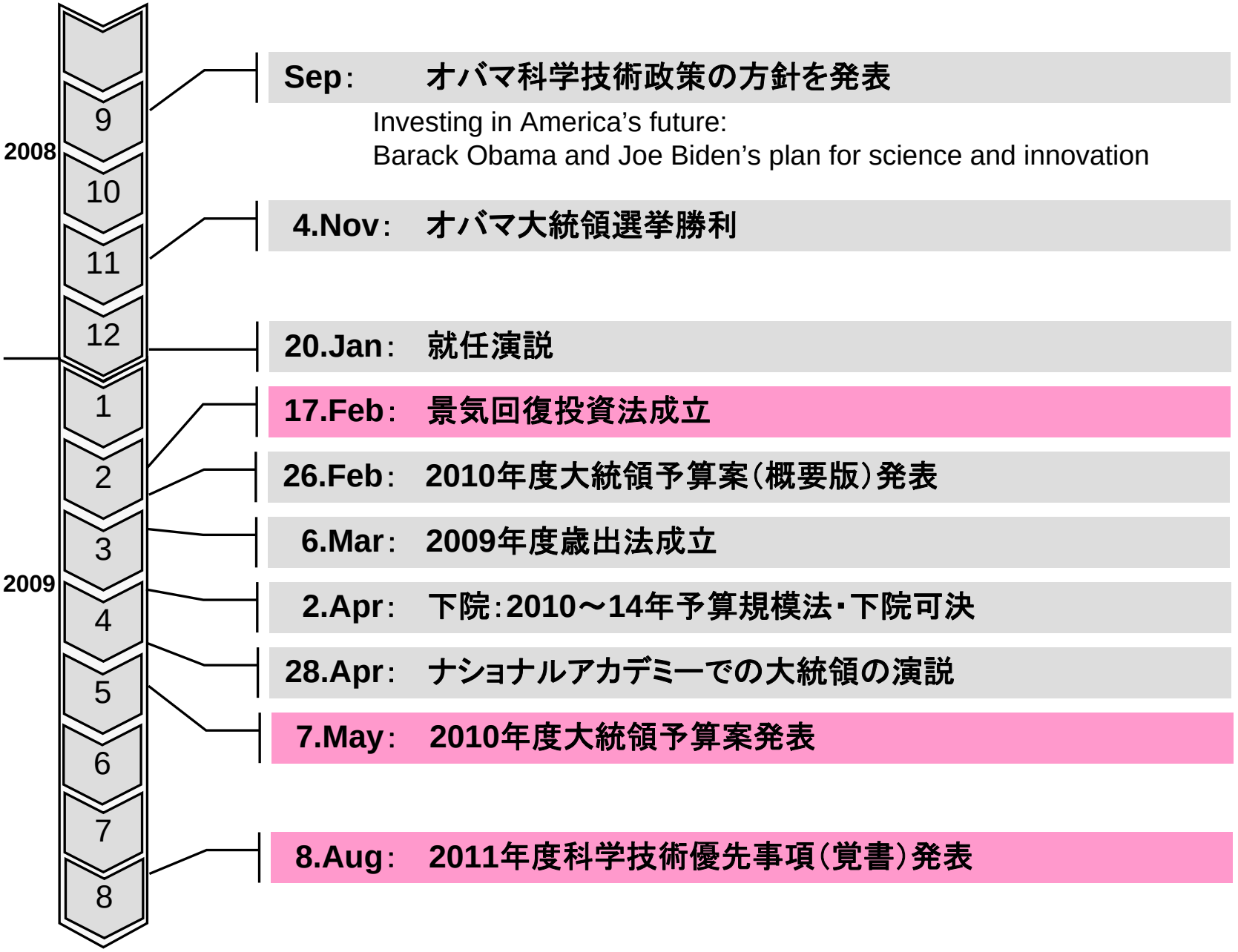
米欧の情報通信分野へのファンディング状況

- 米: ＮＩＴＲＤ（The Networking and Information Technology Research and Development program）
- 欧: ICT Work Programme, FP7 (Updated WP 2009 and WP 2010 Cooperation, ICT, Framework Programme 7)

2009/9/30

JST研究開発戦略センター
丹羽 邦彦


2008
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2009
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Sep: オバマ科学技術政策の方針を発表
Investing in America's future:
Barack Obama and Joe Biden's plan for science and innovation
4.Nov: オバマ大統領選挙勝利
20.Jan: 就任演説
17.Feb: 景気回復投資法成立
26.Feb: 2010年度大統領予算案(概要版)発表
6.Mar: 2009年度歳出法成立
2.Apr: 下院:2010～14年予算規模法・下院可決
28.Apr: ナショナルアカデミーでの大統領の演説
7.May: 2010年度大統領予算案発表
8.Aug: 2011年度科学技術優先事項(覚書)発表

US

NITRD Program

(NITRD: The Networking and Information Technology Research and Development)

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	2009 Estimate	323.4	77.6	63.3	250.3	99.00	62.1	73.8	54.8	1,004.3
	2010 Request	**314.3**	**106.6**	**67.4**	**283.4**	**110.6**	**74.8**	**95.2**	**58.5**	**1,110.8**
NIH [2]		419.1	66.4		248.1	61.5	93.6	13.2	33.9	935.8
		424.6	**67.8**		**252.6**	**61.9**	**95.0**	**13.4**	**34.5**	**949.8**
DARPA			139.0	125.4	184.9	129.7				579.1
			145.0	**143.6**	**187.6**	**106.4**	**4.9**			**587.5**
DOE [3]		285.2	79.1			49.3		6.0		419.5
		312.2	**92.7**			**54.8**		**8.0**		**467.7**
OSD and DoD Service research orgs. [4]		235.0	3.4	71.1	83.8	94.9	27.9		16.7	532.7
		237.6	**3.5**	**70.0**	**26.9**	**72.7**	**22.7**		**18.2**	**451.6**
NSA			122.7	36.9		1.6	7.5			168.7
			60.9	**32.2**		**2.2**	**6.7**			**102.0**
NIST		11.8	3.6	23.4	12.3	5.7	4.5		4.9	66.1
		12.8	**4.1**	**29.3**	**13.4**	**5.9**	**7.0**		**7.4**	**79.8**
NASA		58.0			7.5	2.4	4.0		2.2	74.0
		58.4			**7.0**	**2.4**	**4.0**		**1.5**	**73.2**
AHRQ					43.8	1.0				44.8
					43.8	**1.0**				**44.8**
NOAA		24.8	0.2		0.5	2.0			0.5	28.0
		26.7	**0.2**		**0.5**	**3.0**			**0.5**	**30.9**
DOE/NNSA		4.8	9.4			1.0		2.9		18.1
		6.5	**6.0**			**.8**		**4.2**		**17.5**
EPA		3.3			3.0					6.3
		3.3			**3.0**					**6.3**
NARA					4.5					4.5
					4.5					**4.5**
TOTAL (2009 Estimate) [1]		1,365.4	501.3	320.1	838.7	448.0	199.6	95.9	113.0	3,882
TOTAL (2010 Request) [1]		**1,396.4**	**486.8**	**342.5**	**822.7**	**421.7**	**215.0**	**120.8**	**120.6**	**3,926**

FY2009 Budget Estimates and FY2010 Budget Requests

US

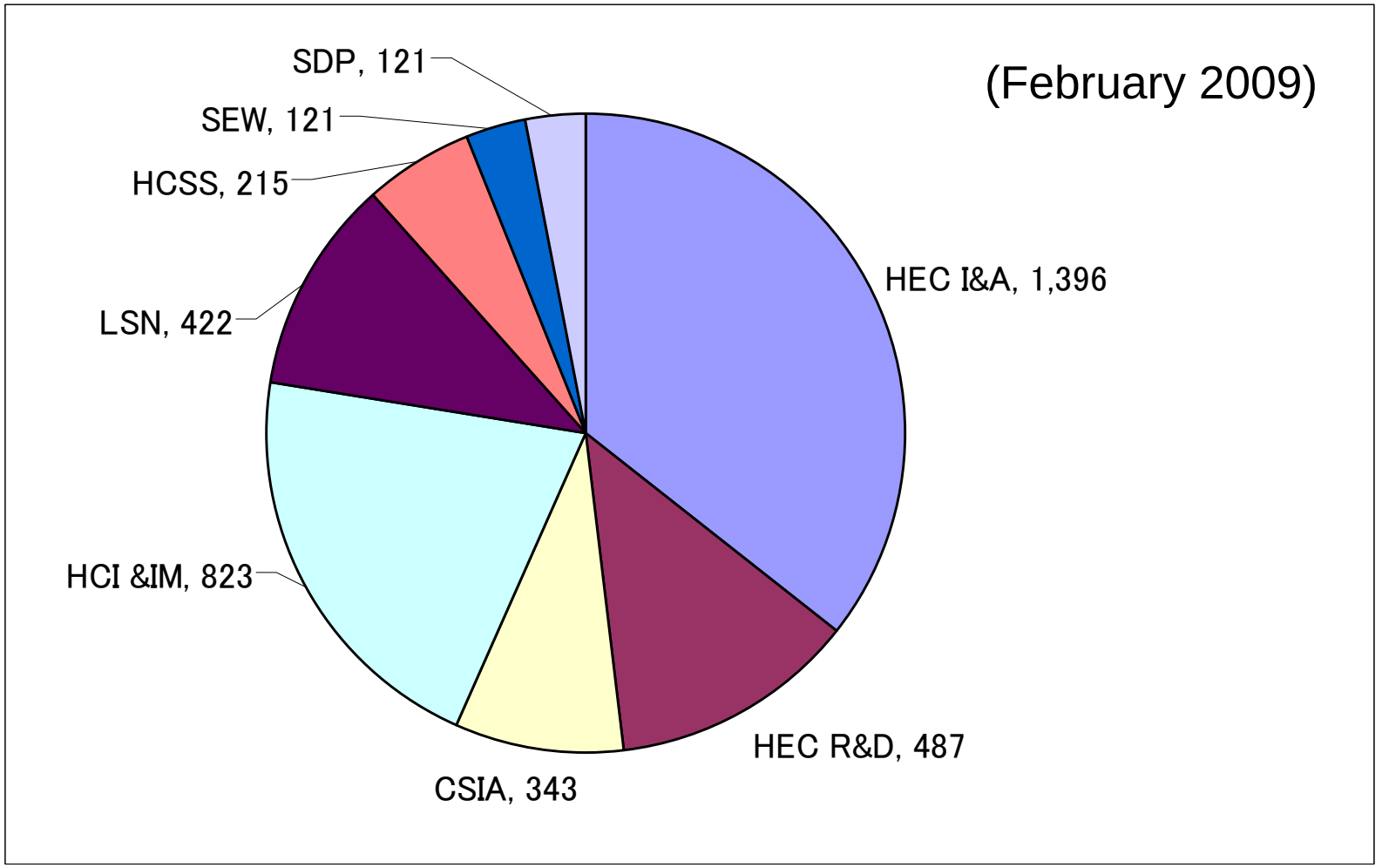
NITRD Program Component Areas

1. High End Computing (HEC)
   - Infrastructure and Applications (I&A)
   - Research and Development (R&D)
2. Cyber Security and Information Assurance (CSIA)
3. Human Computer Interaction and Information Management (HCI&M)
4. Large Scale Networking (LSN)
5. High Confidence Software and Systems (HCSS)
6. Social, Economic, and Workforce Implications of IT and IT Workforce Development (SEW)
7. Software Design and Productivity (SDP)

US

NITRD FY 2010 Budget Requests
by Program Component Area (M$)

FY 2010 Budget Requests : 3,926 M$ (in total)

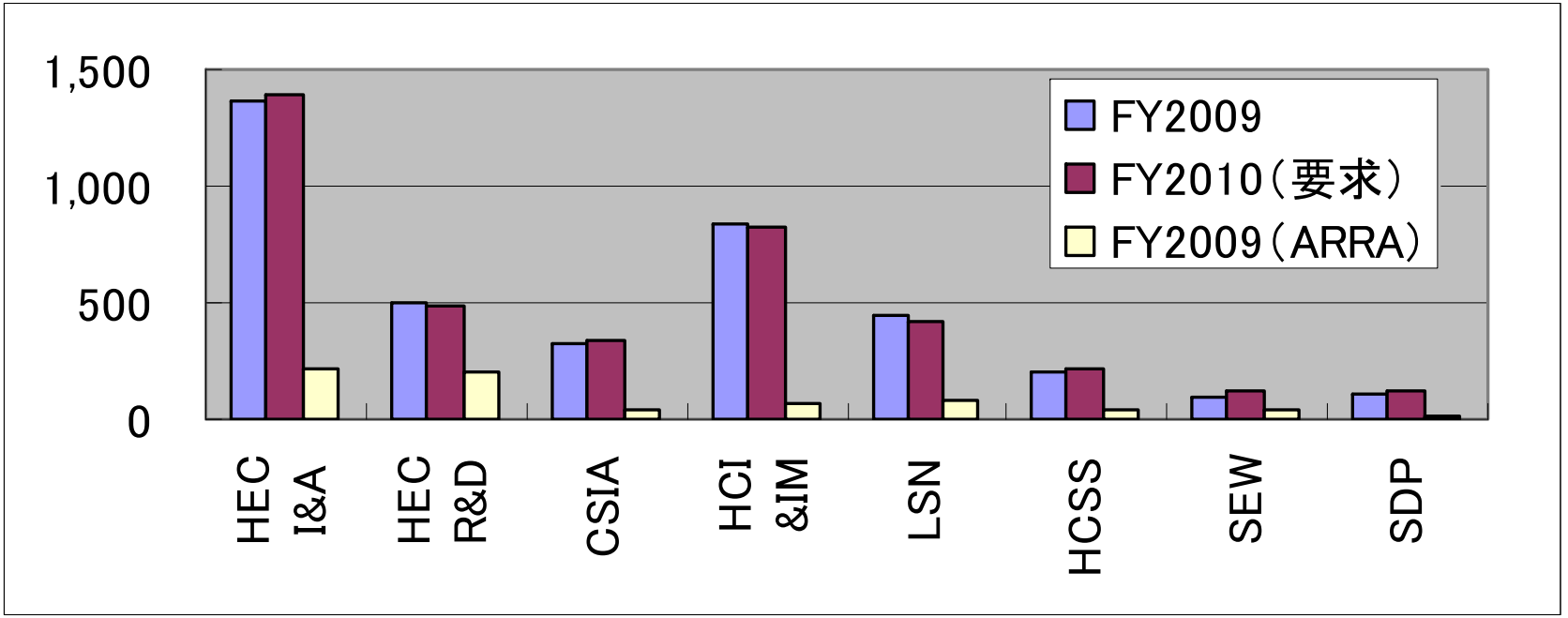


US

http://www.nitrd.gov/Pubs/2010supplement/FY10Supp-FINALFormat-Web.pdf

NITRD Budgets (M$)

FY 2009: 3,882 M$ (in total) ＜ FY 2010: 3,926 M$ (in total) : 1%増額要求



HEC I&A: High End Computing Infrastructure & Applications
HEC R&D: High End Computing Research & Development
CSIA: Cyber Security & Information Assurance
HCI&IM: Huma-Computer Interaction & Information Management
LSN: Large Scale Networking
HCSS: High Confidence Software & Systems
SEW: Social, Economic, & Workforce Implications of IT
SDP: Software Design & Productivity

ARRA (American Recovery and Reinvestment Act): 別会計

US

http://www.nitrd.gov/Pubs/2010supplement/FY10Supp-FINALFormat-Web.pdf

優先テーマ (OSTP*)

*** Office of Science and Technology Policy**

- **Research priorities that NSTC subcommittees have identified:**
  - **Cybersecurity**
    - Federal government should provide a framework for research and development strategies that focus on game-changing technologies that will help meet infrastructure objectives, building on the existing NITRD strategies and other R&D-related work.
  - **Cyber-Physical Systems**
    - Modern vehicles, aircraft, medical devices, machine tools, electrical grids, and many other essential technologies are cyber-physical systems that blend cyber-and engineered components to achieve advanced performance capabilities
  - **Research Capability through Health IT Design and Implementation**
    - The investment in health IT infrastructure planned over the next five years enables research to advance frontiers of biomedical knowledge and medical practice, promote innovation in health care delivery, and enhance the quality, reduce the cost, and increase the accessibility of health care.

Memorandum for NSTC (National Science and Technology Council) Principals
From: John Holdren, Director, OSTP

US

注目テーマ (NSF)

- Cyber Enabled Discovery and Innovation (CDI)
  - FY2008-
  - Create revolutionary science and engineering research outcomes made possible by innovations and advances in computational thinking. Computational thinking is defined comprehensively to encompass computational concepts, methods, models, algorithms, and tools.
  - 151 programs have been awarded (2009/9).

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503163

- Cyber Physical Systems (CPS)
  - FY2009-
  - The term cyber-physical systems refers to the tight conjoining of and coordination between computational and physical resources. We envision that the cyber-physical systems of tomorrow will far exceed those of today in terms of adaptability, autonomy, efficiency, functionality, reliability, safety, and usability.
  - 53 programs have been awarded (2009/9).

US

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503286&org=NSF&sel_org=NSF&from=fund

FY2010 Strategic Priorities (1)

■ HEC I&A

- Leadership-class systems
- Production-quality HEC resources
- Advanced applications

■ HEC R&D

- Next-generation HEC systems
- Extreme-scale computation
- New hardware and software directions
- Productivity
- Prototypes
- Talent pool

US

http://www.nitrd.gov/Pubs/2010supplement/FY10Supp-FINALFormat-Web.pdf

FY2010 Strategic Priorities (2)

■ CSIA

- Foundations
- Applied and information infrastructure security
- Situational awareness and response
- Infrastructure for R&D

■ HCI & IM

- Information integration
  - Information standards
  - Decision support
  - Information management
- Information infrastructure
- Active systems

US

http://www.nitrd.gov/Pubs/2010supplement/FY10Supp-FINALFormat-Web.pdf

FY2010 Strategic Priorities (3)

LSN

- Federal Plan for Advanced Networking Research and Development
- Virtual organizations over networking
- Performance measurement over multimedia, multidomain networks

HCSS

- New croscutting scientific foundations for building high-confidence CPS (Cyber Physical Systems)
- New high-confidence, assured, run-time infrastructure for real-time systems
- Next generation of assured, high-confidence critical CPS

US

http://www.nitrd.gov/Pubs/2010supplement/FY10Supp-FINALFormat-Web.pdf

FY2010 Strategic Priorities (4)

SEW

- Human-centered computing
- Broadening participation in computing
- Federal IT innovation through practitioner communities and emerging technologies
- Public policy
- Computational thinking for everyone

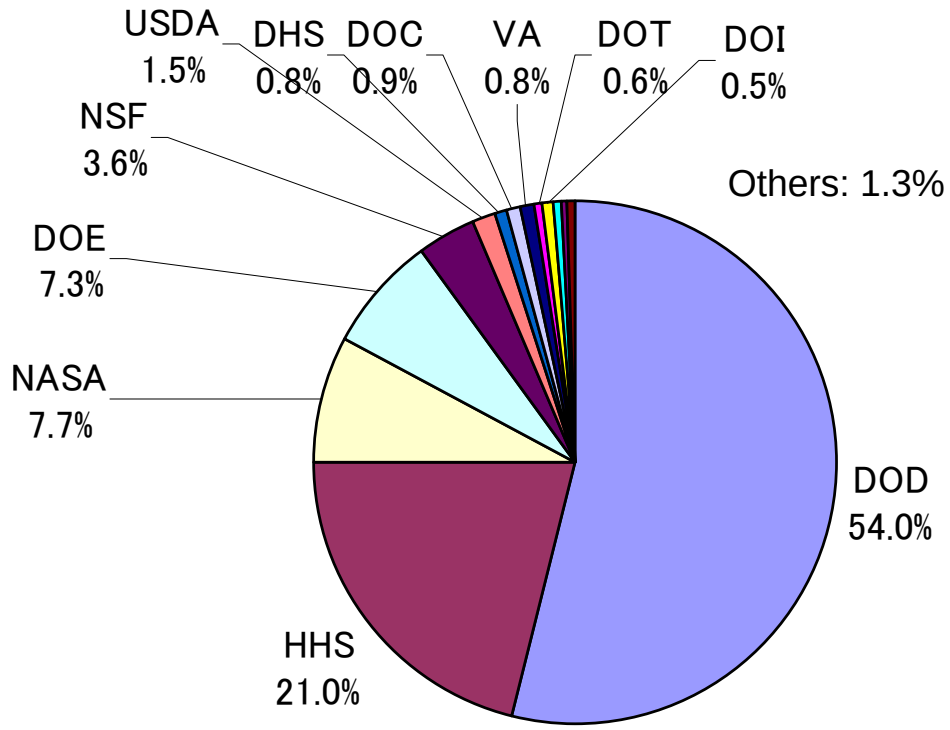
SDP

- Research to rethink software design
  - Foundations
  - New paradigms
- Predictable, timely, cost-effective development of software-intensive systems
  - Advanced integration standards
  - Software application interoperability and usability

US

http://www.nitrd.gov/Pubs/2010supplement/FY10Supp-FINALFormat-Web.pdf

【参考】 Federal R&D Budget, US



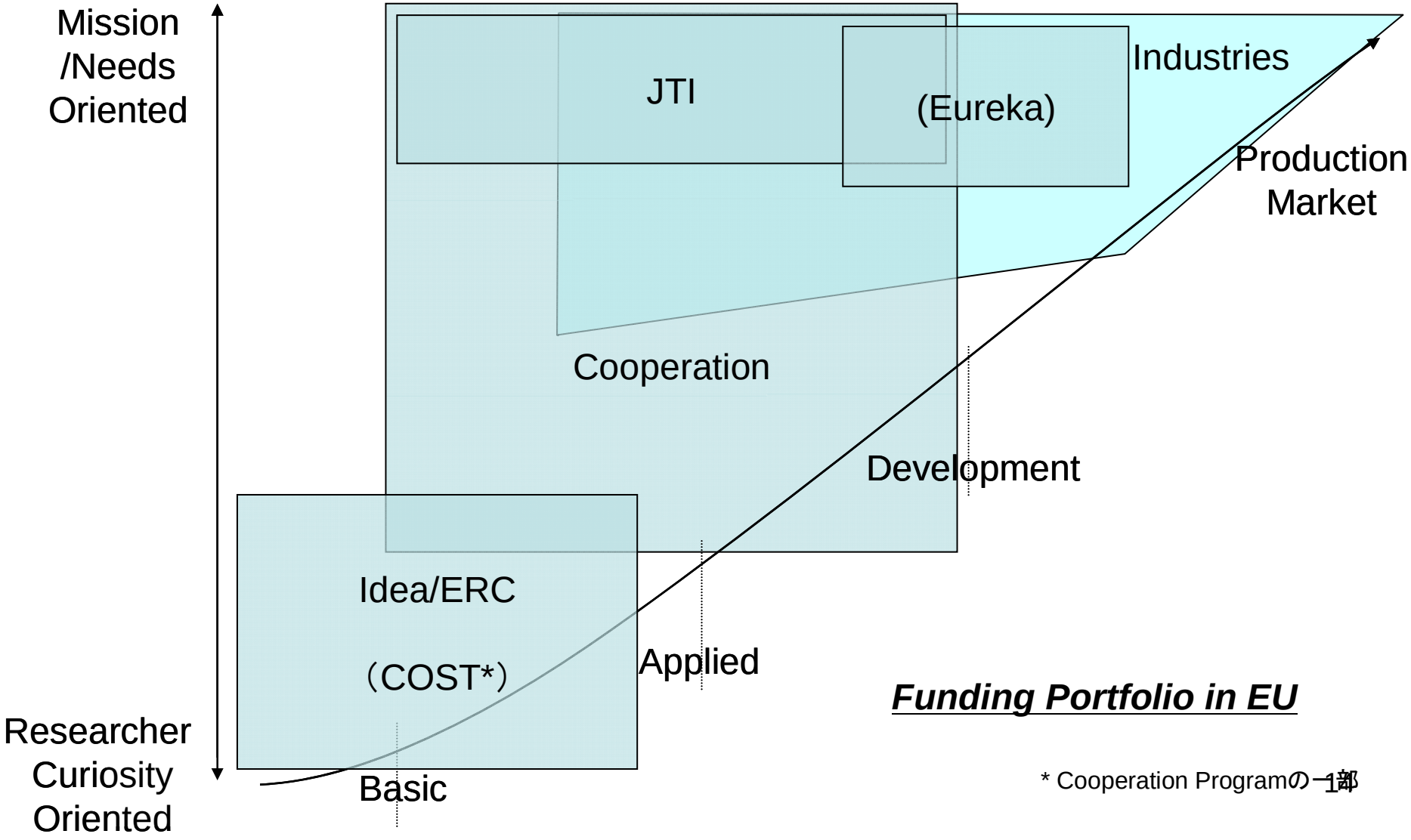
FY2010 US R&D Budget: 147,620 B$ (in total)

DOD: Department of Defence
HHS: Department of Health and Human Service
NASA: National Aeronautics and Space Administration
DOE: Department of Energy
NSF: National Science Foundation
USDA: U.S. Department of Agriculture
DHS: Department of Homeland Security
DOI: Department of the Interior
DOT: Department of Transportation
EPA: Environmental Protection Agency
DOC: Department of Commerce

Budget of the United States Government: Fiscal Year 2010
http://www.gpoaccess.gov/USbudget/fy10/index.html

US

欧州委員会の研究開発助成スキーム



Funding Portfolio in EU

* Cooperation Programの一部

Cooperation vs. Idea

	Cooperation	Idea
研究タイプ	Objective-Driven トップダウン（目的達成）型	Investigator-Driven ボトムアップ型
対象分野	基本的に前もって定めた優先領域の範囲内	全科学技術分野（社会・経済科学、人文学を含む）で優先分野などはない
プロジェクト参加国	複数国の研究者による共同研究	個別研究者
複数国の参加	必須	必須でない
審査	エキスパートパネル	ピアレビュー
実施主体	EU研究総局	独立性の高い研究者による組織 （European Research Council）

Challenges in FP7-ICT

ICT Work Programme (2009-2010)

1. Pervasive and Trusted Network and Service Infrastructures
2. Cognitive Systems, Interaction, Robotics
3. Components, Systems, Engineering
4. Digital Libraries and Content
5. Towards Sustainable and Personalized Healthcare
6. ICT for Mobility, Environmental Sustainability and Energy Efficiency
7. ICT for Independent Living and Inclusion
8. Future and Emerging Technologies (FET)
9. Horizontal Support Actions
10. Contribution of the ICT Theme to Public-Private Partnerships for R&D in the European Economic Recovery Plan

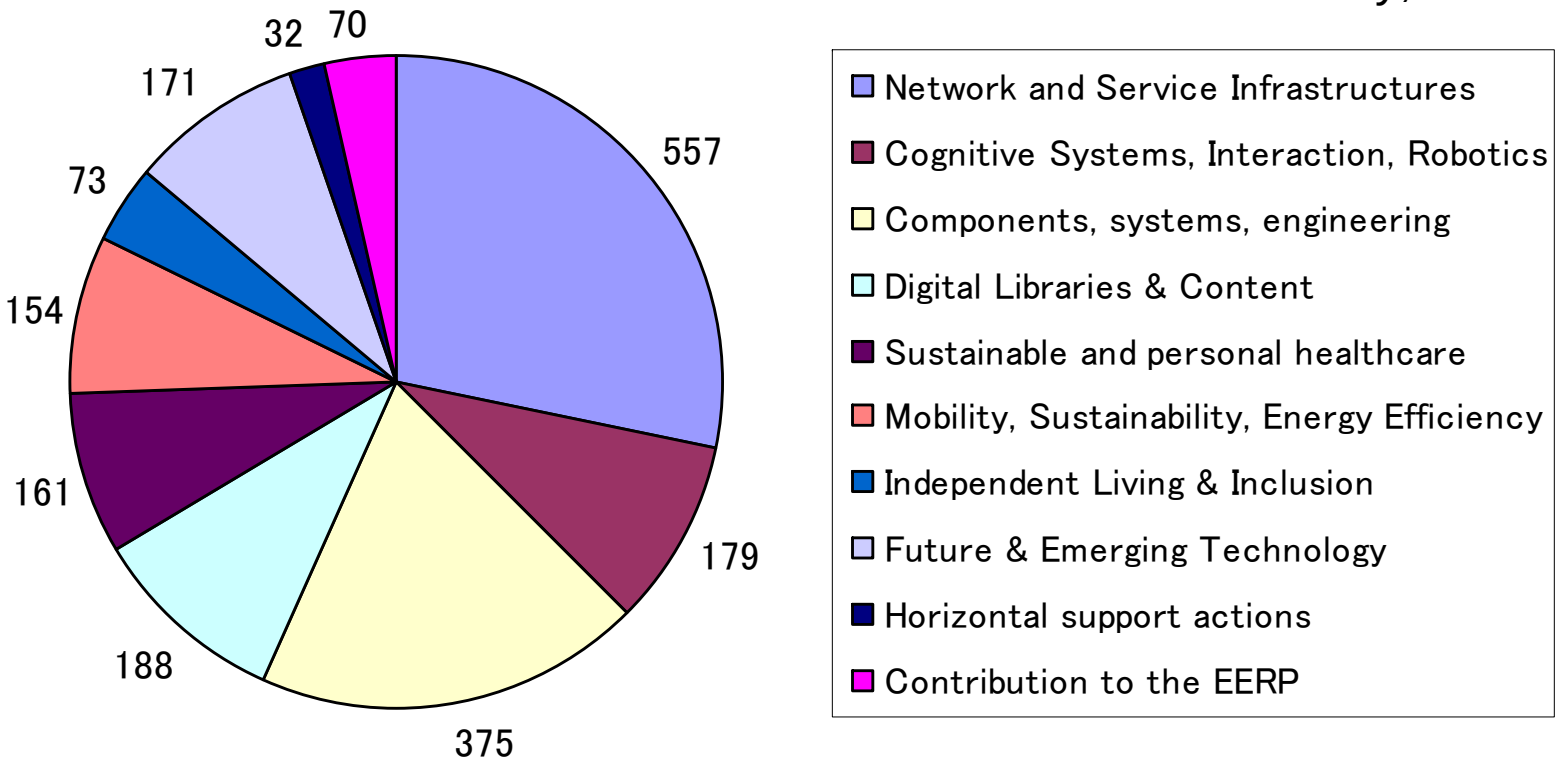
EU

ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/ict-wp-2009-10_en.pdf

FP7-ICT Budget Breakdown
FY 2009-2010 (M€)

FY 2009-2010 Budget (preliminary draft budget) : 1960 M€ (in total)

July, 2009

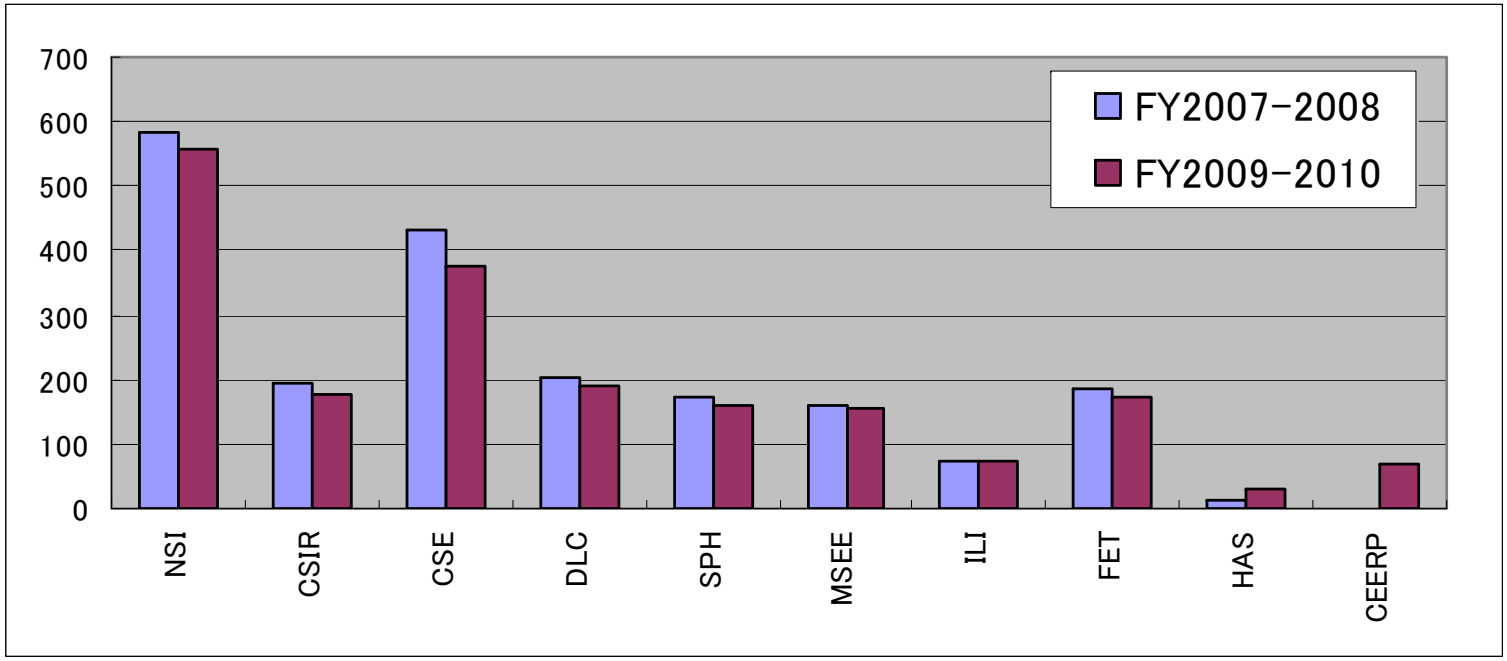


EU

http://ec.europa.eu/information_society/tl/research/documents/fp7-ict-4poverview.pdf

FP7 ICT Work Programme Budgets (M€)

FY2007-2008: 2,021 M€ (in total) ＞ FY2009-2010: 1,960 M€ (in total) : 3%減額



NSI: Network and Service Infrastructures
CSIR: Cognitive Systems, Interaction, Robotics
CSE: Components, systems, engineering
DLC: Digital Libraries & Content
SPH: Sustainable and personal healthcare

MSEE: Mobility, Sustainability, Energy Efficiency
ILI: Independent Living & Inclusion
FET: Future & Emerging Technology
HAS: Horizontal support actions
CEERP: Contribution to the EERP

EU

http://www.nitrd.gov/Pubs/2010supplement/FY10Supp-FINALFormat-Web.pdf

注目テーマ (FP7 Programs)

- RESERVOIR (FP7/CP)
  - FY2008-2011
  - Project Cost: 17.32M€, Project Funding: 10.53M€
  - Resources and Services Virtualization without Barriers (RESERVOIR) is a European Union FP7 funded project that will enable massive scale deployment and management of complex IT services across different administrative domains, IT platforms and geographies.

http://cordis.europa.eu/fetch?CALLER=FP7_PROJ_EN&ACTION=D&DOC=12&CAT=PROJ&QUERY=0123ff6a467c:eb96:6dc15145&RCN=85304

- ARTEMIS (ETP/JTI)
  - The Advanced Research & Technology for EMbedded Intelligence and Systems (ARTEMIS) ETP started in 2004 and produced a Strategic Research Agenda (SRA) in 2006.
  - ARTEMIS JTI is the legal embodiment created by the Artemis Joint Undertaking (JU, established in February 2008). These are long-term public-private partnerships implemented as JU based on Article 171 of the EC Treaty. The Artemis JU will implement significant parts of the SRA co-funded by industry, research organisations, Member States and the Commission's own ICT programme. The Artemis JU will manage and co-ordinate research activities through open calls for proposals.
  - Indicative Budjet: 37M€ (@2009 Call)

EU

https://www.artemis-ju.eu/call_2009

WP structure:
Focus on a limited set of Challenges (1)

- Overcoming technology roadblocks and reinforcing Europe's industrial strengths
  - Pervasive and trustworthy network and services infrastructure
  - Engineering of context-aware and easy-to-use ICT systems
  - The increasingly smaller, cheaper, more reliable and low consumption electronic components and systems

EU

ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/ict-wp-2009-10_en.pdf

WP structure:
Focus on a limited set of Challenges (2)

- Seizing new opportunities and applying ICT to address Europe's socio-economic challenges
  - Digital libraries and content technologies
  - ICT tools for sustainable and personalized healthcare
  - ICT for mobility, environmental sustainability and energy efficiency
  - ICT for independent living, inclusion and participatory governance

EU

ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/ict-wp-2009-10_en.pdf

WP structure:
Focus on a limited set of Challenges (3)

- Addressing synergies throughout the Programme
  - i.e. Internet of Things (IoT)
    - Service architecture that enables the discovery of object properties and events.
    - Novel architectural schemes at network level
    - Security and privacy in networks at the infrastructure level as well as the development of technologies to support security in networks of 'tiny things'
    - System level integration, including programming of possibly opportunistic collections of smart networked objects

EU

ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/ict-wp-2009-10_en.pdf

JTI and ETP

- The Joint Technology Initiatives (JTI) and Joint National Programme (JNP)
  - JTIs are a pioneering approach to pooling public-private efforts, designed to leverage more R&D investments from Member States, Associated Countries and industry, and to reduce the tremendous fragmentation of EU R&D.
  - ENIAC JTI
    - industrial developments addressing mainly technology for the next generation of 'More Moore' and the 'More than Moore‘ domains
  - ARTEMIS JTI
    - industrial platforms for the development and implementation of embedded systems responding to industry requirements in specific application domains
  - AAL JNP
    - Ambient Assisted Living (AAL) JNP will cover market-oriented R&D on concrete ICT-based solutions for ageing well with a time to market of 2-3 years
- European Technology Platforms in ICT and the Work programme
  - ETPs bring together the main industry and academic research stakeholders in a particular field with the aim of better coordinating their research and related activities and achieving common goals.
  - ARTEMIS, ENIAC, SmartGrids, EPoSS, ISI, eMobility, NEM, NESSI, Photonics, EUROP,

EU

ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/ict-wp-2009-10_en.pdf

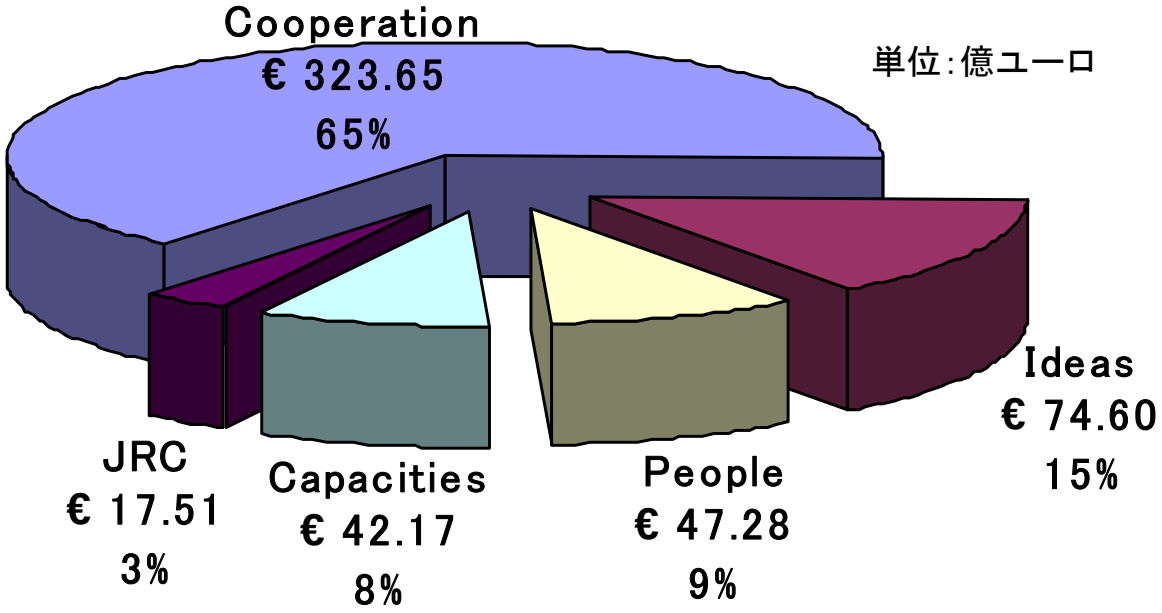
【参考】 Others

- Developing global partnerships
- General accompanying measure
  - Better coordinate efforts to ensure the supply of high-quality ICT R&D skills in Europe
  - Raise awareness of the strong potential of pre-commercial procurement
  - Setting-up of EU-level shared research facilities or excellence centres
- Involving SMEs and feeding innovation
- Contributing to European and global standards
- Encouraging the use of Internet Protocol version 6 (Ipv6)
- Bringing the user in research cycles
- The socio-economic dimensions of ICT
  - ICT impact on growth, productivity as well on the knowledge capital stock is significant and generally strongly underestimated
- Co-ordination of non-Community research programmes
  - coordination of national or regional research programmes or initiatives
- Funding schemes
  - Collaborative projects (CP), Network of Excellence (NoE), Coordination and support actions (CSA)
- Links with other Programmes
  - networking, exchanges, coordination of funded projects, trans-national access to research infrastructures, studies, conferences, etc.

EU

ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/ict-wp-2009-10_en.pdf

【参考】 FP7資金配分



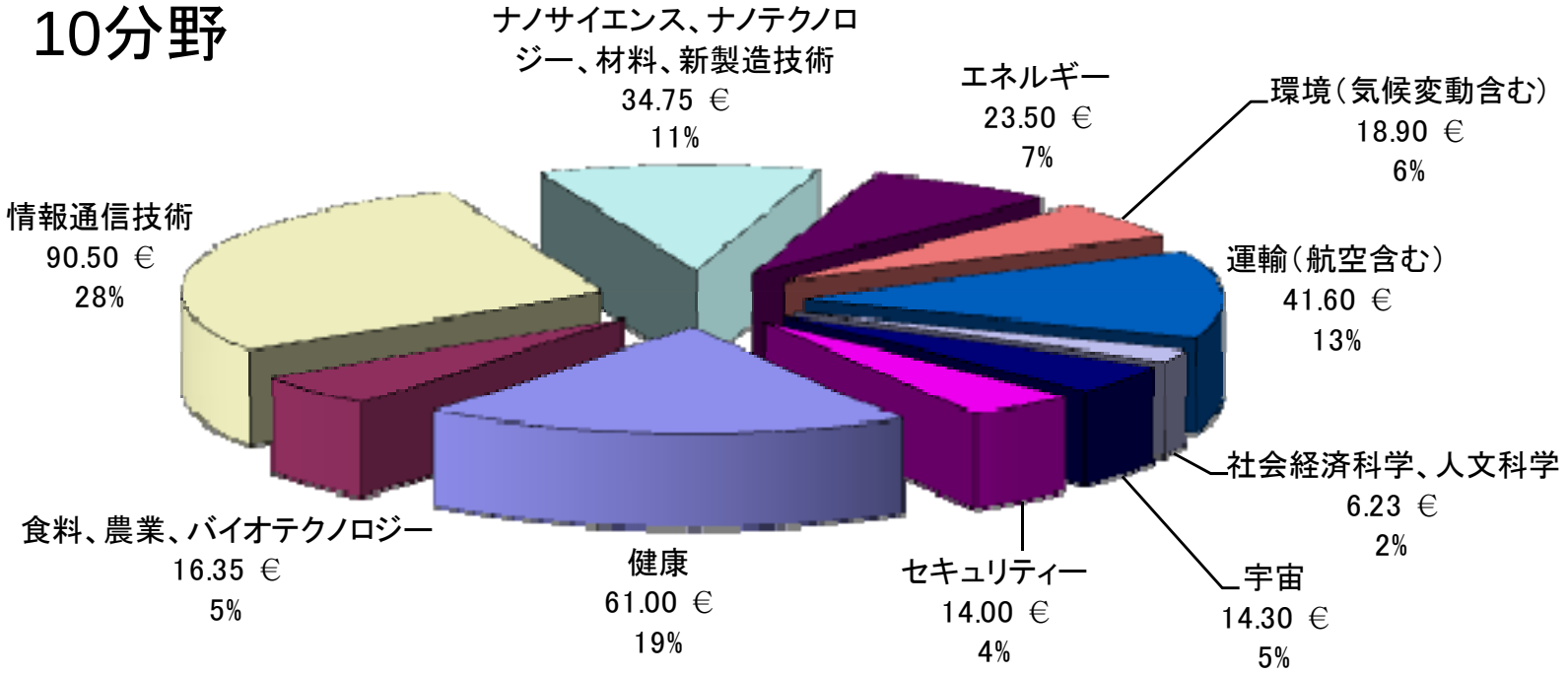
- **Cooperation**：
  共同研究・JTIへの助成、各国の研究プログラムとの連携、10分野の設定
- **Ideas**：
  欧州の知の卓越性の構築を目的とした、フロンティア研究、ハイリスクハイインパクト研究へのERC（欧州研究会議）を通じた助成
- **People**： トレーニング、キャリア開発
- **Capacities**：
  研究インフラ、中小企業研究支援、地域研究振興（クラスター構築）、地域連携の促進、科学の合意形成（社会における科学）、首尾一貫とした研究政策の構築、国際協力
- **JRC**： EU直轄研究機関

EU

【参考】 Cooperation: 共同研究・分野別資金

- FP7予算： 323.65億ユーロ
- 共同研究への助成、JTI（Joint Technology Initiative）への助成、各国の研究プログラムとの連携
- 10分野

単位：億ユーロ



（参考）ERC（欧州研究会議）：74.6億ユーロ

EU

【参考】 JTI（Joint Technology Initiative）

- 産業界主導の研究開発プログラム
- 長期的かつ多額の資金が必要なハイリスク研究で、産業界の支援が明確なプログラムが対象
- 現時点では以下の6分野が対象
  - 水素・燃料電池
  - 航空機・航空輸送
  - ナノエレクトロニクス
  - 組み込みシステム
  - 革新的医薬
  - 環境セキュリティーのためのグローバルモニタリング
- ETP（European Technology Platform）のSRAから発展

EU

【参考】 ETP（European Technology Platform）

- 欧州の競争力強化に向け、欧州産業界のFP7への積極的な参加を促すために設けられたシステム
- 欧州全体の科学技術戦略を立案・実施する、産業界主導で学界など利害関係者を含むメンバーよりボトムアップ的に発足・構成

  → 実質的には欧州ワイドの業界団体
- 偏りがなく透明性のある、社会、産業界、学界のニーズに沿った中長期的な研究開発課題を検討
- 研究を技術・生産・商品・サービスなど経済的価値につなげることを考慮
- 34の重要な分野を発展させるための戦略を検討・実施
  - ビジョンの作成 → SRA*：戦略研究アジェンダの作成 → SRAの実施（FP7にて一部実施）
- FP7の方針作成および実施において重要な役割を担う
- 一部のプログラムはFP7のJTI（Joint Technology Initiative）に指定され重点的に実施

EU

*** SRA：Strategic Research Agenda**

【参考】 ETP（欧州技術プラットフォーム）の例

- 革新的医薬
- 医療ナノ技術
- 生活のための食物
- 森林関連技術
- 世界的動物の健康
- 次世代植物
- 給水・公衆衛生技術
- 移動・ワイアレス通信
- ネットワーク化ソフトウエア・サービス
- メディアのネットワーク化・電子化
- 組み込みコンピュータシステム
- 統合スマートシステム技術
- フォトニクス21
- ナノエレクトロニクス
- 次世代繊維・衣料品技術
- 金属技術
- 先端エンジニアリング材料・技術
- 建設技術
- 次世代製造技術
- ロボティックス
- 環境対応化学
- 太陽電池
- 無公害化石燃料発電所
- バイオ燃料技術
- スマートグリッド技術
- 風力発電技術
- 水素・燃料電池
- 鉄道研究諮問委員会
- 自動車交通研究諮問委員会
- 航空工学研究
- 水上輸送技術
- 産業の安全技術
- 宇宙技術
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