

What do you get when you combine Gordon  
Gekko with Stephen Hawking?

# Two choices – Two consequences

- In 1492, Columbus received funding from Spain to sail West to Asia
- The Ming dynasty stopped treasure ship explorations that had reached the coast of Africa, because they were too expensive
- Consequences
  - European world domination and the Industrial Revolution
  - A century of humiliation for China

# The lesson

- Economic growth requires massive investments in science and technology, but those investments are becoming too expensive for governments.
- The WWW came from the CERN collider. The semiconductor and internet came from Apollo
- Creative funding solutions from private industry are essential to build these projects.

# The difference

- Immediate profit - Columbus was not motivated solely by prestige or curiosity. He wanted to make money selling spices.
- Competition - If Spain funded Columbus only after he was rejected by Portugal and England. Once Spain pushed into the New World, the other European powers had to follow.

# The lesson

- For the next generation of science mega-projects, we need two things:
  - Competition
  - Immediate profits
    - Tens of billions of dollars is a lot of money for a non-profit venture. It's a small, even trivial, amount of money for a for-profit company.

# Particle accelerators

- Next generation of accelerators currently in design stage
  - CERN
  - China
  - United States (?)
- Massive engineering projects
  - 50 to 100 km tunnels

# Constructive competition

- Either we have two or three projects or we have none of them.
- We can take people's competitive urges and focus it into doing better science rather than through destruction
- Business people are used to this

# Constructive competition

- Competition between the United States and the Soviet Union got us to the moon, but then the space race ended. We need to restart the space race. We need a Mars race, a Jupiter race, and a race to build the next particle accelerator
- Destructive competition is bad. No competition is also bad
- Constructive competition requires a lot of cooperation



# Three projects

- Europe – FCC – Future circular collider
- China – SPPC / CEPC
- United States - ?

# Europe

- Next generation of collider after LHC
- Estimated cost:
- Political goals: Deepen European integration and remain number one in particle physics

# China

- CEPC
- Estimated cost – USD 3 billion for phase I
- Political goals: Establish China as a world power, while internationalizing the Chinese scientific community by importing talent and best practices from around the world.

# United States

- No current projects
- If Europe and China go ahead, then the United States will have to ask itself whether it still wants to be a superpower.
- This decision will be made around 2025.
- I believe that the United States will rise to the occasion. There will be a Sputnik moment.

# Immediate profits

- These projects will be difficult to justify without some immediate or near term profits
- Some element of non-profit government funding will be necessary, but private for-profit funding would be helpful.
- Good for the scientists – Multiple streams of funding, give the scientists the ability to direct the project in a way that will maximize science.

# How do you make money from a particle accelerator?

- You tell us
- Bankers, real estate developers, urban planners, advertising and marketing experts are needed to come up with ideas
- Projects are in the planning stages and the physicists are open to ideas

# Possible ideas

- Shopping malls and residential complexes?
- Clean energy development – geothermal?
- Theme parks? Science tourism?
- Biotech? Medical tourism?
- Robotics?
- High technology manufacturing centers?
- Educational technology?
- Long term space studies? How do you build a hotel on Mars?

# More than a particle physics laboratory

- The next generation of physics megaprojects, will not just be a laboratory in physics, but also civil engineering, and business and finance
- We need not only the world's brightest physicists to make this work, but also the world's brightest financiers and real estate development



# The economic future of humanity is at stake

- If we can't figure out how to make this work, we are doomed to economic stagnation.
- If this works, then we can start thinking about spreading out into the solar system and the cosmos.

# Getting involved

- China is in the concept design review stage. CERN is in the pre-CDR stage.
  - CERN CDR -
  - China CDR -
- Bitquant Research Laboratories can work as a cultural mediator between the physicist and business worlds.
- Professor Hawking meet Mr. Gecko. Mr. Gecko, Professor Hawking. I'm sure you have a lot of things to discuss.