Preparing & Strategizing for Future Technologies

Five Disruptive Technologies that are Driving Ten Transformational Megatrends

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A strategically-focused understanding of the technologies that are driving changes in our built environments.

The megatrends that are reshaping our profession.

The urgency of shifting our mindset of "doing more with less" to a strategy of "doing different with less."

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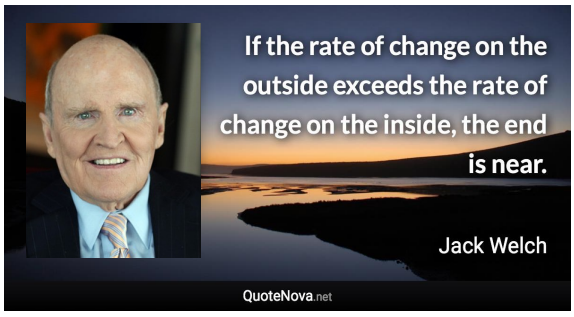

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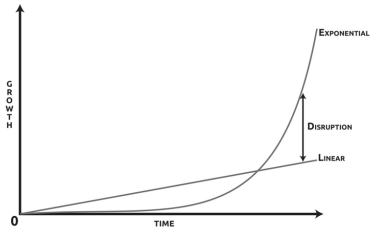
Linear vs. Exponential



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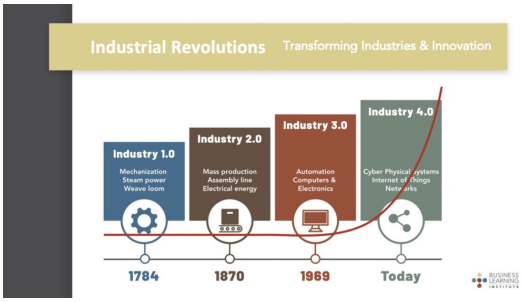

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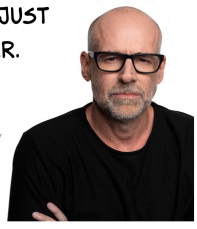
THINGS WON'T CHANGE AS MUCH AS THEY WILL ACCELERATE. WHILE OTHER CRISES RESHAPED THE FUTURE, COVID-19 IS JUST MAKING THE FUTURE HAPPEN FASTER.



Scott Galloway
Professor of Marketing
NYU Stern Business School

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"The only smart strategy is to embrace and start leading the digital transformation of your company (organization)."

Andrew McAfee. MIT Research Scientist
Coauthor of "***The Second Machine Age***"

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The Fourth Industrial Revolution

Big Data Driven
IoT Enabled
OT Engineered
AI Elevated
5G Fueled
Blockchain Secured

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Big Data Driven

Capacity

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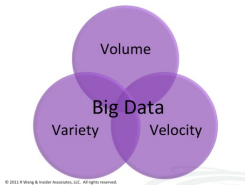
What is Big Data?

The definition of big data is data that contains greater variety, arriving in increasing volumes and with more velocity. This is also known as the three Vs.

Source: Oracle



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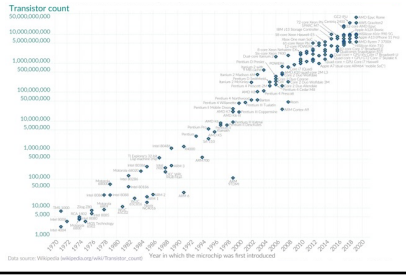
Velocity

Moore's Law: The number of transistors on microchips doubles every two years



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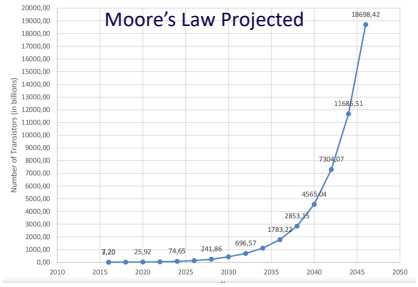
Velocity



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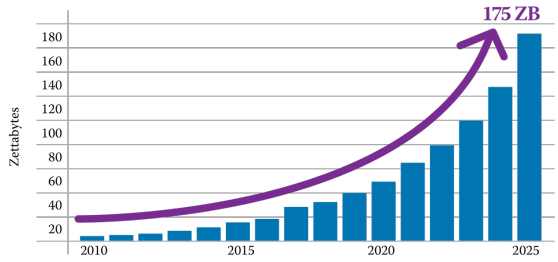
Volume



Source: Data Age 2025, published November 2018.

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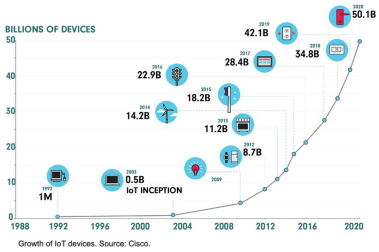
Variety



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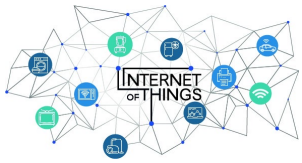
IoT Enabled



Sensors

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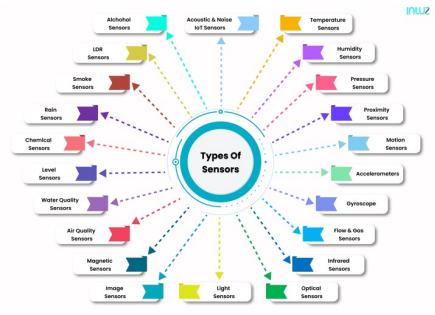

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Internet of Things

Smart building features. Source: Senseware

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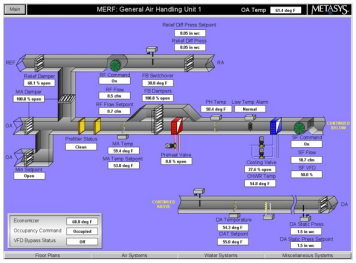
Internet of Things



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Internet of Things

Air Handler Performance

- Fan Runtime
- Fan Power
- VFD Control
- Static Pressure
- Heating Control
- Cooling Control
- Ventilation Air Control
- Economizer Control
- CO2 Control
- Outside Air Temperature
- Return Air Temperature
- Make-up Air Temperature
- Supply Air Temperatures
- Freeze Stat Alarms
- Smoke/Fire Alarm
- Pressure Drop Alarm

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Fault Detection & Diagnostics

- Simultaneous heating and cooling
- CHW valve leaking by
- Steam valve leaking by
- Heat rec. running when it shouldn't
- Heat Recovery leaking by
- Dirty filters
- Not maintaining static
- CHWS temp too high
- DAT off set point
- Humidification when it shouldn't
- Not meeting humidity set point
- Humidity high limit
- CO2 sensor out of calibration
- Any current senses zero for a fan
- Multiple units running out of sync
- Air flow thru unit that is off
- Ave valve position versus OAT
- Economizer Optimization
- CW valve staging incorrectly
- Avg CHW delta T versus OAT

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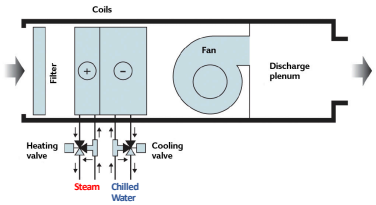
Fault Detection & Diagnostics

- Simultaneous heating and cooling



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OT Engineered
(Operations Technology)

Applications

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OT Engineered

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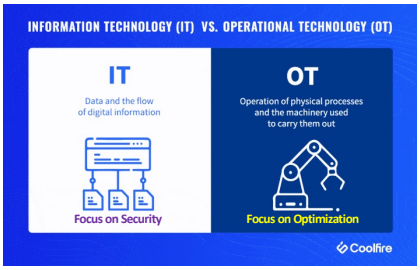
OT Engineered



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AI Elevated

Machine Learning

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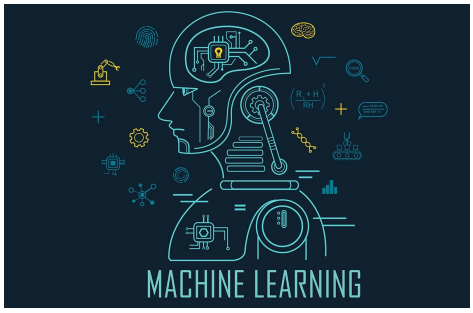

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Cognitive Computing

Cognitive computing simulates the human thought processes using self-learning algorithms that use data mining, pattern recognition and natural language processing to mimic the way the human brain works.

Source: Forbes Magazine, March 23, 2016

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5th Generation Fueled

5G

Connectivity & Instant Data

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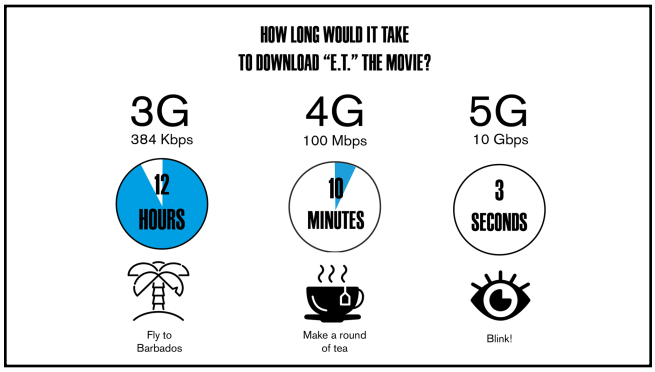

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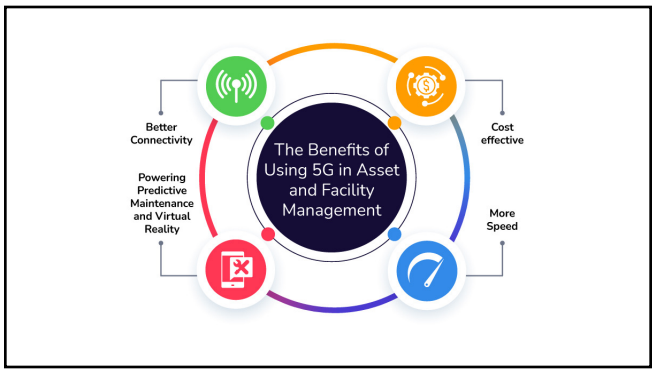

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Blockchain Secured

BLOCK CHAIN

Trust

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Blockchain Secured

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Blockchain Secured

"The Internet wasn't designed for transactions. It was designed for email and communications."

George Gilder, Author & Economist

"What the Internet did for communications, Blockchain will do for trusted transactions."

Ginni Rometty, President & CEO of IBM

"Blockchain technology could change our world more than people imagine. Bitcoin, however, could be a bubble."

Jack Ma, CEO and Founder of Alibaba

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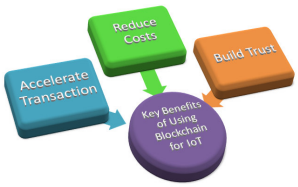
Blockchain Secured



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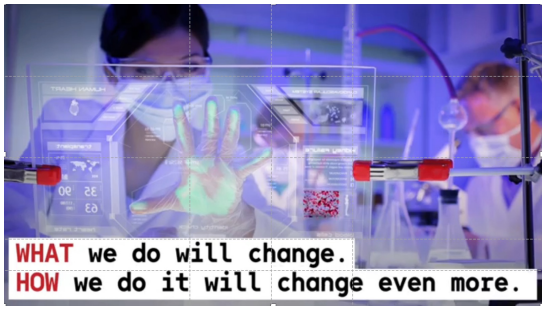

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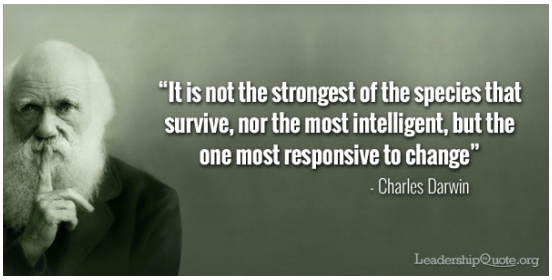

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Ten Megatrends Shaping Our Profession

Source: Facilities Innovations LLC

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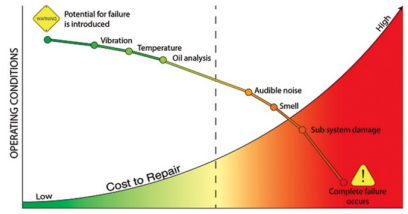
Megatrend #1
From reactive maintenance to predictive maintenance



5 Key Metrics that Affect Operational Efficiency. Image credit: CVP

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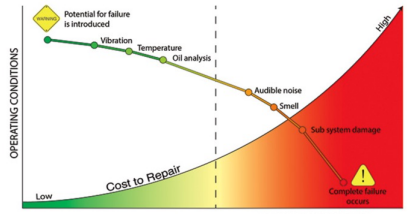
Megatrend #2
From valuing institutional knowledge to valuing shared knowledge



5 Key Metrics that Affect Operational Efficiency. Image credit: CVP

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Megatrend #2
From valuing institutional knowledge to valuing shared knowledge

"The intuition about how a machine is operating on a factory floor used to come from working there thirty years and being able to detect a slightly different sound signature emanating from the machine, telling us something is not exactly right. That is a weak signal. Now with sensors, a new employee can detect a weak signal on the first day of work – without any intuition."

Thank You for Being Late
An Optimist's Guide to Thriving in the Age of Accelerations
Thomas L. Friedman

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Megatrend #2
From valuing institutional knowledge to valuing shared knowledge

"Experienced workers knew how to process weak data. But now with Big Data, with a much finer grain of fidelity we can make finding a needle in the haystack the norm - not the exception. And we can augment the human worker with machines so they work as colleagues and enable them to process weak signals together and overnight become like a thirty year veteran."

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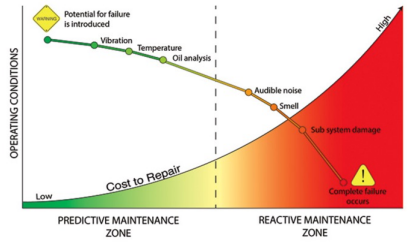
Megatrend #3
From funding repairs to funding detection and analytic systems



5 Key Metrics that Affect Operational Efficiency. Image credit: CVP

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Megatrend #3
From funding repairs to funding detection and analytic systems

- Better occupant experience
- Healthier building environments
- Reduced risk of business disruptions
- Increased productivity & wrench time
- Decreased cost of repairs
- Reduced scheduled PM activities
- Lower energy costs
- Retained energy conservation savings
- Improved turnover of new construction

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Megatrend #4
From preventative maintenance to condition-based maintenance

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Megatrend #4
From preventative maintenance to condition-based maintenance

"Preventative maintenance was: change the oil every six thousand miles, whether you drive it hard or not. The new approach is "predictive maintenance" and "prescriptive maintenance" We can now predict nearly the exact moment when a tire, engine, car or truck battery, turbine fan or widget needs to be changed."

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Thomas L. Friedman

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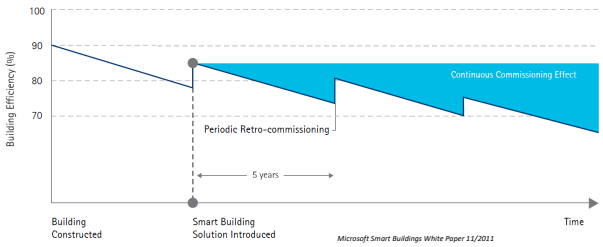
Megatrend #5
From recommissioning to continuous commissioning



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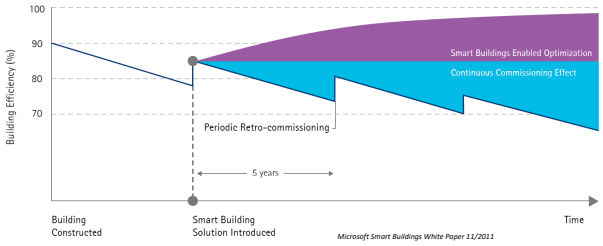
Megatrend #5
From recommissioning to continuous commissioning



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Megatrend #6
From competing with the Machine to complementing it

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Megatrend #6
From competing with the Machine to complementing it

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Megatrend #6
From competing with the Machine to complementing it

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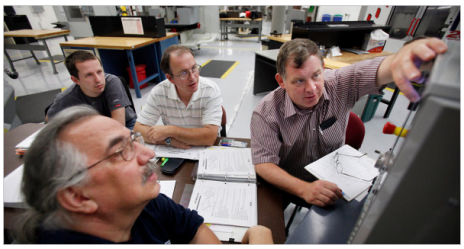
Megatrend #7
From rewarding expertise to rewarding collaboration



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Megatrend #8
From managing facilities to managing occupant experiences

"…spend less time and resources on running buildings and more time on what is important – the occupant."

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Megatrend #8
From managing facilities to managing occupant experiences

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Megatrend #8
From managing facilities to managing occupant experiences

- Create environments for enhancing the student experience
- Provide places to work that attract smart, sustainability-minded employees
- Ensure comfort with temperature, humidity and lighting tailored to occupant preferences
- Raise productivity, health and wellness through indoor air quality
- Empower individuals with control of occupant personal workspace
- Accommodate schedules and workflows of business operations
- Manage the indoor environment to pre-empt issues before they surface
- Deliver 100x value of energy efficiency

Source: 75F

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Megatrend #9
From owning physical assets to ensuring systems performance

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Megatrend #10
From leading top-down to leading bottom-up and outside-in

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Megatrend #10
From leading top-down to leading bottom-up and outside-in

Chief Operations Technology Officer

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Megatrend #10
From leading top-down to leading bottom-up and outside-in

Facilities Technology Strategist

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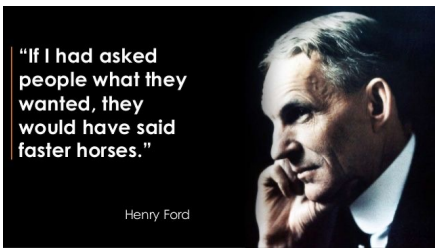

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Doing More With Less

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Doing more with less is not a differentiating business strategy

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The More and Less of Doing More With Less

- More Demands & Deadlines
- More Workload
- More Stress
- More Risk
- More Errors & Mistakes
- More Staff Turnover
- More Burnout
- More Reactive Mindset
- Less Training & Development
- Less Peer Networking
- Less Responsiveness
- Less Communication
- Less Quality
- Less Job Satisfaction
- Less Innovation
- Less Strategic Mindset

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Stop doing more with less…and start doing different

Let's do a Fosbury Flop!!

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Doing different raises the bar on building performance, operational effectiveness, occupant productivity, and most importantly the student experience.

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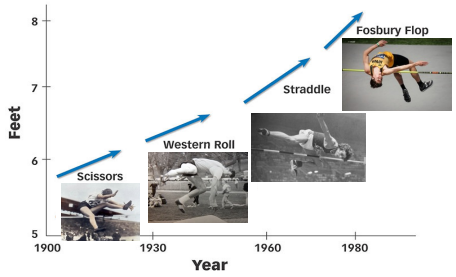
Doing Different



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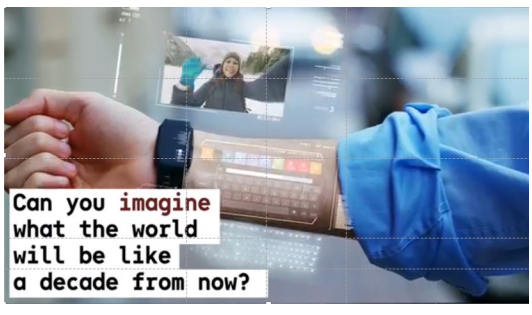

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Preparing for Disruptive Change

Maintain at least a basic understanding of the disruptive technological forces and embrace the Operations Technology role of your organization.

Be positioned and prepared for the megatrends reshaping the profession.

Think “doing different” when others are thinking “doing more.”

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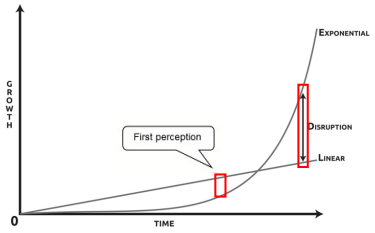
Prepare for Change



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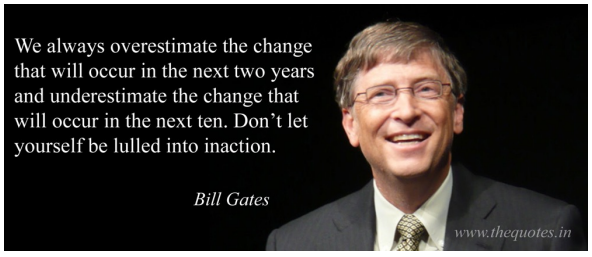

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