



The Nova Scotia Provincial Blood Coordinating Program
Approval Process

by

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Acknowledgement and Endorsement

This report has been written by me and I have not received any previous academic credit at this or any other institution.

I would like to thank Marina Hamilton, program manager, for her continuous mentorship and leadership.

A handwritten signature in blue ink that reads "Tanja Keselj". The signature is written in a cursive style and is positioned above a horizontal line.

Tanja Keselj

Executive Summary

The Nova Scotia Provincial Blood Coordinating Program operates under the Department of Health and Wellness. The Program is pivotal in providing collaboration between blood and blood products distributor (Canadian Blood Services) and transfusion health care providers.

Since its inception the Program evolved from one person to 14 employees and the number of the initiatives has significantly increased. The Program has reached a point where it became essential to develop a formalized approval process for all of the Program's initiatives to ensure that all tasks performed are aligned with the Program's strategy. Consistency across processes with ability to identify bottlenecks and inefficiencies will ensure better performance. A formalized and documented process will ensure better knowledge transfer and regulatory compliance.

Literature review lead to the use of Business Process Modeling Notation (BPMN), with emphasis on the simplest most possible solution. Process workflows often look good on paper, but if they are not easy to use, they never get adopted. If adoption is forced upon, productivity is not necessarily improved.

Work included thorough and comprehensive analysis of the existing processes. Understanding of the regulatory constraints was mandatory. Institutional structure, and employees' roles and responsibilities had to be fully understood. This was achieved through the series of the interviews and studying of the existing documentation. Organization's strategy document, in conjunction with desire for the optimized performance, was a central focus. Special attention was paid to develop the process as simple and as minimal as possible. Only necessary steps are included. Every step is self-descriptive and clear, with concise and precise notation.

With usability as a main guideline, a simple to follow process was developed. A parallel process flowchart, with the actual employees' names, was developed, to aid understanding and the adoption.

A final output is the Program's Approval Process Policy. The policy follows organization's policy guidelines and describes the approval process, includes the approval process form, and the flowchart. Presentation to the staff and training are the parts of the project.

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Introduction

The Nova Scotia Provincial Blood Coordinating Program provides leadership in collaboration between Canadian Blood Services, hospitals, and the Department of Health and Wellness by offering education, publishing guidelines, standards, reports, and newsletters. The Program also develops and operates software applications.

Standard approval process was non-existent and was needed to ensure that all provincial, and Program's policies and procedures are followed, and to achieve optimal productivity. It is believed that the new process will aid consistency across the initiatives, and that all tasks align with the Program's strategy. Too much reliance on staff to remember to do the right thing is not the best practice. Formalization and documentation of the existing processes will help with training new employees and better performance of all.

Program's new Approval Policy is developed following the Program's guidelines. The Policy contains the approval form and the approval flowchart. Training and presentation to the staff is an integral part of the project.

Description of the organization

Blood Transfusion

Blood transfusion is an irreplaceable medical treatment that makes difference between life and death.

Common uses are as follows [1]:

1. Replace lost blood. As blood is precious, loss of excessive amounts of blood, means loss of life. Death due to severe blood loss caused by hemorrhage, trauma e.g. in car accidents, surgeries etc. is now circumvented with blood transfusion.
2. Stop bleeding. Bleeding can be stopped with clotting factors and platelets transfusion.
3. Treat anemia. Hemoglobin's purpose is to carry oxygen throughout the body. Lack of oxygen can cause organs damage. Blood transfusion increases hemoglobin levels and prevents crucial organs damage.
4. Treat various otherwise deadly blood disorders.

Canadian Blood Authority

Since 1940s until 1998 blood distribution and transfusion was under authority of the Canadian Red Cross.

In 1970s Canada faced huge blood transfusion crisis. Thousands of people were infected, through blood transfusions, with HIV and Hepatitis C. Royal commission of inquiry on blood system in Canada was established. Inquiry of this commission, mostly known as Krever commission, found that blood was not adequately screened.

Recommendations included a formation of national body - Canadian Blood Services, with Hema Quebec for Quebec [4].

Canadian Blood Services (CBS), formed in 1998, is a main distributor of blood and blood products for all Canada except Quebec. CBS, with operating budget of ~\$1 billion yearly, is responsible for safe blood collection, storage, transportation, delivery, and screening [5].

Provincial Blood Flow

Blood is collected, stored, and distributed by Canadian Blood Services. Blood and blood products are issued at hospital and clinics. Hospitals are responsible for their own inventory and transfusions.

Nova Scotia Provincial Blood Coordinating Program

In 2003 Province of Nova Scotia recognized a need for a provincial body to oversee safe and appropriate use of blood.

The Nova Scotia Provincial Blood Coordinating Program was established in 2003 with three main objectives:

1. Optimize appropriate use of blood
2. Maintain surveillance for adverse events and reactions
3. Ensure standards are followed

The Program operates directly under the Department of Health and Wellness and is a catalyst for collaboration between the Canadian Blood Services and Nova Scotia hospitals. New guidelines and standards are published in partnership with the clinical advisors, National and Provincial Advisory Councils.

The Program works towards its objectives through:

1. Publication of guidelines and standards
2. Education through seminars and training sessions
3. Providing information to the stakeholders (e.g. newsletters)
4. Organizing and hosting conferences, working groups, and stakeholders' meetings
5. Conducting surveys
6. Development and implementation of an information system for data collection, storage, and reporting
7. Publication of the reports on utilization, appropriateness, discards, surveillance
8. Leads Atlantic wide initiative on appropriate utilization

Structure and budget

Yearly budget for fiscal year 2013-2014 is \$871,000 [6]. 14 employees take various roles as follows: program manager, laboratory standards coordinator, transfusion practice coordinator, transfusion practice utilization coordinator, utilization management coordinator, tissue and organ surveillance coordinator, administrative assistant, data entry specialist, factor product utilization assistant, two senior system analysts, database coordinator, and data analyst.

Program manager is an employee of the Department of Health and Wellness, where the rest of the Program's staff is employed by the Nova Scotia Health Authority (Capital Health before Apr 1, 2015).

There are nine provincial programs in Nova Scotia with somewhat similar roles and structure: cancer, cardiovascular, diabetes, legacy of life, breast screening, hearing and speech, renal, and reproductive care, with over \$27 million yearly budget. One program provides patient screening (hearing and speech) and one provides service coordination (breast screening) [6].

By definition a program is a set of projects. At the Nova Scotia Provincial Blood Program numerous projects and initiatives are happening simultaneously, with some being one time projects, with others being the continuous initiatives.

Hosting

Program's database and the Web server are hosted at HITS-NS (Health Information Technology System).

Blood in Nova Scotia is implemented in Laboratory Information Systems. However, Nova Scotia has three different systems. Formerly Capital Health district uses Cerner Millennium Laboratory Information System. IWK uses Meditech Magic, and formerly DHAs 1-8 use Meditech C/S, which itself has three different modules. Both Meditech systems are hosted at HITS-NS, where Cerner Millennium is hosted on a different server.

Description of Work

Initial phase included understanding what the need is. Mainly through meetings with the manager, it was identified that the Program has reached a point where it became increasingly difficult to keep track of all the initiatives and tasks. There is a strong need to keep all tasks aligned with the Program's strategy. Even successfully accomplished tasks, if not aligned with the strategy, are waste of the resources and time.

It is obvious, that formalization of the existing processes will help identify bottlenecks and inefficiencies thus leading into optimization and better performance. Documented approval process will help knowledge transfer and swift training of the new employees.

Upon understanding the objective, it was obvious that a complete understanding of the existing processes is needed. This was achieved through studying existing documentation and interviews with the staff.

Regulatory constraints had been brought up on numerous occasions which lead to the next step – studying and understanding all the regulations applicable to the organization.

Next, organization's structure and employees' roles and responsibilities play significant role in developing the best possible process. In an organization this small, employees often have overlapping responsibilities. As the Program slowly evolved from one person to fourteen, more initiatives were added at varying pace, and responsibilities were partially transferred from one to

another. Truly understanding who is responsible for what was very important and was achieved through thoroughly studying the Program's documentation and the interviews.

The most important document to internalize was the Program's strategy. Every future task has to be aligned with the Program's strategy and has to contribute towards the common objective. Everlasting need for better performance and the best optimized approval process was a guiding light.

In developing the new process usability was extremely important. There were numerous versions that would cover everything needed but they were not simple enough. Finally, the iteration lead to the simple enough process.

Studying of the documentation, interviews, and literature review lead to developing the best possible approval process that is believed it will help the Program align its tasks with its strategy and achieve optimized performance while complying with regulations.

The process flowchart is an integral part of the Program's Approval Policy. Presentation and staff training are the parts of the project too.

The policy and the process are considered internal to the Program. It pertains only to the Program's staff. Since the Program has a flat structure, approvals are performed by the Program's manager exclusively.

Problem and corresponding solution

Problem identified is a need for a formalized approval process to ensure that all tasks and the initiatives are aligned with the Program's strategy. It is believed that if introduced the formalized process will help better performance through identifying bottlenecks and inefficiencies. Furthermore, documented process will ensure better knowledge transfer and consistency across the initiatives.

All Program's initiatives will be subject to this approval processes. This includes all publications, reports, presentations, software releases, and data extracts. Program manager approves all requests.

Understanding the problem, and arriving to the solution was a time consuming exercise.

A solution had to be simple; otherwise it will never be implemented and used in practice. A complicated process, with numerous steps, is not likely to be followed. A solution had to be intuitive, easy to follow and easy to remember.

One page flow chart is the maximum size. Not too many steps are a must. A printed copy can be easily kept at easy to see location like desks etc.

Experience shows that complicated and numerous steps are more likely to be ignored.

Project was initiated on Apr 20, 2015 with the start of the internship and then divided into several phases:

Requirements gathering

Through series of meetings the requirements were gathered. It was learned that numerous projects and initiatives, many external stakeholders, overlapping areas of work for some staff, a need to

periodically review policies, competing priorities and so on, make it increasingly difficult to keep track of all publications and initiatives.

A need for formal approval process has arisen primarily to meet the requirements and avoid partial or complete redundant work.

There is a clear need for:

- a) Easy overview
- b) Formal and standardized approval process

Business rules

Gathering information on business rules of the various program initiatives. This includes schedules of the reports and publications, and conferences and workshops organized and hosted.

Organizational structure and stakeholders

Learning of the organizational structure includes an understanding of the responsibilities and the domains of each team member. The Program's stakeholders are another added layer of complexity. To mention a few: provincial government officials, CEOs of Nova Scotia hospitals, lab managers across province, Canadian Blood Services representatives and so on.

Literature review

Extensive literature review was conducted (please see below)

Considering several options

A need for a formal approval process is not unique to this organization.

Option 1:

There are many commercially available products on the market. This option was dismissed due to:

- a) For a small organization and for fulfilling a single of many needs it was not financially viable solution
- b) Most products offer more than what the Program needs
- c) Learning curve with a new proprietary product

Option 2:

Free online solution

- a) Due to provincial privacy and data hosting laws and rules this was not a feasible option either.

Option 3:

Simple solution that will be easy to implement. Develop a process and train staff. It has to be simple, user friendly and require a minimum amount of time. It is not acceptable that an approval process takes a prolonged time away from staff's regular duties.

Development

After interviewing the staff, gathering and compiling the requirements, requirement specification was completed. The first prototype was developed and the staff consulted. Feedback was considered and updates were made.

Business Process Modeling Notation is used as proven industry leading notation [7].

In addition to a general approval process, a parallel workflow was created with staff names to better illustrate the process and aid understanding.

The process is as simple and as minimal as it can be. Necessary steps are included only. Special attention is paid that every step is self-descriptive and clear, along with concise and precise.

Results

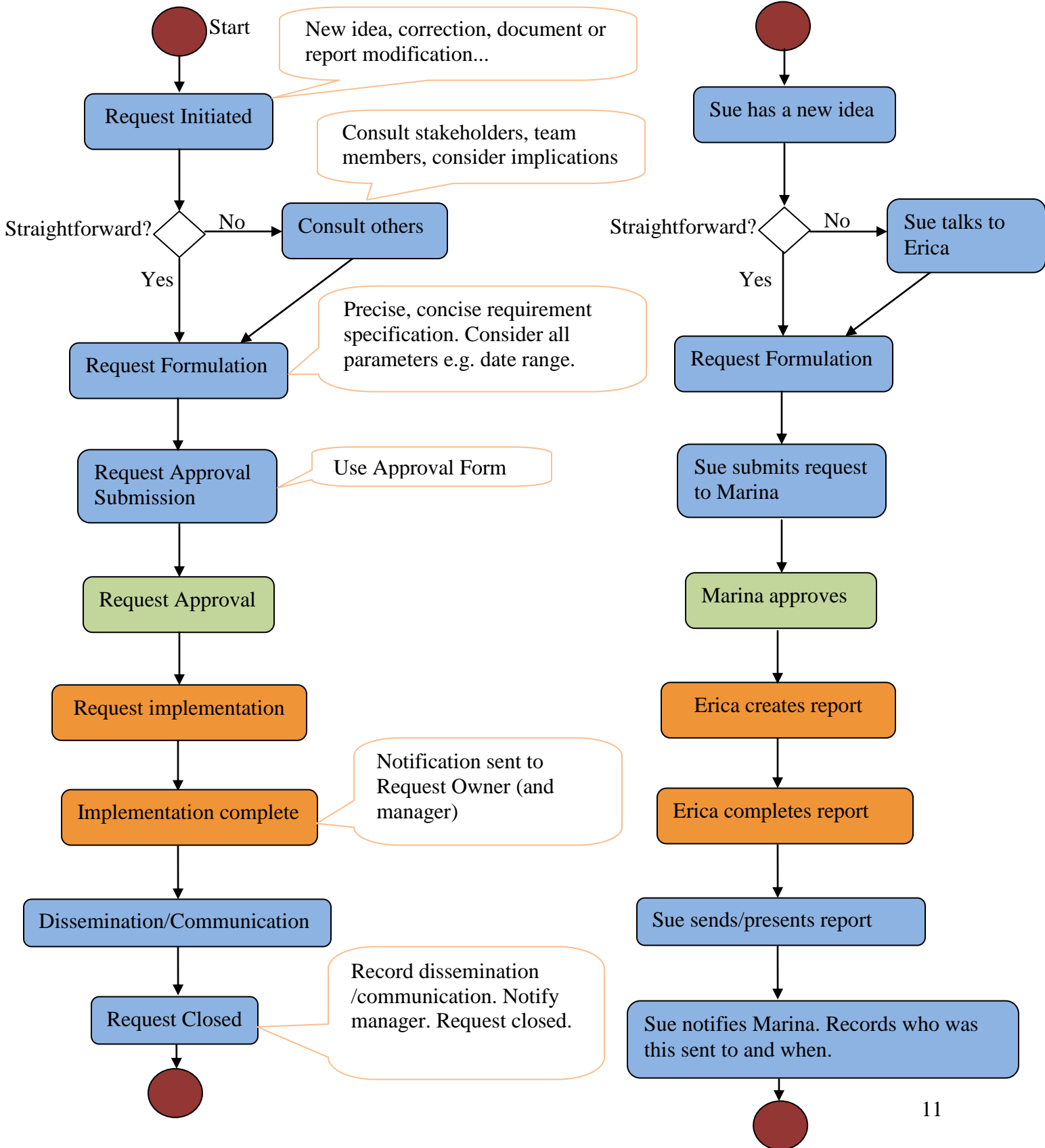
After studying the documentation, regulations, learning about the structure, roles, and responsibilities several iterations were developed. While keeping in mind usability, a struggle was to develop a simple but complete process. Identifying processes that can be merged as one abstract process helped in this regard. More generic approach was chosen as opposed to developing several or one complicated process with numerous specific tasks.

Program's initiatives are very diverse. They vary from publishing newsletters to software releases.

Final solution was as abstract as it can be so it applies to all the initiatives.

Formalization is achieved through the Program's Approval Policy. Introduction of the policy and the process is accompanied with the presentation to the staff and training.

Approval Process Flowchart



Relation to Health Informatics – Literature Review

Abidi and Hashemian in “Modeling Clinical Workflows Using Business Process Modeling Notation” in 2012 [7] define four main workflow patterns: a) control flow; b) data; c) resource; and d) operational perspectives.

Although, focus of the article is on Clinical Pathways, the approach can be generalized and applied in the various areas. It is about healthcare knowledge management represented through business workflows, thus applicable in many areas of the knowledge management. Formalizing and understanding of the existing processes is greatly helped with the approach.

Business Process Modeling Notation (BPMN) makes it easy to create a visual representation of the workflows that can be understood by professionals from both healthcare and business domain [7].

As Avi described in 2012 in “BPM: antidote to inefficiency. Business process management serves as a foundation for effective workflow automation in healthcare” [8] health care organizations are severely burdened with paper-based processes. A very nature of the health care industry as a highly regulated environment dictates that a number of the processes and procedures are documented and followed. Processes govern every domain of the health care and without a question they are necessary. However, numerous, not well understood or not easy to follow processes present a burden.

Main purpose of the processes is to increase the productivity. An example is given for a vacation request. If every employee knows which form to fill out, and how to submit it, there is no confusion and time lost.

Interestingly enough Avi points out that introducing electronic documents that replace paper is like treating the symptom not the disease. Moving away from paper is generally right direction, but that action in itself cannot solve process management issues.

Process needs to be well thought out, easy to follow and understand. Effective process management is much more than eliminating paper. It is rather looked at as empowering staff. It is connecting actual employees with what needs to be done. Questions like: who needs to be involved, what level of privileges/responsibilities they need, and who ensures that process is followed [8].

Reijers in 2005 in “Business process redesign in healthcare: towards a structured approach” [9] explored business process modeling in healthcare as a way of significantly decreasing health care cost. “Clean sheet” approach is recommended, meaning that new processes should be designed without old processes in mind.

Four main dimensions are mentioned: time, cost, quality, and flexibility. What this means is that a good process decreases time and cost of a task, improves quality, and improves ability of the process to accept inevitable variation.

Although business process modeling originated in manufacturing industry it is now considered essential in the health care. Study conducted was set in mental health care settings and suggests outstanding benefits if the business process modeling is implemented properly [9].

In 2009 Helfert in “Challenges of business processes management in healthcare; Experience in the Irish healthcare sector” [10] evaluated a system intended to standardize human resource and payroll in a health care organization in Ireland. Compared to other industries, health care is lagging behind in area of information technology, including business process modeling.

A special focus was on project failures. In addition to all usual reasons for unsuccessful project delivery, like not having clear requirements, health care setting is inhibited with other reasons like occasional bed shortage, epidemics and so on [10].

Kirchmer at al. in “Transparency-Driven Business Process Management in Healthcare Settings” [11] raise the importance of transparency in healthcare. Optimal transparency is achieved through well-thought out, well-planned and successfully implemented business process.

Especially sensitive issue is a risk of medical error. Data shows that medical errors are most often caused by series of events as opposed to one single mistake. Good processes ensure that the number of medical errors is decreased. Process transparency is a remedy for individual blame.

It is rightfully pointed out there are two essential steps: a) defining knowledge (process); b) internalizing knowledge (employees actually following the workflow).

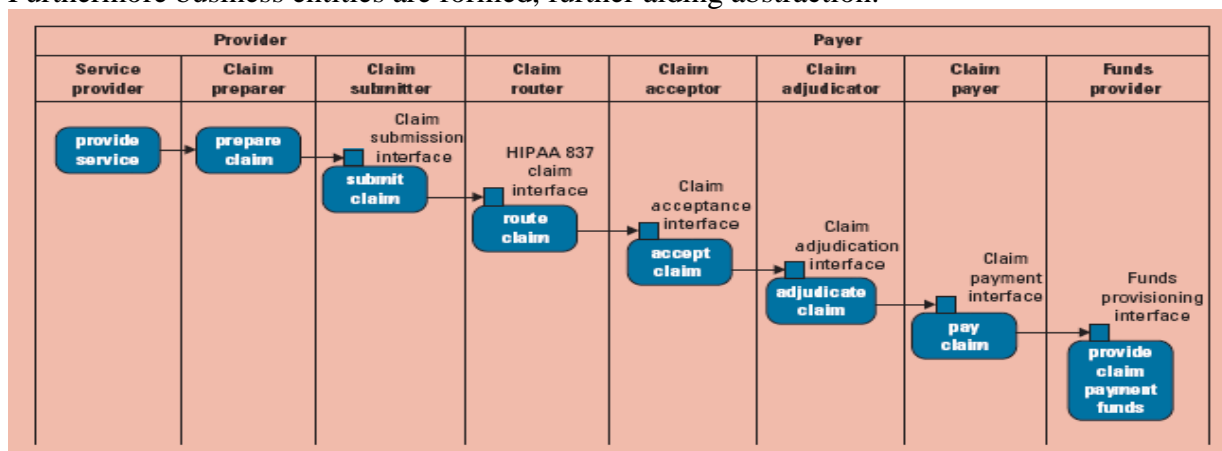
Transparency is essential for acceptance. If the process is easy to find, if it is displayed in high traffic areas and so on, it is more likely to be followed [11].

In “Toward a Healthcare Business-Process Reference Model“ Brown at al. [12] look into how are the processes standardized in healthcare. Generally speaking there is very little standardization in health care processes’ administrative side of business. More specifically there is an issue what participants’ roles are. There is no doubt that healthcare can benefit from standardization. It is proven that lack of business process standards drives up the cost of conducting business.

When attempted to introduce a new process, comprehensive plans are conducted by aggregating smaller plans. From administrative and information point of view, outcome often falls short of the expectations. On some occasions, situation becomes even more chaotic than before. Not only this is the information nightmare but it is expensive too.

One strong recommendation is the role based processes. Rather than defining processes for individual employees, the roles are defined. Processes are then defined for the roles. This offers higher flexibility when employees leave an organization or change roles.

Furthermore business entities are formed, further aiding abstraction.



Source: Brown, P; Kelly, J; Querusio, D. toward a Healthcare Business-Process Reference Mode [12]

“Supporting Email-based Collaborative Work across a Social Semantic Space” by Scerri in 2010 [13] concludes that email is an important business and communication tool. Even though email is used in all areas of life, it is indeed a crucial business tool. Some organizations have travelled an entire cycle, invested significant amounts of money into software packages, only to learn that information is not more available, communication is not easier, and productivity has not increased. In most situations “old-fashioned” email is the most efficient solution.

Although, the main focus of this article is semantic Web and machine learning, an interesting chapter drew attention: Email workflow and Business Process Modeling [13].

Afrasiabi at al. “An Evaluation Framework for Business Process Modeling Languages in Healthcare” [14] point out that process modeling in health care setting is especially challenging.

Process model is more than graphical representation. If the model is not followed, and if it does not improve productivity, then it is not useful at all. A special focus is on evaluation framework. Successful models most have three dimensions: change, improvement, responsiveness.

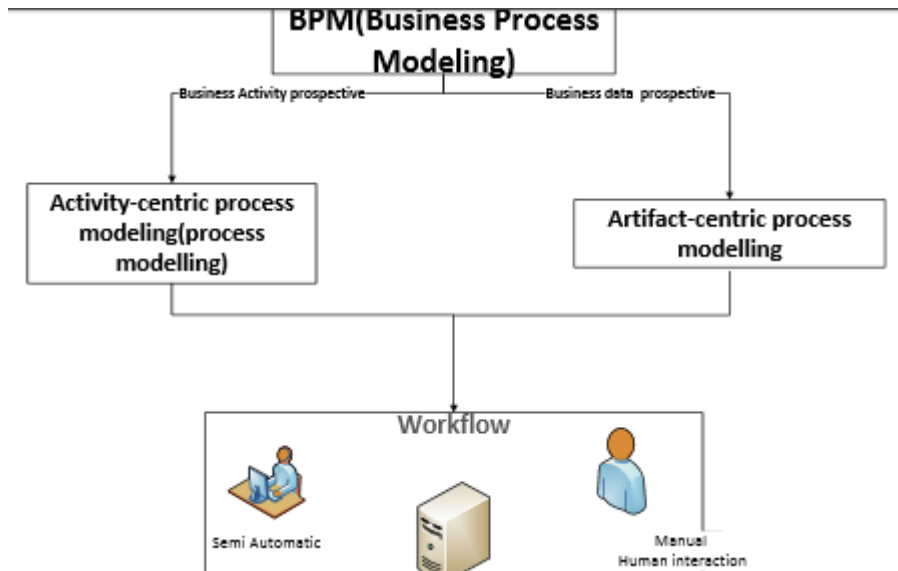
Nothing stays constant thus change is inevitable. Models that are not flexible to a change are doomed to ignorance and dismissal. A change should not require a major overhaul and huge investment for developing a new model.

Improvement is necessary to justify investment of time and the resources in developing a new model. If the new model offers no improvement there is no justification for a new model.

Responsiveness is also described as evolution, which is achieved through the abstraction and modularity [14].

In “Improving the understandability of artifact-centric workflows using BPMN with extensions” [14] Brown at al. delve into Activity-centric and Artifact-centric process modeling.

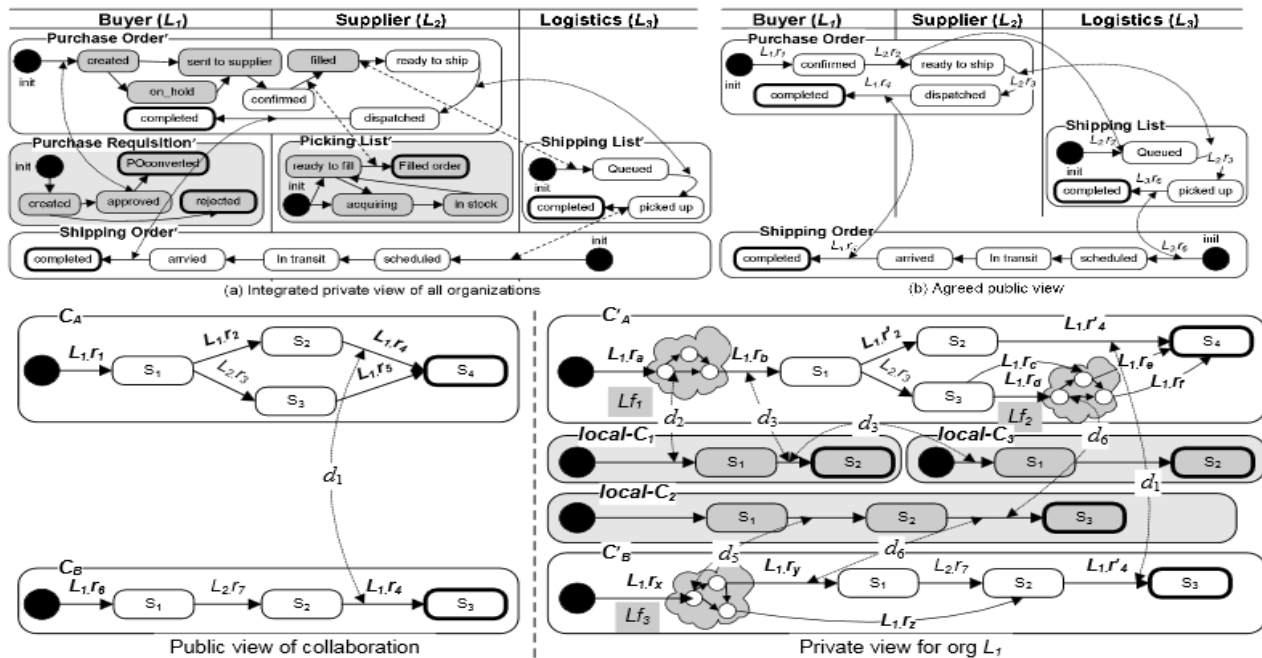
Recently there were initiatives to develop business process models around business artifacts as opposed to business activities. A business artifact is defined as an identifiable information entity that can be used to run business. Note: in relation to the internship project this is an approval form. Once established identity of an artifact cannot be changed. Although changeability is a desired feature of the business modeling, artifacts do not fall in this category. Once established they are not changeable [14].



Source: Brown, P; Kelly, J; Querusio, D. toward a Healthcare Business-Process Reference Model [14]

In 2015 Yongchareon et al. in “A View Framework for Modeling and Change Validation of Artifact-Centric Inter-Organizational Business Processes” [15] reveal that artifact-centric model has four core constructs: roles, artifacts, services, and business rules. An artifact is either local (one process only) or shared (present in multiple processes). A service is an action performed on artifacts. Designing a good model involves considering all of the: artifacts, services, roles, and business rules.

Abstraction is best depicted with the following:



Source: Godha, Narendra Yongchareon, Dr. Sira; Sathu, Hira; Improving the understandability of artifact-centric workflows using BPMN with extensions

Conclusions

After carefully and thoroughly considering a problem, and after reviewing the literature, the simplest solution is chosen.

Financial cost is not the only consideration. A need for training and most of all likelihood for adoption play a role too.

Poor usability is a main reason why information technology projects fail. Thus, usability was the highest priority.

At the beginning a problem looked complex, but solution looks surprisingly simple. Recommendations from the research literature are adopted like BPMN, role defining, abstraction, email as the most important business tool etc.

Expectations are very high that the solution will be adopted, and as such improve productivity.

Recommendations

The model should be evaluated one year after the beginning of the implementation. Special consideration should be paid to whether productivity has increased, and if the model is adaptable to change. Users' feedback on usability of the model should be evaluated. Usability should continue to be the highest priority.

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Appendix 1: Approval Process Workflow

