Environmental Health: Past and Present

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~60 Years Ago (1960):
The Vision of the Future
In 1969, astronauts landed on the Moon. The onboard computer had 2K of RAM.

Operated at 0.043 MHz; your cell phone is at least 1200 MHz
Frigidaire owned by General Motors with the Dupont connection

Freon 12 and Freon 11

Legacy of Lead in Gasoline

Kettering (1876-1958)
- Head of GM's research division
- Champion of leaded gas
- Contributed to Sloan-Kettering Cancer Center

Middles (1889-1954)
- VCEL, inventor of TEL
- Father of Ethyl gas
- Recognized huge profit potential of TEL
- Defended suffer
April 22, 1970

The Tipping Point in the U.S., but.....

Into the Present:
Analog to Digital Revolution
Claude Shannon and the Most Important Masters’ Thesis of the 20th Century (1937):
A Symbolic Analysis of Relay and Switching Circuits

Binary logic: 0 and 1

Artificial Intelligence (AI), Machine Learning and Technology

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<th>Internet Protocol version 4 (IPv4)</th>
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<td>Deployed</td>
<td>1981</td>
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<tr>
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<td>Prefix Notation</td>
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Why robots helped Donald Trump win

Toledo has more robots per worker than any other US city. They’re producing a healthy economy—and lots of anxiety.

by Brian Alexander  June 21, 2018

~50%
of current work activities in the US are technically automatable by adopting existing technologies

6 of 10
current occupations have more than 30% of activities that are technically automatable

+1 robot = -6 jobs


Half of millennials could be competing with robots for jobs

by Danielle Paquette  May 1

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Heavy Manufacturing to Digital Manufacturing

1950s                                    2050s

$1000 prize for making a 1/64 inch motor (400,000 nanometers)

Challenge set in December 1959, paid off in November 1960
But, by 2019.....

First 3D-printed pill approved by US authorities

In a world first, the US Food and Drug Administration has given the go-ahead for a 3D-printed pill to be produced.
When you hear hoof beats…. 

- you don’t think zebras.
- Bayesian logic
- But...
- Sometimes it is a zebra.

_The environment affects health in both obvious and subtle ways and this course was designed to sensitize you to these principles._
The Future: Building Solution Teams

There is No 🙋 in Team, Can I Survive?
Setting the ground rules of collaborative research for large-team science that occurs between multiple institutions.

Büchi

How to get early-career scientists
How to approach colleagues to collaborate?

Knowing personal strengths and weaknesses

Groopman
MIT '79

Kensler
MIT '76

Roebuck
MIT '75

VALIDATED BIOMARKERS

Qidong, PRC

West Africa

Thailand, Vietnam

South Africa

Liver Cancer Studies: 1979 to present
Principles

• Trust
  – Open discussions of expectations at the beginning
  – Many mid-course corrections needed
• Every team member looking out for each other
  – Internal mentoring
• Everyone is committed to the principle that the whole is greater than the sum of the parts
• Share the successes and the failures