Universities and Centers: U.S. examples

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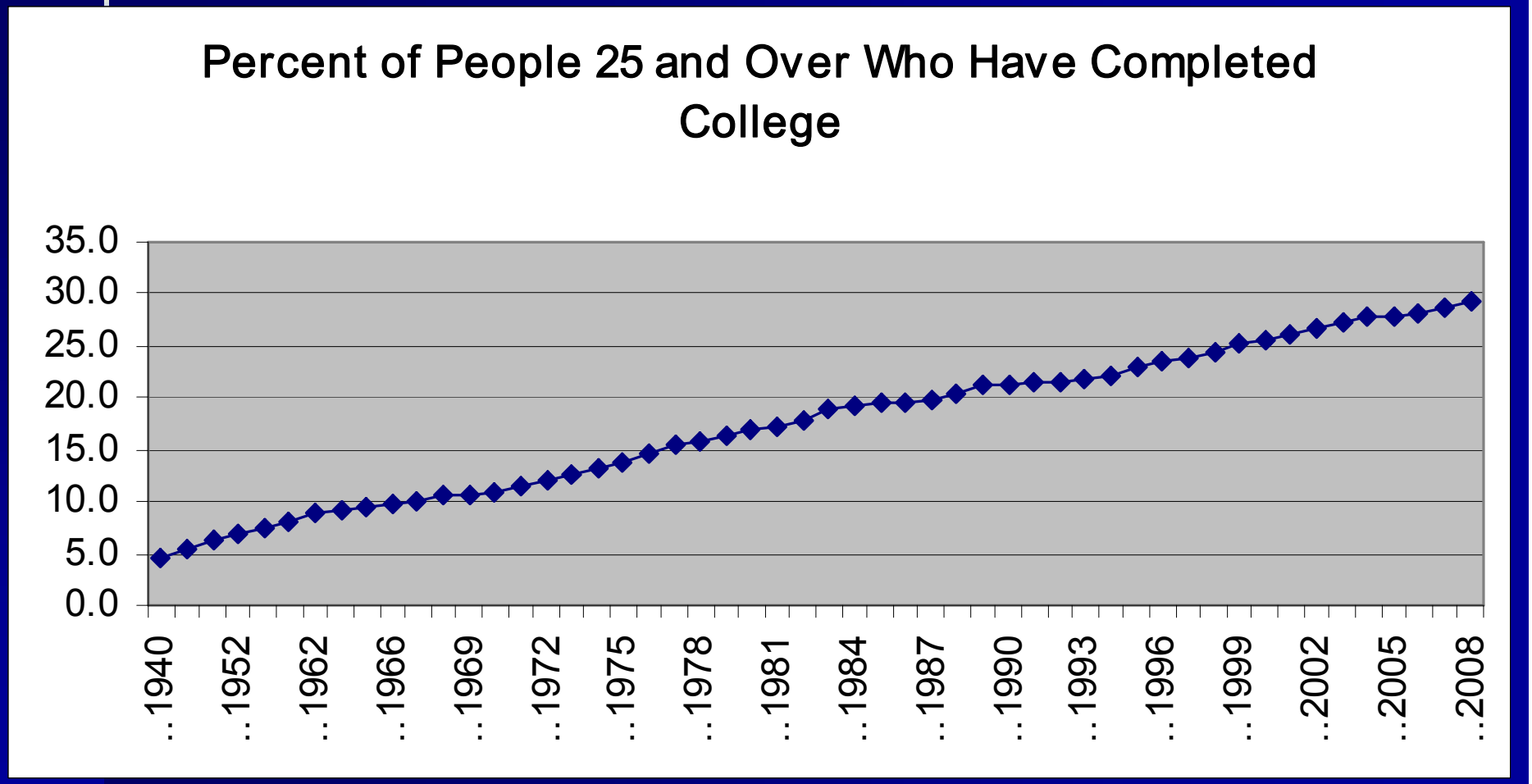
Outline of talk

- Brief history of university research and government research in the U.S.
  - 1787
  - 1876
  - 1941
- Illustrations using Georgia Tech
- Main point: Diversity and decentralization serve us well.

College Education in the U.S.



Private higher education

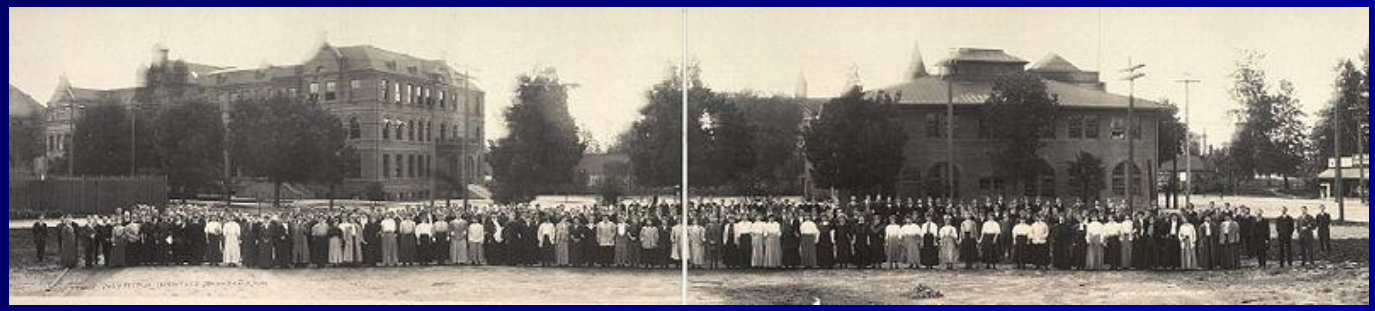
- Private higher education started before the U.S. was a country
  - Harvard, 1636
  - College of William and Mary, 1693
  - Yale, 1701
  - University of Pennsylvania, 1740
- About 1600 today
  - 204 give doctoral degrees

Public higher education

- Education left to the states in the Constitution in 1787
  - 650 public higher education institutions now
  - 150 give doctoral degrees
  - 75% of undergraduate enrollment
- Land grant universities created a specific link in agriculture in 1862.
  - Michigan State was the first, 1855
  - About 75 of these now

Technological universities

- First was Rensselaer Polytechnic Institute, Troy NY, 1824
  - MIT, 1861
  - Cal Tech, 1891
- Engineering-based, mostly private
- History of special relationships with industry, as well as military and space research



Adoption of German model

- Johns Hopkins 1876
- Freedom
- Seminars
- Laboratories
- Active learning
- Shaping the world

Diversity of institutions

- Comprehensives – masters
- Four-year colleges - bachelors
- Community colleges - associate

Government laboratories

- Agriculture
- Defense
- Health
- Space
- Energy
- And many others

The project grant system

- Invented at OSRD, 1941
- Proposal driven
- Reviewed by experts
- Pays (almost) full costs
- Hallmark of NSF and NIH
- Also used by Defense, Agriculture, NASA, Energy, etc.
- Flexible and scalable

The non-laboratory agency

- National Science Foundation, 1951
  - A balance wheel
  - The home for university research

Industry research

- About two-thirds of total U.S. R&D funding
  - Computer and electronics
  - Chemicals
  - Computer-related services
  - Aerospace and defense
  - R&D services
  - Automotive manufacturing
- 71% of R&D spending
- Provides just a small portion of university funding (5%)

The Georgia Tech Example

- Public technological university
- 19,000 students, 6500 graduate students (half doctoral)
- 1000 faculty, 4600 total staff
- Two-thirds engineering, but also
  - Computing, Sciences, Management, Architecture, social science and humanities
- $1 billion budget
- $500 million in sponsored projects

ORNL

- Oak Ridge National Laboratory
- Major user facilities
- Georgia Tech is one of ten "core universities" for Oak Ridge
- Joint program in computing
- Alliance with Imperial College (UK)
- Joint faculty

GTRI

- Georgia Tech Research Institute
- Affiliated laboratory, does classified work
- Formed 1934
- 1200 people, 7 labs, 13 field offices
- Separate promotion tracks for research faculty
- Largest employer of GT graduates

ERCs and STCs

- NSF-supported
  - Engineering Research Centers
  - Science and Technology Centers
- Industry advisory board
- Integrated research, education, and outreach
- Examples:
  - Tissue engineering
  - Microsystems Packaging Research

Partnerships

Other types of centers

- Industry-based
  - Institute for Paper Science and Technology
- Endowed
  - Brooks Byers Institute for Sustainable Systems
- GT as partner
  - ASU Center for Nanotechnology in Society
- Block funding
  - Georgia Water Resources Institute

DOE Bioenergy Science Center

Roger Reisert is CEO of C2 Biofuels, a startup ethanol company that has supported research at Georgia Tech.

A complex pattern

- Each university can have many, many relationships.
- Mostly this is driven bottom-up from the faculty.
- But the areas reflect the priorities of funding agencies.

Lessons learned

- Diversity of funding sources is a strength of U.S. research.
- Decentralization to the states has contributed to a pragmatic orientation in universities.
- The project grant system has been given great flexibility.

Hopefully, some of these lessons are useful for Colombia.

Muchas gracias