



NAE
GRAND
CHALLENGES
SCHOLARS PROGRAM®

WORKSHOP – 5 to 8 August 2019
Belo Horizonte

Panel: Student and Alumni Voices

Moderator: Richard M. Stephan (UFRJ)

THE GLOBAL GOALS

For Sustainable Development



#GLOBALGOALS

The NAE 14 Grand Challenges for Engineering in the 21st Century

<http://www.engineeringchallenges.org/>

1. Advance Personalized Learning
2. Make Solar Energy Economical
3. Enhance Virtual Reality
4. Reverse-Engineer the Brain
5. Engineer Better Medicines
6. Advance Health Informatics
7. Restore and Improve Urban Infrastructure
8. Secure Cyberspace
9. Provide Access to Clean Water
10. Provide Energy From Fusion
11. Prevent Nuclear Terror
12. Manage the Nitrogen Cycle
13. Develop Carbon Sequestration Methods
14. Engineer the Tools of Scientific Discovery

Boeing List of “Desired Attributes of an Engineer”

- **A good understanding of engineering science fundamentals**
 - Mathematics (including statistics)
 - Physical and life sciences
 - Information technology (far more than “computer literacy”)
- **A good understanding of design and manufacturing processes (i.e. understands engineering)**
- **A multi-disciplinary, systems perspective**
- **A basic understanding of the context in which engineering is practiced**
 - Economics (including business practice)
 - History
 - The environment
 - Customer and societal needs

Good communication skills

- Written
- Oral
- Graphic
- Listening

High ethical standards

An ability to think both critically and creatively - independently and cooperatively

Flexibility. **The ability and self-confidence to adapt to rapid or major change**

Curiosity and a desire to learn for life

A profound understanding of the importance of teamwork.

Diversity – wanted and needed !

John H. McMasters, Narayanan Komerath

Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition

GCSP

(Grand Challenges Scholars Program)

1. Talent Competency
2. Multicultural Competency
3. Multidisciplinary Competency
4. Entrepreneurship Competency
5. Social Consciousness Competency
6. Ecological Consciousness Competency

MISSION:

“Continuation of life on the planet, making our world more sustainable, healthy, secure and joyful”

Engineering Courses at UFRJ

- Undergraduated Courses (EP)

The place of “Know why” (#1)

The place of “Know how” is the Industry !

Student Competition Groups (#2, #3, #4, #5, #6)

- Graduated Courses (COPPE)

Place of “Why not?”

The MagLev-Cobra project

Graphical Abstract



Linear motor

Rails of magnets



Superconductors refrigerated with LN_2 inside of cryostats

200 meters long line – outside the laboratory
Vehicle for 20 passengers

The MagLev²-Cobra project

Graphical Abstract



Linear motor

Rails of magnets



Superconductors refrigerated with LN₂ inside of cryostats

200 meters long line – outside the laboratory
Vehicle for 20 passengers

The MagLev²~Cobra project

Graphical Abstract



Linear motor

Rails of magnets

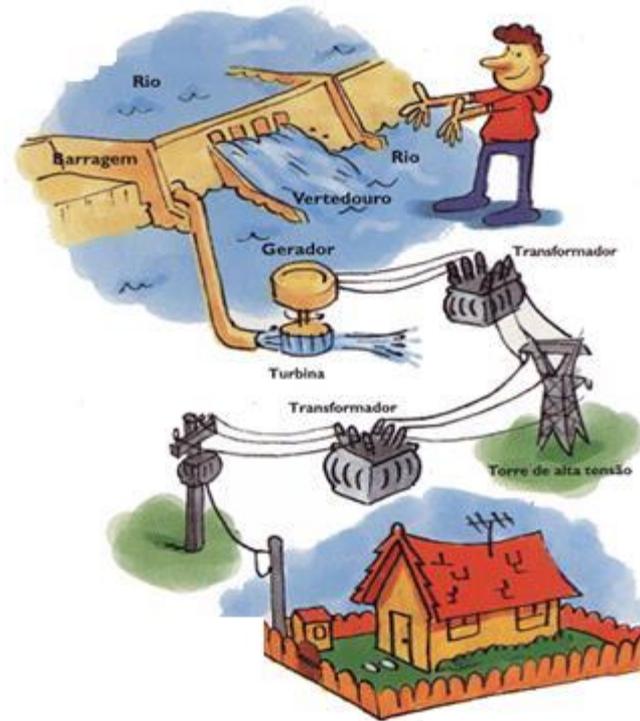
200 meters long line – outside the laboratory
Vehicle for 20 passengers



Superconductors refrigerated with LN₂ inside of cryostats



Introdução à **ENGENHARIA ELÉTRICA DE POTÊNCIA**



Richard M. Stephan

UFRJ

Agosto – 2018

Conclusion

At UFRJ, we are active and eager to collaborate and share our experience with you!

Thanks for your attention!!!

RICHARD M. STEPHAN





The NAE 20 Greatest Engineering Achievements of the 20th Century

<http://www.greatachievements.org/>

1. Electrification
2. Automobile
3. Airplane
4. Water Supply and Distribution
5. Electronics
6. Radio and Television
7. Agricultural Mechanization
8. Computers
9. Telephone
10. Air Conditioning and Refrigeration
11. Highways
12. Spacecraft
13. Internet
14. Imaging
15. Household Appliances
16. Health Technologies
17. Petroleum and Petrochemical Technologies
18. Laser and Fiber Optics
19. Nuclear Technologies
20. High-performance Material