On Beyond Z:

Building a Directory Service

In implementing an enterprise directory for our campus, we created a new model for implementing any campus-wide IT initiative

In the places I go, there are things that I see
That I never *could spell if I stopped with the Z.*
I'm telling you this 'cause you're one of my friends.
My alphabet starts where your *alphabet ends!*

—Dr. Seuss
On Beyond Zebra

In the fall of 2001, the University of Colorado at Boulder (CU–Boulder) implemented an enterprise directory. That statement doesn't come close to doing justice to the technical, political, and cultural negotiations that formed the foundation of that implementation.

During the early stages of this project, it became clear that success would be elusive unless we turned our attention to more than just the cobbling together of an enterprise directory. That's not to say that the technical A–Zs of an IT project aren't important — they are. But the success of our directory implementation depended on our forging into the seldom-explored and rocky terrain beyond technical A–Zs.

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For this project, that territory was characterized by a culture of collaboration, an eagerness for broad participation, and a commitment to community-wide responsibility. Consciously and artfully negotiating the challenges of the land beyond Z produced a successful model for implementing this campus-wide IT initiative.

The combination of data, people, and business practices found within and among institutional territories — silos — form the basis for subsequent decisions regarding the processes and business rules that will drive the design, implementation, and management of a project and resulting system. With the enterprise directory project, we ventured beyond business practices and functions, and into the world of departmental and institutional politics, policies, and processes. Although this required mapping new terrain, we knew that an understanding of this land beyond Z was critical to the long-term success of our enterprise directory.

To get the necessary buy-in, to establish a robust process of ongoing directory management, and to ensure the success of the project, we needed to build a cohesive enterprise-wide foundation of technology, expertise, and culture, woven together with the expertise and culture found within individual silos. To accomplish this, we began building the letters beyond Z: a surprising and enlightening, sometimes frightening and frustrating, and, for the optimists, magical endeavor that included

- collaborating across institutional and political boundaries,
- establishing a cultural fit among the directory, departments, and technology, and
- opening boundaries between processes.

The Impetus for the Project

Like many higher education institutions, CU–Boulder found many compelling reasons to implement an enterprise directory. The campus had a plethora of application-specific information silos that were discrete, noncommunicative, and often repetitive sources of information. Taken as a whole, the campus's processes for collecting and using information were inefficient, ineffective, and without a means for ensuring integrity or consistency of information from one silo to another.

Again, as at many higher education institutions, CU–Boulder's employee, student, and financial information is stored in discrete, highly independent systems: a Human Resources system (recently converted to PeopleSoft), a Student Information System (SIS), and a General Ledger system (also recently converted to PeopleSoft). Each of these systems represents a distinct data silo.

CU–Boulder has also had (and, until full implementation and acceptance of the enterprise directory, will continue to have) myriad departmental applications that duplicate information from HR or SIS. The student health center billing system, the BuffOne ID card system, the recreation center membership system, and Mailing Services' E-Memo system are just a few examples of siloed applications at CU–Boulder.

Not surprisingly, the data contained in these silos is not only walled off from the rest of the university, it is often disparate. That is, mismatches among systems abound. During the project, discrepancies became evident in name spellings, dates of birth, social security numbers, and even gender. Disconnects between systems were highlighted: name, telephone number, and address changes for students, faculty, or staff need to be updated in every one of the silos in which a person appears but often were found to have been updated in only one system. The very idea of data reconciliation among all discrete units of the constellation of systems was mind-boggling.

Additionally, until the enterprise directory, there was no single definitive aggregation of data or set of business rules or policies that could be referenced in the case of inconsistent data. For example, there was no agreement about the criteria to use to determine a person's primary affiliation if that person had multiple roles with the university. There was no shared understanding of what data differences were acceptable (such as nickname versus formal name) or indicative of errors (like name spelling differences).

The most compelling evidence of the timeliness of an enterprise directory services project was the lack of an authoritative source for access control, an issue also recognized in an internal audit of the campus's telecommunications and network infrastructure. The existence of many independent system administrators meant numerous (and inconsistent) criteria for granting access to electronic information, network resources, and services. While silo-based guidelines existed, there was no documented campus-wide policy for access control.

It was, in short, a nightmare of scattered information and lack of access control that was only going to get worse in the absence of an enterprise directory.

Furthermore, savvy departments understood the need for better information and more controlled access and authorization. New applications being considered for implementation required an enterprise directory, and the departments interested in those applications were queuing up, in some cases begging for a directory. Portals, calendaring, electronic voting, computer-based training, library resource validation, and security mechanisms were all applications that required the authentication services, affiliation checking, and attribute information that an enterprise directory could provide and support.

The Original Alphabet

Although we contend that our forging Beyond Z was the element most crucial to the long-term and broad success of our

enterprise directory, we also understand that an IT project cannot succeed on the most basic level without significant attention to the A–Zs of the institution's technical infrastructure. The campus and university infrastructure played a large role in the design of the enterprise directory and continue to have an impact on its implementation. The following items give a brief overview of our campus's demographics and pertinent structure:

- The University of Colorado comprises four campuses, a central administration, and five distinct cultures, all of which need to be taken into consideration during the course of an enterprise-wide project.
- The Boulder campus serves approximately 29,000 students. The campus employs about 2,400 faculty, instructors, and researchers, and another 2,600 staff. Each of these community members has a directory entry, as do retirees, the Board of Regents, and a variety of other affiliates.
- CU–Boulder's Information Technology Services (ITS) is the campus's primary technology provider. It provides the campus backbone and an extensive array of computing, telecommunications, and media services, and is strengthening its role in technological innovation and setting standards. However, several large "alliance networks" and an array of decentralized IT professional campus units create a mix between central and departmental technology support across the campus. CU–Boulder's IT Council supports the work of the entire campus by facilitating cross-campus communication and policy development. Nonetheless, department-specific IT shops pursue their own technologies, systems, and protocols, presenting a challenge to the development and integration of IT solutions. In addition, the university's System Office manages the primary systems of record for the university: General Ledger, HR, and SIS. Most, if not all, IT solutions have some interdependency on these systems.

Structure and Process

Our campus environment of inde-

pendent information systems, processes, and technologies necessitated a venture into the cultures and languages Beyond Z. The project structure and processes represent a concerted effort among our IT, administrative, and academic cultures to proactively foster collaborative relationships and broad participation throughout the project. As such, it signals a cultural shift resulting in the establishment of a new model for the implementation of campus-wide IT initiatives.

The project structure was characterized by the following elements:

- Project Champion
- Project Manager
- Core Team
- Big "Team"
- Steering Team
- Technical Team

The Project Champion — in this case, the Executive Director of ITS — recognized the importance of the project and maintained its momentum by reinforcing the importance of the directory initiative at every opportunity, particularly to those directly affected by the project and to those doing the hands-on project work. The Project Champion acted as a political conduit to the top ranks of the administration and to departments and

system administrators, and championed the project to all of CU's campuses, establishing the groundwork for university-wide commitment to the enterprise directory services. Finally, the Project Champion engaged in behind-the-scenes work to move the community from passive interest to active engagement with the project.

The Project Manager has been with the project from the first day. This position succeeded because the Project Manager was trusted by the community thanks to prior, and successful, project experience; had a collaborative, communicative, and non-threatening demeanor; possessed technical acuity; was a proactive communicator willing and able to represent the project to a broad spectrum of audiences and forums; was an expert multitasker; and had solid baking skills — an optional, but desirable, characteristic that has the potential to enhance any meeting.

The Core Team was at the heart of the project, guiding the implementation process from conceptual design through project implementation details. The Core Team was a small, nimble group, starting with 10 members and growing to 16 — a large enough number for fostering ideas but small enough to move quickly to action. Team members were chosen for their technical and functional expertise, representing areas of ITS and major campus departments (Libraries, Housing, Computer Science, Registrar), as well as the the System Office. The team held frequent meetings — twice-monthly throughout the life of the pro-

ject — focusing on detail-oriented issue resolution of, for example, implementation and design decisions, and specific task assignments ranging from technical exercises to documentation. The Core Team was also a source of recommendations that were sent to the Steering Team for their review, comments, and, in most cases, approval.
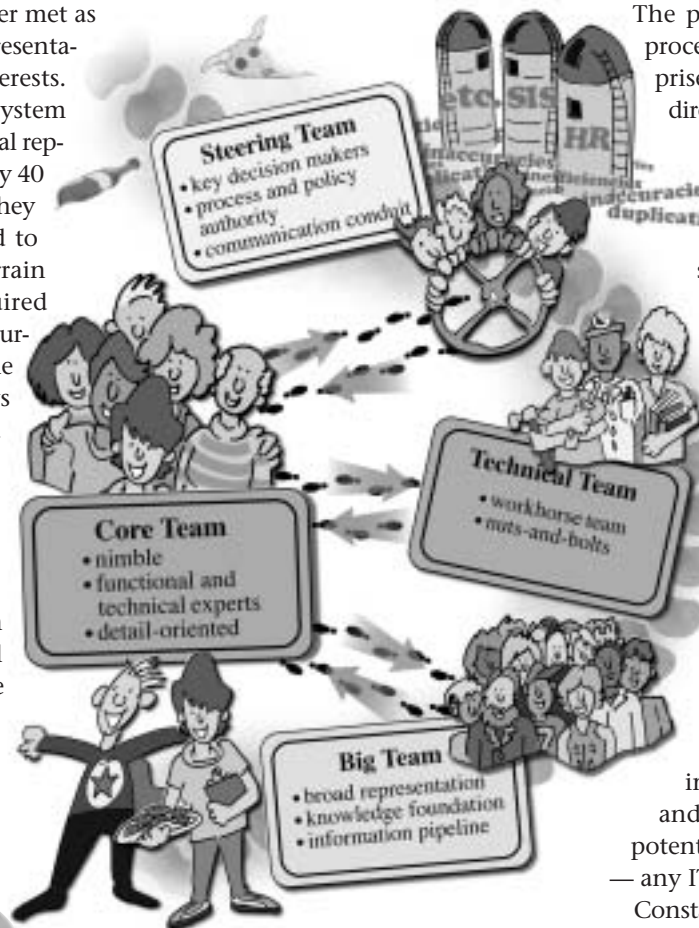
The Big "Team" (the word "team" is in quotes because this group never met as a group) provided a broad representation of requirements and interests. The team was composed of system administrators and departmental representatives from approximately 40 campus and university units. They provided the language needed to perform effectively in the terrain Beyond Z, which was acquired through individual interviews during the early design stages of the project. From these interviews critical information was gleaned about the campus's respective data, systems, business functions, and culture. The Big Team provided iterative confirmation of requirements and direction through consultation whenever their individual expertise was needed, and the

foundation — through their imparted knowledge — for the analysis, design, and project implementation strategy. Lastly, the project benefitted from enhanced information flow and collaboration because interactions with the Big Team focused on understanding and educating the campus rather than on technical dictates.

The Steering Team was the smallest (seven people), but the most powerful, of the teams. Its membership consisted entirely of key decision makers, all at levels of senior manager, director, or above, representing the primary constituencies of the campus (faculty, staff, and students) and with the authority to approve process change and institute policy. The size of this team fostered intimate and intense discussion. The team served as communication conduits

Steering Team
• key decision makers
• process and policy authority
• communication conduit

Core Team
• nimble
• functional and technical experts
• detail-oriented

Technical Team
• workhorse team
• nuts-and-bolts

Big Team
• broad representation
• knowledge foundation
• information pipeline

to constituencies and superiors. Monthly Steering Team meetings established a culture of communication and understanding among and between these constituencies and with the technical side of the project. The Steering Team had responsibility for laying the foundation for what is now known as the Directory Governance Board, which acts as the policy oversight group of the enterprise directory.

The Technical Team tackled the nuts and bolts of the project tasks. This workhorse team, made up of a programmer, Web designer, database administrator, IT architect, and directory administrator (each working only part-

time on the project), plus the project manager, shouldered responsibility for all of the development, testing, and integration of the technical components of the enterprise directory.

This broad participation in the project implementation established channels of cross-campus communication and buy-in, and helped define the political and cultural structures to be negotiated. The project structure established a process and a culture for the enterprise directory project, and for the directory itself. Both would be intimately concerned with silo-based functional expertise, and both were dependent upon a collaborative, inclusive process that attended to the cultural and political nuances of individual fiefdoms. More important, the structure set

a precedent for tackling the interplay of technical, political, and cultural issues that have the potential to disrupt — or even derail — any IT initiative.

Constant communication and collaboration between the technical side of the project and the Core, Steering, and Big Teams set in motion an iterative process that has served the project and the directory equally well. Original interviews with the Big Team set the direction for the original design proposals; the Core Team worked through these proposals, sending recommendations to the Steering Team for review; Steering Team comments returned to the Core Team for refinement; refined specifications went to the technical team for development; and the resulting product was presented to the campus for piloting, comments, and subsequent refinement. Each step generated comments, ideas, and issues

that percolated throughout the project and evolved into a system design and implementation stamped with institution-wide authorship.

This integration of players within the directory project has not abolished silo fiefdoms on campus. Indeed, it hasn't needed to. Instead, the project has drawn such fiefdoms, which dot the land Beyond Z, into the process, while respecting cultural boundaries and functional expertise. It's not just that lines of communication have been open throughout the project, but that communication is facili-

tated. Opportunities abound to increase understanding of departmental business practices, as well as the politics and culture that underlie them.

There have been significant rewards for departmental participation in the project, rewards that will continue throughout subsequent initiatives. First, there is the satisfaction of being involved with a successful, campus-wide project. Historically at the University of Colorado, the decentralization of technological systems and administration has been coupled with a perception that departments were on their own, their concerns neither heard nor taken into consideration. In the past several years, steps have been

taken to change that perception. The enterprise directory project built upon this trend. Integrating departments into the project and processes of the directory serves both to change the technological landscape on campus and to provide the intrinsic reward of being an active participant in and contributor to a successful endeavor.

Building Trust, Strength, and Potential

Because of the continual percolation of ideas, and design and issue resolution through the project layers, departments that have participated in the project, and those that continue to collaborate in the implementation and operation of the enterprise directory, are able to influence both its design and its ultimate use. Most importantly, these participants and collaborators witness first-hand the results of their influence both on the directory project itself and on the campus's project process as it moves Beyond Z.

Although the Beyond Z realm is enjoyable on its own merits (it really is exciting to chart new terrain, learn new cultures, and visit exotic places), there are also campus-wide benefits for approaching an IT initiative with Beyond Z in mind. Silo and campus buy-in, trust, and collaboration have all contributed to a comfort level and a level of engagement that encourages adoption of directory-enabled applications and even a measure of risk-taking concerning those applications. It has increased knowledge about security, access, authorization, and authentication, while fostering a better understanding across functional units and promoting efforts to establish consistency among data-dependent processes.

The enterprise directory project drew its strength from three integrated layers. First, it was crucial to build a strong technical foundation for the directory in order to maximize its potential: the stronger the technical foundation, the more effective the directory will ultimately be at supporting current and future needs of Boulder campus users, as well as potential university-wide and inter-university users. Second, the foundational layer is nested in a communication layer of education and commitment that moves the project Beyond Z. The Beyond Z influence of project participants creates a third, overarching layer of process, policy, and design that encompasses the entire project. To maximize its potential, this layer must include a thorough understanding of cultural and political complexities, diplomatically acquired and enhanced through collaboration.

Measures of Success

There are different ways to measure the success of an IT project. Basic existence of a new system is one: just getting an enterprise system up and running can be viewed as a significant accomplishment. Mundane indicators abound as well. For example, with the enterprise directory, error-free data indicates success. But there are equally significant, though less easily quantifiable,
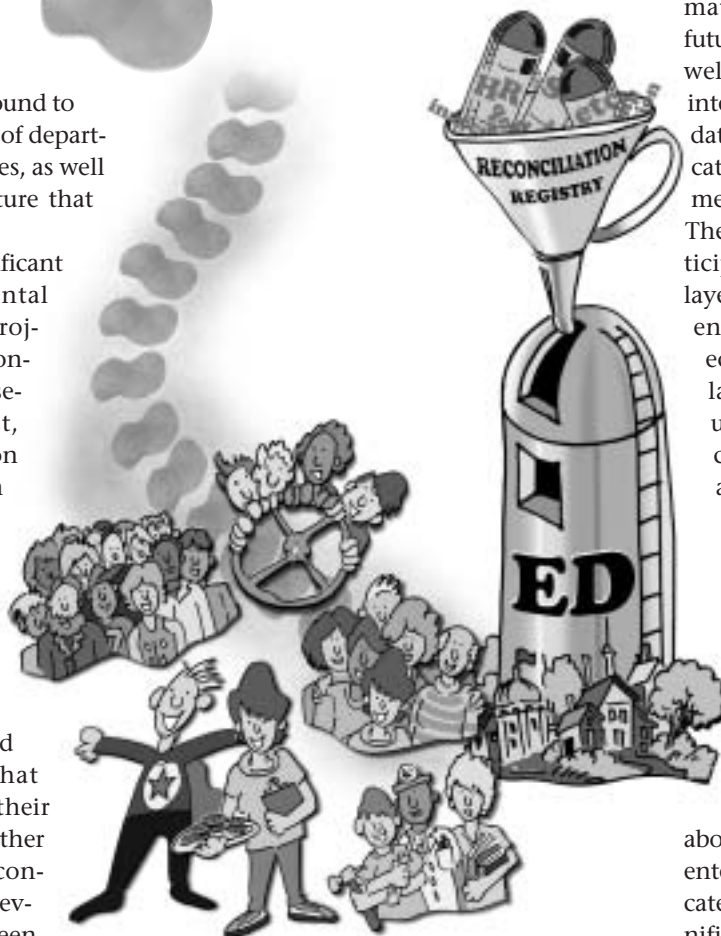
measures of success — measures that correlate with the processes put into place by our enterprise directory project and continue past its implementation. We knew the project was successful when

- community members — such as the technical and administrative citizens of the silo fiefdoms — were engaged in the process and not threatened by it.
- community members — from network managers to deans — asked to learn more about the project and post-implementation details.
- people were asking to be involved, to serve on teams and committees associated with the project and its post-implementation processes and policies.
- system administrators and system owners were eager to use the directory and had lists of directory-enabled applications that they wanted to implement.
- we heard praise via the campus grapevine. Official buy-in was fostered through the cross-campus structure of the teams and encouraged by policy. But voluntary buy-in is more elusive and therefore more significant when evidence that it abounds starts rolling in.

Lessons Learned

Based on what we learned from the enterprise directory project, we are firm believers in this project model with just a few adjustments. We would

- pay more attention to project staffing requirements. Staffing at a higher level, earlier in the project and with more employees dedicated full-time to the project, would compress the time spent on the earlier project stages and accelerate the project's momentum.
- build on the same project structure, with one adjustment: we would bring a dedicated system manager into the project at its earliest stages.
- consider having one or two actual "Big Team" meetings with the group as a whole to build a common energy among those players.
- collaborate with Legal Counsel earlier in the process to streamline policy development and approval.

- be better prepared to capitalize on the success of the project, staffing to handle new initiatives while putting the final touches on the original implementation initiatives.

Conclusion

The enterprise directory project gave us the opportunity to blend the talents of our highly skilled IT professionals, the functional expertise of our departments, the political savvy of our administrators, the strength of the campus community itself, and the wisdom of Dr. Seuss. The technical underpinnings of the project were well-grounded in the established landscape of higher education's fiefdoms and in the enterprise directory's technical architecture. The success of the project, however, depended on our willingness to venture out of our familiar environment and into the Land Beyond Z, to the

- trials, tribulations, and ultimate successes of the intermingling of data, processes, politics, and cultures;
- creation of a robust and sustainable project culture;
- forging into the future with the proj-

ect framework built on communication, understanding, and collaboration; and

- realization that the success of technological innovation depends on cultural and political trust.

Adopting an iterative and open multilayered project model has helped to create an environment of increased trust. This, in turn, is building a campus culture of collaboration and commitment — a culture that further enhances the potential successes of future campus-wide IT projects that choose to venture Beyond Z. *e*