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My system runs perfectly without users!

Human Factors in System Engineering

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**Defense****Aerospace****Transportation****Security****Space****THALES**



Users

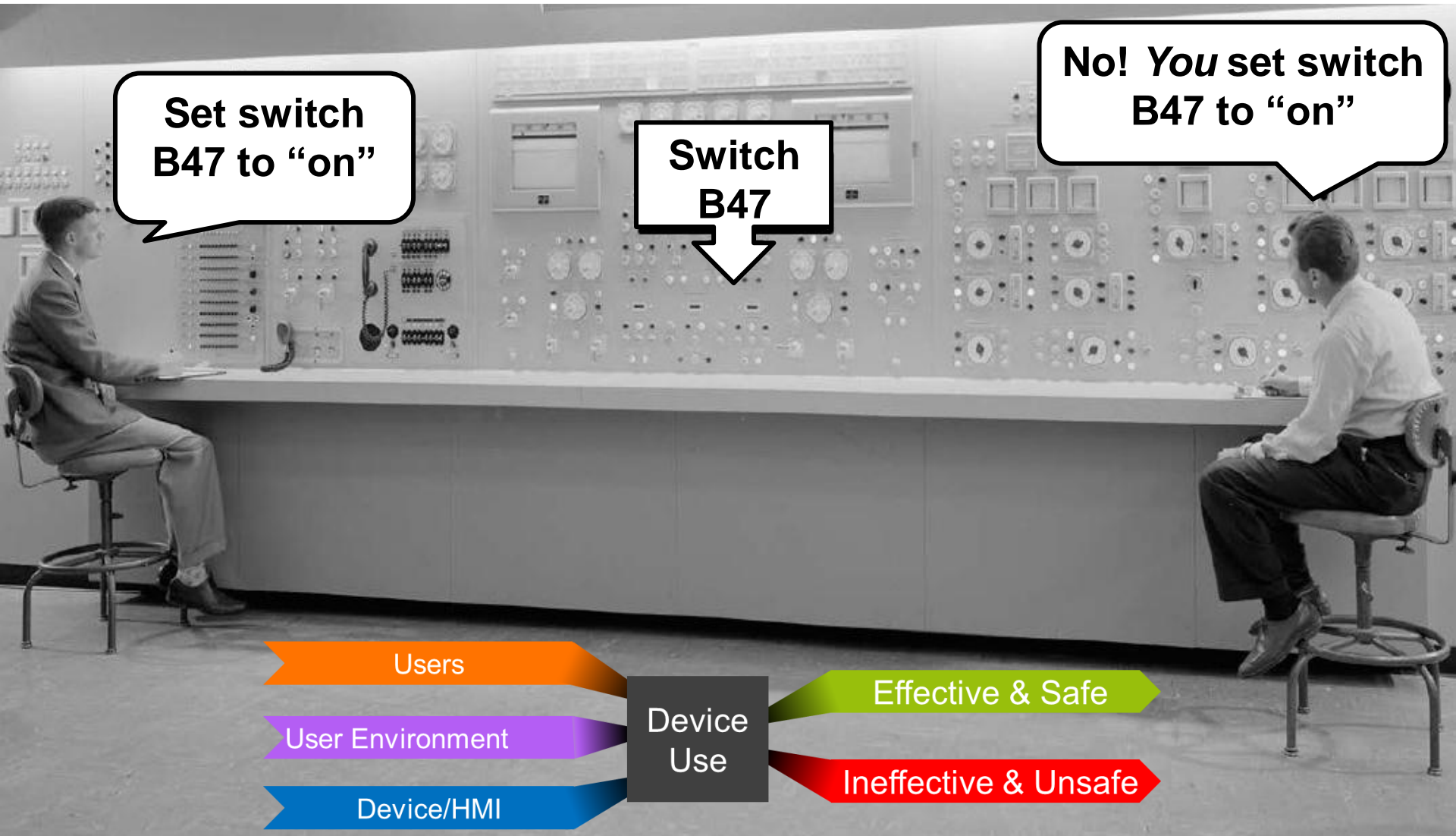
User Environment

Device/HMI

Device
Use

Effective & Safe

Ineffective & Unsafe



The study of how humans behave physically and psychologically in relation to particular environments, products, or services.

User-Centered Design

Benefits

- **Customer satisfaction**
- **De-risk internal projects**
- **Cost reduction**
- **Tuned to the end-user**
- **Innovation**



Human Factors

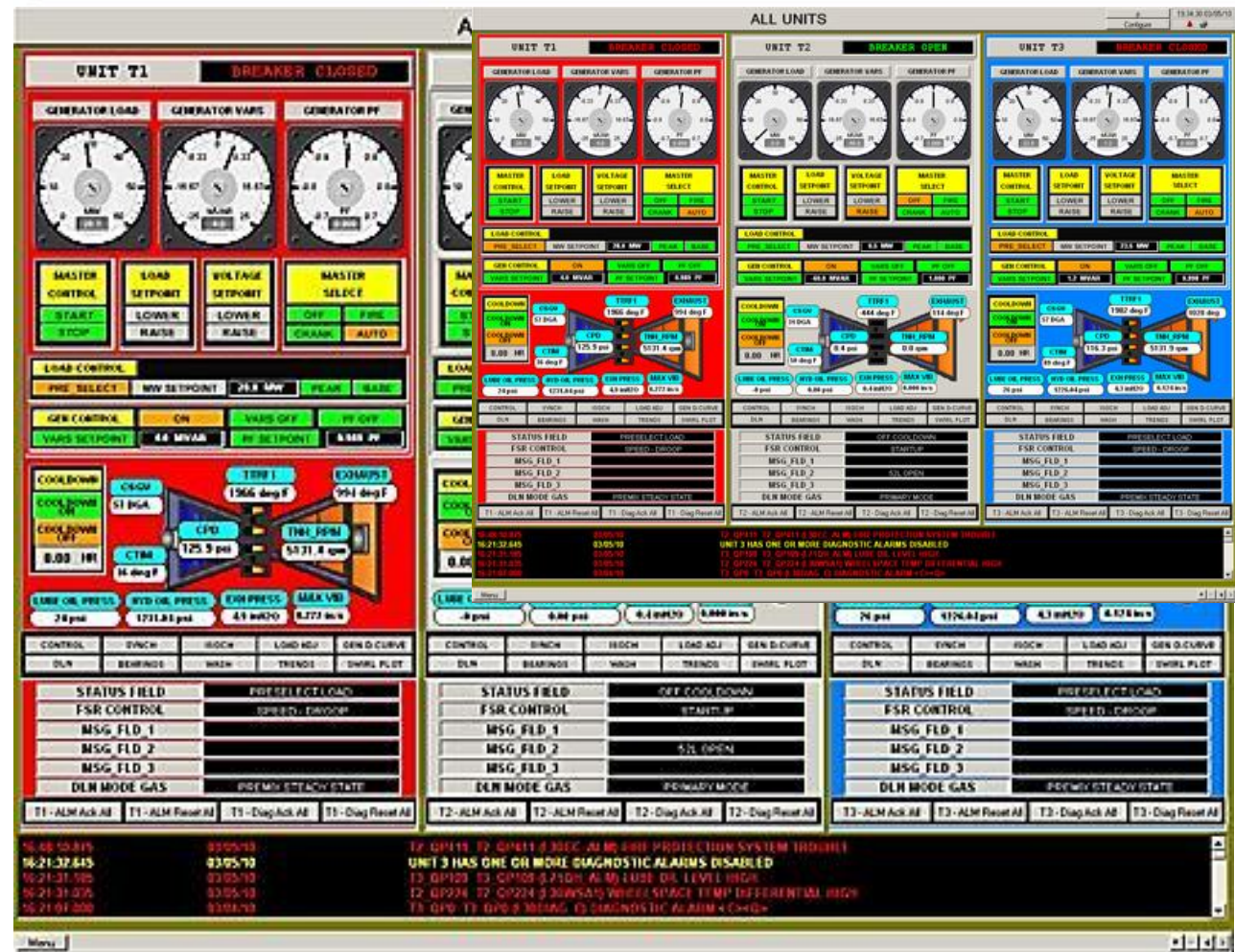
1. **Is just common sense**
2. **Can't be measured**
3. **Is just for making things look nice**
4. **Costs too much**
5. **Is unrelated to system engineering**
6. **Is a magic trick**

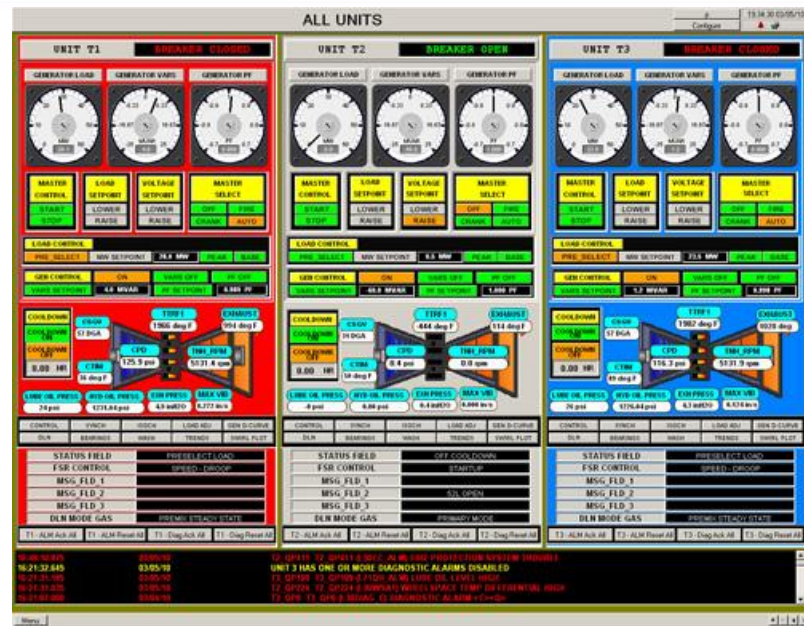
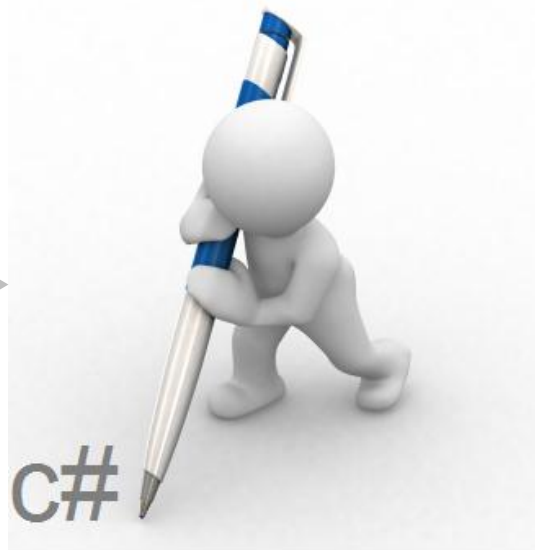


Human Factors

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Overall goal(s):
system alignment

Overall goal(s):
operator alignment

(Operators)

HMI/GUI

**System
functionalities
& components**

**System of
Systems**

General Architecture



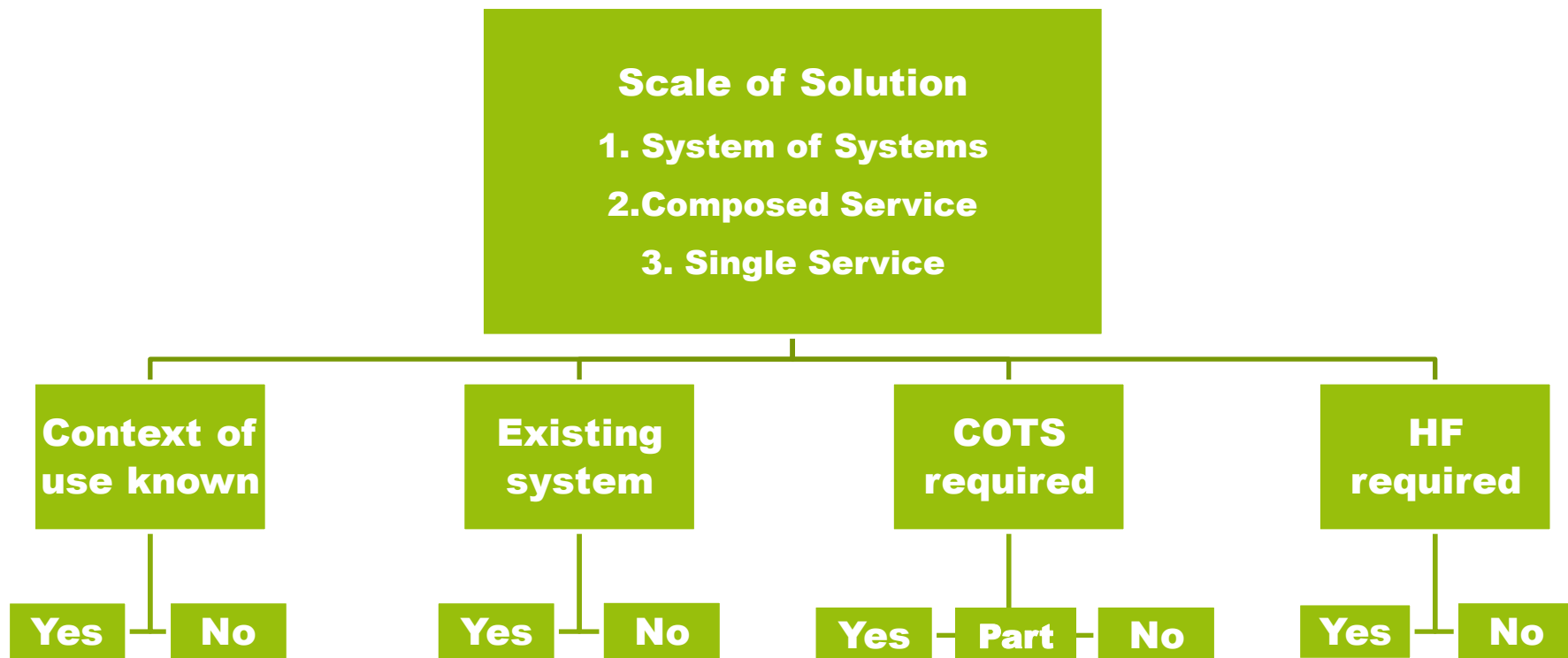
Information Flow

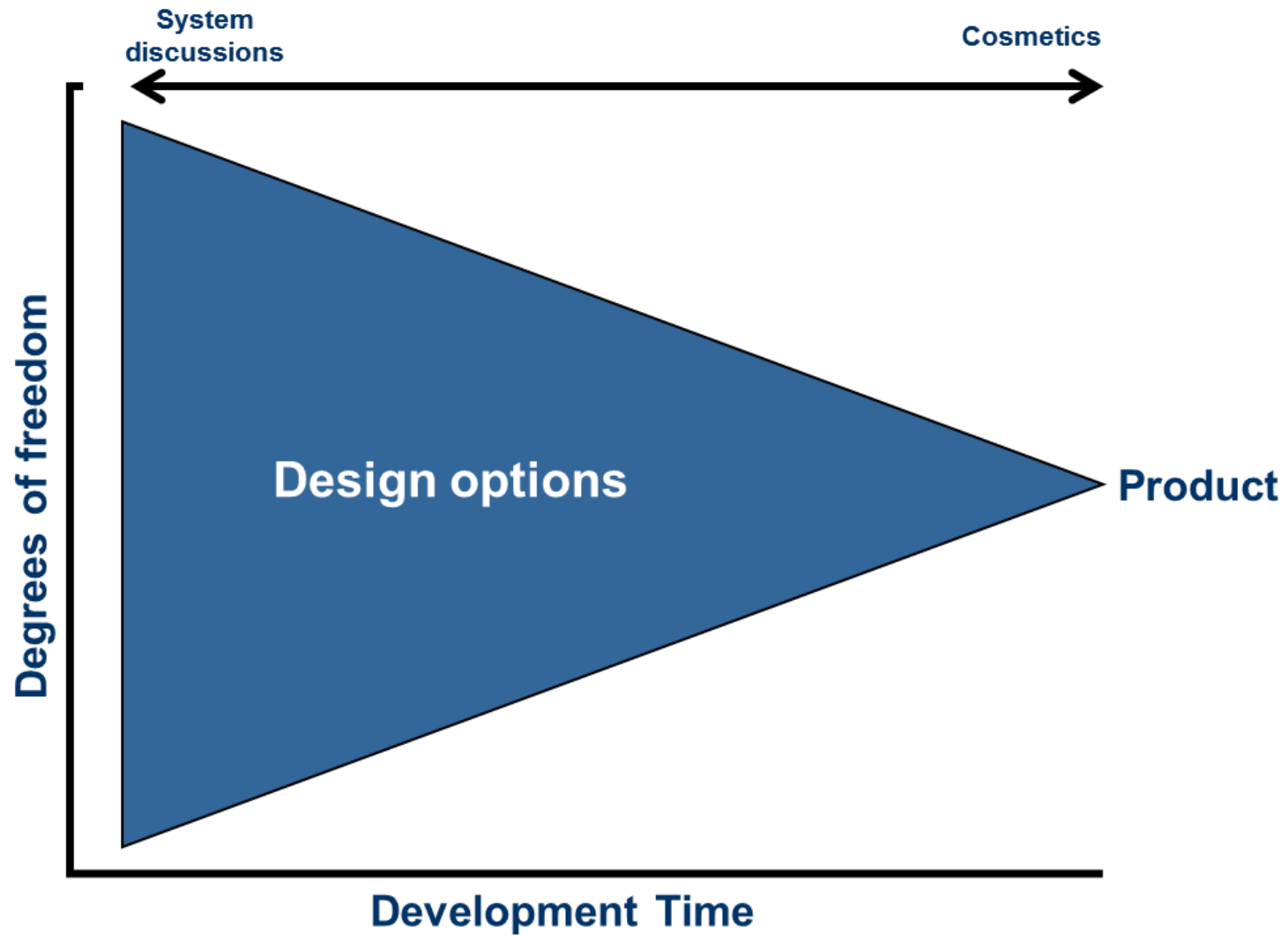
**Perception/
Cognition**

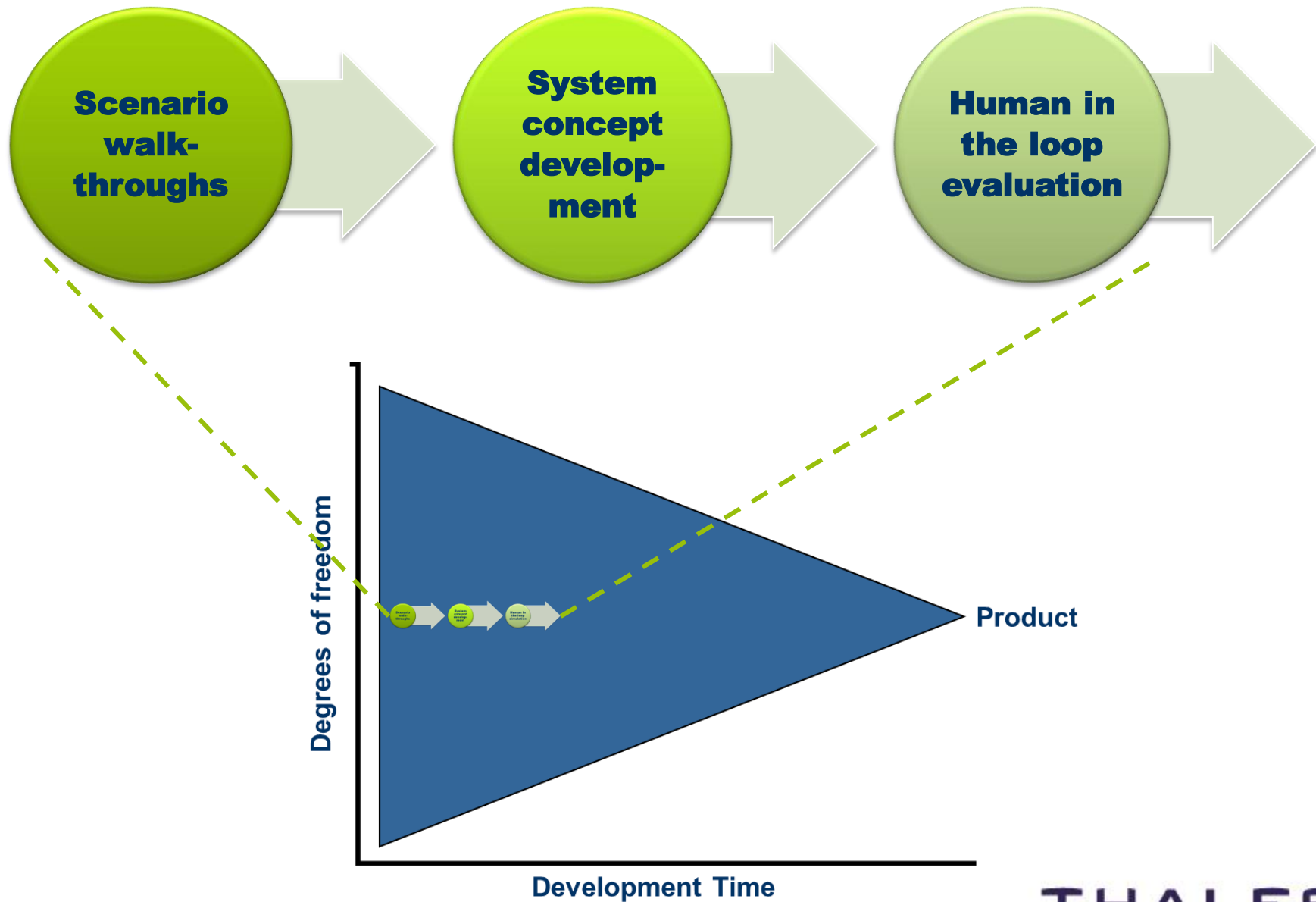
**Information
representation**

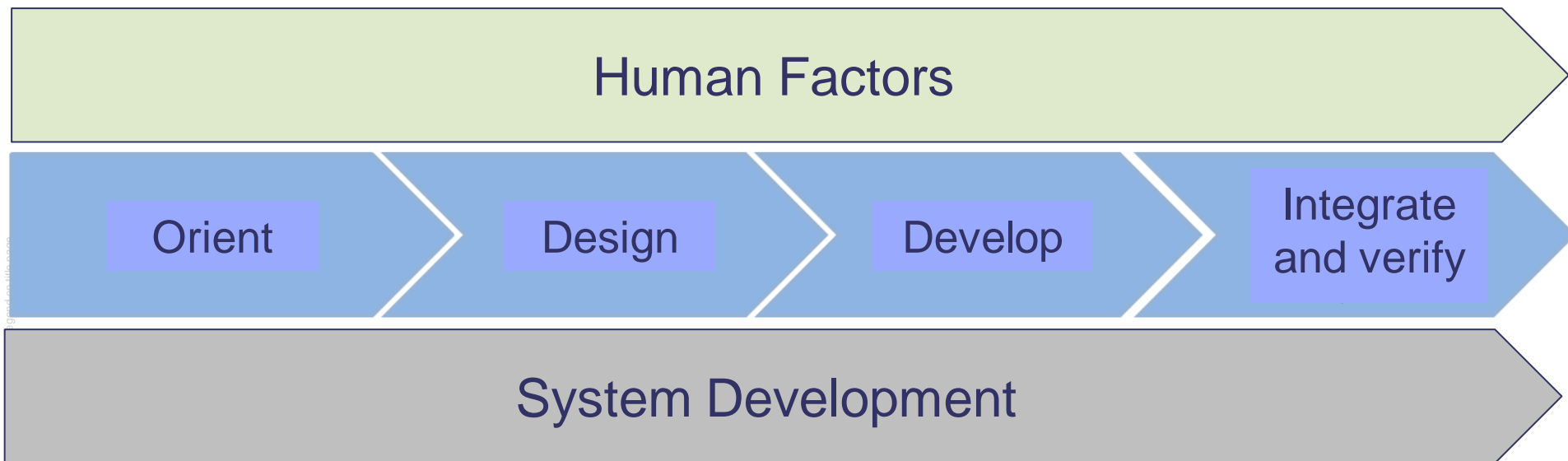
**Mapping of
system-to-
operator
functionalities**

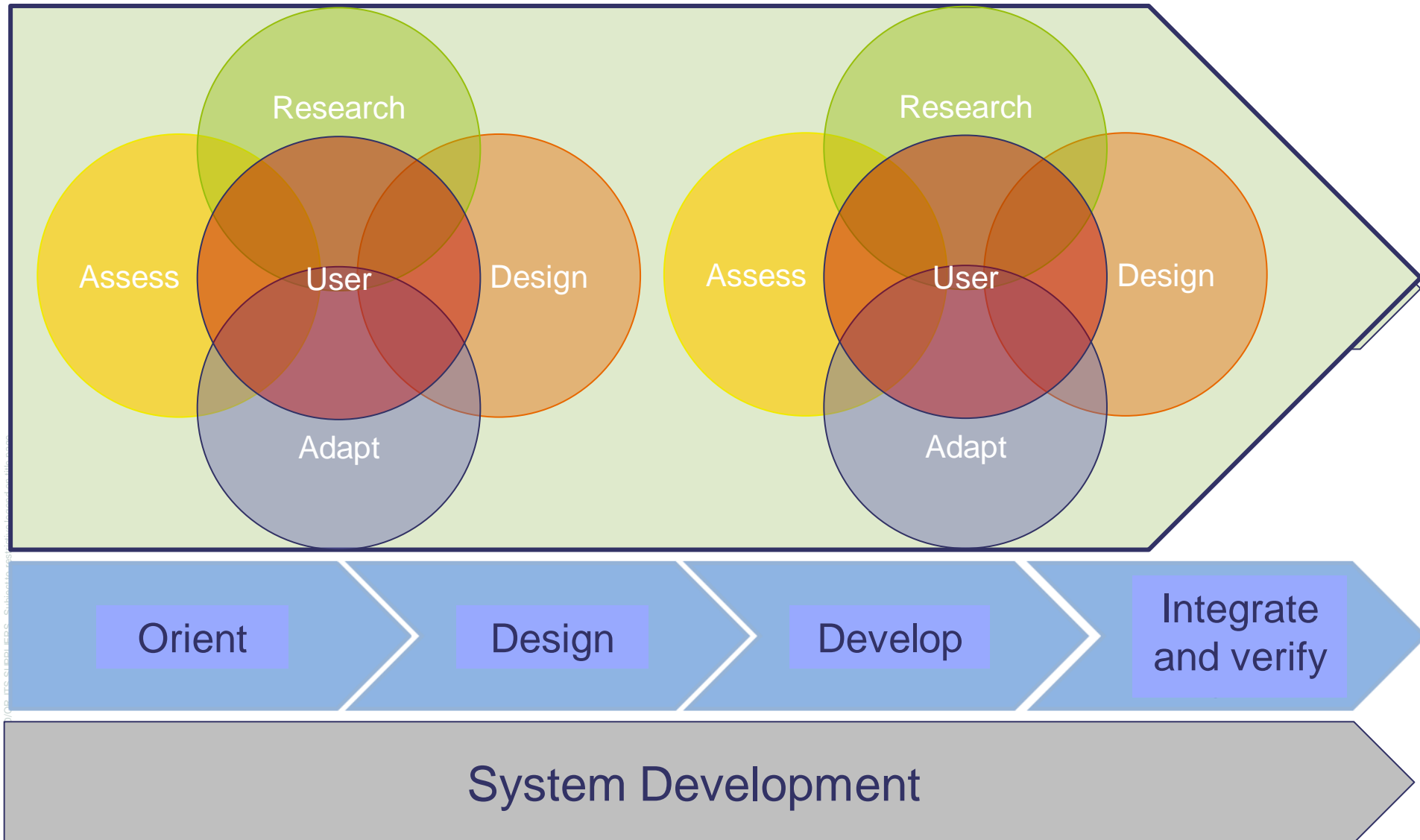
**Dataflow +
Communication
+ Distributed
locations**

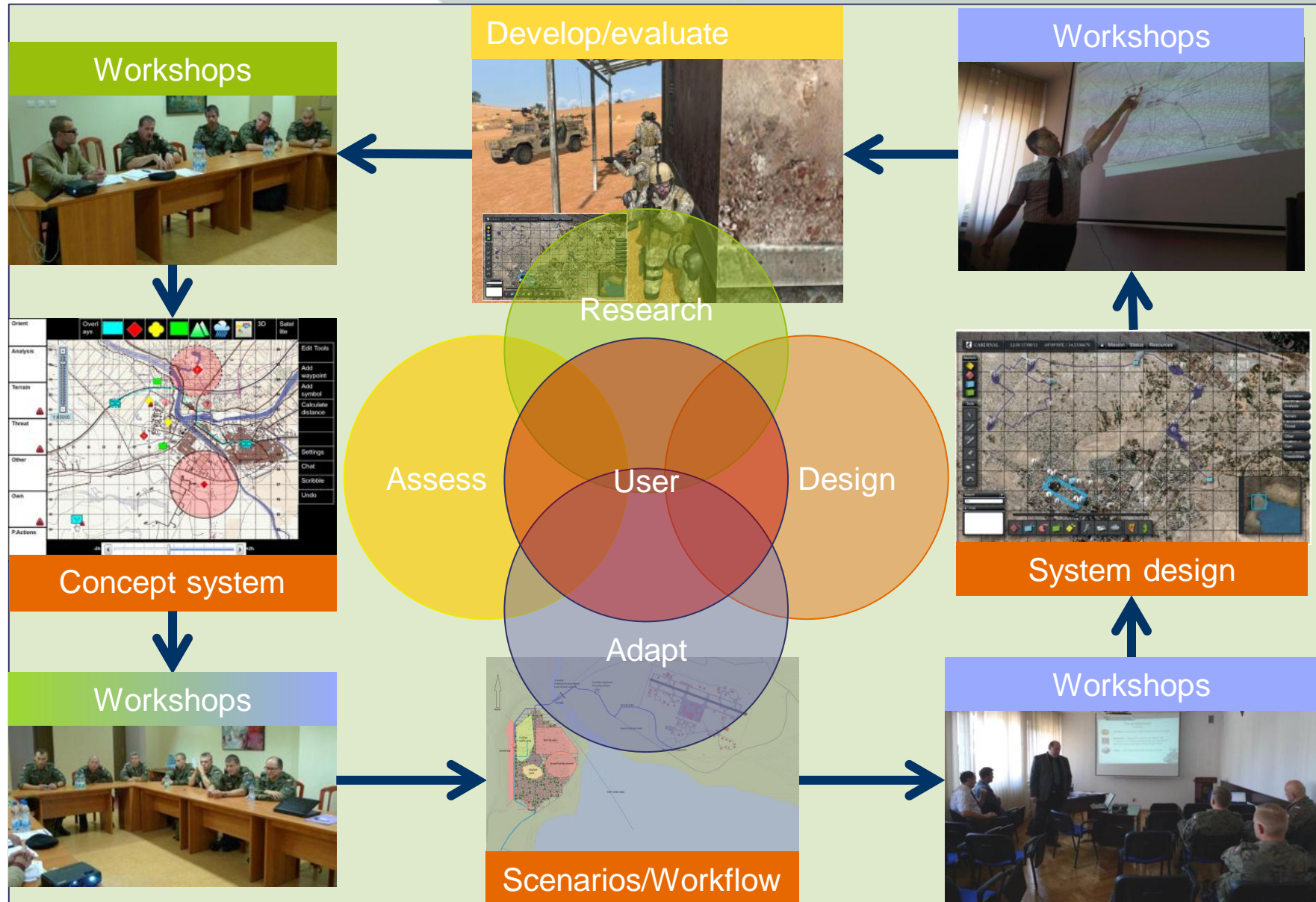


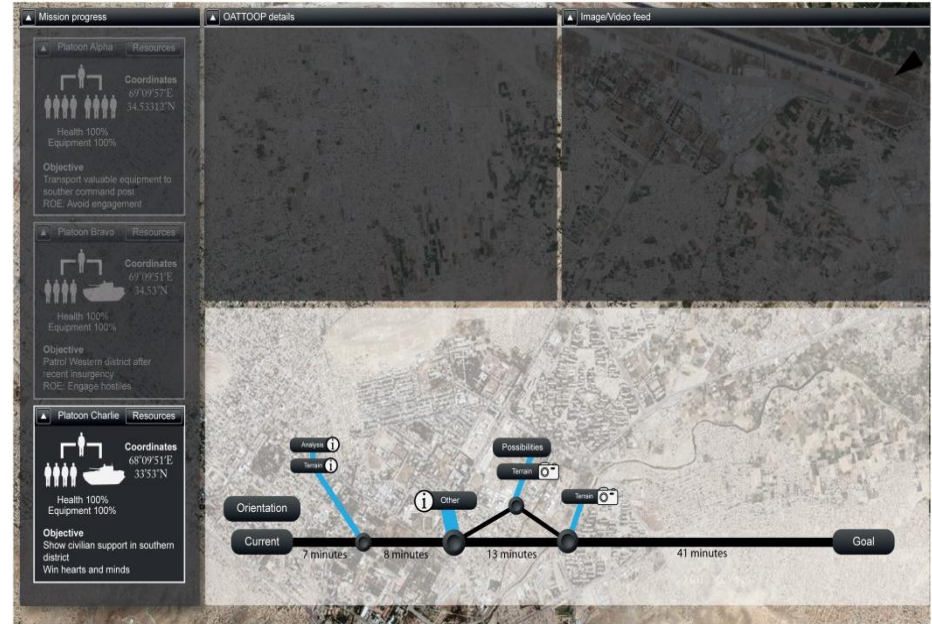
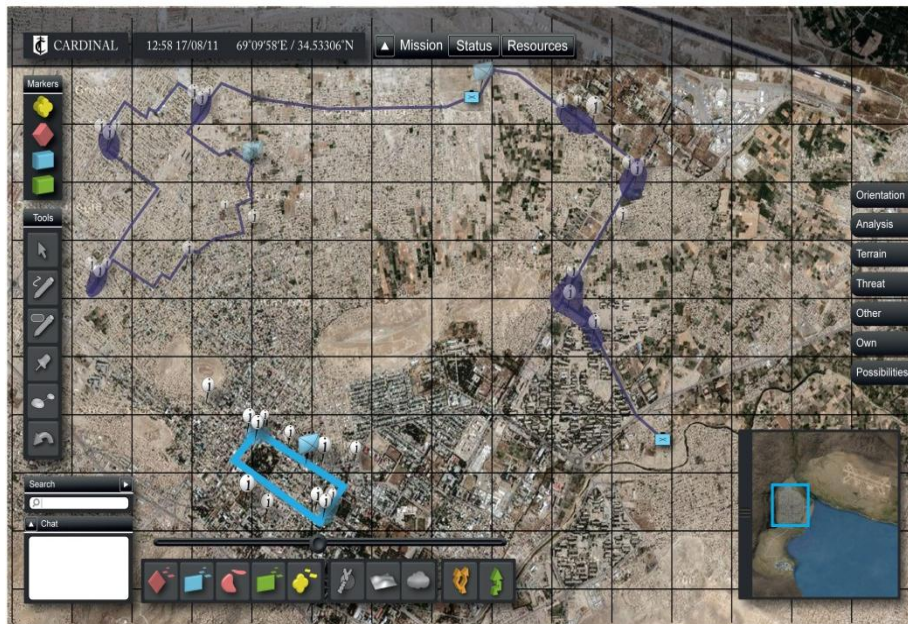










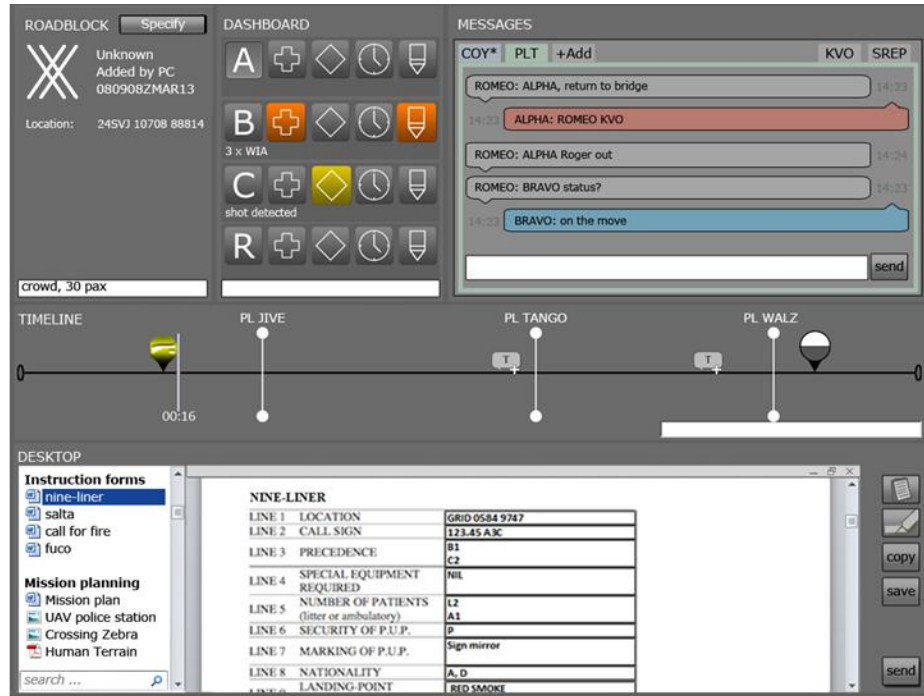
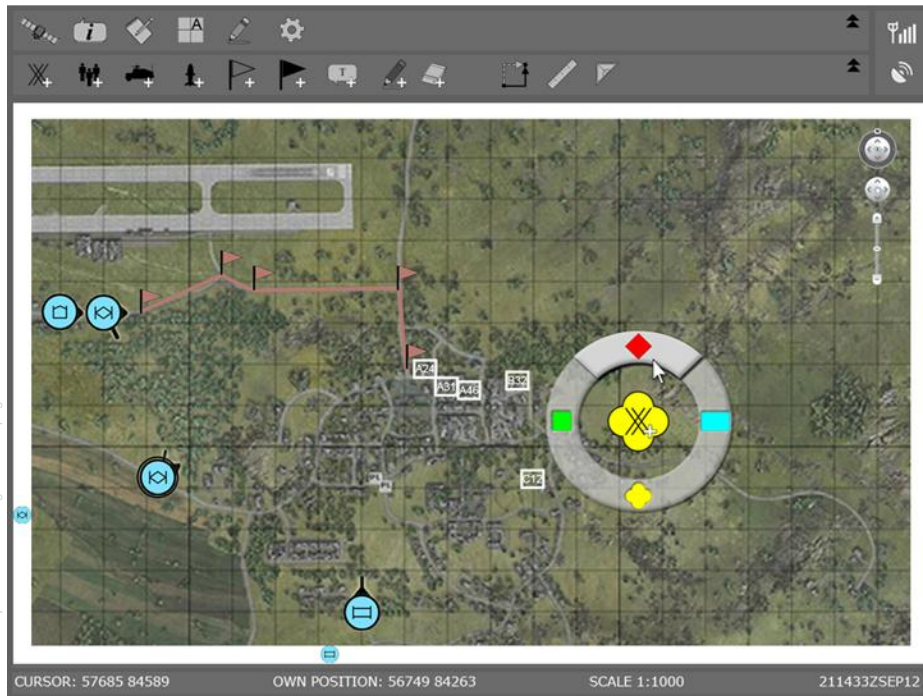


The screenshot displays a military simulation software interface. The main map shows a terrain with a river, a city grid, and a large cluster of blue and red force units. The interface includes several control panels:

- Coordinate Panel:** Options for Geographical coordinates (degrees) and Projection coordinates (meters).
- Measure Panel:** Buttons for Measure and Fit to all objects.
- Layers Panel:** Options to Show all or Hide all layers. Checked layers include Paths, Vertices, and Segments. Other layers include BlueForces, RedForces, CWDB, and KmGrid, each with a names checkbox.
- Routing Panel:** Buttons for New Vertex, New Segment, Send Routing, and Clear Routing. Sliders for Safety, Fastness, and Shortness. Buttons for Find Path and Reset Path. Color-coded buttons for Red Forces and Blue Forces. A Threat Layer checkbox.
- Map Controls:** A compass and a scale bar (500m, 1000ft).
- Status Bar:** Date: 2012-09-05 10:44:32, CWDB Start, and Terms of Use link.

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[Wednesday, September 05, 2012]



For good design you pay now, for bad design you pay later (and more)

- Re-design/re-engineering
- Loss of customer(s)

Ask advice R&T/HF department (Large Companies)

Hire HF consultant (Small & Medium-sized Companies)

Perfect world model:

- Team of system engineers, designers & HF experts

Human Factors is a profession not a trick

The background is a complex, layered composition. On the left, a large, translucent blue silhouette of a human head in profile, facing left, is the central focus. Overlaid on and around this head are various elements: a network of glowing purple and blue lines resembling circuitry or neural pathways; a semi-transparent image of a computer keyboard on the right side; and a faint, colorful grid pattern in the upper left. At the bottom, there are silhouettes of several people standing, suggesting a group or audience. The overall color palette is dominated by purples, blues, and magentas, with some green and yellow highlights from the grid pattern.

Thales Human Factors & Cognition

- **De-risking internal projects**
- **User-centered design**
- **Customer satisfaction**
- **Innovation**

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