BBVA was a global financial group that established a data science center of excellence (CoE) in 2014 to co-create high-value analytics-based solutions with BBVA project teams; create innovative BBVA data science capabilities; and lead BBVA’s data-driven culture change. BBVA established the CoE as a wholly owned subsidiary called BBVA Data & Analytics, and by 2017, the CoE had taken several noteworthy actions, which included (1) launching more than forty data science projects for approximately one-third of the business units at BBVA; (2) commercializing a flagship data product for markets in Spain, Mexico, and Colombia; and (3) developing an active, BBVA-wide data science community of practice. The case illustrates exemplary CoE activities and describes lessons learned that can help managers accelerate the spread of data science and maximize financial returns from their own data science investments.
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BBVA FUELS DIGITAL TRANSFORMATION PROGRESS WITH A DATA SCIENCE CENTER OF EXCELLENCE

In 2018, companies were embarking on digital transformation journeys so they could thwart unconventional competitors, exploit exciting opportunities, and drive revenues in unique ways. CIOs recognized that data science—and being data driven—were required for such digital pursuits, and many were using centers of excellence (CoEs) to optimize their data investments and more quickly build contemporary enterprise capabilities.

Commonly, data science centers of excellence were centrally funded, positioned as a shared enterprise service, located within or alongside IT, and charged with creating data science innovations. The CIO challenge was how to execute the CoE so that it generated financial returns and influenced company culture. CIOs needed to understand: How can I prevent the CoE from being insular? How can the CoE encourage my company to become more data driven? How can the CoE quickly produce innovations that can be absorbed widely? How do I quantify the economic impact of data science activities?

BBVA was a global financial group that took a unique and highly effective CoE approach: in 2014, the company established a data science center of excellence as a separate legal entity and charged it with data science leadership. The center of excellence was physically and structurally separated from the bank, which helped the CoE nurture unique kinds of
talent, initiate innovative data monetization projects and partnerships, and balance short-term and long-term BBVA demands. The CoE activities influenced BBVA’s data culture and laid the groundwork for a BBVA Data Office, reporting to the CEO, which was put in place in late 2017 to recognize data as a core BBVA competency. In a June 2017 keynote address, BBVA CEO Carlos Torres remarked, “Data are the cornerstone for creating opportunities.”

BACKGROUND

Banco Bilbao Vizcaya Argentaria, S.A. (BBVA) was in 2018 a global financial group with €691 billion in total assets, headquartered in Madrid and operating in more than thirty countries. BBVA’s 132,000 employees served 72 million customers in the areas of asset management and retail, private, and wholesale banking. Over the preceding decade, BBVA leadership had invested heavily in digital transformation activities and had received accolades for its efforts, including nine Euromoney Awards for Excellence in 2016 and recognition from Forrester Research in 2017 for the best mobile banking app in the world and the best online service in Europe.

A key asset that fueled digital transformation progress was BBVA Data & Analytics (D&A), a data science center of excellence that was established by BBVA as a separate legal entity to generate value for the bank using data science. By the end of 2017, the CoE had taken the following noteworthy actions:

• Launched more than 40 data science projects for 27 business units, or approximately one-third of the business units at BBVA; 24 of these projects have already generated financial returns
• Developed a data science community of practice platform that connects 50 D&A data scientists with 300 data scientists embedded in BBVA business units
• Commercialized a flagship data product (Commerce360) for markets in Spain, Mexico, and Colombia
• Created a bank-wide data science development and learning platform, with outreach training of 250 BBVA employees
• Established a presence in academia (15 peer-reviewed publications, 2 awards received, and 2 awards nominations), in the media (136 references in the press), online (7,835 followers on social media), and onstage, all of which contribute to BBVA’s reputation
• Laid the groundwork for a BBVA Data Office, reporting to the CEO, which was put in place in late 2017 to recognize data as a core BBVA competency

The following case describes the story of the BBVA data science center of excellence and how the CoE evolved into an essential element of BBVA’s digital transformation journey.

THE ESTABLISHMENT OF BBVA DATA & ANALYTICS

In 2011, a small multidisciplinary team formed a BBVA innovation program to explore the opportunities to exploit financial big data. The group partnered with the MIT Senseable City Lab, the Spanish National Research Council, and an ecosystem of small and large organizations to conduct innovation experiments. In one case, the data scientists helped build an advanced analytics platform housing more than four million anonymized BBVA

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5 The nine Euromoney awards included best bank in Spain, best digital bank in North America, and best digital bank in Latin America.


8 In Spanish: Consejo Superior de Investigaciones Científicas, or CSIC.
credit card payment transactions. The platform was used to create visualizations of urban spending for city planners who created strategies to stimulate economic growth.

Inspired by such innovation successes, in February 2014 BBVA established a wholly owned subsidiary called BBVA Data & Analytics (D&A) to serve as BBVA’s data science center of excellence.

We built a center of excellence as a separate company for two reasons. Number one: because we wanted to attract people with a research attitude and an interest in development and technology. If that talent had come into the bank [like everyone else], they would have run the other way the next day because technology was a support function, not the core of the bank. So, we knew we needed to isolate a new way to treat talent. The second reason is that if the center of excellence were to sell non-financial products, [the center] needed to be separated from the bank for regulatory reasons. We decided to kill two birds with one stone and form a company.

MARCO BRESSAN, HEAD OF DATA AND OPEN INNOVATION, BBVA (FORMER)9

D&A was accountable for its own P&L, and D&A leadership ran the unit to earn profits from data monetization, which initially meant selling new products or services based on BBVA data (such as anonymous, aggregated payment data) in external markets. The subsidiary was set up to pay royalties to BBVA based on a formal revenue-sharing contractual arrangement.

To reinforce D&A’s autonomy, BBVA located the group in a building in Madrid separate from the bank, and the physical space was built out with contemporary features that inspired collaboration and innovation (e.g., movable furniture, glass wall whiteboards). The space was a key component of D&A’s talent strategy because its data scientists valued a “Silicon Valley”-like working environment that fostered shared responsibilities, analytical challenges, and flexible work arrangements.

Many of the data scientists who joined the new company came from academia or had taken part in one of the BBVA innovation experiments. Hiring each data scientist took three to six months. Both technologists and human resources specialists interviewed candidates to deeply assess soft and hard skills, and as many as ten D&A people participated in the interviews and had a say in the hiring decision. As a result, by the time candidates were onboarded they had a strong understanding of the D&A culture and work practices.

After data scientists joined D&A, Ana de Melo e Faro, the head of Human Resources, managed a homegrown program intended to develop and retain people. De Melo e Faro had created the program to nurture each D&A employee’s competence, autonomy, and feeling of belonging. A key part of the program was self-guided development whereby each data scientist identified training opportunities that built (1) generic skills in a competence or language; (2) specific skills of interest to the individual; and (3) rare skills afforded by extraordinary experiences, such as participating in an international event or working with a university professor.

Traditional organizations have a generic catalog of training, and employees have to adapt to what is offered. New training proposals are hard to get approved. I wanted to change that approach because it was not well suited to how we wanted to manage talent. These are profiles with different knowledge and interests, at different levels, and we firmly believe that they are the best suited to define and choose the training that will cover best their interests and needs. Also, we wanted them to feel responsible for their own growth and learning and to feel valued for the unique competencies and value that they are contributing to the company.

ANA DE MELO E FARO, HEAD OF HUMAN RESOURCES, BBVA D&A

9 Marco Bressan left BBVA in March 2017.
De Melo e Faro monitored the effectiveness of her program by meeting frequently with every D&A employee. Although this was time intensive, she believed that the open and continuous communication was critical for delivering on employees’ “emotional salary.”

D&A got positive results from its careful attention to talent management. From 2014 to 2017, the D&A group grew from six to fifty people, one-third of whom were female. D&A enjoyed a low annual rate of attrition: only six employees left D&A over those three years, and only one of those people left for motivational reasons.

As D&A grew, D&A leadership focused on three distinct value propositions (see exhibit 1): (1) D&A Inside, co-creating high-value solutions with BBVA project teams; (2) D&A Edge, creating new innovative BBVA data science capabilities; and (3) D&A Circle, leading BBVA’s data-driven culture change.

Exhibit 1: BBVA D&A Value Propositions


VALUE PROPOSITION ONE: CO-CREATING HIGH-VALUE SOLUTIONS WITH BBVA PROJECT TEAMS

Projects for External Markets

At first, one of D&A’s primary focuses was to sell new data-based products and services drawing on BBVA data to external markets. BBVA expected that D&A’s legal separation from the bank would help it more easily build new monetization capabilities in the areas of legal, tax management, ecosystem partnerships, and business development for non-financial products.

D&A leaders discovered that they could kick-start such capabilities by pursuing “social good” efforts. And the social good projects would not only help build new capabilities, but also attract new data science talent and help BBVA become recognized as a responsible business and trusted provider of analytics solutions.

We are constantly seeking a balance between innovation, new features based on data, and privacy, so [that] our solutions contribute to building trust, and not the contrary. Data for Social Good Projects are a good instance of this kind of application.

JUAN MURILLO, ANALYTICS DISSEMINATION MANAGER, BBVA DATA & ANALYTICS

For example, in 2015 and 2016 the BBVA D&A team collaborated with United Nations Global Pulse and with BBVA Bancomer, the main financial institution in Mexico, to investigate resilience against natural disasters. The team decided specifically to investigate economic activity associated with Hurricane Odile.
To achieve this, the team analyzed transactions from PoS systems and ATMs by more than 100,000 BBVA Bancomer clients, which represented approximately thirty percent of Mexican bank account holders, at a rate of 25,000 per day. The team built a model to estimate economic activity under normal conditions, and then compared the normal projections with what happened after Odile. Results of Odile’s impact over time and geographic areas (see exhibit 2), as well as how people’s reactions varied across socio-economic profiles, were presented in a scientific paper and communicated using interesting visualizations. Insights from the project were intended to help shape policies and programs for emergency response and reconstruction.

Exhibit 2: Visualization Example of Hurricane Odile Economic Recovery

![Visualization Example of Hurricane Odile Economic Recovery](https://www.bbvadata.com/odile/)


The Hurricane Odile project and other social good initiatives helped D&A build capabilities, such as geospatial data processing, time series analysis, and clustering techniques. These projects also inspired commercial offerings. In one case, D&A reused what they learned about analyzing anonymized bank payment data to develop a for-profit analysis for urban planners and municipalities that needed to understand the impact of their planning decisions, or how to grow or improve economic activity in cities. In another example, D&A reused the data platform by partnering with a start-up company, which helped them commercialize a payment data API called PayStats to which customers could purchase access.

D&A leaders learned that new markets were not always ready to exploit insights extracted from financial data. Initially, for example, D&A had to convince urban planners and municipalities that cities’ activities follow rhythms that could be understood with data. Previously, these markets typically viewed cities as having static, well-understood patterns of activities. Also, D&A—together with BBVA Research—had to build credibility by validating the

accuracy of its data, methodologies, and insights; it did this for urban planners and municipalities by establishing a high correlation ($r=.95$) between BBVA indices (the data they were using) and the INE Retail Trade Indices, Spain’s official retail indices.\(^{12}\)

**Projects for Internal Business Units**

Although D&A initially focused on—and enjoyed success with—social good and commercial projects, D&A’s data monetization strategy quickly broadened to include internal BBVA projects. D&A leaders encouraged the data scientists to work face-to-face with project teams located throughout the business to identify important problems to solve.

*It is extremely easy to work on something that is not the actual problem. Co-location and cross communication are super important for identifying the right problem—and to prioritize problems.*

JON ANDER BERACOECHEA, CO-CHIEF EXECUTIVE OFFICER, BBVA DATA & ANALYTICS

The data scientists, who initially assumed that BBVA already was capturing value from advanced data science, learned that the bank was only scratching the surface—and that by focusing on internal bank projects, D&A could generate tremendous returns for BBVA. As a result, projects were launched to improve core business processes. In one early project, D&A helped BBVA retail banking optimize the placement of bank branches, which resulted in €39 million in cost savings in 2015.

The improvement projects often led to new ways of working. For example, bank branch managers historically telephoned small- to medium-sized enterprise (SME) customers and promoted the “product of the month” suggested by a business intelligence report based on internal bank data and a set of simple business rules. D&A worked with BBVA Customer Analytics to build a dashboard that delivered individualized product recommendations to branch managers on demand. The new approach was able to offer tailored, accurate product recommendations by incorporating more data sources (e.g., external data about non-customers), more sophisticated analytics (e.g., peer comparison models), and more advanced techniques (e.g., machine learning). Branch managers who used the dashboard were twice as successful in closing sales when compared with those in control groups. In 2017, the dashboard helped branch managers find two thousand new SME clients and an estimated annual net incremental margin of €1.7 million.

The improvement projects often changed the way decisions were made. For example, in Customer Analytics, the digital marketing team formerly attributed customer acquisition success to the last click. The team recognized that this approach over-rewarded and under-rewarded certain click-points (e.g., the approach over-rewarded clicking on a webpage banner ad). However, more precise attribution would have required the team to evaluate every step along a customer journey, ranging from a customer completing a form to a phone solicitor or a digital agent making a direct offer. D&A helped the team apply data science techniques to appropriately attribute customer acquisition for several online products. In 2016, based on insights from this capability, BBVA reallocated four million euros in digital marketing investment from banner ads to other, lower-cost activities such as paid search. By 2018, BBVA was evaluating customer acquisition success using the full customer journey when making digital marketing investment decisions.

Improvement projects generated large financial value for BBVA; however, D&A leaders recognized that BBVA also had to become great at using analytics to enhance the customer value of core offerings, which was key for digital transformation efforts. The leaders supported projects that used analytics to create meaningful digital product features and customer experiences. In one case, D&A collaborated with the Digital Transformation business unit to create a personal finance tool that automatically categorized a customer’s transactions into certain common budgeting categories (e.g., rent, food, entertainment). The categorizer was launched to customers in March 2016

as a digital banking service website feature and promoted as a way to help customers manage their personal budgets. Machine learning was used to analyze text fields (where customers notated what a transfer represented); this approach increased the accuracy of categorization. By summer 2017, the categorizer had 1,000,000 unique monthly users in Spain, which represented about one-third of all users who connected monthly to the BBVA website; it was the most used web feature after transfers.

Similarly, D&A worked with BBVA to develop product features and customer experiences for its business customers. In some cases, BBVA business units decided to charge customers directly for the data science solutions (see exhibit 3 for the story of Commerce360).

Exhibit 3: Commerce360

Commerce360 was a web-based business intelligence service available to BBVA point of sale (POS) customers. The service drew on data collected, anonymized, and aggregated from BBVA bank card transactions and point of sale terminals. Customers could not trace transactions specific to an individual or business, but they could access insights and alerts that were created to inform their business performance. The Commerce360 project team identified system functionality by working directly with select SMEs in a pilot setting. After six months, the basic version of Commerce360 was offered at no charge to BBVA’s POS customers; seven months later, the application reached ten thousand SME activations. In Spain, Commerce360 users generated 25 percent higher margins than SMEs not using the application. In November 2017, BBVA released a premium version at a subscription price; this version allowed customers to customize the dashboard metrics and insights.

This Commerce360 screenshot is a view of the customizable dashboard. Users could download and arrange 116 different modules. The top right of the screen informed a user how data was aggregated and explained the statistics using common business language. A typical retail business would view this screen to learn:

- How much total revenue the business was generating versus the average in its business sector
- The business’s average transaction amount versus the aggregate average for businesses in its sector and neighborhood
- Cyclical patterns in the business sector and/or geographic zone by month, week, day of the week, or time of day
- Demographics common to the business’s customers and the customers of other businesses in the same sector and neighborhood
- The business’s repeat customers, and how many customers it had lost

The Economic Impact of Data Science

In 2015, former BBVA D&A CEO Elena Alfaro developed an economic impact framework to classify D&A projects according to their intended economic goals: increased revenues, lower costs, and other impacts. Each project was placed on the framework depending on how it created value—projects closest to revenue mainly increased sales or market size, projects closest to cost generated operational efficiencies, and projects closest to other impacts contributed to BBVA capabilities or credibility (see exhibit 4). The framework allowed D&A leaders to orchestrate a balance of project types and to ensure that the bank gained financially from its data projects.

Business units were accountable for measuring and achieving the appropriate kind of value for each project that they sponsored. Alfaro hired Pablo Gomez to serve as director of finance and operations. Gomez was responsible for managing D&A’s diverse project portfolio, and he helped the business unit leaders create appropriate measurement metrics and methodologies and validate results. In 2016, D&A tracked sixteen projects that drove new value (nine of them launched that same year); in 2017, the team put seventeen projects in place that would create value.

Exhibit 4: Value Framework

VALUE PROPOSITION TWO: CREATING NEW INNOVATIVE BBVA DATA SCIENCE CAPABILITIES

While D&A data scientists were working on projects, they spent half the week onsite, colocated with BBVA project teams, and the other half at the D&A offices. Being colocated allowed data scientists to learn about and explore real business problems; being in the office gave them time to build a community among their peers and to think innovatively. Every two weeks the entire D&A group convened to share wins and new lessons learned.

There was a constant tension between being in the office too little and too often.

When the business units need to have delivery in six months, they want our teams with them. Which is okay, but if we start spreading the teams among the rest of the teams in the bank, then they become the bank. So, we must have the power to say, these people have to sit for some time of the week with the rest of our team here—we need the analytic, the algorithmic knowledge to be shared.

ELENA ALFARO, HEAD OF CUSTOMER SOLUTIONS ANALYTICS & OPEN INNOVATION, BBVA
D&A leadership believed that active attention to colocation optimized the team’s impact on both short-term project outcomes and long-term innovations and capability building. Another lever that influenced the short-term and long-term balance was project funding. D&A data scientists were only partially funded by business units, which justified the scientists’ spending time on strategic, long-term endeavors. Additionally, D&A’s P&L goals dissuaded data scientists from embedding too deeply in the BBVA organization.

**BBVA Data and Analytics has a profit and loss account, and it has a profit. But our goal is not to grow that. We don’t have a goal of margin or amount of revenue. This is the difference between us and other companies that give data science services. When we end a project with the bank that means we can jump to another thing. If we were a consultant with a goal of margin, we would always try to stay on the projects so we could sell more.**

ELENA ALFARO, HEAD OF CUSTOMER SOLUTIONS ANALYTICS & OPEN INNOVATION, BBVA

The long-term innovations and capabilities developed by the data scientists ranged from technical platforms (e.g., a Hadoop-based data lake, data services based on Amazon Web Services) to machine learning algorithms. In 2016, D&A introduced into business units eleven new tools and thirty-four new data engines. The data engines were categorized according to how they were being applied so that D&A could more easily communicate their applications across BBVA (see exhibit 5). The categorization of practical examples helped D&A leaders explain to new business users exactly what machine learning offered.

**Exhibit 5: The D&A Data Engines Catalog**

<table>
<thead>
<tr>
<th>Classify</th>
<th>Compare</th>
<th>Detect</th>
<th>Optimize</th>
<th>Predict</th>
<th>Recommend</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transactions</td>
<td>Customers (individuals and businesses)</td>
<td>Card fraud with supervised &amp; deep learning</td>
<td>Prices for home insurance</td>
<td>Potential future expenses</td>
<td>Personalized pension plans</td>
<td>Customer propensity to purchase certain products</td>
</tr>
<tr>
<td>Texts</td>
<td>Transactional behaviors</td>
<td>Fraud in branches</td>
<td>Advertising budget</td>
<td>Customer sources of incomes and expenses</td>
<td>The next best product in Netcash</td>
<td>Credit scoring of businesses</td>
</tr>
<tr>
<td></td>
<td>Businesses with their competitors</td>
<td>Capital flight</td>
<td>Negative balances to warn customers</td>
<td>Negative balances to warn customers</td>
<td>Large businesses to customers</td>
<td>Non-customer scoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Money laundering</td>
<td>Online mortgage acquisition</td>
<td>Online mortgage acquisition</td>
<td>The most suited group of clients for a targeted campaign</td>
<td>Assess customer financial resiliency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Premium customers with low engagement</td>
<td></td>
<td></td>
<td>Products for small businesses</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customers with savings capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


The data scientists also built a development platform called Clarity that stored and documented code; it was specifically intended to allow them to scale the creation and consumption of customer knowledge from data. Clarity served as a platform for BBVA customer analytics, in the sense that data scientists could create, document, and

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13 BBVA defines a data engine as an analytic solution running in production.
publish models and algorithms that produced customer attributes and metrics. Data scientists also could explore data models, find solutions to problems already solved, and design datasets. Clarity included:

- 200+ customer attributes and metrics
- Automated computation of attributes and metrics
- Mechanisms for peer knowledge sharing

D&A also was intent on moving BBVA data from business unit silos onto enterprise platforms, an effort they called “data rainmaking.”

*Part of my job is to convince my [BBVA] colleagues that moving data [to a central platform] is more important than keeping it locked up. The organization has improved a lot in this regard. Nowadays pretty much everybody understands that sharing ends up being a key ingredient when developing new data products: a single unit usually does not have all the data it needs.*

**JON ANDER BERACOECHEA, CO-CHIEF EXECUTIVE OFFICER, BBVA DATA & ANALYTICS**

By 2017, D&A had helped unlock 34 new data subject areas by migrating 188 associated data tables to an enterprise platform based on Cloudera.\(^{14}\) Combined, the data tools and engines, Cloudera platform and Clarity resource represented a state-of-the art data science capability that could serve data science needs across all of BBVA.

**VALUE PROPOSITION THREE: LEADING BBVA DATA-DRIVEN CULTURE CHANGE**

**Data Science Training**

BBVA leadership appreciated that D&A’s projects and capabilities would not scale if the bank’s talent and culture were unable to absorb them. Thus, it set an aggressive goal to teach all of BBVA about data science. D&A created and executed a training strategy to accomplish this goal.

D&A first segmented BBVA employees by the level of data science knowledge required for their jobs. The majority of BBVA employees required only a baseline understanding of data science. For this segment, D&A leaders produced an event in January 2017—Brainstorm@BBVA—to unveil BBVA’s strategy to become a data-driven organization. At the event, attended by 18,000 in-person and online employees, the leaders showcased actual BBVA data science applications and their impact on digital sales, process automation, and customer engagement. The event highlighted how all BBVA employees needed to understand what was meant by data-driven transformation—and to become aware of concepts like artificial intelligence and big data. D&A also launched a series of small-group classes to build baseline understanding of data science technologies and their implications: “Machine Learning for Designers,” “Machine Learning for Executives,” and “How Algorithms Shape our World.” Initially, the classes were co-created and delivered to designers; but over time, the classes were delivered to the BBVA executive committee and to the BBVA board of directors.

Another segment of BBVA employees had strong analytical skills, but needed to learn about contemporary data science techniques and resources; some of these employees had been engaged in data mining\(^{15}\) for twenty years. BBVA D&A collaborated with BBVA’s training organization to design and deliver several programs to retool these kinds of workers.

One such program was a three hundred-hour project-based course called “From Data Mining to Data Science.” Employees with data mining skills applied to attend this immersive experience hosted at the BBVA Campus and BBVA D&A Madrid headquarters. During the program, students visited D&A for three to four months of part-

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\(^{14}\) Cloudera was a suite of cloud-based applications and services for machine learning and analytics platform. See https://www.cloudera.com/.

\(^{15}\) Traditional data mining activities did not use actual bank data, but instead were based on demographics, often purchased, and unlinked to BBVA products. Most data mining models were very basic, and the few advanced models were based on data that was limited by time or a subset of customer features, primarily because of high data costs. The models rarely addressed behavioral or attitudinal questions.
time coursework before returning to their business units to complete projects. D&A data scientists taught the course and also served as mentors for the course projects. Topics included:

- Infrastructure, data provisioning, and legal framework
- Statistics and analytical tools (e.g., R, Python)
- Analytical methods and models (e.g., machine learning, graph theory)
- Visualization tools (e.g., dashboards, GIS)

By the end of 2017, two hundred fifty students had completed this course, including four cohorts from Spain and two cohorts from Latin America. In July 2017, D&A established a virtual implementation of the course to reach data miners in other geographies—and discovered that the mentoring component was tough to scale in the virtual setting. Therefore, D&A created three project challenges from which virtual students would choose to pursue. By creating standard challenges, the mentors did not have to spend time understanding the problems that needed to be solved—and instead could focus on helping the students complete the challenges.

**Data Science Communities of Practice**

As students graduated from the courses, D&A offered two kinds of continued support. The first was a data science technology platform (described earlier) that provided no-cost access to data and tools they could use in their own data science projects. The second was a community of practice (CoP) platform. D&A set up and hosted communities of practice on common topics; for example, 300+ people participated in the CoP designated as “Machine Learning Technologies.” Community of practice activities included asynchronous knowledge sharing as well as community meet-ups. The meet-ups were held virtually each month, and there were annual in-person meet-ups to share technical best practices. The 2017 annual meet-up brought together 120 attendees from eleven countries to share advancements in areas like pricing optimization, churn models, and recommender systems. In July 2017, D&A established a global community manager role to oversee the CoP efforts.

**Data Science Culture Change**

BBVA and D&A leaders had aggressive digital transformation goals for BBVA, and they believed that the company had to become data driven in order to exploit digital opportunities.

_We believe the intelligence derived from data and algorithms can transform the banking industry, its relation with customers, and its role in the world._

FABIEN GIRARDIN, CO-CHIEF EXECUTIVE OFFICER, BBVA DATA & ANALYTICS

The leaders discovered that D&A’s activities were having important impact on the bank’s culture. As data science took hold and spread throughout BBVA, employee habits began to change (see exhibit 6). For example, project teams were more open to experimental approaches when solving problems.

_The BUs are becoming more open to AB testing. [In the past, they saw that] they are losing customers because they have to dedicate some of them to the test. Sometimes they have very short-term goals, which is understandable, but this [was] sometimes a problem. But the way they [now] approach a project has changed._

ELENA ALFARO, HEAD OF CUSTOMER SOLUTIONS ANALYTICS & OPEN INNOVATION, BBVA

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16 Fabien Girardin developed these core values and beliefs that connects D&A with BBVA’s digital transformation, May 2016, on the BBVA website, [https://www.bbva.com](https://www.bbva.com).
### Exhibit 6: Key CoE-Inspired Changes

<table>
<thead>
<tr>
<th>CHANGE AREA</th>
<th>BEFORE</th>
<th>AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-value customer definition</td>
<td>Based on salary</td>
<td>Based on association</td>
</tr>
<tr>
<td>AB testing</td>
<td>Not used</td>
<td>Used, and analysts willing to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>subject customers to testing</td>
</tr>
<tr>
<td>Scoring approach</td>
<td>Risk governed</td>
<td>Commercially driven</td>
</tr>
<tr>
<td>Data use</td>
<td>Internal data only</td>
<td>Both internal and external data</td>
</tr>
<tr>
<td>Risk modeling</td>
<td>Static models based on internal</td>
<td>Models using a wider variety of</td>
</tr>
<tr>
<td></td>
<td>data, using consensus-based conservative</td>
<td>variables and data sources</td>
</tr>
<tr>
<td></td>
<td>process for change</td>
<td></td>
</tr>
<tr>
<td>Risk assessment</td>
<td>Based on a single customer</td>
<td>Based on a customer’s network of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>activities</td>
</tr>
<tr>
<td>Product recommendations</td>
<td>Based on internal data, with offer extended</td>
<td>Based on internal and external data, with</td>
</tr>
<tr>
<td></td>
<td>to all current customers</td>
<td>offers tailored for specific</td>
</tr>
<tr>
<td></td>
<td></td>
<td>customers and non-customers</td>
</tr>
<tr>
<td>Digital marketing</td>
<td>Last click attribution</td>
<td>Customer journey attribution</td>
</tr>
<tr>
<td>Pricing</td>
<td>Generic pricing, based on simple rules</td>
<td>Personalized pricing, based on</td>
</tr>
<tr>
<td></td>
<td></td>
<td>price sensitivity and informed by</td>
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<tr>
<td></td>
<td></td>
<td>historical claims</td>
</tr>
</tbody>
</table>

The Customer Analytics business unit redefined high-value customers, moving away from scrutinizing how much someone earned and instead considering associations that reflected a high-value lifestyle, such as relationships with certain schools, clubs, or retail outlets. Analysts began to score customers and businesses differently.

*The [scoring] process changed from being risk governed to being commercially driven. Commercial information is a much fresher information source than risk information, so using commercial information allows us to re-score businesses faster, which results in reduced default risk.*

**JORDI NIN, SENIOR DATA SCIENTIST, BBVA DATA & ANALYTICS**

D&A institutionalized these and other habits by working closely with key areas of the bank. The first key relationships were with BBVA technology groups.

*From the start [of the center of excellence], we built the threads back to rest of the organization. One of the first organizational linkages we had to BBVA Data and Analytics was the link with [Engineering] because, at the end of the day, if we wanted to build access to data, build data tools, and build all that is required for the center of excellence to work, we had to set up a close partnership with Engineering.*

**ELENA ALFARO, HEAD OF CUSTOMER SOLUTIONS ANALYTICS & OPEN INNOVATION, BBVA**

In 2017, BBVA introduced a data organization into its formal organizational structure (see exhibit 7) to recognize data as a core competency for the bank.
Exhibit 7: BBVA Organization Chart

The BBVA organizational structure was intended to support two fundamental goals: (1) boost BBVA franchise short-term and medium-term results, and (2) build critical competencies and global talent that contribute to long-term, sustainable competitive advantage. Led by David Puente, Data was established to promote the strategic use of data in all the areas and businesses of the BBVA Group.


The head of Data, David Puente Vicente, reported to the CEO and was included on BBVA's Global Leadership Team. Puente was charged with promoting the strategic use of data in all the areas and businesses of BBVA, and he was responsible for BBVA's global data strategy, data governance model, data democratization, and data communities of practice. As of late 2017, D&A reported to Puente and his team and was expected to scale existing D&A efforts even further across BBVA by building advanced analytics capabilities in additional business areas. Moving forward, D&A leaders planned to organize by programs, which would be co-created with business units and set up to achieve economic impact.

Principles and Practices for CIOs

When companies set up data science centers of excellence, they rarely drive the level of economic and cultural impact that has occurred at BBVA. We believe that there are six striking moves that BBVA made that CIOs should consider to accelerate their own digital transformations using CoEs:

- Consider legally separating your center of excellence if your company has aggressive goals to innovate and change in unique or dramatic ways. BBVA aspired to fundamentally change its business model as it digitally...
transformed; leaders wanted to pursue new revenue streams, establish new ecosystem partners, and engage with customers in new ways. By establishing an autonomous CoE, BBVA was able to more quickly break tradition, create innovative capabilities, and pursue interesting opportunities. Leaders were careful, however, to maintain close ties and coordination with the CoE; in this way, the bank could continuously learn and grow from the CoE activities while the CoE learned about the practical needs of the bank.

- **Use funding, physical space, and performance goals as key levers to balance CoE time between executing short-term projects and building long-term innovative capabilities.** BBVA leaders used a variety of managerial levers to help the company balance investment returns and innovation. For one, business units and the CoE co-funded projects so that the business unit would be incentivized to produce financial returns, while the CoE would be motivated to innovate and reapply lessons and techniques. CoE data scientists split their time (and colocated) based on the funding breakdown. And BBVA established performance metrics for the center of excellence that encouraged both financial gains and innovative activities.

- **Invest in social good projects to attract talent, inspire innovation, develop new capabilities, build credibility, and establish new ecosystem partnerships.** BBVA discovered that there is a lot of good that results from using data science for social good. The altruistic projects not only attracted willing, interesting partners that may not have engaged in commercial ventures (e.g., governments, non-profits), but they also attracted top data science talent. In fact, the social good projects became an effective hiring channel for the center of excellence. Participating in social good projects contributed positively to BBVA’s reputation in the data science space, and BBVA was able to transition quite a few innovations—such as data sets, platforms, and techniques—from social good projects into BBVA capabilities and commercial offerings.

- **Formally measure—and communicate—the economic value that data science projects generate.** From the outset, the BBVA CoE set financial goals for each of its data science projects, appreciating that projects create economic value in different ways. The CoE created a formal framework to help its leaders optimize the project portfolio, and hired a person with strong financial acumen to help measure, capture, and validate returns in a consistent, credible manner. Through these activities, BBVA gained great clarity regarding the value of the CoE as well as its progress and impact over time.

- **Teach everyone in your company about data science, but not at the same depth, nor in the same way.** BBVA leaders believed that data science was foundational for digital transformation and that all employees needed to understand what it was. In most cases, employees simply needed buzzwords like “big data” and “artificial intelligence” to be defined and placed into BBVA context so that they could understand why and how data science mattered to their practice. In other cases, employees needed to understand the benefits that contemporary data science approaches and techniques offered—and how to upskill efficiently. Ultimately, BBVA established a common data science language so that everyone across the company could communicate about data science in meaningful ways.

- **Compensate data scientists with a high emotional salary, created using activities like customized training, contemporary workspaces, heavy communication, and challenging problems.** BBVA learned that data scientists value an emotional salary. Instead of attracting and retaining new talent through purely financial incentives, the company created benefits that contributed to each data scientist’s competence, autonomy, and sense of belonging. Data scientists valued a range of non-financial benefits, including sharing responsibilities, learning opportunities, flexible work environment features, and challenging, important projects. The head of HR listened intently to data scientists’ needs and evolved HR benefits as new ideas arose, such as a “bring your pet to work” day or work anniversary celebrations.
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