Improving remote marine service

A concept for the next generation ABB customer and service portal

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The level of remote automation, remote monitoring, and remote control have continuously increased over the decades in key industries. Military, power utilities, nuclear, rail, port authorities, highway authorities, emergency services, mining, oil and gas, aviation, and space industries are heavy users of remote technologies and operational centers to manage their operations, fleets of assets and emergency services. This industry trend confirms what has been recently coined the 4th Industrial Revolution by World Economic Forum founder Klaus Schwab [1] and is closely related to Zuboff's three laws [2] which are 1) everything that can be automated will be automated, 2) everything that can be informated is informated (the process of digitizing information) and 3) every digital application that can be used for monitoring and control will be used for monitoring and control. ABB is building on this operational concept to develop smarter solutions that more effectively support its remotely connected marine customers.

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Traditionally, diagnosing and troubleshooting problems for marine customers have been activities ABB engineers have done in person at customer sites. However, with the introduction of advanced sensors, cloud services and satellite communication technology, the service and support tools of remote diagnostics and troubleshooting – which have been sporadic for the past decade – are now becoming a common work practice. ABB engineers are now in a position to offer marine customers more timely issue resolution due in large part to the ability to remotely connect to customer equipment onboard and collect data from sensors installed onsite. As a result, ABB engineers are able to support not just one customer but many customers at the same time since they may not need to travel to the site. The customer's technical staff are involved in the resolution

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process as well. In fact, when a problem occurs, a virtual team of all required experts is quickly formed to share relevant information and rectify the situation. This allows marine customers to get back online more quickly than in the past.

With this approach to remotely support customers, both changes in work practices and an improvement of the tools supporting engineers are required. Just some of the changes needed for effective support are: providing engi-

neers with quick and easy access to colleagues worldwide, enhancing how customer data is visualized to ensure engineers have a complete picture of the problem and ensuring relevant material is at each engineer's fingertips. To this end, ABB Marine has developed a cloud-based fleet portal. This portal provides engineers working remotely with a more effective way to analyze the important information necessary to diagnose and troubleshoot customer issues. It provides the most critical information required to obtain an overview of an individual situation as well as a fleet of assets, helping them establish context and, in turn, the possibility of more timely resolutions of customers' cases.

Customer and supplier needs
Within any type of service support role, time is a critical factor. Being able to diagnose and efficiently resolve issues with customers' equipment is the primary focus for ABB support engineers. As such, the tools used to support them need to be as effective as possible.

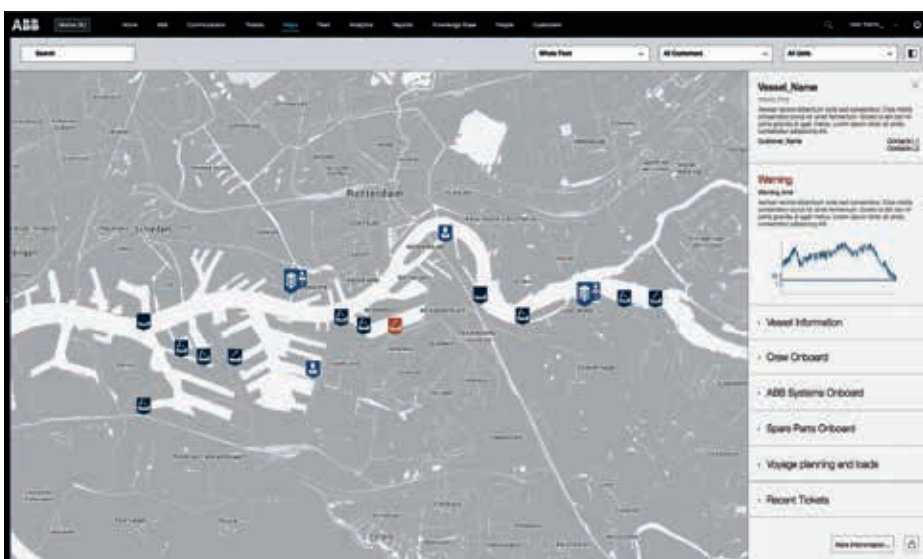The customer's technical staff are involved in the resolution process as well.

1 The Dashboard tool

2 The Map tool

Designing effective support solutions requires an in-depth understanding of how support engineers work. Interviewing and observational approaches are used to gain valuable insights into real work practices and to assess goals, needs and concerns. In turn, this information provides the key design considerations for the creation of the new HMI (human-machine interaction) solution. The prototype developed took into account the following key outcomes of the interviews and observations:

– Establishing the context for trouble-shooting:
  1) In order to understand all possible solutions, remote support engineers need to gather as much relevant information as possible about the problem.
  2) There is no easy way for technical crew members to easily and quickly transfer context information such as video or images to the remote support engineer handling the case.
  3) There is also no easy way for the remote support engineer to give suggestions to the technical crew located onboard.
– Information is distributed. Not all information for diagnosing and troubleshooting a problem is in one easily accessible location. Engineers therefore spend a lot of time searching for relevant material.
– Locating and coordinating with a local field engineer, who is both adequately qualified and who is in close physical proximity to the customer`s vessel, to go onsite for a hardware fix can be challenging.

3 Fleet details

4 Fleet details drilled down

Design concepts

Based on these identified needs, a new prototype of a fleet and service coordination portal was developed, comprised of four main components: Dashboard, Map, Fleet details and Analytics. The prototype was developed using contemporary web technologies such as HTML5, JavaScript, Angular JS, D3.js, bootstrap, CSS, Google Maps open API.

The Dashboard tool enables engineers to customize their view according to what information is important for them based on their role ➔ 1. The information on the dashboard can be rearranged to suit the user with information being added or deleted as they require for their work. Engineers can also filter information displayed in this view according to a certain customer or vessel.

The Map tool provides users with an interactive map that enables users to pan and zoom as well as filter information ➔ 2. Vessel locations are shown and individual vessels are color-coded to indicate those vessels with issues (ie, has active alarms) in red. This enables the engineers to stay informed about the current state of all vessels they are responsible for monitoring at any one time. Zooming into the vessel enables the engineer to see a more detailed map view with the ship's planned route outlined. Additional information is also provided when zoomed into a specific vessel including locations for local support centers (ie, where local field engineers may be available), port locations, airports, as well as a night/daytime visualization to indicate under what time of the day the vessel is operating.

The Fleet tool provides engineers with more detailed information about the vessels under their watch. Vessels can be grouped (filtered or sorted) into certain categories that can be filtered further, such as vessels with active alarms. Selecting a vessel from this list takes the engineer to a more detailed information page about that vessel with a breakdown of data such as systems onboard, equipment maintenance history, planned route and spare parts onboard ➔ 3, 4.

Finally, the Analytics tool provides engineers with a customizable workspace whereby they can arrange the layout of information in a way that works best for them. Engineers can add or remove information, and can annotate data on-screen. This workspace can also be used to collaborate with other remote service engineers to get further assistance on cases. The analytics concept provides engineers with a way to dig deeper into data, using pattern matching and data tagging to find commonalities and relationships between key signals. This capability allows them to make better data comparisons and therefore more informed decisions ➔ 5.

Production management benefits
The prototype developed provides remote service support engineers with an overall awareness of the state of the vessels they are monitoring and supporting. Providing these engineers with the right information in an intuitive and easy to understand format enables them to more effectively and quickly understand the current vessel's state and any issues associated with that vessel. Providing a way to effectively identify issues with customers' vessels, as well as competent support for understanding the problem at hand, enables engineers to use their advanced skill set to resolve customer issues in a timely manner.

Wave problems goodbye
ABB's solution provides remote service support engineers with information in a more intuitive and easy to understand format, supporting them in their decision-making. The solution further demonstrates ABB's commitment to producing high quality solutions targeting key domains and to improving processes for industry-leading service.

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