

THE WORLD BANK GROUP'S TECHNOLOGY AND INNOVATION LAB, FROM CONCEPT TO DEVELOPMENT

A CASE STUDY IN LEVERAGING AN IT DEPARTMENT
TO SUPPORT DIGITAL TRANSFORMATION

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I discovered, to my amazement, that all through history there had been resistance . . . to every significant technological change that had taken place on earth. Usually resistance came from those groups who stood to lose influence, status, money . . . as a result of the change, although they never advanced this as their reason for resisting it. It was always the good of humanity that rested upon their hearts.

—Isaac Asimov, *lecture delivered at Newark College of Engineering*

The difficulty lies, not in the new ideas, but in escaping from the old ones.

—John Maynard Keynes, *The General Theory of Employment, Interest and Money*

The World Bank Group (Bank Group) blockchain lab was launched in June 2017, largely as a result of the actions of a small but dedicated group of volunteers who were interested in how blockchain technology could be used to solve the world's most difficult and intractable

development challenges. This article describes the evolution of the blockchain lab from an informal working group to a fully staffed technology and innovation unit comprising two labs: one for blockchain and a second for artificial intelligence (AI). It also highlights,

through the lens of the technology department, the challenges and opportunities of sparking the exploration and use of transformative technologies in a multi-lateral, established institution.

FROM CONCEPT TO COMMUNITY

In February 2017, the Bank Group had little formal experience in disruptive technologies like blockchain. A working group had been established by Bank Group operations staff a year earlier to

follow its development, but the group had no formal funding or mandate. The International Finance Corporation (IFC), the World Bank Group's private-sector arm, had explored the blockchain space at a conceptual level and issued a paper as part of its Emerging Markets Compass Thought Leadership series. Blockchain was also on the radar of the Bank Group's IT department as a technology trend that could have long-term implications for its infrastructure, but it was not an immediate priority.

ABOUT THE AUTHORS

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In short, the Bank Group's relationship with blockchain consisted mostly of informal discussions, research papers, and the occasional talk. This would soon change. What follows is the story of how the World Bank Group developed its own innovation lab to focus on disruptive technologies like blockchain and AI and located that lab in an unusual place: the technology department.

To understand the Bank Group's innovation journey, we must first understand its operating environment and the IT department that supports it. The World Bank Group comprises 15,000+ full-time staff members working in 170 countries around the globe. As part of its ambitious goals to end extreme poverty and boost shared prosperity, the Bank Group works with a broad variety of private- and public-sector partners, including but not limited to agriculture, education, energy, environment, finance, governance, and health. Not surprisingly, the complex work of the organization requires an equally complex IT infrastructure. This infrastructure, which was featured in a 2003 *Harvard Business Review* case study on systems transformation, is supported by a diverse group of staff located across roughly 110 countries.

In 2016 this group managed 29,200 computers, 25,800 smartphones and tablets, and 10,050 terabytes of storage, which gives a sense of its responsibilities. The role of the technology department was to enable the smooth, uninterrupted business activities of a variety of stakeholders, from executives in Washington, D.C., to operational staff working in remote regions of the world. With major offices in Washington and Chennai, India, the technology department was a center of technical and operational excellence; a successful implementer of large, complex ERP projects; and a source of cost efficiencies. But, it was not necessari-

ly a thought leader on emerging technologies.

In the spring of 2017, we were looking at how to manage the identities of the various types of individuals who are present in the Bank Group's ecosystem more effectively, including staff, visitors, contractors, consultants, vendors, donors, partners, and others. The identity and access management team was exploring options and scheduling show-and-tell sessions with external vendors when they started to see a pattern. A number of companies were suggesting the Bank Group explore blockchain—not just for identity management but for other use cases. In a series of intense sessions over the course of the spring, leading technology companies shared with that the Bank Group not just the technology's potential but how the technology department could demonstrate blockchain's potential by building prototype decentralized apps for World Bank Group use cases.

As the IT team began to explore, they realized that they were not alone in seeing the potential of blockchain. Though still little understood, the technology appeared to have applicability across use cases that could be applied to the Bank Group's work: supply chain, trade finance, payments, financial reconciliation, and more. They also realized they were not the only people in the room anymore. Others from different parts of the organization had begun to join them: the finance and markets Global Practice, World Bank Treasury, and the IFC. This eclectic mix did not necessarily know how to use the technology or who should take it forward, but they were interested in learning about the impact and application of disruptive technologies and needed a vehicle to pursue that learning.

It is worth noting that this was a rare moment. For decades, the World Bank Group's technology department has worked closely with the business on plan-

ning and implementing vetted, production-ready software and hardware: SAP, Oracle, PeopleSoft, Business Objects, Informatica, Windows. Although the department had a rapid-application development team, most IT projects were multiyear endeavors requiring careful, tested approaches that minimized risk and the potential for failure. But the Bank Group's blockchain moment was different because the technology was immature and evolving quickly. Because blockchain was not production ready and did not appear close to being so, the Bank Group had to look at what approach it would take in this new, untested area. More specifically, how would this new cohort of explorers from different parts of the institution come together to move the conversation forward?

LAUNCH AND DEVELOPMENT

As the spring of 2017 progressed, momentum began to accumulate around the creation of a formal blockchain lab. Interest became so intense that, on short notice in the last weeks of June, with the support of newly appointed World Bank Group chief information officer Denis Robitaille and technology adviser Yusuf Karacaoglu, a group of entrepreneurial staff took the bold step of creating a blockchain lab. The launch brought together a variety of groups working on digital transformation, both within and outside the Bank and IFC: Michael Casey of MIT's Media Lab, Perianne Boring of the Chamber of Digital Commerce, Yoshiyuki Yamamoto of UNOPS, Marina Niforos of Logos Global Advisors, Michael Pisa of the Center for Global Development, and Tomicah Tillemann of the New America Foundation. These thought leaders and industry participants expressed a variety of opinions on the readiness, risks, and opportunities of

blockchain, and their presence underscored the importance of the new lab, which was still a volunteer function but now had demonstrated buy-in and relevance.

The launch of the lab felt complicated to this set of pioneering volunteers, and their journey was just beginning. With requests arriving daily from within the World Bank Group, the team wondered how they would be able to respond with a part-time, volunteer workforce. Robitaille considered the options: If the lab remained a volunteer function, it remained a low-risk-enterprise. With blockchain not ready for enterprise adoption, the lab could safely function indefinitely with no impact on the technology department's core business. But the new CIO recognized the rareness of this moment: a group of interested and talented Bank Group operational staff, had turned to the technology department for leadership and guidance on the potential uses of a new technology for their developing-country clients. Seeing this opportunity, Robitaille decided that the blockchain lab could only deliver if it had full executive and organizational support.

Through the summer and early fall, the lab was focused on executing a triple challenge. First, it had to jump through the bureaucratic hoops required to start a new, fully staffed and budgeted function with a work program. Second, the lab was in the middle of coordinating closely with Aanchal Anand of the World Bank's Global Land and Geospatial Unit to develop its first proof of concept on land administration, including, first, the registration of a parcel, transfer of ownership, and notarization of a transaction. Lastly, the lab needed to continue to support its clients as it scaled up to include new team members, some of whom had no previous knowledge of blockchain and were just beginning to understand it.

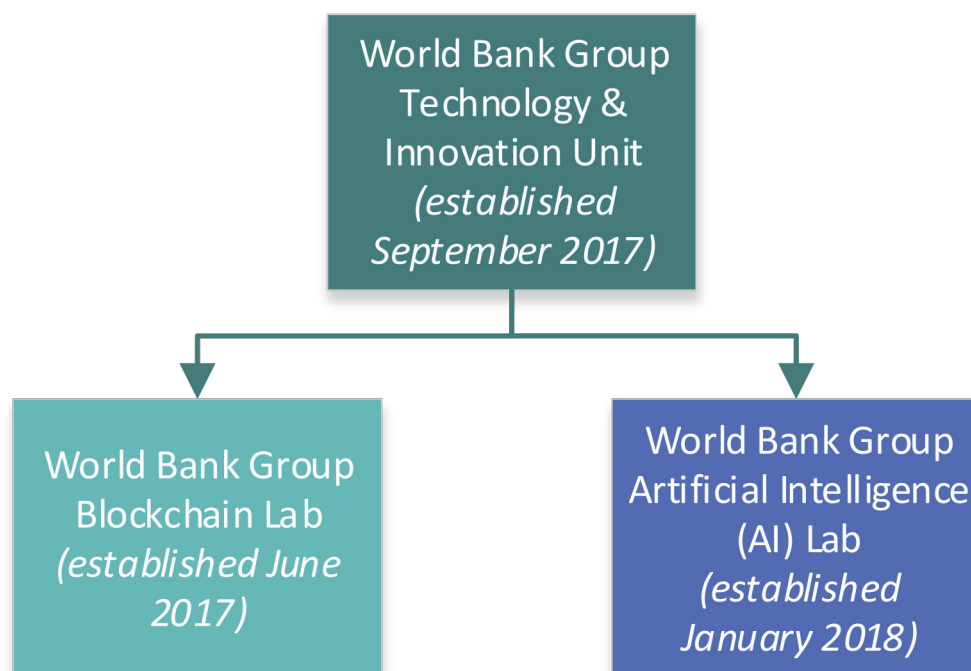


Figure 1. : Structure of the Technology and Innovation Unit

One of the biggest challenges during this time was learning fast enough. Team members described this period as “drinking from a fire hose.” Of the small group had joined the staff of the newly formed technology and innovation unit (now the home of the blockchain lab), only one or two had a good conceptual understanding of blockchain technology; the rest were starting from scratch. After a few weeks of “Blockchain 101,” reading all the foundational documents, the team ran a small experiment wherein a volunteer sat in a conference room and each member of the team took a turn privately explaining blockchain to him. After everyone had completed their turn, he told the group that each of them explained the concept very differently. This led the team to two conclusions. First, that everyone internalizes blockchain differently and that the unique combination of computer science, cryptography, and economics makes it

difficult to explain simply and consistently to others. Second, that reading about blockchain is no substitute for hands-on experiments and prototypes.

By September 2017, following many long weeks of sustained effort, the lab had reached its first milestone. It had become a fully staffed, dedicated unit in the World Bank Group technology department, and it had completed its first proof of concept: a land-management decentralized application leveraging Ethereum. The lab started sharing its understanding of the technology not just at a theoretical level but based on its hands-on experience with the technology itself. Although the experiment was small and not specific to any jurisdiction or region, it proved that the bet on a business-technology collaboration around disruptive technologies was viable. More than a technical experiment, it was a successful attempt to rethink the way the technology department could



Figure 2. World Bank Group Blockchain Lab Selected Partners and Community Members

support and enable the business. It also provided the land unit and the lab with a real communication tool they could use to discuss blockchain with the organization.

During this time, external media coverage of blockchain began to increase. Although blockchain and distributed-ledger technology had been in existence since 2009, following Satoshi Nakamoto's seminal paper of October 2008, it had largely remained off the front pages. But as the fall of 2017 progressed, organizations around the world—especially those in the financial sector—started discussing blockchain more openly and with increasing frequency. The lab harnessed this wave of interest by planning an aggressive events schedule at the Bank Group with market players such as Microsoft, IBM, Marco Santori, Everid, Evernym, Deloitte, Jill Carlson, Google, the Asia Foundation, Bitt, RedHat, the UN Alt Finance Lab, UNICEF, and others. The goal of these events was to create an

opportunity for staff across the institution to listen to external thought leaders on blockchain technology, and to provide an outlet for their interest and enthusiasm for learning. The events also spurred important questions, such as how these technologies will change the Bank Group's business model and the way it engages with client countries.

The thought leaders who attended the World Bank Group event came from a variety of perspectives: public, private, and academic. Robleh Ali represented MIT's Digital Currency Initiative and encouraged Bank Group staff "not to wait" to understand blockchain and its potential impact on financial systems and capital markets. Elizabeth Rossiello from BitPesa described the challenges and opportunities of leveraging cryptocurrencies to enable cross-border payments for businesses operating in Africa. As a woman working with blockchain, Elizabeth also put a different face on disruptive technologies, sparking discus-

sions around how it could become a more diverse and inclusive space. Alisa DiCaprio, who represented R3, discussed opportunities for a better approach to trade finance—typically a cumbersome, heavily intermediated, paper-heavy process—enabled by distributed ledger technology. Finally, Irving Wladawsky-Berger spoke about blockchain in the context of the digital economy while also highlighting the emergence of big data and AI and the critical importance of security and trust.

With these conversations came the need for new communities. The lab had planned a series of “streams,” or working groups, around specific cross-cutting topics: legal and policy, technology, security, and knowledge-sharing. Of these streams, the legality and policy community—jointly led by representatives from the IFC and World Bank legal departments—pursued their own conversations around how to understand this technology. They also began work on important legal and policy frameworks, such as a blockchain readiness assessment, to enable the adoption of the new technology. From the beginning it was clear that blockchain was not just the domain of technologists. At one of their earliest sessions, the legal and policy community held a standing-room-only discussion on managing know-your-customer compliance in a distributed ledger ecosystem. Through communities like this, the lab extended its reach and was able to support others’ creative, self-led learning and development. These communities also shed light on the many challenges of adopting blockchain, including data protection, privacy concerns, and consumer safeguards. The lab hopes to leverage the blockchain legal and policy community to enable high-level conversations on how policy, regulations, and laws can handle the new paradigm of decentralized computing.

One unexpected community that

developed over the course of the fall was a collaboration with the International Monetary Fund (IMF) innovation lab. Having recognized as early as August that both institutions could benefit from joining forces, this community of innovators, sector specialists, technologists, and operational staff began to work closely to develop knowledge around distributed ledger technology and blockchain. Not only did this save each group effort, but it deepened the nature of conversations around the potential impact on individuals, business models, and existing paradigms. Through this collaboration, both the Bank Group and the IMF accelerated their learning and knowledge. The collaboration also put a spotlight on the challenges of working closely with other organizations: trying to find a digital platform that worked across both firewalls, finding a better way to communicate than email, navigating a jumble of new acronyms (“I’m from ITS,” “I’m from MCM”), and getting lost in a maze of conference rooms across five different buildings. Practical challenges aside, this lab-to-lab connection has connected two worlds of people, thereby shining light on common interests, synergistic enthusiasm, and willingness to collapse traditional organizational boundaries.

Another fruitful experience was the lab’s engagement of the Bank Group technology staff. The lab used a combination of formal and informal methods to connect with this group, including seminars and coffee meetups in different buildings. One of the more interesting moments was the first “TechMuscle” debate, wherein the lab staff and community members debated a director in the technology department about the hype and the reality of blockchain. Although the technology department has constant debates over new technology, it is rare for one to take place in a public forum. The technology director took the position that blockchain

SPOTLIGHT ON WORLD BANK GROUP BLOCKCHAIN USE CASES

Supply Chain and Development (Lead: Prasanna Lal Das)

Easing the regulatory burden on small businesses can increase competitiveness and foster innovation. This use case leverages the example of “blockchain at the border,” using blockchain to track products (and associated suppliers) from their country of origin and across a border through the Global Value Chain and then using this data to make it easier for small firms to utilize preferential tariffs as applicable at the border. This use case will help develop practical tools for governments and the private sector to maximize the benefits of blockchain implementation, and help test whether blockchain can be a platform to simplify the regulatory environment for cross-border trade.

Health (Leads: Andreas Seiter, Dominic Haazen) The last mile of a pharmaceutical supply chain is a particular challenge in many developing countries, due to issues with coordination and the management of inventory and orders. This use case will explore how blockchain can help track incoming drug stock from when it arrives at a facility until it is sold or administered to a patient.

Cross-Border Payments and Financial Inclusion (Lead: Harish Natarajan)

This proof-of-concept will explore the potential of blockchain to enable recording details at each stage of a cross-border remittance and sharing details to interested stakeholders like correspondent banks and regulators. This is expected to contribute to reduce the cost of compliance for correspondent banks and remittance service providers. This proof-of-concept would be expanded to cover more specific use-cases like enabling payment flows in fragile, conflict and violence affected contexts and bringing further efficiencies to cross-border payment flows.

Carbon Markets (Lead: Eduardo Ferreira)

There are various challenges to establishing decentralized compliance market at the country level: difficulty ensuring that climate assets are not sold to multiple countries at the same time, and double-spending against a country's “National Determined Contributions” quota or being counted by multiple countries. The goal of this use case is to test blockchain's viability as a platform for carbon-market trading, with the goal of creating a cheaper, interoperable solution that resolves the double-spend problem of traditional carbon markets and interoperability between disperse markets and asset types.

was not a civilization-altering innovation but “better plumbing.” He also argued that trusted third parties will still be needed in a blockchain world and that smart contracts are unlikely to entirely replace traditional legal contracts, due to their complexity and nuance. This debate pro-

vided a much-needed outlet for the conversation the technology department was already having, albeit behind closed doors.

Toward the end of the fall, the lab had created many use cases for the World Bank Group to leverage blockchain tech-

nology in its development work with client countries: cross-border payments, carbon-markets trading, social-impact tokens, supply chain and traceability, and pharmaceutical inventory tracking, among others. It had worked closely with its partners in the World Bank Global Practices and the IFC to pursue ideas, struggle through bad ones, and revert to the drawing board multiple times. It also had connected with the Netherlands and Australia—countries leading on blockchain technology—to leverage their knowledge and accelerate learning. But as the lab was preparing to pursue a substantial use case on supply chain with its partners in the World Bank trade and competitiveness Global Practice, it recognized a key gap: a lack of methodology. Its exploration of blockchain thus far had been either vendor-led or organic in nature, but these weren't scalable.

To have greater impact, the lab then began a monthlong sprint to develop a methodology for exploring and proving disruptive technologies. This work included leveraging different resources: blockchain decision frameworks, innovation thought pieces, technical community discussions, and feedback from clients. The result was an approach that could be used not just for blockchain but for other technologies, such as AI. All use cases were mapped against the methodology, and we realized that, like blockchain in the marketplace, we had a few use cases at the stage of creating a minimal viable product, but many were still in the exploration phase. However, this was not necessarily problematic: although a use case might not be ready for a proof of concept, it was a useful vehicle to discuss the applicability of blockchain.

At the end of 2017, the lab staff made a realization that was echoed by advice from the Dutch Blockchain Coalition: collaborate or become irrelevant. Although the nature of typical IT projects

at the Bank Group was one of specialization and siloes, this did not work with blockchain. Siloed project teams would be unable to do anything interesting or meaningful by themselves. A networked approach with fluid leadership, little hierarchy, rapid demonstration of value, and as much diversity as possible seemed to yield the best results. Rather than the business specifying what was needed and telling the technology department (or vice versa), the two groups needed to think together about the issues, risks, and opportunities of the digital age. Several months later, the lab had made sufficient progress around key use cases to be able to demonstrate this new way of working. Several prototypes had been developed by the internal lab team and external technology partners, and strong communities of practice were growing around blockchain, distributed ledger technologies, and disruptive technologies in general.

LAUNCHING AN ARTIFICIAL INTELLIGENCE LAB

In January 2018, the World Bank Group technology and innovation unit began its next evolution in exploring disruptive technologies. Under the guidance of Denis Robitaille, the lab worked closely with the Office of the World Bank Group President to launch a new wing of the lab that focused on AI.

As was the case with blockchain, the AI lab was not the first to explore this technology at the Bank Group. By the time of the launch, the vice president of development economics, several World Bank Global Practices, and the technology department itself had been exploring machine learning. Importantly, the Bank Group finance and accounting, human resources, and World Bank Treasury teams had also been exploring AI in the context of robotic process automation

(RPA). These three groups had successfully demonstrated the value of using RPA to automate low-complexity processing tasks, such as those associated with managing World Bank loans to client countries. Finally, different teams at the Bank Group were also exploring text analytics. With decades of documents and records under institutional management, these teams were interested in exploring how text analytics could find patterns and yield insights.

With disparate groups focusing on AI, the question was what an AI lab would contribute. The answer was simple: A lab could be a broker and clearing house for information across the Bank Group and could also provide a safe space for experimenting with more complex business use cases that required dedicated exploratory capacity. The lab could help bring visibility across teams so they could share what they were doing. Although this seemed a simple mandate, the lab had learned that, internally, communication and coordination are among the most difficult challenges at an established, multinational organization. The AI lab could help streamline this communication and coordination by providing targeted, experience-based knowledge and thought leadership.

With the launch of the AI lab came new challenges. The first was a paradigm shift for the technology department. Traditional IT projects might focus on requirements, then product selection, then a limited pilot, followed by a production launch. Bank Group IT projects are heavily governed, closely monitored, and rarely fail. The lab realized almost immediately that this approach would not work with AI. The team would instead need to develop hypotheses, test them, and fail repeatedly for the sake of learning. They might find that their problem was not phrased correctly or that the technology was not ready, and go back to the drawing

board. Each successive iteration would bring greater insights, that could be discussed and applied to new experiments.

One of the earliest friction points between this new philosophy and the organization was in corporate procurement: How would the institution reconcile its time-honored approach to competitive vendor selection and careful engagement with supporting risky experiments that might fail immediately and never lead to a production-ready system? How would the Bank Group follow standard, resource-intensive processes while also trying to minimize cost and effort? How would market evaluation work for a space in which knowledge and understanding of the technology were still evolving? Working closely with corporate procurement, the lab team recognized that they would need to start thinking about a different framework for procuring innovation. This process would not be short; it would require creative thinking from both groups, and management's support.

Another challenge was meeting client demand and expectations. The AI lab discovered very early that there was a significant amount of interest from many parts of the organization in adopting AI in its various forms. AI was not following the typical Bank Group path of IT-led technology change followed by slow business adoption. Bank Group units were not only seeing the possibilities of AI in their daily work (e.g., using chatbots to schedule meetings and conduct research), they wanted to move to production as fast as possible.

Reflecting on this, a member of the AI lab said, "People see it and they want to use it." This enthusiasm was welcome, but it also portended the larger issue of how the technology department would be able to adapt its traditional model to deliver innovation more quickly. If customers did not want to wait 1-2 years for

a security accreditation, risk assessment, and a launch plan, how could the technology department change its approach?

Finally, as with blockchain, the AI lab realized that the technology does not fit within typical organizational boundaries. In its short time working on experiments, the team discovered that it is difficult to work with a technology like AI and limit oneself to technical questions. When the team saw the capability of bots to schedule meetings, they also started thinking about the future of jobs and work: With the impact of AI, what would the responsibilities of a World Bank Group administrative assistant look like in 20 years? How would we prepare for that future through re-skilling and personal development? How would our employment architecture and recruitment approach need to change to reflect the new focus on creative thinking and relationship development?

Although these questions might typically be asked by World Bank Group HR professionals, they now are also being asked by the technology department. Through this experience, the lab is seeing firsthand how transformative technologies like AI and blockchain are blurring organizational lines of responsibility, thereby reaffirming the need for different groups to work together to prepare for a very different future.

CONCLUSION: HORIZONS

As the World Bank Group technology and innovation unit reflects on its first nine months in existence, we cannot help but think about the future and our role in preparing Bank Group staff to embrace transformative technologies. A key question for the future will be how the unit can plug learning and innovation into the organization's fabric in terms of learning new skills, acquiring new knowledge, and working across boundaries.

The unit's success will reflect whether staff members—regardless of whether they are in the technology department or business operations—are able to use the resources provided to them to see future opportunities more clearly, and to have informed, high-level conversations about the impact transformative technologies have on their work. It will also reflect whether the team is able to translate its hands-on work with experiments in blockchain, AI, and other transformative technologies into meaningful learning and knowledge. Finally, it will show whether the Bank Group is able to provide each staff member with the opportunity to express their natural drive for innovation and creativity in the application of new technology to further the Bank Group's mission of reducing extreme poverty and boosting shared prosperity.

Looking ahead, the lab's next challenge will be to fully embed its work in the larger Bank Group disruptive technology agenda of establishing the foundational building blocks, expanding the capacity of institutions and people, and harnessing disruptive technology to solve development challenges and manage risks. Achieving this will require an entrepreneurial spirit—of both the technical and non-technical staff—that created the lab and helped it grow. It also will require stamina and commitment from the lab's partners across the institution, from the developers who built the first proofs of concept to the lawyers who began the important conversations around enabling regulatory environments, to the frontline staff in the Global Practices and IFC who are working every day to understand how to bring tomorrow's technology to bear on the world's most pressing challenges.