FY 07-08 IT Budget Proposal  
IST: Subversion Code Repository Service  
ABBA Category One: Institutional Effectiveness  
ABBA Category Two: Information Technology

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In keeping with industry practice, the IST Application Architecture team has identified use of code repositories as a fundamental element in effective software methodology.

Use of this key tool is irregular in IST and across the campus. Two open-source offerings, Concurrent Versioning System (CVS) and Subversion (SVN), and Microsoft's Visual Source Safe are the tools presently in greatest use on the campus. The possibility of running a centrally managed Team Foundation Server instance for Microsoft .NET development on the campus is in an exploratory stage.

Subversion -- the heir to CVS -- is an excellent, proven tool that can be utilized by developers across many application languages/platforms, and integrates well with a broad spectrum of commercial and open-source Integrated Development Environments (IDEs).

This proposal requests staff and infrastructure funding to support an offering of version control services in the form of Subversion code repositories for use by UC Berkeley staff IT development groups and staff developers in departments across the campus, at no direct cost to the client IT groups and developers.

Benefits to the campus will accrue in two primary areas if this proposal is approved:

1. **Mitigation of risk to software assets.** Software code developed by UC Berkeley employees is a critical asset to the organization, obtained at great cost (a significant portion of UC Berkeley's annual $135M IT budget). Code stored outside centrally managed, secure, backed-up servers is vulnerable to loss. Loss occurs, and recovery of lost code (which often involves reinventing work already completed) is a significant, demoralizing, and unnecessary expense borne by the University. Storage of code in centrally managed and hosted repositories would mitigate this risk and expense.

2. **Increased productivity and collaboration in software development.** Use of version control is widely recognized as an enabler of software development productivity, particularly among multiple developers collaborating on software projects. Provision of repository service would concretely support IT development productivity and collaboration across the campus at modest cost (about $170,000 over the next three fiscal years), and facilitate shared use and maintenance of reusable code.

Risk and loss will continue to accrue as long as UC Berkeley software assets are stored outside a professionally managed data center. Likewise, productivity benefits will not accrue until and unless developers adopt version control as a fundamental element of their working environment. Central, no-cost provision of this service would remove administrative and financial disincentives to its use by departmental developers and IT groups.

Implementation of this service will serve as a prototype and pilot for future repository service offerings targeted to research projects hosted at UC Berkeley, and to students for use in course and lab work in which software development is a component of the teaching/learning experience.

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1. **Alignment with IT Strategic Plan**

Critical issue 4 of the IT Strategic Plan, “Security, reliability, access,” directly aligns with use of code repositories. Securing of valuable campus assets (software code) in a recoverable, versioned, centrally managed repository addresses the identified need for a "reliable physical environment for information and services." Productivity gains inherent in methodologies that incorporate repository use addresses efficient, effective, timely implementation of IT efforts that support Teaching/Learning, the Student Experience, and Research on the campus. Future offerings targeted to UC Berkeley research projects and software development courses, for which this proposal's implementation will serve as a pilot, are expected to directly support Critical Issues 1 and 3, Teaching/Learning and Research.
2. Impact

The entire campus will benefit by this service offering. Individual developers and larger IT groups alike, in all departments, will be invited and encouraged to utilize centrally hosted repositories. Developers and groups implementing applications and services using a wide variety of languages/platforms will be able to integrate the offered service into their development environments (including, but in no way limited to, Java, .NET, PHP, Perl, Python, Ruby, etc.).

An informal survey of developers and developer groups with whom this proposal's authors are in contact suggests that there is strong interest in a Subversion repository service among campus departments. Departments (and individuals) who have expressed such interest include:

- Budget & Finance Info Systems (Rob Johnson)
- Career Center (Xing Li)
- EECS (Eric Fraser)
- Financial Aid (Tuan Nguyen)
- Graduate Division (Chris Hoffman)
- IST - Application Services (Kelly Haberer, JR Schulden, Bill Allison)
- Residential and Student Service Programs (Steve McCabe)
- Student Affairs (Tim Heidinger)
- University Relations (Josh Marcus)
- Undergraduate Admissions (Hebert Diaz-Flores)

Chris Hoffman, of the Graduate Division, writes in support of centrally hosted and managed repositories:

"This looks like a great proposal and a very useful service that IST could offer to other campus offices. In Graduate Division we have experienced some of the problems you have described when programmers have retired and new ones have been hired. Not surprisingly, without a formal structure, each programmer will have his or her own technique for code control and versioning. Also, our mission-critical code base is being stored on multiple servers in different locations. Most of it is being backed up one way or another, but it can take significant effort to find the correct version of another programmer's code. At the recommendation of Judy Dobry, our J2EE software engineer, we have begun implement Subversion for some of our code in the Graduate Division, and we see that it is a powerful tool. The proposed Central Subversion Repository would take advantage of the potential of Subversion, would help protect vital campus resources, and would help foster best practices for code control and versioning across campus."

Steve McCabe of RSSP echoes these thoughts: "As manager of the Systems and Applications teams within RSSP-IT, I strongly support IST in your efforts to provide a Subversion repository." Tuan Nguyen of Financial aid writes, "Although we are using a local code repository now, I think this is an excellent idea and believe we would use this service (especially if it is centrally funded)." Josh Marcus of University Relations concurs: "We would definitely use this service if it were available. We manage a CVS repository now for our Java web development work, and I would very much prefer not to do this." Tim Heidinger writes, "The Student Affairs Computing developer will use a central code repository when it becomes available. Specifically, myBerkeleyApp and other applications developed by the Student Affairs Computing departments would greatly benefit from the transition to a central code repository."

3. Risk assessment

Loss and corruption of UC Berkeley's software assets is an unfortunate, and often expensive, reality. Hard disk crashes; loss of password-protected access to a staff member's computer due to separation from University service (and thus access to the media on which code is stored); and accidental overwriting of the only valid, working copy of a code base are events that occur regularly across the campus. The scope of loss may range from a single file representing minutes, hours, or days of staff effort; to an entire codebase that requires weeks or months of effort to replicate. Ancillary loss of
productivity due to the demoralizing effect of having to reproduce effort already expended is a further cost to the University.

The need to "roll back" code revisions due to mistakes (bugs, misalignment with business need, etc.) in software development is a normal and expected occurrence. Using manual systems for tracking and managing changes to a code base add significant, often invisible, cost to this aspect of the software development process. Proper use of version control is widely understood to cut these costs dramatically. Furthermore, version control facilitates flexibility in software development -- with attendant benefits in greater alignment with business requirements -- by reducing risks associated with changes to complex programs.

Recognition of the value inherent in mitigating these risks through use of version control systems is ubiquitous among software engineers.

4. Innovation

While Subversion and its peers are not new concepts or tools, bringing a very large body of software assets under version control that were not previously housed in a centrally managed repository will yield quantum improvement to the development environment for staff and IT groups who avail themselves of the service. In adopting widespread use of version control, the campus will align itself with standard industry practice.

5. Funding model

Hardware, infrastructure, and maintenance of Subversion hosts, as well as staffing necessary to provision the service and provide basic support for the tool, will be centrally funded. The repository software itself is open-source; no software licensing fees apply. The cost of offering the service is divided equally between establishment and maintenance of the service and its provision processes; and the nuts and bolts of establishing repository instances for client developers and IT groups (based on incremental adoption estimates).

As the service is adopted by campus IT development shops and individual departmental developers, the latter costs are expected to reduce dramatically over time. Hardware replacement, data center infrastructure, storage, and system administration costs are expected to recur.

IT developers and developer groups will be expected to come up to speed on the use and simple administrative tasks of this tool using widely available documentation and tutorials, with some guidance from locally-produced "quick start" references. Where additional support or orientation is needed, service clients may obtain assistance and/or training on a recharge basis. This proposal suggests that these client-borne costs are part of a standard staff development and training efforts for campus IT staff.

Central investment in this service is expected to yield savings in the form of reduced loss of campus software assets, and increased efficiency and flexibility in IT development across the campus. Failure to fund this service would limit adoption of code repository use, exposing the campus to continued risks and inefficiencies.
## Summary of Funding Model: IST: SUBVERSION CODE REPOSITORY SERVICE

### Summary or funding: campus vs other

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<th>ACTUAL</th>
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<td>Campus funding sources</td>
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<td>Permanent/on-going</td>
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<td><strong>Total campus funding sources</strong></td>
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| Other funding sources |       |          |          |          |          |
| Temporary/development | $0     | $0       | -$10,401 | -$1,716  | -$1,820  |
| Permanent/on-going    | $0     | $0       | -$771    | -$541    | -$557    |
| **Total other funding sources** | **$0** | **$0**  | **-$11,173** | **-$2,257** | **-$2,377** |
| **TOTAL ALL FUNDING SOURCES** | **$0** | **$0**  | **-$79,165** | **-$52,465** | **-$55,604** |

**Note:** In accordance with the University's accounting system, positive numbers are expenses or deficits, while negative numbers are funding or surpluses.