

One Size Does Not Fit All – EoR Legacy Design and Scalability

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Where are we?

A Declining Resource Base?

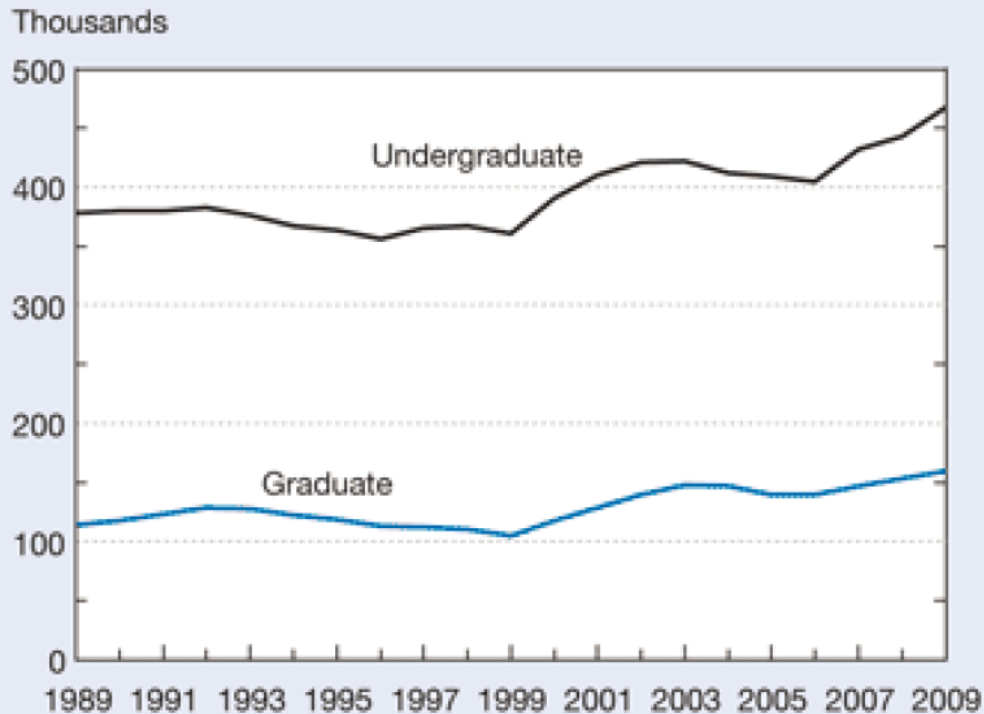
- A small professional community
 - Small niche skill group
- Inherent dearth of resources
 - Cyclic Industry with attrition during down markets
 - 1990s dot-coms
 - Deemphasis of engineering as a profession
 - Past declining enrollment
 - Current movement to State and Federal positions
- Ongoing Senior attrition (Father Time)
- Requires continues “on-the-job” training



Copper Prices – Past 45 Years



Figure 2-12
U.S. engineering enrollment, by level: 1989–2009



NOTE: Enrollment data include full- and part-time students.

SOURCE: American Association of Engineering Societies,
Engineering Workforce Commission, Engineering & Technology
Enrollments (various years). See appendix tables 2-15 and 2-22.

Science and Engineering Indicators 2012

Current Trends

- Changing state of the practice driven by
 - Improved understanding and tools
 - Recent failures have forced paradigm change
 - Building higher and larger
 - Corporate reputation and risk awareness
- Tailing renaissance ahead?
 - Reduced hydromet
 - Abundant deep sulfides
- Increasing mine life (+30 years)

EoR Program Support – Current Minimums

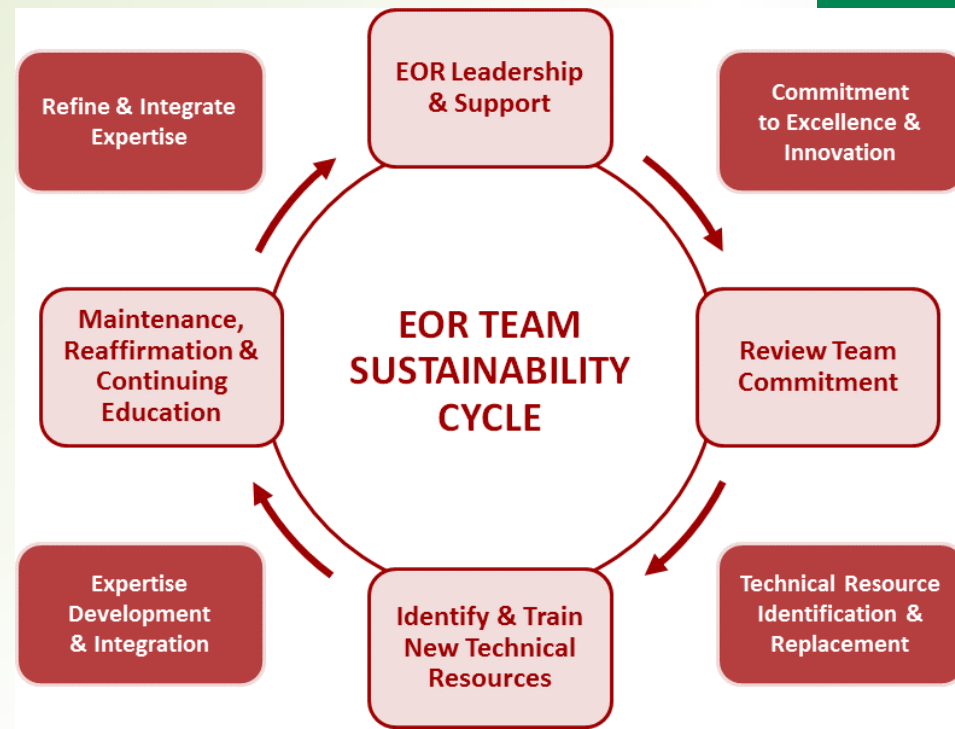
- Operations
 - Qualified internal engineering support
 - Corporate commitment and investment
 - Increased operations investment
 - Tailing stewardship programs
- External 3rd party review
 - Increased investment
 - Stewardship teams
 - Guidance accountability
- External review boards
 - Qualified leadership

Tailing Stewardship – Typical Profile

- Owner Team
 - Program Director, a “corporate champion”
 - Internal experienced civil engineers (geotechnical and water resources)
- External Review Team
 - EoR (design and/or operations) direct engagement
 - Multiple external supporting teams
 - Annual 3rd party Review
- Technical Review Board
 - 2 or more members from academia or private practice
 - Renowned experts in respective fields (geotechnical and water resource engineering, seismologist, etc.)
 - 5-year interval and major projects

Strategy for EoR Teams

- External professionals
 - Qualified senior professionals
 - Focus on geotechnical and operations experience
 - Internal training programs
 - Sustainability cycle
- Consider multiple EoR groups
 - Built-in peer review
 - Improved attrition planning
 - Resource base diversity
- Scalable
 - Start small; go big



EoR Legacy Planning and Scalability

EoR requirements need to be sufficiently flexible to

- Accommodate all project sizes
 - Accommodate teams and multiple EoRs
- Account for project length
 - Attrition planning
- Maintain qualified personnel and expertise
- Continuing education of all stakeholders
- Utilize team approach to leverage resources