

Rage Against the Machines: Surviving the End of Architecture

TH503

Thursday, June 21st 2018, and 10:30 AM – 11:30 AM

1.0 Learning Unit

This presentation is protected by U.S. and international copyright laws.

Reproduction, distribution, display and use of the presentation without written permission of the speaker is prohibited.

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to constitute approval, sponsorship or endorsement by AIA of any method, product, service, enterprise or organization.

The statements expressed by speakers, panelists, and other participants reflect their own views and do not necessarily reflect the views or positions of The American Institute of Architects, or of AIA components, or those of their respective officers, directors, members, employees, or other organizations, groups or individuals associated with them.

Questions related to specific products and services may be addressed at the conclusion of this presentation.

Course / Learning Objectives

- Identify which industry-changing technologies will accelerate creative practices to develop forward-thinking practices and empower a new generation of designers educated in human-centered design, research, spatial interaction, and coding.
- Discuss the benefits of the personalization, closed-loop systems, asset sharing, usage-based pricing, collaborative ecosystems, agility processes, and data analytics.
- Explore how to embrace emerging technologies by implementing an asynchronous, but hands-on, discovery process coupled with data-driven research to identify services, products, methodologies, and markets.
- See how augmented, virtual and mixed-media reality can be powerful tools in conceptualizing, communicating ideas, and engaging with end-users.

Rage Against the Machines:
Surviving the End of...

rchitecture

TRANSLATED

Learning Objectives



DISRUPTIONS

Identify types of disruptor evolving into new AEC business models



EMERGING PLATFORMS

Discuss the use & emergence of business-focused platforms & networks



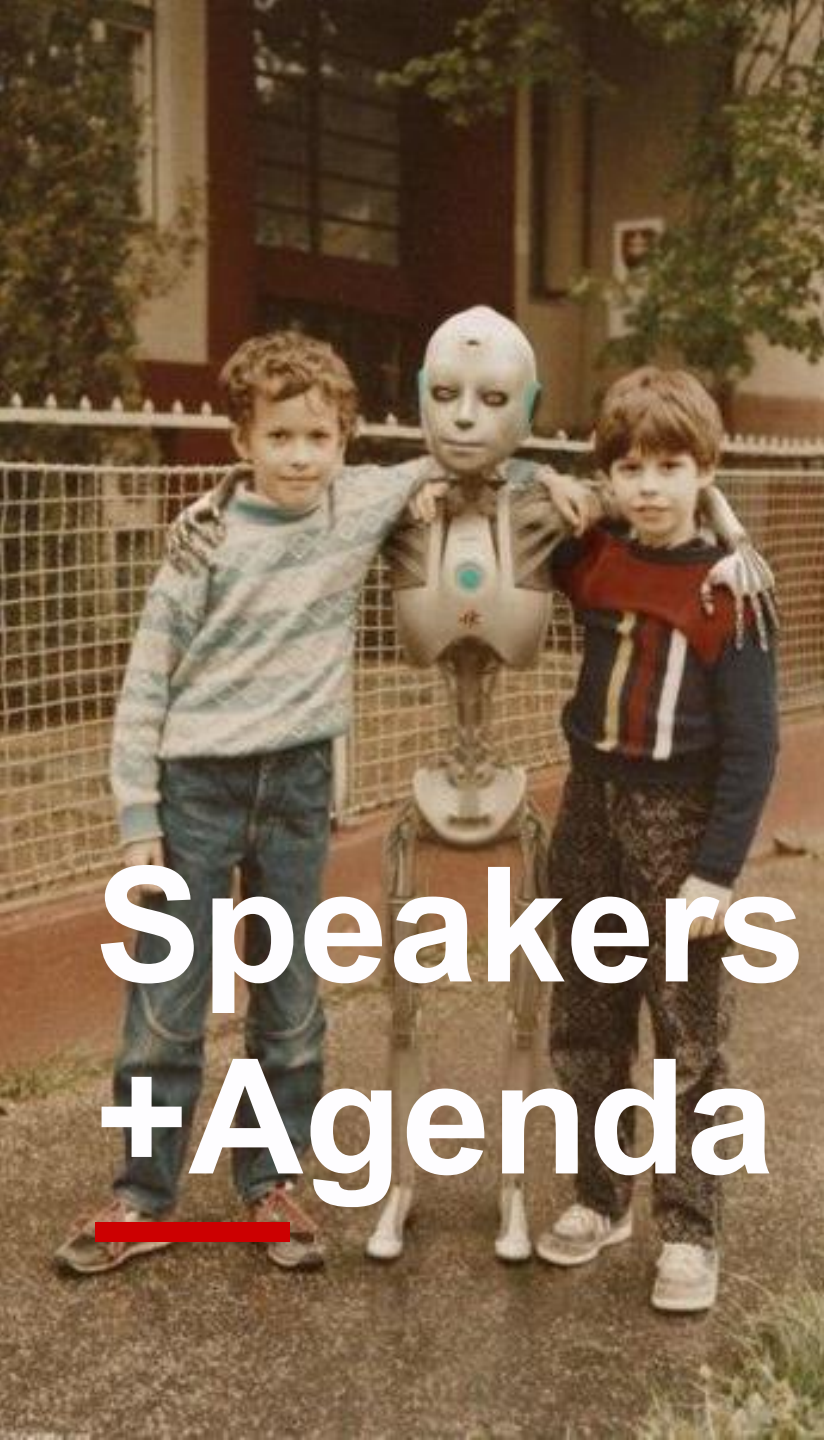
RESEARCH & DEVELOPMENT

Explore the importance of R&D, experimentation & play



TECH IN PRACTICE

Role of emerging technology in practice



Speakers + Agenda

INTRO

30min Topic Intro

Ricardo J. Rodríguez, Assoc. AIA, LEED AP BD+C
BASF

PANEL

20min Q&A Panel

Israel Medina, MSc. Architecture & Urban Design
(Columbia)

Anthony Vanky, Ph.D. (MIT)

ARCHITECTS



What my relatives think I do



What my friends think I do



What society thinks I do



What the developer thinks I do



What I think I do



What I really do

1. Profile

Some things I'm
passionate about



- AIA|HOU CKLDP Advisor: 2018**
- PRFAA Logistics Volunteer: 2017**
- Chris Wilhelm for Council Advisor: 2017**
- AIA National Practice Innovation Lab: 2017**
- AIA|MIA CKLDP Advisor: 2017**
- AIA|DC CKLDP Past Chair: 2017**
- AIA|DC CKLDP Chair: 2016**
- AIA|DC EAC Past-Chair: 2017**
- DCCEAS Young Architect of the Year: 2016**
- AIA National Leadership Institute: 2015**
- AIA|DC Emerging Architect Award: 2015**



1. Why Now?

Disrupting practice beyond what firms can cope with

Real happiness can only connecting with the world. But how many of you wouldn't see this as kind of a digital design happiness? I would like to share my experience with this.

I hope that you use this data to create beautiful work. You will see this idea sparking everyone's imagination. You can't say that of the current profession.

It's hard for the brain to consider that which is mutating all the time. How many of you could think this way? It would be a good choice - but of course we also need surprises. Thank you very much!



CONTRIBUTING FACTORS

- Creativity as a Service
- Risk Tolerance
- Inherent Liability
- Innovation
- Standard of Care
- Opinion-based design

2. No Data, No Progress...

Tracking New Metrics:

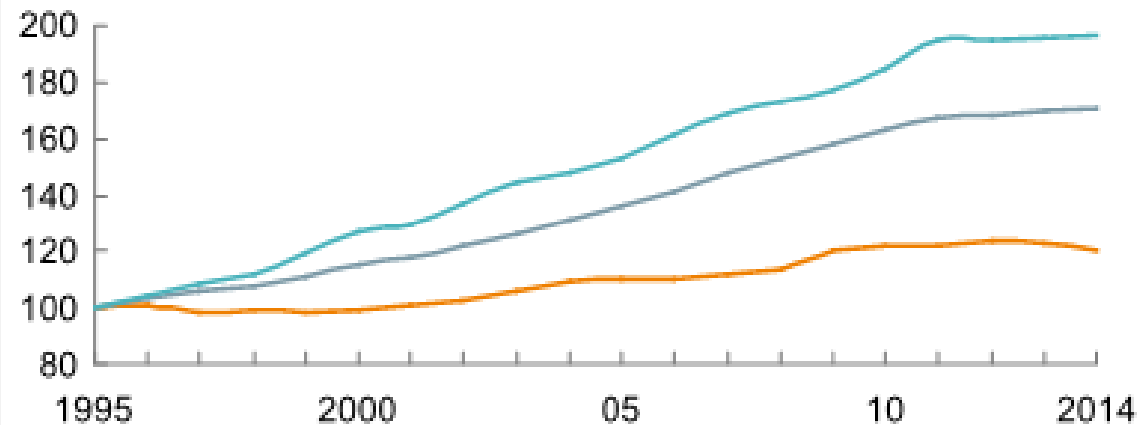
- Asset Efficiency
- Growth
- Building Performance
- Comfort
- Engagement
- Talent Turn-Over
- Cyber Security Index
- Retention Cost
- Conversion Rates
- Usage Statistics
- Client Acquisition Cost
- On-Budget Performance

Globally, labor-productivity growth lags behind that of manufacturing and the total economy

Global productivity growth trends¹

Construction Total economy Manufacturing

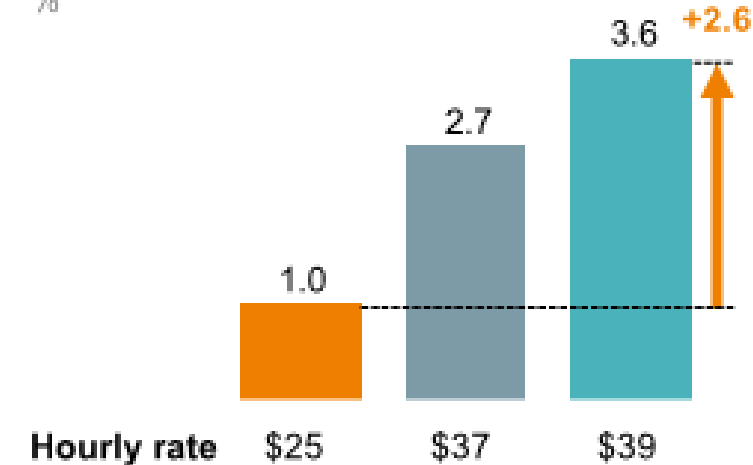
Real gross value added per hour worked by persons engaged, 2005 \$
Index: 100 = 1995



¹ Based on a sample of 41 countries that generate 96% of global GDP.

SOURCE: OECD; WIOD; GGCD-10, World Bank; BEA; BLS; national statistical agencies of Turkey, Malaysia, and Singapore; Rosstat; McKinsey Global Institute analysis

Compound annual growth rate, 1995–2014
%



2. No Data, No Progress...

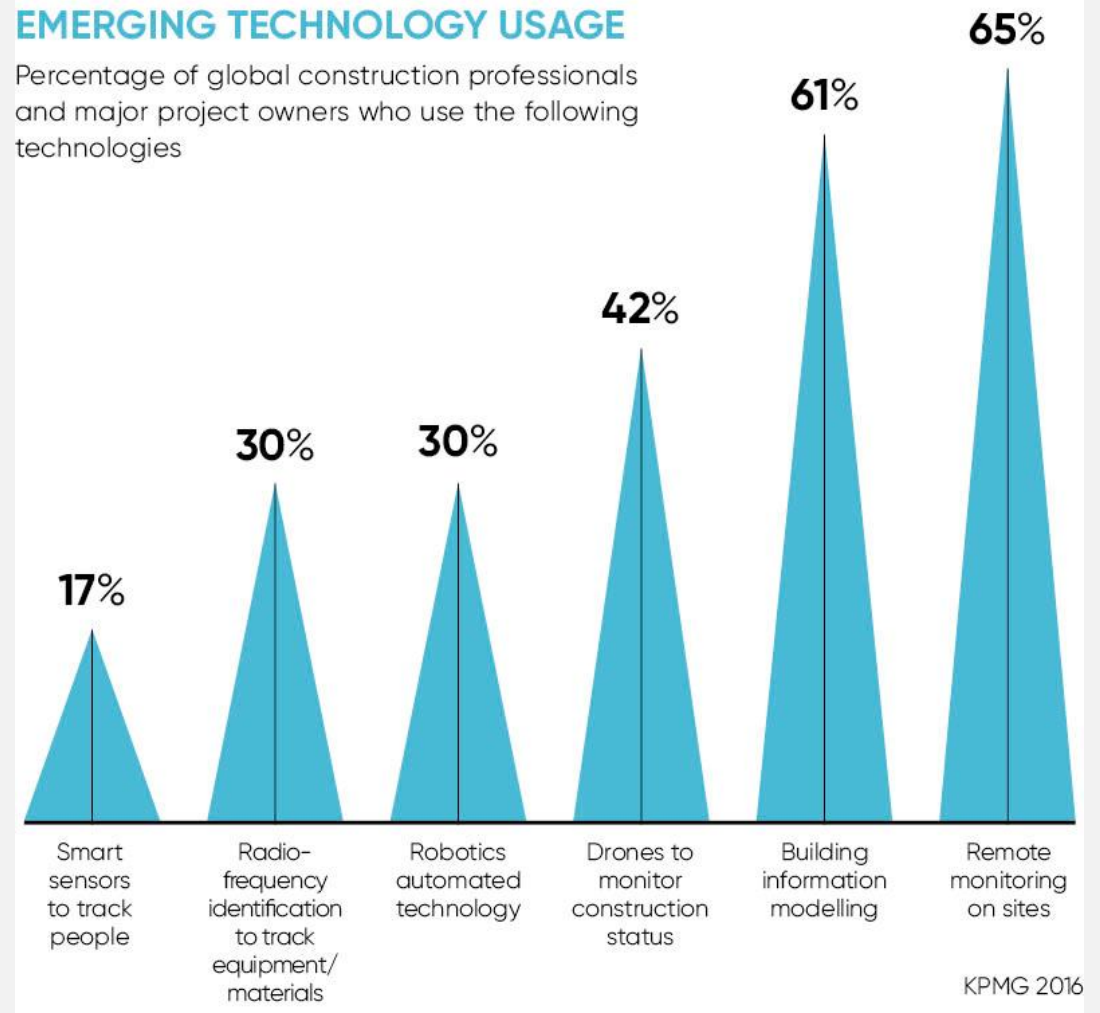
How To Tell If An Industry Is Ripe For Disruption?

- Power Is Consolidated
- Consumers Are Using Outdated Technology
- Business Practices Aren't Changing, Despite Negative Consumer Sentiment
- The Research Backs You Up

Source: <https://medium.com/swlh/4-ways-to-tell-if-an-industry-is-ripe-for-disruption-b599f657c788>

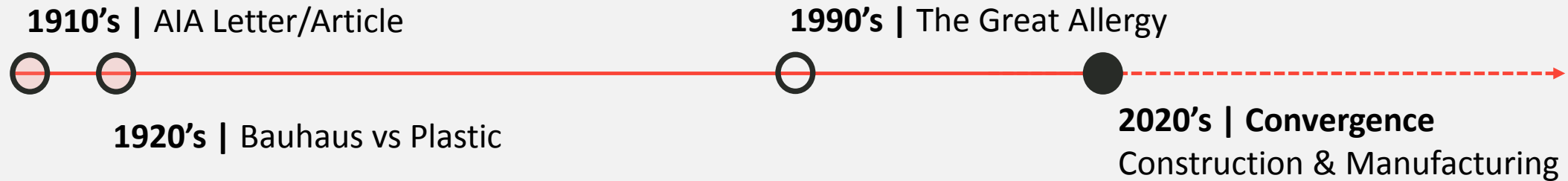
EMERGING TECHNOLOGY USAGE

Percentage of global construction professionals and major project owners who use the following technologies



3. An Inconvenient Truth

Some Context



- 20th century business solutions & structure vs iPhones & Netflix @ home
- Is the tinfoil hat & sinking-ship theory accurate?
- Outdated conventions
- Shifting focus from procedures & technical production towards human values
- At the crossroads of digital humanism

- Are we leaders or followers?
- Decades of trying to quantify value
- Human nature usually opposes disciplined critical-thinking due to our inherent bias
- Good professional judgement = Opinion
- Prescriptive solutions
- Let's get up to speed on some vocabulary

There's a new architecture style that's sweeping the nation:



Developer Modernism

(also known as "Beige Box Revival", "Earth Tones n' Rectangles", "Normcore")

'18

3. An Inconvenient Truth Towards a Future Workflow?

A digital future -

"In five years machine learning will enable computers to make the kinds of aesthetic choices that humans make today - the more on the production end of the spectrum, the more quickly it will happen. This will enable massively more personalized experiences."

- Matias Duarte, Google's VP of Design

The Perennial Concern -

"Many of the fastest-growing occupations will be in the areas of technology (e.g., software developers) [...]" and concludes indicating "A 2015 AIA survey of firms looking to fill architectural positions found that more than half reported that finding candidates with either the required technical skills [...] was a major problem, [...]. And this concern does not appear to be easing"

-K. Baker Hon. AIA, Architect Magazine
(2018, January 5)

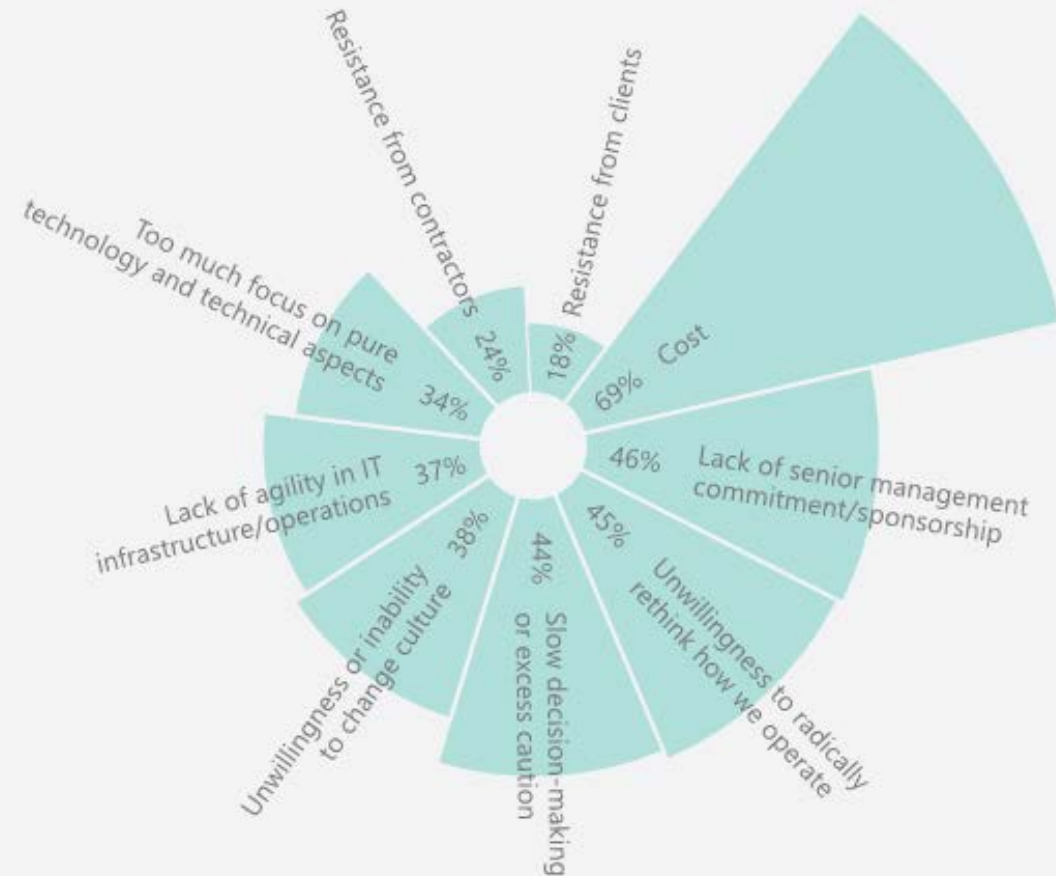
3. An Inconvenient Truth

Looking for a Job 2020's-2030's

Who's Missing?

- Augmented Reality Designer
- Avatar Programmer
- Chief Design Officer
- Chief Drone Experience Designer
- Digital Conductor
- Embodied Interactions Designer
- Human Organ Designer
- Machine-Learning Designer
- Realtime 3D Designer
- Simulation Designer
- UBER Driver...

What would you say are the biggest challenges for architectural practices/ organisations wanting to transform into a digital business?



Source: Fast Company & RIBA/Microsoft

3. An Inconvenient Truth

Biggest Challenges

- Can we compete in hyper-connected, data-driven, adaptive, economy?
- How do we get a seat at the table?

Figure 5. The skills challenge

What would you say are the biggest challenges for architectural practices/ organisations wanting to transform into a digital business?



48%
Lack of digital skills
company-wide

Figure 6. Digital technologies bring improved efficiencies

What would you say are the main benefits of adopting digital technologies in your organisation?



79%
To optimise
project efficiency



63%
To optimise our
internal business
efficiency

3. An Inconvenient Truth

Relevance is Challenging



- Adaptation speed vs market relevance
- We are “producers of drawings” & “race-to-the-bottom” strategy.
- Low margin/productivity/scalability
- Highly segmented knowledge framework
- Practices are a detriment to their scope, stability, connectedness, effectiveness, and resiliency of their businesses.
- An expanded view of practice
- Beyond “what” focus on “how” we will practice

Report Sources: RIBA/Microsoft

A'18 AIA Conference on Architecture 2018
June 21-23, New York City

3. An Inconvenient Truth Digitalization

- 1 Knowledge-intensive sectors that are highly digitized across most dimensions
- 2 Capital-intensive sectors with the potential to further digitize their physical assets
- 3 Service sectors with long tail of small firms having room to digitize customer transactions
- 4 B2B sectors with the potential to digitally engage and interact with their customers
- 5 Labor-intensive sectors with the potential to provide digital tools to their workforce
- 6 Quasi-public and/or highly localized sectors that lag across most dimensions

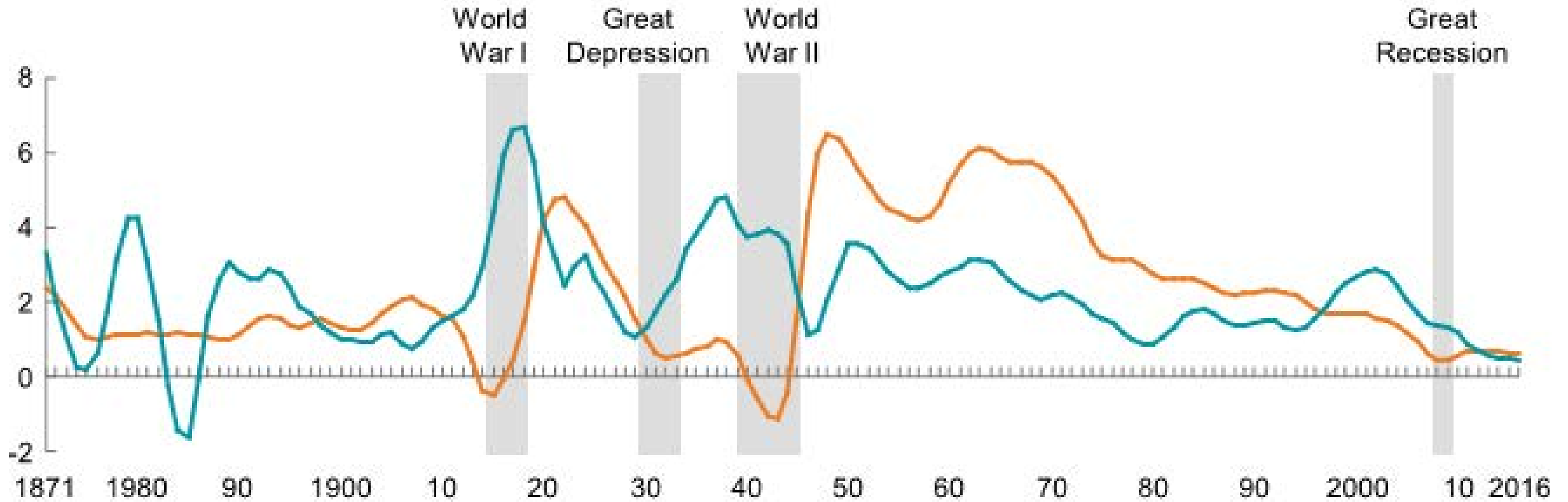
Report Sources: McKinsey

A'18 AIA Conference on Architecture 2018
June 21-23, New York City

Sector	Over-all digitization ¹	Assets			Usage			Labor			GDP share %	Employment share %	Productivity growth, 2005–14 ² %
		Digital spending	Digital asset stock	Transactions	Interactions	Business processes	Market making	Digital spending on workers	Digital capital deepening	Digitization of work			
ICT											5	3	4.6
Media		1									2	1	3.6
Professional services		1									9	6	0.3
Finance and insurance											8	4	1.6
Wholesale trade					4						5	4	0.2
Advanced manufacturing					4						3	2	2.6
Oil and gas		2									2	0.1	2.9
Utilities		2									2	0.4	1.3
Chemicals and pharmaceuticals											2	1	1.8
Basic goods manufacturing											5	5	1.2
Mining											1	0.4	0.5
Real estate	●										5	1	2.3
Transportation and warehousing	●										3	3	1.4
Education	●										2	2	-0.5
Retail trade	●				3						5	11	-1.1
Entertainment and recreation											1	1	0.9
Personal and local services											6	11	0.5
Government	●										16	15	0.2
Health care											10	13	-0.1
Hospitality	●	6									4	8	-0.9
Construction											3	5	-1.4
Agriculture and hunting											1	1	-0.9

Trend line of labor productivity growth, total economy
% year-over-year

— Europe¹ — United States



Report Sources: McKinsey

4. Is the End Near / Here?

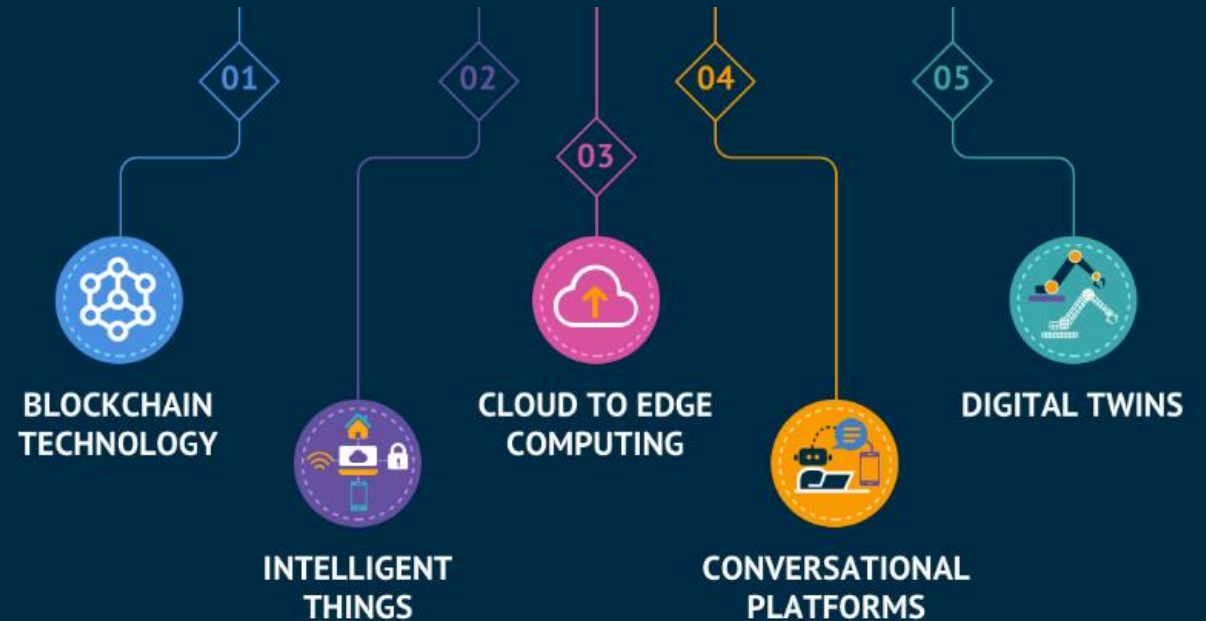
Tech trends to watch for

Technological Singularity Theory –

[...] where inventions which will abruptly trigger runaway technological growth, resulting in unfathomable changes to human civilization

[...] there's a real opportunity to develop a myriad of practice models fully-empowered by their digital arsenal

-L. Grozdanic, *How to Win Clients and Make Money: New Business Models for Architects*, Archipreneur



www.xcubelabs.com

Email: connect@xcubelabs.com

Phone No: 1-800-805-5783

BLOCKCHAIN TECHNOLOGY

A decentralized and distributed digital ledger that is used to record transactions across many computers so that the record cannot be altered retroactively without the alteration of all subsequent blocks and the collusion of the network.

WHAT ARE THE TOP 5 AREAS OF APPLICATION



WHY THIS TECHNOLOGY MUST BE EMBRACED?



NUMBERS TELL THE STORY



INTELLIGENT THINGS

A combination of AI and machine learning intelligence that works semi-autonomously or autonomously in an unsupervised environment for a set amount of time to complete a particular task.

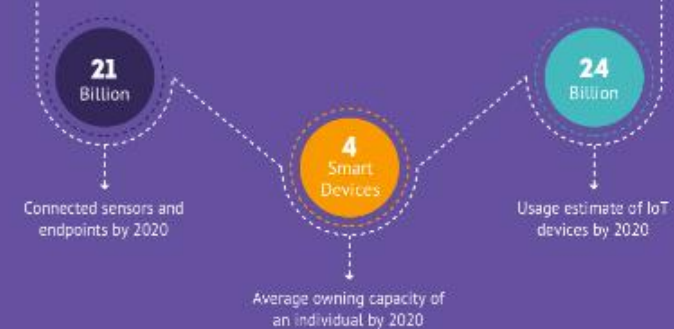
WHAT ARE THE TOP 5 AREAS OF APPLICATION



WHY THIS TECHNOLOGY MUST BE EMBRACED



NUMBERS TELL THE STORY



CLOUD TO EDGE COMPUTING

Processing and analyzing data closer to the source of where that data is collected. It enables companies to capture, store, and process data without having to worry about scaling servers and databases.

WHAT ARE THE TOP 5 AREAS OF APPLICATION



WHY THIS TECHNOLOGY MUST BE EMBRACED

Quicker response time & economically beneficial

Enhanced application performance

Provides real-time analysis of data

Minimized network latency issues

Improved data security

NUMBERS TELL THE STORY



CONVERSATIONAL PLATFORMS

A high-level design model and execution engine in which user & machine interactions occur with the help of AI & NLP to build natural and rich interactions between your users and your business.

WHAT ARE THE TOP 5 AREAS OF APPLICATION



WHY THIS TECHNOLOGY MUST BE EMBRACED

Streamlined customer experience

Simplified complex interactions

Convenient & re-engageable

Time-Saviour

Personalized marketing & sales

NUMBERS TELL THE STORY



DIGITAL TWINS

A virtualized dynamic representation of an industrial process, product or a service in an encapsulated software object or model that mirrors a unique physical object. It uses the combination of data & intelligence to predict and optimize the performance of their industrial asset via simulations.

WHAT ARE THE TOP 5 AREAS OF APPLICATION



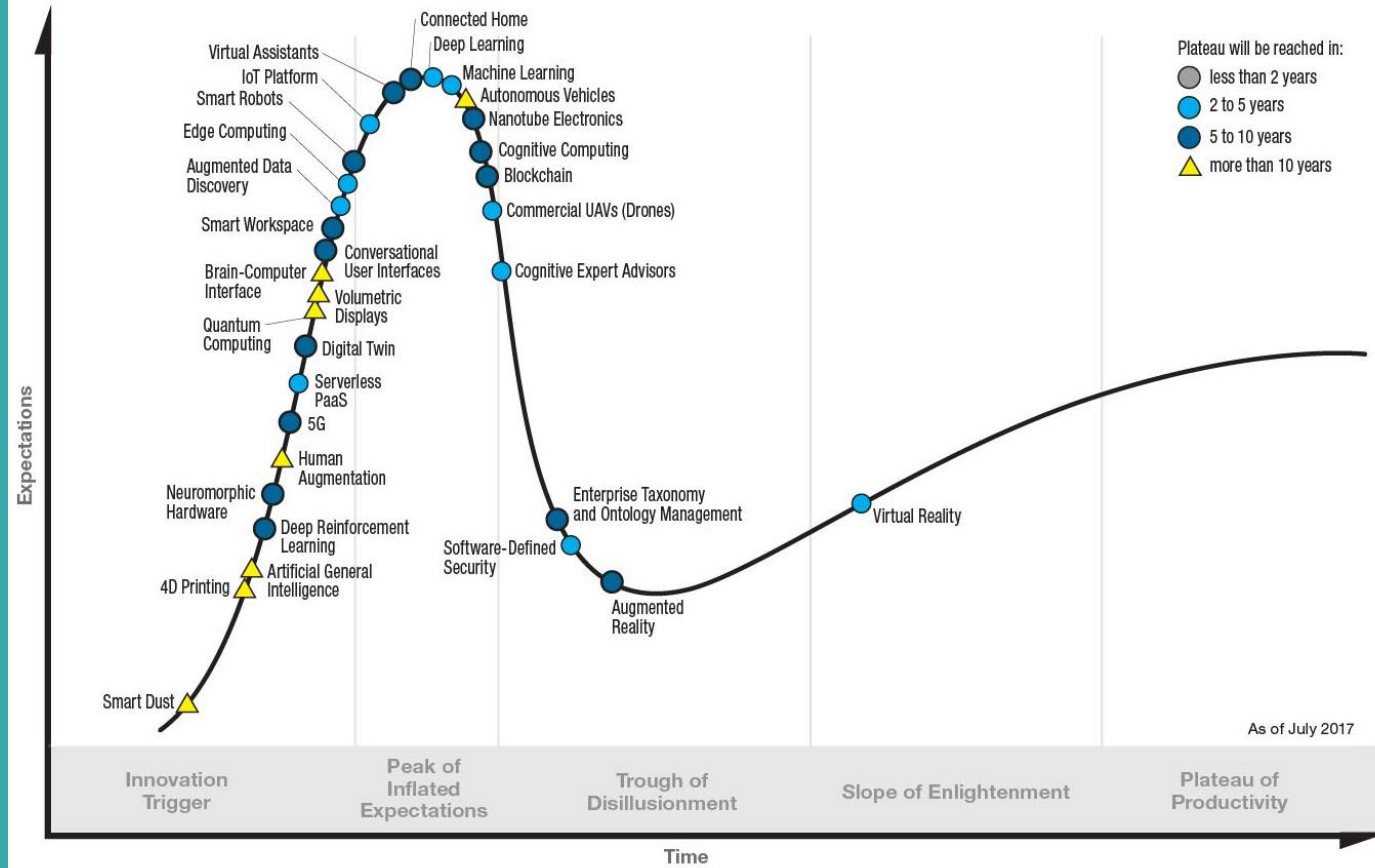
WHY THIS TECHNOLOGY MUST BE EMBRACED



NUMBERS TELL THE STORY



Gartner Hype Cycle for Emerging Technologies, 2017



5. Disruption in the AEC Industry

Shifting Traditional Values

- Democratization of Tools
- Blurring “public vs private”
 - Crowdfunded projects
- IoT > IoS & SaaS > SpaaS
- Good design vs good judgment
- User’s Needs > Business Processes
- Documentation vs Designing
- Discarding tools that slow us down



5.1 Disruption in the AEC Industry

Main Disruptors

Personalization

- Common vector for IoT
- Easily-accessible tools

Usage-based pricing

- Customers charged actual use
- Allows elimination of “broad strokes”
- Provide services at varying increments

Closed-Loop Systems

- Using business data and establishing partnerships
- Reduce operational costs
- Repurpose assets & services
- Smart tools (image processing AI)

Tactics

Players



IOTAS

wework
welive



5.2 Disruption in the AEC Industry

Main Disruptors

Tactics

Collaborative Ecosystems

- Partner w/ Stakeholders
- Leverage Non-traditional Players
- Manufacturing & AEC Converges
- Asset-Sharing Platforms

Software as a Service (SaaS)

- Contractual Documents Authentication (Blockchain)
- Unlock gains through procurement processes (Blockchain)
- Cloud-deployed services

Agile & Data Analytics

- Develop new applications
- Support real-time adaptation and decision-making.
- AEC firms sit on a mountain of untapped data
- Quantify & qualify value of work

Players



Trimble Connect



PlanGrid



CORE | **Thornton Tomasetti**



5.3 Disruption in the AEC Industry

Main Disruptors

Tactics

Haptic Interfaces

- AR/VR/MR allow users to interact using movements & senses
- Passive gestural controls
- Voice-activated solutions
- Facial recognition technology

Smart Materials

- Self-healing concrete
- Kinetic paving
- 4D structures (which reshape over specified conditions)
- Photo-catalysts (smog inhibitors)

Artificial Intelligence

- Data Analytics
- Generative Design
- On-the-fly building-code research
- Automatic space planning

Players

**ARCHITECTURAL
BIOMETRICS**

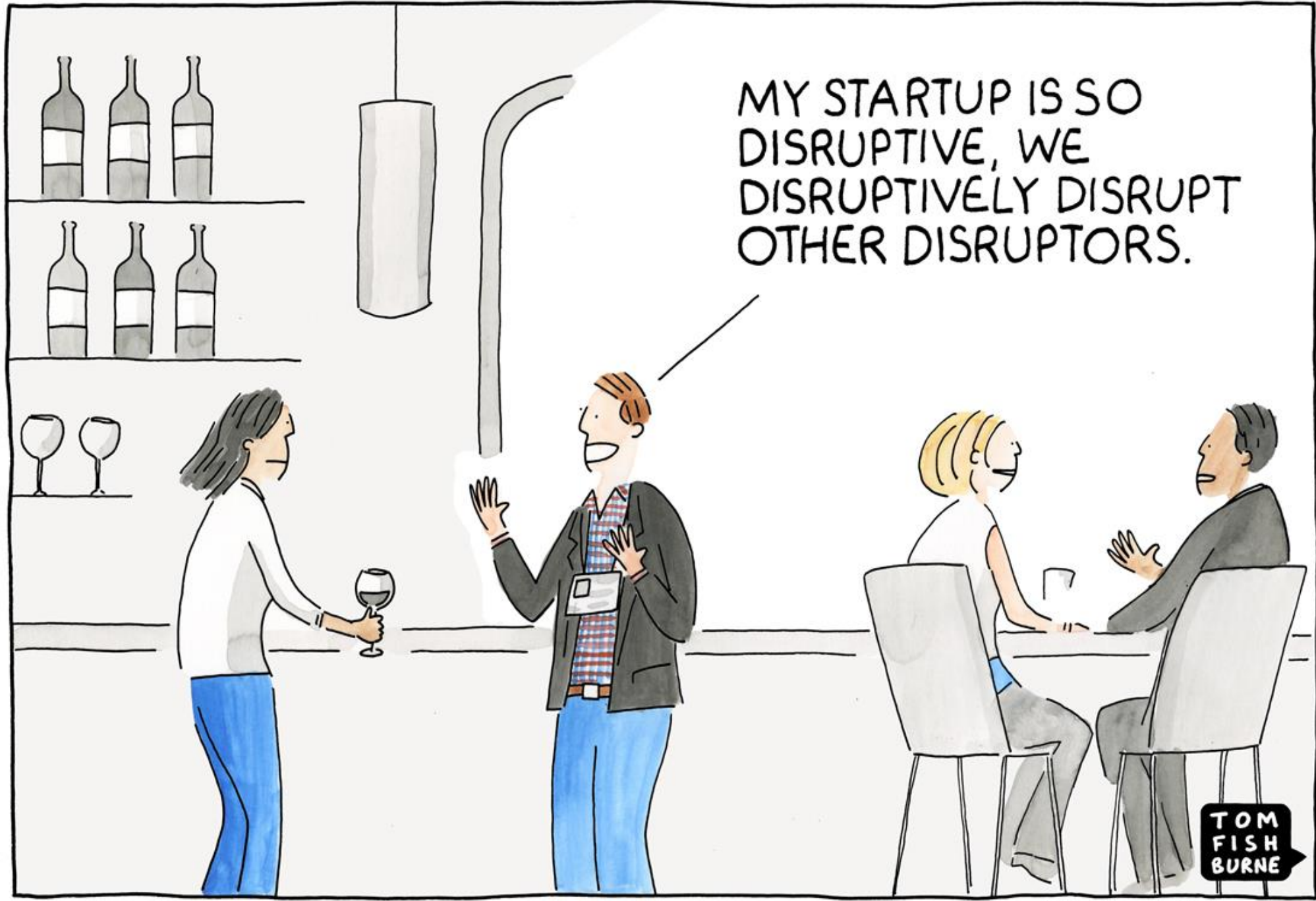


Basilisk
self healing concrete

Project Virga

Machine Learning Applied to
Your Past Projects to Enable
Advanced Automation

MY STARTUP IS SO
DISRUPTIVE, WE
DISRUPTIVELY DISRUPT
OTHER DISRUPTORS.



TOM
FISH
BURNE

6 Creative Yet Analog Benefits & Risks

- 99% | Data Created is Digital
- 2X | Amount of Data Generated Doubles Daily
- 91% | BIM Insights: More data could be leveraged to improve insights if it were digitally available
- Commoditization

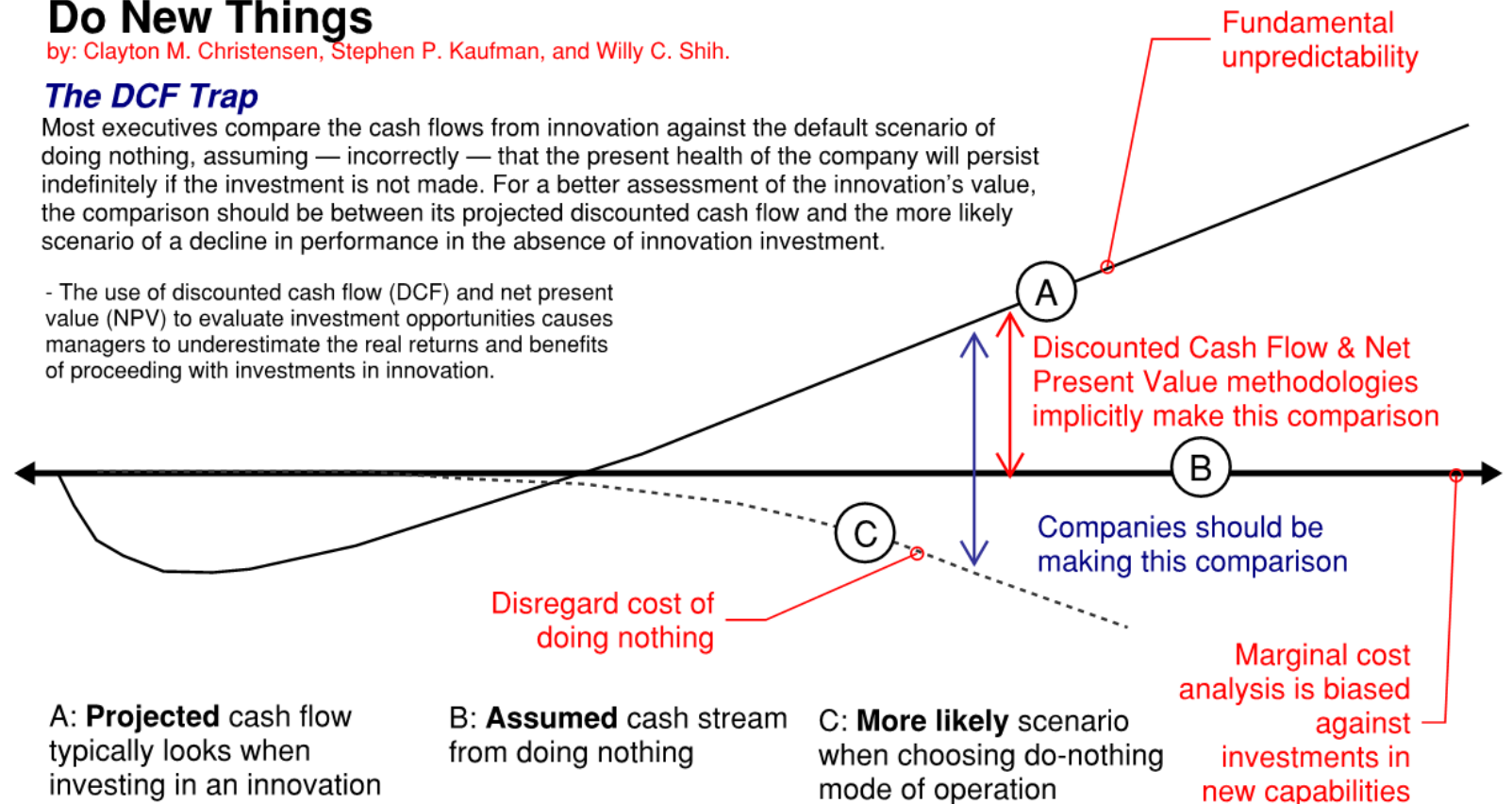
Tools Destroy Your Capacity to Do New Things

by: Clayton M. Christensen, Stephen P. Kaufman, and Willy C. Shih.

The DCF Trap

Most executives compare the cash flows from innovation against the default scenario of doing nothing, assuming — incorrectly — that the present health of the company will persist indefinitely if the investment is not made. For a better assessment of the innovation's value, the comparison should be between its projected discounted cash flow and the more likely scenario of a decline in performance in the absence of innovation investment.

- The use of discounted cash flow (DCF) and net present value (NPV) to evaluate investment opportunities causes managers to underestimate the real returns and benefits of proceeding with investments in innovation.



A: **Projected** cash flow typically looks when investing in an innovation

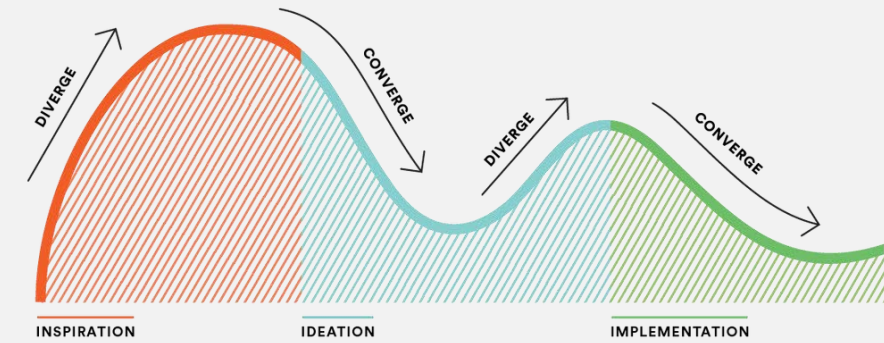
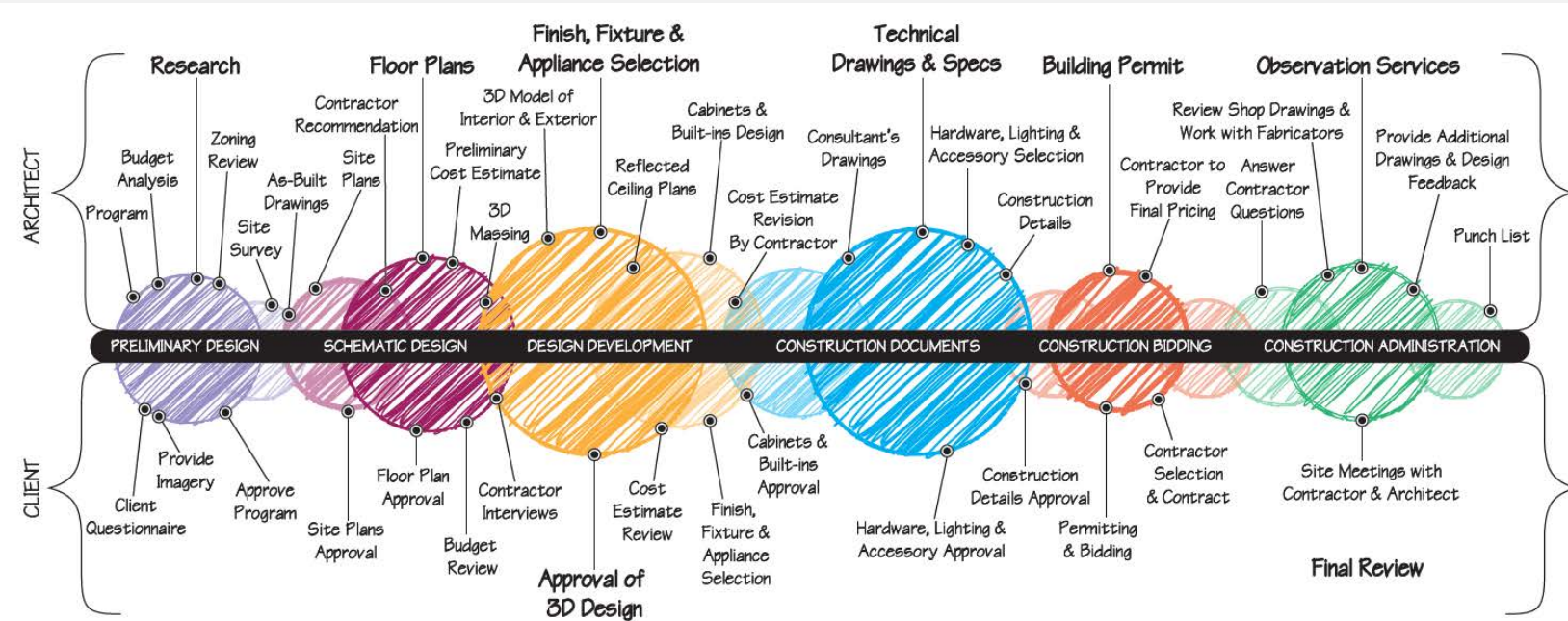
B: **Assumed** cash stream from doing nothing

C: **More likely** scenario when choosing do-nothing mode of operation

- The projected value of an innovation must be assessed against a range of scenarios, the most realistic of which is often a deteriorating competitive and financial future.

- More often than not, failure in innovation is rooted in not having asked an important question, rather than in having arrived at an incorrect answer.

6 Creative Yet Analog Design-Thinking Usurped

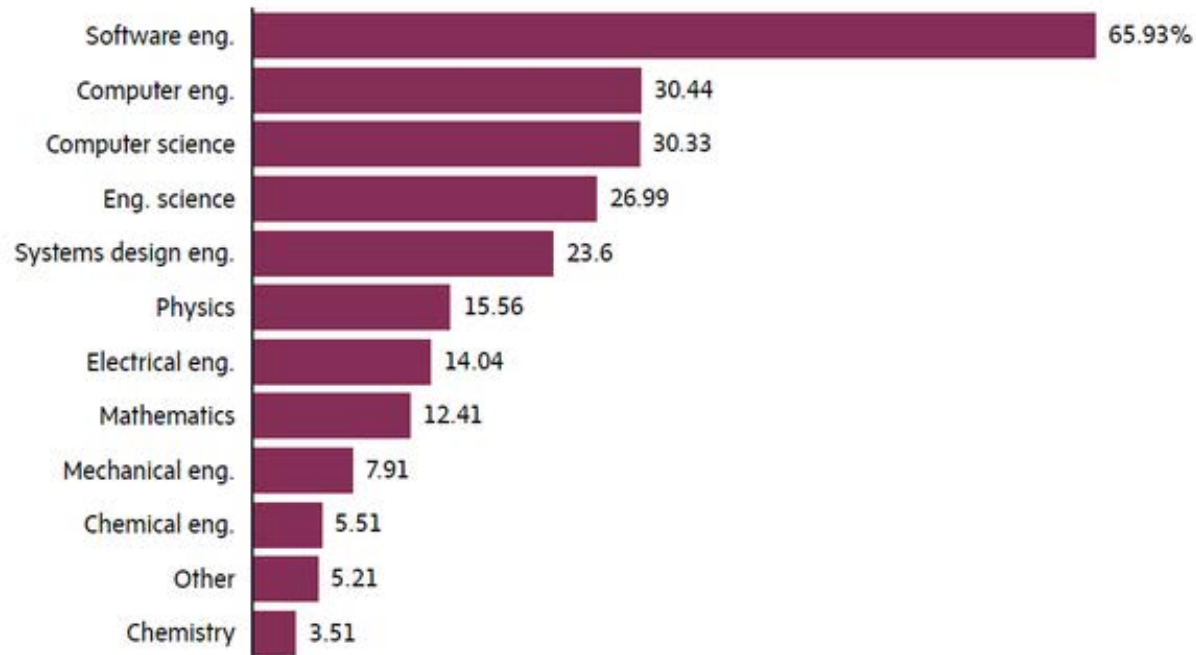


6 Creative Yet Analog Tech Poaching Talent?

Skills in Architecture + Tech =
“Alternative Career Path”

Migration to U.S. by academic program

Percentage of recent graduates that went to the U.S., based on the report's sample of graduates from three Canadian universities

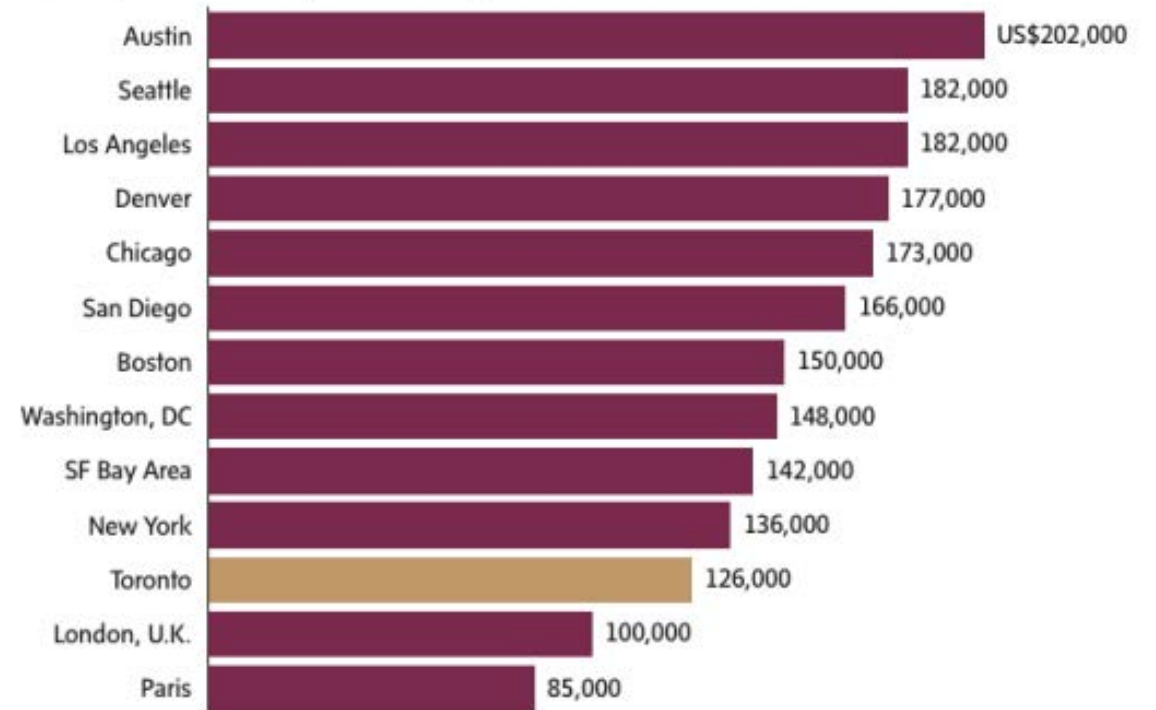


THE GLOBE AND MAIL, SOURCE: SPICER, OLMSTEAD AND GOODMAN

DATA SHARE

Average adjusted tech worker salary in 2017

Figure adjusted for each city's cost of living relative to that of San Francisco

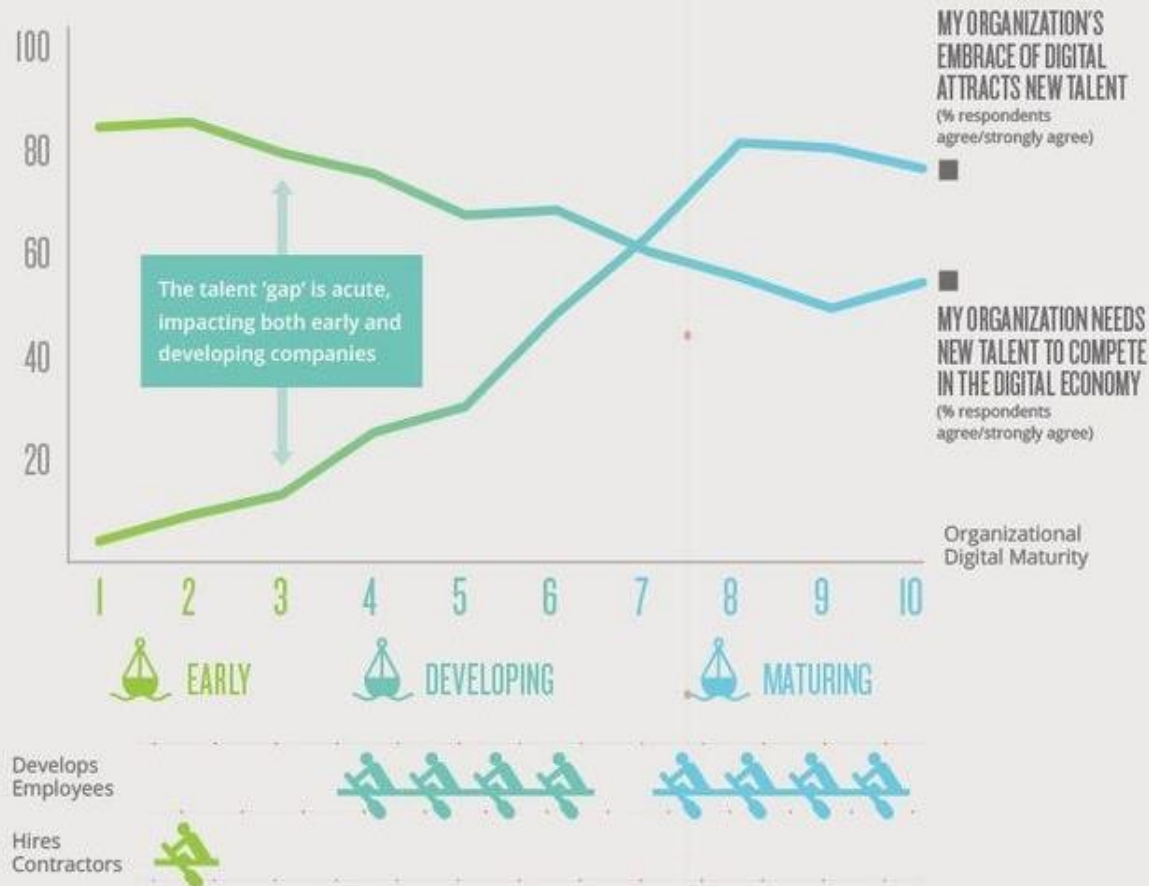


THE GLOBE AND MAIL, SOURCE: HIRED

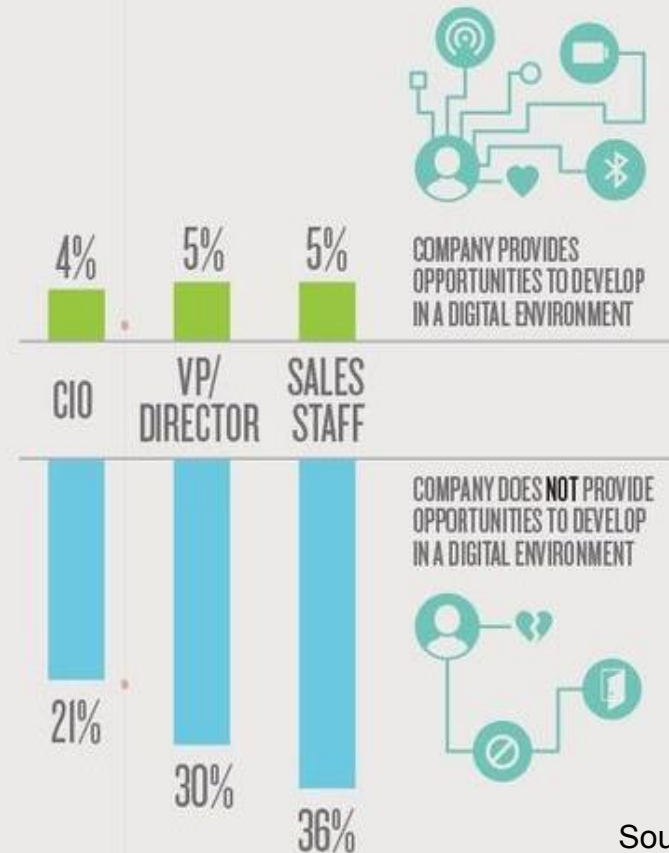
DATA SHARE

6 Creative Yet Analog Where's Everyone Going?

How is my organization strengthening digital innovation capabilities?

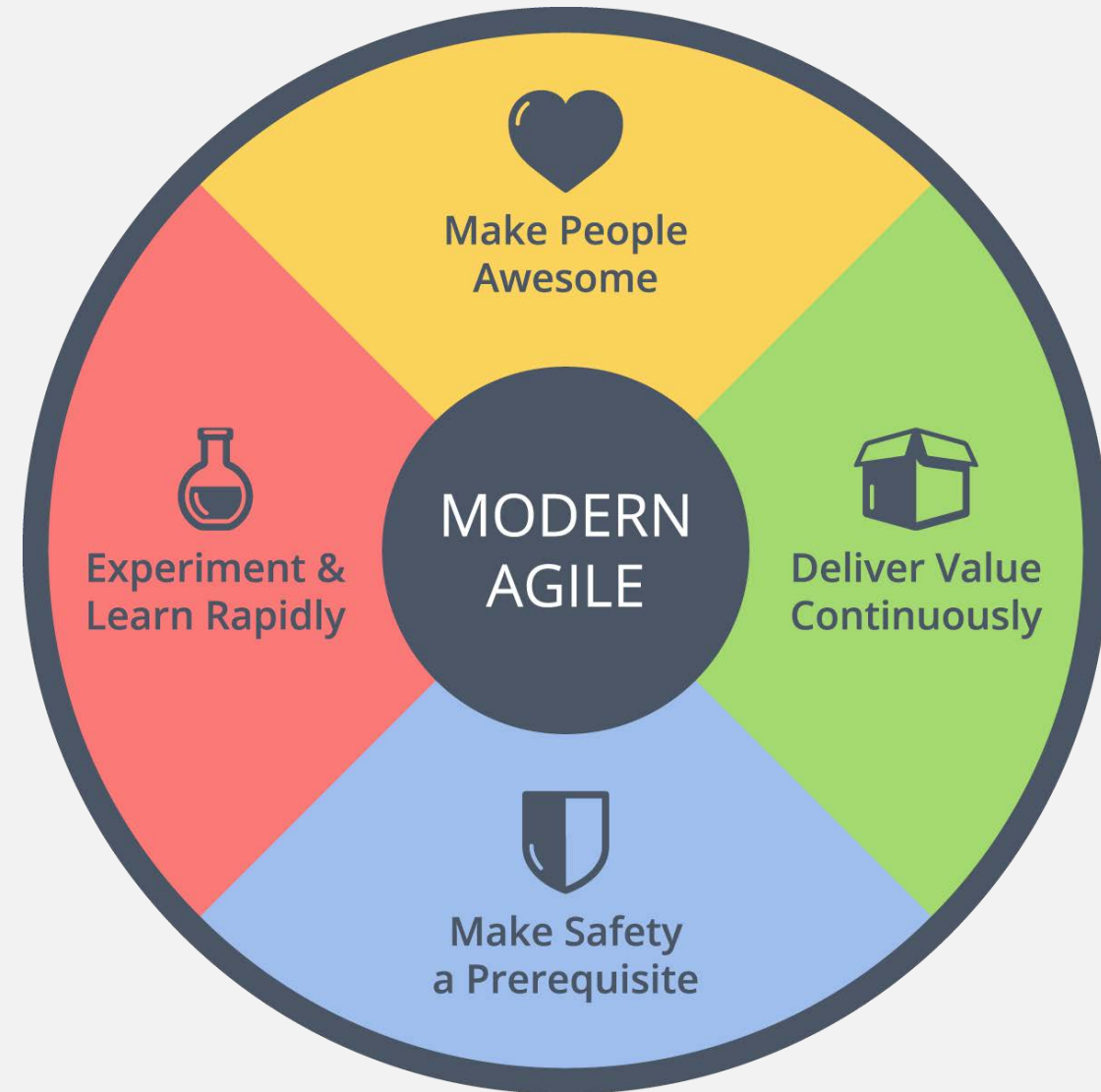
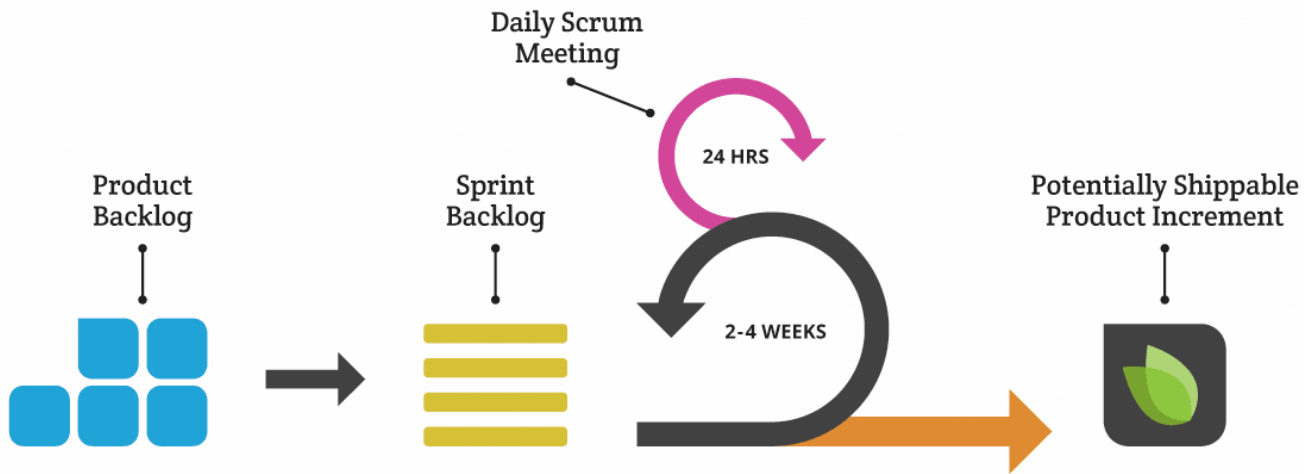


Plan to leave their organization in less than one year, given digital trends:



Source: MIT Sloan & Deloitte

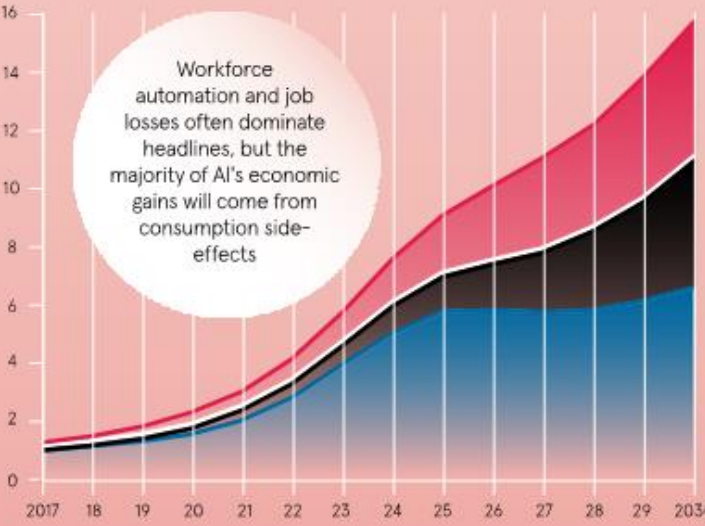
6 Creative Yet Analog Lean / Agile Architecture



Where value gains will come from

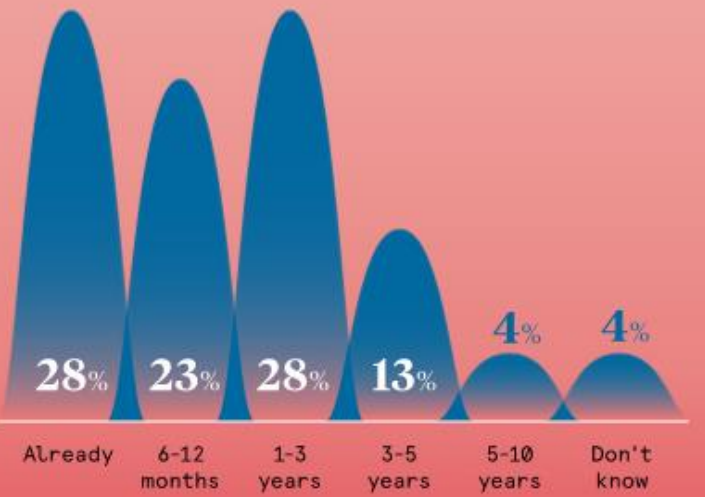
Impact on global GDP by effect of AI (£trn) PwC 2017

◆ Labour productivity ◆ Personalisation ◆ Time saved ◆ Quality



Return on investment

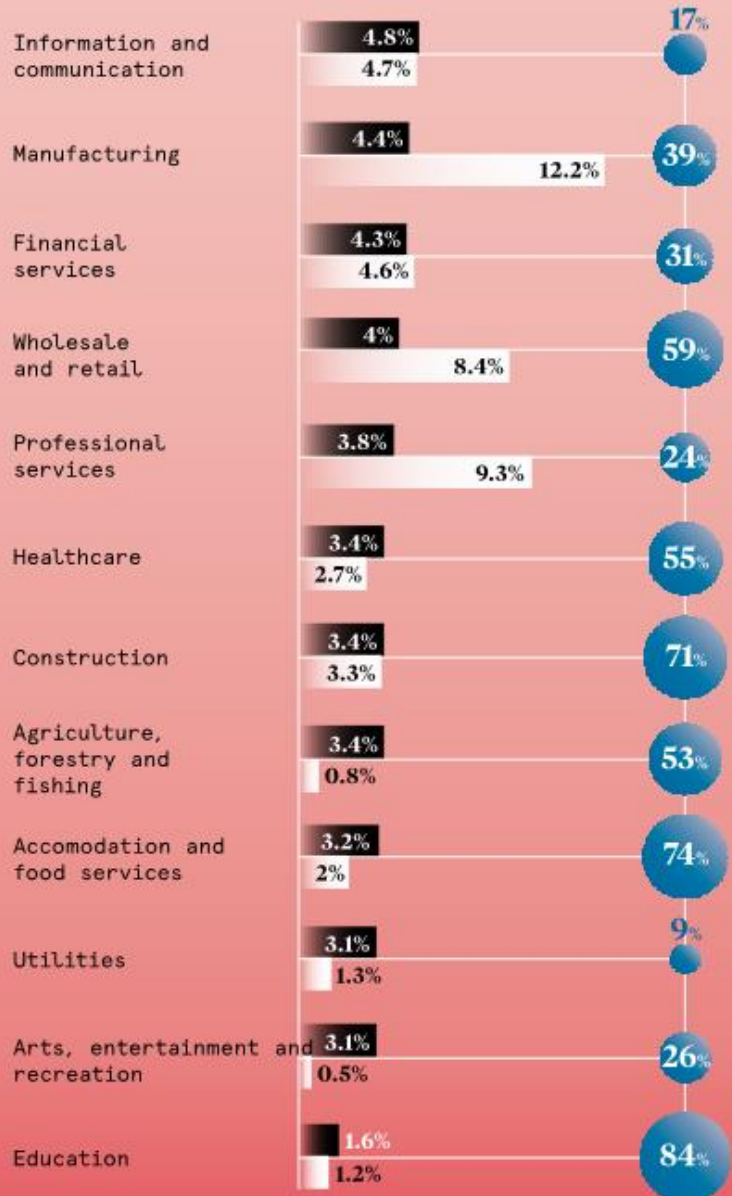
How long businesses believe it will take to realise tangible returns on their AI implementation AI Business 2018



Sectors to benefit from AI

AI's estimated impact on industry growth by 2035, under a steady state adoption/implementation scenario Accenture 2017

◆ Industry growth ◆ Industry output ◆ Share of estimated profit increase by 2035 attributable to AI



1.8%



Architects, Except Landscape and Naval

SOC CODE: 17-1011.00

Plan and design structures, such as private residences, office buildings, theaters, factories, and other structural property.



52%



Architectural and Civil Drafters

SOC CODE: 17-3011.00

Prepare detailed drawings of architectural and structural features of buildings or drawings and topographical relief maps used in civil engineering projects, such as highways, bridges, and public works. Use knowledge of building materials, engineering practices, and mathematics to complete drawings.



7 A Way Forward Taking Advantage of it All

Business Focused Approach

- Adopt New Processes
- Drop Non-Performing Services
- Fail Quickly

Include & Empower Staff

- Partner with them?
- In-house R&D team?
- Hire them?
- Incubate them?

YAF's Practice Innovation Lab (PIL)

- Importance of Program
- 5 Viable Business Models
- Follow up?

A'18 AIA Conference on Architecture 2018
June 21-23, New York City

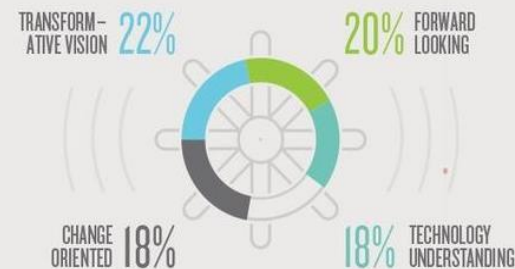


Leadership

STEADY AT THE HELM

Leaders with vision are critical to driving digital changes.

Most important leader skill:

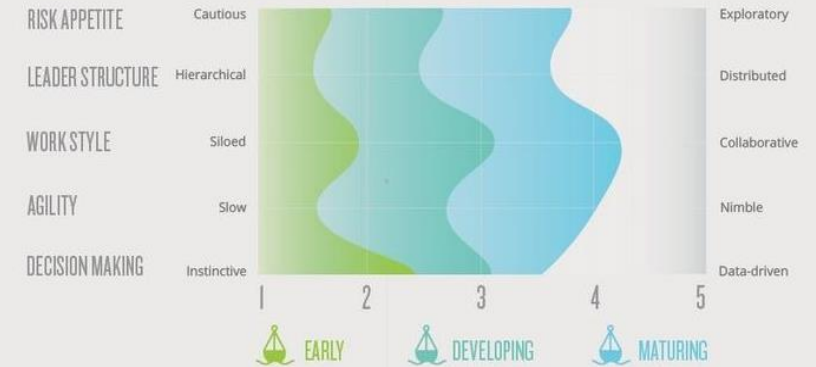


Culture

CORPORATE DIGITAL CULTURE MATTERS...A LOT.

Motivating cultural traits are shared across maturing companies.

An organization's culture:



Effective change management is imperative to making the transformation from “doing” digital things to “becoming” digital.

F I N I S H

F I N I S H

“Time frames greater than 10 years may be needed in a digital environment.”

John Hagel, co-chairman of the Center for the Edge at Deloitte

Silicon Valley companies follow a ‘Zoom Out and Zoom In’ approach:

Consider a



time horizon by defining what the market will likely look like and what customers will expect.

Address the next

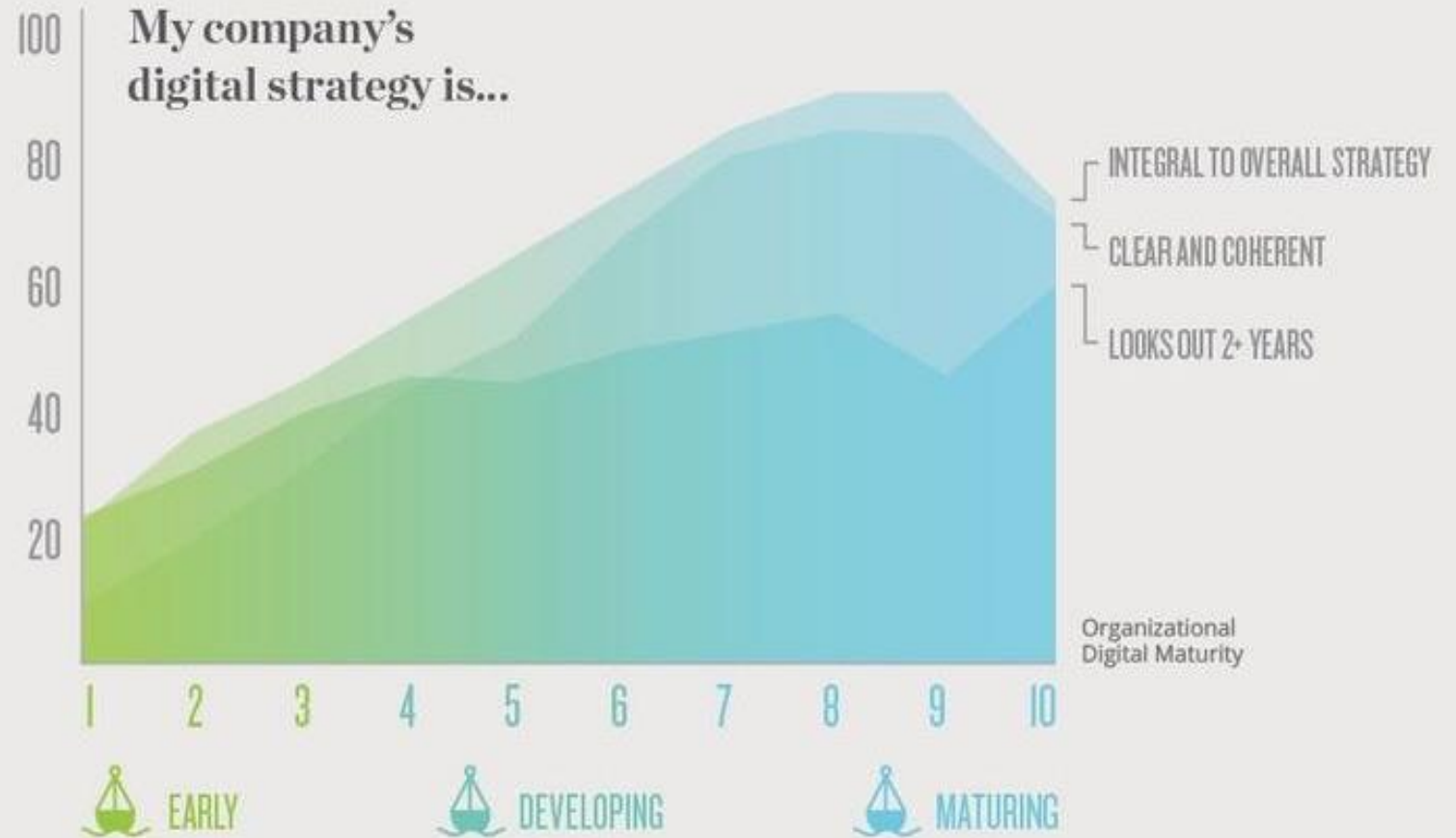


and identify the two or three business initiatives that will have the greatest potential to accelerate movement toward the longer-term destination.

Strategy

WHERE DO YOU GO FROM HERE?

Take a long-term view. Longer than that. No, even longer.

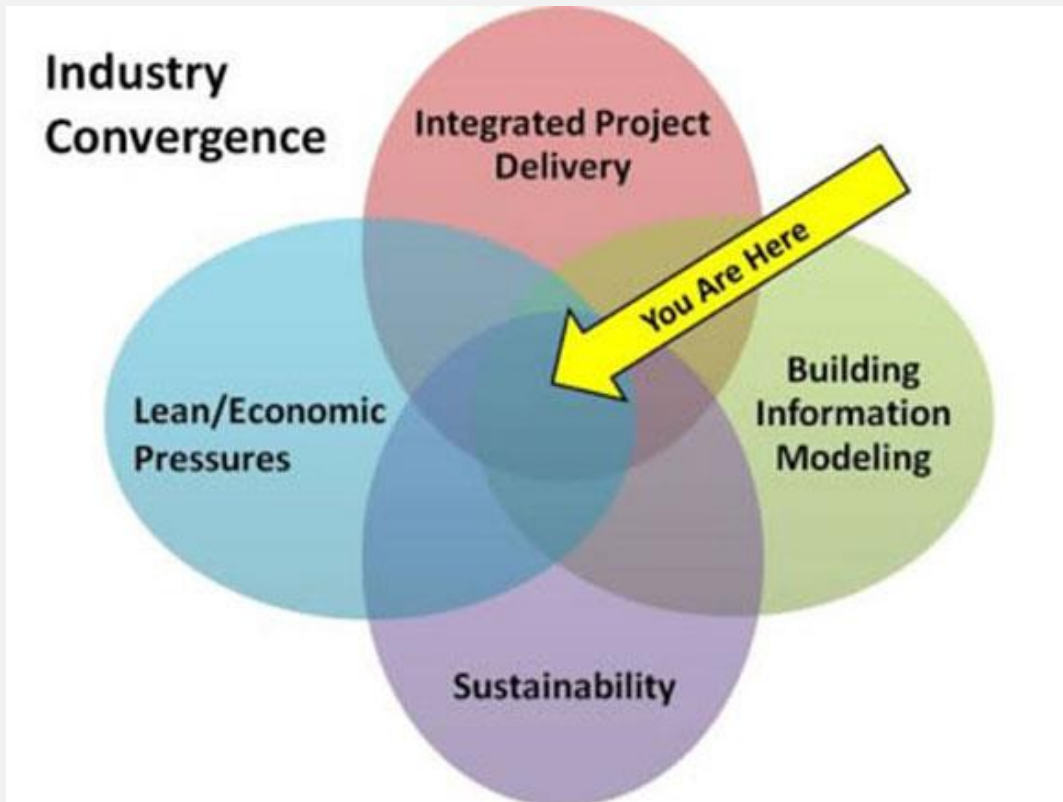


APPLIED INNOVATION MODEL



8 The Emerging Value Chain

Data is KING | Putting it All Together



- Artificial Intelligence (AI)
- Smart Platforms
 - Prescriptive Solutions
 - Iteration Development
 - Digital Bots
- Blockchain & Cryptocurrency
- Combined workflows
 - 360 cameras + drones + AI + cloud computing = **autonomous aerial inspection**
 - Natural Language Processing (NLP) + blockchain = **smart contracts**
 - AI + biometrics = **real-time safety & welfare**
 - 3D printing + machine learning + robotics = **adaptive manufacturing**
- Data-driven workflows
 - Services, Products, Methods, & Markets
 - Identifying relationships through meta-data
 - Responsiveness
 - Untapped opportunities & Unknown problems
- Leveraging BIM methodology
 - Models > Data-Vehicle
 - Moving into 4D, 5D, 6D
 - Construction scheduling
 - Facilities Management
 - Lifecycle costs
 - Sustainability

SUSTAINING vs ORIGINATING

Simple Strategic Activities help drive & sustain innovation. Activity fit is key to Continued Success. A depreciation process enables shifting the focus to a strategic approach and the activities which support the end-product

ORIGINATING PRACTICES

- Unknown Talent working on Known Issues
- Setting Technical Leadership as a Constant
 - Consistent Leadership
 - Combined Experience & Knowledge



SUSTAINING TACTICS

- Work/Design Across Multiple Mediums
 - Mutual Reinforcing
- Concentric Topics / Stories
- Interconnected
- Delivery & Production Timeline
 - Advance Planning
 - Communicate Constantly to Create Users



MARVEL

**CINEMATIC
UNIVERSE**

1. SOPHISTICATED DISCOURSE

Departure from Mainstream
Plant Ideas

2. FROM ONE, MANY...

Established Roles
Autonomy (Solo / Side Projects)
Innovative Contracts (Free-Agent)

**CLEAR
GOAL vs
ADAPTIVE
PLAN**

A Five-Year Plan for World Domination

3. DISTINCT BRAND

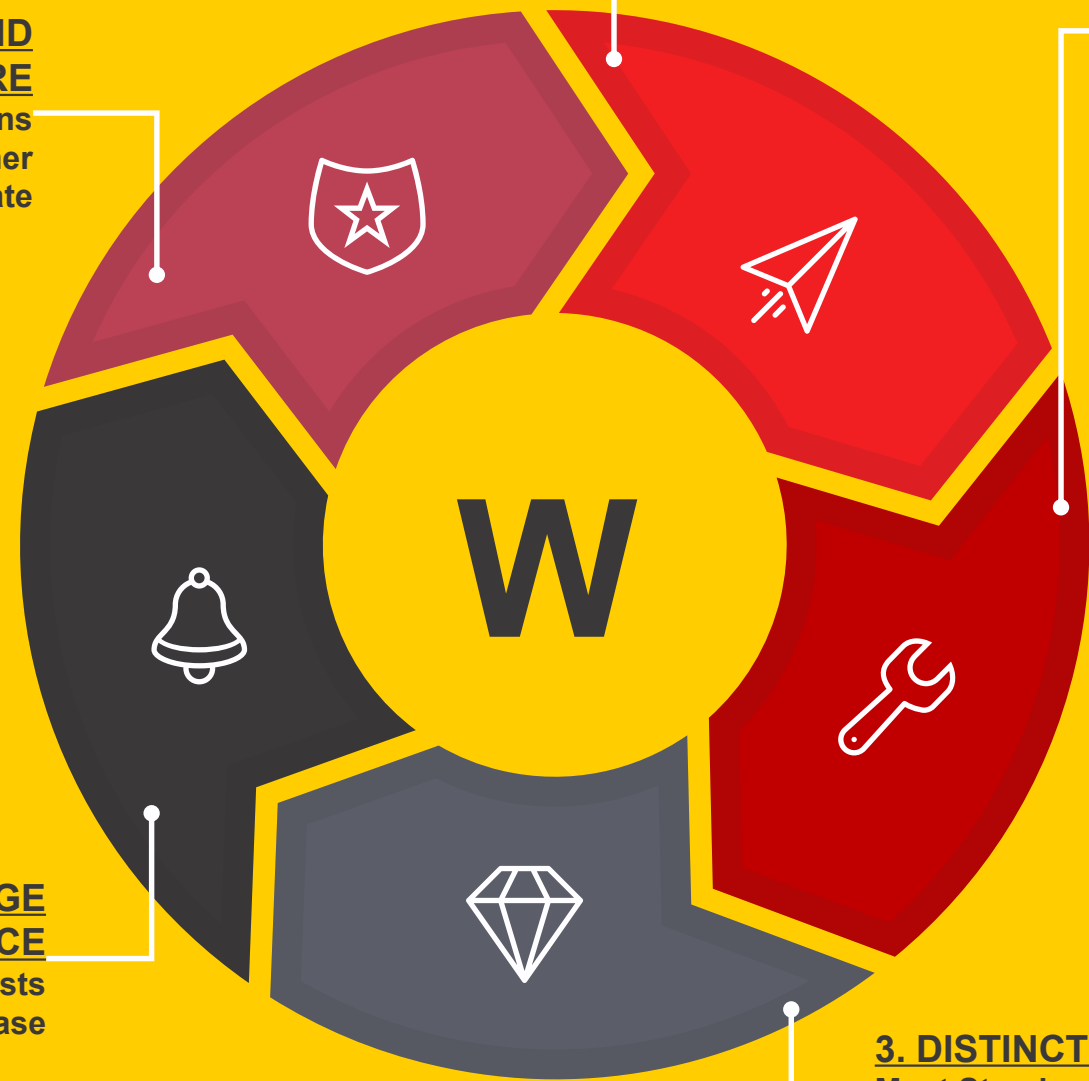
Must Stand out
Eclectic Signature
Prominent Artifacts / Collateral
Cross-Media

**5. TAKE BRAND
EVERYWHERE**

Infiltrate Other Organizations
Partner
Cross-Pollinate

**4. ACKNOWLEDGE
AUDIENCE**

Create Evangelists
Engage w/ User-base





'18

VI – Panel Discussion

Meet our Panelists

Israel Medina

Founder, VP of Design, Pair



Anthony Vanky, Ph.D.

Lecturer in Urban Design and Planning,
Massachusetts Institute of Technology (MIT)



Contact Information

Ricardo | @rjrds_arq

Israel | @lizzy_ux

Anthony | @avanky

WAKE UP.

KICK ASS.

REPEAT.

Thank you!