The business implications of Open Source Synthetic Biology

Woodrow Wilson International Center for Scholars
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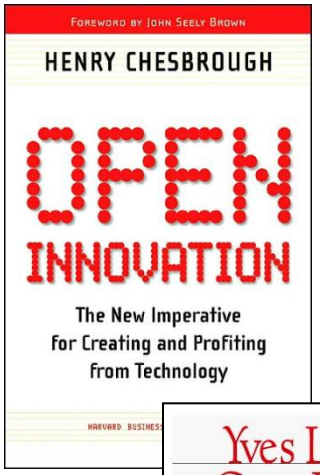
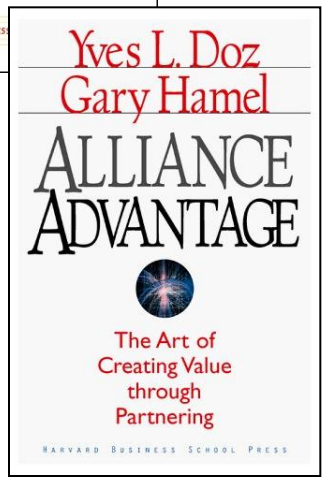
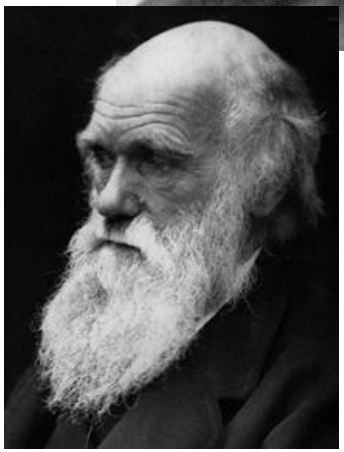
Lux Research, Inc.

Open innovation: looking outside the company for ideas and technology





- Adapt to changes in the environment
- Survive through adversity
- Exploit new niches
- EVOLVE



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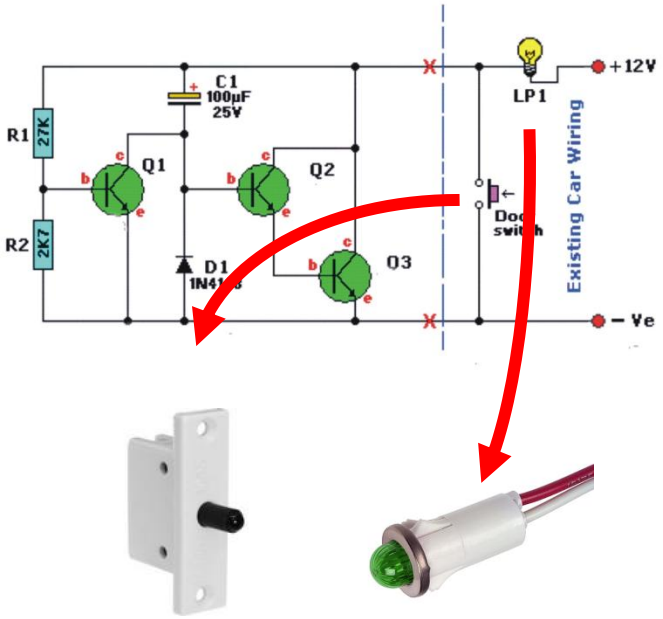
Synthetic biology: standardizing biological parts to create predictable devices

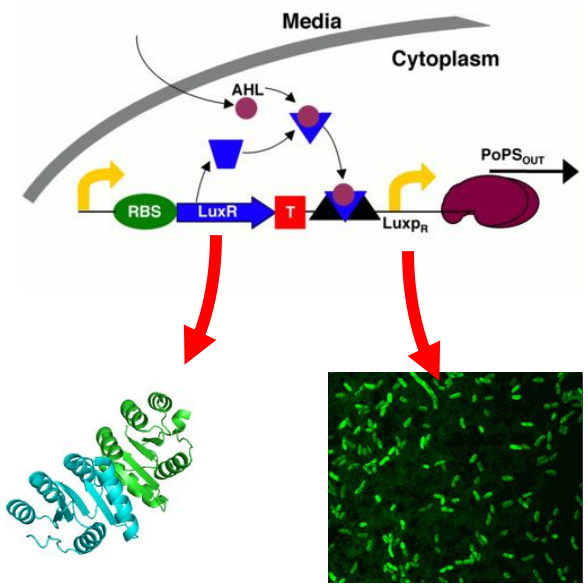
Electronic circuit



Switch Light

- Standard parts
- Predictable input-output

Biological circuit



Switch Light

- Standard parts
- Predictable input-output

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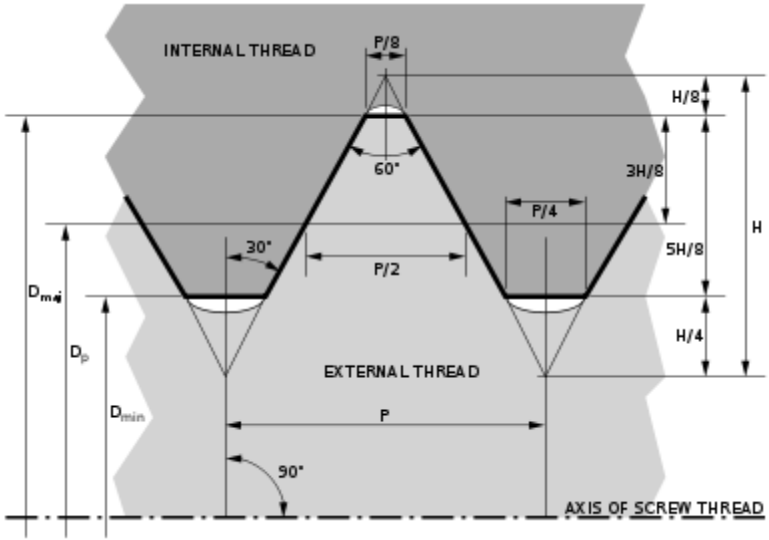
All technologies (d)evolve into standards



Proprietary systems and unique works

Standards and commodities

…so developers must keep moving ahead!

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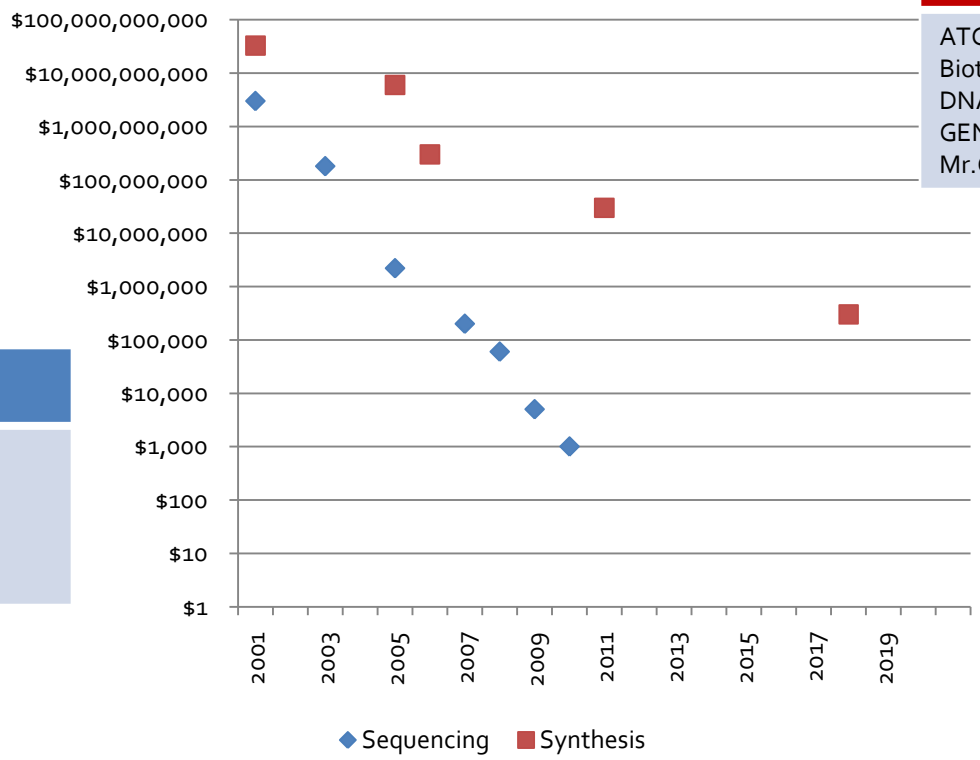
DNA sequencing and synthesis costs are rapidly declining, commoditizing genetic data

Cost to sequence or synthesize a human genome (3 billion bases)



Gene Synthesis Companies

ATG:biosynthetics, Blue Heron Biotechnology, Codon Devices, DNA 2.0, febit synbio gmbh, GENEART, Sloning Biotechnology, Mr.Gene GmbH

Gene Sequencing Companies

454 Life Sciences, Helicos Bio, Oxford Nanopore, Illumina, RainDance, Life Technologies, Pacific Biosciences, Complete Genomics, Visigen

Source: Lux Research

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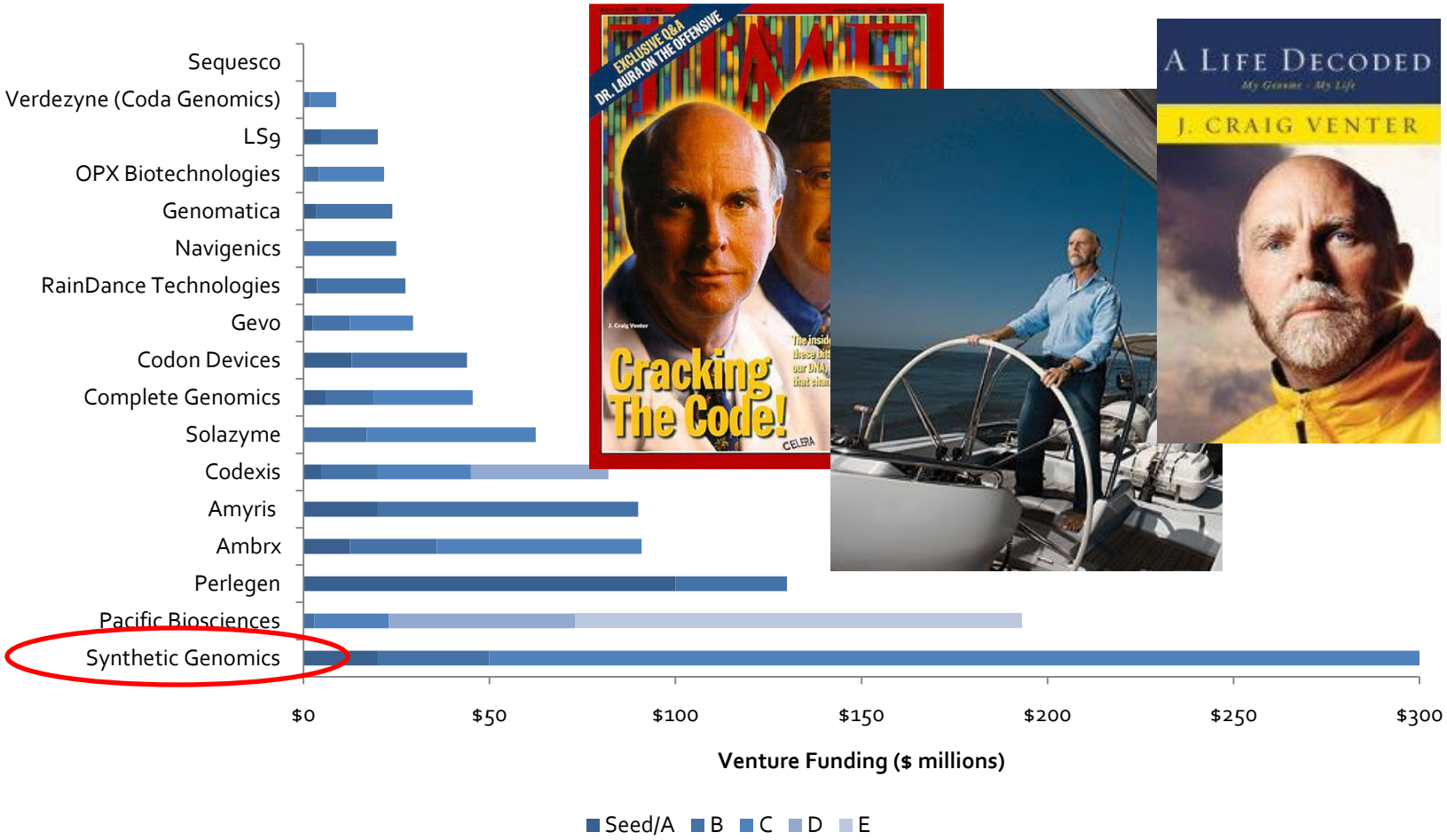
Synbio application companies have received more than $1 billion in funding to date



IP: Open source biohacking or patented and corporate-owned?

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Which industries will be affected, when?

- **Should have done it yesterday:** companies making tools and instruments (Invitrogen/ABI, Illumina, Agilent, Thermo Fisher, GE)
- **No time like the present:** companies making potential molecular metabolites, like industrial chemicals, fuels, and pharmaceuticals (BASF, Bayer, Dow, DuPont, DSM, Pfizer, Merck, ExxonMobil)
- **Next up:** companies that use multicellular materials derived from plants and animals, like wood, paper, fruits, vegetables, milk, and meats – (Weyerhaeuser, Louisiana Pacific, Unilever, Cargill, Kraft, Nestle)
- **Years to go (but start to monitor):** devices, sensors, semiconductors, displays (Intel, Flextronics, IBM, Samsung, Hewlett-Packard)

"Open" questions

- Can patents, copyright, or trade secrets even protect something that anyone can read and copy?
- What effect will the ACLU lawsuit over Myriad's breast cancer gene patents have on synbio (and vice-versa)?
- Do notions of similarity really apply to genetic sequences?
- Is there a difference between patenting genes and patenting pathways?

Thank you / Q&A

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About Lux Research

- Helps clients capitalize on science-driven innovation
- Clients on five continents, primarily large corporations
- Delivers value via weekly intelligence reports, semi-annual State of the Market reports, and analyst inquiry
- Subscription-based services in biosciences, energy storage, solar, water and nanomaterials
- Primary research methodology: Focus on proprietary interviews and site visits
  - > 1,400 interviews last year
  - Site visits in 18 countries
- Source proprietary ideas from Lux Research Network of execs + scientists
- Diverse, 40-person team; Ph.D scientists to market researchers

George W. Bush, U.S. President

Josh Wolfe, Director, Lux Research

21st Century R&D Act signing in Oval Office

LR Chairman Peter Hebert on CNBC

LR President Matthew Nordan testifying before U.S. Congress

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