



November 2009

Document **J84**

ROI CASE STUDY PERFORCE CARDINAL HEALTH

THE BOTTOM LINE

By deploying Perforce, Cardinal Health was able to improve the productivity of developers, project managers, and testers.

ROI: 1,100%

Payback: 2 months

Average annual benefit: \$2,512,744

THE COMPANY

Cardinal Health distributes pharmaceuticals and medical products. The company's pharmaceutical segment has as customers retail, hospital, mail-order, and long-term care pharmacies. In addition to providing pharmaceuticals, this segment also provides comprehensive financial, inventory, contract management, and marketing services that help our customers reduce costs, improve efficiency, and increase profitability. The company's medical segment manufactures and distributes medical products from more than 2,000 manufacturers to hospitals, surgery centers, laboratories, and physician offices throughout the United States and Canada. This segment also provides its customers integrated supply chain and logistics services.

THE CHALLENGE

In late 2004, Cardinal identified some challenges in the processes and workflows that it relied on to create the software embedded in its medical devices:

- **Compliance.** Because Cardinal's medical devices were used in the diagnosis and treatment of medical conditions, the devices and supporting software had to be FDA-compliant. Software development processes also had to be compliant, requiring audit trails for all changes to software in installed devices.
- **Complexity.** The code embedded in Cardinal's devices was proprietarily developed, involved up to 300 developers, and included large volumes of code in branches which had to be merged prior to testing and production. Compounding this complexity was a relatively high number of hot fixes, upgrades, and patches for each device annually.
- **Delays.** Because of complexity in both the developed code and the processes that created that code, the company often encountered bugs that lengthened project cycle times.

Cardinal's software configuration management team was responsible for tracking, controlling, and auditing changes in Cardinal's software as well as managing a large

TOPICSApplication Development
& Integration

Security & Compliance

number of configurations so that the software would be compatible with all the platforms it supported. The team had been using a combination of off-the-shelf and homegrown applications. However, the team was unable to rapidly produce rebuilds and had difficulty merging branches of code from different developers or teams, which contributed to challenges in the development environment.

THE STRATEGY

Cardinal looked at a number of version control applications, including Microsoft Visual Studio Team System, and selected Perforce for a number of reasons:

- **Cost.** With Perforce, Cardinal was able to reduce costs by focusing on version control, rather than a suite of tools or a broader more costly range of features and functionality.
- **Functionality.** Cardinal believed that Perforce would be able to perform the required functions in version labeling, code branching, and documenting of audit trails.
- **Usability.** In experimenting with the application, Cardinal's director of software configuration management found the application to be very easy to use, which would accelerate adoption, broaden adoption, and reduce training costs.

Perforce was deployed by three Cardinal employees over a 3-month period. Changes were made to software development and quality control practices so that they would be enhanced by the better version control, version labeling, and branching in Perforce. The development environment was then partitioned into 20 product silos so that code, best practices, and versions could be compartmentalized. A server was then selected, purchased, and configured in order to ensure the high levels of security required for FDA compliance. Prior to the May 2005 go-live date, three members of Cardinal's software configuration management team attended formal Perforce training, so that they could then train both super users and other users.

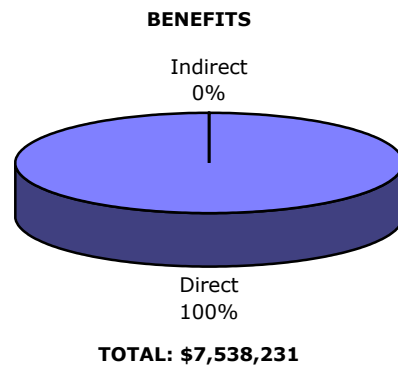
Following the go-live date, the population of Perforce users grew significantly. Within weeks of the deployment, an acquisition added 110 users who were already proficient in the application. Additionally, a total of 145 new seats were purchased to broaden use of the application. Both additions to the user population made the usage of Perforce more uniform across the development environment.

KEY BENEFIT AREAS

Moving to Perforce has enabled Cardinal to improve productivity for developers, project managers, and testers. Key benefits from the solution include:

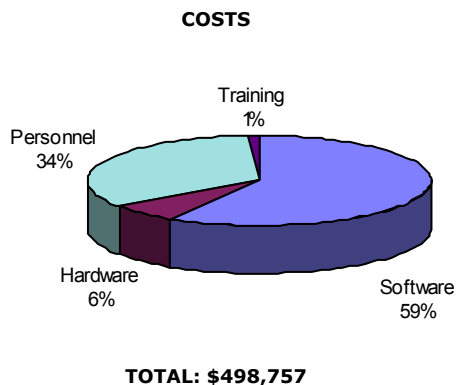
- **Improved developer productivity.** The deployment has enabled developers to reduce the amount of time they spend on unproductive activities by an hour a day. Instead of relying on face-to-face meetings, e-mails, or ad-hoc conversations, Cardinal's developers receive assignments and identify which branch or pieces of source code they will work on in Perforce. As a result, they spend more time on code development and less time working on the wrong source code. Developers are also more productive because these process and control improvements reduced the volume of configuration management-related bugs by 60 percent, eliminating a significant amount of code rework.

- Improved project manager productivity. Because of improved developer productivity and reduced bug-fix activity, project cycle times have been shortened and Cardinal's 20 project managers have been able to increase the number of projects they complete per year by 13 percent.
- Improved tester productivity. Because of process changes and improvements to waterfall development practices, testers in Cardinal's quality assurance department now test larger pieces of more fully refined code, which has reduced the total amount of configuration testing. As a result, these testers are 35 percent more productive when they are performing configuration-related testing.



KEY COST AREAS

Key cost areas for the deployment included personnel, software, hardware and training.



Three Cardinal employees spent approximately 20 percent of their time deploying the solution over a 3-month period. Software costs consisted of seats for Perforce developers — excluding developers already proficient in Perforce when their company was acquired by Cardinal — purchased during the pre-start period, year one, and year two. Software costs also include annual license maintenance and technical support. The application, supporting data, and all source code were deployed on a server which was separately purchased, configured, and secured for

the deployment. Training costs consisted of a formal 3-day training program that was attended by three members of the deployment team, who then used this knowledge for ad-hoc training of users and super users. Perforce is supported by three members of the software configuration team who each spend approximately one hour a day on maintenance tasks such as configuration changes, security management, and adding or deleting of users.

BEST PRACTICES

Although Cardinal's adoption of Perforce generated a high ROI and payback, the project manager believes that ideally the deployment team would have attended formal training prior to starting the deployment, in order to know more about the application and how it should be configured. During both formal end-user training and during the adoption stage, the deployment team acquired knowledge that, had they possessed it during the deployment, would have resulted in a shorter project cycle time. Such pre-deployment training could have enabled the team to complete tasks such as building back-up scripts and establishing code depots with less trial and error and fine tuning. It also could have shortened the deployment by up to a month.

CALCULATING THE ROI

Nucleus calculated the costs of software, hardware, personnel, and training investments over a 3-year period to quantify Cardinal's total investment in Perforce.

Indirect benefits calculated included the improved productivity of developers, project managers, and testers, who became more productive because source code is more accurately tracked, code development tasks are delegated more appropriately, and the code resulting from these improved workflows has fewer bugs. No productivity improvements were calculated for developers who were already proficient in Perforce when their company was acquired by Cardinal. Productivity benefits were calculated based on the employees' average fully loaded annual cost and an estimation of the improvement in their productivity. A correction factor was applied to reflect the fact that not all time saved will be converted into new work.

DETAILED FINANCIAL ANALYSIS

CARDINAL HEALTH

SUMMARY

Project:	Perforce
Annual return on investment (ROI)	1100%
Payback period (years)	0.15
Average annual benefit	2,512,744
Average annual total cost of ownership	166,252

ANNUAL BENEFITS	Pre-start	Year 1	Year 2	Year 3
Direct	0	0	0	0
Indirect	0	1,674,338	2,769,525	3,094,369
Total Benefits Per Period	0	1,674,338	2,769,525	3,094,369

DEPRECIATED ASSETS	Pre-start	Year 1	Year 2	Year 3
Software	74,500	74,500	25,375	0
Hardware	20,000	0	0	0
Total Per Period	94,500	74,500	25,375	0

DEPRECIATION SCHEDULE	Pre-start	Year 1	Year 2	Year 3
Software	0	14,900	29,800	34,875
Hardware	0	4,000	4,000	4,000
Total Per Period	0	18,900	33,800	38,875

EXPENSED COSTS	Pre-start	Year 1	Year 2	Year 3
Software	0	38,240	38,240	41,040
Hardware	0	4,000	4,000	4,000
Consulting	0	0	0	0
Personnel	22,275	49,005	49,005	49,005
Training	5,571	0	0	0
Other	0	0	0	0
Total Per Period	27,846	91,245	91,245	94,045

FINANCIAL ANALYSIS	Pre-start	Year 1	Year 2	Year 3
Net cash flow before taxes	(122,346)	1,508,592	2,652,905	3,000,324
Net cash flow after taxes	(108,423)	726,496	1,330,665	1,519,599
Annual ROI - direct and indirect benefits				1100%
Annual ROI - direct benefits only				-59%
Net present value (NPV)				2,528,648
Payback (years)				0.15
Average annual cost of ownership				166,252
3-year IRR				737%

FINANCIAL ASSUMPTIONS

All government taxes	50%
Discount rate	15%