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DEFINING THE FUTURE

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Systems  
Missile  
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Systems  
Intelligence,  
Surveillance  
and  
Reconnaissance  
Navigation  
Systems  
Systems  
Integration  
Shipbuilding  
Electronic  
Systems  
Radar and  
Air Defense

# Human – system integration

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# Human – system integration

- **At the human-to-device level, the 1970-era mouse – icon – click strategy still dominates**
  - Not much has changed since its introduction
  - Can be effective when the computer is intended to be a portal for one highly-trained person
- **However:**
  - Not generally effective for people under stress or time constraints
  - Not conducive to normal human modes of collaboration
  - Does not, in and of itself, integrate the human to the system . . . just to the device
- **We want to:**
  - Link people together for more effective collaboration
  - Link people more effectively to the actual work-process of their organization

# Things that we are trying

- **TouchTable<sup>tm</sup>**
- **Gesture-driven control of computers (*without* gloves or other aids)**
- **Telepresence<sup>tm</sup>**
- **TerrainTable<sup>tm</sup>**
- **High-resolution displays**
  - For teams
  - For single humans
- **Information presentation strategies**
- **Integrating people into the work-process**
- **Measuring the operational effectiveness of the techniques**

Patents pending.

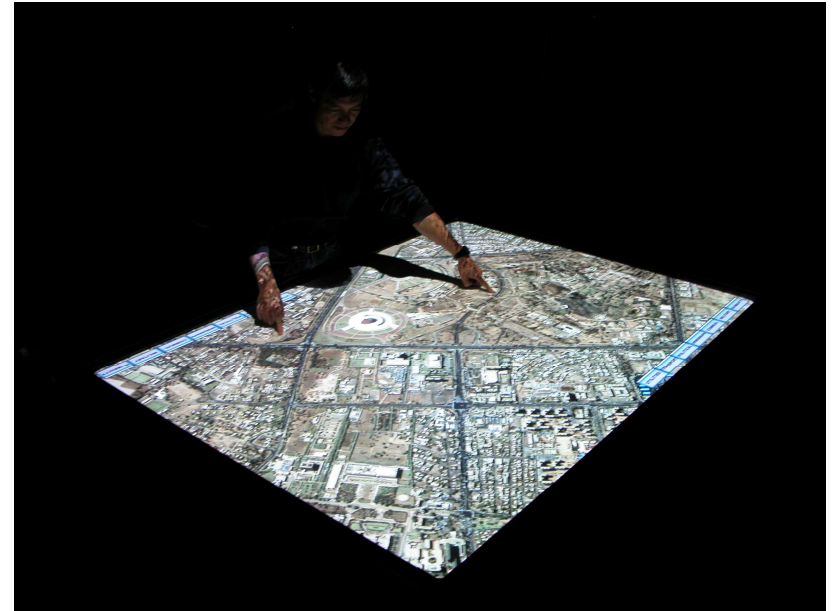
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# TouchTable™

- 2-point control
- Pressure control
- Surface can be horizontal or angled
- TouchShare™ software
- Groups of geographically-distributed tables
- Orientable menus



Patents pending.

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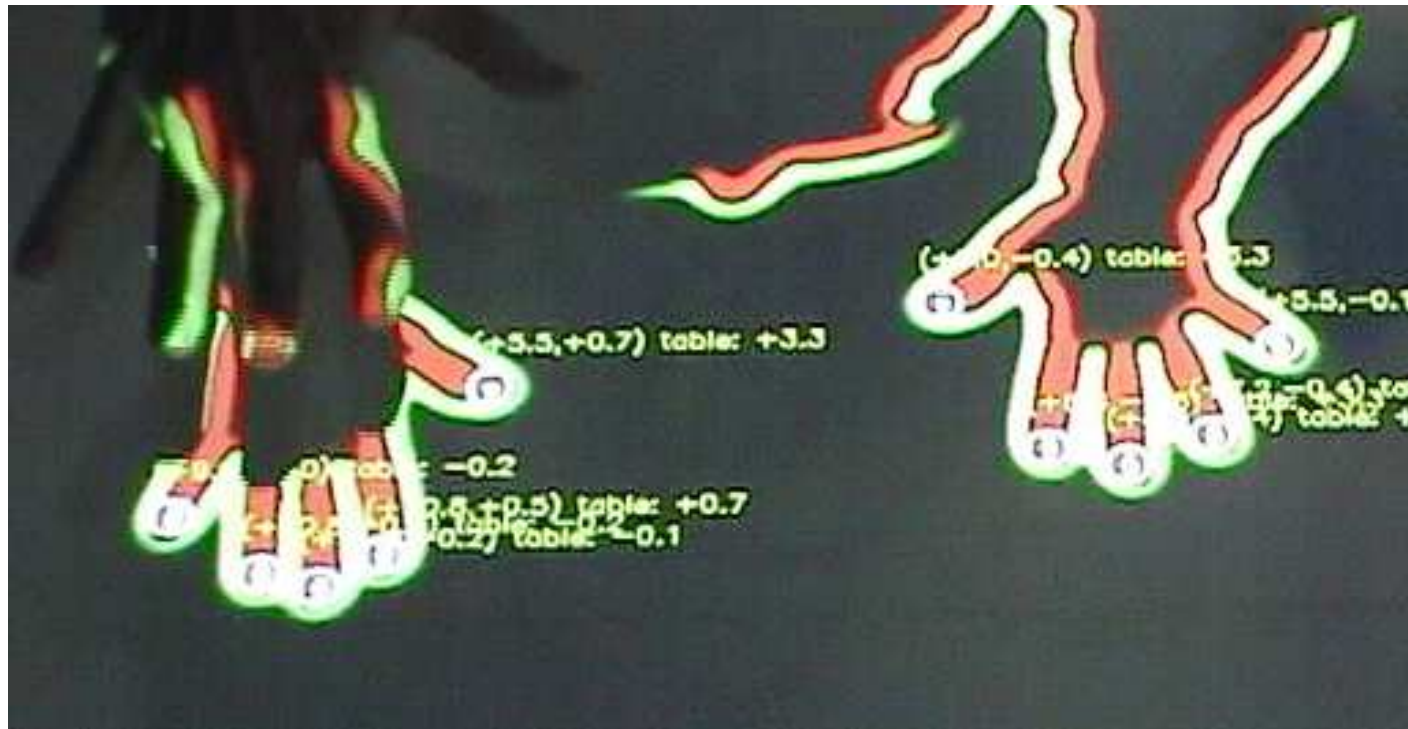
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# Gesture-driven control of computers

- 10 or more point control
- Free space control
- No gloves or other devices
- Can be combined with our “shadow-free” projection
- Can be combined with holographic displays – manipulate objects in free-space



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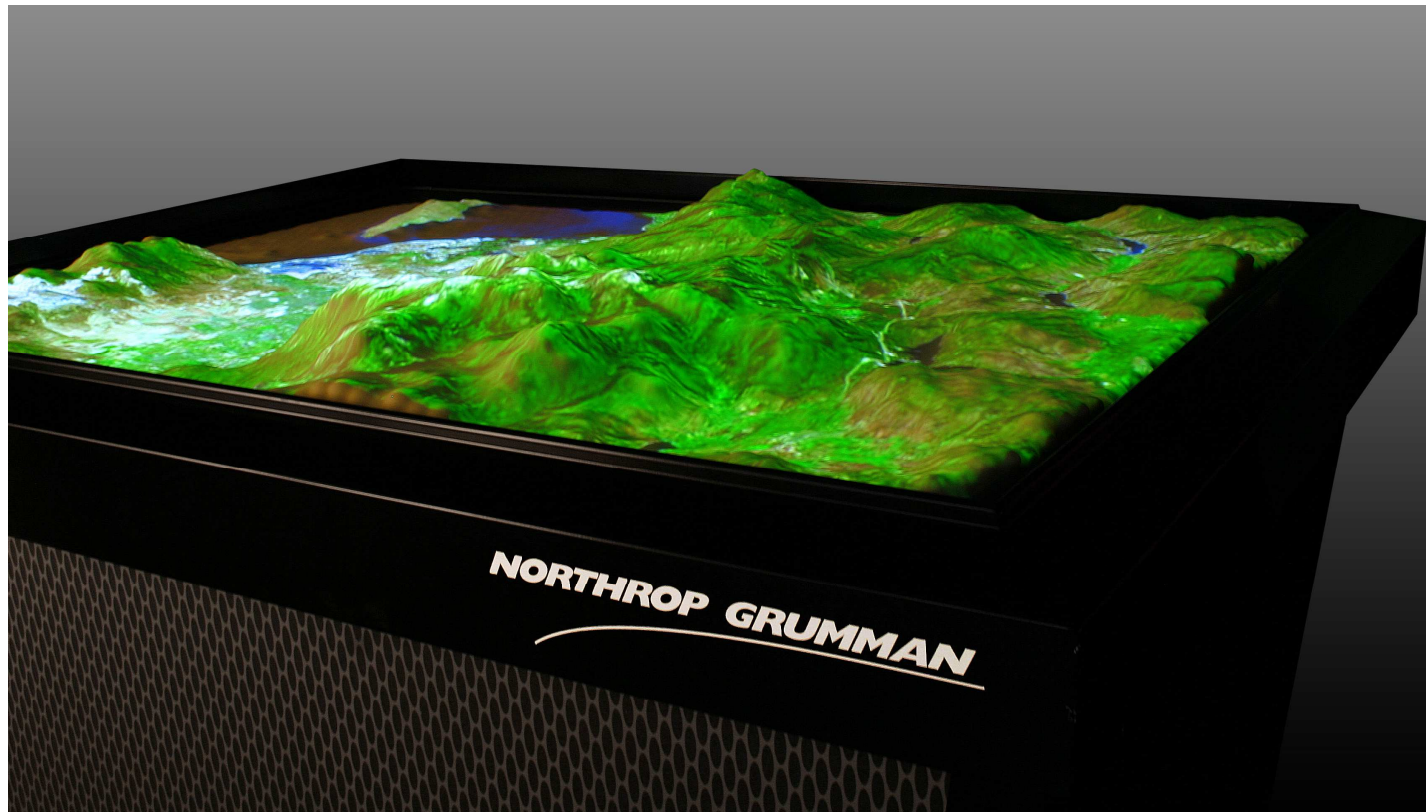
# Telepresence<sup>tm</sup>

- Credible virtual room
- Currently, virtualizes four physical sites
- Careful camera angles, lighting, and directional sound – you experience body language
- Work surface is a gesture-driven TouchTable<sup>tm</sup>
  - Can have one big display, or one display per person



# TerrainTable<sup>tm</sup>

- True space-filling, solid 3D display
- Adjusts in a few seconds to a new configuration
- True vertical scale, or exaggerated
- “Toys”



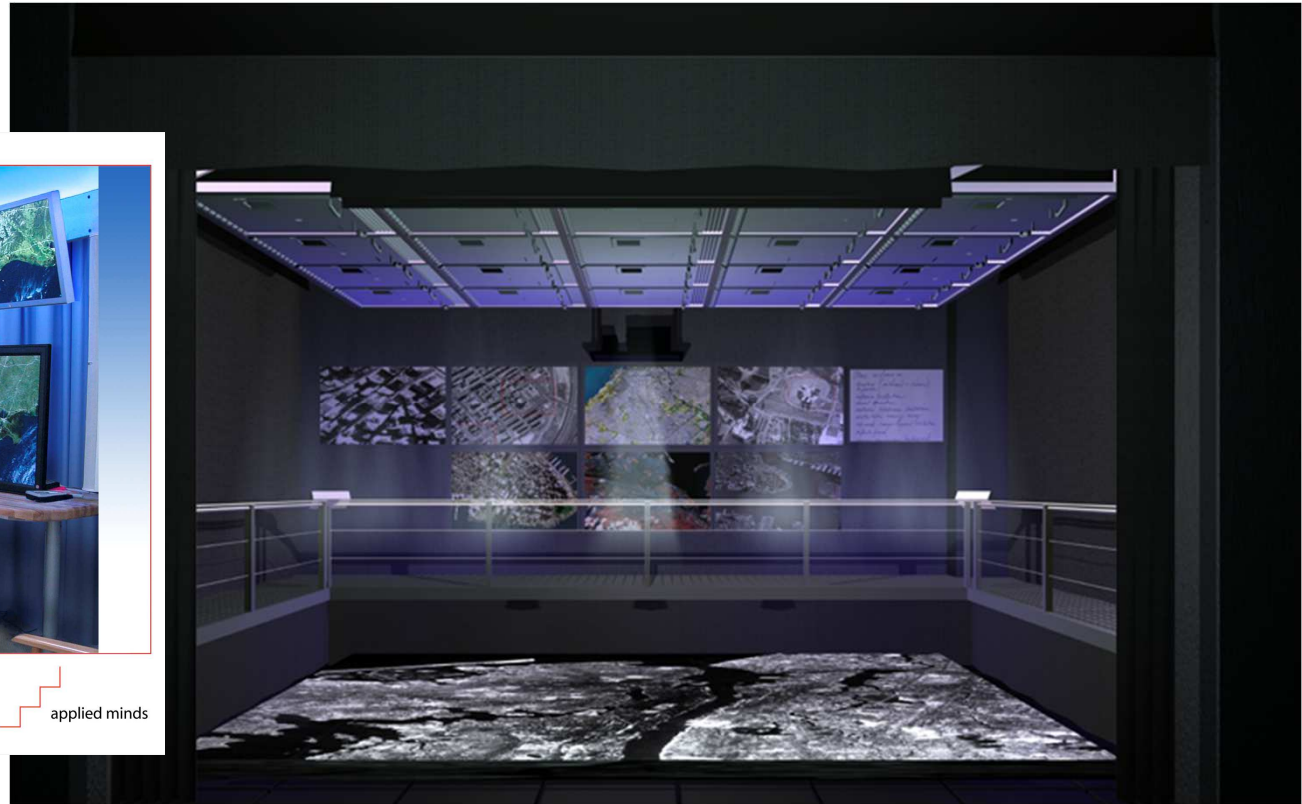
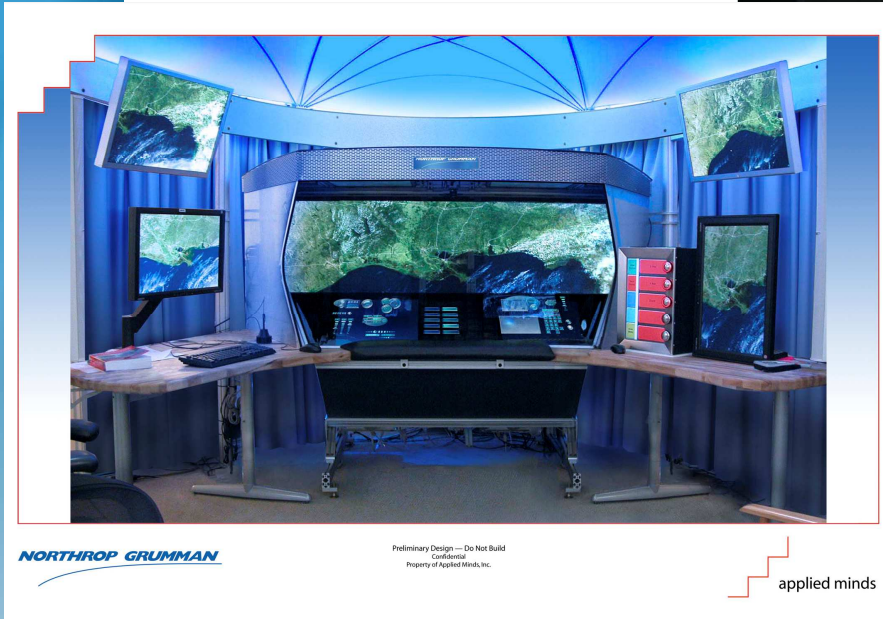
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# High-resolution displays

- Details and context at the same time
- Fill your eye's resolution
- For teams or a single person
- Seamless – no borders, edges
- Fully color-corrected



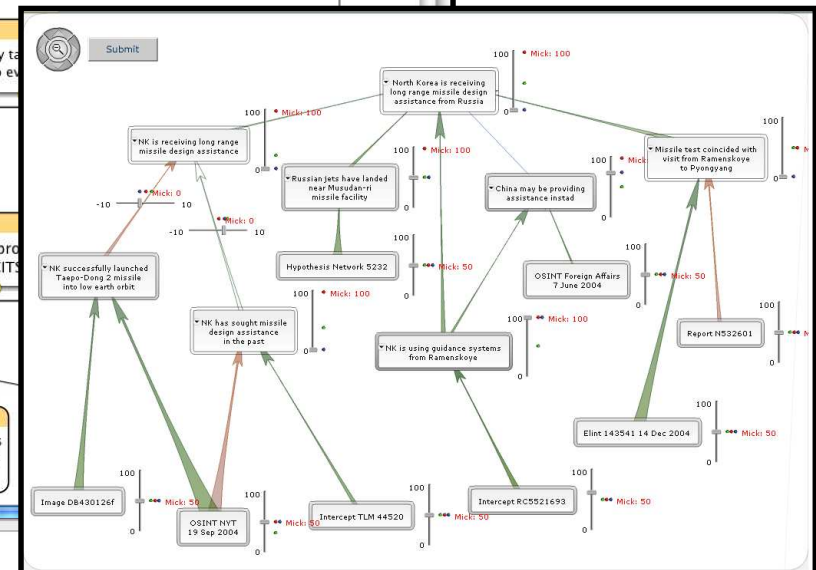
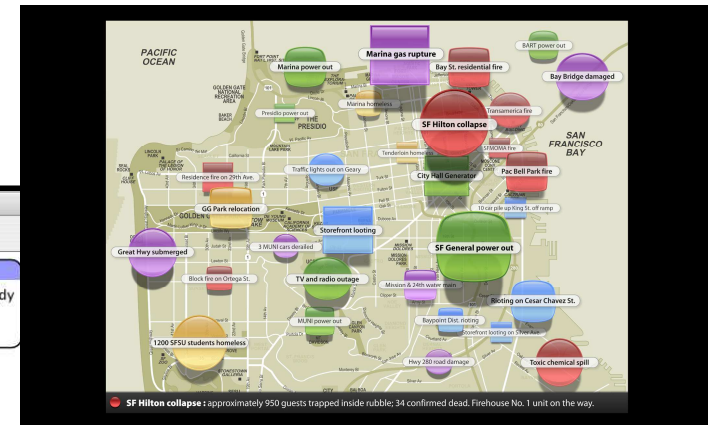
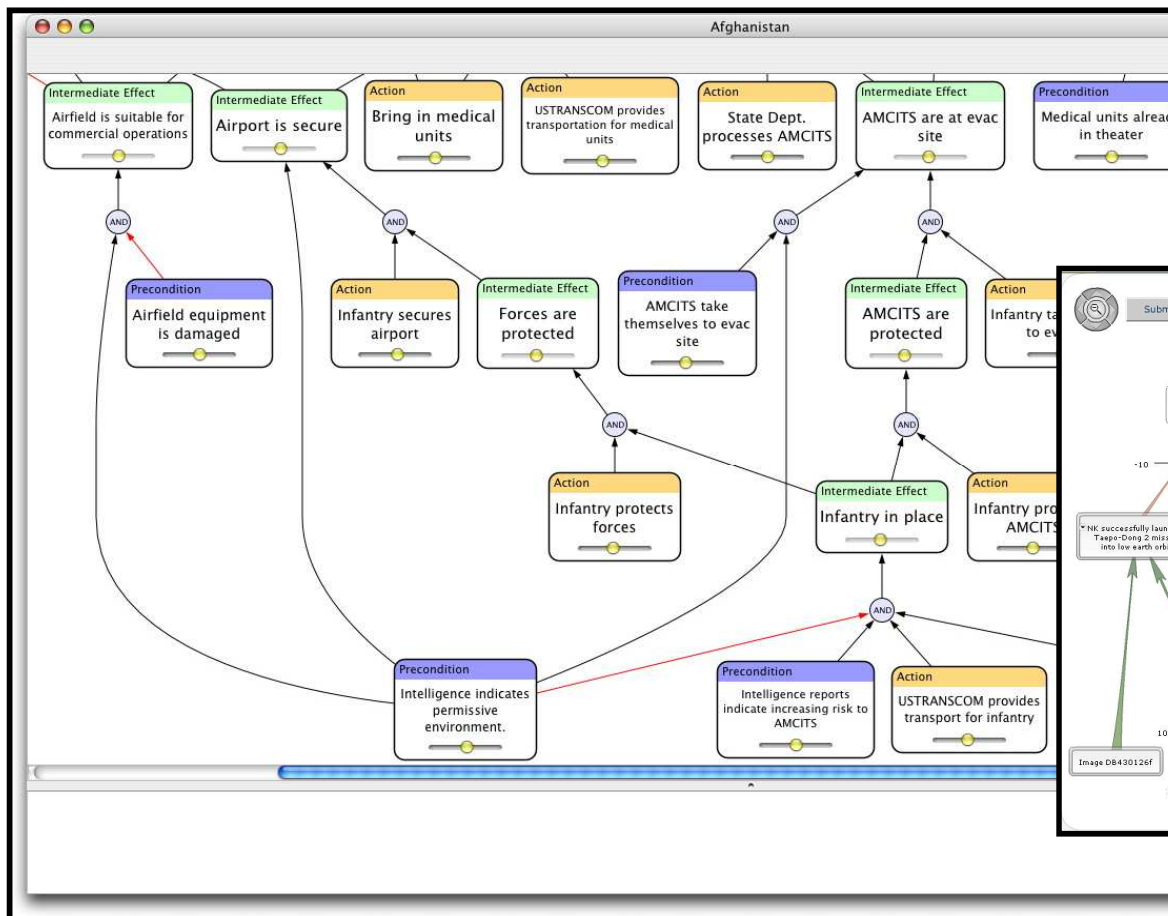
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# Information presentation

- Techniques for enabling collaboration on complex issues
- Techniques for cueing attention



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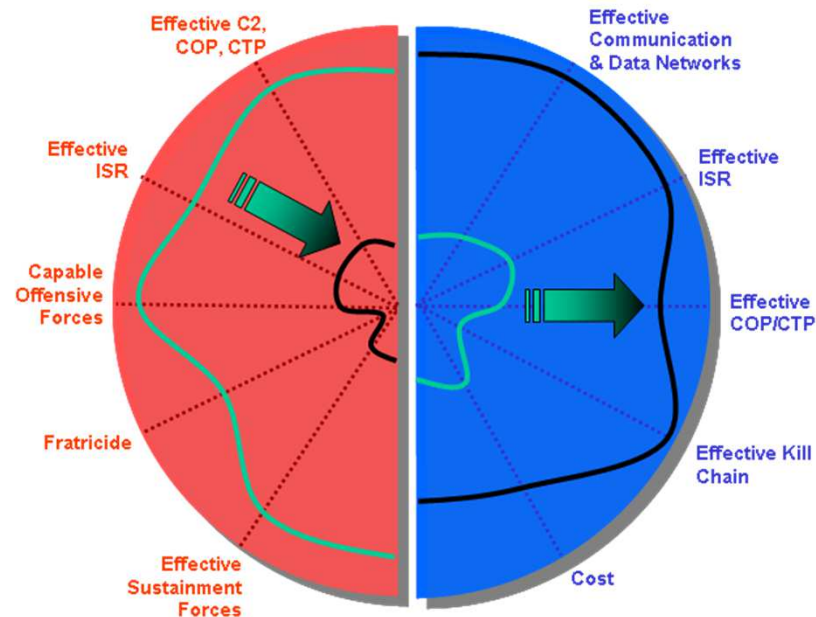
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# Integrating people into the work-process

- **Careful partitioning of what the human can do best, and what the computer can do best**
  - Effective and credible
  - Don't ask the human for data the computer can figure out
- **Support the stressed user**
- **Crossing security domains**

# Measuring operational effectivity

- There is a tendency towards “technology for technology’s sake”
  - Could easily be “one step forward, two steps backwards”
- We spend a lot of effort building models / benchmarking operational effectivity
  - e.g., loss-exchange ratio, rather than message completion rate
  - Linking physics / logic / human processes
  - Many dimensions of measurement





# Summary

- **Exploring more intuitive ways for humans to interact**
  - With computers
  - With data
  - With other humans . . . especially those not present
- **“Devices” not a panacea**
  - Human / computer partitioning is a key quality attribute

Informing the system design through  
domain knowledge seems essential