Re-Imagining IT at Cornell University

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The Crisis

• As of June 2009, Cornell had a structural operating budget deficit of $130 million/year

• Significant savings had to be achieved within 1-2 years, and the full deficit eliminated by 2015

• Cornell brought in Bain Consulting to do a high-level review of the administrative budget
In 2009, Cornell University was spending approximately $113-117M on IT (Ithaca campus)
Personnel spend of $77M was spread across multiple units
Approximately 289 FTE and ~$28M was spent on developing, enhancing, and maintaining applications.
End User support represented ~174 FTEs and $12.3M in personnel spend
Key IT Issues Identified

- **IT governance**: Complex environment with poorly defined roles and decision rights. This resulted in fragmentation of IT resources, redundant systems, and inconsistent standards.

- **End-user Support**: Spend on desktop support (~$7M) was nearly twice benchmarks.

- **Application Development & Maintenance**: Over $28M spent, but campus was generally unhappy with applications.

- **Servers & Storage**: Infrastructure was fragmented and not virtualized, adding costs.
High-Level Analysis

• By comparing Cornell’s IT personnel spend with standard industry metrics, it was estimated that changes in IT could save $10-$13 million/yr out of a total administrative savings of $90 million/yr

• This was the third highest area of potential savings in the Cornell budget after procurement and reducing supervisory overhead
Crisis = Opportunity
We already knew

• Many individual units had created independent IT support groups - some very small
• CIT cost recovery models made central services appear expensive compared to local solutions
• There was no budgetary or governance support for close collaboration among units or between units and CIT
• That if we could break down the budgetary and governance barriers, we could deliver much more efficient and effective IT services to all of Cornell
Developing the Reimagining IT Recommendations

- University IT governance and decision rights: Analysis by team of five - two faculty, interim CIO, Dean of CIS, and a college officer

- End-User Support: Analysis by team of seven - IT specialists from across campus and one college officer

- Application Development & Maintenance: One senior CIT manager, two unit managers, and me

- Servers and Storage: Delayed, eventually team of five IT specialists developed recommendations

- Team results were then summarized as recommendations in the Reimagining IT Vision document by the three leads and accepted by the President and Provost
The Gory Details for each area
Governance
IT had a complicated governance structure with unclear roles and decision rights.

Governance model leads to redundant systems and inconsistent standards.
Problems with existing governance model

- Lack of visibility and control between central IT and units
- Units viewed CIT as expensive
- Duplication of services across CIT and units
- Few common IT standards across Cornell
- Individual unit decisions led to fragmentation of services and infrastructure
Striving for the best of both worlds

• Coordination, not centralization

• IT is embedded in and reports to the individual units, and can create flexible local solutions

• Common Cornell-wide services and infrastructure mean that distributed IT groups don’t have to build everything from the ground up
Three part solution

- IT Governance Council (Provost, CFO, Dean of CIS, and CIO) and CIO provide coordination and oversight for all non-sponsored research IT at Cornell
- Central IT provides university-level common services and infrastructure
- IT Service Groups provide comprehensive appropriately sized unit-level support (25-50 IT staff members per service group)
Proper governance will ensure that the ITGC has oversight of IT activities across campus.

**High-Level Reporting Relationships**

**Description**

- **ITGC makes strategic decisions that apply campus-wide**
  - Establishes IT priorities
  - Approves campus-wide staffing requirements
  - Approves annual IT budget
  - Drives accountability for an effective IT organization

- **CIO has reporting relationships with CIT and IT service groups**
  - Sets campus-wide standards and ensures best practices are followed
  - Enforces basic service level campus-wide
  - Recommends staffing roles and levels for CIT and IT service groups

- **IT service group directors also report to VPs/Deans**
  - Unit leaders ensure that service groups are meeting units’ programmatic needs
  - Unit leaders monitor and enforce unit-specific service level agreements

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**IT Service Groups:**

Service Groups are a redeployment of local IT functions and may be shared by multiple units. They develop unit-specific applications, perform in-person support, and host walk-in support centers.
Project oversight

- All projects over $25K must submit formal business case; <$100K can assume approval
- Projects over $100K must receive approval from ITGC subcommittee (Administrative, Academic, Infrastructure)
- Projects over $250K must receive ITGC approval
- Will require IT staff time tracking and project management
University-level IT Services

• The central IT group coordinates with all the IT service groups to provide comprehensive services to the university

• CIT is not just a standalone, subsidized cost-recovery unit

• Central services provided at marginal, not fully-burdened, cost
Service Groups will support unit needs; CIT will provide campus-wide services

Service Group Delivery Model

- All service groups will provide agreed levels of support to constituent units
- IT Directors will lead and manage service groups
  - Directors accountable to CIO and constituent VPs/Deans
- Development teams will focus on unit-specific applications
  - Primarily research-funded and smaller, unit-specific projects
- Support teams will provide in-person support
  - Dispatched from the University-wide service desk
- Service groups may also include a limited number of other approved IT staffers
- Service groups may serve as “centers of excellence” for specialized campus-wide services
End-User Support
End-user support is concentrated in desktop and application support.
There are at least four different models for desktop support at Cornell

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit Employees</th>
<th>Outsource</th>
<th>Third-party</th>
</tr>
</thead>
</table>
| **Dedicated desktop support** | • Employed by unit  
• Job description is to provide desktop support | • Employed by unit  
• Job description is not to provide desktop support; however, provide support as needed | • Hire a third party firm to provide desktop support to unit |
| **Ad-hoc desktop support** | • Employed by unit  
• Job description is to provide desktop support | • Another campus unit provides desktop support  
• Often transfer of money occurs to pay for services | |
| **Other campus unit** | • Keeps money within Cornell  
• Allows smaller units to have access to dedicated desktop support staff | |
| **Third-party** | • Can be less expensive  
• Provides access to capabilities that may not be present in unit | |

**Benefits**
- **Dedicated desktop support**
  - Usually sit in same building and offer high levels of service and responsiveness  
  - Can hire and deploy individuals with capabilities unique to unit  
  - Cost effective for smaller units
- **Ad-hoc desktop support**
  - Keeps money within Cornell  
  - Allows smaller units to have access to dedicated desktop support staff
- **Other campus unit**
  - Can be less expensive  
  - Provides access to capabilities that may not be present in unit
- **Third-party**
  - Security of Cornell data and systems

**Concerns**
- **Dedicated desktop support**
  - Can be expensive for small units
- **Ad-hoc desktop support**
  - Often not informed about desktop standards, rules, and regulations (for example: don’t have admin passwords)
- **Other campus unit**
  - Confusion over roles and responsibilities of contracted units  
  - Often not cost effective
- **Third-party**
  - Security of Cornell data and systems

Results in inconsistent delivery of desktop support
Units have varying degrees of scale in desktop support, most below benchmarks.

Benchmark = 200-400

PCs Supported per Desktop Support FTE

Cornell Units
Standardizing devices is critical in controlling costs in support services

<table>
<thead>
<tr>
<th>Device type</th>
<th>Recommended Standards (excludes sponsored funds)</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Personal computers (desktop or laptop)</td>
<td>• <strong>Small set</strong> of certified PC vendors (e.g. 1 PC, 1 Laptop, Mac)</td>
<td>• Single source, <strong>central purchasing</strong> of personal computers that meet university-wide standards</td>
</tr>
<tr>
<td></td>
<td>• Certified vendors provide repair</td>
<td></td>
</tr>
<tr>
<td>• Operating systems</td>
<td>• <strong>Small group</strong> of standard versions (e.g., 1x each Windows, Mac, Linux)</td>
<td>• Operating systems installed through <strong>central desktop engineering</strong> teams</td>
</tr>
<tr>
<td>• Mobile devices</td>
<td>• <strong>Preferred vendors &amp; multiple</strong> devices</td>
<td>• Users <strong>call cell phone carrier</strong> for technical support to resolve issues</td>
</tr>
<tr>
<td></td>
<td>• Paid for with Cornell stipend</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>Limited support</strong></td>
<td></td>
</tr>
<tr>
<td>• Printers</td>
<td>• <strong>One vendor</strong> with outsourced hardware support</td>
<td>• Printer types (makes, models) <strong>determined centrally</strong></td>
</tr>
<tr>
<td></td>
<td>• <strong>Shared multi-function</strong> units are standard</td>
<td>• <strong>Standard replacement cycle</strong> adhered to by units</td>
</tr>
</tbody>
</table>

Device list not exhaustive

Exceptions will require full cost recovery and multiple levels of approval
Staffing changes will reflect regional clustering of end-user support within Service Groups

**High-level delivery model**

- **University-wide ITGC Oversight**
  - **CIO**
    - Director of CIT
    - Device and desktop engineering (disk images, hardware, software)
  - **CIT**
    - University-wide Service Desk (phone, web and remote desktop)
  - **Service Group**
    - IT Director
    - In-person support (dispatched centrally)
    - Walk-in center (optional)
  - **VPs/Deans**

**Description**

- **Central service desk provided by CIT**
  - Serves as initial point of contact and resolution for campus
  - Will use phone and remote desktop technologies
- **Service groups provide clustered end-user support for units**
  - In-person desktop support teams dispatched by the service desk
  - Strategically placed walk-in centers will be available in certain units
- **CIT also provides device and desktop engineering**
  - Maintains device standards, disk images and non-standard hardware/software
- **New/enhanced capabilities and roles**
  - Example: University-wide service desk, walk-in support centers
Application Software Services, Development, Maintenance and Support
Approximately 289 FTE and ~$28M is spent on developing, enhancing, and maintaining applications.

Cornell spends significant money on applications... with questionable results

"We spend enough money on applications to get a gold-plated Mercedes Benz, but what we’ve got is a Volkswagen with the engine falling out."

Dean

"Our spend is not commensurate with the applications we have."

Vice President

"I came into this project assuming duplicative application development would be a big opportunity."

College IT employee

"We put a lot of money into building apps to fill needs not met by the university."

College Officer
Application development and maintenance resources are highly fragmented

Application Development, Enhancement, and Maintenance FTEs
(Personnel Spend)

Total = 289 FTEs ($28.5M)

CIT

<table>
<thead>
<tr>
<th>Application Type</th>
<th>FTEs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin/Business</td>
<td>113</td>
<td>($11.6M)</td>
</tr>
<tr>
<td>Outreach/Extension</td>
<td>118</td>
<td>($11.0M)</td>
</tr>
<tr>
<td>Research</td>
<td>42</td>
<td>($4.2M)</td>
</tr>
<tr>
<td>Academic/Teaching</td>
<td>16</td>
<td>($1.7M)</td>
</tr>
</tbody>
</table>

[Diagram showing the distribution of FTEs across different categories]
Fragmentation of application development results in inefficiencies

**Poor life cycle management**

- Cornell is maintaining over **1,800 applications**, many >5 years old
- ~50% were **developed internally** or customized heavily

**Duplication of applications**

- "We are all rewriting the same applications. We can’t come together, not even some of the smaller colleges, and agree on what our end user requirements should be.”

**Multiple standards for applications**

- "We don’t need gold-plated applications, when bronze will do.”

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### College IT Director

- Three colleges collaborated to develop a SIP (Salary Improvement Plan) application
- They agreed on ~80% of development but ended up with three unique solutions
- Application was not designed for University-wide standards & scale

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### College Officer

- One unit developed an application to monitor and track compliance
- Animation and other “bells and whistles” were added when vanilla application would have sufficed
“Developing or molding a solution to meet existing, often historical or idiosyncratic practices, is ineffective and expensive. We instead need to make careful choices of standard IT systems and services while simultaneously redesigning the affected work practices so that they are effective with the new systems and services.”
Admin/bus and outreach/extension applications offer the largest opportunity for clustering

Application Development, Enhancement, and Maintenance FTEs (Personnel Spend)

<table>
<thead>
<tr>
<th>Category</th>
<th>FTE</th>
<th>Budget ($M)</th>
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<tr>
<td>Administrative/Business</td>
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<td>16</td>
<td>$1.7</td>
</tr>
<tr>
<td>Total</td>
<td>289</td>
<td>$28.5</td>
</tr>
</tbody>
</table>

Potential Opportunity
209 FTE
$20.9M

Key
- Yellow = Potential opportunity to cluster resources
- Red = Being investigated by Academic Technologies subcommittee
- Blue = Likely to retain current model

CIT
Academic/Colleges
Central Admin
Research Centers
Staffing will reflect changes in oversight and focus on clustered development

High-level delivery model

University-wide ITGC Oversight

CIO

VPs/Deans

CIT

Director of CIT

Service Group

IT Director

Tier 1
- Project Manager
- Developer
- Quality Assurance
- Business Analyst
- Standards Mgmt
- Architecture
- Information Security
- Vendor Management
- External Vendor 1

Tier 2
- Architecture
- Information Security
- Vendor Management
- External Vendor 2

Tier 1
- Quality Assurance
- Business Analyst

Tier 2
- Project Manager
- Developer
- Quality Assurance
- Business Analyst

Description

- CIT provides campus-wide solutions
  - Application development/sourcing for solutions that are either large or impact multiple units
  - Architecture and information security for entire campus
  - External vendors and outsourced solutions

- IT service groups provide unit-specific solutions
  - Development resources focused primarily on smaller, unit-specific solutions
  - Staffing levels subject to ITGC oversight

- New/enhanced capabilities and roles in both CIT and IT service groups
  - Examples: architecture, vendor management, business analyst

Tier 1 = Applications with high cost and campus-wide impact
Tier 2 = Applications with lower cost and/or unit-specific impact
Servers and Storage
Improved Centralized Services

• Convert to blade servers, reducing power and cooling requirements

• Virtualize most servers, and include “on demand” services

• Develop uniform campus-wide storage solutions

• Cost-recover based only on incremental costs, not on overhead
What about Library IT?
Before Reimagining

- Library had two independent IT organizations
- Individual IT staff were scattered in unit libraries and departments
- IT units had defined areas of responsibility, but there were both gaps and overlaps
- The IT units were a mix of IT-related activities
Information Technology Services

The Information Technology Services (ITS) group (map it) at Mann Library is responsible for all computer equipment in the library, which consists of approximately 130 public access computers and 120 staff computers. Mann Library ITS also develops digital collections and other online teaching and research resources for the library, the College of Agriculture and Life Sciences, and the College of Human Ecology. Mann Library ITS is responsible for over 25 servers that run a variety of systems developed in Mann Library including:

- CALS Research Portal
- Cornell University Geospatial Information Repository (CUGIR)
- e-Clips: Cornell's Premier Digital Video Clip Collection
- The Essential Electronic Agricultural Library (TEEAL)
- Virtual Life Sciences Library (VIVO)
- USDA Economics & Statistics System
Cornell University Library IT (CUL-IT) became one of the first four IT service groups at Cornell
What is IT?

• Does it include digitization services and metadata creation?

• What about ePublishing support (arXiv, Project Euclid, eCommons)?

• For web development: Are the graphics and content creation functions part of IT?
Under Cornell’s new IT structure, none of those activities are IT
What are the consequences?

• Library avoids oversight burden by separating out IT-enabled activities from core IT activities

• This forced a very specific division of responsibilities into two high-level units: CUL-IT and Digital Scholarship Services

• Web development is split into two different organizations: one for programming, and one for content and design
What’s Working for the Library?

• Developers now share common web services, code repository, and practices

• Creating common service monitoring system and system configurations

• All Library units can draw on complementary expertise of formerly separate units

• If anyone in the Library has an IT problem, CUL-IT owns it
What challenges remain for Cornell?

- A lot remains to be implemented, including university-level services, a central helpdesk, and 3/4 of the service groups
- There is no current plan for supporting academic technologies or making investments in academic IT
- Agreement on a new university budget and cost allocation model is critical to all the new IT efforts
- ITGC review for projects could discourage new efforts - even when they result in better outcomes
- Many IT efforts currently work well - the proposed changes could break them
Acknowledgements

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