

Emerging Technologies Panel

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RERC on Technology Transfer

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Acknowledgement

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Bob Yeager & NSF

Jim Lenker

Overview

- Assistive Technology
- Historical Framework
- Development in Public & Private Sectors

Assistive Technology

Technology-Related Assistance For Individuals With Disabilities Act Section 3. Definitions. (2)

“The term “assistive technology device” means
any item, piece of equipment, or product system,
acquired commercially off the shelf, modified, or customized,
used to increase, maintain, or improve functional capabilities of
individuals with disabilities.”

World Health Organization

International Classification of Functioning, Disability and Health (ICF)

Technical Aids for Persons with Disabilities: Classification and
Terminology (ISO 9999)

ICF-Based Taxonomy

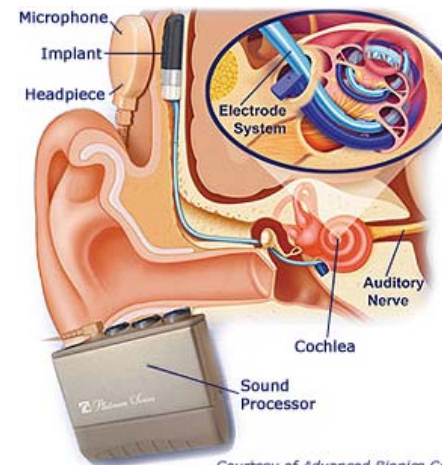
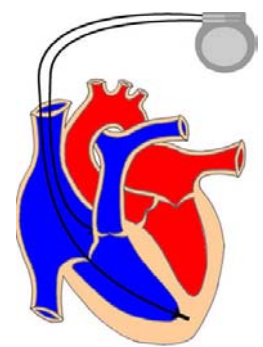
ICF Component	Integration	Customization	Role(s)	Context(s)
Body Structure & Function	<i>Intrinsic</i>	<i>Custom</i>	<i>Pervasive</i>	<i>Pervasive</i>
Activities	<i>Extrinsic</i>	<i>Configured</i>	<i>Pervasive</i>	<i>Pervasive</i>
Participation	<i>Environmental</i>	<i>Group</i>	<i>Situational</i>	<i>Situational</i>
Contextual	<i>Societal</i>	<i>Cross-Group (Universal)</i>	<i>Facilitator</i>	<i>Facilitator</i>

AT for Body Function & Structure

✓ Intrinsic



- ✓ Custom
- ✓ Pervasive (across) Roles
- ✓ Pervasive (across) Contexts

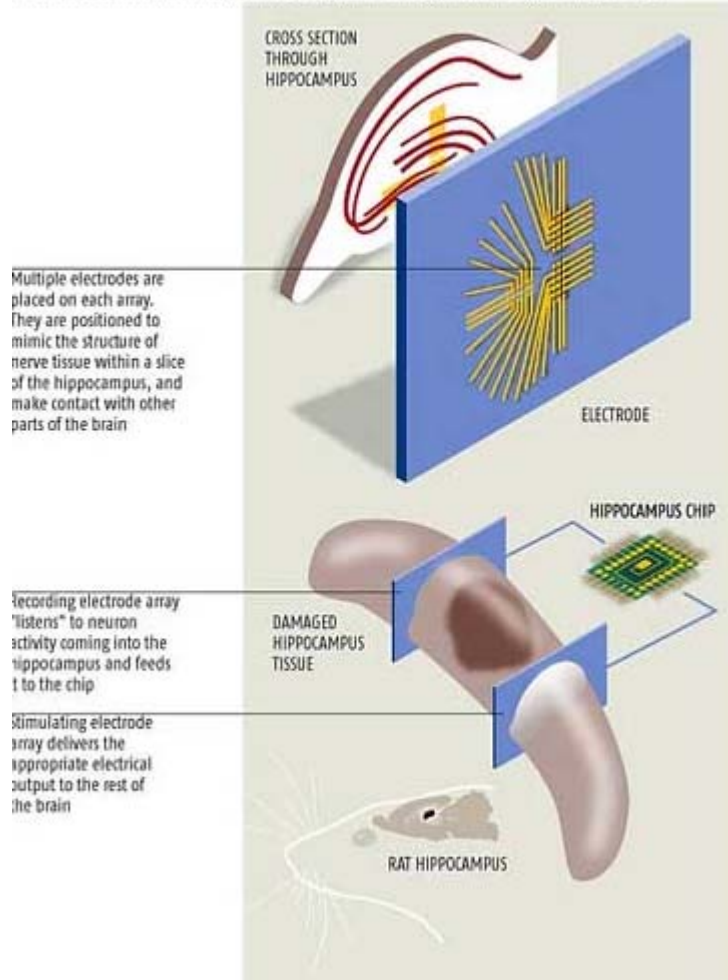


Courtesy of Advanced Bionics Corp.

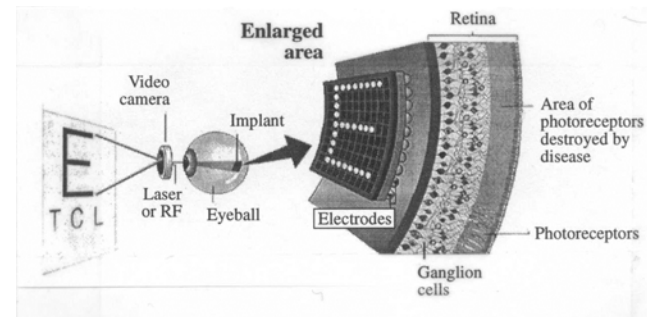
Cognitive Prosthesis

HIPPOCAMPUS REPLACEMENT

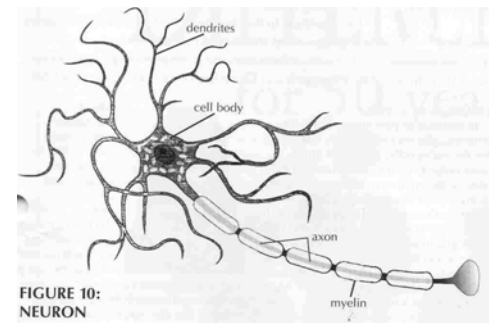
Chip takes over the processing of nervous signals normally performed by the hippocampus



Sensory Prosthesis



NMS Prosthesis



Nerve Stem Cells, Nerve Growth Factors, Hydrogels...

Nanotube & Polymer Scaffolds (Implants)

AT for Activities

Low Vision

New Biocompatible Contact Lens Materials Developed *LBNL/Sunsoft CRADA Yields New Materials in Clinical Trials*



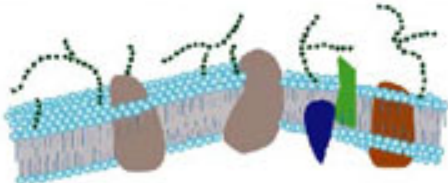
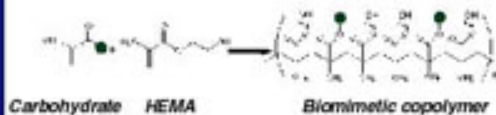
LBNL/Sunsoft Corporation team has developed two new contact lens materials for increased biocompatibility. One is now being prepared for clinical trials.



✓ Extrinsic

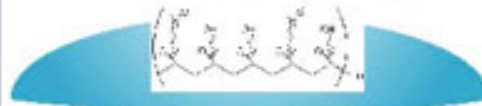
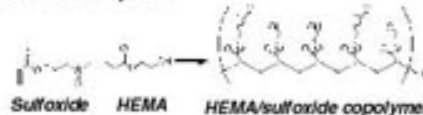
- ✓ Configurable
- ✓ Pervasive Roles
- ✓ Pervasive Contexts

Carbohydrate hydrogels mimic cell surfaces and bind water but not protein.



Normal cell surfaces display carbohydrates (green) on their surfaces.

Sulfoxide groups expressed at lens surface confer high water content and retention and low protein adsorption.

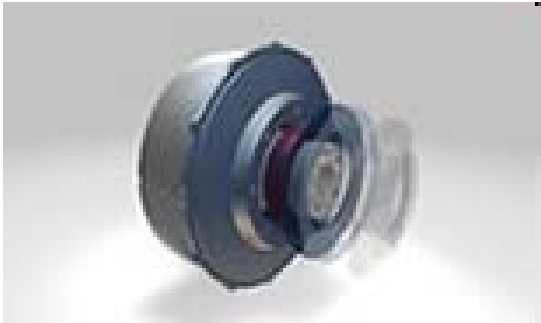
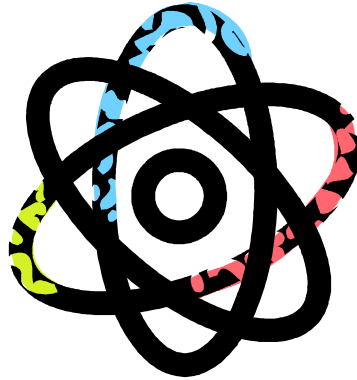


CAROLYN BERTOZZI
BIOMOLECULAR MATERIALS PROGRAM
MATERIALS SCIENCES DIVISION
BERKELEY LAB

9-10

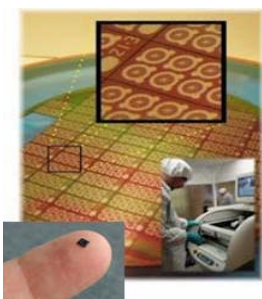
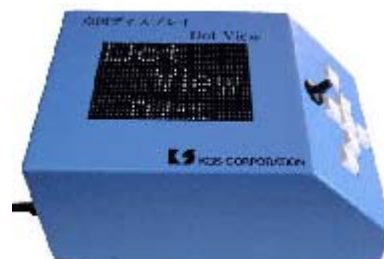
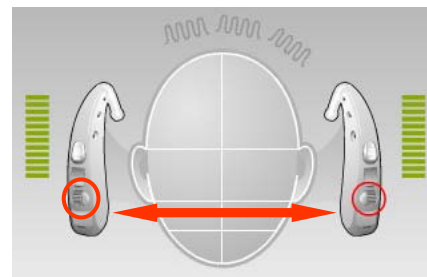


Blind Wayfinding

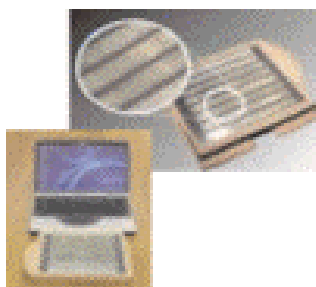
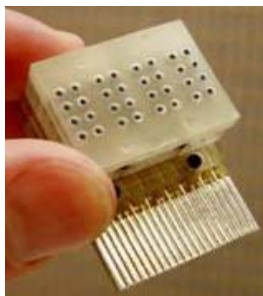


Another TESLA Patent !



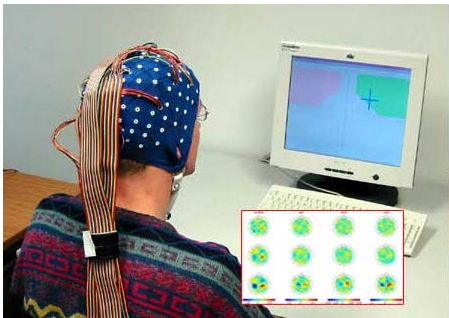


®



AT for Participation

Computer Interfaces



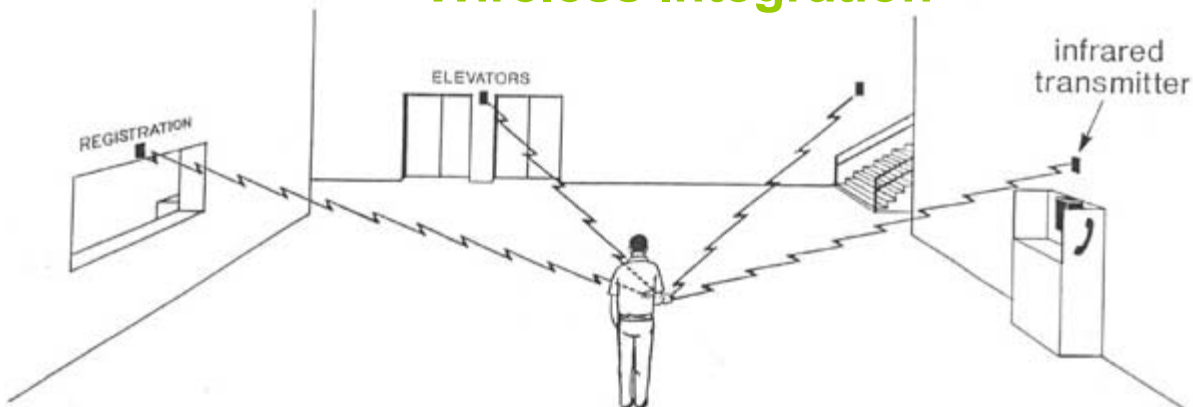
✓ Environmental

- ✓ Group
- ✓ Situational Roles
- ✓ Situational Contexts

UD Learning



Wireless Integration



Cognitive Assistants
Environmental Control
Communication
Wayfinding
Hearing...

Contextual AT

Academic Software Inc.



“Use the ADAPTIVE DEVICE LOCATOR SYSTEM-on-the-Web to find information about assistive technology products from thousands of companies to make life better and help you live independently.”

MSF&W

Information Technology Solutions

“Authoring Tool that Promotes Web Accessibility”

✓ **Societal**

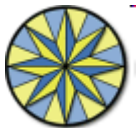
✓ **Cross-Group**

✓ **Facilitate (across) Roles**

✓ **Facilitate (across) Contexts**



**Compass -
Access Assessment Software**

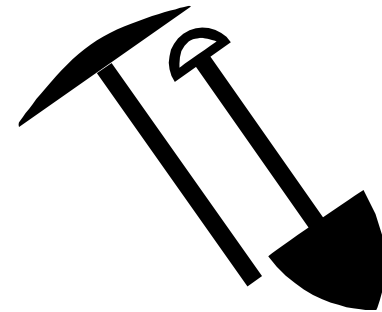
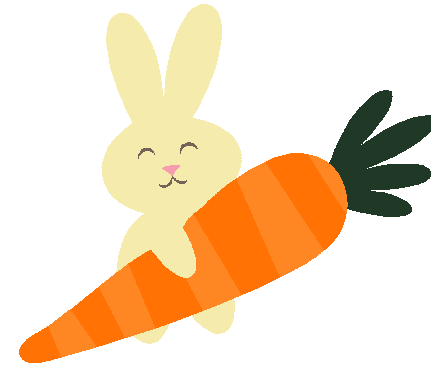


History

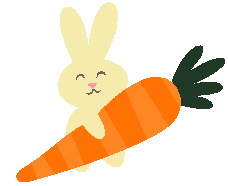
- Disability Rights, Independent Living Movement
- Societal Paradigm Shift
- **Legislation**, Rules, Guidelines, Legal Challenges
- Customers, Markets **\$\$\$\$B**
- Professions, Industries

Legislation By “Type”

- Demand
 - + Market Size
 - + \$ in Market
 - + Requirements on Purchase
 - + Requirements on Function
- Supply
 - + Product Development
 - + Applied Research
 - + Basic Research
 - + Capacity Building
- Demand Impact >> Supply Impact



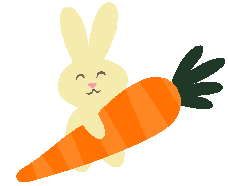
Demand Legislation



- Section 508 of the Rehabilitation Act as Amended (1998)
 - Electronic and Information Technology
 - Accessible to Federal Employees, Persons Using Federal EIT
- Federal Acquisition Regulations (2001)
 - Computers, PDA, kiosks, websites...
 - Department of Defense, General Services Administration, National Aeronautics and Space Administration
 - Economic Impact >\$100M/Yr (Major Ruling)
 - Exceptions: Micro-Purchase, National Security... Undue Burden

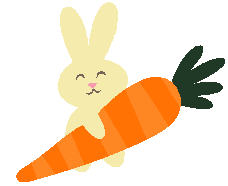
<http://www.access-board.gov/sec508/FARnotice.htm>

Demand Legislation



- (1973) Rehabilitation Act
- (1988) Hearing Aid Compatibility Act
- (1990) Americans with Disabilities Act
- (1990) Air Carrier Access Act
- (1996) Section 255 of Telecommunications Act
- (1997) Individuals with Disabilities in Education Act
 - Title II (Assistance to States for Education of Children with Disabilities)
 - National Instructional Materials Accessibility Standard
- (2007) Hearing Aid Tax Credit legislation

Demand Legislation



- Americans with Disabilities Act (1990)
 - Title II (State and Local Governments) - "...required to give people with disabilities an **equal opportunity to benefit from all their programs, services and activities** (e.g. public education, employment, transportation, recreation, **health care, social services**, courts, voting and town meetings)...",
- Olmstead Decision (1998), Olmstead Executive Order (2001)
 - Supreme Court ...ruled that Title II of the Americans with Disabilities Act requires that **people with cognitive disabilities (and by extension any person with a disability)** must be able to live in a "**least restrictive environment.**"
- **Disabled Elders, Elder Demographics...**

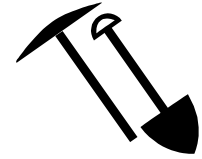
Elder AT and UDT

- Intel+ – Smart Homes, Telehealth, Telerehab
- Microsoft+ – Computer Access
- Whirlpool+ – Major Home Appliances
- Black and Decker – Kitchen Appliances

Supply Legislation

- (1980) Stevenson-Wydler Technology Innovation Act
 - Federal Labs
- (1980) Bayh-Dole Patent and Trademark Act
 - Universities
- (1982) Small Business Innovation Development Act
 - Small Business
- (1992) Small Business Technology Transfer Act
 - Small Business + Universities

Supply Legislation



Title 15 - Commerce and Trade (Stevenson-Wydler Technology Innovation Act) §3710 Utilization of Federal Technology (e)(1)(K)

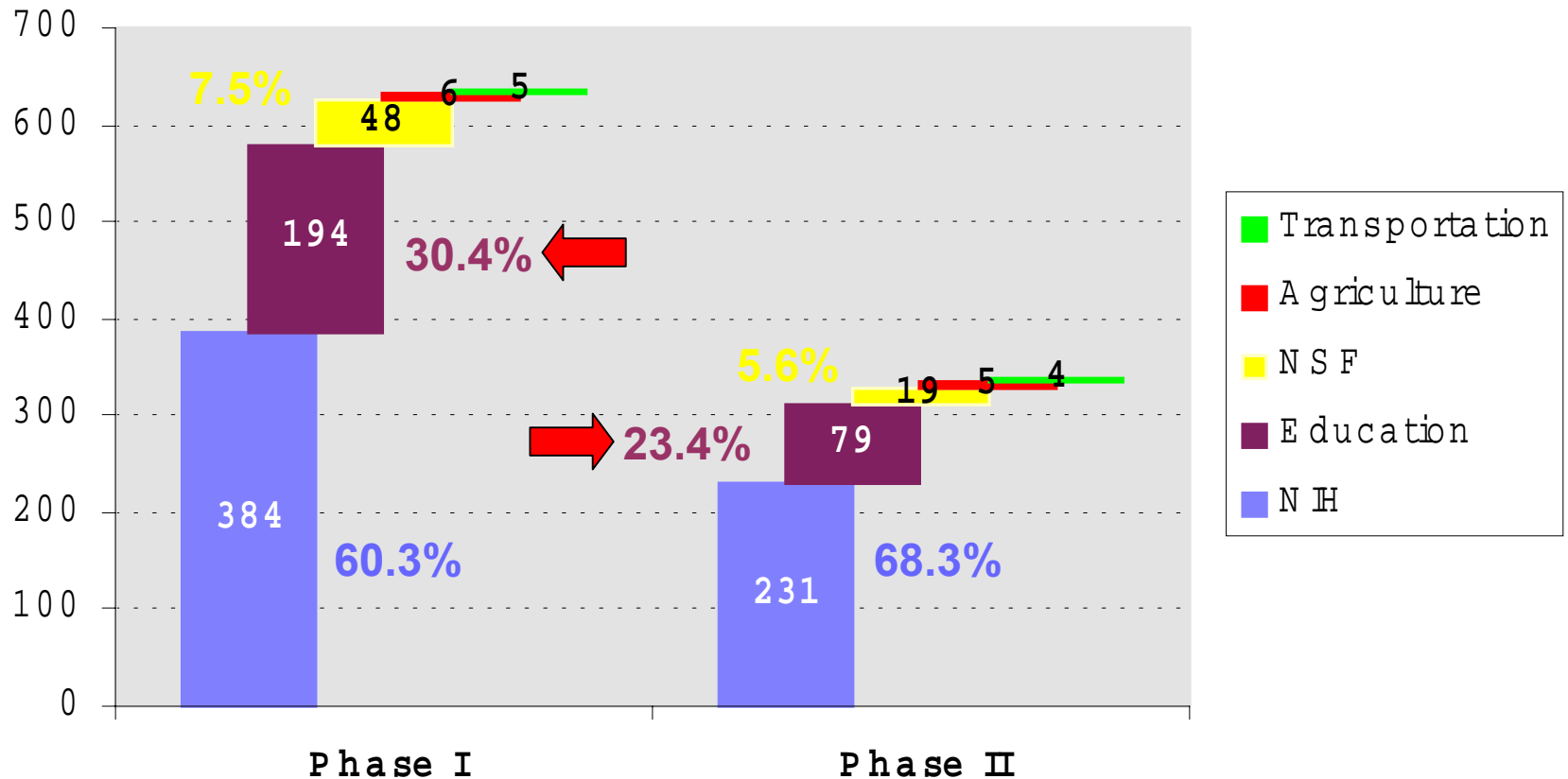
“...work with the Director of the National Institute on Disability and Rehabilitation Research (NIDRR)

compile a compendium of current and projected Federal laboratory technologies and projects

intended or recognized impact on the available range of assistive technology for individuals with disabilities,

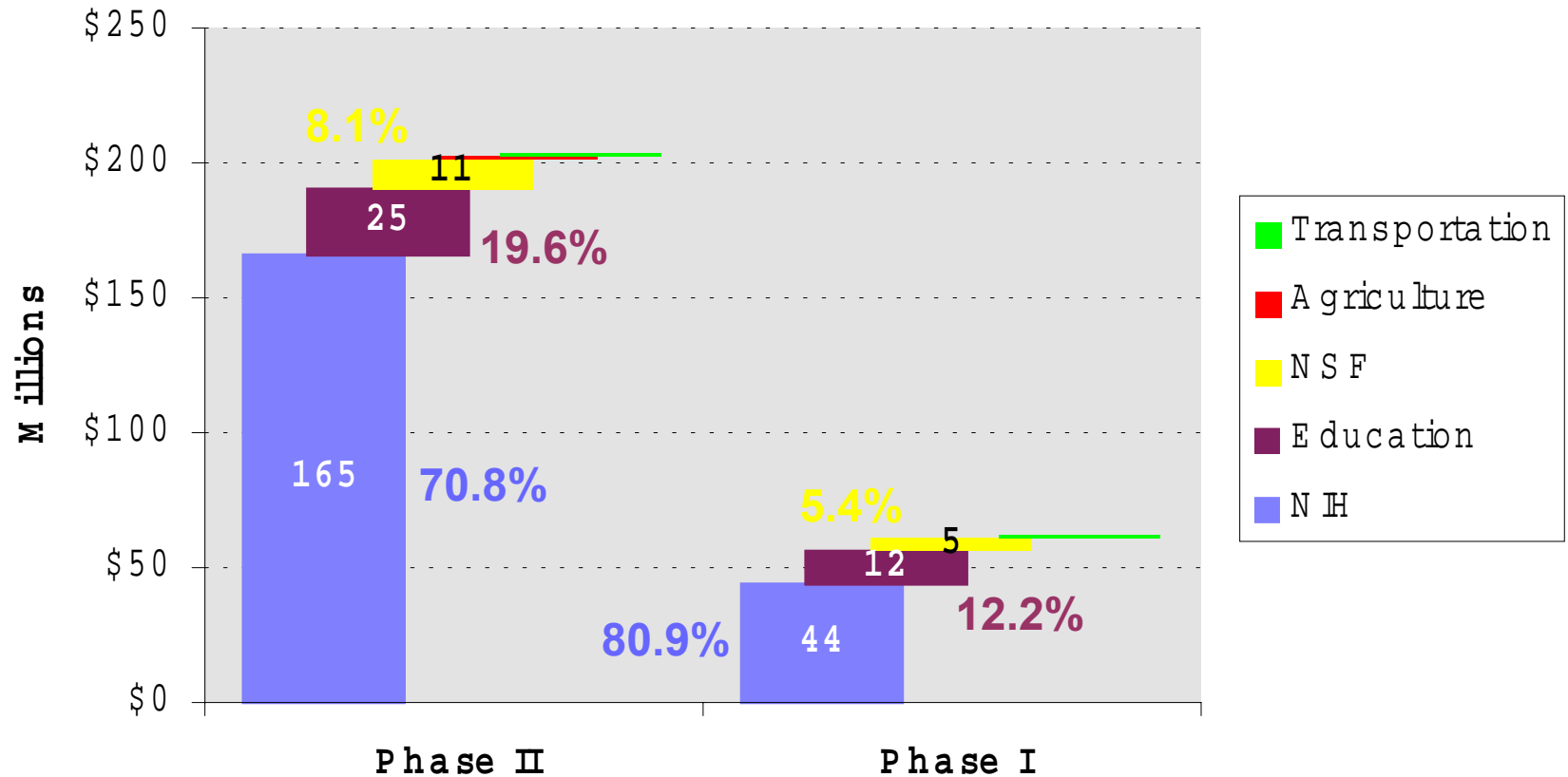
including technologies and projects that incorporate the principles of universal design.”

AT SBIR Awards (1996-2005)



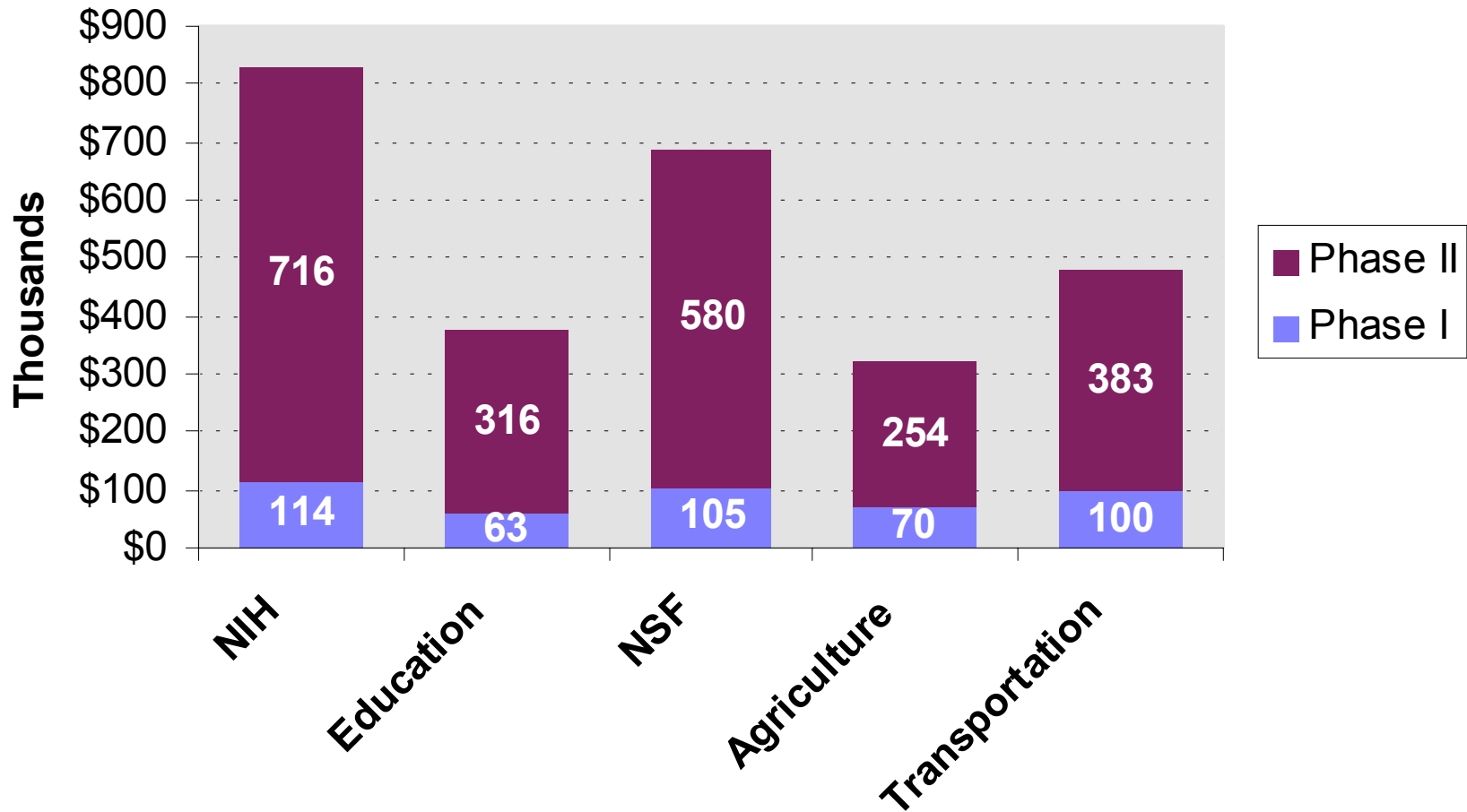
DoED : NIH ~ 1 : 70

AT SBIR Funding (1996-2005)



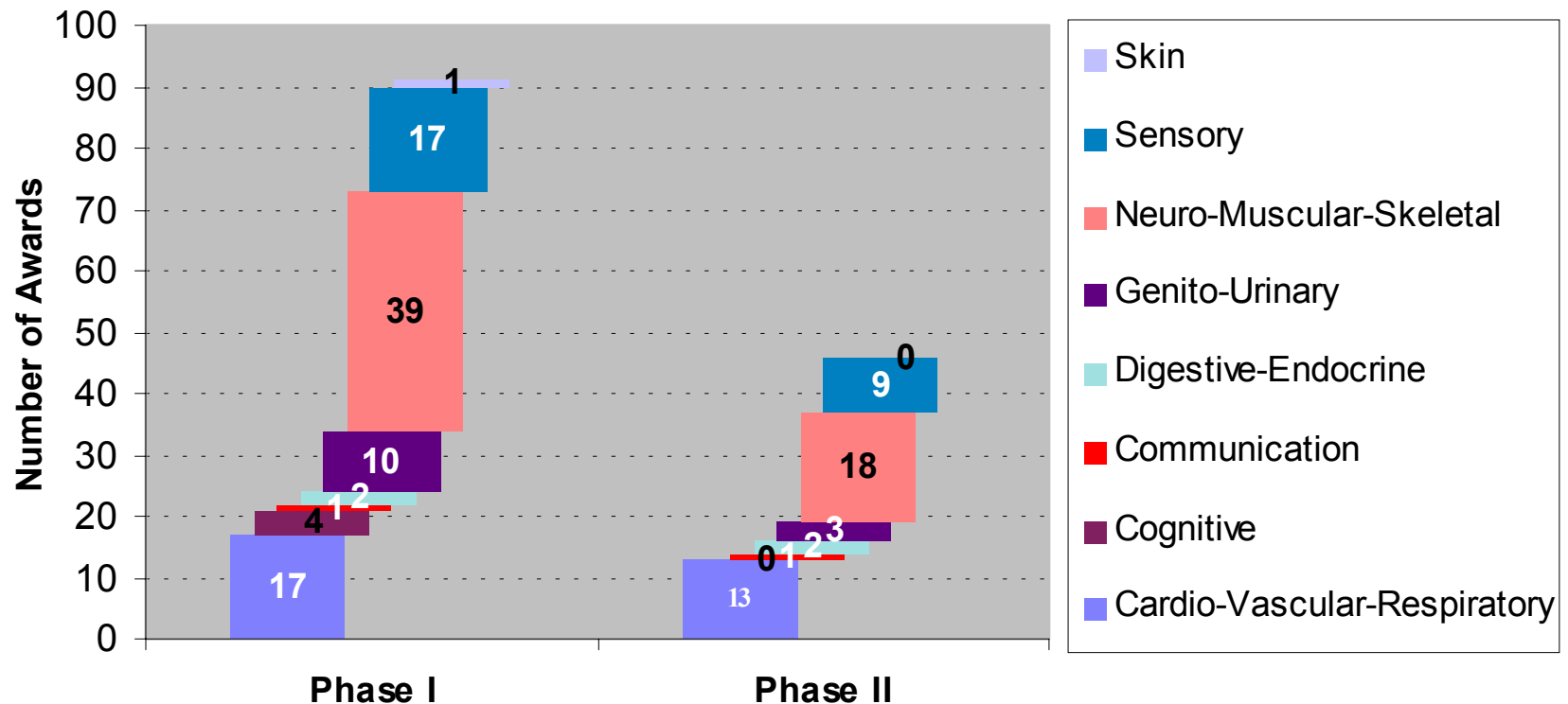
Amount per Award

SBIR Awards (1996-2005)

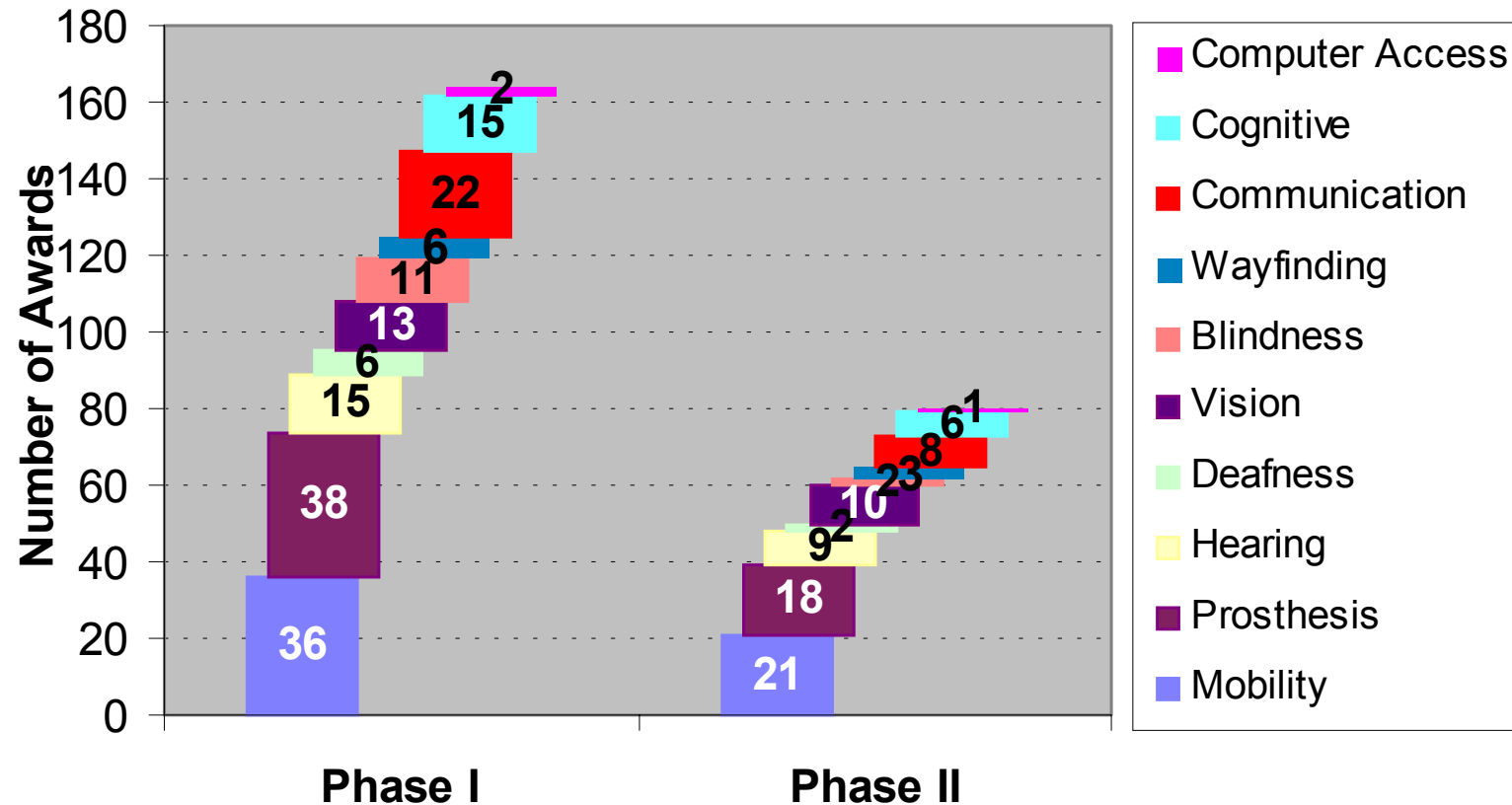


AT for Function & Structure

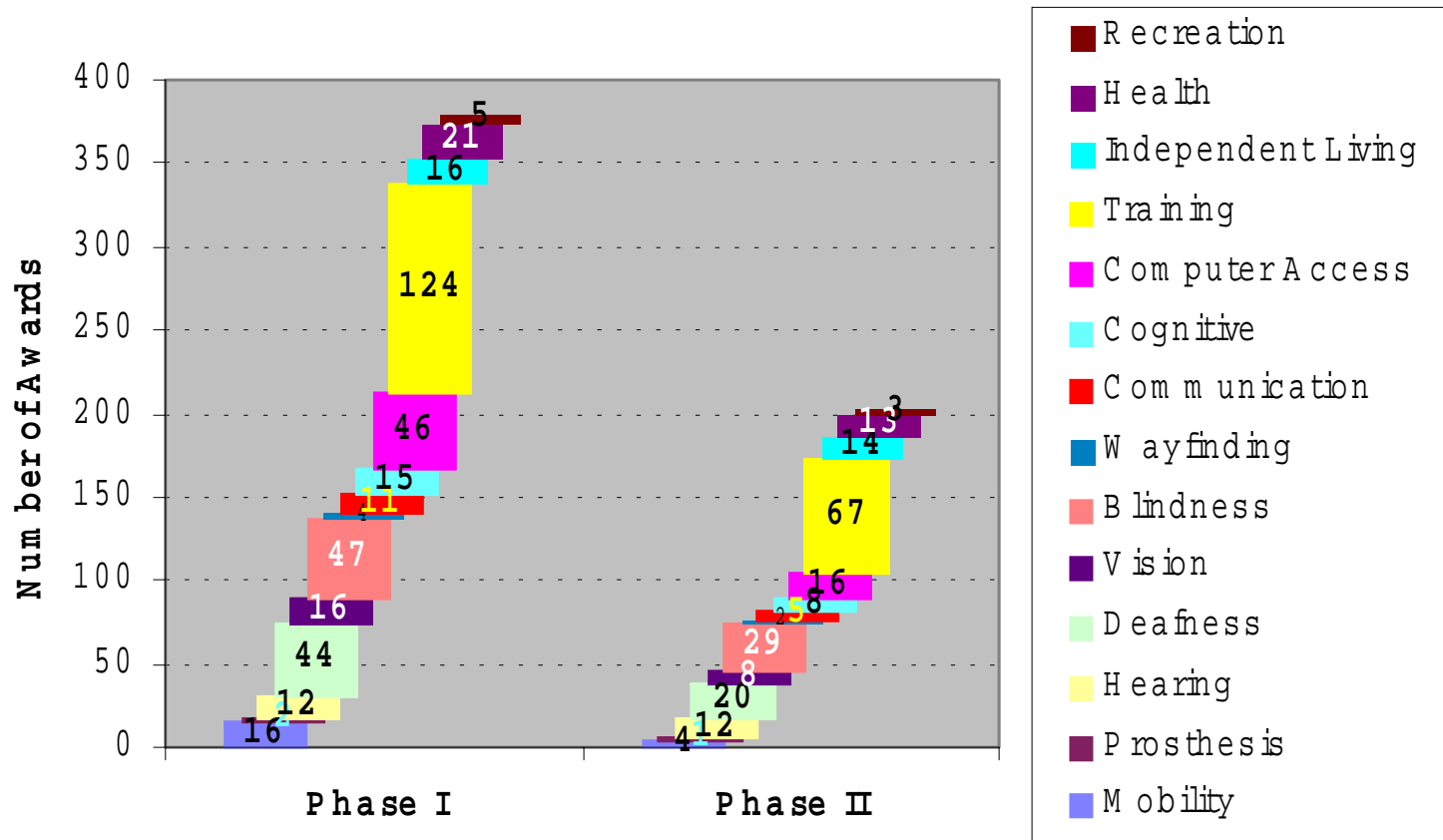
SBIR Awards (1996-2005)



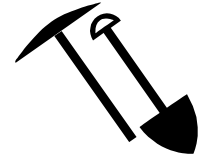
E.g. SBIR Awards: AT for Activities



AT for Participation

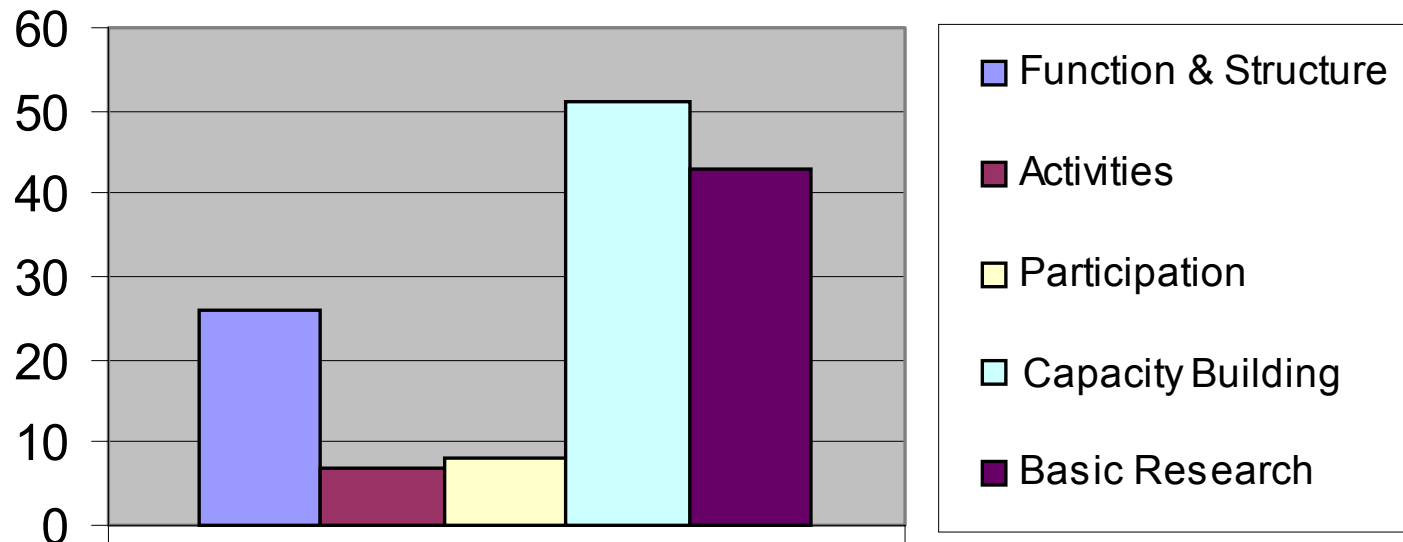


E.g. Federal Programs

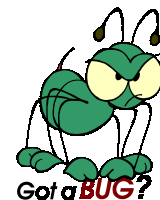


- (NIDRR) Rehabilitation Engineering Research Centers
- (NIH) National Center for Medical Rehabilitation Research
- (NSF) Research to Aid Persons with Disabilities

RAPD Awards (1996-2005)



Questions?



Contact Information

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