Arthritis Care Workflow System

James Kent
Michael Frysinger
Steven Gogos

Executive Summary 1
10/04/2003
Arthritis Care

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1. Executive Summary

A charity organization is focused on providing assistance and services to people in need. Many people who work for charities are volunteers that donate hours of their time to the organization. Making efficient usage of that time by eliminating inefficiencies with computerized processes helps both the volunteer and the charity. Volunteers experience frustration when a system does not work the way they want or expect, or involves many slow processes. The charity wastes important resources every time the volunteers waste their own time while working with these inefficient systems.

The charity organization Arthritis Care manages several disperse databases between its central UK office, regional offices and national offices. This has caused data storage problems including inaccuracy, redundancy and inefficiency. There is a lack of standard storage formats, along with a lack of procedure for collection, recording and maintenance. In several cases, the same data is duplicated and maintained by various offices. It is necessary to resolve these issues so the organization can operate more efficiently, be more productive, reduce costs, and increase security. The main technical issues concerning the project were database consolidation and procedure definition. Additionally, human factors such as end users' acceptance of the system, training, and feedback had to be addressed.

The regional and national offices maintain independent databases that duplicate a significant portion of the data stored at the central UK office. The central UK office manages the majority of its data using a vendor called Saturn Databases. This data source is currently unavailable to other offices and they generally have to go through a lengthy request process to obtain any information. Additionally, this database system is detached from the Corporate Information Database (CID pronounced sid), which is used to share information over the Internet.

The purpose of our project was to create a workflow solution (nicknamed Flo) that can remedy the problems of the existing system. We had several specific goals:

- Consolidate the databases of the four regional and three national offices.
- Coordinate Flo with the Saturn Database.
- Coordinate the resulting multiple databases with CID creating a unified system
- Develop data migration procedure, training procedure, and manuals for the staff along with documentation for future developers.

We achieved these goals by using an adaptive design strategy and iterative implementation. The phases of the project were interviewing, design, implementation, and integration. The interviewing and design phases consisted of interviewing key staff and making revisions to an existing partial database schema. Various members of the regional offices originally designed this schema, nicknamed RANDY, to unify their databases. We extended it to create the final system known as Flo. Additionally, the interviews established criteria for future recommendations and additional functionality. During the implementation phase we deployed the schema on the CID host and migrated sample data to it. After this we coordinated the Saturn Database with Flo so the regional and national offices can access relevant data. The last step of the implementation was to coordinate the unified database system with CID to provide the user interface.

The entire development and coordination process was an iterative cycle where the staff continuously provided feedback and we made the corresponding revisions. The conclusion of the Flo project was the creation of materials for staff integration. This included the development of manuals, training resources and maintenance protocols for Arthritis Care. Additionally, it was necessary to develop procedure for data migration and how the staff will actually begin using the system. The actual use of these materials will primarily occur after our departure. Concerns of the integration phase overlapped interviewing, design, and implementation significantly.

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Introduction Draft
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Arthritis Care

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1. Introduction

Arthritis Care managed several disperse databases between its central UK office, regional offices and national offices. This caused data storage problems including inaccuracy, redundancy and inefficiency. There was a lack of standard storage formats, along with a lack of procedure for collection, recording and maintenance. In several cases, the same data was duplicated and maintained by various offices. It was necessary to resolve these issues so the organization could operate more efficiently, be more productive, reduce costs, and increase security. The main technical issues concerning the project were database consolidation and procedure definition. Additionally, human factors such as end users' acceptance of the system, training, and feedback had to be addressed.

We were concerned with information and workflow management. We wanted to understand how information flowed into Arthritis Care, how it was stored, and how it was finally utilized. Information and workflow management are domains pertaining to these topics. Information management refers to issues of information flow, storage, and accessibility. Workflow management addresses business processes and how they interact with staff, management, and Information Technology (IT) infrastructure.

In addition to the technical issues, human concerns formed a large area of interest. The system had to be designed with consideration of the staff needs. Significant effort also had to be devoted to integrating it with the daily operations of the organization. This means that we needed to educate the staff on benefits and use, while building morale and support. There was certainly no guarantee that everyone would autonomously begin using the system just because it was completed.

Each of the regional and national offices maintained independent databases that duplicated a significant portion of the data stored at the central UK office. The central UK office manages the majority of its data using two primary vendors: Saturn Databases and Sun Accounts. These two data sources were previously unavailable to other offices and they generally had to go through a lengthy request process to obtain any information. Additionally, the database systems were detached from the

Corporate Information Database (CID pronounced sid), which is used to share information over the Internet.

The first three Interactive Qualifying Projects (IQPs) completed for Arthritis Care provided the IT infrastructure for our project. These projects developed an Intranet to facilitate better communication among the entire Arthritis Care organization. Namely, the outcome was the creation of CID. Substantial research was conducted in user interface design with a focus on people with arthritis. We were able to utilize much of that work when developing our interfaces. In terms of basic layout/design, we were able to reuse their work as well. For example, we needed to ensure that any modifications and additions were 508 compliant (508 requires electronic and information technology to be accessible to people with disabilities). Interface design is a fundamental aspect of good web development. (Gwizdak, Cormier)

The fourth IQP, conducted by Sicila Wijaya, had the biggest impact on the focus of our work. Arthritis Care needed a system to manage the storage and flow of all their data. First, she diagrammed how Arthritis Care is organized and how work was done. Then Sicila proceeded to analyze the data management practices at each of the offices. She cataloged exactly how information was collected and retained at each individual office. Then she looked at how data flowed among these disparate databases. (Wijaya)

The previous work outlined the major gaps in the existing system. Namely, CID provided an information sharing solution, but it did not solve the data management issues or the informational needs of daily operation. This was where the information and workflow management system (nicknamed Flo) entered the picture; it unified the databases and integrated them with the user system provided by CID. The result is a unified entity where members of Arthritis Care can interact transparently with the databases. This means that the users see a single logical unit and they are not concerned with the underlying details of the individual systems.

We had several specific goals for the development of Flo:

- Consolidate the databases of the regional and national offices.
- Combine the informational needs of the Arthritis Care hotels with Flo.
- Integrate Flo with the other existing databases (i.e. the Saturn Database and Sun Accounts).
- Integrate the resulting multiple databases with CID creating a unified system.
- Develop training procedures and manuals for the staff along with documentation for future developers.

Our goals were achieved using an adaptive design strategy and iterative implementation cycles. The initial phase of the project consisted of designing the database schema for Flo along with interviewing key staff and making revisions. We then implemented the schema and migrated the necessary data to it. After this we integrated the Saturn Database and Sun Accounts with the Flo system. The last technical step was to integrate the unified database system with CID in order to provide the user interface. The entire development and integration process was an iterative cycle where the staff continuously provided feedback and we made the corresponding revisions. The conclusion of Flo's integration was the development of manuals, training resources and maintenance protocols for Arthritis Care.

The database consolidation and procedure definition provided by Flo is a positive development. The previous distributed arrangement of information sources had many inherent problems. Arthritis Care's resources were not utilized effectively and information was not accessible in many cases. This arose from the fact that different offices were maintaining data independently and not properly sharing it. Flo is a consolidated system that eliminates duplicated data and effort, and facilitates information sharing throughout the entire organization.

The social impact of Flo relates to the improvement of the working environment at Arthritis Care and the way the organization operates in the community. This more efficient electronic system eliminates repetitive tasks and time-consuming manual processes. Arthritis Care will be able to

allocate more of its labor for the provision of human services, rather than for administrative and operational concerns.

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Arthritis Care Workflow System

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Introduction 2
31/03/2003
Arthritis Care

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1. Introduction

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it with the daily operations of the organization. This means that we needed to educate the staff on benefits and use, while building morale and support. There was certainly no guarantee that everyone would autonomously begin using the system just because it was completed.

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Since the fourth IQP, Arthritis Care had begun a few sub-projects. They had formed a committee called the “Data Capture Working Party” which analyzed the data needs of service users.

Additionally, members of a branch office began work on an organization-wide database to meet the specific needs of the regional and national offices. This work reflected the Arthritis Care staff's new enthusiasm toward the development of a new system. They realized that there were limitations in the existing system and knew that something had to be done.

The previous work identified the major gaps in the existing system. Namely, CID provided an information sharing solution, but it did not solve the data management issues or the informational needs of daily operation. This was where the information and workflow management system (nicknamed Flo) entered the picture; it coordinated the databases and integrated them with the user system provided by CID. The result is a unified entity where members of Arthritis Care can interact transparently with the databases. This means that the users see a single logical unit and they are not concerned with the underlying details of the individual systems.

To remedy the issues of the previous system, we had several specific goals for the development of Flo:

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- Combine the informational needs of the four Arthritis Care hotels with Flo.
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The social impact of Flo relates to the improvement of the working environment at Arthritis Care and the way the organization operates in the community. This more efficient electronic system eliminates repetitive tasks and time-consuming manual processes. Arthritis Care will be able to allocate more of its labor for the provision of human services, rather than for administrative and operational concerns.

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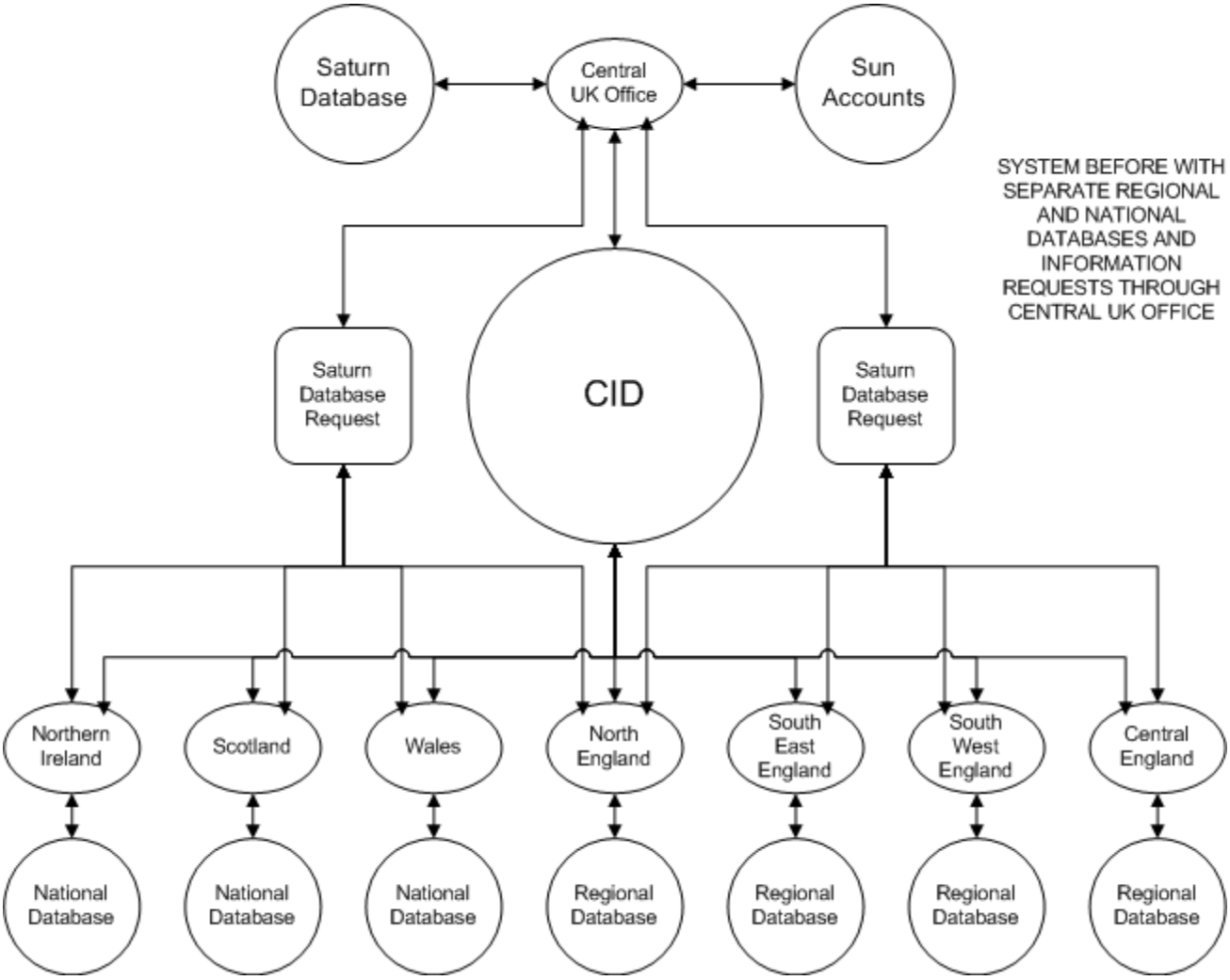
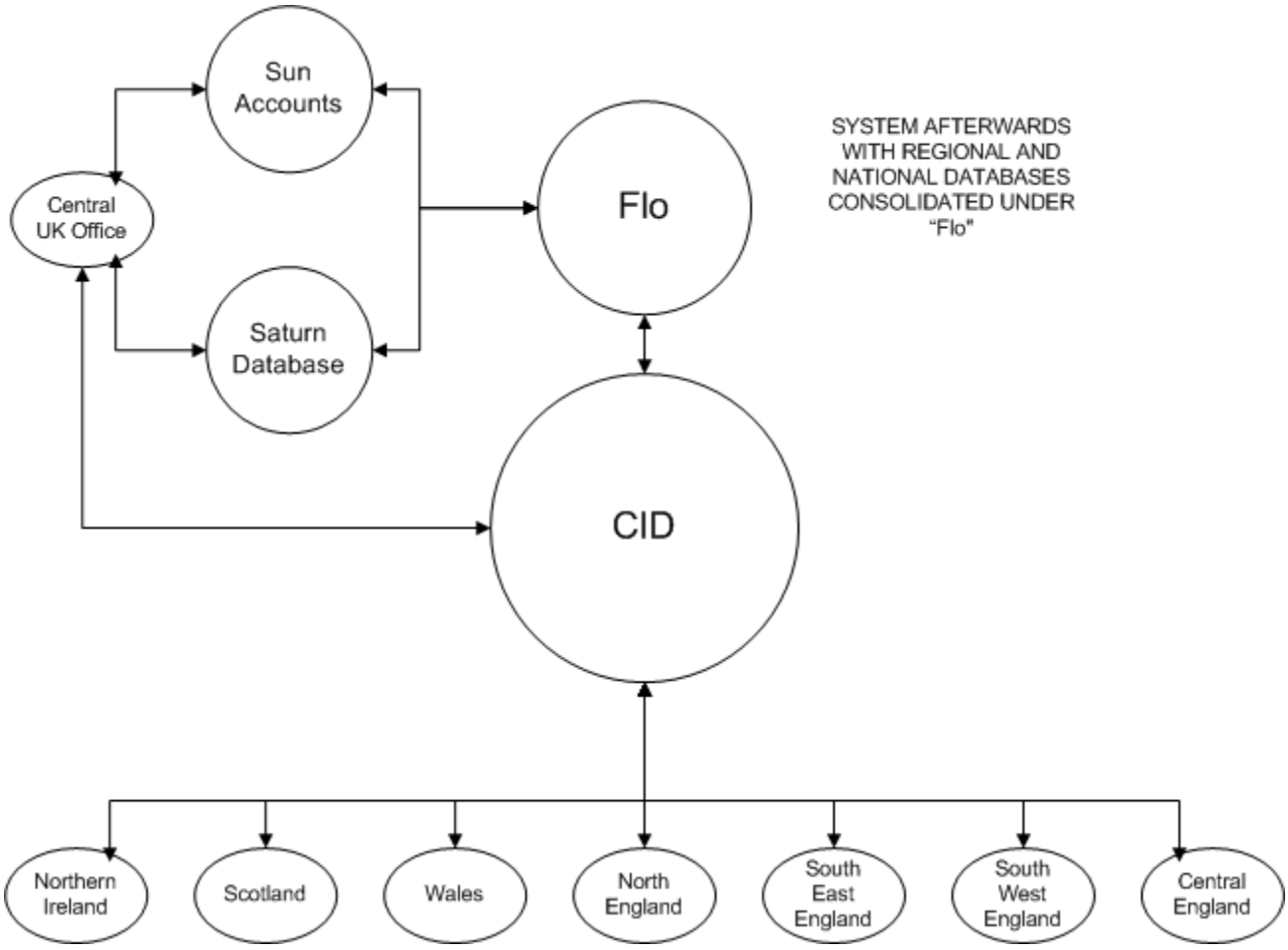
Appendix A: Arthritis Care System Structure Before Flo



The above diagram shows the previous state of databases at the regional and national offices of Arthritis Care. Each of the regional and national offices had access to their own databases. Those databases were not able to directly communicate with one another and were updated independently. Information was duplicated between them and also became outdated. Some information that was stored on databases was not available at any of the other offices, which lead to errors and multiple entries. Also, the central UK office was the only office with access to the Saturn Database. All of the branches had to make requests to the UK office in order to access any of the information contained in those databases. Requests could take up to a week to complete, as there were a number of steps that had to occur. Required information was identified at the regional office, which then sent a request to the central UK office, which then had to process that request, retrieve the information from the Saturn database, then send it back to the regional office at which point it could be used. The tedious process explains why separate databases were maintained – with this system it was far more convenient to have the information directly accessible (though it could be outdated).

All offices had access to CID, but CID did not interact with the Saturn Database. Again, only the central UK office was able to directly access either this data source.

Appendix B: Arthritis Care System Structure With Flo



The new entity marked on the diagram above as "Flo" is the consolidated replacement for the individual databases. Flo is accessible via CID and provides access to information stored on the Saturn Database. Direct access to the Saturn Database is still possible from the central UK office at this stage, though full integration with Flo would save money, time, and make the entire system more efficient.

It is no longer necessary to request reports from the central UK office as information can be obtained directly through CID (which accesses the Saturn Database using Flo). This change reduces the time used to access information from days (under the old system) to minutes (under the current system).

Appendix C: Overview of Schedule

- Preliminary
  - Partial schema for database
  - Understand key processes/people
- Week 1
  - Analyze database hosting solutions
  - Introductory meetings, postings
  - Discussion board
  - Schedule interviews
- Week 2
  - Additional meetings
  - Interviews at other locations
- Week 3
  - Database schema
  - Migrate Data
- Week 4
  - Implement database interface
  - Obtain user feedback and make revisions
- Week 5
  - Implement database interface
  - Obtain user feedback and make revisions
  - Development of training resources
- Week 6
  - Developer documentation
  - Write manuals
  - Development of training resources
  - Revise final report
- Week 7
  - Last minute adjustments that may arise
  - Final feedback
  - Final revisions to report

Arthritis Care Workflow System

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Background Draft 1
24/03/2003
Arthritis Care

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1. Introduction

Introduction.

2. Background

2.1 Overview

Data storage, information management, workflow management, and human concerns are the topics relevant to our project. It was necessary to determine how each of these related to the specific issues at Arthritis Care. The background information guided our understanding of how to perform the database consolidation and integration of Flo.

2.2 Data Storage

Flo is concerned with the storage of information, a significant amount of which is confidential. When storing personal data, there are multiple factors that must be considered such as privacy, security and accuracy. In the United Kingdom, there exists extensive legislature regulating data storage. The Data Protection Act passed in 1998 details specific guidelines. (Thomas)

Organizations that collect or process data that can be linked to an individual are referred to as data controllers. The controllers manage information on data subjects. Every data controller must obtain a license, which signifies that they follow the principles of the Data Protection Act. The Data Protection Register contains the complete list of all licensed organizations. It is available online at http://www.dpr.gov.uk/. (Thomas)

In addition to general guidelines, the information in the register specific to Arthritis Care is particularly important. If Arthritis Care were ever found in violation of the Data Protection Act and had its license revoked, significant harm would be done to its operation and continuing success. Therefore, it was necessary to be thoroughly aware of the provisions of the Act and the stipulations of Arthritis Care's license.

The set of general guidelines protect individual safety and serve public interest. Namely, they specify that data must be (Thomas /principl.htm):

1. fairly and lawfully processed
2. processed for limited purposes
3. adequate, relevant and not excessive
4. accurate
5. not kept longer than necessary
6. processed in accordance with the data subject's rights
7. secure
8. not transferred to countries without adequate protection

These articles were concerns of our project. For example, when defining procedure we had to ensure that only relevant data was collected and not retained longer than necessary. When designing the consolidated database, principles of accuracy and security were incorporated.

As mentioned, Arthritis Care also has specific terms with its license. Data being processed by the organization can only be used for the following five purposes (Thomas /notify):

1. staff administration
2. advertising, marketing, and public relations
3. accounts and records
4. education
5. consultancy and advisory services

For each of the five articles, there are additional specifications on who the data subjects are, what the data classes are, and what disclosures are necessary. As with the general guidelines, the license specifics were considered in the database design and procedure definition.

Perhaps the most perplexing problem facing database maintenance is ensuring that the data is accurate. With large data sets and active transactions, this is a difficult task. At the design level, it is necessary to create a precise definition of the data model (Doorn 7). This means the objects that the

database models, their attributes, and the actors that manipulate them must be clearly defined. Additionally, these definitions must be combined with rules and relationships that have real-world semantics (Doorn 21). In general, business processes form the rules for automation and object relationships; the hierarchy of staff and management defines relationships between actors and task responsibility. Maintaining accurate data was an important objective since inaccuracies lead to inefficiency, poor communication, and mistrust in the system. These factors made it critical to have precise definitions for the data model, rules, and relationships.

Unfortunately, a database with good design is still subject to error. Human interaction with a system can never be discounted as a source of inconsistency. Reasonable consideration of human factors can prevent this to some extent. For example, if donor information needs to be entered manually, mailing confirmation cards to the donors to verify the information could trap potential errors. A common suggestion is that people should have access to information stored about them along with a method of correcting it (Baase 61). This reduces the chance of persistent errors contrary to the data subject's knowledge. Similarly, the system checks user requests for errors to the largest extent possible. As an example, if a staff member tries to file a document on the wrong day, they are alerted to the situation.

The issues of data storage were essential to the success of Flo. Procedure for information and workflow management largely depended on the structure and efficiency of the consolidated database.

2.3 Information Management

An applicable iterative technique for analyzing and designing corporate information management is the ASCERTAIN method (Coleman). The method defines a framework for utilizing the consolidated database and integrating it with staff needs. This section is an overview of the steps and their applicability to Arthritis Care.

Assess the organization as a whole and look at what internal and external factors affect it. This is a general step and involves acquiring an understanding of information and business processes

for analysis. This gives the current state of the organization and clearly shows what parts need change. Assessing is an important and flexible step that can and must be applied as a basis for this technique. In the context of Arthritis Care, this was a research and analysis step that involved checking previous work on the organization and interviewing employees to find more detailed and specific information.

Scrutinize any problems that are found from the previous step. Questions should be asked here to determine the relevance of activities. Non-essential processes should be consolidated or eliminated. Application of this step to Arthritis Care was important, but this is similar to the previous step; there is little purpose in assessing the state of operations if it will not be analyzed. Primarily, this involved determining which processes had to be eliminated in the information workflow. Most of the processes to eliminate were the paper based forms and redundant information. The full analysis provided details of exactly what had to change.

Create new approaches and ways to handle any of the problem areas that were eliminated. This is the recreating step that involves adding in new creative paradigms that could increase productivity or efficiency. New approaches are the way to move forward after determining what can be eliminated. At Arthritis Care this involved the development of standards and electronic forms that are used in place of the loosely defined procedure and paper forms that were previously utilized.

Evaluate the areas that should be changed immediately. Analyzing the current system against the new ideas that have been created gives an indication of the magnitude of change required to switch over. The creation of clear goals and reasonable time frames for completion and transition was the outcome from the evaluation.

Reengineering is the actual design step for the changes in infrastructure and management organization. Here the formal design was established which was used for the implementation.

Train is one of the most difficult steps. Once a new system is in place, the workforce needs to be trained in its use. Without any training, the majority of the staff will either be unaware of it, or just not understand. Even once they are taught the new skills required by the redesign, some workers

may require special attention and additional help. Developing manuals and holding instruction sessions were methods to enable the staff to understand how to use the new system and adapt to any changes. Previous IQP groups created manuals that explain in detail how to use every aspect of the CID. This project produced similar manuals for the staff concerning the operation and maintenance of Flo.

Alter is the other difficult step for the workforce since it creates a transition to the new system. Those who are resistant to change will need special help. The preliminary aspects of the ASCERTAIN model should help users with this step. Altering is a gradual phase and was done in such a way as to enable the staff to adapt to the changing conditions. With the repeated feedback and design implementation, the process of altering the workforce to utilize the new system occurred smoothly.

Implement is when the full system is created and deployed in its target environment. At this stage, the staff was completely aware of what the system entailed.

Nurture is the final step that should be viewed as an on-going process to keep the new organizational designs flourishing and productive. Nurturing goes beyond the scope of our project to some extent, as it represents the maintenance and development over the next few years. The IT staff of Arthritis Care has a strong understanding of the modifications to the system and they know how to support the new design. Our activities after implementation ensured that the staff is comfortable with Flo.

The ASCERTAIN method provided a background for answering our research question concerning how information flows within Arthritis Care. The information flow is a complex situation since there are seven offices and a large staff that stores information in both paper and electronic forms. The information can move around in many ways since people can access databases, mail information (either electronically or postal), and use spoken communications (e.g. meetings, personal exchange, or telephone). Without a good understanding of the previous flow of information within

Arthritis Care, any attempt at redesigning the system would not have taken into account the full scope of methods previously employed.

Another research question that the ASCERTAIN method provided a background for was how information flow processes could be improved within Arthritis Care. Once information flow processes within Arthritis Care were understood, standardized techniques could be developed to replace the loosely defined methods. Details of how information flows within Arthritis Care had to be analyzed to determine where the largest bottlenecks occured in order to eliminate those slowdowns. Improvement of the information flow processes involved examination of the previous scheme of information flow employed at the various offices.

The ASCERTAIN method is applicable to the restructuring of information management. Coupled with workflow management, it largely influenced the design of our procedure. Our methods section follows the sequence outlined by ASCERTAIN.

2.4 Workflow Management

Managing the flow of work in Arthritis Care refers to the way information flows and any work done, which utilizes the information. In order to manage this flow efficiently you must define processes and the logic behind them (IBM). The ultimate goal is to refine and perhaps even automate as many processes as possible (IBM). We refined and automated different aspects of processes with the development of Flo.

Processes are models that show activities within an organization. They identify actors and information that flows between the actors. The model outlines what actions are required to start the process, and all the actions to complete the process. Actors are commonly comprised of the staff within an organization and the people who interact with the staff. However, they also may consist of inanimate objects that people utilize. For example, a machine can be an actor if it processes forms in any way (e.g. automatically stamping them with a date). Actions are defined as anything that does work. This is vague because it is up to managers to define what constitutes doing work. (Sharp)

When defining a process from scratch, there are a few steps that help to develop the model. First you look at the actions that belong to this process. These actions are put into an order that is determined by what really happens in the organization. The actual data that is involved is identified and associated with the different steps. Finally, the actors are linked in with the appropriate actions and data. (IBM)

The encompassing process we looked at involved the flow of data in Arthritis Care. The actors here were made up of the managers, staff, donors, and patrons. The information that was managed consisted largely of personal data related to arthritis. The first action was data collection, followed by data transmission, then data retention, and finally data utilization. We broke this down into smaller processes as deemed necessary.

After defining the processes by identifying the actions and actors, the process is refined. This involves identifying actions that can be consolidated or replaced by a more efficient system. It may also involve modifications in the roles that some actors play in the process. Whatever decisions are made, they take into consideration the potential savings with respect to time, money, and any other factor that Arthritis Care deems a priority. How the actors react or are affected by these changes is also reviewed. (Sharp)

Workflow management addressed our research question of how the IT infrastructure was going to support Flo. Any changes that were made had to be within the scope of the IT infrastructure or range of possible improvements that we could make. A review of the capabilities of the previous system was necessary to develop Flo.

2.5 Human Concerns

In addition to the numerous technical concerns of Flo, there were several human factors that had to be considered. Many people were adverse to the ongoing transition toward a paperless office for a variety of reasons. For example, they thought that their job was in jeopardy, adapting to change would be difficult, the resulting system would be complicated, or the system was unnecessary to

begin with. It was also possible that original supporters of the system had become skeptical for reasons such as the rate of progress or state of results. However, the reverse phenomenon likely occurred as well (i.e. original skeptics becoming supporters as a result of positive developments).

Documentation and training were generally used to ease transition and allow people to adapt accordingly at a reasonable rate. It is recommended that the target audience continually be aware of the end goals, current status and any changes in their work environment (Coleman). The people affected are more comfortable with the changes if they are well informed and their input was valued. Education and feedback curbed fears of job loss, change and complexity.

Training was the most immediate form of education. It provided hands on experience in the presence of a system expert. Often this alleviates fears of making mistakes or being technologically stranded (Baase). People felt more comfortable when they thought that their peers were at a similar level of understanding and there was a sense of mutual aid. Training sessions fostered such an atmosphere and addressed what the organization expected of the trainees. People were not to be under the impression that demands would be made of knowledge they do not have.

The mentioned reasons for opposition to a system were all present at Arthritis Care – whether openly admitted or not. It was necessary to keep the general staff informed of our intentions and progress. Related information was posted in a generally accessible area, such as the Intranet news section. Additionally, we continually received feedback, wrote documentation and established training procedure. These activities increased support for the system and helped people adapt to it.

3. References

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Arthritis Care Workflow System

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Background 2
03/04/2003
Arthritis Care

Table of Contents

1. Introduction

2. Background

2.1 Overview

Data storage, information management, workflow management, and human concerns are the topics relevant to our project. It was necessary to determine how each of these related to the specific issues at Arthritis Care. The background information guided our understanding of how to perform the database consolidation and integration of Flo.

2.2 Data Storage

Flo is concerned with the storage of information, a significant amount of which is confidential. When storing personal data, there are multiple factors that must be considered such as privacy, security and accuracy. In the United Kingdom, there exists extensive legislation regulating data storage. The Data Protection Act passed in 1998 details specific guidelines. (Thomas)

Organizations that collect or process data that can be linked to an individual are referred to as data controllers. The controllers manage information on data subjects. Every data controller must obtain a license, which signifies that they follow the principles of the Data Protection Act. The Data Protection Register contains the complete list of all licensed organizations. It is available online at http://www.dpr.gov.uk/. (Thomas)

In addition to general guidelines, the information in the register specific to Arthritis Care is particularly important. If Arthritis Care were ever found in violation of the Data Protection Act and had its license revoked, significant harm would be done to its operation and continuing success. Therefore, it is necessary to be thoroughly aware of the provisions of the Act and the stipulations of Arthritis Care's license.

The set of general guidelines protect individual safety and serve public interest. Namely, they specify that data must be (Thomas /principl.htm):

1. fairly and lawfully processed
2. processed for limited purposes
3. adequate, relevant and not excessive
4. accurate
5. not kept longer than necessary
6. processed in accordance with the data subject's rights
7. secure
8. not transferred to countries without adequate protection

These articles were concerns of our project. For example, when defining procedure we had to ensure that only relevant data was collected and not retained longer than necessary. When designing the consolidated database, we had to incorporate principles of accuracy and security.

As mentioned, Arthritis Care also has specific terms with its license. Data being processed by the organization can only be used for the following five purposes (Thomas /notify):

1. staff administration
2. advertising, marketing, and public relations
3. accounts and records
4. education
5. consultancy and advisory services

For each of the five articles, there are additional specifications on who the data subjects are, what the data classes are, and what disclosures are necessary. As with the general guidelines, the license specifics have to be considered in the database design and procedure definition.

Perhaps the most perplexing problem facing database maintenance is ensuring that the data is accurate. With large data sets and active transactions, this is a difficult task. At the design level, it is necessary to create a precise definition of the data model (Doorn 7). This means the objects that the database models, their attributes, and the actors that manipulate them must be clearly defined. Additionally, these definitions must be combined with rules and relationships that have real-world

semantics (Doorn 21). In general, business processes form the rules for automation and object relationships; the hierarchy of staff and management defines relationships between actors and task responsibility. Maintaining accurate data is an important objective since inaccuracies lead to inefficiency, poor communication, and mistrust in the system. These factors make it critical to have precise definitions for the data model, rules, and relationships.

Unfortunately, a database with good design is still subject to error. Human interaction with a system can never be discounted as a source of inconsistency. Reasonable consideration of human factors can prevent this to some extent. For example, if donor information needs to be entered manually, mailing confirmation cards to the donors to verify the information could trap potential errors. A common suggestion is that people should have access to information stored about them along with a method of correcting it (Baase 61). This reduces the chance of persistent errors contrary to the data subject's knowledge. Similarly, the system checks user requests for errors to the largest extent possible. As an example, if a staff member tries to file a document on the wrong day, they are alerted to the situation.

The issues of data storage are essential to the success of Flo. Procedure for information and workflow management largely depends on the structure and efficiency of the consolidated database.

2.3 Information Management

An applicable iterative technique for analyzing and designing corporate information management is the ASCERTAIN method (Coleman). The method defines a framework for utilizing the consolidated database and integrating it with staff needs. This section is an overview of the steps and their applicability to Arthritis Care.

Assess the organization as a whole and look at what internal and external factors affect it. This is a general step and involves acquiring an understanding of information and business processes for analysis. This gives the current state of the organization and clearly shows what parts need change. Assessing is an important and flexible step that can and must be applied as a basis for this

technique. In the context of Arthritis Care, this was a research and analysis step that involved checking previous work on the organization and interviewing employees to find more detailed and specific information.

Scrutinize any problems that are found from the previous step. Questions should be asked here to determine the relevance of activities. Non-essential processes should be consolidated or eliminated. Application of this step to Arthritis Care was important, but this is similar to the previous step; there is little purpose in assessing the state of operations if it will not be analyzed. Primarily, this involved determining which processes had to be eliminated in the information workflow. Most of the processes to eliminate were the paper based forms and redundant information. The full analysis provided details of exactly what had to change.

Create new approaches and ways to handle any of the problem areas that were eliminated. This is the recreating step that involves adding in new creative paradigms that could increase productivity or efficiency. New approaches are the way to move forward after determining what can be eliminated. At Arthritis Care this involved the development of standards and electronic forms that are used in place of the loosely defined procedure and paper forms that were previously utilized.

Evaluate the areas that should be changed immediately. Analyzing the current system against the new ideas that have been created gives an indication of the magnitude of change required to switch over. The creation of clear goals and reasonable time frames for completion and transition was the outcome from the evaluation.

Reengineering is the actual design step for the changes in infrastructure and management organization. Here the formal design was established which was used for the implementation.

Train is one of the most difficult steps. Once a new system is in place, the workforce needs to be trained in its use. Without any training, the majority of the staff will either be unaware of it, or just not understand. Even once they are taught the new skills required by the redesign, some workers may require special attention and additional help. Developing manuals and holding instruction sessions were methods to enable the staff to understand how to use the new system and adapt to any

changes. Previous IQP groups created manuals that explain in detail how to use every aspect of the CID. This project produced similar manuals for the staff concerning the operation and maintenance of Flo.

Alter is the other difficult step for the workforce since it creates a transition to the new system. Those who are resistant to change will need special help. The preliminary aspects of the ASCERTAIN model should help users with this step. Altering is a gradual phase and was done in such a way as to enable the staff to adapt to the changing conditions. With the repeated feedback and design implementation, we hoped that the process of altering the workforce to utilize the new system would occur smoothly.

Implement is when the full system is created and deployed in its target environment. At this stage, the staff was completely aware of what the system entailed.

Nurture is the final step that should be viewed as an on-going process to keep the new organizational designs flourishing and productive. Nurturing goes beyond the scope of our project to some extent, as it represents the maintenance and development over the next few years. The IT staff of Arthritis Care has a strong understanding of the modifications to the system and they know how to support the new design. Our activities after implementation ensured that the staff is comfortable with Flo.

The ASCERTAIN method provided a background for answering our research question concerning how information flows within Arthritis Care. The information flow is a complex situation since there are seven offices and a large staff that stores information in both paper and electronic forms. The information can move around in many ways since people can access databases, mail information (either electronically or postal), and use spoken communications (e.g. meetings, personal exchange, or telephone). Without a good understanding of the previous flow of information within Arthritis Care, any attempt at redesigning the system would not have taken into account the full scope of methods previously employed.

Another research question that the ASCERTAIN method provided a background for was how information flow processes could be improved within Arthritis Care. Once these processes were understood, standardized techniques could be developed to replace the loosely defined methods. Details of how information flows within Arthritis Care had to be analyzed to determine where the largest bottlenecks occurred in order to eliminate those slowdowns. Improvement of the information flow processes involved examination of the previous scheme of information flow employed at the various offices.

The ASCERTAIN method is applicable to the restructuring of information management. Coupled with workflow management, it largely influenced the design of our procedure. Our methods section follows the sequence outlined by ASCERTAIN.

2.4 Workflow Management

Managing the flow of work in Arthritis Care refers to the way information flows and any work done, which utilizes the information. In order to manage this flow efficiently processes must be defined along with the logic behind them (IBM). The ultimate goal is to refine and perhaps even automate as many processes as possible (IBM). We refined and automated different aspects of processes with the development of Flo.

Processes are models that show activities within an organization. They identify actors and information that flows between the actors. The model outlines what actions are required to start the process, and all the actions to complete the process. Actors are commonly comprised of the staff within an organization and the people who interact with the staff. However, they also may consist of inanimate objects that people utilize. For example, a machine can be an actor if it processes forms in any way (e.g. automatically stamping them with a date). Actions are defined as anything that does work. This is vague because it is up to managers to define what constitutes doing work. (Sharp)

When defining a process from scratch, there are a few steps that help to develop the model. First, look at the actions that belong to this process. These actions are put into an order that is

determined by what really happens in the organization. The actual data that was involved is identified and associated with the different steps. Finally, the actors are linked in with the appropriate actions and data. (IBM)

The encompassing process we looked at involved the flow of data in Arthritis Care. The actors here were made up of the managers, staff, donors, and patrons. The information that was managed consisted largely of personal data related to arthritis. The first action was data collection, followed by data transmission, then data retention, and finally data utilization. We broke this down into smaller processes as deemed necessary.

After defining the processes by identifying the actions and actors, the process is refined. This involves identifying actions that can be consolidated or replaced by a more efficient system. It may also involve modifications in the roles that some actors play in the process. Whatever decisions are made, they take into consideration the potential savings with respect to time, money, and any other factor that Arthritis Care deems a priority. How the actors react or are affected by these changes is also reviewed. (Sharp)

Workflow management addressed our research question of how the IT infrastructure was going to support Flo. Any changes that were made had to be within the scope of the IT infrastructure or range of possible improvements that we could make. A review of the capabilities of the previous system was necessary to develop Flo.

2.5 Human Concerns

In addition to the numerous technical concerns of Flo, there were several human factors that had to be considered. We anticipated that people could be adverse to the ongoing transition toward a paperless office for a variety of reasons. For example, they could have thought that their job was in jeopardy, adapting to change would be difficult, the resulting system would be complicated, or the system was unnecessary to begin with. It was also possible that original supporters of the system had become skeptical for reasons such as the rate of progress or state of results. However, the reverse

phenomenon likely occurred as well (i.e. original skeptics becoming supporters as a result of positive developments).

Documentation and training are generally used to ease transition and allow people to adapt accordingly at a reasonable rate. It is recommended that the target audience continually be aware of the end goals, current status and any changes in their work environment (Coleman). The people affected are more comfortable with the changes if they are well informed and their input is valued. Education and feedback curb fears of job loss, change and complexity.

Training is the most immediate form of education. It provides hands on experience in the presence of a system expert. Often this alleviates fears of making mistakes or being technologically stranded (Baase). People feel more comfortable when they think that their peers are at a similar level of understanding and there is a sense of mutual aid. Training sessions foster such an atmosphere and address what the organization expected of the trainees. People should not be under the impression that demands will be made of knowledge they do not have.

The mentioned reasons for opposition to a system were all present at Arthritis Care – whether openly admitted or not. In such an environment, it is necessary to keep the general staff informed of intentions and progress. Related information should be posted in a generally accessible area, such as CID's news section. Additionally, it is necessary to continually receive feedback, write documentation and establish training procedure. These activities increase support for the system and help people adapt to it.

3. Methods

3.1 Overview

3.2 Interviewing

3.3 Design

3.4 Implementation

3.5 Integration

3.6 Schedule

4. References

Baase, Sara. A Gift of Fire: Social, legal, and ethical issues for computers and the Internet. Upper Saddle River, NJ : Pearson Education, 2003.

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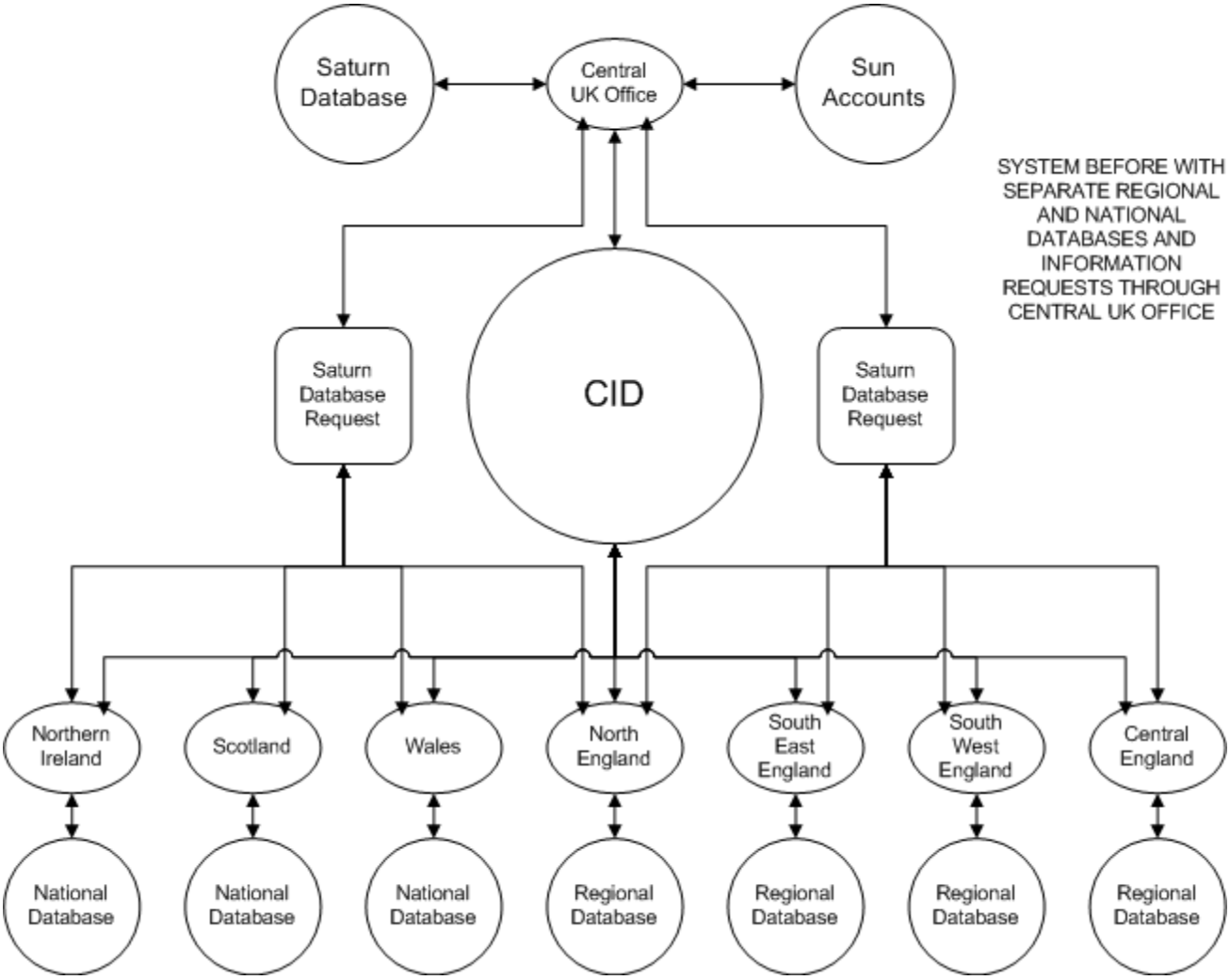
Wijaya, Sicilia. "Analyzing Arthritis Care's Data Management Practices." Worcester Polytechnic Institute, 2002.

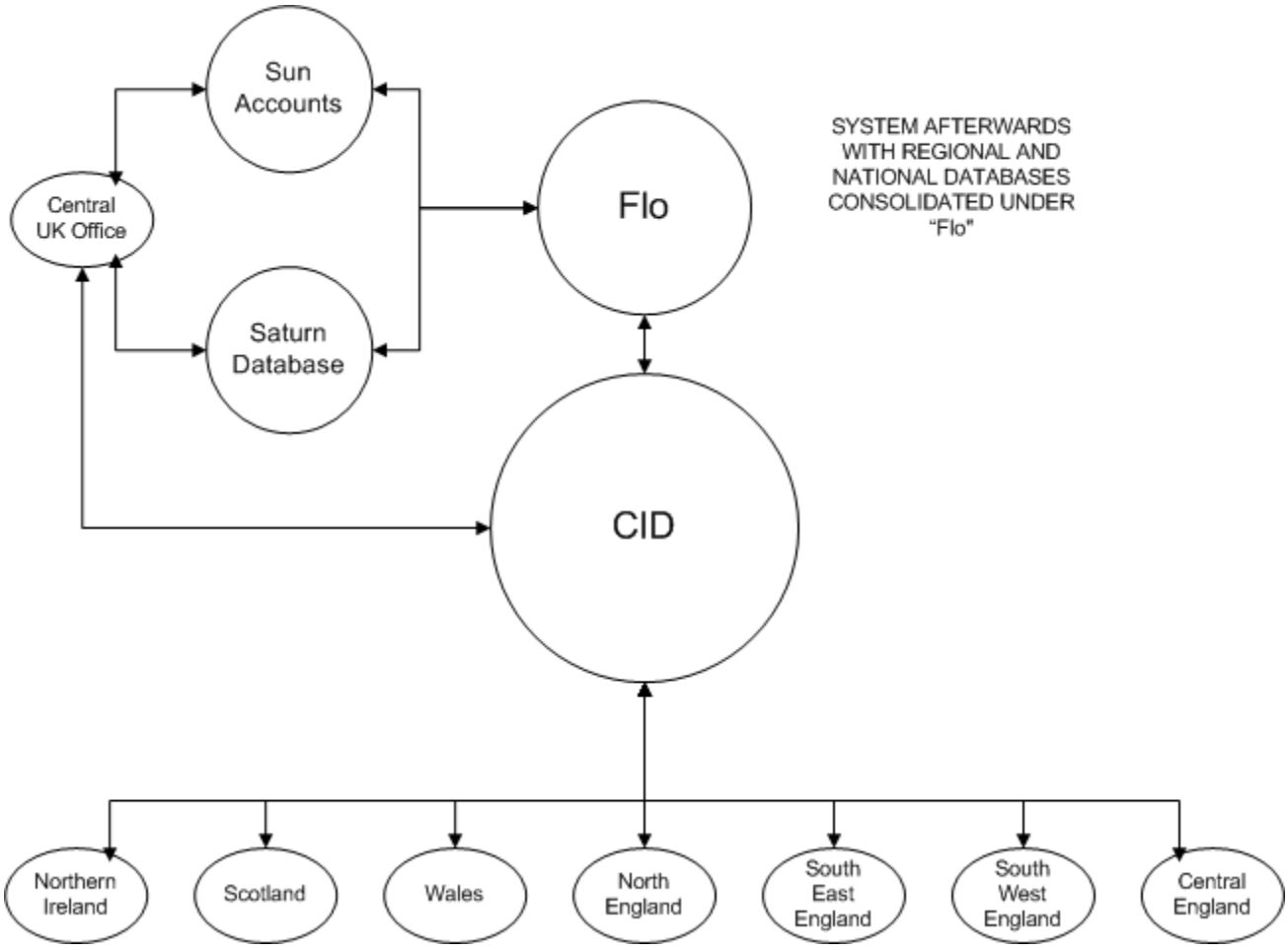
Appendix A: Arthritis Care System Structure Before Flo



The above diagram shows the previous state of databases at the regional and national offices of Arthritis Care. Each of the regional and national offices had access to their own databases. Those databases were not able to directly communicate with one another and were updated independently. Information was duplicated between them and also became outdated. Some information that was stored on databases was not available at any of the other offices, which lead to errors and multiple entries. Also, the central UK office was the only office with access to the Saturn Database. All of the branches had to make requests to the UK office in order to access any of the information contained in those databases. Requests could take up to a week to complete, as there were a number of steps that had to occur. Required information was identified at the regional office, which then sent a request to the central UK office, which then had to process that request, retrieve the information from the Saturn database, then send it back to the regional office at which point it could be used. The tedious process explains why separate databases were maintained – with this system it was far more convenient to have the information directly accessible (though it could be outdated).

All offices had access to CID, but CID did not interact with the Saturn Database. Again, only the central UK office was able to directly access either this data source.

Appendix B: Arthritis Care System Structure With Flo



The new entity marked on the diagram above as "Flo" is the consolidated replacement for the individual databases. Flo is accessible via CID and provides access to information stored on the Saturn Database. Direct access to the Saturn Database is still possible from the central UK office at this stage, though full integration with Flo would save money, time, and make the entire system more efficient.

It is no longer necessary to request reports from the central UK office as information can be obtained directly through CID (which accesses the Saturn Database using Flo). This change reduces the time used to access information from days (under the old system) to minutes (under the current system).

Appendix C: Overview of Schedule

- Preliminary
  - Partial schema for database
  - Understand key processes/people
- Week 1
  - Analyze database hosting solutions
  - Introductory meetings, postings
  - Discussion board
  - Schedule interviews
- Week 2
  - Additional meetings
  - Interviews at other locations
- Week 3
  - Database schema
  - Migrate Data
- Week 4
  - Implement database interface
  - Obtain user feedback and make revisions
- Week 5
  - Implement database interface
  - Obtain user feedback and make revisions
  - Development of training resources
- Week 6
  - Developer documentation
  - Write manuals
  - Development of training resources
  - Revise final report
- Week 7
  - Last minute adjustments that may arise
  - Final feedback
  - Final revisions to report

Arthritis Care Workflow System

James Kent
Michael Frysinger
Steven Gogos

Methods Draft 1
27/03/2003
Arthritis Care

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1. Introduction

Introduction.

2. Background

2.1 Overview

2.2 Data Storage

2.3 Information Management

2.4 Workflow Management

2.5 Human Concerns

3. Methods

3.1 Overview

We achieved the goals outlined in the background section by using an adaptive design strategy and iterative implementation. The phases of the project were interviewing, design, implementation, and integration. The interviewing and design phases consisted of interviewing key staff and making revisions to an existing partial database schema. This schema, nicknamed Randy, was extended to become the final system known as Flo. Additionally, the interviews established criteria for future recommendations and additional functionality. During the implementation phase we deployed the schema on the CID host and migrated the necessary data to it. After this we coordinated the Saturn Database with Flo so the regional and national offices can access relevant data. The last step of the implementation was to coordinate the unified database system with CID to provide the user interface. The entire development and coordination process was an iterative cycle where the staff continuously provided feedback and we made the corresponding revisions. The conclusion of the Flo project was integration with the staff. This included the development of

manuals, training resources and maintenance protocols for Arthritis Care. The integration phase overlapped the interviewing, design, and implementation significantly.

A visual representation of how Flo interacts with the other electronic systems of Arthritis Care is available in Appendices A and B. Appendix A depicts the system structure before the development of Flo. Here the regional and national offices maintain their own databases, and the central UK office processes requests. Appendix B shows the revised system with the introduction of Flo. Here the regional and national offices access a central database. Additionally, they have access to the Saturn Database so they do not have to wait for the UK office to process data requests.

The overall structure of our methods followed the ASCERTAIN model which was described in the background section. Specifically, our interviewing strategy **A**ssessed, then we **S**crutinized the resulting information, **C**reated new approaches based on our findings and **E**valuated areas that had to be changed. Next, our design strategy performed the **R**eengineering step by planning the changes in the infrastructure and producing a basis for the implementation. **T**raining and **A**ltering occurred in parallel with the **I**mplementation; we continually received feedback and adapted accordingly. Finally, our integration strategy provided a foundation for the **N**urturing step.

3.2 Interviewing

Prior to leaving for London, we conducted interviews with previous IQP groups. Specifically, we spoke with Benjamin Wilson of the C02 Arthritis Care project, then later with Sicilia Wijaya of the E02 project. The interviews were informal but we followed a basic agenda. The topics included their views on database consolidation at Arthritis Care, introducing a new system, training staff, and interacting with people. Issues were investigated more thoroughly as questions became apparent to us through the course of the conversations. Additionally, we had preliminary teleconferences with Dave Wright (Information and Office Systems Manager) and Elizabeth Lendering (Director of Resources) to informally discuss goals of the project, basic technical issues and rough ideas concerning our methods.

Once we arrived in London, initial interviews were conducted with Dave Wright, Elizabeth Lendering, and Simon Goodwin (IT Support) to refine the ideas of our proposal. We were interested in any changes that had occurred in the system, assumptions in the proposal that were invalid, and additional understanding of the everyday processes at Arthritis Care. Discussions with Dave, Elizabeth, and Simon generally occurred as the need arose. Since they were on-site and involved with the project, they were usually available (however, Dave left Arthritis Care during our second week so communication with him was minimal afterward).

Arthritis Care also assembled a committee called the 'Data Capture Working Party' in order to assess immediate and future informational needs of service users. Everyone we had previously selected for interviewing was either involved with or represented in this committee. After our first meeting with the committee we identified several people for in-depth interviews. These people generally fell into two categories: those related to the needs of the regional and national offices and those related to additional services, such as hotels and training. For all of these interviews, there was no formal pre-structuring of questions, but we did have topic agendas of issues to address.

To establish the needs of the regional and national offices we interviewed Nicki Hastie (Information Services Manager) and John McGregor (Senior Services Manager) at the central England office in Nottingham. During these interviews we discussed the current status of Randy and how to extend Randy into what would become Flo. Although the interviews were loosely structured, the operational and informational requirements of the office were analyzed in great detail. We addressed topics such as existing procedure, current systems, and access control.

While in Nottingham, we also interviewed John Haslam (Training Services Manager). The purpose of this interview was to establish needs of the training services that could be incorporated into Flo. We wanted to determine what training information is exchanged between the regional and national offices and the central UK office, and what is exchanged between the regional and national offices themselves.

To analyze informational needs of the Arthritis Care hotels we interviewed Tim Gardiner (General Manager of Arthritis Care Hotels) and John Jesmont (Director of Mayfair Hotel in Blackpool). Tim provided a general overview of the goals of the hotels and how they interact with the rest of the organization. Specifically, we were concerned with what information the hotels need from the central UK office and what information the central UK office needs from the hotels. Additionally, we discussed broad goals of the electronic ADS reservation system used by the hotels for their operational and financial needs.

After our interview with Tim, we traveled to Blackpool to speak with John Jesmont. Here we determined <Interview has not been conducted yet. It is scheduled for 26/03/2003. The main topic for discussion is how to provide access to the ADS system at the central UK office.> After the interview with John Jesmont, we conducted a follow up interview with Tim. <Again, this has not occurred yet. It is scheduled for the Monday after the Blackpool visit. The topics will be determined at a later time.>

To determine the details of the coordination between Flo and the Saturn Database, we interviewed Joanne Brackenbury (Head of Supporter Development). <This interview is scheduled for the week of 31/03/2003. The specific topic will be the use of a technology called ODBC to link to the Saturn Database.>

We also spoke with human resources to determine the legality of incorporating a staff directory with Flo. <This is also scheduled for the week of 31/03/2003.>

Interviewing was used to establish the scope and objectives of Flo. Generally, the meetings and interviews identified additional staff members and departments from which to obtain further information. After the scheduled formal interviews, ongoing discussion with the staff occurred through our feedback loop; this was part of our integration step.

3.3 Design

The existing schema, Randy, and the results of our interviews largely determined the design of Flo. Specifically, Randy established the core data types and corresponding attributes to be included. This core schema definition was extended to include additional functionality and thereby satisfy other needs.

The consolidation of the regional and national office databases posed several design issues. Creating a data type with a single set of attributes from multiple sets of attributes was trivial. The union of all attributes was used so that no data was lost. However, it was desirable to eliminate unnecessary fields that were wasting storage. This required a more thorough analysis of the existing system to see which fields were not in use. Another issue was the problem of verifying which data was correct when it existed in multiple locations. Using time stamps (values indicating when a record was last modified) was a realistic and practical way to determine which data was the most recent. However, in cases where this was not possible, it was necessary to have the branch secretaries manually verify the data. In most cases, the regional and national office data was more current than that in the Saturn Database.

Information from the interviews determined the actors and their levels of accessibility within Flo. We designed tables of tasks and responsibilities that the regional and national offices assigned to specific staff members, as they deemed necessary. In some cases, a specific function was not present at a particular office or staff members with different titles performed a certain task. These issues were incorporated into the design by mirroring real world privileges and restrictions in the electronic system.

3.4 Implementation

Once Flo's design was established, we deployed it on the CID host and migrated pertinent information. The process involved creating skeleton tables and databases according to the schema, and adding the appropriate permission settings. The permissions are configurable by appropriate

managers and IT staff so that new workers or people changing positions have the correct access to the data. Once we had this in place it was possible to begin migrating data to the new database.

Some of the existing data was retained in Microsoft Access databases, Excel spreadsheets, Word documents, and paper form. Depending on the format, some repositories were easier to assimilate than others. Access and Excel provide ways to transfer data from their native format to a new database. Word documents needed supplementary programs to extract and store the data into Flo. The paper resources had to be added manually, so protocol was developed for this task. The formats for the existing databases were different, but the techniques for importing and exporting data did not vary significantly. Basically, the process of migration came down to identifying the source format, finding a way to export it, and developing a way to import it into our new database.

After Flo was deployed, it was necessary to coordinate it with the Saturn Database. This involved using Open Database Connectivity (ODBC) to retrieve data from Saturn. Using this method, the central UK office still has direct access to the Saturn Database as necessary.

In order for Flo to be of any use to Arthritis Care, we had to develop interfaces and tools within the framework of CID. This allows standard web access to Flo through the existing system. The interfaces provide an abstraction of the underlying system so that users of the database do not need to be concerned with unnecessary technical details. To ease transition to the new system, the interfaces mimic previous forms that were in use. Arthritis Care's resources determined the actual technologies used. However, the technological details were not as important as making the interfaces logical, familiar, and intuitive.

3.5 Integration

After implementation, it was necessary to integrate the new developments with the daily operations of Arthritis Care. While procedure definition was part of the design, it was necessary to have the organization actually start using Flo. This was a transition where specific parts were

incorporated gradually. Actually integrating the new procedure entirely was not possible within our time frame. We have left recommendations for this procedure to be carried out after our departure.

Resistance to change was an obstacle we had to overcome. We had to convince people of the virtues of the system. The first step was to constantly obtain feedback from the users. By working with them consistently and adapting the system to suit their needs, integration was not a sudden unexpected event. Since the system works the way they wanted and expected, they more readily accepted it.

The second step was to teach the end users how the system works. We made ourselves as approachable as possible so that the staff received our advice and directions without feeling invaded. We formed recommendations for training based upon the staff schedules and availability. Additionally, we posted a discussion board where the staff could leave anonymous feedback. This encouraged honest suggestions and concerns that people may not have been willing to voice otherwise. The last step we took was to create a newsletter that detailed the benefits of the new system. It was disseminated via email, CID, and other public areas where people were likely to see it.

We wrote documentation and manuals to help the staff in adapting to the changing conditions of their workplace. The user manuals are as straightforward and simple as possible so as to capture the abilities of all the staff. Walkthroughs and reference manuals are readably accessible to everyone. The documentation of our work created for developers will facilitate any future modifications. We also provided many external resources for the purpose of education. The technology we utilized to create the system has plenty of existing documents. Literature was also created for the use and maintenance of the system. In order to maintain consistency, the style and format was similar to that of previous manuals produced by former IQP groups.

Training and continual feedback allowed us to fine tune the system and create manuals that addressed the most common issues the staff encounter. During the course of training, key issues became apparent that we did not plan for. When these problems arose, we specifically addressed them by updating the interfaces and adding more details to the system literature.

3.6 Schedule

Please see Appendix C for a timeline over which our methods were executed.

4. References

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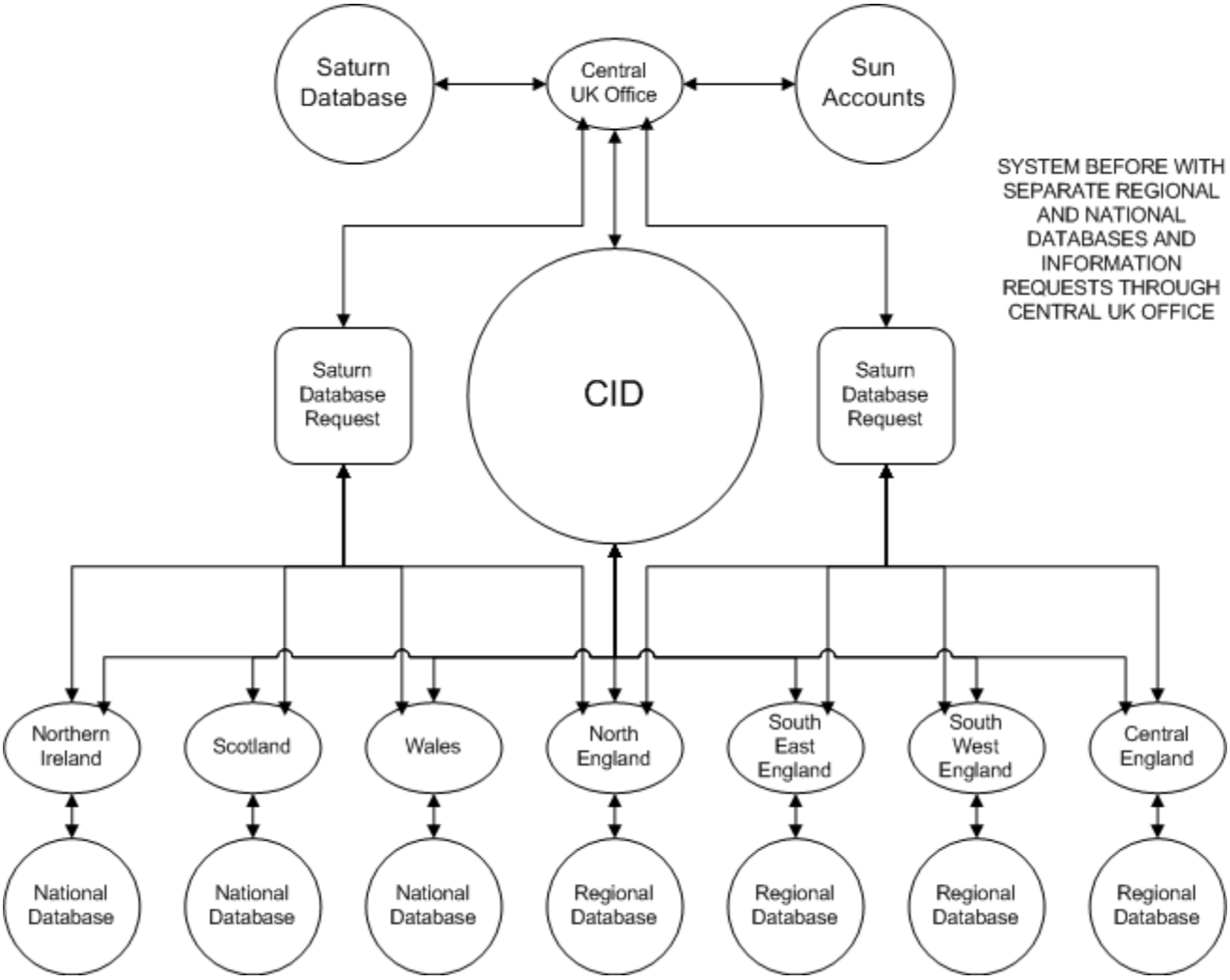
Wijaya, Sicilia. "Analyzing Arthritis Care's Data Management Practices." Worcester Polytechnic Institute, 2002.

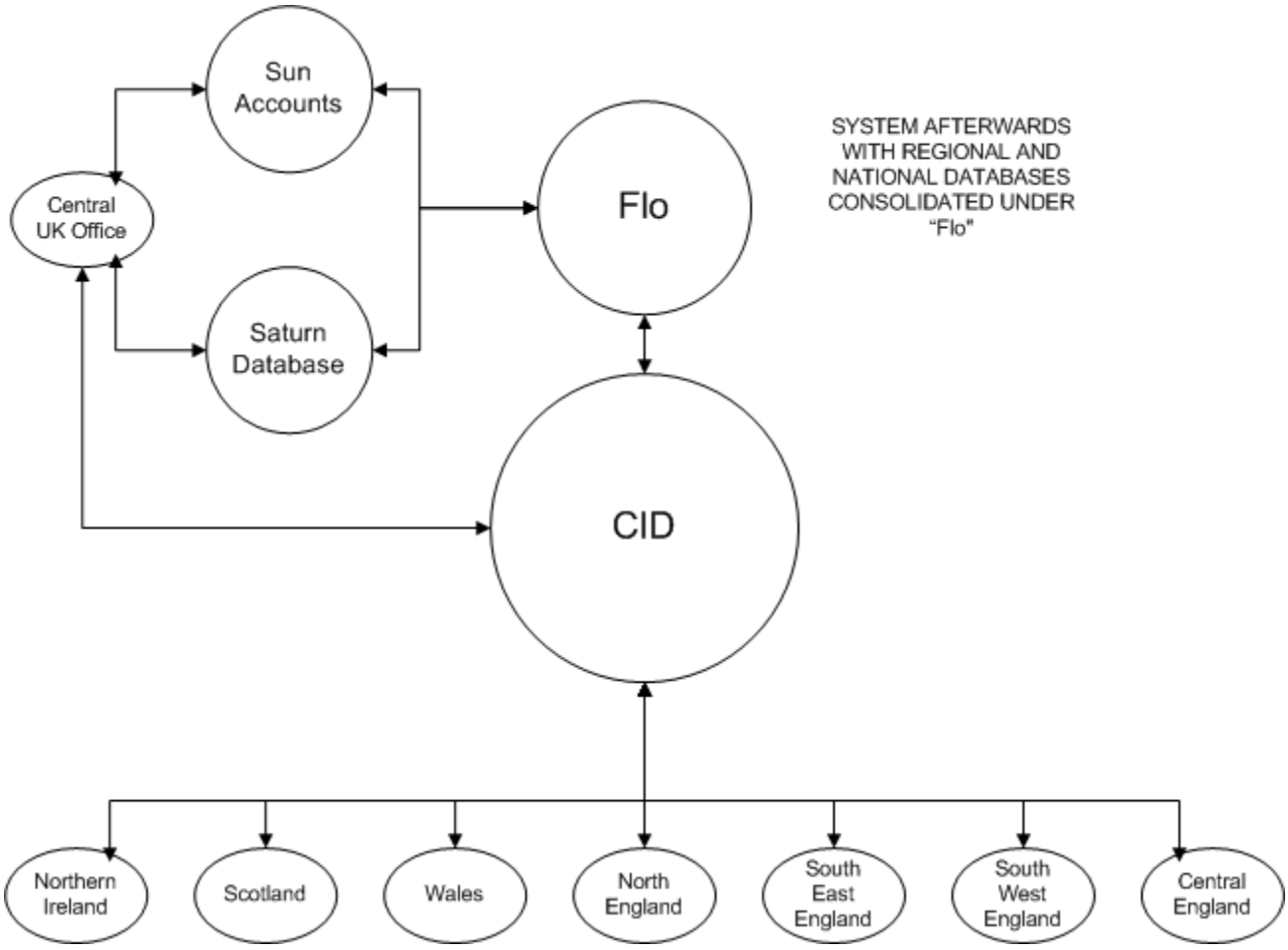
Appendix A: Arthritis Care System Structure Before Flo



The above diagram shows the previous state of databases at the regional and national offices of Arthritis Care. Each of the regional and national offices had access to their own databases. Those databases were not able to directly communicate with one another and were updated independently. Information was duplicated between them and also became outdated. Some information that was stored on databases was not available at any of the other offices, which lead to errors and multiple entries. Also, the central UK office was the only office with access to the Saturn Database. All of the branches had to make requests to the UK office in order to access any of the information contained in those databases. Requests could take up to a week to complete, as there were a number of steps that had to occur. Required information was identified at the regional office, which then sent a request to the central UK office, which then had to process that request, retrieve the information from the Saturn database, then send it back to the regional office at which point it could be used. The tedious process explains why separate databases were maintained – with this system it was far more convenient to have the information directly accessible (though it could be outdated).

All offices had access to CID, but CID did not interact with the Saturn Database. Again, only the central UK office was able to directly access either this data source.

Appendix B: Arthritis Care System Structure With Flo



The new entity marked on the diagram above as "Flo" is the consolidated replacement for the individual databases. Flo is accessible via CID and provides access to information stored on the Saturn Database. Direct access to the Saturn Database is still possible from the central UK office at this stage, though full integration with Flo would save money, time, and make the entire system more efficient.

It is no longer necessary to request reports from the central UK office as information can be obtained directly through CID (which accesses the Saturn Database using Flo). This change reduces the time used to access information from days (under the old system) to minutes (under the current system).

Appendix C: Overview of Schedule

- Preliminary
  - Partial schema for database
  - Understand key processes/people
- Week 1
  - Analyze database hosting solutions
  - Introductory meetings, postings
  - Discussion board
  - Schedule interviews
- Week 2
  - Additional meetings
  - Interviews at other locations
- Week 3
  - Database schema
  - Migrate Data
- Week 4
  - Implement database interface
  - Obtain user feedback and make revisions
- Week 5
  - Implement database interface
  - Obtain user feedback and make revisions
  - Development of training resources
- Week 6
  - Developer documentation
  - Write manuals
  - Development of training resources
  - Revise final report
- Week 7
  - Last minute adjustments that may arise
  - Final feedback
  - Final revisions to report

Arthritis Care Workflow System

James Kent
Michael Frysinger
Steven Gogos

Methods 2
07/04/2003
Arthritis Care

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3.1 Overview

We achieved the goals outlined in the background section by using an adaptive design strategy and iterative implementation. The phases of the project were interviewing, design, implementation, and integration. The interviewing and design phases consisted of interviewing key staff and making revisions to an existing partial database schema. This schema, nicknamed RANDY, was extended to become the final system known as Flo. Additionally, the interviews established criteria for future recommendations and additional functionality. During the implementation phase we deployed the schema on the CID host and migrated the necessary data to it. After this we coordinated the Saturn Database with Flo so the regional and national offices can access relevant data. The last step of the implementation was to coordinate the unified database system with CID to provide the user interface. The entire development and coordination process was an iterative cycle where the staff continuously provided feedback and we made the corresponding revisions. The conclusion of the Flo project was integration with the staff. This included the development of manuals, training resources and maintenance protocols for Arthritis Care. The integration phase overlapped the interviewing, design, and implementation significantly.

A visual representation of how Flo interacts with the other electronic systems of Arthritis Care is available in Appendices A and B. Appendix A depicts the system structure before the development of Flo. Here the regional and national offices maintain their own databases, and the central UK office processes requests. Appendix B shows the revised system with the introduction of Flo. Here the regional and national offices access a central database. Additionally, they have access to the Saturn Database so they do not have to wait for the UK office to process data requests.

The overall structure of our methods followed the ASCERTAIN model which was described in the background section. Specifically, our interviewing strategy **A**ssessed, then we **S**crutinized the resulting information, **C**reated new approaches based on our findings and **E**valuated areas that had to be changed. Next, our design strategy performed the **R**eengineering step by planning the changes in the infrastructure and producing a basis for the implementation. **T**raining and **A**ltering occurred in parallel with the **I**mplementation; we continually received feedback and adapted accordingly. Finally, our integration strategy provided a foundation for the **N**urturing step.

3.2 Interviewing

Prior to leaving for London, we conducted interviews with previous IQP groups. Specifically, we spoke with Benjamin Wilson of the C02 Arthritis Care project, then later with Sicilia Wijaya of the E02 project. The interviews were informal but we followed a basic agenda. The topics included their views on database consolidation at Arthritis Care, introducing a new system, training staff, and interacting with people. Issues were investigated more thoroughly as questions became apparent to us through the course of the conversations. Additionally, we had preliminary teleconferences with Dave Wright (Information and Office Systems Manager) and Elizabeth Lendering (Director of Resources) to informally discuss goals of the project, basic technical issues and rough ideas concerning our methods.

Once we arrived in London, initial interviews were conducted with Dave Wright, Elizabeth Lendering, and Simon Goodwin (IT Support) to refine the ideas of our proposal. We were interested

in any changes that had occurred in the system, assumptions in the proposal that were invalid, and additional understanding of the everyday processes at Arthritis Care. Discussions with Dave, Elizabeth, and Simon generally occurred as the need arose. Since they were on-site and involved with the project, they were usually available (however, Dave left Arthritis Care during our second week so communication with him was minimal afterward).

Arthritis Care also assembled a committee, called the Data Capture Working Party, in order to assess immediate and future informational needs of service users. Everyone we had previously selected for interviewing was either involved with or represented in this group. After our first meeting with the committee we identified several people for in-depth interviews. These people generally fell into two categories: those related to the needs of the regional and national offices, and those related to additional services, such as hotels and training. For all of these interviews, there was no formal pre-structuring of questions, but we did have topic agendas of issues to address.

To establish the needs of the regional and national offices we interviewed Nicki Hastie (Information Services Manager) and John McGregor (Senior Services Manager) at the central England office in Nottingham. During these interviews we discussed the current status of RANDY and how to extend it into what would become Flo. Although the interviews were loosely structured, the operational and informational requirements of the office were analyzed in great detail. We addressed topics such as existing procedure, current systems, and access control.

RANDY was a project originally started by the southwest England office to standardize its database systems. As the project progressed, many other offices became interested in the idea and asked to be included in its development. During the summer of 2002, the coordinator of the project did not wish to continue work on it and it was passed to Nicki and John. They worked on the development further but due to time constraints and the necessity of devoting attention elsewhere, development was slow and generally occurred in their free time. When we inherited RANDY, it was an operational database system that incorporated feedback from all of the regional and national offices. However, it lacked the ability to function as a multiple-office web solution since the original

intention was for each office to maintain a local copy of the database. There were several other areas of RANDY that required improvement and more thorough consideration than was previously given.

We also interviewed John Haslam (Training Services Manager) while in Nottingham. The purpose of this interview was to establish needs of the training services that could be incorporated into Flo. We wanted to determine what training information is exchanged between the regional and national offices and the central UK office, and what is exchanged between the regional and national offices themselves.

To analyze informational needs of the Arthritis Care hotels we interviewed Tim Gardiner (General Manager of Arthritis Care Hotels) and John Jesmont (Director of Mayfair Hotel in Blackpool). Tim provided a general overview of the goals of the hotels and how they interact with the rest of the organization. Specifically, we were concerned with what information the hotels need from the central UK office and what information the central UK office needs from the hotels. Additionally, we discussed broad goals of the electronic ADS reservation system used by the hotels for their operational and financial needs.

After our interview with Tim, we traveled to Blackpool to speak with John Jesmont. Here we determined specifically what paperwork can be eliminated, how information the hotels report to the central UK office can be automated, and how duplicate data can be consolidated. After the interview with John Jesmont, we conducted a follow up interview with Tim. He encouraged us to pursue the topic further by interviewing Parul Shah (Management Accountant). She manages the other aspect of the information exchange with the hotels, namely that which occurs at the central UK office. During this interview, we verified whether specific paperwork can be eliminated and if the Accounts Department wants it to be. Additionally, Parul identified other issues in the current accounting system that may make certain changes impossible.

To determine the details of the coordination between Flo and the Saturn Database, we interviewed Joanne Brackenbury (Head of Supporter Development). Joanne detailed the operation of Saturn and gave us access to the system so that we could analyze it afterward. She expressed her

thoughts on the scope and feasibility of our project, and helped us understand the limitations of integration with the Saturn Database. Additionally, we spoke with Ruth (a temporary assistant) who demonstrated how Saturn is used to generate reports and extract information. Ongoing discussion with Joanne occurred throughout the project since it was necessary to consult her closely on all matters concerning the Saturn Database.

We also spoke with Gill Chilvers (Acting Head of HR) and Jennifer Lawson (HR Administrator) to determine the feasibility of incorporating a staff directory with Flo. This interview established where the staff information is currently stored, whether CID access to it would raise ethical or legal issues, and how the information is maintained. Gill and Jennifer also described how the staff directory is used and why historically many people have outdated copies of the information.

Interviewing was used to establish the scope and objectives of Flo, and criteria for future work. Generally, the meetings and interviews identified additional staff members and departments from which to obtain further information. After the scheduled formal interviews, ongoing discussion with the staff occurred through our feedback loop; this was part of our integration step.

3.3 Design

The existing schema, RANDY, and the results of our interviews largely determined the design of Flo. Specifically, RANDY established the core data types and corresponding attributes to be included. This core schema definition was extended to include additional functionality and thereby satisfy other needs.

The consolidation of the regional and national office databases posed several design issues. We had to verify which data was correct when it existed in multiple locations. Using time stamps (values indicating when a record was last modified) was a realistic and practical way to determine which data was the most recent. However, in cases where this was not possible, it was necessary to have the branch secretaries manually verify the data. In most cases, the regional and national office data was more current than that in the Saturn Database.

Information from the interviews determined the actors and their levels of accessibility within Flo. The electronic system mirrors real world privileges and restrictions. Appendix C shows an example of the authentication process that ensures users only have access to the information they are supposed to. We supplemented this by designing tables of tasks and responsibilities that the regional and national offices assigned to specific staff members, as they deemed necessary. This allowed the offices to assign responsibilities in the most sensible manner possible. For example, if a certain person in a given office used to perform a task that is similar to one in the new system, they should be the one responsible for managing the new task. In some cases, a specific function was not present at a particular office or staff members with different titles performed a certain task.

3.4 Implementation

Once Flo's design was established, we deployed it on the CID host and migrated pertinent information. The process involved creating skeleton tables and databases according to the schema, and adding the appropriate permission settings. The permissions are configurable by appropriate managers and IT staff so that new workers or people changing positions have the correct access to the data. Once we had this in place it was possible to begin migrating data to the new database.

Some of the data was previously retained in Microsoft Access databases, Excel spreadsheets, Word documents, and paper form. This was due to the fact that there was little coordination between offices and lack of standardization. Additionally, local data duplicated that of the Saturn Database because of lack of access to Saturn. The regional and national offices would often maintain local databases to circumvent the issue. Depending on the data format, some repositories were easier to assimilate than others. Access and Excel provide ways to transfer data from their native format to a new database. Word documents needed supplementary programs to extract and store the data into Flo. The paper resources had to be added manually, so protocol was developed for this task. The formats for the existing databases were different, but the techniques for importing and exporting data did not vary significantly. Basically, the process of migration came down to identifying the source

format, finding a way to export it, and developing a way to import it into our new database. Complete migration was not possible because of time constraints, but we did leave sufficient documentation for it to be carried out.

After Flo was deployed, it was necessary to coordinate it with the Saturn Database. This involved using Open Database Connectivity (ODBC) to retrieve data from Saturn. The regional and national offices have read-only access to the Saturn Data. This ensures that the Supporter Development Department will remain as the single access control point. Additionally, the central UK office still has direct access to the Saturn Database as necessary.

In order for Flo to be of any use to Arthritis Care, we had to develop interfaces and tools within the framework of CID. This allows standard web access to Flo through the existing system. The interfaces provide an abstraction of the underlying system so that users of the database do not need to be concerned with unnecessary technical details. To ease transition to the new system, the interfaces mimic previous forms that were in use. Arthritis Care's resources determined the actual technologies used. However, the technological details were not as important as making the interfaces logical, familiar, and intuitive. The development of tools included the creation of the electronic update request forms. These allow the regional and national offices to submit changes to data in the Saturn Database that is incorrect. The electronic nature of the forms allows them to be processed quickly.

3.5 Integration

After implementation, it was necessary to integrate the new developments with the daily operations of Arthritis Care. While procedure definition was part of the design, it was necessary to have the organization actually start using Flo. This was a transition where specific parts were incorporated gradually. Actually integrating the new procedure entirely was not possible within our time frame. We have left recommendations for this procedure to be carried out after our departure.

Resistance to change was an obstacle we had to overcome. We had to convince people of the virtues of the system. The first step was to constantly obtain feedback from the users. By working with them consistently and adapting the system to suit their needs, integration was not a sudden unexpected event. Since the system works the way they wanted and expected, they more readily accepted it.

The second step was to teach the end users how the system works. We made ourselves as approachable as possible so that the staff received our advice and directions without feeling invaded. We formed recommendations for training based upon the staff schedules and availability. Additionally, we posted a discussion board where the staff could leave anonymous feedback. This encouraged honest suggestions and concerns that people may not have been willing to voice otherwise. The last step we took was to create a newsletter that detailed the benefits of the new system. It was disseminated via email, CID, and other public areas where people were likely to see it.

We wrote documentation and manuals to help the staff in adapting to the changing conditions of their workplace. We strove to make the user manuals as straightforward and simple as possible so as to capture the abilities of all the staff. Walkthroughs and reference manuals are readably accessible to everyone. The documentation of our work created for developers will facilitate any future modifications. We also provided many external resources for the purpose of education. The technology we utilized to create the system has plenty of existing documents. Literature was also created for the use and maintenance of the system. In order to maintain consistency, the style and format was similar to that of previous manuals produced by former IQP groups.

Training and continual feedback allowed us to fine tune the system and create manuals that addressed the most common issues the staff encounter. During the course of training, key issues became apparent that we did not plan for. When these problems arose, we specifically addressed them by updating the interfaces and adding more details to the system literature.

3.6 Schedule

Please see Appendix D for a timeline over which our methods were executed.

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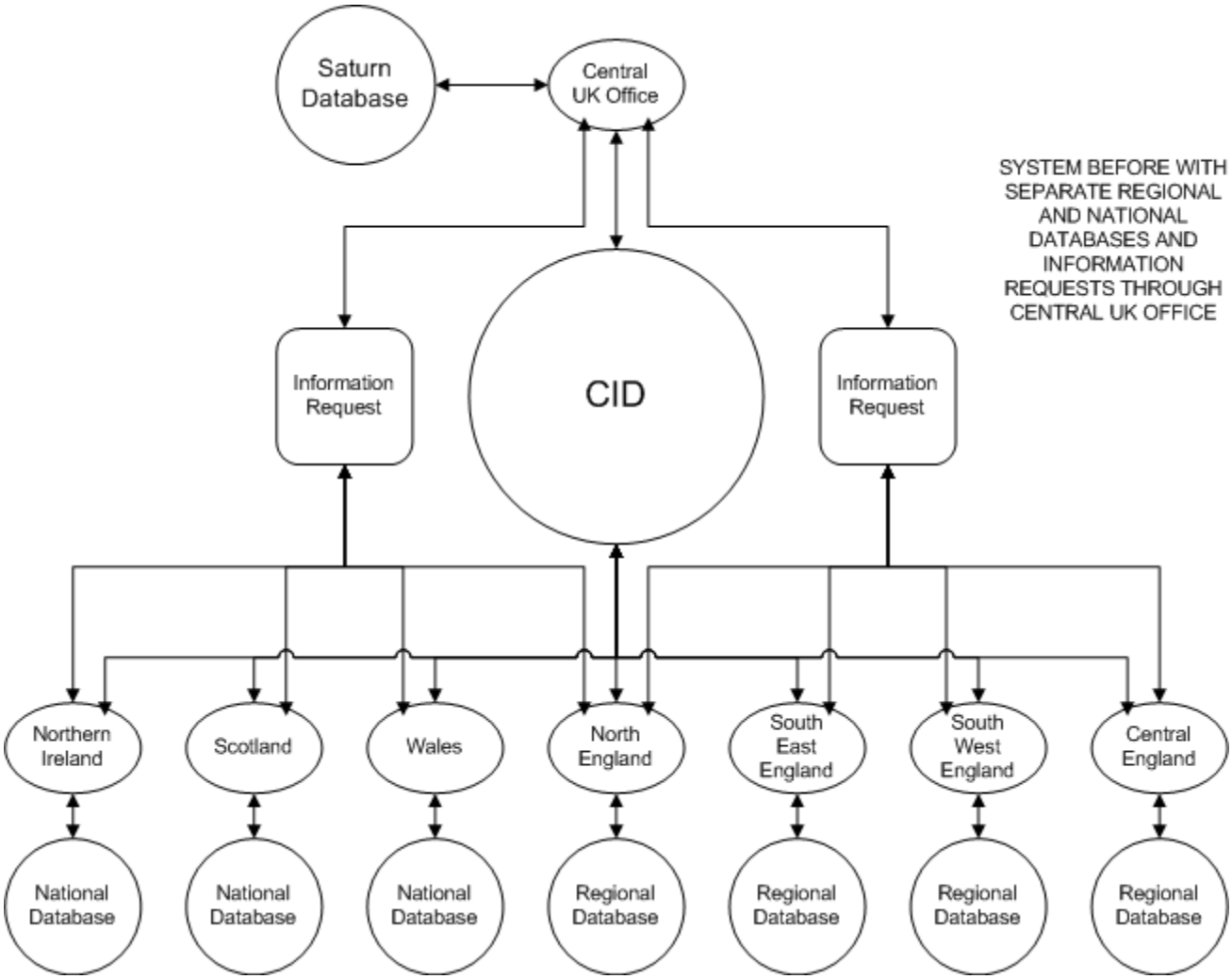
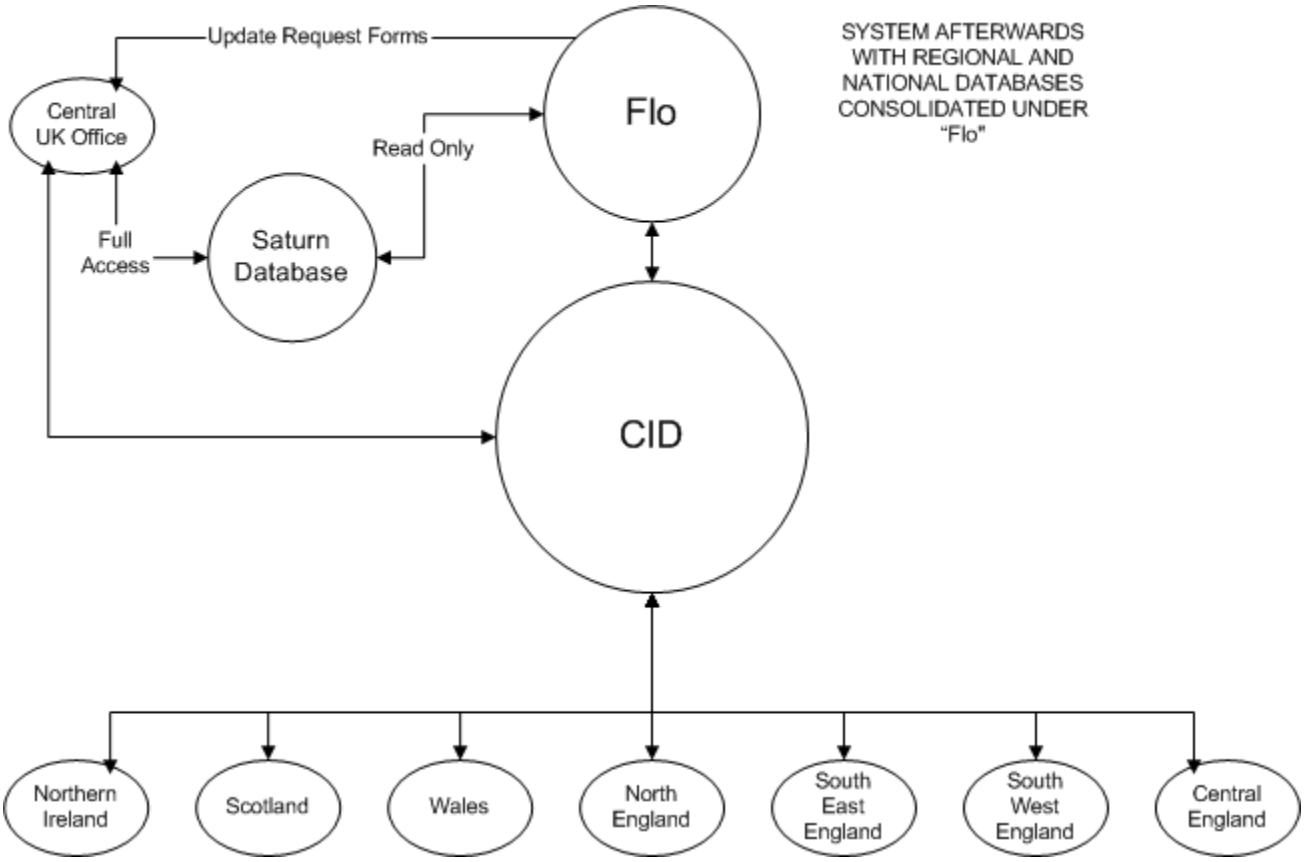
Appendix A: Arthritis Care System Structure Before Flo



The above diagram shows the previous state of databases at the regional and national offices of Arthritis Care. Each of the regional and national offices had access to their own databases. Those databases were not able to directly communicate with one another and were updated independently. Information was duplicated between them and also became outdated. Some information that was stored on databases was not available at any of the other offices, which lead to errors and multiple entries. Also, the central UK office was the only office with access to the Saturn Database. All of the branches had to make requests to the UK office in order to access any of the information contained in those databases. Requests could take up to a week to complete, as there were a number of steps that had to occur. Required information was identified at the regional office, which then sent a request to the central UK office, which then had to process that request, retrieve the information from the Saturn database, then send it back to the regional office at which point it could be used. The tedious process explains why separate databases were maintained – with this system it was far more convenient to have the information directly accessible (though it could be outdated).

All offices had access to CID, but CID did not interact with the Saturn Database. Again, only the central UK office was able to directly access this data source.

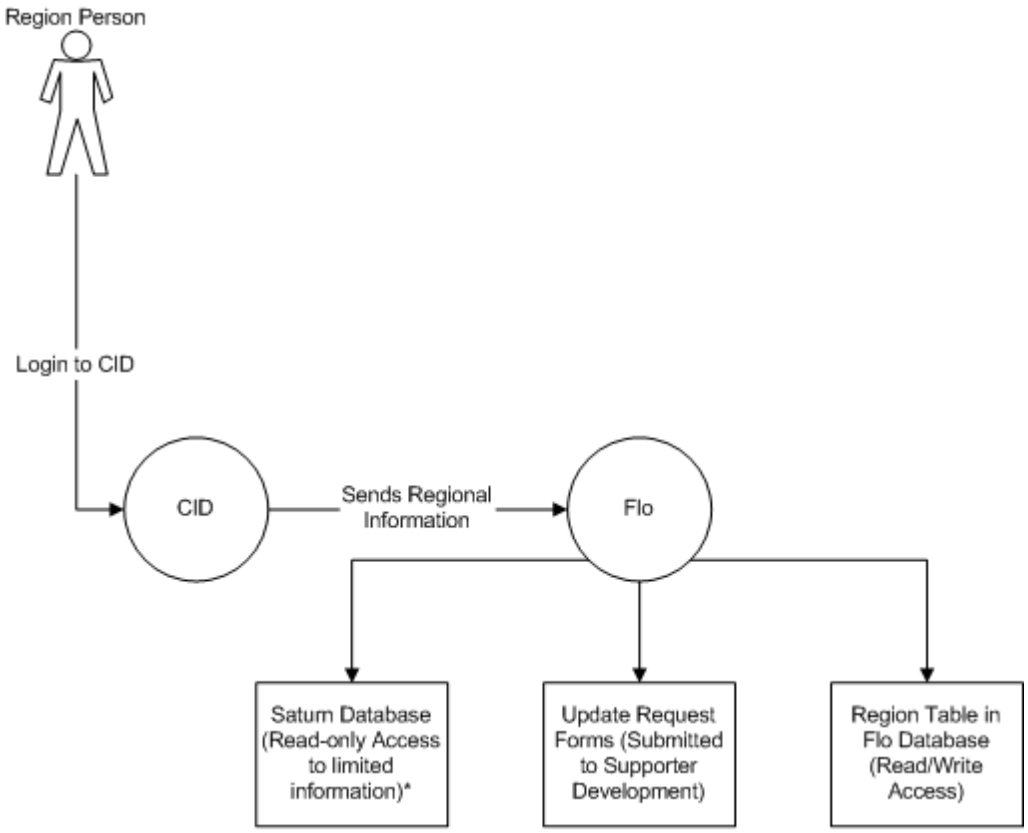
Appendix B: Arthritis Care System Structure With Flo



The new entity marked on the diagram above as "Flo" is the consolidated replacement for the individual databases. Flo is accessible via CID and provides access to information stored on the Saturn Database. This allows the regional and national offices to read the data, and they can use the electronic update request forms to submit changes to the central UK office. Direct access to the Saturn Database is still possible from the central UK office at this stage, though full integration with Flo would save money, time, and make the entire system more efficient.

It is no longer necessary to request reports from the central UK office as information can be obtained directly through CID (which accesses the Saturn Database using Flo). This change reduces the time used to access information from days (under the old system) to minutes (under the current system).

Appendix C: Flo Authentication Process Example



*Subject to approval by supporter development

Here is an example of the authentication process for someone at a regional office. They first login to CID as normal. Their location information (i.e. what region they are from) is next given to Flo. Flo then allows the person to access limited information in Saturn, the update request forms to submit changes and information in the Flo database specific to their region. Notably, Supporter Development still serves as the single access control point in this protocol.

Appendix D: Overview of Schedule

- Preliminary
  - Partial schema for database
  - Understand key processes/people
  - Proposal
- Week 1 (March 17 – March 21)
  - Cost analysis of database hosting solutions
  - Introductory meetings, postings
    - March 18, Initial presentation to AC staff
    - March 19, Participated in second meeting of Data Capture Working Party
  - Schedule interviews for following week
  - Began analysis of current Saturn Database condition and feasibility of exporting options
- Week 2 (March 24 – March 28)
  - Discussion board with anonymous posting
  - Review of ACID/RANDY database in preparation for Nottingham trip
  - Meetings/interviews
    - March 25, Interview with Tim Gardiner in preparation for Blackpool
    - March 25, Trip to Nottingham to interview Nicki Hastie, John McGregor and John Haslam
    - March 27 to March 29, Trip to New Mayfair hotel in Blackpool to interview John Jesmont
- Week 3 (March 31 – April 4)
  - Meetings/interviews
    - March 31, follow-up meeting with Tim Gardiner
    - April 1, First meeting with Joanne Brackenbury and demonstration afterward with Ruth
    - April 1, Unplanned meeting with Nicki
    - April 1, Meeting with Gill Chilvers and Jenni Lawson
    - April 4, Meeting with Parul Shah
  - Updated staff directory form
  - Design for Flo schema nearly complete
  - Begin trying to link to Saturn database
- Week 4 (April 7 – April 11)
  - Deploy Flo on CID host for private testing
  - Finish linking to Saturn database
- Week 5 (April 14 – April 18)
  - Implement database interface (including update request forms)
  - Obtain user feedback and make revisions
  - Development of training resources
- Week 6 (April 21 – April 25)
  - Developer documentation
  - Write manuals
  - Development of training resources
  - Revise final report
- Week 7 (April 28 – May 2)
  - Last minute adjustments that may arise
  - Final feedback
  - Final revisions to report

Arthritis Care Workflow System

James Kent
Michael Frysinger
Steven Gogos

Results 1
14/04/2003
Arthritis Care

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4. Results and Analysis

4.1 Overview

Each category of our methods produced specific results that ultimately led to our understanding of Arthritis Care's operations, the creation of Flo, and development of future recommendations. The interviewing established specific objectives for the Flo system and highlighted additional problems related to workflow and information management. Our design,

implementation, and integration created Flo along with necessary documentation for its use and maintenance.

4.2 Interviews and Meetings

From the preliminary meetings with the Data Capture Working Party we found that Arthritis Care is severely lacking an organization-wide database solution. This has created major problems in accounting for their operations and matching financial inputs with their tangible outputs. For example, approximately one million pounds were spent on training services last year but they do not know how many courses were offered, where courses were offered, or even how many people were trained. We discovered that a truly unified solution would require major revision to the use and operation of the Saturn Database, but this is not currently feasible. Several staff members became highly defensive when we suggested making changes to Saturn and they indicated that the necessary work was well outside of the scope of a two-month project.

The Data Capture Working Party also enabled us to identify the key areas for in-depth interviews. The results of these interviews are detailed in the remainder of Section 4.2.

4.2.1 The RANDY Project

As mentioned in the methods section, we used a partially completed project called RANDY as the basis for Flo. The interview conducted in Nottingham with Nicki Hastie and John McGregor established the status of RANDY and specifically where it was lacking. We found that the Nottingham office was successfully using the RANDY system. However, it was intended to be a local database so it lacked support for multiple users across different offices that would access it simultaneously. Nicki and John indicated that they were unsure of how the project could be brought to this level. Although RANDY was intended to be local, it did incorporate input and address issues of all seven regional and national offices. The database and interface were developed in close

coordination with staff throughout Arthritis Care. In general, the offices use the same type of data. However, without any form of standardization, the storage formats and methods of access varied.

Expanding the RANDY project into a multiple office solution raised additional issues that we discussed. We found that when developing Flo it would be crucial to respect the provisions of the Data Protection Act. For example, home workers that may have access to CID should not have access to sensitive information in Flo such as branch membership. Another concern was that multi-lingual support might be necessary since one of the national offices is in Wales. This point had already been considered and there was a mutual consensus that it was not immediately necessary.

We found that the regional and national offices do not outsource their databases in any manner – contrary to what members of previous IQP groups indicated. However, it would still be necessary for us to verify the local data so that it could be consolidated. Nicki and John suggested that this process could occur with the office secretaries who are responsible for recording information. In general, they felt that the regional and national offices would have more accurate data than the Saturn Database. Furthermore, certain data in RANDY duplicated Saturn so it would be necessary for us to replace this with some sort of link to Saturn. The regional and national offices do not have permission to access the Saturn Database and they cannot work closely enough with the central UK office for this to occur. While we discovered previously that consolidation of Saturn could not happen, it became apparent that we would have to link to it in some way.

A related issue that we discussed was database maintenance. In many cases, a person with a given title may not exist at each office, or people with the same titles may be responsible for slightly different tasks. We reached an agreement regarding the best way to assign responsibilities to ensure that the Flo database is maintained properly. A list of responsibilities would be created and the individual offices could then assign them to specific people as they see fit. It would be most desirable for a task to be assigned to an individual that performed a similar duty in the old system. Along with database maintenance, we investigated how willing staff would be to accept new responsibilities and generally how motivated they are to adopt a new system. We received the impression that most

people realize that their old system is inefficient and they are increasingly becoming aggravated with it. However, they want a new system immediately and some have been discouraged with the rate of progress to date. There is certainly a willingness to change and nearly all of the staff in the regional and national offices are computer literate and able to make a significant transition.

After the preliminary meeting with Nicki and John in Nottingham, we spoke with Nicki several other times informally and exchanged emails. Her understanding of the RANDY project and direction it should take in becoming Flo was crucial to our design and development process.

4.2.2 Saturn Database

In order to gain access to the Saturn Database and determine how we were allowed to interact with it, we had meetings with Joanne Brackenbury and Kieran Kettleton of the Supporter Development department. In general, we established that access to Saturn would have to be read-only and that Supporter Development would remain the single access control point in the organization. We also established a process whereby the regional and national offices could submit requests for changes to data in the Saturn database. Joanne suggested that the Flo system send requests by email to Supporter Services and then they would be responsible for filtering out the ones that should be forwarded to her – data requests and direct mail. Supporter Services already performs a similar function and they have an email account for this specific purpose.

Joanne also informed us that a project had begun whose goal was to determine what information the regional and national offices needed access to in Saturn. The central UK office was unaware of the existence of RANDY before we mentioned it. Prior to our arrival, Joanne had only sent a questionnaire to the regional and national offices and she was waiting for the results. Flo addresses the concerns of her project to some extent, but full coordination with Saturn would require much more detailed analysis in this area.

Ongoing discussion with Joanne was critical to our work. We spoke with both her and Killian multiple times through the course of the project and reviewed our direction with them.

4.2.2 Arthritis Care Hotels

The Arthritis Care Hotels are perhaps the most business-oriented aspect of the organization. They periodically exchange a considerable amount of information with the central UK office. To analyze the informational needs of the hotels we spoke with Tim Gardiner and Parule Shah at the central UK office, and John Jesmont at the New Mayfair hotel in Blackpool. Rather than provide the details of each meeting here, an overview will be given of the information exchange.

Each of the hotels periodically reports financial information to a representative in the Accounting department at the central UK office. The two types of records sent are supplier invoices and income receipts. In both cases, paper copies of the information are sent along with an electronic form that is eventually entered into Sun Accounts. The central office needs paper copies of the supplier invoices to authenticate and verify payments. Therefore, these invoices cannot be eliminated from the information flow with the hotels.

The income receipts are a different matter. These receipts record any income that the hotel receives. This can include anything from guests purchasing drinks at the bar to room reservations. In Blackpool, we observed the process by which John entered information onto the paper receipts and then recorded it electronically as well. As an example, at the end of the day the bartender goes to John's office and reports the total bar income for people who put drinks on their room charge (i.e. they do not pay cash). John then records the information onto a paper receipt that produces two carbon copies. One copy of the receipt is kept locally, another is the one sent to the central office, and the third is given to the guest. After writing out the receipt, John enters the same information into an electronic spreadsheet on his local computer. Each month the income receipts are sent to the central office in an envelope and they are accompanied by the electronic spreadsheet on a zip disk.

The process of reporting income to the central UK office is rather wasteful. The hotel directors record the same information in paper and electronic form, but the manner in which this is done provides no form of verification. To restate this, if the income is incorrectly reported originally,

the error will simply be carried through to the electronic system. Here there is no third party ledger that can be used to verify the information. Parul, who works in the Accounting department at the central UK office, agreed that the paper receipts can be eliminated. Furthermore, the process of reporting financial information can likely be automated since all of the hotels do have dedicated Internet access.

4.2.3 Human Resources Department

The original purpose of our meeting with the HR staff was to determine how Flo could be coordinated with the staff directory. We first discovered that CID already contains an accurate copy of the directory and the department also maintains a separate local copy. Locally, the directory is stored as an Excel spreadsheet and it is used to generate a "Who's Who" list periodically. However, this list has very specific formatting that must be fixed manually after an entry is changed. If the information for any given staff member changes, human resources must complete the following procedure:

- Modify the record in the local spreadsheet.
- Manually fix the formatting of reports on the spreadsheet.
- Modify the record in the CID database.
- Periodically (about once a month) email out updated reports from the spreadsheet

This procedure wastes time and unnecessarily requires duplicate effort. Gill and Jennifer agreed that automating the updates so that information only needs to be entered once and the reports are generated automatically would save considerable time.

We also investigated the issue of staff members having outdated versions of the directory. Both David Wright and Nicki Hastie indicated that this is a problem. Apparently, Human Resources periodically mails out the updated directory, but people in the various offices do not always use the latest version. In some cases, a staff member may print the "Who's Who" list and use it for several

months. A possible solution would be to eliminate the distribution of the spreadsheet report that is used for printing. This would result in everyone using the electronic directory that is always valid.

4.2.4 Training Services

Training Services currently lack formal information exchange and general accountability. We found from John Haslam that seminars and information sessions are loosely structured and often there are problems with reliably securing course leaders and venues. There is no standard procedure for the operation of training services; each office is allowed to autonomously run programs as they see fit and only general guidelines are passed down from the central UK office. However, they all need to report the same type of information to the central office and they generally retain the same type of information although its use may vary. John suggested that Flo could accommodate training services if the system were to include the following data:

- Information about particular course offerings
    - Leader
    - Approved venues (is venue accessible to people with disabilities)
    - Waiting lists of participants
- What exists in post code area
    - Number of venues
    - Course leaders
    - Participants
- Automated documentation to course leaders, participants, etc.
- Ability to see information for bordering regions.

Appropriate interfaces and maintenance procedure would also need to be developed if this information were included.

4.3 Flo Design and Implementation

During our design process, several issues arose with the development of RANDY into Flo and linking to Saturn. Issues concerning RANDY were reviewed with Nicki Hastie. These were generally minor problems such as unnecessary duplicate fields or relationships that could be simplified. The result of our design was the revision of the RANDY schema that would become the core of the Flo system.

Preliminary design work with the Saturn coordination revealed that we would not be able to link Flo with Saturn as originally anticipated. Our initial plan was to provide a direct link to Saturn so that current data would always be immediately accessible. However, we realized that access in this manner would be too slow and inundate the server with requests. This would also degrade the database performance for privileged administrators at the central UK office. Therefore, we decided to revise our plan so that a regular process would periodically synchronize the information in Flo with that of Saturn.

The deployment of Flo on the CID host has several advantages and disadvantages. It is beneficial to unite the solutions under a single host to provide close integration. This makes it easier to work with the system from a developer standpoint and centralizes access. Thus, we did not have to repeat a significant amount of work for tasks such as authenticating users. Additionally, the CID host provided the technical support required by Flo with no additional cost. We were able to avoid the financial issues and potential time delay of needing to secure an additional external host. Unfortunately, these benefits have two main drawbacks. First, if Flo receives a large volume of requests, Arthritis Care may have to pay an additional charge to the CID host for extra bandwidth. This would still be considerably less costly than paying for an entire additional host. Second, requests to Flo may negatively impact the performance of CID, causing the system to run slower. If this becomes an overbearing issue, then Flo will have to be moved elsewhere. However, both

systems are not extremely resource-intensive so we sincerely doubt that this will need to be considered.

4.5 Staff Integration

The integration with staff has not occurred yet, but we anticipate the following outcomes of this stage. Developer documentation was created for future additions and modifications to the system. This will assist future people working on CID and Flo in making changes easily and without destructively interfering with existing functionality. The existing system was designed using independent modules that can be augmented or replaced.

For maintenance, a list of responsibilities was created that the regional and national offices will use to assign tasks to specific staff members. This is accompanied by protocol in cases where access control points are necessary. Additionally, a manual was created and posted on CID that explains the use of the Flo system.

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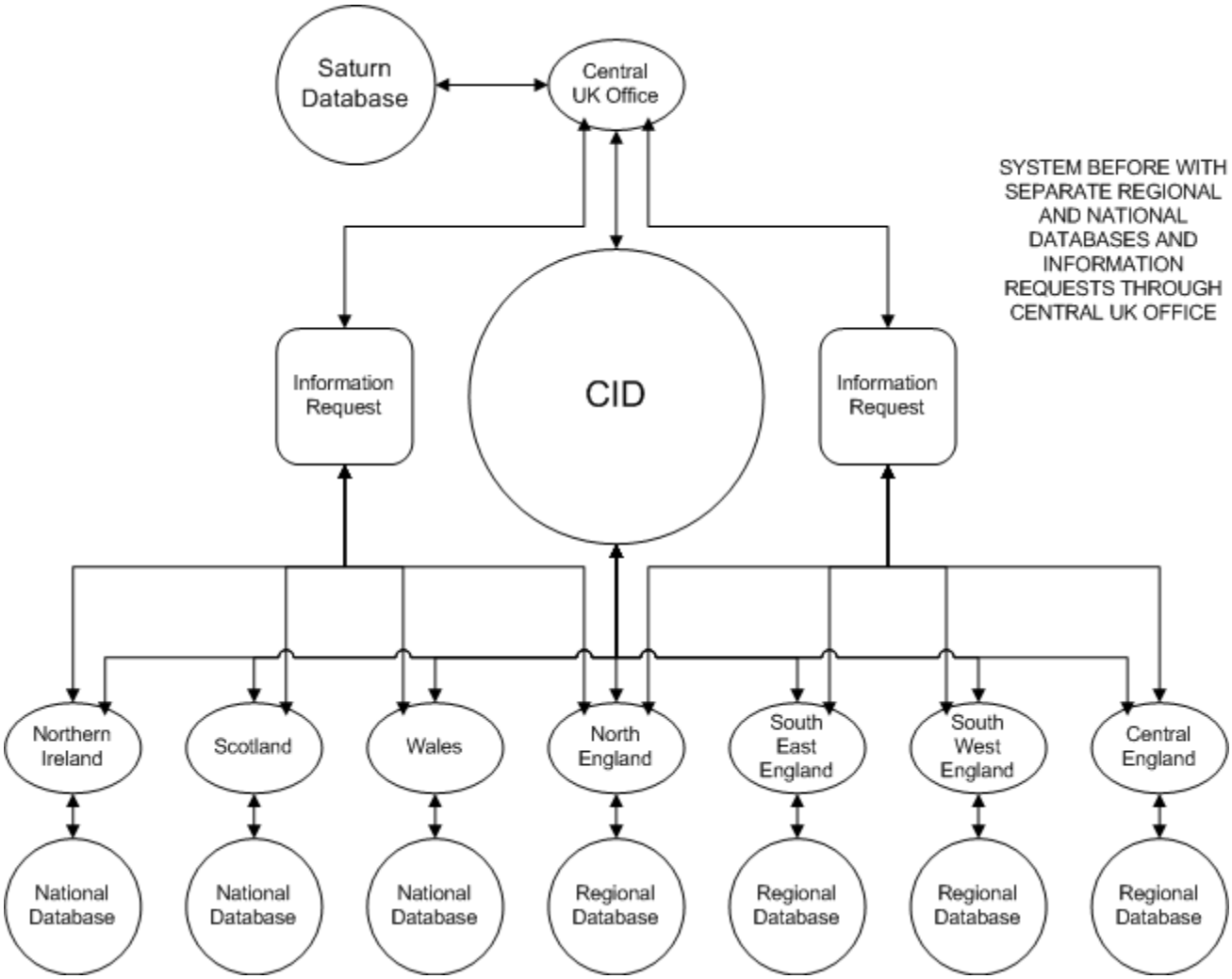
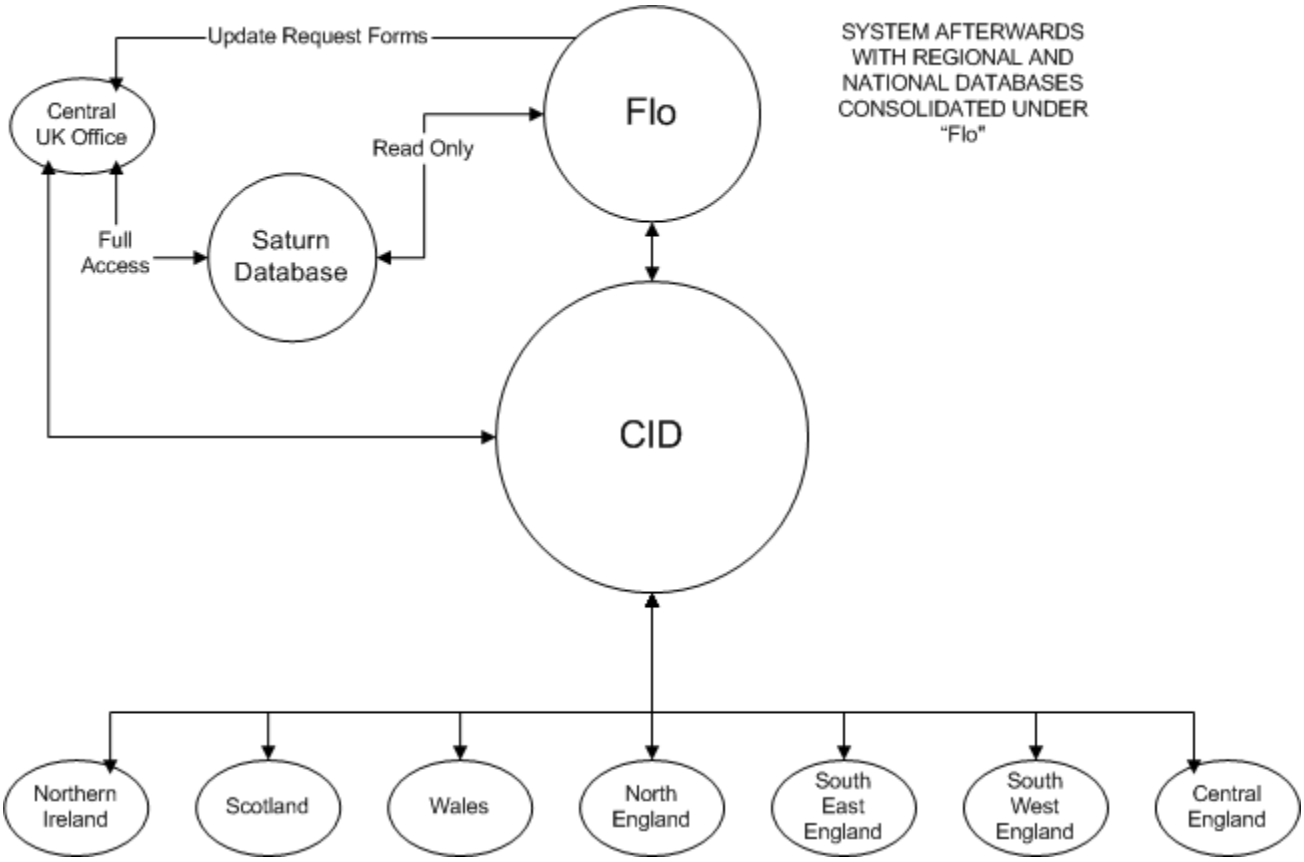
Appendix A: Arthritis Care System Structure Before Flo



The above diagram shows the previous state of databases at the regional and national offices of Arthritis Care. Each of the regional and national offices had access to their own databases. Those databases were not able to directly communicate with one another and were updated independently. Information was duplicated between them and also became outdated. Some information that was stored on databases was not available at any of the other offices, which lead to errors and multiple entries. Also, the central UK office was the only office with access to the Saturn Database. All of the branches had to make requests to the UK office in order to access any of the information contained in those databases. Requests could take up to a week to complete, as there were a number of steps that had to occur. Required information was identified at the regional office, which then sent a request to the central UK office, which then had to process that request, retrieve the information from the Saturn database, then send it back to the regional office at which point it could be used. The tedious process explains why separate databases were maintained – with this system it was far more convenient to have the information directly accessible (though it could be outdated).

All offices had access to CID, but CID did not interact with the Saturn Database. Again, only the central UK office was able to directly access this data source.

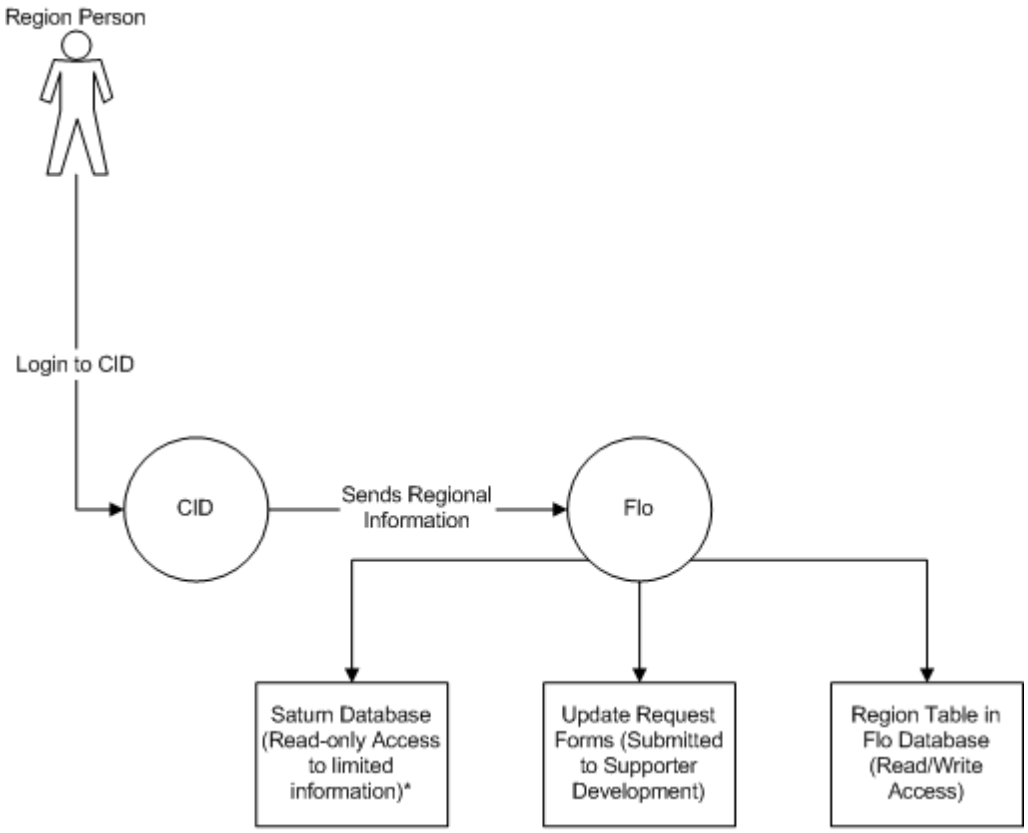
Appendix B: Arthritis Care System Structure With Flo



The new entity marked on the diagram above as "Flo" is the consolidated replacement for the individual databases. Flo is accessible via CID and provides access to information stored on the Saturn Database. This allows the regional and national offices to read the data, and they can use the electronic update request forms to submit changes to the central UK office. Direct access to the Saturn Database is still possible from the central UK office at this stage, though full integration with Flo would save money, time, and make the entire system more efficient.

It is no longer necessary to request reports from the central UK office as information can be obtained directly through CID (which accesses the Saturn Database using Flo). This change reduces the time used to access information from days (under the old system) to minutes (under the current system).

Appendix C: Flo Authentication Process Example



*Subject to approval by supporter development

Here is an example of the authentication process for someone at a regional office. They first login to CID as normal. Their location information (i.e. what region they are from) is next given to Flo. Flo then allows the person to access limited information in Saturn, the update request forms to submit changes and information in the Flo database specific to their region. Notably, Supporter Development still serves as the single access control point in this protocol.

Appendix D: Overview of Schedule

- Preliminary
  - Partial schema for database
  - Understand key processes/people
  - Proposal
- Week 1 (March 17 – March 21)
  - Cost analysis of database hosting solutions
  - Introductory meetings, postings
    - March 18, Initial presentation to AC staff
    - March 19, Participated in second meeting of Data Capture Working Party
  - Schedule interviews for following week
  - Began analysis of current Saturn Database condition and feasibility of exporting options
- Week 2 (March 24 – March 28)
  - Discussion board with anonymous posting
  - Review of ACID/RANDY database in preparation for Nottingham trip
  - Meetings/interviews
    - March 25, Interview with Tim Gardiner in preparation for Blackpool
    - March 25, Trip to Nottingham to interview Nicki Hastie, John McGregor and John Haslam
    - March 27 to March 29, Trip to New Mayfair hotel in Blackpool to interview John Jesmont
- Week 3 (March 31 – April 4)
  - Meetings/interviews
    - March 31, follow-up meeting with Tim Gardiner
    - April 1, First meeting with Joanne Brackenbury and demonstration afterward with Ruth
    - April 1, Unplanned meeting with Nicki
    - April 1, Meeting with Gill Chilvers and Jenni Lawson
    - April 4, Meeting with Parul Shah
  - Updated staff directory form
  - Design for Flo schema nearly complete
  - Begin trying to link to Saturn database
- Week 4 (April 7 – April 11)
  - Meetings/Interviews
    - April 9, Meeting with Joanne Brackenbury and Kieran Kettleton
  - Deploy Flo on CID host without public access
  - Design and implement authorization protocol
  - Begin implementing batch process that periodically coordinates Flo with Saturn data
  - Continue work on interface
    - Web page that browses NRC/ALC/Branch structure and allows display of branch members
    - Web form for equipment management: history and listing
- Week 5 (April 14 – April 18)
  - Implement database interface (including update request forms)
  - Obtain user feedback and make revisions
  - Development of training resources
- Week 6 (April 21 – April 25)
  - Developer documentation

    - Write manuals
    - Development of training resources
    - Revise final report
- Week 7 (April 28 – May 2)
    - Last minute adjustments that may arise
    - Final feedback
    - Final revisions to report

James Kent
Michael Frysinger
Steven Gogos

Outline 2
10/04/2003
Arthritis Care

Results and Analysis

- Flo system
  - Developing RANDY into Flo
    - Section title: Extending RANDY
    - Topic sentence: The primary result of our work was the adaptation of the RANDY project into the core Flo system. This involved adding support for multiple offices and linking to the Saturn Database.
    - Previous
      - Results of interviews and ongoing discussion with Nicki Hastie and John McGregor
      - What we determined from preliminary analysis of RANDY
  - Deployment on CID host
    - Section title: Flo Deployment
    - Topic sentence: After the core system was in place, Flo was deployed on the CID host.
    - Previous
      - Is hosting the database on the CID host been beneficial
      - Has this lead to any problems or could it in the future
      - Is there technology on the CID host that may make migrating the database in the future an issue
  - Coordination with Saturn
    - Section title: Saturn Coordination
    - Topic sentence: To avoid data duplication with the central UK office, the Flo system was coordinated with the Saturn Database.
    - Previous
      - Results of interviews with Joanne Brackenbury and Kieran Kettleton
      - Was it successful
      - Is it lacking in any way or could it be made more efficient
      - What does this mean for Saturn performance and people in the UK office
  - User interface and tools via CID
    - Section title: User Interface
    - Topic sentence: The user interface is the external portion of the system that the users actually interact with. To this extent, we developed web forms and they were integrated with the existing CID system.
    - Previous
      - What has been developed in this area
      - Are they user-friendly and easy to use
      - Are there any “holes” in the interface (i.e. areas where the system has functionality but there is no way to access it)
  - Integration with Staff
    - Section title: Staff Integration
    - Topic sentence: Materials were created for the integration of Flo with the Arthritis Care staff. This includes data migration procedure, training procedure, manuals, and developer documentation.

        - Previous
            - How successful was this in general
            - Were people able to grasp the new system quickly
            - How long do we think this process will take in its entirety
- Interviewing in other areas
    - Hotels
        - Section title: Arthritis Care Hotels
        - Topic sentence: The Arthritis Care hotels exchange information with the central UK office. Some of this information is transmitted using inefficient paper forms and often it is duplicated.
        - Previous
            - Results of interviews with Tim Gardiner, John Jesmont, and Parul Shah
    - Human Resources
        - Section title: Human Resources
        - Topic Sentence: Human Resources currently manages the Arthritis Care staff directory in two locations: CID and a local spreadsheet. Unnecessary duplicate effort is being used to maintain the directory in both locations.
        - Previous
            - Results from interview with Gill Chilvers and Jennifer Lawson
    - Training Services
        - Section title: Training Services
        - Topic sentence: Flo does address basic informational needs of training services, but it can be extended to include additional functionality.
        - Previous
            - Results of interview with John Haslam

Conclusions and Recommendations

- What will the Flo system do for Arthritis Care in terms of improving the organization
- Does it satisfy people's expectations, especially the key stakeholders (Senior Management Group, Trustees, Staff)
- What potentially undermines the validity of our conclusions
    - E.g. we only interviewed key staff as it was not physically possible to speak with everyone
- Recommendations
    - Specific implementation plans for hotels, human resources, and staff directory
    - Long-term plan for elimination of Saturn to increase system coherence and standardization