Promoting safety and productivity of control rooms

Services for in-depth control room life-cycle management

Control rooms are easily a source of despair and frustration: If the control room becomes obsolete, productivity and safety losses emerge; if the utility races to keep up with technology and upgrades it, project delays and budget overruns become certainly familiar. But do not lose sleep over control rooms. VTT has put 30 years of human factors experience into practice and developed an integrated approach to control room life-cycle management which is cost-effective, punctual and of high quality. It includes tools and methods to tackle challenges related to each critical stage of the upgrade process – from the strategic planning phase through management of Human Factors Engineering activities at the design phase to multistage verification and validation of implemented control room systems at simulators and systematic processing of validation data.

VTT’s approach in the nuclear domain

VTT supports safe and efficient use of nuclear fission power including nuclear waste management by developing, validating and applying experimental and theoretical methods and tools. For example, in the domain of automation and control room design, we help our partners achieve safety, productivity and well-being by providing tools and methods for systematic and efficient design, verification, validation and monitoring processes. Our approach integrates the technical, psychological and organisational aspects of systems development. We enable our customers to achieve improvements in system quality, environmental friendliness, occupational well-being and user experience.

VTT’s services for managing complexity in socio-technical systems

VTT provides services to take care of human control, safety and sustainability in the design and development of complex systems. VTT approach requires interplay of three kinds of research, design, and innovation activities: empirical research to understand current situation in the system; analytical modelling to abstract and simulate alternative development paths; and participatory development accomplished through interventions in which the actors gain understanding of the potential future and are then empowered to make decisions to carry out transformations. Specifically, VTT develops the systems life-cycle processes for customers to enable traceable flow of data from requirements to all consequent phases of design. Human Factors Engineering provides methods which ensure that human role in systems design is taken into account sufficiently to reach the objectives of safety, productivity, and well-being.
The VTT offering

Development of control room upgrade strategy
- Development of strategies, visions and migration paths for control room modernizations
- Cost-benefit analysis of feasibility and safety of alternative modernization solutions
- Control room technology reviews and tests

Human Factors Engineering program planning and management
- Development of Human Factors Engineering program
- Support for management of Human Factors Engineering programs
- Development of Human Factors Case for systematic processing of Human Factors data

Training program development for operating personnel
- Assessment of competence development needs
- Development and implementation of training programs for control room operators and trainers

Multistage control room verification and validation
- Multistage verification and validation of control rooms
- Systematic treatment of verification and validation evidence

Reference projects

Human Factors Engineering programme development
We have constructed together with Fortum a Human Factors Engineering process model which is in accordance with the existing engineering processes and Human Factors Engineering requirements in international standards and guidelines.

Training program development
We have developed together with Fortum the existing initial training system for CR operators and developed a novel training program for simulator instructors based on Systematic Approach to Training and Change Laboratory method.

Multistage verification and validation of control rooms
We have carried out independent stepwise Human Factors Engineering validations in Fortum Loviisa control room modernization project. Recently, we evaluated the usability of accident management human-system interfaces and emergency operating procedures.

Human Factors Engineering implications of the level of control room modernization
We have reviewed the Human Factors Engineering implications of the level of the human-system interface modernization and of the migration strategy for the possible modernization of the control room. The results have been analysed and synthesized to obtain an overall view of the prospects and limitations of different modernization levels and strategies.

Justifications for the minimum level of manning for control rooms
We have provided justifications for the minimum level of manning for control rooms by studying the operation of plant systems performed by a minimum crew.