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Author: Dr. Eva Hoschlova
Faculty of Arts, Charles University, Czech Republic

Dr. Radvan Bahbounh
QEDGROUP Ltd, Czech Republic
Mr. Michal Hužva
Faculty of Arts, Charles University, Czech Republic
Mrs. Eva Chroustova
Charles University, Czech Republic
Dr. Katerina Bernardova Sykorova
Czech Republic

MEASUREMENT AND ANALYSIS OF THE STRUCTURE AND DYNAMICS OF CREW
COMMUNICATION CONCERNING ITS QUANTITY AND QUALITY IN THREE STAGES OF THE
SIRIUS EXPERIMENT

Abstract

INTRODUCTION Both the quantity and quality of communication are universal predictors of the performance of work teams and are usually considered as one of the main components guaranteeing the smooth running of missions in exposed teams. Thus, the measurement and analysis of crew communication in simulated flights serve as an important basis for implementing measures contributing to maintaining high crew performance and reliability. This paper aims to present a series of analyses of the structure and dynamics of communication in the SIRIUS 2017-2023 experiments and to compare quantitatively and qualitatively its three stages. Each of them involved a different team and each had a different total duration of isolation.

METHODS Six-person crews (three men and three women each) participated in all three stages of the SIRIUS experiment. The first stage lasted 17 days, the second stage 4 months, and the third stage 8 months. In all stages, the quantity and quality of communication were measured by assessment questionnaires using Likert scales (both frequency and qualitative-developmental). Each crew member individually assessed all of his/her colleagues, thus the data collected is relational and matrix structured. Responses were collected before, after, and during the mission at regular intervals (every two weeks). The collected data was analyzed using control charts and also using the Sociomapping method, which focuses on the analysis and visualization of relational data.

RESULTS AND DISCUSSION The study compared communication patterns both between stages and within each stage at different timeframes. A comprehensive series of results of the regulation diagrams from all the stages under study shows that the method used to measure communication is sufficiently reliable over time and at the same time sensitive to capture both sudden changes and longer-term trends in the overall quantity and quality of communication, its structure, dynamics, communication subgroups (national, gender), etc. With this complexity, the applied methodological approach brings unique insights into crew communication during the mission and offers new possibilities in the field of follow-up interventions. The experience of the SIRIUS experiment suggests that the measurement of communication does not only serve research purposes but also as a tool to focus the crew's attention on the level of their intercommunication throughout the experiment, contributing to maintaining it at an appropriate level throughout the simulated flight.