This paper describes a project to modify an existing Human Resource Information System for the Dean’s Office in the College of Arts and Sciences at the University of North Carolina at Chapel Hill. The current system was evaluated through observations, informal surveying, and employee input. The main problems with the system were scalability, ease of use, ability to analyze information, and duplicated data entry.

After reviewing the current systems available, a decision was made to develop a new system so that a customized, staggered solution could be implemented. Several design decisions were made, including creating a one-page system with sorting and parameters to increase the ease of use; facets to organize the data; and the ability to export to Microsoft Excel to facilitate analysis. The new system received positive reviews and the experience proved that the entire environment should be scanned when designing an information system of any size.

Headings:

- Faceted browser
- User interface design
- Enterprise Resource Planning
- Human Resource Information System
FACETED INTERFACE FOR HUMAN RESOURCE MANAGEMENT IN THE COLLEGE OF ARTS AND SCIENCES

by
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A Master’s paper submitted to the faculty of the School of Information and Library Science of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Science in Information Science.

Chapel Hill, North Carolina
April 2011

Approved by

_______________________________________
Brad Hemminger
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Introduction

The focus of this study is on the development of a system to capture human resource information in the College of Arts and Sciences’ Dean’s Office at the University of North Carolina at Chapel Hill. This system was targeted in another study as the primary point of duplicate data entry and a starting point for redesigning the entire information architecture supporting the Dean’s Office. The goal of the project was to first evaluate the existing human resource information system, research the potential options, determine a solution that would best fit into the information architecture of the office, and assess the implemented solution. The results shed light on some important considerations for information architects when designing systems.

1.1 Background information

The College of Arts and Sciences is the largest school at the University of North Carolina at Chapel Hill. The College teaches over eighty-six percent of undergraduate credit hours at the University, and operates with over 260 million dollars in annual expenses. Due to its size and diversity, administrators have adopted unique methods to manage the finances and related human resources of the seventy departments in the College. Also, small holes in University systems have been magnified in the complex environment, and this forced the development of shadow systems for either reporting or appending additional information what the University captures.
During the past decade, the Dean’s Office has purchased and developed shadow systems as independent applications that support a specific need or process. This approach has molded the current information landscape into an impassable sea of systems (see figure 1), and the result is a duplication of effort to maintain each application. The current method of developing new systems for individual processes has proven to be an inefficient strategy for growth. Unfortunately, the University has a culture that motivates departments to remain autonomous and not collaborate with other units. This means that the Dean’s Office cannot attach new modules or entire systems to existing University systems.
For a small office of only eleven permanent staff members, the information processed through the Dean’s Office is monumental. Even though the College is decentralized and departments initiate their own human resource and financial actions, most of these actions must be approved in the Dean’s Office. There are 1,527 permanent employees – 765 tenured and tenure-track faculty, 201 fixed-term faculty, and 561 staff – and another 3,369 temporary employees. In addition, the College of Arts and Sciences holds an endowment of over $380 million including hundreds of endowed chairs and private funds for awards, scholarship, or departmental support. The Dean’s Office is supports the allocation and budgeting of these funds along with approximately $120 million in state funds. Finally, the eleven staff members serve as a resource for questions on the operations of departments in the College.

1.2 Problem

This project targets the replacement of a system which requires heavy data entry and is not very user friendly, the IT Works system. This system embodies the definition of a shadow system and requires much of the University kept human resource data to be re-keyed into its many forms. This system has been identified by staff members through unstructured interviews, surveys, and observations conducted as part of work processes as one of the most difficult systems to use and the main source of duplicate data entry.

IT Works allows users to view personnel information one employee at a time but searching is limited to the employee ID or name and you can only search an exact match or contains. The user interface organizes information by tabs for the various types of information – demographics, leaves, ranks, and salary. The system does not allow users to sort any of the data or filter the results by any attribute, such as primary department.
<table>
<thead>
<tr>
<th>Issue</th>
<th>Survey Question</th>
<th>Agree</th>
<th>Disagree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of use</td>
<td>Enjoy using system</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>I like the design of IT Works</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Easily navigate within the system</td>
<td>50%</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>Duplicate data entry</td>
<td></td>
<td>50%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td>Filter data to see results I want</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sorting is not needed</td>
<td>75%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can accomplish what need to</td>
<td>75%</td>
<td>25%</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2: IT Works Evaluation Survey Results**

**Sample size = 4 employees; one never entered data into IT Works**

The research found four main areas for improvements with the current human resource information system, IT Works:

1. **Scalability** – Major modifications and additions to IT Works are only available if other customers have similar needs. Furthermore, each need in the Dean’s Office prompts a new system and there is not a system that can integrate new processes well. It requires an information professional just to navigate through the complex web of systems, but staff members need to have more information at their fingertips.

2. **Ease of use** – IT Works does not have many advanced features, and nearly half of the users are not happy with the system (figure 2). You can only search on the ID and name fields, and searching using an unintuitive key combination [Ctrl+Z]. Furthermore, the windows are not expandable and users often need to scroll after five rows of data. This issue is also closely tied to analysis because users are not able to perform the analysis that they want due to poor reporting and a lack of filtering and sorting options.
3. **Analysis** - Users need a system that will not only provide quick access to personnel information, but also they must be able to export data and have new views created quickly – IT Works does not allow either. There are no filtering or sorting options and the reporting options in the system are too slow and clunky.

4. **Duplication of data entry** – The Dean’s Office purchased the personnel piece of the software in order to maintain information on employee leaves, ranks, salaries, and reviews. Since they are only using a small piece of the system, the staff members are not receiving a lot of the benefits of the system and instead are forced to view unused parts of the system which impacts their cognitive load (Miller, 1956). Furthermore, only the data on faculty leaves, reviews, and travel grants is not available in the University systems but the staff members must re-key demographic, rank, and salary information to use the system.

**Review of Literature**

Before deciding what solution to implement, it is important to determine what research suggests for the problems with this system. The IT Works system functions as a human resource information system (HRIS) which may have specific concerns or limitations. On the other hand, the strategy for the information architecture focuses on the integration of systems and an Enterprise Resource Planning (ERP) system may need to be implemented. Lastly, the size and scope of the Dean’s Office makes reporting a serious concern with respect to each information system, and some form of faceted browsing might help alleviate the need for standardized reports by facilitating the exploration of the data.
1.3 HRIS

Human resource information systems (HRIS) play a very important role in the management of human resources in organizations. According to DeSanctis (1986), these systems should support three distinct applications – operations and record keeping, managerial support, and planning (p. 19). While human resource employees will need to enter and update information, an HRIS needs to be flexible enough so that employees can query and retrieve information that they need to support decisions for management. Furthermore, the valuable information in these systems can assist in the planning and analysis of employees in an organization. Haines (1998) states that “…the extent to which the HRIS is flexible to interact with or that the HRIS helps increase productivity” determines its successful application in the organization (p. 271).

Furthermore, a human resource information system can function as the primary analysis tool for an organization with many employees. In his research survey of organizations in the United Kingdom, Ball (2000) found a positive correlation with the number of employees and the amount of information analysis that occurs with the organizations HRIS (p. 691). These findings confirm that as an organization grows, it will be more important for their human resource information system to move from operation and record keeping toward planning. Larger organizations will employ their HRIS to support a “hierarchy of managerial activities, ranging from routine reporting to unstructured decision making” (DeSanctis, 1986, p. 18). The complexity of the needs of management drives the implementation of a flexible system that supports querying and the exporting of data. These features help managers to use existing skills to look up and manipulate the employee information.
Even the most sophisticated human resource information system can still lack important information needed to support decision making and planning. These systems should ultimately reduce costs and provide analytical support (Ball, 2000, p. 679). However, if the HRIS is not adequately integrated into the overall information architecture of the organization, then managers may not have the full picture when they are making decisions. For example, the department may have transferred personnel money to pay for equipment and they are unable to fund a temporary employee. An ERP system is the only solution that can illuminate the entire picture all at once for management and prevent duplicated data entry for staff.

1.4 Enterprise Resource Planning Systems

An Enterprise Resource Planning system is a comprehensive software suite that attempts to integrate the “…complete range of a business’s processes and functions in
order to present a holistic view of a business from a single information and IT architecture” (Klaus et al., 2000, p. 141). Companies provide a standard ERP package which can then be customized for the specific needs of the purchasing organization. In order to support the entire business, the system provides controlled redundancy to create a highly functional, efficient experience. Furthermore, users can easily move to a new module because a characteristic of ERP software is a consistent graphical user interface (Klaus et al., 2000, p. 144). Another characteristic of these systems is that they are developed around business processes. Therefore, even though the modules may have similar user interfaces, they do have major differences due to the coding of the business rules.

Businesses of all sizes are implementing Enterprise Resource Planning systems due to the wide range of benefits that can be experienced (Klaus, 2000, p. 141). According to Robey (2002), the main reason for implementing an ERP is “…greater data visibility and analysis capability, and more process-centered thinking” (page 18). Managerial decision-making and planning can be heightened more with an ERP system than through an HRIS alone. Furthermore, Shang and Seddon (2000) mention five benefits that will lead to integrated processes and system coordination which support an employee ‘common vision’ and more empowered users (p. 2). These benefits are operational, managerial, strategic, IT infrastructure, and organizational. These benefits explain how upper management can assess ERP software.

The assessment of an ERP system must take into consideration the current state of the information architecture within the organization. Part of the investment in an ERP system will also be the customization for the specific operations of the business as well.
The first step in an implementation will be a thorough needs analysis using techniques typical to “…user-centered design (interviews, contextual inquiry, observation) but….focus[es] on obtaining a more complete and holistic picture of the environment” (Robertson, 2007, p. 3). Gable (2002) suggests evaluating an ERP system based on four components, including individual impact, organization impact, system quality, and information quality (p. 586). Since ERP implementations are a costly and time-consuming venture, perhaps better information analysis can be provided through a faceted browsing interface.

1.5  **Faceted Browser**

A faceted browser can be implemented as a user interface to facilitate the analysis of the information contained in the database. Hearst (2003) describes the goal of a faceted interface as offering the flexible organization of search results. She provides a description of the faceted system that they implemented for image browsing:

The design can be thought of as having three stages, by rough analogy to a game of chess: the opening, middle game, and endgame. The most natural progression is to proceed through the stages in order, but users are not forced to do so… The items in the result set can be sorted on various fields, or they can be grouped into categories by any facet. Selecting a category both narrows the result set and organizes the result set in terms of the newly selected facet (p. 412).

The organization of the collection through faceted meta-data allows the users to move through their queries in a more flexible manner. Serendipitous information retrieval is more likely through a flexible, faceted system, thereby increasing the analysis potential. Additionally, Shneiderman and Byrd (1998) states that faceted browsing improves the refinement of user searches through successive querying since their previous searches will be kept in the history buffer and allow the “…review, alteration, and resubmission of
earlier searches” (p. 98). More modern faceted browsing allows the user real-time control of the data, including the ability to move backward through their search and easily explore the data set.

Employees need a system that allows more than just searching in order to perform analysis and planning. Research by Hemminger and Niu (2011) indicated that users are more inclined to use faceted browsing systems “…where facets support as well browsing the collection as refining a text search” instead of facets purely for refining a search (p. 7). These findings also link to the fact that often the information retrieved based on the user’s statement of need does not always represent exactly what they might be looking for, and this can be especially true for complex management. A “…facet analysis is a general yet powerful strategy for decomposing complex information needs…. systems should provide some type of support for this method of analysis” (Lin et al., 2008, p. 30). These type of system could be a middle ground to provide analysis without the cost of a full ERP implementation.

Implementing a faceted interface has been found to have many benefits for the users of the system. First, Antelman et al. (2006) found that task success was improved and task duration was reduced when using a faceted navigation system for North Carolina State University’s library catalog. Furthermore, a faceted browsing interface allows the user to examine relationships among data attributes and understand the data set (Marchionini & Brunk, 2003). According to Marchionini and Brunk (2003), “…understanding the data set leads to more effective searching and usage” of the system and the information in the database (p. 1). Lastly, the dynamic query building afforded by these systems combines browsing and querying to give the users more control over
their experience with the system and the information (Plaisant et al., 1999). Users can refine query to get a different view of data, which can help both novice and expert users find trends and spot exceptions.

**Competing Alternative Products**

In order to solve the issues related to the current human resource information system, IT Works, the Dean’s Office considered several comparable systems. The desired solution needs to be scalable and allow related data to be integrated into the system. It also needs to be easy to use with more advanced features that will allow managers more ad-hoc querying and data analysis. Linking in with University systems and data would be preferable in order to reduce duplicate data entry, although the ability to load in data would suffice. The system needs to be able to sustain a small number of users, around five, in the short-term but hopefully be scalable to be used outside of the Dean’s Office with up-to 200 users. Lastly, financial considerations limit the choices to products costing at most several thousand dollars (including the option of modifications to the existing system).

<table>
<thead>
<tr>
<th>Name</th>
<th>Cost</th>
<th>Database</th>
<th>Main Benefit</th>
<th>Main Drawback</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Works</td>
<td>$3K00 per year</td>
<td>MS Access</td>
<td>No implementation</td>
<td>See problem</td>
</tr>
<tr>
<td>Drupal</td>
<td>&lt; $5K</td>
<td>MySQL</td>
<td>Faceted interface</td>
<td>Not best solution for numerical content</td>
</tr>
<tr>
<td>HarrisData</td>
<td>$5K to $30K</td>
<td>IBM DB2</td>
<td>Scalability</td>
<td>Too many features</td>
</tr>
<tr>
<td>InfoPorte</td>
<td>None</td>
<td>N/A</td>
<td>Linked to Campus data warehouses</td>
<td>Limited customization</td>
</tr>
<tr>
<td>OnBase</td>
<td>$5K to $30K</td>
<td>IBM DB2</td>
<td>Integration with other applications</td>
<td>Not best solution for numerical content</td>
</tr>
<tr>
<td>PeopleSoft</td>
<td>&gt; $30K</td>
<td>Oracle</td>
<td>Scalability</td>
<td>Implementation Cost</td>
</tr>
<tr>
<td>SAP</td>
<td>&gt; $30K</td>
<td>any</td>
<td>Data analysis</td>
<td>Implementation cost</td>
</tr>
</tbody>
</table>

**Figure 4: Comparable products**
1.6 IT Works

Description – IT Works distinguishes itself as grant management software specifically designed for educational institutions. In addition to the personnel module that the Dean’s Office purchased, there are other modules that could be purchased in order to make it a complete enterprise system, including the grant, accounting, facility management, and space/inventory modules. Furthermore, the license agreement for IT Works is available for a smaller set of users than most HRIS and ERP systems (screenshots – appendix B).

Benefits – This is the “as is” solution and there would be no implementation cost for the system. A loading feature could be arranged in order to import data from the University systems, but that would be an additional cost.

Drawbacks – see the problem statement.

1.7 Drupal

Features – Drupal serves as a content management system that can be implemented for free on an organization’s servers. Since it is an open source software package, there is limited support for the implementation and users must be adept in the deploying applications in order for the pages to work. Furthermore, there is a faceted search module that will allow users to “never feel lost in the data”. The metadata is created using the taxonomy features of Drupal and other tagged metadata as well, allowing users to refine or expand queries at any point during their search.

Benefits – This would serve as a fully integrated faceted browsing interface for the Dean’s Office, which would give the most flexibility for analyzing their human resource
data. Additionally, new content or data can be added quickly and easily with Drupal and the facets would be created when the content is entered into the system as metadata.

**Drawbacks** – The main drawback of Drupal is that it functions best for text-based content and not for the numerical data that the Dean’s Office needs to access. There would also be a larger learning curve to implement the Drupal Core and the faceted search module which creates a cost for this solution.

### 1.8 HarrisData

**Features** – HarrisData runs off an IBM servers and their ERP solution includes management modules for accounting, payroll/human resources, ordering, purchasing, inventory, and manufacturing.

**Benefits** – Targeted toward mid-sized businesses, this solution would be more affordable than a larger scale ERP. Also, the software includes entry and exit points for any part of the system allowing customization and integration with outside applications.

**Drawbacks** – The HRIS piece has more features than are needed by the Dean’s Office, and this software may not allow for their customized needs. Furthermore, this would require IBM servers to be purchased, installed, and scanned for the database storing the human resource information.

### 1.9 InfoPorte

**Features** – InfoPorte provides a consolidated view of financial and human resource information from the University data warehouses. The software was custom built by the School of Pharmacy and is being modified to work within the College of Arts and Sciences and other schools at the University. The system provides and easy to use
interface with standardized features and appearance. The system was created in order to allow front-line employees to have access to information they need without requiring the training necessary to use the complex and full-featured systems at the University (screenshot – appendix C).

**Benefits** – Since the College is already implementing InfoPorte, this would be an opportunity to select InfoPorte as the system for Dean’s Office data. As an added benefit, departments would have live access to any of the Dean’s Office data on faculty leaves, reviews, etc.

**Drawbacks** – At the current time, modifications to InfoPorte must go through a University stakeholder committee and they would probably not consider these additions as a high priority. Also, the system functions more as a view of the University data warehouse information than a true RDMS application that would allow data to be created, read, updated, and deleted.

### 1.10 OnBase - Information Access Systems Inc. (IAS)

**Features** – OnBase is a fully integrated enterprise content management software package, this includes workflow and document imaging. This system also allows full integration with other applications, which allows other systems to display the related documents and data in OnBase. This functionality comes out of the box and is provided along with the ‘single interface’ software (screenshot – appendix D).

**Benefits** – Users can manage and analyze content from a variety of sources including Microsoft SharePoint, SAP, or other business applications. The University of North Carolina at Chapel Hill has SharePoint licenses allowing the Dean’s Office to affordably maximize the power to integrate documents, workflow, and data. Since this is the only
solution that will allow this level of integration, it will provide a ‘plug-in’ enterprise level atmosphere for the current systems.

**Drawbacks** – As with other content management solutions, OnBase does not handle numerical data and analysis as well as pure database driven applications. While the addition of workflow and imaging could be beneficial in the long-term, it was not identified as a primary issue with the current framework.

1.11 PeopleSoft Campus Solutions

**Features** – A complete and fully featured ERP software package, PeopleSoft includes modules for most of the standard processes within an organization. In addition, businesses can create custom modules for specific business needs. The University has already implemented the Campus Solution piece of the software and is in the process of implementing Finance, HR, and payroll (screenshot – appendix E).

**Benefits** – The system contains many features that would help with the analysis of data and contains a scalable framework to support growth of data storage, users, and modules. Adding Dean’s Office data into PeopleSoft would be the best way to eliminate duplicated data entry.

**Drawbacks** – A stand-alone implementation would be too expensive and the College cannot append data into the University’s PeopleSoft implementation. In addition, it can be difficult to navigate through the system given the amount of information available. Additions and modifications could take too long or not be implemented because work must be performed by the University ERP group.
1.12 SAP Human Capital Management

Features – The SAP system for human resource management is based on one set of employee master data, which completely reduces redundant data entry. The software caters to organizations of all sizes, but is capable enough for the largest businesses (screenshot – appendix F).

Benefits – Similar to other ERP systems, the SAP module for Human Capital Management has many features and is scalable for customized needs as well. Deeper insight into the data can be attained through their flexible reporting features and the ability to explore the data due to the links between the modules and tables.

Drawbacks – Implementation and customization is expensive. Similar drawbacks apply to SAP as with PeopleSoft, and the users often complain that the system is complex and it is difficult to navigate through such an extensive amount of information. This would lead to increased training for the staff in the Dean’s Office and potentially less satisfaction with the system.

Implementation – College Datamart

Despite the comparable solutions available to replace the IT Works system, the decision was made to build a custom, in-house system. According to Haines (1998), human resource information systems that are developed in-house are often more successful because the users enjoy the increased customization of these systems (p. 265). The Dean’s Office did not have the budget or the time to implement a full-scale ERP solution, and there are currently only a handful of users for the IT Works system. The system will be developed so that further data and modules can be added one at a time to ultimately support all of the extra data needs of the Dean’s Office.
1.13 Platform – MS Access

The chosen platform for this project was Microsoft Access because the College has two staff members dedicated to maintaining ten other MS Access systems. In addition, these applications can be developed quickly and the only cost will be staffing for maintenance and the modules that will be added. Also, the system can be integrated well with MS Excel, which many employees are already familiar using for data analysis. Forms can be quickly built using Visual Basic and MS Access contains most of the functionality of a large scale application despite not being scalable for more than ten to twenty users. The College Datamart will be developed without any extra budget and using current staff time and resources.

Design Decisions

Based on the existing research and comparable systems, specifications were developed for the College Datamart system. The evaluation of the IT Works system also filled in most of the user requirements, but additional consultations were performed in order to make sure that the best decisions were made for the design given that the system was going to be developed in MS Access. Additional design features and screenshots can be viewed in appendix G.

1.13.1 Facets

The main design of the system will be tabbed structure with sub-tabs that are related to the main tab. This approach chunks the information, or “combin(es) many units of information into a limited number of units or chunks, so that the information is easier to process and remember” (Lidwell et al., 40). The main tabs will be used for
specific processes – looking up employee information, managing travel allocations, position authorizations, etc. This will help users analyze the data by grouping it into similar categories and allowing them to filter all of the sub-tabs by parameters on the main tab. It is also a scalable solution because tabs can be added in the appropriate group.

1.13.2 One page, one look

The user interface will only have one page for the current information and one look if any additional pages are added in the future (see figure 6). This concept provides an easy to use interface and a scalable system. Moreover, it follows the Entry Point Principle and helps to initially orient the user so that they are able to quickly determine how to navigate the system (Lidwell et al., 80). Design and coding time will be reduced because the developers will not need to make any new design decisions when building new modules or tabs.

1.13.3 Scalability

The real benefit of creating a system with one look is that the system can be programmed using objects so that the system is truly scalable. This mimics the relational browser in Marchionini and Brunk’s study (2003), in which they found that for adding data to the system that the data collection itself takes longer than the programming. The “information architects can focus on data collection and organization rather than interface programming (p. 11).

In order to do this, the application must save attributes of the interface into a table along with the parts of the queries that the users will generate. When a user opens the
application, the form loads the appropriate tabs (pages) for the users. These page objects are initiated and loop through tables that load parameters and other attributes, including sub-pages (sub-tabs). Those sub-pages also load parameters and attributes and store the “Select” and “From” statements of the queries for the data that they will load (figure 5). When a user makes choices in one or more of the parameters, the systems will dynamically generated the “Where” clause to append to the existing query. These choices are saved and the user can then refine and expand their selections at any time. They also have the option of simply resetting the system and starting over again.

1.13.4 Excel Export

Users should be able to access a quick export for any data in the system from any tab and using their current filters. Marchionini and Brunk (2003) recommend using
current conventions to prevent confusion and create a better experience for users.

Managerial analysis can be best performed using MS Excel as everyone is already familiar with this tool. It can also serve to prevent the manual keying of data for users to create and maintain their own spreadsheets. Instead, they will be able to quickly and easily drill to the data that they need, and then export it into MS Excel in order to manipulate it and create a report.

1.13.5 Use existing data

The system will use an extract from the HR Data Warehouse in order to prevent users from needing to re-key information that is currently available from the University. Although the extract must be loaded on a bi-weekly basis, the loading procedure will be automated so that the user only needs to use a familiar file browser to select the downloaded file from the HR Data Warehouse and then the system will load and validate the data. User created data will never be deleted, but all data pulled from the Data Warehouse will be overwritten and validated with the automated procedure. Furthermore, the loading procedure will flag employees that may be new and need some manually entry to fill in information that is not available from the HR Data Warehouse.

1.13.6 Sorting and parameters

Users were not satisfied with the sorting options in IT Works related to the salary tabs and any other lists of information and the inability to filter the set of employees by division, department, or employee type. Therefore, the College Datamart will have extensive sorting capabilities and parameters in the system to ensure that it is capable of meeting these functions. The main tabs will contain related sub-tabs and users will now
be able to filter employee information by employee type, division, department, employee name, and effective dates. Also, each sub-tab with long lists of data will have a consistent sorting on each column. Sorting will be enabled by having clickable column labels that sort the records based on the contents of that column. The label for each column will allow the user to click once to sort ascending and then again to sort descending. This will save clicks, reduce mental load, and help organize the information on the fly by any of the Five Hat Racks (Lidwell et al., 100).

1.14 Design Implemented for Version 1

After several mock-ups, the system was creating with a consistent icon set and a blue tone color scheme. The pages were tested for data entry by one employee and the validation and user experience were modified as problems occurred. The final design can be viewed in figure 6.
Assessment

An assessment of the College Datamart system was initiated eight months after it replaced IT Works. Many changes were made to the system during the implementation phase, but the system has remained nearly unchanged over the past five months. This is due in part to one of the programmers moving to different position in the Dean’s Office and no one has had time to create other modules and further develop the system as an enterprise level system for the Dean’s Office. Nonetheless, the College Datamart continues to be used by employees on a daily basis and has not required much support as initially planned.

1.15 Methodology

As part of a work process to evaluate the system and plan for modifications, a survey was sent to eight employees in the Dean’s Office. Five of those employees filled out the short survey and gave their recommendations as well. The survey was conducted anonymously online in an attempt to remove some of the observer biases that may have been present if the survey was conducted in person.

Of the respondents, one hundred percent had used the system to query employee demographic information. However, only fifty percent had used the system to review faculty leaves, salaries, and reviews. An even more striking fact was that only one employee had ever used the system to enter information before. This was partly due to the loading from the HR Data Warehouse but also because the data entry was given to just one employee at the current time.
1.16 Results

The responses from the survey were all positive, and there were not many complaints about the design and capabilities of the new system. Most of the current staff had not used the IT Works system due to employee turnover, but all of the employees who had preferred the College Datamart. They defined the Datamart as requiring less duplicate data entry, easier to use, less frustrating, more capable, and they are having a more enjoyable experience as well. One user commented that they like the “ease of moving from tab to tab.”

Some of the positive sentiment about the IT Works system could have been related to the benefits from storing valuable information that was not available elsewhere. Davis (1989) states that how useful the system is can often be much more important than how easy it is to use (p. 333). In line with the cost-benefit theory, even if the system does not perform well, users may continue to perceive it as adequate if they benefit from critical information or functionality. This hypothesis would help to explain why many more users made positive claims toward the new College Datamart system (figure 7).

Figure 7: Dean’s Office Datamart survey responses vs. IT Works survey responses
Many employees have also generated their own reports using the excel export feature. This has been a huge help to provide managerial analysis for the underlying data. Users are adept at pulling excel exports and creating a quick pivot table of the data, which was not possible in the previous system. These ad-hoc reports have also helped the users to reduce their need for maintaining separate spreadsheets where portions of data or all of the data is available in the Datamart system. Additionally, the system has more flexibility and users can request for additional columns or even tables to be added to the system and eliminate their shadow spreadsheets.

Staff members in the Dean’s Office have been especially pleased with the level of customization for the College Datamart system. This begins with the flexibility to add more data and view it in the organization that makes sense to the user and flows throughout the system. Since an in-depth user requirements analysis and testing occurred within the Dean’s Office, this system meets their needs better than the IT Works system. Nonetheless, the organization marks the true customization to the needs of the Dean’s Office. All of the other features of the system could be implemented in any business environment with success due to the ease of use and the flexibility for it to be implemented based on the needs of any organization.

Finally, little maintenance is required with the new implementation and the Dean’s Office has reduced their costs to meet their needs for human resource information storage and reporting. The previous contract with IT Works included an annual fee, whereas this system will be maintained in-house and supported by existing employees. Eight months after implementation, the system has only had a handful of problems requiring less than eight hours of support from the programmers. Hopefully, the system
will continue to grow and include more information with the majority of the effort falling into the hands of the information architect to organize the data and provide a meaningful structure for the users.

**Implications for future research**

More time is needed to thoroughly evaluate the effectiveness of this system as a scalable solution for providing a quick, intuitive, and organized view of data within an organization. One possibility would be request views from the various data warehouses at the University that the system could use in its queries. In general, more steps need to be taken in order to reduce the complexity of the information architecture and the amount of duplicate data entry that is needed for these systems.

One last possibility would be to code this into a web-based framework so that more users could have access to the system. This would allow even more feedback and further disbursement of information throughout the College to improve the decision quality of departmental managers and chairs.

Perhaps larger systems and implementation could focus more on the structure of the data than the pages that are developed for the users. The design of this system has proven flexible enough for any user to explore information in their organization and develop reports based on their needs. Business software developers have spent a lot of effort analyzing what businesses do and how they do it instead of focusing also on why they do it. Data entry and processing may be streamlined by these systems, but they do not have good methods for the discovery of issues and opportunities.

Finally, even though all organizations perform their work differently, the real difference lies in how they organize their data. The College Datamart system would
allow any organization to define how their information needs to be stored, viewed, and explored. This flexibility can lead to competitive advantages and a true understanding of what has happened and will happen in the future.

**Conclusion**

The biggest lesson that can be learned from this study is that you cannot build any system in isolation. Careful thought needs to be given before undertaking any application development project, but not just input from the customer on their needs. You also need to conduct a thorough analysis of the environment to try and determine what already exists and how to best add to the current infrastructure. This might not always be an internal search either, and a truly skilled information architect will also scan the exterior environment. Schools and departments at the University have begun to collaborate more on the development of information systems, and this will pay dividends in the future.

Finally, this project demonstrates the importance of thinking about what the users need to get out of a system rather than just how they will put information into a system. This thinking goes beyond just considering the normal reporting needs of users to providing information analytics tools which will allow users to serendipitously find problems and opportunities. Users will accept a system for various reasons, but we are leaving behind the era of just improving workflows to a time in which users demand the ability to understand the information that is kept in the system. Great systems will be build knowledge with information extraction, and not just focus on data entry.

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**NOTES**

The previous study was performed as part of a course on systems analysis at the School of Library and Information Sciences at the University of North Carolina at Chapel Hill. The study was targeted on
evaluating and improving the new hire process in the Dean’s Office for employee exempt for the State Personnel Act (EPA). This process required the use of the IT Works system along with Commitments, Contacts, Position Authorizations, and Professorships. Upon evaluating the process and these systems, the research team found that IT Works required the most work hours for entering data that is available in other systems.

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All statistics on the College of Arts and Sciences is as of April 2011.


http://www.harrisdata.com/

http://infoporte.unc.edu

http://www.iasinc.net/solutions/ecm/onbase


Bibliography


### Appendices

#### 1.17 Appendix A: System Descriptions

<table>
<thead>
<tr>
<th>System Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting Reports</td>
<td>Subsidiary ledger reporting on expenditures by fund type.</td>
</tr>
<tr>
<td>Advise</td>
<td>Donor data, including pledges, gifts, payments, and outstanding pledges. It also has all of the demographic information and even documentation for most designsations.</td>
</tr>
<tr>
<td>College Annual Report</td>
<td>Faculty members enter annual accomplishments - including publications, committees, teaching, awards, etc. The chairs also fill out a questionnaire on the department’s activities and use the information to help determine raises. Stewardship- Students, faculty, and departments enter details of how gift funding was spent during the reporting period and their responses are given to the donors.</td>
</tr>
<tr>
<td>College Listserv Manager</td>
<td>Automates the maintenance of departmental listservs from University directory data.</td>
</tr>
<tr>
<td>College Reporting</td>
<td>Parameterized report distribution to any employees in the College. The critical reports are released to help with department administration.</td>
</tr>
<tr>
<td>Commitments</td>
<td>Tracks funding commitments for the Dean’s Office and used for budgeting.</td>
</tr>
<tr>
<td>Common Authorization Tool</td>
<td>Assigns security access to all College-wide applications.</td>
</tr>
<tr>
<td>DO Accounts</td>
<td>General ledger reporting and stewardship.</td>
</tr>
<tr>
<td>DO Companion</td>
<td>HR reports using data from IT Works.</td>
</tr>
<tr>
<td>DO Contacts</td>
<td>Create a list of chairs and managers for the College of Arts &amp; Sciences and update listserv membership.</td>
</tr>
<tr>
<td>DO EPA</td>
<td>Manage positions in the Dean’s Office and permanent funding sources.</td>
</tr>
<tr>
<td>DO Professorships</td>
<td>Track awarded professorships and allocations from the gift accounts.</td>
</tr>
<tr>
<td>DO SPA</td>
<td>Track SPA pool of money for upgrades, new positions, salary increases, etc.</td>
</tr>
<tr>
<td>EPAWeb</td>
<td>University HR system for EPA employees.</td>
</tr>
<tr>
<td>Faculty Salaries</td>
<td>Provide aggregated reports on faculty members, including reports on peer data for decision-making.</td>
</tr>
<tr>
<td>Finan$eer</td>
<td>Financial application that provides enhanced inquiry</td>
</tr>
<tr>
<td>System Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Finance Data Warehouse</td>
<td>Static storage of accounting data from University systems.</td>
</tr>
<tr>
<td>FRS</td>
<td>(Financial Records System) Main accounting system of the University for SL and GL accounting.</td>
</tr>
<tr>
<td>HR Data Warehouse</td>
<td>The only place to get reports on EPA employees, but it also has SPA employees.</td>
</tr>
<tr>
<td>HRIS</td>
<td>University HR system for SPA employees.</td>
</tr>
<tr>
<td>InDepth</td>
<td>Cost-code accounting system.</td>
</tr>
<tr>
<td>InfoPorte</td>
<td>Provides a consolidated view of financial information from various University systems. The purpose of InfoPorte is to allow a variety of users a simplified way to access the information they need to perform their job functions on a day-to-day basis.</td>
</tr>
<tr>
<td>IT Works</td>
<td>Dean’s Office shadow system for DO supported positions, includes over 750 faculty members.</td>
</tr>
<tr>
<td>LDAP</td>
<td>University directory information.</td>
</tr>
<tr>
<td>Lyris Listservs</td>
<td>University supported listserv management tool.</td>
</tr>
<tr>
<td>Non-Personnel Requests</td>
<td>Departments enter requests for non-personnel funding to the Dean’s Office.</td>
</tr>
<tr>
<td>OIRA</td>
<td>(Office of Institutional Research and Assessment) This is the canonical source of information, especially for student information used by the Dean’s Office.</td>
</tr>
<tr>
<td>Online Help Request System</td>
<td>This is the actual portal that staff in the University use to submit requests.</td>
</tr>
<tr>
<td>OSIS</td>
<td>(Online Spatial Information System) Building plans and occupancy data.</td>
</tr>
<tr>
<td>Payroll</td>
<td>Track benefits, payroll, check register, and tax information for each employee.</td>
</tr>
<tr>
<td>Position Authorization</td>
<td>Track the new positions paid for by the Dean’s Office until hired, including salary, FTE, start-up and faculty CCI requests (computers).</td>
</tr>
<tr>
<td>RAMSeS</td>
<td>(Research Awards and Management system) It has grant, contract, and cooperative agreement application and reporting.</td>
</tr>
<tr>
<td>Registrar's Datamart</td>
<td>Degrees conferred, enrollment, and credit hour reports.</td>
</tr>
<tr>
<td>Remedy</td>
<td>Help requests that are sent online from departments. This system is used by HR and Finance staff in the Dean’s Office to help collaboration on issues.</td>
</tr>
<tr>
<td>SIS</td>
<td>(Student Information System) Recently replaced with PeopleSoft as the main system for student information and management.</td>
</tr>
<tr>
<td>Staffing Workload</td>
<td>Summary of instruction and instructional spending for</td>
</tr>
<tr>
<td></td>
<td>College departments.</td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Starlite</strong></td>
<td>Student Awards and Reporting system.</td>
</tr>
<tr>
<td><strong>TIM</strong></td>
<td>Track employee time, wage, and leave information using a web-based system. Includes leave reports and it is used to determine leave payouts.</td>
</tr>
</tbody>
</table>
1.18 Appendix B: Screenshot of IT Works – previous HRIS

Main form – tabbed structure

Searching – either exact match or contains
1.19 Appendix C: InfoPorte Screenshot
1.20 Appendix D: OnBase Screenshot
Appendix E: Screenshot of PeopleSoft Campus Solutions
1.22 Appendix F: SAP screenshot
1.23 Appendix G: Dean’s Office Datamart - other features

Searching: Click on any header

Processes drop-down

Cascading Parameters: Note the department list has changed