Development of digital ‘Mission Planning Support’ tool

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The assignment involves the development of a Mission Planning Support (MPS) tool that will be used for mission planning on board of navy ships. The assignment is for Thales Nederland B.V., a part of the Thales Group specializing in high-tech systems for defence, transport, and security industries. Thales’ aim is to develop a Combat Management System that will be sold to navies worldwide. To remain competitive, they are continuously looking for new extensions to the system and to enable their customers and end users to do their work as best as possible. The MPS tool could become an additional capability that can be offered to their customers. Therefore, Thales's Human Factors research team and development team are tasked with designing the MPS tool to enhance naval Command Teams' efficiency during tactical mission planning by developing from the end-user’s perspective and developing a product that makes their daily work easier.

The project's focus is on the end-user, the Commander Task Group (CTG) and his command team, and their needs during an Anti-Subsurface warfare (ASW) use case by mapping the task flow of the end-user and visualizing components (van Maurik, 2022; Ministry of Defense, 2014). Therefore, the following main question is formulated.

What kind of interactions and visualization components of the digital MPS tool will best support the task flow of the CTG and his command team in the ASW use case?

The approach involves problems- and needs-detecting, intervention-orientation, and solutions-orientation. Stakeholder analysis and mapping of end-user task flow are conducted to identify problems and needs (Ministry of Defence, 2014). Literature research on the M-OODA loop (Richards, 2020; Rousseau & Breton, 2004), Dynamic Decision-Making (Brehmer, 1992; Gonzalez, 2005), Situational Awareness (Endsley, 2000) and decision support, provides background information. Subject Matter Experts, including those with UX design, industrial design, cognitive psychology, software development, and naval operational experience, contribute valuable insights. Next to that, the six relatable tools ArcGIS by Esri, C2 and ISR by Tacteris, Cesium, Collaborative combat by ATOS and Gotham by Palantir are analysed for inspiration with a focus on timeline and geographical visualizations and feedforward advice. Concept requirements are set based on user needs, and concept development is carried out on operational, interactional, and representational design levels (Benyon, 2019).

During concept development, two visual and two wireframe concepts focused on the component 'Position Group' and the fisheye view visual 'Vulnerability' are made and reviewed during alfa-testing (Yamamoto, 2018). The three focus points that emerge from this review are user-set constraints, Key Performance Indicators (KPIs) for options, and different task flows for proactive and reactive scenarios. Final concept development is done with the insights of the alfa-testing and by combining certain aspects of the wireframes and the visuals.

The Naval Design System guidelines of Thales are implemented in the final concept wireframe that is developed in Adobe XD. The final concept supports the end-users task flow for a what-if scenario detection probability and a trigger scenario response on a possible submarine datum point. For the trigger scenario, the user can define the goal and set constraints and optimization factors. The tool gives the user KPI-based options and visualizes the predicted outcomes with feedforward control.

The final concept is subject to beta-testing with an operational expert providing feedback for further refinement. Future improvements involve addressing specific issues such as scrolling through time in

what-if scenarios and exploring additional use cases, also in the Anti-Air Warfare and Anti-Surface Warfare field. The next steps in the MPS tool development include deeper elaboration of components and working out details. For the concept's productization, there should be an exploration of how the MPS components can be enhanced.

In conclusion, the MPS tool aims to support the CTG and his command team in the Decision-Making M-OODA loop, offering components for situation understanding, prediction, and recommendations. The recommended interactions and visualization components focus on user-set constraints, KPI-based options, and differentiated task flows.

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