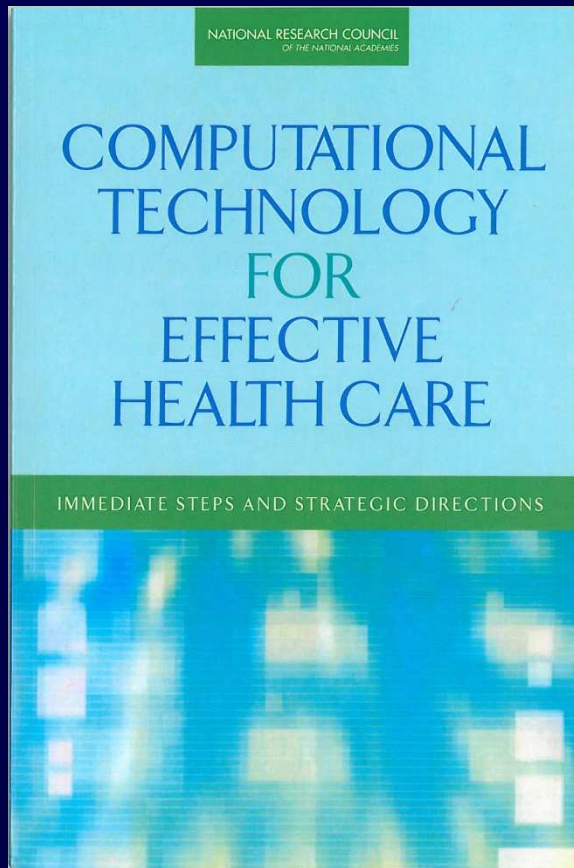


Central Conclusions of NRC Report



2009

Current efforts aimed at nationwide deployment of HCIT will not be sufficient to achieve the vision of 21st century health care, and may even set back the cause...

Success will require emphasis on providing cognitive support (assistance for thinking about and solving problems).

In the near term, embrace measurable health care quality improvement as the driving rationale for HCIT adoption efforts.



Committee Membership

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Information-Intensive Aspects of the IOM's Vision for 21st Century Health Care

Comprehensive data on patients' conditions, treatments & outcomes

Cognitive support for health care professionals & patients to help integrate

- § patient-specific data
- § evidence-based practice guidelines & research results

Tools to manage a portfolio of patients & to highlight problems as they arise

Rapid integration of new instrumentation, biological knowledge, treatment modalities, and so on into a "learning" health care system

Accommodation of growing heterogeneity of locales for provision of care

Empowerment of patients and their families in effective management of health care decisions and their implementation



Site Visits

**University of Pittsburgh
Medical Center
Pittsburgh, PA**

**Veterans Administration
Washington, DC**

**HCA TriStar
Nashville, TN**

**Vanderbilt University
Medical Center
Nashville, TN**

**Partners Healthcare
Boston, MA**

**Intermountain Health Care
Salt Lake City, UT**

**University of California,
San Francisco
San Francisco, CA**

**Palo Alto Medical Foundation
Palo Alto, CA**



Site Visit Observations

Patient records are fragmented.

Clinical user interfaces mimic paper without human factors & safety design.

Biomedical devices are poorly integrated.

Systems are used often to document what has been done, after the fact, for regulatory and legal uses.

Support for evidence-based medicine and computer-based advice is rare.

Clinical research activities are not well integrated into clinical care.

Legacy systems are predominant.

Centralization is the predominant method of standardization.

Implementations timelines are long and course changes are expensive.

Response times are variable and long down times occur.



**Root Cause: Mismatch between
Computational Technique & Scale of
Problem**

Automation

Connectivity

**Decision
Support**

Data Mining



Overarching Grand Challenge: Cognitive support

PATIENT CARE

RESEARCH

Where
clinicians
want to stay

Virtual
Patient

Medical
Knowledge

Decision Support

Medical Logic

Where
Health IT
chains us

Transactions

Clinical
research
transactions

Raw data

Raw research
data

Workflow modeling and support, usability, cognitive support, computer-supported cooperative work (CSCW), etc.



Stead WW, Lin HS. 2009. Computational technology for effective health care: immediate steps and strategic directions. Comput Sci and Telecom Board, Nat Res Council. Washington: National Academies Press.

Principles for Evolutionary Change

Focus on improvements in care — technology is secondary.

Seek incremental gain from incremental effort.

Record all available data to drive care, process improvement, and research.

Design for human and organizational factors so that social and institutional processes will not pose barriers.

Support the cognitive functions of all caregivers, including health professionals, patients, and their families.



Principles for Radical Change

Architect information and workflow systems to accommodate disruptive change.

Archive data for subsequent re-interpretation.

Seek and develop technologies that identify and eliminate ineffective work processes.

Seek and develop technologies that clarify the context of data.



Shifting the Paradigm to Achieve Interoperable Health Information by 2014

Redefine interoperable data

- § Data that can be assembled & interpreted in light of current knowledge & re-interpreted as knowledge advances

Require data liquidity

- § Separability of data & decision support content from applications

Limit use of standard data

- § Data whose meaning is explicit and stable



Paradigm Shift

OLD	NEW
One integrated set of data	Sets of data from multiple sources
Capture data in standardized terminology	Capture raw signal and annotate with standard terminology.
Single source of truth	Current interpretation of multiple related signals
Seamless transfer among systems	Visualization of the collective output of relevant systems
Clinician uses the computer to update the record during the patient visit.	Clinician & patient work together with shared records and information.
The system provides transaction-level data.	The system provides cognitive support.
Work processes are programmed and adapt through non-systematic work around.	People, process and technology work together as a system.



Match Computational Approach to Complexity of Data

