THE ROLE OF HUMAN FACTORS IN SYSTEMS ENGINEERING, MUTUAL INTEREST AND EFFECTIVE CO-EXISTENCE

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**Human Factors**

"Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance."

International Ergonomic Society

http://www.iea.cc/whats/index.html [150413]
"Systems Engineering is an engineering discipline whose responsibility is creating and executing an interdisciplinary process to ensure that the customer and stakeholder's needs are satisfied in a high quality, trustworthy, cost efficient and schedule compliant manner throughout a system's entire life cycle."

http://www.incose.org/AboutSE/WhatIsSE
**WHY IS SYSTEMS ENGINEERING OF INTEREST**

**Increased complexity**

“Demands structure”

Goal:
Conscious decisions during product development
THE ROLE OF HUMAN FACTORS IN SHORT

INCOSE definition of a system:

“
A system is a construct or collection of different elements that together produce results not obtainable by the elements alone. The elements, or parts, can include people, hardware, software, facilities, policies, and documents; that is, all things required to produce systems-level results. The results include system level qualities, properties, characteristics, functions, behavior and performance. The value added by the system as a whole, beyond that contributed independently by the parts, is primarily created by the relationship among the parts; that is, how they are interconnected (Rechtin, 2000).”

“Competitive advantages accrues to firms that can bring a technology into the market place in a product that meets the customer needs efficiently and in timely manner”

1. If we are to build future systems smart we need to understand the users.

2. Human Factors = Lean
Traditional vs Future Product Development (PD)

Life cycle stages:
- Exploratory research “What to do”
- Concept “What to deliver”
- Development “How to deliver”
- Implementation “Deliver”

Future PD-perspective of Human Factors

Managing top down perspective enables LEAN.

“Technical perspective”
(Traditional PD-perspective of Human Factors)

ISO/IEC 15288:2008,
Systems engineering handbook, V 3.2.2, p25

Dubbla V-modellen från ACD²-processen (Bliigård 2015)
Example of Human Factors tool:
The method of Hierarchical Task Analysis (HTA) was developed in the 1960s. Initially, the method was developed for training in process control tasks performed in steel and petrochemical industries.

Today the HTA is used in many different contexts like for example interface design and error analysis.

Example of Systems Engineering tool:
“The need of dealing with abstraction levels”
ACTIVITY THEORY

KARLSSON, I. C. M. (1996)

Activity Theory applied by PU²B-model
ACTIVITY THEORY IN SYSTEM OF SYSTEMS

Axiomatic design (N²-matrix):
1. System context conflicts?
2. System functionality conflicts?
THANK YOU!