



Enterprise innovation in the cognitive era

Igniting cultural transformation for the future of work

Executive Report

Cognitive

IBM Watson and cognitive computing

When IBM Watson (named after the first IBM CEO, Thomas J. Watson) outplayed two *Jeopardy!* champions on the U.S.-based TV quiz show in 2011, it brought recent advances in artificial intelligence into broad public view. Today, IBM has invested billions of dollars in ecosystem development and new business units such as Watson Health, Watson Internet of Things and Watson Education. Through these partnerships and strategic investments, cognitive solutions have been developed for a variety of industries and use cases. IBM already has made available over the public cloud dozens of Watson cognitive services that understand, reason and learn from data, with many more services to come.

Introducing “Cognitive Build”

Cognitive computing has the potential to completely transform the way organizations develop products and solutions, refine processes and go to market. IBM had already defined steps for organizations to enter the cognitive era, including developing a cognitive strategy, using advanced analytics and the cloud, creating the proper infrastructure and using cognitive security. Internally, IBM wanted to make sure that its employees were provided the opportunity to engage in the cognitive experience. As a result, the company launched a social collaboration project “Cognitive Build,” which was open to every employee in every location. This exercise was designed to equip employees and leaders to take on disruption, embrace new work methods and continue the IBM history of continuous reinvention. IBM experience has shown that a collaborative initiative of this magnitude fosters bold ideas, accelerates learning and creates a more engaged workforce. What worked for IBM can work for other enterprises that desire to forge a cognitive, agile future.

Executive summary

Cognitive Build was a global, multi-phase, collaborative initiative in which tens of thousands of IBM employees came together in small groups to brainstorm ideas and to develop working prototypes for new products, services and internal processes based on the company’s cognitive computing system, Watson. Having enjoyed previous success with large-scale online collaboration efforts called “jams,” IBM adapted these in Cognitive Build to include the characteristics of a hackathon – going beyond brainstorming to actual product and service creation.

This large-scale experiment was undertaken for strategic business reasons. The company had provided employees extensive education on many aspects of digital and cognitive technology through its internal Think Academy learning system. However, cognitive represented a fundamental shift in IBM’s strategy, direction and value proposition, and the company believed it was essential that all IBMers understand it in an experiential and operational way. Only then would the company’s 380,000 employees be prepared to identify opportunities to apply it in the industries, sectors and parts of the world where they work.

Therefore, the goals of Cognitive Build were: (1) to deepen IBMers’ knowledge about the power of cognitive computing; (2) to equip them to build real solutions to business problems; and (3) to accelerate the cultural and operational transformation of IBM itself into a cognitive business. The groups in Cognitive Build, receiving guidance from cognitive experts around the company, honed their ideas over a three-month period and applied cognitive tools to bring their concepts to life. An internal virtual crowdfunding exercise prioritized and built awareness for the newly developed ideas. Teams whose ideas received the most support were invited to expand upon their prototypes and present them to a panel of senior executives.

What is cognitive computing?¹

Cognitive computing refers to systems that learn at scale, reason with purpose and interact with humans naturally. Rather than being explicitly programmed, they learn and reason from their interactions with us and from their experiences with their environment.

Cognitive computing can:

Create deeper human engagement

Scale and elevate expertise

Infuse products and services with cognition

Enable cognitive processes and operations

Enhance exploration and discovery

Cognitive systems generate not just answers to numerical problems, but hypotheses, reasoned arguments and recommendations about more complex – and meaningful – bodies of data.

IBM anticipated hundreds of ideas and, instead, received thousands. Dozens of viable prototypes were expected; hundreds were created. The “Build” received broader participation than any previous collaborative initiative sponsored by IBM: nearly 75 percent of IBMers from 115 countries and every business unit were engaged. Ultimately, eight finalists and three winners were selected, and their projects – as well as many others that did not make it to the final round – are being further developed and implemented across different business units.

In this report, we look under the covers of this innovative experiment to describe how it came about and what lessons it offers to leaders seeking to bring their organizations into the Cognitive Era – lessons about technology, strategy, process and culture. The most important lesson was in how to move at scale from ideas to concrete action and transformation. Cognitive Build was an experiential learning journey that delivered tangible outcomes to the business. As one participant noted, “People love talking about wild ideas and business improvements. This was a great opportunity and platform to make ideas come to reality.”

Cognitive Build: A new approach to innovation

IBM has a long history of collaborative and crowdsourced innovation, which has been an important engine for new ideas (see Figure 1). The introduction of cognitive computing constitutes a significant shift in how organizations can now apply technology to solve

Figure 1

The wisdom of the crowd: unleashing brainpower by driving innovation through social collaboration

	Hackathon	Jam	Enterprise Crowdfunding	Cognitive Build
Goal	Create a solution to a predefined subject through collaborative computer programming	Kick-start a transformation or change program through a transparent conversation and generate lots of ideas in a short timeframe	Take the successful model of Internet crowdfunding and adapt it to the Enterprise	Provide a hands-on experience to generate cognitive ideas and to apply the tools and methodologies available
Location	Physical location/venue	Online platform	Online platform	Combined online platform and physical location
Demo-graphics	A limited number of teams, each consisting of 2-5 people	An unlimited number of participants, and a team of experts to facilitate	All employees (can be limited to a single division)	All employees
Time	Generally 1-5 days	3-4 days	1-2 months	3 months
Structure	Teams create a prototype and pitch their results before a panel of judges	Individuals share expertise and opinions and a team of specialists uses sophisticated analysis to find and rank conversations of interest	Employees propose ideas or solutions in response to an executive challenge. Colleagues express their level of support through virtual investments, and the most promising ideas receive executive visibility for further development	Through individual and experiential learning, self-formed teams develop and crowdfund ideas, create prototypes and pitch results before a panel of judges
Outcomes	Working prototypes that can be adopted and scaled	Recommendations on the activities or initiatives discussed, based on shared themes and conversations of interest	New technologies, new features, new products	Working prototypes that can be adopted and scaled; new ideas on how to apply cognitive solutions in both internal processes and client situations

*“It’s a ‘Do Tank’,
not a ‘Think Tank.’”*

Ginni Rometty, IBM CEO²

business challenges. IBM again wanted to ensure that all employees, regardless of job description, had the opportunity to contribute their insights. Cognitive Build was designed to drive further culture change, as well as tap into IBM Watson's emerging capabilities.

The Cognitive Build initiative encompassed five distinct stages over 88 days: learning about the potential of cognitive computing (Prepare), collaborating and idea generation (Team), agile development and design thinking (Build), crowdfunding (Invest) and a final phase (Launch) in which winning teams were selected in a global pitch event (see Figure 2).

Figure 2

A phased approach: a guide to Cognitive Build



Prepare: Creating the learning foundation

To bring the Cognitive Build process to life, individuals needed a common vocabulary and context to understand how cognitive technology works, as well as the concepts necessary to achieve successful outcomes. Fortunately, IBM had already created an educational vehicle to achieve that. The company's cloud-based, mobile-ready learning platform with "just-in-time" content – IBM Think Academy – had been launched two years previously. Cognitive Build's designers used Think Academy to prepare more than 185,000 IBMers for each successive phase of the exercise. Learning kicked off with two live sessions hosted by IBM CEO Ginni Rometty. These were complemented by 22 brief learning modules over the course of the Build, covering a wide variety of topics, including:

- How to develop an idea using design thinking and agile work methods
- What cognitive data you need, and what tools and Watson APIs to use
- What makes a good team
- How to perfect and promote your idea
- Where and how to invest your crowdsourcing "dollars"
- How to turn ideas into solutions and working prototypes.

These self-paced modules not only enabled individuals to learn at their own time and pace, but also established the fundamental building blocks to collaborate more effectively with peers throughout the Cognitive Build process.

“My team was made up of people I’d never get to meet in my day job – amazing research scientists, developers, designers and people from countries that I may never visit.”

Cognitive Build team member

Team: Bringing people and ideas together

After the initial learning experience, IBM employees were encouraged to come up with ideas in one of three key areas:

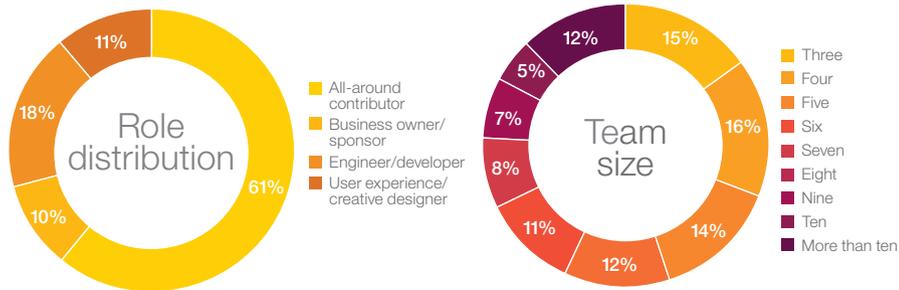
- Bringing cognitive capabilities to client opportunities
- Infusing cognitive into products and services
- Transforming IBM’s own processes with cognitive.

Making it easy to get started was critical to the Build’s success. Anyone could register an idea and recruit team members, or join an existing team. Since participation was not limited to those with technical or programming skills, the Build generated considerable momentum throughout IBM.

Each project team was self-directed and consisted of at least three people (see Figure 3). Drawing from a range of expertise, each member assumed a role, such as business owner/ sponsor (to assess business value), developer (to determine feasibility and initiate prototyping), user-experience designer (to gauge usability) or a general contributor (to apply business acumen and problem-solving skills). While typical Cognitive Build teams averaged six-to-seven members, the top 40 funded teams averaged more than nine members, and the ten most-funded teams averaged 13 team members. This corroborates what we have seen in previous IBM research efforts: the more members on a team, the more likely they are to be successful at crowdfunding.³

Figure 3

Self-directed teams: team size and role distribution were well balanced



Within each of the three categories defined at the outset, teams proposed solutions to a broad range of topics and goals, addressing both societal and business challenges. Analysis showed that client support and data analytics were the most prevalent topics addressed, accounting for almost one-third of all subjects. Collaboration, sales and marketing, and healthcare-related solutions were also popular. The result was a diverse mix of cognitive ideas: myriad topics, yet all with a clear client focus.

“The Build awakened the imagination and creativity of IBMers. Seeing the numerous innovative ideas makes me more proud to be an IBMer.”

IBM employee

Design thinking. Design thinking is a model of solution development that begins by understanding the issues to be addressed from a user point-of-view. Then desired outcomes are defined and minimum viable products or prototypes are developed and built.⁴

Agile. Agile is a methodology for rapid, iterative development and prototyping by small teams. After each predefined milestone, teams evaluate progress and make changes or corrections where needed. They continuously gain clarity about the expected outcome and quickly adjust elements of their ideas through the agile principles of “listen, iterate, learn and course correct.”

Build: Applying agile and design thinking

From the initial 8,361 ideas collected during the Team phase, 3,924 teams felt confident to take their ideas to the next level and submit them to cognitive experts for feasibility reviews. Cognitive experts were selected from the company’s technical leadership community, including the IBM Academy of Technology, to assist teams in refining their ideas. The criteria were:

- Is it a cognitive use case?
- Is the data available?
- Is the idea feasible – ideally within 12 months?

Based on these reviews, many teams refined how they would address specific pain points, design the user experience and create business value for IBM and its clients. Ideas evolved using collaborative brainstorming tools and techniques. Design thinking principles and an agile approach helped teams take a user-centric mindset and identify strong solutions around well-defined business issues.

At the conclusion of the Build phase, a total of 2,603 teams had refined their ideas and proceeded to the Invest phase. Now colleagues could express their support through crowdfunding investments.

Invest: Crowdfunding the best ideas

IBM used a form of mock crowdfunding to gauge employee interest in the published cognitive ideas. Each IBMer was allocated \$2,000 of virtual currency to “invest” in what he or she thought were the most valuable projects. The investment could be allocated across projects in any amount the employee desired, with maximum investment in a single project of \$1,000. Projects could raise as much as possible until the end of the Invest phase. IBM suggested that employees invest in ideas that were:

- User-centric, with clear client value
- Novel or disruptive to a key market or industry
- Differentiated, with potential to create competitive advantage.

To help teams promote their ideas, almost 60 local “invest stations” were created in IBM locations around the world, where teams could encourage their colleagues to invest through in-person events and social sharing. Through these local booths, poster sessions, online collaboration tools, email campaigns and community presentations, teams expressed their creativity and marketing prowess.

Overall, more than 225,000 IBMers invested \$291 million virtual dollars in their favorite ideas. Semi-finalists were selected from among the following:

- The ten most-funded teams overall
- The top ten from each of the three Build focus areas (bringing cognitive capabilities to client opportunities; infusing cognitive in products and services; and transforming IBM's own processes with cognitive)
- Ten additional teams selected by cognitive experts and IBM leaders, based on key industry alignment and potential for immediate impact.

“I am totally on board if we do this again – wouldn’t think twice. I learned so much about how people think, better understand creative ideas, how to bring things together, build things with cognitive, challenges that IBM and clients are dealing with.”

Cognitive expert, IBM

Launch: Pitching the prototypes

The 50 semi-finalist teams were given three weeks, plus development tools and the additional resources required, to build their prototypes. Technical experts guided these teams through additional agile sprints, while business experts coached them on finalizing business plans and creating succinct, compelling executive presentations.

Two members from each team travelled to the IBM Design Studio in Austin, Texas, to refine their work and prepare presentations to showcase their prototypes to IBM executives. Each team had only four minutes to pitch its idea to business leaders from the market, industry or process area its project was designed to address. Judges scored the ideas based on business model, ability to solve a problem, customer impact and ability to execute. From the 50 semi-finalists, eight were selected to advance to the final round.

The eight finalists presented their ideas to a panel of clients and senior business leaders, chaired by IBM CEO Ginni Rometty. Almost 40,000 employees around the world watched the live feed or replay of the event, and the broadcast has had more than 80,000 subsequent views. After a nerve-wracking pitch fest, three teams emerged as winners of the Cognitive Build Global Outthink Challenge. Interestingly, all three focused on Watson's capacity to understand individuals: #Here4U, a cognitive agent for counselors supporting people in need of emotional support; Project Esaki, enabling an interactive conversation with IBM job candidates; and Myca, a cognitive coach that provides interactive career guidance to IBM employees.

From the perspective of IBM management, all 50 teams that made it to the semi-finals were winners. As a result, not only were all these teams recognized for their creativity, diligence and passion, but they also received a substantial monetary reward, which was not announced until the finals. Additional awards were allocated to teams in recognition of, among other things, innovation and diversity. As was the goal from the very beginning, the ideas of all eight finalists were adopted by IBM business unit leaders for further development.

Local Cognitive Build competitions – Outthink Challenges – mirrored the experience in Austin, broadening sponsorship opportunities and team recognition. It turned Cognitive Build into something local and relevant, and afforded visibility to promising ideas targeted at key regional and industry challenges. These events extended the high level of engagement of Cognitive Build and allowed many local and regional executives the opportunity to invest in one or more of the more than 60 ideas that won local competitions.

“In my ten years at IBM, those two days in Austin were my absolute best.”

Watson Health executive

Cognitive Build Global Outthink Challenge Winner – #Here4U

#Here4U is a text-based mental health counseling solution. An instant messaging app connects counselors with individuals dealing with emotional crises. The Watson cognitive agent monitors the conversations for potential behavioral risk, based on language and sentiment, and uses leading counseling practices to suggest responses through a counselor dashboard.

Idea and impetus: Mental health issues, such as stress, anxiety and depression affect a large percentage of the population, directly or indirectly. Several members of the #Here4U team had personal stories where they had witnessed inefficiencies in mental health support services, as well as the reluctance of individuals to use such services. The team strongly believed that, through IBM Watson, better and more personalized support could be offered where and when it was needed most.

#Here4U was imagined as a text-based digital helper that people could turn to, anonymously, and without fear of judgment, any time of day or night. Watson would chat with individuals in natural language, listen, learn, remember and offer guidance as appropriate, all while continuously assessing risk and preparing to provide an informed hand-off to a trained human counselor at any time.

Cognitive Build journey: A team of 15 people banded together to discuss their perspectives on the use cases, the cognitive services and the interaction. Although the team was primarily from IBM Global Business Services, they had never worked on a project together before. They conducted ideation exercises, ran an IBM Design Thinking workshop and crafted a business plan that incorporated market, industry and demographic research.

#Here4U's strong use case resonated with IBMers and received an overwhelming response. More than 3,600 employees from 59 countries invested in the idea. The team travelled to Austin and ultimately was selected as one of the three overall winners.

Current status: The team's first development effort is to create a cognitive agent to directly interact with mental health counselors. Watson will understand, learn, reason and converse in natural language to suggest next best actions and identify potential risks. Designers and developers are working closely with IBM colleagues in IBM Global Business Services, IBM Research, IBM Watson and Watson Health organizations to design the optimal solution.

The #Here4U team has been engaged with, and has received significant interest from, clients and partners across North America, spanning public and private sectors. These organizations recognize both the business and the societal value of the proposed solution and have offered their support with training and solution development. Several clients have already acknowledged #Here4U's applicability to other mental health use cases, such as Post-Traumatic Stress Disorder (PTSD) or as a valuable addition to an employer's wellness program.

15 members (14 Canada, 1 U.S.)

\$2,446,674 pledged

3,617 Investors

Cognitive Build Global Outthink Challenge Winner – Project Esaki

Project Esaki is a cognitive advisor that engages job candidates in deeper conversations about IBM and recommends positions relevant to a candidate's personality, skills and interests. The advisor learns about a job candidate through a series of natural conversations and responds to the candidate's questions just as a recruiter would, based on a vast company and job-specific corpus.

Idea and impetus: Team members recognized important challenges both for IBM as an employer and for the next generation of workers it hopes to attract and retain. IBM needs to discover the best talent fit – based on skills, goals, culture and values – through an improved recruiting experience. Job candidates want to understand more about IBM culture, specific positions and career paths before making an employment decision.

Cognitive Build journey: Many of the original 15-member team members work in talent management or talent acquisition and, thus, had first-hand experience with the challenges to be addressed. Through video storytelling and clearly outlining the potential quantitative and qualitative benefits of their cognitive solution, Project Esaki became one of the most funded and most discussed Build projects. Senior executives saw the business value as well, and the team was a winner at the Global Outthink Challenge in Austin.

Current status: Through sponsorship by the IBM Digital organization, the Project Esaki team has been designing, developing, testing and showcasing its solution. The team is currently working on an external pilot.

15 members (12 Brazil, 1 Mexico, 2 U.S.)

\$1,444,781 pledged

2,057 investors

Cognitive Build Global Outthink Challenge Winner – Myca

Myca is a personal cognitive career coach that is available 24/7 to give one-on-one career advice. The app enables employees to understand and optimize career options based on interests and company imperatives.

Idea and impetus: Career opportunities are one of the biggest drivers of increased employee engagement and retention. Employees need to be challenged, and they need clear visibility to new roles matched to their professional development aspirations. The Myca team believed that cognitive computing could deeply understand individuals and fundamentally change the employee experience.

Cognitive Build journey: The team of 14 people from Human Resources and other organizations met daily to brainstorm, build personas and empathy maps, conduct agile sprints and iterate on the prototype. They wanted employees to interact naturally with a

cognitive agent that recognized and recommended growth opportunities, from learning, to mentorships, to career paths. The idea resonated strongly and globally. Myca received over \$1 million in crowdfunding from over 2,000 employees, and was ultimately successful at the Global Outthink Challenge finals in Austin.

Current status: An extended team was sponsored and funded to further develop the asset. Myca is now a mobile app that employs six Watson APIs across five key functions, including an employee dashboard, a chat agent, an opportunity recommender, a career navigator and an assessment tool. After an internal pilot, it will be part of the Watson Talent (formerly “Smarter Workforce”) offering portfolio as “IBM Watson Career Coach”.

13 members (9 U.S., 1 UK, 3 India)

\$1,109,393 pledged

2,009 Investors

Conclusions

Cognitive Build catalyzed both creative thinking and new ways of working throughout IBM. As a result, a pipeline of innovative, cognitive solutions exists for IBM to fuel its transformation and offering portfolio.

The Cognitive Build served as a new benchmark in experiential learning and intrapreneurship across the workforce. More than 80 percent of participants state they now have a much better understanding of cognitive.⁵ Senior IBM leaders from both business units and geographies plan to pursue additional promising ideas – almost 10 percent of participants are now working with a sponsor to further develop their prototypes.⁶ Many employees have continued working on ideas in their spare time, and IBM has a dedicated community and project office to celebrate successes and help these teams make progress. The project office continues to offer support to the top 50 projects, local Outthink Challenge finalists and other viable ideas created by teams passionate about keeping their projects moving forward.

The long-term implications of Cognitive Build are still being assessed. However, through our observations and interviews, we learned three valuable lessons:

The importance of action beyond ideation

Traditional brainstorming techniques are good at generating ideas, but once those ideas are surfaced, an organization's standard processes and budget constraints can slow or inhibit their adoption. Cognitive Build revealed a new way to close that gap, demonstrating the value and ease of using cognitive tools to move rapidly from ideas to solutions. Using API-accessible services enabled people to tap into powerful resources without having to start from scratch. The combination of cognitive tools and collaborative thinking allowed ideas to proceed rapidly from initial insight to viability.

The importance of creating safe spaces to work in new ways

For many, new ways of working, such as design thinking, agile methods and crowdsourcing, require more than textbook reading and classroom training to be effective. Individuals need to apply new tools “in vivo” to understand their nuances and application. Using these approaches in day-to-day work activities can be intimidating. Cognitive Build gave large numbers of people opportunities to experiment with these techniques in controlled, low-risk environments. As a result of the Build experience, more than 55 percent of participants indicated they are now using agile methodologies, and 45 percent are actively using IBM Design Thinking in their work environments.⁷ Further, the use of crowdfunding provided the opportunity for people to weigh in and provide direction, regardless of their position, location or role within the organization.

Organization-scale creativity requires process, structure and infrastructure

Any individual or team can have a creative moment. However, to institutionalize creativity, there must be goals, context and guidance to help move ideas from concept to fruition at scale. In Cognitive Build, we saw how upfront, self-directed training built a common understanding and vocabulary among teams. The use of cognitive experts proved critical in helping evaluate and refine ideas and proposals. Although the structure of the Build imposed limits on the types of problems considered, those limits focused the work on strategically important issues, while giving individuals and teams considerable flexibility in how they developed their solutions.

Are you ready to engage your workforce?

The following questions can help you get started on your journey to engage your employees in the cognitive era:

- What will it take for your entire workforce to embrace new ways of working such as agile and design thinking?
- How can you capitalize on the diversity, collective intelligence and entrepreneurial mindset of your workforce to deliver value?
- What innovative programs and events have the power to ignite the cultural change necessary to reinvent your organization?
- How could cognitive capabilities improve your processes, offerings and experiences?

About the authors

Vanessa Carels van de Vliet is the EMEA program manager for C-suite Studies at the IBM Institute for Business Value, where she conducts fact-based research on business strategy trends in the boardroom. During the past eight years, she contributed to all major C-suite Studies released by IBM. For more than 20 years, Vanessa has built expertise in human and resource management, IT security and data privacy, knowledge management, legal business counseling and technical sales. You can contact her via email at v.carelsvandevliet@nl.ibm.com.

Bob Pulver leads the IBM Cognitive Build Project Office, with the mission to sustain momentum for promising cognitive ideas and applications, as well as to drive the strategy and evolution of the Cognitive Build initiative. Bob has over 21 years of industry experience in various business and technical leadership as well as consulting roles, with deep expertise in enterprise innovation, collective intelligence, social analytics and workplace transformation. He can be reached at bobpulver@us.ibm.com.

Contributors

Alberto Alvarez Saez, Michael Muller, Shaila Pervin, Stefan Ravizza and Wanita Sherchan.

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For more information

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Research methodology:

We conducted dozens of interviews with global and local members of the Cognitive Build project organizations, cognitive experts, Cognitive Build team members and managers across multiple business units and geographies. The interviews provided insights on the setup, organization and experience of Cognitive Build. We also analyzed the data of 2,698 teams that passed the Build phase. This provided insights into team dynamics, diversity, the variety of proposed solutions and topics, and the progression in funds raised.

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