to deal with them.

From early 2021, SITE can be delivered with alarm management functionality that can capture alarm signals from many different sources and consolidate the monitoring and handling of the resulting alarms. Personnel in the O&M control room then only need to go to one single place to deal with any alarms – quickly and effectively. All critical alarms will also pop up on the monitors your marine coordinators use, so they can take appropriate, well-informed action straight away.

The SITE alarm management functionality is delivered with a REST API that makes it easy to import a wide selection of alarm types from many different sources.

Alarm management



If you are interested in knowing more about how to start consolidating the many different sources of information in your control room, please contact:

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Getting **started**

SIMPLIFYING CRITICAL DECISION MAKING Systematic delivers reliable and straightforward IT solutions and products that empower customers to make critical decisions based on a solid foundation.

Since the foundation in 1985, Systematic has developed into an international IT company that focuses on five core business areas: Public & Private, Healthcare, Defence, Intelligence & National Security, and Library & Learning. A common feature of all these sectors is a need to integrate, compare and analyse large volumes of complex data, and to generate an overview that allows decision-making based on a solid foundation, often in critical situations and harsh environments.

All quotes in this white paper are from fictional characters and written by Systematic for illustrative purposes only

About **Systematic**