

Cutter Business Technology JOURNAL

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Management, Innovation, Transformation

“There is no shortage of new technologies, business strategies, or operating models for any organization ready to embrace a digital transformation.”

— the *Cutter Business Technology Journal* Team

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Cutter Business Technology JOURNAL

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Opening Statement



by the *Cutter Business Technology Journal* Team

The year 2018 is in full swing and the dizzying pace of new technology development, business strategies, and operating models hasn't relented. With digital disruption lurking around almost every corner, many organizations — ranging from large global powerhouses to small niche startups — are painstakingly busy evaluating their relevance and value not only within their own markets but in markets outside their sphere. Almost all are working toward making the necessary strategic changes to get in the game (and stay in it!) and ultimately rise above the competition.

As we do each year, we asked Cutter's team of experts to weigh in on some of the technologies, trends, and strategies that will truly make waves in the months to come. We hope the articles in this issue of *Cutter Business Technology Journal* help clarify your organization's path forward in today's digital economy.

In This Issue

First up, Harvard Business School Professor and Cutter Fellow Karim Lakhani highlights how a small number of "hub firms," such as Amazon, Alibaba, Facebook, Google, Apple, and Microsoft, are dominating and disrupting traditional businesses by leveraging their network-based strength to gain market share. Lakhani offers advice on competing with these hub firms and laments the need to examine future prospects in the context of the hub economy.

Next, Cutter Fellow Steve Andriole describes five accelerating trends to watch for in 2018 and predicts which ones will carry the most momentum, using a concrete score on a 1-5 scale. Andriole goes on to recommend paying very close attention to the companies providing the services you deeply depend on, as he warns of upcoming volatility in the technology industry itself.

In our third article, Carl Bate, Laurie Guillodo, Greg Smith, and Mandeep Dhillon detail four outcome-affecting trends for 2018 (i.e., "trends that impact the ability of a company to leverage emerging technologies in their business"). The authors illustrate how companies can turn these potential trend risks into positive business outcomes through "startup ways of working" and new opportunities in the coming year. In particular, they encourage a return to the principles of the Agile Manifesto and a hard look at the technology foundations.

With digital disruption lurking around almost every corner, many organizations are painstakingly busy evaluating their relevance and value not only within their own markets but in markets outside their sphere.

Next, Cutter Senior Consultant James Mitchell turns to the flurry of attraction in the past year in securing public cloud service providers. Further validating this trend, he predicts that "the trend across the globe will be to go 'all in' on just a handful of hyperscale public cloud providers." Mitchell further asserts that "this concentration of risk will become a focus of attention for those charged with mitigating 'black swan' risks to the global economy."

In our fifth contribution, Cutter Technical Consultant Nate O'Farrell introduces Nano (recently rebranded from RaiBlocks), a third-generation cryptocurrency that appears to make up for Bitcoin's and Ethereum's shortcomings with zero fees, instant transactions, and infinite scalability. He opines that Nano is one of a few third-generation cryptocurrencies that "can offer the technology and functionality needed to facilitate mass adoption and real-world use as an effective currency."

Kevin O'Leary shares O'Farrell's vision of Bitcoin's fate but has more faith in Ethereum's potential in 2018. He details some interesting plans in the works to develop smart contract applications on the Ethereum platform as well as a proof-of-stake (POS) mining process that will make Ethereum more efficient and environmentally friendly.

Next, Seán Nevin and Rob Gleasure discuss the rise in popularity of a new form of crowdfunding — initial coin offerings (ICOs). They believe the hype surrounding ICOs will continue through 2018 but will level off when crowdfunding platforms and traditional funding players become involved. Ultimately, as the authors suggest, legislative change like that imposed on traditional crowdfunding will need to be extended to cover the ICO market.

Cutter Senior Consultant Paul Clermont updates some predictions he made over the past couple years while adding four more, replete with their implications on our workforce and society. According to Clermont, "While 2018 may or may not be a watershed year for some specific technology or other ... the more interesting action will come from the public policy and perception arenas and in the evolution of business models."

As a follow-up to his article from last year's trends issue, Cutter Senior Consultant Alexandre Rodrigues expands on his commentary surrounding AGI — artificial general intelligence. AGI capabilities continue to

play an influential role in the business arena but as Rodrigues points out, there are two issues that companies need to firmly address: (1) setting realistic expectations for the technology and (2) various ethical challenges (with a need for more legislation and regulation).

In her article on business architecture, Cutter Senior Consultant Whynde Kuehn predicts that architecture will continue to play an essential role in the success of a business and, specifically, that the architecture role will elevate to one of a more strategic nature. She tells us that "business architects should challenge themselves to be not only architects, but also leaders and change agents — and develop value-added skills that complement the business architect role."

Next, Cutter Senior Consultant Balaji Prasad takes a broad look at the enterprise in 2018. He believes the enterprise is comprised of a core platform — the sum of multiple components. Some of the components that might play a role in the success of the enterprise include APIs, business architecture, agility, and "a return to the roots — to the people side."

Data governance, although not a new practice, is more critical than ever, according to Cutter Senior Consultant Claude Baudoin. A recent increase in privacy breaches, Internet of Things (IoT) data generation, and data residency challenges enforces the urgency to prioritize and address vulnerabilities and formulate a governance plan to responsibly manage enterprise data.

Finally, Dean Crowley and Oliver Browne stress the importance of the adoption of an industry-wide ontological standard within the financial industry. They believe this will prove useful for streamlining the reporting process and enabling an improved customer experience. The authors also feel that those organizations using an ontology will secure a competitive advantage over those who choose not to adopt one.

Clearly, there is no shortage of new technologies, business strategies, or operating models for any organization ready to embrace a digital transformation. We wish you the best of luck in your future business endeavors!

We would love to hear your thoughts on these trends and predictions, as well as any others you wish to add. Let us know in the comments section on our website (<https://www.cutter.com/article/business-technology-trends-and-predictions-2018-opening-statement-498441>).



Upcoming Topics

AI: Trends, Opportunities, Challenges

San Murugesan

**Disciplined Agile:
The Roadmap to Business Agility**

Scott Ambler

Blockchain Technology

Phil O'Reilly

**Transforming the
Customer Experience**

Jeanne Bliss



The Era of the Hub Economy

by Karim Lakhani

Business models for creating and capturing value are shifting, giving rise to the new “hub economy,”¹ in which networks and data are the organizing principles. This, in turn, is creating a winner-take-all world, where a small number of hub firms, such as Amazon, Alibaba, Facebook, Google, Apple, and Microsoft, dominate. The hub economy is disrupting traditional businesses — from retail to automotive, hospitality to health, manufacturing to finance — across the spectrum.

The nature of competition in the hub economy versus the economy of the past drives much of the change. While increasing its customer base offers traditional product and service firms clear advantage early on, this competitive advantage diminishes after a certain point, making ongoing competition possible. In contrast, platform businesses like Amazon and Google benefit from increasing returns as their user base grows. Moreover, successful hub economy firms can leverage their network-based strength to enter and win in new markets, as Amazon has demonstrated repeatedly.

A Digital Domino Effect

Three principles underlie this new economic world:

1. **Moore’s Law.** Intel cofounder Gordon Moore observed that the number of transistors per square inch on integrated circuits had doubled every year since their invention, leading to the prediction that computer processing power would double every two years. While Intel now reports that chip technology cannot continue advancing at the same pace, making it difficult for the processing power of computers to double every two years ad infinitum, other developments are helping to improve computing muscle. Breakthroughs in artificial intelligence/machine learning and cloud computing are examples of technological change accelerating the rise of the digital economy.
2. **Metcalf’s Law.** Named for Robert Metcalfe, founder of 3Com and coinventor of the Ethernet, Metcalfe’s Law states that the value of a telecom network is proportional to the square of the number

of connected users of the system. The “network effect” that Metcalfe’s Law describes further enables value creation, especially given that information now can be shared at almost zero marginal cost as networks continue to spread.

3. **Barabási-Albert (BA) model.** Albert-László Barabási and Réka Albert are credited with the discovery of the “scale-free network” concept; namely, that the websites forming the Web exhibit mathematical properties. According to the BA model, if the network expands, nodes will preferentially link themselves to hubs; that is, to the websites that have the most connections.

Once a hub firm benefits from increasing returns to scale, enabled by increased computing power and the fast-rising number of users, it has a competitive advantage as it enters new markets — creating a “digital domino effect.”

The hub economy is disrupting traditional businesses — from retail to automotive, hospitality to health, manufacturing to finance — across the spectrum.

Google provides an illustration in the mobility sector, where it has set its sights on the automotive market via autonomous vehicles that make use of Google’s superior network and data in the mapping and location services sphere.

Another example is the three-year-old Alibaba spinoff, Ant Financial. Building on Alibaba’s user base, Ant Financial has successfully commoditized traditional financial services. With more than a half-billion users, it has shifted a portion of the Chinese financial sector to its own platform. Ant Financial also exemplifies the successful rearchitecture of a traditional industry, from product-driven to network-driven.

Amazon's acquisition of Whole Foods, and rumored plans to acquire Target, show how digital dominance can lead to an aggressive play in traditional brick-and-mortar industries. Facebook and WeChat are competing with telecom service providers, while Google, Spotify, and Apple have become dominant players in the music industry.

Denial Is Not a Strategy

Many senior leadership teams believe that changes to their industry will take longer than expected and that there will be latitude to retain their old business model. But that optimism is unfounded. Executives must recognize and accept the shift — and put a new model in place as quickly as possible. While incumbents have the advantage of IP, assets, cash flow, and technical talent, too often established firms are unable to make the cognitive, strategic shifts required. This is not a new phenomenon, as Harvard Business School case “The Rise and Fall of Nokia”² teaches. And Nokia hasn't been alone; BlackBerry and Palm were also too slow to see the rearchitecting of their marketplace and were ultimately driven out of the mobile phone business by Apple and Google.

Some companies are responding by creating their own platforms and becoming hubs themselves, as GE did with the creation of GE Digital and the development of its Predix platform for Internet of Things solutions. The latter built on GE's earlier move toward contract service agreements that involved total operational management of an asset (i.e., preventive maintenance and repairs). GE Digital focuses on an outcome-based business model, where data collection, synthesis, and analysis allow for real-time, predictive solutions for products as diverse as jet engines, oil rigs, medical systems, and rail.

Another competitive response is for companies to offer their services and products on multiple hubs. Multi-homing, which allows for enhanced Internet connectivity by configuring a computer with multiple network interfaces and IP addresses, allows participants on one hub ecosystem to join another, thereby reducing hub dominance. An example is retailers supporting multiple payment systems, including Google Wallet, Apple Pay, and Samsung Pay. Strategic cooperation by non-hub firms can also help combat hub dominance, as the open source movement did in the face of Microsoft's monopolistic threat. In addition to allowing for the survival of more players, diversification also reduces system risks.

Regulators may step in, too, but each company ultimately needs to examine its own prospects in the context of the hub economy. While the risks are new, revenue creation and capture opportunities also abound for players that forge their future business strategies with a clear view of emerging digital drivers.

Endnotes

¹This article is based on the author's previous work: Iansiti, Marco, and Karim R. Lakhani. “Managing Our Hub Economy.” *Harvard Business Review*, September-October 2017 (<https://hbr.org/2017/09/managing-our-hub-economy>).

²Alcacer, Juan, Tarun Khanna, and Christine Snively. “The Rise and Fall of Nokia.” Harvard Business School Case 714-428, January 2014, revised April 2017 (<https://www.hbs.edu/faculty/Pages/item.aspx?num=46041>).

Karim R. Lakhani is a Cutter Consortium Fellow, a Professor of Business Administration at the Harvard Business School (HBS), the Principal Investigator of the Crowd Innovation Lab and NASA Tournament Lab at the Harvard Institute for Quantitative Social Science, the faculty cofounder of HBS's Digital Initiative, and a Summit 2016 keynote. Professor Lakhani specializes in technology management and innovation. His research examines crowd-based innovation models and the digital transformation of companies and industries. Professor Lakhani is known for his pioneering scholarship on how communities and contests can be designed and managed to achieve innovative outcomes. He has partnered with NASA, TopCoder, and the Harvard Medical School to conduct field experiments on the design of crowd innovation programs. Professor Lakhani's research on digital transformation has shown the importance of data and analytics as drivers of business and operating model transformation and source of competitive advantage.

Professor Lakhani has been published in Harvard Business Review, Innovations, Journal of Organization Design, Management Science, Nature Biotechnology, Organization Science, RAND Journal of Economics, Research Policy, and MIT Sloan Management Review. He is coeditor of two books: Revolutionizing Innovation: Users, Communities, and Open Innovation and Perspectives on Free and Open Source Software. Professor Lakhani's research has been featured in Bloomberg Businessweek, The Boston Globe, The Economist, The New York Times, The Wall Street Journal, The Washington Post, and Wired, among others. He holds a PhD in management from the Massachusetts Institute of Technology (MIT), a master of science degree in technology and policy from MIT, and a bachelor's degree in electrical engineering and management from McMaster University (Canada). Professor Lakhani was a recipient of the Aga Khan Foundation International Scholarship and a doctoral fellowship from Canada's Social Science and Humanities Research Council. Prior to coming to HBS, he served as a Lecturer in the Technology, Innovation and Entrepreneurship group at MIT's Sloan School of Management. Professor Lakhani has also worked in sales, marketing, and new product development roles at GE Healthcare and was a consultant with The Boston Consulting Group. He can be reached at klakhani@cutter.com.



5 Accelerating Technology Trends to Watch in 2018

by Steve Andriole

Every year we look at trends. Lots of companies, consultancies, and research organizations do the same. And every year many of the trends are simple extrapolations of the previous year's trends. But every year there are also some breakout trends. Perhaps of greatest interest are the rates of acceleration some trends experience in any given year. Some trend quickly; some more slowly. Momentum is driven by technology maturity, adoption rates, and how well — or poorly — the use cases evolve. Momentum scores are perhaps as useful as the trends themselves.

This year is no different. There are some old favorites and some new ones. There are some breakout trends and applications attracting a lot of attention, and there are some trends that will generate serious momentum in 2018. Let's look at five of them and assign them a momentum score (1-5).

1. Just Talk to Me

We've known for decades that users love talking to machines, searching with graphic interfaces, and immersing themselves with video. However, the state of the technology matters more than the preference. Comcast, Google, Amazon, and others led the use of voice interfaces in 2017. Comcast built some of its advertising based on the differentiation its Xfinity voice interface enables. This trend will accelerate in 2018 and beyond. We all get pleasure from talking to our apps. We love saying, "Hey, Google" or calling out to "Alexa." The greatest impact, however, comes from connectivity via the Internet of Things (IoT) to enable additional functionality. The infrastructure is now in place to enable voice-controlled smart homes, cars, buildings, and cities. If you don't feel like talking, you can authorize Alexa (and others) to just manage increasingly more aspects of your life. Momentum score? 5

2. Blockchain

This one is easy — but important. 2018 will be more about blockchain platforms than cross-industry applications. While the financial industry will lead the way, healthcare will follow quickly. Blockchain will completely free itself of its cryptocurrency identity in 2018. It will become a legitimate transaction platform that mainstream technology vendors and vertical industry leaders deploy. Momentum score? 4

The effects of the explosive growth of fake are impossible to calculate, but it's safe to say that they are never healthy and will undermine the credibility of democratic institutions and the technology industry itself.

3. Digifake

This trend is disturbing, and digital technologists must assume significant responsibility for the creation, housing, and distribution of fake data, information, and news. "Digifake" will continue to explode in 2018. There's no technological limit to the amount of fake in the system. Even worse, fake is profitable, which means there are incentives to the creation, housing, and dissemination of fake. The effects of the explosive growth of fake are impossible to calculate, but it's safe to say that they are never healthy and will undermine the credibility of democratic institutions and the technology industry itself. The bloom is already off the digital rose. Watch for technology professionals to express resistance to the trend. Momentum score? 4

4. Artificial Intelligence and Machine Learning

Artificial intelligence (AI) and machine learning (ML) are upon us in full force. In 2018, they will continue to leap forward. Following the work that has been going on in this space for years, AI and ML platforms and applications will be true debutantes in 2018. But the most notable trend in this area to watch will be AI's attack on knowledge workers. 2018 will launch phase one of a prolonged war against cost and inefficiency. Translation? Knowledge-based automation is coming for accountants, lawyers, and diagnosticians, among other knowledge workers, while lower/no knowledge task automation continues to grow. Momentum score? 5

5. Internet of Everything

2018 will encourage more investments in sensors, connectivity, and the applications that energize them. Ignore trends that predict the number of connected devices. No one knows. Do track trends that describe the impact of device interconnectivity and check your business models at the pre-Internet of Everything (IoE) door. The key trend here is not explained by any one piece of technology or a single killer app that someone developed in an incubator. IoE represents the integration of technology trends in much the same way that analytics generates (or fails to generate) the ROI around all technology trends. IoE is therefore as powerful as the trends that enable it, so track trends in sensor technology, power technology, integration technology, connectivity, AI, and other technology areas that accelerate the adoption of IoE. Momentum? 4

And Let's Not Forget ...

There's one more trend that deserves some attention: the structure of the technology industry itself. There will be significant consolidation in 2018. At the same time, there will be growing legislative pressure to break up the technology giants, especially as digifake continues to explode. Pressure will also mount as more and more technology darlings find themselves described in publications like the Paradise Papers.¹ So, in addition to the volatility of emerging and digital technologies, there will be volatility in the technology

industry itself. That may be the most important technology trend of the year. Pay very close attention to the companies that provide the services you depend on so deeply. Pay equal attention to how technology is governed and therefore distributed. Momentum? **A clear 10.**

Reality Checks

Everyone loves annual predictions. They make the turn-of-year season more interesting and entertaining. My takeaways from the list are that AI is making progress; IoE is spreading; blockchain is real; lots of digital content is fake; and big, rich companies may be regulated in ways they never anticipated. We also like to talk to machines — especially when everything's connected. The momentum around all these trends is strong and likely to accelerate in 2018.

Annual predictions are obligatory. Everyone expects them, and they generate some credibility. They're also usually a little vague (thereby providing plausible deniability after the fact). Let's face it; no one wants a client to transform its business based on predictions that could be wrong. Annual predictions should therefore not be specifically actionable. The most important trend is *momentum*. Predictions that gain momentum deserve the most attention. Declining ones can be sent to the back of the line — at least until next year.

Endnote

¹"Paradise Papers." Wikipedia (https://en.wikipedia.org/wiki/Paradise_Papers).

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2018 Technology Trends: Say vs. Do Innovation

by Carl Bate, Laurie Guillodo, Greg Smith, and Mandeep Dhillon

While KPCB venture partner Mary Meeker’s annual “Internet Trends” report¹ does an outstanding job as a “State of the Digital Nation,” there is no single user manual on the related trends affecting how companies can leverage emerging technology. Often there is asymmetry between the apparent positive trends from emerging technology and the negative trends these can create for established companies.

We therefore select four “outcome-affecting trends” to highlight for 2018 (i.e., trends that impact the ability of a company to leverage emerging technology in their business) from our work with established companies in 2017. Despite crossing multiple sectors, these companies all share the characteristic of the need to leverage emerging technology and startup ways of working to address the major initiatives in question. We hope these trends may be of use in leveraging new technologies as you solve your own business problems and address new opportunities in 2018.

1. The Mask of POSIWID

Elvis once sang, “A little less conversation, a little more action, please.” Similarly, throughout 2017, we encountered a rise in *saying* rather than *doing* innovation.

Stafford Beer coined the term POSIWID,² and we would propose this term as a front-of-mind trend for 2018. “The purpose of a system is what it does” — referring to “system” as the company as a whole — means that a company’s statements of intent (“we are an innovative, digital native company”), or even its market analysis or the initiatives it has undertaken, are secondary to what a company actually does. When you lift the hood, you may find the engine is not designed to adapt.

This has significant consequences when we consider the parts of a company that come together into an activity system to solve a business problem or address a new opportunity leveraging emerging technologies. What objectives do these parts *actually* have (not what is stated in the project governance model)?

Is there an aligned goal, or are motivations from the current system, by definition, part of the problem and misaligned? Is the team following best practice (what worked before/what I already know) or next practice (what could work better now/what should I know)? Are the technologies aiding question-centric “bubbles of innovation” (e.g., rapid design to value, loosely coupled, and microservices capable)? Most important, is the team doing something that is moving the dial or changing the game for customers?

Embracing new technology en masse in the stated intent to increase competitiveness or innovate with new business models can make things worse, not better.

To paraphrase *The Lean Startup* author Eric Ries, your customers “don’t care if you live or die,” they just want the best product or service.³ POSIWID reinforces this idea by pointing out that your customers don’t care if you say you are providing better products or services; they only care about the best products or services.⁴

2. The Technology “Feel Good” Factor

The rise of hypercompetition and the associated rise of emerging technologies has created a trap for many companies, and it is a trend to be mindful of. Embracing new technology en masse in the stated intent to increase competitiveness or innovate with new business models can make things worse, not better.

Current business and operating models can be made even more rigid with a whole set of new technology thrown at them, while creating a false “feel good” factor that the technology itself will improve competitiveness or lead to innovation.

Let's Review the 12 Principles of the Agile Manifesto¹

1. Ensure customer satisfaction by early and continuous delivery of valuable software.
2. Welcome changing requirements, even in late development.
3. Deliver working software frequently (in weeks rather than months).
4. Enable close, daily cooperation between business people and developers.
5. Build projects around motivated individuals, who should be trusted.
6. Face-to-face conversation is the best form of communication (i.e., collocation).
7. Working software is the primary measure of progress.
8. Aim for sustainable development – the ability to maintain a constant pace.
9. Pay continuous attention to technical excellence and good design.
10. Simplicity (the art of maximizing the amount of work not done) is essential.
11. The best architectures, requirements, and designs emerge from self-organizing teams.
12. The team should regularly reflect on how to become more effective and adjust accordingly.

¹"Principles Behind the Agile Manifesto" (<http://agilemanifesto.org/principles.html>).

In the rapidly expanding landscape of new technology available to all companies, if ever there was a year to start asking the right questions and providing the safe bubble of innovation that teams need to address these questions (question-centric, not technology-centric) – and have a bias for delivering innovation rather than talking about it – 2018 is it.

3. Partial Adoption of the Agile Manifesto = A Risky Shift

Related to POSIWID, another outcome-affecting trend we see for 2018 is the need for the return to the Agile

Manifesto. We found in our work in 2017 that, while many companies believe they are doing Agile, their ways of thinking, working, and providing executive oversight do not pass the 12-part litmus test (see sidebar "Let's Review the 12 Principles of the Agile Manifesto"). In particular, we found a risk of recurring reversion in established companies doing the following:

1. Using expensive design studios in San Francisco, New York, or London, for example, plus lower-cost remote software engineering
2. Having the most senior person in the room determine the solution before the team even starts
3. Favoring specious certainty over real-world delivery (e.g., attempting to analyze everything up front, creating a two-year plan for a solution, and then requiring the project to deliver to this schedule without taking real-world feedback into account)

These reversions breach half of the principles behind the Agile Manifesto. The first breaches principles four and six; the second contravenes principle five; and the third violates one, three, and seven. Breaching of these principles normally comes with well-argued justifications, but ultimately our experience finds that these are specious arguments born out of motivations other than solving the problem at hand, and they make innovation harder to deliver, not easier. Therefore, we suggest a return to the Agile Manifesto and its principles as a project checklist.

4. Lacking Technology Foundations

In 2018, businesses will likely find out if they are not equipped with the right technology foundations – those essential capabilities both in terms of technology and ways of working (see Figure 1).

According to *The Economist*, even tech giants like IBM can be surprisingly at risk of lagging in emerging technology such as cloud computing and artificial intelligence: "Technology giants are a bit like dinosaurs. Most do not adapt successfully to a new age – a 'platform shift' in the lingo."⁵

Ways of working are also a vital capability; specifically, a company's ability to solve the right problem in the right way, even for apparently well-trodden paths – not to mention in pursuit of innovation! While the FoxMeyer Drugs ERP failure (a large US \$100 million, multiyear project set to implement a technology unfit for purpose) received a lot of attention back in the

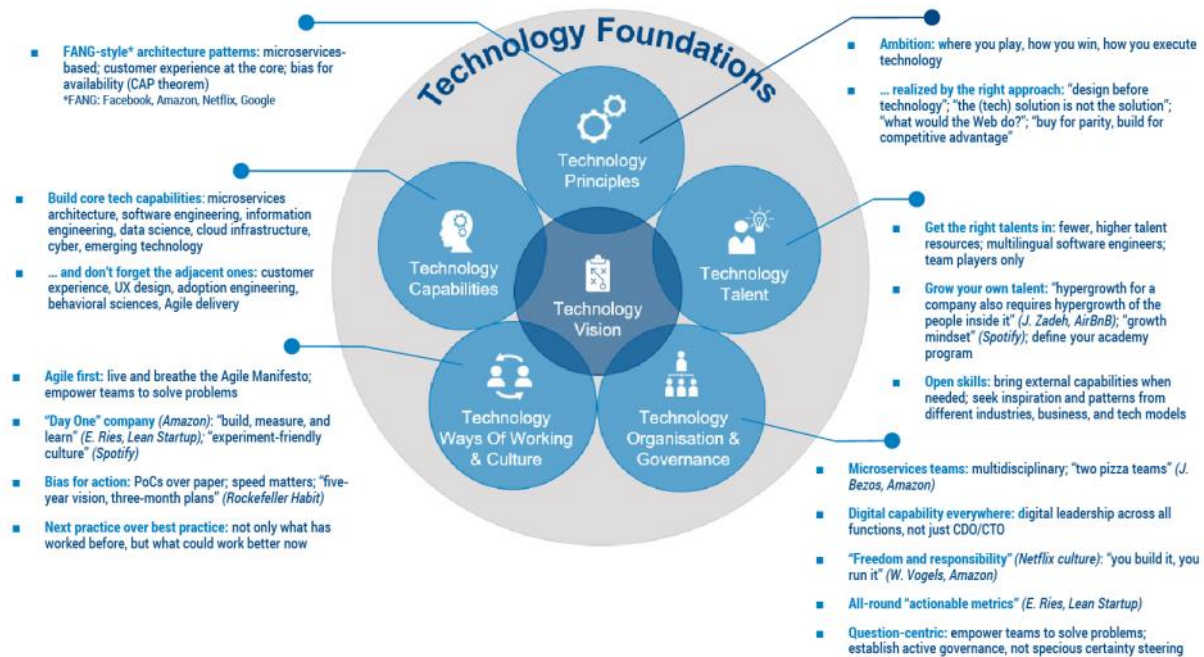


Figure 1 – The makeup of good technology foundations.

1990s, about 60% of ERP projects still fail, according to ERP Focus.⁶

We predict 2018 to be a year when companies' technology foundations will be particularly tested. In a world being "eaten by software,"⁷ where everything is being digitalized and becoming software definable, businesses are challenged to keep pace.

Responding to the Trend Risks

In 2018, we believe businesses will be exposed to the growing challenge of "specious technology" and "specious projects," as summarized by the four trends described in this article.

By "specious technology," we mean technology that is superficially plausible; even misleadingly attractive. And by "specious projects," we mean projects solving the wrong problems or taking the wrong approach to the right problems; either way, with well-crafted arguments that appear attractive. This also includes initiatives that *claim* innovation and increase the false comfort blanket of innovation, but don't *do* innovation (POSIWID). The combination of specious technology and specious projects is deadly.

To summarize the findings from our work with companies that have turned each of these potential trend risks into something positive, we suggest the following path for 2018:

1. **Recognize POSIWID.** Talking more about innovation than doing does not meet customer needs. *Management action:* Bias your teams for innovation action (*doing* work, not *making* work). Establish as a minimum the quarterly value review of actual delivery plus real customer feedback.
2. **Avoid the technology trap.** Throwing technology at the wrong problems will not increase competitiveness. *Management action:* Have clear sight on what problems are being solved for whom and ensure no conflation of "what" with "how." Ensure technology is being used to enhance adaptability, not increase rigidity.
3. **Follow the Agile Manifesto.** We see a tendency to breach the Agile Manifesto. *Management action:* Ensure the most important initiatives follow all 12 Agile Manifesto principles. Beware of well-constructed arguments for bypassing one or more of these principles. There's a reason the Agile Manifesto works.
4. **Focus on technology foundations.** Companies will no longer get away with poor technology foundations. Specious technology will find specious projects. *Management action:* Take an objective SWOT of your current foundations (see sidebar "More About Foundations") and ask, "Would a FANG (Facebook, Amazon, Netflix, Google) company do this?" We like to use the meme "WWWD" (What Would the Web Do?) as a

More About Foundations

We find that successful companies share a trait of having a conscious strategy to deploy FANG-like technology foundations, covering both technology fundamentals (high expertise in software engineering, data science, platform engineering, etc.) and ways of working that are Lean startup by default.

Based on work in 2017 in bridging the “startup to established company” gap, we find that a minimal capability foundation is required for companies to sort out the tech hype from the real tech, and equally as important, to build capabilities that can address real business problems for the customer, rather than deliver solutions that ultimately maintain the internal status quo. Each capability lives and breathes the culture and ways of working as exemplified by FANG companies.¹

¹For more on these practices, see Bate, Carl. “Becoming a Next Practice Business.” Arthur D. Little *Prism*, 2015 (http://www.adl.com/sites/default/files/prism/Next_Practice_Business_39.pdf); and Bate, Carl, and Greg Smith. “Moving from ‘Best Practice to Next Practice’ to Drive Effective Digital Transformation.” *Cutter Business Technology Journal*, Vol. 28, No. 11/12, 2015 (<https://www.cutter.com/article/moving-best-practice-next-practice-drive-effective-digital-transformation-489181>).

guiding principle, not only for specific projects but also to inform sustainable technology capability development.

When asked how many companies he thought would actually take on real innovation and work in the startup way, Ries replied, “The vast majority will not implement it at all.”⁸ In 2018, will yours be one of them?

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“All In” with Public Cloud for 2018

by James Mitchell

The year 2017 saw a flurry of large enterprises announcing that they were going “all in” on their preferred public cloud provider. A prediction that this will continue into 2018 is therefore hardly a risky one. However, my prediction goes further. I predict that, this year, the trend across the globe will be to go “all in” on just a handful of hyperscale public cloud providers, all of them headquartered in the US. I further predict that this concentration of risk will become a focus of attention for those charged with mitigating “black swan” risks to the global economy.

In 2017, my colleagues and I designed, published, and scored an RFP for the provision of public cloud to a major organization that is a member of the UN. You can imagine that for such an organization, fairness — and, in fact, *auditable* fairness — was paramount in the design and scoring of this open international tender. The RFP secured a healthy number of responses, almost all of high quality. As the client was based in Europe, we secured a good number of responses from European companies, including smaller companies, as we had deliberately avoided placing unnecessary barriers to entry for smaller “challenger” cloud providers.

Having reviewed all the responses, there was no question that one of the market-leading hyperscale vendors would be selected, either directly or via one of the several channel partners that submitted proposals. The value that the tender brought was in identifying and fairly comparing cloud providers that could be leveraged in a manner complementary to use of those hyperscale vendors, reducing the risk of vendor lock-in and single supplier risk, as well as reducing the dependency upon a single technology stack and a single set of fairly rigid, standardized business processes.

If every organization in the world were to run an equally fair process, I would expect most organizations to select Amazon Web Services (AWS) first, with at least one other provider, usually selected from the other hyperscale providers (i.e., Microsoft Azure, Google Compute Platform, and IBM Bluemix/SoftLayer), as their disaster recovery, or business continuity, backup provider. The exception would be

for workloads with overriding jurisdictional concerns or unusual use cases. In reality, most organizations do not have to run open international tenders and are simply following the trend to select the most overtly successful hyperscale cloud providers. When you consider this decision on an organization-by-organization basis, it is hard to argue against it.

However, what happens when all organizations follow the same logical process? What happens when they all do the right thing for their organization, and all end up with the same AWS-plus-one answer? Society ends up with AWS having more than 50% market share, with perhaps the other 50% split evenly between three other hyperscale providers and a handful of what will become niche players.

Market forces, cutthroat competition, and over a decade of 50% year-on-year organic growth of the cloud industry pioneer will have resulted in a global market that is more concentrated in the hands of a single vendor, using a single technology stack, than almost any other market you might care to compare it to.

Electricity markets are often cited as analogous to cloud computing markets, as for both, capacity is perishable, largely concentrated, not geographically distributed, delivered to large numbers of small remote users, and is usually consumed on demand under a pay-as-you-go pricing model. But when the Fukushima nuclear meltdown shut down all nuclear power in Japan, the lights did not go out because other types of generation were able to make up for the loss of 20% of Japan’s electricity generation capacity (see Figure 1).¹

Notably, the market share for global public cloud infrastructure as a service (IaaS) is becoming far more concentrated than that of the Japanese electricity generation market. Following the global financial crisis, there has been much concern and restructuring to reduce the reliance on banks that are “too big to fail.” In 2007, 53% of the US banking market was made up of the four biggest banks plus a slew of other “giant banks” (see Figure 2). The market share for global public cloud IaaS is becoming far more concentrated

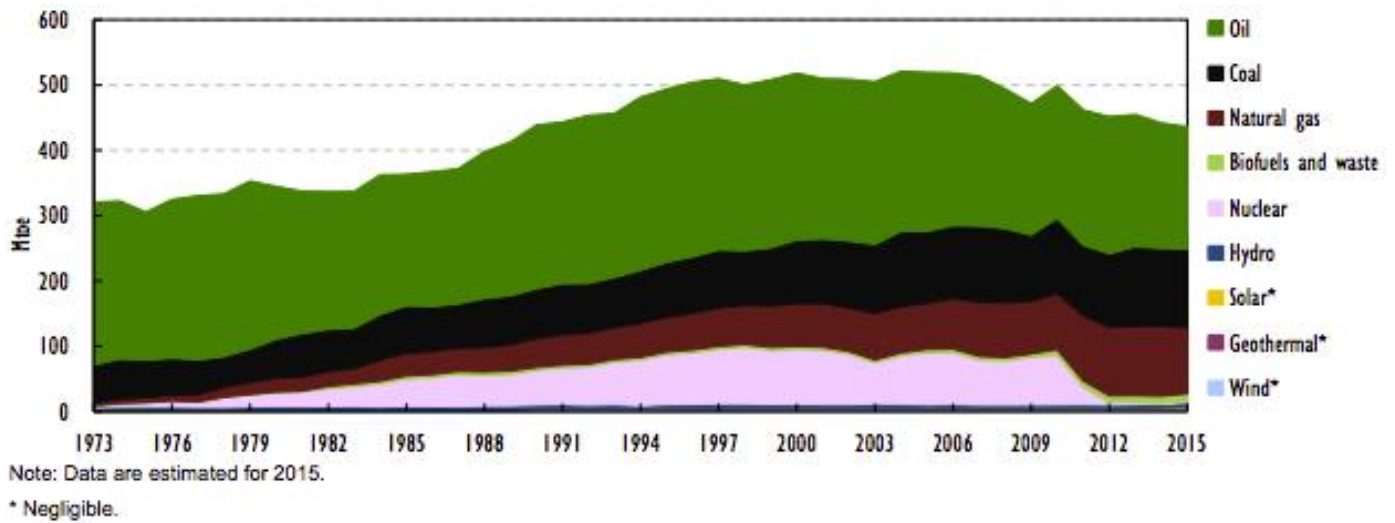


Figure 1 – Japan’s net electricity generation by fuel, 1973-2015. (Source: IEA.)

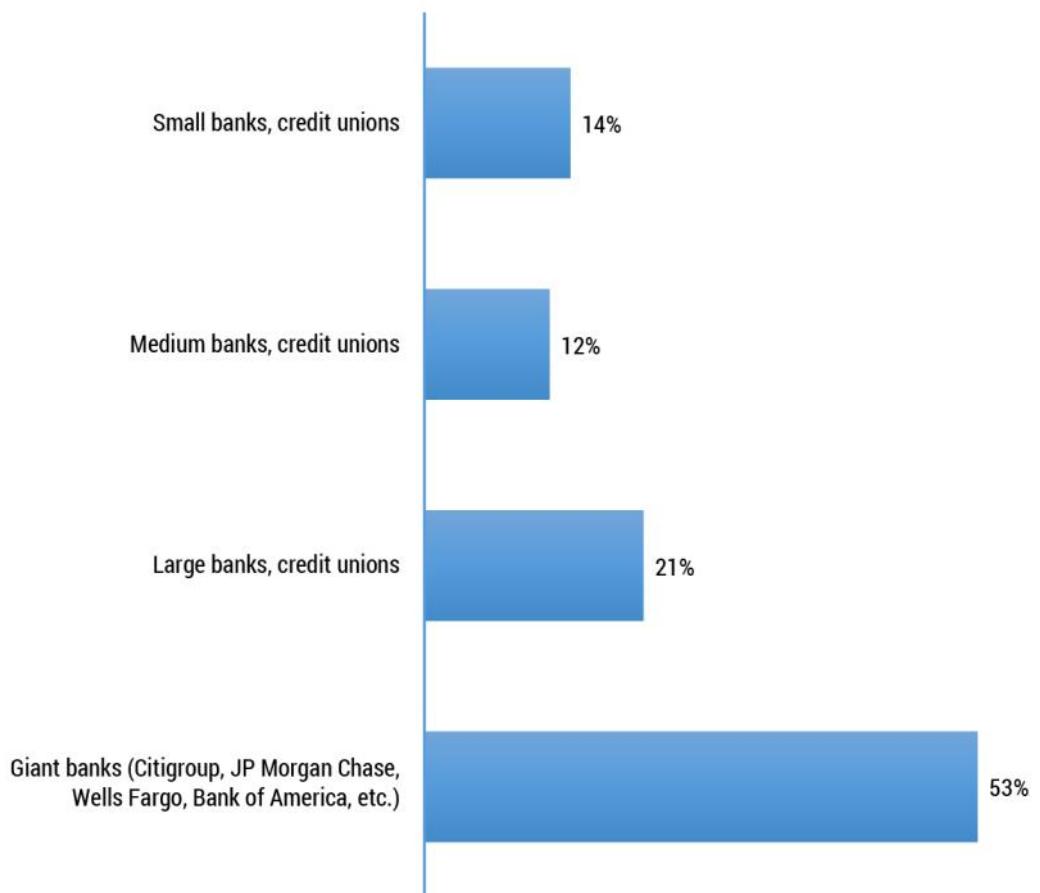


Figure 2 – Bank market share in the US in 2007. (Source: Adapted from FDIC and NCUA.)

than that of the US banking sector just before the global financial crisis.

This concentration risk has not gone unnoticed by global organizations charged with keeping an eye out for the next systemic black swan risk to the global economy. The Financial Stability Board, which counts as its members the International Monetary Fund, the Bank of England, the US Federal Reserve Bank, and all the equivalent bodies from most countries globally, issued a report in June 2017² identifying “areas that merit authorities’ attention,” including “managing operational risk from third-party service providers,” which would include both specialist fintech companies offering software as a service (SaaS) and more generalist public cloud providers such as AWS and Microsoft Azure.

The European Commission is paying attention to this area, too. In fact, the group funded two years of my team’s research, in collaboration with Oxford University and other members of the CloudWATCH2 consortium,³ into a roadmap⁴ toward a cloud market encouraging price transparency, which looked into exactly this risk and how it could potentially be mitigated without resorting to anything too drastic.

To summarize my predictions, then, I expect AWS to continue to grow market share, with only a couple of other hyperscale vendors really keeping up. Indeed, I expect this to become a focus of attention for a wide range of regulatory and supervisory bodies around the world throughout 2018. Finally, because I have faith that Amazon really is the world’s most customer-centric company, I predict that AWS will take various actions to mitigate these potential black swan risks, so that the ongoing migration from inefficient private cloud to the hyperscale public cloud will be able to continue without either risking disruptive regulatory intervention or suffering an unmitigated worldwide systemic risk to our digital economies.

I expect AWS to continue to grow market share, with only a couple of other hyperscale vendors really keeping up. Indeed, I expect this to become the focus of attention for a wide range of regulatory and supervisory bodies around the world throughout 2018.

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Nano Currency: Third-Generation Cryptocurrencies Are Upon Us

by Nate O'Farrell

2017 may come to be viewed as the year cryptocurrency went mainstream. For the most part, cryptocurrency leverages the technology of blockchain, with the majority of currencies using a proof-of-work (POW) method to achieve consensus, prevent double spending, and secure the network. Bitcoin, the original cryptocurrency, pioneered the POW movement, using power-intensive mining computers across the world to solve calculations that decentralize and secure its blockchain.

If nobody can use these technologies for actual payments and P2P transactions without incurring lengthy wait times and large fees, it becomes increasingly more difficult to achieve the adoption level required to make cryptocurrency use for the masses more than just a pipe dream.

One would look at the cryptomarkets and see Bitcoin as a “first-generation cryptocurrency,” but with the rise of popularity in cryptocurrencies, Bitcoin is no longer adequately scalable. Transaction fees have skyrocketed. Average network costs at the time of writing are US \$30 per transaction. Additionally, a Bitcoin transaction can take hours or days to process with the only means of speeding it up being to increase the fee paid to the network. As a result, extremely long transaction times and exorbitant transaction fees have cost Bitcoin its role as a transactional currency and caused it to exist purely as a digital store of value. This is in addition to the energy requirements of Bitcoin, which represent another negative. One Bitcoin transaction uses roughly the same amount of electricity to process as an average household consumes in one week.

In last year's trends issue,¹ I discussed Ethereum and the problems it faced as a POW currency. Ethereum was slated to move to a proof-of-stake (POS) consensus method; however, while still on the roadmap, that

has not yet happened. We can think of Ethereum as a “second-generation cryptocurrency,” offering “programmable money.” But it is not without its flaws. Although the transaction times and fees are lower than those of Bitcoin, the times remain too long and the fees too high for Ethereum to have actual real-world use as a transactable currency. Where Ethereum stands tall is in its ability to host immutable smart contracts and applications that run on its blockchain, resulting in a vastly more interesting use case than purely as a transactional currency.

If nobody can use these technologies for actual payments and peer-to-peer (P2P) transactions without incurring lengthy wait times and large fees, it becomes increasingly more difficult to achieve the adoption level required to make cryptocurrency use for the masses more than just a pipe dream. Thus far, we have identified the dominant negative issues with these technologies: their inability to scale and provide quick transaction times and their transaction fees, which become exponentially crucial when it comes to micropayments. There's also the negative impact on the environment from these technologies due to their energy requirements. Enter Nano (formally known as RaiBlocks),² a potential solution to all these obstacles.

Will 2018 Be the Year of Nano?

Nano, recently rebranded from RaiBlocks to appeal to more mainstream audiences, is one of a very few number of the emerging “third-generation cryptocurrencies.” It is the only one that, in my opinion, can offer the technology and functionality needed to facilitate mass adoption and real-world use as an effective currency. The goal of Nano is to do one thing only and to do it well, better than every other option. Its chosen function is payments. It has zero fees, instant transactions, and is infinitely scalable. Nano has been tested in up to 7,000 transactions per second, but theoretically can scale to much higher throughput. It is also one of very few “green” currencies; it requires no miners and achieves consensus on conflicting blocks through a delegated POS system, allowing account

representatives to vote on conflicting transactions in the event one arises.

In addition to these seemingly too-good-to-be true traits, Nano is a completely revolutionary technology. Unlike many other coins that just took Bitcoin's source code, made a few updates, and slapped a new name on them, Nano has been developed from the ground up with the purpose of fixing the specific shortcomings of traditional cryptocurrencies. What makes Nano so fast and absolutely free to transact is (1) its design upon a directed acyclic graph, (2) its idea of account-chains, and (3) its block-lattice network.

Each Nano account has its own blockchain that can be updated only by the account's owner (see Figure 1³). Instead of keeping track of a single blockchain for the whole network:

This allows each account-chain to be updated immediately and asynchronously to the rest of the block-lattice, resulting in quick transactions.... Since blocks can only be added by each account-chain's owner, transferring funds from one account to another requires two transactions — a send transaction deducting the amount from the sender's balance and a receive transaction adding the amount to the receiving account's balance.⁴

This structure makes Nano effectively instantaneous and uses a negligible amount of energy to process transactions when compared to nearly any other currency. This allows for 100% free, instant transfers.

What does this mean for cryptocurrency in general? It's hard to compete with free, instant, and infinitely scalable. The rising price of Nano has reflected this, jumping over 20,000% in the last two months alone before correcting downward; take note that the correction was largely due to technical issues on cryptocurrency exchanges as they work to implement such a different and new technology. At the time of writing, the total market cap of Nano is just over US \$2 billion,⁵ a figure that, in my opinion, is vastly undervalued. As with any currency, the key is mass adoption and, as that happens, the price will follow. Up until now, Nano has only been available on smaller, lesser-known exchanges but is due to be added to the largest cryptocurrency exchange, Binance, in the coming weeks. This addition to Binance will provide the visibility and liquidity Nano needs to move from being a Top 20 cryptocurrency to a Top 5 coin.

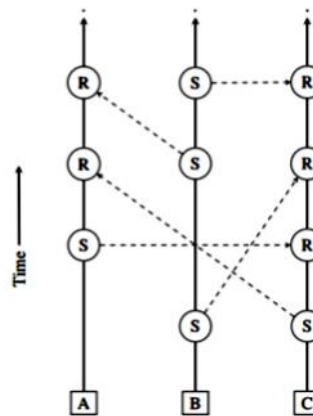


Figure 1 – The block-lattice, where every fund transfer requires a send block (S) and receive block (R), each signed by their account-chain's owner (A, B, C). (Source: LeMahieu.)

Throughout history, we've seen that the best technology doesn't always win when pitted against the best marketing. However, Nano has the technology and a talented dev team to help propel it to the top. If nothing else, it's refreshing to see a coin with a real-world use case and a working product come onto a scene dominated by Bitcoin clones and vaporware that leverage excellent marketing but lack any real working product.

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Cryptocurrency Adoption in 2018

by Kevin O'Leary

2017 was, without doubt, the breakout year for cryptocurrencies. As of 31 December 2017, the total market cap was over US \$614 billion; a week later, it reached an all-time high of over \$820 billion.¹ This is spread across 1,340 different cryptocurrencies, the leading two being Bitcoin and Ethereum with market caps of over \$191 billion and \$116 billion respectively, at the time of writing. Indeed, both Bitcoin and Ethereum have experienced incredible growth during the last 12 months. Bitcoin's closing price as of 1 January 2017 was \$958.70. It closed out the year at \$14,156.40, representing a 1,377% rise, having reached a record high in December of \$17,899.70. While Bitcoin grabbed most of the headlines due to its long-established position as the cryptomarket leader, Ethereum actually outperformed Bitcoin in terms of percentage increase. The number two currency rose in value by 9,162% this year, from a closing price of \$8.17 on New Year's Day 2017 to \$756.73 on New Year's Eve. Naturally these eye-watering figures have led to suggestions that the market is in a dangerous bubble that is about to pop. For instance, Jamie Dimon, CEO of JPMorgan Chase stated that Bitcoin traders are "stupid" and if he were to catch one of his employees trading Bitcoin, that person would be fired on the spot.²

This article focuses on Bitcoin and Ethereum and how 2018 will prove to be a make-or-break year for both cryptocurrencies, where they will either continue to be viewed as highly volatile, speculative assets or transition to commercially viable instantiations of blockchain technology.

The term "cryptocurrency" has been used to describe both currencies; however, they each represent unique blockchain networks with disparate value propositions. Bitcoin is "a purely peer-to-peer version of electronic cash [that] allow[s] online payments to be sent directly from one party to another without going through a financial institution."³ Ethereum is "a decentralized platform that runs smart contracts: applications that run exactly as programmed without any possibility of downtime, censorship, fraud, or third-party interference."⁴ However, several studies have shown that users of the cryptocurrencies have only entered the market to trade the currencies as speculative assets and to cash in

on their returns for traditional fiat currency.⁵ This is not the purpose of either currency, and as the prices of both assets increase, their adoption for their originally intended purpose becomes less likely.

The Winklevoss twins, widely known for their IP theft lawsuit with Facebook, recently became the first "Bitcoin Billionaires."⁶ The brothers invested \$11 million of their payout from Facebook into the cryptocurrency in April 2013. However, they have reportedly never sold a single coin, meaning that their crypto-portfolio is only worth a fortune on paper. The reality is that they still buy their coffees using US dollars. The cruel irony in all this is that if news broke that the Winklevoss twins had sold a portion of their holdings, it would likely be taken as a sign that they had lost confidence in the currency, leading to a mass sell-off in the market. In fact, despite widespread media attention focusing on Bitcoin, until you are paid in Bitcoin and can pay your rent in Bitcoin, the cryptocurrency remains unsuccessful.

Bitcoin and Ethereum: The Year Ahead

As the price of Bitcoin continues to rise, retailers become more reluctant to accept it as a means of payment. For instance, online gaming service Steam announced in December that it would stop accepting Bitcoin payments, citing "high fees and volatility" as the reason for its decision.⁷ Worse still, it was recently disclosed that the *North American Bitcoin Conference* no longer accepts Bitcoin payments due to network congestion and manual processing.⁸ Unfortunately, I predict that this trend will continue, and Bitcoin will struggle to be accepted as a viable alternative to fiat currencies.

In addition to rising prices, increased transaction fees, and network congestion, another serious threat to Bitcoin adoption in 2018 will be energy consumption. Over the last month or so, media attention has increasingly focused on the amount of energy the Bitcoin network consumes during the proof-of-work (POW) mining process, with many sources reporting that the network requires the same amount of electricity in a

year as entire countries such as Denmark or Ireland.⁹ China has already started to crack down on this issue and has announced that it plans to shut down Bitcoin miners. I believe that more governments will adopt a similar approach to regulating Bitcoin in the year ahead.

Similarly, despite a meteoric rise in market price in 2017, Ethereum also remains relatively unsuccessful. The vision for Ethereum is to create a platform for others to develop smart contracts. Ether, the cryptocurrency, is simply a fuel to run this platform. Therefore, the rise in the price of Ether over the past 12 months is actually a double-edged sword in that it has now become more expensive to develop and interact with smart contract applications hosted on the Ethereum network.

However, there have been signs of progress to come, tongue-in-cheek though it may appear. November 2017 saw the launch of perhaps the first viral Ethereum application, CryptoKitties¹⁰ — an online marketplace where users can buy virtual cats with Ethereum and then breed them with other users of the service. Although CryptoKitties may not be an industry-focused application, it proves the ability of the Ethereum network to host a smart contract application that tracks the provenance of digital assets in a secure, verifiable, and immutable fashion.

Plans for more serious applications have been announced and we will likely see many of these go live in the next 12 months. In May 2017, Bank of America demonstrated the progress it had made on an Ethereum-based application that automates the process of creating a standby letter of credit.¹¹ Both the Canadian and Russian governments have expressed significant interest in Ethereum as well, perhaps due to Vitalik Buterin, founder of the network, holding dual citizenship in these countries. Moreover, the Enterprise Ethereum Alliance, formed in May 2017, now consists of roughly 200 companies, ranging from *Fortune* 500 companies to startups, all working to develop smart contract applications on the Ethereum platform.¹² I predict that 2018 will be the year that these applications begin to go live.

Another significant value proposition offered by Ethereum is that it is actively working on moving from the energy-sapping POW mining process to proof of stake (POS), which is said to be far more environmentally friendly and more efficient to run. Ethereum expects this transition to be complete in the next year.

Although 2017 was the year that the cryptocurrency market exploded, I believe that the unprecedented

growth has exposed Bitcoin as an impractical alternative to traditional, government-backed currencies. Ethereum, on the other hand, has benefited from the increased attention over the last 12 months, and I feel it is set to thrive in 2018.

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ICOs: Crowdfunding's Friend or Foe?

by Seán Nevin and Rob Gleasure

Since the global financial crisis, individuals are taking more control over their personal finances and investments. Investors are now looking for alternative opportunities outside of traditional investment strategies. With the passing in the US of Title III of the Jumpstart Our Business Startups (JOBS) Act, equity crowdfunding was made available to the general public. Equity crowdfunding enables almost anyone to act like a venture capitalist, allowing people to invest in private startups in return for a stake or equity in the company. The crowdfunding market has been growing steadily in recent years. In 2012, total crowdfunding volume was US \$2.7 billion, rising every year to \$34.4 billion in 2015.¹

The year 2017 saw the extraordinary growth of a new form of crowdfunding, initial coin offerings (ICOs). ICOs, also known as token sales or crowdsales, are a funding mechanism where a virtual coin or token (cryptocurrency) is sold to investors to raise capital for a new company. Depending on the terms of the ICO, the token sold can represent either an investment security or a form of currency within a company's application. Like a crowdfunding campaign, an ICO takes place

over a given period, and anyone can buy the coins or tokens in question in exchange for other cryptocurrencies such as Bitcoin or Ethereum.

The rise of ICOs has been rapid and unprecedented (see Figure 1), far exceeding that of crowdfunding. According to Coinschedule, 46 ICOs raised a total of \$96 million in 2016, while in 2017 there were more than 230 ICOs raising more than \$3.5 billion, with projects such as Filecoin (\$257 million) and Tezos (\$232 million) contributing to ICO growth.² In just one year, ICOs have raised more than the most popular crowdfunding platform, Kickstarter, has in its eight-year history.

We are already seeing well-established crowdfunding platforms pay attention to ICOs. Indiegogo, a successful rewards-based crowdfunding platform, announced it would begin offering services to blockchain-based projects that seek to undertake an ICO. Indiegogo's size and influence in the crowdfunding ecosystem will be a huge benefit to companies looking to undertake ICOs. Significantly, Indiegogo will handpick projects and help startups comply with SEC regulations.

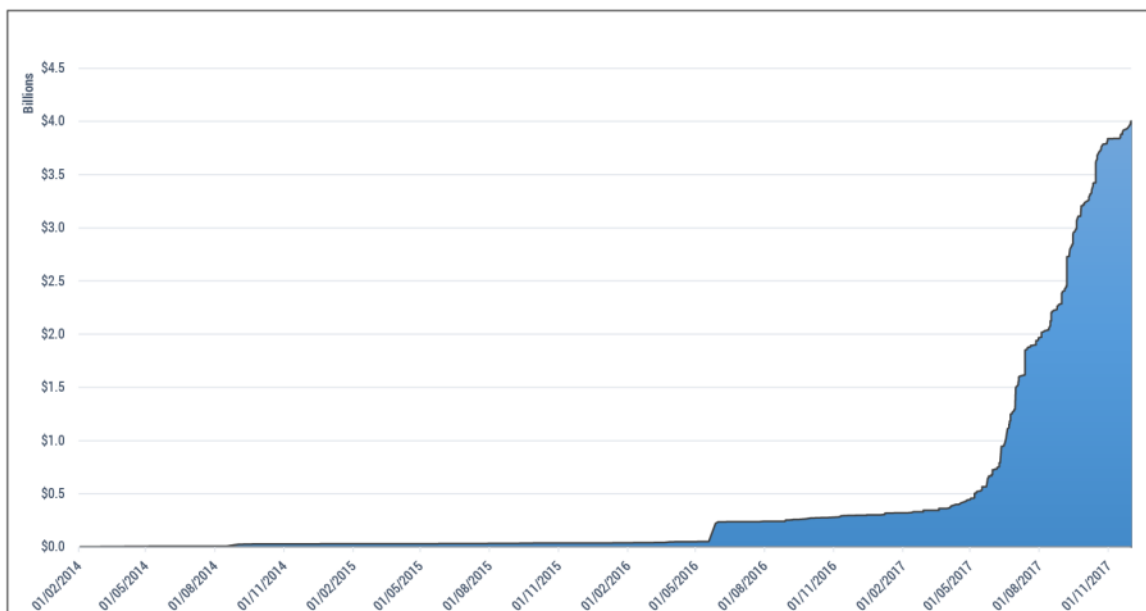


Figure 1 – All-time cumulative ICO funding. (Source: Coinschedule.)

As shown in Figure 2, there has been a significant shift in interest in the two forms of alternative funding. Toward the end of May 2017, interest in crowdfunding decreased slightly, while interest in ICOs rapidly rose. During this time, ICOs were happening frequently, and with much more success than they had previously enjoyed. According to Coinschedule, there were 98 ICOs in 2017 that raised over \$10 million, with 83 of them taking place after May of that year.³ In comparison, there were only five traditional crowdfunding campaigns in 2017 that raised over \$10 million, with only one finishing funding after May, and four still ongoing.⁴

Maecenas, a London-based fine art investment platform, provides an example of this move in interest. In April 2017, Maecenas launched a crowdfunding campaign with Seedrs, with a target of £400,000, giving 12.4% equity to the crowd, but the campaign was not funded, and the project failed. However, in September, Maecenas released a white paper and began funding through an ICO. Within a month, with the ICO complete, Maecenas had raised over 50,000 Ether, with a value of \$15.5 million. So a crowdfunding campaign that failed to raise £400,000 on Seedrs was able to raise 30 times that amount through an ICO only a few months later, while also giving away less equity.⁵

The upward trend of popularity in ICOs after May 2017 is quite interesting. As Figure 2 illustrates, when interest in ICOs rose, there was a slight decrease in interest in crowdfunding. This suggests that ICOs may

be capturing some of the crowdfunding market, with crowdfunding investors moving to fund blockchain-based startups.

Another interesting trend over time relates to the peaks of highs, followed by a drop in interest, which line up with the percentage of ICOs that reach their funding goal. As reported by Architect Partners, there was a peak of interest in June 2017, which also saw 92% of all ICOs reach their funding target. A dip in interest followed in August, which showed a funding success rate of 46%.⁶

When interest in ICOs rose, there was a slight decrease in interest in crowdfunding. This suggests that ICOs may be capturing some of the crowdfunding market.

In the short term this trend looks likely to continue, with ICOs going through periods of hype followed by a phase of low interest. These oscillations are likely to continue into 2018, as periods of hype encourage investors to move away from crowdfunding in favor of ICOs. However, in the long term, ICOs are likely to grow in tandem with crowdfunding. This complementary growth will be achieved only when crowdfunding platforms and traditional funding players become

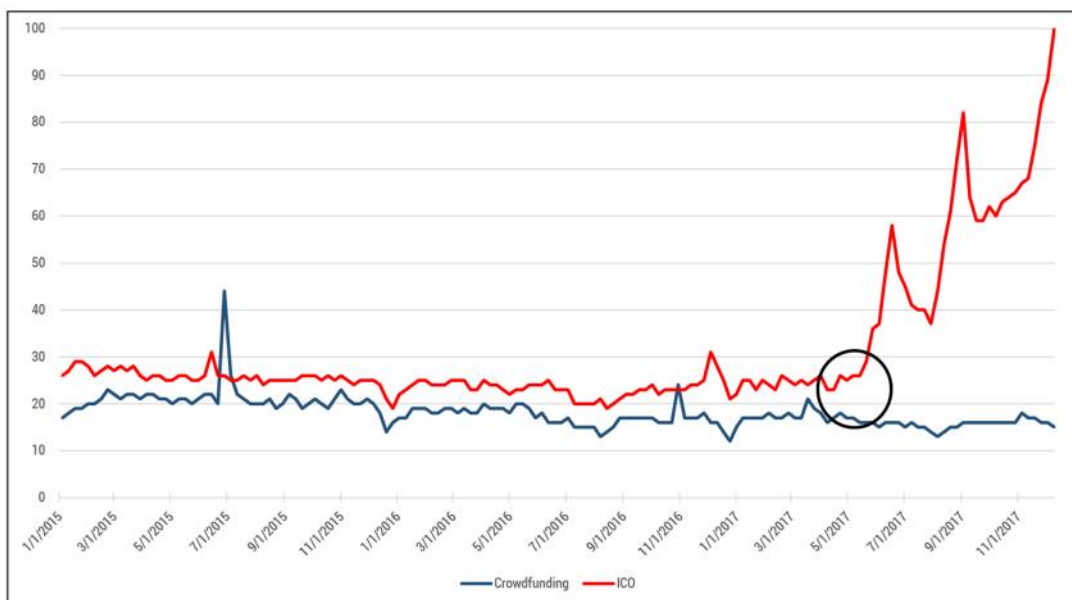


Figure 2 – Crowdfunding vs. ICO: interest over the past three years. (Source: Google Trends.)

involved. This is already starting to happen, with crowdfunding platforms such as Indiegogo, Republic, and AngelList having expanded into the ICO market. With venture capitalists also coming onboard, the experience and expertise of these traditional actors will help weed out projects that don't have what it takes to succeed or that may be fraudulent.

As the year progresses, we expect to see several hype-fueled projects fail to meet expected deadlines. This will drive traditional crowdfunding investors back to the more stable and reliable crowdfunding platforms, where levels of success and failure are spread among large numbers of companies. Crowdfunding investors will return to ICOs when regulation is put in place and demonstrably trustworthy intermediaries become involved.

The clustering of intermediaries among ICOs has allowed the paradigm to grow rapidly while also meaning that oscillations in public interest are inevitable. The ICO market will ultimately require legislative change like that imposed on crowdfunding. Further into 2018, we will see that ICOs will no longer be able to get funding with only a white paper. Investors will no longer blindly fund any ICO but will instead demand business plans and high levels of transparency.

Endnotes

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Public Policy Coming in from the Sidelines?

by Paul Clermont

In 2016¹ and 2017², I declined to make predictions about specific technologies and what exactly they would disrupt or how they would impact society. As I shared in my predictions last year, this decision was based on a mix of humility and cowardice. That said, a prediction I didn't make for 2017 — but should have — is that artificial intelligence (AI), viewed for decades as the technology of the future,³ would become widely recognized as a technology of the present.

Let's begin my 2018 assessment with how I am doing on my earlier predictions.

Some Prediction Updates

1. Security

Security concerns got a very big boost last year from the Equifax debacle that exposed critical personal information about 143 million Americans. Not only the fact that this happened, but also the fact that it was kept buried for weeks, made it a total public relations disaster. The CEO had to "retire" — a personal and professional blow salvaged somewhat by a US \$90 million golden parachute.

Of possibly far greater impact is the recently disclosed compromise of critical information and techniques in the super-secret US National Security Agency.⁴ It should be clear that opportunities will remain indefinitely for inventors and vendors of ever-more sophisticated and effective countermeasures. Though significant new regulation is unlikely with the current US administration, private companies holding masses of sensitive personal data should not be surprised by increased government scrutiny of their security practices.

2. Social Networking

Any notion that platforms like Google, Facebook, and Twitter can sidestep accountability for what they distribute (and from whom it comes) is now clearly dead. The executives at these companies have been enjoying the warm personal experience of questioning

by members of the US Congress who are righteously (and rightfully, I believe) indignant about the ease with which domestic and foreign entities have been able to disseminate false, misleading, and libelous information.

These platforms are also being questioned more widely about the way their algorithms tailor the distribution of content in such a way as to reinforce users' prior beliefs and shield them from other views. Consequently, these platform operators will undoubtedly want to design and implement changes for themselves — but may call upon experts in the design phase. Top-flight people can expect substantial rewards.⁵

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AI and Robots: Full Steam Ahead

Now, back to AI and robots. This once exotic field is now all over the media as various experts and pundits (not necessarily the same) opine on the impacts on jobs and people's lives. Occupations that once seemed secure — accounting, the law — are now threatened.

Scare tactic stories predict a dystopian future in which large swaths of the population are rendered useless. Others have pointed out that the history of mankind is very much about finding ways to reduce labor — going all the way back to using a beast of burden to carry loads. The mechanization of industry and agriculture certainly raised concerns as they happened, but we ultimately took them in stride, preserving widespread employment and enjoying hugely improved living standards. That there will be disruptions to careers and ways of life is inevitable, but the idea that the march of technology-based progress can be stopped or even slowed down is an illusion.

We should expect a great deal more handwringing on one side and hand-waving dismissals of concern on the other. Perhaps 2018 will bring some clarity and perspective to the discussion. We can hope.

One big thing that could slow down or derail a specific AI implementation is a performance failure in which workers or innocent bystanders are killed or maimed by an artificially intelligent object like a loaded truck having done something too stupid to imagine a human ever doing.

Public policymakers will of necessity be involved regarding the extent to which we ease the financial and emotional impact of having once good jobs disappear, but for technologists, the future is bright and the opportunity for exceptionally proficient and productive people is enormous.

Whether or not Bitcoin and the like turn out to be a high-tech tulip mania, the underlying technology of blockchain can be useful in many other applications requiring tamper-proof data.

The Rise of Blockchain

Another technology-related story that got much bigger this year is cryptocurrencies. Whether or not Bitcoin and the like turn out to be a high-tech tulip mania, the underlying technology of blockchain can be useful in many other applications requiring tamper-proof data.

One possible hindrance to its use may be the extraordinary amount of electricity consumed in building and maintaining the blocks, but we shouldn't bet against the ingenuity of technologists who attack that problem.

I also foresee two other trends taking shape. While I feel less certain about these, I have picked up the scent.

The Honeymoon Is Over

First, the exceptionally long honeymoon that technology companies have enjoyed with the general public is threatened. In particular, Google and Facebook claim

missions that transcend mere profit as they offer extremely useful and enjoyable services for free. If they have found a way to make a free service exceptionally lucrative, what's the problem, right? Well, if those organizations that actually provide the revenue can too easily put the platform to malign use, such as we're now learning happened in the 2016 US election, and management seems not to take this sufficiently seriously and deal with it forcefully, the general public may become a bit cynical.⁶

If the *New York Times* op-ed page is a barometer of trends in thinking, one recent week bodes ill. On Monday of that week, a former Facebook employee criticized the company's almost callous lack of concern about distribution and use of private data.⁷ And on Tuesday of the same week, a regular columnist discussed the ill effects and addictive quality of smartphones on the young.⁸

Death of the Middleman

Second, middlemen spawned by the Internet will be increasingly cut out. As an example, websites like Hotels.com⁹ show a range of lodging options available at a particular place and time. In the past, they could complete the reservation process and handle payment, unlike early proprietary lodging websites, and usually offered a better price than the hotel itself listed. But things have changed.

First, hotels and even B&Bs now have online reservation systems that can process payments. Second, innkeepers and hoteliers figured out that if they were willing to get less than the so-called rack rate for rooms booked through Hotels.com, they might as well match Hotels.com's price and save the commission. Third, sites like TripAdvisor contain links to connect directly to the lodging. Fourth, from the guest's point of view, it is far easier to deal directly with the lodging itself for clarifying details or making changes than it is to deal with the middleman, since hotels and B&Bs are staffed, unlike websites whose business model depends on minimal staffing. It's a win/lose/win for the guest, the middleman, and the lodging.

Existing middlemen are pressured in another way by a second layer of travel middlemen — like Skyscanner and KAYAK (part of the Priceline Group) — that show all the deals available from the first layer (existing

middlemen) as well as the price offered directly. This makes the first layer an even purer commodity, rewarded only for cost-cutting and sharp bargaining. Just as a Hotels.com disrupted the Main Street travel agent's business model, this second layer disrupts theirs!

I have also noticed that manufacturers with no proprietary retail channel have started offering direct Internet sales with free delivery at prices no higher than Amazon's. For example, I recently purchased an air purifier online from the manufacturer at Amazon's price. If Amazon didn't add value, why should I pay them?

Conclusion

While 2018 may or may not be a watershed year for some specific technology or other, I suggest the more interesting action will come from the public policy and perception arenas and in the evolution of business models.

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⁹I use Hotels.com solely as an example; it's a category that includes Booking.com, Expedia, and several others.

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AGI and the Ethical Challenges Ahead for 2018

by Alexandre Rodrigues

The phenomenon of artificial general intelligence (AGI) will continue in many ways to influence the way organizations do business and societies organize themselves. The process has become irreversible. I addressed this matter in my predictions for 2017,¹ and, given its continued relevance, this subject is worth pursuing as we look into 2018.

The development of AGI capabilities and their increasingly influential role in the business arena continues, ranging from war drones and self-driving cars to the optimization of sales processes, among many others. But there are two aspects we should address now: (1) setting realistic expectations as to how far AGI can go and in what time frame and (2) acknowledging the important ethical challenges that lie ahead.

Since AGI robots have the potential to exacerbate the worst tendencies in human behavior, where will we draw the line between direct human accountability and accidental, unintended AGI behavior?

From a science-fiction perspective, it seems quite reasonable to anticipate that AGI-based robots that look and behave like us will ultimately outmaneuver human beings due to their superior intellectual and physical capabilities. But is such a scenario likely to occur anytime soon? Will it ever happen? Why would humans build robots capable of overtaking our own species unless it were accidental? Do we have valid reasons to fear such a scenario, given the likely absence of human-like emotions in such robots? Should we develop a “safety” technology, side-by-side, to ensure we can exterminate, stop, or otherwise switch off those AGI-enabled robots should they become dangerous?

On the ethics side, there are two main aspects to consider. First, we need to think carefully about the “programmed” behavioral logic we may introduce

into the robots. Some examples include the self-driving car that, based on its programmed logic, decides in an unavoidable collision whom to protect and whom potentially to injure — either its passenger or the pedestrian crossing the road. Or, an AGI sales program implemented to sell useless insurance products to uninformed consumers to improve profits (note that humans have long been committing fraud and deceit even without the existence of AGI).

Second, and, in my opinion, the far more relevant aspect in the short term, is the use (or abuse) of AGI devices to “hide” human unethical behavior. Examples include drones bombing the allegedly “wrong” targets, or myriad other actions in which companies may respond (once their misdeeds are uncovered in an attempt to deflect blame onto the robots) with statements along the lines of, “We apologize for the incorrect actions of our robots; we are working hard to further improve the ethical rules we incorporate into our AGI devices.” Or, consider operating systems that degrade older versions of the hardware they run on by reducing their performance, with the aim of stimulating users to dispose of old hardware and buy new devices, thereby increasing sales. Since AGI robots have the potential to exacerbate the worst tendencies in human behavior, where will we draw the line between direct human accountability and accidental, unintended AGI behavior?

We are still quite far away from AGI robots reaching the level of outmaneuvering humans and becoming autonomous beings in themselves. It is arguable whether we will ever reach such a scenario (despite being possible). To reach the AGI point of so-called singularity, there is a long road of cumulative progress required, from (1) logically optimized programmed behavior (e.g., finding the fastest route between two geographical points on the map); (2) “animal-like” sustained and efficient learning (most likely based on artificial neural networks); (3) artificial self-awareness; and, finally, (4) a form of self-sustainability and/or a system to ensure continuation and evolution (the equivalent to procreation in biological beings).

While Step 1 largely has been achieved, we are still developing technology for Step 2 while Step 3 is still under philosophical discussion.² In my opinion, humans are more likely to use technology and AGI to extend our own capabilities and life expectancy, or, in other words, to introduce AGI technology into our evolutionary path, rather than creating new “AGI beings” from scratch capable of taking over humankind (which would be Step 4). In my view, no major breakthroughs to singularity are expected in the short term.

The ethical dimension, on the other hand, is becoming increasingly relevant. Not so much because of the accidental emergence of “unethical” behavior of AGI-enabled robots, but because of the unethical use of AGI by humans in the business world and in social affairs (e.g., the selling of useless insurance products or the misuse of drones in warfare). These areas, where crucial and important issues exist in the short term, require a deliberate consideration of those ethical ramifications.

In fact, I believe that the dangers and risks from a self-sufficient, AGI-enabled device that acts “unethically” due to possibly lacking (benign) “human emotions,” are far less than the dangers and risks of humans taking advantage of AGI devices to pursue their own agendas — often focused on obtaining immense benefits for a few individuals at the expense of great loss for vast segments of society.

Areas where concerns may be immediately identified relate to the use of drones — mainly in, but not limited to, warfare — and in the use of AGI in the areas of security, privacy, and sales. The main concerns relate to the current lack of legislation and regulations, not only about what can be done with AGI devices (e.g., airports have only recently supported legislation to restrict the use of private drones that dangerously interfere with landing planes), but also in terms of what kind of AGI itself can be developed. Should it be legal to develop software that deliberately markets profitable but wrong insurance products to the prejudice of clients? Or to program an AGI war drone to identify its targets based on racial or religious prejudices, for example?

The potential for the development of “unethical” AGI-enabled devices is immense and the financial and social interests at stake are very high. Indeed, I believe these stakes are so high that humans will not easily resist the temptation to make use of this potential. Furthermore, unethical actions, when perpetrated by AGI devices,

will make it very difficult, if not impossible, to trace accountability to one or a group of specific individuals.

In summary, I anticipate that AGI is an arena with rapidly emerging issues, triggering concerns and the need for a more proactive approach to legislation and regulation (which so far has been primarily reactive). The label “We use AGI ethically and responsibly” should be honestly used and rapidly promoted as a marketing asset. Ethical and responsible use of AGI will benefit society as a whole. Unregulated and unethical use will plunge society further into socio-economic and environmental problems, conflicts, and social inequality, all of which over the last few years have increased globally at an unprecedented rate.

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Momentum for Business Architecture

by Whynde Kuehn

Based on the current business architecture state and trends, here are a few predictions for how the discipline will unfold over the next horizon.

Practitioners and Organizations

While the collective maturity level of business architecture practices still has a long way to go, there is growing evidence of and momentum for the following six trends:

1. **Business architecture adoption will continue at an increased pace.** Business architecture is continually being adopted by different types of organizations (e.g., for-profit, non-profit, government), in different industries, and in different geographies. There is some adoption within universities as well. At this point, the momentum is only increasing.
2. **The business architect role will shift more focus on “architecting the business” versus developing the business architecture knowledgebase.** The ultimate value is in applying the architecture, not just building it. The emerging industry reference models will certainly accelerate creation of an organization’s knowledgebase; in the future, they may even “commoditize” some of the mapping skills needed by an architect.
3. **Organizations will increasingly leverage business architecture for strategic purposes and position business architecture teams to work front in**

The business architect role will continue to increase in the level of responsibility and respect it receives, the talent it draws, and its desirability as a career.

the strategy execution lifecycle.¹ Business architects will become the focal point for strategy translation and prioritization, as well as key leaders in business transformations. To do so, in existing organizations, the business architecture team may shift “upstream” in the lifecycle to work more closely with leaders and strategy teams, where new teams will likely be positioned there from the beginning. The trend of business architecture teams reporting to a leader within the business will likely continue and increase.

4. **The role of the business architect will elevate.** Based on the focus and usage of business architecture per the second and third trends above, the business architect role will continue to increase in the level of responsibility and respect it receives, the talent it draws, and its desirability as a career.
5. **Business architecture may be deployed in new ways across organizations.** As business architecture becomes better understood and embedded within an organization, the function may be deployed in new ways, such as where business architects work as part of a cross-functional design team or aspects of business architecture become part of multiple peoples’ roles.
6. **Organizations will architect across their boundaries.** The scope of organizations’ business architectures should represent their entire ecosystem (e.g., including aspects that may be performed by external partners); some are beginning to work with those partners to architect or rearchitect together toward a common goal. This type of collaboration will likely increase in the highly connected world.

The Discipline

Multiple enterprise architecture industry organizations are advancing the discipline, both individually and together in partnership, with the following two trends:

1. **Significant progress will continue to be made to advance the business architecture discipline.** There is evidence that industry organizations will continue advancing the discipline in all directions, from content to standards to integration, at the continued pace.
2. **There will be an increased focus on business architecture as a profession.** Up to this point, there has been an intentional focus on defining the practice of business architecture first, but industry professional organizations are now shifting their focus to also include the profession. This will lead to further clarity around the business architect role, competencies, and career path.

What Does All This Mean?

Business architects should continue to aspire to practice the role strategically and focus on delivering business value. While building the business architecture knowledgebase is a critical foundation, some emerging accelerators will help business architects put one in place for their organizations quicker. Business architects should challenge themselves to be not only architects, but also leaders and change agents — and develop value-added skills that complement the business architect role. With the level of transformation occurring globally, it is a unique time in history. Architects can leverage to their advantage if they have the courage and ability to do so.

The industry organizations and practitioners that have led the way in formalizing the business architecture discipline deserve a lot of credit for how much has been done in a short time, and done well. These organizations will need to continue the pace or increase it to keep up with — and keep ahead of — practitioners' needs and the new momentum of the discipline.

Finally, we need to build a stronger partnership between business and IT architects. This applies to all of us as architecture practitioners, organizations, and industry organizations. Business architecture has somewhat reinvented itself to have its own identity outside of enterprise architecture, where it has become much closer to the business, and to some extent this had contributed to its success. This is very positive, but it has seemed to have created a separation between some business and IT architecture teams, which should be working closely together, especially as the lines between business and technology blur. Moreover,

business and IT architecture industry bodies may consider coming together to create a common foundation for a true architecture profession (with specializations by domain) to emerge with characteristics such as accountability, institutional preparation, and ethical constraints.

Here's to an exciting journey ahead!

Business architects should challenge themselves to be not only architects, but also leaders and change agents — and develop value-added skills that complement the business architect role.

Endnote

¹For more background on what this means, see: Kuehn, Whynde. "A New Vision for Strategy Execution." *Cutter Consortium Business & Enterprise Architecture Executive Update*, Vol. 20, No. 4, 2017 (<https://www.cutter.com/article/new-vision-strategy-execution-495161>).

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The 2018 Enterprise: More Open, Composed, and Thoughtful

by Balaji Prasad

There are three things extremely hard: steel, a diamond, and to know one's self.

— Benjamin Franklin

As chaos, complexity, and change swirl around enterprises, it is wise to take a step back, clamber a little higher up the abstraction tree, and take a broader view. Framing actions within a larger framework of what really matters can help us differentiate innovation and transformation opportunities from wild goose chases. The bottom line in this predictor piece is that we will see enterprises value “openness” more, move toward a “composed” state, and recognize the need to be a tad bit more “thoughtful.”

The trend toward an enterprise as the sum of multiple legal entities, composed together to produce a whole that is greater than the sum of its parts, is a real one.

Openness via APIs

The year 2017 saw enterprises push the gas pedal on the new paradigm for enterprise integration: APIs. The goal was to make it possible to quickly and cheaply access software-enabled business capabilities in one part of the enterprise from another part of the enterprise.

As strength in integratability becomes obvious, so does demand, driven by competitors and regulators. This demand comes from outside the enterprise. For example, the UK's Open Banking initiative intends to enable improved customer service and foster more competition in the banking industry. In Europe, regulations are driving APIs. While the US does not have similar regulations in banking, competitive pressures are influencing US banks to open up business capabilities and information to customers and authorized third parties.

Enterprises have already started this journey. In 2018, we will see greater investment in making APIs easier to publish, consume, and monetize. APIs are a core architectural capability needed to position enterprises in a shifting, unpredictable landscape of third parties and competitors playing together within a broader ecosystem.

Composing the New Enterprise

Some renewed ideas are driving a mindset that will eventually replace the “firm,” for which Nobel Laureate Ronald Coase explained the *raison d'être* in his 1937 piece, “The Nature of the Firm.”¹ One of these ideas is the notion of a “platform”; a number of books, articles, and papers have emerged on this subject over the last couple of years. There have also been highly visible implementations of platforms such as Facebook that have turned traditional business models upside down. This subtly repositions the enterprise and enables it to be cast in a different mold.

The trend toward an enterprise as the sum of multiple legal entities, composed together to produce a whole that is greater than the sum of its parts, is a real one. This trend arises from the many moving parts of an enterprise's digital platform and the difficulty for a single entity to create and manage all these specialized components. Even the hoary automotive industry has not been immune to this, as recognition sets in that a vehicle has a digital heart beating inside it and that there are Silicon Valley entrepreneurs pioneering autonomous vehicles who have a better grasp on the digital skeleton of the vehicle.

Similarly, the financial industry has seen a surge of fintechs — startups focused on specific aspects of the business (e.g., payments) that are more tech-savvy and nimble in bringing the latest technologies to bear on business problems in new ways. Banks are especially under threat, as even big techs such as Google, Apple, and Amazon start encroaching onto the banking and payments space. The bank of tomorrow may bear faint resemblance to the bank of today, and it behooves

incumbents to find a way to reposition for the potential disruption that will ensue. Fintechs offer a path. Coupling that with APIs and a better definition of the “core” platform will help financial institutions execute in-line with where things are likely to go.

In 2018, we will see enterprises work toward more partnerships with specialists that can help offload noncore capabilities (e.g., cloud-hosting services) and with others that can extend the core platform with value-added services (e.g., payment exchanges). In some cases, APIs will provide the fabric for connectivity, while in other cases it may be necessary to cobble together data feeds that are necessary in collaborative efforts, at least in the initial stages.

The Thoughtful Enterprise: Who Am I?

The thing about the future is that while some things change, some components will carry forward more or less the same. If the past carries into the future, would it not help to get a deeper appreciation for those components — and to grow them into what they can be?

Many enterprises have already begun efforts directed at gaining a grasp on what the business is about *and* what it is not. The practice of business architecture is coming to the fore, driven by complexity at the lower levels of the business stack. Moreover, conversations about technology are no longer just the domain of technologists because most enterprises have crossed the “digital tipping point” — a state where a significant part of the enterprise is tech-based.

Thus, architecture itself will see the beginnings of a transformation in 2018, as technology-heavy architecture transforms itself and climbs higher up in the business stack, getting more in tune with what really matters. The business architect’s day has arrived. Business architecture will also help with making decisions on what to hold close, what to let go, and what to share in the emerging firm that will be a composite of multiple firms.

There will be more reflection as well on other methods such as Lean and Agile that have crept into enterprises over the last few years. Hype is giving way to a calmer

view; Agile is less of the Agilism it has sometimes been. Many in the industry now talk of going back to the intent and spirit of Agile — things that have sometimes fallen through the cracks in the scrums that exploded along the way. People matter. Motivation matters. Learning matters.

Conversations about technology are no longer just the domain of technologists because most enterprises have crossed the “digital tipping point” — a state where a significant part of the enterprise is tech-based.

2018 will see not only more emphasis on business architecture and roadmaps, but also a return to the roots — to the people side. A more pragmatic, people-oriented way of being Agile will go more mainstream in 2018 as the enterprise seeks to consolidate its core: the people who make the enterprise what it is.

Endnote

“The Nature of the Firm.” Wikipedia (https://en.wikipedia.org/wiki/The_Nature_of_the_Firm).

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The Year of Data Governance?

by Claude Baudoin

Given all the attention devoted to data in information systems since at least the 1960s, the titular question may seem strange or silly. You may also remember the sudden popularity of the “chief data officer” (CDO) role a few years ago¹ as proof that we didn’t wait for 2018 to address the need to apply governance principles to data. So why would 2018 see this subject return to the front stage? Let’s begin with three specific reasons.

You cannot manage your data if you do not know what it is, what parts of it are sensitive, or where it is located. You need to map all your data assets.

The Return to Data

1. Focus on Privacy

Each of the past several years has seen breaches of security resulting in the release of personally identifiable information (PII). The Equifax accident was notable in 2017 because of the sheer number of records affected — 143 million, more than half the adult population of the US!

And that’s not all. In May 2018, the EU’s General Data Protection Regulation (GDPR) will come into effect. GDPR imposes strong restrictions — and potentially huge fines in case of violations — on organizations that store PII of citizens of the EU (500+ million people in 28 countries, including the UK for now). Management and IT consulting firms are already ramping up their offerings on how to achieve GDPR compliance.

2. Internet of Things

When devices first began capturing data and exploiting it only within a limited perimeter and in a fleeting manner, few people paid attention. Now that devices are connected to the Internet — and the data they

capture is being moved to the cloud to feed big data analytics and machine learning algorithms — the questions of who does what with that data, and where and when, become much more consequential. This relates to privacy, of course, but also to my third reason, data residency.

3. Data Residency

Companies — and their lawyers — are waking up to the fact that with 200 countries in the world, some of which are federations without uniform laws, as well as supranational entities like the EU and various regulations buried in trade pacts, storing data in another country or jurisdiction (e.g., by using a cloud service) or perhaps just *moving it through* another country, could violate a law even if the data does not contain PII. Many countries forbid banks to store data outside their borders, and a few treat natural resource data (e.g., data on oil reserves) as another form of “sovereign data,” whose export constitutes a crime. In fact, a recent report by the Object Management Group (OMG) on data residency states that ignorance or neglect of this issue poses an existential risk to the IT services industry.²

This trifecta poses significant challenges as we enter the new year. CIOs — or, for that matter, CEOs or boards of directors — who do not understand the risk posed to their organization if they cannot answer the question, “It is 10 pm, do you know where your data is?”³ are at great risk of jeopardizing their organization’s existence and, of course, their own careers.

So what should an organization do in 2018 to address these issues?

Model Your Data

You cannot manage your data if you do not know what it is, what parts of it are sensitive, or where it is located. You need to map all your data assets. It is a huge task if it hasn’t ever been done, but it is critical. Some side benefits will be to detect integration issues, the need for

master data management, and more. But the immediate goal is to understand what data poses security, privacy, and data residency challenges, and then prioritize and address vulnerabilities.

Review Cloud, Outsourcing Contracts

Under GDPR and other laws and regulations, the owners of the data cannot abdicate their compliance responsibility under the pretext that that responsibility is the data custodian's (e.g., a cloud storage or data center provider). In addition, it is becoming too risky to sign a cloud service agreement that does not specify that the customer is informed when its data is moved across jurisdictions, or when a security incident has been detected. For more guidance on these topics, see the various free guides from the Cloud Standards Customer Council (CSCC).⁴

Bridge the OT/IT Chasm

In industrial companies, the IoT is often an extension of earlier control systems that functioned within disconnected silos. The "operational technology" (OT) owners of these systems rarely communicated with the IT organizations and, in fact, often didn't need to because their control systems used special-purpose computers, operating systems, and network protocols.

Now that many IoT systems are general-purpose computers connected to the Internet, OT people cannot ignore the skills and concerns of IT, yet they still fear the intrusion into their affairs of generic IT personnel who lack a deep understanding of their special requirements. The two organizations (in fact, while IT is often centralized, OT has sprung up organically in each line of business, so we're talking about more than two departments) need to collaborate and find the right combination of rigor and agility before an accident happens.

Put Governance in Place

What does it mean to put governance in place? For starters, decide who oversees the data. Is it the CIO, is it a separate CDO (who reports to whom?), or someone else? Then, start thinking about the policies you need — for your IoT data, for PII, for IT service contracts, and so on. Write those policies, get them approved, train people on them, and keep them simple. Next, use a recognized responsibility assignment methodology

— RACI, or one of its derivatives — to decide who does what. If you want to tie those policies and organizational matters to IT management frameworks like COBIT or ITIL, fine — but just asking a mid-level IT manager to adopt ITIL 2011 is not going to solve the high-level problem of responsibly managing the organization's data (and that of its customers or employees).

For starters, decide who oversees the data. Is it the CIO, is it a separate CDO (who reports to whom?), or someone else? Then, start thinking about the policies you need.

Endnotes

¹The first known CDOs were named at Capital One in 2002 and Yahoo! in 2004, but it was not until 2012 that the role became more generally known. It's still worth noting that the need for a CDO is not universally accepted: it seems to contradict the middle initial of the CIO title. The blunt response of the CIO of a major financial institution, when questioned about one of the articles proposing this role, was "I thought I was in charge of the <bleep> data!"

²Baudoin, Claude (ed.) "Data Residency Challenges and Opportunities for Standardization." Object Management Group (OMG), March 2017 (<http://www.omg.org/cgi-bin/doc/mars/17-03-22.pdf>).

³This is one of many imitations of a public service announcement used during evening news TV programs in the 1960s in the US.

⁴Cloud Standards Customer Council (<http://www.cloud-council.org>).

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Semantic Ontologies: Be the Shepherd, Not the Sheep

by Dean Crowley and Oliver Browne

The technology associated with semantic ontologies has been in existence for quite some time but is not yet adopted as an industry-wide standard within the financial industry. There are some ontologies currently in use, such as the Financial Industry Business Ontology (FIBO), the Financial Industry Regulatory Ontology (FIRO), and the Financial Industry Ontologies for Risk and Regulation Data (FIORD), but there is no single solution that all organizations can use as the one common standard. I believe this will change in the coming year, and there will be a significant shift toward a single standard within the industry.

It is only a matter of time until regulators encourage reports in a FIBO-friendly format, thus driving wide-scale recognition of FIBO as the universal standard.

Organizations can use ontologies with Hadoop and data lake systems when they are evaluating the underlying systems themselves, their documentation, and respective data dictionaries. In an ideal world, a single standard like an ontology is used from day one. This has not been the case, however, so an ontology must be applied retrospectively, increasing the difficulty in layering over the different systems used within different organizations across the industry.

Unfortunately, before an organization can reap the rewards from ontology adoption, they must break through a significant challenge: high-level, key decision-making employees often do not understand how an ontology will benefit the business. They tend to view ontologies solely as an administrative or technical function, not as an immediate need. Thus, they make them low priority. Only after key employees view the benefits of ontology adoption as advantageous can there be a significant commitment by their respective organizations to their creation and adoption.

From a regulatory point of view, an industry-wide standard will prove very useful for reporting. Because all data will be uniform with an industry standard, there will be very little need to change data for reports within financial institutions; and for regulators, reports will be very easy to interpret. This will save time and money for all parties.

It is only a matter of time until regulators encourage reports in a FIBO-friendly format, thus driving wide-scale recognition of FIBO as the universal standard. For example, if the US Commodity Futures Trading Commission accepts reports in a FIBO format in 2018, that decision will force organizations to consider using it in their day-to-day operations.

Within the financial industry, there is a hesitancy among organizations to adopt or implement significant industry-wide changes. This holds true with the serious overhaul that ontology creation and adoption would entail as well. While ontologies will benefit areas like data lake creation or system migration, organizations seem to be content to operate as they are, rather than incurring costs that may be viewed as unnecessary in trying to change processes that are already operating at a satisfactory level. Many organizations would prefer to let someone else take the plunge and wait to see if any of the observed benefits could be applicable to them.

There are several benefits to organizations that take the lead in the industry in standard creation. Leaders will have the opportunity to work with others and align the ontology closely to their own systems while minimizing the need for change within their own organizations. After the initial creation, organizations that follow suit will have to adhere to the standards outlined by the industry leaders, which will result in some disruption and bigger changes within their own organizations than if they had been involved from the beginning.

I predict that the successful adoption of an ontological standard, such as FIBO, within the financial industry will lead to a massive change in customer experience by

eliminating lengthy and costly processes involved in transferring a customer's business from one organization to another. Because of this new open market, organizations will have to ensure their customers are provided with the best possible services. If they are not, customers will quickly take their business to a competitor. In the current market, this process is quite awkward and lengthy, as funds must be transferred and translated between organizations to take those customers from one system and input them into another. This difficulty effectively disappears with a semantic ontology adopted as a standard within the industry.

I believe that, in 2018, the financial industry, organizations, and consumers alike will become more aware of the improved data standardization offerings associated with semantic ontologies. Organizations that don't recognize this will be left behind as the rest of the industry leads the way forward with ontology creation and adoption. While there have been largely independent movements by organizations like Bloomberg, Deutsche Bank, Wells Fargo, State Street, and many others in the direction of semantic ontologies, only when there is a significant commitment by multiple entities to a universal standard will progress be made toward an industry-wide ontology. It is in an organization's best interest to ensure it is up to speed when the market becomes more open for customers who want to change institutions. Failure to do so may result in disaster, as the gap between organizations using an ontology and those that are not will widen further, leading to some organizations being outstripped by the competition.

Over the past number of years, there has been a constant increase in the uptake of work on semantic ontologies within the financial industry, including increased progress by way of proof of concept (POC) and use cases within organizations.¹ Organizations using these POCs will be the industry leaders moving toward a universal standard because they (1) recognize the benefits available to them and (2) are already working with semantic ontologies internally. These leaders are also going to be the beneficiaries of the more open market that will come with a universal standard, and will therefore be shepherds, not sheep.

Endnote

¹"Semantic Web Case Studies and Use Cases." W3C (<https://www.w3.org/2001/sw/sweo/public/UseCases>).

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