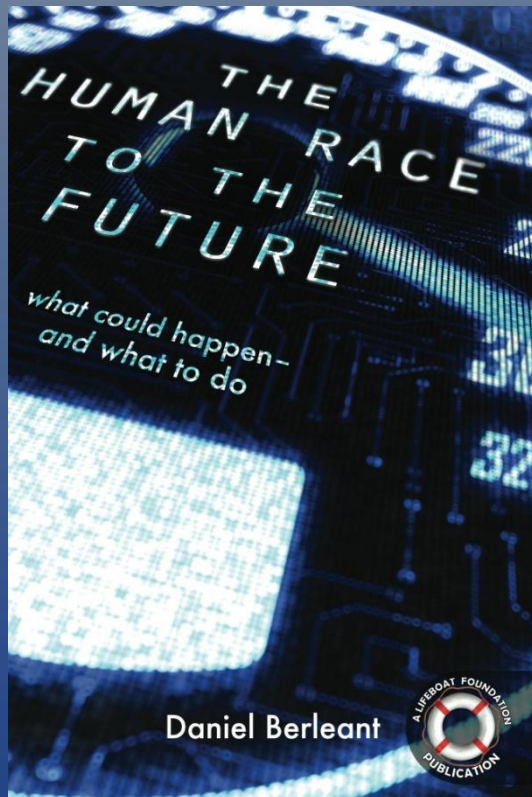
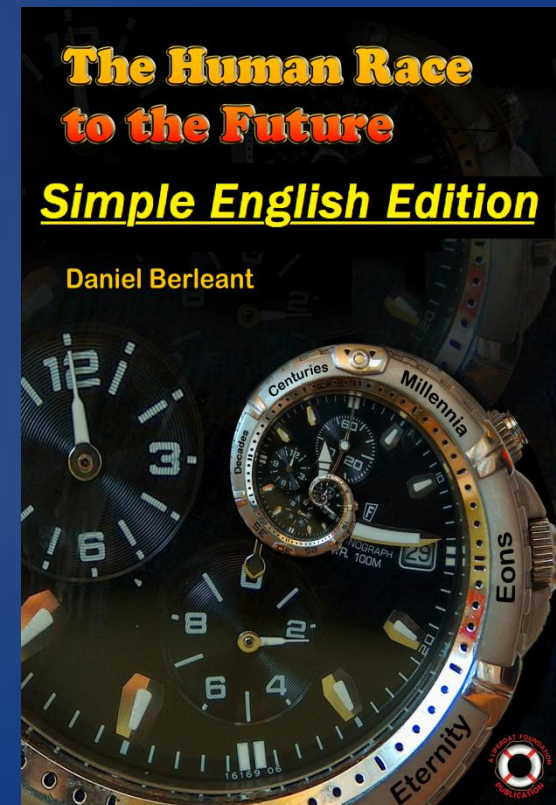


From Highly Centralized -to- Highly Decentralized Societies Daniel Berleant

WorldFuture 2013
July 21, Chicago
(updated 10/26/16)

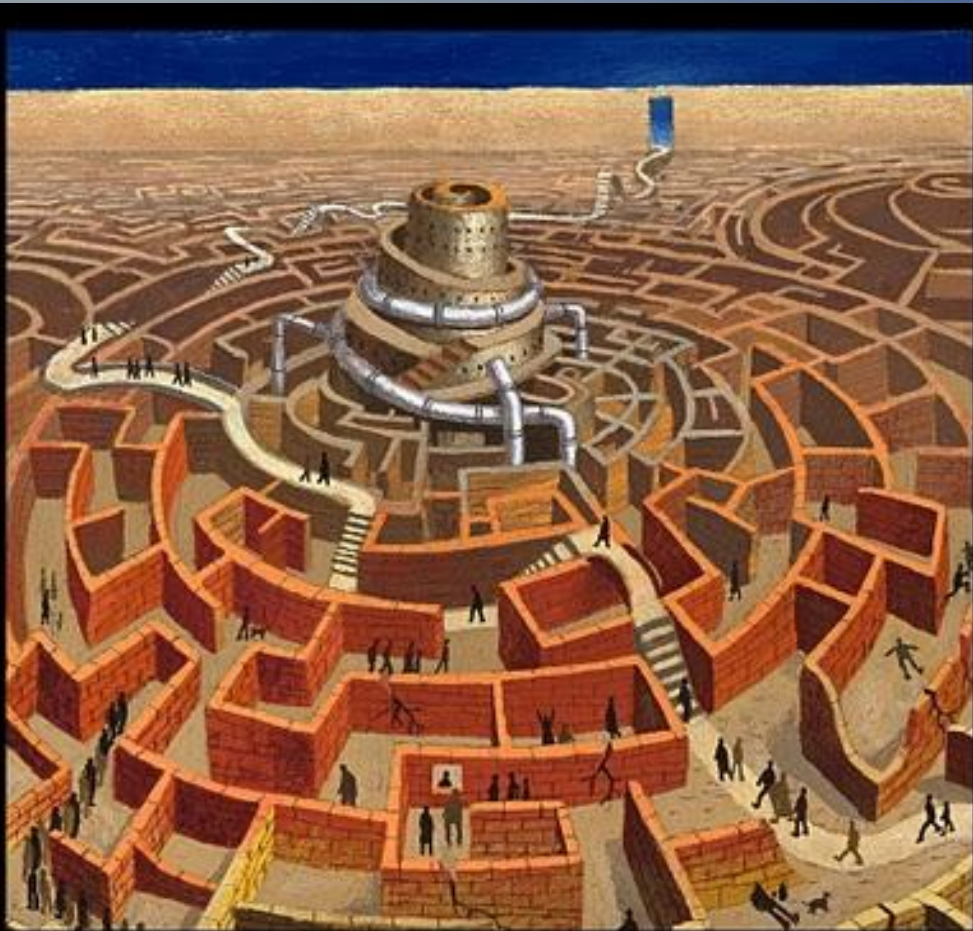


(Artist: Jason Batt)



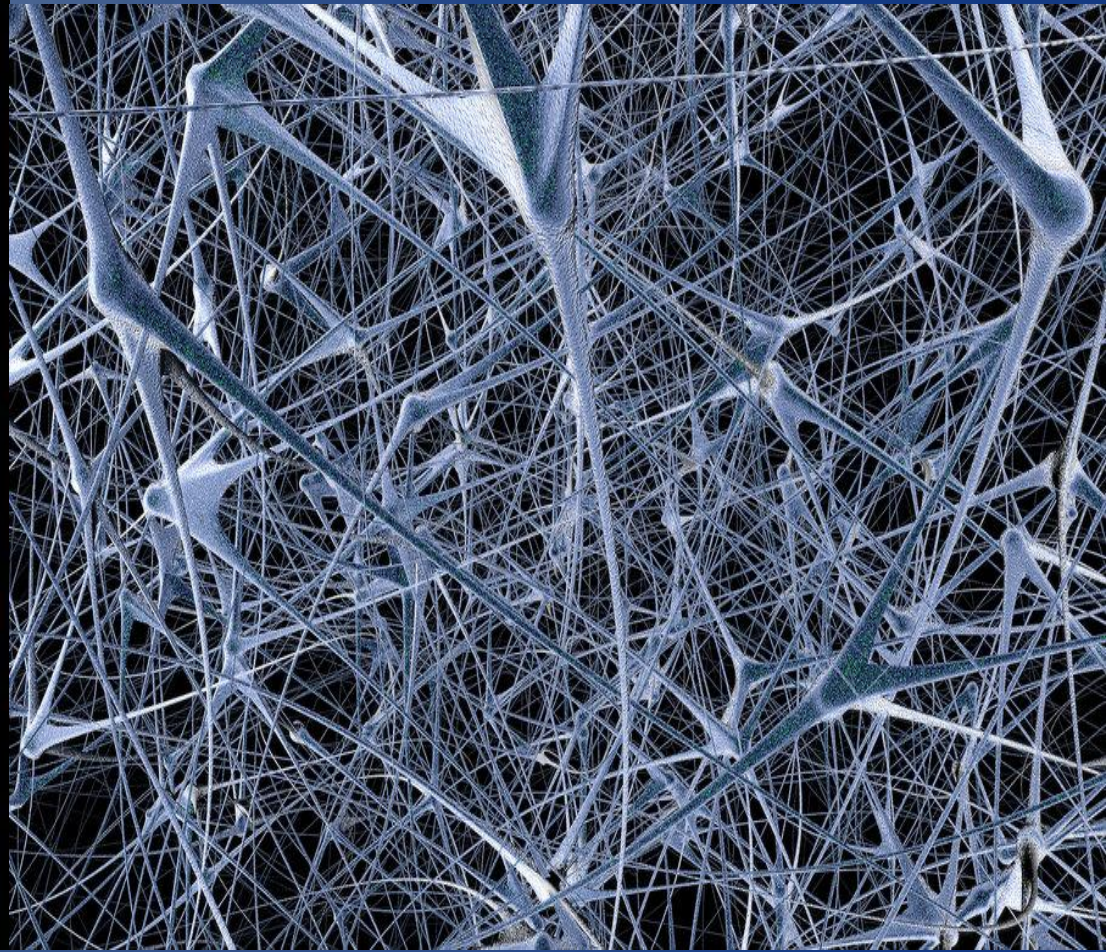
(Artists: Catherine Asaro
and Francesco De Comit )

A Tale of Two Futures



Source: www.thepolisblog.org/2010/05/decentralization-for-development.html

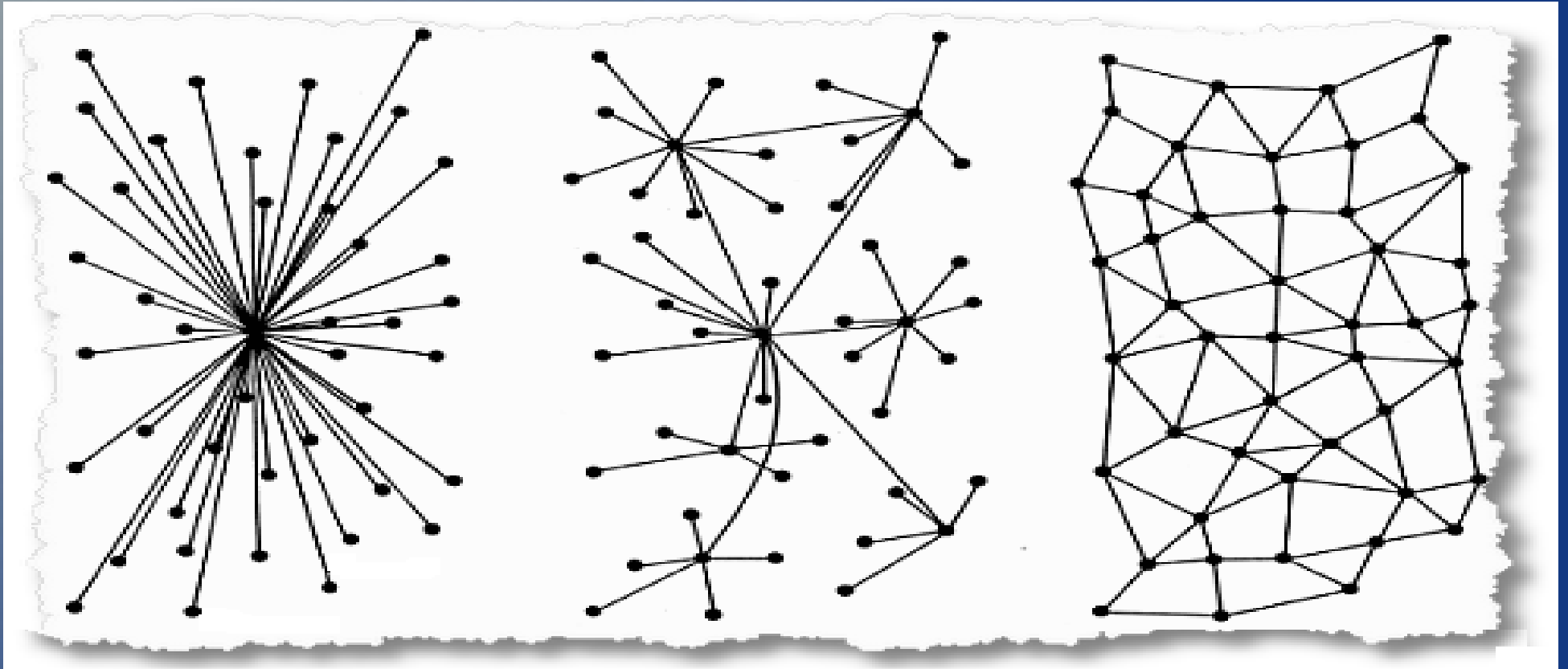
Centralization



Source: marktattersall.com/wp-content/uploads/2013/02/neural_network_by_wieschoo-d5gyq2l.jpg

Decentralization

Which is Better?



Slightly modified from: www.kaushik.net/avinash/owns-web-analytics-framework-critical-thinking/

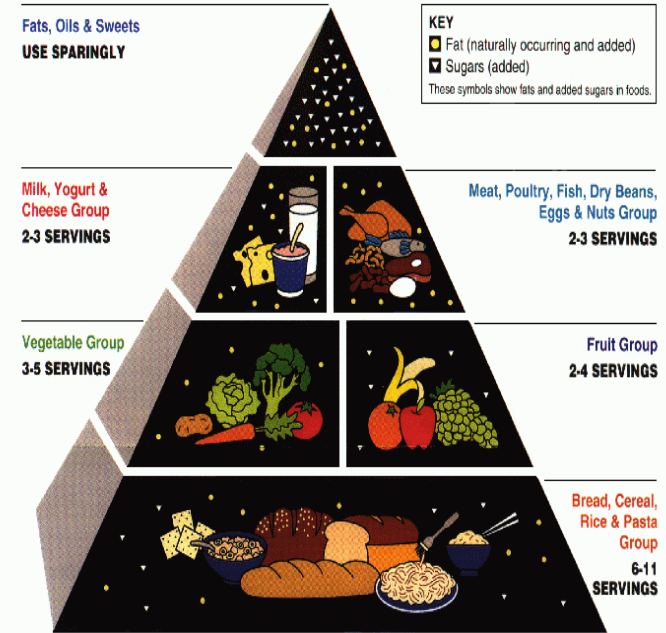
Centralization —————> Decentralization

Outline

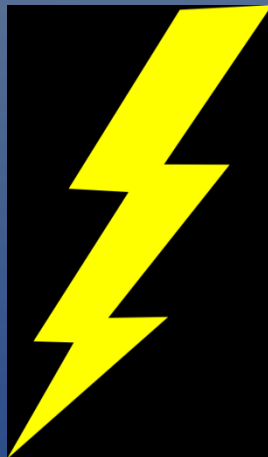
- Centralization, decentralization

- and:

 - Food

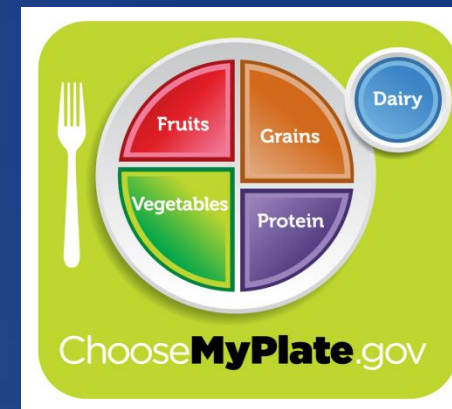


 - Electricity:



 - What else?

- Let's look at these more closely...



Food

Centralized



Source: orientalflovers.wordpress.com/category/nature-scenery-landscapes/hills

Source: www.davidicke.com/headlines/80376-modern-colonialism-foreign-investors-buy-up-vast-amounts-of-developing-world-farmland



Decentralized



Source: www.teichgardensystems.com

- What are the + 's and - 's of each?
 - Obvious ones
 - Hidden ones

Food Production

Highly Centralized

Highly Decentralized

Long distance
transportation

Required

Not required



Food Production

Highly Centralized

Highly Decentralized

Long distance
transportation:

Expensive

No expense



Rome (Tainter, p. 133)

Fuel

Trucks

Infrastructure capacity, maintenance

spoilage health variety . . . others?

Food Production

Highly Centralized

Highly Decentralized

Long distance
transportation: Risk of
disruption

No risk



Sources: (t)
http://www.123rf.com/photo_8081287_isolated-studio-shot-of-a-businessman-sitting-using-a-laptop-computer-while-sitting-in-a-chair.html; (b)
www.gfi.com/blog/wp-content/uploads/2012/08/BOYD-the-risk.jpg.

Virus infection
human
computer

Road closure
damage
bandits

Any other
risks?

How to Decentralize Food

- How to do it:



- We could “think-pair-shair”...



- Ag. tower plan
- 58 stories
- "Sky Farm"
- Toronto
- Gordon Graff
- 8 million sq. Feet
- 180 acres+
- 35,000 people (?)
- Image from www.inspirationgreen.com/vertical-farms.html



Plan

- Hydroponics
 - +
 - offices
-
- SOA Architects
 - (France)
 - Image from www.inspirationgreen.com/vertical-farms.html



- Rice can grow beside
 - buildings
 - roadways
-
- From Taiwan Cultural Portal,
travel.mediamatic.net/page/55990/en

THE SIDEWALK FARMER

IS SUSTAINABLE URBAN FARMING POSSIBLE? WELL, I'VE GIVEN MY FAMILY OF FOUR A CHALLENGE TO BE 100% SUSTAINABLE IN THREE YEARS OR LESS. THE ONLY LAND WE'LL HAVE TO GROW FOOD IS BETWEEN THE STREET AND THE SIDEWALK. WE MIGHT BE SUCCESSFUL, BUT WE HOPE TO INSPIRE YOU TO FARM YOUR SIDEWALK!



- Orange tree
 - (not doing well)
- Rhubarb
 - (doing fine)
- See
 - sidewalkfarmer.blogspot.com

Home farming: not for everyone

- It's great if you can make a go of farming your sidewalk, yard, etc. to support a family of four
 - But many of us want to work a regular job
 - So who has the time?
 - To really make it work requires an alternative . . .
 - Let's look at a couple of them

Highly decentralized food
sourcing...
a traditional practice
among the very young!



Image: www.relphbenefitadvisors.com/article/check-employee-handbook-nursing-mothers-law

This is fine for babies. . .
but won't work for everyone!
Any alternatives?



Image: www.relphbenefitadvisors.com/article/check-employee-handbook-nursing-mothers-law

Agribots



Artist: Christine M. Larsen. www.thelittlechimpsociety.com/?s=larsen;
see e.g. <http://shop.christinelarsen.com/product/robot-of-the-month-club>

Robots are poised for takeoff!

Roombas work on floors



The outdoors has a floor

We call it the "ground"

Source: <http://www.dumbening.com/RSS/7-1-07.html>

Robot precursors

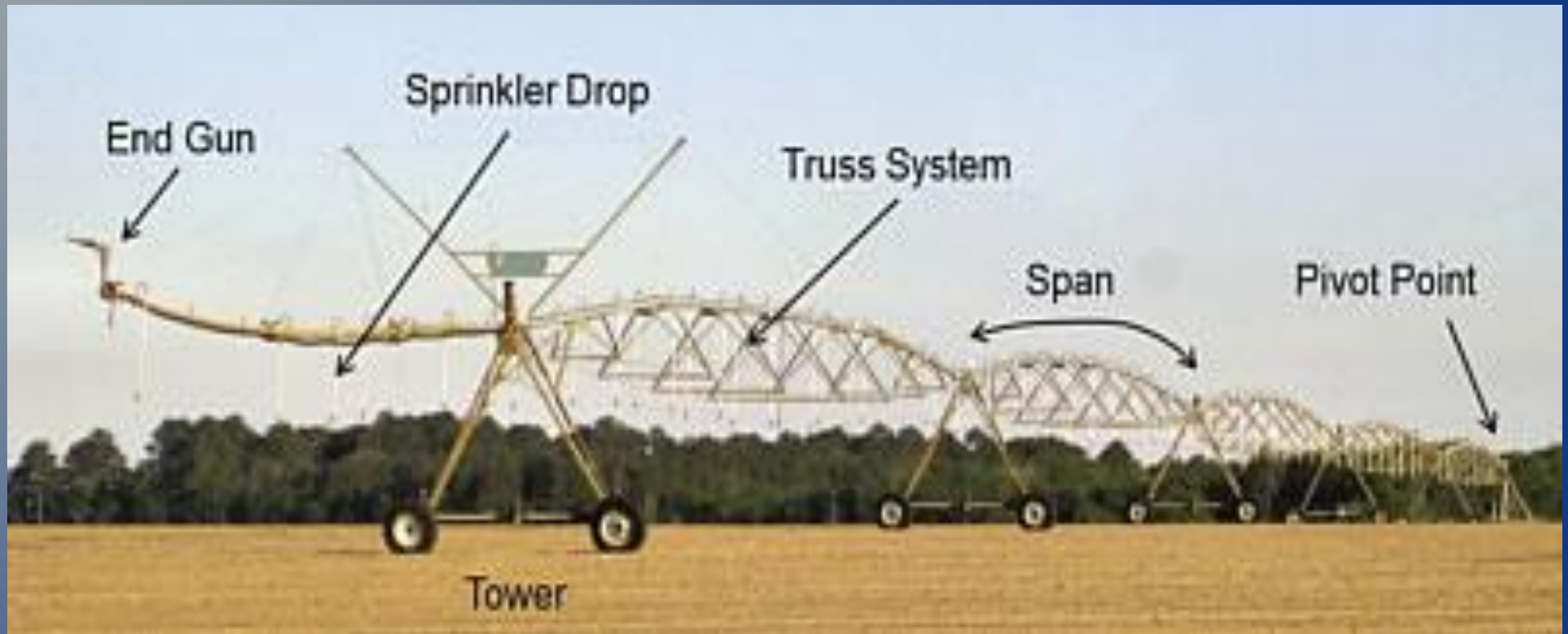
- Surface irrigation systems
 - E.g. furrow irrigation
- Center pivot irrigation systems
 - Often $\frac{1}{4}$ mile, almost $\frac{1}{2}$ km long
 - Among the longest machines in existence
 - They make “crop circles”
- Lateral move irrigation systems
 - Can be 1 km long
 - Mostly mobile
- Pics next...



<http://nrcca.cals.cornell.edu/soil/CA3/CA0324.php>



crossingthesky.blogspot.com/2011/01/western-kansas-tells-and-smells.html



www.cottoninc.com/fiber/AgriculturalDisciplines/Engineering/Irrigation-Management/Irrigation-Systems-Overview/

Lateral irrigation systems:

Look similar

How are they more complex than center pivot?

Toward next generation agbots

- From
- floorbots
- to
-
- groundbots
- From simpler to more sophisticated irrigation
 - Saves water
 - Why not give each plant
 - exactly what it needs
 - no more, no less

Grass farming

- Robot lawnmowers:
 - primitive grass farming bots!



Grass farming

- Robot lawnmowers
 - Taking care of your lawn is grass farming
 - But they can get better
 - Sense and destroy weeds
 - Clever lettucebot idea:
 - use a jet of steam or liquid fertilizer
 - Dispense and plant seeds in bare patches
 - Expert system to diagnose and recommend
 - Operate sprinklers (should be easy)
 - Sprinkle fertilizer
- One step at a time: We're already on the way

**Sod
providers:
Pro grass
farmers**



Farming more than grass

- Tractor? No. . . *Lettuce Bot* !
 - What direction is it going?



Farming more than grass

- Lettuce Bot
 - Kills weeds, with
 - steam (an organic solution)
 - or
 - concentrated fertilizer
 - Thins the field when needed
 - High powered computer vision system
 - \$3 million in venture funding

Tomato Bots



Tomato Bots

- The Roomba-like vehicle is
 - Well... Roomba-like
 - Made by the same company
 - Appears to be mostly Roomba – vacuum
 - Vacuum mechanism is expensive!
 - Robot vehicle costs around \$130
 - Roombas are quite a bit more
- Tomato bots are experimental
 - Commercial ones? Why not?



You and your neighbors

www.parade.com/news/2010/05/02-meet-the-neighbors.html

- Let's say you have a broccobot
- Your neighbor has a
 - raspberrybot
- Work out a trade!
 - Broccoli is a healthy vegetable
 - But "man does not live by bread alone" (or broccoli)
- Neighbors helping, trading, interacting with neighbors. . .
 - . . . building communities . . . with **growbots!**



www.cityofyukonok.gov/city-departments/emergency-management/family-disaster-plan/neighbors-helping-neighbors/

From here to . . . ?

- Mowers, Lettuce Bots, tomato bots are
 - single-crop bots
- A reasonable technical path
 - Mowbots
 - Single crop, single action
 - Mowbot 2.0s, Lettuce Bots, tomato bots
 - Single crop, multiple action
 - Growbots that can handle... whatever
 - Multiple crop, multiple action

Back to decentralization

- What if:
 - everyone had enough land to grow their food
 - ...with robots (no human labor)
- Living in the middle of a cornfield:
 - Less convenient than living next to a grocery store
 - We want to retain the pluses of urban living!



L: thesentinelproject.org/san-francisco-roundup-concept-paper-tapping-wisdom-of-smart-crowd/

R: visitpak.com/chali-rait-wala-popcorn-and-corn-in-pakistan/sweet-corn-field/

Retaining Urban + 's



Retaining Urban + 's

- Cities\$\$\$ create economic vigor!
 - Keep the vigor without the problematic density...
- Commodity robocars
 - Very small (w. tall flags)
 - Send'em shopping with shopping lists
 - It's worth paying 10% to human shelf pickers
- Skypification of life
- Telecommuting; telepresence robots
- **"This class could, in theory, be a teleconference"**
 - **What do you think?**

Retaining Urban + 's



From Left: AnyBots QB, RoboDynamics TiLR, Gostai Jazz Connect, Mantaro's Mantaro Bot, and VGo

Why decentralize?

- Decentralization serves the precautionary principle
 - **“Better safe than sorry”**
- Society is too dependent on long distance transportation
 - Electromagnetic pulses could disable vehicles
 - Societal breakdown could cripple transportation
 - Hunger Games
 - Earth 2100
- **Collapse has happened before, but... “we're different”**
 - **Hopefully so, but prudent risk management is good**

abc NEWS

earth2100

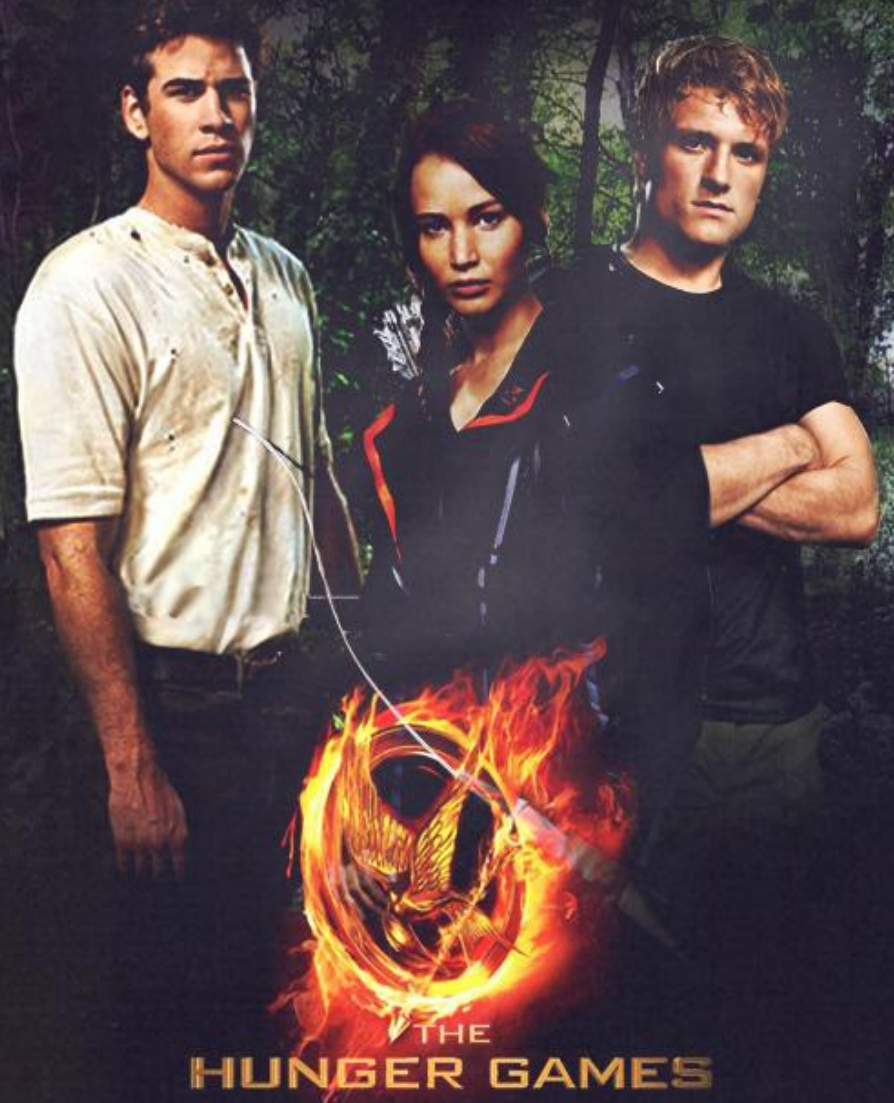
TO CHANGE OUR FUTURE,
FIRST WE MUST IMAGINE IT.



MPI

DVD

MAY THE ODDS BE EVER IN YOUR FAVOR



THE HUNGER GAMES

2012

THEHUNGERGAMESMOVIE.COM

© 2012 LIONSGATE

ALICECULLEN88.DEVIANTART.COM

Social collapse: No way, or some day?

- **“All were from dust, and all return to dust”**
 - **Ecclesiastes 3:20, discussing humans and animals**
 - **Seems to hold for civilizations too**
- **Throughout history, civilizations**
 - **...Emerge...achieve greatness...then disappear...**



Social collapse: No way, or some day?

- **Why is ours the lone survivor?**

- **We're special!**



- **or maybe . . .**

- **Chaos just hasn't happened yet**

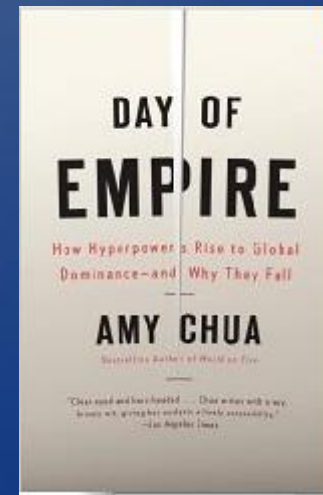
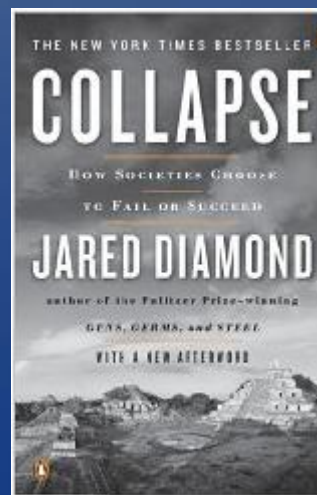
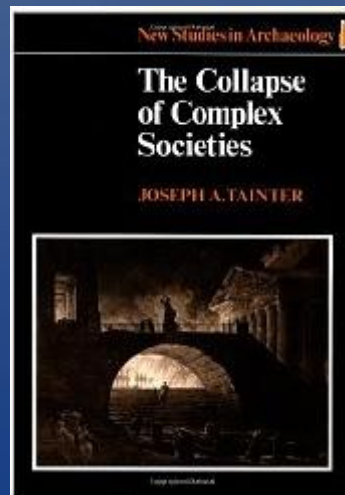


- **Prudent risk management:**

- **Decentralize where possible**

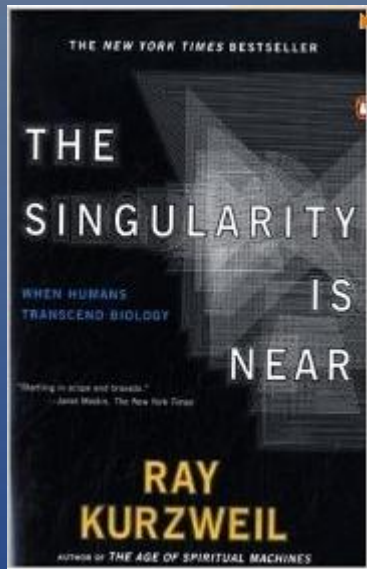
Why Civilizations Rise and Fall

- Numerous theories, including:
 - Environmental overshoot (e.g. Jared Diamond)
 - Immigration policy (e.g. Amy Chua)
 - Sociopolitical complexity (e.g. Joseph Tainter)
 - *The Collapse of Complex Societies*
 - University of Cambridge Press, 1988

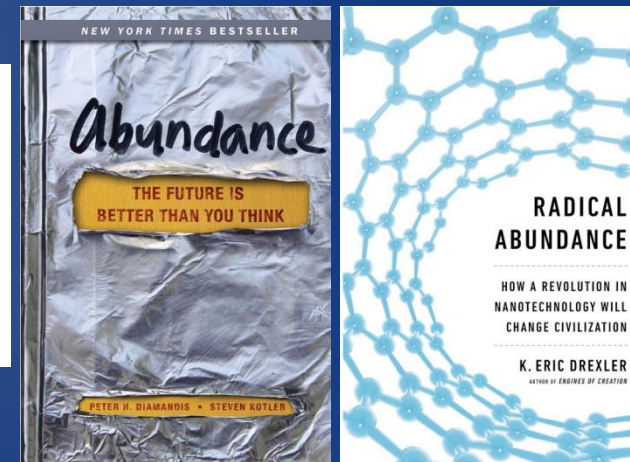


Why civilization won't fall

- Transhumanism, the singularity . . .
 - Ray Kurzweil, Singularity University, and many others
 - A modern social movement and belief system



... and many more!



How about robotics?

Accelerating vs. Decelerating Change

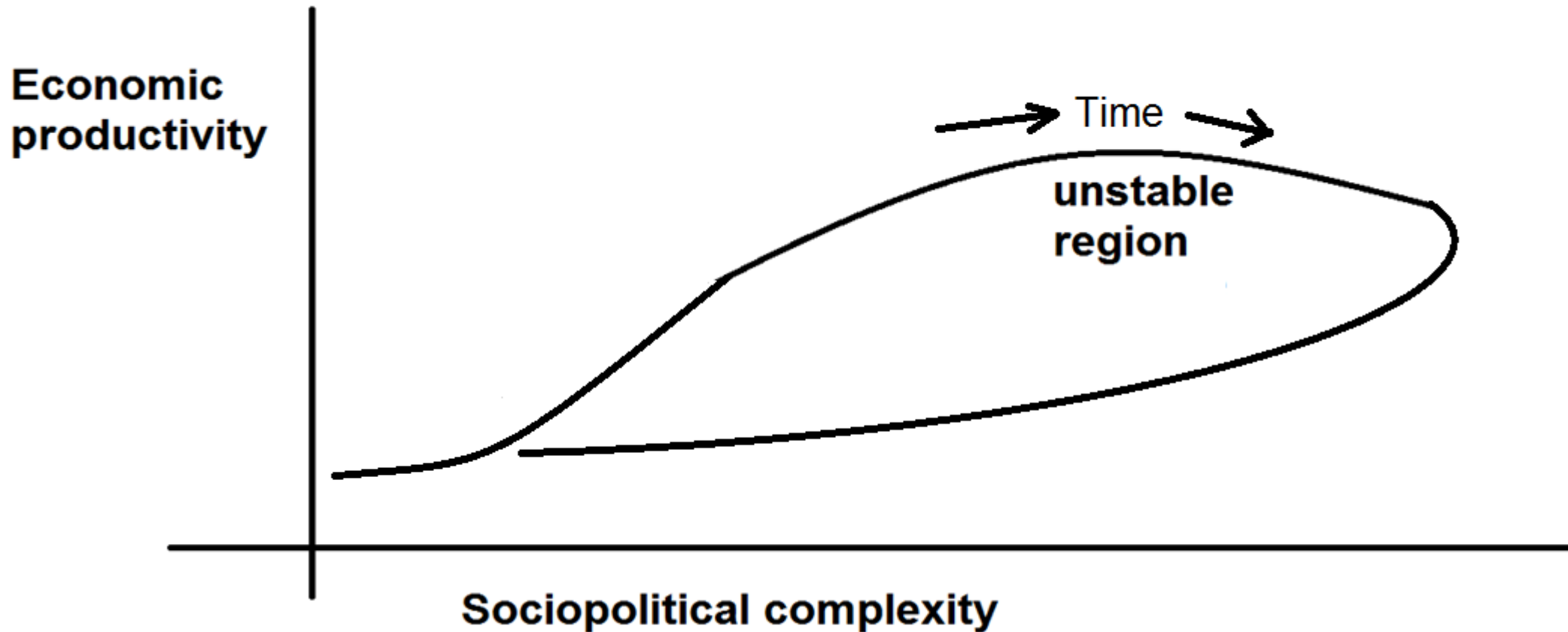
- Accelerating change (Kurzweil)
 - Change accelerates as a function of time
- Decelerating change (Tainter)
 - Change decelerates as a function of sociopolitical complexity
- Kurzweil shortchanges sociopolitical complexity
- Tainter shortchanges time
 - (Both tend to shortchange other theories)

Accelerating vs. Decelerating Change

- Accelerating change (Kurzweil)
 - Change accelerates as a function of time
- Decelerating change (Tainter)
 - Change decelerates as a function of sociopolitical complexity
- Kurzweil shortchanges sociopolitical complexity
- Tainter shortchanges time
 - So there is no direct contradiction!
 - This makes truth elusive, but so it goes

Decelerating change

- Tainter cites food production in the Roman Empire (for example)



Decelerating change

- Decentralization:
 - Can reduce sociopolitical complexity
 - Can protect in case of deterioration
 - . . . addressing the risk problem

