



# Science, Technology & Engineering in Sustainable Human Development

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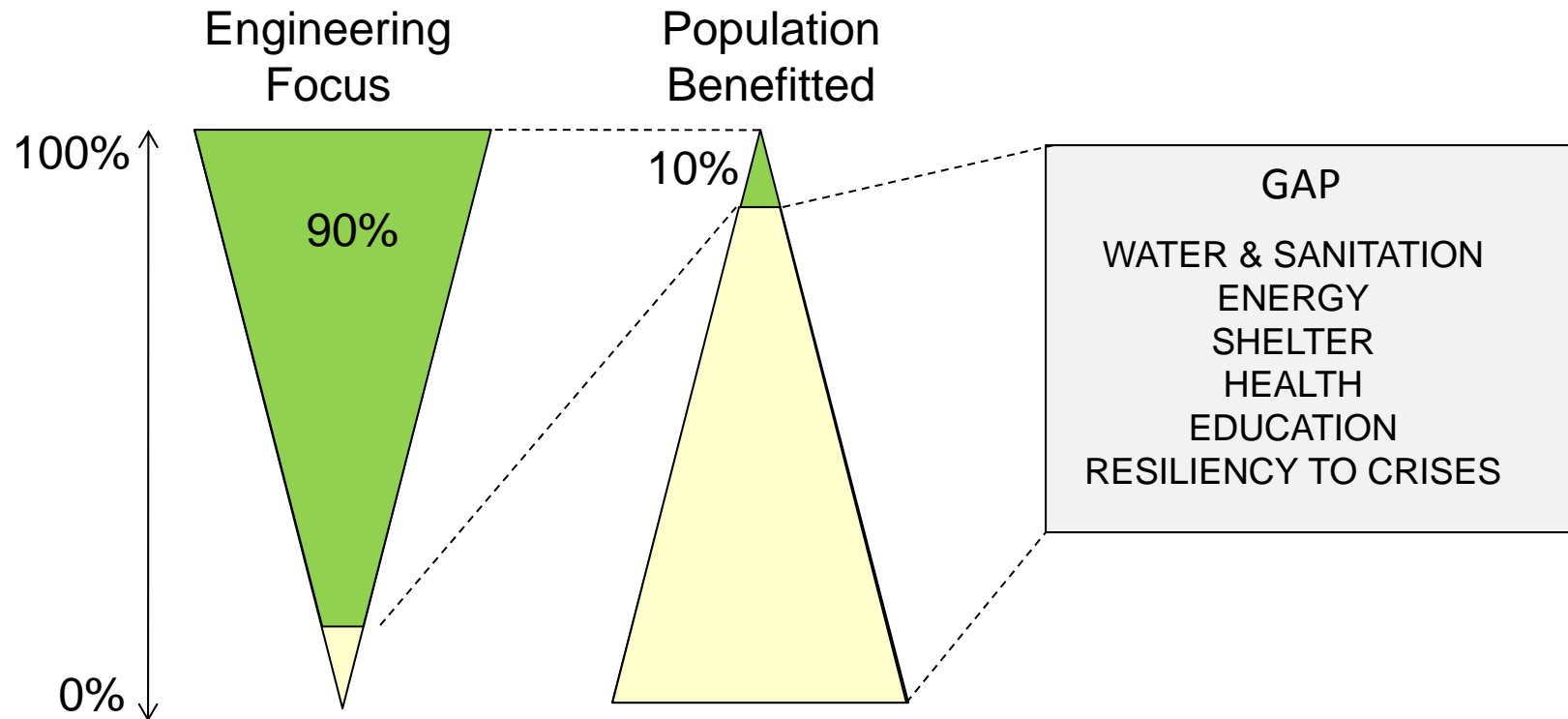


November 6 , 2013  
KAIST  
Daejeon, South Korea



# A LARGE GAP REMAINS BETWEEN TODAY'S TECHNOLOGICAL ADVANCES AND THE NEEDS OF THE WORLD'S MAJORITY

“The majority of the world’s designers focus all their efforts on developing products and services exclusively for the richest 10% of the world’s customers. Nothing less than a revolution in design is needed to reach the other 90%.” *Dr. Paul Polak, International Development Enterprises*





## Doing Well by Doing Good

Market for joint ventures between private and citizen sectors in the low-income world worth:

- \$202 billion in health care,
- \$424 billion in low-cost housing,
- \$553 billion in energy,
- \$36 trillion in agricultural products and food.

Drayton and Budinich (2010)





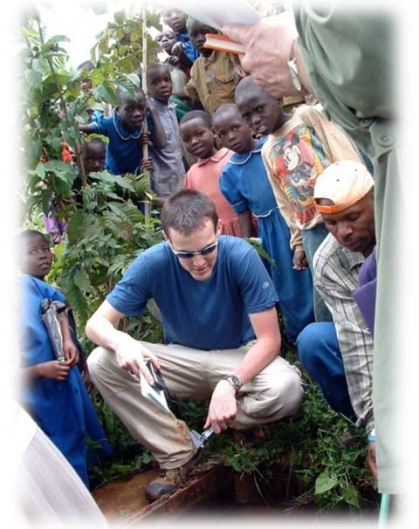
San Pablo, Belize (2001)





# Engineers Without Borders - USA

- Partners with disadvantaged communities to improve quality of life
- Implements environmentally and economically sustainable engineering projects
- Develops internationally responsible engineers and engineering students
- Involves 12,000 members, 275 chapters, 400+ projects in 45 countries, 100+ projects completed.





- 0.78 billion lack clean water
- 2.5 billion lack adequate sanitation
- 2.4 billion are at risk with malaria
- 2.0 billion with no access to low cost essential medicines



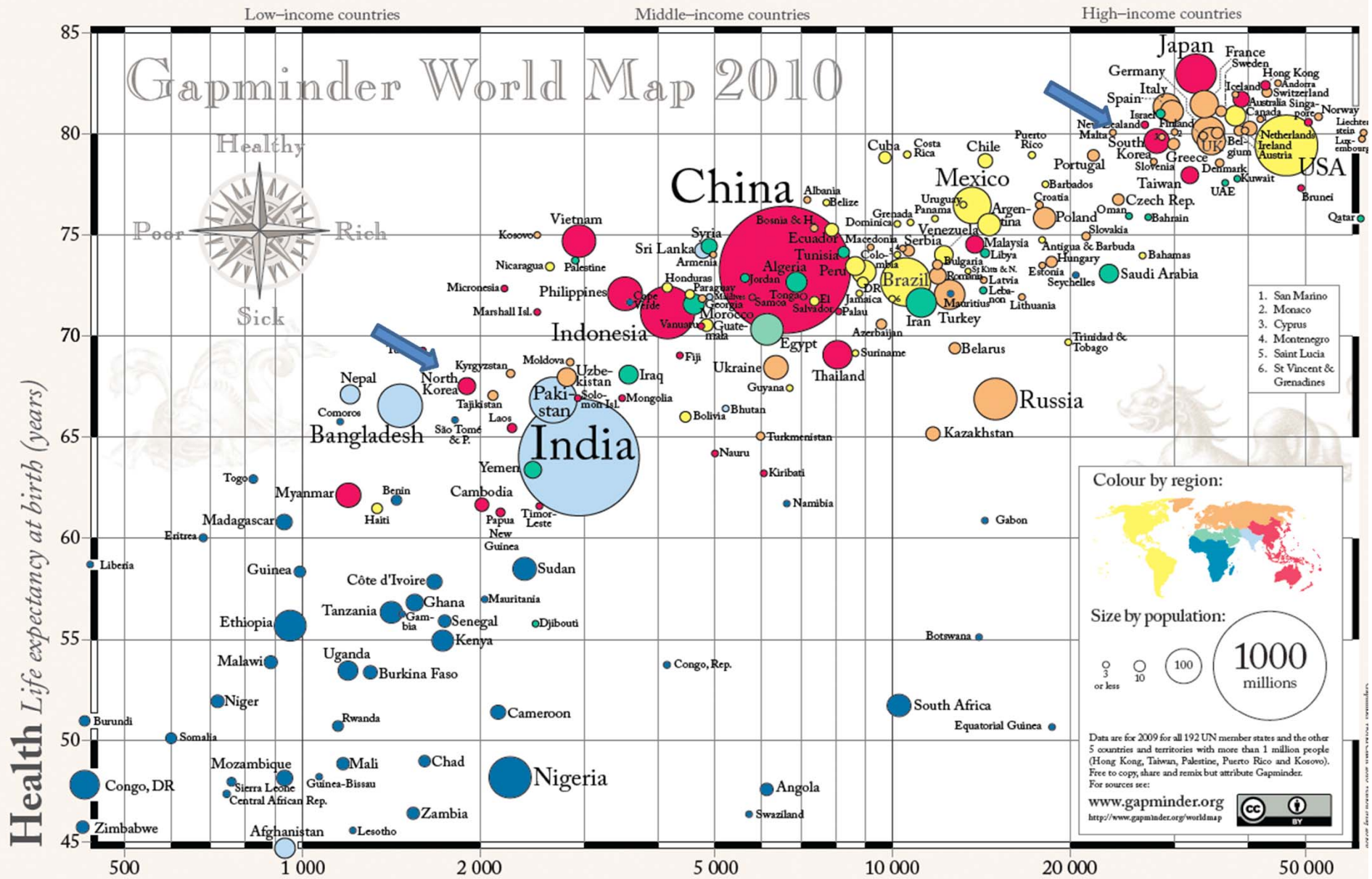
## Why Engineering for the Developing World?

- 1.2 billion lack adequate housing
- 1.6 billion have no access to electricity
- 1.3 billion are illiterate
- 1.8 billion live in conflict zones, in transition, or in situations of permanent instability



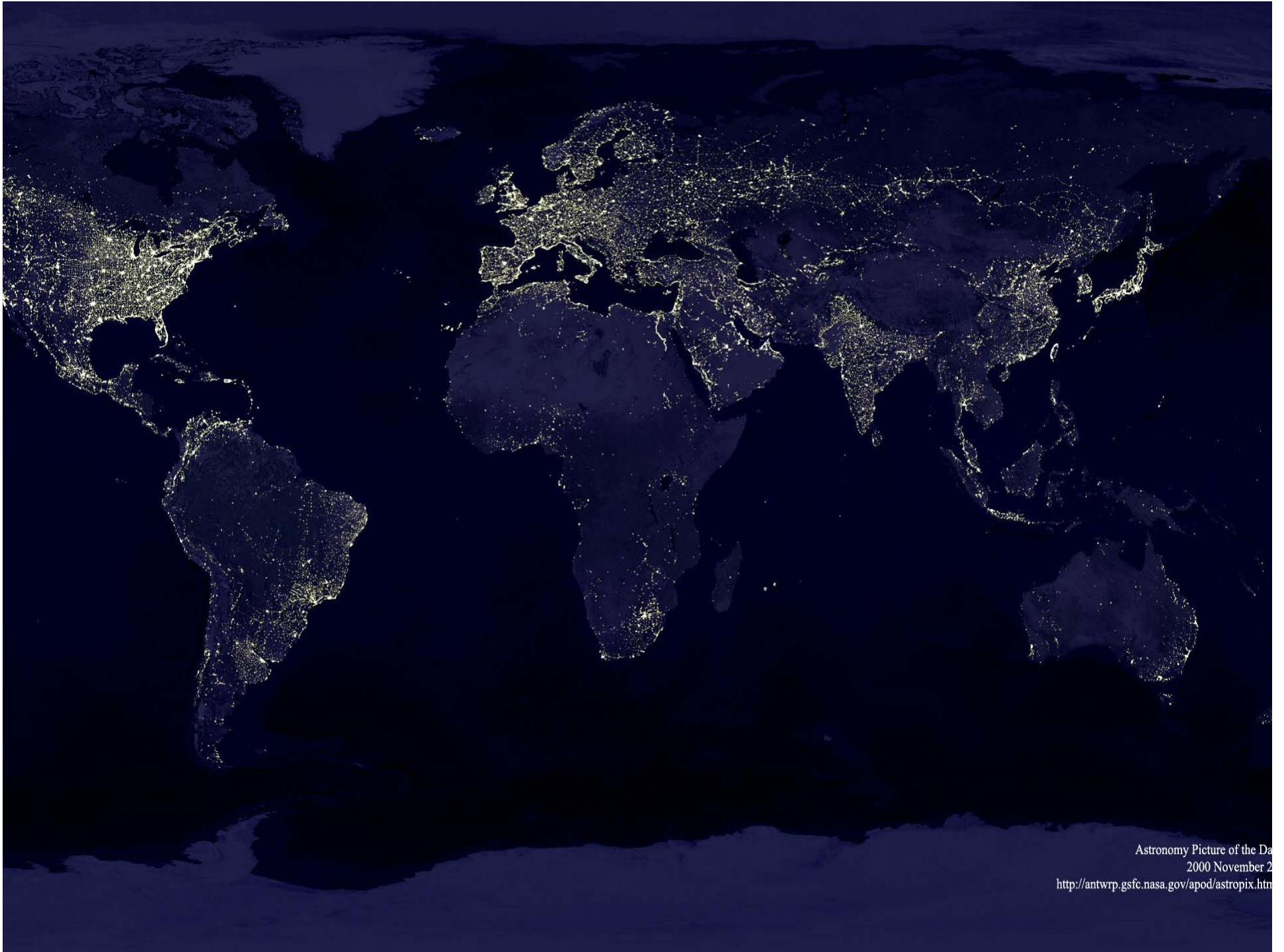


# Gapminder World Map 2010



Money GDP per person in US dollars (purchasing power adjusted) (log scale)

GAPMINDER



Astronomy Picture of the Day  
2000 November 2  
<http://antwrp.gsfc.nasa.gov/apod/astropix.htm>

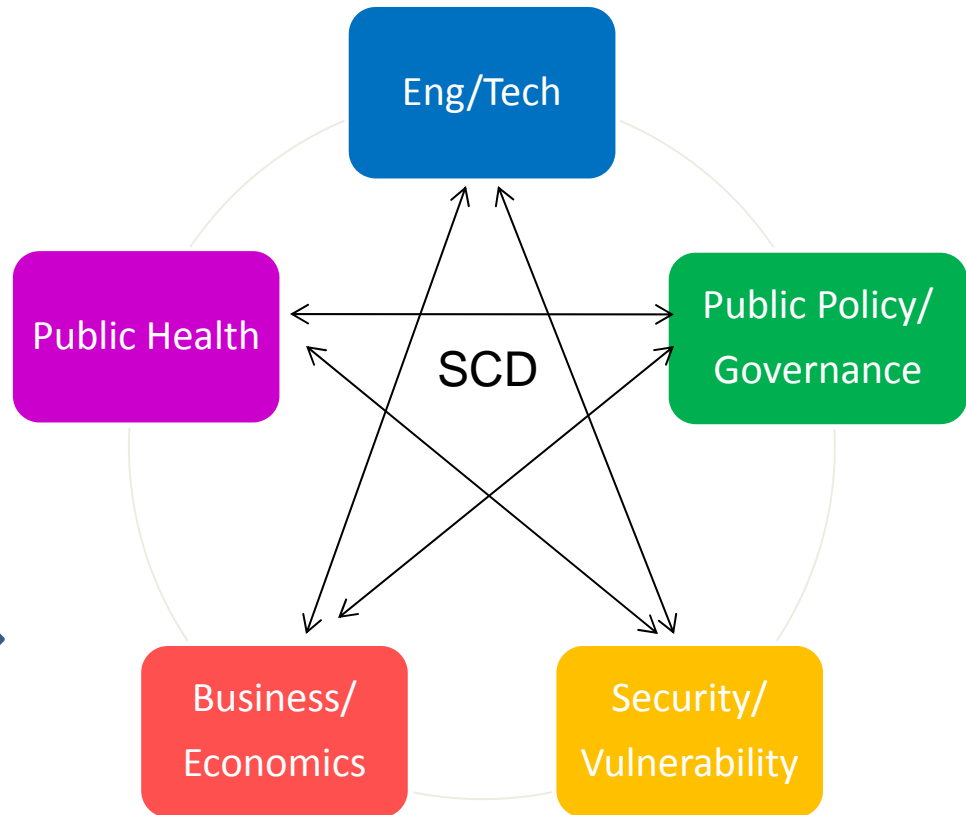
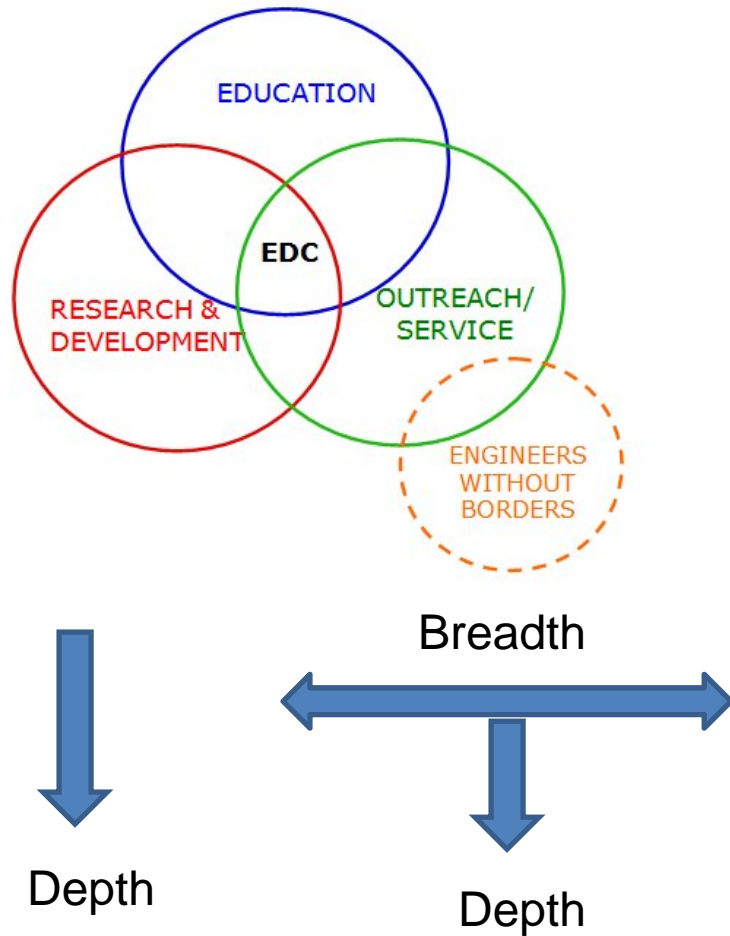


# Developing a New Generation of Global Engineers for the 21<sup>st</sup> Century

Engineers are called to be **CHANGE-MAKERS**, **peace-makers**, **social entrepreneurs**, and **facilitators of sustainable human development**



# Mortenson Center in Engineering for Developing Communities





# Appropriate & Sustainable Technology

“Find out what people do and help them do it better.” E.F. Schumacher



Adapted from ITDG

## Innovation in Emerging Markets

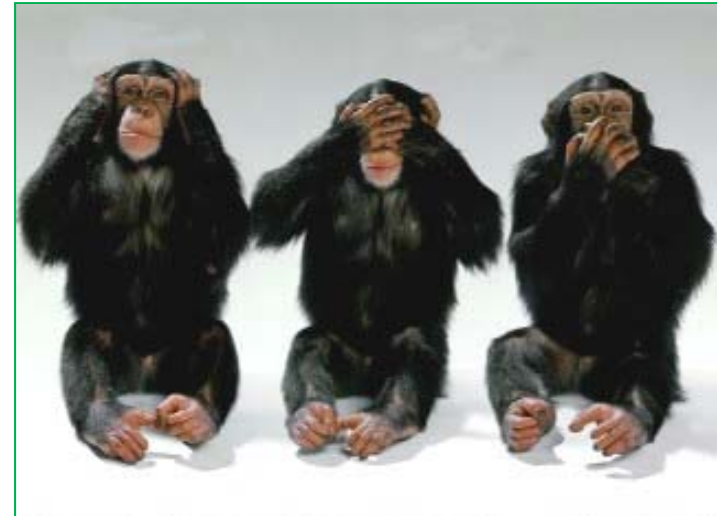
- **Frugal** or constraint-driven innovation
- **Disruptive** Innovation (GE)
- Hand held ECG: \$800. Cost: \$1 per patient
- Tata Swach (Clean) water filter: \$22 initial investment (3,000 l, 200 days, a family of 4)



**Affordability, Accessibility, Availability.....  
Sustainability, Scalability.... Reliability**



“The significant problems we face cannot be solved by the same level of thinking that created them.”



Albert Einstein