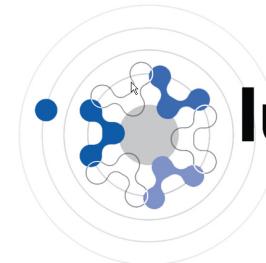


The Best of Both Worlds: Using Data *and* Insight to Drive Your Digital Transformation

Kevin See, Ph.D.
VP, Digital Products

October 18, 2017



luxexecutive **summit**

Tokyo • October 17 - 18, 2017

Agenda

1 Innovation as fuel for digital transformation

2 Case studies: from AI to IoT to Blockchain

3 Owning your digital transformation

Preparing for your digital transformation requires knowing what technologies are poised to disrupt you

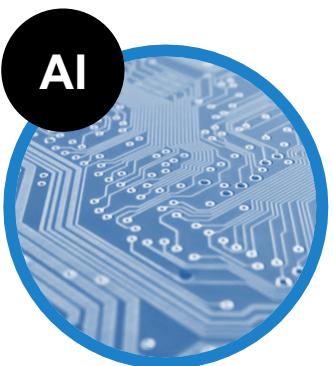
The rise of AI.
When did it first
appear on *your*
company's
radar?

AI has been researched for more than a century – but a few years ago, it suddenly jumped onto every executive's radar:

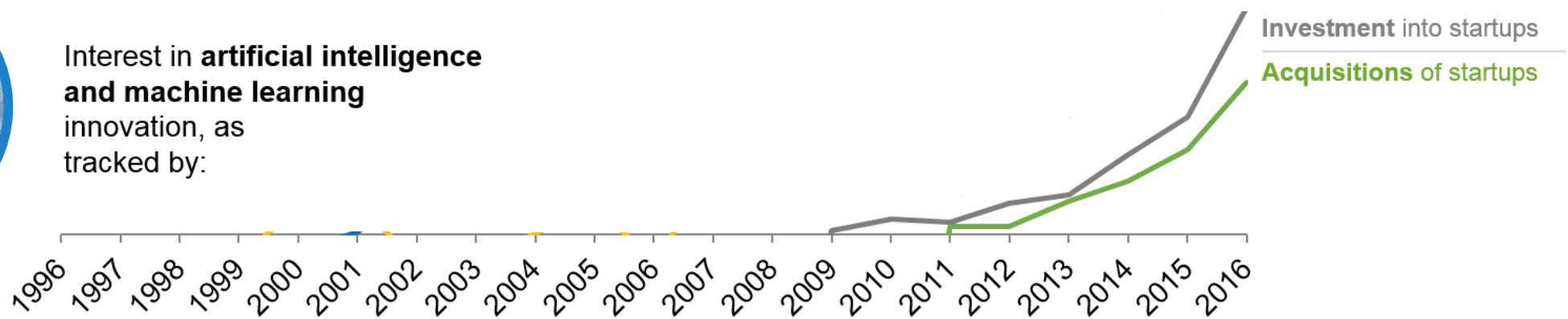


THE FRESHMAN CEO
BETS THE COMPANY ON A.I.

Maybe we can do better than magazine covers. So what does the *data* say?

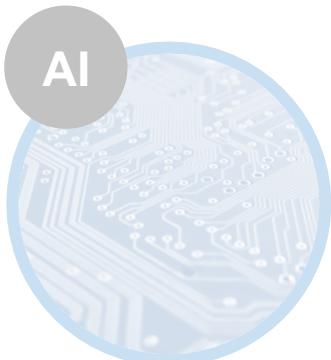


Interest in **artificial intelligence** and machine learning innovation, as tracked by:



Interestingly, the media chatter lines up well with venture capital and corporation acquisitions...

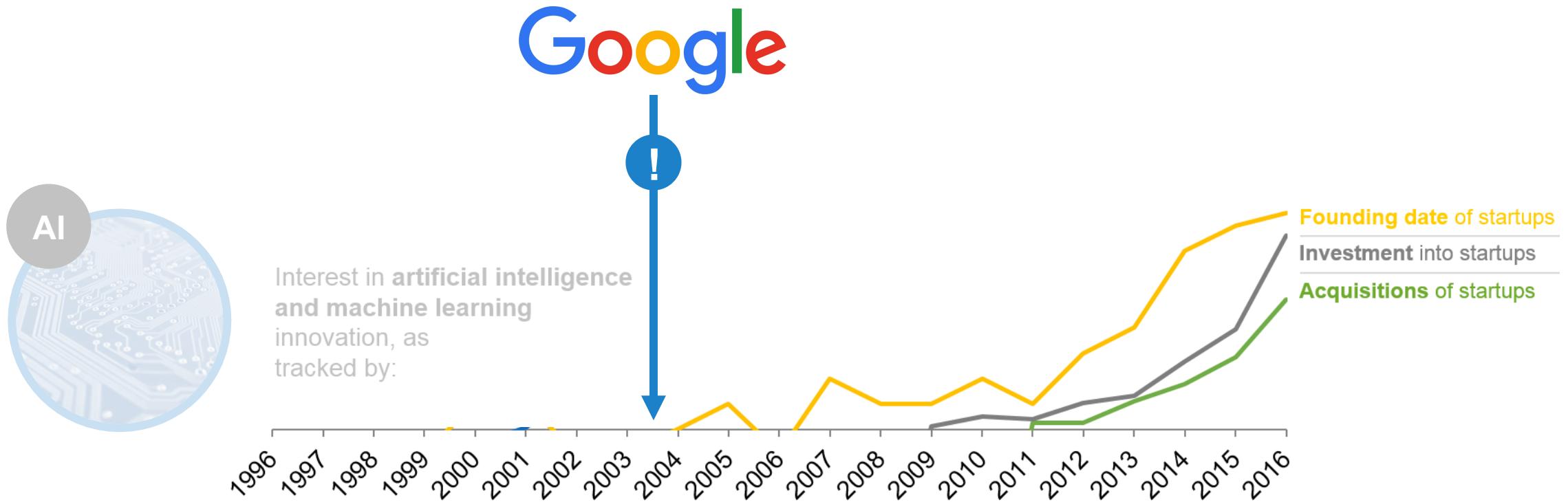
- Reading Forbes and HBR covers aligns well with tracking trends in VC deals and acquisitions:



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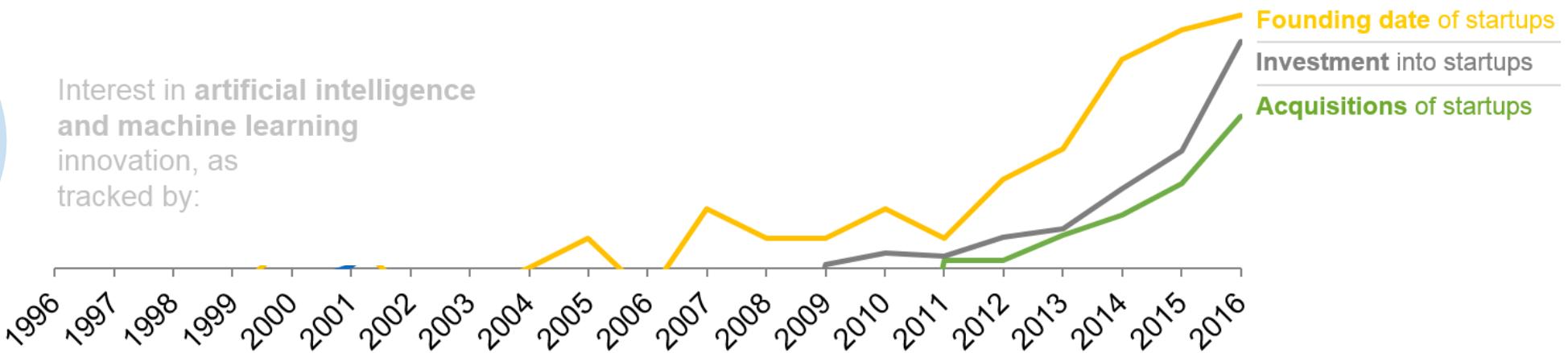
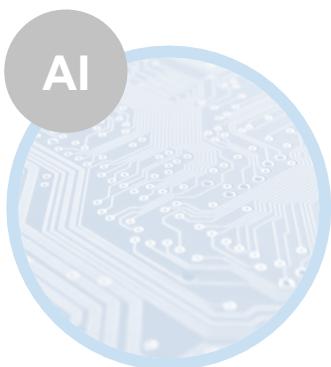


Why is this a problem? Because market leaders start securing position here:



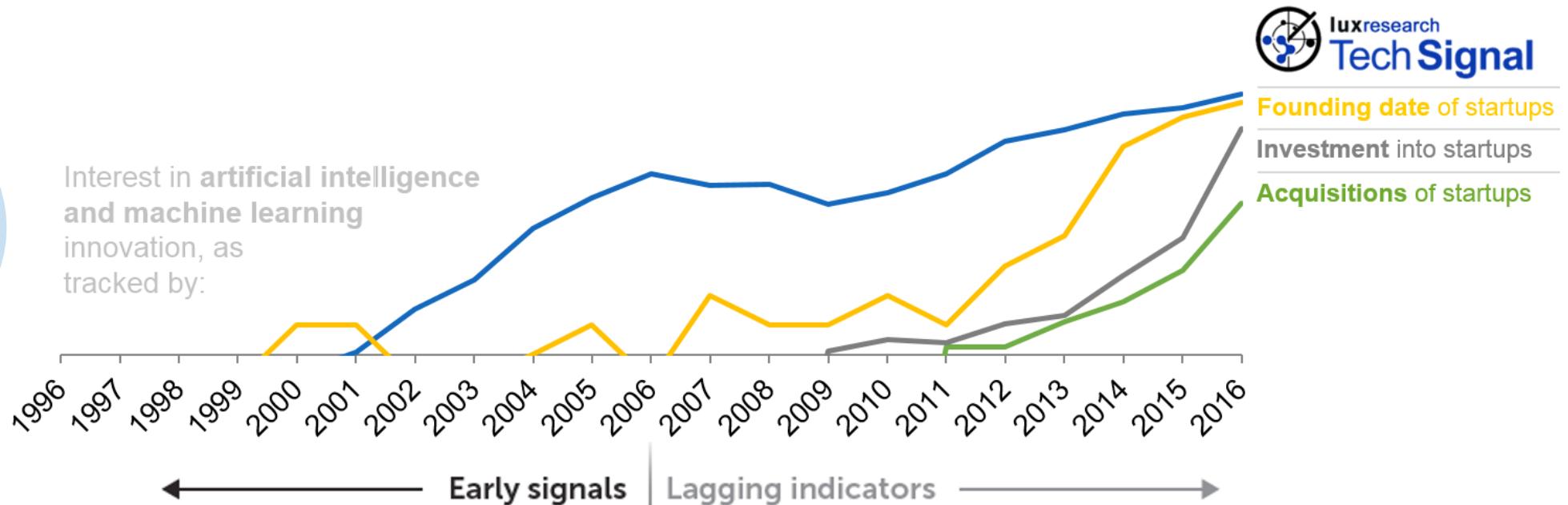
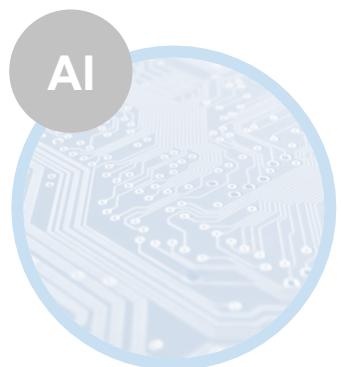
Even laying on start-up founding dates leaves us lacking

- The time series here follows a relatively logical progression – founding, investment, acquisition, but the gap between them is short, just a few years.
 - Moreover, in the case of start-up founding, the data is starting to get pretty noisy.



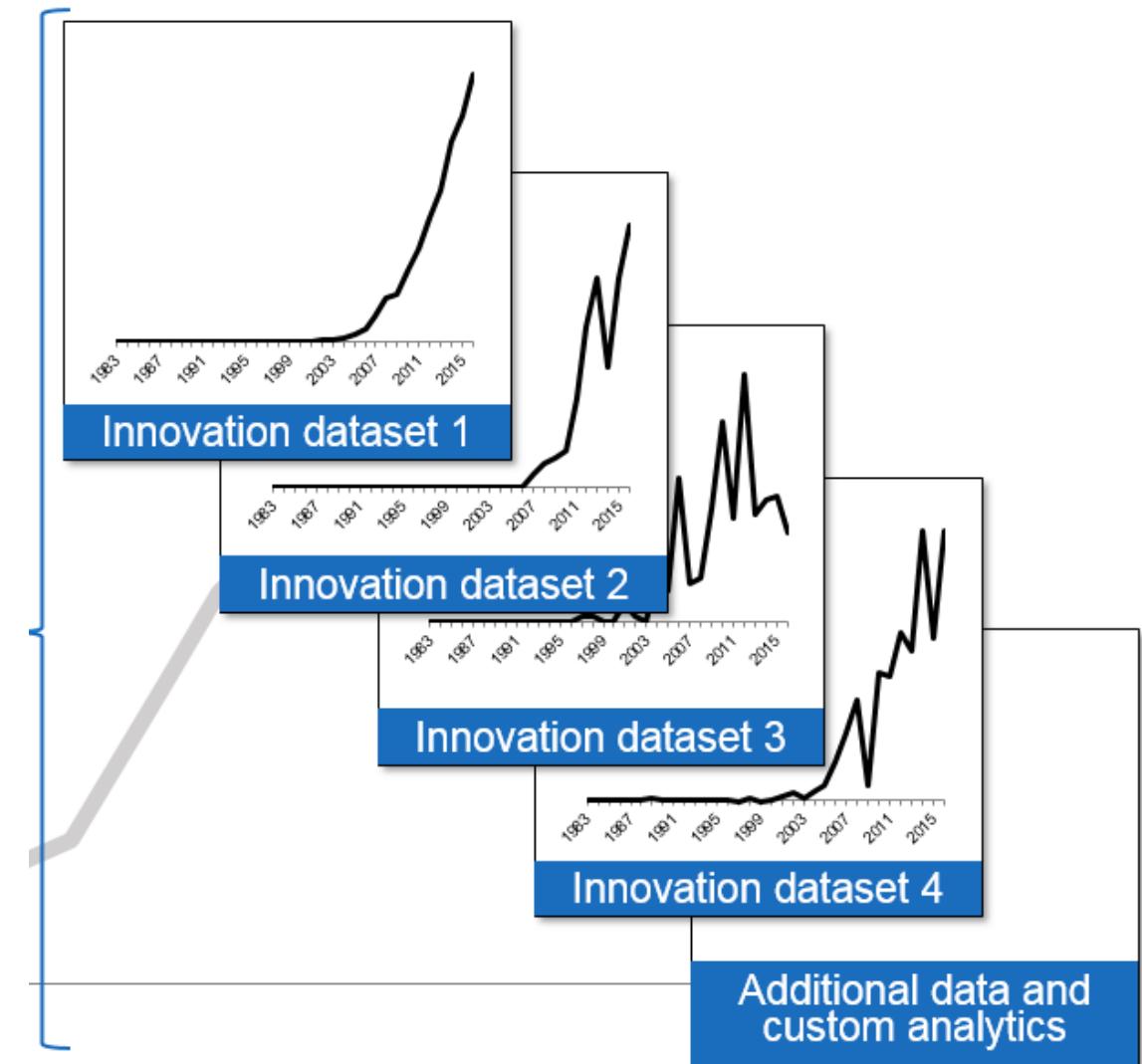
Tapping into the power of “hidden data lakes”

- What we need is something like the blue trace below:



What is a “hidden data lake”?

- A data lake is a centralized repository of cleaned-up, easily accessible data for software to analyze.
- The “hidden” foresight aspect is accessible when:
 1. The data lake is **big** enough, and **diverse** enough.
 2. It contains the **right** data.
 3. It is investigated using insightful **data science** techniques.

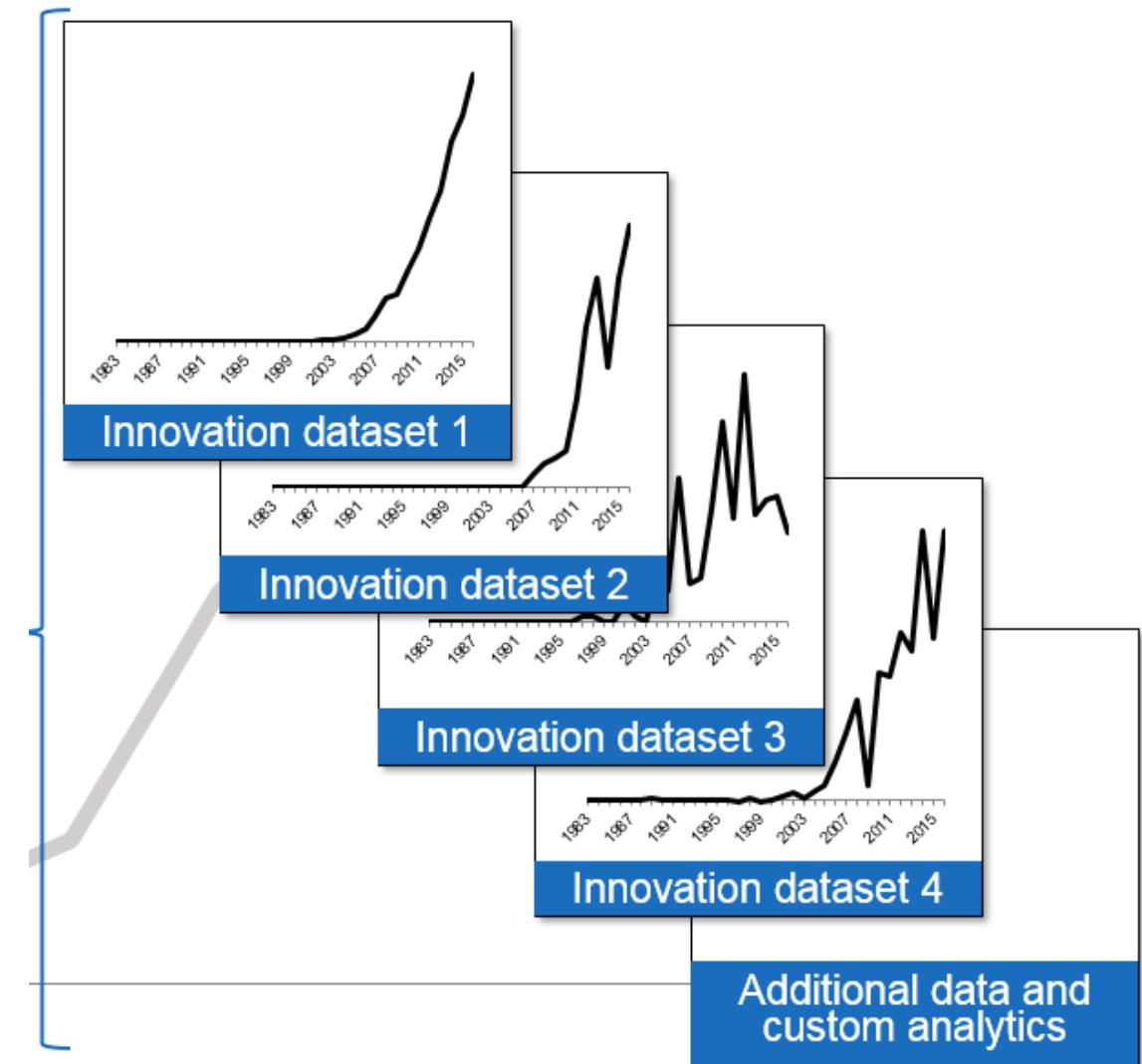


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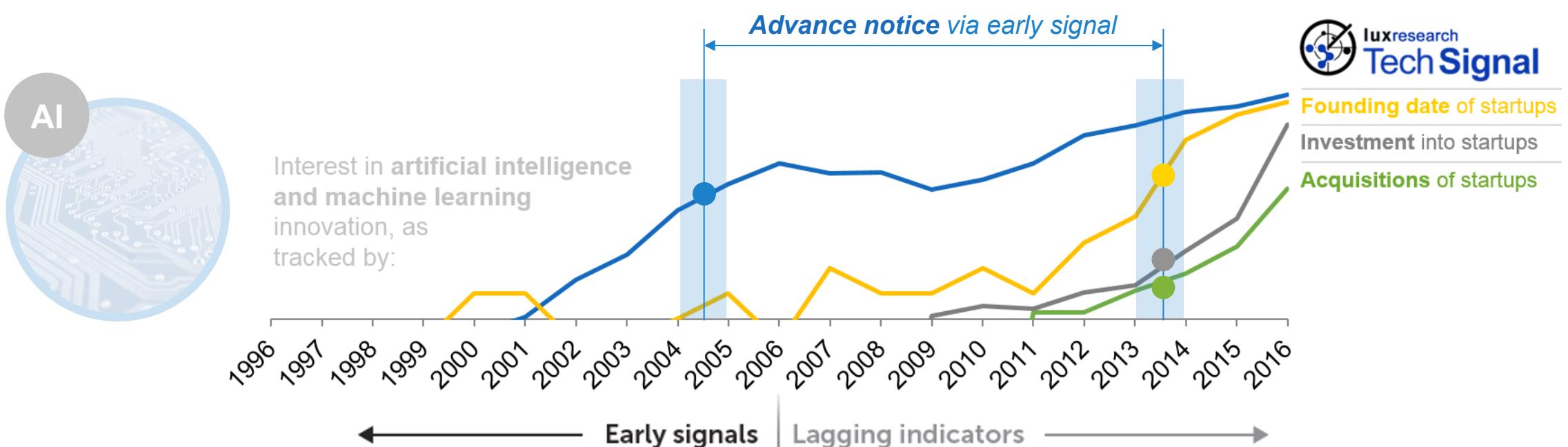
“Big data may mean more information, but it also means more false information.”

- Nassim Taleb



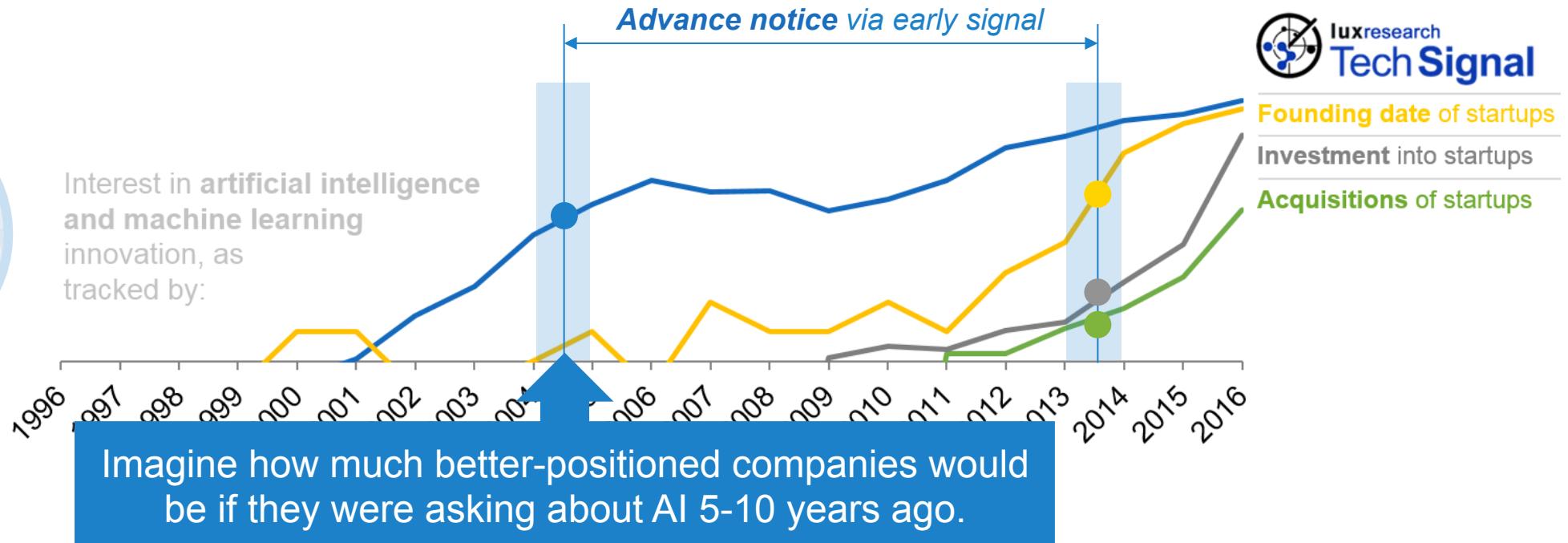
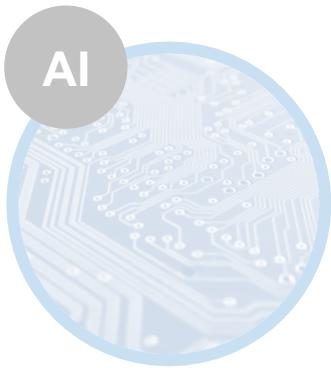
Early signals vs. lagging indicators: Most ways of tracking innovation are lagging indicators, giving actionable signal too late

- Early signals, often 5+ years in advance, enable securing key intellectual property, talent, and market position.



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- 1** Innovation as fuel for digital transformation
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Data alone is only the start

Do you know what's in your digital toolbox?

AI



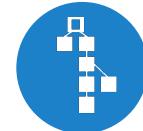
Robotics



IoT



Blockchain



AR/VR



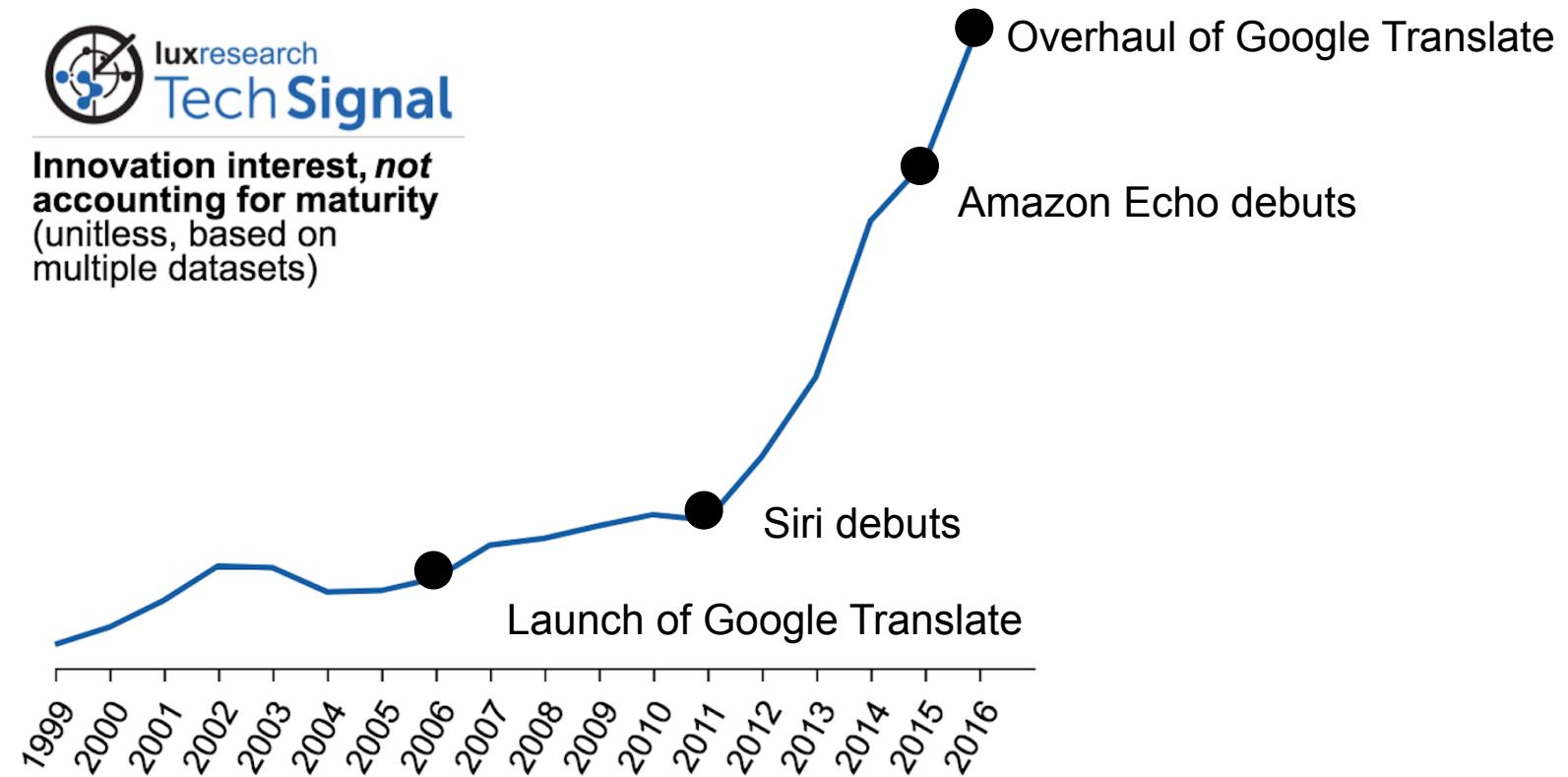
Wearables





NLP is on the rise

"Its speech-recognition team swapped out part of their old system for a neural network and encountered, in pretty much one fell swoop, the best quality improvements anyone had seen in 20 years"





What is NLP good for? Case studies in how businesses are already using language understanding

- Natural Language Processing (NLP) can be a tremendously useful part of any company's AI toolkit, helping to:
 - Understand internal and external documents, such as what companies, people, or locations are mentioned and in what context (like actions), and even helping with translation
 - Generating dialogue, including for virtual “chatbots” that interact with us
 - Gauging customer sentiment and emotion, such as feedback via social media channels

Google :  PageRank™

Lufthansa :  Lufthansa Best Price Travel agent

 + **SINEQUA**
CONNECT TO KNOWLEDGE™

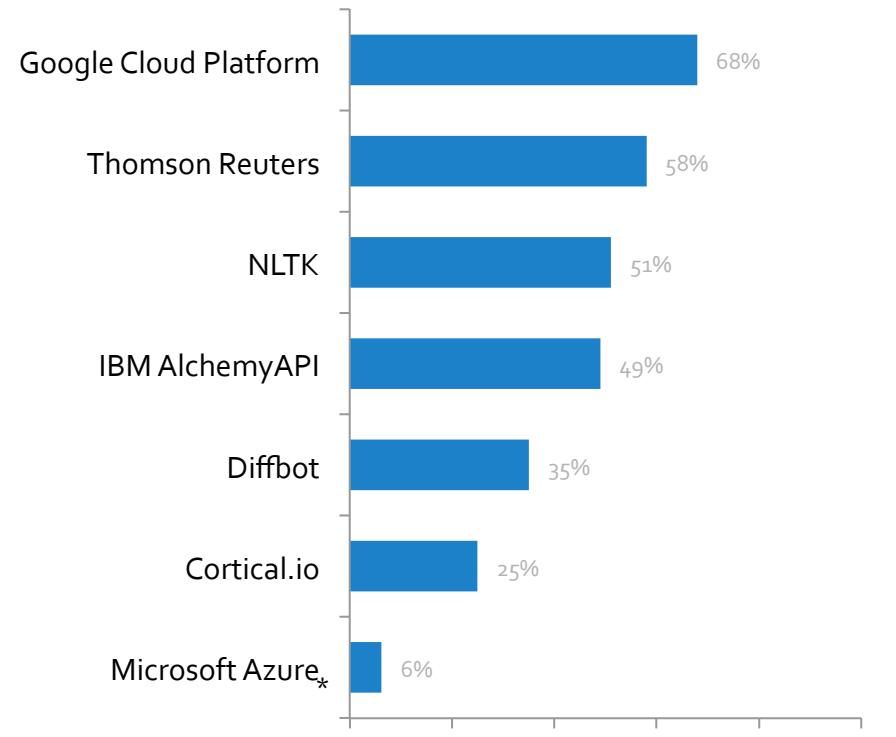


Building an NLP experiment

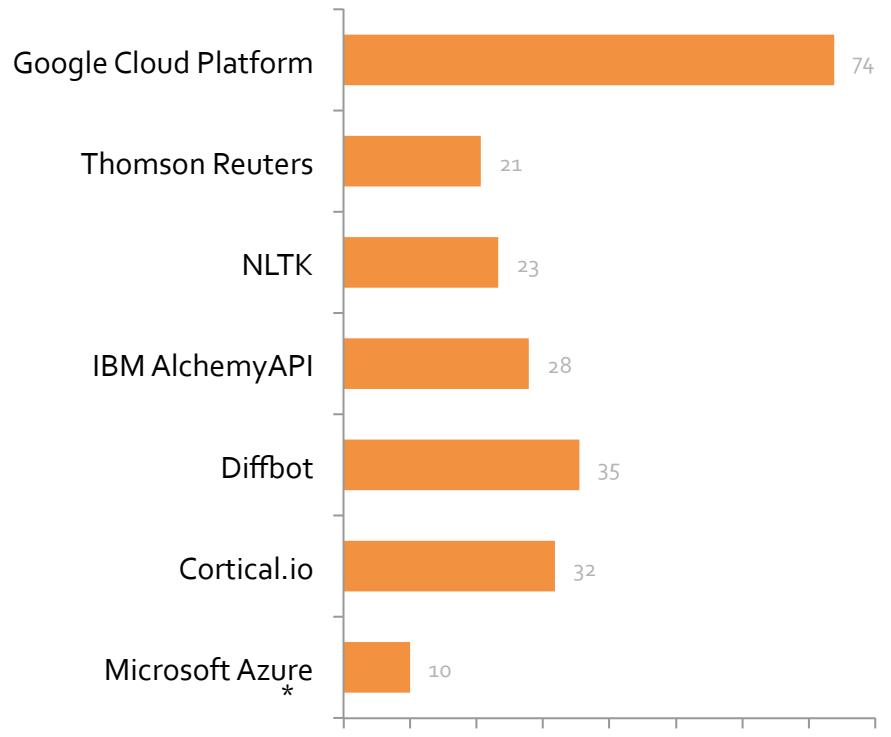
- We selected 10 technical articles from 10 sources across a range of Lux coverage areas, including energy and materials
- Fed it into available NLP engines and grouped the NLP results into:
 - Entities
 - Actions identified
 - Taxonomy findings
- Compared this to what the analysts pulled out of the very same articles
- Measured the efficacy of the NLP engine for accuracy vs analyst findings, as well as consistency (variance) from article to article



Only one NLP solution manages to be both relatively high-accuracy *and* consistent: Google



NLP accuracy score in
Lux Research benchmarking



NLP consistency score in
Lux Research benchmarking

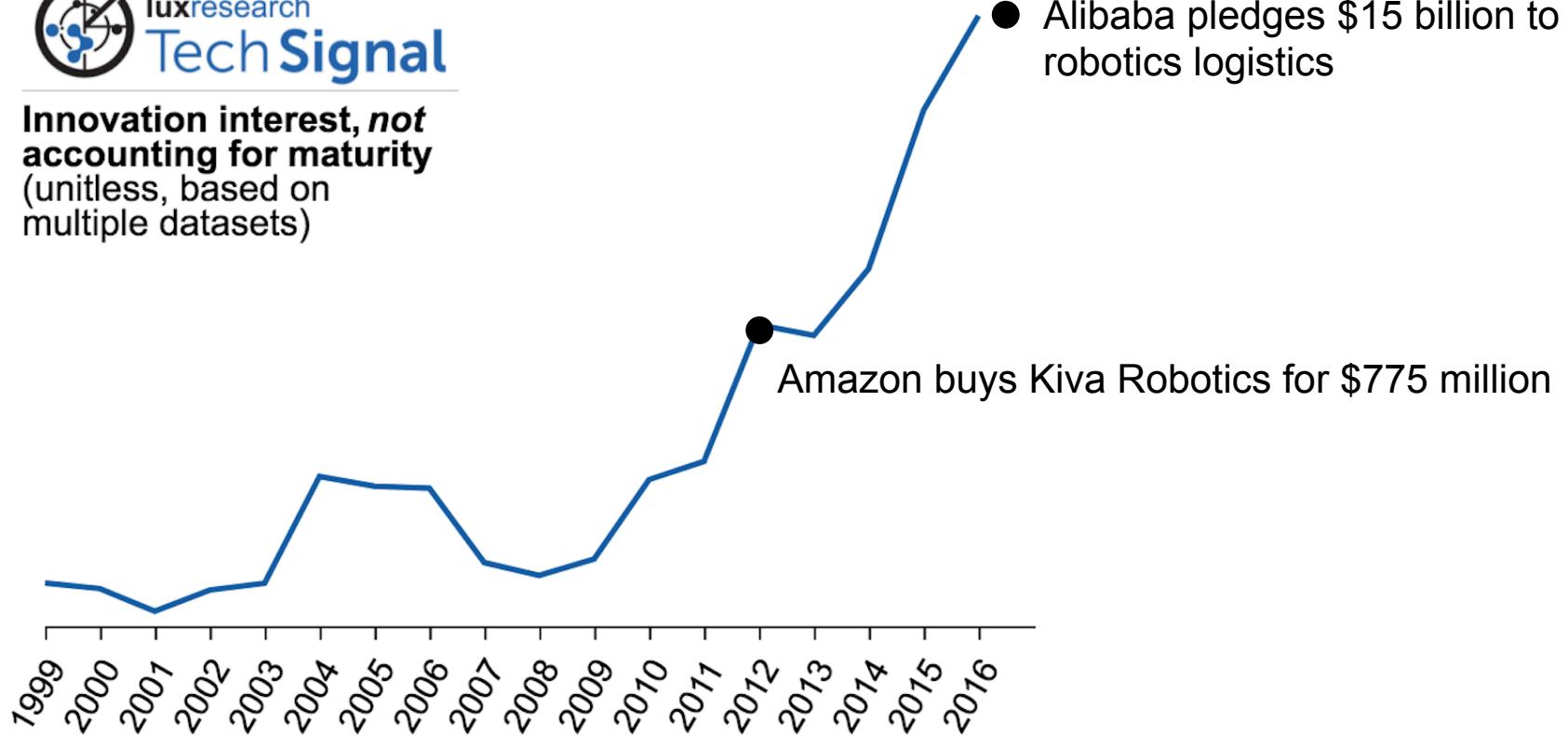
*Note: Microsoft's current NLP implementation was so poor in its lack of granularity that we awarded it only nominal minimal marks accuracy, consistency, and awareness



Warehouse robotics



Innovation interest, not accounting for maturity
(unitless, based on multiple datasets)





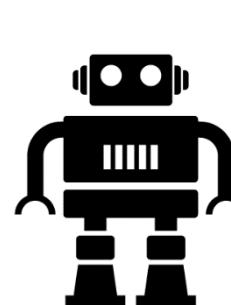
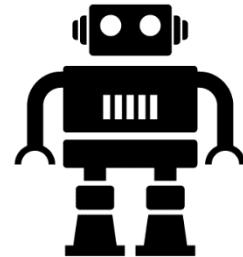
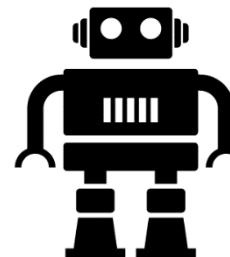
Robots: friend or foe?



Replacing Human Workers

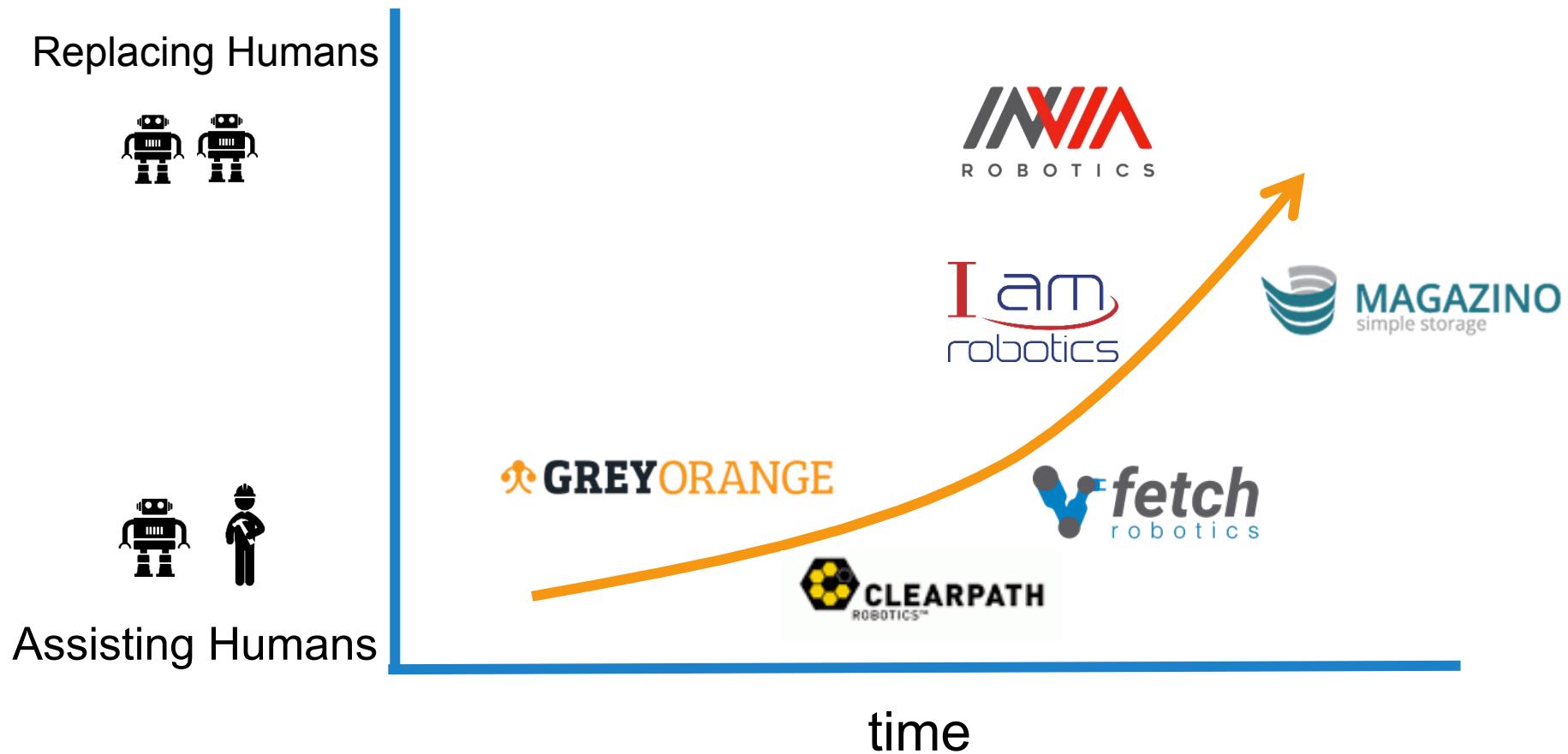
vs.

Assisting Human Workers

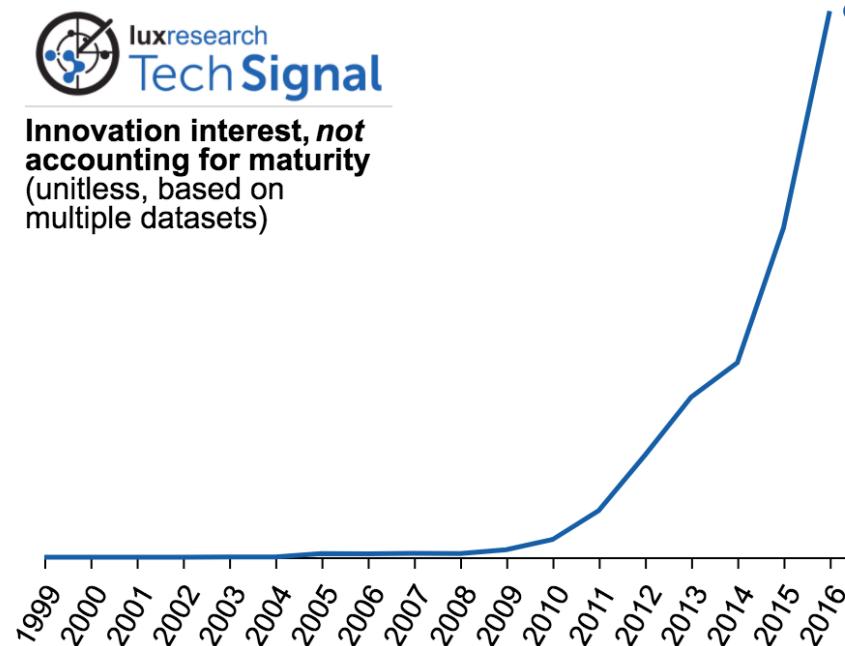
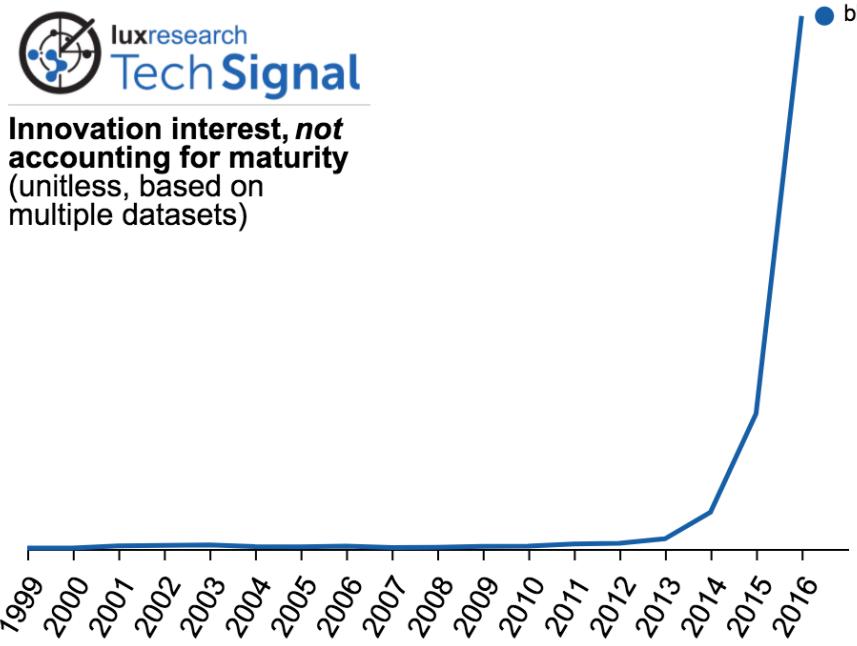
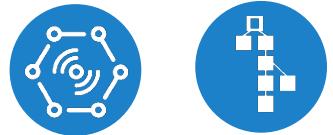


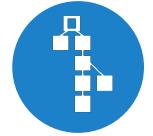


Emerging companies fall along a spectrum



Combining two hot topics: Blockchain and IoT

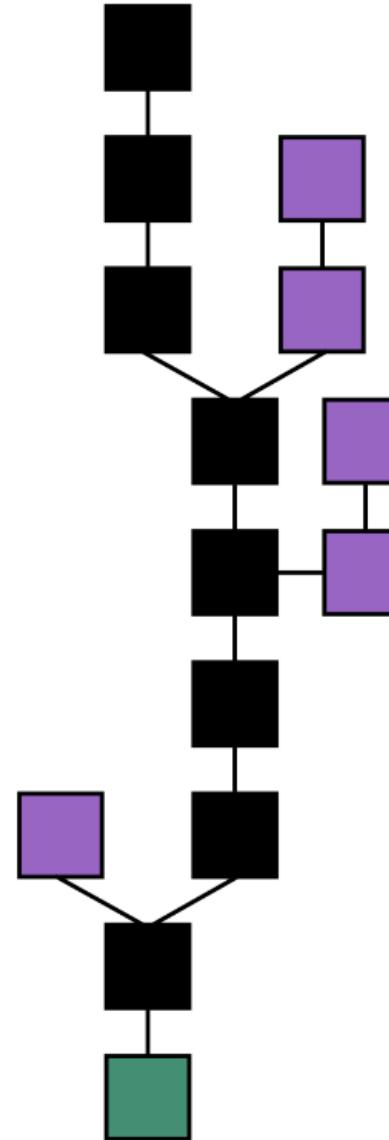




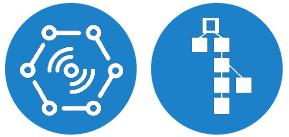
What's so special about blockchain?

Developers are drawn to blockchain technology due to its:

- **Decentralization** – no central authority/owner
- Simultaneous **public openness** and **pseudo-anonymity**
- **Security** and **data integrity**
- Ability to embed value in the form of **token currencies**
- **Smart contract** functionality



Brighthann Cotton & Skuchain take supply chain out of the stone ages

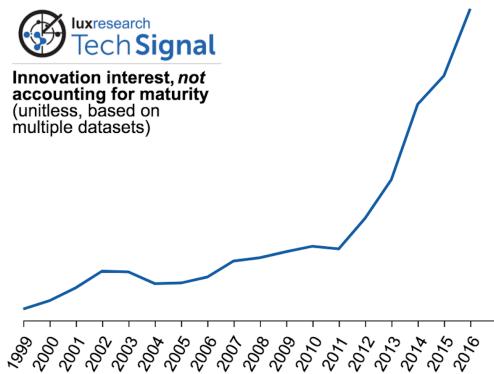


- Brighthann Cotton streamlined a shipment of cotton from Texas to Qingdao, China, using blockchain, smart contracts, and IoT.
- **Blockchain:** Wells Fargo and Commonwealth Bank of Australia were able to digitally develop a letter of credit on behalf of the buyer and seller using Skuchain's distributed ledger
- **IoT:** Payment triggered via smart contract integration with an IoT solution for tracking containers.

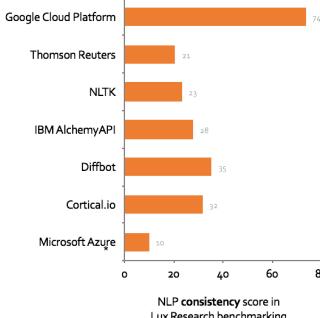
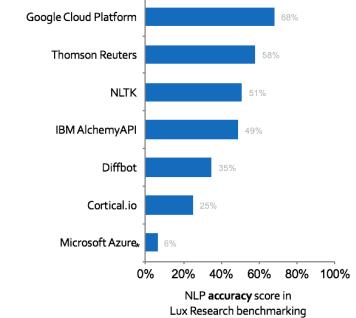


Answering key questions around technology

1. What is the technology trend?



2. What is the best technology?



3. How are the technologies evolving?



4. How do we use the technology?



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Once you've organized your efforts, Data+Insight is the recipe for success

Winning teams have the right players

- Digital demands dedicated effort
 - Head of Digital Transformation Strategy
 - Director, Digital Innovation Organization
 - Director, Open Innovation, New Business & Digital Disruption
 - VP Digital Transformation
 - Team Lead Digital Workplace Business Services
 - General Manager, Digital Enterprise Realization
 - General Manager of IT Innovation
 - Digital Factory Business Development
 - Global Head- Digital Innovation Program
 - Senior Vice President, Project Leader 4.0



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- New titles/functions
- Dynamic, align with needs
- Can build cross functional teams
- Must be empowered to make change

Segment the enterprise



- » What do I sell?
 - » Equipment
 - » Chemicals and materials
 - » SaaS
 - » Energy
 - » ...
- » Can digital tools...
 - » Make my product smarter/better?
 - » Create new products/services?
 - » (in the hands of others) threaten my market?

- What keeps my business running?
 - IT
 - HR
 - Mfg and Supply Chain
 - Marketing
- Can digital tools...
 - Make my people smarter, faster, safer?
 - Lower costs?
 - Enhance efficiency?

Taking our own medicine – Lux's digital transformation



Devote personnel to digital products and add software development capabilities in visualization, AI, and Machine Learning



Consider unique strengths and opportunities for product evolution



Develop new tools for our analysts and provide data on which to layer insight

Evolving our product



Technology + Market Knowledge



Siloed innovation data sets

Combining Data and Insight



Technology + Market Knowledge



Unique, unified innovation data

What news is impacting my business?

- State of the art: Un/lightly curated news feeds/alerts
- Examples: RSS feeds, Google alerts

The screenshot shows a Google Alerts interface for the search term 'Toyota'. At the top, it says 'Google Alerts' and 'Toyota'. Below that, it indicates a 'Daily update - October 2, 2017' and a 'NEWS' category. The main content area displays two news snippets. The first snippet is from NEWS.com.au about the end of road for Toyota Oz manufacturing, stating that Toyota will roll the last car off its Altona production line in less than 24 hours. The second snippet is from ABC Online about Toyota and Holden factories closing, mentioning the end of the line for autoworkers. At the bottom of the alert, there are social sharing icons for Google+, Facebook, and Twitter, along with a 'Flag as irrelevant' link.

- Weaknesses – hit or miss in terms of relevance, requires sorting through massive volumes for the things most important to you

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Google Alerts

Toyota

Daily update - October 2, 2017

NEWS

End of road for Toyota Oz manufacturing

NEWS.com.au
Toyota will roll the last car off its Altona production line in less than 24 hours, signalling the end of the road for more than 2700 Melbourne plant ...

End of the line for the locally-made Toyota Camry as Altona gets ready to shut its factory doors

NEWS.com.au
Toyota shutdown: Total end of Australia's car industry an avoidable tragedy - The Age
Toyota Camry takes final steps down Altona production line - Wheels Magazine
Full Coverage

Flag as irrelevant

Toyota and Holden factories to close, end of the line for autoworkers

ABC Online
But the biggest workforce hit will occur tomorrow — when Toyota shuts down its manufacturing facilities in

- Weaknesses – hit or miss in terms of relevance, requires sorting through massive volumes for the things most important to you

The Lux Approach

- Analyst-curated news with context

Toyota launches two grades of advanced high-strength steel on the new Camry

August 6, 2017 Product Claims

Analyst opinion: **Average importance** — What's interesting about this announcement is that while the steel increased mass of the Camry's frame by 30 kg, the new Camry weighs the same as its predecessor, due in part to an aluminum hood and thinner body panels. Clients can expect this type of design to continue as OEMs complement high-strength steel adoption with the low-hanging fruit of aluminum. For the original news article, [click here ↗](#).

Further reading from Lux Research: [Toyota Motor Corporation](#)

From: Anthony Schiavo

Toyota may be looking to enter the China EV fray around 2019 with a small crossover, in a clever move away from its fuel cell strategy

July 22, 2017 Strategy Product Claims

Analyst opinion: **Very important** — For the original news article, [click here ↗](#).

Further reading from Lux Research: [Toyota Motor Corporation](#)

From: Cosmin Laslau

Japan's wind-power to hydrogen project begins full-scale operation in Yokohama and Kawasaki, testing out its feasibility for forklift niche

July 12, 2017 Policy Strategy Project

Analyst opinion: **Average importance** — Although in general Lux is skeptical of the fit of hydrogen for the future of renewable energy, including integration with wind energy, this Toyota-led project does tap into a niche where fuel cells have shown some mild success thus far - forklifts. Our take remains one of caution, but this is a project worth watching since it involves the leading companies, in a strong application fit, in a policy-friendly country for hydrogen. For the original news article, [click here ↗](#).

Further reading from Lux Research: [Toshiba](#), [Toyota Motor Corporation](#), [Toyota Industries](#), [Iwatani](#)

From: Cosmin Laslau

What is the patent landscape?

- State of the art: lists, targeted searches
- Examples: Patent search engines, google patents, patent dumps

Item	Publication Number	Assignee/Applicant	Publication Date	Current IPC	Relevancy
1	US9755272B2	I-TEN	2017-09-05	H01M 10/0562	100
		Title: Process for manufacturing a monolithic all-solid-state battery DWPI Title: Manufacturing solid battery i.e. lithium ion battery, comprises depositing an anode dense layer and cathode dense layer on the respectively, and depositing solid electrolyte dense layer on one of layers			
2	US9685680B2	NGK INSULATORS LTD	2017-06-20	H01M 10/16	100
		Title: Method of using all-solid-state battery DWPI Title: Usage of all-solid-state battery including positive electrode layer, solid electrolyte layer comprising lithium-ion conductive material backup power supply in apparatus e.g. computer and server			
3	US9455437B2	INTERMOLECULAR INC	2016-09-27	H01M 4/04	100
		Title: Solid-state batteries utilizing template layers for electrode formation and methods for forming the same DWPI Title: Fabrication of solid-state battery e.g. solid-state lithium battery, involves annealing layers comprising lithium and cobalt to form between electrode and forming current collector above electrode			
4	US9419308B2	TDK CORP	2016-08-16	H01M 10/0525	100
		Title: All-solid-state lithium-ion secondary battery and production method thereof DWPI Title: Manufacturing method of all-solid lithium ion secondary battery involves positioning one intermediate layer between anode and intermediate layer between the cathode and solid electrolyte layer			
5	US20170133712A1	FUJIFILM CORP	2017-05-11	H01M 10/0562	100
		Title: ALL SOLID-STATE SECONDARY BATTERY, SOLID ELECTROLYTE COMPOSITION, ELECTRODE SHEET FOR BATTERY USING SAME, METAL ELECTRODE SHEET FOR BATTERY, AND METHOD FOR MANUFACTURING ALL SOLID-STATE SECONDARY BATTERY DWPI Title: All-solid-state secondary battery used for e.g. mobile telephone, comprises positive and negative electrode active material layer containing inorganic solid electrolyte and binder containing polymer			
6	US20160268627A1	HYUNDAI MOTOR CO LTD	2016-09-15	H01M 10/0562	100
		Title: ALL-SOLID-STATE BATTERY CONTAINING NANO-SOLID ELECTROLYTE AND METHOD OF MANUFACTURING THE SAME DWPI Title: All-solid-state battery for vehicle comprises positive electrode, negative electrode, inorganic solid electrolyte layer which is disposed negative electrode, and inorganic solid electrolyte film			

- Weaknesses: Huge volume of data, but insight into how it impacts business decisions is lacking

What is the patent landscape?

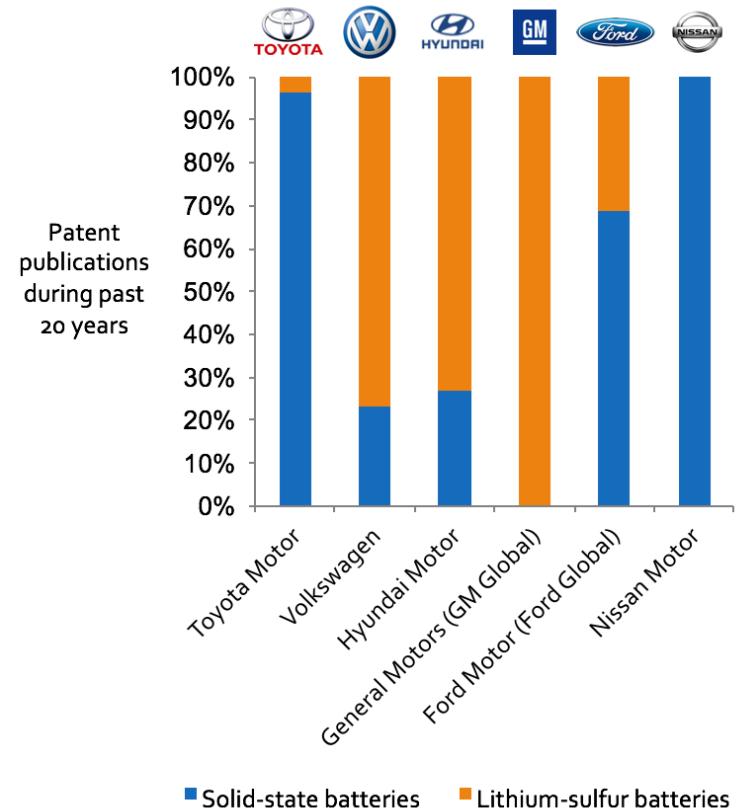
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5	US2017013371A1	FUJIFILM CORP	2017-05-11	H01M 10/0562	100
	Title : ALL SOLID-STATE SECONDARY BATTERY, SOLID ELECTROLYTE COMPOSITION, ELECTRODE SHEET FOR BATTERY USING SAME, METAL ELECTRODE SHEET FOR BATTERY, AND METHOD FOR MANUFACTURING ALL SOLID-STATE SECONDARY BATTERY				
	DWPI Title : All-solid-state secondary battery used for e.g. mobile telephone, comprises positive and negative electrode active material layer containing inorganic solid electrolyte and binder containing polymer				
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- Weaknesses: Huge volume of data, but insight into how it impacts business decisions is lacking

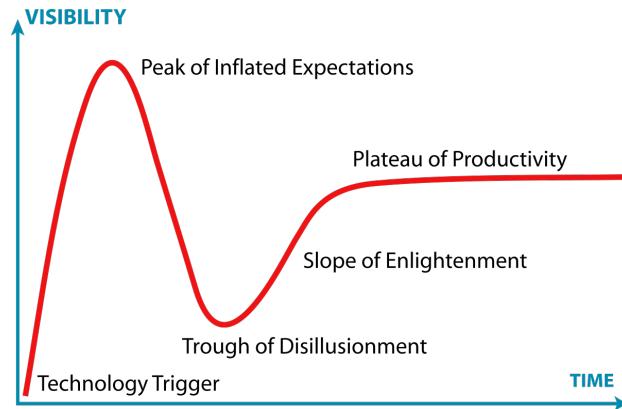
The Lux Approach

- What are key players patenting – and how does it inform their strategy?



What technologies are trending?

- State of the art: Analyst instinct and industry feedback on technology status
- Examples: Hype cycles, tech roadmaps

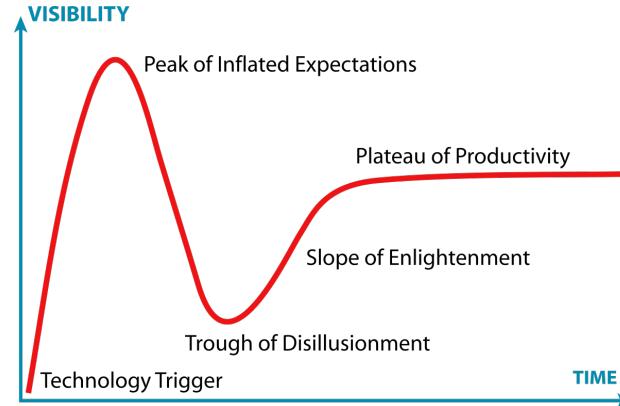


Source: Gartner, Wikipedia

- Weaknesses – includes bias and risks missing important trends (e.g. AI and Machine learning)

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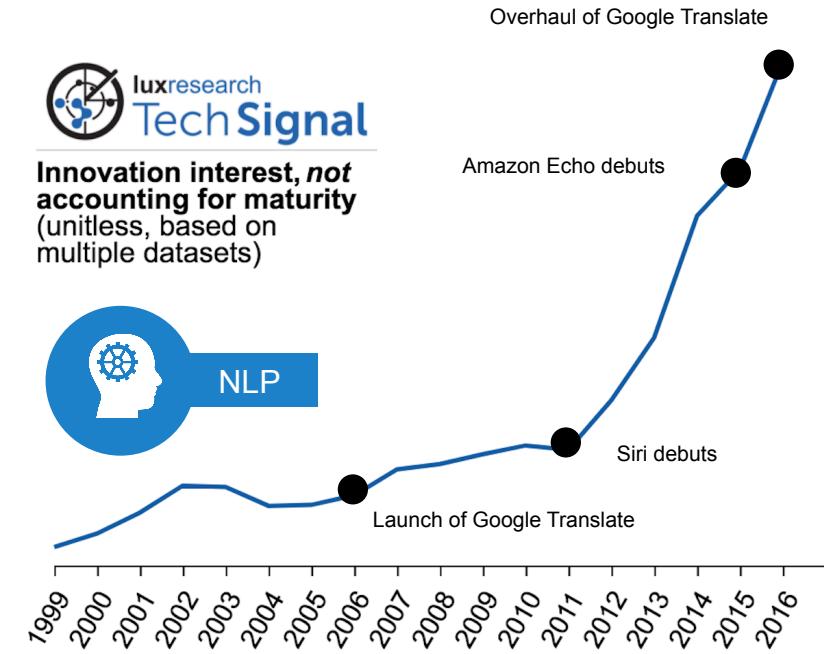


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The Lux Approach

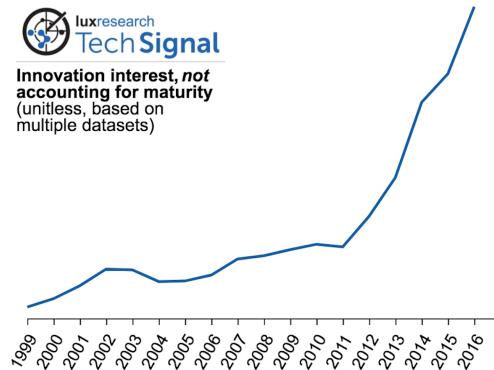
- Quantitative measure of innovation trajectory based off proprietary data-lake



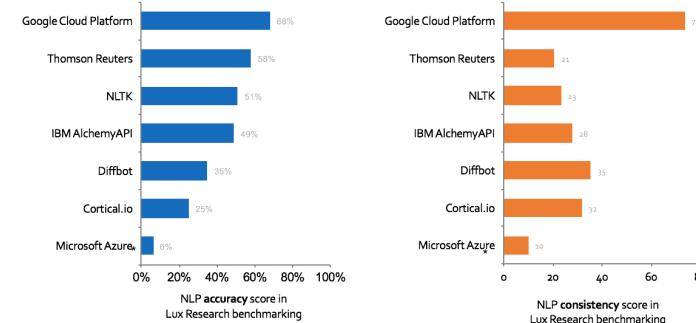
What technologies are trending?....and what do I do about it?

The Lux Approach

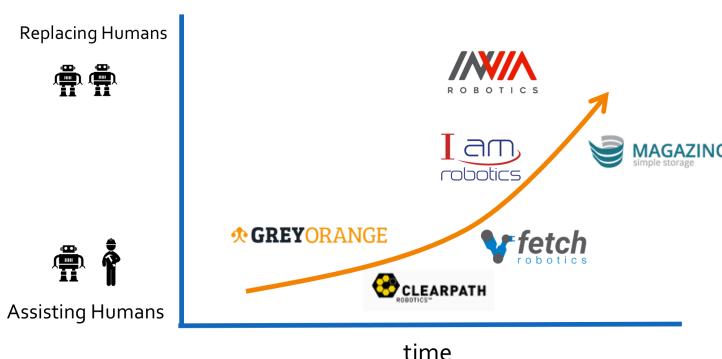
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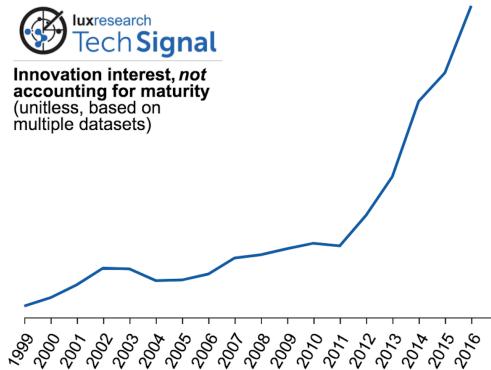
4. How do we use the technology?



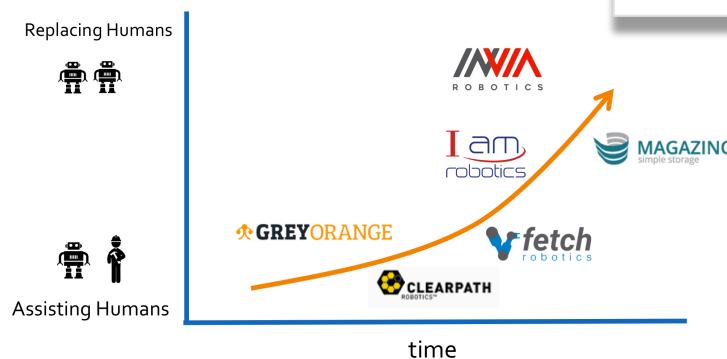
What technologies are trending?....and what do I do about it?

The Lux Approach

1. What is the technology trend?

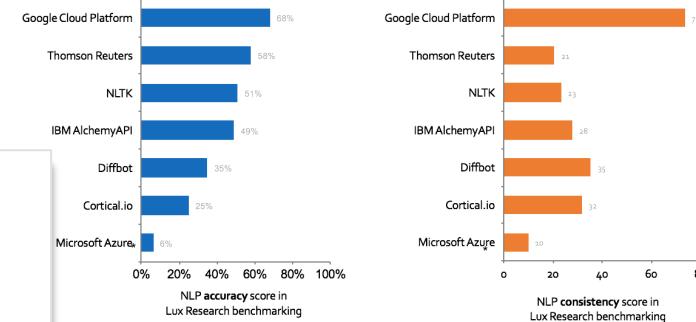


3. How are the technologies ev



5. What are key players doing and how are they positioned?

2. What is the best technology?



How do we use the technology?



Data will drive a revolution in how we do business – but without insight, data is worthless



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