

Welcome to AGI's Leadership Forum 2014

Accommodating Geoscience Workforce Diversity: Including the Talents of All Geoscientists

Ice-Breaker Activity

Guiding Question:

**What is the first word that comes to mind
when you hear about someone living with a
disability?**

Developing an Accessible Geoscience Workforce through Inclusive Training Opportunities

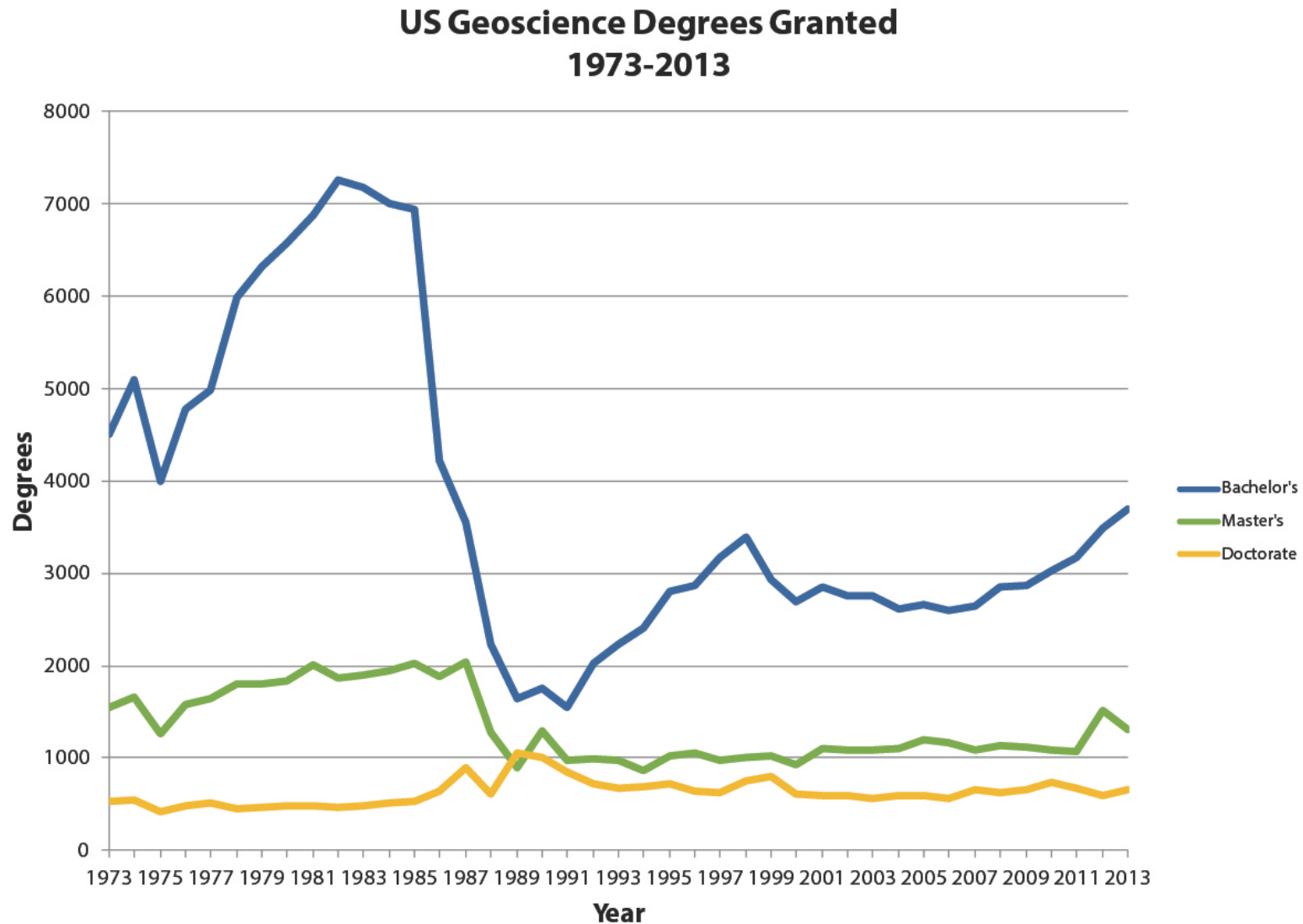
Christopher Atchison

University of Cincinnati

Heather Houlton

American Geosciences Institute

The Breakdown: Workforce Trends



Attrition, Growth and Replacement in the next 10 years in the U.S.

297,000 geoscience jobs **exist today** (BLS)

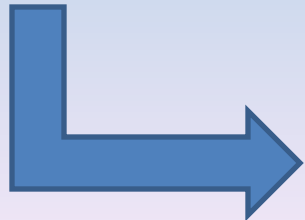
143,000 geoscientists expected to **retire** by 2022 (AGI)

43,000 geoscience job **growth** by 2022 (BLS)

16,000 new MS/PhD + **35,000** BS/BA graduates (AGI)

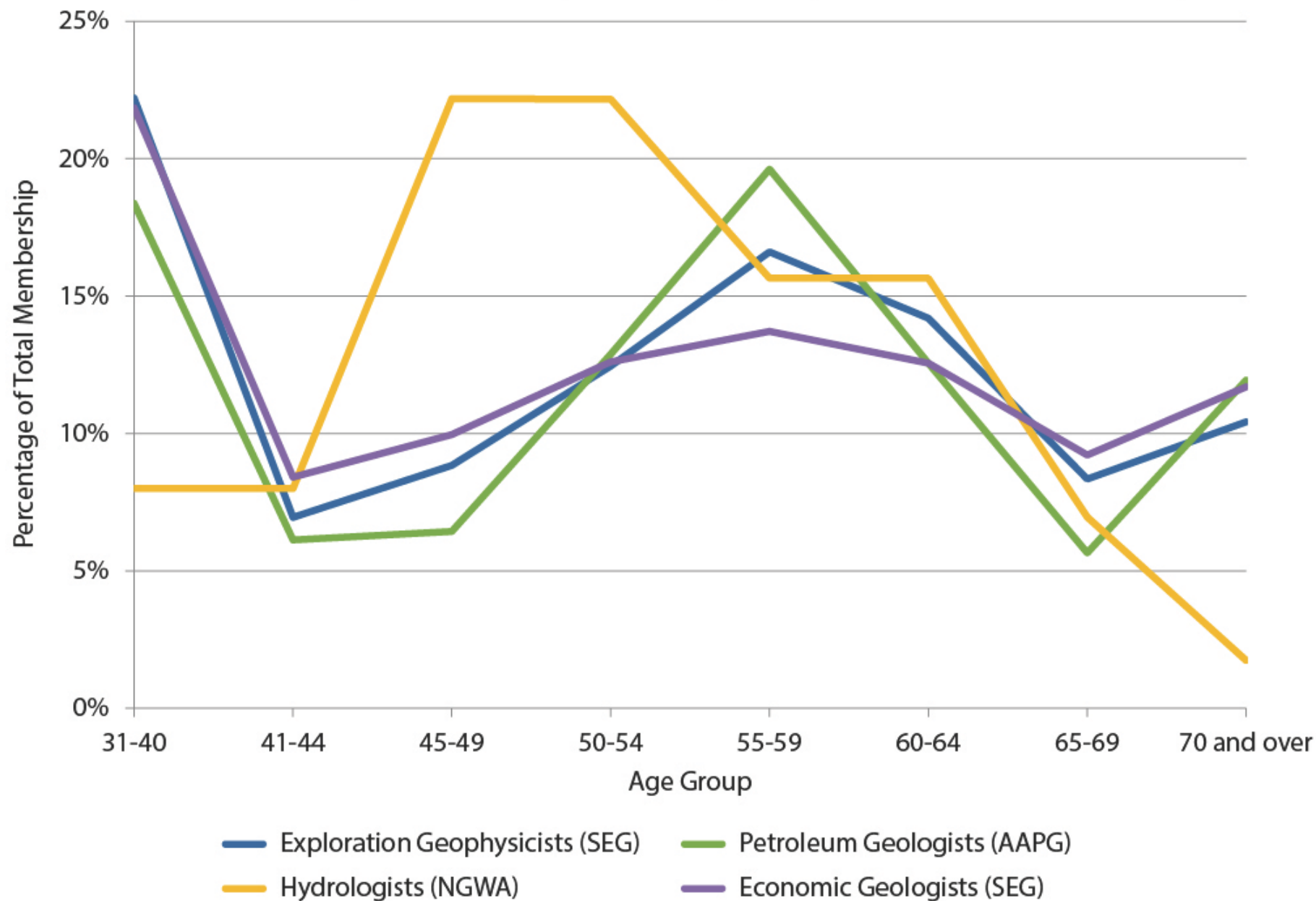
Equals

51,000 total new graduates (with BS, MS and PhD)

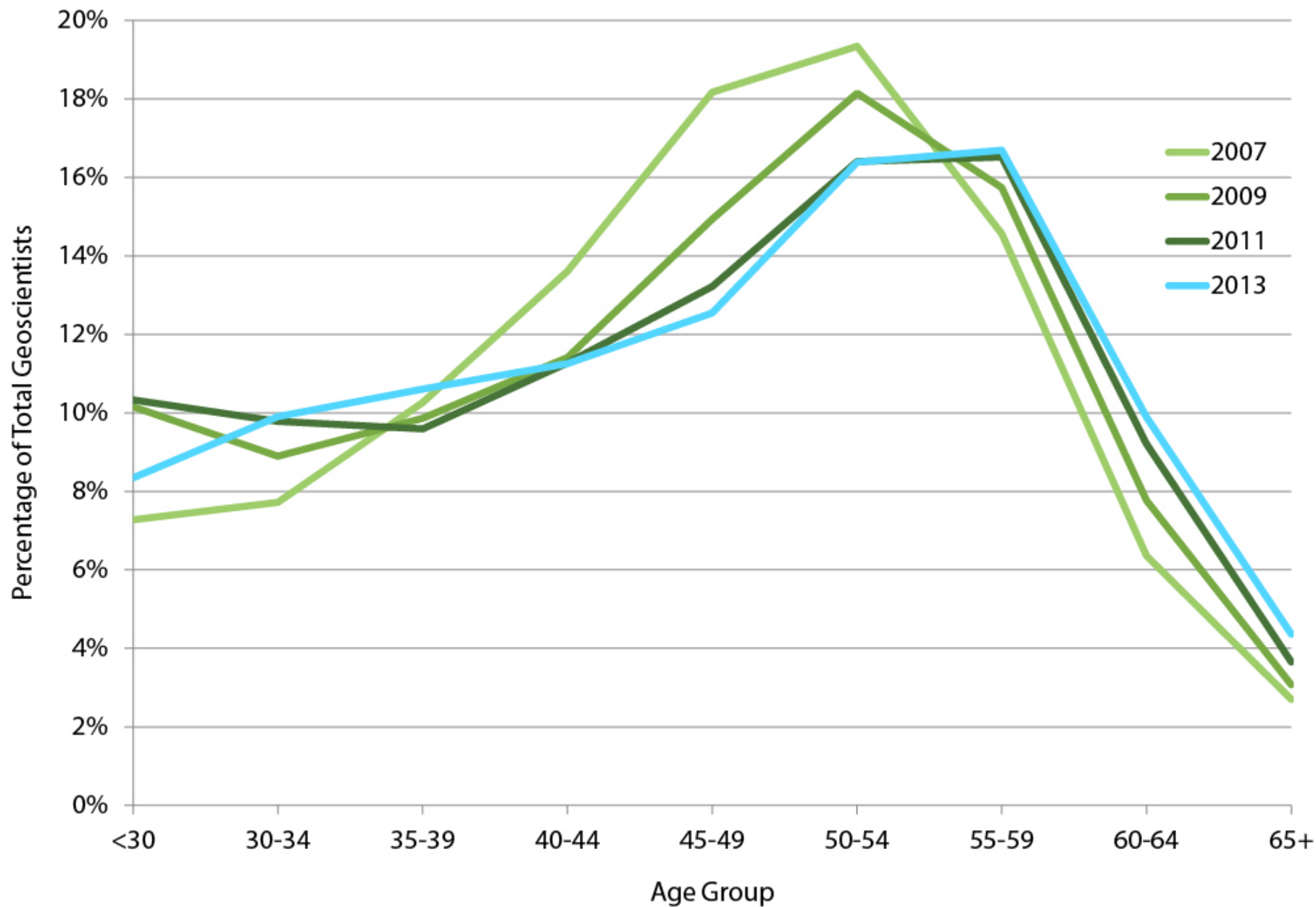


Net deficit of over **135,000** geoscientists by 2022

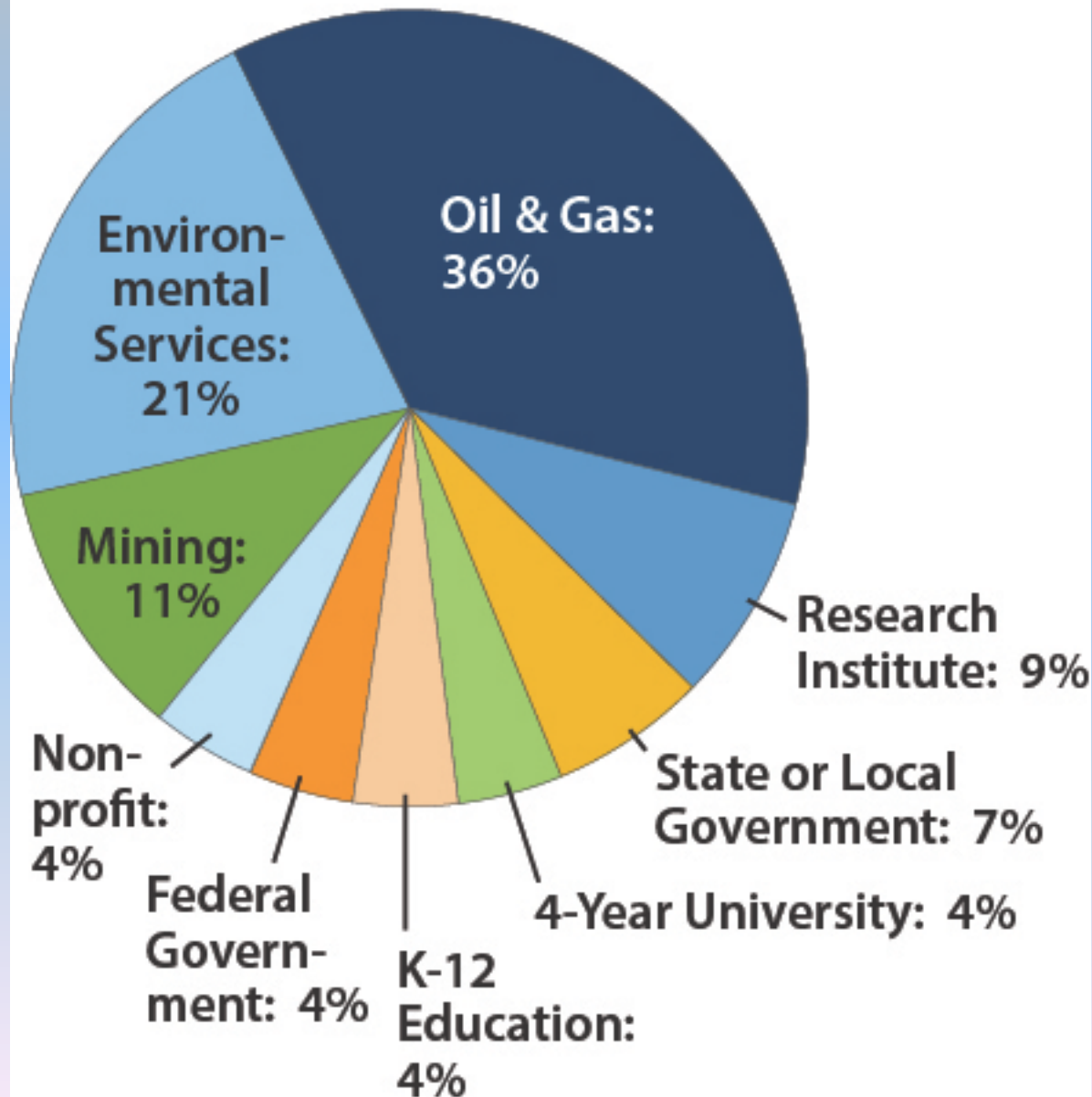
Geoscience Age Distribution by Membership Society without Student Memberships



Age Distribution of Geoscientists Employed in the Federal Government

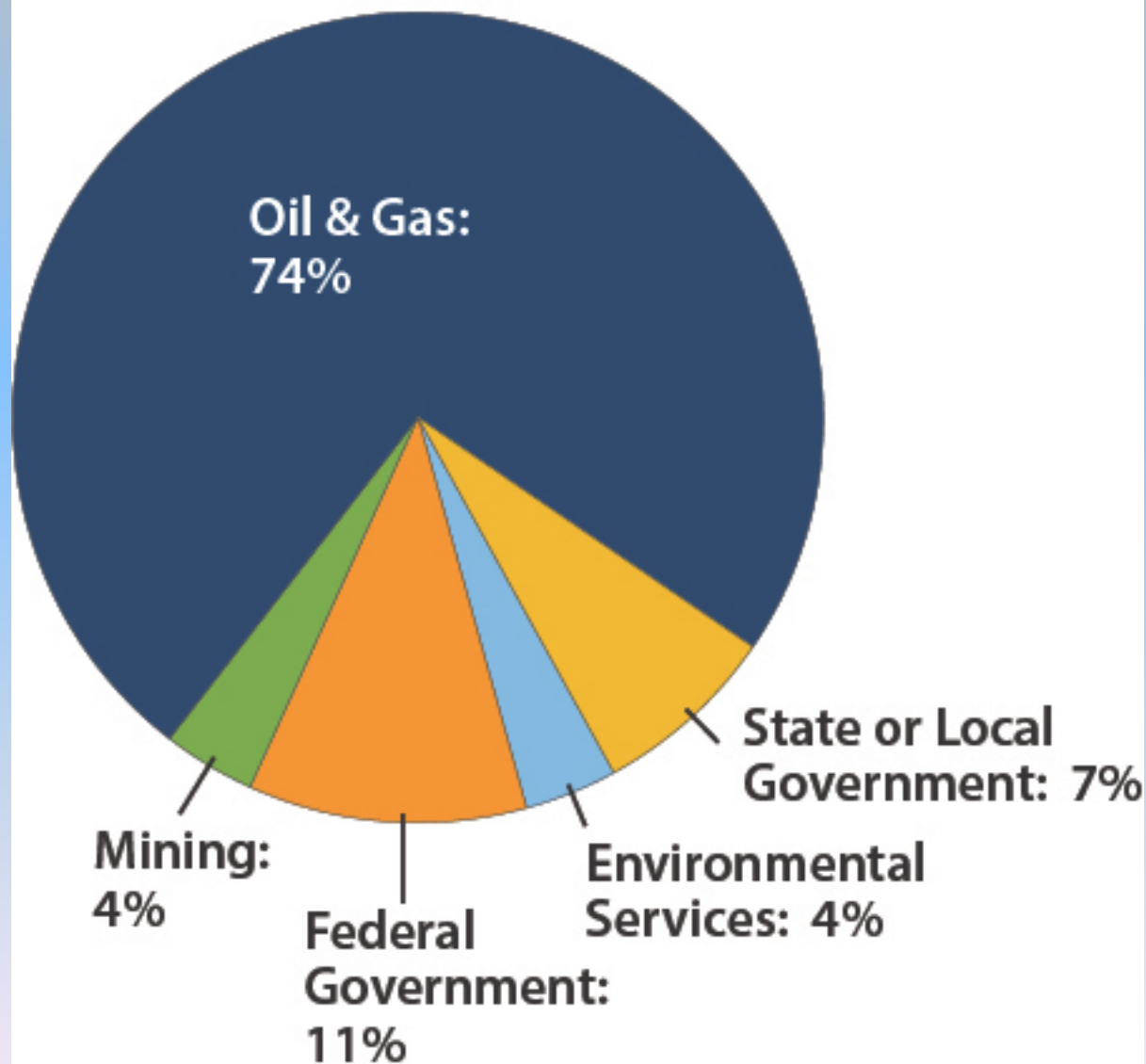


Bachelor's Graduates



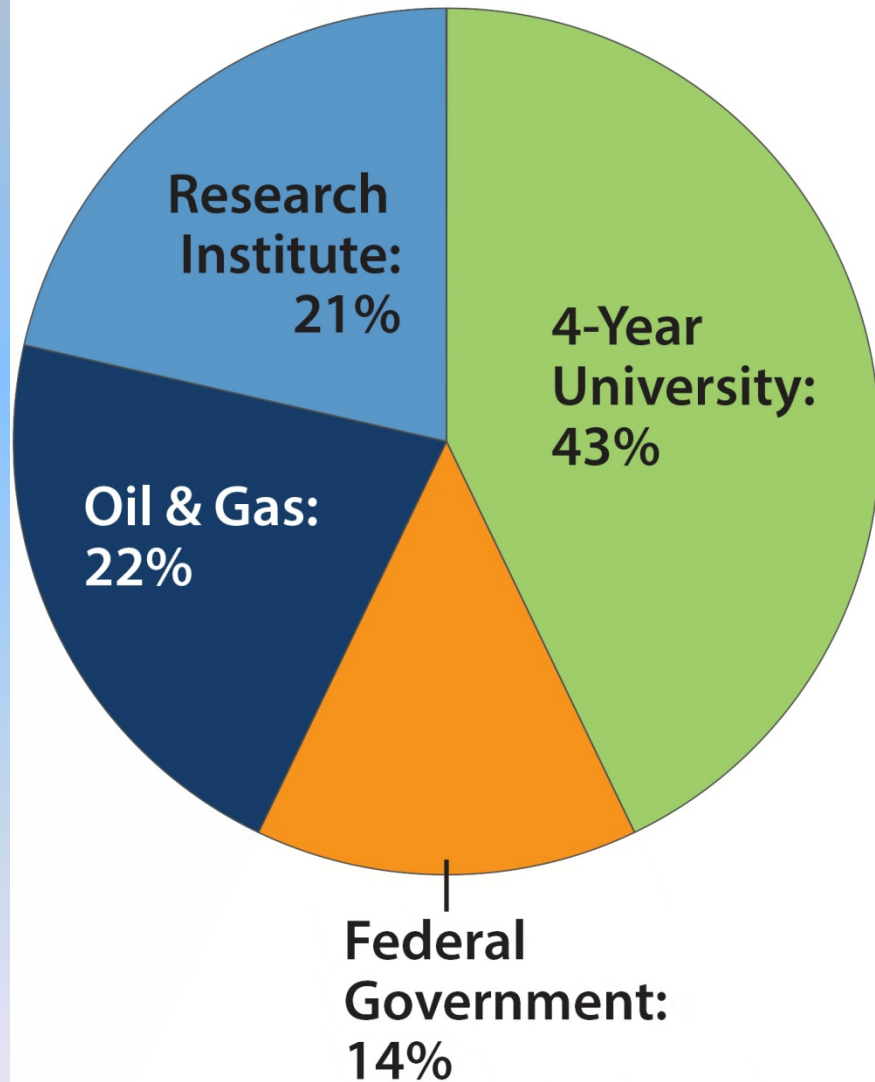
**Industries where
graduating students
have accepted a job
in the geosciences**

Master's Graduates



**Industries where
graduating students
have accepted a job
in the geosciences**

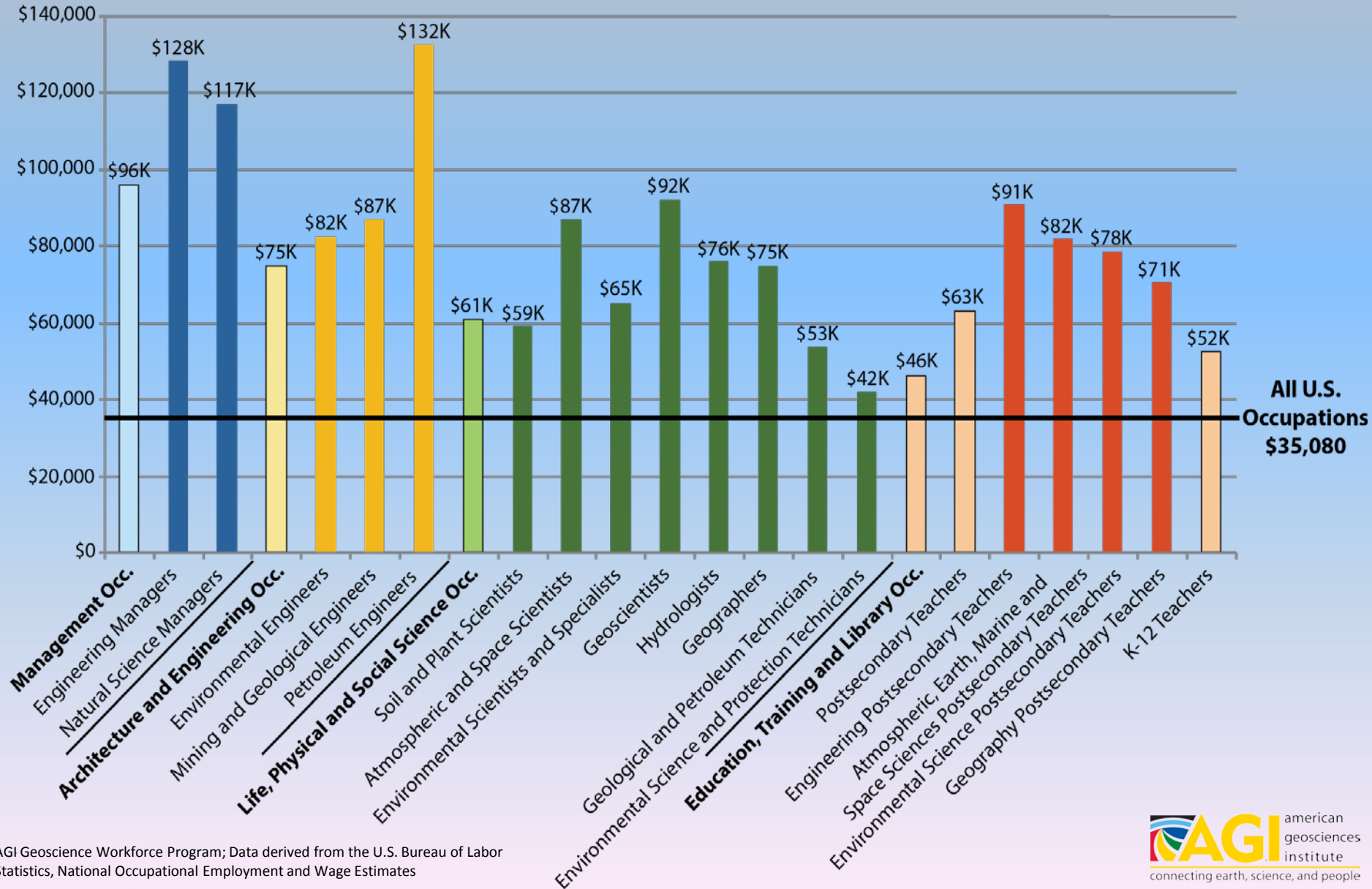
Doctoral Graduates



**Industries where
graduating students
have accepted a job
in the geosciences**

The Breakdown: Workforce Trends

2013 Median Annual Salaries for Geoscience-Related Occupations





The idealistic image of our science?



Preparing the Next Generation of Earth Scientists:

An Examination of Federal Education and Training Programs

“A key goal of federal government recruitment policies is to attain a workforce that draws from all segments of society and that leverages diversity to deliver the best public service. However...”

(OPM, 2011)

Although women and members of minority groups now constitute approximately 70% of college students, they are underrepresented among students receiving undergraduate degrees in STEM subjects (approximately 45 percent). These students are an “underrepresented majority” that must be part of the route to excellence.

- President's Council of Advisors on Science and Technology (PCAST)
February 7, 2012



Disability is defined as "...a physical or mental impairment that substantially limits a major life activity."

- Americans with Disabilities Act of 1990

Handicapped	Infirm	Paralyzed	Weakened
Wounded	Confined	Disarmed	Disadvantaged
Hurt	Incapable	Maimed	Sidelined
Stalled	Wrecked	Incompetency	Broken-down
Helpless	Lame	Hamstrung	Out-of-action
Weakness	Powerless	Run-down	Worn-out
Ailment	Defect	Impairment	Infirmity
Injury	Affliction	Detriment	Disqualification
Drawback	Unable	Incapacity	Decrepit

Handicapped	Infirm	Paralyzed	Weakened
Wounded	Confined	Disarmed	Disadvantaged
Hurt	Incapable	Maimed	Sidelined
Stalled	Wrecked	Incompetency	Broken-down
Helpless	Lame	Hamstrung	Out-of-action
Weakness	Powerless	Run-down	Worn-out
Ailment	Defect	Impairment	Infirmity
Injury	Affliction	Detriment	Disqualification
Drawback	Unable	Incapacity	Decrepit

Re-envisioning ACCESSIBLE programs

The current “state of the union”

- Anticipated workforce shortages should encourage a review of recruitment strategies and training methods
- The past is NOT the key to the present, or the future: geoscience careers are NOT the same today as they have been in the past
- Current momentum of diversity awareness
- Perceptions of current geoscience faculty and industry representatives regarding access and full-inclusion

Geoscience diversity will be most heavily impacted by:

- Undergraduate programs that are designed to retain diverse students and increase graduation rates
- Teacher preparation for increased and inclusive participation

(NRC, 2011)

Eliciting broad participation

- K-6 programs to foster interest
- 7-12 outreach activities aligned to higher education
- Student opportunities to network with peers and mentors in geoscience disciplines
- Financial assistance to support inclusive undergraduate and graduate study

What curricular requirements are necessary for future geoscientists?

The importance of a strong foundation in STEM, including applied mathematics, reading for information, and locating information, basic interpersonal skills, effective communication, and creative thinking

Emerging Workforce Trends in the U.S. Energy and Mining Industries: A Call to Action (NRC, 2013a)

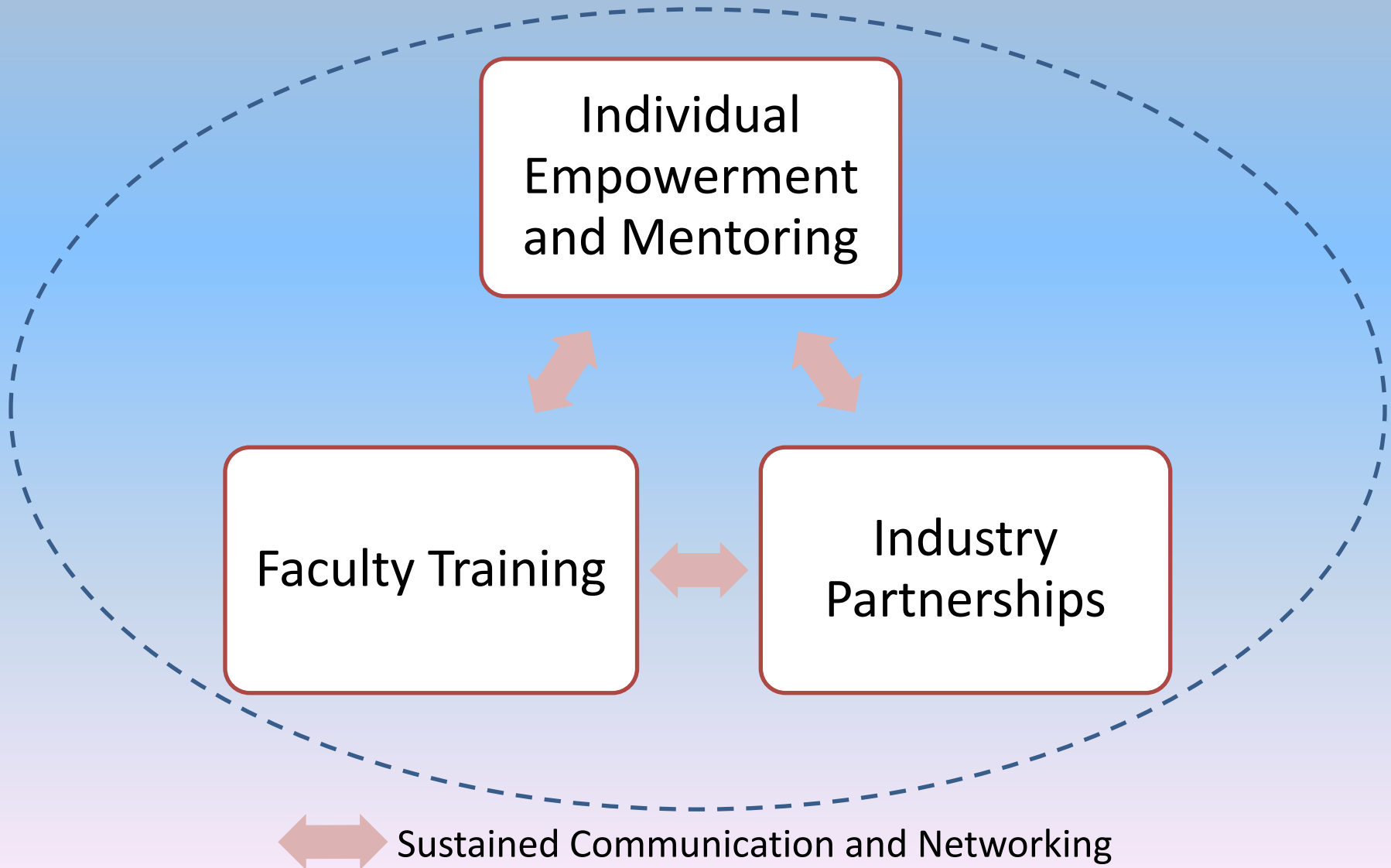
Future U.S. Workforce for Geospatial Intelligence (NRC, 2013b)

Diverse-ability of Future Geoscientists

- Data Mining
- Advanced technological languages; computational aptitude
- High observation and interpretation skills; attention to detail
- Content specialization, enhanced through diverse perspective
- Trained through social ability, rather than physical inability

Are inclusive programs viable?

Eliciting Programmatic Change



We also have to consider...

- Federal, state and university bureaucracy
 - Medical/Insurance accommodation
 - Institutional liability
 - Departmental finance and logistics
 - Faculty time and relevance to RPT
 - Social acceptance
- Individual ability and perseverance

Initial considerations (top down)

- Understand the community perspective
 - What are the questions that need to be asked?
- The voice of multiple stakeholders must be heard
 - Determining industry need
 - Understanding perspectives of
 - Students (personal and social service barriers)
 - Faculty (geoscience, psychology and disability studies)
 - Obtaining **institutional support and buy-in**
 - Coordinate with insurance providers and governmental agencies that provide student support services

But even more... (bottom up)

- How do we include K-12 and 2YC perspective?
- Stop focusing on the limitations of the core curricular requirements in secondary education, and focus on what can be changed
- Develop after school and summer programs that provides full participation of SWD in the earth sciences

Advancing Awareness and the Impact of Diversity

- Geoscience organizations promoting diversity
- Instructional workshops
- Increasing diversity networks
- Years of successful diversity research



- K-12 instruction of earth science
 - accessible informal/after school programming
- parent/teacher/student communities
- pathway programs for higher education
- faculty instructional training
- curriculum evaluation
- accommodation and inclusion in classroom, lab, and field
- guidebook of institutional resources:
accommodating and understanding student needs
in the face of liability constraints
- student/expert mentoring
- pathways to graduate training and the workforce

Examples:

current exploratory studies

- Evaluation of accessible field courses
- Perceptions of current geoscience practitioners
 - Improving pathways from academia to industry
- Spatial abilities of students with physical disabilities
- Transformational effects of student-mentor experiences
- Cognitive engagement of simulated environments



International Association for Geoscience Diversity

www.TheIAGD.org | info@theiagd.org | facebook.com/TheIAGD | [@AccessibleGEO](https://twitter.com/AccessibleGEO)

The IAGD mission is to improve access to the geosciences for individuals with disabilities while promoting communities of research, instruction and student support.



www.theIAGD.org

IAGD Vision

- Celebrate the diverse abilities of all geoscientists while fostering student engagement in geoscience **career pathways**
- Provide faculty **professional development** in instructional access and inclusion
- Unify and promote efforts of **collaboration in research** and instructional best practices
- Develop a **community of resources** for faculty and **student support**
- Advance knowledge of **access and accommodation** within the geosciences through scientific research

How the IAGD can help you!

- Specific resources to accommodate:
 - Physical (mobility/non-mobility)
 - Blind / low vision
 - Deaf / hard-of-hearing
 - Cognitive / learning
- Instructional development for faculty and student instructors
- Research on fully-inclusive instructional practices including developing alternative field-based learning opportunities

IAGD Foundation

Advancing access and inclusion in the geosciences for individuals with disabilities through the development of innovative research and instruction

Travel support for scholars with disabilities attending geoscience meetings and conferences

Seed funding for innovative research and curricular development focus on access and inclusion in the geosciences

Awarding outstanding achievements in scholarship and service that promotes the advancement of access and inclusion in the geoscience profession.

foundation@theiagd.org

Faculty Training

Designed to instruct current geoscience faculty and graduate teaching assistants to apply the principles of universal design to their own lessons, labs, and field trips in order to accommodate students with physical, cognitive, and emotional disabilities.

Key topics: accommodation in the geosciences; the physical barriers to access and inclusion; and the personal, psychological and social challenges that students may face away from the classroom.

Faculty Engagement

*Instructional Approaches to Access, Accommodation,
and Inclusion in the Geosciences*



AGU, 2013

GSA 2014

Field Trip #416 “Full Access to the Geology of the Sea to Sky Highway” - fully accessible!

Exhibit Hall Booth #319

IAGD Annual Meeting, Sunday, October 19,
4-5pm. Hyatt Regency, Georgia B

Community Engagement



Students | Faculty | Industry

Student Community







International Association for Geoscience Diversity

www.TheIAGD.org | info@theiagd.org | facebook.com/TheIAGD | [@AccessibleGEO](https://twitter.com/AccessibleGEO)

Chris Atchison

513.556.3613 | christopher.atchison@uc.edu