Frontline Support at Princeton University: A Centralized and Decentralized Approach

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ABSTRACT
Frontline support and maintenance for desktop hardware and software systems at Princeton University has been uniquely structured, allowing the benefits of centralization and the freedom of decentralization.

The decentralized SCAD/DCS (Support for Computing in Academic Departments/Department Computing Support) program is set up so that each department has their own support personnel with specialized access to all of the information from the centralized Office of Information Technology. The SCAD participates in monthly meetings with others in the program, along with representatives from the central Office of Information Technology. They are offered specialized training and certification programs determined by the needs of the departments and the direction of technology of the University. Departments are able to remain autonomous while garnering the benefits of a campus wide central administration.

The centralized 24x7 Support and Operations Center provides telephone, instant message and e-mail consulting for general technical questions and issues as well as University business application support, support for the telephone system and operator services for the main University telephone number. Any member of the University community can call or write for assistance.

This paper will discuss the funding, staffing and scheduling models for the respective programs, as well as talk about how the two programs balance and collaborate with each other and the other support resources at the University.

Categories and Subject Descriptors

General Terms
Management.

Keywords

1. INTRODUCTION TO THE UNIVERSITY AND THE OFFICE OF INFORMATION TECHNOLOGY
Princeton University is a small liberal arts University located in central New Jersey with approximately 5,000 undergraduates, 2,500 graduate students, and 5,500 staff and faculty.

Princeton simultaneously strives to be one of the leading research universities and the most outstanding undergraduate college in the world. As a research university, it seeks to achieve the highest levels of distinction in the discovery and transmission of knowledge and understanding and in the education of graduate students. At the same time, Princeton is distinctive among research universities in its commitment to undergraduate teaching.

The University provides its students with academic, extracurricular and other resources—in a residential community committed to diversity in its student body, faculty and staff—that help them achieve at the highest scholarly levels and prepare them for positions of leadership and lives of service in many fields of human endeavor.

Through the scholarship and teaching of its faculty and the many contributions to society of its alumni, Princeton seeks to fulfill its informal motto: “Princeton in the Nation’s Service and in the Service of All Nations.”

2. THE OFFICE OF INFORMATION TECHNOLOGY (OIT)
The mission of OIT is to enable the effective use of information technology in support of the University. In pursuit of this mission, OIT’s goals are:

- Deliver information technology products and services that meet the needs of the University community and achieve the highest level of customer satisfaction;
- Support the use and development of information technology to enable innovation in teaching, learning, research, and scholarship;
- Provide leadership in planning for the effective use of technology;

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• Provide a robust, reliable and secure information technology infrastructure;
• Attract, develop and retain quality information technology professionals;
• Enable communication and collaboration among information technology professionals and users of information technology at the University.

Princeton has a robust information technology environment consisting of a campus-wide wired and wireless network, multiple e-mail systems, online data storage for faculty, staff and students, high performance research computing, a broadcast center and an educational technologies center to support faculty teaching. We have over 20,000 user netIDs, 3,000+ participants in our standardized desktop computer program, and 4,800 students owning University-standardized laptop computers. We provide documentation, hardware repair service (including warranty repairs for a variety of manufacturers), 24x7 telephone and chat support, in-office assistance for faculty and staff, and in-room support for students.

This paper will focus on the decentralized Support for Computing in Academic Departments/Departmental Computing Support program (SCAD/DCS) and the centralized 24x7 Support and Operation Center (SOC).

2.1 Support for Computing in Academic Departments/Departmental Computing Support

2.1.1 What is SCAD/DCS?
This program is a University endeavor which complements central support provided by OIT, allowing departments a higher level of individualized advocacy and attention.

![Figure 1: Structure of the SCAD/DCS](image)

Membership in this fee-based program allows departmental consultants to participate in monthly meetings that address common concerns and issues related to campus computing. In addition, members have priority access to the OIT Help Desk, special opportunities for technical training and certifications, access to OIT’s KnowledgeBase and OPM tracking systems, and much more. Along with the technical support advantages that the department gains, one of the main benefits of the program is the unique way the salary of the SCAD/DCS staff is structured.

2.1.2 Funding – SCAD vs. DCS
SCAD/DCS positions provide technical support to University departments. However SCAD/DCS job responsibilities vary from department to department, and the positions range from entry-level support technicians, web developers and server administrators to management. The SCAD position provides support to academic departments of the University while the DCS position supports administrative departments. Although both of these positions are technical support roles, this distinction is important because the salary funding models for the positions differ.

Many academic departments of the University would not be able to afford the luxury of having dedicated technical resources on staff. They would have to rely on the centralized Office of Information Technology to assist them with their computing needs. Given that a centralized office cannot provide a dedicated level of support, decentralized, dedicated resources are needed in certain departments. Recognizing this, the salary of the SCAD is subsidized by the Office of the Provost by up to 50%. This allows a department to add the technical resources needed to support their computing needs. If the computing needs of the department warrant it, they may have more than one SCAD on staff, working in various positions – from entry-level technician to manager. As an example, the Woodrow Wilson School of Public and International Affairs has set up their own help desk to service their school alone, using the OIT Help Desk as backup. They have 11 SCAD members in the program.

Because the DCS position supports administrative areas instead of academic departments, they do not get the salary subsidy that the SCAD position does. The administrative department must pay the DCS salary from their salary budget. They do, however, get all of the technical support and training benefits from the program.

Of course nothing comes for free and participating in the SCAD/DCS program is no exception. In order to meet the operational expenses of the program, OIT charges an annual fee for each SCAD/DCS participant. As with the salary structure, this fee structure differs for SCAD and DCS participants. A SCAD member’s department is required to pay 5% of the salary plus benefits of each SCAD they employ to OIT as a participation fee. Benefits are very costly and this year represents 34% of the salary. A DCS participant does not have the same fee because their department is paying the entire salary alone, without subsidy. The DCS department has a flat fee of $2,000 per participant in the program. This fee is negotiable, depending on the size and needs of a department.

<table>
<thead>
<tr>
<th></th>
<th>Single Department</th>
<th>Two Departments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salary</td>
<td>$50,000</td>
<td>$50,000</td>
</tr>
<tr>
<td>Benefits ((\text{Salary} \times 34%))</td>
<td>$17,000</td>
<td>$17,000</td>
</tr>
<tr>
<td>Total Compensation ((\text{Salary} + \text{Benefits}))</td>
<td>$67,000</td>
<td>$67,000</td>
</tr>
<tr>
<td>Subsidy Minimum of ((\text{Salary} \times 50%, $15,600))</td>
<td>$15,600</td>
<td>$15,600</td>
</tr>
<tr>
<td>OIT Fee ((\text{Salary} \times 5%))</td>
<td>$3,350</td>
<td>$3,350</td>
</tr>
<tr>
<td>Net Cost</td>
<td>$54,750</td>
<td>$27,375</td>
</tr>
</tbody>
</table>

Figure 2: SCAD Salary Costs
Figure 3: DCS Salary Costs

<table>
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<td>$67,000</td>
</tr>
<tr>
<td>OIT Fee Flat Rate $2,000</td>
<td>$2,000</td>
<td>$2,000</td>
</tr>
<tr>
<td>Net Cost</td>
<td>$69,000</td>
<td>$34,500</td>
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</table>

If a department needs technical assistance but is not able to justify hiring a full-time person, they have several options. They can hire a part-time person to assist their area, or they can join together with another department and share in the cost of the technical resource. The SCAD/DCS Program Manager assists in the staffing options available. Currently, as many as four departments share in the cost of one technical person who works 25% of the time in each area. This is a significant benefit of the program, since the cost of dedicated technical resources can be very high.

2.1.3 Needs Analysis and Hiring Process

When a department determines that there is a need for a dedicated technical staff position and would like that person to participate in the SCAD/DCS program, they contact the SCAD/DCS Program Manager to request a needs analysis. The number of users in the department, types of machines, applications used, databases, servers and websites are considered along with any future technical plans of the department. The result of this analysis determines the need for a full-time or part-time staff member as well as the skills and experience required. The recommendation is made to the department chair as well as the Office of the Provost for position approval.

Once the position is approved, the SCAD/DCS Program Manager crafts a job description. This job posting is customized for each department, ensuring that the skills match those needed by the department. The position is posted on the University’s website. Since a typical SCAD/DCS technical support position brings about 100 applicants, the SCAD/DCS Program Manager does the initial screening of résumés. She has the technical expertise to best match the candidate’s skills with those of the position and can sort out candidates that are not a match. After conducting phone screenings, she forwards the resumes of the best candidates to the Department Manager for review and interviews are scheduled. The interview process consists of multiple meetings with the SCAD/DCS Program Manager, Department Manager and staff, and technical assessments by OIT staff. Once the best-qualified candidate is selected, they are scheduled for intense orientation and training.

2.1.4 SCAD/DCS Orientation

In addition to Princeton University’s new employee orientation, the SCAD/DCS member attends intensive training on the processes, structure and technological offerings of the University. They attend one-on-one training with the IT Security Officer, IT Policy Advisor, Software Support Manager, Hardware Support Manager, Help Desk Manager, and Senior Editor of the KnowledgeBase to get an overview of technology at the University. They are guided on how standard machines at Princeton University are set up, added to the network, maintained and supported. They are instructed on the Core Competencies expected of SCAD/DCS members and given the knowledge and tools to achieve those competencies. This training provides them with a broad understanding of technology operations at the University so that they may be better able to support their department. Each new SCAD/DCS member is introduced to the technical support community of the University at their first round of monthly meetings and they are added to the SCAD/DCS Facebook and e-mail distribution lists.

2.1.5 SCAD Member Roles, Training and Meetings

A SCAD/DCS member is typically the primary resource for technology in their department. They are responsible for the day-to-day computing, troubleshooting, software support and any other technology related issue in their department. Some departments require the SCAD member to be a Webmaster while others need the SCAD member to act as a Database Administrator. The vast array of roles that a SCAD member must fill requires them to be well educated and keep abreast of the latest technologies. To meet this need, the SCAD/DCS program offers many training opportunities throughout the year. This training is provided free to SCAD/DCS members as part of the program participation fee. Below is a listing of recent SCAD/DCS training courses, meetings and activities.

**Web Development**
- Web Developer/Programming Certifications
- Web Application Certification (8 month course 7/08-2/09)
- Advanced PHP/MySQL (two day session)
- Intro to Roxen Content Management System
- Intermediate to Roxen Content Management System
- Advanced Roxen Content Management System
- Roxen Content Management System & CSS
- "Developing with Style" CSS

**Network & Security**
- Network Storage
- Network Infrastructure Overview
- Intro/Advance Security Training (two sessions)
- Microsoft Security Essentials
- Microsoft Security Training

**MAC**
- Mac OSX 10.5 Leopard Hands-On Training
- Mac OSX 10.5 Leopard Certification
- Mac OSX 10.6 Snow Leopard Hands-On Training – Fall 2009
- Mac OSX 10.6 Snow Leopard Certification – Fall 2009

**Windows Vista**
- Migrating from XP to Vista
- Getting Started with Windows Vista for IT Professionals
- Microsoft Vista Hands-On Training
- Microsoft Vista Professional Certifications
- Microsoft Vista Security
**Miscellaneous**
Advanced MATLAB – the Language of Technical Computing
Intro SharePoint Training (3 sessions)
Advance SharePoint training (3 sessions)
SharePoint Designer Boot Camp

Formal training is not the only way that the SCAD/DCS community learns about new technology. The program sponsors regular monthly meetings where OIT staff discusses projects that are in progress and being planned. New ideas are shared, issues are discussed and new technology is demonstrated. The topics of the meetings vary each month and sub-committees are formed as necessary.

**SCAD/DCS Program Monthly Meetings**
SCAD/DCS Breakfast Club
SCAD/DCS Monthly Training Sessions
SCAD/DCS Monthly Meetings
SCAD/DCS Yearly Picnic

**SCAD/DCS Computer Security Team- CST**
CST, a sub-committee of the SCAD/DCS program, meets monthly and works closely with the OIT Security Group to implement new ideas and discuss security concerns on campus. The group has a membership of approximately 30 members from the SCAD/DCS program and members of OIT.

2.1.6 Support and Assistance
In their role of technical support personnel for a department, a SCAD/DCS support person is never really alone in handling issues. There are many options available in obtaining assistance from within the University technical community. OIT provides an online KnowledgeBase offering detailed instructions and procedures for many technological issues seen on campus, from setup guides to problem solutions. The SCAD/DCS can send e-mail to the Computing Support e-mail list where they will reach most of the University’s technology professionals. Lastly, they can contact the OIT Help Desk via their 24x7 telephone line or online chat to get assistance. There is always someone in the technical community willing to give assistance. The end user is the customer of the entire technical community of the University and all areas work together with that interest.

The SCAD/DCS program has been in existence at Princeton University for 13 years with approximately 125 SCAD/DCS staff serving 100 departments. The very high level of satisfaction with the program allows it to continue to expand by adding more members each year.

2.2 Princeton University Support and Operations Center

2.2.1 What are the roots of the Support and Operations Center?

Many years ago, Princeton’s academic and administrative computing groups were separate organizations, with the former reporting through the Provost’s office and the latter through the Vice President for Administration. Academic computing provided programming support for academic work through a “clinic” staffed primarily with students. As personal computers became prevalent on campus the clinic began supporting them. The administrative computing department opened an Information Center providing personal computer support and training for administrative staff.

In the mid 1980’s the two departments merged as the Computing and Information Technology department and the Clinic/Information Center joined forces as the Information Center, and later, the Help Desk, providing phone, email and walk-in software support for faculty, staff and students. In August of 2003, a walk-in Solutions Center providing both software and hardware support was opened in the then new campus center.

Several mini-reorganizations later, in August of 2007, the 24x7 Support and Operations Center opened its doors. The SOC is a collaborative effort including the general-technical help desk, the University Business Applications support group, the telephone trouble desk and the University Telephone Operators. This group provides a front door to the University, and to OIT, as well as providing a round-the-clock presence monitoring technology on campus.

Our focus is customer service — we aim to send our customers away happy with the right answers, plus some! We serve every constituency of the University community including students, staff, faculty, parents, community members, as well as those hoping to become part of the University at some future time in some yet to be determined way! And all of our customers, whether Nobel laureates or not, receive the same high level of attention and courtesy. Every call is important to us.

2.2.2 What does the SOC support?
The Support and Operations Center provides the University community with telephone and online assistance for campus computing and network-related problems, and monitors the IT infrastructure. Support provided includes e-mail, accounts and passwords, general application support, and support for student systems such as admissions, matriculation, and course registration. The University business applications group provides assistance with the University’s administrative applications including PeopleSoft Financials, Human Resources and Student Administration, the Information Warehouse and Time Collection. The University has its own telephone switch and the telephone trouble desk provides first tier assistance for problems with landline phone service including problems with instruments, voice mail and electronic voice mail, authorization codes, and calling cards. Telephone operators transfer callers to requested numbers,
provide directory assistance, answer questions about the University, and provide information on University events. Of course, all members of the Support and Operations Center are prepared to help with any question, even if the answer is to point the caller to a more appropriate resource.

2.2.3 How is the SOC staffed?
The SOC staff is made up of nine general-technical support staff including one operational manager, two university business application support staff, one person staffing the telephone trouble desk (with a back up person) and two University telephone operators. For many years, a cadre of students also staffed the Help Desk, but because of an anticipated move off campus, students will no longer be employed. This salary pool will be used to fund another full time staff person.

2.2.4 How does the schedule work?
The University operators, business application support and the telephone trouble desk all follow University business hours. The general technical consulting unit runs around the clock, 24x7, closed only for the eight university holidays. With the exception of the operational manager, each staff member works seven regular twelve-hour shifts in a fourteen-day period. There are four shifts – 7 am to 7 pm, 7 pm to 7 am, 10 am to 10 pm and 10 pm to 10 am, with one person per shift every day. With overlaps, there are two people on duty at all times except when someone is out for illness or vacation. The shift teams decide their schedule including how they want to cover weekends. There is an operational manager who works business hours except one day per week when he works from 1 pm to 9 pm so that he overlaps with the night crew. The operational manager is expected to be on the phones at least 40% of the time, usually averages closer to 50%, and is expected to help cover gaps caused by staff outages.

2.2.5 How busy is the SOC?

Table 2: Traffic at the SOC

<table>
<thead>
<tr>
<th>Monthly data</th>
<th>Phone calls</th>
<th>Tickets</th>
<th>Chats</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>1,853</td>
<td>1,884</td>
<td>152</td>
</tr>
<tr>
<td>Technical Help Desk</td>
<td>5488</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>University Operators</td>
<td>95</td>
<td>95</td>
<td>n/a</td>
</tr>
<tr>
<td>Telephone trouble desk</td>
<td>435</td>
<td>432</td>
<td>n/a</td>
</tr>
<tr>
<td>University Business Application Support</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

2.2.6 What are the tools used by the SOC?
Our tools are many. The bulk of our business is initiated over the phone. We have a vanity telephone number; 258-HELP (8-4357) answered by an automated call distribution system (ACD) from T-Metrics. Each unit has its own option (1 for the general tech help desk, 3 for university business application support, 4 for the telephone trouble desk and 5 for directory information or the operators who also answer the University’s main number).

OPM is our incident/job tracking system that was developed in house. It is based on tickets and a system of individual or departmental queues, and is used for escalating and communicating about issues, both for individual customers or system wide problems. OPM is used by the entire department as well as by support staff outside of OIT including SCAD/DCS members. SOC staff monitor OPM queues constantly as there are
multiple e-mail addresses that create OPM tickets real time in various queues.

The telephone trouble desk uses MySoft, a telephone management system, to pass trouble tickets to the switch room and the line technicians.

The general technical help desk chats online using a web client from ProvideSupport.com found on the main OIT web page.

2.2.7 What is the service level agreement for campus?
Telephone calls are answered in the order received. 92% of the general Help Desk calls are answered with less than a one-minute wait. The general technical consultants also provide back-up for the University operators so that the main University number is answered live. After hours calls to the main University number are answered with an ACD menu with transfers to Public Safety, the campus center, recorded directions and the University voice mail directory; this menu rolls over to the SOC if no option is selected.

E-mail is answered within 24 hours.

2.2.8 How does the 24x7 staff get trained?
Training staff is difficult for a 24x7 operation as it is not possible to have everyone available at the same time. We have one staff meeting per year that requires some staff members to come in on their “weekend” or “off” hours. Training is usually handled by training a subset of the staff who then share with their colleagues. Other groups who train SOC staff are asked to offer one session during non-standard business hours, either early morning or evening. Because there is so little time together, good written information is critical to keeping everyone up to speed, and the SOC uses SharePoint for shared documentation.

2.2.9 Why a 24x7 hour SOC?
There was no other OIT group with this level of presence on campus; therefore, many members of the OIT staff were spending time in the evenings and weekends monitoring services and systems. Moving to a 24 hour service center enabled us to provide vital on-site, 24 hours a day, 7 days a week, proactive monitoring of the IT infrastructure, identifying and addressing problems before they impaired important services. The weekends account for 12% of the calls for general technical assistance.

2.2.10 How would the SOC function during a campus emergency?
The general technical consultants are required to have a landline telephone and high speed Internet access at home, so they can work at home, provided the ACD is functioning. Consultants have dual boot Mac laptops as their primary workstations that they carry between the office and home. All the consulting tools as well as the standard supported software are installed on these machines, including the ACD client. They also have an ACD agent module box that they use to physically connect the telephone with the computer creating the bridge back to the ACD so that they can answer help calls remotely. Consultants periodically work from home and we recently had a ‘round the clock drill where we operated fully from off campus. During these remote operations, consultants communicate with each other using the built-in ACD chat as well as an instant message chat room.

2.2.11 How does the SOC support the SCAD program?
The SOC and the SCAD program are very much dependent on one another. Each new SCAD member spends half a day in the SOC learning about netIDs and accounts, the general technical infrastructure and the network, the e-mail system, OPM, and the general operations of the Support and Operations Center.

Departmental staff and faculty will call the SOC for “tier 1” assistance. Issues requiring attention from the SCAD/DCS are escalated using OPM; if the SCAD is not able to resolve the issue, the SOC escalates the ticket to the appropriate central support group.

In addition to providing support to the end user, the Support and Operations Center provides direct support to SCAD members when they need assistance, especially with access to resources.

And if a SCAD member is out for short-term absences (sick, vacation), the Help Desk will monitor their queues.

3. SUMMARY
Princeton University has learned the importance of providing decentralized support in a centralized environment. Having this structure has enabled us to maximize individual support to both the end users and the departmental support team.