

INFORMATION RICH, ATTENTION POOR

Understanding and Addressing Executive Information Overload

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Cover Image: Refik Anadol, “Archive Dreaming”

Public Art Installation, Excerpt, <https://refikanadol.com/works/archive-dreaming/>

“Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information?”
– T.S. Eliot, *The Rock*



“What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention, and a need to allocate that attention efficiently among the overabundance of information sources that might consume it.”
– Herbert Alexander Simon, Economist and Nobel Laureate

Executive Summary

Whether considering technical innovations like distributed ledgers or social movements for environmental justice, today's business leaders are surrounded by new and disruptive issues that, unless addressed with care and intelligence, can trigger information overload (“IO”) in even the most sophisticated executive. Decision makers often face IO as a *wealth of information, in turn, creates a poverty of attention*.

Parts 1 and 2

Attention poverty is a dangerous state in which to manage, and herein we examine three examples where IO has had a serious negative impact on corporate strategy and social outcomes. In light of the evidence, we argue that executives should not just seek to understand how increasing information loads impact their decision making but also how the distinction between information and insight can help address this growing problem.

Parts 3 and 4

Starting in 2019, my team at DEI Discovery Labs conducted two years of research and experimentation into how executives acquire and access information, ranging from analysis of the academic literature to prototype virtual learning projects with various content models and technologies. From our pre-launch research, we unearthed five critical conclusions that must be considered when developing a platform to help senior leaders make good decisions in a world of incessant IO.

In short, the platform must:

- Help executives separate signal from noise, with respect to their own goals
- Validate information sources with the same care that it validates the information itself
- Focus on insight creation, not just information transfer
- Work through diverse groups of people, not individuals or small groups
- Operate in a virtual environment, not just for economic reasons but to increase access to information and insight creators anywhere in the world

Conclusions

Based on the science and our own experience, we argue that a new kind of platform can help global business leaders process the complex world around them. We believe that all of these challenges are tackled head on in the DEI Discovery Labs platform, which allows global executives to connect to the best sources of information, process content in a vetted peer- review setting, and discover insights that are organic and enable a much higher level of decision-making performance.

1. Introduction

We humans enjoy an unlimited capacity for creating new combinations of words and ideas, and we long, it seems, to let them out into the world. Consider that the total amount of data created, captured, copied, and consumed each year in the world is forecast to increase to somewhere around 150 zettabytes by the year 2024. A zettabyte is a measure of storage capacity and is 2 to the 70th power bytes (or 1 sextillion bytes). One zettabyte is approximately equal to a thousand exabytes, a billion terabytes, or a trillion gigabytes. Not too long ago, “one gig” was a wealth of information. Today, it is but a tiny fraction (one trillionth) of the total information produced in one year.

“The Net is, by design, an interruption system, a machine geared for dividing attention.”

Nicholas Carr

Every day, ideas are born and released into the world – some to fade into obscurity, and some to change society forever. For a business leader, most of that new information is easily ignored. On the other hand, some of that information is critical to innovation, market leadership or even just enterprise survival. The executive’s challenge is, of course, how to tell one from the other. How do we know if information

we encounter signals a sea-change in our environment, is a critical imperative, or just a rehash of tired notions gift-wrapped in new terms? How do we, as leaders, decipher the information that shouts at us every day from within books, articles, lectures, webinars, magazines, peers, consultants, conferences, white papers and websites? Is that even possible in today’s world, and if not, what are the consequences?

While it’s tempting to say “it’s not,” and move on, in the following article we argue that this position is not an option for today’s global business leaders. Ignoring information is a dangerous game, and executives should not just seek to understand how increasing content loads impact their decision making, but also how the distinction between information and insight can help address this growing problem.

“In the age of technology there is constant access to vast amounts of information. The basket overflows; people get overwhelmed; the eye of the storm is not so much what goes on in the world, it is the confusion of how to think, feel, digest, and react to what goes on.”

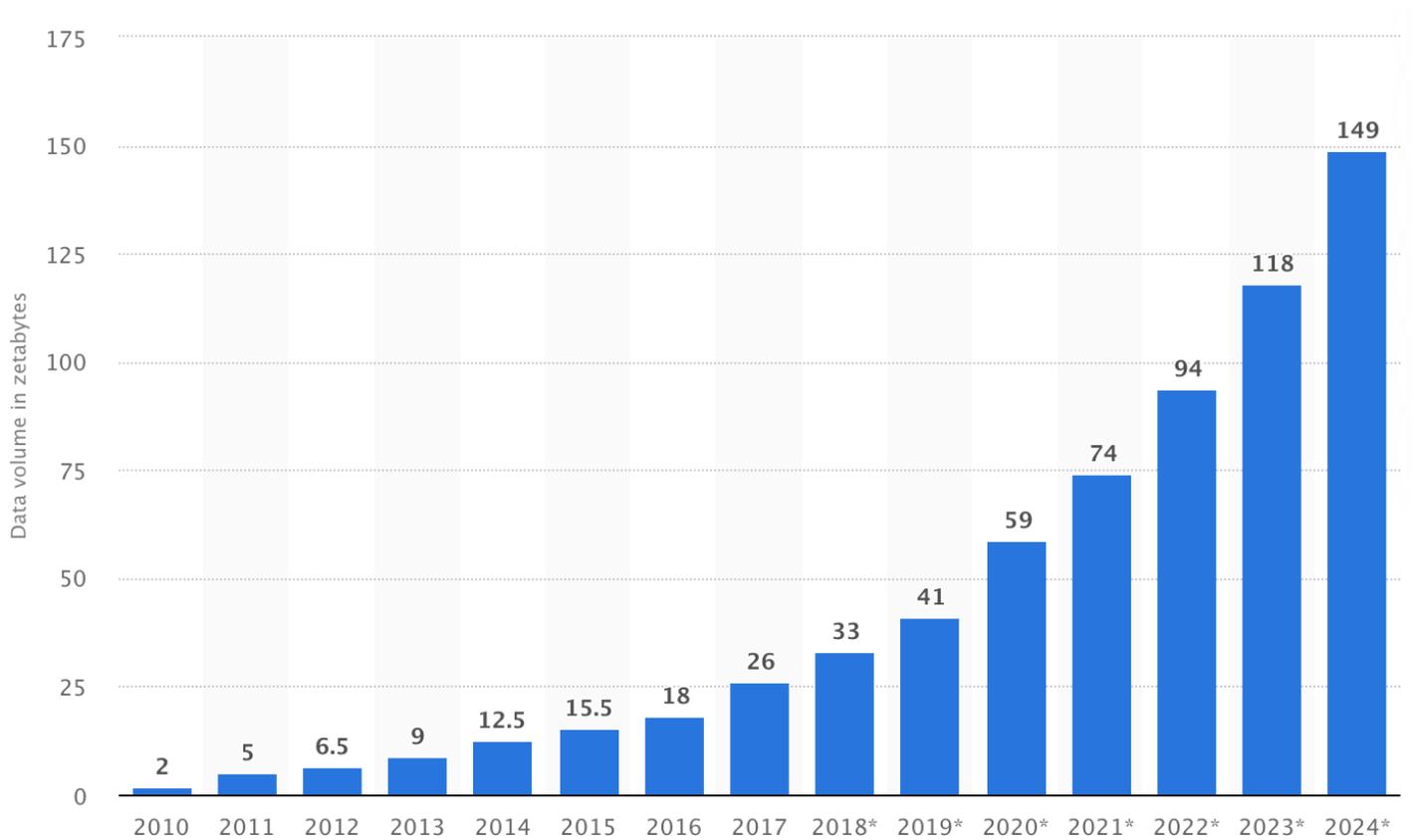
Criss Jami

— American Poet and Essayist

Figure 01

Volume of data created, captured, copied, and consumed worldwide from 2010 to 2024 (in zettabytes)

(Source: Statista)



2. Information Overload: A Definition

Information overload (“IO”) is a common term to most managers, but few of us have ever stopped to consider what the term really means and what impact it may have on our decision-making process. Let’s start our discussion, then, by defining the term as clearly as we can with the help of Prof. Peter Roetzel, Chair of Management Accounting & Information Systems at Aschaffenburg University, who has studied IO extensively (and especially in the context of decision-support systems):

Information overload is a state in which a decision maker faces a set of information (i.e., an information load with informational characteristics such as an amount, a complexity, and a level of redundancy, contradiction and inconsistency) comprising the accumulation of individual informational cues of differing size and complexity that inhibit the decision maker’s ability to optimally determine the best possible decision. The suboptimal use of information is caused by the limitation of scarce individual resources. A scarce resource can be limited individual characteristics (such as serial processing ability, limited short-term memory) or limited task-related equipment (e.g., time to make a decision, budget).¹

There is a lot to unpack in Roetzel’s statement, so let’s take it one step at a time. The first part of his definition posits that IO arises when the information that a given individual receives crosses certain thresholds that make it difficult, if not impossible, to process it correctly. These thresholds, in his view, are as follows:

- Quantity
- Complexity
- Redundancy
- Contradiction
- Inconsistency

Roetzel does not claim this is an exhaustive list, and we can add at least three other factors that could trigger IO:

- Velocity, i.e., the rate of obsolescence of the information makes it difficult or even impossible to process

- Accessibility, i.e., the information can only be processed through the acquisition of specialized skills
- Bias, i.e., information is consciously (or unconsciously) overloaded to drive a specific outcome

Whether considering technical innovations like distributed ledgers or social movements for environmental justice, business leaders are surrounded by issues that, unless addressed with care and intelligence, will trigger IO within even the most sophisticated executive. One might be tempted to assume that IO is simply a “fact of life” and can be ignored, but that’s hardly the case for a reason we can understand intuitively, as illustrated in *Figure 2*.

The figure illustrates a critical point: that as information loads approach the point at which they can no longer be processed effectively (for whatever reason), decision-making performance begins to deteriorate. This is because the decision maker is able to process less and less of the total information available to help make good decisions. In other words, imagine Scenario A where making the right choice requires one to process ten pieces of information, the maximum amount manageable by an executive. Suddenly, because of a technical disruption, the necessary information load increases from

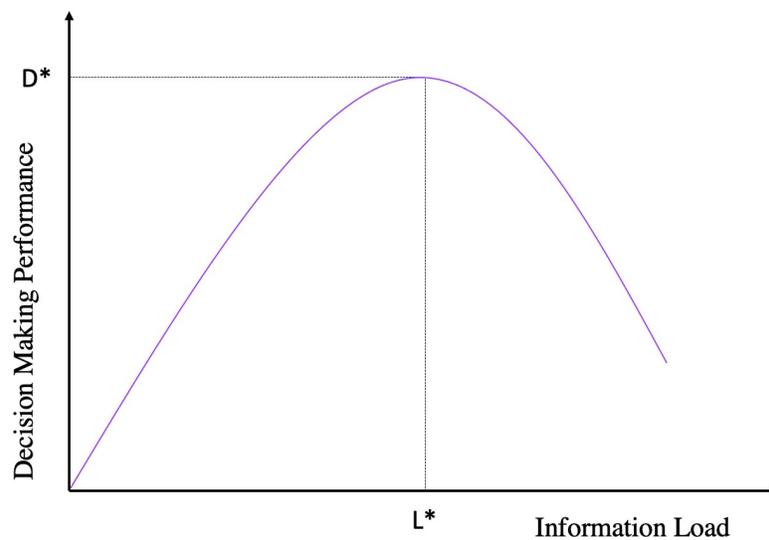


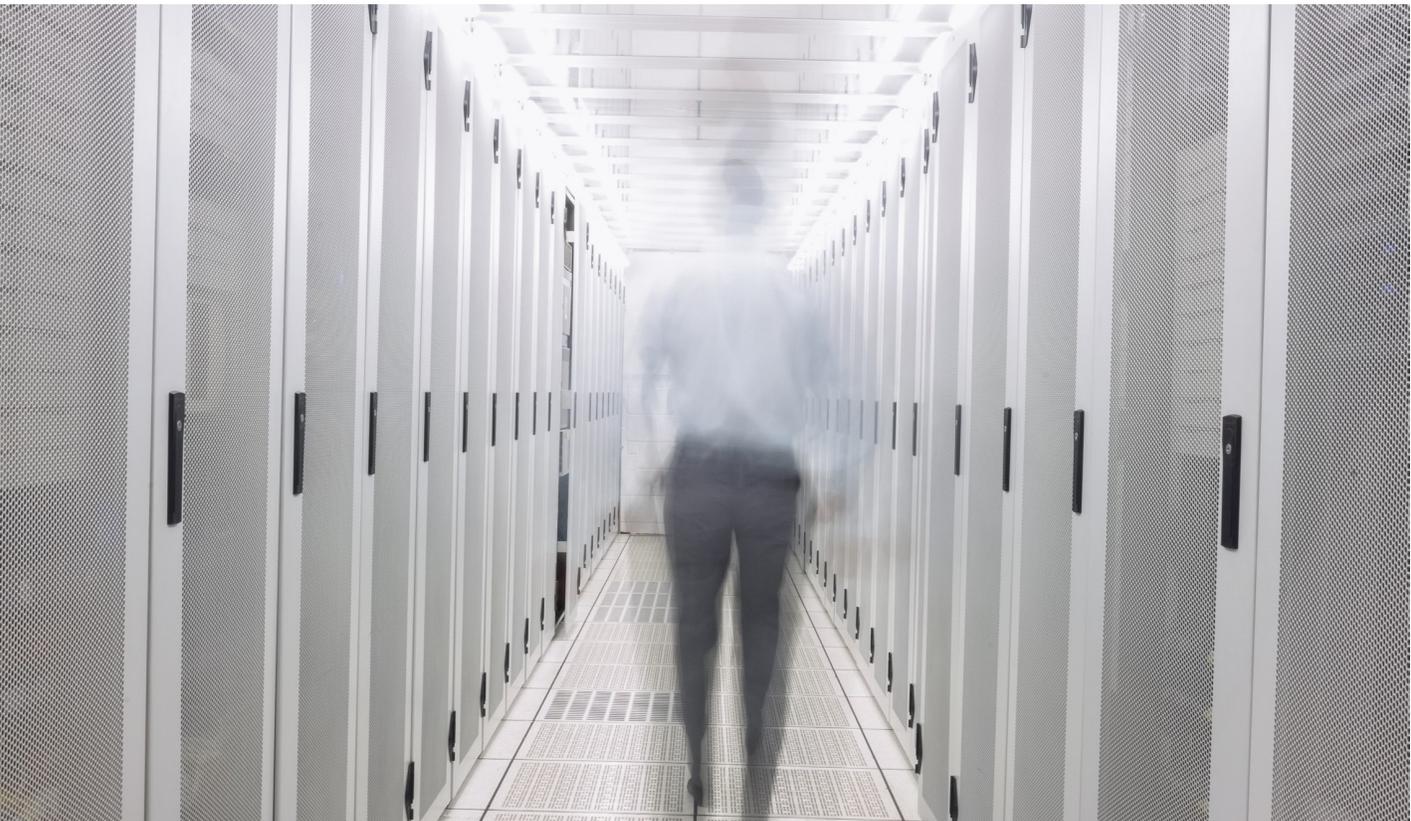
Figure 02
Decision making performance at and beyond the IO threshold.
(Source: Peter Roetzel)

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ten to twenty pieces. In this case, the decision maker who was maxed out at ten analytical tasks (100%) is forced to shift and make a decision at only 50% capacity. As the required information count climbs higher, the processing capacity percentage drops, thus generating a greater probability of making a bad choice.

Decision makers in the situation described above experience what the American executive Herbert Simon described as “a wealth of information [which] creates a poverty of attention.” This attention deficit creates “a need to allocate that attention efficiently among the overabundance of information sources that might consume it.”²

There is no senior executive out there who has not faced this dilemma. Perhaps an issue was manageable for years until a disruptive competitor suddenly created the need for more information to properly manage it. Or an entirely new social or environmental phenomenon appears and, because of its novelty, executives must scramble to gather and process the information needed to respect this new force when making decisions. In either case, managers



are confronted with a high-stakes (and often exasperating) challenge to “get up to speed” quickly and, even more critically, correctly.

Addressing the challenge inadequately is all too easy, of course. Executives can rely on poor information sources, or they can waste months or even years of effort analyzing the wrong information. Or they can also process brand new content with out-of-date skill sets, only to find out later that their analyses missed critical elements and so reached incorrect conclusions. Roetzel notes that in these situations, managers can not only harm themselves but others:

Users seem to ignore possible side effects of information overload up to a very high level before retreating from these channels or platforms. From a bird’s eye perspective, this situation might be compared with the spread of a disease. Thus, people often act irrationally by infecting others (i.e., sending more messages, likes, news to other members of their network) instead of sparing themselves (i.e., making a rest/recovery from their overloaded status).

The biological metaphor is not unwarranted. Indeed, Edward Hallowell, a psychiatrist and expert on attention-deficit disorders, has observed what he calls an “attention deficit trait” in managers that presents similarly to the medical condition often seen in children and adults. Author Linda Stone, who coined the term “continuous partial attention,” has noted that the inability to process something as simple as an e-mail inbox can lead to what she calls e-mail apnea: “The unconscious suspension of regular and steady breathing when people tackle their e-mail.”³

While the sheer volume of information is the main driver of IO, there are other factors at play as well. Researchers have noted that the trend over the last few decades to flatten organizations has increased the number of direct reports executives are forced to manage. Indeed, there are CEOs who now manage over a dozen individual executives directly, each overseeing a complex function. In turn, each direct report creates yet an additional information flow to process, compounding the organizational information overload facing any executive arising from her own functional responsibilities.

“In the age of technology there is constant access to vast amounts of information. The basket overflows; people get overwhelmed; the eye of the storm is not so much what goes on in the world, it is the confusion of how to think, feel, digest, and react to what goes on.”

Chris Jami

3. The Impact of Information Overload

A few examples suffice to illustrate the impact that IO has on executive decisions. Business leaders are constantly asked to recognize, categorize and assess a host of new innovations and forces that might alter the global business landscape in significant and, in some cases, revolutionary ways. Getting this process wrong, however, can have disastrous consequences as the following three examples illustrate.

AMAZON

Amazon launched in 1995 and by 1999 had become the largest online seller in the world, a position of dominance that has only grown in the 21st century. Of course, it is a well-known fact that as Amazon prospers, it continues to destroy countless companies and strategies that fall in its path. Interestingly, Amazon did not spring into life overnight, fully formed and ready to tear down traditional business models. Instead, it evolved slowly, learning and adapting along the way as it patiently absorbed and employed investment capital, realizing the ever-evolving vision of its founder and senior managers. Many theories have emerged about why competitors were not able to respond and react to Amazon's domination successfully, and we may now consider a novel explanation in the context of our analysis of IO.

As Amazon continued to grow and overtake more and more commerce from traditional competitors, a significant amount of public information was generated about its strategy, operations and future intentions. Of course, most companies who competed against Amazon (a) had enough access to this information and (b) failed to process it correctly. We might ask, then, was this failure one of information quality, processing quality, or both? Now, it's tempting to say that the reason so many of Amazon's competitors failed is that they were

“When something becomes abundant, it also becomes cheap.

A world awash in information is one in which information has very little market value.”

Paul Krugman

not smart or visionary enough to read the signals coming from Amazon's growth. That may explain some of the failures, but does it explain all of them? Isn't it also possible that many executives across the retail and product landscape simply were not able to process what they were seeing in front of their very eyes? As we see in *Figure 3*, Amazon was constantly investing, innovating and acquiring, thereby creating a stream of information loads – about

Figure 04

Amazon timeline: 1995-2016

(Source: ISLR)



1995

Jeff Bezos headquarters Amazon in Seattle to avoid collecting sales tax in populous California.

1997

The temp agency Integrity Staffing Solutions lands the first of many contracts to staff Amazon's warehouses.

2000

Amazon opens its platform to third-party sellers, using the data their sales generate to master one industry after another and expand its own retail operations.

2002

Amazon launches AWS, which, by 2016, will control 1/3 of the world's cloud computing infrastructure, powering everyone from Netflix to Comcast.

2003

Amazon opens an office in the tiny tax haven of Luxembourg and, over the next dozen years, skirts paying at least \$1.5 billion in U.S. taxes, according to a claim by the IRS that covers just 2 of these years.

2005

Amazon launches Prime. By 2016, Prime members will represent about half of U.S. households.

2007

Amazon unveils Kindle and prices e-books at a loss, deterring competitors from entering the market. It amasses a 90% share of the e-book market.

2009

Amazon acquires Zappos in a shotgun-wedding after losing \$150 million selling shoes below cost in order to force the rival shoe retailer to the altar.

2010

Amazon embarks on a massive scaling up of its logistics infrastructure, nearly quintupling the total square footage of its fulfillment network by 2015.

2011

Amazon receives \$61 million in subsidies to open up a fulfillment center in South Carolina, one of dozens of such deals.

2012

Amazon buys Kiva, a robotics company that supplies warehouses everywhere, and decides not to extend Kiva's other contracts, but to keep the technology for itself.

2013

Amazon wins a \$600 million contract to build a cloud system for the U.S.'s 17 intelligence agencies.

2014

A temp worker is crushed to death at an Amazon warehouse and though OSHA issues fines and citations for unsafe practices, Amazon is shielded by layers of subcontractors and staffing agencies.

2014

Nearly 40 percent of people looking to buy something online are bypassing search engines and starting on Amazon.

Amazon's Tracy, Calif., facility—an example of its 8th generation fulfillment centers—is staffed by 3,000 robots, 2,500 temps, and 1,500 regular workers.

Retail vacancies triggered by Amazon result in a drop of \$420 million in property tax revenue for cities and counties, the research firm Civic Economics estimates.

2015

A survey finds fewer than 1 percent of Prime members visit competing retail sites when shopping on Amazon.

Amazon passes Walmart in market capitalization, despite earning only \$1 billion in profits over 5 years to Walmart's \$80 billion. Some speculate Wall Street sees an emerging monopoly.

Amazon launches Amazon Flex, a piece-rate, 'Uber' model in which anyone with a driver's license and a car can sign up to deliver packages to customers.

Amazon releases a video showing how its drones could deliver up to 86% of its items and predicts that seeing them will "be as normal as seeing mail trucks on the road."

Amazon opens its first brick-and-mortar bookstore. Reports later surface that it's planning 300-400 bookstores and as many as 2,000 grocery stores.

Amazon's growing market share has caused more than 135 million square feet of retail space to become vacant.

2016

Amazon is capturing nearly \$1 of every \$2 Americans spend shopping online.

In the last year, Amazon has doubled the number of facilities in its U.S. distribution network.

In 16 states, Amazon is still exempt from sales tax, a competitive advantage that an Ohio State study finds boosts its sales by nearly 10%.

Analysts from Credit Suisse project soaring layoffs in the retail sector as more brick-and-mortar stores shutter.

Research finds that Amazon has begun selectively raising prices and that it often steers consumers to its own products or those of sellers who use its fulfillment services, even when another seller is offering a lower price.

Bezos passes Warren Buffett to become the planet's third-richest person, with an estimated net worth of \$65 billion.

We would argue that IO had a great deal to do with Amazon's rise to the top. Many competitors were simply unable to pause their operational duties long enough to correctly process what Bezos and Amazon were doing.

technical innovations, strategic shifts, and evolution in customer buying patterns, etc. – that were very difficult for many competitors to process correctly at the time.

If the hypothesis above sounds fanciful, consider the following description of the Amazon purchase process from a 1997 *Slate* article:

After calling the stores, we connected to Amazon using Netscape Navigator 3.0 and a 28,800-baud modem. Amazon has a special page dedicated to the Turow book, complete with a picture of the cover and some unenlightening amateur commentaries from other Amazon users. The psychology text, not surprisingly, was listed with no description and no commentaries. Amazon said it would take one to two weeks to order.

After clicking your purchases into a "shopping cart," you are directed to a "secure Netscape server" that will encrypt your credit-card information. After this is done, you are told: "Finalizing Your Order Is Easy." Nothing could be further from the truth. Lower down in the verbiage, Amazon concedes, "Though we have tried hard to make this form easy to use, we know that it can be quite confusing the first time." Amazon users have to page through screen after screen of details about shipping charges, refund rules,

“An environment with excess information devours the one thing that information truly demands: attention. Attention is becoming scarce, so we have to use it wisely when we get it.”

Alistair Croll

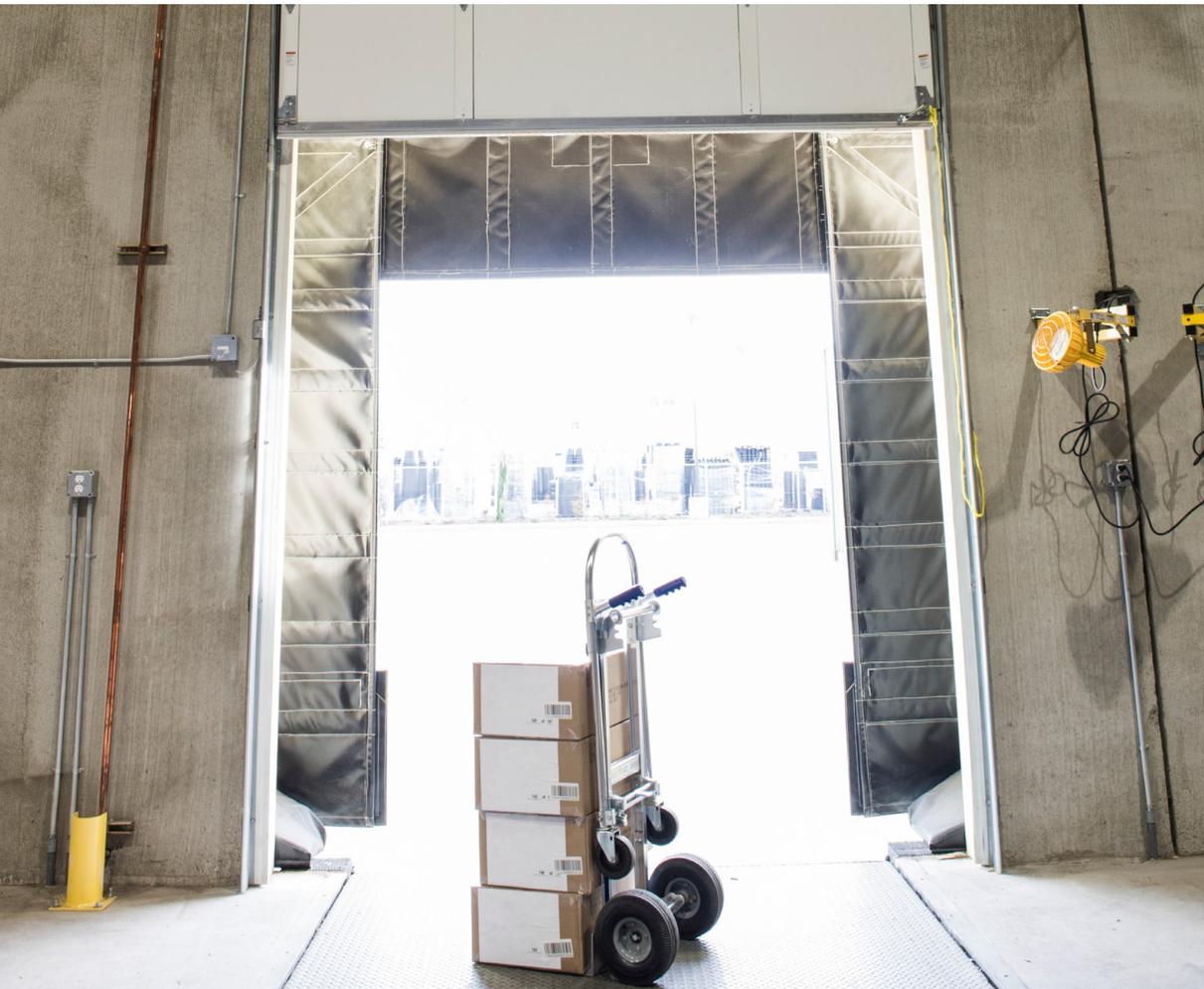
and disclaimers about availability and pricing. Then you are told to allow between three and seven days for delivery after your book leaves Amazon's warehouse. "Upgrading to Next Day Air does NOT [their emphasis] mean you'll get your order the next day."

In this way, a competitor casually reading this article would have been reassured: Amazon is nothing to worry about and poses little threat to a traditional bookstore. It continues:

For ordering, Politics and Prose was by far the easiest. Heidi answered the phone on the first ring. She was chatty, but professional. The store had "many, many, many" copies of the Turow on hand, and she promised to send one out "right away, tomorrow morning at the very, very latest." When asked about the psych text, Heidi apologized ("sorry, sorry") for not carrying it, and offered to order it. Estimated time of arrival: four weeks. She took a name, address, credit-card number. The entire phone call took 2 minutes and 38 seconds.⁴

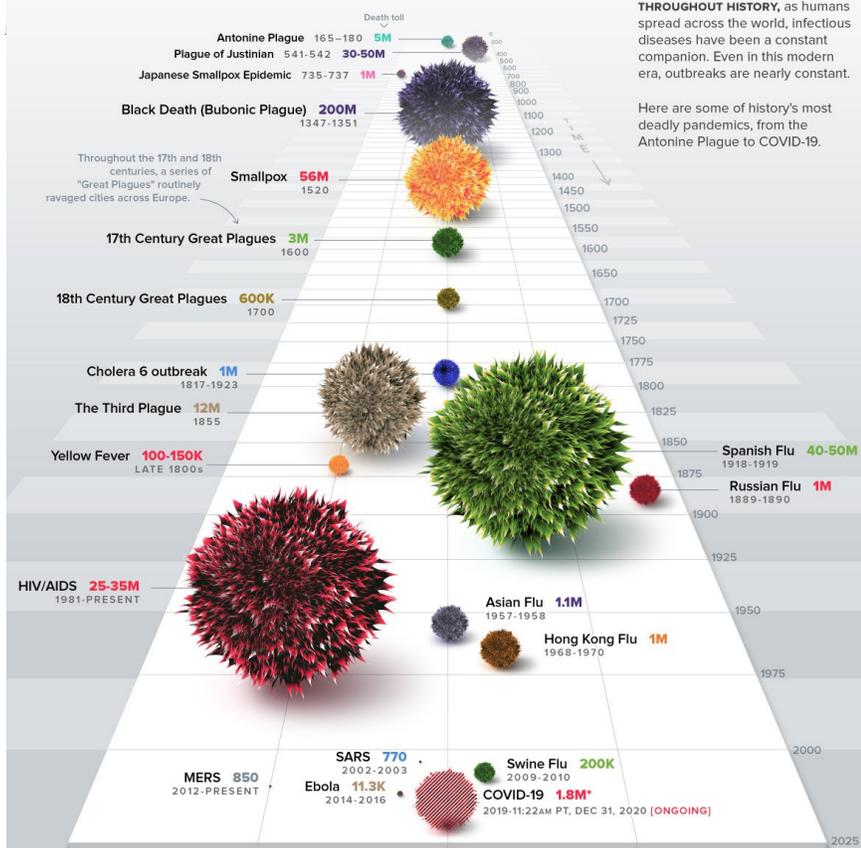
Of course, a visionary bookseller would have been fascinated by Amazon's online presence, the impact user comments could have on consumers, security features of website transactions, ease of direct shipping, and finally by Jeff Bezos's personal history, which hinted that he was never a person to pursue foolish quests.

Having spoken with many retail leaders in the last ten years, we would argue that IO was a major contributing factor in Amazon's rise to the top of the proverbial retail food chain, especially in smaller companies. Many competitors were simply unable to pause their operational duties long enough to correctly process what Bezos and Amazon were conveying; moreover, Amazon's technical innovations were difficult to comprehend by traditional retailers, who had grown up as merchandisers for the most part and thus lacked the computer science foundation that could enable them to process the technical challenges Amazon was in fact embracing. In short, we believe that the IO faced by many of Amazon's competitors was a force in its rise to dominance, along with its brilliant retail model and overall series of disruptive innovations.



HISTORY OF PANDEMICS

PAN-DEM-IC (of a disease) prevalent over a whole country or the world.



THROUGHOUT HISTORY, as humans spread across the world, infectious diseases have been a constant companion. Even in this modern era, outbreaks are nearly constant. Here are some of history's most deadly pandemics, from the Antonine Plague to COVID-19.

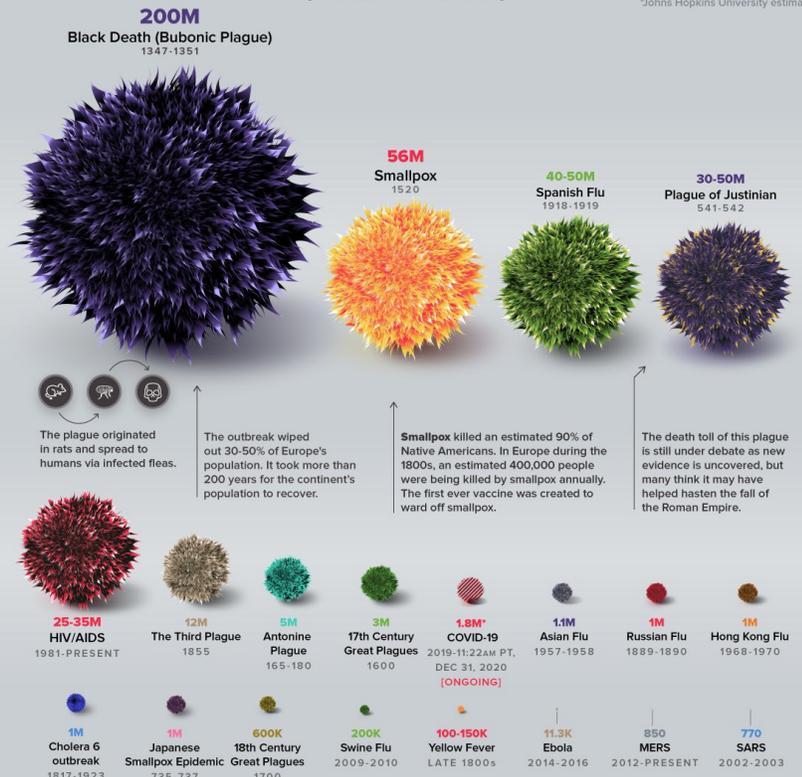
Figure 04

Deadly pandemics over history, with notable clustering from 1981-Present (Source: Visual Capitalist, used with permission)

DEATH TOLL

[HIGHEST TO LOWEST]

WHO officially declared COVID-19 a pandemic on Mar 11, 2020. It is hard to calculate and forecast the impact of COVID-19 because the disease is new to medicine, and data is still coming in. *Johns Hopkins University estimates



COVID-19

When the global pandemic hit the headlines in early 2020, it seemed to catch most business leaders by surprise. As a collective group, they could not possibly imagine how this invisible organism would bring social life around the world to a halt and forever change the working world. I have the good fortune to know more than one scientist working in the realm of infectious diseases, and it's fascinating to note that for this cohort, COVID-19 was not just predictable but pretty much inevitable. *Figure 4* explains why they felt this way.

As the graphic deftly illustrates, the virus clustering that begins around 2000 was a solid indicator of a much more serious global threat that could arise at any time. Indeed, below is a quote from a 2007 WIRED magazine article about virus researcher Nathan Wolfe's project to understand the danger of emerging global viruses:

The implications of those results, published in the Proceedings of the National Academy of Science in 2005, were astounding: Retroviruses similar to HIV were crossing from primates to hunters far more frequently than anyone had expected. The long-ago Cameroonian hunter who acquired SIV was no freak occurrence. Viruses, it turns out, are constantly spilling over from animals to humans. The only reason we don't have frequent pandemics is that most of those viruses have a hard time establishing themselves and then spreading. "There were already some hints of viruses emerging this way," says Burke, who coined the term viral chatter. "What I wasn't ready for was finding them on the order of 1 in 100 people. That means there are literally tens of thousands of people walking around in equatorial Africa harboring viruses in this state."⁵

Or consider this quote from a 2018 WIRED piece regarding a proposal to set up a predictive global virus tracking system:

"Globally we let viruses emerge and trickle through our net quite often," says Peter Daszak, parasitologist and the president of EcoHealth Alliance. "That needs to stop. We need to start taking these things seriously."⁶

These articles, and there are many others like them out there, were not printed in obscure academic journals only consumed by the elite. Instead, they were found time and again in the general business press and yet largely ignored by most senior business leaders, even when COVID-19 started to make headlines. A major driver of this phenomenon was the complexity of the information about the looming crisis. In other words many business leaders read the WIRED pieces but in turn struggled to take the next step. A lack of training in virology and medicine most certainly quashed any effort to understand the story behind the headlines, deeming the virus too difficult or even impossible to grasp. As in the quantity overload case of Amazon, the complexity overload situation with COVID illustrates the serious, even catastrophic, negative consequence of IO across the global business and social landscape.



CLIMATE CHANGE

Most executives have come to accept that the global climate is changing and that these changes could soon have devastating consequences on their most basic assumptions of how the world operates. Yet what we see brought forth from most companies are not wholesale readjustments of their strategies and business models in response to these challenges ahead;

rather, reactions range from conducting business as usual to making statements of intended change, while others put forth a genuine effort to prepare their company for a new world complexion. As climate strategist Prof. Raz Godelnik at Parsons wrote when asked if most global corporations are truly undertaking serious plans for a new climate world:

“Information overload is a symptom of our desire to not focus on what’s important. It is a choice.”

Brian Solis

The short answer is: It is very difficult to know. These climate change plans and commitments usually provide information in a manner that makes it difficult to understand if they go far enough. First, companies tend

to (over)use jargon and terminology (“Firm commits to achieve operational carbon neutrality starting in 2020”) that could be very confusing, and second, it is not clear what constitutes a “good enough plan” to address the climate crisis. As a result, it is not too surprising that the lack of clear language and a comparable format together with vague benchmarks make corporate climate change plans the modern version of the Tower of Babel. Unfortunately, journalists and websites covering these plans do not help most of the time to clearly contextualize them, leaving the readers confused and having a hard time separating signal from noise.⁷

Godelnik’s observations co-exist with conclusions such as this one from researchers at BI Norwegian Business School:

The purpose of this article is to report that we have identified a point-of-no-return in our climate model ESCIMO—and that it is already behind us. ESCIMO is a “reduced complexity earth system” climate model 5 which we run from 1850 to 2500. In ESCIMO the global temperature keeps rising to 2500 and beyond, irrespective of how fast humanity cuts the emissions of man-made greenhouse gas (GHG) emissions. The reason is a cycle of self-sustained melting of the permafrost (caused by methane

release), lower surface albedo (caused by melting ice and snow) and higher atmospheric humidity (caused by higher temperatures). This cycle appears to be triggered by global warming of a mere + 0.5 °C above the pre- industrial level.⁸

Again, note that this conclusion was presented to the world by professors at a business school and so, we must assume, is insight shared with current corporate leaders. Indeed, across the world the information load on climate change continues to increase. This is certainly a good thing in theory, but in practice it's also possible that IO now affects many business leaders who simply find it impossible or too painful to process all information available about our precarious environmental position.

IO UNDER NEGATIVE ESCALATION

Intriguingly, there may be one other IO-related phenomenon at play in the examples above, and it's related to how IO affects decision makers when their situation deteriorates. Roetzl and his colleagues Pedell Burkhard and Daniel Groninger recently looked at this question and found that when someone's course of action does not yield the desired results, IO has an increasingly negative effect, which in turns leads to further bad decisions. As their paper notes:

The finding of a significant interaction between the type of feedback and the information load extends our knowledge about the role of information processing in decision making in escalation situations. Furthermore, we find that the type of feedback affects self-justification, and we find a negative and significant interaction between information load and self-justification in negative-feedback cases.⁹

To understand the implication of this finding, let's return to the Amazon case. Sensing that Amazon is a threat, a competitor begins to react in the ways they know: discounting, coupons, more advertising, etc. All the responses fail, and now the competitor finds himself trying to understand not just Amazon's innovations but the reasons his responses failed. His information load has increased even more than when he was not responding. This increased level of IO can progress to a point where recovery is impossible, and the competitor becomes destined to fail completely. Much like an inexperienced pilot who becomes overwhelmed by cockpit alarms combined with maneuvers that do not correct an unplanned descent, it's precisely when strategies do not go as planned that we are most vulnerable to the negative, or even catastrophic, impacts of IO.

4. The Keys to a Solution

During our two years of research and development our team looked extensively at executive decision making in order to understand its mechanics and how to address the shortcomings in current executive decision support options. We interviewed scientists and researchers, spoke with senior executives and decision makers in an extensive cross-section of industries, and conducted prototype learning projects with both corporate and scientific research partners. Across all our work, our challenge was as clear as it was difficult: to help executives make better decisions in a world of information overload.

From our pre-launch research, we discovered five critical conclusions that must be considered when developing a solution for IO in the context of executive decision making when facing disruptive technical and social change.

1. Signal and noise depend on receiver and purpose.

For most executives, the term “noise” refers to facts or opinions that have little or no intrinsic value. In this view, noise is less valuable than information or, better yet, insight. This point of view is understandable but wrong.

There is no necessary qualitative difference between signal and noise without consideration of receiver and purpose, i.e., the difference between signal and noise arises only when the information must be used. For example, consider the closing value of the NASDAQ stock exchange on any given day. For the average person, this number is noise heard over a radio or television broadcast. However, for a programmer building a trading algorithm that responds to NASDAQ fluctuations, the closing value is a signal.

Furthermore, depending on the nature of the algorithm, the signal may be foundational or merely useful, which means that the end use of the information establishes the degree to which any signal is valuable. For the purposes of this article, the critical point is that when it comes to information, the question is the answer, i.e., whether a piece of information is signal or noise depends on who is asking and for what purpose.

2. Source validation is complex and time-consuming but critical.

In his book *The Information*, James Gleick discusses the relationship of information to its sources and environment:

...knowledge isn't simply information that has been vetted and made comprehensible. "Medical information," for example, evokes the flood of hits that appear when you do a Google search for "back pain" or "vitamin D." "Medical knowledge," on the other hand, evokes the fabric of institutions and communities that are responsible for creating, curating and diffusing what is known. In fact, you could argue that the most important role of search engines is to locate the online outcroppings of "the old ways of organizing knowledge" that we still depend on, like the N.I.H., the S.E.C., the O.E.D., the BBC, the N.Y.P.L. and ESPN. Even Wikipedia's guidelines insist that articles be

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based on “reliable, published sources,” a category that excludes most blogs, not to mention Wikipedia itself.

Gleick’s point is that information always has a relationship to its origin or source. Once again returning to the NASDAQ example above, it makes a great deal of difference if we receive the closing value from a stranger standing in line with us at a supermarket or if we read it on a Bloomberg screen.

The point above may seem obvious, but it has significant implications for our analysis of IO. In today’s world, executives not only have to process information and turn it into insight; they must also validate the sources of the information they consume. Understandably, most

“Information is not only renewable, but self-generating. Running out of it is not a problem, but drowning in it is.”

business leaders rely on external technologies and advisors to do this for them; however, this is a risky strategy. The technologies may be flawed or biased in their consolidation of information. Advisors often have business development agendas that color or even taint the information they present, all of which means that any first-rate insight sources must also be a first-rate validator with the ability to accurately access not just the information but the quality of sources producing it. This is a discipline unto itself and must be understood in that way.

John Naisbitt

3. Insights are a personal experience and cannot be shared.

Insight is a term used constantly by consultants and business gurus, but most executives don’t stop to consider what the term really means. In experimental psychology, the term is specific and refers to the moment when the solution to a problem is seen spontaneously, i.e., the sudden discovery of the answer to a question or solution to a problem, often after continuous effort was put forth without success.

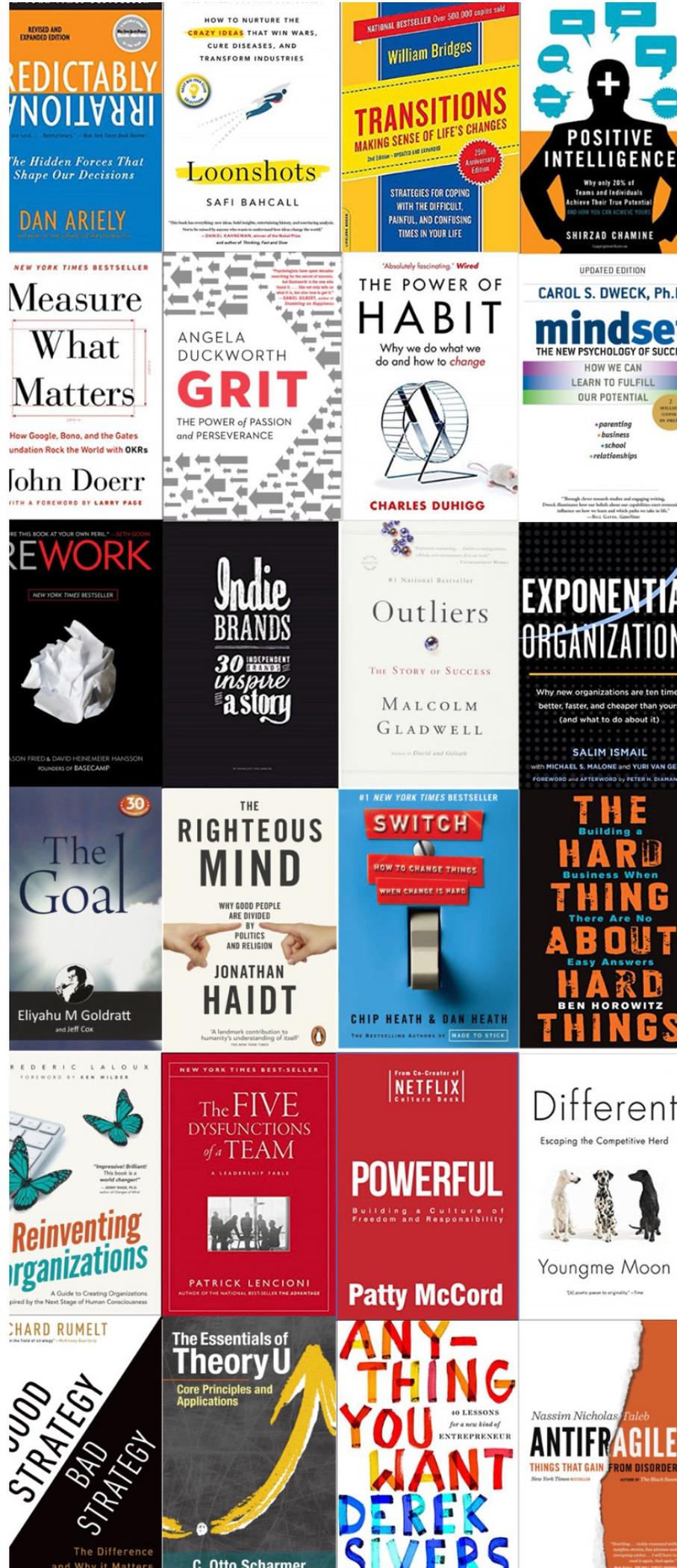
A good example of insight is found when we look below and ponder the following question: What single term connects these three words?

DESK – MOUNTAIN – TREE

This problem is an example of what psychologists call a Remote Associates Test. RATs can be solved with and without insight, which makes them a handy tool. In other words, there are computational methods to find a term that connects all three words, or we might, after some consideration, realize on our own that the answer is “Top.”

“We take it, as a given, that the more information decision makers have, the better off they are. But what does the Goldman algorithm say? Quite the opposite: that all that extra information isn’t actually an advantage at all. In fact, that extra information is more than useless. It’s harmful. It confuses the issues.”

Malcolm Gladwell



Insight, then, for our purposes is defined only as the sudden acquisition of the answer to a question or solution to a problem. This definition matters because under the conception of the term, it is impossible to transmit your insights to anyone else precisely because they are yours. You can share your conclusions, decisions or findings, but you can never really share your insights – it’s an oxymoronic term. Real insights can only be created within the mind of an executive through a process of discovery, dialogue and analysis, and is not found ready-made in reports, presentations or webinars.

4. Groups are better at producing insights.

We are all familiar with the concept of “groupthink,” wherein a collection of similar individuals is unable to escape an erroneous belief or conclusion. However, many people are unaware that the opposite phenomenon also exists, whereby a group is better able to solve a problem than someone working alone. Indeed, a research team studying this effect found that when it comes to insight-generation and insight-dependent problem solving, group interaction is associated with “enhanced performance with respect to both recall and problem solving.” The researchers concluded that a driver of increased group performance is related to something called “fixation,” which is when a problem solver gets “stuck” on one idea or piece of information and that stubbornness makes it impossible to solve the problem.

We can illustrate fixation with the following example. Look at this number sequence carefully for at least three minutes and determine the progression logic in your head:

2, 4, 6, 8, 10

Once you have the logic clearly in your mind, consider the following extension for an additional two minutes exactly:

2, 4, 6, 8, 10, 13, 17, 21....

Now consider this last set of information for one final minute:

2, 4, 6, 8, 10, 13, 17, 21, 28, 37, 49, 55....

It’s common that even teams of fantastically bright executives do not find the correct (and very simple) answer to this problem. It seems so obvious once you know it, yet most people become fixated on the idea that the answer is “a sequence that goes up by 2” when considering the first set of numbers. That fixation, if it takes hold completely, makes it impossible to solve the problem.¹⁰

Fortunately for us, the researchers found that members of a group experience fixation in different ways:

...fixated states were not experienced uniformly by group members, that is, all group members did not remember the associated clues following the incubation period (a likely outcome if one generalizes from the individual clue memory data).¹¹

In other words, the researchers suggest that because different people in a group experience fixation in different ways, it is easier for individual members to “unfix” themselves from an incorrect answer and experience a moment of insight. This finding may be one reason why psychologically diverse groups often have better results when solving complex problems.

5. Virtual learning works when done right.

The last issue we examined during our research and development process was modality, i.e., does insight creation happen best in an in-person setting, or can it occur in virtual environments? In 2020 this question became a global debate, but in 2019 this problem was largely confined to academic environments. Even then, however, the research on virtual learning (limited as it was) indicated that virtual learning could be equal or superior to in-person learning when executed correctly.¹²

A thorough evaluation of virtual learning found that for online education to be effective, it needed to create three conditions:¹³

- A clear and consistent course structure
- An instructor who interacts frequently and constructively with students
- A valued and dynamic discussion

Put another way, virtual and online learning should follow a consistent model that allows learners to anticipate the structure they will follow to generate insights. It is also critical to have a teacher/guide who is committed not just to information transfer but to frequent interaction with learners. Lastly, learners should be provided with a platform that allows them to interact online and exchange additional information outside of the structured setting.

Five Keys to Insight Generation

1. Signal and noise depend on receiver and purpose.

Information must be seen alongside user and purpose to separate signal from noise.

2. Source validation is complex and time-consuming but critical.

The source and purpose of information are often hard to assess; validation can take much effort as processing.

3. Insights are a personal experience and cannot be shared.

Findings, conclusions, etc. are not insights; they can record someone's recollection of an insight but they are different in nature.

4. Groups are better at producing insights.

Because individuals process information in different ways, psychologically diverse groups are more conducive to insight generation.

5. Virtual learning works when done right.

Virtual models can be excellent insight generation settings, but they require a level of design that is not applied to most virtual interactions.

Any executive insight platform must adhere to these five principles in order to solve the information overload problem.

5. Conclusions

In his famous short story, *The Library of Babel*, Jorge Luis Borges describes a single edifice within which all possible written words are contained. Each book wall in the Library holds five shelves, each displaying thirty-two matching books. Every book has 410 pages with 40 lines per page and about 80 characters per line. The cover of each book has a title, but the title has nothing to do with the contents of the book. No two books in the Library are identical and so, the story posits, the Library is “complete.” In other words, the Library’s vast collection contains every idea, thought, emotion, discovery, poem, speculation, etc. that was ever conceived or could ever be conceived by the human mind. The Library in the story is an effective metaphor for today’s information overload, for the overwhelming store of words leads the building’s caretakers to despair, superstition, or even the hope that someone with superpowers will come along and explain everything to them.

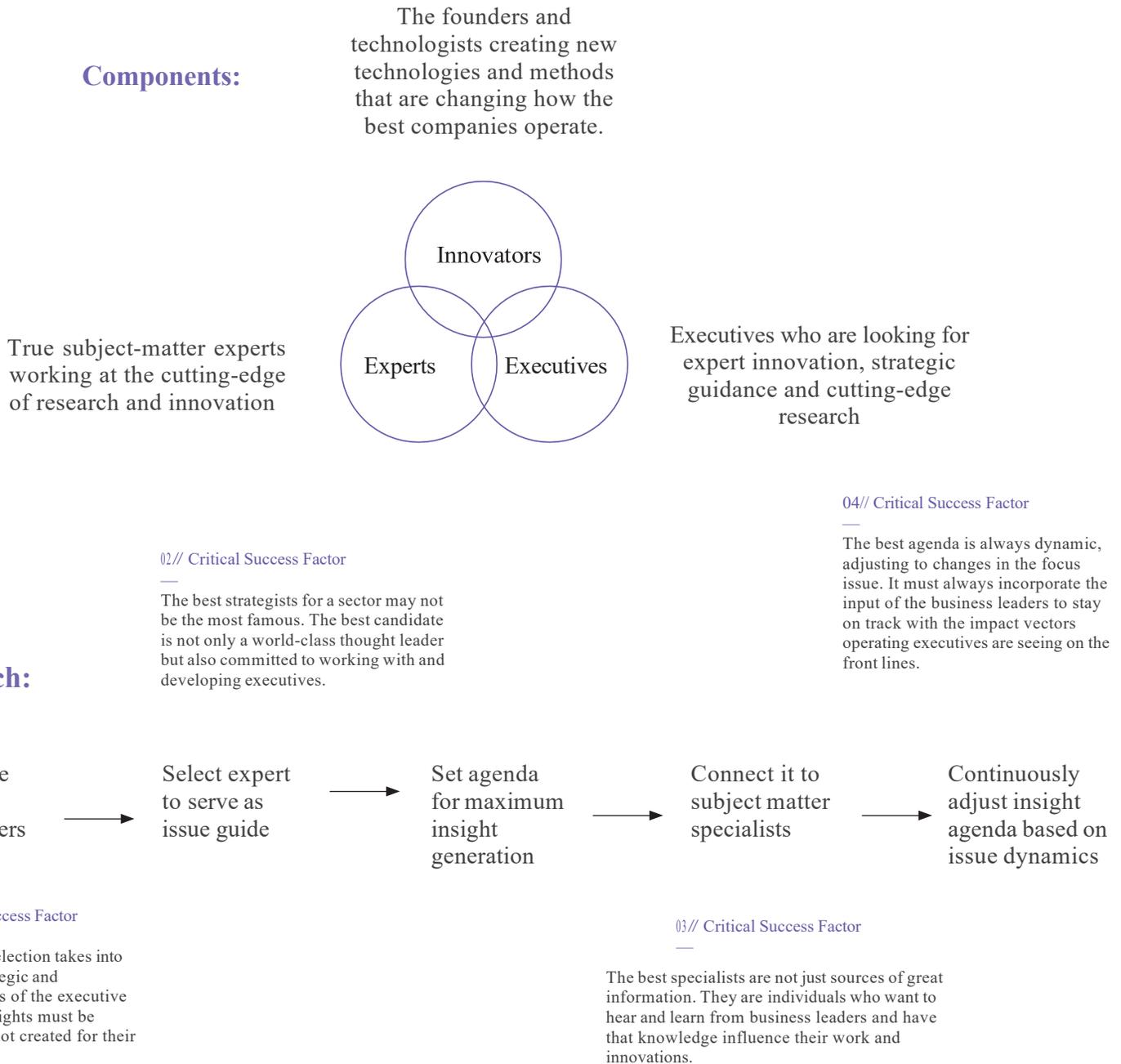
Glancing around our information-saturated world can lead a business leader to become exasperated and imagine that a solution does not exist for the problem of IO. To the contrary, we believe that if one looks at the science and our own experiences, a new kind of platform can help global business leaders process the complex world around them. Such a platform must address the five key imperatives we discussed in order for a real step change in executive decision making to occur:

- It must help executives separate signal from noise, with respect to their own goals.
- It must validate sources with the same care that it does for information.
- It must be focused on insight creation and not just information transfer.
- It should work via diverse groups and not in individual settings or clusters of two to three executives.
- It should work in a virtual environment, not just for economic reasons but to increase access to information and insight creators anywhere in the world.

We call our platform DEI Discovery Labs, and we believe that it addresses all these challenges successfully: it allows global executives to connect to trusted sources of information, process the same in a vetted group setting, and discover insights that are organic and self-originating. An overview of DEI Discovery Labs is presented in *Figure 5* below, which lays out the science-based approach we take when working with senior leaders to solve information overload.

Figure 05.

The DEI Discovery Labs Platform: Components, Approach and Success Factors



Moreover, the insight generation process we developed and in which these highly skilled individuals operate is a carefully designed product of our research.

A final point before closing comes from our 50+ years of working with the world's most senior executives: Getting and staying connected is perhaps the most important thing an executive can do to ensure her success. As Bill Taylor, the founder of *Fast Company*, wrote:

*Finally, and most personally, successful learners work hard not to be loners. These days, the most powerful insights often come from the most unexpected places — the hidden genius locked inside your company, the collective genius of customers, suppliers, and other smart people who would be eager to teach you what they know if you simply asked for their insights. But tapping this learning resource requires a new leadership mindset — enough ambition to address tough problems, enough humility to be willing to learn from everyone you encounter. Nobody alone learns as quickly as everybody together.*¹⁴

There are many fine options out there for connecting to people and peers around the world but connecting directly to the most cutting-edge researchers and their work has been difficult – until today. Executives now have a platform to link them directly – using the world's most carefully designed model and platform – to great thinkers as well as great ideas. These connections will create a dramatic shift in a leader's ability to process the information around them and generate the organic insights required to address the world's most complex technical, business and social issues.

The foundations of our model are not just simple commercial considerations or “features” we think executives will find appealing. Rather, our guiding principles are fundamental insights we have experienced over the past two years of research and testing; thus, they work together to form not just our foundation but, we believe, lay the groundwork for any method or platform that sets out to tackle executive information overload to improve executive decision making.

References

- 1 Roetzel, P.G. Information overload in the information age: a review of the literature from business administration, business psychology, and related disciplines with a bibliometric approach and framework development. *Bus Res* 12, 479–522 (2019). <https://doi.org/10.1007/s40685-018-0069-z>
- 2 Simon, Herbert A. Designing organizations for an information-rich world, Brookings Institute Lecture, 1969 <https://zeus.zeit.de/2007/39/simon.pdf>
- 3 Hemp, Paul. Death by Information Overload, *Harvard Business Review* (September, 2009 <https://hbr.org/2009/09/death-by-information-overload>
- 4 Chait, Jonathan and Glass, Steven. Amazon.con, *Slate* (Jan 05, 1997) <https://slate.com/news-and-politics/1997/01/amazon-con.html>
- 5 Ratlif, Evan. The Plague Fighters: Stopping the Next Pandemic Before It Begins, *WIRED* (August 24, 2007). <https://www.wired.com/2007/04/feat-firstblood/>
- 6 McKenna, Maryn. The Race to Find the Next Pandemic—Before It Finds Us, *WIRED* (December 12, 2018). <https://www.wired.com/story/the-race-to-find-the-next-pandemic-before-it-finds-us/>
- 7 Godelnik, Raz. Are companies taking climate change seriously? A new tool helps you figure it out, Medium (Nov 12, 2020) <https://razgo.medium.com>
- 8 Randers, J., Goluke, U. An earth system model shows self-sustained melting of permafrost even if all man-made GHG emissions stop in 2020. *Sci Rep* 10, 18456 (2020). <https://doi.org/10.1038/s41598-020-75481-z>
- 9 Roetzel, P.G., Pedell, B. & Groninger, D. Information load in escalation situations: combusive agent or counteractive measure?. *J Bus Econ* 90, 757–786 (2020). <https://doi.org/10.1007/s11573-020-00987-x>
- 10 The logic of the sequence is "any series of numbers that increase in value."
- 11 Smith, Christine M.; Bushouse, Emily; Lord, Jennifer. Individual and Group Performance on Insight Problems: The Effects of Experimentally Induced Fixation, Grand Valley State University (2009). https://scholarworks.gvsu.edu/cgi/viewcontent.cgi?article=1021&context=p_sy_articles
- 12 See, for example: Nortvig, Anne-Mette; Petersen, Anne Kristine; Balle, Søren Hattesen. A Literature Review of the Factors Influencing E-Learning and Blended Learning in Relation to Learning Outcome, Student Satisfaction and Engagement, *Electronic Journal of e-Learning*, v16 n1 p46-55 2018
- 13 Swan, Karen. (2002) Building Learning Communities in Online Courses: the importance of interaction, *Education, Communication & Information*, 2:1, 23-49, DOI: 10.1080/1463631022000005016
- 14 Taylor, Bill. Are You Learning as Fast as the World Is Changing? *Harvard Business Review* (January 26, 2012). <https://hbr.org/2012/01/are-you-learning-as-fast-as-th>

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