

## **CYBERTUNITY'S KNOCKING**

Strategic Opportunities for Telecoms in the Decade Ahead

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a presentation by

**David Pearce Snyder, *Consulting Futurist***

for the

**TEXAS STATEWIDE  
TELEPHONE COOPERATIVE, INC.**

at

**The Inn of the Mountain Gods Resort & Casino**

Mescalero Apache Reservation, New Mexico

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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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## MUCH OF THE FUTURE IS UN-CERTAIN !

- Political developments
- Stock market behavior
- Economic performance
- Scientific breakthroughs
- Environmental events

**... are NOT reliably predictable, because they are all *complex dynamic processes*, about which we can only *speculate!***

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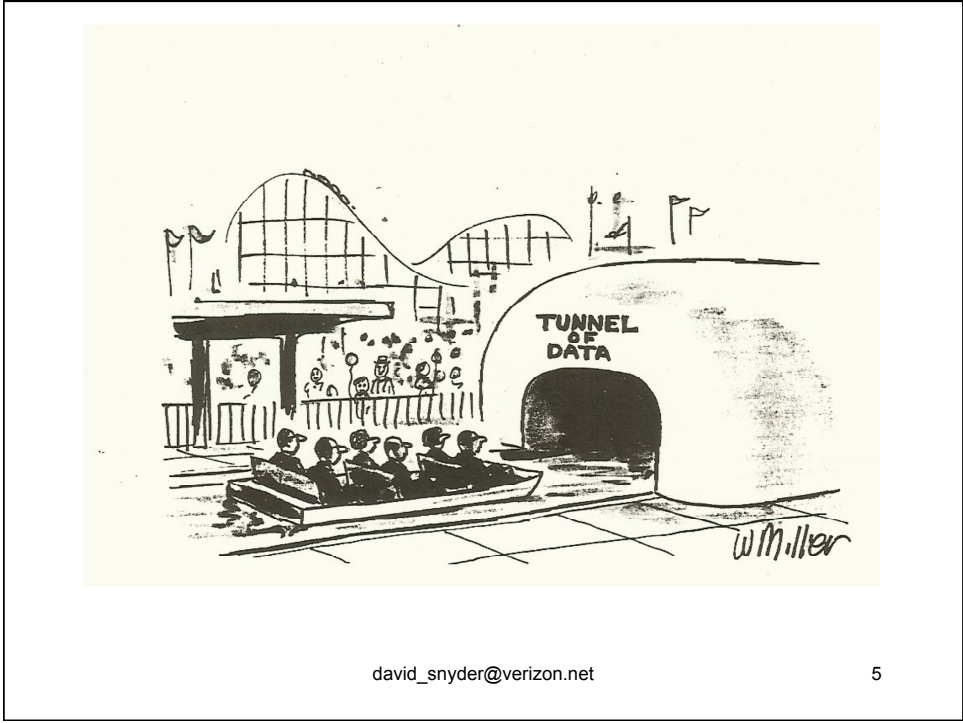
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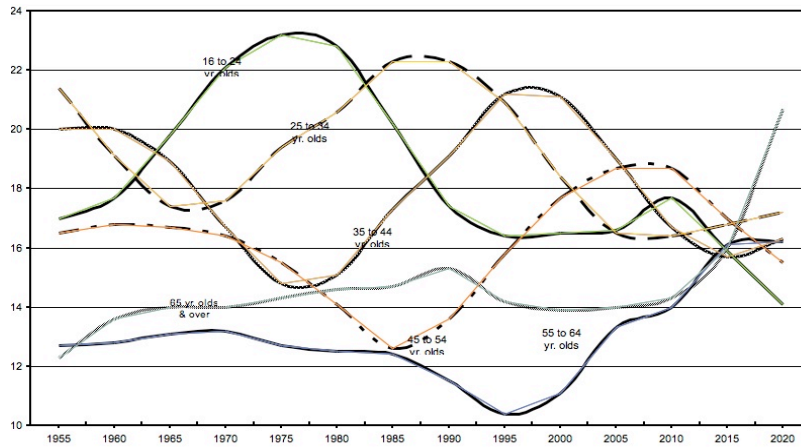
## KNOWABLE INERTIAL FUTURE CERTAINTIES

- ***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**.

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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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## 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 34	102,940	104,619	+ 1,679	+1.6%	66.9%	63.7%
35 to 44	102,940	104,619	+ 1,679	+1.6%	66.9%	63.7%
45 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%
<b>TOTALS</b>	<b>153,889</b>	<b>164,360</b>	<b>11,306</b>	<b>6.8%</b>	<b>100%</b>	<b>100%</b>

MEANWHILE, THE **BABY BOOM** IS STILL OUR BIGGEST GENERATION

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## WHAT'S NEXT FOR THE BABY BOOMERS? AMERICA'S BIGGEST GENERATION FINALLY MATURES

- 45% INTEND TO WORK INTO THEIR 70S OR BEYOND, AND 27% EXPECT TO STILL BE WORKING IN THEIR 80S (AARP); 20% say that they plan to "start their own businesses! Over 2/3 plan to "age in place."
- 52% ARE THE PRINCIPAL CARE-GIVERS FOR THEIR AGING PARENTS; 20% are caring for one or more dependent parents/in-laws *in their own homes*, 35% expect to do so. *Granny-flats everywhere!*
- IN 2009/10, 80% OF BOOMER OFF-SPRING RETURNED HOME TO LIVE AFTER GRADUATING FROM COLLEGE (THE "BABY BOOMER-RANG"); over 30% stay more than one year, and 17% are still there at age 30!
- BETWEEN 10% AND 12% OF BOOMER FAMILIES ARE HOME TO **BOTH ONE-OR-MORE GRANDPARENT PLUS ONE-OR-MORE OFFSPRING**; 16% of all families will be three-generation households within 5 years (1/5 of pop.).

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## AMERICA'S BIGGEST GENERATION FINALLY MATURES WHAT'S NEXT FOR THE BABY BOOMERS?

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- 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

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### 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)		CHANGE	
	2010	2020	(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%

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## THE CHANGING AMERICAN ECONOMY

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

INDUSTRY DIVISION	EMPLOYMENT (IN 1,000s)		CHANGE	
	2010	2020	(1,000s)	(%)
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%

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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		Projected Job Growth		Job Creation Rate
	Numbers	%	Numbers	%	
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!

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

- GLOBAL ECONOMIC INTEGRATION (Y2K)
- INFORMATION AUTOMATION (“INFOMATION”)

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## Infrastructure Leverages Invention

### Technology (Invented)

- Steam Engine (1776)
- Electric Dynamo (1871)
- Computer (1946)

### Infrastructure (Begun)

- Railway System (1825)
- Power Grid (1908)
- 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.**

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

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### **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:

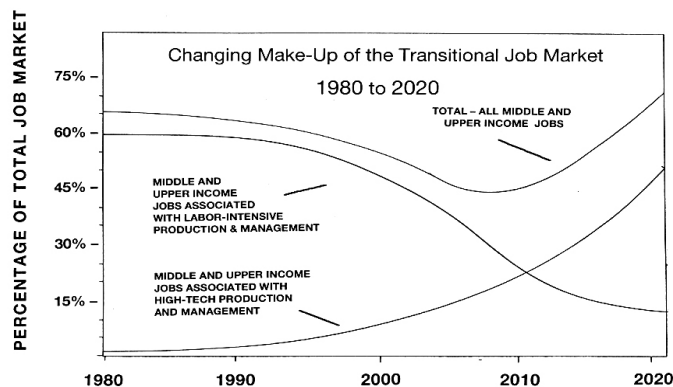
**“waves of creative destruction!”**

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**“a wave of creative destruction. . .”**

Joseph Schumpeter  
*Business Cycles -1939*



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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.

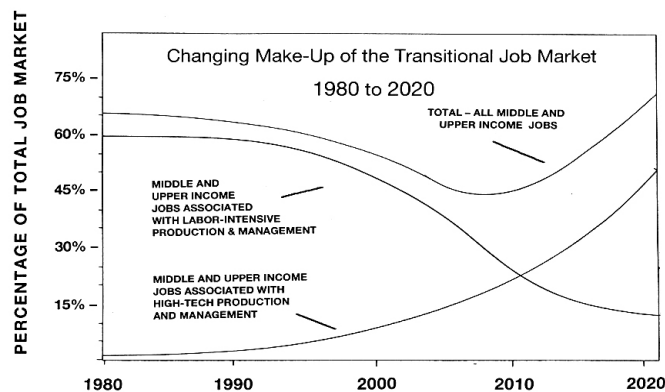
*Because of this, most people — including many political and business leaders — do not comprehend the permanent structural nature of the changes that are happening to the economy.*

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**“a wave of creative destruction. . .”**

Joseph Schumpeter  
*Business Cycles* –1939



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## **ING! WARNING! WARNING! WARNING! WA**

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(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 . . . .**

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### **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*

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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](http://www.mckinsey.com/mgi/publications/debt_and_deleveraging)

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## **PUBLIC SECTOR DELEVERAGING AHEAD!**

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- 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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## OTHER DEBT TO DEAL WITH!

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- ☛ Down-grading \$trillions in mortgage-backed securities
  - ☛ Over 400 banks fail (2009-2012) **M&As eliminate over 1,000 banks between 2009 and 2013)**
  - Plus, more potential big defaults ahead:
    - ☛ Under-funded pensions (2/3 public) \$ 4.1 trillion +
    - ☛ Commercial real estate loans 1.4 trillion +
    - ☛ SallieMae (School loan “Bubble”?) 1.3 trillion +
    - ☛ Consumer debt 0.7 trillion +
    - ☛ Corporate debt 0.7 trillion +
- TOTAL \$ 8.2 trillion +

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## OUR ECONOMY HAS SHIFTED GEARS

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- 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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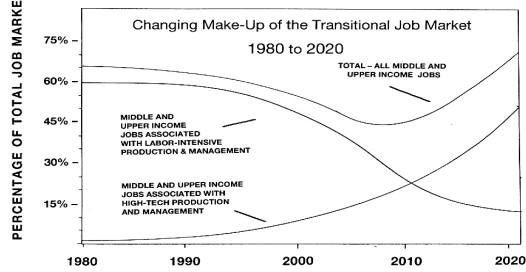
**WE'RE IN A REVOLUTION,  
NOT A BUSINESS CYCLE,  
AND THINGS WILL NEVER  
GET BACK TO [OLD] NORMAL!**

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**“a wave of creative destruction. . .”**

Joseph Schumpeter  
*Business Cycles –1939*



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**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		Projected Job Growth		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)

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- 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, eCreativity

*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

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**By 2020 . . . .**

- the U.S. stream of commerce will be cashless and paperless
- smartphones will be our eWallets / 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
- Personal Mobile Technologies will replace school textbooks
- We'll all be “chatting” with our technology! **"Personologies!"**
- eEntertainment users/revenues – including games – surpass those for all live sports, concerts, movies, plays, etc.
- Universal Connectivity ~ "The Internet of Things"

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## 5 DOMAINS OF THE INTERNET OF THINGS

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- **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, eWallets, proximity marketing
- **Environment** ~ Air/water/habitat monitoring, "eco-warnings" (pollution alerts, fire, flood, landslip, etc.)

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## THE "NEXT BIG THINGS" IN WORKPLACE TECHNOLOGY

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- **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](http://Zoomdata.com)

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## CLLOUDIFICATION OF WORKPLACE IT

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- **2000** - Grid Computing (NSF's "Globus Toolkit" and the D.I.Y. in-house super-computer)
- **2004** - Public "clouds" from Apple, Amazon & Google
- **2008** - Commercial Cloud services (**AICPA SAS 70-II**)
- **2011** - 13,500 cloud servers in U.S. (1/2 in-house, 1/2 public) **58% of large firms run mission-critical workloads on external clouds!**
- **2012 -->** - Clouds will provide SMEs with low-cost access to the computing power of the biggest firms, **including super-computing capability.**

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## Enter "BIG DATA"

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- **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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## "The truth about Big Data. . ."

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"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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## *Clouds and* "BIG DATA"

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- "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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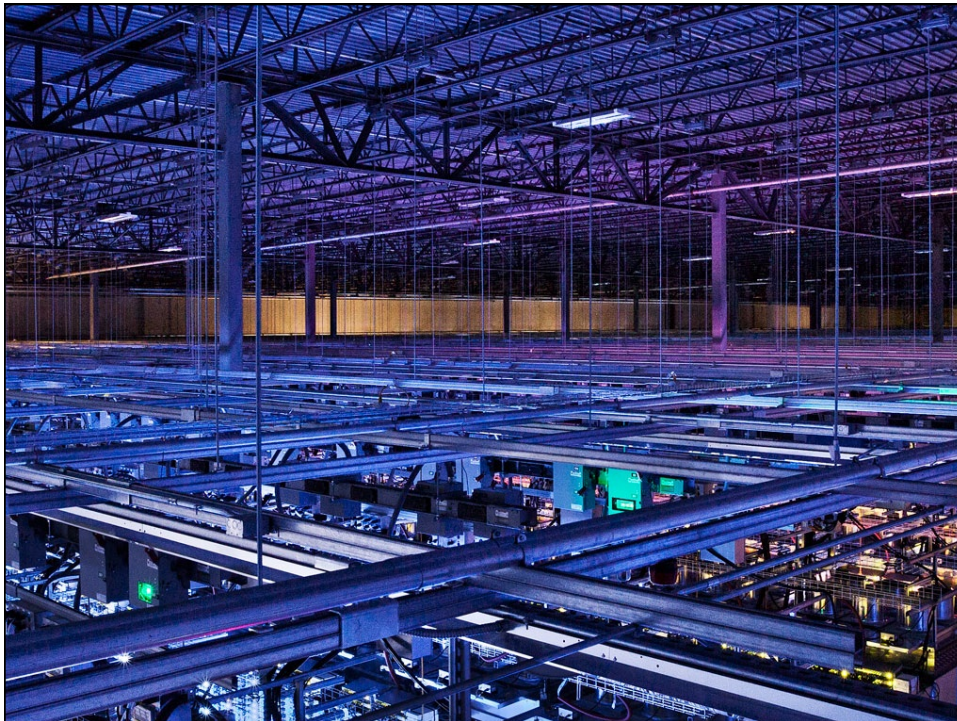
## CLOUD SERVER CENTERS (CSC) = DATA FACTORIES

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- 300 to 400 CSCs being built each year (50K sq. ft. to 500K sq. ft. each)
- Annual public CSC revenues will double from 2013 to 2016 - to \$206 billion (Gartner)
- CSCs are scattered across The U.S. , with the greatest concentrations In NYC, DCMetro, Silicon Valley, the Columbia River Basin, Chicago & Boston
- Because CSCs employ relatively few workers (50 to 200) they are often sited in rural areas.
- 75% of CSC work is consumer-driven, while 25% is commercial (One 3D movie = 1 million gigabytes!)

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## INFO-STRUCTURE BUILDING BOOM!

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- "There is no immediate end in sight to the proliferation of digital infrastructure."  
Chris Crosby, CEO, Compass Datacenters
- Incoming businesses care more about access to fiber than any other attribute of a location. It is very much like electricity; they want reliable service at a reasonable cost."

Susan Crawford ~

*Captive Audience: The Telecom Industry and Monopoly Power in the New Gilded age*

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Cloud Server Centers will be the  
factories of the Information Economy.

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**BROADBAND FIBER NETWORKS  
WILL BE THE SUPER HIGHWAYS  
OF THE INFORMATION ECONOMY**

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## TELECOM IN TRANSITION

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- Between 2012 & 2016, telecom carriers will see 70% growth in data revenue, while voice revenue falls 20% (Gartner 10/12)
- By the end of 2017, over ½ of U.S. households will have dropped their landlines (IDC 3/14)
- Broadband web access revenue (PWC, 2013)

Fixed	~ \$46.5b (2012)	\$57.7b (2017)
Mobile	~ \$44.5b (2012)	\$95.6b (2017)
- “Internet of Things” (Cisco ~ 2014)  
10 billion devices connected to the Web (2010); 50 billion by 2020
- Telecom carriers will migrate their IT to the cloud (INSEAD)

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## Transitioning Residential Markets

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- "Aging in Place" ~ Home monitoring by commercial services, family & caregivers (Clarity Ensemble phone)
- Electronic Medical Records Systems ~ Installed by all hospitals in 2014 and by all practitioners by 2017 (telemedicine & homecare networks)
- Teleworking becoming mainstream - in 2010, 18% of employees worked from home at least 1 day-per-week; today, it's 26% (Forrester Research ~ 6-13)
- On-line learning is being rapidly adopted by both K-12 and post-secondary schooling (eRate issues)

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## THE PRINCIPAL PREDICTABLE REALITIES of the Next 10 Years Are Now In Place . . . .

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- Society will be older (with fewer young people);
- most individuals and institutions will have to live/operate within more limited means;
- technology will pervade every aspect of daily life, and change how work is organized; and
- everybody and (increasingly) everything everywhere will be connected all the time.

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## CYBER WILD CARDS

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- VOIP has reduced telecom income in Europe by 25% since 2005
- Potential of MESH/WiMax networks is still unrealized
- M-Pesa (cellphone) banking from Africa
- Micro-wave towers vs. broadband fiber
- Mobile 911/emergency locator function (up to 90% failure rate!)

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## HEADS UP!

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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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*"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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