Title : **Applying Ergonomics/Human Factors Approach on Industrial Engineering Domain to improve human efficiency, productivity, and well being in Industry**

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Ergonomics and Human Factors engineering may play a key role to improve efficiency, productivity, safety, resilience and well being if applies a systemic approach to design complex production systems in industry domain considering at least 3 dimensions on ergonomics: physical, cogntive and organizational issues. Some case Brazilian case studies will described and presented specially in offshore oil industry and nuclear emergency response domain.

Offshore transportation using helicopters is a complex socio-technical system. The resilience of this system is an emergent property related to performance variability in many nested levels, e.g. pilot activities, maintenance, management systems, helicopter design and so forth. This paper examines production/safety tradeoffs in pilots' work in the helicopter transportation system for the Campos Basin oil fields in Brazil to understand the resilience and brittleness of this system.

The study team carried out and analyzed 63h of interviews with pilots, co-pilots, managers and human resources personnel of some of the main helicopter-operating companies. About 80% of the oil extracted in Brazil comes from this Basin, a 3h drive north of Rio de Janeiro city. The oil company hires nine helicopter-operating companies to transport about 40,000 people who work on ships and platforms every month. The main goal of this project is to discover how the transport system is resilient and brittle, given the workload demands and economic pressures. The analysis uncovered goal conflicts that arise at the boundaries of the organizations and how people in different roles cope with these conflicts, and their implications to overall system safety and resilience.

The second case study is related to nuclear emergency response domain. The current work presents results from a cognitive task analysis (CTA) of a nuclear disaster simulation. Audio-visual records were collected from an emergency room team composed of individuals from 26 different agencies as they responded to multiple scenarios in a simulated nuclear disaster. This simulation was part of a national emergency response training activity for a nuclear power plant located in a developing country. The objectives of this paper are to describe sources of resilience and brittleness in these activities, identify cues of potential improvements for future emergency simulations, and leveraging the resilience of the emergency response system in case of a real disaster. Multiple CTA techniques were used to gain a better understanding of the cognitive dimensions of the activity and to identify team coordination and crisis management patterns that emerged from the simulation exercises.

Our analysis found sources of resilience and brittleness related to team coordination, simulation dynamics, and crisis response activities producing a deeper understanding of cognition at work in the nuclear emergency domain. Knowing and understanding these sources of resilience and brittleness in a system is useful to better understand how and why activities are successful or unsuccessful, and factors that may compromise system performance. The results obtained through this analysis additionally suggest that areas such as workspace redesign, visual and communication technology support are areas with high potential for improvements in emer-gency response and its simulation.