Com4Offshore

Securing Vattenfall Sandbank project by leveraging the decision support & risk management system

Matthias Kraaz[1], Dr. Ralf Borchers[1], Anne Lina Holy[2]

[1]megatel GmbH – An OHB Company

[2]Vattenfall Europe Windkraft GmbH

Introduction

Offshore installation projects imply all the organizational complexity of a big construction project in a still pioneering industry combined with a lacking communication infrastructure between project management office and offshore installation site plus the difficulties of the harsh environment open sea.

A system supporting the management of these projects should change the oftentimes weekly reports to near real-time information flow, collect sensor data from the site, take account of weather forecasts, and automate correlation and further analysis of all inputs. It is safe to say that improving the base of project management decisions in such a way would have a high financial impact.

The Com4Offshore project has set out for the development of such a system. However, the rather small number of offshore installation projects and their short time period of intense activity seriously hampers the development of such a system: repeatedly waiting for the next installation project to collect more requirements, try out some prototype, and get feedback on another version of the system would push the finalization of the system into the remote future.

The Com4Offshore consortium reached a breakthrough in the past few months by employing an agile software development methodology, reducing the time between the identification of a requirement and the delivery of the new feature to a single week. That allows developing the system within a single installation project. Finalization of the development is now planned for September 2016. This paper gives an overview of the intermediate results of the project.

The Com4Offshore project is co-funded by the European Space Agency as part of the ARTES Satcom Applications programme. Vattenfall as the pilot user of the system delivers requirements and gives feedback from the productive use of the system. German satellite manufacturer OHB has the lead on the project.

Approach

The foundation of the system is a communication infrastructure that combines current developments in satellite technology with 3G/4G mobile networks and WLAN to provide the technically and economically optimal solution to the users irrespective of their location. Standard devices such as smartphones, tablets and notebooks have seamless coverage within the relevant offshore construction areas.

The software built on this foundation is specially designed to take high latency and considerable cost of satellite services into account: Network stacks and protocols are selected based on bandwidth usage. Background data transfers between multiple nodes onshore and offshore allow for instantaneous responses from the user interface even at the offshore site.

Users enter data either through the web based user interface or via integration with third-party systems on the supply chain. A wireless sensors network at the offshore site augments the manually captured data. The input is rounded up by weather data and weather forecasts from external services.

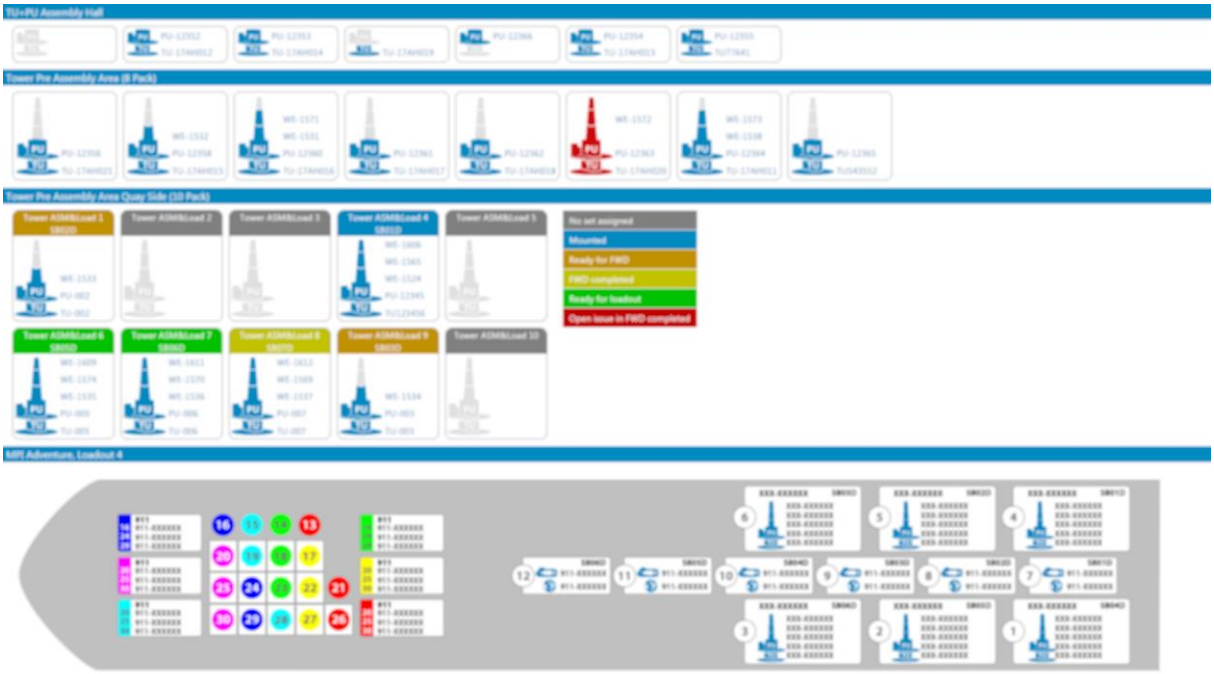
The software development team uses the Scrum approach: Every week a working increment of the software is produced and a demonstration of the new features delivered to the users for review. Software testers are tightly integrated into the development team to ensure the quality of each delivery. After the review, the new version of the software goes live for all users, with small changes and corrections if the review results call for them. The whole software development team (requirements engineer, software architect, developers, and testers) meets daily for 15 minutes in person to coordinate and ensure that all team members work toward the common goal of delivering a new software version at the end of a week's time.

The onshore part of the software is hosted in the Microsoft Cloud ("Azure"). Cloud based delivery allows to flexibly adapt the capacity of the system to the growing usage by the installation project within minutes. Waiting periods of days or weeks for additional servers that are usual with traditional IT infrastructure were just not acceptable for the agile software development approach taken. The cloud provider has been selected for meeting a broad set of international as well as regional and industry-specific compliance standards, such as ISO/IEC 27001/27002:2013, ISO/IEC 27018, and SOC 1 to 3 (formerly known as SAS 70) and offering to restrict the hosting to data centres located within European boundaries.

Preliminary results

Near real-time information flow of manually acquired data has been achieved in two ways: First, a graphical map-based user interface replaced the whiteboards that were used before. Ease of use was critical for the acceptance of this user interface to avoid that the users turn back to their whiteboards. Second, an existing computer application for data entry that sent out human-readable reports has been extended to connect directly to the new system. As a result, project management has an always-current view on location and state of all components.

Currently the system automatically acquires environment conditions at the installation site like wave height and temperature. As a next step, integration of genset data e.g. the fuel level is targeted. The system also receives current weather data and weather forecasts from an external service.



Various dashboards visualize the data

Various dashboards aggregate and visualize the data using tables, graphs, and maps as appropriate. Different dashboards are targeted at different user roles in the installation project. Complete data historization will make it possible to review the situation at any point in the past.

Conclusion

Transparency and availability of information about the supply chain is key in an offshore installation project. Digitization of communication and replacement of daily or weekly reports with online connections lead to a near real-time information flow and an always-current, overall view on the downward flow of goods from the manufacturers, identification of issues well in advance and an improved decision making process.

This puts project management in the position to feed the right information or instruction upward the supply chain e.g. in order to postpone works, accelerate processes or simply request clarification of a deviation from the planned schedule.

The projected benefits of the system are quantifiable as saving several days of installation time equivalent to millions of Euros of installation costs and turnover from earlier start of production.

Learning Objectives

Upon completion of this session, participants will have an overview of how the base for project management decisions in an offshore installation project improves through

- digitization of communication,
- communication services that reach out to the offshore installation site,
- additional data sources, and
- automated integration and analysis of data.