

Easter morning 1900: 5th Ave, New York City. Spot the automobile.



Source: US National Archives.

Easter morning 1913: 5th Ave, New York City. Spot the horse.



Source: George Grantham Bain Collection.

A Complex Future of Opportunity

A Great Opportunity - Why ?

By 2030

~ 30-40% of existing jobs replaced by Automation

85% of the jobs don't exist today,

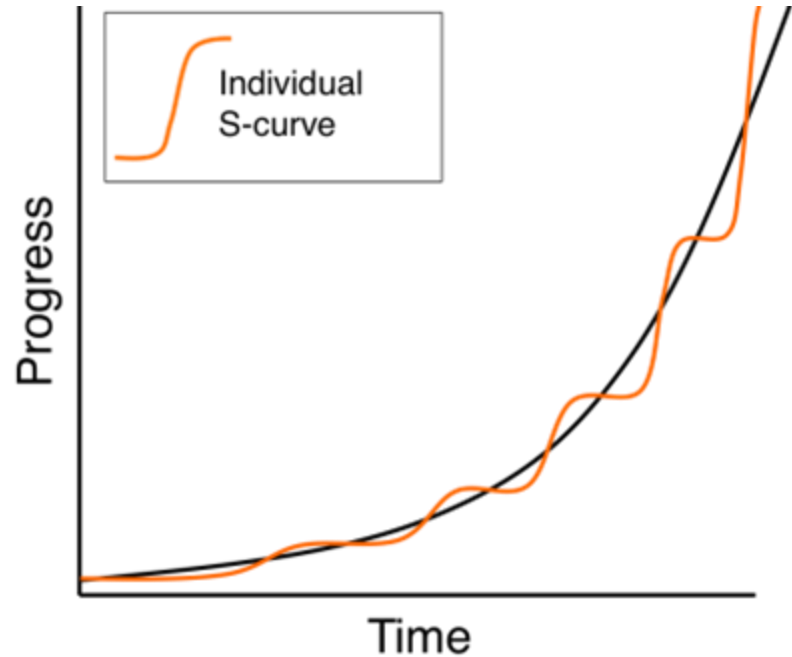
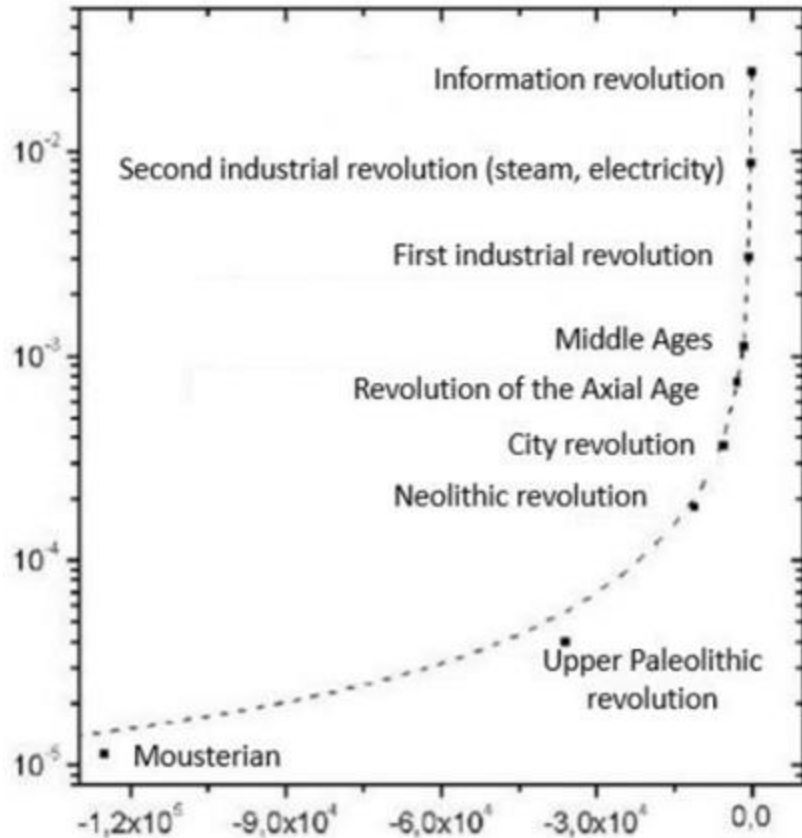
$\frac{2}{3}$ of Global output & trade from developing nations in Asia

CEDA - Committee for Economic Development Australia

Jobs taken by Automation
45% in 10-15 years

Industry	ABS Number of Employees	Chance of automation	Jobs threatened*
1. Food and beverage services	846,000	62%	525,520
2. Store-based retailing	702,000	60%	421,200
3. Administrative services	602,000	64%	385,280
4. Food retailing	439,000	81%	355,590
5. Property operators and real estate services	345,000	88%	307,050
6. Agriculture	407,000	45%	183,150
7. Food product manufacturing	218,000	79%	172,220
8. Road transport	273,000	54%	147,420
9. Personal and other services	305,000	47%	141,927
10. Construction services	713,000	19%	135,470
11. Professional, scientific and technical services	776,000	17%	131,920
12. Social assistance services	319,000	20%	63,800
13. Medical and other health care services	378,000	12%	45,360
14. Residential care services	275,000	5%	13,750
15. Preschool and school education	249,000	4%	9,960
Total	6,847,000		3,038,617

Accelerating Returns - Epoch's in Civilization

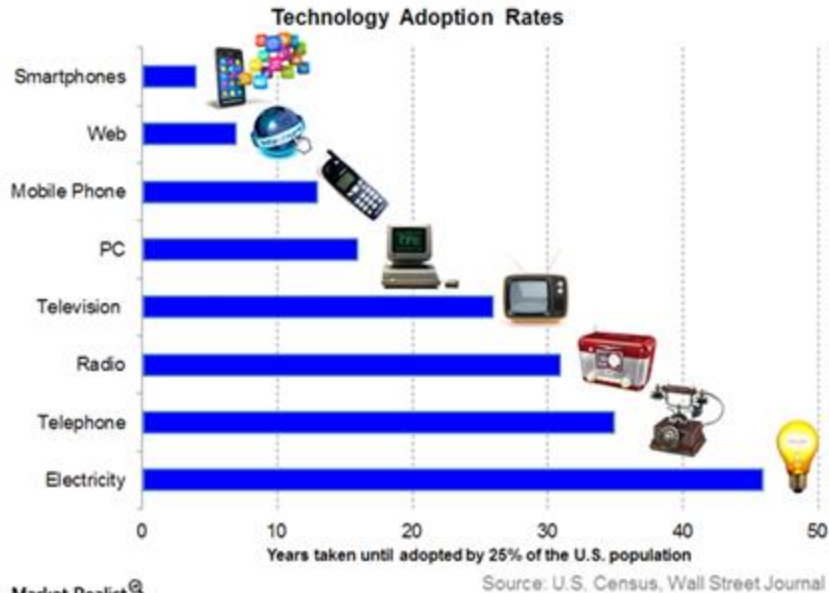


Punctuated Equilibrium

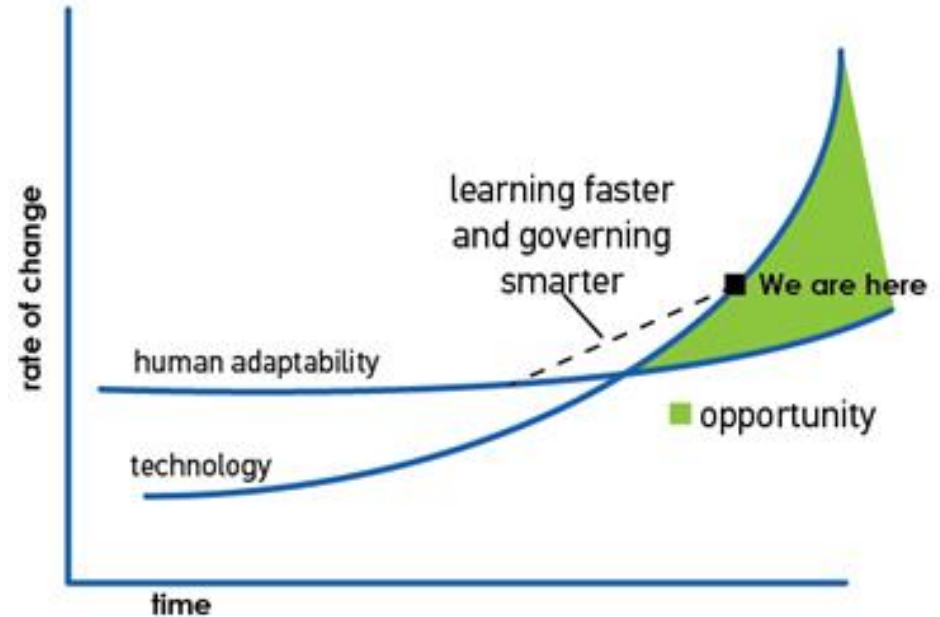
Scaling law in the phase transitions (from A.D. Panov / The singular point of history, 2005)

Change in Technology vs. Human Adaptability

Cycles / Periods between technology milestones get faster.



Market Realist



<https://www.experfy.com/blog/defining-the-iot-opportunity-for-field-service-providers>

Industrial Revolutions - Industry 4.0

Cyber-Physical Systems

1. Digitization and Integration of value chains → **Distributed Systems**
2. Digitization of Product and Service offerings → **Digital Twins**
3. Digital Business Models and customer access → **Platforms**



1st Industrial Revolution WATER & STEAM

Steam and water power
replace human and animal power
with machines.



2nd Industrial Revolution ELECTRICITY

Electricity, internal combustion
engines, airplanes, telephones,
cars, radio, and mass production.



3rd Industrial Revolution AUTOMATION

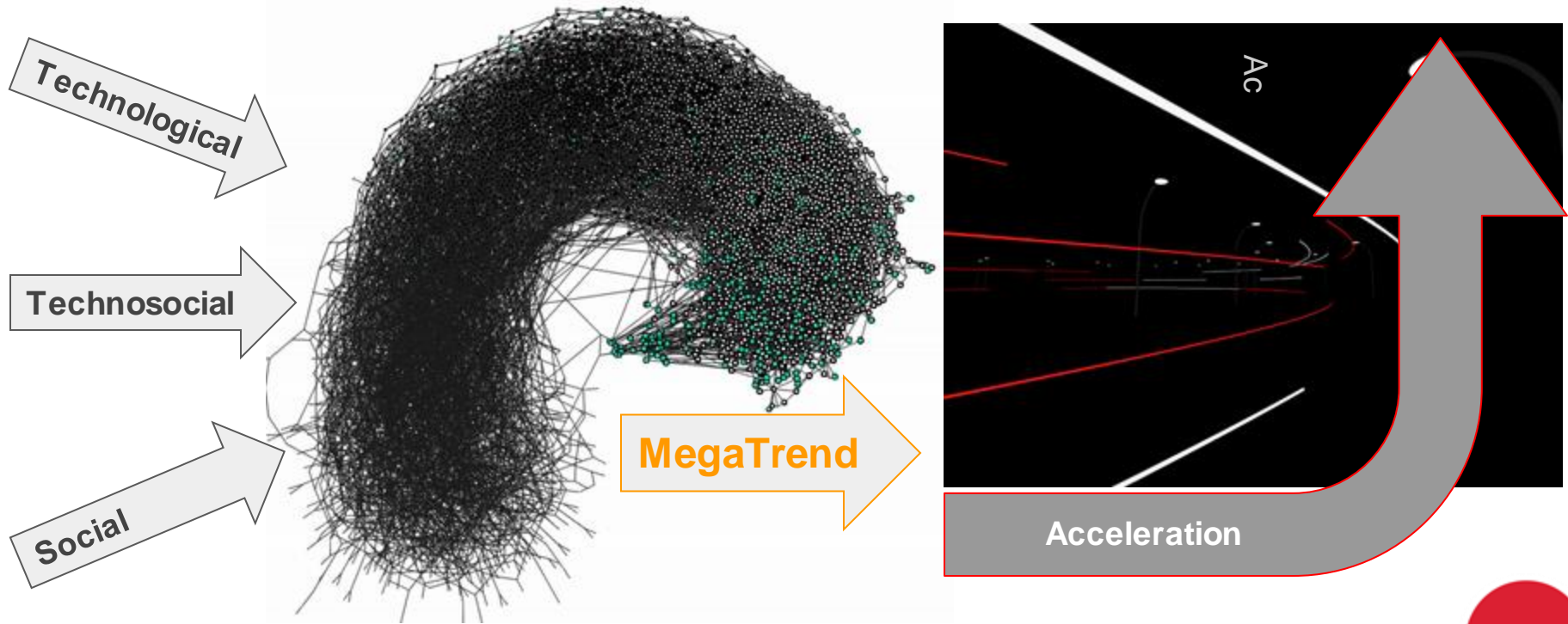
Electronics, the internet and IT
used to further the automation
of mass production.



4th Industrial Revolution CYBER-PHYSICAL SYSTEMS

Driverless cars, smart robotics,
materials that are lighter and
tougher, and a manufacturing
process built around 3D printing.

Future Work - Key Trends



Compound Complex Systems in **Exponential Growth** - Unknown **Emergent Results** → VUCA

For Millennia the world was VUCA



Courtesy of geez

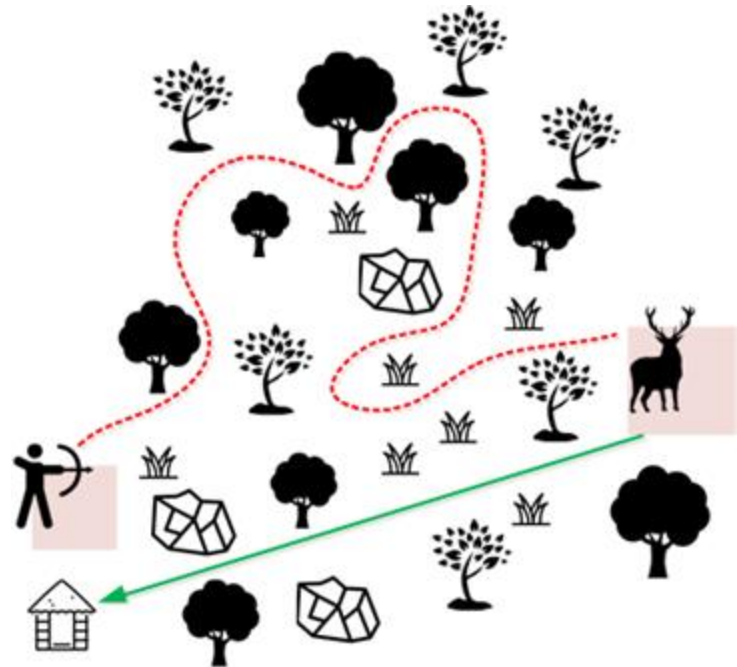


Courtesy of Wikipedia



Courtesy of Giphy.com

Volatile - Uncertain - Complex - Ambiguous



Reductionist

Linear - Deterministic - Clear



TRENDS

Technological

Digitization of Everything

- Software eats everything.
- Digital Twins
- Reality Mixed - XR (VR+AR).

Automation & Robotics

- Vehicles.
- IoT / Cyber Physical
- Cognitive work.

“Software is eating the world.”

Mark Andreessen - 2011

Technosocial

Globalization

- Value Chains.
- Culture.
- Collaboration.

Environmentalization

- Green alternatives go mainstream.
- Sustainability.
- Full cost accounting.



Social

Demographic Changes

- Women.
- Aging population.
- Intercultural Fluency

Network Society

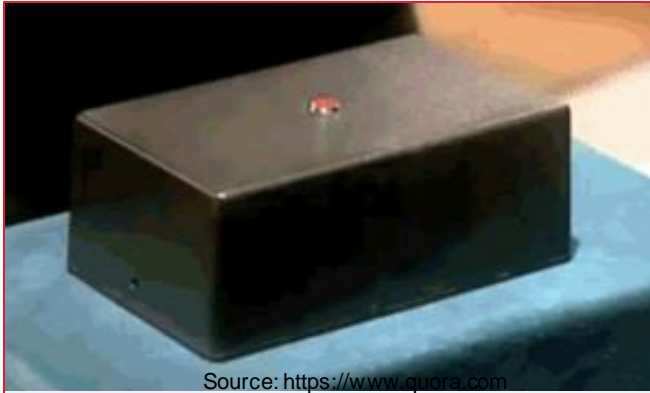
- Social Technologies
- Game Society
- Collective governance & development through Blockchain / DLT.



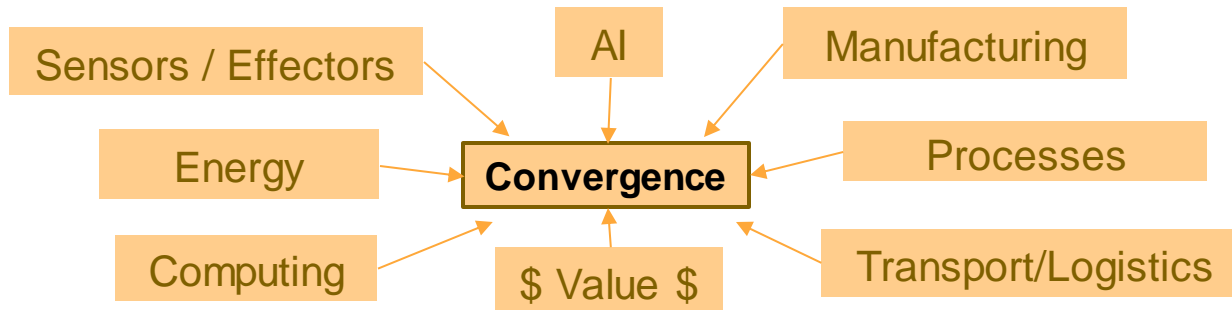
Disruptive Technologies

IoT (the Internet of Things) = Cyber Physical Systems

What is the Internet of Things?



What is the Internet ?
A network of many computers.
Emergent - economies, social networks, systems, cyber crime, etc



Short Clip Mashup - Disruptive Tech - “Youtube”

Google Duplex Ai Assistant - replacing important administrative tasks

<https://www.youtube.com/watch?v=D5VN56jQMWM>

How Boston Dynamics' Robots Became Internet Favorites | WIRED

<https://www.youtube.com/watch?v=hMtABzjslXA>

Learning Dexterity - OpenAI

<https://www.youtube.com/watch?v=jwSbzNHGfIM>

Incredible breakthrough in medicine: 3D printed organs are a real thing now!

<https://www.youtube.com/watch?v=fRLEmpCT4sI>

Microsoft HoloLens 2 : Demo #3 On Stage at MWC 2019

<https://www.youtube.com/watch?v=NaA5fDGPcjE>

Self-Driving Cars: The Future of Transportation

<https://www.youtube.com/watch?v=aNkKZuKbVKc>

Robotic Kitchen Cooks Food In 3 Minutes Or Less

<https://www.youtube.com/watch?v=OUJe0Wmfo5g>

The Robot Revolution: The New Age of Manufacturing | Moving Upstream

<https://www.youtube.com/watch?v=HX6M4QunVmA>

Advanced Manufacturing

3D Printing - Additive Manufacturing

Has democratized Manufacturing and help create the Maker Movement.



810-0275 CRICOS #5008



O 0275 CRICOS 03020E

Disruptive Technosocial

Examples of full cost accounting, traceability, distributed ledgers in sustainability.

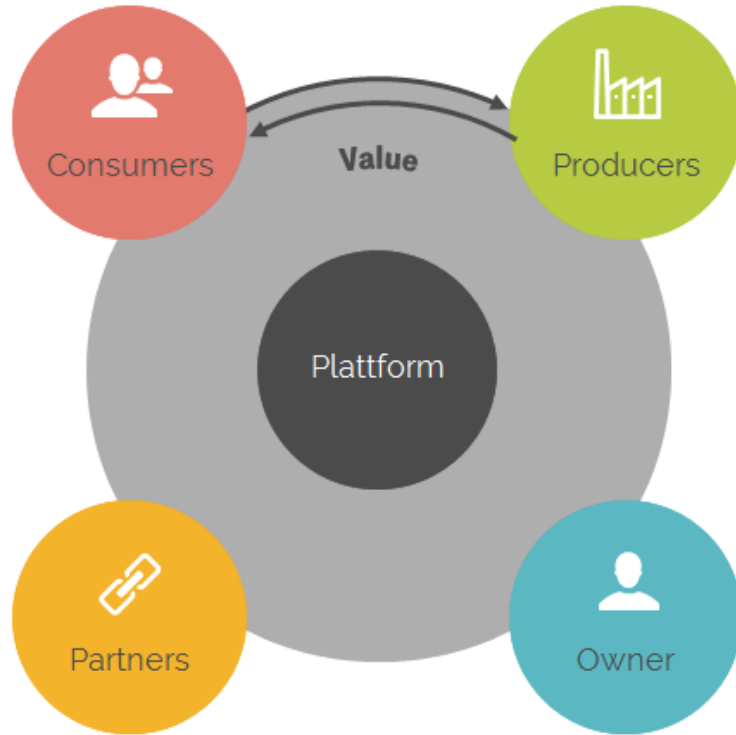
Governance Technology

Disruptive Social

Example of Social Trend

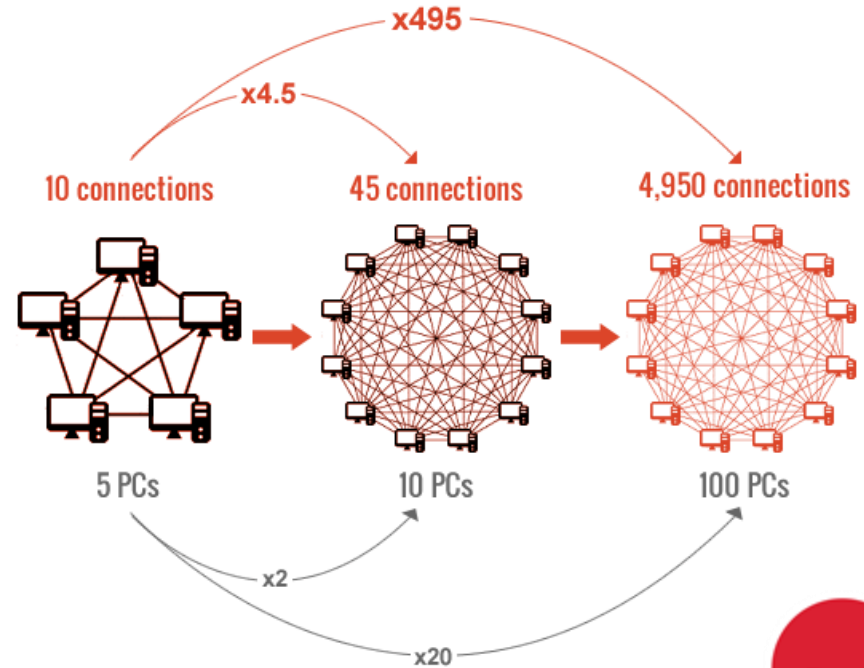
Result - Disruptive Business Trends

Platform Model



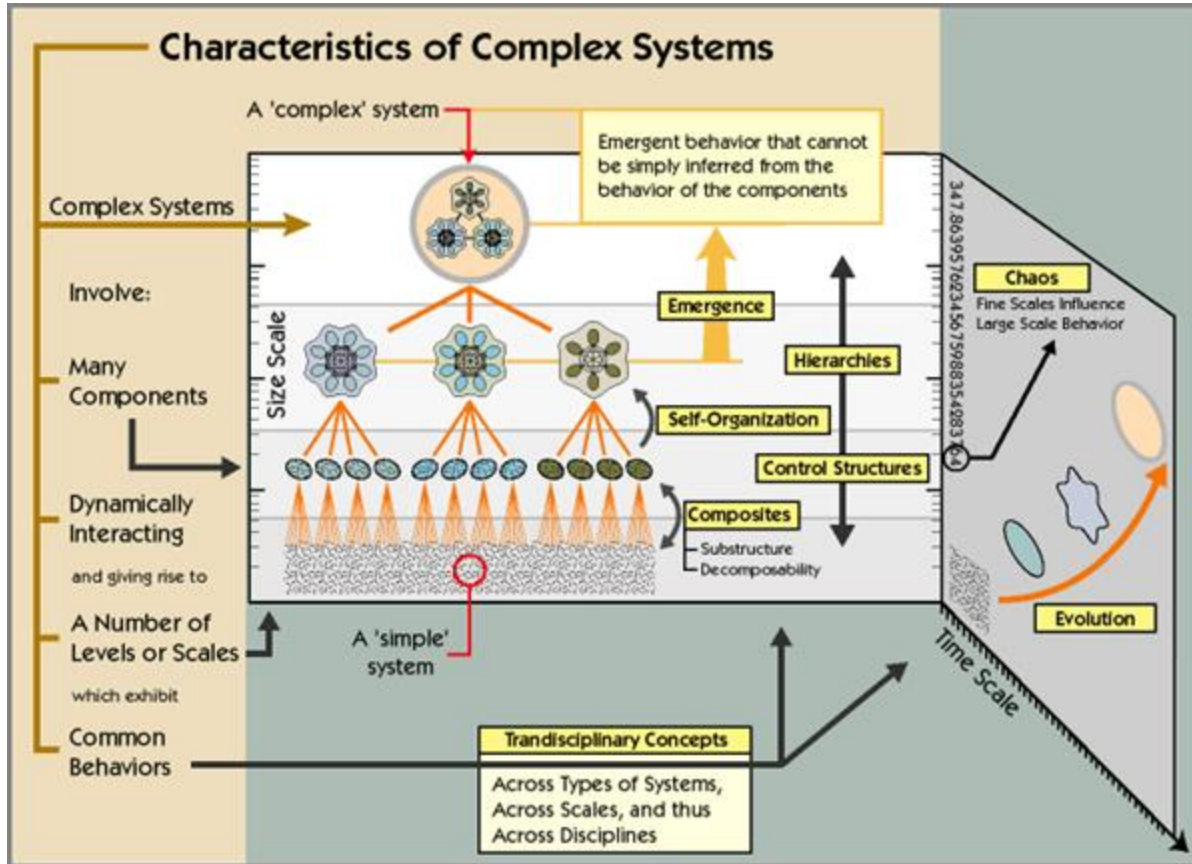
<https://medium.com/platform-innovation-kit>

The Network Effect



<https://www.bigtime.net>

What is Complexity ?



- Emergence
- Non-Linear
- Anti-Reductionist
- Self-Organizing
- Continual Adaptation
- Locally Interacting Agents

A World of Complex Systems

Requires a whole new set of;

Skills

Mental Models

Tools

Behaviours

1. No skills learnt once.



2. No simple jobs

3. No linear hierarchy

4. No routine (Obvious) computer work - e.g. Copy here to here

5. Many New occupations still not named.

6. Collaboration - Increased teamwork with mixed demographics.



Prosumers

Digital Nomads

Neo-Craftsmans

CloudCrowd

Makers

Secorial Changes - Growth

Manufacturing

- Automation of entire value-chain
- Cobotics / Robotics
- Creative production
- Humans as key decision makers.

Services

- Automation of mass service industries.
- Unmanned logistics
- Global digital entertainment.
- **Human oriented services.**

Knowledge Economy

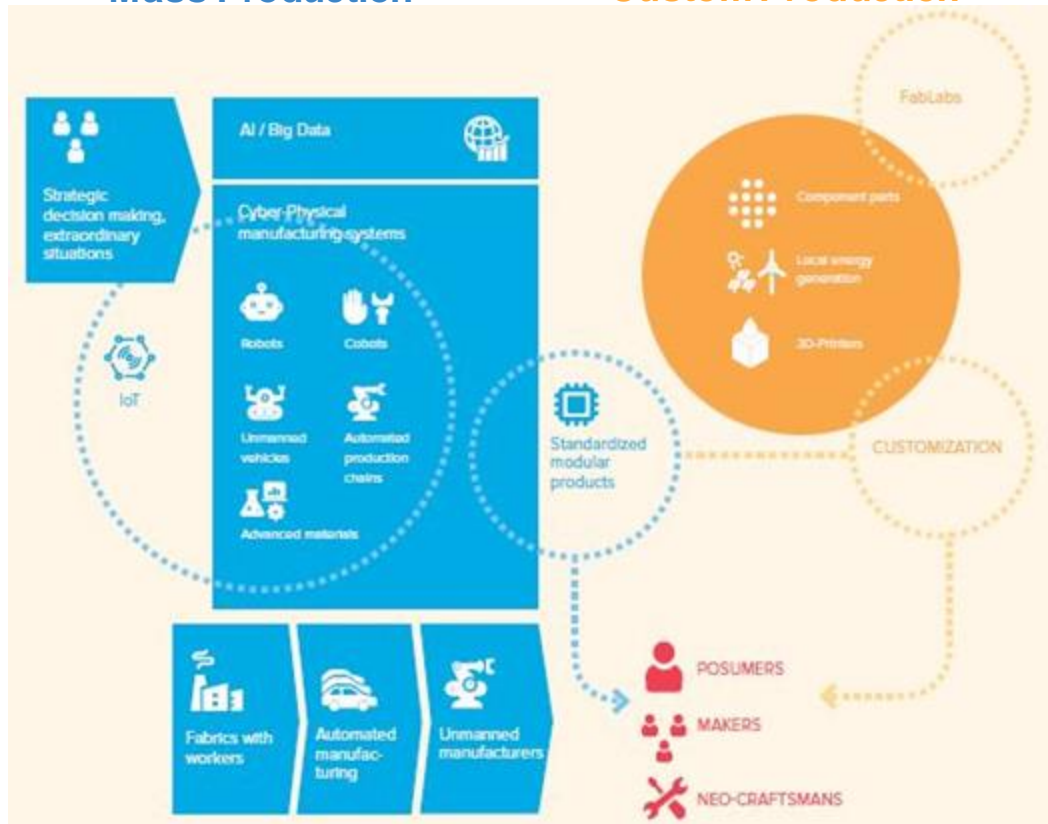
- Hybrid Intelligence.
- Collaboration
- Open Science



Role Changes - New Tasks = New Skills

Mass Production

Custom Production



Delegation of Tasks to;

- Ai Assistants
- Robots
- Crowd → Cloud-Crowd
- Digital Nomads
- Makers
- Neo-craftsmans.

Disappearance of
Entire Professions.

Skills for this Century



<http://www.globaledufutures.org>

	TYPE OF SKILL & KNOWLEDGE	AVERAGE LIFETIME
Relevance increases over life time-span	Context / domain specific	Months to few years
	Cross-context / domain	Years to decades
	Meta	
	Existential	Decades to lifetime

The most valuable skills require **“Lifelong”** learning.

No skill is learnt once.

Getting these skills - How-Where-Who

Schools ?

- Industrial era curriculum system.
- 12 years - outdone by a few seconds of searching on a phone.

Universities ?

- Theory focused.
- Few trade skills.
- Little focus on interpersonal skills.

MOOC's ?

- Impersonal
- Lack of physical experience
- Social Experience.
- Lacks interdisciplinary mix.

TAFE

- **Balance** - practical skills and knowledge.
- **Real Experience** – hands on Industry use.
- **Leader** – human services & interpersonal skills.
- **Advanced Resources** – Industry 4.0 tools/equipment.
- **Collaboration** - Industry, Schools, and Communities.



TAFE Design & Development - Leading

This is the key slide!

TAFE -

Leading in collaboration with Industry, Schools, and Communities
To create learning centers which exemplify practical applications of
Technology, Technosocial, and Social skills.

Implementing innovation practices of “Design Thinking Processes”

Internet of Things

Makerspace / Fablabs

Advanced Manufacturing Hubs

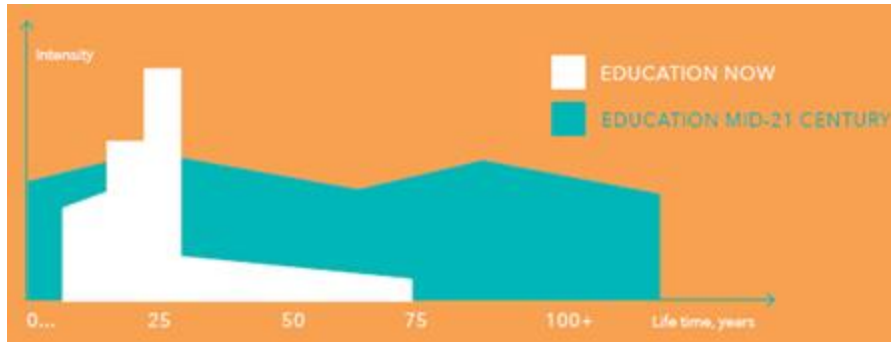
Community resources.

Global digital media resources - Avatar Studio.

....

In A Nutshell - Regenerative Lifelong Learning

The Problem of Transition



Our civilization should not try to remove uncertainty – but to develop capacity to manage higher levels of complexity and uncertainty.



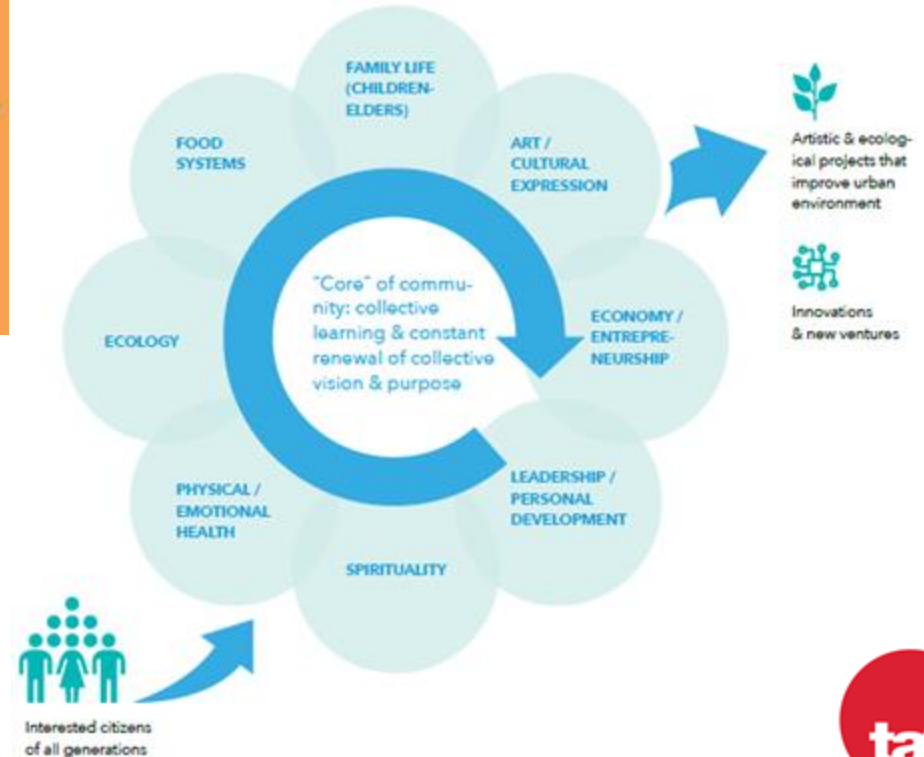
ROBERTO POLI,
UNESCO Chair in Anticipatory
Systems

The main mission of education in the 21st century is to hone one's skills of interacting with complexity.



ALEXANDER ASMOLOV,
CEO, Russian Federal Institute
of Education Development

Urban Learning Spaces & Learning Ecosystems



The model of Evolutionary Learning Community hub

TAFE QLD – Learning & Resource Hub

Advanced Manufacturing Hubs

Industry
4.0

Industrial
Robotics

Composite
Materials

Innovation Methodologies

Collaborative
Platforms

Agile
Lean

Design Thinking
Process

Makerspaces

Up-Cycling

Robotics

Electronics

CNC - Laser

3D Printing

Design

Prototyping

Wearable Tech

Media Studios

Virtualization &
Digitization

Avatar
Studio

Immersive Reality
XR

Design &
Recording

Internet of Things

Cloud
Functions

Progressive
Web Apps

Industrial
Design

Edge
Computing

Electronics

Sensors

Radio

Coding

STEM

Community
Hub

PD
Workshops

Cloud Computing

Serverless

as a Service

Education - Future Skills | New Systems

Teachers/Guides:

Time-management & Goal setting.

Systems thinking.

Computational Thinking.

Information Hygiene

Empathy and Interpersonal.

Collaboration and Co-creation.

Mixing areas of life and work.

Advanced Resources -

- Advanced Manufacturing.
- Computing & Design.
- Immersive Mixed Reality.

EDUCATIONAL PROJECTS WORKING WITH COLLECTIVE DIMENSION OF LEARNING

EJ - Education Jockey

Serve as as a guide and a role model of an inquisitive self-guided learner.

COLLABORATIVE EDUCATION

Fostering methods that put learners in the “driver seat”

