

CISCO SYSTEMS



Academic Research and Technology Initiatives (ARTI) Overview

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Agenda



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- **Who we are...**
- **Our research focus...**
- **Our technology focus...**
- **Our team support...**

Who we are...

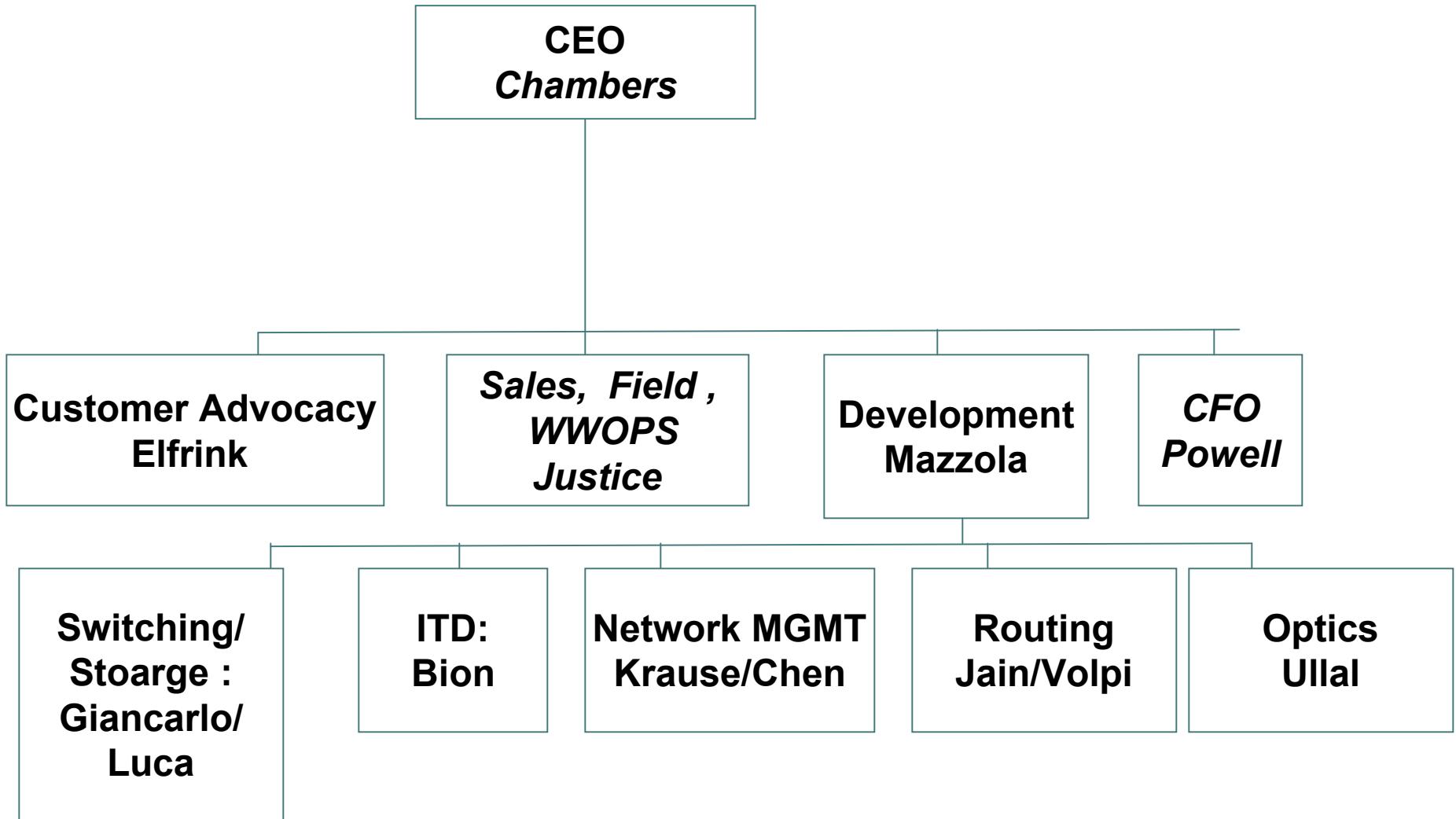
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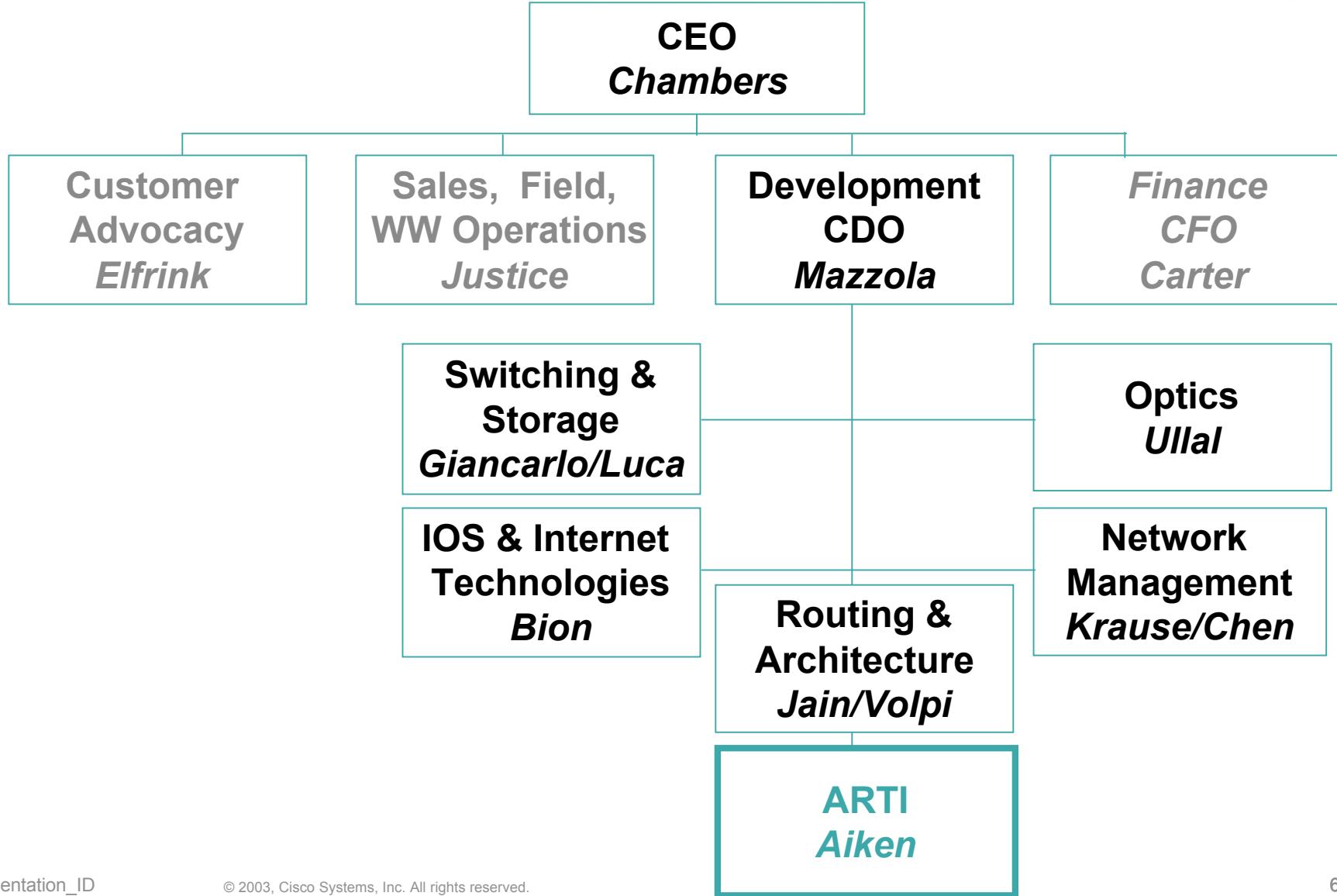
Academic Research and Technology Initiatives

- ... a sponsor of network focused research
- ... a National Research Network & Higher Education Institution (NRN/HE) business development group
- ... a facilitator of novel networks and technology demonstration projects and ideas
- ... an internal champion for network research

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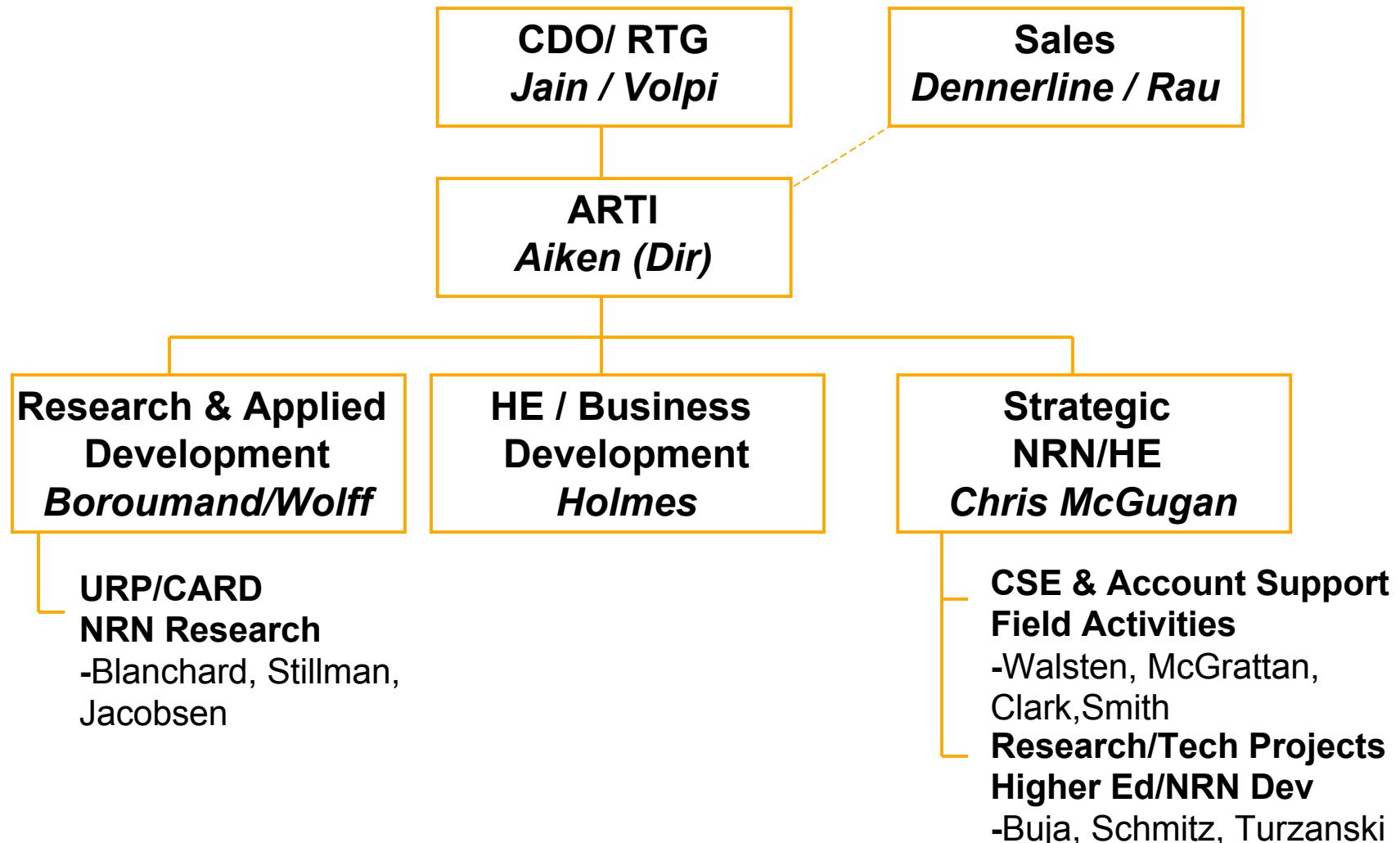
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ARTI Organization

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ARTI - Shape & Own the Future

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R&D Leadership

Influence Market

- Engage with research & education (R&E)
- Leverage R&E to support BU R&D needs
- Leverage R&E to validate HW/SW technologies/ideas
- Drive standards and technology through R&E activities and investments
- Provide and support technical relationships between R&E and BU, Field, Marketing, & Strategic Alliances
- Provide neutral, technical interface to R&E organizations
- Identify technology trends developing in R&E
- Foster advanced technology development & deployments in R&E communities

ARTI Functional Areas

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- **Research**

- Grants and directed studies programs

- Higher Ed and NRN focused

- **R&E Technology Initiatives**

- Demonstration projects with and technology support to R&E entities

- Next Gen R&E networks and deployment of advanced technology

- **Academic Alliances**

- Higher Education issues and strategies within Cisco

- Equipment donation program to foster technology usage in classrooms

- **R&E & Technology Services**

- Long term strategic relationship with R&E

- Technology requirements “heads up” to Cisco TGs

ARTI Methods

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Engage R&E Community at influencing points

- HE, NRNs, National Labs, and research labs worldwide on a strategic and technical basis
- JointTechs, SuperComputing, Consortiums and memberships

Strengthen/Leverage R&E engagement opportunities

- Single point of contact for internal & external communication
- EBC support, Cross business projects coordination (GNRNC)

Sponsor thought & technology leadership activities projects

- NLR, 6Net, NRN research programs
- NRN TABs, Technical Leadership Councils, and HE Technology Symposia
- HE focused field/VIM communication, Research Digest, IPJ

Facilitate Cisco internal research & programs

- Facilitate identification of technology trends and research interests to Cisco benefit
- Research councils
- Intra-BU technology focus and R&D needs assessment

ARTI Initiatives

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- **Higher Education (HE)/ Research Networks (RN)**

Internal voice for global networking activities and strategic Universities – identify requirements, champion & liaison

Work with advanced national, state and regional networks (e.g., CENIC, NLR, Gigaport, SINET) on innovative infrastructures

Support advanced technologies and topologies for peering points (Gigapops, AMX, International peering points etc.)

Support combined advanced application and network infrastructures with proof of concept and prototyping (eg. HE Physicist network)

- **Research**

University Research Program (URP)- expand, scale, relevancy

Cisco Applied Research & Development (CARD)- expand

NRN scaling/engineering research projects (e.g., CENIC & NLR)

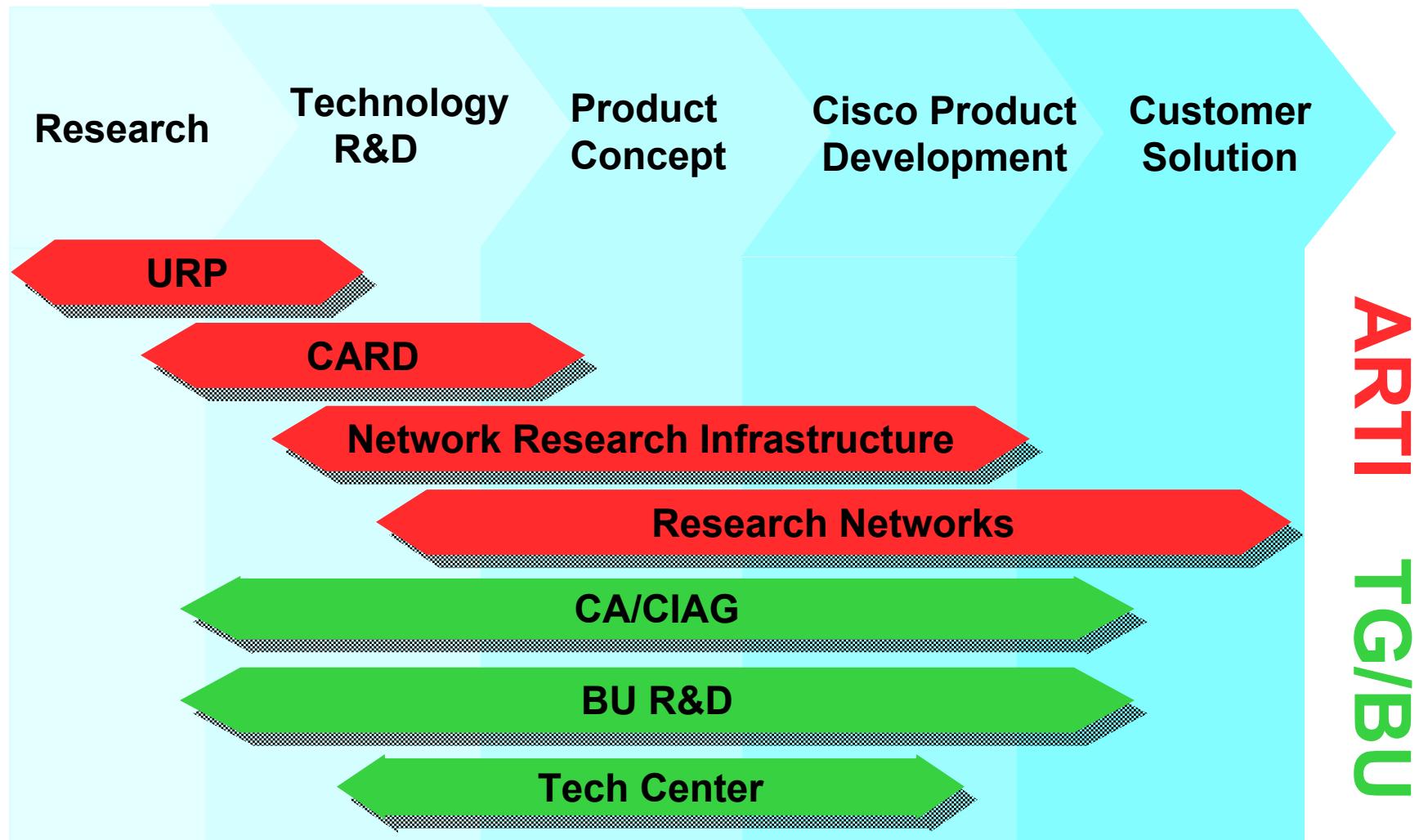
Our Research focus

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- Promote and support directed research on topics of current or future interest to Cisco
- Provide a venue for Cisco to experiment with risky or "orphan" research topics
- Encourage research faculty to remain in academia
- Shape mindshare of industry bound research students

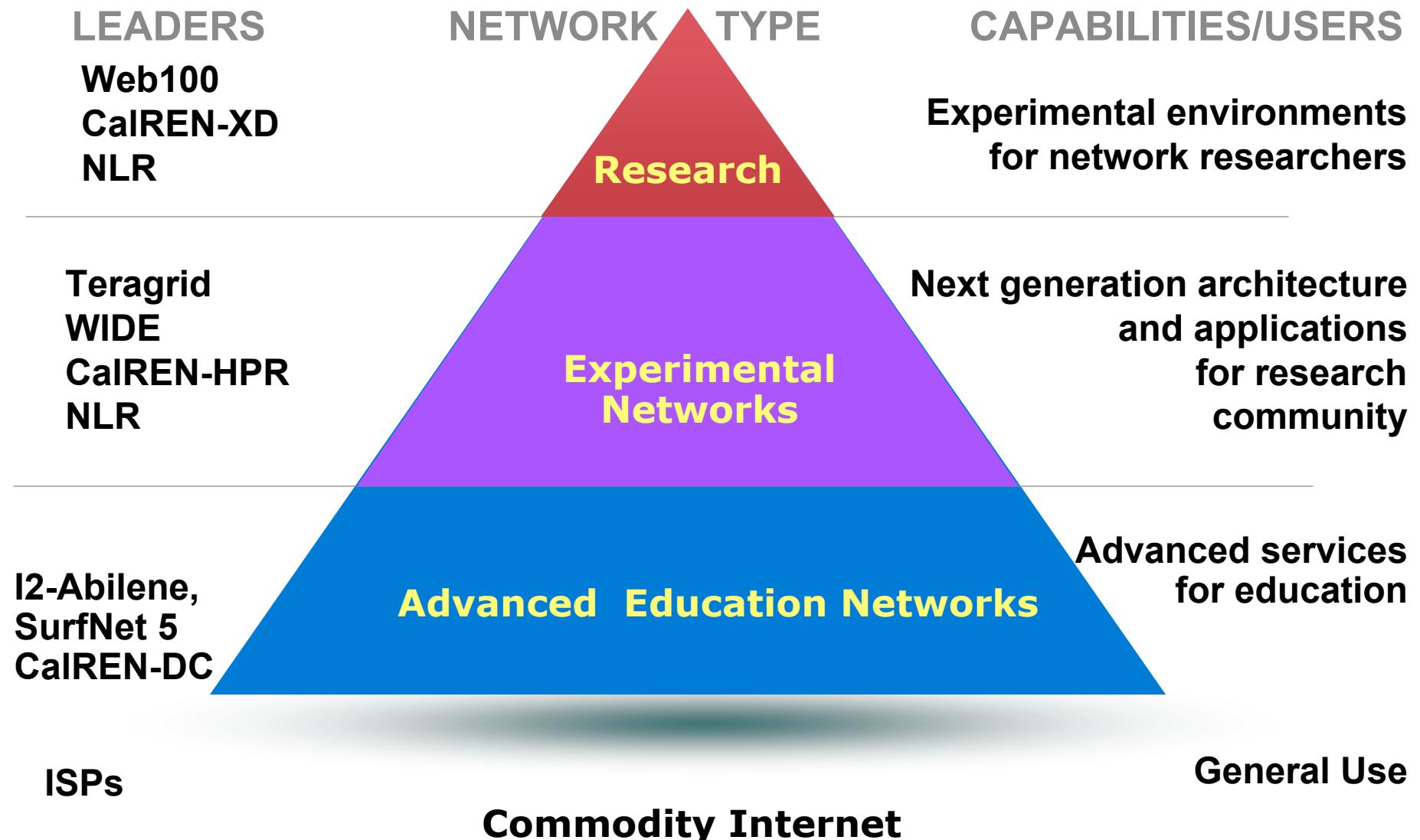
Cisco Research & Development

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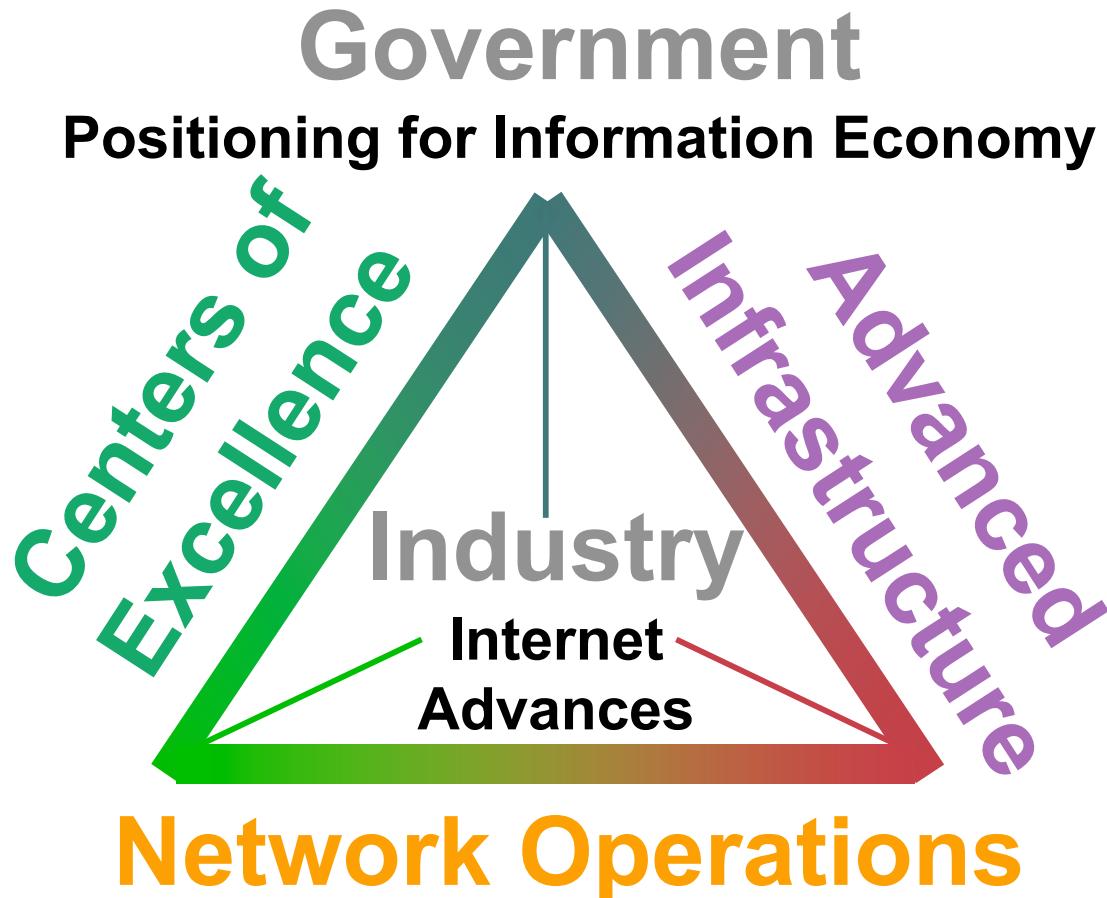
Research & Education Network Tiers

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Partner Issues and Shared Goals

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Universities / Labs

Academic Fields; IT Operations

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Service Providers

Preparation for Competition

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ARTI External Research Programs

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University Research Program (URP)

- Fund research projects of interest to Cisco
at universities and other institutions worldwide
via unrestricted cash and equipment gifts (\$50-100K)
- URP does not fund center membership, chairs, fellowships, etc.

Cisco Applied Research & Development (CARD)

- Fund cooperative development with Cisco BU/TG
at universities and other institutions worldwide
with specific deliverables and property rights
as single or multi-year project (typically 12-24month horizon)

ARTI External Research Programs

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NRN Research Program

- A collaboration among investigators who are -
staff of the National Research Network involved, or
faculty/staff of NRN member institutions, or
Cisco developers
- Research issues exposed by, enabled by, or otherwise
germane to, the NRN itself,
- Selected by a joint process of the participants
- May use NRN facilities

Research Projects

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- **Optical ASIC:** CARD research project integrates active and passive optical components on InP wafers, evaluate/demonstrate potential to enhance 10G (NRZ) system performance, and pilot process for technology transfer from R&D to Cisco partner(s) commercial fab. **UCSB**
- **Network Management:** WEB100 project with EMBU illuminates host based network metrics and capabilities needed in the network. EMBU & parallel processing supercomputer community learn about network demands of large number crunching and data storage programs. **PITT**
- **Security:** URP funded to develop a distributed denial of service system based on NETFLOW. The researcher started his own company after that and WBU/ELOB is planning on investing in the new company (ARBOR) and may even OEM some of the technology. **MICHIGAN**
- **Network Simulation:** URP, working with Fred Baker, have supported extensions to the NS2 simulator by the researchers at Edinburgh in Scotland. This tool is used by many Cisco engineers, as well as many of our customers and the Internet community. **EDINBURGH**
- **IPv6 R&E Network:** Cisco won the bid for the GIGAPORT National Research Network (NRN) in the Netherlands, a leading edge NRN, via joint research projects on presence, Ipv6 , and optics. **NETHERLANDS**
- **"Universally accessible" phone system:** A two year CARD and development created a cross disability accessible PBX and next generation phones. Using the Cisco IP phone system and the XML capabilities to create accessibility capabilities for hearing and visually impaired users. The results will be developed in a fashion that would allow their application across the industry – in this case, on any open standards IP phone systems. **Wisconsin**

ARTI Internal Research Programs

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TG/BU Research Councils

- Composed of BU engineers
- Identify cross BU/company research topics and priorities in specific technology areas

Drives URP and CARD selection process

Other

- Cisco Distinguished Engineers and Fellows
- Nerd Lunches

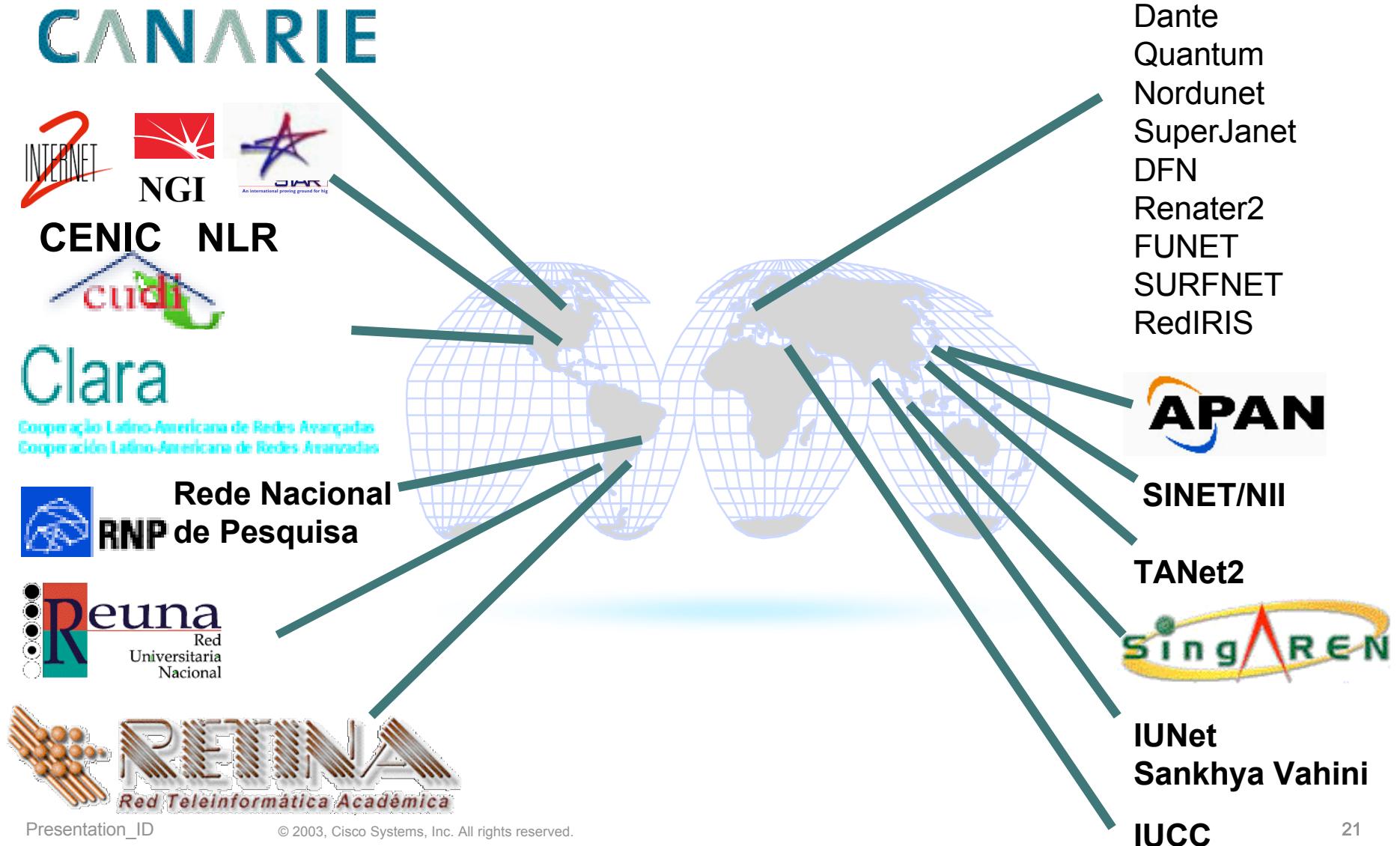
Our Technology focus

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- Focus on strategic R&E organizations and NRNs
- Further R&E mindshare and partnering activities
- Detect emerging trends and opportunities within R&E community for TG/BU/Sales

Advanced Internet Initiatives

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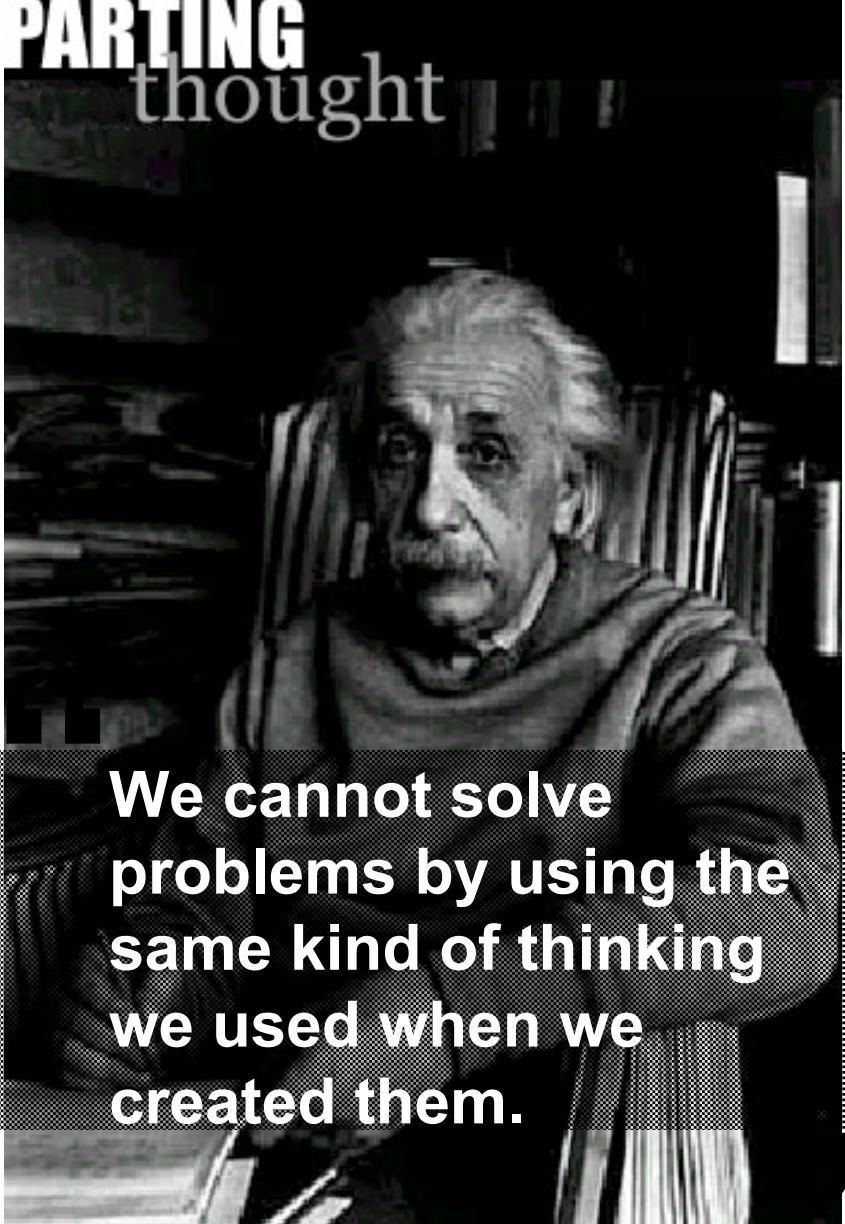


Other ARTI endeavors

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- **Distinguished Engineers / Cisco Fellows & Pioneer Awards**
- **Work with Business councils and CDO to identify strategic technologies**
- **Academic Alliance Initiatives (AAI) & Strategic Technical University Relations**
- **Internet Protocol Journal**

PARTING thought



**We cannot solve
problems by using the
same kind of thinking
we used when we
created them.**

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EMPOWERING THE
INTERNET GENERATION

www.cisco.com/go/arti

www.cisco.com/go/research