



Southwest Geotechnical Engineering Conference
May 7, 2019 Baton Rouge, Louisiana

“Risk in Geoconstruction and Geoengineering”

Jerry A. DiMaggio, PE, D.GE
Applied Research Associates, Inc.
jdimaggio@ara.com



NATIONAL SECURITY



ENERGY & ENVIRONMENT



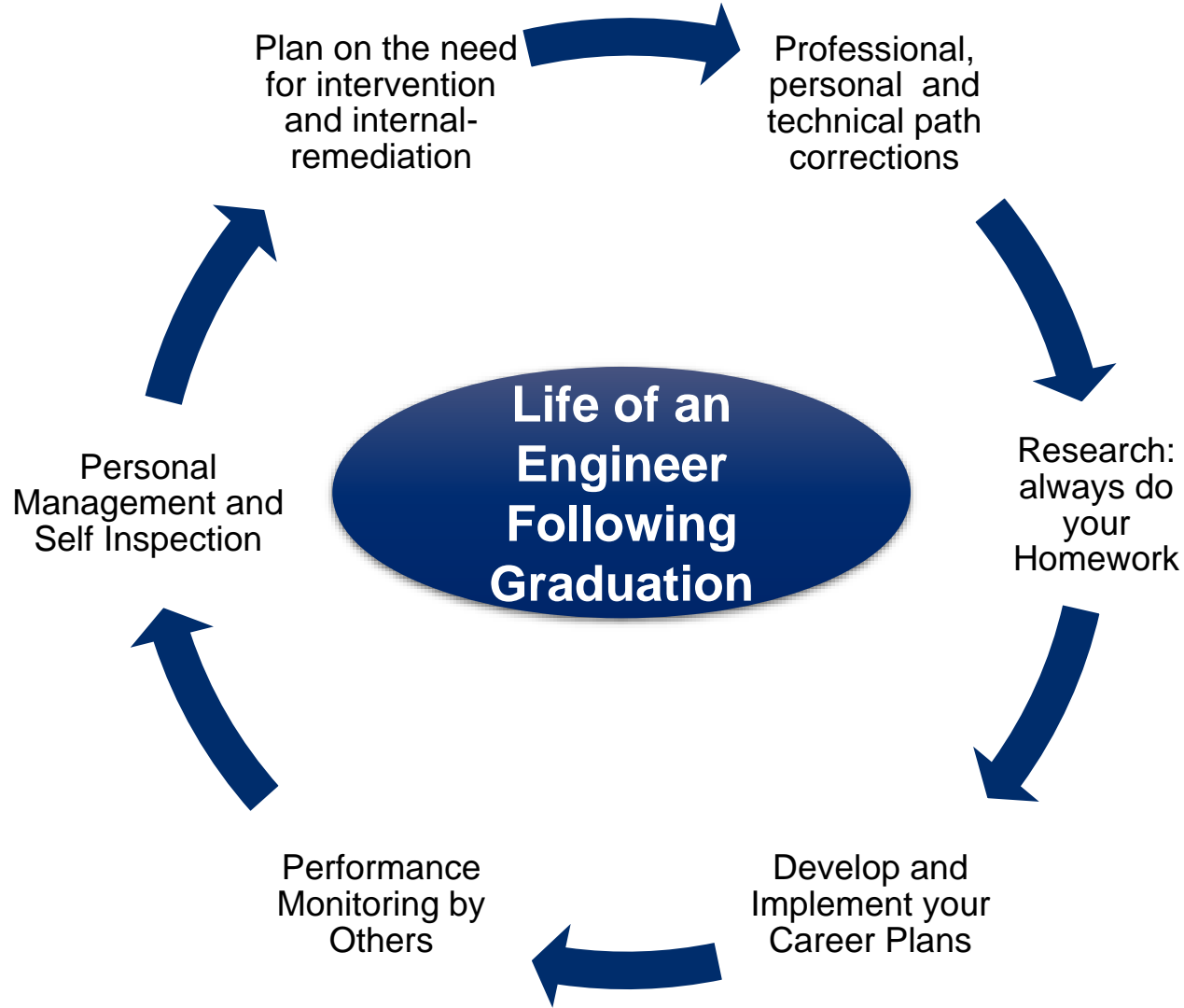
INFRASTRUCTURE



HEALTH SOLUTIONS

THE REAL: Jerry A. DiMaggio

- Pin Ball Machine Repairman – 1yr
- Country Club Maintenance Foreman – 3yrs
- Teamster Trucker– 2yrs
- Father – 41yrs
- Grandfather – 7 boys and girls
- Husband – 50yrs
- Civil Engineer (geotechnical and construction) - 46yrs





A popular and often misunderstood and misapplied topic

Risk Background

- Risks commonly and regularly affect our personal and professional lives
- Professionally risks can be addressed at a project, program and enterprise level in an organization
- Risks can be negative (threats) or positive (opportunities)
- Risk Management has been a recognized “best practice” for decades but isn't mainstreamed in many segments of the infrastructure communities
- A Risk Register (list of risks) is not risk management
- Many in the Geocommunity (owners, contractors, consultants and material suppliers) believe they understand risks well and that they routinely apply some form of risk management!
- However the number of dispute matters in our industry and the frequent disappointments in profit, revenue, geofeature performance and excessive staffing turnovers suggest otherwise.

Geoengineering and Geoconstruction Risks

- **DIFFERING SITE CONDITIONS!!!!!!**
- Poorly prepared plans and specifications
- Unfair risk allocation between owners, consultants and contractors
- Design and construction details which lack constructability details
- Poor execution during construction
- Poor and overly conservative designs
- Complex and unfair quality control and quality assurance requirements
- Complex definitions of work acceptance
- Unfair units of measurement and basis for payment clauses
- Failure to apply prequalification requirements

**Health and
Safety**

Operational

Economic

Political

Regulatory

Information

**Natural
Environment**

**Fraud or
Malfeasance**

Litigation

Definitions of Risk Terms

- RISK: Uncertainties regarding future events that may have either positive or negative impacts to specifically defined objectives.
- OBJECTIVE: an **objective definition** must include a verb, defined outcome, a deadline date and be able to be accomplished with a available resources (costs, staff and time)
- EACH RISK: is unique and has a different chance of occurrence and has a different impact (severity) on the objective **Expected Value!**
- RISK MANAGEMENT: a **series of coordinated activities** to direct or control opportunities and threats to achieve the defined goal and objective.

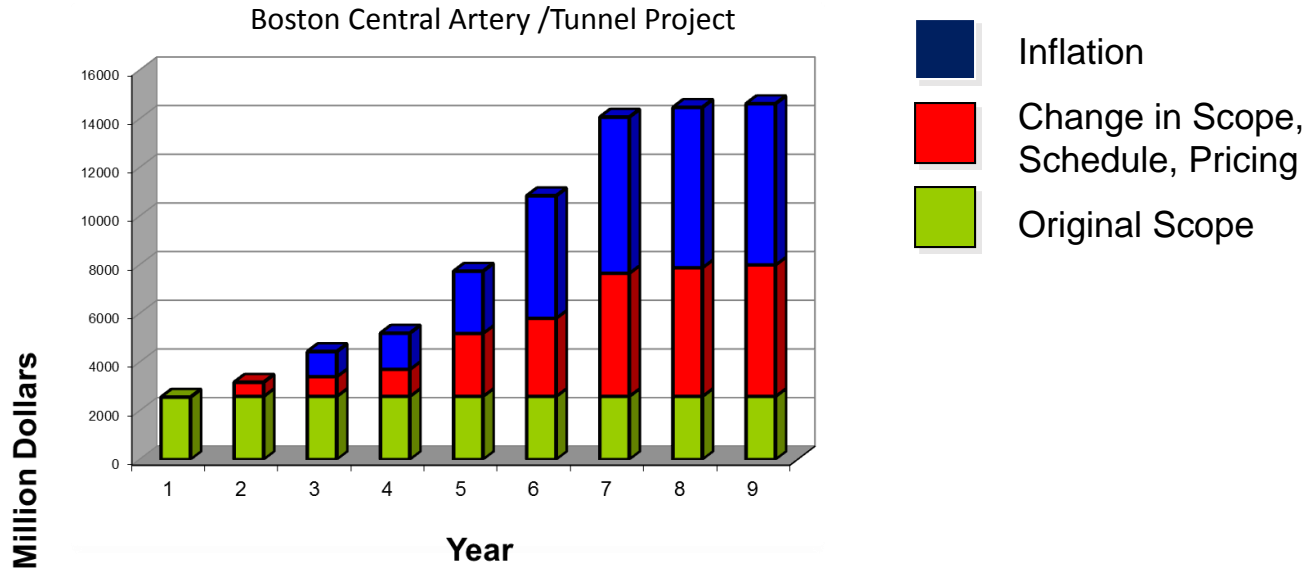
Expected Value



Why Risk Management?

Historically, widespread problem

- Project budget and schedule over-runs
- Owner-contractor-user disconnect



Risk Management Benefits

Is very proactive

Puts “project manager” in control

Has been shown to:

- **Decrease majority of project issues**
- **Recognize substantial cost/schedule savings**

Is “best practice”

Is applicable to all projects and phases

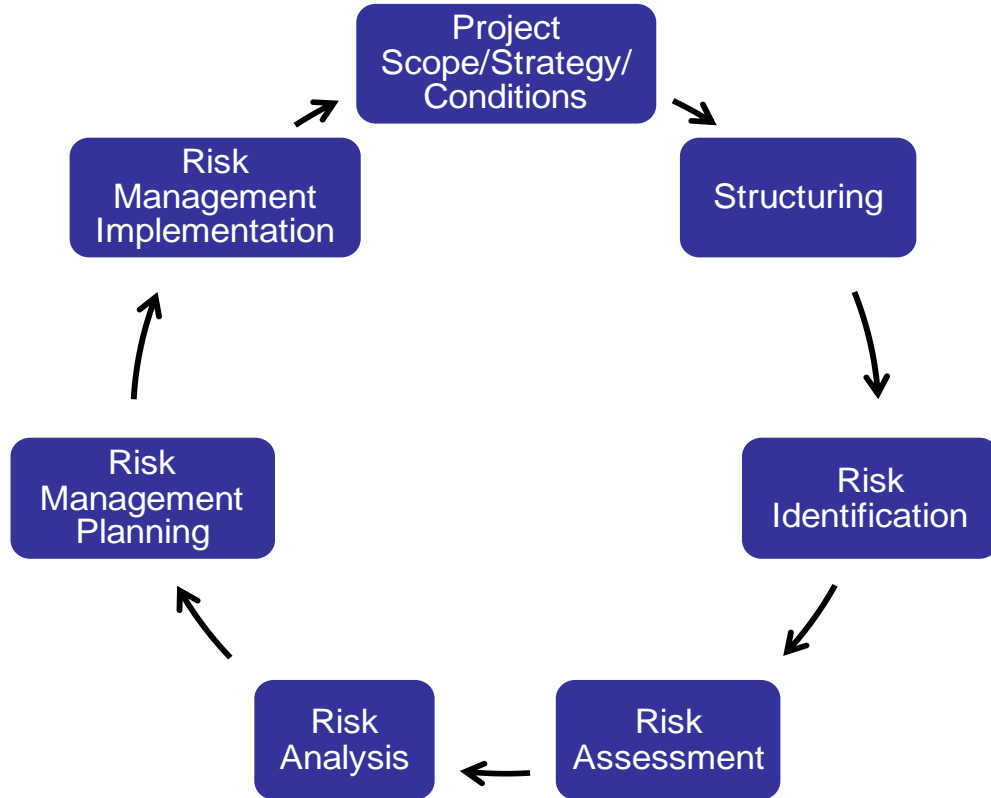
Helps project team and management to better understand/communicate challenges/issues

Why Risk Management isn't More Widely Accepted

- Perception it requires the use of probability and “black box” computer programs
- Difficulty in developing a clear set of benefits and cost effective outcomes
- Perception it is too complex, costly to implement and time consuming
- Failure to achieve a balance between Threats and Opportunities
- Lack of support from upper management
- Inability to identify and develop an internal champion
- Difficult to integrate within current organizational processes, policies and procedures
- Lack of TEAM support and follow-through

Risk Management Definition

Risk management is a series of coordinated activities to direct and control challenges or threats to achieving project goals and objectives.



Critical Steps to Successful Formal Risk Management

- “SELL” the Risk Management principle both top down and bottom up
- Establish a clearly defined scope and objective using a team approach
- Identify a comprehensive set of Threats and Opportunities
- Rank each risk by severity (product of impact and probability of occurrence)
- Focus on the risks which have the greatest severity (you can't manage every risk)
- Develop and implement a mitigation plan and secure sufficient resources (don't be unrealistic)
- Periodically track the plan for progress and necessary changes (risk management is a time dependent activity)

WHAT are Common “Geo” Threats?

- **DIFFERING SITE CONDITIONS!!**
- Interpreting subsurface factual data
- Overly conservative or unconservative designs
- Incomplete geo-feature performance and acceptance criteria
- Deep foundation defects during installation
- Difficulty meeting deformation tolerances
- Difficulty meeting aesthetic requirements
- Addressing known and unknown subsurface utilities
- Communication and Coordination with internal and external stakeholders
- Interpretation and achieving design life requirements
- Natural and manmade obstructions
- Meeting accelerated design and construction schedules
- Meeting engineered fill and cut slope requirements

WHAT About “Geo” Opportunities?

- **Innovative Delivery Methods**
- **Alternative Technical Concepts**
- **Performance based Specifications**
- **Constructability and Peer Reviews**
- **Value Engineering**
- **Optimized use of design and construction guidance and tools**
- **Narrow the GAP between State of Art and State of Practice**
- **Reliability based design processes**
- **Improved procedures for determining geomaterial design and construction parameters**

Threat and Opportunity Responses

A-TEAM



Jerry D. "Alias Joe D' Cousin"

jdimaggio@ara.com

