

WELCOME TO “THE NEW NORMAL”

The Strategic Outlook for Telecoms in America

a presentation by

David Pearce Snyder, *Consulting Futurist*

for the

TEXAS STATEWIDE TELEPHONE COOPERATIVE, INC.

at

Harvey's Hotel

Lake Tahoe, Nevada

August 7, 2013

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david_snyder@verizon.net

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What does *THE NEW NORMAL*
have to do with the future?

david_snyder@verizon.net

2

Something that is “new”
has only been in existence
for a short time.

david_snyder@verizon.net

3

Something that has become
“normal” is likely to stay
that way for a while.

david_snyder@verizon.net

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The phrase "New Normal" implies that we have recently crossed a *threshold in time*, and entered a future that will be distinctly different from our recent past.

david_snyder@verizon.net

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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

david_snyder@verizon.net

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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!*

david_snyder@verizon.net

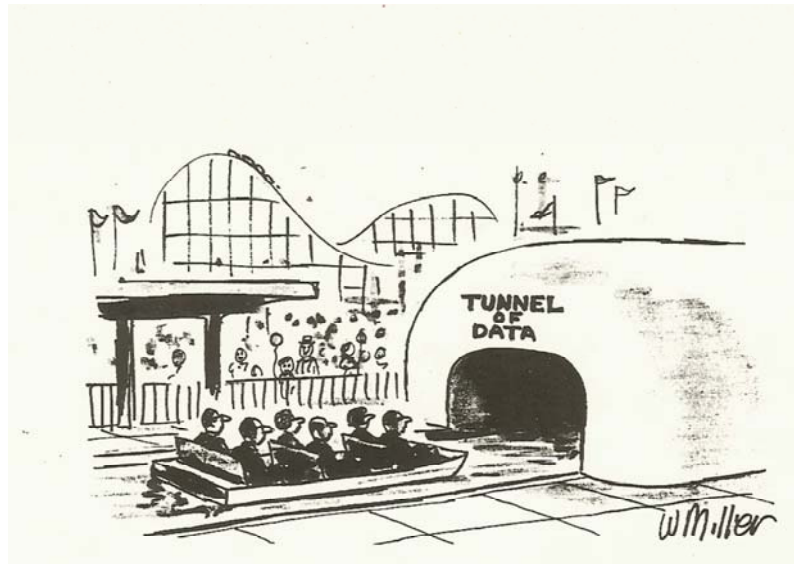
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CERTAINTIES OF "THE NEW NORMAL"

- ***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**.

david_snyder@verizon.net

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david_snyder@verizon.net

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FASTEN SEAT BELTS!

Rates of social, economic and
technologic change will accelerate
throughout *The New Normal*.

david_snyder@verizon.net

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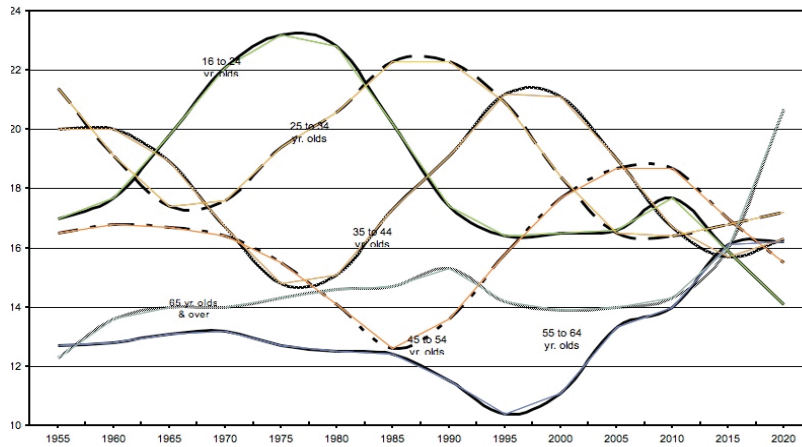
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Now entering
"THE NEW NORMAL"
BE PREPARED FOR:
• **an older society**

david_snyder@verizon.net

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

SOURCE: U.S. CENSUS BUREAU

david_snyder@verizon.net

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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

david_snyder@verizon.net

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THE GREAT DIVIDE

How Millennials see themselves in the workplace
and how they're seen:

How Millennials describe themselves		How HR professionals describe the Millennials
65%	People-savvy	14%
35%	Tech-savvy	86%
82%	Loyal to their employers	1%
14%	Fun-loving	39%
86%	Hard working	11%

SOURCE BEYOND.COM SURVEY OF 6,361 JOB SEEKERS AND VETERAN HR PROFESSIONALS IN APRIL AND MAY

david_snyder@verizon.net

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LABOR SUPPLY AND DEMAND – (2010 to 2020)

• Projected new job growth	20,468,900
• Projected replacement vacancies	+34,318,500
• Total job openings	54,787,400
• Projected labor force growth	- 10,472,000
• Job openings to be filled from existing labor pool	44,415,400

Source: U.S. Bureau of Labor Statistics (February, 2012)

david_snyder@verizon.net

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“Regional Talent Innovation Networks”

Civic enterprises that serve as intermediaries to build networks of partnerships among local employers and community institutions that upskill local surplus labor to meet specific labor shortages.

- Santa Ana, CA
- Cleveland Clinic
- Fargo, ND
- Philadelphia Academies
- Mansfield, OH
- N.C. Bio-Network
- Chicago Manufacturing "Renaissance Council

david_snyder@verizon.net

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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; 18% are caring for one or more dependent parents/in-laws *in their own homes*, 35% expect to do so by 2015. *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.).

david_snyder@verizon.net

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

- 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!)

david_snyder@verizon.net

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THE CHANGING AMERICAN ECONOMY

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

INDUSTRY DIVISION	EMPLOYMENT 2010	(IN 1000s) 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.gov>

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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.**

david_snyder@verizon.net

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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)

david_snyder@verizon.net

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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”)

david_snyder@verizon.net

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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.**

david_snyder@verizon.net

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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!

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

david_snyder@verizon.net

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This all begins to sound pretty

GLOOMY!

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

david_snyder@verizon.net

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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:

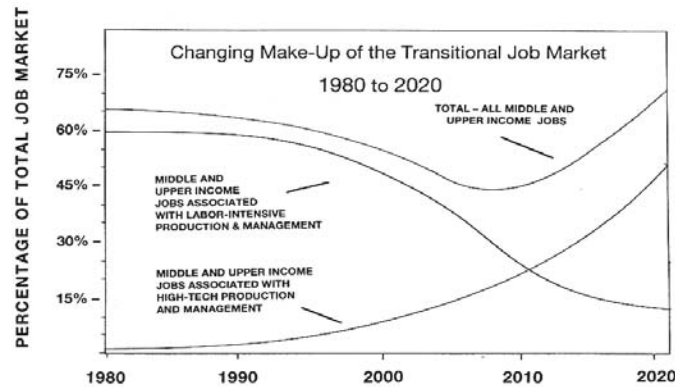
“waves of creative destruction!”

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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.*

david_snyder@verizon.net

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PAVED WITH GOOD INTENTIONS

- (2001) To assist the beleaguered middle class, Congress (and most states) reduce income and capital gains taxes.
- (2001 →) To stimulate economic growth, the Federal Reserve lowers the discount rate, further reducing the cost of credit.
- **MEANWHILE** (1995 →) Computer risk analysis permits the financial services sector to create new forms of investment – **derivatives, securitized debt obligations** – that increase the supply of capital and drive down interest rates for both commercial and consumer credit.

david_snyder@verizon.net

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EASY CREDIT FOR UNCLE SAM

- (2000 →) China & Japan invest over \$3 trillion of their trade surpluses in U.S. sovereign debt acquired as a result of cutting Federal taxes while fighting 2 wars and expanding Medicare drug benefits
- (2000 →) Because China & Japan purchase most U.S. sovereign debt, Federal borrowing does not have to compete in the financial marketplace, which keeps the supply of capital high and the cost of commercial/consumer credit low.

david_snyder@verizon.net

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DOIN' WHAT COMES NATURALLY

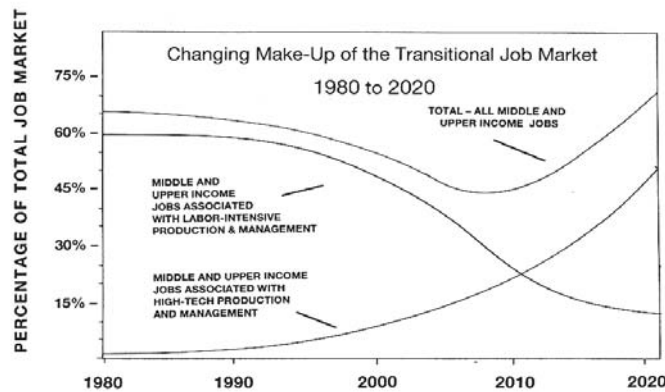
- (2000 - 2007) Buoyed by cheap credit and low taxes, American consumers become the driving force behind U.S. economic growth, **using borrowed money**.
- (2000 - 2007) **HOME EQUITY LINES-OF CREDIT ALONE ADD \$1 TRILLION PER YEAR TO U.S. CONSUMER SPENDING**, which rises from 67% to 72% of GDP. (Suze Orman says: "Your house is a self-refilling piggy bank!")
- (2000 - 2007) 1/4 of Boomers purchase 2nd homes.
- (2006) The share of U.S. households in owner-occupied homes briefly reaches 69%.

david_snyder@verizon.net

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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!”

david_snyder@verizon.net

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Remember the

ANDREA GAIL

david_snyder@verizon.net

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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.

david_snyder@verizon.net

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Now entering a
"NEW NORMAL"

BE PREPARED FOR:

- **an older society**
- **an austere economy**

david_snyder@verizon.net

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THE REPUBLICAN ADMINISTRATION SAYS:

“QUICK! SAVE THE BANKS!”

“We threw a \$750 billion TARP over the whole financial sector. We can come back, sort out the mess, fix the blame and regulate everybody later.”

Anonymous Capital Hill Staffer

david_snyder@verizon.net

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THE DEMOCRATIC ADMINISTRATION SAYS:

“HERE, TAKE THIS STIMULUS!”

- \$262 billion in immediate tax relief
- \$274 billion in social and educational assistance
- \$251 billion in infrastructure investments:
 - municipal water systems
 - transportation (highways, bridges, rail transit, etc.)
 - renewable energy R & D and production (wind, tidal, geothermal, solar, bio-mass)
 - “smart” electrical power grid
 - national broad-band “info structure”
 - energy conservation (“green” buildings)
 - Electronic Medical Record Systems (EMRS)
 - and \$100 billion to education !

david_snyder@verizon.net

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THE \$1.5 TRILLION QUESTION:

*“Were the bank bailout and the stimulus package big enough to counteract the effects of a **\$13 trillion** combined home value / stock market **LOSS**, the contraction of the credit markets, and the **elimination of 8.5 million jobs?**”*

david_snyder@verizon.net

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THE \$1.5 TRILLION ANSWER:

“NO !”

But *deficit hawks* have blocked further stimulus measures in Congress because they are much more concerned with the answer to a different question:

david_snyder@verizon.net

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“How are we going to pay for all this?”

“To avoid large and eventually unsustainable budget deficits, the nation will **ultimately** have to choose among higher taxes, modifications to entitlements such as Social security and Medicare, less spending on everything else from education to defense, or some combination of the three.”

Ben Bernanke, Chairman
U.S. Federal Reserve Bank
speech to Dallas Chamber of Commerce
April 8, 2010

david_snyder@verizon.net

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**In the financial world,
what Mr. Bernanke is describing
is called “deleveraging.”**

david_snyder@verizon.net

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DEBT, DELEVERAGING & AUSTERITY

Credit 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

david_snyder@verizon.net

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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"?**)

david_snyder@verizon.net

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OTHER DEBT TO DEAL WITH!

- ☛ 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"?) 1.0 trillion +
 - ☛ Consumer debt 0.9 trillion +
 - ☛ Corporate debt 0.7 trillion +
- TOTAL \$ 8.1 trillion +**

david_snyder@verizon.net

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"Deleveraging" Life

- U.S. birth rates down 9% from 2007!
- U.S. marriage rates down 7% from 2007!
- **SUZE ORMAN SAYS: "SAVE! DON'T SPEND!"**
- "Now that people are moving back to cities and renting rather than buying homes, that will free them up to spend money on things other than mortgages, cars and gas – like experiential goods, new technologies and saving for retirement."

(Richard Florida, *The Great Reset*, 2010)

david_snyder@verizon.net

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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.**

david_snyder@verizon.net

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An aging society . . . a labor shortage . . .
a slow growth economy . . . isn't *anything*
GOOD going to happen in *THE NEW NORMAL?*

david_snyder@verizon.net

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An aging society . . . a labor shortage . . .
a slow growth economy . . . isn't *anything*
GOOD going to happen in *THE NEW NORMAL*?

ABSOLUTELY! And I'm going to tell you
all about it right after the break.

david_snyder@verizon.net

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So

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

david_snyder@verizon.net

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

david_snyder@verizon.net

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Now entering a
"NEW NORMAL"

BE PREPARED FOR:

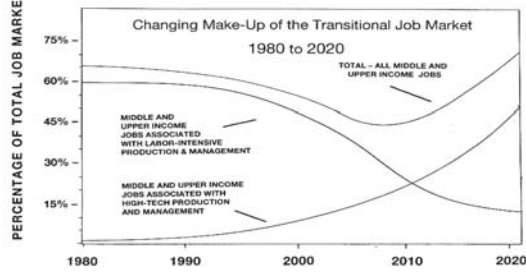
- **an older society**
- **an austere economy**
- **PERVASIVE technology**

david_snyder@verizon.net

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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.

david_snyder@verizon.net

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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
	Numbers	%	Numbers	%	
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
2010 to 2020	34.2 million	10%	20.5 million	14.3%	100:60

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

david_snyder@verizon.net

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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, **eCreativity**

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

david_snyder@verizon.net

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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 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.
- 3D printing fosters "mom & pop" manufacturing"

david_snyder@verizon.net

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THE "NEXT BIG THINGS" IN WORKPLACE TECHNOLOGY

- **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

david_snyder@verizon.net

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“COMMUNITIES OF PRACTICE” - I

Most employees maintain a “community of practice:” an informal personal network of peers – present and former co-workers, supervisors, teachers, class-mates, family members, etc. – whom they call on to validate and augment their personal workplace knowledge and judgment. **The individual employees’ communities of practice are crucial to all organizations’ abilities to master changing realities and to deal effectively with innovation on the job.**

Etienne Wenger, 1991
The Institute for Research on Learning

david_snyder@verizon.net

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“COMMUNITIES OF PRACTICE” - II

“Organizations that manage themselves as *connect-and-collaborate* networks of multiple **communities of practice** will devote more discipline, resources and incentives to achieving superior performance than will the *command-and-control* hierarchies they supplant.”

Dr. Jim Botkin
*Smart Business: How Knowledge Communities
Can Revolutionize Your Business*
Free Press, 2002

david_snyder@verizon.net

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"NETWORKED: THE NEW SOCIAL OPERATING SYSTEM"

A long-term study by Pew Research recently found that:

- As people mature, they join, leave & create a continuously evolving portfolio of personal networks, reflecting the changing important components of their lives: *e.g.* pop culture, work, health, hobbies, education, faith, finance, family, etc.
- Individuals use the "collective wisdom" of their networks (6 or 7, on average) to help them interpret and validate the surfeit of information available on the internet.
- There is a positive correlation between personal and financial success and the numbers of networks to which individuals belong.

david_snyder@verizon.net

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THE "NEXT BIG THINGS" IN WORKPLACE TECHNOLOGY

- **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

david_snyder@verizon.net

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CLOUDIFICATION OF WORKPLACE IT

- **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** - 13,000 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.

david_snyder@verizon.net

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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

david_snyder@verizon.net

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Clouds and "**BIG DATA**"

- "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

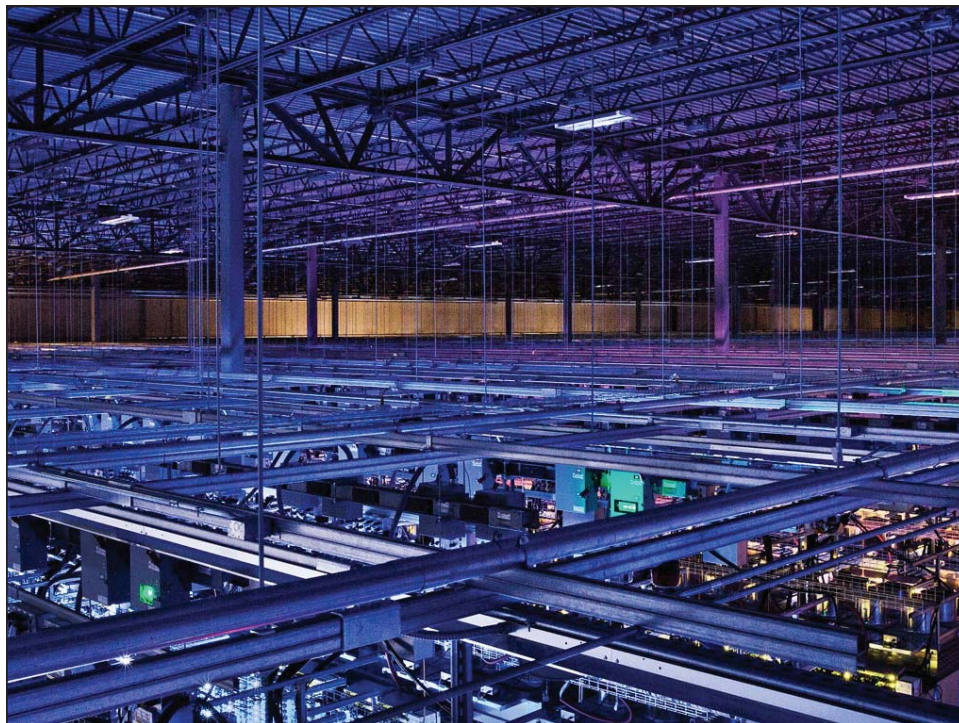
david_snyder@verizon.net

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**CLOUD SERVER CENTERS
WILL BE THE FACTORIES
OF THE INFORMATION ECONOMY !**

david_snyder@verizon.net

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CLOUD SERVER CENTERS (CSC): A NEW NORMALITY

- 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!)

david_snyder@verizon.net

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INFO-STRUCTURE BUILD-OUT: A NEW NORMALITY

- "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's 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

david_snyder@verizon.net

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

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

david_snyder@verizon.net

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TELECOM TRANSITION TO A NEW NORMALITY

- Between 20012 & 2016, telecom carriers will see 70% growth in data revenue, while voice revenue falls 20% (Gartner 10/12)
- By the end of 2013, 1/3 if U.S. households will have dropped their landlines (IDC 3/12)
- Broadband web access revenues (PWC, 2013)

Fixed	~ \$46.5b (2012)	\$ 57.7b (2017)
Mobile	~ \$44.5b (2012)	\$ 95.6b (2017)
- "Internet of Things" (Akamai Technology ~ 2013)
10 billion devices connected to the Web (2010); 30 billion by 2020
- Telecom carriers will migrate their IT to the cloud (INSEAD)

david_snyder@verizon.net

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New Normal Life in Residential Markets

- "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 at home at least 1 day-per-week; today, it's 26% (Forrester Research ~ 6/13)
- On-line learning is being rapidly adopted for both K-12 and post-secondary schooling (eRate issues)

david_snyder@verizon.net

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So, welcome to **THE NEW NORMAL**, where

- 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.

david_snyder@verizon.net

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AND THERE'LL BE SOME **SURPRISES!**

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

david_snyder@verizon.net

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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 ❖

david_snyder@verizon.net

❖ *After 43 years, it's still true!*

david_snyder@verizon.net

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