HoliDes

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

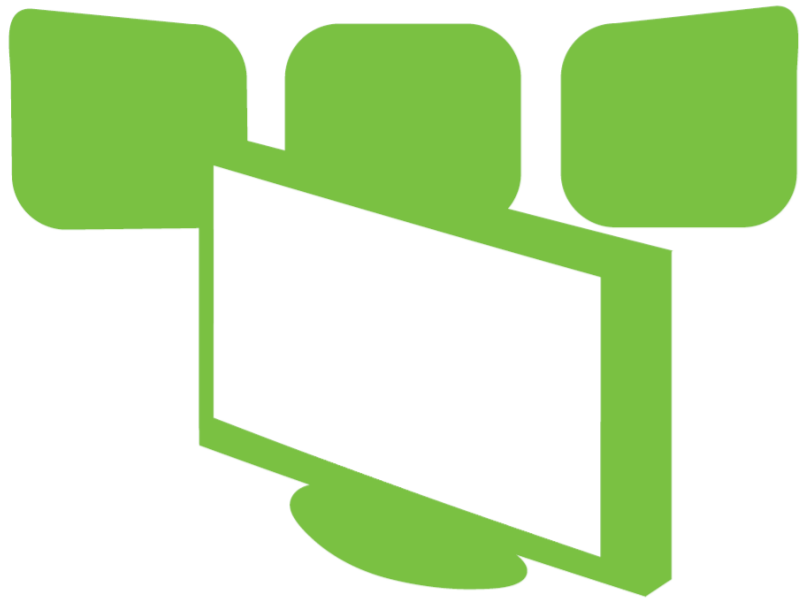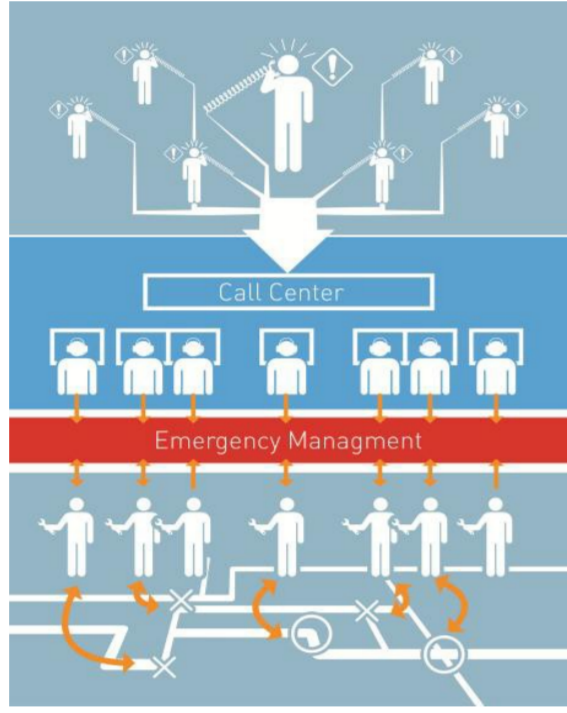# WP8: Control Room Domain Energy Control Room

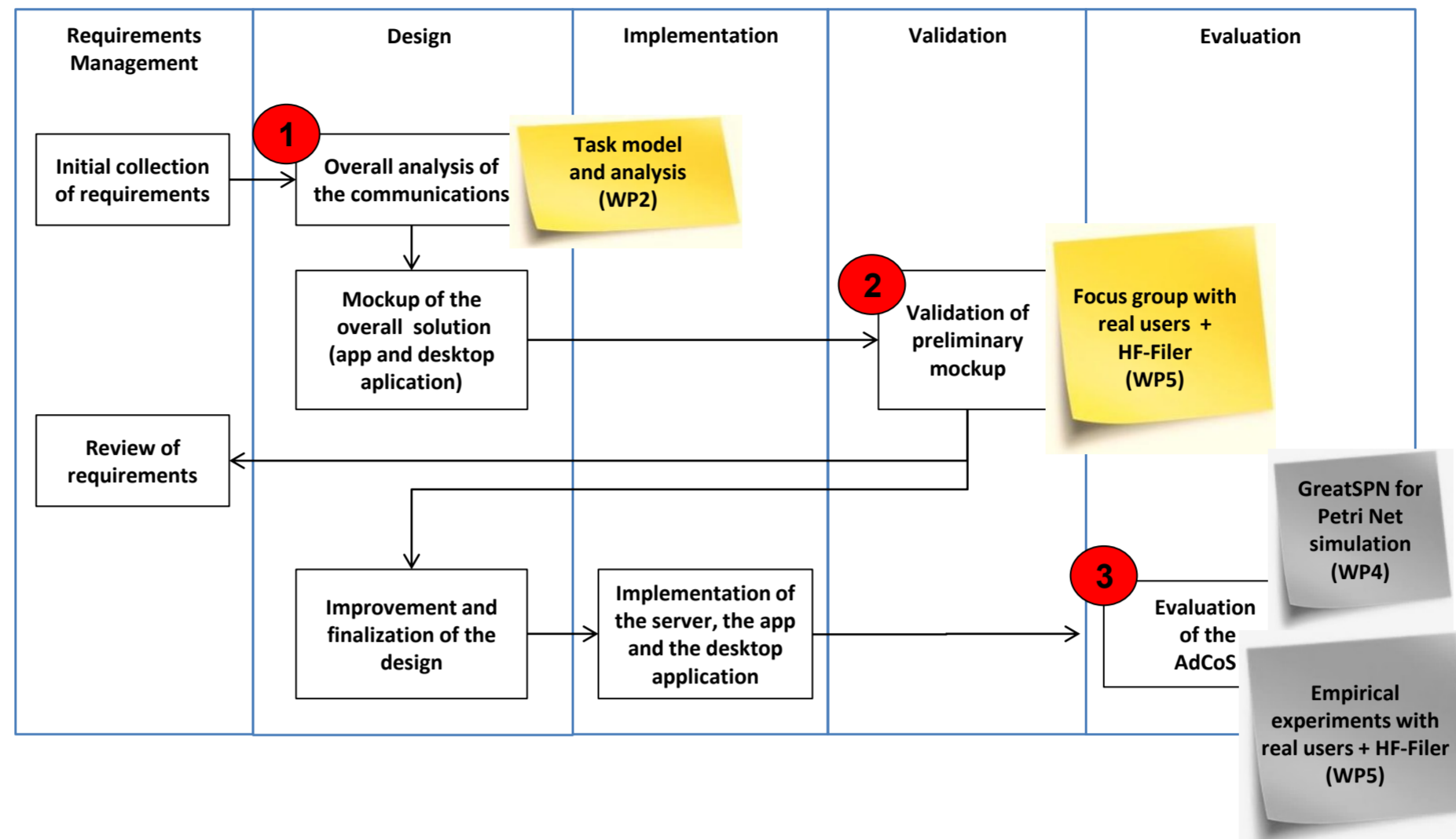**ARTEMIS**

Domain

Motivation

- The Control Room of IRN collects energy emergency requests and assigns the interventions to the techni-cians in the field.

- At present, **IRN does not use any adaptive system** to allocate tasks to available operational teams in the field.

- The communication between the Control Room operators and the operative teams takes place only via **phone calls** (very time-demanding) and the allocation of tasks and responsibilities is based on the **senior experience** of Control Room operators.

Applied MTTs

WP2 — Task Analysis
WP3
WP1 HF-RTP
HF-Filer
Focus Group and Empirical Evaluation — WP5
Great SPN — WP4

Current State: Tailored HF-RTP

Requirements Management | Design | Implementation | Validation | Evaluation

1. Initial collection of requirements → Overall analysis of the communications — Task model and analysis (WP2)
2. Validation of preliminary mockup — Focus group with real users + HF-Filer (WP5)
3. Evaluation of the AdCoS — GreatSPN for Petri Net simulation (WP4); Empirical experiments with real users + HF-Filer (WP5)

In the 2nd year we used the task modelling and analysis provided by WP2 to identify the tasks to be automated and to estimate the potential improvements of the automation.

By using this analysis, we defined a preliminary solution, where we mainly focused on the **automation** (i.e. how to optimize the resource allocation – the technicians in the field).

We tested the preliminary AdCoS with real operators and technicians in a **Focus Group** (in collaboration with SNV - WP5).

The operators of the Control Room raised concerns about the automation ("**How can I trust the decision-making process of the system?**")

Therefore, the HMI concept has been improved by including features that cope with the **sharing of authority** issue, to share knowledge and increase trust in automation.

The design of the Focus Group, as well as the results, have been recorder by using the HF-Filer developed by AWI (WP5).

**In the 3rd year** we plan to evaluate the performance of the AdCoS by applying

a **model-based approach:** a simulation with the GreatSPN – developed by UTO in WP4 – to show how the AdCoS behaves in case a great number of emergency interventions are expected

an **empirical approach:** an experiment with real operators and technicians – designed by SNV in WP5 - to measure the performances of the Control Room with and without the AdCoS

Results

Development of a **fully functional prototype** that automates the selec-tion of the most approp-riate technicians for each intervention and facilitate the communication bet-ween the Control Room operators and the technicians.

The AdCoS adapts in real-time to the context (shifts, localization of the technicians, assignment of other interventions, etc..) in order to optimize the allocation of the resources.

Graphical schema that represents the compo-nents of the AdCoS (HMI for the Control Room op-erator, Server with the decision algorithm, data base, HMI for the technicians).
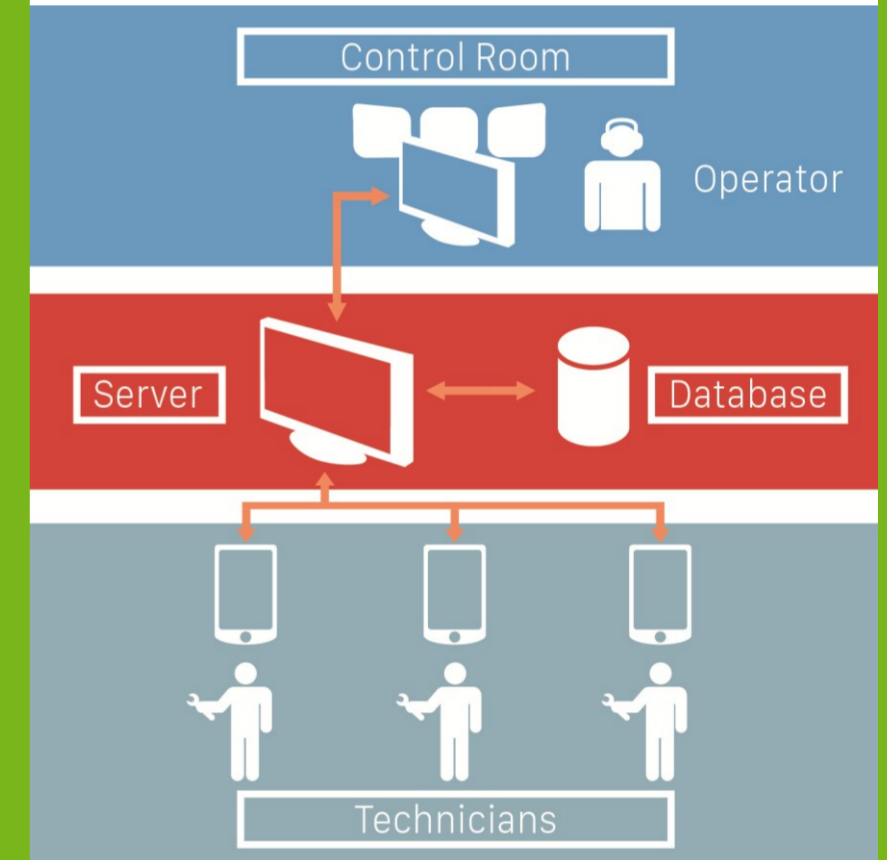
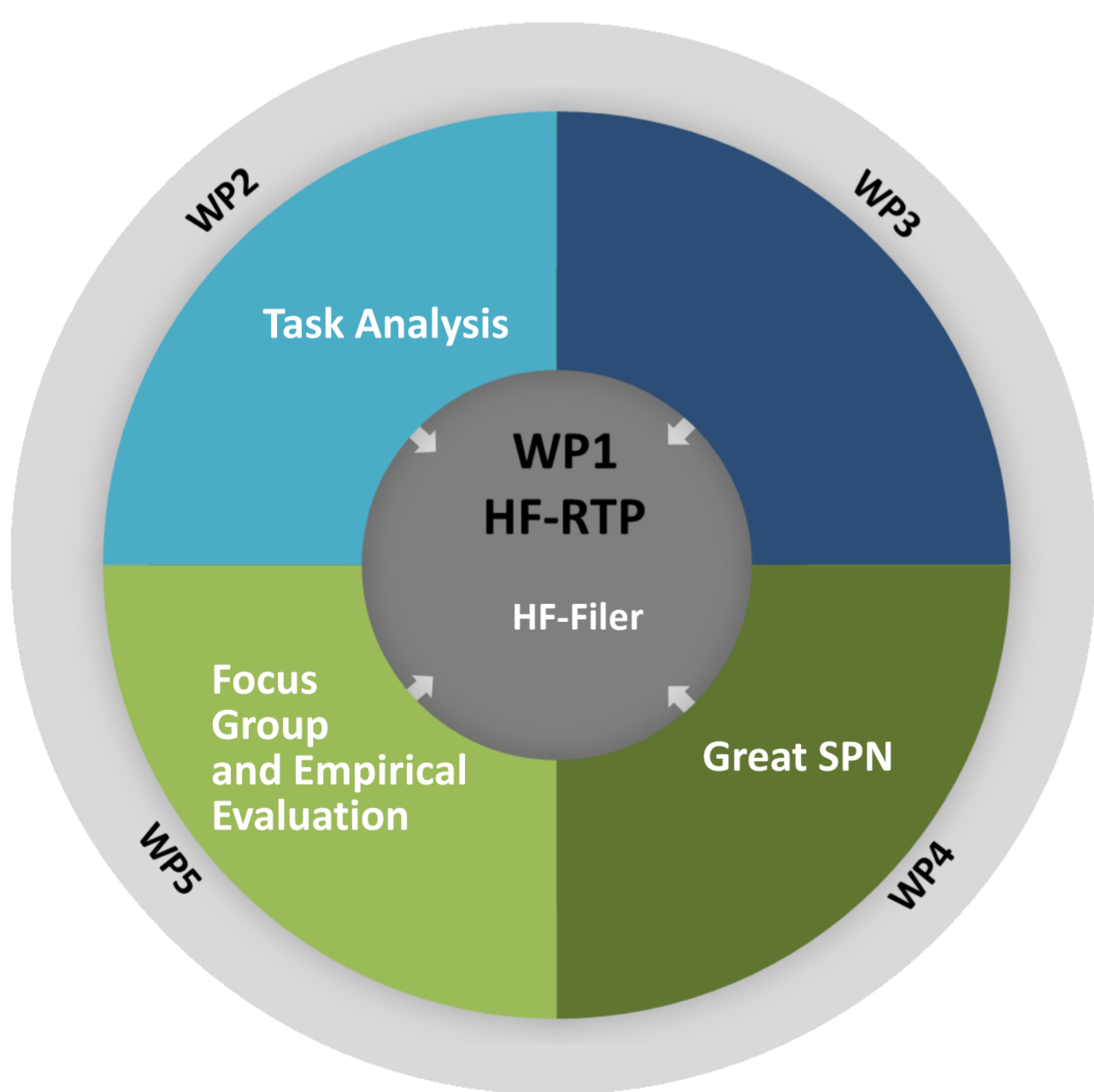Using the task analysis we could estimate the improvements brought of the AdCoS:
- Optimization of the workflow, reducing the number of subtask for each task and in some cases to unify some tasks **(-35%)**
- Introduction of fully automated tasks **(+35%)** with a con-sistent reduction of manual tasks **(-77%)**
- Reduction of tasks that require a communi-cation by phone **(-81%)**

Contact

RE:Lab s.r.l.
Via Augusto Tamburini 5
Reggio Emilia

Elisa Landini
elisa.landini@re-lab.it
Research and Project Design

Consortium

OFFIS INSTITUTE FOR INFORMATION TECHNOLOGY · Atos · TAKATA · Honeywell · AIRBUS DEFENCE & SPACE · CRF CENTRO RICERCHE FIAT · CIVITEC · AnyWi · Ergoneers · Human Factors Consult · ibeo · IFSTTAR · INTEGRASYS · INTEMPORA · iren · Lufthansa · AIRBUS GROUP · RE:Lab · UNIVERSITÀ DEGLI STUDI SUOR ORSOLA BENINCASA · tecnalia · PHILIPS sense and simplicity · TWT · ENAC · TRUESTREAM · UNIVERSITÀ DEGLI STUDI DI TORINO

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