Chapter 67

Data Science and Big Data Analytics in Financial Services:
A Case Study

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ABSTRACT

The chapter discusses how Financial Services organizations can take advantage of Big Data analysis for disruptive innovation through examination of a case study in the financial services industry. Popular tools for Big Data Analysis are discussed and the challenges of big data are explored as well as how these challenges can be met. The work of Hayes-Roth in Valued Information at the Right Time (VIRT) and how it applies to the case study is examined. Boyd's model of Observe, Orient, Decide, and Act (OODA) is explained in relation to disruptive innovation in financial services. Future trends in big data analysis in the financial services domain are explored.

INTRODUCTION

For reasons of confidentiality Company X is the name we chose to represent an independent technology and managed service cloud-based provider of online trading and liquidity aggregation systems to the foreign exchange (FX) market.

Company X has delivered the only known multi-sided trading network for foreign exchange. The platform aims to enable participants across the FX market to configure and operate their own automated, unique, private FX business. Company X's On Demand cloud-based solutions aims to provide financial institutions with operational efficiencies and the ability to flexibly enter new markets quickly and to scale efficiently without owning and operating any IT infrastructure of their own.

In this chapter we use Company X as a real case study to explore how Big Data analytics provide innovation in the financial services industry. Company X, in collaboration with PhD interns from a US university research center, created a Data Science team of engineers to analyze Big Data and provide innovative services to the FX market. The team's vision is to provide Analytics-as-a-Service built on a Platform-as-a-Service. The development of Analysis services and tools is in progress.

This chapter will draw from the work of Hayes-Roth (Hayes-Roth, 2004). His work on "Valued Information at the Right Time" (VIRT) provided a basis for Company X's Data Science service offerings to the financial services industry. VIRT is used by the US Department of Defense and IT organizations such as Oracle (Hayes-Roth, 2004).

The driving force behind Company X's Data Science initiative is a belief that there is no OODA cycle available in the FX market today. OODA refers to the decision cycle of *observe, orient, decide, and act*. It was developed by Boyd, a military strategist, who applied the concept to the combat operations process, often at the strategic level in military operations. It is now also often applied to help understand commercial operations and learning processes (Michel, 2006).

The case study aims to explore the challenges and breakthroughs met by Company X, confirm a set of critical success factors and offer a learning opportunity for other organizations that are embarking on or are in the midst of a similar endeavor.

BACKGROUND

Foreign exchange markets generate large volumes of data. Some of the information hidden within these interactions could be valuable to market participants. In the past there were limitations on accessing some of this data. In recent years analytics technology has developed to the point where companies are able to extract insights from such data.

Financial organizations may need to use streaming analytics (which operate in real time) in conjunction with historical data from conventional business intelligence systems if they are to improve retention and identify potential clients, both retail and institutional. This integration allows for customer profiling, not just to personalize offers but to achieve more optimal timing. In foreign exchange markets, where an institution wants to check thousands of transactions per second, streaming analytics can enable it to narrow the focus and monitor the success rate in quoting foreign exchange prices to potential customers.

Historical analysis can reveal a particular customer's usual transaction size, timing and individual price point relative to a median in the market. Dynamic pricing that ensures a profit on a specific transaction at a specific time, while meeting the customer's likely requirements based on their profile, requires the use of real-time analysis.

The use of streamed real-time data is becoming increasingly common. In the development and marketing of foreign exchange products, the typical foundational capabilities we might see include predictive customer intelligence and big-data analytics, coupled with enterprise marketing management.

Banks already have large quantities of real-time data that they analyze for very specific needs as dictated by their current analytical capabilities, which have been designed to allow the users to carry out broadly predetermined analyses.

Deutsche Bank for example uses a big-data application called FiREapps to aggregate, validate and analyze underlying exposure data from corporate customers. Its FX trade execution services customers

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