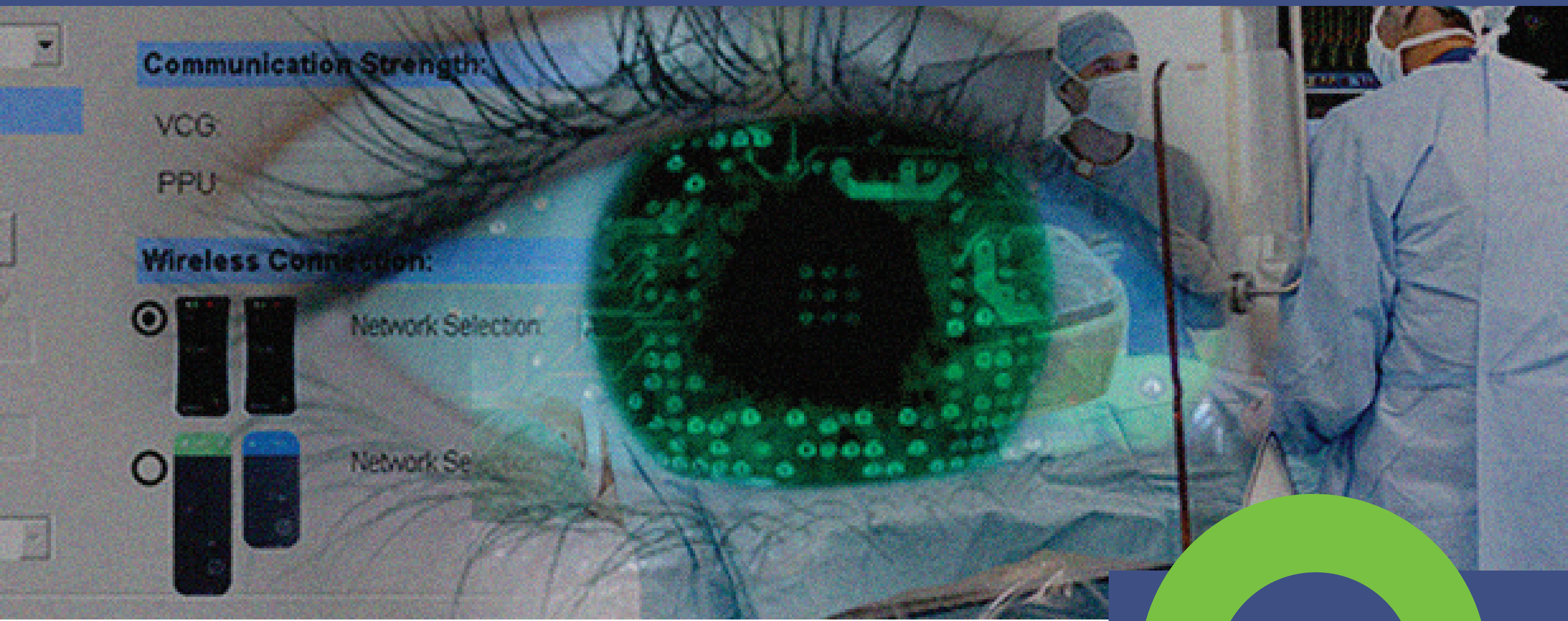
HoliDes newsletter

July 2016



vol. 4

Intro

Project HoliDes is about to complete!

We explored the use of Human Factors Methods, Techniques and Tools for the development and qualification of adaptive, cooperative Human-Machine Systems (AdCoS) in that many humans and many machines act cooperatively together to guarantee fluent task collaboration. 31 partners from the industry, research institutes and universities in seven European countries investigated in an innovative Human Factors engineering process that can be embedded into traditional System Engineering processes as they are used to develop safety critical systems. This enables for the first time a systematic derivation, design and development of Human Machine Systems that can pro-actively communicate system adaptations to human operators and at the same time keeping them sufficiently in the loop based on the operators' situational load and capacities. In three years over 50 Human Factors methods, techniques and tools have been studied, extended and extensively applied in four different application domains: Health, Aeronautics, Control Rooms, and Automotive.

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See you in Friedrichshafen!..............

All of them have been classified, described and made available via **the HoliDes Platform Builder,** which enables to instantiate Human Factors Reference Technology Platforms that interconnect methods, tools and techniques (MTT) via linked data to ease and address Human Factors integration in System Engineering processes. In this number of the HoliDes newsletter, the last one, we introduce the HoliDes Platform Builder and present an overview of the Health AdCoS we developed during the three years of the project, followed by insights about the **Diversion Assistant AdCoS** from the Aeronautic domain.
Finally, we announce the **HoliDes Final Event, hosted by Airbus Defence and Space in Friedrichshafen, Germany on Thursday, September 29th**:

see what we are going to show you there
in the next pages!

The HoliDes Platform Builder

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You can start directly by Creating an HF-RTP instance

Creating an HF-RTP instance

For more on how the Platform Builder works, and what an HF-RTP is, go to

Information & How-To

If you want to explore or manage the MTTs, go to

MTT database

One of the main assets of the Holides Project is the Platform Builder, an online webapp that will allow users to deal with HF issues during all the design and development phases of an Adaptive Cooperative System. The tailoring process of an Adaptive Cooperative System faces a lot of complex Human Factors issues, and the achievement of its goals and objectives is strongly linked with the engagement of mechanisms and methodologies proven to solve this Human Factors issues.

In the scope of a development of a business process, the user will have the chance to instantiate its own Human Factors Reference Technology Platform, a set of methods, tools and techniques aimed to helping to solve the Human Factors issues described in the selected domains with its own constraints.

The Platform Builder provides a friendly-user environment where, even if you're not an expert in Human Factors, can easily model the casuistic of your Adaptive Cooperative System design and development phases, including the main phases of the tailoring process.

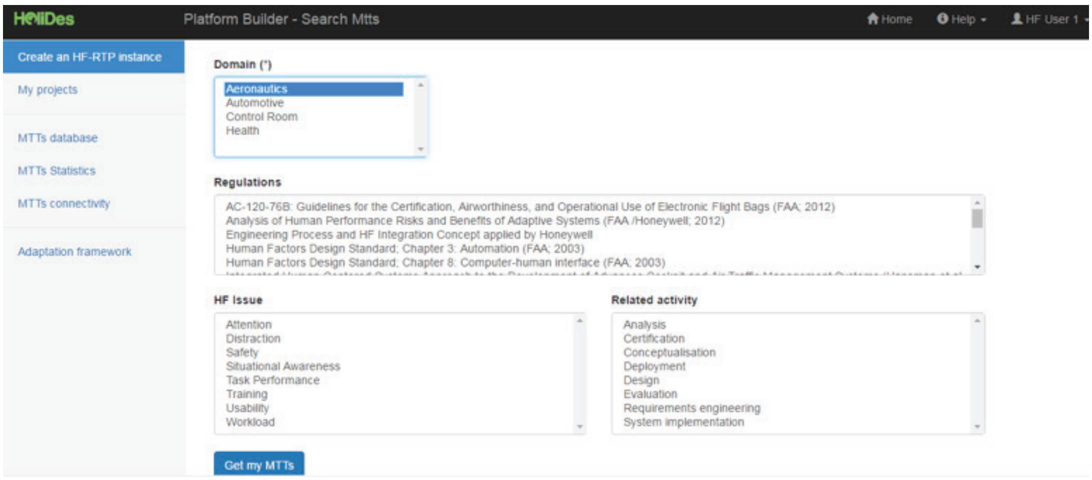

Figure 1. Web interface of the HoliDes Platform Builder

During the HoliDes final event in Friedrichshafen, you will see how to use the Platform Builder application to find the most suitable MTTs (methods, techniques and tools) according to specific design needs and how to create an instance of the HF-RTP (Human Factors Reference Technology Platform). For more information, see the Platform Builder videos on the HoliDes web site
http://www.holides.eu/videos

Health AdCoS
Guided patient positioning 1

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The Guided patient positioning AdCoS provides guidance to operators of MRI scanner during preparing and positioning patients for MRI examinations. Correct positioning of the patient for the MRI examination and using the right coils and other devices is important to get good diagnostic quality images, but also important to avoid safety issues. Currently, operators are trained for this. The on-line guidance system intends to improve usability and to reduce risks, also in case of novice, less experienced users.

Figure 2: Pictures of several actions during patient positioning

An important way to provide guidance to the MR users is the use of a so-called “gantry display”, an interactive display attached to the scanner in the exam room as a means to provide guidance.
The UI design on the gantry display to guide the user to prepare the patient has been iteratively improved based on user test feedback.

Based on feedback from (1) hospital observations to learn about the current way of working, (2) a card sorting exercise to discover what users find important in the workflow, and finally (3) a user test based on an iterated version of the UI design, a iterated design was created as depicted in Figure 2.

Use of the HF-RTP

Multiple tools from the Human Factors – Reference Technology Platform (HF-RTP) have been used to support this AdCoS, especially tools provided by Work Package 5 (WP5) of the HoliDes project about “Empirical Human Factors Analysis Techniques & Tools” for usability-related activities such as task analysis and user testing. The WP5 tools **Means-end analysis** from Anywi, to analyse user needs, **U-DAT** from Philips, to capture user test results, in combination with **HF-filer** from Anywi, to generate a structured report, have been used in different stages. This allows for a more systematic concept validation and capturing of the results (see Figure 3).

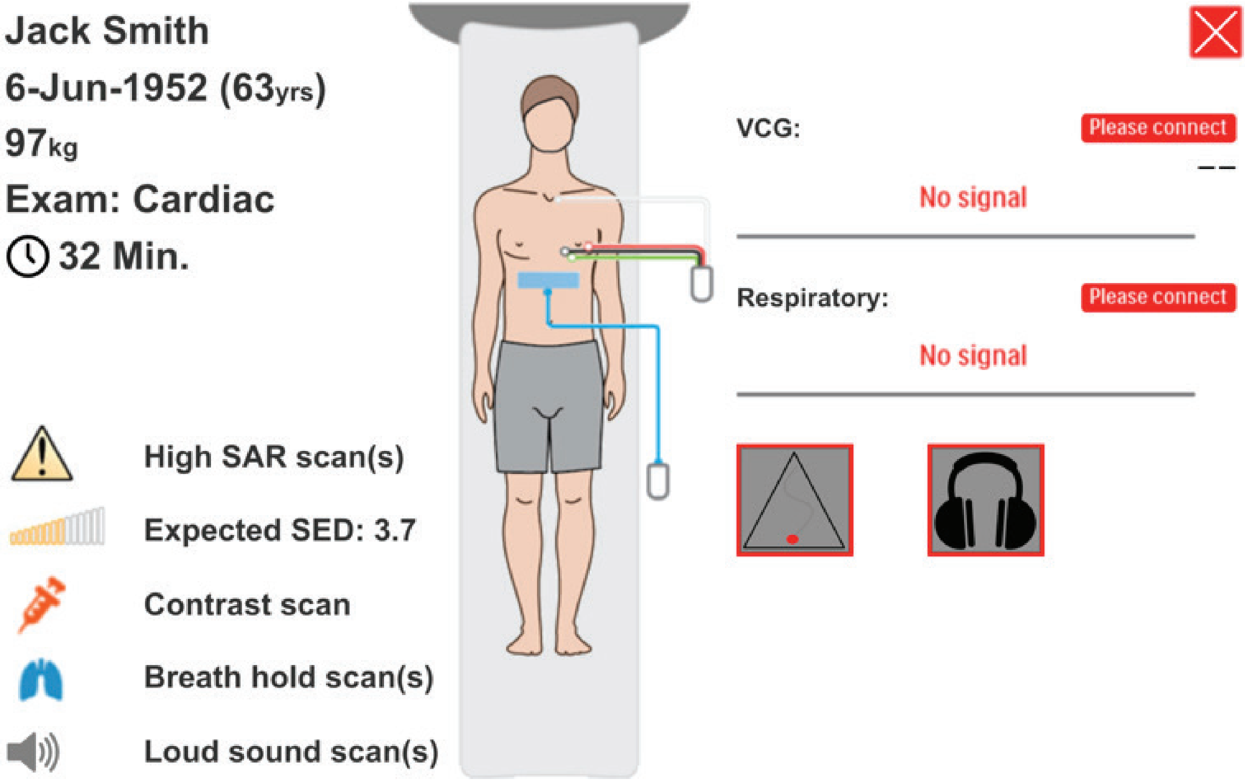

Figure 3: Iterated UI design

The output in several steps in the workflow can be translated as input to a tool supporting the subsequent step through an XML-based file format. This chaining of tools highly increases the efficiency and consistency of the usability results.

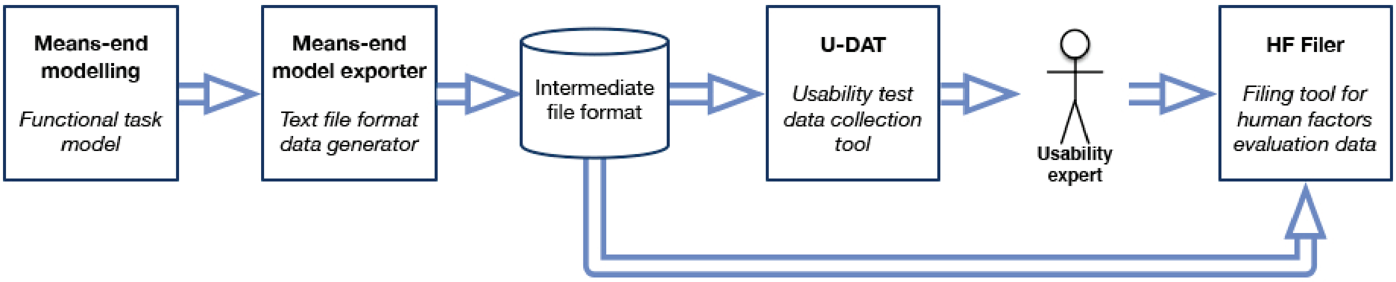

Figure 4. Chain of lifecycle tools for usability evaluations of the Guided patient positioning AdCoS

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ECG triggering is often required during MRI scans to avoid image artefacts due to motion of the heart or blood flow. However, it is not very easy to obtain reliable trigger signals, since both the magnetic field and the scanning techniques distort these signals. A new technique measures the voltages between different leads indicated as V1 and V2 in Figure 5. A smart algorithm based on this cross-referential information can detect the ECG triggers in a different and better way. However, this technique requires some user interaction to get the system properly calibrated.

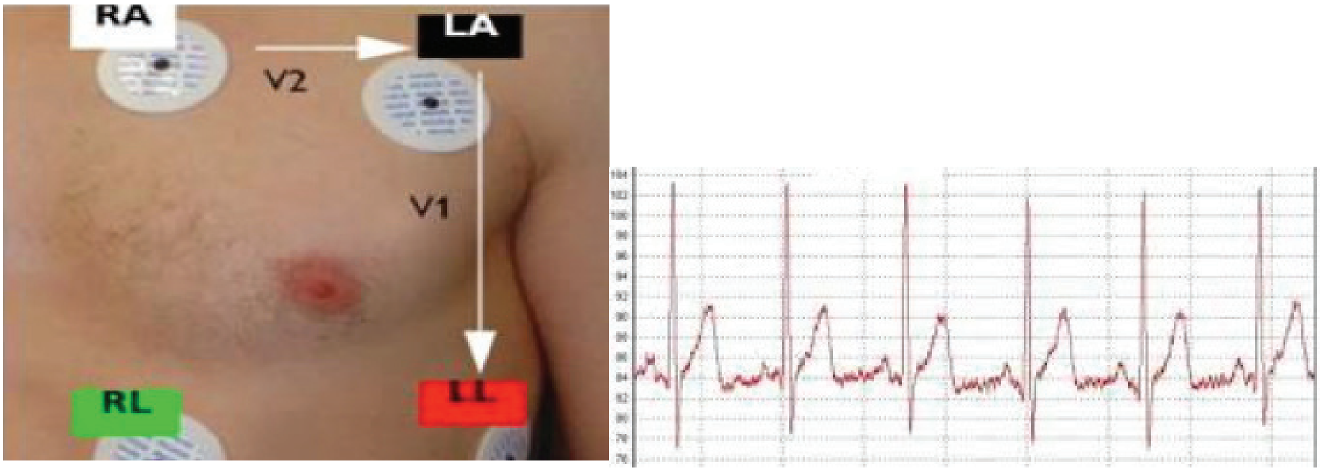

Figure 5: Pictures of the positioning of the ECG electrodes and an example of an ECG trace

Additional guidance for the operator is required during patient preparation and scanning to improve the reliability of these newly measured ECG triggers.

The UI design on the console for ECG Triggering to guide the user to prepare for manual VCG triggering has been iteratively improved based on user test feedback.

Based on feedback from (1) hospital observations to learn about the current way of working, (2) a user test based on an iterated version of the UI design, a iterated design was created as depicted in Figure 6.

Multiple tools from the Human Factors – Reference Technology Platform (HF-RP) have been used to support this AdCoS, especially tools from Work Package 5 (WP5 - “Empirical Human Factors Analysis Techniques & Tools”) for usability-related activities such as task analysis and user testing. The WP5 tools HF-task analysis from HFC, to analyse user needs, U-DAT from Philips, to capture user test results, in combination with HF-filer from Anywi, to generate a structured report, have been used in different stages.

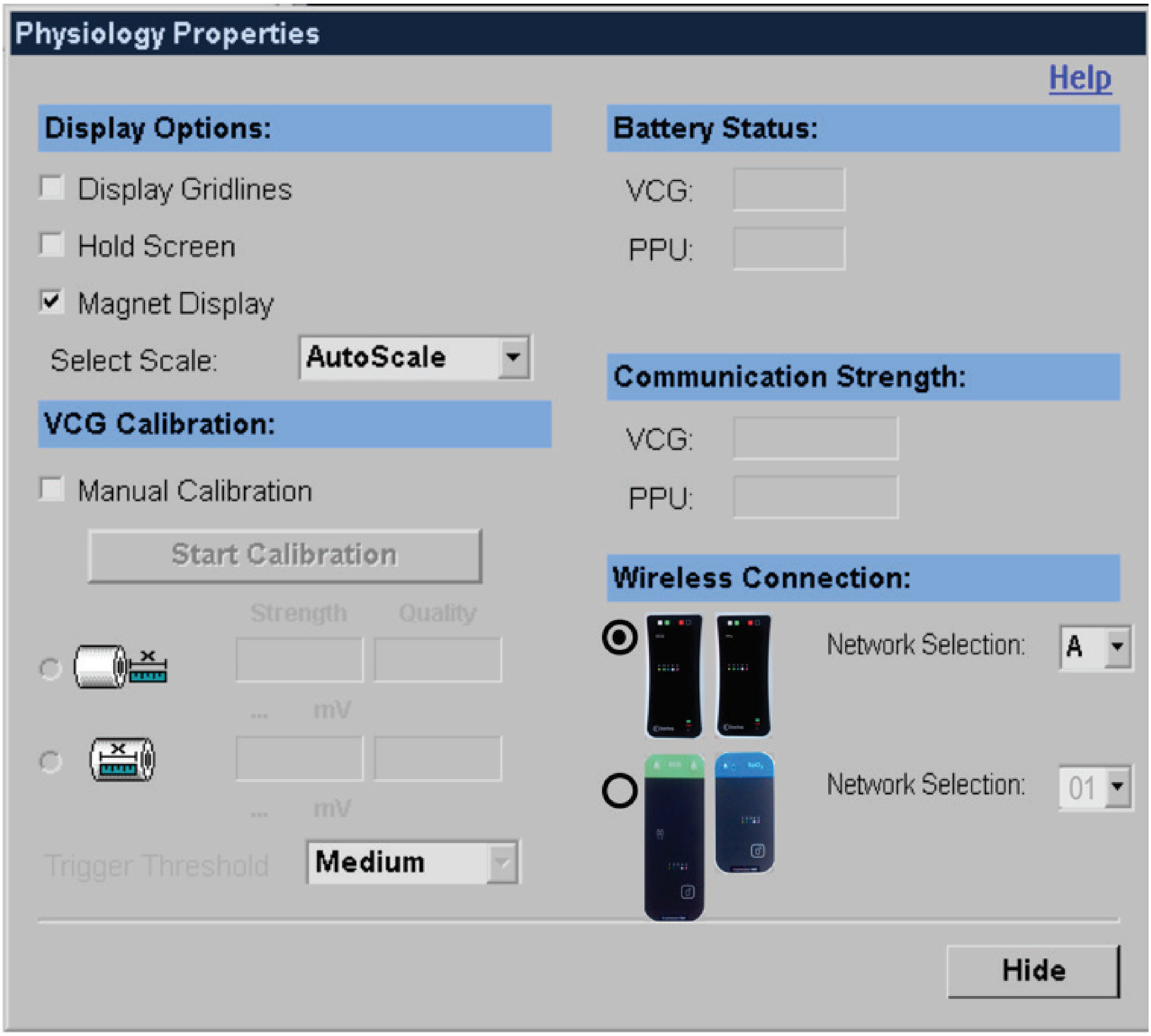

Figure 6. Final UI design of the main screen for manual ECG Triggering

The formative user test revealed 23 usability issues. All feedback has been taken into account, which has led to the final UI design from Figure 6.
The fact that these usability issues were highlighted using the U-DAT based user test has resulted in an improved usability in terms of possible use error and efficiency.

The manual ECG triggering feature has been released as part of the Philips MR scanner software. Feedback from actual customers shows very satisfying results.

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An X-ray angiography system is typically used to visualize anatomy, catheters and other instruments during minimally invasive procedures like coronary stenting in the heart or aneurysm repairs in the brain. The X-ray images used to be only 2D, but advances in technology now also allow to make a 3D scan to better visualize the anatomy and use this 3D volume as planning and 'navigation' tool for the intervention.

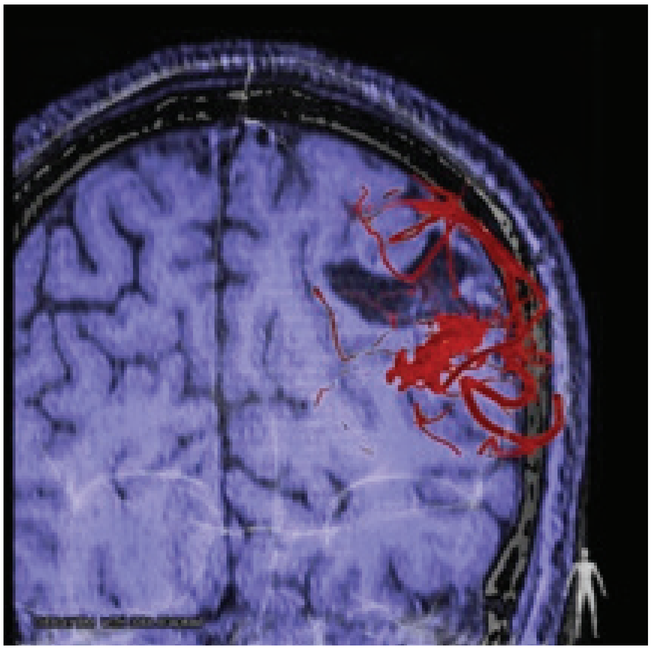

Figure 7. X-ray system acquires 3D volume to visualize the vessels (see red). In this example, it is than overlaid on a MRI scan that the patient had earlier (see purple).

A 3D scan allows better visualization of the anatomy, but is difficult to perform due to the amount and complexity of the steps that need to done. The tools require repetitive training and a lot of expertise, which is not always available in the hospital. Furthermore, staff rotation and variability in their task division (roles) is high, so users are not likely to become expert users before the end of their rotation. Because of this, highly skilled personnel are required to perform the 3D scan and in some cases, when the staff does not feel comfortable in making a 3D scan, they will rely on the 2D images only to do the procedure.

It is the objective of this AdCoS to help the staff become more confident in acquiring and using 3D data. This is done by analysing the workflow steps and developing an improved Human Machine Interface (HMI) that helps the user in the preparation and execution of the 3D Acquisition.

Use of the HF-RTP

To improve the HMI for the 3D Acquisition and get earlier feedback on usability aspects, several tools from the HF-RTP have been used and integrated in the development process for the new HMI. A task editor is used to identify interaction tasks between the operator and the system. **The Human Efficiency Evaluator** is used to model the interaction capabilities of the environment and to demonstrate procedures for common tasks. In addition, it executes **CASCaS**, a cognitive architecture for prediction of human behaviour, allowing analysis of Human Factor metrics. The integration of the tools in the workflow is shown in the following Figure.

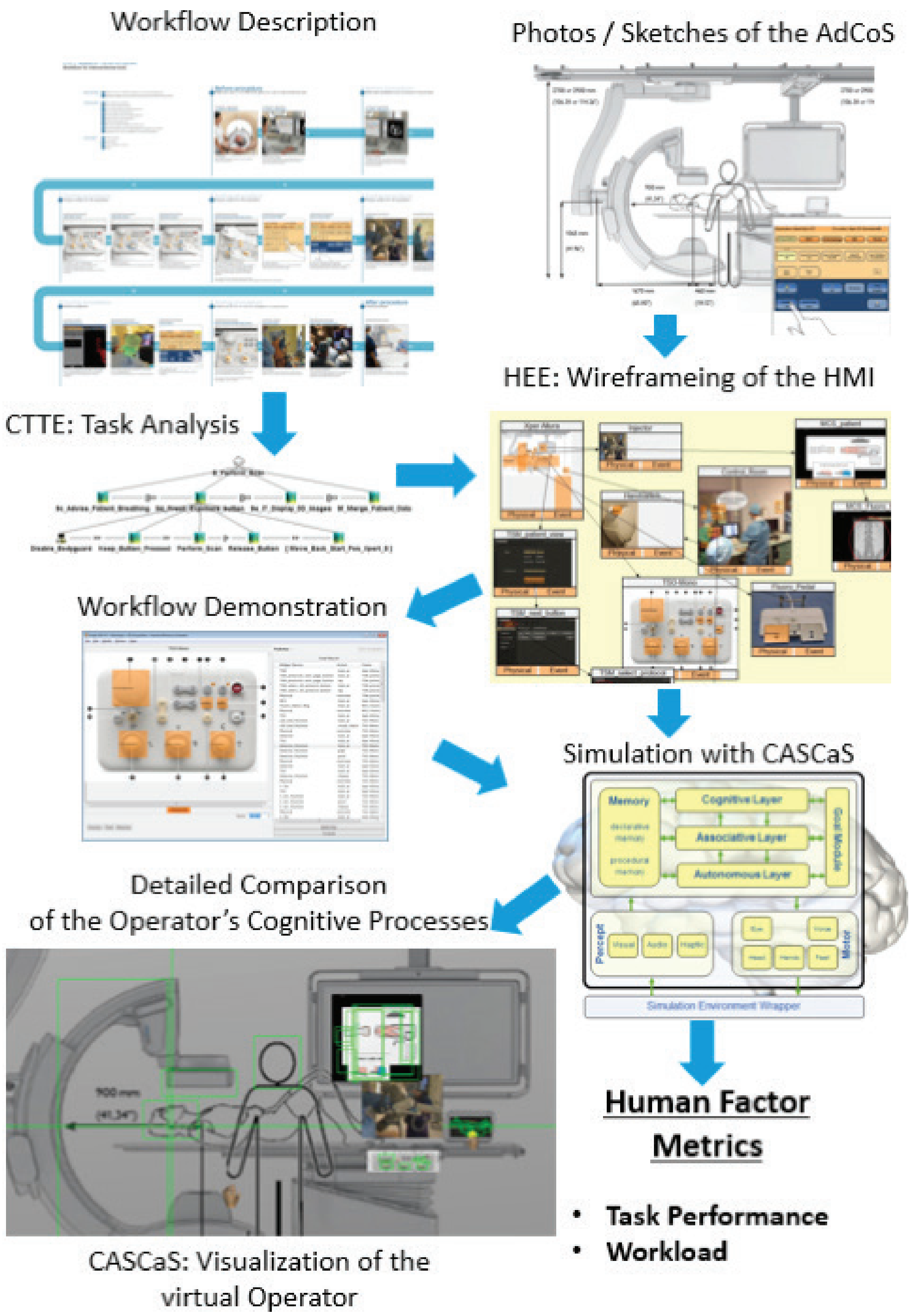

Figure 8. Tool integration in the 3D Acquisition Use Case

Evaluation

First evaluations show that the count of user errors will decrease thanks to the guidance provided by the AdCoS. The number of user actions, compared to the existing product, will generally decrease. In some cases, the number of user actions will remain the same or even increase, thanks to the additional checks provided by the new HMI. This than leads to less user errors and as a result also to improved user satisfaction. Finally, usability evaluations and SUS scores indicate a clear improvement of user satisfaction for the new HMI.

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The University Medical Center Utrecht is the second largest hospital in the Netherlands. It is high ranking in a wide range of research fields among which magnetic resonance imaging (MRI) technology. Its radiology department disposes over 12 MRI systems one of which is an ultrahigh field research system with a permanent magnetic field strength of 7 tesla (versus 1.5 or 3 tesla for regular systems). Imaging at this field strength comes with a multitude of scientific and technological challenges. One of these challenges has been addressed by our AdCos in the Holides project ‘Safe parallel transmit scanning’.
For many anatomical regions, 7 tesla imaging requires the use of a so-called ‘parallel transmit’ antenna array. The array consists of a set of antennas (in MRI mostly called ‘coils’) that emit the radiofrequency (RF) signals into the patient. This radiofrequency field will excite the atomic nuclei that, after relaxation, will emit radiofrequency signals that are detected to generate the image.
A set of RF amplifiers, each connected to the coil array elements (antennas), provides the required transmit field. Each channel is independently modulated: optimal phase, frequency and amplitude modulation should lead to the required excitation of part of the patient, e.g., homogeneous (same signal from all parts of the brain), or spatially focussed (only signal from the spinal cord).
However, this temporal modulation of the RF signals alters also the spatial interference of the concomitant electric fields resulting potentially in unsafe RF induced tissue heating (microwave heating effect) at certain body location. The electric fields and heating cannot be detected directly with MRI and their spatial patterns are highly patient specific due to the complex electromagnetic interaction of RF signals with the human body. The spatial heating pattern can only be determined by means of electromagnetic simulations employing dielectric models of the scanned subject. In this way, the spatial peak temperature can be calculated and power levels can be adjusted to avoid peak temperature levels from rising above safety thresholds. However, often the models that are used for electromagnetic simulations do not well represent the features of the subject under examination, and thus the assessment could be inaccurate.

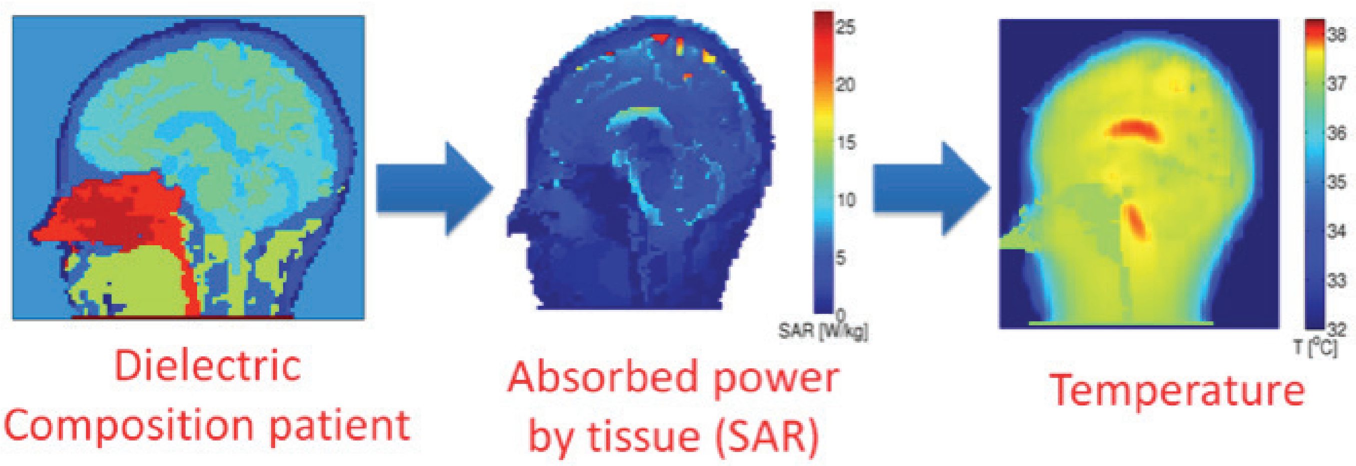


Figure 9. Relation between various calculated maps of field in the patient

Tissue heating is often characterized by the power absorbed in the tissue, divided by the tissue density. This is called ‘specific absorption rate’ (SAR) expressed in W/kg. Safety guidelines are expressed as maximum SAR levels. Currently it is still not possible to perform a real time assessment of the SAR distribution using subject-specific online-generated models of patients undergoing MRI.

For this reason we believe that the best solution is to build a database with many different models and to use it for real time SAR prediction. However the MRI technologists rarely have the required knowledge to use appropriately a similar database, therefore it is equally important to design an AdCoS with an intuitive interface that enables non-scientific staff to be able to perform safe parallel transmit scanning.

Before HoliDes, the UMC did not yet evaluate the wide range of inter-subject variability and therefore large safety margins were used with consequently long scan times. As soon as the HoliDes project started, by following the pipeline shown in Figure 10, many models were built to be stored in the database and a preliminary prototype of interface was designed.

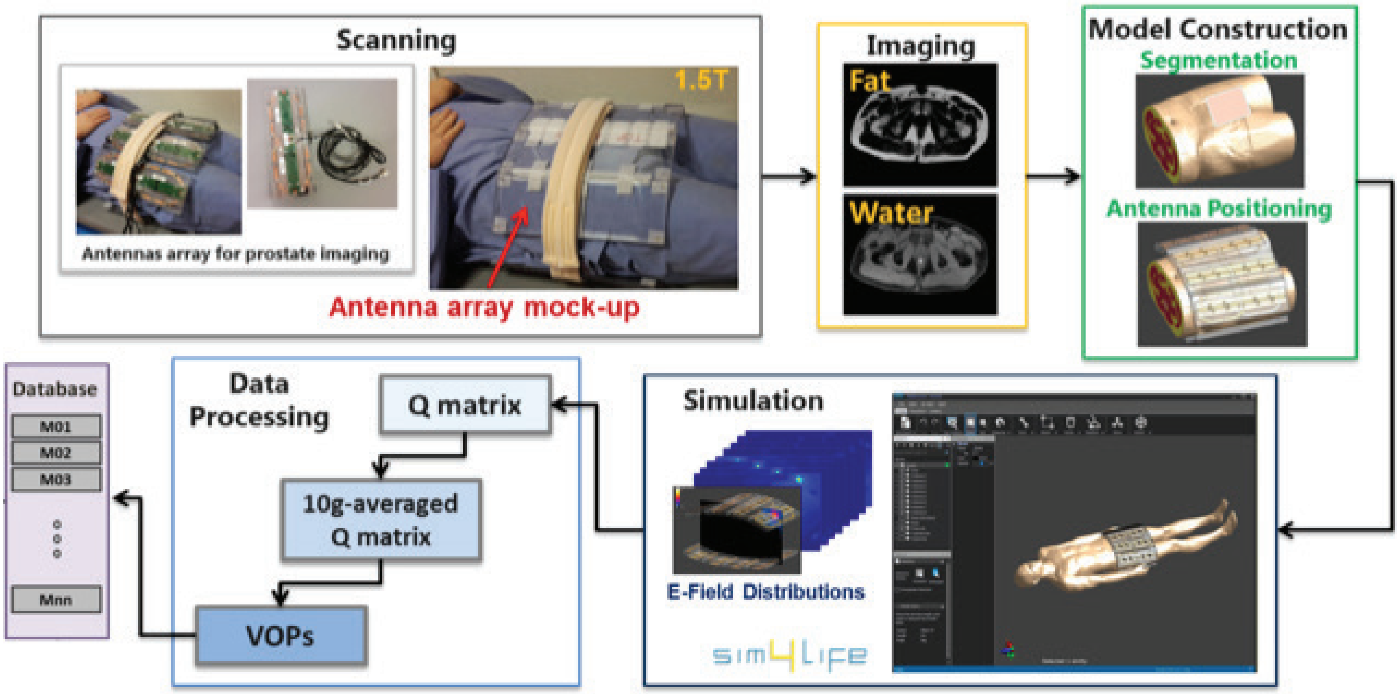
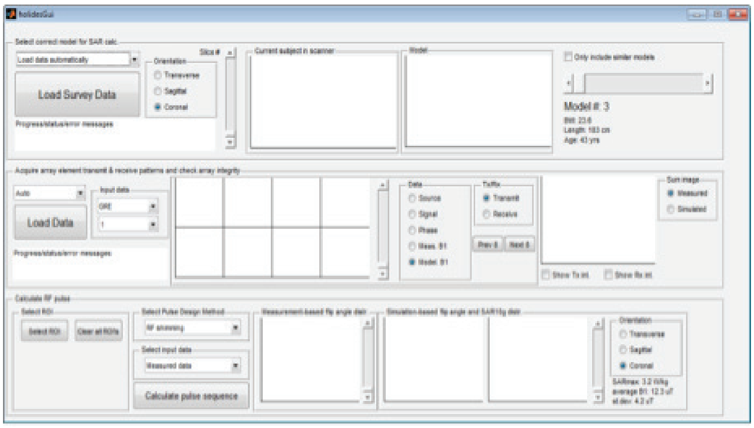
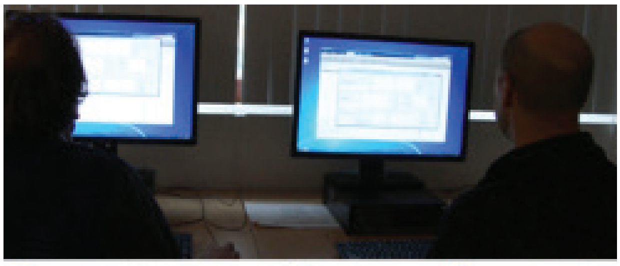


Figure 10. Pipeline for Database Construction

In line with the HoliDes project, different initiatives were taken to improve the design of the AdCoS interface by including HF considerations. In particular, an iterative design has been planned leveraging empirical analysis of cognitive and communication processes techniques and the HF-filer tool, all included in the Human Factors – Reference Technology Platform (HF-RTP).

In cooperation with the Scienza Nuova Research Centre, a first focus group session was organized and a structured analysis of the operators' feedbacks was performed on a preliminary version of the interface to evaluate its suitability to expert and non-expert users. Hence, the human factors data have been collected and tracked by means of HF-filer to be included into the system engineering workflow at the same level as other more technical development information. Different HF-issues have been detected thanks to that analysis: for example, it has been detected that there were too confusing information displayed on the interface according to the non-expert users, and some misinterpretation of the sequence of steps to be performed during the calibration activities. HMI design solutions have been derived accordingly.





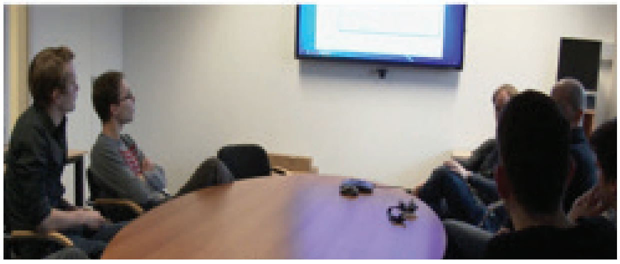
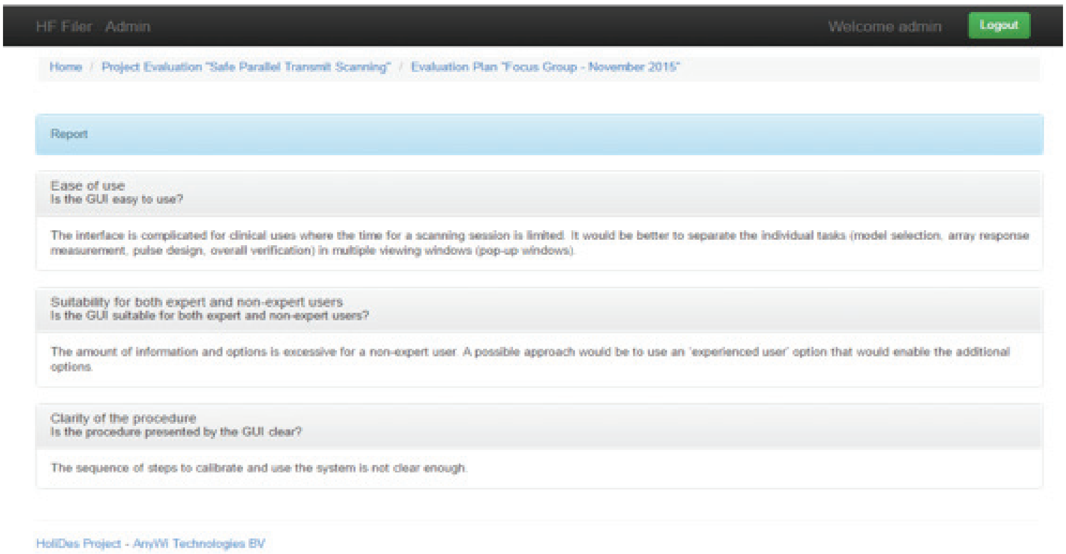


Figure 11. Preliminary design of the interface and first focus group



HF Filer Admin Welcome admin Logout

Home / Project Evaluation "Safe Parallel Transmit Scanning" / Evaluation Plan "Focus Group - November 2015"

Report

Ease of use
Is the GUI easy to use?

The interface is complicated for clinical uses where the time for a scanning session is limited. It would be better to separate the individual tasks (model selection, array response measurement, pulse design, overall verification) in multiple viewing windows (pop-up windows).

Suitability for both expert and non-expert users
Is the GUI suitable for both expert and non-expert users?

The amount of information and options is excessive for a non-expert user. A possible approach would be to use an 'experienced user' option that would enable the additional options.

Clarity of the procedure
Is the procedure presented by the GUI clear?

The sequence of steps to calibrate and use the system is not clear enough.

HoliDes Project - AnyWi Technologies BV

Figure 12. Evaluation report for the preliminary design of the interface

After the interface was suitably adapted, a second focus group session was organized in order to finally check the resulting ease of use and suitability for non-expert users of the new version of the interface, following the procedure derived in the HoliDes project. The results of the analysis recorded a clear improvement of the final product.

Figure 13. Second Focus Group to evaluate the new version of the AdCoS

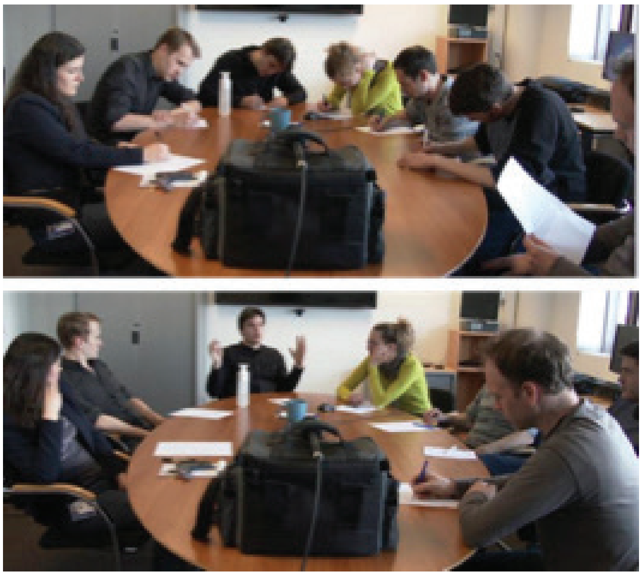


Figure 14. AdCoS for safety assessment and pulse design for parallel transmit MR imaging

Thanks to the HoliDes project, the UMC has come in contact with a network of the human factors experts and related best practices that have allowed to reduce the distance between researchers and MRI technologists who finally use the system and that will allow to accelerate the transition from the research to the clinical application for now and in the future.

Operator task schedule and guidance 5

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One of the problems that older adults and newcomers face at work is the adaptation to a changeable working environment, which could come from many different factors: new computer and machine interfaces, new devices, new procedures and workflows, new business line and markets, etc. An incorrect introduction of these changes in the working environment can cause an improper assimilation of concepts, and it could cause demotivation and low productivity, especially in older employees.

The workflow for operators in medical environment (nurses, laboratory technicians, physicians, and others) comprises very complex procedures with many factors that influence the execution of tasks, such unexpected events that make difficult to accomplish a pre-organized plan. Informal process at hospital is very common. For instance, short disruptions of daily tasks of nurses are usual in hospitals. When the number of small interruptions outweighs the amount of planned work done in a given hour, the impact translates into slower progress, lower job satisfaction, and potentially lower quality of care. Furthermore, the above can lead to operator errors, which can put patients at risk.

Figure 15. Elderly nurses working in a medical environment

On the other hand, we note that workflow technology has expanded substantially into the industry over the last year. Companies are embracing this technology as a means to improve operational efficiency, achieve safety goals, and positively influence the quality of their services. This technology increases and strengthens the collaboration between the business process and the operators.

The aim of our AdCoS is to ease the development of workflow solutions for hospitals focused on the following aspect:

- Helping to proper staff tasks assignment.
- Providing real time instructions – trigger alarms – reminders and check points.
- Optimizing the workflow and cooperation with the rest of operators.
- Providing feedback to the platform for further adjustment.

Given the broad scope of the workflow, we have focused on a subset of casuistic. The development of our application was focused on a prototype implementation of a dynamic workflow system that helps care personnel to carry out their daily tasks and that accomplishes these basic functionalities:

- Helping to assign/re-assign tasks to operators.
- Giving context-aware instructions to operators.
- Providing different user interfaces for different devices: tablet, smartphone and smartwatch.

The care personnel are provided with an Android smartphone or tablet where the “HoliApp” application is installed (see Figure 16) allowing the reception of real time information from the workflow system. In this application, the operator has to be registered in order to receive custom information about available tasks, assigned task, information about how to proceed with the task, work done history, user profile, etc.

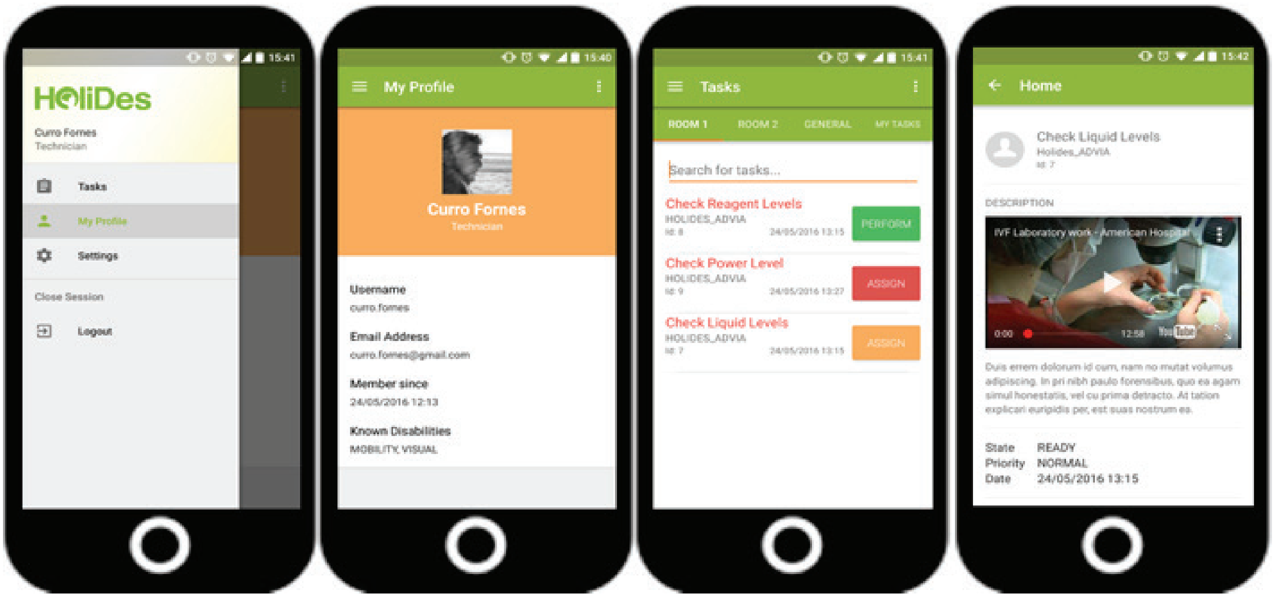

Figure 16. HoliApp application

Moreover, we also provide another tool to the hospital administrator with the enough infrastructure for the monitoring and configuration of the workflow system (task and workflow status, task assignment, user management, etc.), via web technology (see Figure 17).

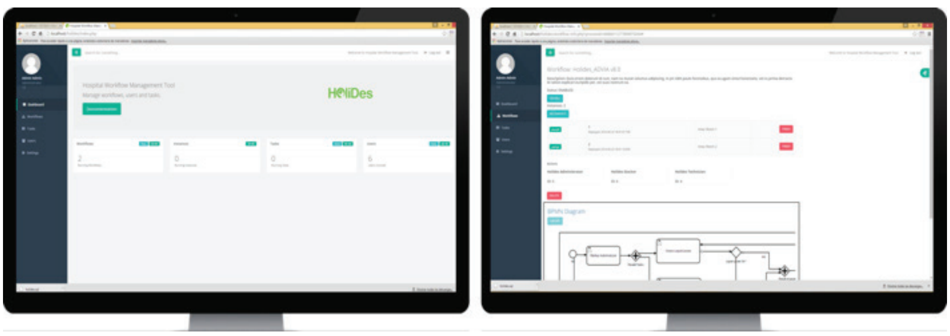

Figure 17. Hospital Workflow Management Tool

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The Querying openEHR data AdCoS has two main objectives based on physician and patient:

1. To provide the physician with a helpful tool to help him/her in the diagnosis of disease. The AdCoS joins images with patient´s EHR (Electronic Health Record) using WADO (Web Access to DICOM images, where DICOM stands for Digital Imaging and Communications in Medicine), as depicted in Figure 18. WADO connects to the PACS (Picture Archiving and Communication System), as an image server, and takes the information from yourEHRM middleware (openEHR/EN13606 compliant) and displays full patient clinical data. By this way, the authorized physician provides the proper treatment based on the specific patient's information, profile (foreign patient, English mother tongue, symptoms…) and patient´s EHR which contains clinical details: diseases, habits, allergies, DICOM images, etc.
2. To provide access to patients (and other authorized people like physician), to their own medical and clinical data, always in a secure way. The data to be displayed to the patient are demographic, habits patterns and personal details as well as clinical reports previously generated by his or her professional. In addition, the patient is allowed to modify some data like demographic, habits or personal details in order to keep his or her information as updated as possible.

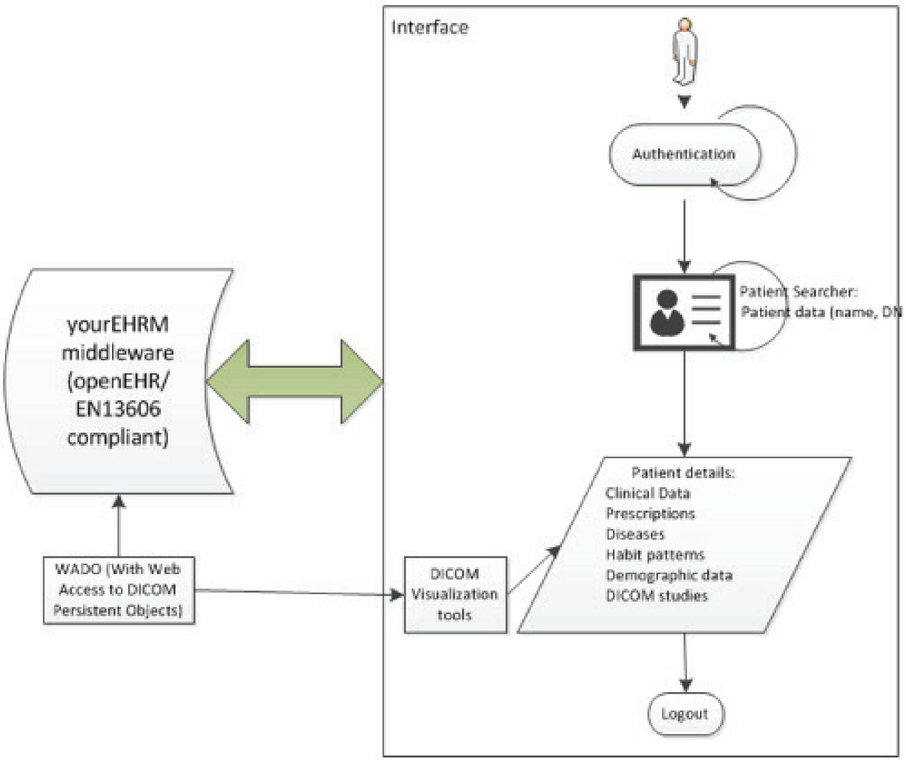

Figure 18. Querying openEHR data workflow.

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The objective of the Internal analysis and reporting AdCoS is (1) to access the patient data for statistical analysis of pathologies and (2) to generate patient clinical reports based on data coming from heterogeneous and fragmented healthcare information systems.

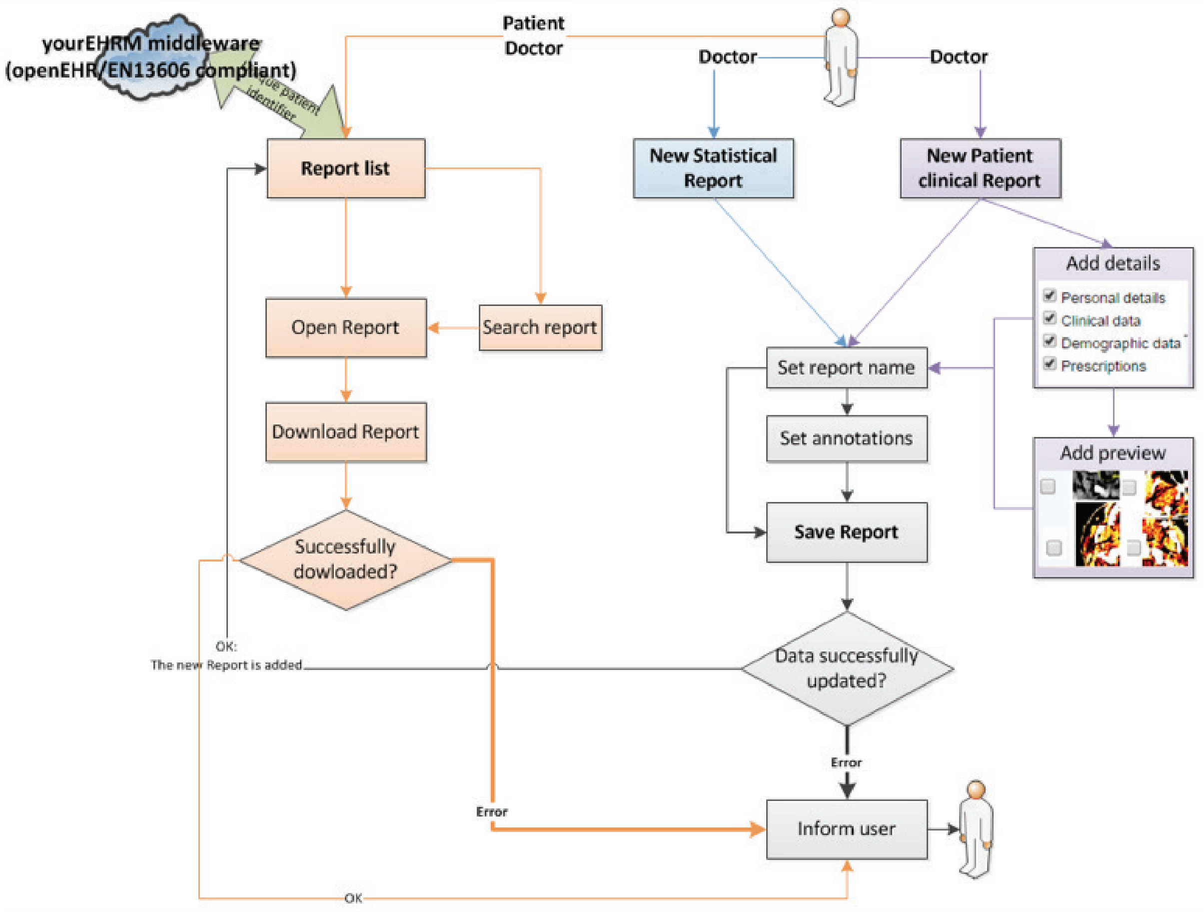

Figure 19. Internal Statistical Report and Patient clinical Report workflow

Internal statistical report allows analysing possible causes that has brought a certain patient to the hospital by comparing and analysing data with other patients in order to avoid possible future illness.

Besides the predictive report, the AdCoS permits to generate custom patient reports in order to provide a general overview of his/her health status. This report includes clinical patient data, Magnetic Resonance Imaging (MRI), Lab Tests, prescriptions, etc., and any EHR data considered by the professional.

The Diversion Assistant AdCoS (DivA)

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The Diversion Assistant AdCoS (DivA) is the Honeywell demonstrator for the Aeronautics domain. DivA is a system that monitors and integrates different sources of information that are needed for the diversion operations. Using an intuitive HMI, DivA provides the pilot with an overview of the current situation which is relevant to land at airports within reach and to perform the correct maneuvering. In case the situation requires the diversion from the planned route, DivA adaptively shows a prioritized list of available airports.

Figure 20. Diversion assistant provides guidance for selecting an alternate airport based on analysis of up-to-date information

The en-route diversion is an example of sudden change of a calm flight into a complex maneuvering when sophisticated decisions on incomplete information must be made in a short time. Pilot must identify airports around current aircraft location and estimate which of the airports is the most suitable for immediate or short-term landing. The suitability of airports depends of the overall situation – weather conditions, traffic or services available at the airport, as well as on the reasons for the diversion – passenger medical issue or aircraft malfunction. The decision that pilot makes affects the safety of landing and also costs to airline associated with the diversion.
In current practice, some airlines have dispatching centers that solve the situation for pilots, but other airlines rely merely on pilots' ability to solve the situation in the air. In the latter case, pilots must put together various pieces of information – updated status of infrastructure at considered airports, weather situation and its evolution, aircraft status and also rules and prescription of the airline. These pieces are

available in form of paper charts or manuals, electronic documents and indicators displaced across the cockpit. The manual look-up and integration of information from all these sources is time consuming and also error-prone. Indeed numerous incidents are reported with respect to sub-optimal decision pilots made when solving the diversion.

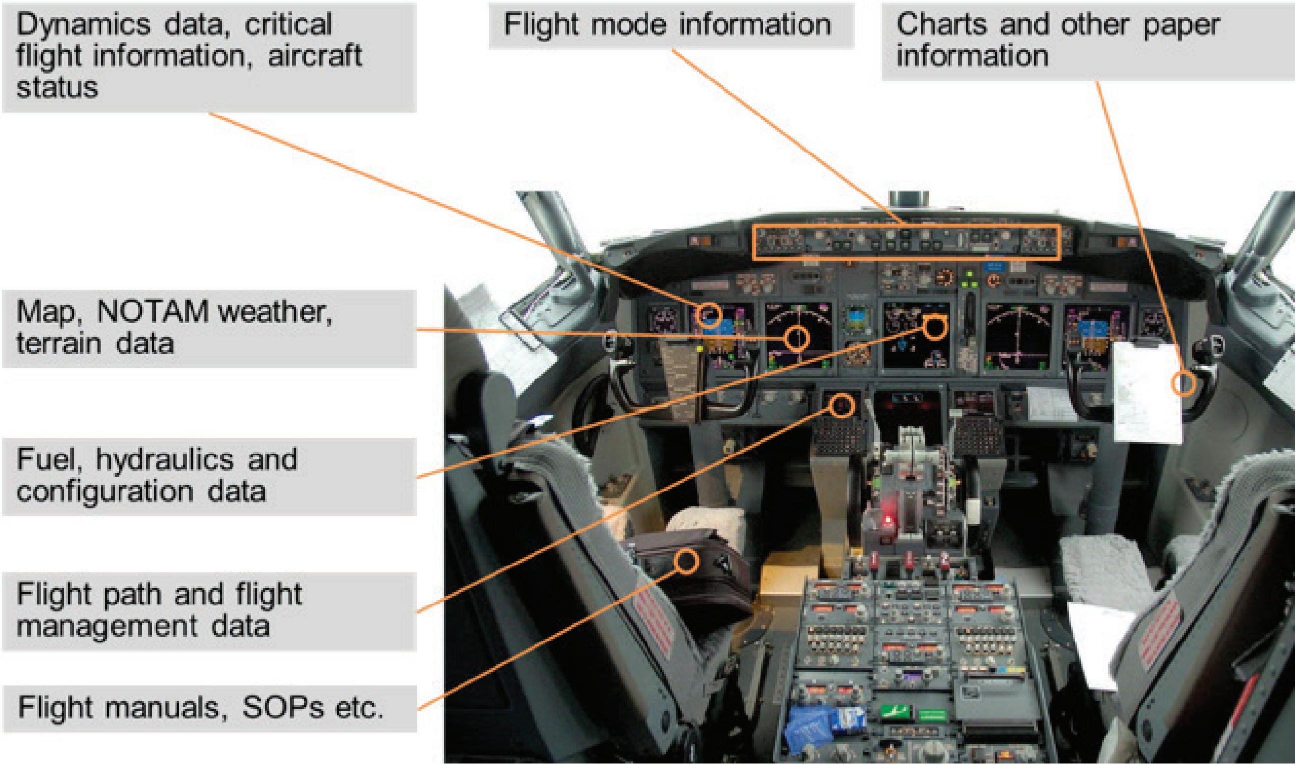

Figure 21: In current practice, pilots are left to build their understanding of situation by integrating various pieces of information spread across the cockpit

In HoliDes, we analyzed the latest developments in digitalization of Aeronautics information and we created a system, the Diversion Assistant, that can recursively update all relevant pieces of information and create a precise and up-to-date situation model for all airports within a specified distance from the aircraft. With the situation model, the Diversion Assistant evaluates the airports and prioritizes them with respect to ease of access, suitability for landing and availability of services. Applying the best human-factors practices as identified in HoliDes, the HMI for the Diversion Assistant was designed for the pilot in order to provide on one hand a fast orientation in the situation, and on the other hand also a deep understanding of what is behind the scenes. The two contradictory aspects are enabled by smart hierarchical structure of information and its graphical depiction.

Figure 22: diversion assistant provides quick situation overview and via a simple interaction also a detailed insight in the situation

With the help of partners in the HoliDes project, we looked at the ambitious technologies that monitor and infer the cognitive state of human operators. Using the cognitive state knowledge as one of the inputs to the prioritization algorithm of the Diversion Assistant, the system is able to adaptively react to an increasing workload during the diversion by the adjustment of priorities and information content presented to the pilot. At the same time, pilot's behavior is evaluated to assure compliance to regulations.

Diversion assistant supports pilots in the following use-cases:

1. During flight preparation, the Diversion Assistant allows pilot to split the flight plan in segments and guides the pilot in pre-selecting the optimal alternate airport in each segment. Already in this phase of flight, the Diversion Assistant helps pilots to create a correct overall picture of situation with respect to potential diversion.
2. During flight, the Diversion Assistant supports decision making of pilots in the event of diversion. The Diversion Assistant updates information, verifies validity of pre-selected airport and in case of changes it communicates to pilots what the best course of actions to take.
3. While pilot works with the Diversion Assistant, a tool created by Brno Technical University monitors the pilot behavior using a face and gaze angle detection in a real-time video recording. The tool communicates with aircraft module and prevents pilot from missing an important event in the cockpit while pilot is working with Diversion assistant on a dedicated portable device.
4. In cooperation with partners from Centro Scienza Nuova, Tecnalia and TWT, we investigated possibilities to use physiological data, such as EEG and eye characteristics, to estimate level of workload and distraction during activities in an aircraft cockpit. Subject-related classifiers were developed and were demonstrated the ability to distinguish between low, medium and high workload/ distraction situations.

Figure 23: Application of physiological signals such as EEG was demonstrated in the cockpit as capable to monitor pilot's workload

The HoliDes Final Event will be hosted by Airbus Defence and Space in Friedrichshafen, Germany on Thursday, September, 29th.
The public event will feature an interactive mix of keynotes (there will be Prof. Klaus Bengler from the Technical University of Munich and Felix Mehler, from Airbus Defence and Space, Vice President and Head of Engineering), a discussion panel about the future of Human Factors in System Engineering, guided tours through our exhibition of the project results, and includes time for discussion and networking in the sight of the beautiful Lake Constance. You will be able to get insights about our application of Human Factors MTT for Healthcare, learn about assistance system development methods, techniques, tools and simulations in the Automotive and Aeronautics domain and can experience how Human Machine Systems of a Control Room benefit from our project results.
In the following, highlights about what we are going to show there are presented.
If you are willing to participate, please contact **final-event@holides.eu**

HF – RTP: the HoliDes Platform Builder

Contact | Ignacio Gonzalez Fernandez, Atos, ignacio.gonzalezf@atos.net

As presented in Section 1 of this newsletter number, the Platform Builder application helps system engineers and developers who want to apply Human Factors methods within the system engineering process. During the exhibition session of the final event, you will see the Platform Builder in action for the creation of an instance of the HF-RTP (Human Factors Reference Technology Platform), according to specified design needs.

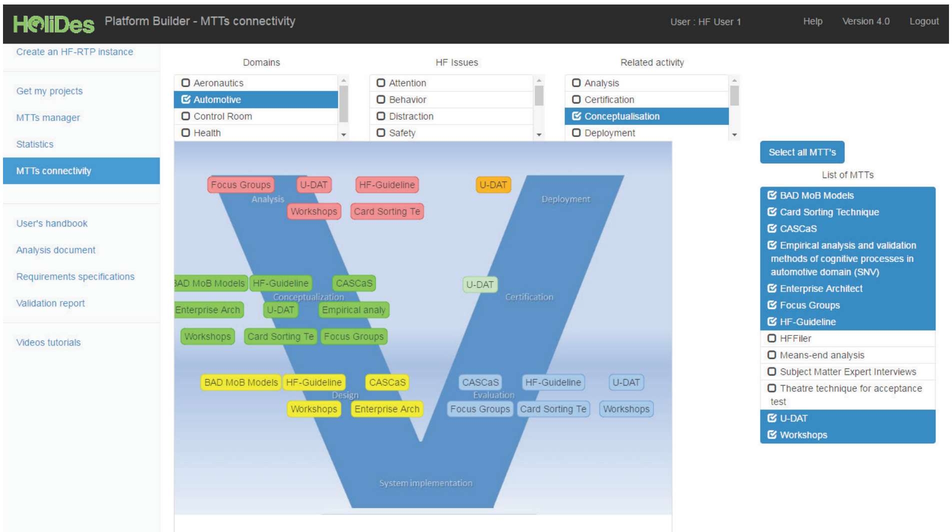

Figure 24. Platform Builder in action: MTTs mapped onto the V model

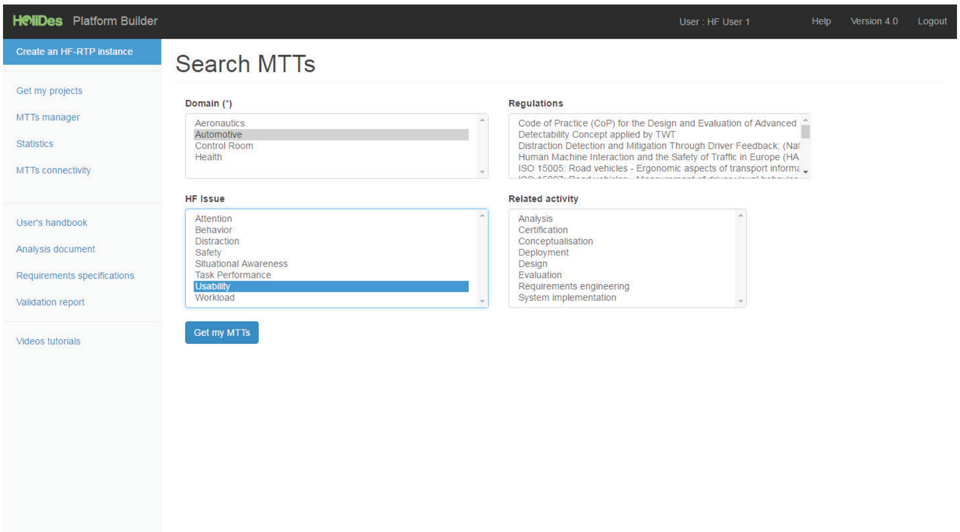

Figure 25. Platform Builder in action: creation of an HF-RTP instance according to the specification of the design needs

Aeronautics: the Diversion Assistant AdCoS

Contact | Zdenek Moravek, Honeywell, Zdenek.Moravek@Honeywell.com

The Diversion Assistant AdCoS (DivA) is the Honeywell demonstrator for the Aeronautics domain, presented in Section 3 of this number of the HoliDes newsletter. DivA provides the pilot with an overview of the current situation which is relevant to land at airports within reach and to perform the correct maneuvering. In case the situation requires the diversion from the planned route, DivA adaptively shows a prioritized list of available airports. The DivA AdCoS has been realized exploiting a set of MTTs realized with the collaboration of the other project partners within the HoliDes project, such as the Experiment Data Archive and the Missed Event Detector (MED). For example, the MED tool analyzes the video recording of pilot's face and gaze to detect the area where pilot is looking and to understand if he is missing some messages provided by the HMI: by this way, the adaptation of the system can be triggered, allowing the system to mitigate potentially risky situations when the pilot could miss an important information.

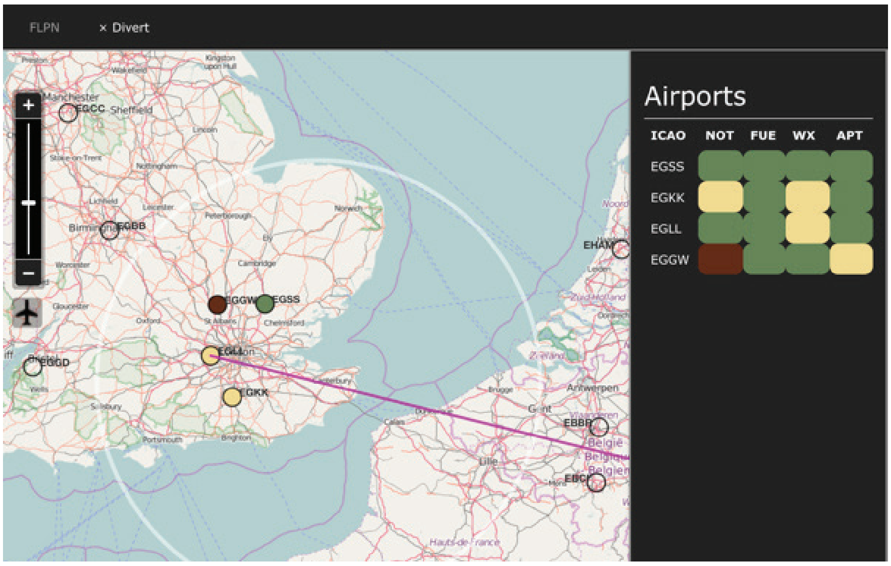

Figure 26. Details of the HMI of the DiVa AdCoS

Control Room: the Border Security AdCoS

Contact | Martin Böcker, Airbus Defence and Space, martin.boecker@airbus.com

The Border Security Control Room AdCoS of Airbus in Friedrichshafen employs the combination of novel proximity-based interaction technologies and adaptive support functionalities in order to increase the effectiveness and efficiency of emergency response operations. The AdCoS is able to identify the absence of operators from their workplace, their level of fatigue and workload in order to better adapt the distribution of the control tasks, regular and observable operators' behaviour patterns that can be exploited by perpetrators for scheduling illegal activities.
Read more: HoliDes newsletter vol.3 (www.holides.eu)

Figure 27. The Border Security Control Room AdCoS

Control Room: the Energy Network AdCoS

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Elisa Landini, RE:Lab, elisa.landini@re-lab.it

The AdCoS developed in HoliDes by Iren and RE:Lab for the Energy Network Control Room focused on the communication between the energy network control room operator and the operational teams in the field managing the emergency response operations. The AdCoS has been designed taking the HF issues into consideration into the development process since the very beginning and includes: a Server with the Decision Algorithm for the automatic selection of the most appropriate technician for each intervention; an Android app for the technicians in the field, installed on several mobile devices (tablets/mobile phones); an HMI application for the control room operators. The resulting system will be shown in action during the demo for the HoliDes final event.
Read more: HoliDes newsletter vol.3 (www.holides.eu)

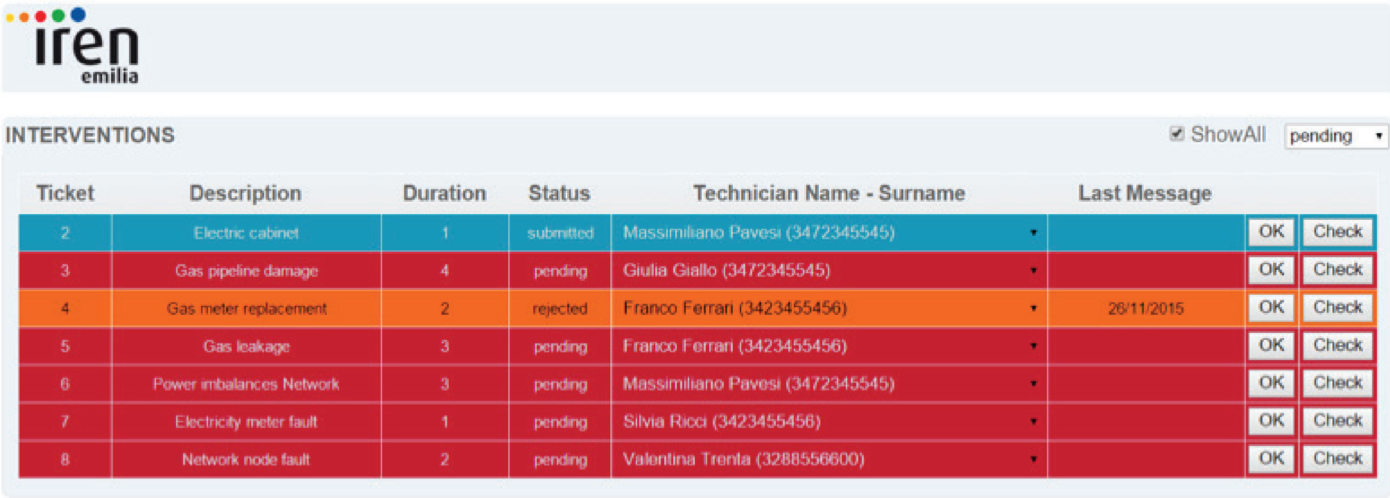

Figure 28. The Energy Network Control Room AdCoS: detail of the HMI for the adapted selection of the technician to whom assign the emergency response task

Figure 29. The Energy Network Control Room AdCoS: details about the mobile app for the technicians in the field

Automotive: the Adaptive Assistance AdCoS

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Elisa Landini, RE:Lab, elisa.landini@re-lab.it

The AdCoS presented by Centro Ricerche Fiat and RE:Lab is named Adaptive Assistance and it focuses on the Lane-Change Assistant (LCA) application. In particular, LCA supports the driver in the lane-change and overtaking scenarios, as well as in the longitudinal driving task (forward collision warning). The core of the system is the co-pilot tool, which is an intelligent driver model, able to understand and predict the external situation, in order to assist the human driver as a trip-mate. This artificial agent can adapt its level of support based on driver's status (e.g., recognizing if the driver is distracted or not) and on driver's intentions (e.g., predicting if the driver aims at changing lane to overtake a slower vehicle ahead). In addition, the co-pilot can cooperate with human agent by means of a dedicated HMI, where the previous human factors are taken into consideration using a distributed modality to provide the appropriate information and support to the humans.
Read more: HoliDes newsletter vol.2 (www.holides.eu)

Figure 30. The Adapted Assistance AdCoS in a simulation environment

Automotive: the Adapted Automation AdCoS

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For the final HoliDes event the AdCoS Adapted Automation will be on display. The vehicle has been developed for highly automated driving on highways by Ibeo. Two subsystems provided by partners have been implemented in the vehicle to address human factors issues in vehicle automation. At first, a driving style classifier has been developed by DLR to estimate the preferred driving style of the individual human during periods of manual driving. The driving behaviour of the automation is then adapted in real-time to meet the preferences of the human driver and thus increase the acceptance and the trust in the automated system. Secondly, a cognitive distraction classifier has been developed by TWT, employing i.e. facial video data and behavioural data. This system detects the level of cognitive distraction of the driver, which can be used to trigger a warning system, or adapt the automation style to when the driver is not sufficiently attending the traffic situation.
Read more: HoliDes newsletter vol.2 (www.holides.eu)

Figure 31. The Adapted Automation AdCoS to be shown @ HoliDes Final Event

Health

The Health AdCoS that will be shown at the HoliDes Final Event in Friedrichshafen have been presented in the newsletter so far and deals with:

- 3D Acquisition
- Robust ECG Triggering
- Guided Patient Positioning
- Operator Task Scheduling & Guidance
- Quering Open Electronic Health Record Data
- Safe Parallel Transmit Scanning
- Internal analysis and reporting

See you in Friedrichshafen!