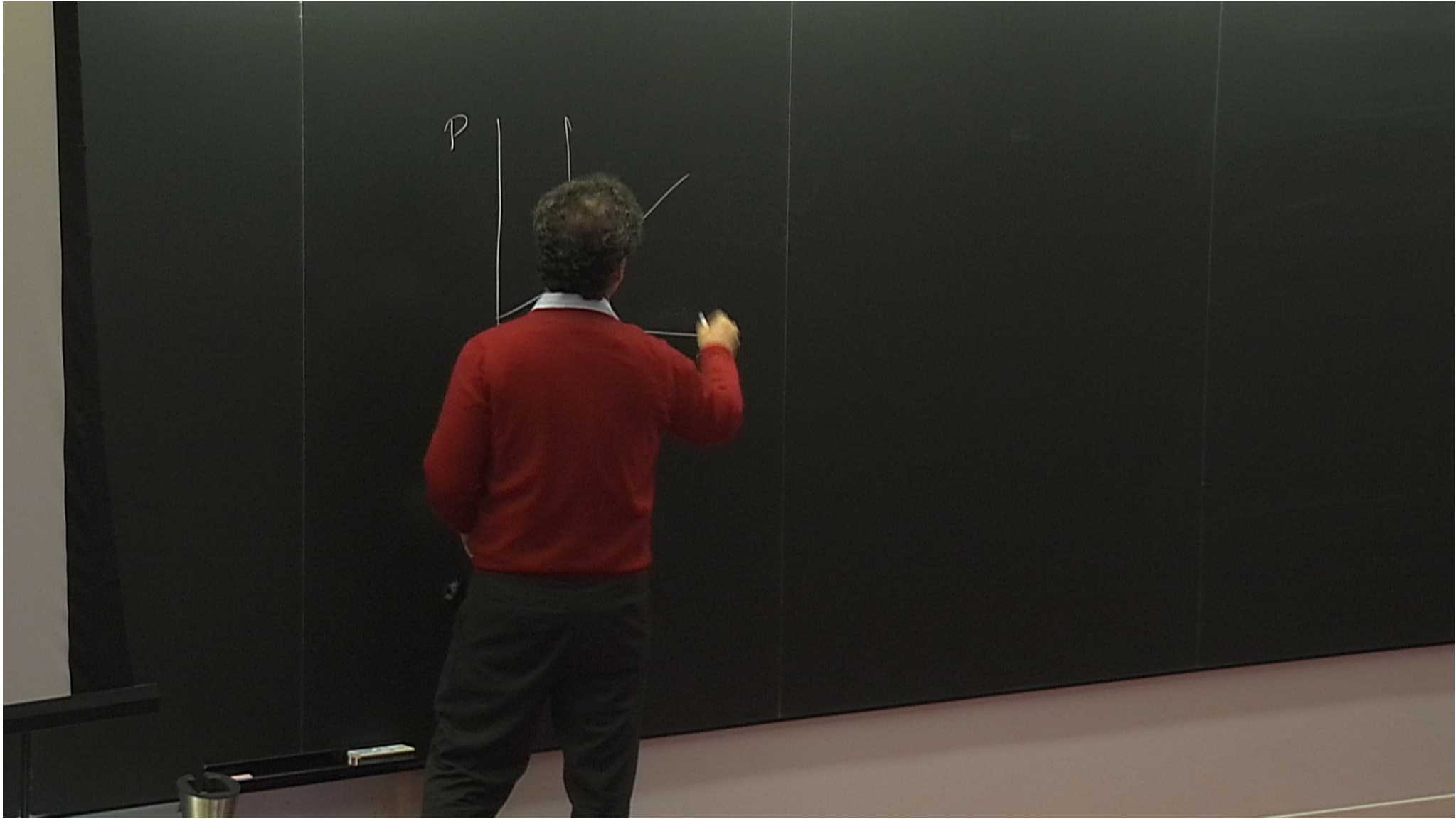


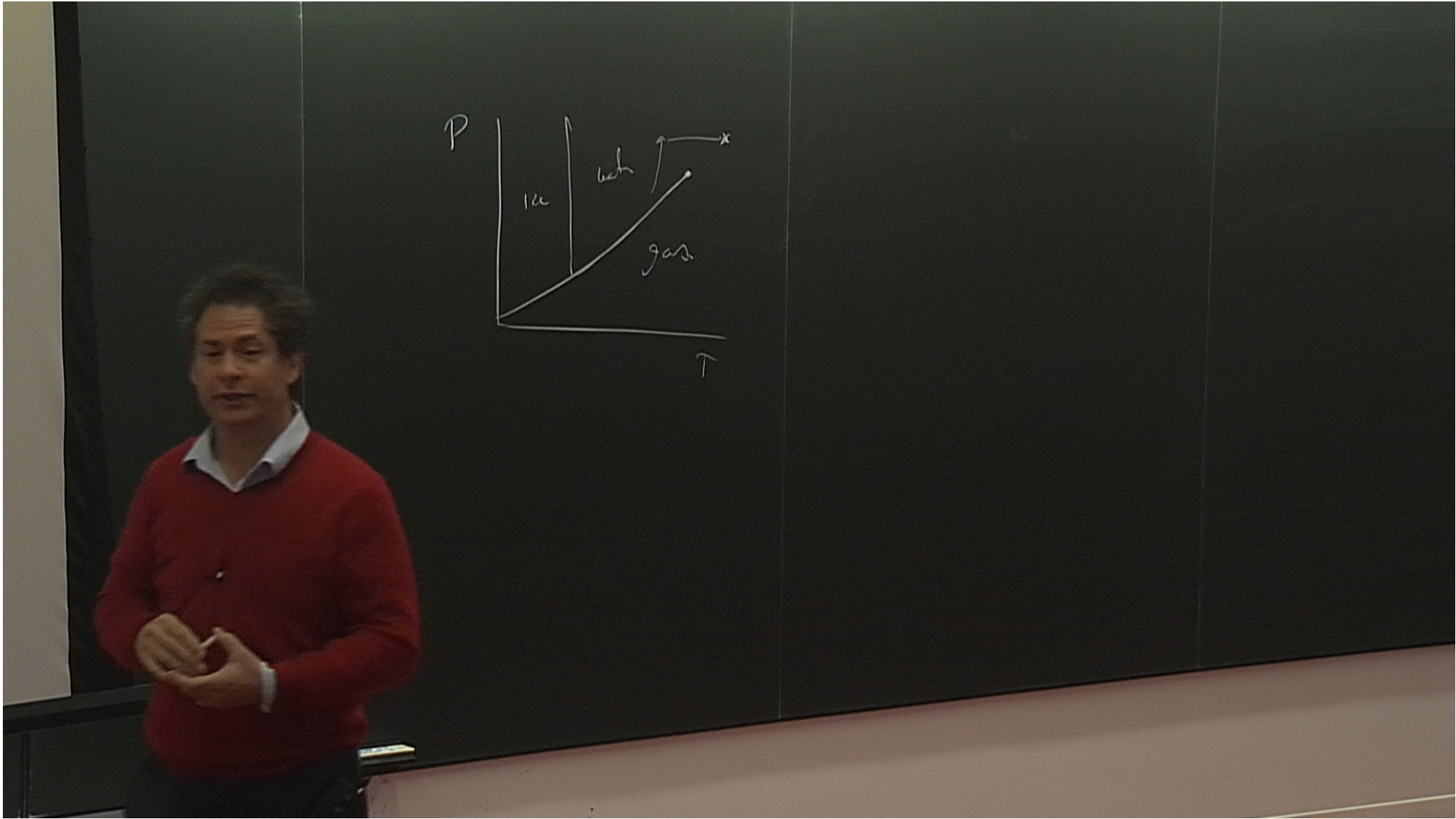
Title: Can Physics Solve Real World Problems?

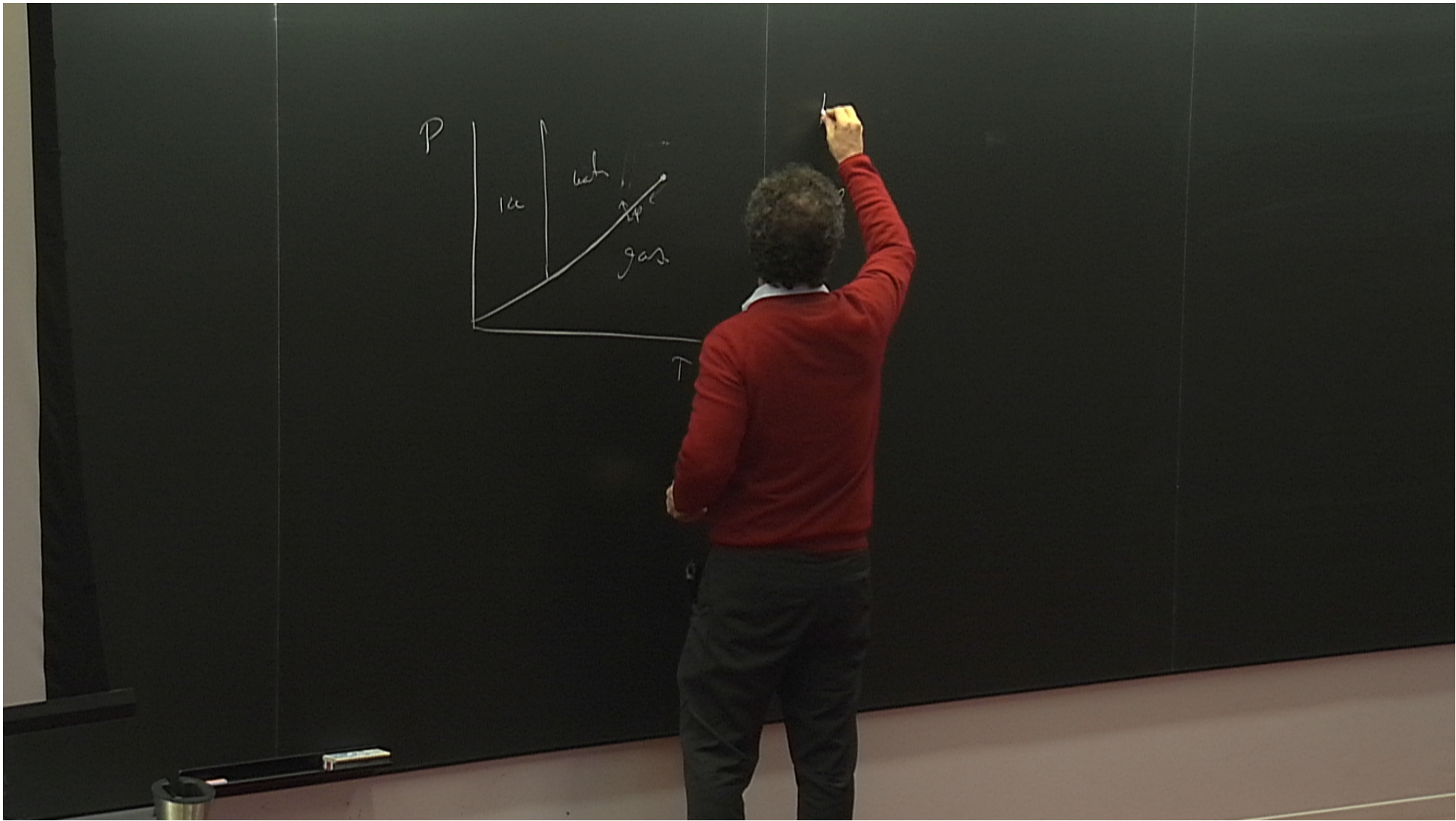
Date: Nov 24, 2014 10:00 AM

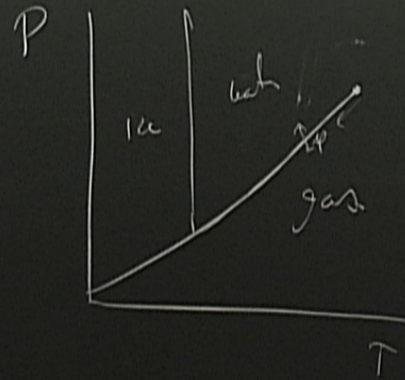
URL: <http://pirsa.org/14110146>

Abstract: <p>We will discuss our work on (1) the global food crisis and the implications for how we can address hunger and social unrest around the world, (2) the financial crisis and the implications for the role of regulation in economic market stability, and (3) the Ebola epidemic and the vulnerability of global civilization to pandemics. </p>





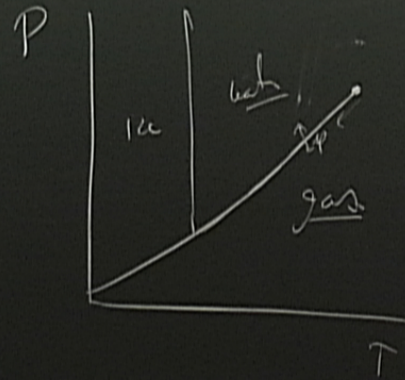




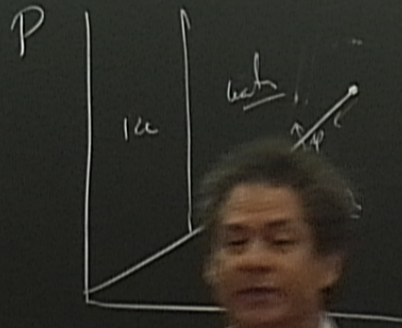
Landau

$$sp \approx (\Delta T)^{\frac{1}{2}}$$

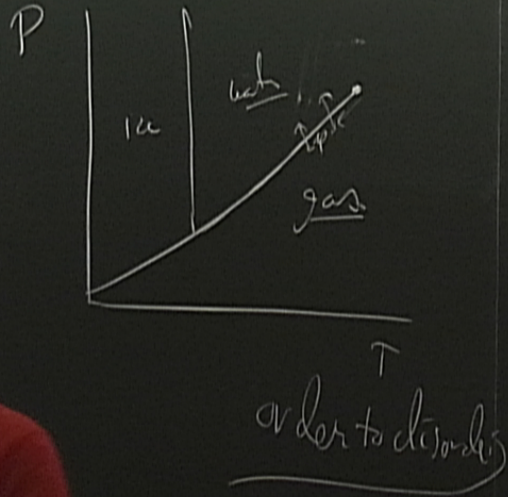
0.334



Landau $\left(\frac{1}{2}\right)$
 $sp \approx (\Delta T)$
.334
Ken Wilson



Landau $\left(\frac{1}{2}\right)$
 $sp \approx (\Delta T)$
Ken Wilson \uparrow
 $\frac{0.334}{0.374}$



Landau

$$sp = (\Delta T)^{1/2}$$

0.334

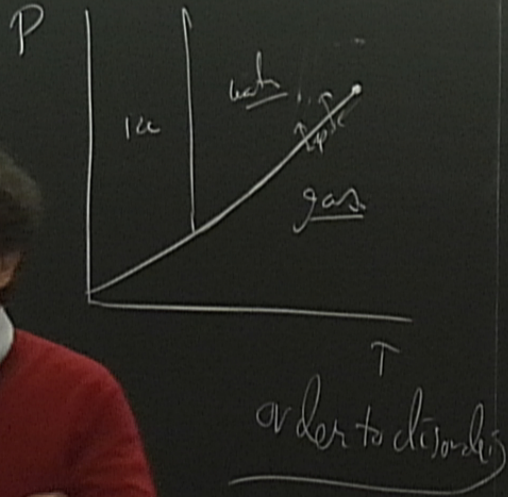
Ken Wilson

↑

0.374

Universality





Landau

$$sp = (\Delta T)^{\frac{1}{2}}$$

Ken Wilson

$$\frac{0.334}{0.374}$$

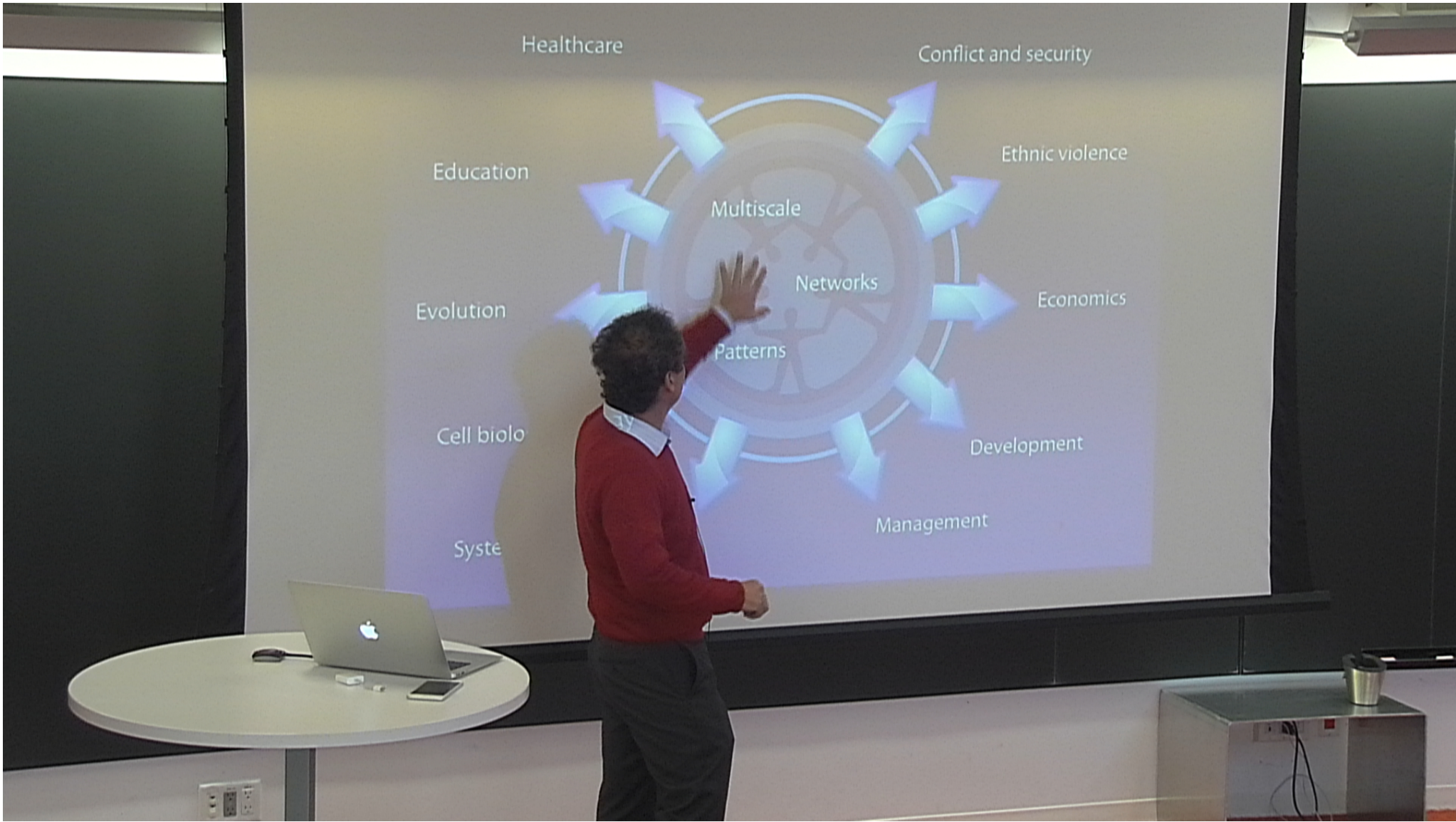
Universality

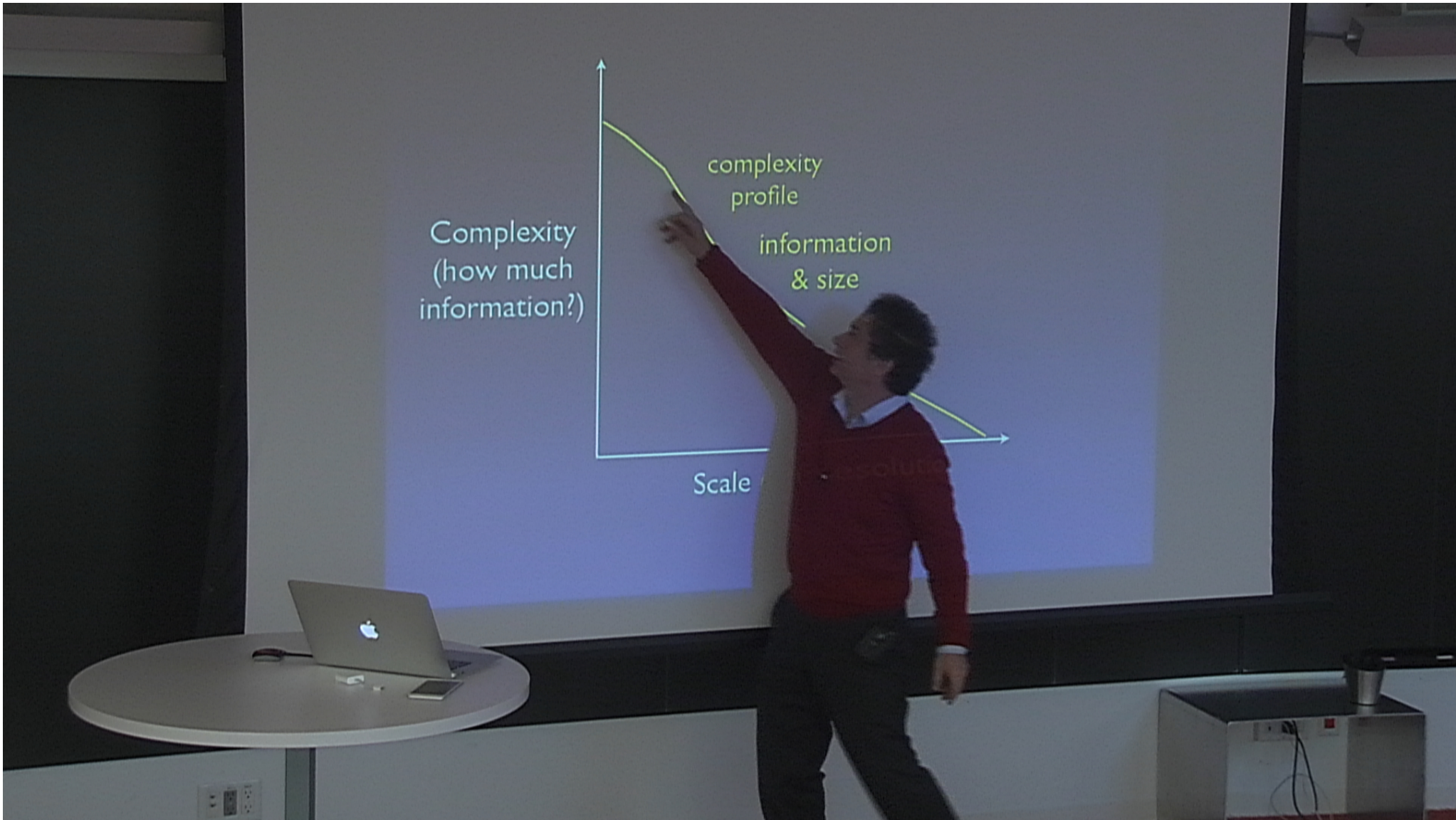


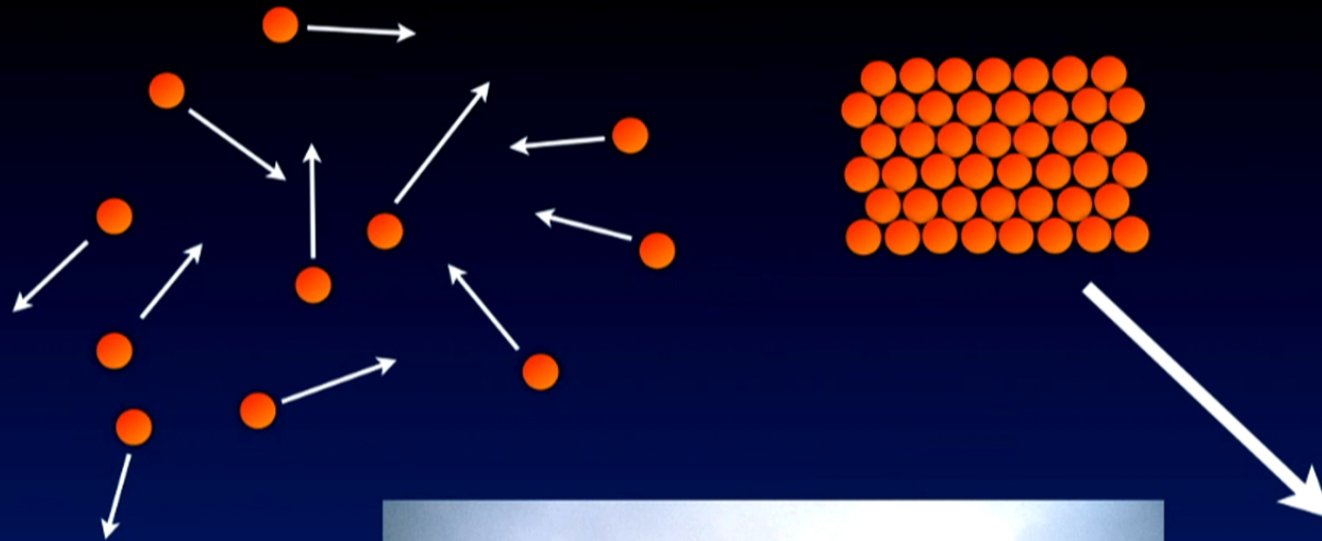
Global Connectivity and Vulnerability!

Financial crises, Social unrest, Pandemics, Terrorism.
Policy as Social Engineering

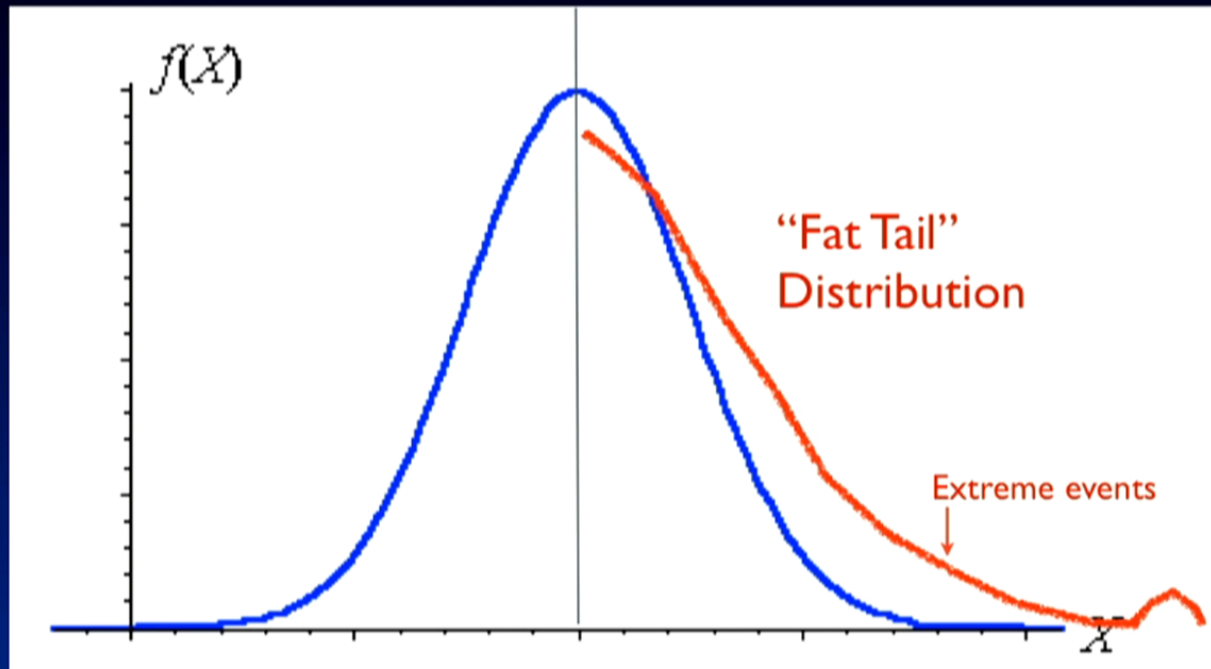




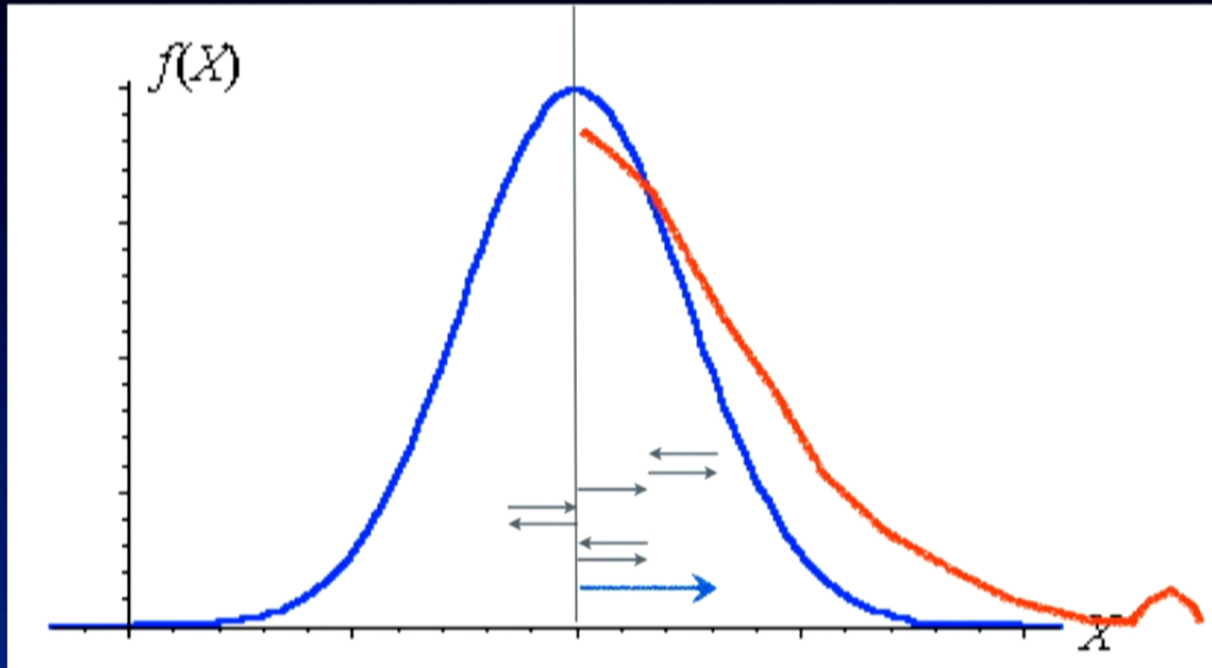




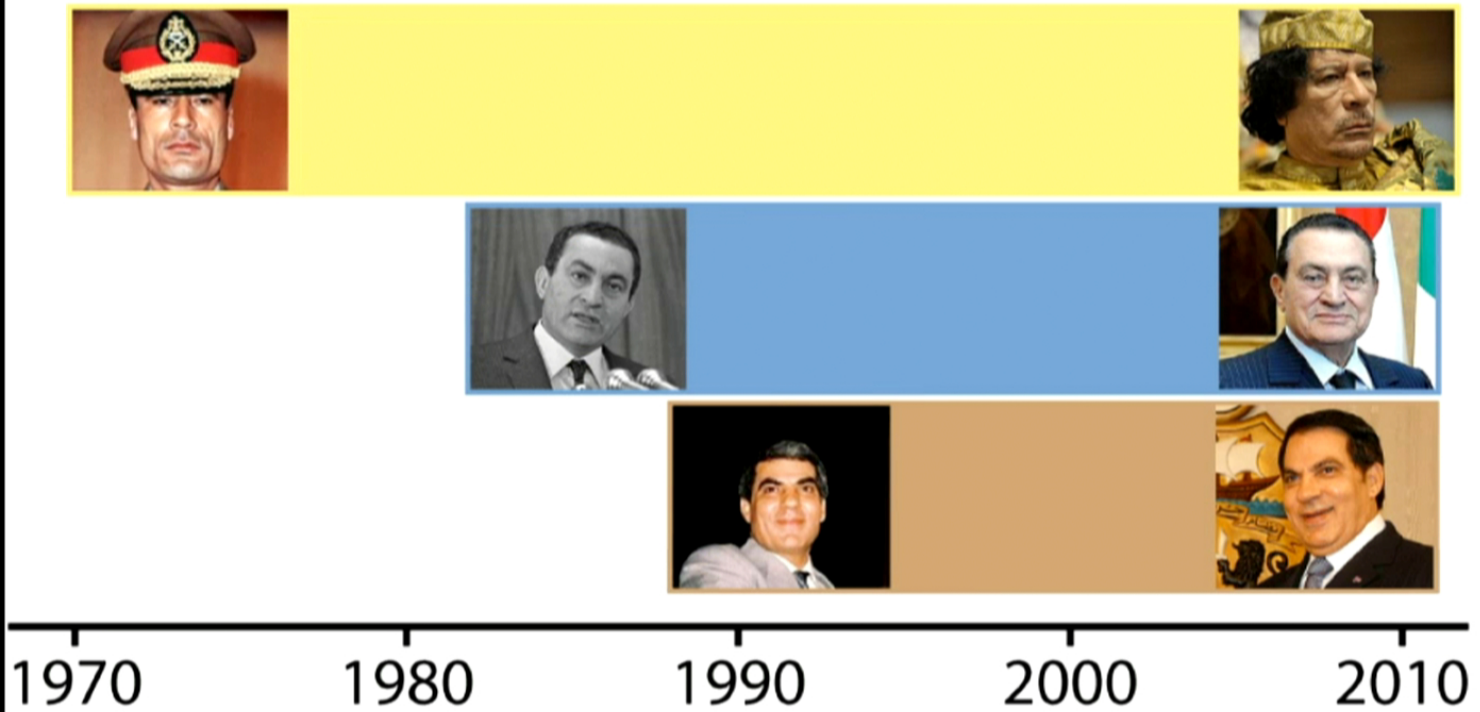
Origins of extreme events

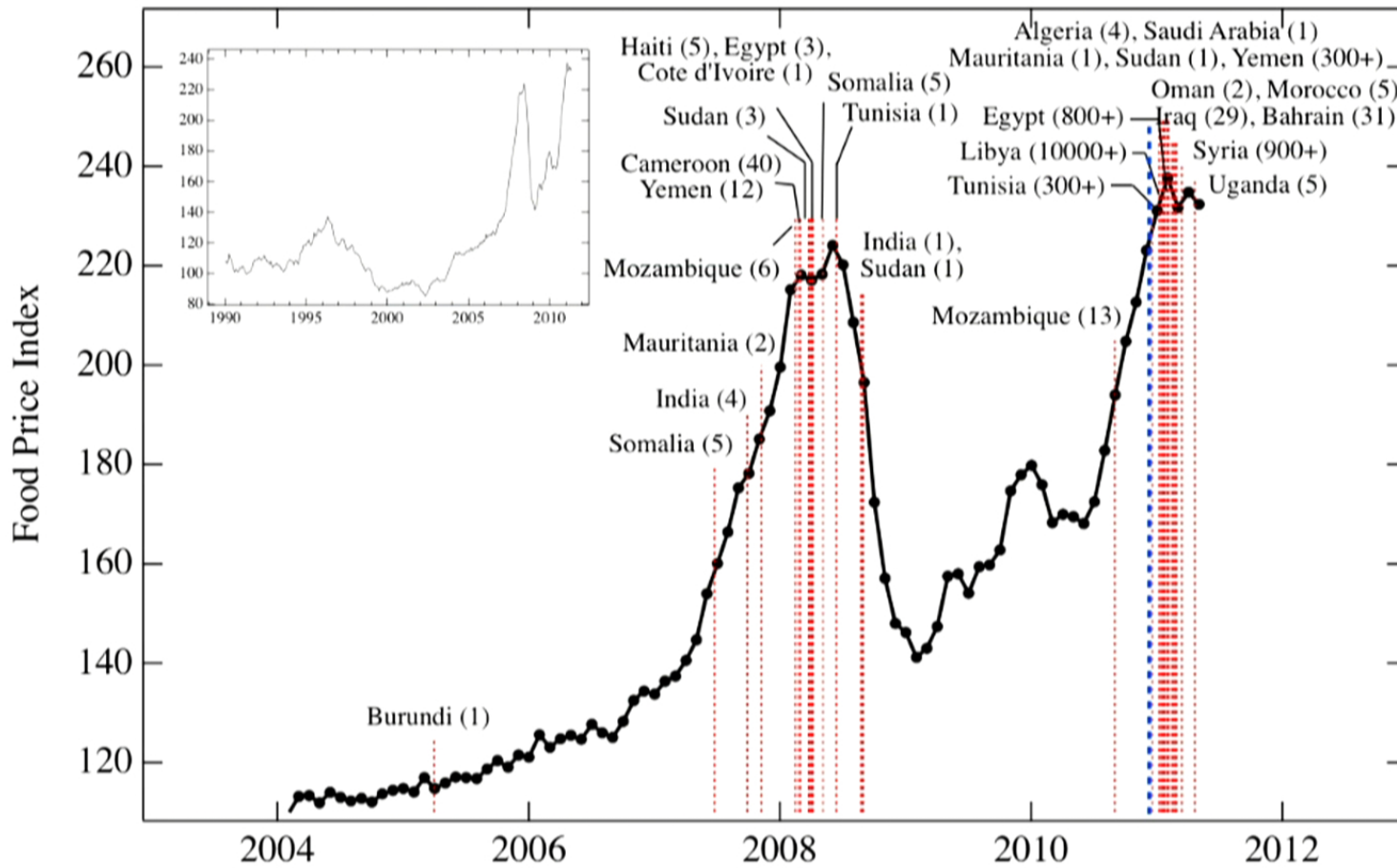


Origins of extreme events



Why now?

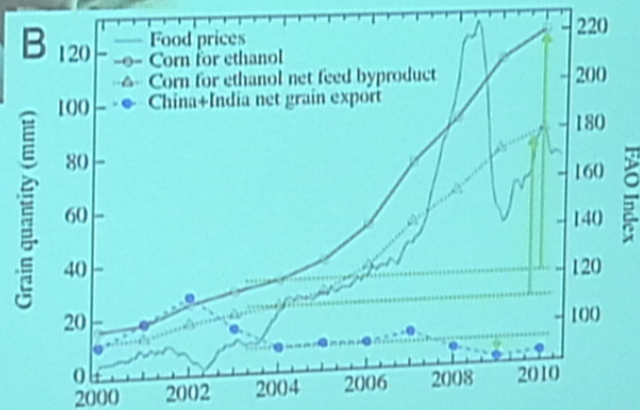




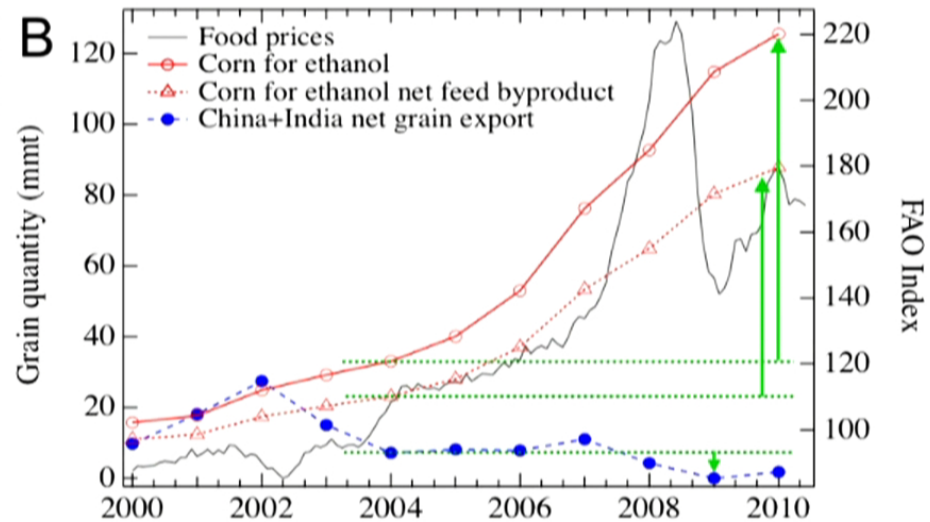
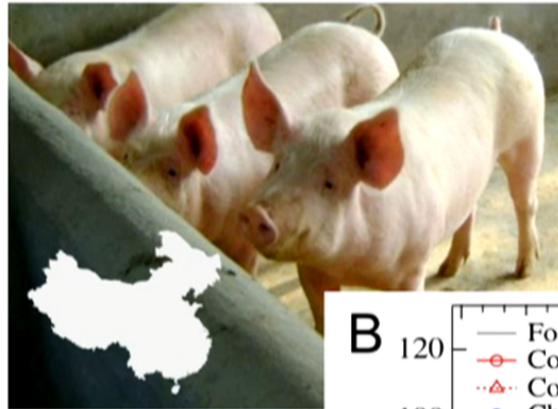
...Why?

- what do people say?
 - Supply and demand factors
 - Weather in Australia
 - Meat in China and dairy in India.
 - Corn to ethanol conversion
 - Speculators
 - No, Perhaps, Yes --- no quantitation
 - Currency conversion rates
 - Costs: Oil prices

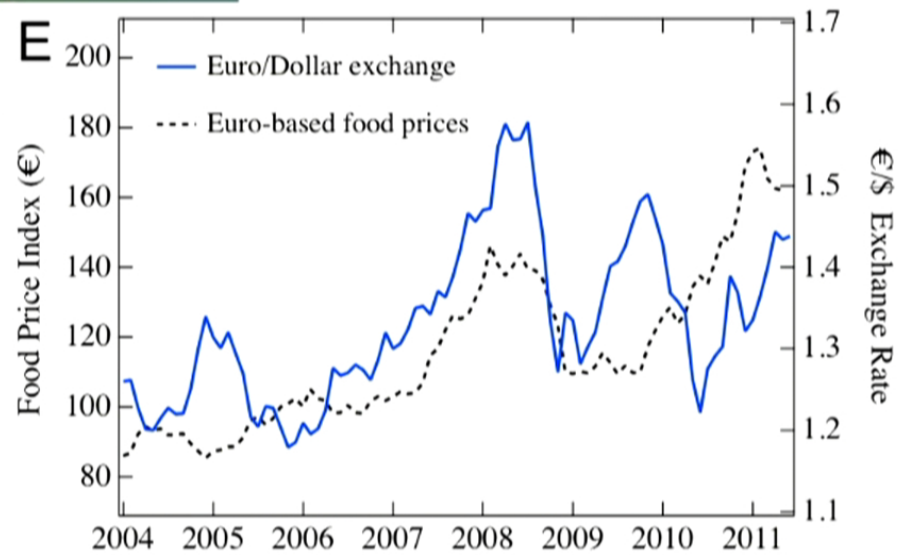
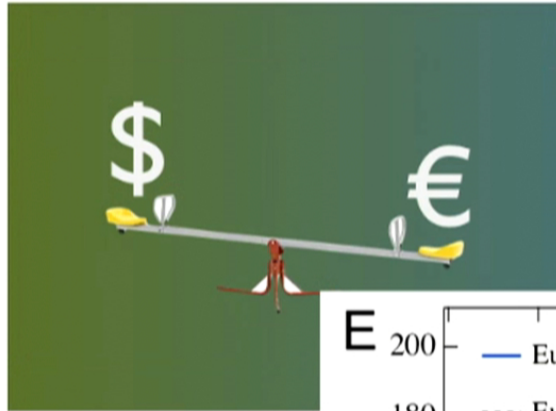
Demand: China and India rising



Demand: China and India rising



Currency exchange rates



Model Ethanol and Speculators

- 1. Supply and demand
 - Ethanol shock
- 2. Speculators (**can't leave it out**)
 - Trend following
 - Market shifting

Complete dynamic model

Ethanol shock

Supply and demand

Speculation

$$P(t+1) = k_c(t) + [1 - k_{sd}]P(t) + k_{sp}[P(t) - P(t-1)]$$

$$+ \sum_{i=1}^N k_i [P_i(t) - P_i(t-1)]$$

Stocks and Bonds

Complete **dynamic** model

Ethanol shock



Supply and demand



Speculation



$$P(t + 1) = k_c(t) + [1 - k_{sd}]P(t) + k_{sp}[P(t) - P(t - 1)]$$

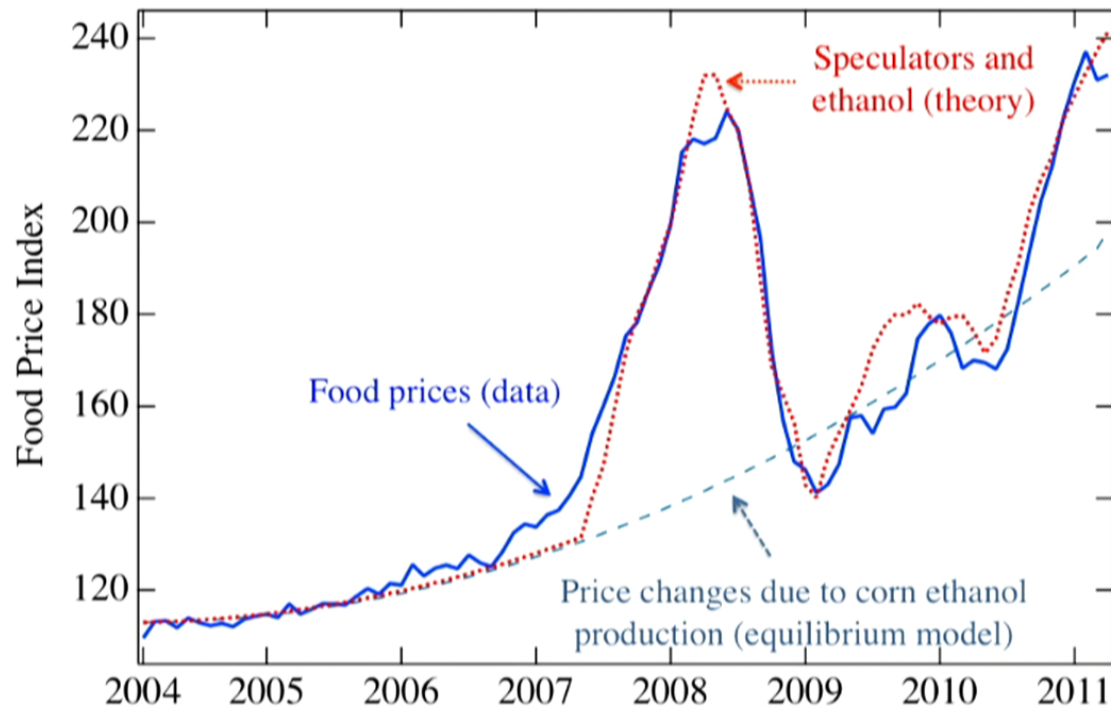
$$+ \sum_{i=1}^N k_i [P_i(t) - P_i(t - 1)]$$



Stocks and Bonds

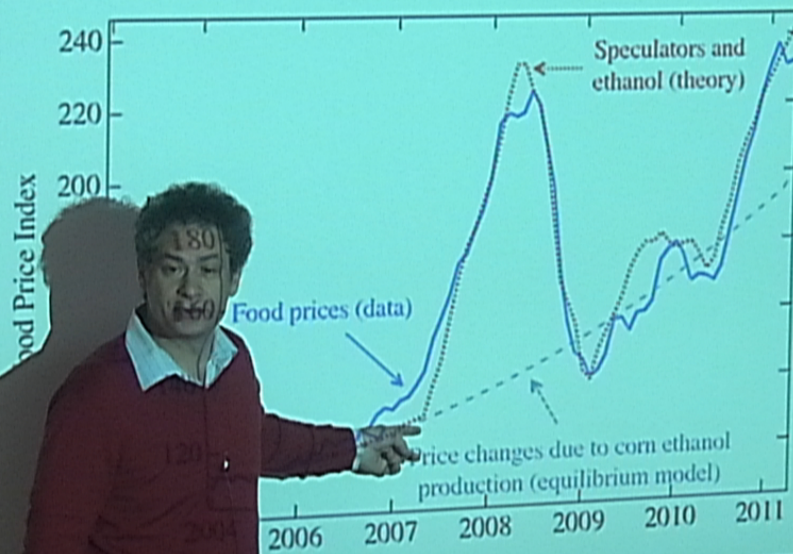
...Why?

- Ethanol: underlying increase
- Speculation: spikes

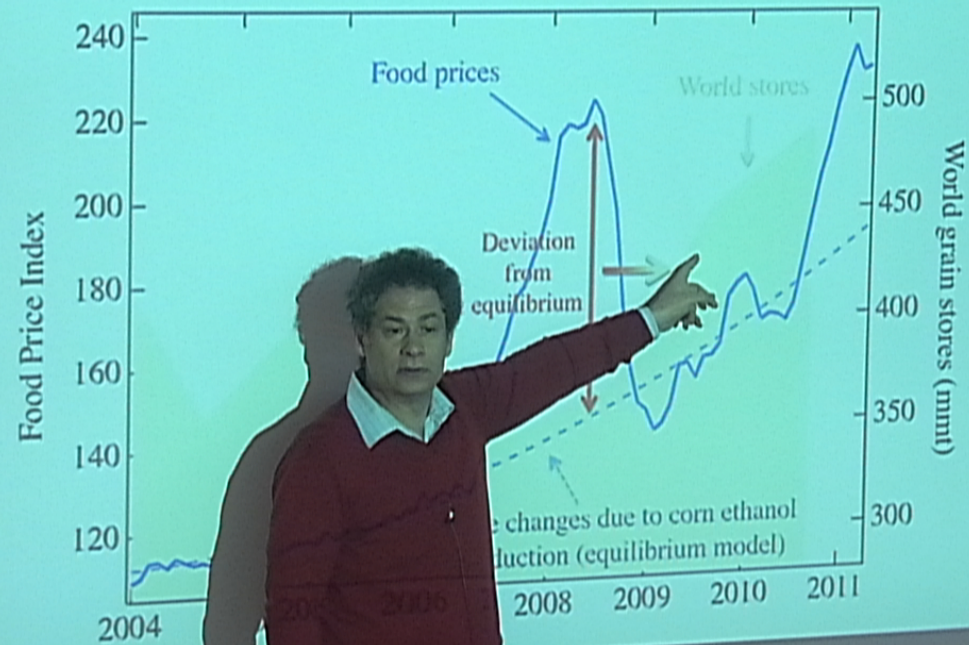


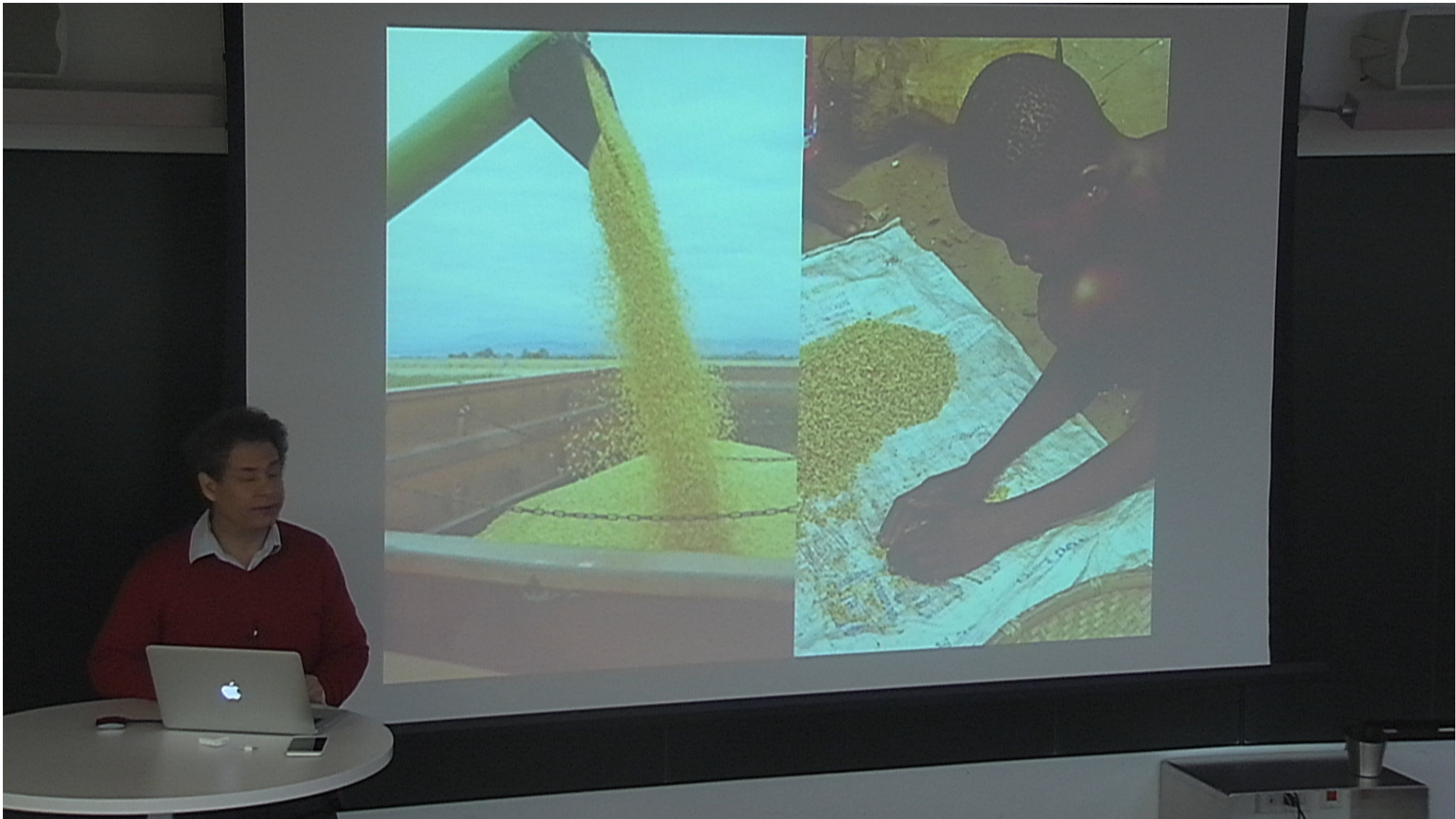
...Why?

- Ethanol: underlying increase
- Speculation: spikes



What about inventories?





EU 1/14/2014

EUROPE MARKETS

EU Reaches Deal on Regulating Financial Instruments

Law Will Force More Trading Into the Open, Cap Commodity Positions

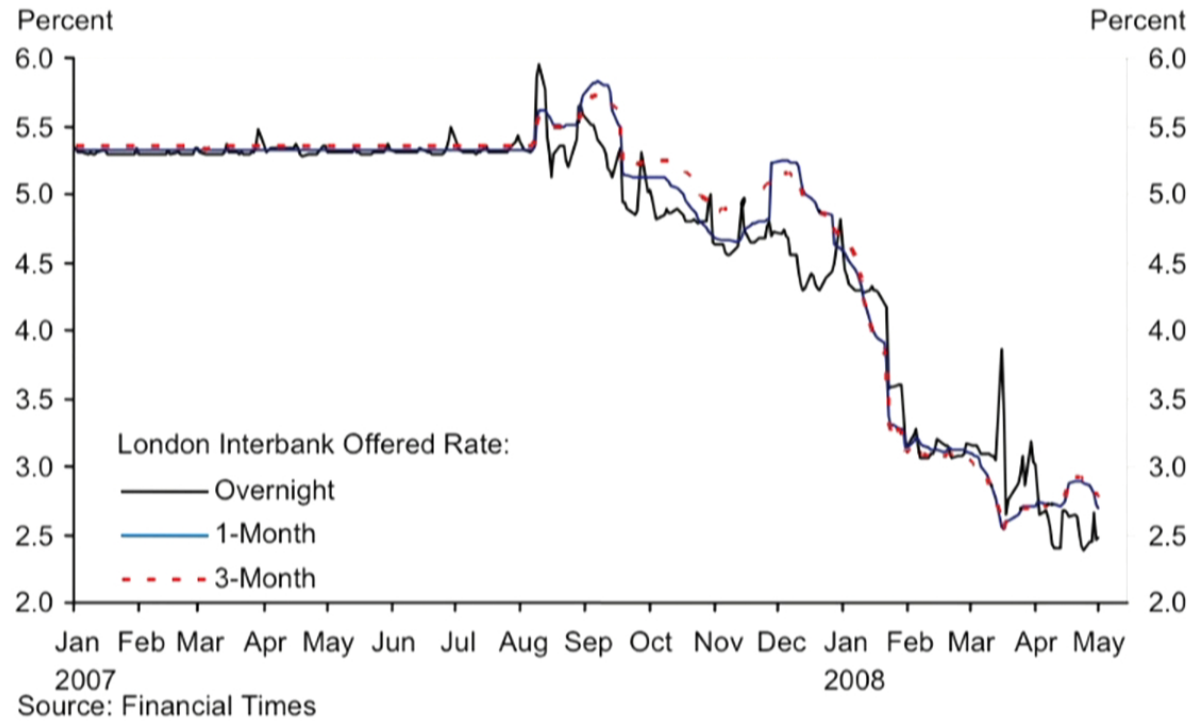
The EU Commission, the bloc's executive arm, said the rules on agricultural derivatives will "contribute to orderly pricing and prevent market abuse, thus curbing speculation on commodities and the disastrous impacts it can have on the world's poorest populations."

"For the first time the EU will regulate commodities to tackle food speculation," said Arlene McCarthy, a British centre left lawmaker who took part in the negotiations.

SEC Deregulation, June 2007

“...today’s markets are characterized by high levels of transparency and regulatory surveillance. These characteristics greatly reduce the risk of undetected manipulation ... the federal securities laws continue to prohibit activity designed to improperly influence the price of a security.”

LIBOR



LEVERAGED LOSSES:
Lessons from the Mortgage Market Meltdown
.....
Proceedings of the U.S. Monetary Policy Forum 2008

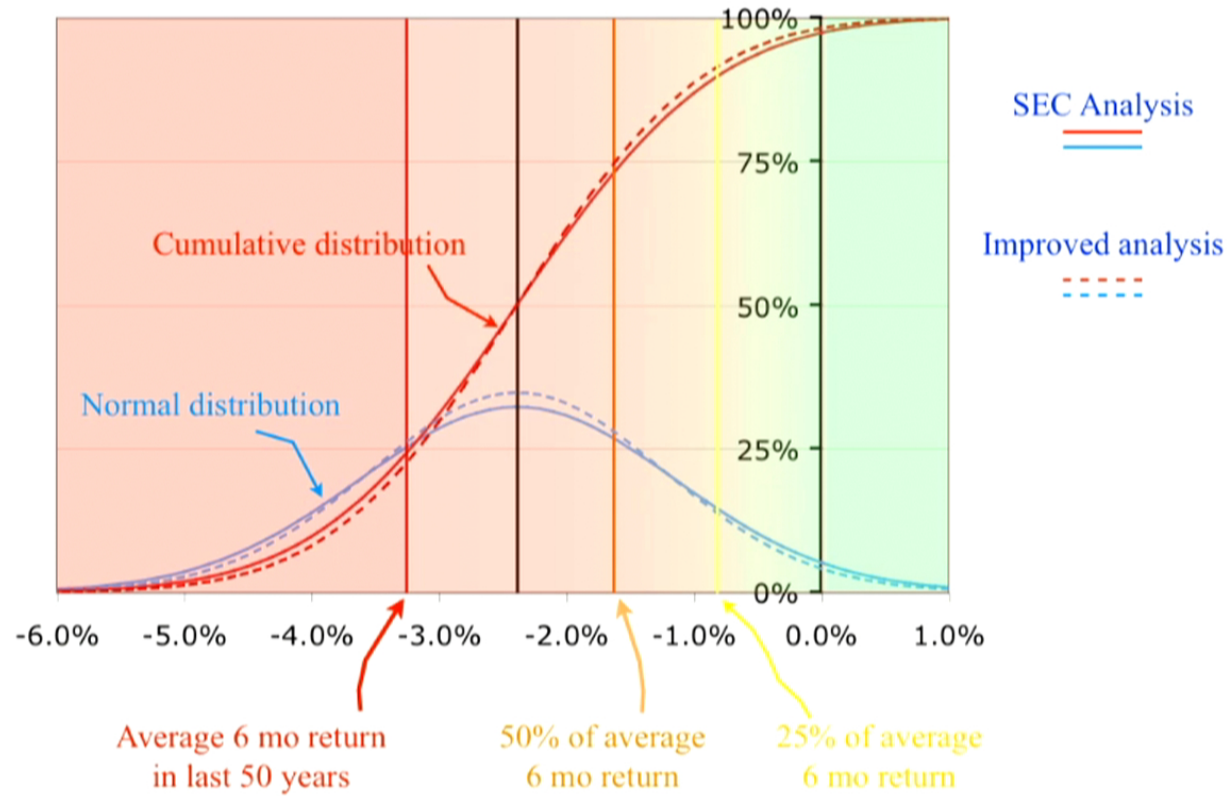
Uptick rule

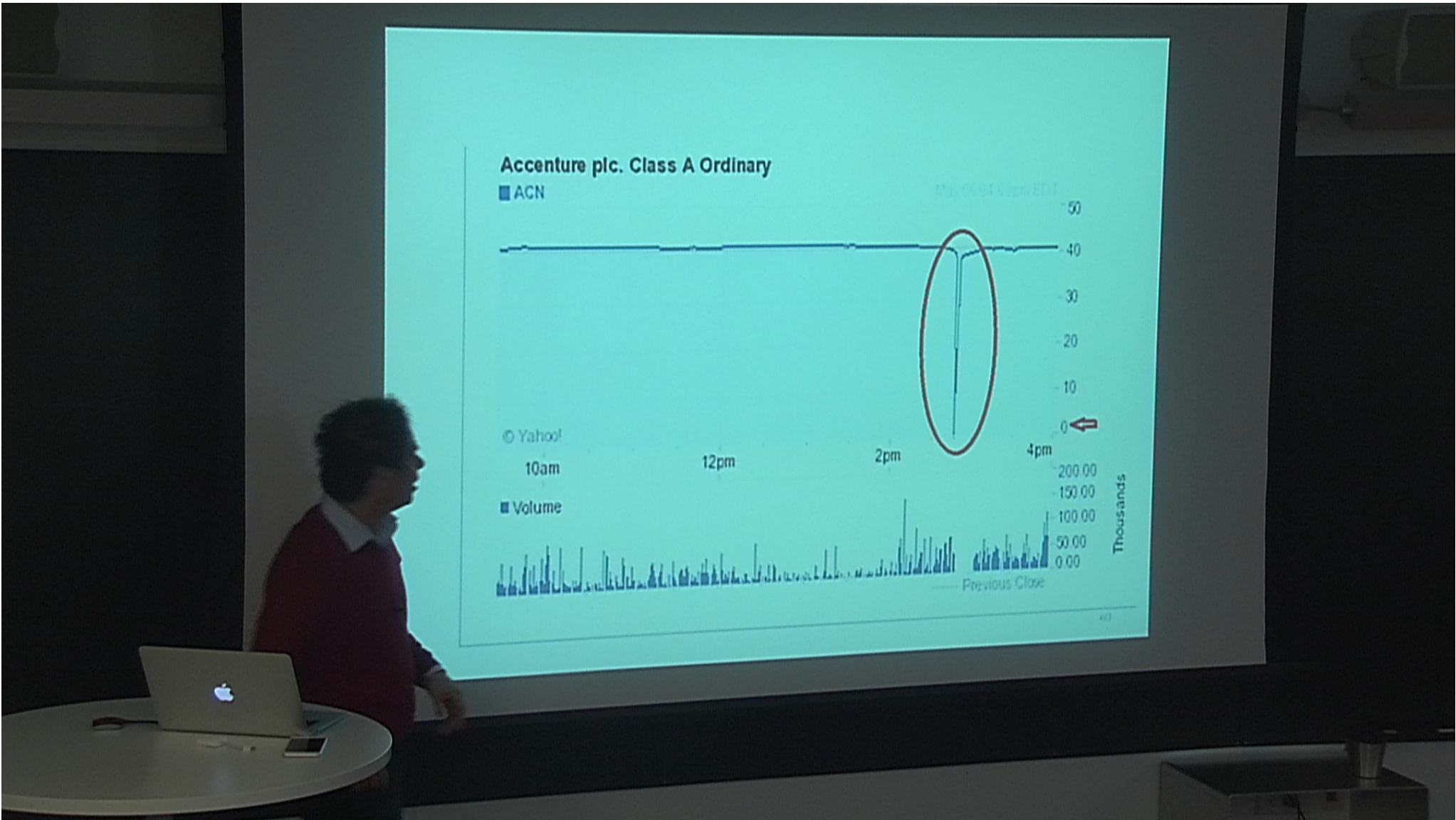
- Chronology:
- 1934: SEC created by congress, mandated to regulate short selling (borrowing of shares).
- **1938**: Uptick rule instated by first SEC Chairman: Joseph Kennedy, Sr.
- 2005: Pilot study (6 months starting in May)
- **July, 6 2007**: Repealed
- Today: Only circuit breaker versions.



NECSI

Economic vs Statistical Significance

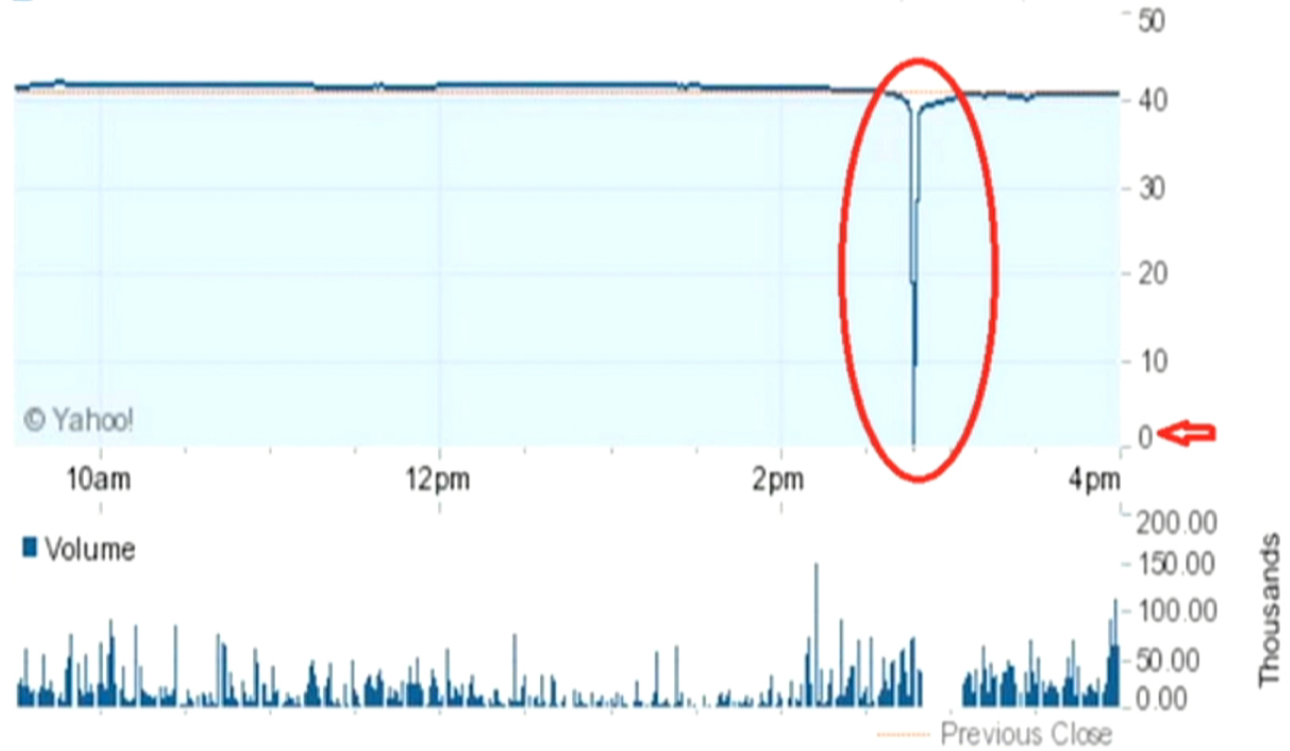




Accenture plc. Class A Ordinary

■ ACN

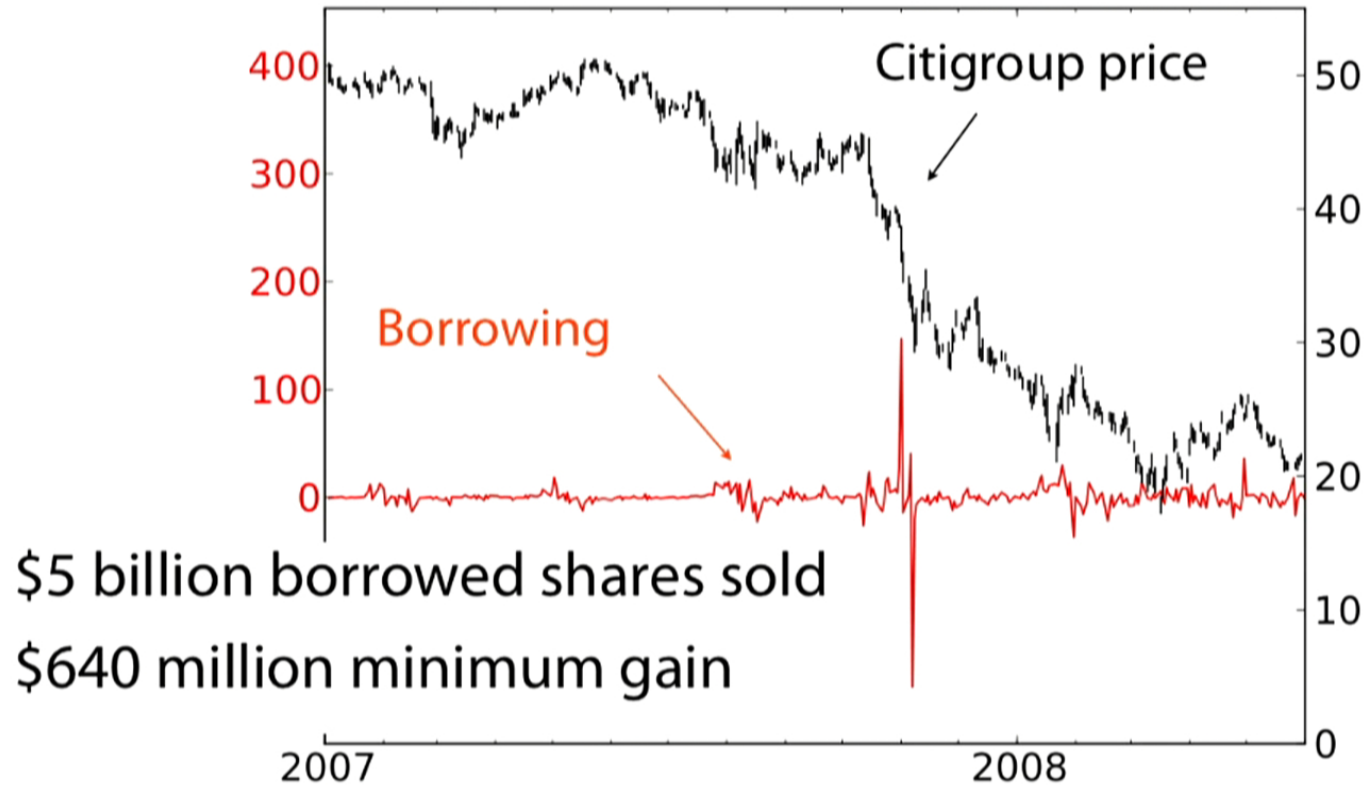
May 06 04 00pm EDT



Why flash crashes happen

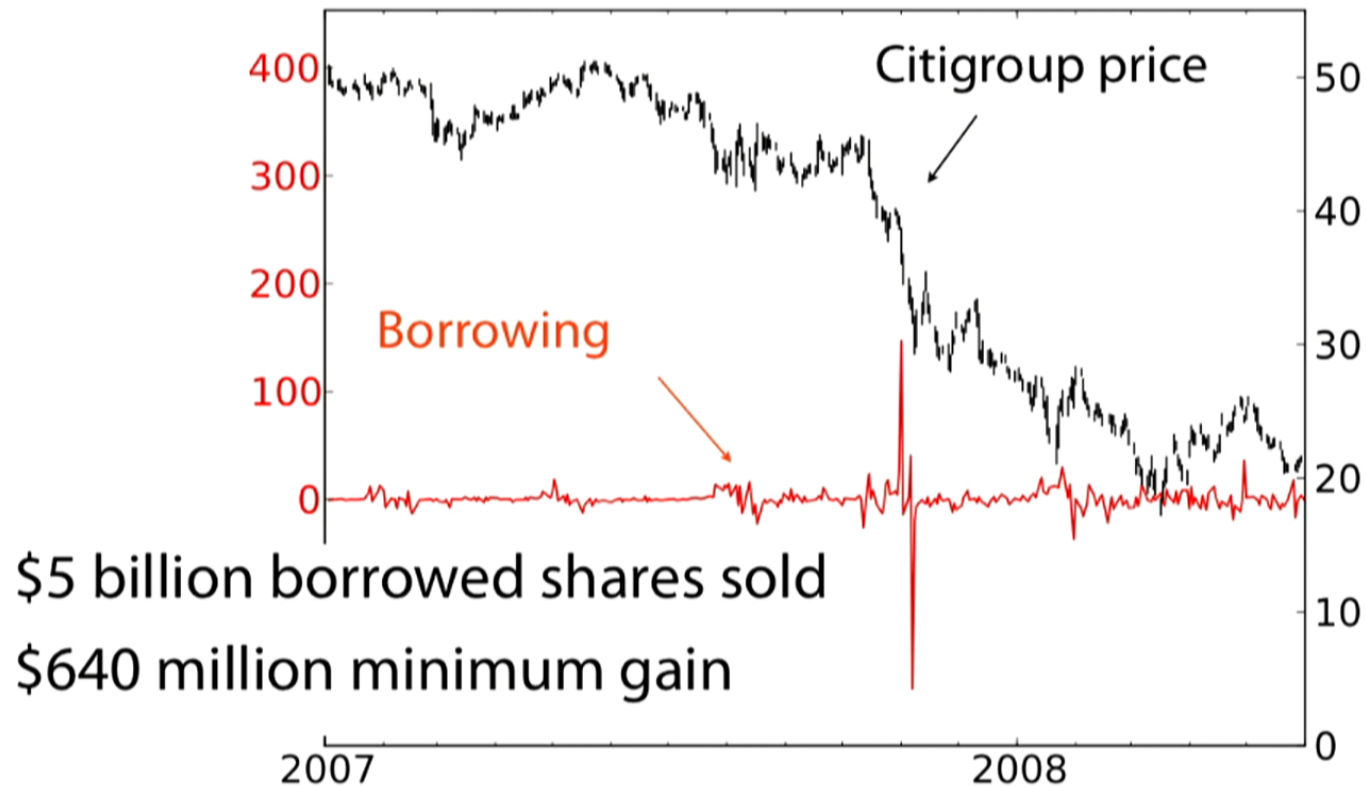


Bear Raid: Nov 1 – Nov 6, 2007

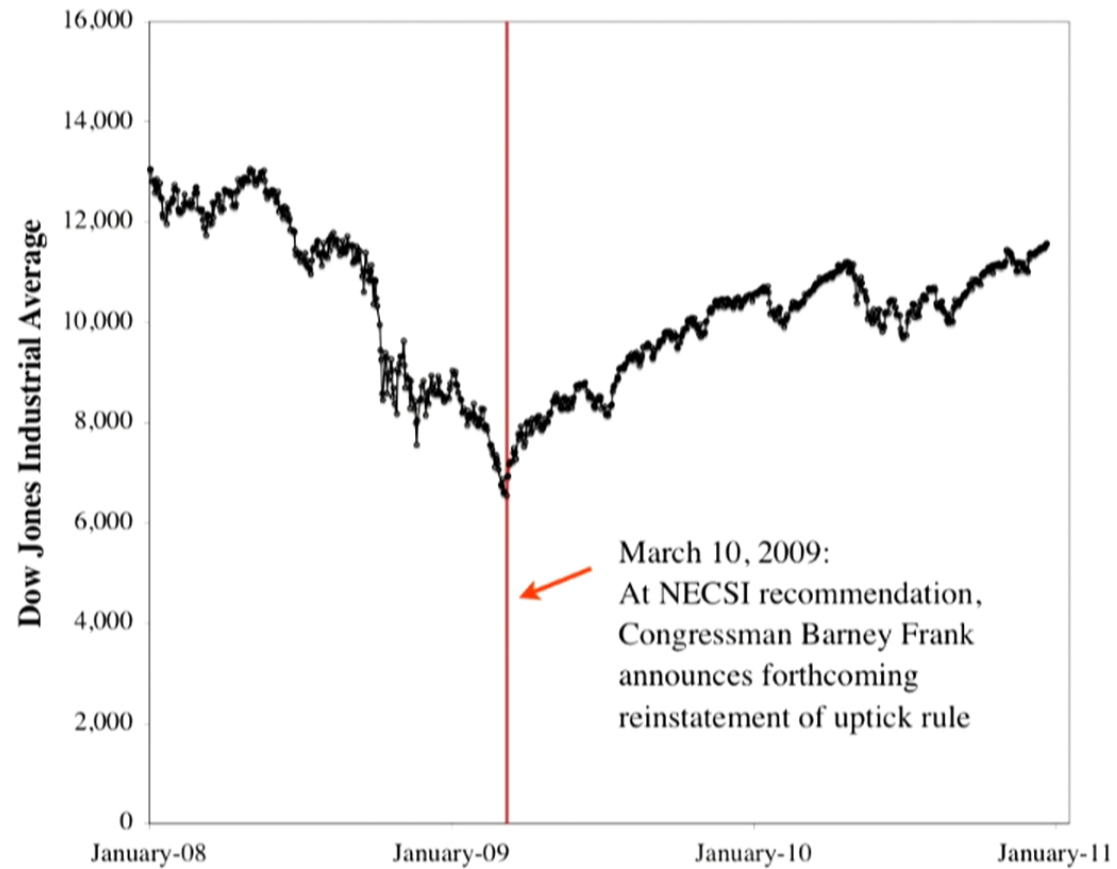


68

Bear Raid: Nov 1 – Nov 6, 2007

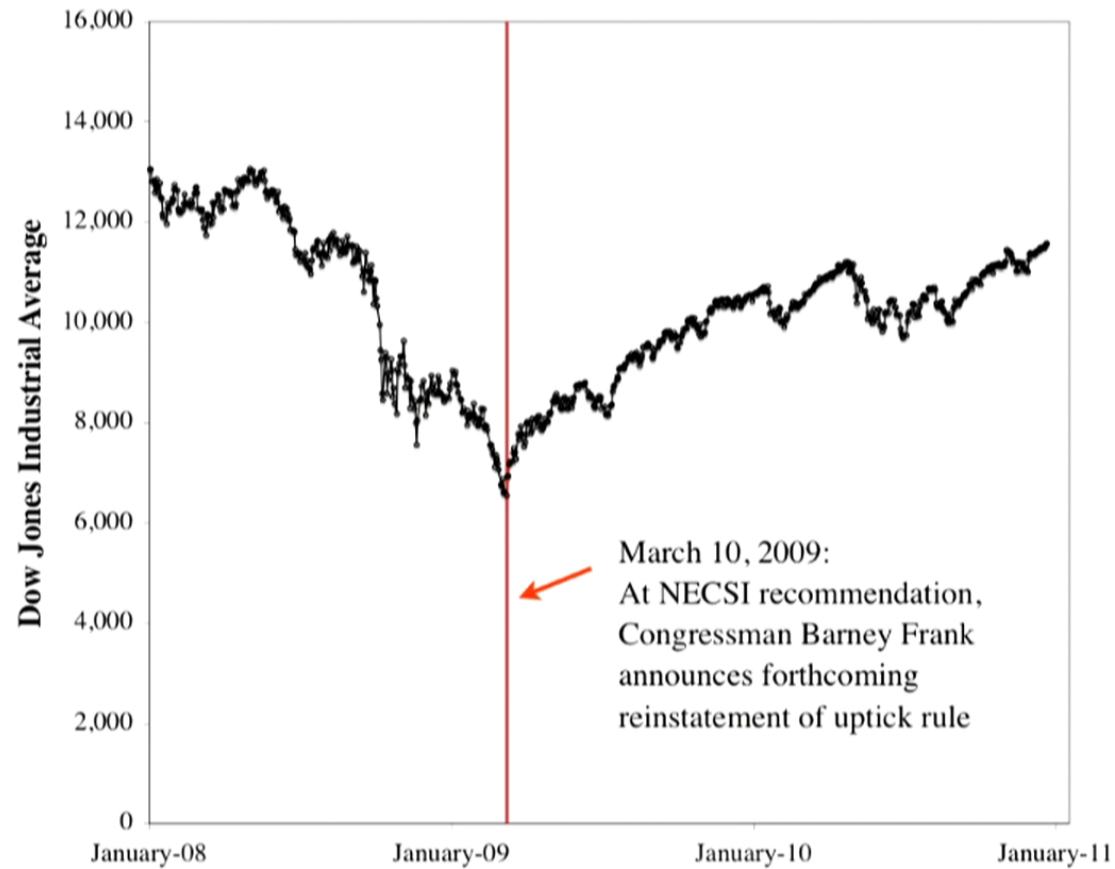


Policy: Uptick rule

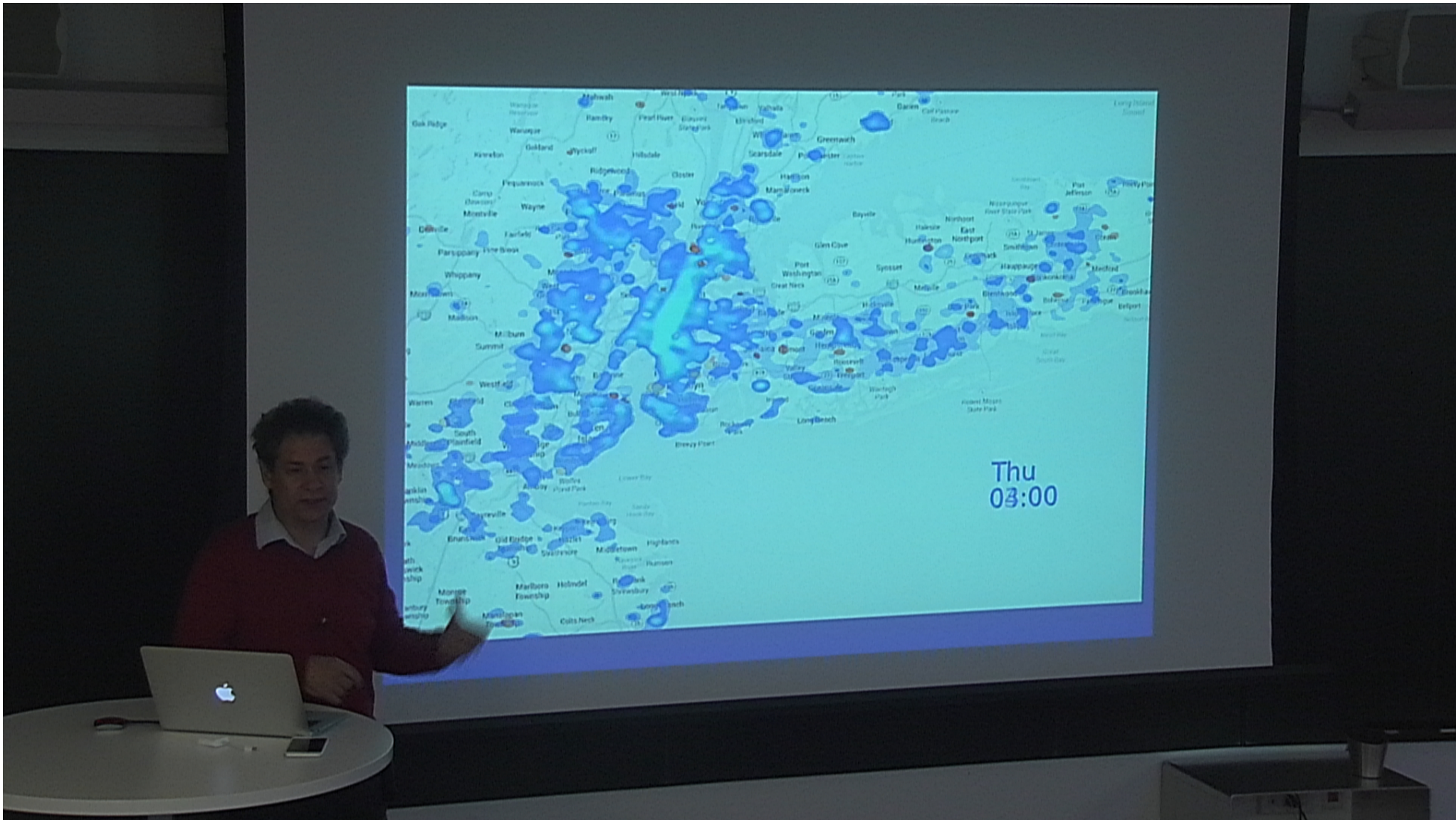


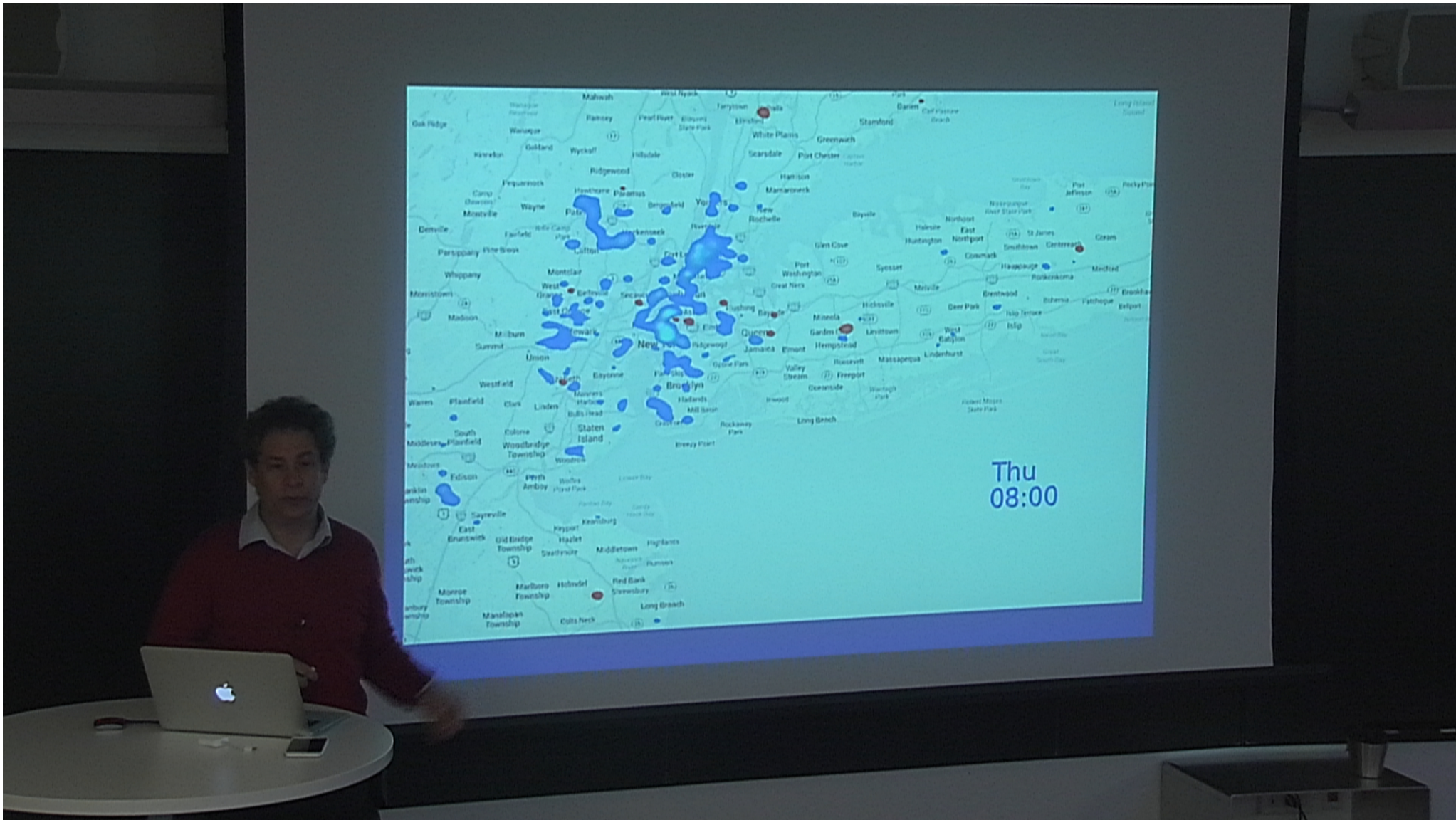
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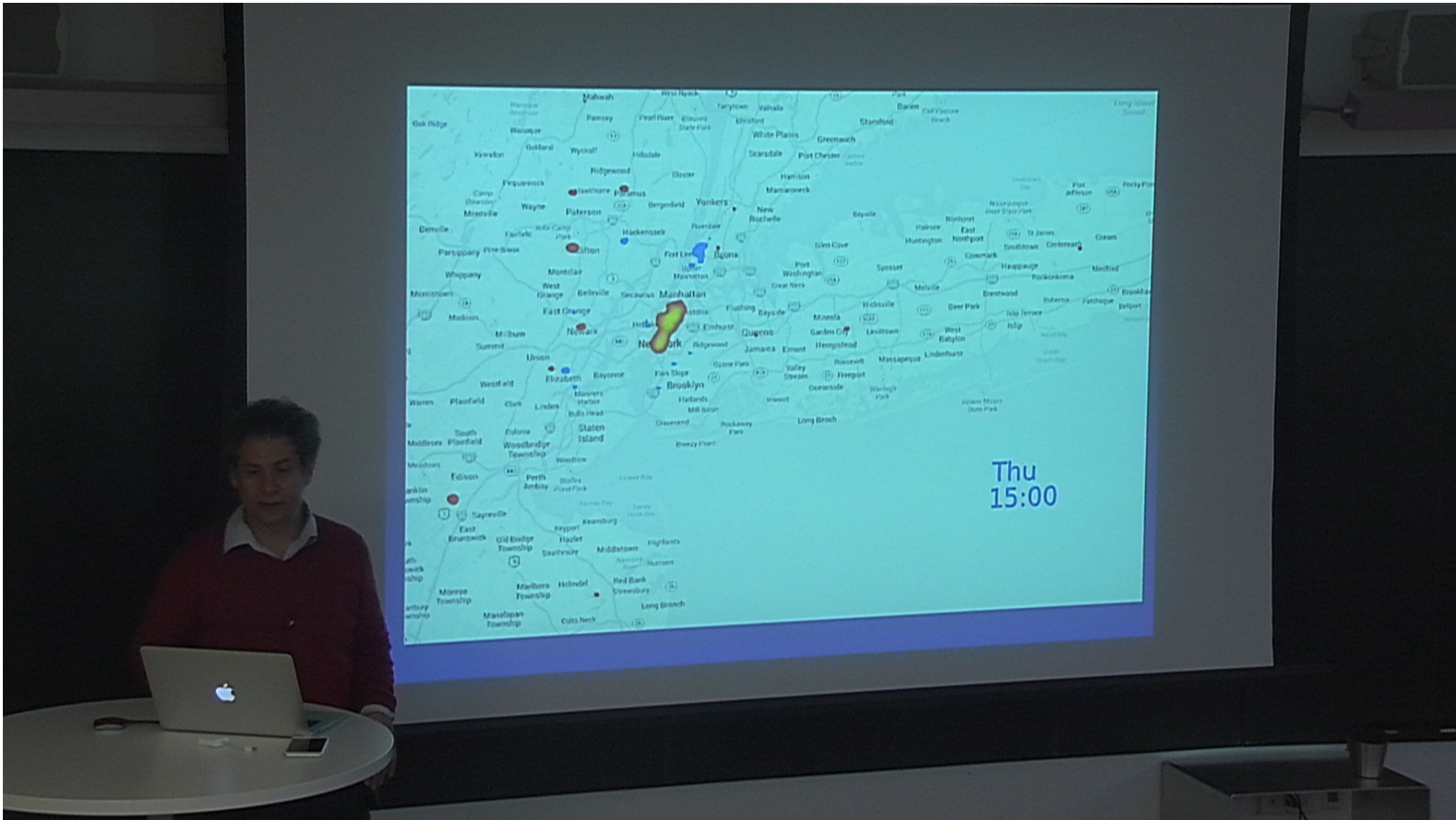
Policy: Uptick rule

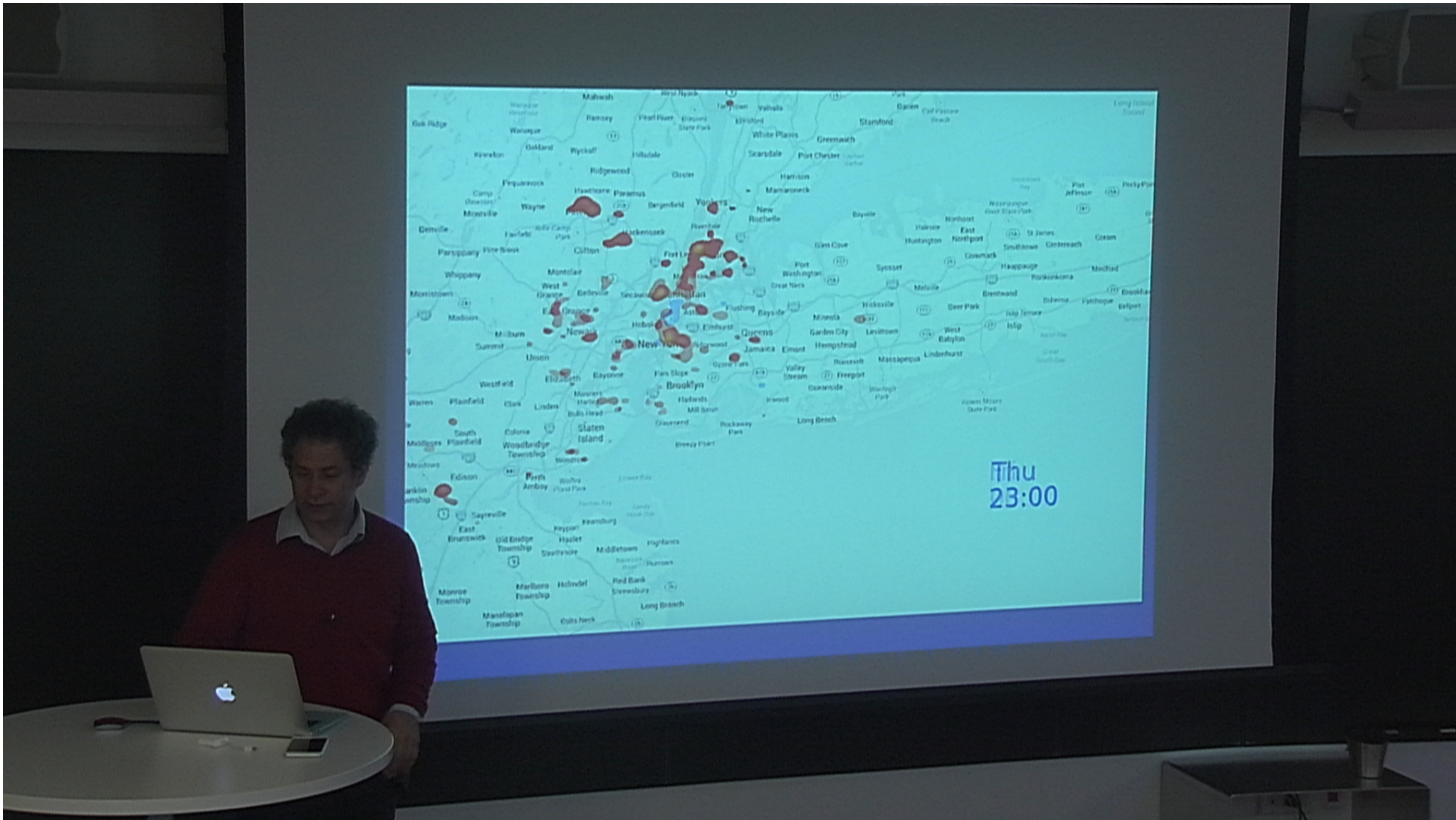


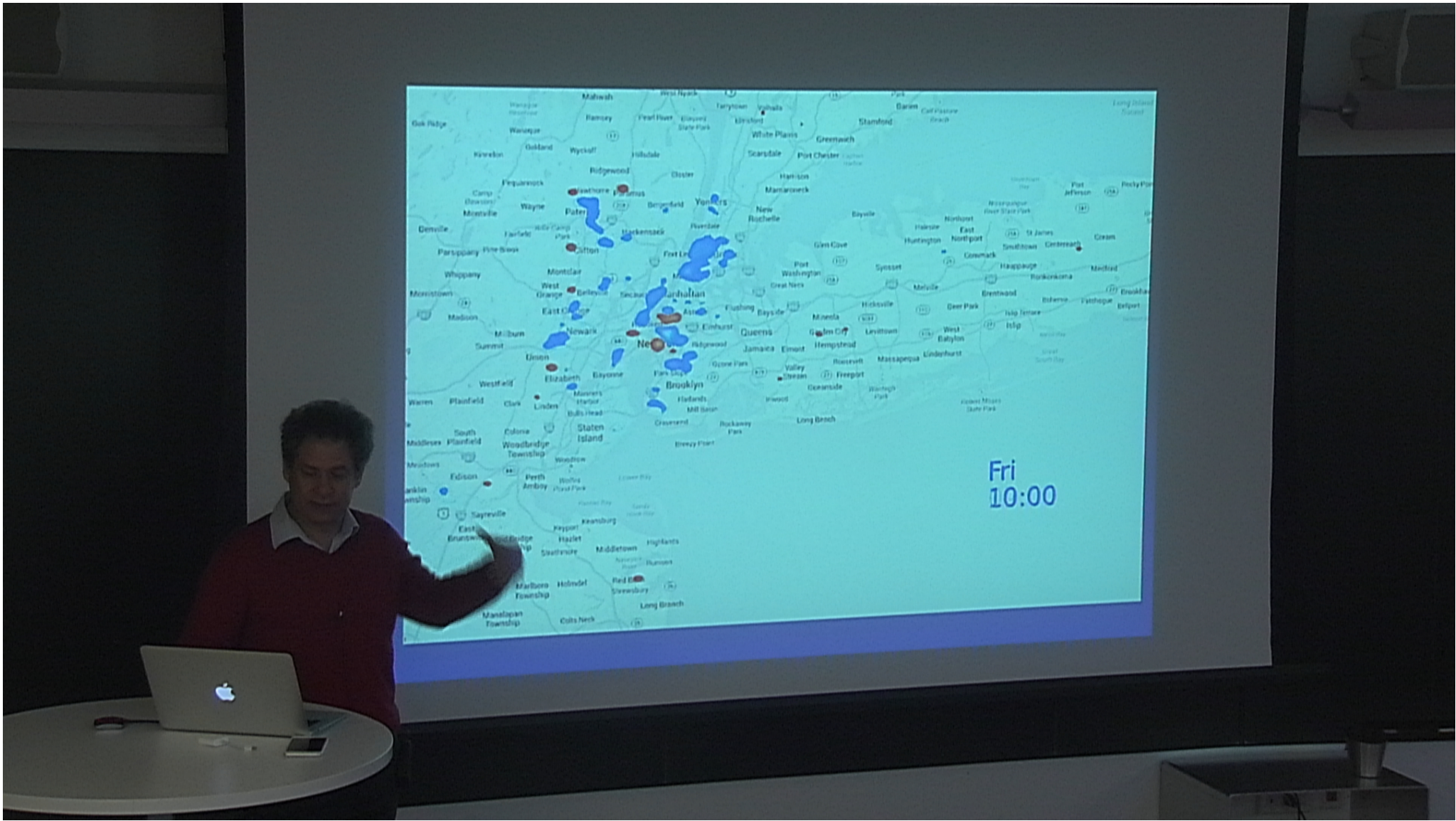
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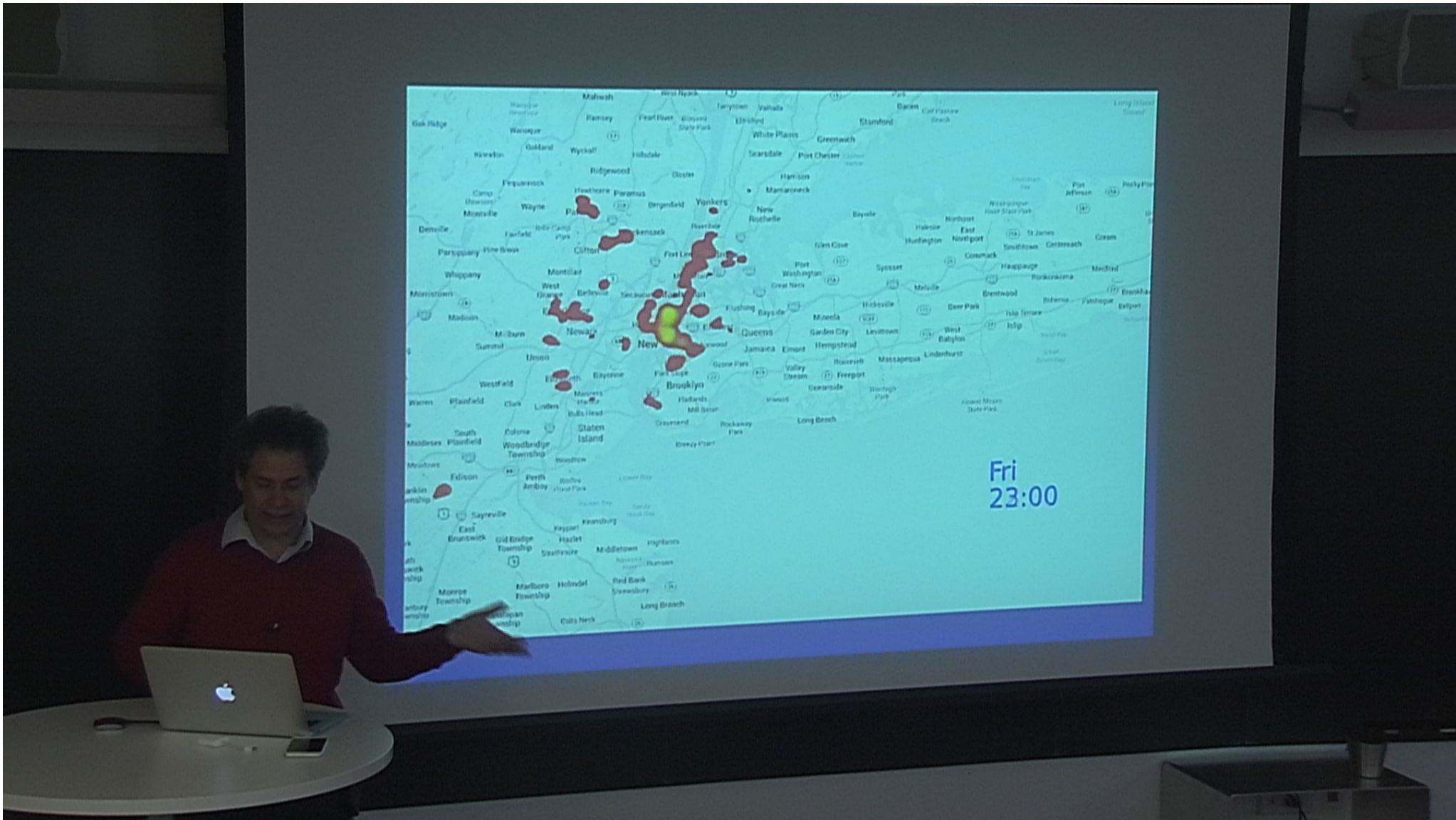


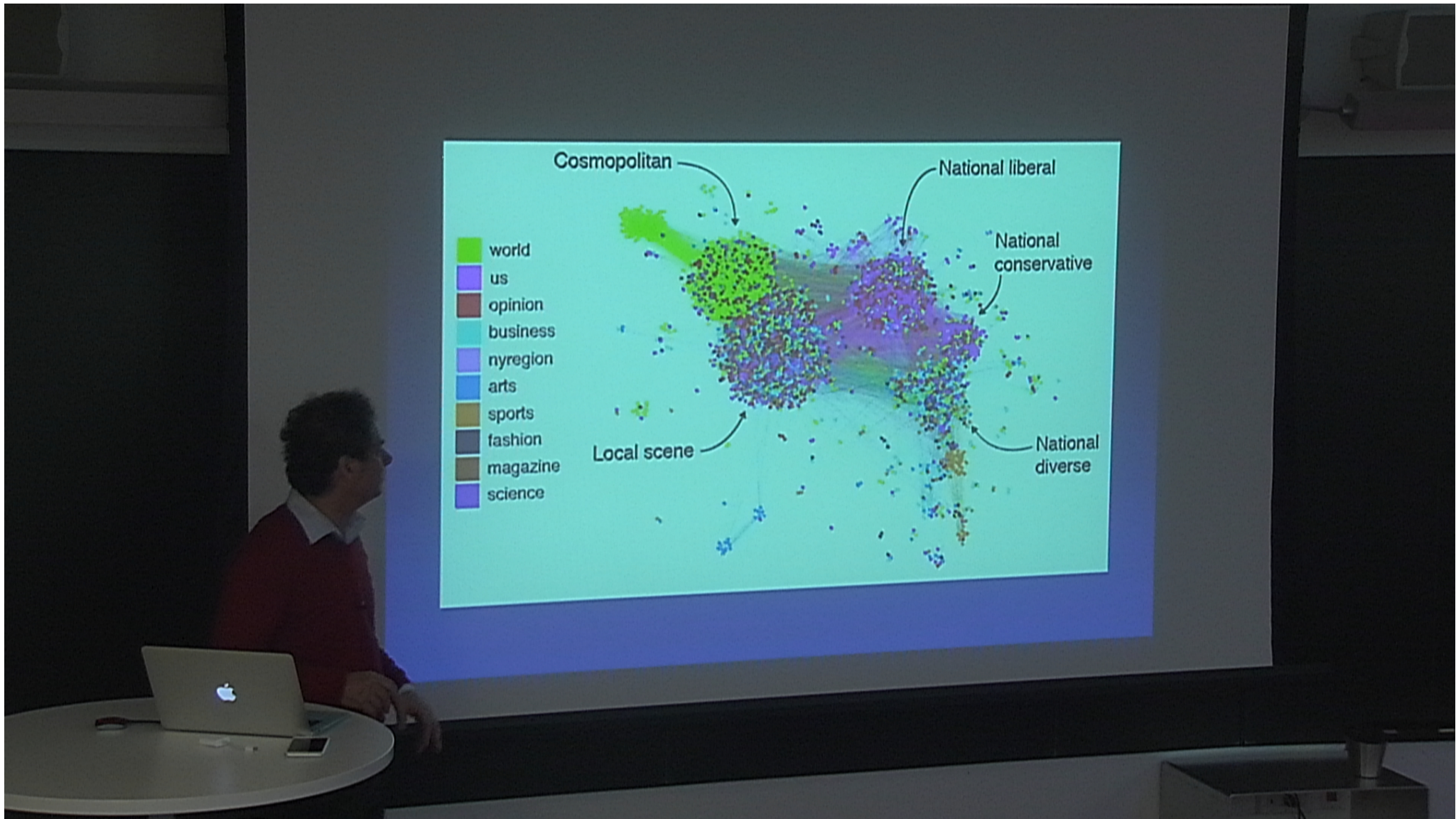


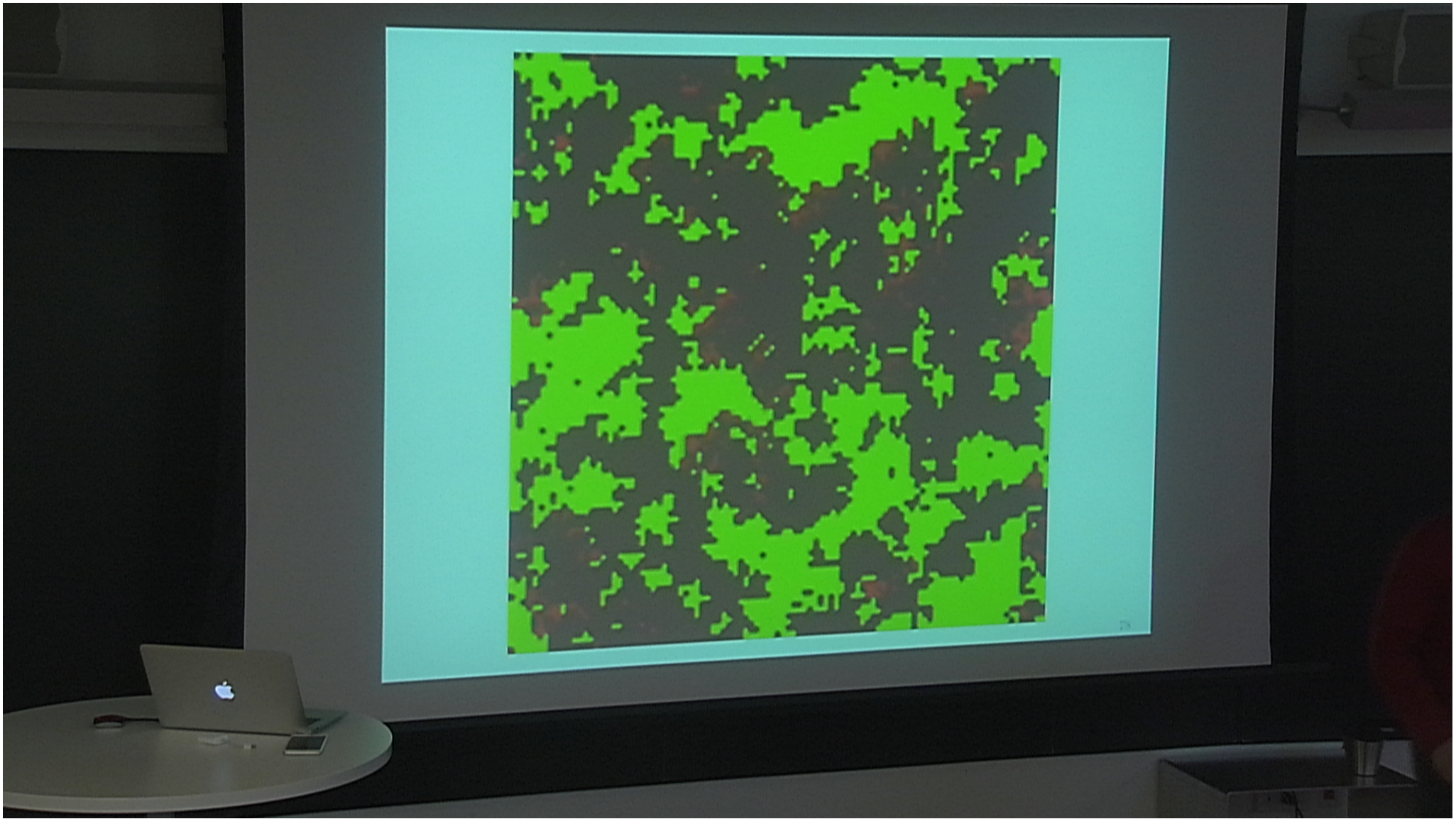








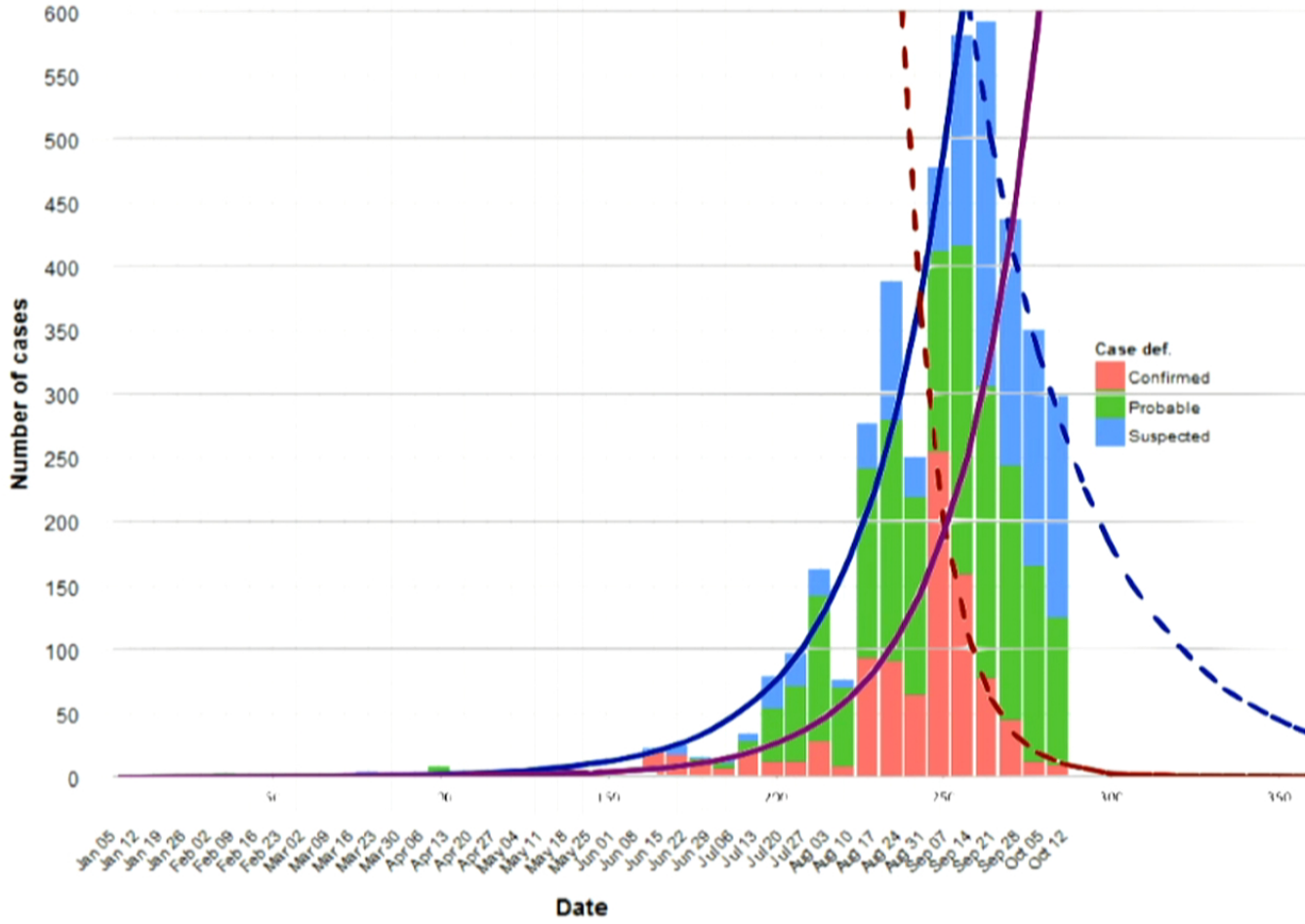




Implications: Need community scale response

- Contact tracing is not enough if there are more than a few cases.
- Need to have community, national, global response
- Not individual care, collective (community) care!!!
- May include travel restrictions (just like individual)

Liberia



Global Connectivity & Vulnerability

- Food riots and revolutions (Arab Spring+)
- Panic on markets (Crashes)
- Seeing collective social behavior (Twitter)
- Pandemics and collective action (Ebola)
- Extremism and terrorism (ISIS)