The Transformation Of AT&T's Enterprise Network Systems Group To Avaya: Enabling The Virtual Corporation Through Reengineering And Enterprise Resource Planning

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ABSTRACT

This case discusses the management and control of a large enterprise-wide implementation of an ERP system while the business model and corporate culture were shaping and being shaped by that implementation. In 1995, the Enterprise Networks Systems business unit of AT&T faced a triad of problems caused by its legacy IT infrastructure, including the lack of timely, accurate financial and operating data, looming Y2K issues and systems capacity issues that were beginning to limit growth. A business plan for change was developed and approved. A project team was assembled to replace 25 years of legacy systems architecture (400+ systems) with a new enterprise systems architecture. The team was to act as change agent by supplanting a myriad of business processes and people practices that were seen as impediments to future growth and profitability. This case describes the design, development and deployment of one of the largest ERP implementations. The project required the implementation of standardized business processes and people practices for 30,000+ associates globally while minimizing the impacts on 1.3 million customers and on shareholders. Simultaneously, upper management set out on a strategy of creating a virtual business by outsourcing major business functions, including IT, Manufacturing and Distribution, and major parts of the sales and service operations. Other major events included the spin-offs of Lucent Technologies and Avaya.

Keywords: Enterprise Resource Planning, Reengineering, Virtual Business, Telecommunications

1. CASE SUMMARY

The Enterprise Network Systems business unit[8] of AT&T had been through several reincarnations since its inception in 1983. Layers of IT systems technologies had been created over the years to support various business structures and strategies as the communications industry evolved from a regulated monopoly structure to a competitive structure, and as the underlying technology evolved from analog voice to digital voice to integrated voice-data applications. By 1995, the layers of functionally oriented IT systems, which tied the vertically integrated, traditionally managed functional structure of the business together, were a barrier to the future growth of the business and formed a cost floor with a breakeven point that was too high. The advent of new technologies and new types of supplier firms could enable the business to focus on those parts of the value chain for which it had a comparative advantage, such as R&D, marketing, and sales and service.

In 1995, AT&T set up the reengineering team to replace the legacy IT infrastructure with a new ERP-enabled one. In 1996, Lucent Technologies spun-off from AT&T. It announced the outsourcing of information technologies to IBM Global Services, "including management of mainframe data centers, much of its systems applications maintenance, and provide support for its desktop systems worldwide." (Lucent 1996) This first step of outsourcing key functions set the pattern for the future of the integrated vertical structure. i.e., business functions that were not competitive would be outsourced to firms that were considered at the top of their respective industries.

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[8] We use the name Enterprise Networks Systems as the business unit precursor to Avaya.

The next target Lucent Technologies considered was the channel structure of Enterprise Networks Systems. Enterprise Networks Systems marketed its products through both direct and indirect (dealers and distributors) channels. Approximately 90% of the business was conducted through the direct channel with dealers providing complementary market coverage. The U.S. direct channel was divided into two major divisions: one focused on selling to small business and one selling to large businesses.

On April 2, 2000, the small business division spun off to Expanets, Inc., a partner entity of NorthWestern Corporation (Hersch 2000). By the mid-1990s, technological change had reduced the size of the physical product produced and competition had reduced the amount of product required from Enterprise Networks Systems manufacturing operations. This left the business unit with an aging manufacturing infrastructure and excess capacity. On February 20, 2000, it announced a deal to outsource manufacturing to Celestica, Inc. (Celestica 2001)

In October 2000, Avaya spun from Lucent Technologies. Avaya continued to evaluate various functions and outsourced parts or all of real estate management, procurement, and much of the remainder of information systems. By October 2001, this left Avaya as a virtual company with the key business functions of R&D, marketing , services, large company sales, channel management, and contract management of the outsourced functions. The glue that now held Avaya together were contracts, an integrated enterprise resource planning system, and the integrating functionality of the World Wide Web.

2. THE GOAL OF THE PROJECT

In 1995, AT&T's Enterprise Network Systems set out to replace 25 years of U.S. IT infrastructure consisting of layers of legacy mainframe systems and a spaghetti of manufacturing, distribution, sales, services and marketing applications that supported the vertically integrated business. A small team, which included IT and several business leaders, created a business case and received approval by business unit executives in 4Q1995. The business case included the selection of an enterprise resource planning (ERP) system from SAP AG, a major supplier of ERP solutions. The approved business case set forth the following goal: A team was to transform Enterprise Networks Systems by replacing 25 years of U.S. business processes, people practices, and enabling systems technologies. They were to replace it with an end-to-end, customer-focused value chain that delivers products and services on time and at least cost. The delivery of those goods and services was to be based on internal and external customer requirements. The project was to achieve cost savings of at least $125M per year. The project was to begin in January 1996 and to be completed by September 1999. Finally, the project was required to minimize the disruption of the business units operations.

The business case did not include the business unit's international operations, certain aspects of the business unit's services operations, or systems supporting the R&D community.

The project begun in January 1996 was concluded in September 2001. Over that period, the project had three leaders: 1) Ron Joaquim for Phase 1 from January 1996 to August 1999; 2) Jim Flinton for Phase 2 from August 1999 to August 2000; and 3) John Stevenson from August 2000 to September 2001.

3. STRATEGY AND TACTICS

In 1995, Enterprise Network Systems was comprised of 35,000+ (SEC 2000, 2001) employees in 90 countries. It sold products and services to a customer base of 1.3 million customers with 90% of them in the U.S. Employees were located at more than 600 sites in the U.S. Enterprise Network Systems derived 80% of its revenue from U.S. operations. It manufactured and repaired products at three major facilities in the U.S., manufactured them at three sites outside of the U.S., and repaired them at multiple locations globally.

In January 1996, Ron Joaquim was named Vice President, Reengineering, to lead the reengineering effort. He assembled a small planning team to develop a strategy. The team included managers from the key business functions, including sales, service, manufacturing, market management, finance, and human resources. The business chose Price Waterhouse Coopers (PWC) as the consultant. PWC facilitated the design of the strategy, provided the initial design methodology and led the initial design effort. The team built the reengineering strategy constructed on a series of principles. The most important principle and the only principle not violated was "One customer, one system." This founding principle drove the strategy. At its highest level the strategy was to convert the products, and distribution and manufacturing infrastructure on a customer segment basis (small, large, multinational, and international customers) and then to convert sales and services teams and the customer base associated with each segment.

4. BUILDING BLOCKS OF CHANGE

During 1996, Ron and the strategy planning leaders established team objectives, assembled teams, built requirements, developed an applications architecture roadmap, and developed a realization process to configure and deploy SAP and the associated architecture. In addition, Ron and the team leaders worked with each of the business leaders to gain the necessary functional business support.

4.1 Team Objectives
The existing business processes, people practices and legacy systems architecture were generating results that were unacceptable to internal operations, customers and

shareholders. For example, integrated operations and financial data did not exist. Only partial operations data were available on a real time basis in manufacturing, distribution, sales and services. The financial information that these operational results drove were not available until the end of the third week after the beginning of the next month. Operational effect and financial consequence were separated from each other for the business unit and for the corporate parent. Therefore, financial book close was manual, slow and fraught with potential errors. The book close process consisted of the reconciliation of data across multiple financial and operational systems. In addition, 25% of large customer make-to-order shipments were being shipped incompletely or late. Of the most complex communications orders and all international orders, none shipped on time or completely.

An additional inefficiency was the use of a late 1970's vintage product configurator. The configurator was accurate approximately 60% of the time. The sales team used this to configure products for technical assurance and to price configurations for customer quotes and orders. The root causes of these inaccuracies were incorrect and untimely modifications to the configurator during product realization updates and introductions and dual material coding structures. The marketing and sales team (and therefore customers) used one coding language; and the R&D, manufacturing, distribution and services team, a different language. This lack of common product and service languages meant the creation of a multitude of code translation tables. The result was that orders seldom reflected what the customer ordered, what the factory manufactured, what services installed or what the customer was billed. Finally, when a customer called into a service center for help, the inconsistency in the coding language meant that customer and the customer service agent frequently spoke two different languages about which products were on the customer's premise and which ones were causing the problem.

From these, and many other problems, the team developed objectives. These included improving the quality and accuracy of the quote to cash process, reducing the time to configure and process orders, eliminating order rework in sales manufacturing, distribution and installation, reducing book close time, reducing billing errors, improving accounts receivable collections, reducing IT costs, reducing services installation time, improving on-time, accurate shipping performance. Figure 1 provides the targeted enhancements, by stage of the value chain.

The senior leaders assembled teams of key knowledge workers from the functional organizations based on their knowledge of the business, on their ability to translate business requirements into technical requirements, on their acceptability to the business community, and their willingness to create change. The business teams were accountable for developing the future state business processes and people practices, converting the requirements into technical specifications, configuring and

testing the SAP software, and deploying the new business processes, people practices and enabling technologies to their respect business constituencies.
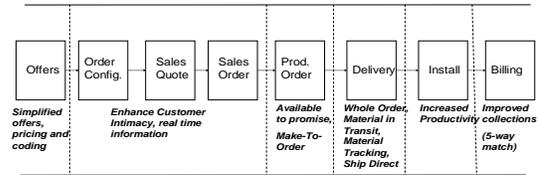

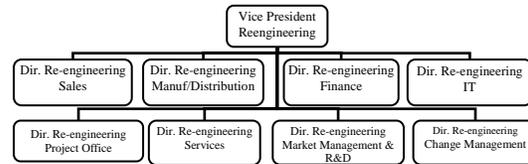**Figure 1: Targeted Enhancements**

Figure 2: Reengineering Team Organization Chart: 1996-1999

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In parallel to the business team, the Information Technologies (IT) team leader assembled a team to support the business teams, provided the initial, transitional, and final state technical architecture, as well as led the design, development, testing and deployment of the interfaces necessary to enable the transformation and for decommissioning the legacy systems.

The leader of the project office acted as the Chief Operations Officer for the project. The project office set project management standards including those for the standardized realization process and for results reporting, developed and coordinated the planning and project management of each release of process, people practice and systems functionality, and managed the integrated meeting process. Each team managed its own timeline

within the context of the overall release schedule. A set of daily, weekly, and biweekly team and across teams meetings served to integrate and maintain control over the project.

4.3 Realization Process

A standard realization process was established (Figure 3). Each of the teams developed a set of business requirements from their respective business functions. The requirements teams then developed an integrated value chain by working backwards from the customers through the value chain to insure that internal inputs and outputs corresponded across functions. This integrated value chain formed the basis for configuring SAP and the applications architecture[9].
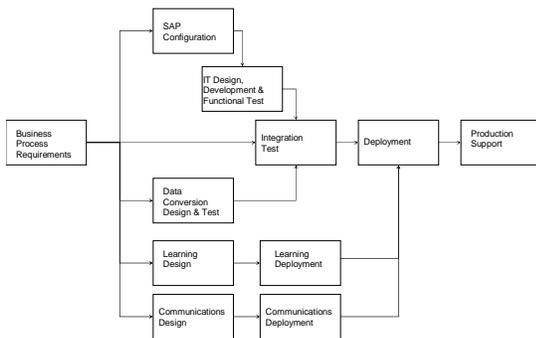

Figure 3: Integrated Release Process

4.4 Transformation Of The Core

The core business was transformed in three releases. In release one, Enterprise Network Systems sales operations to small and midsized companies were converted. The business unit serviced over 1.2 million customers in the U.S. (including Alaska and Hawaii). The team chose to change out this portion of the business first to improve customer satisfaction and profit margins, as well as to test and improve the systems realization and change management processes. The large size of the task required the conversion of the sales teams and customers in waves by region. The data conversion team converted customer data from the legacy system to SAP[10]. Then, the change management team worked with the sales channel to insure that they could service customers in SAP before moving to the next customer set. The conversion cycle time was from 2 – 4 months, depending upon: the number of sales locations, the size and complexity of the customer base, and sales team readiness and willingness for conversion to the new processes, people practices and SAP technologies.

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[9] This approach did allow the team to get "buy-in" for the design; unfortunately, it also leads down the path to mass customization of the software.

[10] The data conversion process was recognized as "best practice" by SAP due to the detailed step-by-step planning and implementation process built by the data conversion team

End to end cycle time for this phase of the project was 16 months.

In the third year of the project, the team was required to modify the structure of SAP and the project (release two) to accommodate changes required by Lucent Technologies, when it decided to run the business as a holding company[11]. The existing systems infrastructure made this decision difficult to implement and manage and in late 1997, Lucent Technologies decided to adopt SAP for its ERP system. The planned architecture included an umbrella of corporate functions into which the business units were simply "plugged in". This plug and play architecture was to provide the capability to acquire (buy) and divest (sell) companies as required by the strategies and tactics of the business. Headquarters and functional teams from each business unit developed requirements for finance (Francesco 1998), treasury, procurement, and data standards common functions. Critical planning included splitting common business functions between headquarters and business units, i.e., which business functions were going to be executed in the business units and which functions were to be accomplished within Lucent Technologies headquarters or both. Additionally, a new data coding structure was developed to insure that there was a minimum of data structures within Lucent.

The team integrated a front-end technical product configurator by Trilogy, Inc. with SAP and designed a realization process by which prices, technical rules and product codes were loaded simultaneously in both the new architecture and the legacy architecture. The combination of these factors, i.e., the new configurator, new pricing, coding and configurator change management process, and integration between the Trilogy based configurator and SAP, dramatically improved the timeliness and quality of the quote to cash process. The systems design, development and deployment cycle time for Release 2 of the ERP functionality was 12 months.

In the late 1980s, Enterprise Network Systems had converted its large customer, PBX[12] manufacturing operations to a make-to-order operation based on a fixed manufacturing interval. A series of functional systems, which required manual intervention in order to insure order quality and timeliness, supported the order process from the field sales teams to the Denver manufacturing operation and delivery of the order to the customer site. Release 3 converted these operations to SAP. This required plugging SAP into the existing order flow process and unplugging the existing manufacturing and distribution systems.

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[11] It acquired some 38 companies between 1996 and 2001.

[12] Private Branch Exchanges (PBX) are voice switches that larger businesses require for managing voice traffic within a location and to outside communications networks.

In preparation for the conversion of the Denver Works manufacturing and distribution functions to SAP new manufacturing processes were designed to provide for flexible order intervals based on customer requirements. A second major step was the conversion of the current coding structure to the SAP bill of materials structure. The team chose to flash cut the conversion over a three-day weekend. When the flash cut to the new manufacturing processes, people practices and SAP occurred, the project team was assigned to supplement the operators and the line management to work out problems with the cut. The change management team supported the operations team through a 60-day operations change process and in parallel worked with the manufacturing management team through a 90-day period. This allowed the team to work out bugs in the manufacturing and distribution processes and then to streamline the management reporting processes enabled by SAP. In the end, shipping performance improved from 75% on time and accurate to well over 90%. Order rework before, during and after manufacturing was dramatically reduced since manual intervention were eliminated. The team completed the end-to-end realization project in 14 months.

4.5 Business Transformation

As 1999 progressed, the pressure to grow revenues was increasing as well as the growth of competing business requirements for e-enabled business capabilities A group was set up to e-enable the business. To fund the group, the reengineering teams and legacy IT teams were merged and the savings gained from combining the two teams was used to fund the new e-team. In September 1999, Jim Flinton was named as CIO to lead the next phase of the project. As one of the first steps, he restructured the team to achieve these goals. The reengineering teams and legacy systems IT teams were merged and reconfigured and became accountable for the simultaneous design, development, configuring, testing, data conversion and deployment of multiple releases (Figure 4). In addition, each team was now accountable for decommissioning of the associated legacy infrastructure. With the integration and the reduction in budget, the structure of the team was modified 1) to reduce cost, 2) to improve speed and 3) to increase the accountability of the team to the business for producing smaller and more frequent deliverables.

On April 2, 2000, Lucent Technology announced that it was spinning off its Enterprise Networks Systems business unit and a portion of the Networks Systems wire division. The new Avaya chairman, Donald Peterson requested an estimate of the costs that would be need to complete the deployment of SAP and decommissioning of the legacy architecture by October 1, 2000, the date the new business was to go live. The team faced a difficult problem since SAP was now "middleware" in a legacy systems architecture and the team was under pressure to continue to manage its cost structure. The re-configured team developed a plan to complete the implementation of the new SAP infrastructure by July 2001. Jim Flinton and the

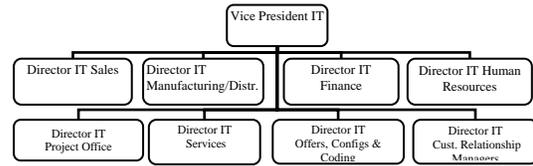team divided the plan into two stages: Create Avaya and complete the ERP.

Figure 4: IT Applications Team Organization Chart: 2000 – 2001

4.6 Creating Avaya

Avaya required the creation of corporate headquarters functions including finance, treasury, human resources, procurement, legal, information technologies and public relations. These functions existed at Lucent Technologies with satellite functions within each business unit. The team's new focus was on conversion and deployment of existing functionality, and less on creation of new business processes and people practices. The joint business unit and Lucent Technologies headquarters team converted finance, treasury and procurement functionality from a Lucent Technologies version of SAP to an Avaya version of SAP. A separate HR IT team converted human resources functionality in PeopleSoft to SAPHR. The plan included the completion of outsourcing of manufacturing to Celestica (Lucent 2000). The end-to-end realization project was completed in 6 months, with the exception of HR, which required two releases of functionality over 14 months.

The new headquarters functionality provided the same "plug and play" functionality for the new business unit as for Lucent Technologies. Into this new functionality, the business integrated both the Enterprise Networks Systems and the Connectivity Solutions business units into SAP. This presented a problem from a business-reengineering standpoint. The team had installed Enterprise Networks Systems functionality on SAP V3.1i of software (which at this point looked like middleware rather than an ERP system) and had proposed SAP V4.2b for the international conversion and for human resources functionality. The team decided to convert Connectivity Solutions to SAP V4.2b and set up a standalone version of the business processes, people practices and enabling software and hardware. The team completed the end-to-end realization project in 6 months going live prior to October 1, 2001. The new corporation came into existence on October 1, 2000.

4.7 Completing the ERP

The end game consisted of converting the U.S. large customer sales and service force and associated customers to SAP, converting the International sales and service force and International customers, as well as multinational customers, and decommissioning the legacy architecture.

As part of the transition from Lucent Technologies to Avaya, Inc., a new IT organization had to be created to manage those functions previously managed by Lucent Technologies headquarters functions, including voice and data networks, server and mainframe data centers, and desktop and laptop access to the new applications. Jim Flinton began that transition and handed off both the reengineering project and the new IT functions to a newly named CIO, John Stevenson.

As the spin-off from Lucent Technologies was completed in October 2000, the team focused on completing the conversion of the large customer base and indirect channel customers. This entailed conversion of back office operations, sales teams and customer records. In addition, it required the conversion of the offer configurators to the new Trilogy configurators. The lessons learned during the previous releases were applied and the speed of the conversion to SAP was reduced (Avaya 2001).

The original business case did not include conversion of non-U.S. operations to SAP, but by 2000, Avaya conducted 20% of its business outside of the U.S. in approximately 90 countries, with approximately a 60/40 percentage split between direct and indirect channels. The largest share of this business was conducted in Europe and the Middle East with the remainder in Asia and the Americas (outside of the U.S.). In addition, it had a series of joint ventures in Brazil, India, Mexico and Australia. The international business grew by fits and starts beginning in the early 1990's. Each country and region had developed local solutions in country for handling finance, ordering, customer care, and international specific capabilities for customs and duties. These local solutions were loosely tied to the U.S. systems. Large customer orders were configured manually or through a standalone, Trilogy based configurator and then sent to Denver for manufacture and shipment.

It was clear that the international business needed to be converted. In order to meet the timeframes required by Avaya, a separate standalone team was used to configure SAP V4.2b and deploy it to each country. In addition, Deloitte and Touche was chosen as the consultant for the conversion. Data was converted from a myriad of systems ranging from desktop PC applications to server-based databases to paper based accounting ledgers. The design, development and deployment began in spring 2000 and were completed in August 2002, or approximately 16 months.

The legacy infrastructure remained virtually intact throughout the conversion to the SAP-enabled architecture. Some minor systems and a few major manufacturing systems were decommissioned over the period 1996 to 2000, but most of the legacy architecture was still in place. Only when all U.S. and International customers had been converted, the small business sold off, and manufacturing outsourced was Avaya able to decommission the legacy structure.

The planning for the conversion began in the fall of 2000 when a team consisting of representatives from each group supporting the legacy infrastructure and IBM Global Services (who actually maintained and supported the systems) was assembled. The team was given the charge to decommission the applications and retire or redeploy hardware. For the most part the systems were contained on older NCR servers, AT&T 3B servers or IBM mainframes. None of which could be reused. The software was decommissioned by the end of September 2001.

In July 2001, the economy was in the second year of a recession. IT costs had dropped dramatically from over 9% of revenues to under 4.5%. Revenue forecasts in the spring 2001 were not encouraging as buying from the IT industry slowed globally. John Stevenson and the IT leadership team knew that the combined Legacy, SAP, reengineering and IBM global services teams were more than was required to manage the new hardware and software infrastructure. In addition, the team was still comprised of business managers (from the original reengineering team) and IT professionals. The future team needed to be comprised of IT professionals and a small group of business/IT managers to interface with the functional leadership for purposes of managing future business requirements for IT functionality.

As part of an overall Avaya program, John and the IT leadership team adopted a number of retirement, force reduction and career management programs. Career development programs were developed for the IT professionals, and the plans implemented. One of the paths opened up for the IT professional occurred when Avaya and IBM expanded their outsourcing relationship to include management of the new SAP infrastructure. A large part of the team moved to IBM Global Services under that outsourcing arrangement.

And the project was completed.

5. CONCULSIONS

The project that began in the 4th quarter of 1995 ended in August 2001, two years overdue and at an additional cost of more than $175 million. At a minimum, it did achieve its goal of saving $125 million a year. The project replaced 25 years of business processes, people practices and legacy systems and applications. It improved Quote to Cash speed and reduced cycle time from 3 in 4 customer orders configured, ordered, shipped, installed and billed accurately on time to 19 out of 20. Order processing speed was reduced to minutes from days. At least $20 million in annual order rework was eliminated. Offer realization time was reduced.

The project team achieved end-to-end data visibility. This alone enabled real time and fast end of period book close (from more than 8 days down to a few days) and provided real time financial results based on operational effect versus pre-conversion book close data which was delivered

three weeks after the end of the month. In addition, managers at all level of the enterprise had access to operational data and customer visibility for the first time.

The new architecture was structured around a few primary vendor products, including SAP, Trilogy, and Seibel There were now standard global business processes and global people processes. The technological structure could be upgraded as the business strategy evolved.

There were some unintended consequences. As the firm spun off from Lucent Technologies, it became clear that the infrastructure of mainframe and server data centers, desktop and laptop PCs, hotline support, and applications support was unnecessarily too high (approximately 9+% of revenue in 1999) and the new applications structure required a far simpler IT infrastructure and resulted in lower IT costs. In addition, the new architecture enabled the construction of an e-customer, e-supplier, and e-associate based backbone and provided a modular business model to support future acquisitions or divestitures and to in-source or outsource business functions as required by the needs of the business. Finally, the streamlining of the infrastructure eliminated the internal handoffs and quality checks required of a functionally based process and systems architecture. This final step has provided the basis by which Avaya's breakeven point has been reduced to $1.075 billion (Avaya 2003).

Among the lessons learned were:

1) The "One customer, One system" principle required that both the Legacy and the ERP architectures remain in place until the last customers were converted to SAP, thus prolonging the cost and complexity of the reengineering effort.
2) Focus on data integrity and control of changes during the customer conversion were keys to successful conversion.
3) Who ever has the knowledge of the problem has the lead regardless of level in the organization.
4) The initial business team structure and resulting business requirements caused the initial projects to require mass customization and slowed the project down.
5) Only the CEO can enforce a "no customization" rule.
6) The project was only completed when the integrated IT team used off-the-shelf software and functionality.
7) The real world waits for no team. Expect major changes to the business model and expect to have to include them in the project.

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