

BUSINESS PROBLEM-SOLVING CASE

Did Information Systems Cause Deutsche Bank to Stumble?

Deutsche Bank AG, founded in 1870, is one of the world's top financial companies, with 2,790 branches in 70 countries. It offers a range of financial products and services, including retail and commercial banking, foreign exchange, and services for mergers and acquisitions. The bank provides products for mortgages, consumer finance, credit cards, life insurance, and corporate pension plans; financing for international trade; and customized wealth management services for wealthy private clients. Deutsche Bank is also the largest bank in Germany, with 1,845 retail branch locations, and plays a central role in German economic life. In many ways, Deutsche Bank is the embodiment of the global financial system.

Deutsche Bank has the world's largest portfolio of derivatives, valued at about \$46 trillion. A financial derivative is a contract between two or more parties whose value is dependent upon or derived from one or more underlying assets, such as stocks, bonds, commodities, currencies, and interest rates. Although Deutsche Bank had survived the 2008 banking crisis, which was partly triggered by flawed derivatives, it is now struggling with seismic changes in the banking industry, including recent regulatory change. The bank was forced to pay \$7.2 billion to resolve U.S. regulator complaints about its sale of toxic mortgage securities that contributed to the 2008 financial crisis.

In addition, the Commodity Futures Trading Commission (CFTC) charged that Deutsche Bank submitted incomplete and untimely credit default swap data, failed to properly supervise employees responsible for swap data reporting, and lacked an adequate business continuity and disaster recovery plan. (A credit default swap is a type of credit insurance contract in which an insurer promises to compensate an insured party [such as a bank] for losses incurred when a debtor [such as a corporation] defaults on a debt and that can be purchased or sold by either party on the financial market. Credit default swaps are very complex financial instruments.)

The CFTC complained that on April 16, 2016, Deutsche Bank's swap data reporting system experienced a system outage that prevented Deutsche Bank from reporting any swap data for multiple asset classes for approximately five days. Deutsche Bank's subsequent efforts to end the system outage repeatedly exacerbated existing reporting problems and led to the discovery and creation of new reporting problems.

For example, Deutsche Bank's swap data reported before and after the system outage revealed persistent problems with the integrity of certain data fields, including numerous invalid legal entity identifiers. (A legal entity identifier [LEI] is an identification code to uniquely identify all legal entities that are parties to financial transactions.) The CFTC complaint alleged that a number of these reporting problems persist today, affecting market data that is made available to the public as well as data that is used by the CFTC to evaluate systemic risk throughout the swaps markets. The CFTC complaint also alleged that Deutsche Bank's system outage and subsequent reporting problems occurred in part because Deutsche Bank failed to have an adequate business continuity and disaster recovery plan and other appropriate supervisory systems in place.

In addition to incurring high costs associated with coping with regulators and paying fines, Deutsche Bank was a very unwieldy and expensive bank to operate. U.S. regulators have identified Deutsche Bank's antiquated technology as one reason why the bank was not always able to provide the correct information for running its business properly and responding to regulators. Poor information systems may have even contributed to the 2008 financial crisis. Banks often had trouble untangling the complex financial products they had bought and sold to determine their underlying value.

Banks, including Deutsche Bank, are intensive users of information technology, and they rely on technology to spot misconduct. If Deutsche Bank was such an important player in the German and world financial systems, why were its systems not up to the job?

It turns out that Deutsche Bank, like other leading global financial companies, had undergone decades of mergers and expansion. When these banks merged or acquired other financial companies, they often did not make the requisite (and often far-reaching) changes to integrate their information systems with those of their acquisitions. The effort and costs required for this integration, including coordination across many management teams, were too great. So the banks left many old systems in place to handle the workload for each of their businesses. This created what experts call "spaghetti balls" of overlapping and often incompatible technology platforms and software programs. These antiquated legacy systems were designed to handle large numbers of transactions and sums of money,

but they were not well suited to managing large bank operations. They often did not allow information to be shared easily among departments or provide senior management with a coherent overview of bank operations.

Deutsche Bank had more than 100 different booking systems for trades in London alone and no common set of codes for identifying clients in each of these systems. Each of these systems might use a different number or code for identifying the same client, so it would be extremely difficult or impossible to show how the same client was treated in all of these systems. Individual teams and traders each had their own incompatible platforms. The bank had employed a deliberate strategy of pitting teams against each other to spur them on, but this further encouraged the use of different systems because competing traders and teams were reluctant to share their data. Yet the bank ultimately had to reconcile the data from these disparate systems, often by hand, before trades could be processed and recorded.

This situation has made it very difficult for banks to undertake ambitious technology projects for the systems that they need today or to comply with regulatory requirements. U.S. regulators criticized Deutsche Bank for its inability to provide essential information because of its antiquated technology. Regulators are demanding that financial institutions improve the way they manage risk. The banks are under pressure to make their aging computer systems comply, but the IT infrastructures at many traditional financial institutions are failing to keep up with these regulatory pressures as well as changing consumer expectations. Deutsche Bank and its peers must also adapt to new innovative technology competitors such as Apple that are muscling into banking services.

In July 2015, John Cryan became Deutsche Bank's CEO. He has been trying to reduce costs and improve efficiency, laying off thousands of employees. He is focusing on overhauling Deutsche Bank's fragmented, antiquated information systems, which are a major impediment to controlling costs and finding new sources of profit and growth. Cryan noted that the bank's cost base was swollen by poor and ineffective business processes, inadequate technology, and too many tasks being handled manually. He has called for standardizing the bank's systems and procedures, eliminating legacy software, standardizing and enhancing data, and improving reporting.

Cryan appointed technology specialist Kim Hammonds as chief operating officer to oversee reengineering the bank's information systems and operations. Hammonds had been Deutsche Bank's global chief information officer and before that chief information officer at Boeing. Hammonds observed that Deutsche Bank's information systems operated by trial and error,

as if her former employer Boeing launched aircraft into the sky, watched them crash, and then tried to learn from the mistakes.

In February 2015, Deutsche Bank announced a 10-year, multibillion-dollar deal with Hewlett-Packard (HP) to standardize and simplify its IT infrastructure, reduce costs, and create a more modern and agile technology platform for launching new products and services. Deutsche Bank is migrating to a cloud computing infrastructure where it would run its information systems in HP's remote computer centers. HP will provide computing services, hosting, and storage. Deutsche Bank will still be in charge of application development and information security technologies, which it considers as proprietary and crucial for competitive differentiation.

Deutsche Bank is withdrawing from high-risk client relationships, improving its control framework, and automating manual reconciliations. To modernize its IT infrastructure, the bank will reduce the number of its individual operating systems that control the way a computer works from 45 to four, replace scores of outdated computers, and replace antiquated software applications. Thousands of applications and functions will be shifted from Deutsche Bank's mainframes to HP cloud computing services. Automating manual processes will promote efficiency and better control. These improvements are expected to reduce "run the bank" costs by 800 million euros. Eliminating 6,000 contractors will create total savings of 1 billion euros. Deutsche Bank has also opened four technology centers to work with financial technology startups. In March 2017, the bank opened a new center in New York to work with financial technology startups to improve its technology.

Deutsche Bank is not the only major bank to be hampered by system problems. IT shortcomings were one reason Banco Santander's U.S. unit in 2016 failed the U.S. Federal Reserve's annual "stress tests," which gauge how big banks would fare in a new financial crisis. According to Peter Roe, research director with TechMarketView LLP in the United Kingdom, banks now spend about 75 percent of their IT budgets on maintaining existing systems and operations and only 25 percent on innovation.

A 2015 Accenture consultants report found that only 6 percent of board of director members and 3 percent of CEOs at the world's largest banks had professional technology experience. Financial technology innovations, security, IT resilience, and technology implications of regulatory changes are now all critical issues for bank boards of directors, but many lack the knowledge to assess these issues and make informed decisions about strategy, investment, and how best to allocate technology resources.

All professional sports teams today collect detailed data on player and team performance, fan behavior, and sales and increasingly use these data to drive decisions about every aspect of the business—marketing, ticketing, player evaluation, and TV and digital media deals. This includes the National Football League (NFL), which is increasingly turning to data to improve how its players and teams perform and how fans experience the game.

Since 2014 the NFL has been capturing player movement data on the field by putting nickel-sized radio frequency identification (RFID) tags beneath players' shoulder pads to track every move they make. The information the sensors gather is used by NFL teams to improve their training and strategy, by commentators on live game broadcasts, and by fans attending games or using the NFL app on the Xbox One.

The NFL's player tracking system is based on the Zebra Sports Solution developed by Zebra Technologies, a Chicago-based firm specializing in tracking technology that includes the bar codes on groceries and other consumer goods and RFID technology. The Zebra Sports Solution system records players' speed, direction, location on the field, how far they ran on a play, and how long they were sprinting, jogging, or walking. The system can also determine what formation a team was in and how players' speed or acceleration impacts their on-field performance. Want to know how hard Eli Manning is throwing passes or the force with which a ball arrives in the hands of receiver Odell Beckham? The system knows how to do all that.

NFL players have an RFID chip in their left and right shoulder pads that transmit data to 20 radio receivers strategically located in the lower and upper levels of stadiums to collect data about how each player moves, using metrics such as velocity, speed in miles per hour, and distance traveled. From there the data are transmitted to an on-site server computer, where Zebra's software matches an RFID tag to the correct player or official. The football also has a sensor transmitting location data. The data are generated in real time as the game is being played. Each sensor transmits its location about 25 times per player.

It takes just two seconds for data to be received by the motion sensors, analyzed, and pushed out to remote cloud computers run by Amazon Web Services for the NFL. From the NFL cloud computers, the data are shared with fans, broadcasters, and NFL teams. Once the data are stored by the NFL, Microsoft gathers and displays the data to fans using NFL.com, the NFL's social media outlet, and the NFL app on Windows 10 and the Xbox One. The data are also transmitted to the giant display screens in the arena to show fans during the game.

The data have multiple uses. NFL teams use them to evaluate player and team performance and to analyze tactics, such as whether it might be better to press forward or to punt in a particular fourth-down situation. Data transmitted to broadcasters, to stadium screens, to the NFL website, and to the NextGen Stats feature of Microsoft's Xbox One NFL app help create a deeper fan experience that gets fans more involved in the game.

While the data may be entertaining for fans, they could prove strategic for the teams. Data markers for each play are recorded, including type of offense, type of defense, whether there was a huddle, all movement during the play, and the yard line where the ball was stopped. The NFL runs custom-created analytics to deliver visualizations of the data to each team within 24 hours of the game via a custom-built web portal. The system displays charts and graphs as well as tabular data to let teams have more insight. Each NFL team may also hire its own data analyst to wring even more value from the data.

Zebra sees other potential uses for the data. For example, more analytics could identify when a player's performance is likely to flag late in the game and how to improve training to prevent such fatigue. Coaches could use that information to decide whether to pull out a certain receiver during the fourth quarter or to rely on that player less in a critical moment. Even now the data are giving NFL fans, teams, coaches, and players a deeper look into the game they love.

Sources: Brian McDonough, "How the NFL's Data Operation Tracks Every Move on the Field," *Information Management*, December 7, 2016; www.zebra.com, accessed March 15, 2017; Mark J. Burns, "Zebra Technologies, NFL Revamp Partnership for Third Season," *SportTechie*, September 6, 2016; and "Zebra Tracking Technology May Change How NFL Fans See the Game and Teams Play It," *MarketWatch*, September 15, 2015.