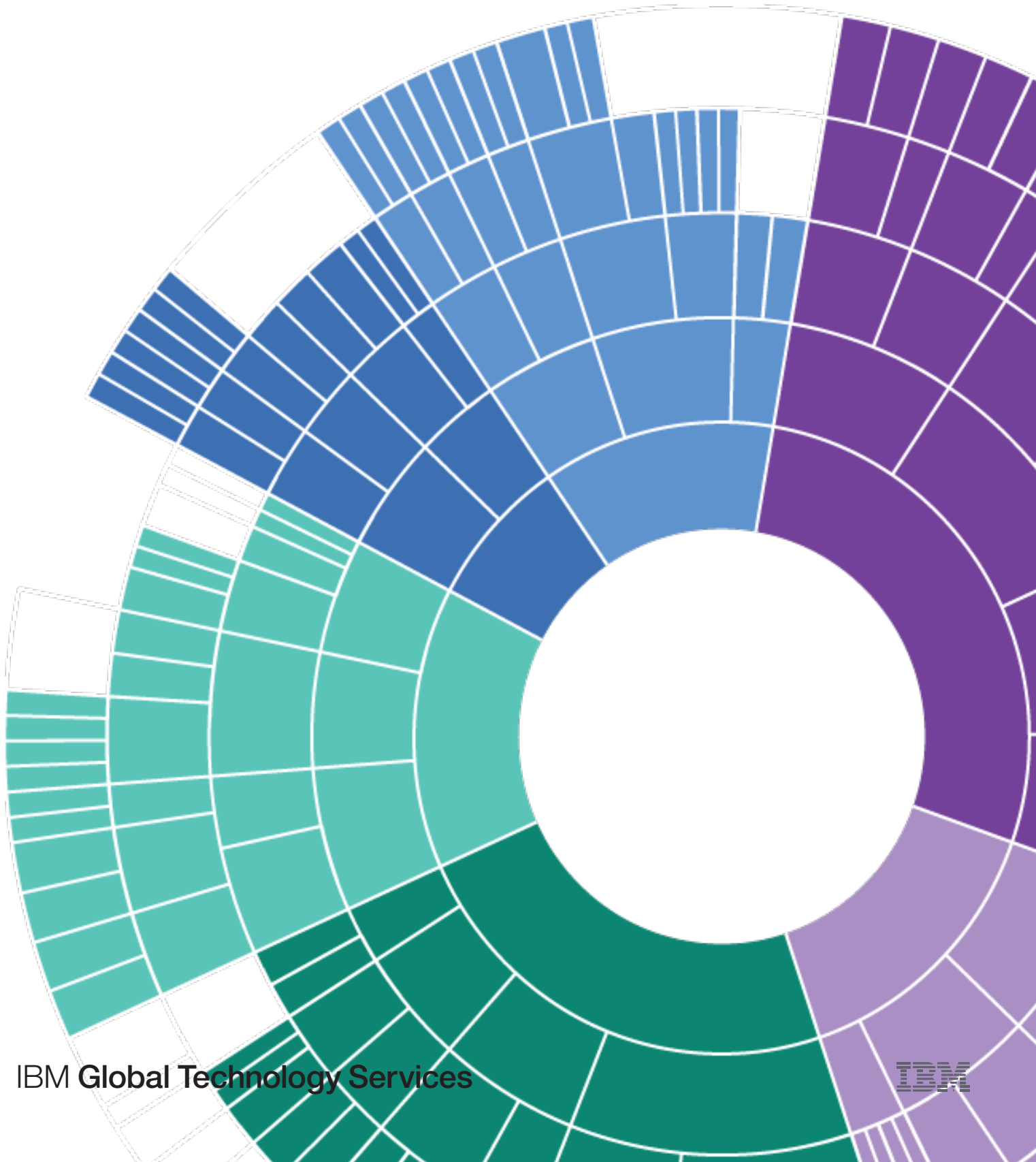


Turning Business Inside-out: How a Cognitive Approach can Transform IT



IBM Global Technology Services



In the vast world of big data, client value lies in increased efficiency, reduced redundancy, and a user-centric focus that sees business outcomes as the true measure for success. The solution is a scalable hub-and-spoke ecosystem grounded in a cognitive service platform. Together these approaches will empower internal and external teams to co-create and data share with constant forward momentum.

NEW
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photographer: Alyssa Smith

Introduction

After over five years climbing Gartner's hype scale, big data may finally be settling in as a mature technology¹, but the amount of data continues to increase. In one day, almost a year's worth of videos are uploaded to youtube; if you take all the videos seen on youtube in one month and watch them consecutively, it'd take you almost four hundred thousand years.²

The numbers increase exponentially by the minute, and with each user action, so does the data. To complicate matters further, this data is also increasingly unstructured: images, videos, emails, texts, sound files.

For the past few years, businesses have invested in storage and software systems. Yet the hardware-as-a-service industry has plateaued; Rackspace, an industry leader, has flattened bottom-line profits. Amazon's AWS platform is barely managing a 5% operating income.³ The 'build it and they will come' days are receding, even as the data grows.

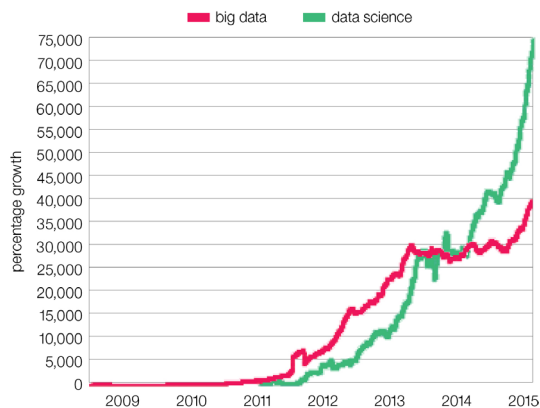
If hardware demands have stalled, the need for people has shot up. Now that we can track, for example, millions of customer purchases across a massive time frame, we require data scientists who can write the algorithms to parse the data. The problem is that the work force doesn't exist. In a 2016 report, International Data Corporation (IDC) predicted that by 2018, US businesses would need almost 200K data scientists, and five times that many for data analysts.⁴

When Stitch Data crunched the numbers, they identified only 11,400 data scientists worldwide (excluding related titles such as data analysts, business intelligence analysts, or quantitative analysts), and roughly half had earned the 'data scientist' title within the previous four years.⁵ Even if we include a greater spread of titles within the data science spectrum, there remains a massive gap between resource supply and business demand.⁶

In industry discussions about big data over the past years, much has been made of data's transformative power. The extent of the transformations, however, has mostly begun and ended with marketing and sales. Data-based decisions have enabled companies to target underserved and unserved consumers, and upend traditional marketing segmentation. Seen from the heights of an entire organization, these data-based transformations have been, at best, superficial and limited, if lucrative in the short term.

Business transformations—some successful, some less so—have been studied in depth. A significant marker for success is a collaborative definition of the new structure⁷; others include strategic vision, supportive leadership, and engaged employees. The majority of these transformations are organizational in nature, however, and informational transformations are treated as a byproduct of the change in structure.

Obviously we cannot grow data scientists on trees; we must more efficiently use the resources we have, lest our data lakes become swamps. This drives up against the classic model of organization, where span of control is measured by the number of resources. Given the dearth of analysts to fill seats, and the current stasis of technology platforms, our solution lies in a third way: a cognitive services platform.



Job Trends from Indeed.com

Why now

The technology landscape is changing. Between big data, mobile, social media, security, and analytics, the way we work is actually changing. These changes aren't superficial; these new technologies affect processes, applications, and infrastructure.

The demographic landscape is changing. For most of our clients, roughly half of their workforce are millennials. In less than 10 years, about 75% of their workforce—and their customers—will be millennials.

The user's expectation is changing. Users have become used to delightful technology experiences as consumers, and as employees. 89% of companies believe that customer experience will be their primary basis for competition in 2016, yet less than half of those companies consider their provided customer experience as superior to their peers.⁸

The skill level is changing. With the advent of self-learning AIs and unfathomably complex deep data, the human skill of storytelling is needed more than ever. The workforce can no longer be an assembly line; businesses must cultivate people who can transform data and statistics into a crafted narrative.

In 2013, industry awareness reaching a tipping point for design, and IBM was ahead of the curve. Now begins the age of data analytics and visualizations, and IBM is ready to assist our clients in navigating the oncoming waves of data, and these data-based decisions can transform the entire organization. But rather than simply collaborating on a new version of the same structure, our hub-and-spoke approach makes collaboration the structure itself.

From up-down to inside-out

As data grows, by necessity it becomes increasingly more distributed in nature. In contrast to this decentralization, we have centralized a broad swath of tools, technology, and analysis expertise, so the hub can provide deeper support to the spokes' domain experts. Akin to a functioning ecology, the hub's hybridization allows for the spokes' specializations.

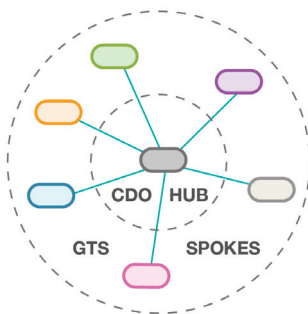
The traditional hub-and-spoke model has been around long enough for its positives and negatives to become apparent. In its favor are efficient use of limited resources, reduced redundancy, and the flexibility to respond and grow rapidly to fill new markets.¹²

On the other hand, any breakdown at the hub will impact the entire system, just as a rebellious spoke can cause inconsistency in delivered quality.¹³ To combat this, the final goal should be envisioned as a multi-node ecosystem, each of which may act as a limited hub to its related spokes.

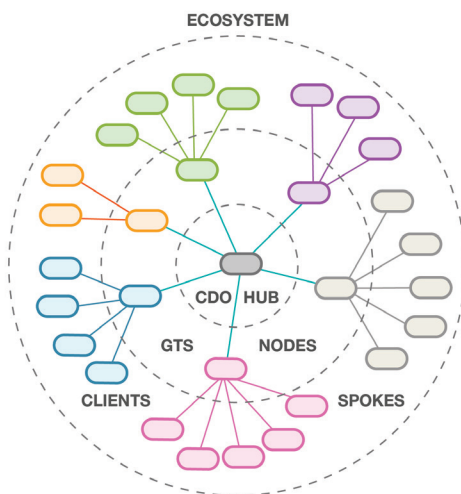
The earlier reference to ecology is intentional, as the proposed transformation is beyond a simple platform. It's a complete ecosystem. Stretching from the interior of the CDO, where the tools and techniques live, through the outer points where the domain experts reside with their specialized data, the ecosystem reaches beyond to encompass the client environments and experiences.

Beyond the informational or organizational processes, the model has a further psychological value to its many constituents. From the scientists in the hub, to the domain experts in the nodes, to the users in the spokes, each

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Simple hub-and-spoke



Multi-level hub-and-spoke

one revolves around a central point. Unlike the unidirectional hierarchy—top or bottom—of the traditional model, this revolution allows for equalization via a shared perspective.

Much like Spotify's concept of guilds and tribes¹⁴, cross-team alliances continue the collaborative experience beyond any organizational change. Within the multiple, revolving levels, each role can maintain a forward momentum through its connection to the greater ecosystem.

Laying the groundwork

One illustration of this systemic shift is IBM's own Design Studio. In 2013, a team of about 10 people began discussing the need for a strong design program at IBM. They assessed a healthy team ratio to be one designer for every 8 engineers; IBM's estimated ratio at the time was closer to 1:400. With limited resources and scope, the team realized the best solution was to consolidate, rather than stretch their resources even thinner.⁹

According to Adam Cutler, now the Design Thinking Practices director, other teams in IBM would often ask the core design team how they'd achieved a successful client engagement, and whether the designers could repeat this for a new project. What the designers realized was that pulling a

design team apart would result in failure; given their limited resources, their work succeeded because it was all of them working together.

As their successes grew, their growth was not focused solely in hiring more design practitioners; they put equal effort into training and cultivating design thinking practitioners within IBM's ranks.

Between short-term workshops

and longer-term boot camps, the core design studio reached out to bring engineers, offering managers, and executives into a design ecosystem.¹⁰ These partnerships with non-design teams became the basis for the farthest-flung spokes, figuratively and literally, as Studio grew into a global team of 44 studios and over 3,000 design practitioners.¹¹

Each interaction with a spoke is also a conversation, shifting the process from one-way delivery to incorporating the client-user experience and perspective. As each spoke works with the external clients—duplicating their own spoke-state into the client's patterns and interactions—they provide a direct route for the main Studio to discover, absorb, and act on user insights and needs.

Building the center

The foundation of this ecosystem is the hub, where the following skills are concentrated and supported.

- The data architect designs, deploys and manages an organization's data architecture so data scientists and engineers can extract value.
- The data scientist and data engineer are a bridge between the architect and the storyteller, performing analyses and delivering value in consumable format.

“Design is *not* style. It's *not* about giving shape to the shell and not giving a damn about the guts. Good design is a renaissance attitude that combines technology, cognitive science, human need, and beauty to produce something that the world didn't know it was missing.”

Paola Antonelli, senior curator of the Museum of Modern Art

- The data storyteller translates engineer/scientist output for users via visualization, with the UX designer.
- The UX designer focuses on user advocacy and research, and assists the storyteller in crafting delightful, usable interfaces.

These four roles collaborate throughout a project in four key ways. First, the entire team participates, with each client team, in design thinking throughout the project.

Design thinking is not a process or a checklist, but a way of thinking: working together, digging into the questions, reflecting on the results, and digging in again to define the problem, rather than simply list symptoms. Once the true problem is known, the team works together to determine, design, and build a solution.

Second, projects are broken into milestones that each deliver an MVP that's also a complete user experience. The course of a milestone can be broken roughly into beginning, middle, and end, roughly equivalent to the classic software cycle of development, testing, and production.

Team members also shift positions depending on the milestone's status; some will move forward into primary position, while others step back into supporting roles. These continuous transitions allow the team to pivot quickly.

Third, the team's process is highly iterative, including fine-tuning the original problem statements in light of new knowledge. The beginning of a phase is marked by defining hills, which are tightly-scoped statements centered on the user experience.

At a sprint's conclusion, the team presents playbacks to review progress. Although the entire process is collaborative, these two points are especially so, as our clients are invaluable in defining the hills with us, and the cross-functional feedback during a playback has spurred many unexpected innovations.

Fourth, the hub team are facilitators, modeling these skills with domain experts and clients, and mentoring them to incorporate these approaches independently. In this collaborative atmosphere, this direct interaction between the hub and clients means direct user experience feedback can add to the global vision to improve all spokes.

This collaborative, informational organization thus becomes the basis for external change, as clients learn to maximize their position within the overall ecosystem.

Case Study: facilitating teamwork

Recently the CDO team worked with a large, highly mature, and strongly risk-adverse financial services company. Early in the contract, the clients approached the team with a question: given the introduction of new technologies and processes, how can we better organize our teams to take advantage of these changes?

“The CDO’s team is not a new department that is simply appended onto the old way of doing things, like a third arm that adds incremental capability. It is more like developing a nerve system; it works with all the other parts of the organism, collecting information and passing signals back and forth in a new way that allows for better collective action and decision-making. A nervous system is not made of muscle; its job is to inform, not act all by itself.”

Julie Steele, Understanding the Chief Data Officer

The GTS Chief Data Officer, joined by a Distinguished Engineer, sat down with the client VP and a newly-minted CDO to work out a strategy.

First, IBM assisted the clients in identifying their teams' strengths and skills. Those identified as data engineers were moved to a central team, and empowered to draw and recruit from the periphery.

Employees identified as domain experts remained in the spokes, where their systems knowledge would bridge between running those systems and the data engineers in the hub. Those newly-centralized data analysis teams would reduce redundancy and inefficiency, allowing individual members to pivot faster to meet user needs.

Down the road, every team would eventually have an embedded data scientist, to establish continuous collaboration and communication between data science peers across the entire system. IBM also recommended revolving data scientists in and out of the hub, to allow them exposure for recruiting potential new scientists into the center.

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Platform Maturity model

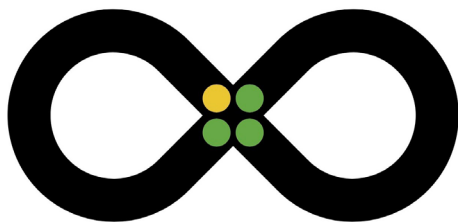
The cognitive ecosystem

In a 2016 study, only 11% of respondents had adopted cognitive technology, and 58% said improving operational efficiency was their most important strategic priority. Of the respondents, 49% considered operational efficiency the most expected benefit of cognitive computing. As cognitive computing matures, more of the industry grasps the potential, but 'cognitive' should not begin and end with code.¹⁵

A cognitive approach is defined by three main attributes: diagnostic, predictive, and prescriptive. This tripartite approach echoes the data science principles of measure, analyze, and act. In turn, those principles map to IBM's design principles loop of observe, reflect, and make to drive the client outcome.

Each working part (or individual) in a cognitive system is autonomous, and empowered to effect change, and this includes our clients, as integral parts of our ecosystem. Rather than simply deliver prescriptive formulas to address what gets built, or the technology of how it's built, this cognitive approach—combined with design thinking—frees us to focus on the why, and to let people explore new ideas, and truly innovate. This transparent and collaborative approach is echoed through every part of our hub-and-spoke model, exchanging information, knowledge, and experience across every connection to achieve delightful and robust solutions.

A robust cognitive platform can empower people. The right skills can use that platform. The right organization can transform your business.



Observe

Reflect

Make

IBM Design Thinking Loop

About the Author

Kate Hamilton is the UX Strategist for Global Technology Services' Chief Data Office, and is a writer, developer, and UX practitioner with over twenty years' experience in the IT industry.

Acknowledgements

Eugene Kolker is the Vice President and Chief Data Officer (CDO) of Global Technology Services (GTS), the largest business unit of IBM. Eugene's mission is to leverage data and analytics as strategic business assets of GTS and IBM for data-enabled, better-informed decision making and execution.

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Janice Cha is the Data Science Organization Leader for the GTS Chief Data Office with a successful track record of inspiring, nurturing and leading a global team to winning, executing and delivering data analytics projects and delighting our clients.

Adam Cutler is a Distinguished Designer, and the Design Practices Director at IBM Design, and is responsible for the IBM Design Studio in Austin, TX while advising the other Studio Directors globally. He is also responsible for the competency, culture and practices of design and designers at IBM.

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