### **Engineering Excellence and Engineer Exemplars: Lessons Learned for PEs**



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## As a result of this presentation, you will be able to:

Discuss examples of engineering excellence



Describe some engineering exemplars and their accomplishments

**Explain a few lessons learned for PEs** 

**Create boldly** 





#### **West Point**

#### First school of engineering in the English-speaking world

Engineering excellence





#### **Erie Canal**









#### **Brooklyn Bridge**



Emily Roebling

## Thank you ?!

Two small variable thrust rocket engines





## Two real-time input-output digital computers







**Saturn Rocket** 

The most amazing engineering project ever ?

## Apollo 11



Lunar Module "Eagle"

## Small real-time digital computers



#### Six years before Stephen Wozniak created the Apple I desktop computer







## Engineer Exemplars



#### Arthur E. Morgan: Renaissance engineer

"I don't intend to be commonplace. I intend to make a great person of myself... great in having fulfilled my possibilities: great in having seen which of my possibilities are greatest." Morgan's accomplishments:

Founded an engineering company

Led development of Minnesota water control law

Formed the Miami (Ohio) Conservancy District

**Served as President of Antioch College** 

**Chaired (first) the Tennessee Valley Authority** 

**Authored books** 

#### Personal



#### Herbert C. Hoover: Engineer, President, and Humanitarian

"Great engineer"

"Doctor of sick mines"

#### Hoover's public service:

Helped 100,000 Americans stranded in Europe at beginning of WW I

Saved millions of Europeans from starvation during WW I

Served as U.S. Secretary of Commerce

Elected 31<sup>st</sup> U.S. President (blamed for the Great Depression)

Provided food to 300,000 Polish children affected by Germany's WW II invasion of Poland

**Resolved post-WW II food crisis in Europe** 

Led two Hoover Commissions that reorganized the Executive Branch of the U.S. Government



Margaret Hutchison Rousseau: Always found a better way

**Contribution's to America's WW II effort:** 

**Produced synthetic rubber and airplane fuel** 

Figured out how to produce penicillin in large quantities -- Two million doses saved lives

First women to become a member of the AIChE and the first women to receive its Founder's award



David B. Steinman: Master bridge builder, writer, and NSPE Founder

#### His masterpiece: The Mackinac Bridge





Five stories high above a city street He dwelt, a child with wonder in his eyes. For him, through winter cold and summer heat, The sunbeams danced and stars sang lullabies.

A Bridge! The cables swung across the bay, The strands that hummed like harp-strings murmuring, They whispered to the child, "Some day...Some day..." "There is a harp, sir. I can hear it sing!"

What childhood experience drew you to engineering?

#### **Steinman's accomplishments:**



Founded NSPE in 1934



National Society of Professional Engineers®

Designed, via his firm, hundreds of bridges around the globe

Earned a PhD and was awarded 19 honorary degrees

Authored 600 professional papers, 20 books, and 150 poems

**Recognized by many organizations** 

Helped financially needy students



#### Mae Jemison: Engineer, MD, Astronaut, Consultant, Professor, Entrepreneur, Author, and Speaker

"Never be limited by other people's limited imaginations" Jemison's accomplishments, in addition to being an astronaut:

Practiced medicine and served in the Peace Corps

Founded a consulting firm

**Established the Foundation of Excellence** 

Taught at Dartmouth College and Cornell University

Wrote and co-wrote children's books

Appeared in a Star Trek episode

**Received 10 honorary degrees** 



#### William R. Ratliff, PE City Manager and Consulting Engineer

Elected to the Texas Senate, filled in as Senate President, and became Lieutenant Governor



U.S. congress: Engineers comprise only 1.5 % Lawyers 40 %

## Ratliff encouraged engineers to participate in politics

**Personal** 



#### John F. Kennedy Profile in Courage Award





#### They had eccentricities and shortcomings:



Stubbornly refused to accept defined authority

Dour and withdrawn

Let's not let our personal liabilities prevent us from exercising our hard-earned abilities



Reluctant to give credit to others





Lessons Learned For PEs

#### **1 Create boldly**

#### Need: Maintainers and builders, followers and leaders

#### Some of us: Urge to create, lead, build, reform, ...













#### 2. Leverage your engineering education

What do you and I do with our engineering education?

### **Engineering**!



#### **Double-diamond process**





### "Conclusive engineering analysis"







#### 3. Communicate effectively

#### Personal





# NSPE

"Protect the public against the incompetent, the quack, and the impostor"





#### 4. Behave ethically







"He is a gentlemanly, no-nonsense, solutionoriented, moderate conservative policy man, known for delivery of straightforward honest judgements without frills and flourishes."



"There is something almost terribly personal about it, in [his] desire that things shall change, that order shall be brought out of an existing chaos."

- •We follow the trusted leader
- •We seek advice from the trusted friend
- •Clients retain the trusted firm
- •Employers recruit/promote the trusted engineer
- Citizens support the trusted official

### **Lessons Learned for PEs**

1. Create boldly

2. Leverage engineering education



You've got the ball

3. Communicate effectively

4. Behave ethically

Your – Questions Critiques Tips Comments Suggestions ?

Ideas, information, and images used in this presentation are documented in this book





Engineering's Public-Protection Predicament

> Reform Education and Licensure for a Safer Society

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