

Designing practical systems to improve information transfer

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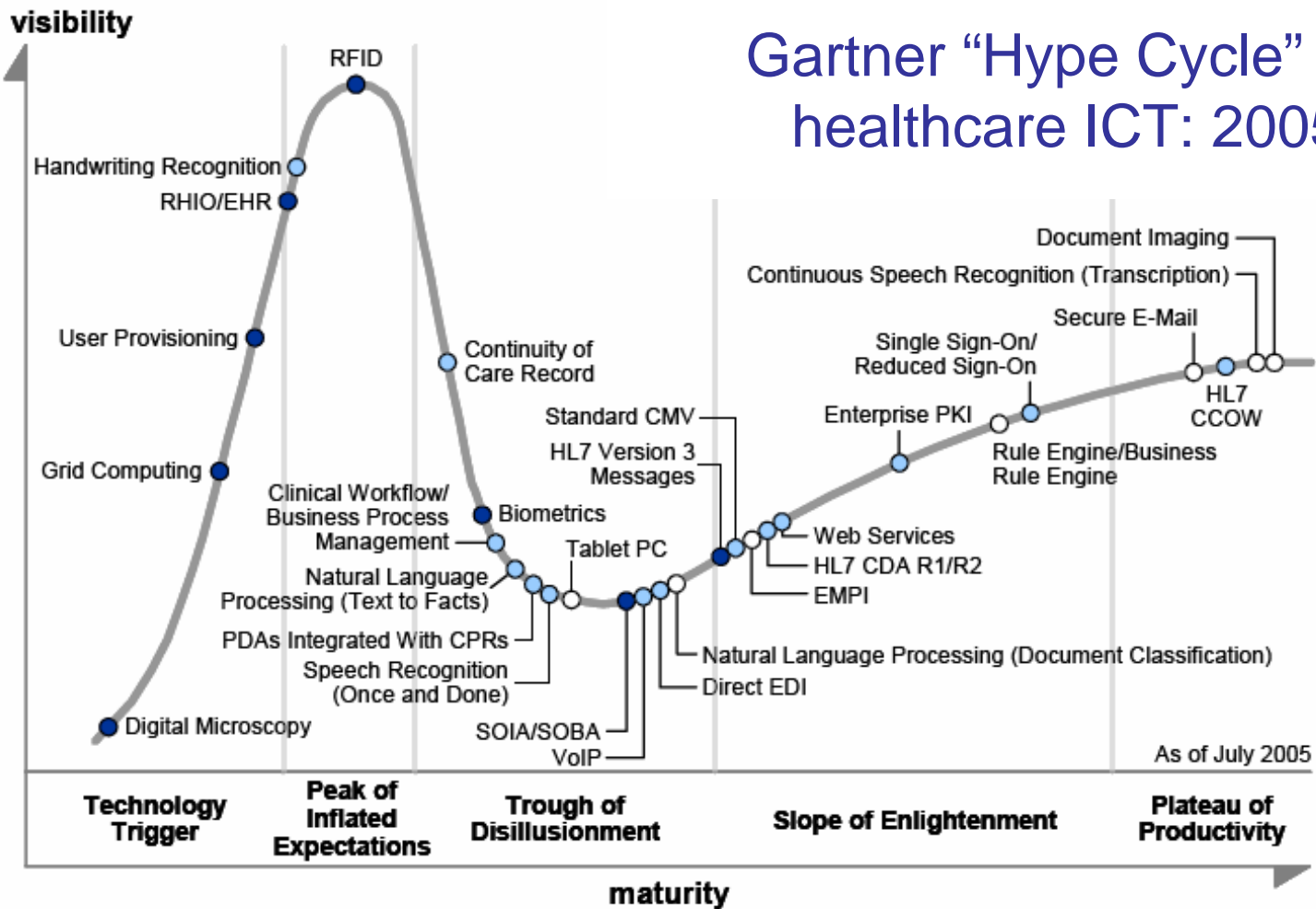
Outline

- Challenges to identifying the problem ICT might help to solve
- Danger of technology-driven solutions
- Design challenges for handover
- Evolutionary and revolutionary technology design and evaluation

Variety of handover → variety of ICT

- Some scenarios (ACSQHC 2005)
 - GP referral to another health professional
 - Handover of patient care at nursing shift change
 - Handover of patient care at RMO shift change
 - Handover of patient care between institution and GP
 - Patient care transition between ward and OR
- Differences in size and kind of “gap”
- Challenge: continuity of information despite discontinuity in location, timeframe, information subset, modality...

Gartner "Hype Cycle" for healthcare ICT: 2005



Plateau will be reached in:

- less than 2 years
- 2 to 5 years
- 5 to 10 years
- ▲ more than 10 years
- ⊗ obsolete before plateau

Acronym key:

CCOW clinical context object workgroup
CPR computer-based patient record
EDI electronic data interchange
EHR enterprise health record
HL7 CDA Health Level Seven Clinical Document Architecture

PKI public-key infrastructure
RFID radio frequency identification
RHIO regional healthcare information organizations
SOBA service-oriented business architecture
SOIA service-oriented integration architecture
VoIP Voice over Internet Protocol

**“Our euphoria is not matched
by our understanding”**

(Gomez & Hunt, 1999)

To prevent healthcare ICT implementation failures, we need to move from a technology-centred focus to a human-centred focus
(Nemeth & Cook, 2006; Ash, Berg & Coiera, 2000, Vicente, 2004)

Design and development

- Need human-centred analysis early
- \$1 spent solving a problem during design becomes \$10 correcting it during development and \$100 correcting it after release (Karat, 1990)
 - “Focus groups” and “early customer feedback” may hide future problems in practice (Alarms on central monitoring station)
 - “User acceptance tests” usually too late, subjective not objective data, and disregard timeframes (EHR: Poissant et al, 2005)

Best practice—and its ICT challenge

- Best evidence of handover practice reducing incidents (ACSQHC 2005):
 - Multiprofessional groups of clinicians
 - Involved in clinical decisionmaking during ward rounds
 - Treatment prescribed by patients' allocated care team (not on-call clinician)
- Important design constraints for ICT support
 - *Whose* viewpoints needs to be coordinated
 - *Where* they have to be
 - *When* they have to be there
 - *How* they access appropriate information

Lightweight and personal technologies



- Right information, right time, right person—also right location, right modality
- Best ICT not necessarily most sophisticated ICT
 - Video relay of OR master schedule (whiteboard) to other areas (Xiao et al., 2001)
 - Development of “locative” ICT—Backpacker communities, digital art (ACID CRC, QUT)
- Remove “interruptive” technology (strong silent third member of interaction)



Evolutionary and revolutionary healthcare ICT design

- Evolutionary—enhancing current practice
 - Participatory design and rapid prototyping important
 - Danger of getting trapped in “local minima”
- Revolutionary—potential to transform current practice
 - Techniques for “envisioning” ICT in Contextual Design (Beyer & Holtzblatt, 1998)
 - Cognitive Work Analysis (Vicente, 1999).

Evaluating revolutionary designs

Cognitive Work Analysis (Vicente, 1999)

- Analyses the systems, social, and cognitive factors that shape a domain of work and the activity of people in it:
 - What matters in the work domain or system
 - What has to get done
 - Different ways of achieving work goals
 - Options for allocating responsibility for work
 - Different cognitive capabilities and strategies.
- Helps us design for what needs to get done, not just for better ways of doing what we do now.

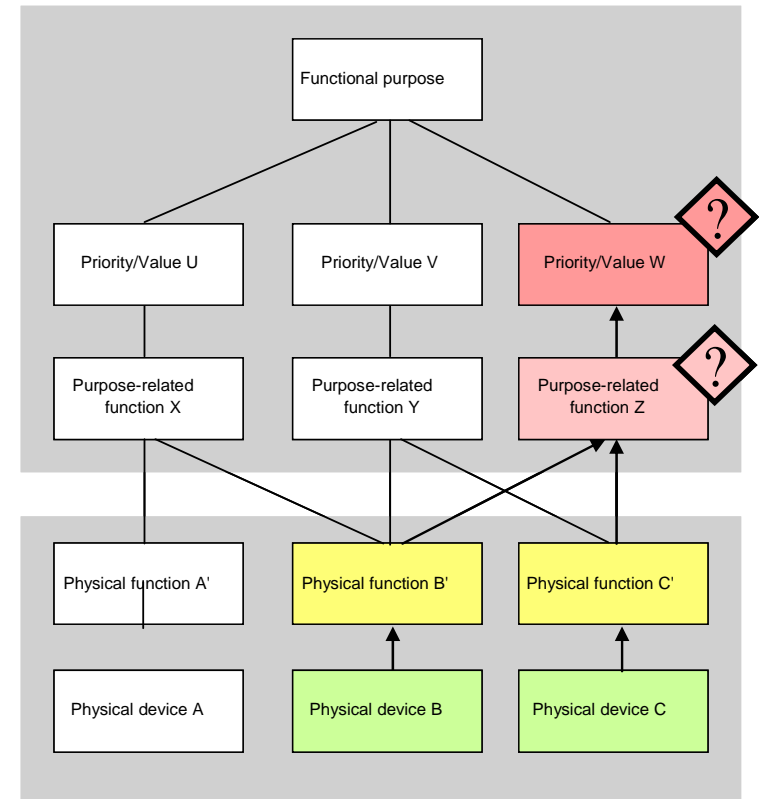


Evaluating ICT

“First of a kind” systems

What matters in the work domain or system

- Available from system requirements:
 - System purpose, priorities, values
 - Functions needed for system to achieve its purpose.
- Q: Will ICT work together to:
 - Achieve functions?
 - Satisfy system priorities and values?





Selecting measures to evaluate new ICT

- Black Hawk Air Mobile operations (Crone et al., 2003)

Functional purpose

Mission effectiveness measure

Values and priorities

Mission priority measures

Essential system functions

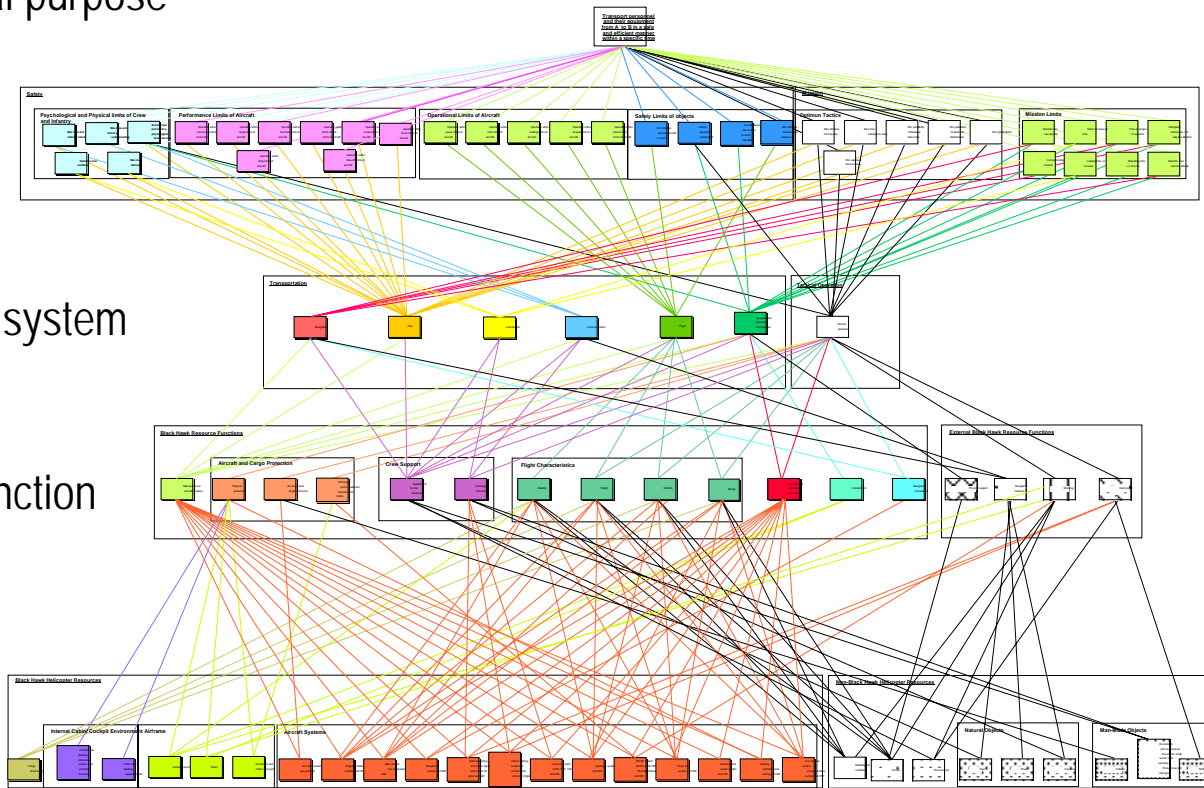
Mission function measures

Object function

System function measures

Objects

System performance measures



Cultural challenges

- ICT development: UNDP ICTD Report 2001
 - As relevant for healthcare in developed countries as for “pay phones in Bangladesh”!
- Challenges
 - Awareness—across all levels of system/society
 - Politics—know where issues lie, and be inclusive
 - Access—both technical and socio-professional
 - Relevancy and meaningful use—usefulness of input, expanded capacity to act
 - Sustainability—minimalism, roll-out timing, training
 - Coordination—keep good system integration and network structure

END