

National Workshop on High Confidence Automotive Cyber-Physical Systems

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NITRD SC and Program Coordination

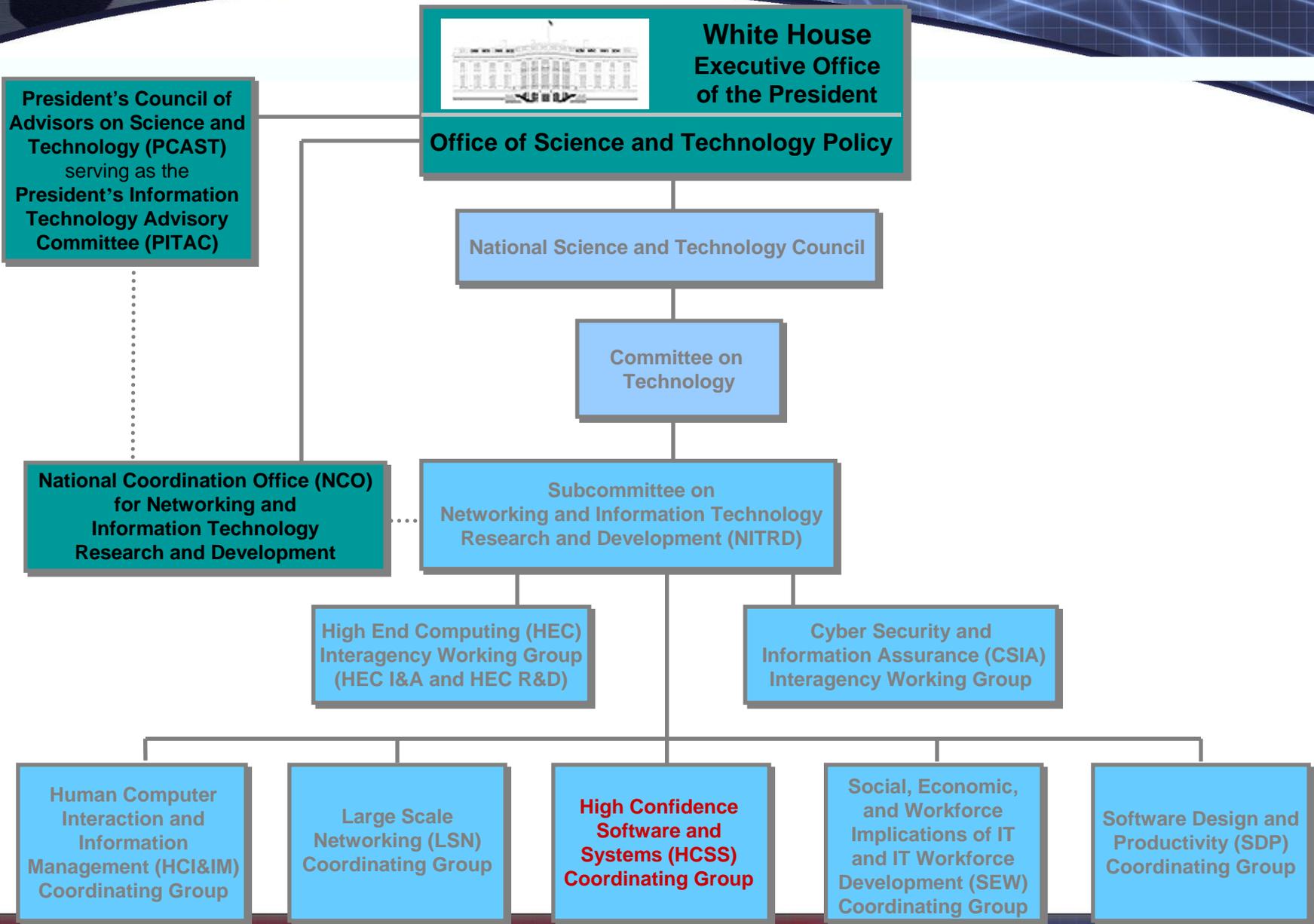
- ◆ **Coordination takes place under the auspices of the National Science and Technology Council (NSTC)**
 - The NSTC structure allows Federal agencies to focus critical attention to technical and budget planning, coordination, and assessment

- ◆ **Coordination is led by the NITRD Subcommittee**
 - Legislative bases for the Networking and Information Technology Research and Development (NITRD) Program
 - The High-Performance Computing Act of 1991 (Public Law 102-194) as amended by the
 - Next Generation Internet Research Act of 1998 (P.L. 105-305) and the
 - America COMPETES Act of 2007 (P.L 110-69)
 - Reports to the NSTC Committee on Technology
 - Representatives from 13 program agencies + OMB + OSTP + NCO/NITRD
 - Has eight coordination bodies, or Program Component Areas (PCAs), including two Interagency Working Groups (IWGs) and five Coordinating Groups (CGs)
 - High End Computing (HEC) IWG that coordinates both HEC Infrastructure and Applications (I&A) and HEC R&D
 - Cyber Security and Information Assurance (CSIA) IWG
 - Human-Computer Interaction and Information Management (HCI&IM) CG
 - Large Scale Networking (LSN) CG
 - High Confidence Software and Systems (HCSS) CG
 - Social, Economic and Workforce Implications of IT (SEW) CG
 - Software Design and Productivity (SDP) CG

- ◆ **Budget of \$3.5 billion proposed for FY 2009**



NITRD Program Coordination Groups



NITRD Agencies (1/2)

(By size of NITRD budget)

- ◆ **National Science Foundation (NSF)**
- ◆ **Office of the Secretary of Defense and Services research organizations (OSD)**
- ◆ **Defense Advanced Research Projects Agency (DARPA)**
- ◆ **National Institutes of Health (NIH)**
- ◆ **Department of Energy Office of Science (DOE/SC)**
- ◆ **National Security Agency (NSA)**
- ◆ **National Aeronautics and Space Administration (NASA)**



NITRD Agencies (2/2)

(By size of NITRD budget)

- ◆ **National Institute of Standards and Technology (NIST)**
- ◆ **Agency for Healthcare Research and Quality (AHRQ)**
- ◆ **Department of Energy National Nuclear Security Administration (DOE/NNSA)**
- ◆ **National Oceanic and Atmospheric Administration (NOAA)**
- ◆ **Environmental Protection Agency (EPA)**
- ◆ **National Archives and Records Administration (NARA)**



NITRD Participating Agencies

- ◆ Air Force Research Lab (AFRL)
- ◆ Air Force Office of Scientific Research (AFOSR)
- ◆ Department of Energy (OE)
- ◆ Department of Homeland Security (DHS)
- ◆ Federal Aviation Administration (FAA)
- ◆ Food and Drug Administration (FDA)
- ◆ Office of Naval Research (ONR)



Agency NITRD Budgets by PCA

FY 2009 Budget Requests (dollars in millions)

Agency		High End Computing Infrastructure & Applications (HEC I&A)	High End Computing Research & Development (HEC R&D)	Cyber Security & Information Assurance (CSIA)	Human-Computer Interaction & Information Management (HCI &IM)	Large Scale Networking (LSN)	High Confidence Software & Systems (HCSS)	Social, Economic, & Workforce Implications of IT (SEW)	Software Design & Productivity (SDP)	Total ¹
NSF	2008 Estimate	257.4	78.6	68.1	234.8	82.6	56.6	98.6	54.8	931.5
	2009 Request	298.4	91.5	87.6	266.5	95.8	67.6	112.0	70.8	1,090.3
DARPA			92.0	124.4	205.3	109.0				530.7
			142.6	106.8	184.9	135.9				570.2
OSD and DoD Service research orgs. ²		247.6	18.1	38.6	109.6	136.1	25.6		6.7	582.3
		249.6	15.6	40.7	92.9	114.1	26.9		7.8	547.5
NIH		159.4	76.4	1.1	182.7	68.1	7.7	10.8	4.6	510.7
		159.4	76.3	1.1	181.7	68.0	7.7	10.8	4.6	509.6
DOE/SC/NE/FE ³		282.0	73.1			47.6		5.0		407.6
		334.6	73.1			52.2		5.0		465.0
NSA			93.5	15.5		2.9	25.2			137.1
			72.6	17.8		1.8	27.2			119.3
NASA		59.4		0.3	6.5	1.3	4.8			72.3
		60.1		0.2	5.5	0.7	4.3			70.7
NIST		10.7	2.4	20.8	11.8	5.8	4.9		5.6	62.0
		10.7	2.4	25.8	11.8	5.8	4.9		5.6	67.0
AHRQ					39.8	5.0				44.8
					39.8	5.0				44.8
DOE/NNSA		8.4	14.3			1.3		4.3		28.3
		8.2	15.7			0.9		4.7		29.5
NOAA		15.9	1.9		0.5	2.9			1.6	22.8
		18.0	1.9		0.5	2.9				23.3
EPA		3.3			3.0					6.3
		3.3			3.0					6.3
NARA					4.5					4.5
					4.5					4.5
TOTAL (2008 Estimate) ¹		1,044.1	450.4	268.7	798.5	462.4	124.8	118.7	73.3	3,341
TOTAL (2009 Request) ¹		1,142.4	491.8	279.8	791.2	483.0	138.5	132.6	88.7	3,548



NCO Objectives

◆ **The National Coordination Office (NCO) for NITRD supports the Program's multi-agency technical activities. The NCO's objectives are:**

- To support NITRD-related policy making in the White House Office of Science and Technology Policy (OSTP)
- To serve as the Federal focal point for interagency technical planning, budget planning, and coordination for the Federal NITRD Program
- To serve as a source of timely, high-quality, technically accurate, in-depth information on accomplishments, new directions, and critical challenges relevant to the NITRD Program
- To augment the impact of information technology R&D as a transforming force for societal and economic good



NCO Support for NITRD Coordination (1/2)

- ◆ **Technical support for workshops, meetings, studies, industrial interactions**
- ◆ **Production of major Federal reports**
 - Research Needs Reports
 - Reports derived from HCSS national workshops
 - Special reports (e.g., NITRD Grand Challenges)
 - Federal Plans
 - PITAC reports and August 2007 PCAST assessment of the NITRD Program



NCO Support for NITRD Coordination (2/2)

- ◆ **Technical and administrative support for the PCAST/NIT Subcommittee up until 2007 which resulted in the publication:**
 - *Leadership Under Challenge: Information Technology R&D in a Competitive World*
 - Report of the President’s Council of Advisors in Science and Technology, serving as the President’s IT Advisory Committee
 - Published August 2007
 - Available at www.nitrd.gov
 - Assesses the NITRD Program, and more
 - “NIT [Networking and IT] systems connected to the physical world (CPS)” (Essential element of the HCSS PCA R&D scope)
 - ❑ Warrant disproportionately larger funding increases
 - ❑ Addresses issues for which progress will have both the greatest effect on important applications and the highest leverage in advancing NIT capabilities
 - Recommends Federal Plan for coordinated multi-agency R&D
 - ❑ Already underway
 - ❑ Any R&D roadmap needs priorities, metrics
 - Develop in consultation with academia and industry
 - Recommends rebalancing funding profile by increasing support for:
 - ❑ Larger-scale, longer-term, multidisciplinary R&D
 - ❑ Innovative and higher-risk explorations



Next Steps: A Government Perspective

- ◆ **Retrain current generation — and train future generations — of researchers and workforce to be able to develop assuredly dependable systems — better, cheaper, and faster**
 - Requires new curricula
 - HCSS is already working here, including at K-12 STEM
- ◆ **Potential substantial, far reaching impact for all NITRD PCAs, especially HCSS**
 - HCSS emphasis is on complex, real-time, assured, highly dependable IT-centric cyber-physical systems — about which more later ...

HCSS APPROACH to NITRD

- **Complements the work of other NITRD areas by focusing on the scientific foundations needed for building dependable systems. Related NITRD activities include:**
 - HEC: Advanced platforms and software for modeling/simulation of complex physical systems (e.g., aircraft, air traffic control systems)
 - CSIA: In coordination with private sector, preparing to roadmap critical R&D needs in cyber security and information assurance – called for in the *Federal Plan for CSIA R&D*
 - HCI&IM: R&D in integration of large-scale science and engineering data; multimodal interfaces; cognitive systems
 - LSN: R&D in next-generation optical architectures to improve network reliability, security, and performance
 - SEW: Education and training of the next generation of IT researchers
 - SDP: Foundational R&D in the science of software design for improved cost-effectiveness and “producibility”



The HC Automotive CPS Workshop's Importance to the NITRD Program

- ◆ The HC Automotive CPS Workshop is an excellent example of NITRD coordination at work and the HCSS CG's attempt to expose the complex NITRD challenges that underlie the dependability, reliability, safety, survivability, and trustworthiness of our Nation's critical infrastructures as well as the quality of U.S. manufactured high integrity, IT-centric technologies, such as in this case, the automobile industry
- ◆ Your presence here today shows that the Federal government working with our academic and industry research communities are well-positioned and willing to tackle these IT hard problems facing this important industry sector.



Any Questions ?

◆ Thank You!

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