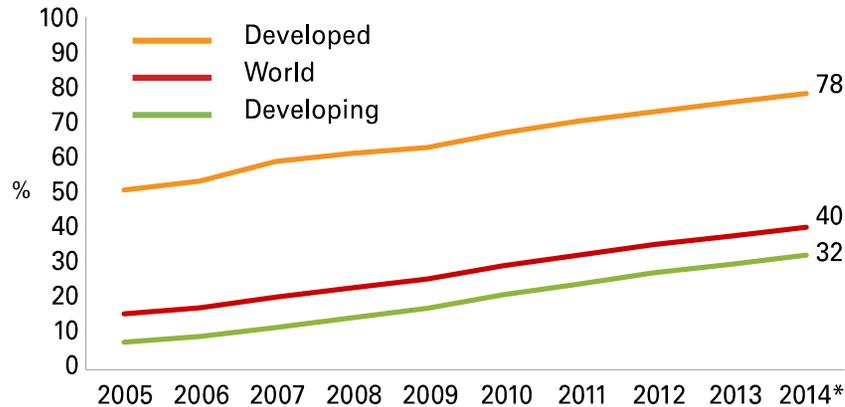


The Impact of 70 Years of NIT Research and Development

Nearly 80% of the Developed World is Online

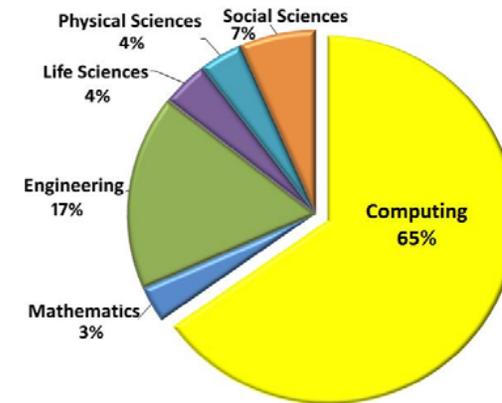


Note: * Estimate

Source: ITU World Telecommunication/ICT Indicators database

New Job Opportunities

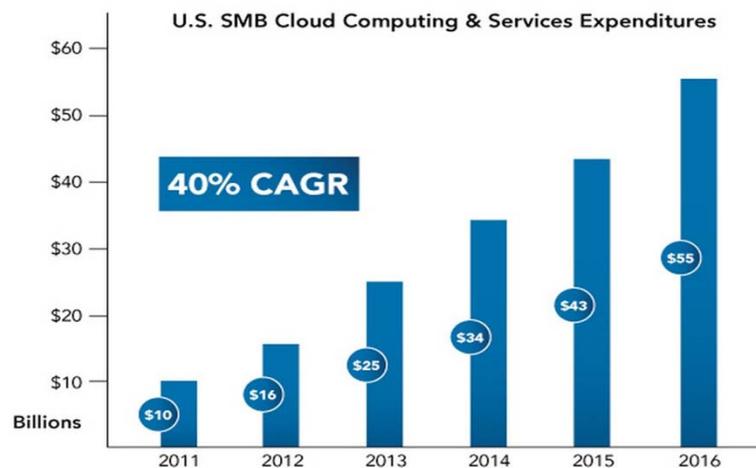
Projected Annual Growth of **NEWLY CREATED** STEM Job Openings 2012-2022



Source: Jobs data are calculated from the Bureau of Labor Statistics (BLS), Employment Projections 2012-2022, available at <http://www.bls.gov/emp/>. Courtesy of Association for Computing Machinery (acm.org).

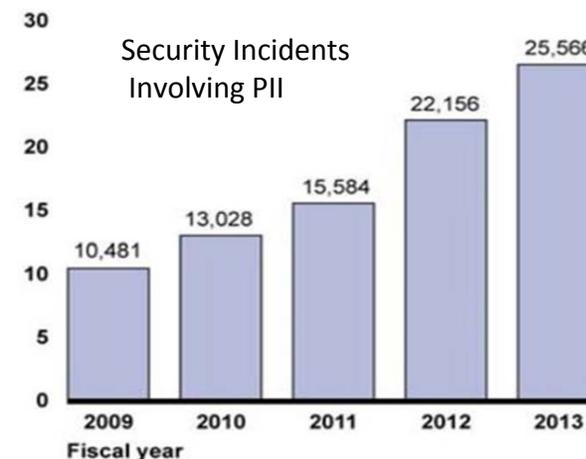
Computing Research Association – cra.org

Entirely New Economic Sectors



Source: Compass Intelligence

New Societal Challenges



Source: GAO analysis of US-CERT data for fiscal years 2009-2013.

The 2015 NITRD Review

Follows the 2010
and 2013 PCAST
reports on NITRD

Assess response to recommendations

Review state of the field and NITRD

Identify emerging challenges

Make new recommendations

Working Group

Study Co-Chairs

- Susan Graham
- Greg Hager (Johns Hopkins)

PCAST Members

- Michael McQuade
- Eric Schmidt

Working Group Members

- Sara Kiesler (CMU)
 - Bill Dally (Nvidia)
 - Eric Horvitz (Microsoft)
-

Timeline - 2015

Recurring Weekly Team Meetings Starting Tuesday, January 20



Weekly teleconferences

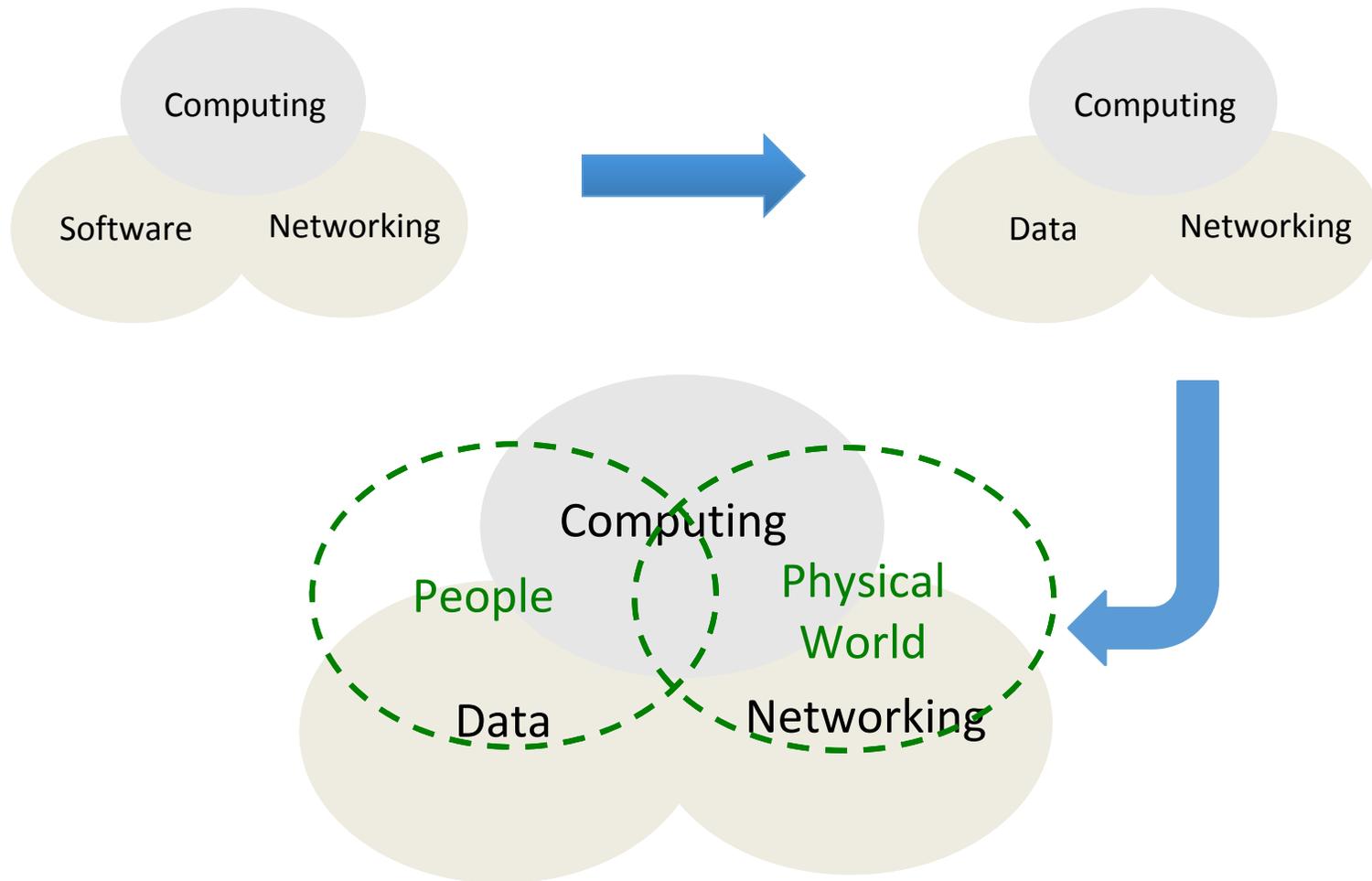
Consultations with multiple experts from government, private sector, and academia

Committee interviews and reading/review

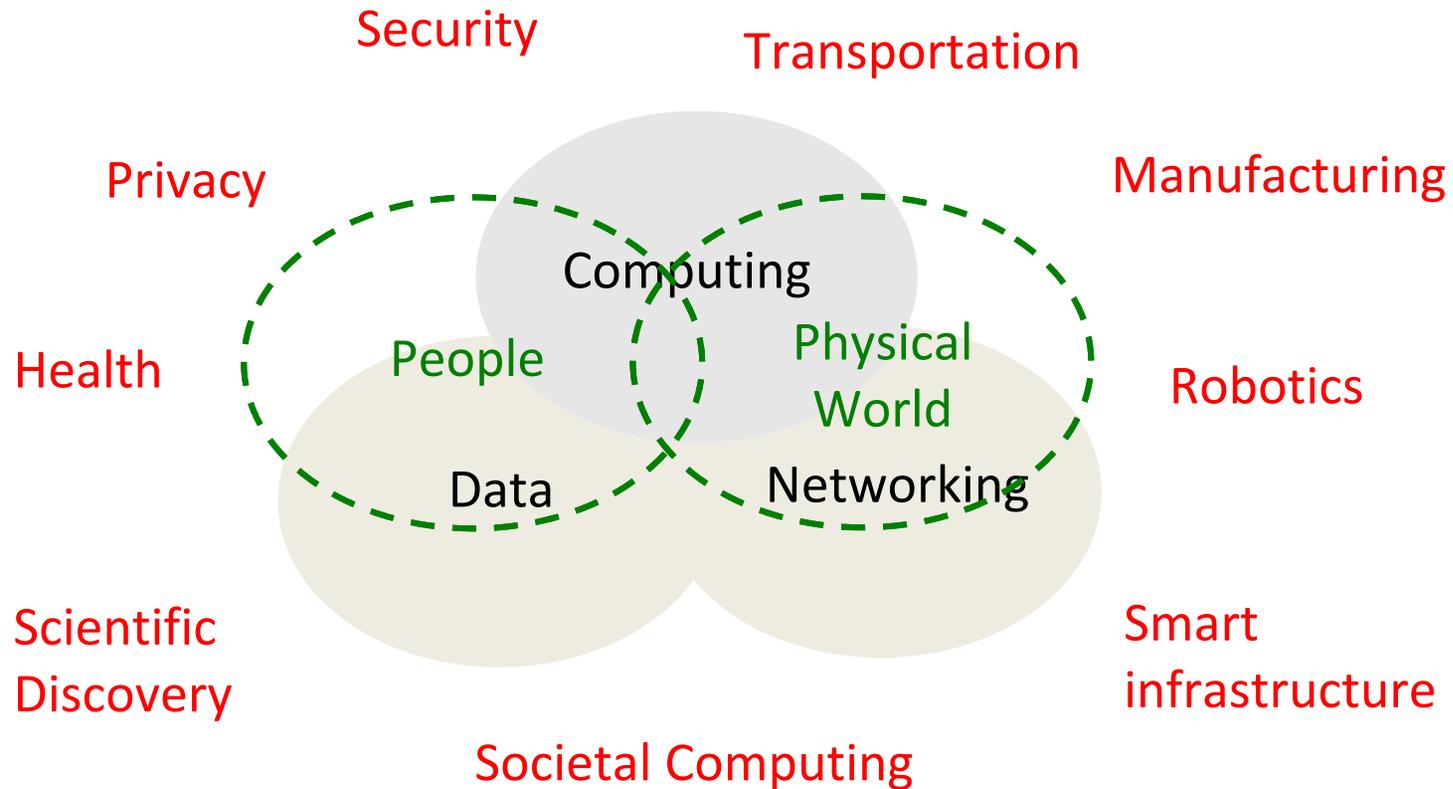
General Observations on NIT

- Strong contributor to our national economic and societal well-being.
- Under stress due to growth of field, need for trained workers, relatively flat federal research funding.
- Emerging convergences of historically separate research areas points to growing need for multidisciplinary research.
- Continued need for coordination to maximize impact of federal investments in NIT R&D

Evolution of NIT 1991-2015



Evolution of NIT 1991-2015



This evolution has not diminished, but rather has increased the relevance and role of NITRD in coordinating federal investments in NIT research.

NIT R&D
is essential to
many
National
Priorities

Cybersecurity - research on cybersecurity by design, defense against attack, systems resilience, implementation support, better and faster attack attribution methods.

Health - research on treatment and outcomes, disease and wellness, mobile and biometric technologies for monitoring and care, actionable decision support, regulatory compliance.

These areas remain critical – multi-agency coordination is essential to promote collaboration, public-private partnerships, and to create paths for translation into practice.

Government
Initiatives
Catalyze
NIT R&D

Big Data and Data Intensive Computing -
research on automated large-scale analysis, causality, confidence and errors, active learning, understanding deep learning, interactive data visualization and exploration.

NIT Interaction with the Physical World -
robotics, cyber-physical systems, Internet of Things. Research on robust autonomy, cyber-human effects, realtime multi-modal sensing, intelligent systems components.

Both need multi-agency and multi-disciplinary collaboration and foundational research coupled with effective means of deployment and testing.

R&D that
Integrates
People
and NIT

Privacy - a science of privacy based on NIT is needed to inform policy decisions and to enable appropriate use of personal data while protecting its source.

Cyber-human systems – computational systems that support communication and coordination of individuals, groups, and organizations, computational systems and methods supported by people and socially-intelligent devices and systems.

Results from cyber-human systems are increasingly used to address important societal problems. Advances in both domains require broad, multidisciplinary research.

The Technology Base

Foundational NIT Research – long-term research that advances understanding and discovery and provides the base for future innovation and disruptive advances in the use of NIT

High-capability computing – need a substantial and sustained program of long-term, fundamental research on architectures, algorithms and software for high-capability compute-intensive and data-intensive computing systems.

Long-term research in NIT is essential for the application areas that build on it, and for the future of our robust NIT industry.

High-capability systems are platforms for current and future advances in science, commerce, and defense.

Developing the Workforce

The demand for skilled IT workers necessitates new approaches to identify and train students and to retain them in the educational pipeline as they progress from the K-12 level to college and beyond.

Diversity in computing-related fields continues to be a significant issue. This reduces our ability to fulfill the demand of the IT industry and limits the economic opportunities for those populations.

Programs are needed to grow the pipeline by attracting and retaining students at all levels, and by enhancing diversity.

Principled approaches for training and retraining of workers are needed to address immediate needs and opportunities to grow the IT workforce.

Effectiveness of NITRD coordination

Multi-agency budget reporting and coordination of networking and information technology R&D continues to be important.

The model of coordination and management instantiated through the NITRD Subcommittee, the NCO and the NITRD Groups is appropriate and beneficial.

Previous recommendations to modernize the budget reporting and coordination structure have not been followed.

Revise the
NITRD
Budget
PCAs

Tracking of government investment in NIT R&D is inhibited by outdated Program Component Areas (PCAs).

PCAST recommends that OSTP, NCO, and the NITRD Subcommittee, in collaboration with OMB,

- create a process for periodic review and revision.
- revise the PCAs for the 2017 Budget cycle to reflect both the current nature of NIT and the major national priorities in which NIT plays a major role.

The report proposes a new list of PCAs.

Update the NITRD Coordination Groups

The coordination process lacks transparency and process regarding the creation and operation of coordinating groups

PCAST recommends that

- The NITRD Subcommittee, in collaboration with NSTC and OSTP, establish specific language specifying what the purpose of each *type* of Group is and what mechanisms should be used to establish, monitor and terminate a Group.
- The NITRD Subcommittee, in collaboration with NCO and OSTP define a process for periodic review of each Group, with a recommendation for continuation, modification or sunset.
- Each Senior Steering Group periodically publish and publicly discuss a research and coordination plan for its area of interest.

The report suggests some changes to the Groups.

