

Data Center Management Executive Summary

Problem

What they were doing: The CEO and founders of a major internet information services company (the Company) believed that they could increase their shareholder value substantially with an improved strategy for upgrading their data center capabilities as new technology became available. The CEO charged the Director of Data Center Operations (the Director) with creating a new strategy, beginning with a single data center. His top manager/analyst (the Analyst) spent several months creating an Excel spreadsheet model valuing four different strategic options.

Problems encountered and what it was costing them: The Analyst recognized that there were many future uncertainties that would impact the strategy, but had known that it would take him several months just to put together a spreadsheet that assumed no uncertainty and upgrade decisions at fixed three-year intervals. The decision criterion, while reflecting the specific interests of the Information Technology group, was ad-hoc and acknowledged to lack the foundation and alignment with corporate goals desired by a major technology leader.

Solution

What they did with us: The Director asked Provisdom to work with the Analyst, and the Analyst asked Provisdom to begin by building a model to replicate the spreadsheet results as validation of the Provisdom Decision Platform. After being given a brief description of the problem and model, Provisdom implemented the logical structure of the spreadsheet; however the numbers did not match. The transparency of the platform made it easy to compare various values at different points in the models, and quickly narrow down the possible sources of disagreement. After a day of wading through an opaque spreadsheet, Provisdom had identified numerous inconsistencies and errors in the spreadsheet. The spreadsheet was reviewed with the Analyst over a 45 minute meeting. Then Provisdom spent the next two days creating an accurate model, seeking to directly maximize shareholder value and include all the major factors like revenue effects and greater decision flexibility.

Time required: 3 days + 3 hours of the Analyst's time

Results: Fixing the spreadsheet errors resulted in changes to the Analyst's determination of the NPV of between \$119M and \$172M for the four fixed seven-year strategies. By exploring the entire range of upgrade choices, modeling the salvage value of the platforms, and comparing strategies by their shareholder value, a minimum-cost strategy was discovered that showed a vast improvement over the Analyst's best strategy and convinced him that it was critical to build a more accurate model that included the possibility that data demand could exceed capacity. The new model included the relevant information and uncertainty regarding demand, revenue, tax, and depreciation.

Using the accurate model clearly showed that the analyst's new strategy was actually at least \$150M more valuable than the other three strategies he tested and the minimum-cost strategy. The accurate model also found an optimal strategy conditioned on the data demand that increased the shareholder value by an additional \$460M. Additionally, the optimal strategy would reduce the average electricity

usage by 23% and prevent an average of 66K metric tons of carbon dioxide emissions while still meeting 100% of the data demand even in extreme cases.

The model represented a single datacenter holding approximately 18% of the servers. If this model incorporated all of the Company's most relevant information, and the Company applied the strategy to every datacenter, we'd expect to see an instantaneous gain in shareholder value of over \$2.8B.

From the optimal strategy, however, it became apparent that the option to build new data centers to meet demand should be considered. Including this option into the model could have a major impact on the upgrading strategy. An improved model would model not just a single data center, but all the current data centers and the option to build new ones.