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Session Number: IT13

Title: *"Data Center Enterprise Transformation 2017"*

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Data Center Enterprise Transformation 2017

Learn about the continued transformation of data center "solutions" in the year 2017 and beyond!

The presentation:

1) Defines the elements of the data center transformation.

2) Identifies the underlying factors of the cause of transformation.

3) Summarizes how risk and total cost of ownership impact the final decision.

AGENDA

I. *The 2017 and Beyond Data Center Transformation*

II. *The Eighteen (18) Elements of the Comprehensive Data Center Solution*

III. *Evolving 2017 "Factors" Impacting the Data Center Transformation*

IV. *The Decision Process of Total Cost of Ownership vs. Risk (Short Term…Long Term)*

V. *Commentaries/Examples of 2016/2017*

VI. *Closing - Summary - Recap*

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Part I

The 2017 and Beyond Data Center Transformation

The 2017 and Beyond Data Center Transformation

1) **Data center "business as usual" continues to transform in 2017 at an accelerated pace**

2) **Enterprise data center solutions look for the most:**

  ➤ *Flexible/expandable/scalable data center*
  ➤ *Maximum risk aversion*
  ➤ *Continuous compliance*
  ➤ *Cost effectiveness*
  ➤ *Leveraging of the technology tools available and emerging*
  ➤ *Minimization of personnel*
  ➤ *Being best in class in a vendor neutral delivery*
  ➤ *Zero (goal) downtime*
 ➤ **Financial/liability recovery to the enterprise*

The 2017 and Beyond Data Center Transformation

3) **Types of data being directly categorized and mapped to compliance/security:**

   ➢ *Type I, II, III, and IV*
   ➢ *Production vs. test vs. development vs. DR*

4) **Dominating theme of 2017 and beyond:**

   ➢ *Data security: Who maintains IT? Who is liable?*
   ➢ *Compliance*
   ➢ *Financial impacts*
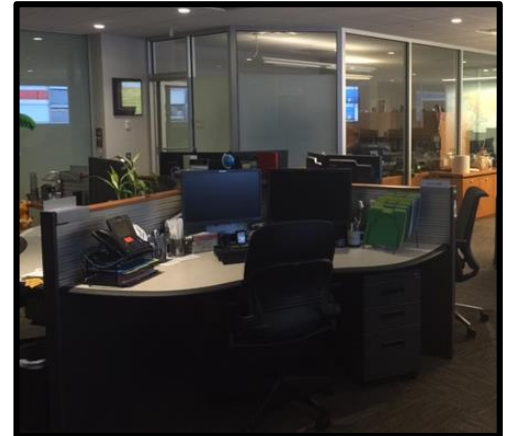   ➢ *Cybersecurity*

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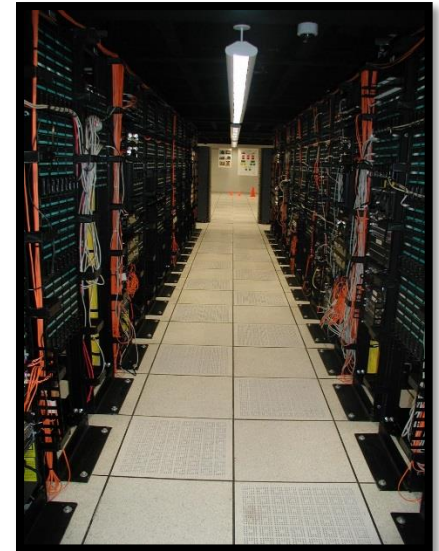
The 2017 and Beyond Data Center Transformation

5) **Why would board members, trustees, and/or government be concerned:**
   - ➢ *Gross negligence*
   - ➢ *SLA's vs. recovery*
   - ➢ *Brand impact*
   - ➢ *Fiduciary responsibility*
   - ➢ *Recent (2016/2017) class action lawsuits*

6) **The role of 3rd party providers/partners:**
   - ➢ *Technical expertise/proficiency*
   - ➢ *Financial stability*
   - ➢ *Damages to be paid from a potential "event" – see contracts*

7) **Data breaches dominating 2016/2017 and beyond**

8) **The total cost of ownership opex vs. capex discussion**
   - ➢ *Trends 2017*

The 2017 and Beyond Data Center Transformation

9) **Current 2016+ (Uptime Institute 2016 Survey):**

➢ *71%: Estimated percentage of all IT assets currently sitting in enterprise data centers*

➢ *20%: Estimated percentage of all IT assets currently sitting in colocation data centers (and growing)*

➢ *9%: Estimated percentage of all IT assets currently deployed in cloud*

10) **Transformative industries and their impacts:**

➢ *Education remote*

➢ *"Driverless" vehicles*

  a) **Personal**

  b) **Commercial**

➢ *Banking*

➢ *Food and delivery*

➢ *Merchandise (brick and mortar)*

➢ *Video conferencing vs. travel*

Part II

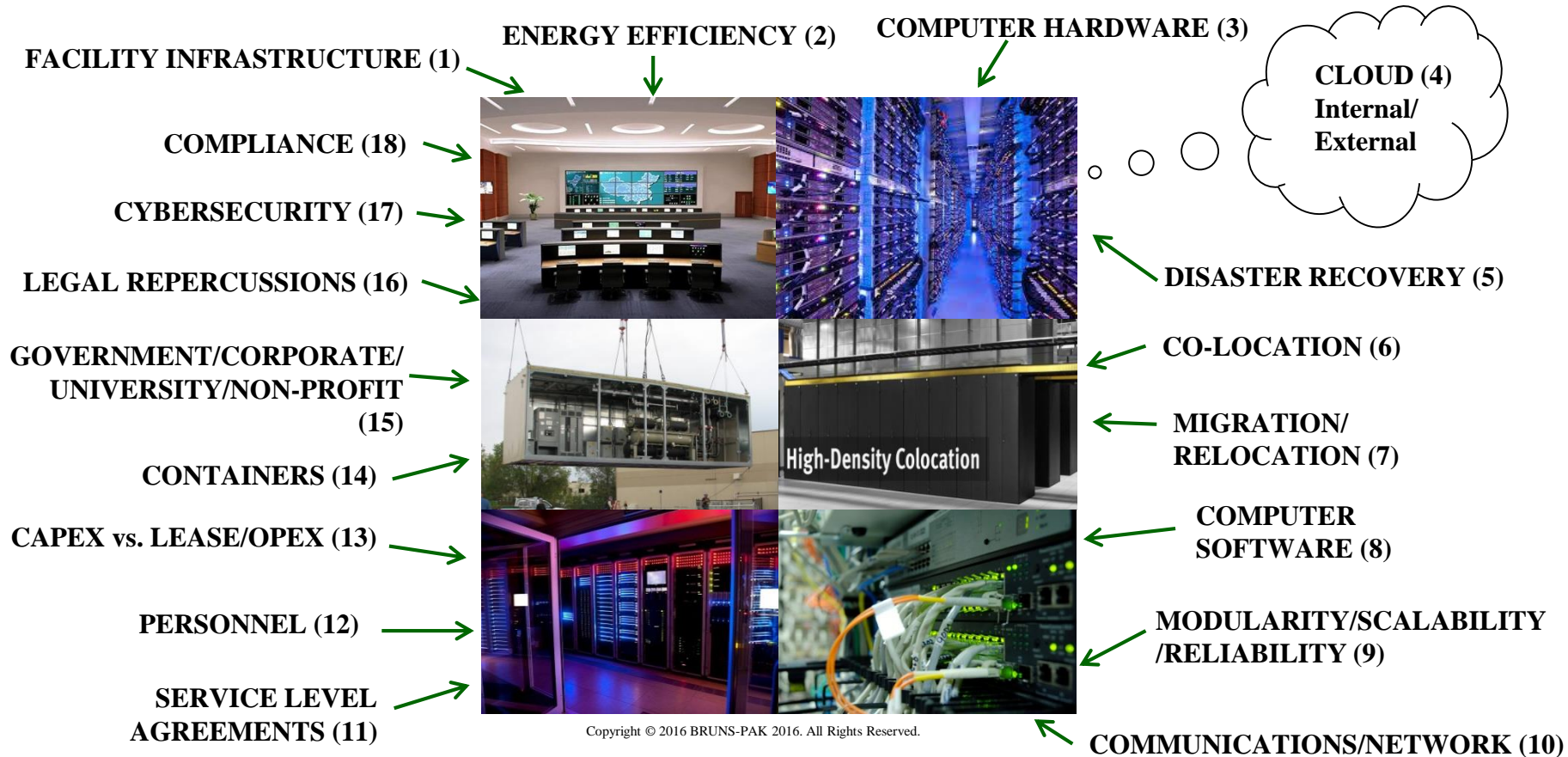## The Eighteen (18) Elements of the Comprehensive Data Center Solution

The Eighteen (18) Elements of the Comprehensive Data Center Solution

The Hybrid "2017 Transformation" Efficient Data Center Elements

FACILITY INFRASTRUCTURE (1)

ENERGY EFFICIENCY (2)

COMPUTER HARDWARE (3)

CLOUD (4) Internal/External

COMPLIANCE (18)

CYBERSECURITY (17)

LEGAL REPERCUSSIONS (16)

DISASTER RECOVERY (5)

GOVERNMENT/CORPORATE/UNIVERSITY/NON-PROFIT (15)

CO-LOCATION (6)

MIGRATION/RELOCATION (7)

CONTAINERS (14)

High-Density Colocation

COMPUTER SOFTWARE (8)

CAPEX vs. LEASE/OPEX (13)

PERSONNEL (12)

MODULARITY/SCALABILITY/RELIABILITY (9)

SERVICE LEVEL AGREEMENTS (11)

COMMUNICATIONS/NETWORK (10)

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The Eighteen (18) Elements of the Comprehensive Data Center Solution

I. How do the "eighteen elements" combine to optimize the data center enterprise solution?

- *Total cost of ownership*
- *Risk*
- *Scalability*
- *"Critical vs. non-critical" application data*
- *Best Practices*

II. The dominating theme of #10 - Communications/Network, #11 - Server Level Agreement, #16 - Legal Repercussions, #17 - Cybersecurity, and #18 - Compliance

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The Eighteen (18) Elements of the Comprehensive Data Center Solution

1) **Facility Infrastructure**

   A. *Architectural*

   B. *Civil*

   C. *Electrical*

   D. *Fire Protection (EPO Code Change) – Update NEC/NFPA vs. Factory Mutual*

   E. *Mechanical – CFD Models*

   F. *Security*

   G. *Site*

   H. *Structural*

   I. *Geographic Regional Considerations… i.e. southwest hurricanes, west earthquakes, etc.*

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The Eighteen (18) Elements of the Comprehensive Data Center Solution

2) Energy Efficiency

A. *ASHRAE 9.9 – Higher Inlet Temperatures*
- ✓ **80° F**
- ✓ **90° F**
- ✓ **△t of 20-25° F**

B. *Containment*
- ✓ **Hot Aisle**
- ✓ **Cold Aisle**
- ✓ **Impact to people**

C. *DCIM*
- ✓ **Gartner "Magic Quadrant"**
- ✓ **Per data centre (UK)**
  - a. *Reduction in costs*
  - b. *Integration*
  - c. *Valuable insights*
  - d. *Increased productivity*
  - e. *Environmental benefits*

900 kW IASE Using Rotary HXs

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The Eighteen (18) Elements of the Comprehensive Data Center Solution

D. *CFD Models*
  - ✓ **Why**
  - ✓ **Updates**

E. *Submerged Data Center Solutions*
  - ✓ **Microsoft**

F. *Outside Air to Cool Data Centers*

G. *Virtualization of Servers*

H. *LEED – New Data Center Guidelines*
  - ✓ **Written to save "dollars" and be more green**
  - ✓ **Office of Management and Budget to create a strategy**
  - ✓ **DOE and EPA to study server and data center efficiency trends**
  - ✓ **New "data center energy practitioner program"**
  - ✓ **New "metrics"**
  - ✓ **Data center LEED guidelines – New – LEED v4 – October 2014 US Green Building Council (USGBC)**

I. *Unity (close to) Power Factors on UPS Systems*

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LEED v4 for BD+C: Data Centers
Project Checklist

Project Name:
Date:

Y	?	N			
			Credit	Integrative Process	**1**

Y	?	N			
0	**0**	**0**		**Location and Transportation**	**16**
			Credit	LEED for Neighborhood Development Location	16
			Credit	Sensitive Land Protection	1
			Credit	High Priority Site	2
			Credit	Surrounding Density and Diverse Uses	5
			Credit	Access to Quality Transit	5
			Credit	Bicycle Facilities	1
			Credit	Reduced Parking Footprint	1
			Credit	Green Vehicles	1

Y	?	N			
0	**0**	**0**		**Sustainable Sites**	**10**
Y			Prereq	Construction Activity Pollution Prevention	Required
			Credit	Site Assessment	1
			Credit	Site Development - Protect or Restore Habitat	2
			Credit	Open Space	1
			Credit	Rainwater Management	3
			Credit	Heat Island Reduction	2
			Credit	Light Pollution Reduction	1

Y	?	N			
0	**0**	**0**		**Water Efficiency**	**11**
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
			Credit	Outdoor Water Use Reduction	2
			Credit	Indoor Water Use Reduction	6
			Credit	Cooling Tower Water Use	2
			Credit	Water Metering	1

Y	?	N			
0	**0**	**0**		**Energy and Atmosphere**	**33**
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
			Credit	Enhanced Commissioning	6
			Credit	Optimize Energy Performance	18
			Credit	Advanced Energy Metering	1
			Credit	Demand Response	2
			Credit	Renewable Energy Production	3
			Credit	Enhanced Refrigerant Management	1
			Credit	Green Power and Carbon Offsets	2

Y	?	N			
0	**0**	**0**		**Materials and Resources**	**13**
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
			Credit	Building Life-Cycle Impact Reduction	5
			Credit	Building Product Disclosure and Optimization - Environmental Product Decla	2
			Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
			Credit	Building Product Disclosure and Optimization - Material Ingredients	2
			Credit	Construction and Demolition Waste Management	2

Y	?	N			
0	**0**	**0**		**Indoor Environmental Quality**	**16**
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
			Credit	Enhanced Indoor Air Quality Strategies	2
			Credit	Low-Emitting Materials	3
			Credit	Construction Indoor Air Quality Management Plan	1
			Credit	Indoor Air Quality Assessment	2
			Credit	Thermal Comfort	1
			Credit	Interior Lighting	2
			Credit	Daylight	3
			Credit	Quality Views	1
			Credit	Acoustic Performance	1

Y	?	N			
0	**0**	**0**		**Innovation**	**6**
			Credit	Innovation	5
			Credit	LEED Accredited Professional	1

Y	?	N			
0	**0**	**0**		**Regional Priority**	**4**
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1

0	**0**	**0**	**TOTALS**	Possible Points:	**110**

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110 points

The Eighteen (18) Elements of the Comprehensive Data Center Solution

3) Computer Hardware

A. *Higher Efficiency*

B. *High Performance Computing (HPC) Continues to Dominate*

C. *New Flash Storage*

D. *Water Cooled to the Chip in 2016 and Beyond*

E. *52" Deep by 30" Rack!!!*

F. *Non-Uniform Cabinet Distribution*

G. *"Submerged" systems in cooling*

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4) Cloud

A. *Managed services*

B. *Internal vs. external*

C. *Migration to the cloud*

D. *Migration Back?*

E. *Moves/adds/changes*

F. *Trouble shooting*

G. *True "partner" of equal financial stability*

H. *Downtime: Who Pays?*

I. *Security Breach: Who Pays?*

J. *Terms and conditions (Legal Beagles!!!) 2016+ in motion*

K. *Production vs. Test/Development*

The Eighteen (18) Elements of the Comprehensive Data Center Solution

L. *Applications Conducive to Cloud – General Common Platform – Candidacy*

M. *Where is My Data? Who Manages? Do You Care?*

N. *"New" 2016/2017 United States Legislation – "Company" Liability for Data*

O. *Speed to delivery of applications*

P. *The 2016 / 2017 contract language for cloud contracts*

Q. *Critical vs. non-critical data*

R. *Moves/adds/changes*

S. *Amazon, Microsoft, Google, etc. If Interruption – What is Impact?*

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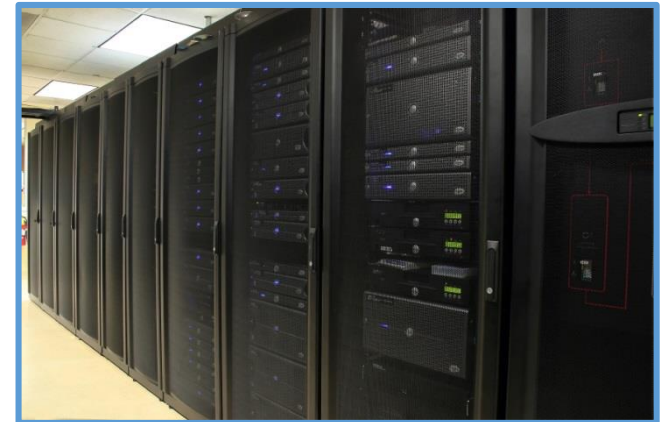
5) Disaster Recovery

A. *Downtime Tolerance - critical*
- ✓ **None to 2 days**

B. *Synchronous Data Replication*
- ✓ **Impact to Data Center Facility Infrastructures**
- ✓ **Hardware, Software, Network, and Personnel Consideration**

C. *"100 Mile" Disaster Recovery vs. Multiple "Regional" Recovery Centers*

D. *Testing*

E. *Testing of Disaster Recovery Plan*

F. *Government Regulations for Uptime*

The Eighteen (18) Elements of the Comprehensive Data Center Solution

6) Co-Location

 A. *Leased data center constructed space*

 B. *Capex schedule of delivery minimized*

 C. *ROI – see total cost of ownership – 4+?*

 D. *Other tenants? – Impact of security - Dominating 2016/2017*

 E. *Downtime: Who pays? - Dominating 2016/2017*

 F. *Security Breach: Who pays? - Dominating 2016/2017*

 G. *Terms and conditions (Legal Beagles 2016/2017!!!)*

 H. *"New" 2015 United States Legislation – Progressing – Class Action Lawsuits*

 I. *Financial strength of service providers – see Cushman Wakefield survey of "economics" 2016 report –* **DANGER!**

 J. *Moves/add/changes*

 K. *New 2015/2016/2017 "Internal" Self Funded Co-location "Lease" Data Center Solutions*

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The Eighteen (18) Elements of the Comprehensive Data Center Solution

7) Migration / Relocation

A. *Move existing or buy/lease new?*

B. *Asset swap outs – seed equipment*

C. *General hardware life cycle ± 3-4 years?*

D. *Maximize uptime*

E. *Multiple phases*

F. *Consolidation strategies*

G. *Physical cost vs. planning costs (Larger)*

H. *Impacts of the network*

I. *Move it? – Plan to migrate back? – Resume update!!*

   DANGER!!–Bowling tournaments-Fly Fishing-General Retirement?

J. *Risk of Move*
   - ✓ **Existing**
   - ✓ **Co-location**
   - ✓ **Cloud**

The Eighteen (18) Elements of the Comprehensive Data Center Solution

8) Computer Software

A. *Continues emphases on large scale corporate "procurement" effort to leverage one (1) license where possible*

B. *Production (Critical) vs. Non-Production Software*

C. *SPOF Consideration*

D. *Examples:*

- ✓ **Patient Care**
- ✓ **Pharmacy**
- ✓ **Surgical**
- ✓ **Banking**
- ✓ **Stock Trading**
- ✓ **Grading**
- ✓ **Diagnostics**

E. *Data Analytics – TREMENDOUS! 2017 and Beyond*

F. *Tier I-IV Applications - Candidacy*

The Eighteen (18) Elements of the Comprehensive Data Center Solution

9) Modularity / Scalability / Reliability

A. *Optimize*

- ✓ **Computer hardware**
- ✓ **Computer software**
- ✓ **Telecommunication (network)**
- ✓ **Facilities**
- ✓ **Service level agreements**
- ✓ **Disaster Recovery**
- ✓ **Cloud/Co-location/Container**

Scale with growth!

B. *Defray CAPEX/OPEX dollars until needed across the board*

C. *Scale without interruption*

D. *Reliability past/present/future*

E. *In house vs. outsource*

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10) **Communications / Network – Dominating 2017 and Beyond - #1 Factor Dominating**

A. *Redundant / isolated paths?*

B. *Multiple carriers*

C. *Data breach? Who pays? Significant dominant focus 2016 / 2017*

D. *Data security? Who is responsible?*

E. *- Hillary Clinton Server – "Chinese and Russians have everything anyhow" – WOW! – Classified Top Secret Emails?*
   - "Pokémon"

F. *The power of the cloud – iPhone®*

G. *Impact of network loss*

H. *Who manages the network?*

I. *Dominating the news media 2016/2017*

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11) Service Level Agreements

A. *Internal vs. external (client) based*

B. *Government imposed guidelines/performance (i.e. HIPPA, etc.)*

C. *Co-Location / Cloud – 2016/2017 transformation – fine print – who pays? – how much? – damages (Legal Beagles 2016/2017!!)*

D. *What does 99.999 availability mean to me when "I go down?"*

E. *Example – 3rd Party Provider – Contract 99.999 (32 seconds?) – What if I go down – Your Risk!!!*
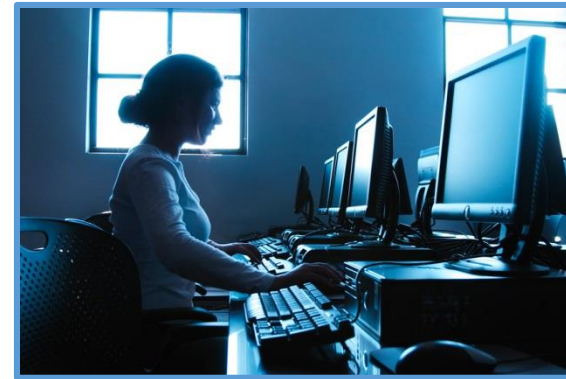
F. *See Part III*

The Eighteen (18) Elements of the Comprehensive Data Center Solution

12) Personnel

A. *Employee vs. contract personnel*

B. *Data Breaches*

C. *The Staffing Costs*

D. *Why Not Outsource?*

   ✓ **Share Personnel Costs with Others**
   ✓ **Share Benefits**

E. *Wiki Leaks*

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13) CAPEX vs. OPEX

A. *CAPEX – Capital dollars spent to build/deploy data center across (18) elements*

B. *OPEX – Operating dollar "expense" to financial statements – very attractive*

C. *New trend of internal "OPEX" data center solution 2016 / 2017 / 2018*

D. *Cloud/Co-location OPEX?*

E. *Migration Cost – OPEX*

F. *Relocation Cost – OPEX*

G. *Network (Recurring) Cost – OPEX*

H. *Seed Equipment – CAPEX or OPEX*

The Eighteen (18) Elements of the Comprehensive Data Center Solution

14) Containers

A. *Speed to Market?*

B. *Regulatory Agency Review – AHJ*

Temporary

vs.

Permanent

C. *Cost of Pre-Fabricated vs. "Stick Build"*

D. *ADA Compliance*

E. *Remove World Quality Control Issues*

F. *High Performance Compute vs. Work Flow*

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The Eighteen (18) Elements of the Comprehensive Data Center Solution

15) Government/Corporate/University/Non-Profit

A. *Data Center Global Initiatives*

B. *The Impact/Goal of Being "Green"*

C. *Government Regulations to Continue to Roll-Out Regarding "Data"*
   - ✓ **Safety**
   - ✓ **Security**
   - ✓ **Liability**
   - ✓ **Storage**

D. *The Role of Downtime*

E. *Parallel – The "Drone" Legislation*

F. *"In the News"*
   - ✓ **Highlights each evening**

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16) Legal Repercussions

A. *The most dominant theme of 2016 / 2017 data center optimization impacting in house vs. outsource*

B. *The 2016 "Reaction" of 3rd Party Provider "Contracts" (i.e. Cloud/Co-location Companies) to the Liability Issue – Example: $35 per sq. ft. per month to $350 per sq. ft. per month - Trend*

C. *Government fines – No More "Life Lock" – Good Luck!*

D. *Stockholder lawsuits*

E. *Individual lawsuits*

F. *Fiduciary responsibility*

G. *"Non-disclosed" trends*

H. *Mark Evanko – Data "permanently borrowed – see limited law school" – disqualified mortgage?*

17) Cybersecurity

- *5 Types of attacks evolving*

    A. *Malicious messages that really look like the real thing.*

    B. *Ransomware moves into the cloud and onto your phone*

    C. *Point of sale attacks*

    D. *Targeting the "1%" individuals – wealth – DANGER!*
       Tommy Lawrence, Robert Sharp, Paul Brandenburg!

    E. *Espionage and cyberwar*

       ✓ *CNA HARDY*

18) Compliance

- *Data protection compliance – 5 points*
  - ❖ *Personal information protection and electronic documents act PIPEDA*
    - A. *Seeing the personal information*
    - B. *Collecting the record*
    - C. *Considering a complaint*
    - D. *Filing a complaint*
    - E. *Going to court*

- *SSAE Standards*
  - A. *SOC 2 Type 2*
    1. *Security*
    2. *Availability*
    3. *Processing integrity*
    4. *Confidentiality*
    5. *Privacy*
  - ❖ *Jatheon Email Archiving Blog*
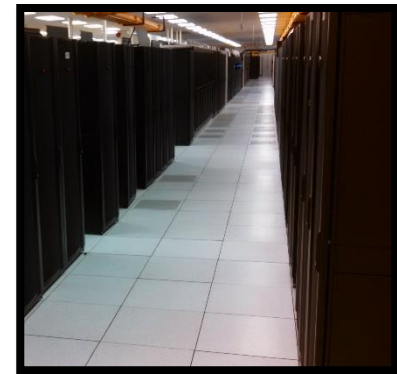
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Part III

Evolving 2017 "Factors" Impacting the Data Center Transformation

Evolving 2017 "Factors" Impacting the Data Center Transformation

1) **The focus of a preference for a data center opex vs. capex cost**

2) **Data center outsource model – reduce employee/perceived cost/allow one (1) group to manage/maintain**

3) **Cloud and co-location models**

4) **Short term vs. long term financial planning**

5) **Evolving – legal liability and responsibility/accountability**

6) **Cybersecurity impacts – Who is liable?**

Evolving 2017 "Factors" Impacting the Data Center Transformation

7) **Compliance impacts – Who is liable?**

8) **Tier I vs. Tier IV data**

9) **Board members/trustees – gross negligence and fiduciary responsibility**

10) **Contact language of 3rd party providers being reviewed in detail**

11) **Class action lawsuits – Target, Home Depot, etc.**

12) **Hybrid enterprise data center solutions – more complex**

13) **Impacts of buy/sell/out of business – 3rd party providers?**

Part IV

The Decision Process of Total Cost of Ownership vs. Risk...(Short Term/Long Term)

The Decision Process of Total Cost of Ownership vs. Risk (Short Term…Long Term)

1) **More enterprise awareness of total cost of ownership**

   A. *Opex lease*

   B. *Opex network*

   C. *Move/migration*

   D. *Changes?/reserve cost*

   E. *Seed equipment*

   And Risk

   A. *Network*

   B. *Downtime*

   C. *Penalty*

   D. *Cybersecurity*

   E. *Compliance*

   F. *Brand*

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The Decision Process of Total Cost of Ownership vs. Risk (Short Term…Long Term)

2) **Short term planning**

    A.   *Move in vs. long term planning*

    B.   *3 yr./5 yr./10 yr.?*

        - **Out of Dodge???**

3) **2008 vintage – Opex available only 3rd party 2017 – Opex available internal**

4) **How many data center enterprises do a comprehensive total cost of ownership vs. risk analysis on a vendor neutral basis???**

    - **Trends – Board's Demand**

5) **True cost analysis - Tier I – IV applications vs. test vs. development**

Part V

Commentaries/Examples of 2016/2017

Commentaries / Examples of 2016/2017

1) **Data security pending 2017 – Verizon enters purchase agreement with Yahoo for $4.8 billion. Then (apparently after?) finds ±500 million Yahoo accounts hacked? Deal impact – pending –** NY Times 9/23/16

2) **New York State Attorney General "says that number of breach notifications companies send to New York residents when personal information exposed is up 40% this year compared to last." *Wall Street Journal 5/6/16**

3) **Digital transformation – Security**

Security: Many loT security threats have already been publicly demonstrated or exposed. It is clear that security needs to be included throughout the whole product life cycle – from design and development through to production - and not just added on as an afterthought. Attention also needs to be paid to developing processes and mechanisms for updating, patching, and scanning components and systems that are no longer in the producer's domain but are already in use by the customer. ***IDC – White papers April 2016**

Commentaries / Examples of 2016/2017

4) Gartner analyst - Mr. Dave Cappuccio – VP summarized by Data Center Knowledge

That new role has less to do with managing disparate bits of infrastructure and more to do with selecting the best infrastructure strategy to provide a specific service. The toolbox they can select from includes on-premise or colocation data centers and cloud - private, public, or hybrid, on-prem or outsourced.

In addition to the primary data center, that environment is likely to include a secondary data center, some colocation space, a disaster recovery site, DR-as-a-Service, branch-office IT, Software-as-a-Service applications, micro data centers in branch offices, social-networking platforms used by staff, and so on.

- **Latency**
- **Reputation**
- **Service continuity**
- **Performance**

- **Security**
- **Data Protection**
- **Compliance**
- **RTO and DR**   * 1/4/17 by Yevgeniy Sverdlik

Commentaries / Examples of 2016/2017

5) **It takes 33 hours to recover from a ransomware attack – 48% said their organizations have been hit by at least one ransomware attack in the last 12 months –** Cyberheist News, November 21, 2016

6) **Stringent compliance and eDiscovery requirements, which means organizations must store and manage more data over longer periods of time. Demand for high availability and zero downtime, even in the event of natural disasters or others unexpected events. *** Iron Mountain Build vs. Buy 2016 – See Compliance and Security

Commentaries / Examples of 2016/2017

7) **The top 10 IT issues for 2017, reiterated in today's report:**

1. *Information security;*
2. *Student success and completion;*
3. *Data-informed decision-making;*
4. *Strategic leadership;*
5. *Sustainable funding;*
6. *Data management and governance;*
7. *Higher education affordability;*
8. *Sustainable staffing;*
9. *Next-generation enterprise IT; and*
10. *Digital transformation of learning.*

* EDUCAUSE 1/18/17

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Commentaries / Examples of 2016/2017

8) *** Equinix ends Brazil's 24 days digital blackout effecting 16,000 organizations**
   * IBM January 3 Sao Paulo data center outage Sao Paulo, 8 hours * FIF London, January 27, 2017

9) **Example confidential**
   A. *4th quarter 2016 – colo provider – accepts "unlimited liability" – conversation*
   B. *Analysis January 2017*
      - **4 data centers**
      - **Centralize in region**
      - **Facilities initially**
      - **Board of Directors – add hardware, software, network (cybersecurity), migration/relocation**

10) **Delta impact 2016**

Part VI

Closing - Summary - Recap

3 Key Things You Have Learned During this Session

1. What is the definition of data center transformation 2017?

2. What are the underlying factors causing the data center transformation of 2017 and beyond?

3. How does risk and total cost of ownership relate to data center transformation?

Thank You!

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