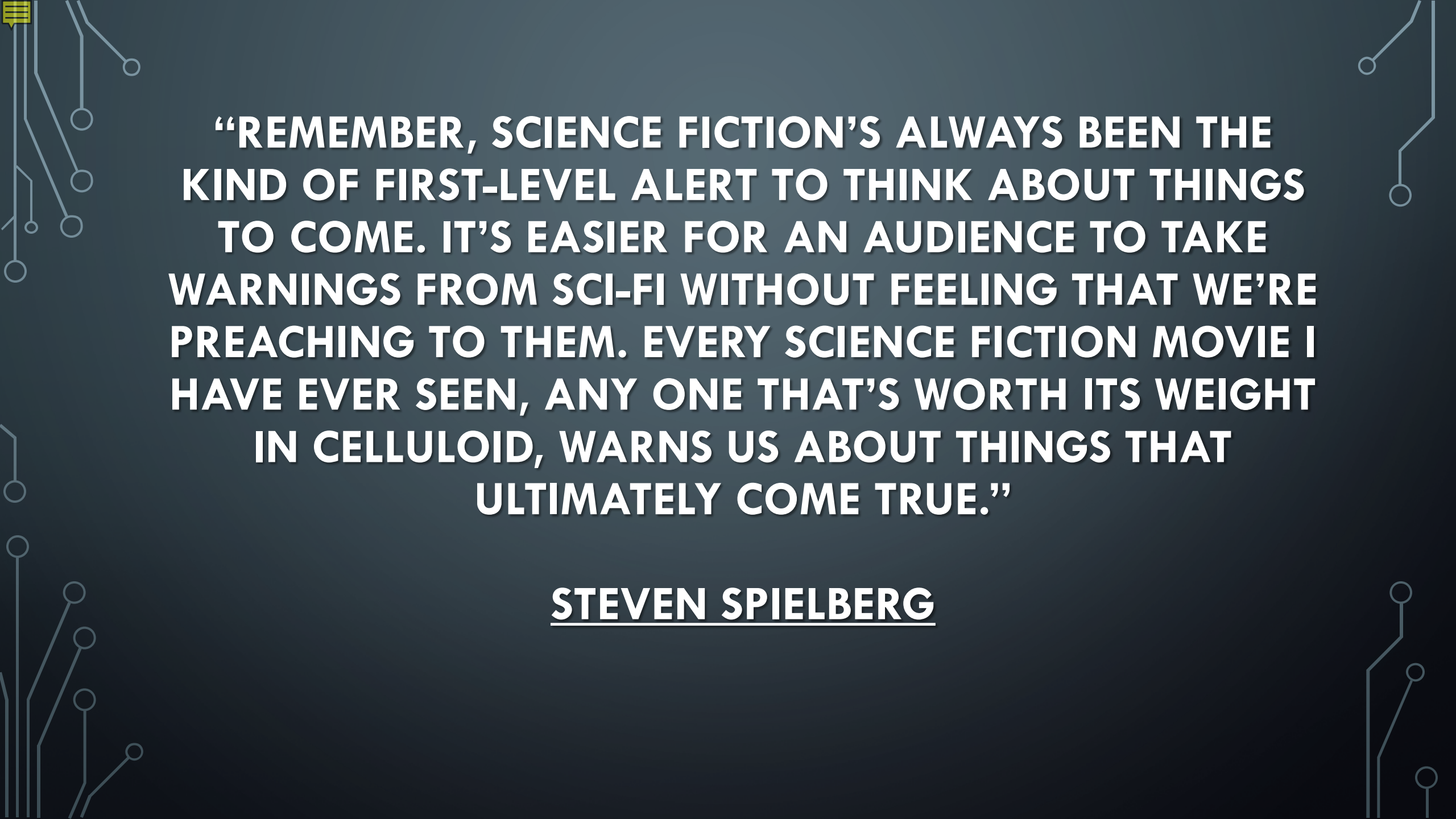# RADICAL LEVELING TECHNOLOGIES: WHAT THEY ARE, WHY THEY MATTER, AND THE CHALLENGES TO COME
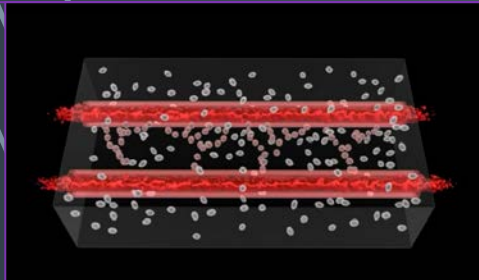
JENNIFER SNOW, MAJ, USAF

THIS BRIEFING CAO: 4/30/2016

THE VIEWS EXPRESSED IN THIS BRIEFING ARE THOSE OF THE PRESENTER AND DO NOT NECESSARILY REFLECT THE OFFICIAL POLICY OR POSITION OF THE DEPARTMENT OF DEFENSE OR THE US GOVERNMENT.

"REMEMBER, SCIENCE FICTION'S ALWAYS BEEN THE KIND OF FIRST-LEVEL ALERT TO THINK ABOUT THINGS TO COME. IT'S EASIER FOR AN AUDIENCE TO TAKE WARNINGS FROM SCI-FI WITHOUT FEELING THAT WE'RE PREACHING TO THEM. EVERY SCIENCE FICTION MOVIE I HAVE EVER SEEN, ANY ONE THAT'S WORTH ITS WEIGHT IN CELLULOID, WARNS US ABOUT THINGS THAT ULTIMATELY COME TRUE."

STEVEN SPIELBERG

# 3D Printed Self Assembling Blood Vessels



# German Anti-Drone Laser



# NPS Drone Swarm





# Northstar VI



# Transhumanist



# TALOS Suit



# ReWalk 6.0
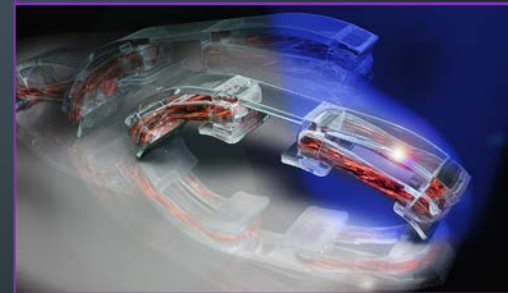


# Jet Propelled Humans
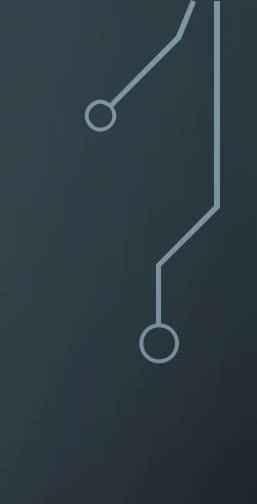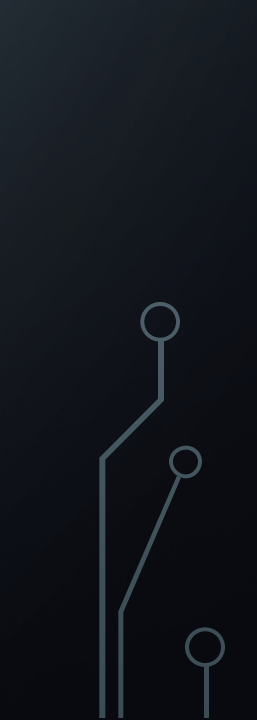


# U of Illinois BioBots



# CRISPR/Cas9 Gene Editing



Don't forget the Internet of Things!

# OVERVIEW

- Entering the Matrix: Walking the Line Between Government and Geek

- Radical Leveling Technologies Defined

- Entering a New Era
    - Technological, Legal and Social Aspects

- Forging Solutions for Today and Tomorrow
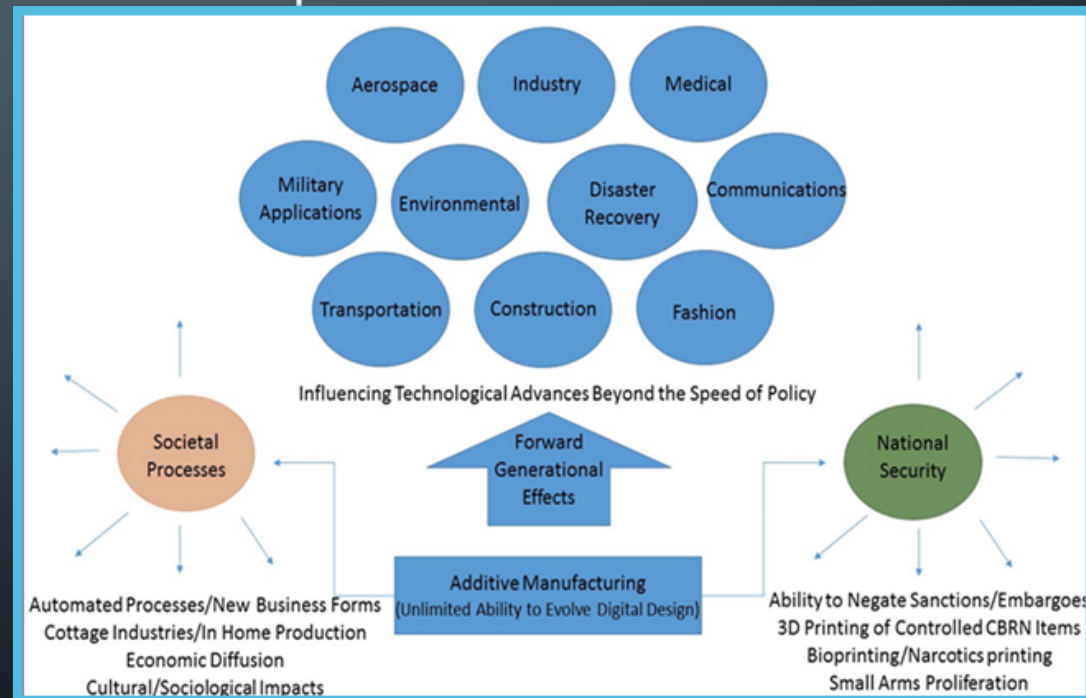
- The Way Forward from Here

# ENTERING THE MATRIX:
# WALKING THE LINE BETWEEN GOVERNMENT AND GEEK

- Focused on AM initially but realized there were multiple disruptive technologies at work

- Technological convergence revealed that the rapid pace of exponential evolution could in fact be accelerated

- Technological convergence produced new breakthroughs (ex. 4D printing)

- Expertise needed to educate, address concerns, make smart policy existed outside government

- Labelled this group of tech as Radical Levelling Technologies (RLTs) based on their characteristics and effects

Linear Tech Evolution



**Evolution of the Mobile Phone**

Motorola 8900X-2 | Nokia 2146 | Nokia 3210 | Nokia 6210 | Ericsson T39 | Alcatel OT511 | Samsung E250 | Apple iPhone | BlackBerry Curve 8900 | Samsung Galaxy S2 | Samsung Galaxy S4 | Sony Xperia Z Ultra

Storify.com

## Exponential Tech Evolution



Aerospace | Industry | Medical
Military Applications | Environmental | Disaster Recovery | Communications
Transportation | Construction | Fashion

Influencing Technological Advances Beyond the Speed of Policy

Societal Processes

Forward Generational Effects

National Security

Additive Manufacturing (Unlimited Ability to Evolve Digital Design)

Automated Processes/New Business Forms
Cottage Industries/In Home Production
Economic Diffusion
Cultural/Sociological Impacts

Ability to Negate Sanctions/Embargoes
3D Printing of Controlled CBRN Items
Bioprinting/Narcotics printing
Small Arms Proliferation
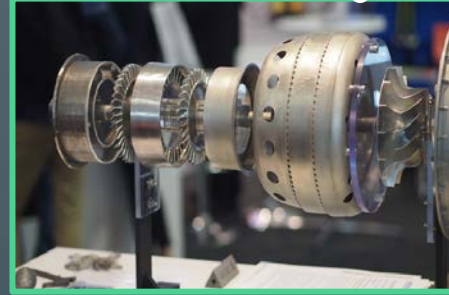
# RADICAL LEVELING TECHNOLOGIES DEFINED

- Anchored in the internet via collaborative, developmental or operational necessity critical to the function and/or application of the technology

- Employment results in broad decentralization of power, economic or informational capabilities

- Driven by the innovation & expertise of online Open Source Communities (OSCs)

- Has a transformative, disruptive nature not just within its initial sphere of influence but also across a diverse set of societal/cultural processes and functions

- Mature RLTs have the ability to produce generational leaps with transnational impacts

Biohacking Night Vision
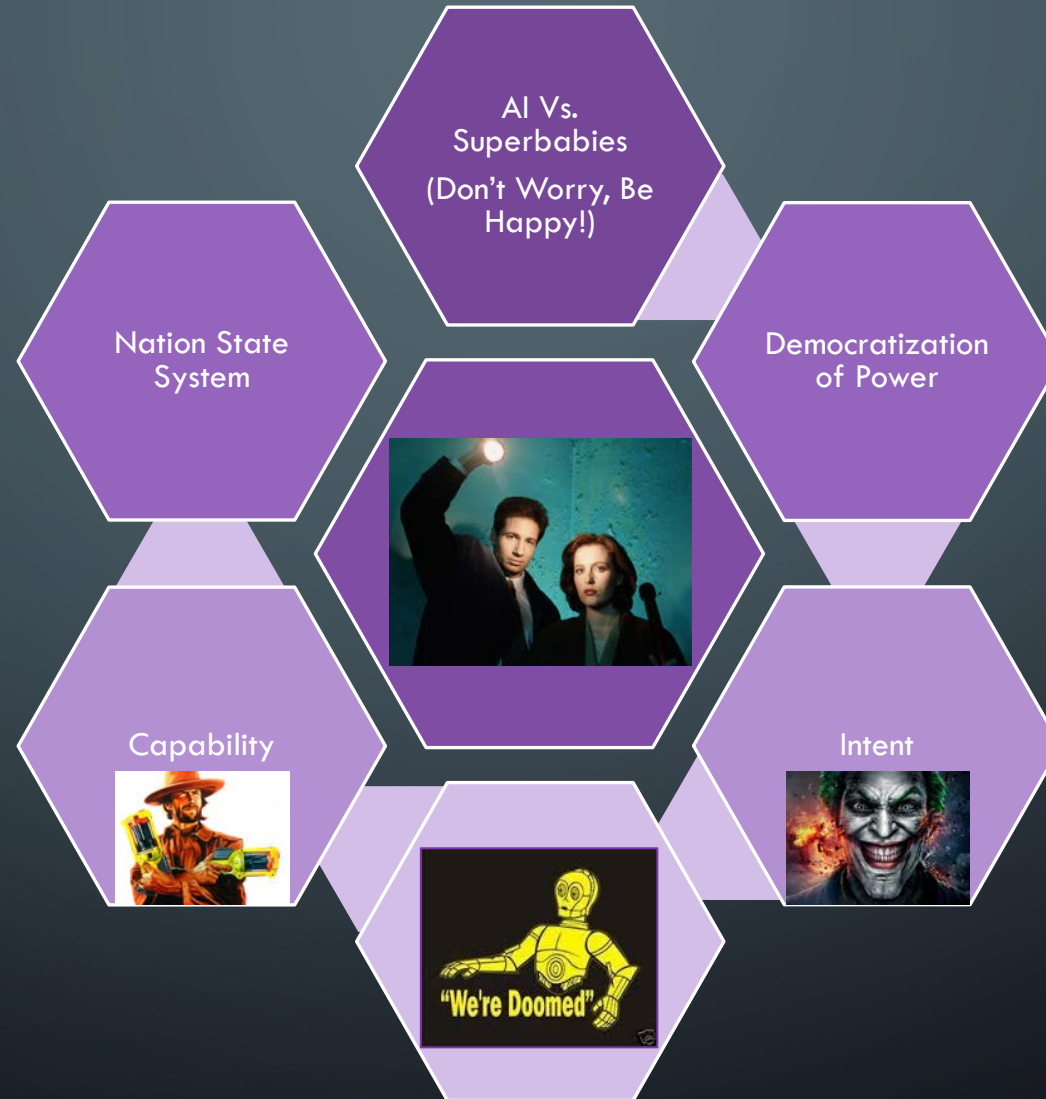
Inhabitat.com

3D Printed Jet Engine

Engineering.com

Tesla Fremont Plant

The Motley Fool.com

# BALANCING THE DISCUSSION

# ENTERING A NEW ERA: TECHNOLOGICAL ASPECTS

Enabling Factors

- Down-Skilling/Free SME support

- Civilian to MilTech processes impact regulation effectiveness

- Regulatory/Monitoring gaps due to transnational cyber derived nature

- Anonymizing technologies used to mask illicit activities/malicious actors

Threat vectors

- Marketplace/social disruption

- Creation/sale of illicit, unregulated, potentially unsafe products

- Ineffective policy/regulation = anonymizing effects

- Misuse/Abuse of tech (includes ignorant actors)

- Arms racing among nation states and non-state actors for WMDs/WMEs

NY Daily News.com

Wired.com

LANL.gov

# ENTERING A NEW ERA: LEGAL/POLICY ASPECTS

### Decentralization and Anonymizing Effects

- MGM prosecuted users and P2P designers; Resulted in increasingly decentralized P2P programs and tech proliferation
- P2P capability became autonomous and hosted publically across the internet = can't target or prosecute a cloud
- Enhanced use of anonymizing tools and programs to avoid detection by government and corporations in the future

### Compliance Without Effect

- Government requested take down of Liberator 3D printed gun files; 100,000 downloads had occurred already
- Defense Distributed complied with request
- Despite compliance, Liberator design continued to proliferate and evolve via digital environment

### Streisand Effect

- Barbara Streisand complained about beach house photos leaked on the internet
- Her actions attracted additional unwanted attention when she tried to suppress the photos
- Photos became widely proliferated online
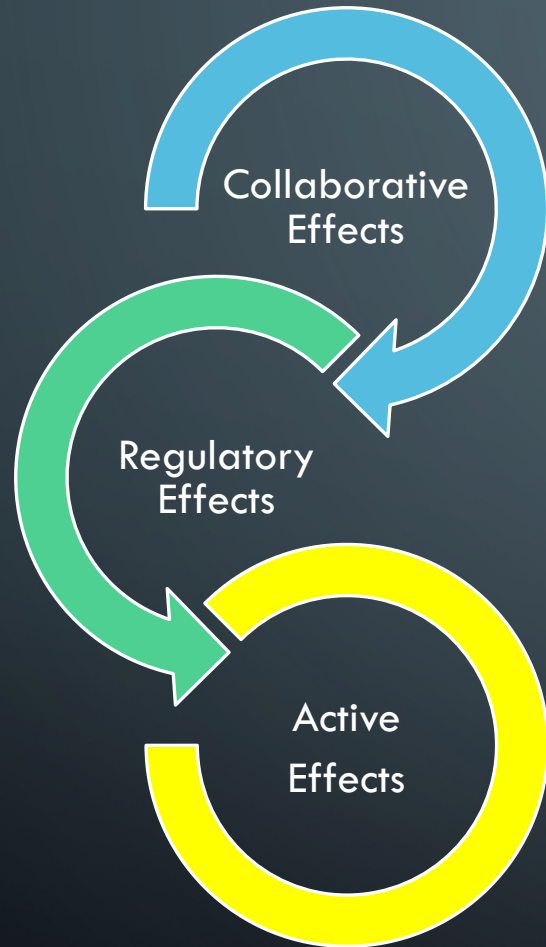
### Motivation Crowding Effect

- Takes moral calculation (stealing music is bad) and turns it into a risk/benefit calculation (free vs legal action)
- MGM tried to punish individual users and P2P developers via lawsuits and fines
- Legal actions contributed to belief that P2P downloading was justified; resulted in wide spread proliferation activity

# ENTERING A NEW ERA: SOCIAL ASPECTS

- Exponential technologies will reshape the global workforce as tech displaces people and jobs

- RLTs (AI, synthetic biology, 3D printing, etc) will provide new capabilities that will change life as we know it

- Exponential transitions will require exponential mindsets; leadership and citizens must be ready for accelerated evolution, disruptive effects & complexity = global instability will need to be handled with finesse and international collaboration

- Must ensure that social norms, ethics and values prevail to ensure equal access to the benefits as well as equal protection from the threats

- Tech communities (OSCs) can self regulate, use education and limit potential threats early on by creating a culture of accountability

- OSCs can also help to educate government and create much needed capacity, expertise and access which in turn lead to smart tech policy

Toprankblog.com

Techrepublic.com

# FORGING SOLUTIONS FOR TODAY AND TOMORROW

**Collaborative Effects**

- Education and Outreach
- OSC Collaboration/Partnering
- Ethical Design
- Standardization of safety protocols
- Self-policing/self regulation by OSCs

**Regulatory Effects**

- Revise Existing Policy
- Focused Policy Development
- New CP Model (digital vs physical interdiction/disruption)
- International Jurisdictional authorities

**Active Effects**

- Use of Cyber Bounties
- Establish Cyber Privateer Clause
- Continue Development of Government/Private sector/OSC fusion centers for intelligence sharing

# THE WAY FORWARD FROM HERE….

- What will you do to make the world: safer, more secure, and to the benefit of all?

- Gamers
  - Games for Good: http://www.gamesforgooddesign.com/

- Hackers
  - Hack the Pentagon: https://hackerone.com/hackthepentagon

- Cyber Security Geeks
  - Cultivate Smart Tech Policy: https://www.iamthecavalry.org/

- Bio-Hackers
  - Improve Medical Tech for Diabetics: http://www.nightscout.info/

- Makers
  - "Treatment not Terror" – MIIS-CNS & IAEA initiative to improve cancer treatment and prevent radiological terrorism across Europe – talk to Dr. Dalnoki-Veress for more info on how to get involved!
  - Epic Quest: http://www.nuclearsecuritychallenge.org to help make the world's nuclear arsenal safer!!

# QUESTIONS?

"There was an idea called the Avengers Initiative. The idea was to bring together a group of remarkable people so they could become something more. See if they could work together when we needed them to - to fight the battles we never could."
- Nick Fury
*The Avengers 2012*

# RESOURCES