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Integrated Emergency Management Platform Using IoT to Improve MEM

White paper

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Abstract

We are presenting new tool for emergency response teams to enhance management of major emergencies as they occur. The tool (Real-time Emergency Situation Communications and Updates Exchange—RESCUE) augments communication and provides higher levels of situation awareness for offshore assets and their onshore support teams. It was developed to increase visibility, coordinate responses, and decisively resolve incidents with minimal consequences. RESCUE integrates onshore and offshore communications – a key benefit providing seamless and instant, coordinated response planning.

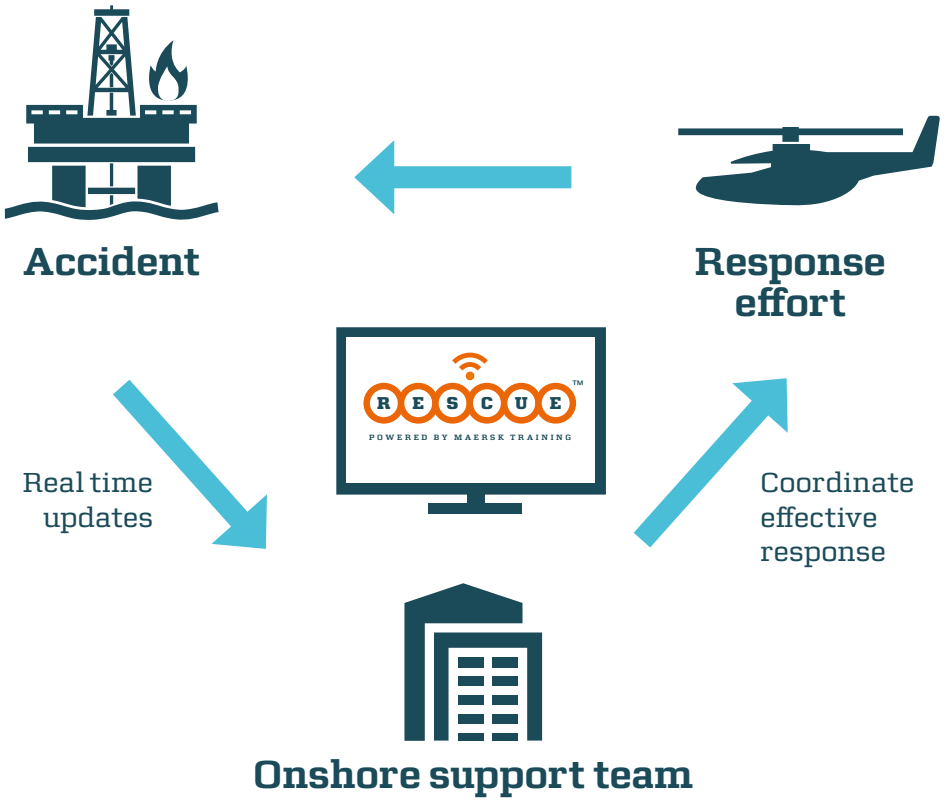
RESCUE utilizes an interactive display to track emergency incidents and tactical responses. It is intended to be rig, crew, and company specific in order to maximize effectiveness. The system is loaded with a given installation/facility's general arrangement drawings onto the interactive display – drawings can be generic or installation specific, depending on the desired level of customization. Additionally, RESCUE will also be loaded with company specific emergency response procedures and policies – allowing response teams to access checklists and pertinent documents instantly. Through the use of different icons (representing fire, smoke, Response Teams, injured persons, etc.) the Emergency Control Team is able to visually represent the incident's simulated conditions and response efforts in real-time on the interactive display. This macro level visualization allows the Emergency Manager to maintain high situation awareness, maximizing effective decision making. Possibly the biggest advantage, is the synchronization of offshore and shore side response efforts. Via RESCUE, the onshore emergency support team is able to visually observe real time incident updates. This exchange bridges communication gaps between the offshore and onshore response teams providing tighter response efforts for the offshore asset. RESCUE can be loaded on any smart device so key personnel can observe at any time, from any location. Where capable and permissible, the system can also access an installation's closed circuit cameras for direct observations of incidents as they occur.

RESCUE was initially developed to be used for emergency response training; however, as companies were exposed to the system, its capabilities have evolved. As its original intent was for training purposes, RESCUE is also capable of providing remote training in various settings such as on offshore installations or shore based control rooms. Given authorization, everything that the screen displays can be replicated making it possible for the training provider to facilitate remote emergency management training, exercises, and debriefs.

Emergency response management lacks utilization of technology

The oil/gas industry as a whole tends to be slow adopters around technology innovations. Multiple examples can be cited as it relates to drilling equipment and advances

Real-time Emergency Situation Communication Updates Exchange (RESCUE™)



over the past several decades. In general, this is an innate human flaw for we are all hesitant to change and accept challenges to the status quo. Fear of the unknown is a very real and common objection to accepting technology innovations.

This can be observed by the industry's current management of major emergencies on offshore installations. Despite the wide array of technology innovations that have occurred in the past decade, the management of incidents is still done in a very primitive manner.

Emergency response rooms are equipped with binder upon binder of procedures and policies for handling crises. Installation schematics and diagrams are printed and laminated in order to place on boards when mapping incidents and response teams. Communication with onshore support teams is done via phone, at intervals, without instant updates as a situation can evolve and dynamics change.

For the safety of our crews, environment, and investment, this simply cannot persist in light of the technology at our fingertips.

Statement of Theory & Definitions

We observed this antiquated method for emergency response during our training courses for the industry and knew there was a better way to respond. The goal was to create a real-time communication and update exchange for coordinating emergency response.

Incorporating the internet of things was a clear answer for the need of instant updates. In a world where news updates are available in the blink of an eye via Social Media, emergency response should be able to have the same advantage.

The solution is simple enough – an interactive display with connectivity with dual purpose of allowing offshore teams to deploy immediate response and allow onshore support offices to see updates real-time as they happen. Implementation of the solution is more detailed and methodical.

Description & Application of Equipment & Processes

We first had to identify a proper display that meets the demands of connectivity and ability to manipulate in a manner similar to a white board. The display also has to be large enough that it can provide a clear picture to the Offshore Installation Manager (OIM) and their team to determine appropriate course of action. This is the hardware component.

More important would be the software component. We needed the capability to upload rig specific diagrams, schematics, and procedures. We would also need the capability to create specific icons for fire, smoke, emergency response teams, injured persons, and so forth. All the relevant nomenclature that would need to be displayed during an actual emergency. We identified the software solution and then the hard work began.

Our test case was a generic semi-submersible that could be used for training and instructional purposes. We uploaded the diagrams and schematics one level at a time on the software platform – they were then interlinked to allow quick scrolling from one area of the installation to another.

We also created all the applicable icons necessary for visualizing a situation graphically. These were uploaded and assigned on the display so an operator can "drag & drop" to the place on the rig schematic that an event or response is taking place.

Additional features were added including linking closed circuit camera feeds to the schematics. This allows an incident commander to click on pertinent camera feeds when available of the area in question. It allows for greater and more instant awareness of the situation as it unfolds.

The onboard system is duplicated at the onshore support office and for onshore support personnel. The software platform can be installed or uploaded on any smart device. This allows all pertinent personnel – whether from the contractor or the operator – to have instant updates on the situation at the installation. It eliminates the risk of human error in communication when the offshore team is calling to update the onshore office and/or request assistance. The onshore office has the ability to see the situation and preemptively start planning their response efforts.

We also added electronic procedures on the same platform, so that if an event occurs, the OIM can easily reference checklists and policies when necessary. This is a much faster method for accessing the information than thumbing through larger binders and it is less cumbersome requiring smaller footprint and space.

First implementation at an offshore installation

Initially, we developed this system as a method to provide better training. However, as our customers began observing the capabilities of the system during simulations and courses they realized the potential for the system at their offshore installations.

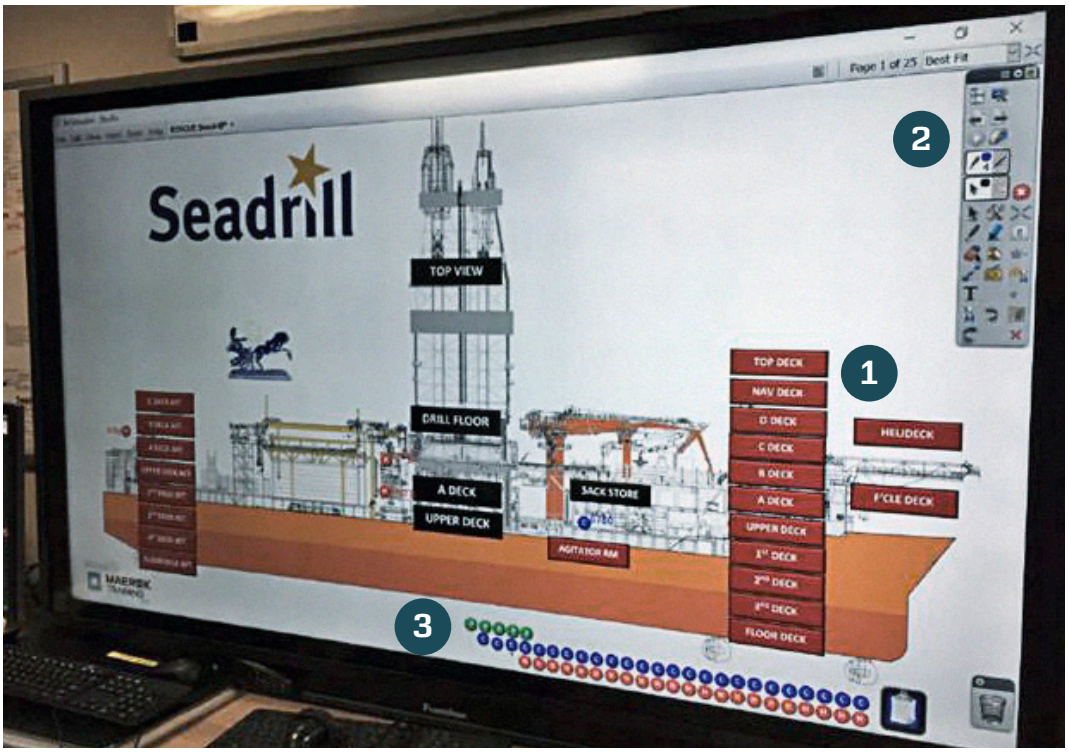
BP made the first request and investment to deploy the system on one rig in the summer of 2017. We then worked with BP and their contractor, Seadrill, to develop a custom and rig specific version of the platform.

This included acquiring all diagrams and schematics from Seadrill; emergency response procedures from Seadrill and BP. Once the system was customized, we then worked with both companies for input to ensure it was suited to meet the requirements they saw for effective emergency response.

Rachel Booker was deployed in August for the first installation, whereby the customer purchased all the required hardware for the installation and their onshore office(s). She visited the rig to set up the system and train the emergency response teams on how to use the system. We also traveled to visit with the onshore support team to train them on how to effectively use the system as well.

Response from the first installation are positive. The crew states that it is visually cleaner than using the printed

Pictures from Initial Installation – Seadrill Drillship



TOP LEVEL VIEW OF RIG ON RESCUE SYSTEM

1. *Access to individual level diagrams on rig*
2. *Tools (ex: draw, drag & drop, select, insert text)*
3. *Work permit icons*

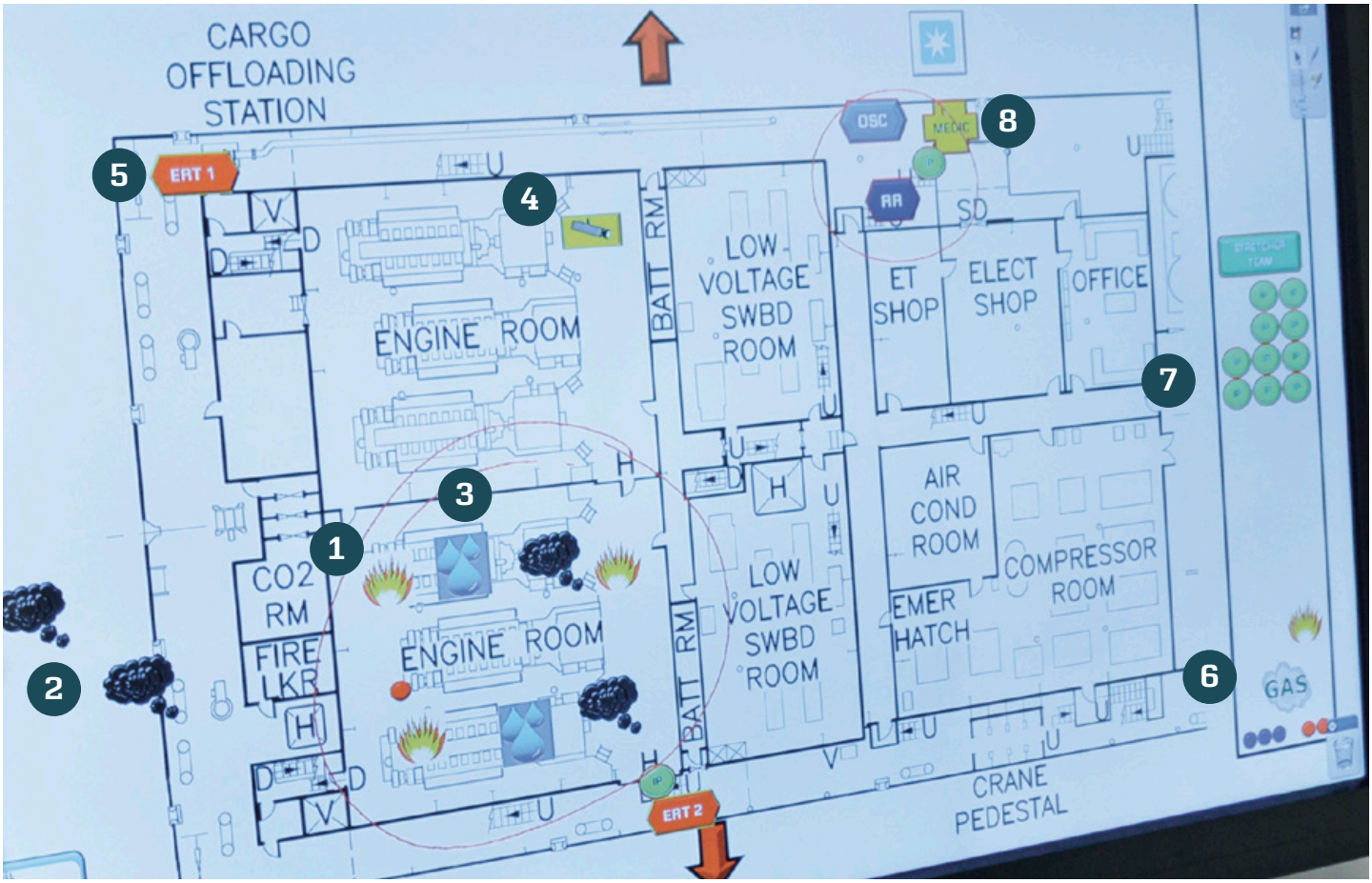
OPERATOR INTERACTING WITH MAIN DISPLAY

1. *Main display*
2. *Side display with emergency response procedures*
3. *Stylus for display interaction*

Pictures from Maersk Training Emergency Response Simulator

Instructor using icons to display fire in engine room & response efforts

Instructors practing emergency response procedures with rescue tool.



EXAMPLE OF HOW RESCUE CAN BE USED TO DISPLAY EMERGENCY SITUATION

1. *Fire*
2. *Smoke*
3. *Sprinkler system*
4. *Closed circuit camera feed*
5. *Emergency response team*
6. *Gas*
7. *Injured person*
8. *Medic*

safety plan, especially with regard to each individual level. The icons are immediately recognizable and easy to interpret for users and observers. Overall the system has a fairly intuitive layout and most people take to it easily (including those with limited technological knowledge).

The first installation has encountered some setbacks due to bandwidth availability of the network and IT security challenges. We are continuing to work with the customers to sort through and resolve these items.

Conclusions

After the initial system was deployed at one installation, BP has requested we work with them to integrate on additional installations in their offshore operations. Seadrill has also seen the benefit of the system and is exploring the potential to implement across their fleet.

Both companies have seen the drastic step forward this innovation is for the purpose of effective management and response in major emergency situations. It is during crises that time is the most critical and the ability to provide instant communication and updates between teams is vital to mitigate risks and potential catastrophes.

The customer also identified the additional ability to use the system for permit work and toolbox talks. They now use the system to track all of their cold and hot work as well as discuss and plan tasks prior to starting them. This allows them to become familiar with the system and have it seamlessly integrated in their daily operations so they are more comfortable with it in the event they need to utilize the emergency response capabilities of it.

Acknowledgements

It is through the feedback of our customers that we have been able to fine tune this solution for their needs. BP and Seadrill were the first to venture an attempt at adopting this technology and we believe others in the industry will begin to follow their example.

RESCUE™

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