"THE KNOWABLE FUTURE"

A STRATEGIC CONTEXT FOR MINITRENDS

presented by by

David Pearce Snyder, *Consulting Futurist*

for

MiniTrends 2014

Insights, Innovation & Strategy

Holiday Inn at Lady Bird Lake
Austin, Texas

September 26, 2014

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THE FUTURIST MINDSET

"Futurists think constantly and by preference of things to come, and of present things mainly in relation to the results that must arise from them."

H.G.Wells
"The Discovery of the Future"
address to the Royal Society
January 24, 1902

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TIMELESS WISDOM ON STRATEGY

"The essence of strategy is to take advantage of what is CERTAIN."

Sun Tzu, Mythic Chinese Warlord
in *The Art of War* - 320 BCE

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KNOWABLE INERTIAL FUTURE CERTAINTIES

- ***DEMOGRAPHIC FORECASTS*** – The future size and make-up of the U.S. adult population – including our labor pool and our consumer markets – can be accurately forecast **fifteen years out**.
- ***ECONOMETRIC FORECASTS*** – The future size and make-up of the U.S. economy and workforce can be accurately forecast **ten years out**.
- ***TECHNOLOGIC FORECASTS*** – Mass-market applications of new technology can be accurately forecast **seven to eight years out**.

A STRATEGIC MINDSET

Understanding the "knowable future" - the inertial realities of the present - and of "the results that must arise from them," to serve as a context for assessing the future potential of all new things, including Minitrends.

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THE MINITREND MINDSET

"Applying the minitrends concept is not a step-by-step process, but rather the adoption of a mindset that encompasses all of the elements of the concept."

John Vanston
Minitrends (p. 18l5)
Technology Futures, Inc.
2010

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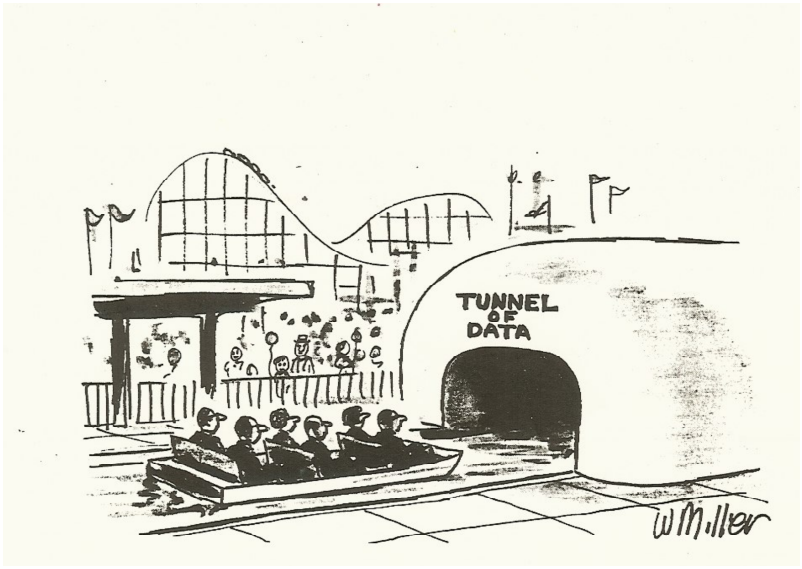

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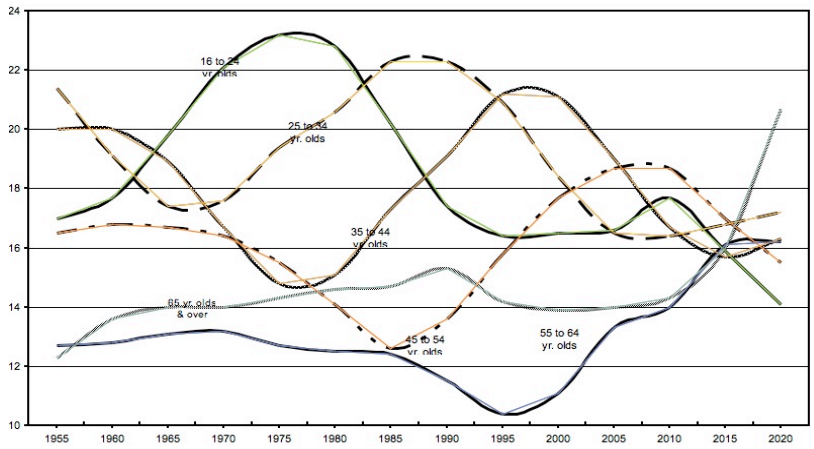

(Fig. 1) AGE COMPOSITION OF THE U.S. ADULT POPULATION 1955-2020

SOURCE: U.S. CENSUS BUREAU

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MARKETPLACE IMPLICATIONS
FROM INERTIAL DEMOGRAPHIC REALITIES

With the entry-level labor pool predictably shrinking, the accelerating retirements of the Baby Boomers will lead to growing labor shortages at all levels of the workforce, driving up wages and provoking employers to invest in ever-cheaper and more powerful technology to supplant increasingly scarce - and expensive - workers.

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WANTED! DIGITAL NATIVES!

US LABOR FORCE – 2010 TO 2020 (PROJECTED)

AGE COHORT	2010 (1000's)	2020 (1000's)	Change (1000's)	Change % Rate	Distribution 2010	2020
16 to 24	20,934	18,330	- 2,604	- 12.4%	13.6%	11.2%
25 to 54	102,940	104,619	+ 1,679	+1.6%	66.9%	63.7%
55 & over	30,014	41,411	+ 11,397	+ 38.0%	19.5%	25.2%
TOTALS	**153,889**	**164,360**	**11,306**	**6.8%**	**100%**	**100%**

MEANWHILE, THE **BABY BOOM**

IS STILL OUR BIGGEST GENERATION

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AMERICA'S BIGGEST GENERATION FINALLY MATURES

WHAT'S NEXT FOR THE BABY BOOMERS?

- **They're delaying retirement by about 5 years!**
- **The warranty has begun to EXPIRE on their parts!**

Boomers are not as healthy as
their parents were at the same age;
2/3 are **overweight** and **1/3** are **obese**!
(And 1/4 are going deaf!)

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HEALTH CARE – 2010 TO 2020

AMERICA'S BIGGEST INDUSTRY GETS BIGGER!

- Over-65-year-olds – who consume 2/3 of all medical services – will become the biggest age cohort in the U.S. population by 2015.
- Healthcare now 17% of GDP, projected to rise to 20% by 2020; 25% by 2025! (CBO)
- Healthcare employs 1/8 of U.S. workers today, and creates 1/4 of all new jobs; 1 out of 5 U.S. jobs will be in health or medicine by 2020!
- National & regional "chains" dominate U.S. healthcare, operating hundreds of "Urgent Care" clinics; Medical Malls.

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THE CHANGING AMERICAN ECONOMY

15 U.S. Industries with Largest Employment Growth - 2010 and 2020 (projected)

INDUSTRY DIVISION	EMPLOYMENT (IN 1000s) 2010	2020	CHANGE (1,000s)	%
1. Construction	5,526	7,365	+1,839	+33.3%
2. Retail trade	14,414	16,182	+1,768	+12.3%
3. Health practitioners' offices	3,818	5,209	+ 1,391	+36.4%
4. Hospitals	4,685	5,564	+ 879	+ 18.8%
5. Home healthcare services	1,081	1,952	+ 871	+ 80.1%
6. Eating & drinking places	9,352	10,212	+ 860	+ 9.2%
7. Individual & family services	1,251	2,066	+ 851	+ 70.0%
8. Nursing & residential care facilities	3,129	3,951	+ 822	+ 26.3%
9. Wholesale trade	5,456	6,200	+ 744	+ 13.6%
10. Local government education services	8,010	8,751	+ 741	+ 9.3%
11. Computer system design services	1,442	2,113	+ 671	+ 46.5%
12. Employment services	2,717	3,348	+ 631	+ 23.2%
13. Professional, scientific & technical consulting services	991	1,567	+ 576	+ 58.1%
14. Post-secondary education	1,694	2,171	+ 477	+28.2%
15. Outpatient, laboratory & other ambulatory care services	1,077	1,471	+ 394	+36.6%

http://www.bls.govf

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THE CHANGING *AMERICAN* ECONOMY

U.S. Employment by Major Industry Division - 2010 & 2020 (projected)

INDUSTRY DIVISION	EMPLOYMENT (IN 1,000s) 2010	2020	CHANGE (1,OOOs)	(%)
TOTAL - ALL INDUSTRIES	143,068	163,537	+20,469	+14.3%
GOODS PRODUCING (non-agriculture)	17,706	19,497	+1,791	+10.1 %
Construction	5,526	7,365	+1,839	+33.3%
Manufacturing & mining	12,180	12,131	- 49	- 0.0%
ALL SERVICE PROVIDING	112,731	130,680	+17,950	+15.9%
Retail Trade	14,414	16,182	+1,768	+12.3%
Financial Activities	7,630	8,411	+781	+ 10.2%
Professional, scientific, technical & business services (non-Med/Ed)	16,688	20,497	+3,809	+ 22.8%
Education, Training & Libraries	9,194	10,597	+1,403	+ 15.3%
Health care & social assistance	16,415	22,054	+5,639	+ 34.4%
Leisure and hospitality	13,020	14,362	+1,343	+ 10.3%
Federal, state & local government (non-ed & non-med)	16,437	17,123	+686	+ 4.2%
Other services	12,039	13,567	+1,528	+12.7%
AGRICULTURE	2,136	2,005	- 131	- 6.1%
SELF-EMPLOYED	10,386	11,242	+856	+8.2%

http://www.bls.gov

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THE U.S. JOB CREATION RATE HAS FALLEN!

COMPARATIVE 10-YEAR PROJECTIONS FOR U.S. POPULATION AND JOB GROWTH

2000 to 2010 — 2002 to 2012 — 2004 to 2014 — 2006 to 2016 — 2008 to 2018

Years	Projected Population Growth Numbers	%	Projected Job Growth Numbers	%	Job Creation Rate
2000 to 2010	28.1 million	10%	22.2 million	15.2%	100:79
2002 to 2012	28.8 million	10%	21.3 million	14.8%	100:74
2004 to 2014	29.4 million	10%	18.9 million	13.0%	100:64
2006 to 2016	30.2 million	10%	15.6 million	10.4%	100:52
2008 to 2018	30.8 million	10%	15.3 million	10.1%	100:49

SOURCE: U.S. Bureau of Labor Statistics (BLS)

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BLAME IT ON THE WEB !

THE BROADBAND INTERNET HAS ACCELERATED TWO LONG-STANDING WORKPLACE TRENDS:

- **GLOBAL ECONOMIC INTEGRATION (Y2K)**
- **INFORMATION AUTOMATION ("INFOMATION")**

Infrastructure Leverages Invention

Technology (Invented)	Infrastructure (Begun)
• Steam Engine (1776)	• Railway System (1825)
• Electric Dynamo (1871)	• Power Grid (1908)
• Computer (1946)	• World Wide Web (1994)

The addition of color, graphics, sound and data transmission in 1994 transformed the Internet text-messaging system into the World Wide Web, the infrastructure – or Info-Structure – for the computer, and THE crucial enabler of the information economy.

Because their productivity can't be increased by technology, most consumer service workers get less pay than do their blue-collar counterparts!

VANISHING MIDDLE INCOME JOBS

"Rapidly-growing Service Sector employment requires higher average skills, but pays lower average wages and benefits than do our shrinking capital-intensive manufacturing and primary industries." As a result . . . .

Median U.S. income is falling!

Source: Economic Policy Institute, 2005

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This all begins to sound pretty

GLOOMY!

WHAT ABOUT THE **"HIGH-TECH BOOM"** PEOPLE KEEP TALKING ABOUT ?

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THE BUST BEFORE THE BOOM

Historically, rising tides of technology-based productivity improvement that "lift all boats" have been preceded by what economist Joseph Schumpeter once described as:

"waves of creative destruction!"

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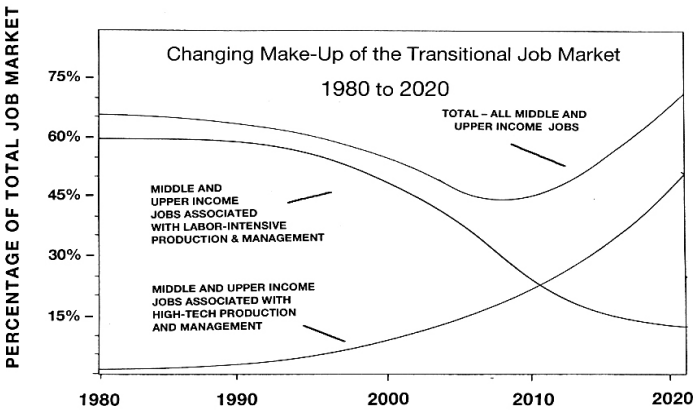
"a wave of creative destruction. . ."

Joseph Schumpeter
Business Cycles –1939



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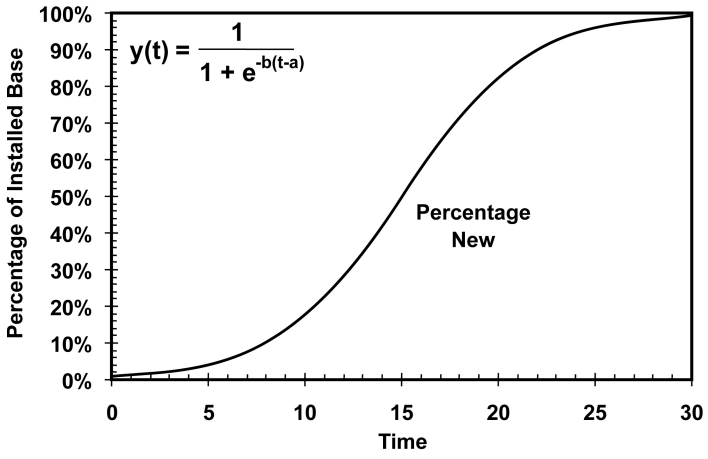
Fisher-Pry Model



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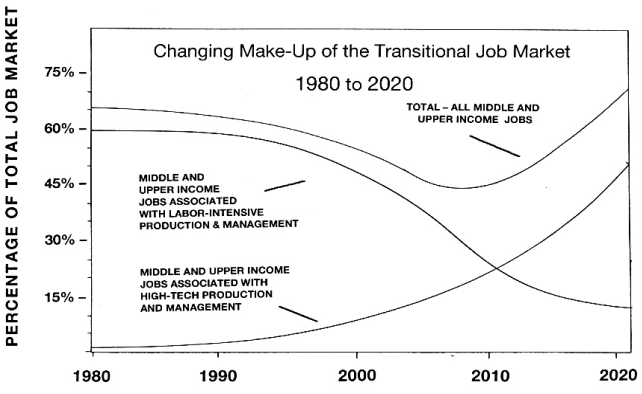
"a wave of creative destruction. . ."

Joseph Schumpeter
Business Cycles –1939



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We are literally in the middle of the

INFORMATION REVOLUTION!*

* Politicians never use the **"R"** word, because it would suggest that historic circumstances were beyond our control —which no politician would ever admit, even if it were true.

Because of this, most people —including many political and business leaders — do not comprehend the permanent structural nature of the changes that are happening to the economy.

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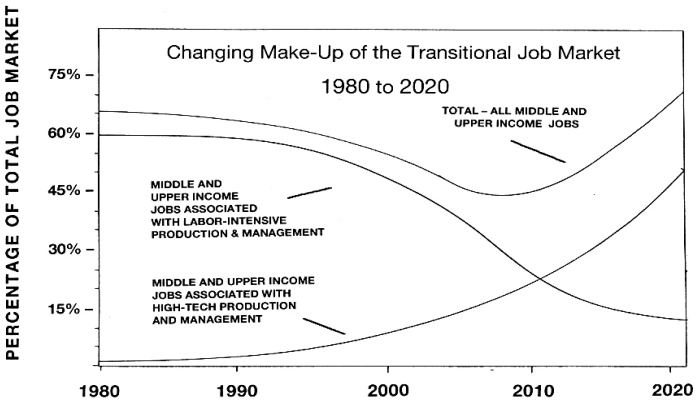
"a wave of creative destruction. . ."

Joseph Schumpeter
Business Cycles –1939



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ING! WARNING! WARNING! WARNING! WA

(1999/2001) "REGULATE SDOs!" Brooksley Born, CFTC

(2005 →) Economists caution that U.S. households are "living beyond their means," and that:

- "U.S. household savings rate has gone negative!" (- 2.7%, April, 2005)
- "There is a huge and growing commercial and consumer debt overhang,"
- "The housing 'bubble' is unsustainable!"
- "75% of all capital is now invested in high risk, non-regulated securities!"

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WHAT BLOWS UP . . . .

Sure enough, the economists were right!

- (2007) Housing bubble bursts; Recession begins!
- (2008 - 2009) A notional $60 trillion "evaporates" from the global capital supply; U.S. housing and stock values fall by more than $13 trillion!
- (2007 →) 8+ million jobs vanish.
- (2007-10) Median U.S. household net worth falls 39% from $126K to $77K.
- (2007-2011) Over $2 trillion in "scared money" flees equities into depository accounts & CDs.

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DEBT, DELEVERAGING & AUSTERITY

Asset Bubbles and Their Economic Consequences

A 2010 McKinsey Global Institute analysis of 45 historic episodes during which 10 developed nations and 4 developing nations significantly reduced their total debt-to-GDP ratios since 1930, found:

- long periods of deleveraging nearly always follow major financial crises;
- deleveraging lasts 6 or 7 years, on average, during which
- public & private sector debt are typically reduced by 1/3, while employment contracts & stagnates.

http://www.mckinsey.com/mgi/publications/debt_and_deleveraging

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PUBLIC SECTOR DELEVERAGING AHEAD!

- Forced by circumstances to reduce public sector debt, all levels of U.S. government will have to cut services and raise taxes, fees, tolls, etc. ($trillions in play!!)
- To preserve Social Security, retirement age will be raised to 69 or 70.
- To broaden the public sector tax base, undocumented aliens may be permitted to "earn" U.S. citizenship through *college/community/military service*. **(WILD CARD!)**
- Congressional Deficit Reduction: **(MAJOR FEDERAL SPENDING CUTS? PERSONAL/CORPORATE TAX REFORM ? NATIONAL VALUE-ADDED TAX VS. "BUFFET RULE"?)**

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OUR ECONOMY HAS SHIFTED GEARS

- The ongoing "jobs recession" reflects a long-term "down-shifting" of the consumer engine that has driven U.S. economic growth since 2000.
- Increased saving, tightened credit and higher taxes will reduce the discretionary expenditures of most U.S. households, keeping consumer spending 5% to 10% below pre-Recession levels for at least five years, as Americans are forced to "live within their means."
- Until the U.S. and European debt overhang is reduce by 1/3 from their 2008 highs, DELEVERAGING WILL DRAG ON ECONOMIC GROWTH.

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So . . . .

How long will it take the economy to fully recover from the recession and "get back to normal?"

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WE'RE IN A REVOLUTION,

NOT A BUSINESS CYCLE,

AND THINGS WILL NEVER

GET BACK TO [OLD] NORMAL!

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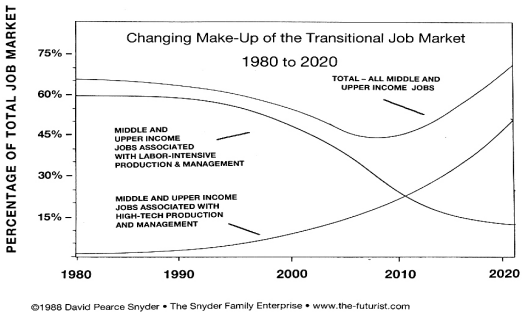
"a wave of creative destruction. . ."

Joseph Schumpeter
Business Cycles –1939



Our high-tech future is right around the corner . . . just out of sight.

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U.S. JOB CREATION RATE IS NOW RISING !

COMPARATIVE 10-YEAR PROJECTIONS FOR U.S. POPULATION AND JOB GROWTH

2002 to 2012 — 2004 to 2014 — 2006 to 2016 — 2008 to 2018 — 2010 to 2020

Years	Projected Population Growth Numbers	%	Projected Job Growth Numbers	%	Job Creation Rate
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2006 to 2016	30.2 million	10%	15.6 million	10.4%	100:52
2008 to 2018	30.8 million	10%	15.3 million	10.1%	100:49
2010 to 2020	34.2 million	10%	20.5 million	14.3%	100:60

SOURCE: U.S. Bureau of Labor Statistics (BLS)

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SOME COMMON VISIONS OF THE U.S. ECONOMY AT THE END OF THE INFORMATION REVOLUTION (2020)

- High Tech Manufacturing (bio-tech, robotics, nano-tech, etc.)
- Green Industrial Economy (wind turbine, electric cars, fuel cells)
- Professional, Scientific & Technical Services Economy
- Micro-businesses, Info-preneurships, *e*Creativity

What we do know for certain is that our "rendezvous with austerity" is about to be followed by . . . .

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A "MASH-UP" with TECHNOLOGY

By 2020 . . . .

- the U.S. stream of commerce will be cashless and paperless
- smartphones will be our *e*Wallets / ID / Drivers Lic / Med-Info
- Web 5.0/cloud computing streamlines Internet (Server Centers!)
- Electronic Medical Record Systems (EMRS) will reduce costs and improve the quality of U.S. healthcare ("Doc" Watson)
- Personal Mobile Technologies will replace school textbooks
- We'll all be "chatting" with our technology! "Personologies!"
- *e*Entertainment revenues (*e.g.* games & user generated content) surpass those for live sports, concerts, movies, plays, etc.
- Universal Connectivity ~ "The Internet of Things"

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5 DOMAINS OF THE INTERNET OF THINGS

- **Bodies** ~ Bio-feedback (wearable tech, embedded sensors), monitoring children, parents & employees; TELE Medicine)
- **Homes** ~ Monitoring/remote management of residential infra-systems (HVAC, lighting, water, energy, security, etc.
- **Communities** ~ Management of traffic, transit, water, sewer & power; infrastructure monitoring, emergency management
- **Goods & Services** ~ Logistics & inventory management; 3D printing, "smart cars," drones, *e*Wallets, proximity marketing
- **Environment** ~ Air/water/habitat monitoring, "eco-warnings" (pollution alerts, fire, flood, landslip, etc.)

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TRANSFORMATIONAL WORKPLACE TECHNOLOGIES

- Mobile connectivity – Consumerization of workplace IT (BYOD/CYOD) (+ 7 additional work hours/week!)
- Social Networking – Fosters teamwork, customer/supplier collaboration, learning platforms, "communities of practice"
- "Cloud computing" – Information services as a utility • 40% to 70% cost savings security issues • private & public clouds, blended systems (Cheap super-computing!)
- BIG DATA – Data-intensive research • Pattern recognition & Granger analysis, Hadoop, Zoomdata.com

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Enter "BIG DATA"

- **2007** - Microsoft senior scientist Jim Gray proposes a new method for scholarly research to the National Research Council:

" DATA- INTENSIVE SCIENTIFIC DISCOVERY"

"With an exaflood of unexamined data and teraflops of cheap computing power, we should be able to make many valuable discoveries simply by searching all that information for unexpected patterns."

Jim Gray, address to Computer Science & Telecommunications Board, NRC, Jan. 11, 2007

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"BIG DATA"

The Fourth Paradigm of Scientific Research

1st Paradigm - Observation

2nd Paradigm - Experimentation

3rd Paradigm - Computer Simulation

4th Paradigm - Data-Intensive Discovery

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"The truth about Big Data. . . "

"A recent Gartner survey found that 64% of enterprises are investing in Big Data, but they also found that a similar chunk of firms (60%) don't have a clue as to what to do with it."

Infoworld Tech Watch
July 24, 2014

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Companies that adopt

- "The march of quantification, made possible by cloud computing and enormous new sources of data, will sweep through academia, business and government; no area will be left untouched."
  Gary King, Inst. for Quantitative Social Science, Harvard
- "Data is a new class of asset, like currency or gold."
  World Economic Forum, Davos, January, 2012
- "Companies that adopt data-directed decision-making enjoy a 5% to 6% boost in productivity."
  Eric Brynjolfsson, Sloan School of Management, MIT

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BIG DATA is changing the traditional strategies of MASS MARKET MANUFACTURING

"Over the past decade, the consumer packaged goods industry has been moving from a manufacturing "push" strategy to a consumer "pull" strategy. With improvements in technology, data collection and storage, and analytical knowledge, companies are now looking to integrate consumer demand with shipping forecasts to capture the impact of marketing activities on supply."

from "Using Multitiered Causal Analysis to Improve Demand Forecasts" SAS 2014

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CLOUD SERVER CENTERS

WILL BE THE FACTORIES

OF THE INFORMATION ECONOMY !

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MEANWHILE, CROWDS GO WILD!!

- Crowd Sourcing – Major firms increasingly solicit ideas for new products and solutions to problems from the general public. (P&G has announced that 1/2 of their new products will be generated by crowd sourcing.)

- Crowd Funding – Rapidly growing numbers of inventors and entrepreneurs solicit direct investments on-line, and, after January 2013, the 2012 Jobs Act authorizes start-ups to sell stock directly to the public.

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COLLECTIVIZING ENTREPRENEURSHIP

- In his 1911 *Theory of Economic Development*, economist Joseph Schumpeter argued that the real "entrepreneurs" in capitalist free-market systems are NOT the inventors & small business start-ups, but the investors who underwrite innovations.
- Will "crowd-funding" democratize the financing of innovation in today's free-market economies?

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KurzweilAI | Accelerating Intelligence. News

At last: a low-cost, professional-grade light-based 3D printer

September 27, 2012

Formlabs' new Form 1 3D printer could bring professional-grade 3-D prints to the home workshop.

Desktop 3-D printing has largely been the domain of extrusion-based machines like MakerBot's Replicator and homebrew RepRap designs.

These lag behind the capabilities of pricier, professional stereolithography devices, where UV light cures incredibly thin layers of resin to create objects on par with manufactured goods.

Developing this type of printer at a consumer price point has been an elusive goal until now.

The Form 1 is a desktop-sized machine that creates professional-grade, light-cured 3-D prints, *Wired* reports.

Their prototype units are fully functional and Formlabs will finance manufacturing via a Kickstarter campaign that broke their $100,000 target in 2.5 hours.

Initial backers will be able to pre-order the Form 1 for $2,299 (only 25 will be available at this price); additional units are priced at $2499 and $2699, based on order of contribution. Actual market pricing has not yet been released.

Form 1 (credit: Formlabs)

How it works

An upper for Nike's Flyknit shoe.

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Products becoming platforms for services

- "We are talking about combining our old science of manufacturing with new, low-cost consumer technology. You put these 2 things together and they'll morph into something we've never seen!"
  Tony Fadell ~ Founder, Nest Labs
  & designer of iPod

- "Your car won't just be connected to the internet; your car will be connected to other cars, to your mobile pone, and to your home computer. Your car becomes an assistant, and companion to your digital life."
  Chuhee Lee, VW/Audi
  Senior Staff Engineer

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CAUTION !

In a world of rapidly-expanding knowledge, ongoing innovation and globalization, EVERYONE must be attuned to anticipating, detecting and responding to the unintended consequences of change, since . . .

"Innovation and change occur in a world so complex that the unexpected must always be expected." ("Tenner's Law")

Edward Tenner ~ *Why Things Bite Back: Technology and the Revenge of Unintended Consequences - 1996*

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We have entered a new era. . . .

a "post-Industrial" age.

But, because we do not yet know how today's multiple rapid changes will ultimately work out, the chattering classes have agreed to call it "The New Normal" for the time being.

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MINITRENDS IN A DECADE OF REVOLUTIONARY CHANGE

The New Normal will be a 10-year period of rapid techno-economic innovation and socio-economic adaptation during which a multitude of Minitrends will emerge and mature into major features of our long-term future.

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David Pearce Snyder

Consulting Futurist

www.the-futurist.com

"The future evolves in an orderly fashion out of the realities of the past, filtered and shaped by the decisions of the present."

David Pearce Snyder, 1969 ✶

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✶ *After 45 years, it's still true!*

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THE NEW NORMAL

will be a period of change
that will prepare us for

THE NEXT NORMAL,

whose inertial realities will dominate

THE 21st CENTURY

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Smithsonian.com

Looking Back on the Limits of Growth

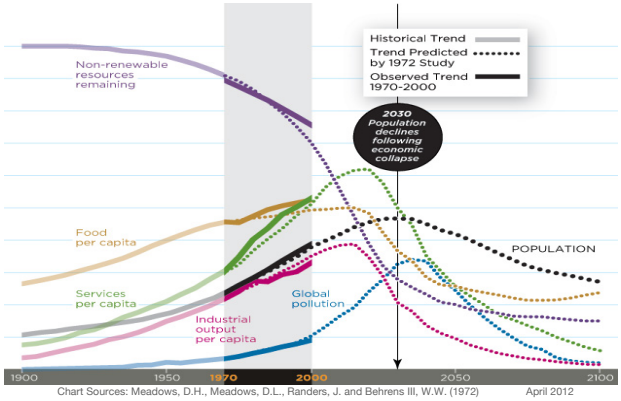

Chart Sources: Meadows, D.H., Meadows, D.L., Randers, J. and Behrens III, W.W. (1972) April 2012

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CLUB OF ROME REDUX!

- A growing body of evidence shows that the current trajectory of growth in global consumption will lead to worldwide shortages in fuel, materials, food and water by 2030 to 2040 and greater "economic nationalism."
- "These shortages - and their consequences - can ONLY be avoided through rapid technologic innovation and dramatic changes in public policies, business models and social expectations worldwide."

McKinsey: Sustainability & Resource Productivity Practice
November, 2011

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THE NEXT NORMAL MINDSET:

"Living Better, Consuming Less"

NEXT NORMALITIES:

- Transparency & Open Knowledge
- Data-intensive decision-making
- Networked learning
- Closed cycle (circular) manufacturing
- Infrastructure enhancement
- Managing complexity

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