ARTEMIS Call 2012 Project
332933

HoliDes

Holistic Human Factors and System Design of Adaptive Cooperative Human-Machine Systems

EXECUTIVE *summary*

HoliDes addresses development and qualification of Adaptive Cooperative Human-Machine Systems (AdCoS) where many humans and many machines act together, cooperatively, in a highly adaptive way to guarantee fluent and cooperative task achievement. The objective is to develop processes, techniques and software tools that enable development and qualification AdCoS.

CONTRIBUTION *to SRA*

HoliDes will contribute to close the design productivity gap between potential and capability by:

1. reducing the cost of System Development in particular compliance with human factors and safety,
2. reducing needed development cycles when applied to innovative and ambitious AdCoS,
3. fostering Embedded Systems for AdCoS that are reusable in different safety critical domains.

The project will investigate new ways to pro-actively communicate system adaptations to human operators by keeping them sufficiently in the loop based on the operators' situational load and capacities. We will design innovative AdCoS in four domains: Health, Aeronautics, Control Rooms and Automotive.

MARKET INNOVATION *& impact*

HoliDes will

1. promote a wider and most effective **industrial competiveness**, by striving to maintain the European leading edge position in the Transportation, Control Room and Health markets against US and Far East competition. HoliDes will boost cost efficiency of highly innovative adaptive cooperative human-machine system solutions involving several interactive Embedded Systems.
2. address and improve **sustainability**, by enhancing efficiency and effectiveness of future Transportation, Control Room and Health systems. Efficiency in the Transportation domain will improve energy management resulting in reduced fuel consumption.
3. enable emergence of **new markets** that address societal challenges by enabling new adaptive functionality and by enlarging the user groups of automated technology.

RELEVANCE & CONTRIBUTIONS *to Call 2012*

HoliDes is positioned within the Sub-Programme N°8 of the Call ("Human-centric design of embedded systems") and will:

- **Enhance the safety and confidence of users and the public** by considering human operator needs during Embedded System development of systems with many men and many machines. The HoliDes technology will support the entire engineering life-cycle, in particular in early phases. This will help minimizing the danger of human operator workload peaks, restricted situation awareness and conflicts between humans and machines and will thus increase safety.
- **Increase the automation of tasks** by developing techniques and tools for implementing adaptation in cooperative human-machine systems that will enable to build systems and tasks with increased levels of adaptive automation that (progressively in real-time) shift control from the humans to the technical systems and back with respect to contextual factors including the capacity and load of human operators (based on real-time measurements of e.g. human operator behaviour, intentions and state).
- **Contribute to the fulfilment of the user centred and technical objectives by providing open innovation environment.** Therefore, the HoliDes partners will integrate their techniques and tools into a new Human Factors Reference Technology Platform (HF-RTP) that is closely linked to the CESAR RTP to enable interoperability. The HF-RTP will be complemented with a new methodology, which supports human-centred development of AdCoS. The combination of the HF-RTP and CESAR RTP will enable holistic development of AdCoS both, from the human factors and technical perspectives. The HF-RTP and methodology will be developed as an open innovation environment to support continuous technology transfer from research to the industry.

R&D INNOVATION *and technical excellence*

HoliDes will offer a combined model-based and empirical approach to the development and qualification of AdCoS, which will significantly ease compliance to human-factor and safety regulations, and will allow to realize adaptation strategies in a transparent, fluent, explicit and controllable way.

Expected results include:

1. **A methodology to facilitate development & qualification of AdCoS against regulations** to formalize and extend the informal descriptions of human factors and safety standards, guidelines and best practices highlighting commonalities between Health, Aeronautics, Control Rooms, Automotive.
2. **Empirical analysis of AdCoS** to advance empirical techniques to support management of the huge number of evaluation scenarios and to cope with the increased dynamic progression of every individual scenario produced by the adaptiveness of AdCoS.
3. **Adaptation on a global & local level** to provide new real-time measurements of the external and internal ACOS context and new reusable algorithms for re-configuration of tightly interconnected global and local AdCoS levels.
4. **A Human Factors Reference Technology Platform (HF-RTP)**, which integrates all techniques and tools allowing full interoperability across the whole industrial development and qualification life cycle in a holistic way taking into account multiple human factor views as well as multiple technical views.
5. **Applications for AdCoS** that demonstrate adaptations in these systems, which comply with human factors and safety regulations, have been developed and assessed using our techniques and software tools, and are integrated in the HF-RTP.

PROJECT *partners*

AIRBUS DEFENCE & SPACE, ibeo, Honeywell, TRUESTREAM AEROSPACE HUMAN FACTORS, TWT GmbH Science & Innovation, Ergoneers Ergonomic Engineers, PHILIPS sense and simplicity, AnyWi TECHNOLOGIES, ENAC, TAKATA, DLR, BRNO UNIVERSITY OF TECHNOLOGY, AIRBUS GROUP, AIRBUS DEFENCE & SPACE, UMC, CIVITEC, INTEMPORA, OFFIS, CRF CENTRO RICERCHE FIAT, AIRBUS DEFENCE & SPACE, Human Factors Consult, AIRBUS GROUP, UNIVERSITÀ DEGLI STUDI DI TORINO, UNIVERSITÀ DEGLI STUDI SUOR ORSOLA BENINCASA, Atos, INTEGRASYS, tecnalia Corporación Tecnológica, IFSTTAR, RE:Lab, iren

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HoliDes
HOLISTIC HUMAN FACTORS AND SYSTEM DESIGN OF ADAPTIVE COOPERATIVE HUMAN-MACHINE SYSTEMS

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WEBSITE
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START
October 2013

DURATION
36 months

TOTAL INVESTMENT
€23.28 M

PARTICIPATING ORGANISATIONS
31

NUMBER OF COUNTRIES
7