

Analysis and optimisation of the SAJIE business model,
design and information support

by

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Executive summary

The South African Journal of Industrial Engineering (SAJIE) was first established in 1987, and has since been used as a way of voicing Industrial Engineering (IE) research. Over the years, the journal has progressed and acquired international accreditation. It is currently published biannually using a paper based publication process. This document contains the detailed information of the problem, the aim, the scope of the project, the current method and the methods used to solve SAJIEs current problem.

The current process used by SAJIE to compile the journal is not optimised and requires a significant amount of administration work to manage the flow between journal activities. The supporting database is not capable of allowing multiple users, resulting in the journal activities being completed in different platforms. SAJIE management recognised a need to improve the process and considers the possible use of online publishing systems that could replace the current system.

An end to end current process has been analysed in detail to identify the possible disconnections hindering the maximum potential of the journal. Appropriate methods for process improvement have been studied and detailed in order to choose from them the methods that best address and solve the journal's current problem. For the selection of an appropriate online system, a gap analysis has been performed and the expected improvements that the journal would gain, should they choose a particular system, have been documented.

The methods studied have been compared and the most suitable method for SAJIEs current problem has been applied in an attempt to provide a model of the solution which SAJIE may use to conquer the problem. The selection of the appropriate supporting system for the proposed new process for SAJIE was done by making use of the criterion matrix. This was to help select the system that best suits the needs of the journal.

Business process reengineering (BPR) was identified as the best method for redesigning SAJIEs process after a criteria matrix have been used to compare the methods according to which best suits SAJIEs requirements. The supporting system that was found to best address SAJIEs main problem of administration work load is the open journal system (OJS) due to its higher capability over the digital publishing system (DPubS).

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List of acronyms

BPM	Business Process Management
BPR	Business Process Reengineering
DPubS	Digital Publishing System
IE	Industrial Engineering
KPI	Key Performance Indicators
OJS	Open Journal System
PADM	Process Analysis and Design Methodology
PKP	Public Knowledge Project
RAD	Role Activity Diagram
SAJIE	The South African Journal of Industrial Engineering
SAIIE	The Southern African Institute of Industrial Engineering

1. Introduction and background

1.1 South African Journal of Industrial Engineering

The South African Journal of Industrial Engineering (SAJIE) was first established in 1987 to encourage publications of articles with practical applications, original research new developments and surveys in the field of Industrial Engineering (IE) and Technology Management. Since its origin 25 years ago, the journal has published more than 283 South African-based papers. It aims to contribute further in to the development of this field of study by serving as a voice of all research work. This enables the interchange of knowledge, ideas and experience between research and training oriented institutions and the application oriented industry. (SAIIE, 2008)

1.2 Problem examination

SAJIEs current process of compiling a journal is not optimised and it involves considerable amount of administration work. The current database used by SAJIE to keep record of the information about authors and their articles and the respective referees is not sufficient to handle multiple users and the load of information that the journal has to process. This results in the usage of other platforms to complete the activities of the journal. This situation opens room for omission and loss of information.

1.3 Project aim

The aim of this project is to develop a new business process for SAJIE that will assist in improving the current process involved in compiling the journal.

1.4 Project objectives

The objectives of this project are:

- Transform the current, paper based and manual, SAJIE process to an electronic process
- Reduce the administration responsibilities and possibility of human error
- Increase effectiveness and efficiency of the process and through put time of articles

1.5 Project scope

The scope of this project comprises of the following activities:

- Analysis and mapping of the current end-to-end process of the journal compilation.
- Identification of constraints and limitations hindering the maximum potential of the journal.
- Identification and evaluation of possible alternatives to publish the journal.
- Performing a gap analysis to establish the shortcomings of the identified alternatives.
- Defining a feasible business model based on key objectives and criteria.
- Formulation and design of an improved process to handle journal publications.
- Formulation of policies to regulate authorship, affiliation, inclusion of articles in academic repositories and plagiarism.

1.6 Current method

SAJIE has a standard end-to-end process that it follows in the compilation of a journal. This process covers all the major aspects that need to be completed by any journal. The process has been in use since the journal began and minor improvements have been made as the journal progressed and became successful. The current publishing system consists of four major processes. These processes are explained in detail in the paragraphs that follow and illustrated in figures 8 & 9 in chapter 3 of this document.

1.6.1 Submission

Articles are submitted through email to SAJIE admin at The University of Pretoria. SAJIE website provides guidelines and a standard template to communicate the requirements of the journal. These documents are provided for the authors to consider before making submissions. Once an article is received, it is directed to the editor, to be reviewed for applicability and high level language.

1.6.2 Editing

The editor reviews the articles and those that are not acceptable for SAJIE audience are sent back to the authors for rework and resubmission. Before the refereeing process can begin, the accepted articles are tested for plagiarism with Turnitin. When the plagiarism test is complete, Turnitin creates a report specifying the original sources of the work and the amount of plagiarism committed. The editor uses this report to decide whether the articles can be accepted, based on the journal's plagiarism policy. Articles that do not satisfy the plagiarism policy are returned to the author for work before resubmission.

1.6.3 Refereeing

The editor identifies the suitable referees for articles based on their areas of expertise. A request for a double blind refereeing is sent via email to the respective referees. Two referees review the article and prepare reports based on their observation. These reports compiled are compared. Based on the findings of the reviewers an article can either be accepted or returned to the author with feedback for rework and resubmission.

The resubmitted articles with track changes are reviewed, corrected and sent back to the respective referee for final review. If the articles are not accepted after resubmission, they are either rejected completely or returned to the author for review, rework and resubmission. Those that were accepted after the refereeing process are sent for editing by the language editor. The language editor is not an expert in the field of Industrial Engineering (IE); therefore the articles may require members of the journal to edit them for the usage of the correct IE terms. Before the publishing process can take place, articles are sent to their respective authors to accept the changes that have been made.

1.6.4 Publishing

Once the authors have acknowledged and accepted the changes, the articles are scheduled for publication of a particular issue. The articles which are ready for publishing are formatted using the correct fonts and spacing suitable for the journal standards. A PDF format of the entire journal is made for test printing. This is stored on a compact disc (CD) which is sent to the printers. The hard copy of the journal received from the printers is used for proof reading and final editing. The changes made on the hard copy are updated on the electronic copy and a final PDF document is made available on a CD for the printers accompanied by the edited hard copy to prevent previous mistakes. The published journal is made available in both hard and electronic copy. All the authors and SAIIE members receive a hard copy of the journal.

1.7 Conclusion

The remaining part of the document consists of three chapters: the literature study, the development of the solution and the conclusion of the project. The literature study contains methods that have been studied in order to select from them the best one to use in solving the current problem experienced by SAJIE and the gap analysis. The gap analysis contains detailed information of existing online publishing

systems which would be compared for the selection of a suitable system for the new process that is to be developed for the journal. The third chapter of the document addresses the application of the chosen methods in order to develop alternative solutions for the problem. The fourth and final chapter of this document consist of the conclusion of the project and recommendations made for future study studies. The journal policies to regulate authorship, affiliation, inclusion of articles in academic repositories and plagiarism have been included in appendix A of this document.

2. Literature study

This chapter presents a study of methods that can be used for process improvement. The research will help with the selection of the most appropriate method that will result in the best solution to address the problem and meet the main objectives of the project.

2.1 Business process reengineering

Business process reengineering (BPR), as described by Muthu, Whitman & Cheraghi (1999), is the rethinking and redesigning of business processes to achieve a remarkable improvement in terms of performance, cost, quality, service and delivery speed. This method is considered to be fundamental and radical because it does not aim at small improvements. It requires the enterprise to go back to the roots of the business and analyse the main objectives in order to lay a strong foundation for the business. This helps with the identification of potential improvements areas. The main purpose of this method is to redesign the strategic and value added processes that exceed organisational boundaries.

2.1.1 Method analysis

Table 1 below, extracted from Muthu, Whitman & Cheraghi (1999), illustrates the summary of methods that could help a process designer understands the basics of BPR. These methods were combined into a single, step by step, methodology that is represented by Figure 1.

Table 1: The summary of methodologies for understanding BPR.

Activity#	Methodology#1 (Underdown, 1997)	Methodology#2 (Harrison & Pratt, 1993)
1	Develop vision & strategy	Determine customer requirements & goals for the process
2	Create desired culture	Map and measure the existing process
3	Integrate & improve enterprise	Analyse and modify the existing process
4	Develop technology solution	Design a reengineered process
5		Implement the reengineered process

Activity#	Methodology#3 (Furey, 1993)	Methodology #4 (Mayer & Dewitte, 1998)	Methodology #5 (Manganeli & Klein, 1994)
1	Set direction	Motivating reengineering	Preparation
2	Baseline and benchmark	Justifying reengineering	Identification
3	Create the vision	Planning reengineering	Vision
4	Launch problem solving projects	Setting up for reengineering	Technical & social design

5	Design improvements	As Is description & analysis	Transformation
6	Implement change	To-Be design & validation	
7	Embed continuous improvement	Implementation	

BPR methodology diagram

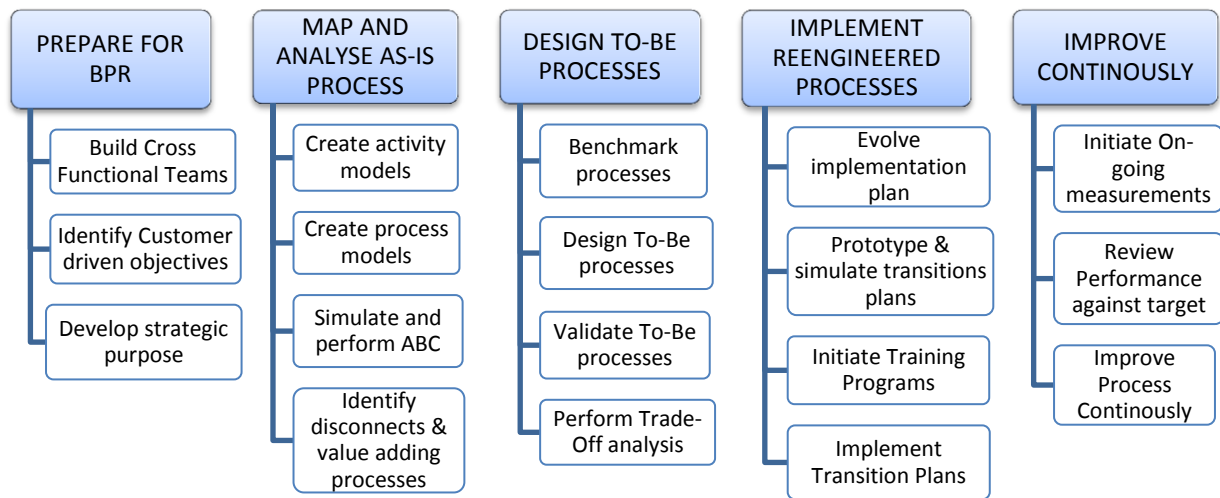


Figure1: BPR steps and respective activities (Adapted from Muthu, Whitman &Cheraghi, 1999).

Prepare for BPR

The first stage of implementing BPR, preparation, is viewed as the most important stage since it helps management answer the questions that depict the relevancy of the method. Failure to complete this stage may results in a higher probability of project failure. This is mainly because BPR are often used to approach problems that may not necessarily be suited for BPR and the execution will not deliver the desired results, and instead cost the enterprise a lot of money as a result of the waste of time, effort and resources.

This stage entails all the planning and preparation of the project. Management is required to assess the necessity of reengineering processes in the enterprise, and the need must be justifiable, resulting in positive change in the enterprise. To plan for BPR, cross functional teams are formed. These are the teams to be used from the beginning of the process to the execution of BPR in the enterprise. Management needs to make compensation for the employees forming part of the cross functional groups to ensure that the work environment continues without noticeable distraction. The main

purpose of the company is to meet its customer's needs and therefore, the company's customer driven objectives should be identified and understood.

Map and analyse as-is process

The second stage of implementing BPR requires the current (as-is) process to be mapped and analysed. The main objective of this phase is to identify disconnections in the process flow and value adding processes. This is done by creating and documenting activities and process models making use of relevant modelling methods. The amount of time taken by each activity and the cost in terms of resources is identified using an appropriate method. The processes that need to be reengineered are identified.

Design to-be processes

The third stage of implementing BPR entails the development of alternative solutions to the current problem. The alternative solutions are developed based on the main objectives of the enterprise in order to meet the enterprise's strategic goals. The first step of this stage is benchmarking of the processes. This implies the comparison of the current processes of the enterprise with those of competitors. When the areas of improvement have been identified, the development of to-be models is done making use of relevant modelling techniques. Similar to the as-is process, the amount of time each activity takes and the cost is identified and analysed. The to-be processes are validated and a trade-off analysis is performed in order to select the best alternative suitable for the enterprise.

Implement reengineered processes

The fourth stage of implementing BPR is the most difficult because this is where the reengineering efforts meet the most resistance. Because of the effort and time spent analysing the current processes, redesigning them and planning change, it would be reasonable to run a culture change program simultaneously with all the planning and preparation.

This stage entails the development of a transition plan from the as-is to the redesigned process. The plan must align the organisational structure, information systems and the business policies as well as the business procedures with the redesigned processes. For the BPR project to be successful, an information system that supports the reengineered process should be developed. The models that were created in

the as-is process are mapped with those created during the design of the to-be process so that the list for changes to be made can be compiled.

Improve continuously

Reengineering process does not happen overnight and therefore continuous improvement would be necessary to maintain and improve the process. The first step towards continuous improvement is by monitoring the activities, specifically the progress of action and the results. This can be done by constant attitude surveys and discrete meeting with those who were not directly involved in the beginning of the project. Employee attitude, customer satisfaction and supplier responsiveness could be measured to monitor the results of continuous improvement.

2.1.2 Conclusion

The use of BPR requires a functional team that would focus on the process improvement from the first stage of BPR to the last. This makes it a good method because it lays the foundation and clearly defines responsibilities. The method's requirement of benchmarking the processes enables the identification of problems that may not have been seen as problems by the company. Therefore this method is good for SAJIE to use as it would lay a good foundation to the project. SAJIE is looking for a long term solution to the current problem; BPR can cater for that with its ability to enable identification of hidden problems and the focus on continuous improvement.

2.2 Process analysis and design methodology

Process analysis and design methodology (PADM), as described in Wood-Harper, Antill & Avison's Multiview (1985), is a problem solving methodology which focuses on analysis and design of a process that has been identified. It does not go into the details of identifying the process that need to be improved and can therefore only be used once the organisations know which processes they want to focus on.

2.2.1 Method analysis

The figure below illustrates the four phase framework and the activities of PADM (Wastell, White & Kawalek, 1994).

The four phases of process analysis and design methodology

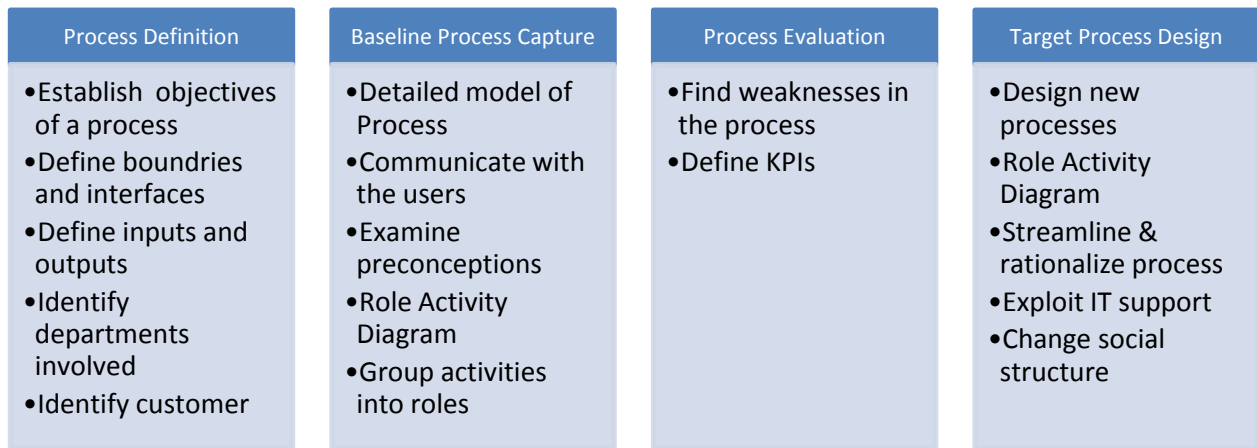


Figure 2: The PADM framework.

Process definition

The completion of this phase requires the establishment of main objectives of the process to be redesigned. The boundaries and interfaces of the process must be specified. The main inputs and outputs of the processes need to be identified and the departments involved in the execution of the process should be specified. In order to clearly define the goals of the process, the customer that benefits needs to be specified and understood so that the definition of goals are based on the objective of meeting the customer's needs.

Baseline process capture

This phase entails the development of a detailed model of the chosen process. It includes the construction of a graphical representation of the process to ease the understanding of the process. This phase is the most critical and needs to be done with care to ensure the success of the entire project. Processes are human activity systems and are thus intangible. This makes modelling the processes more complex and difficult to understand. To successfully complete this stage, the developer needs to consult with the users to determine their problems and expectations. The figure below was adopted from a telecommunications service example. It illustrates an example of role activity diagram (RAD).

Process evaluation

The third stage of implementing PADM entails the utilisation of techniques and criteria for analysing and assessing the processes. The main purpose of this stage is the identification of weaknesses and problems that may exist in the process. The deficiencies may either be in technical or social problems. In the process of identifying the problems and limitations, communication with the customers is important to understand where the process is failing. For this reason customer satisfaction is one of the measures of the process' effectiveness. Other measures, such as customer complaints, late or incomplete output and the need to repeat the work, can also be used in assessing the effectiveness of the process. The efficiency of the process can be assessed by checking whether the process meets its operational goals and is not wasteful of resources. Another technique that can be useful in the process evaluation is identification and measuring of key performance indicators (KPIs).

The role activity diagram

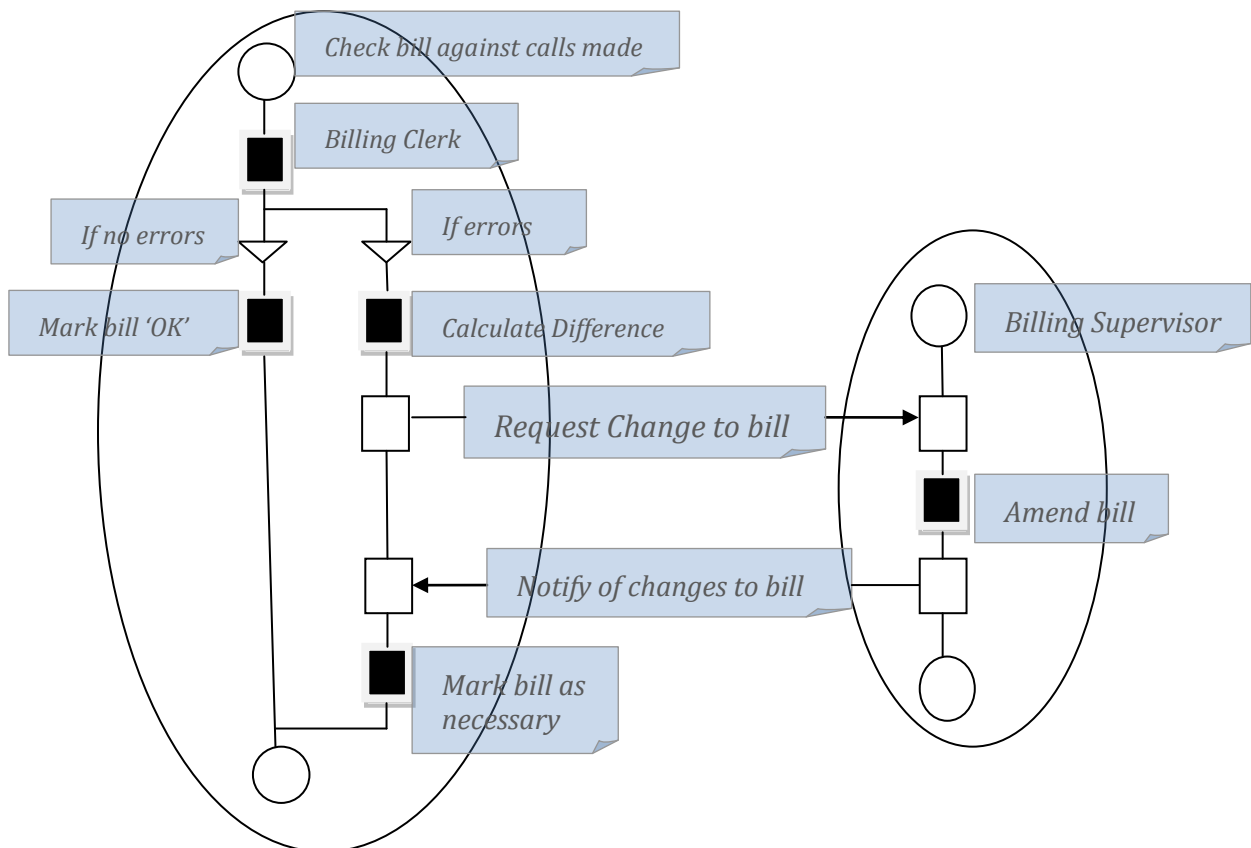


Figure 3: Role Activity Diagram of a Telecommunications Service (Flynn, 1992).

Target process design

The final stage of PADM entails the design of improved processes for the organisation. This can be done in a form of improvement to the existing processes or radical change to the baseline processes. In the design of the new processes, the RAD can be used as a means of improving the existing processes and as bases for designing the new processes. Process design involves both technical and social considerations. The technical part can be in the form of process diagrams. These diagrams can help reveal unnecessary organisational complexity such as: too many management levels, wasteful bureaucracy, and duplicated work. Technical redesign involves streamlining and rationalising of the process, complexity reduction, minimisation of non-value adding activities and the elimination and control of variances. The exploitation of IT support is the final activity of the technical part of process design. The social aspect of process design entails changes to jobs and the social structure in order to increase motivation, reduce stress and improve performance.

2.2.2 Conclusion

This method lacks the ability to identify inadequate processes; therefore it can only be used in combination with a problem identifying tool. It can be useful for the companies that already know the processes with problems because it starts by defining the already known problem. Although SAJIE already knows what the problem with their processes is, but this method may deny them an opportunity to reveal other hidden problems. Therefore PADM would not be a first choice for SAJIE's problem.

2.3 Business process management

Business process management (BPM) is a structured approach used to analyse and continually improve the fundamental and major elements of an enterprise's operations. BPM focuses on the aspects of the business where there is high leverage and added value. The BPM culture requires that the enterprise recognises the importance of quality structure and strategy.

According to Harrington (1995) BPM can be divided into five major phases. The paragraphs below list these phases and explain in detail the activities that take place during each of the five phases.

2.3.1 Organising for quality

The first phase of the implementation of BPM requires that the organisation has a quality assurance plan as the first step for process improvement. This is to create a quality oriented culture in the organisation to meet the customer based objectives. Figure 5 represents the quality assurance diagram, depicting the elements of quality that the organisation needs to consider when developing a quality plan. The subsequent paragraphs briefly explain each of the elements.

The quality triangle

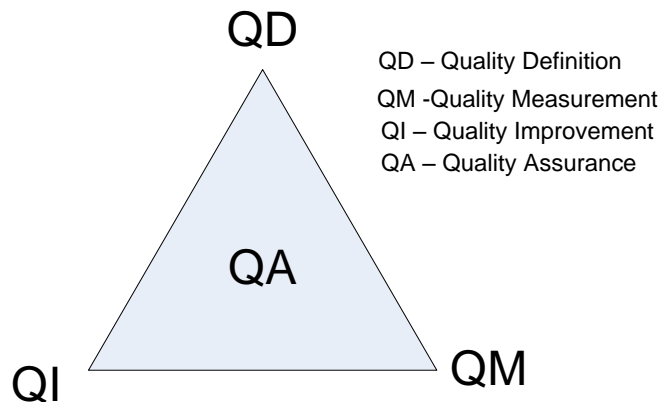


Figure 4: The quality triangle.

Quality definition

The first element of quality assurance requires the development of quality standards and expectations, as well as designing systems for quality. The standards and expectations can be developed for inputs, outputs, processes and outcomes.

Quality measurement

This element consists of quantification of the current level of performance and compliance to the standards defined above. Customer satisfaction can also be used to measure the level of performance. This element requires the definition of KPIs, development of information systems and analysis of results.

Quality improvement

This entails the application of quality improvement tools and techniques in order to close the gap between the current level of quality and the expected level. In order to improve, the system's deficiencies need to be understood and addressed.

2.3.2 Understanding the process

This phase of implementing BPM requires a thorough study of the existing process. This can be done through a graphical representation which illustrates all the activities that take place throughout the process. The main reason for the alignment of activities in a process can be understood by studying the applicable company's main objectives of the process.

2.3.3 Streamlining the process

This stage of BPM implementation entails the improvement of the entire process by improving the individual steps of the process. The phase focus on the processes from an end results view point. The purpose for streamlining the process is to reduce complexity, bureaucracy and the time taken to complete a certain step and the overall process. This would help increase the adaptability and meet the customer's expectations.

2.3.4 Implementation, measurement and controls

This stage of BPM entails the implementation of BPM and the improvement of the control system in place or the development of a new one. The implementation and control system installation are done in parallel. This helps enable a control function for every aspect of the method, including quality control.

2.3.5 Continuous improvement

To ensure that the improved system will function as intended in the future, a plan for continuous improvement needs to be initiated and developed. This plan needs to be in parallel with the methods implementation. It may include the use of tools for observations and relative action to be taken during the functioning of BPM.

2.3.6 Conclusion

The advantage of using BPM is that it uses a combination of different tools in solving problem and managing the process. One of these tools is quality management, therefore BPM does not only ensure provision of the solution, but it also encourages high quality products which would enable the company

to rate their processes according to the products they produce. BPM can be a suitable method for SAJIE problem, but its implementation requires more time due to a combination of management tools.

2.4 Change management

Change management, as described by Alwadani (2001), is a tool which is used during process or system redesign to get the workers acquainted with the new processes or system. It is applicable in an environment where there is change. This tool is very important because it can eliminate resistance to change from employees by initiating training and ensuring a culture where every employee is comfortable moving from one manner of completing the work to another.

2.4.1 Relevancy to project

This project is concern with process redesign and changing from one system to another. Therefore change management would be required to bring employees up to speed with the new system and making them happy in their roles.

2.4.2 Method analysis

There are many aspects of change management that one can consider when redesigning processes within an organisation. Only four aspects of change management, described in Alwadani (2001) are relevant to this project and their details are explained in the paragraphs below.

Communication

Effective communication is considered a major key to successful implementation of BPR. It is needed throughout the process of change, in all levels and for all audiences, including those not directly related to the process redesign project. To ensure patience and understanding of the structural and cultural changes needed, effective communication is required between the stakeholders inside and outside the organisation. This is to make ensure all units of the business are on board with the project and understand the status of the organisation. In most cases, if not all, where processes have to be redesign, all members who are connected to the organisation are affected by this change either directly or indirectly. Therefore frequent communication is required between those in charge of the change and those affected by it. To avoid confusion and misunderstanding, open, honest and clear communication needs to be practiced, especially with sensitive issues such as personnel reduction.

Empowerment

This entails that staff are given an opportunity to participate in the redesign process. This empowerment encourages employees to set their goals and monitor their performance. It also helps them identify and solve problems that affect their work, and therefore supporting the process redesign program. Empowerment establishes a culture where staff feels more responsible and accountable and thus promotes self-management and teamwork culture.

Training and education

This aspect of change management is the most important because it's only through the correct application of the new system that the organisation can achieve the intended results. This can be accomplished over a certain period of time since change creates discomfort to those whose job description involves direct interaction with the processes. Instilling skill and technique upon the staff does not only ensure the proper use of the system, but it also makes them experience the improvement made to the old system.

Creating culture of change

The organisational culture has a big influence on the organisation's ability to adapt to change. Each culture contains beliefs and values that may not be appropriate or useful in the process redesigning environment. It is therefore important that the employees of the organisation understand the new values, management processes and the communication style created by the newly design processes, in order to conform. This is to ensure the effectiveness of the establishment of the culture that upholds the change. Process redesign entails common goals for people making collaboration possible. The teamwork and integration of labour, corporation, coordination and empowerment of employees becomes a standard attitude of a newly redesign environment.

2.4.3 Conclusion

Change Management is not a tool that is not used in isolation, but in collaboration and in parallel with the implementation of the new process of the organisation. It is human nature for employees in an organisation to resist change because it creates discomfort. Therefore it is necessary that change management is implemented in parallel with the proposed new process. This would enable employees to, gradually, familiarise themselves with the proposed process from the beginning of the project to the end.

2.5 Gap analysis

Gap analysis is a process by which a company compares its actual performance to the potential performance. It seeks to establish to some improvement in the actual performance in order to meet the potential performance. This is done by comparing the current state of the enterprise to the target state. A detailed study of the current state reveals the hidden capabilities of the company and it helps the company plan for full utilization of its ability.

In this project, it is known that the target state of the journal is the use of an electronic system. Therefore the gap analysis would be done between the current publishing systems to the target system of electronic publication.

2.5.1 Relevancy to the project

SAJIE is one of the activities that a few people employed at different institutions take part in. Since it does not equal full employment scope, its processes should only consume a minimum amount of time. This is not the case at the moment because the processes required for its completion are time consuming, requiring the SAJIE members to use most of their working hours and overtime in order to complete their jobs as well as activities of the journal. The current process needs to be studied understood in order to replace it with the more desired process

The current database is not capable of allowing multiple users and a lot of manual admin is required to keep the database up to date with the work that's been done. This delays the publishing process of the journal and thus limits it to only two issues a year. Therefore a better support system that best suit the SAJIE objectives is also required. In an attempt to cover SAJIE's first and main target objective, moving from hard copy to electronic publishing, only online publishing systems together with an improved MS Access system have been considered for the gap analysis and the results are documented in the paragraphs below.

2.6 Selection of appropriate methods

The paragraphs above presented methods that could be used to improve and redesign processes of an enterprise. The selection of the suitable method for any process improvement project is determined by the objectives of the enterprise. For the purpose of this project, the studied methods were compared in

order to choose the most suitable method for SAJIE. The paragraphs below detail the aspects taken into consideration in the process of choosing the best method.

2.6.1 Comparison of methods

Table 2 below illustrates the criterion matrix used to select the appropriate method for solving the journal's current problem. Each criterion has been given a rating between 1 & 4, where 1 is the lowest rating and 4 the highest depending on whether the method addresses such a criterion. The rating representation has been illustrated below.

- 4 Beyond requirements
- 3 Fully addressed
- 2 Partially addressed
- 1 Not addressed

Table 2: The criterion matrix for method selection.

Criteria	BPR	PADM	BPM
Ease of conversion to electronic processes	4	1	3
Total Quality management	2	1	4
Eliminate non-value adding activities	4	2	2
Radical outcome	4	2	2
Cultural issues	4	3	2
Implementation concern	3	3	2
Step by step procedure	4	3	1
Drastic change	4	2	2
Enables continuous improvement	4	2	4
Decision integral part of the process	3	2	4
Identification of opportunities for process improvement	4	1	2
Adaptability and flexibility	2	4	3
Supports gap analysis	4	1	2
Total	46	27	33

2.6.2 Conclusion

Based on the criterion matrix on Table 2 above, BPR has scored a higher rating, implying that it is the best method that addresses relevant criteria of the journal. The method also supports the gap analysis

with the provision of '*design to-be processes*' step, leading us to the next sub chapter which discusses a list possible online systems from which the journal can chose one system for implementation.

2.7 Open access publishing systems

Open Access is an online publishing system for scholarly research material such as journals. It has been developed in order to replace the traditional way of publishing, the hard copy publication. This type of a system uses an electronic publishing model where all the submission, editorial, peer review and publishing are done online.

There are many existing software that have been designed to handle editorial publishing processes on open access. This provides a variety of choice to journals which intend on publishing their articles online. Most of the software has been design in the same manner, but their processes and some of their features differ depending on what the software was intended to achieve. Single software cannot suit the needs of each journal intending to publish online; therefore, the availability of a variety of software gives a journal an opportunity to choose the most suitable software that would cover its needs. The following paragraphs describe in details, the chosen online systems for the selection.

2.7.1 Open Journal System

Open journal system (OJS) was developed as part of the research program of the public knowledge project (PKP) at the University of British Columbia which originated in the mid-1990s. It was aimed at designing and creating knowledge management system that would increase the contribution research education has on the lives and work of teachers, administrators, policy makers and the public. This initiative was triggered by the promises made by the World Wide Web in its early days (Willinsky, 2005).

Editorial and publishing process

Figure 5 below was extracted from the OJS website. It depicts the standard editing and publishing process followed by OJS users. The roles and responsibilities of each member involved in the journal compilation are clearly shown at different stages of the process.

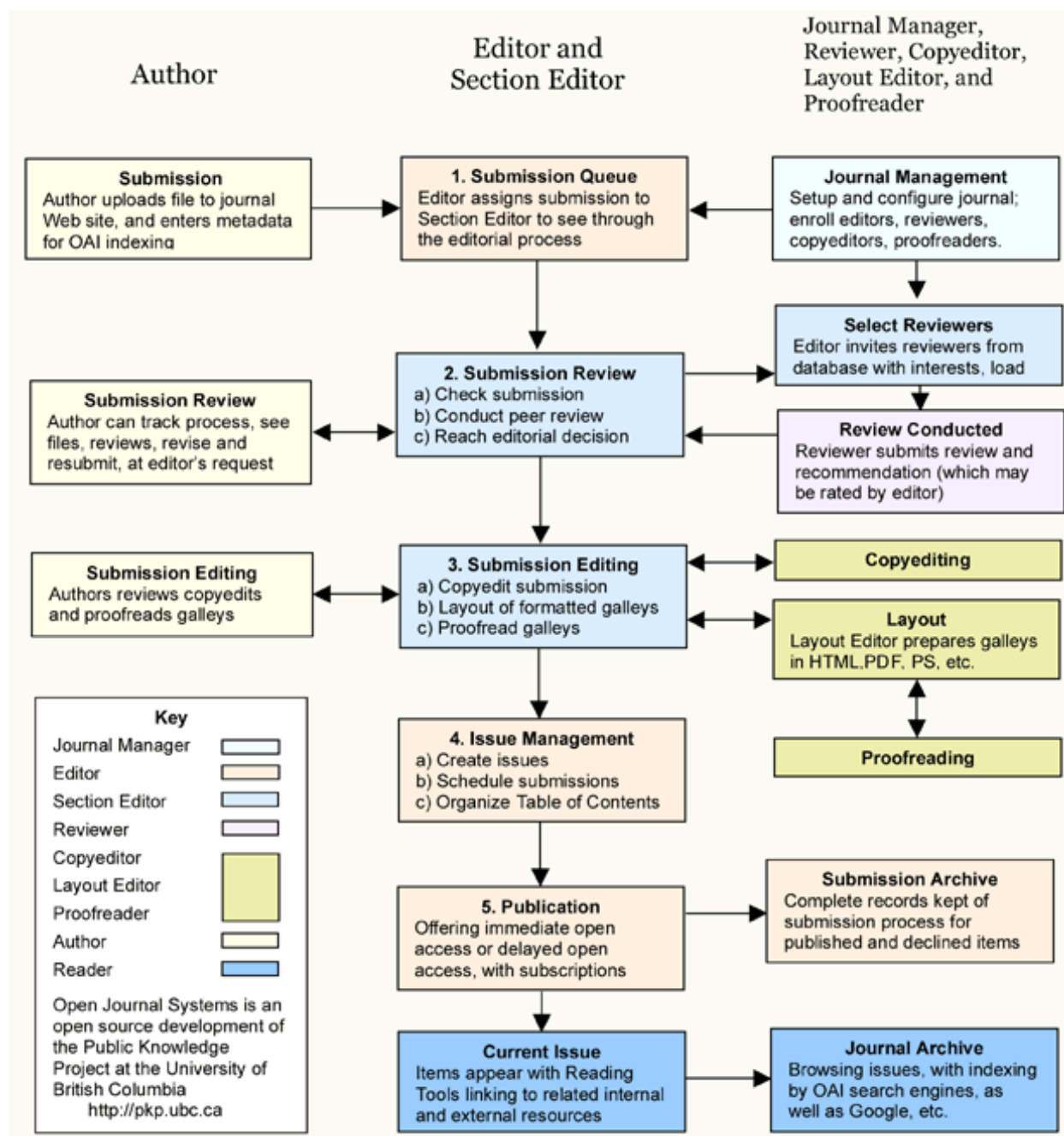


Figure 5: Open Journal System's editorial and publishing process (OJS, 2004)

Capability and flexibility

OJS offers journal editors all of the necessary options required from receiving articles to the publication of the journal, irrespectively of the research area or standards of the journal. This system enables a setup for a standardised multiple reviews by the same reviewers for the journals that use such an

approach. The system is developed with tools that can help new users get acquainted. This helps assist those with little or no experience with journal publishing to establish new journals without difficulty.

All the aspects of online journal publishing are covered, including setting up a journal website and handling of author’s submission through peer review and editing. The management of issues and archives is catered for, as well as the indexing and search capacities of a journal.

Expected improvement

OJS was developed as the improved system compared to the traditional system of publishing, the hard copy publishing system. Table 3 below was compiled by John Willinsky in his research on open access publishing. It depicts the improvements at different stages of the publishing process that the journal would experience by adopting OJS as a replacement for the hard copy publishing system.

2.7.2 Hyperjournal

Hyperjournal is an Open Source web application developed to assist with the administration work of academic journals on the web. This system was written on PHP, which is a general purpose server side scripting language for web development to produce dynamic web pages. It was development to fulfil the request of researchers and institutions for a low cost Open Publishing system (Barbera & Donato, 2006).

Capability and flexibility

Unlike most open source systems, Hyperjournal consist of dynamic contextualization as one of its features. This feature enables the system to automatically transform cross references into hyper textual bidirectional links. Because of this feature, when a user clicks on the author’s name, the system automatically searches across the entire network of linked hyperjournals and produces citation list. The citation list consists of articles written by the author, articles the author cited and all articles that cite the author ((Barbera & Donato, 2006).

Table 3: Electronic journal improvements relative to print journal (Willinsky, 2005).

Stage	Agent	Automated and Assisted journal management	Savings/Improvements
Submission	Author	a) Manuscript, appendices, data, instruments, etc. are uploaded to journal in a variety of formats. b) Templates provided to assist author in indexing work	<ul style="list-style-type: none"> • Clerical time • copying, postage & courier • stationery & editor time

Submission	Editor	a) Author is notified of submission receipt b) Submission is dated and queued for review c) File can be readily modified	
Peer review	Editor	a) Reviewer contacts, interests and record maintained b) Reviewer contacted with title, abstract & date c) Review due date, with reminders, thanks, available d) Review progress tracked and viewable by author	<ul style="list-style-type: none"> • Administration time • Expedited reviewing process
Peer review	Reviewer	Comments managed and editor contacted	
Editor review	Editor	a) Author notified with reviews (complete or excerpts) and access provided to marked copies b) Complete archival record of review process maintained	
Revisions	Editor	a) Back and forth with author and submission facilitated b) Paper circulated among reviewers, as needed	
Editing	Copyeditor Proof-reader	a) Link to editor and author, re-submission queries b) Link to layout for proofreading changes	
Layout	Editor	Manages multiple formats (HTML, PDF, PS) with previews	<ul style="list-style-type: none"> • Printing services • time
Publishing	Editor	a) One-click scheduling and ordering articles and sections b) Volume and number, special issue, assignment	
Distribution	Editor	Automated, email notification of contents to readers, authors and editors.	<ul style="list-style-type: none"> • Postage & packaging • time
Indexing	Readers	a) Automated harvesting of article metadata by open archives initiated engines, including citation indexes. b) Articles linked to relevant items in open access database, based on article's keywords	<ul style="list-style-type: none"> • Third party indexing services
Interchange	Readers/ authors	Comments to articles can be posted, and online forum maintained for continuing exchange on range of themes	<ul style="list-style-type: none"> • Not otherwise available
Archiving	Host library	Web host provides server maintenance, backup, and content migration to new systems	<ul style="list-style-type: none"> • Catalogue storage
Upgrading	OJS	Open source community continues to develop system	<ul style="list-style-type: none"> • Software

2.7.3 Digital Publishing System

Digital publishing system (DPubS) was conceived by Cornell University Library in the 1990s to help Colleges and universities manage and disseminate the intellectual discoveries and writings of scholars. The main aim for this project was to promote affordably scholarly communication (Cornel University Library, 2005).

Editorial and publishing process

Figure 6 below illustrates the editorial and publishing process of DPubS. The system, like other open access systems, consists of online submission. It has a built in tool that distributes articles to reviewers automatically. After reviewing articles for applicability, the system automatically gathers reviewer feedback. This feedback is made available for the author to see whether or not his/her article has been accepted. Those articles that have been accepted are tracked and made available for the editing and decomposition process. In the editorial and decomposition process, an editor can select which issue a particular article should be published in. When all the editorial process has been completed, the built in tool for sorting and queuing sort the articles according to the issue in which they are to be published. DPubS has the ability to publish an article or the entire issue by moving the final copy from editorial work space to the public space.

DPubS editorial and publishing process

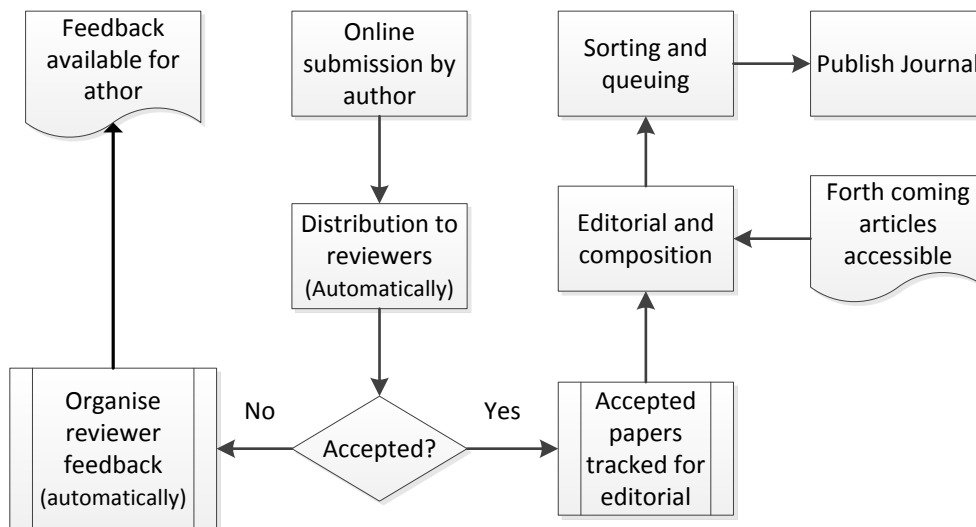


Figure 6: The DPubS editorial and publishing process.

Capability and flexibility

DPubS has been developed with the ability to enable publishers organize, manage, present and deliver both open access and subscription controlled scholarly communication. The editorial management services support manuscript management and peer review activities. Figure 7 below illustrates the metadata services provided by DPubS. The black lines represent the interaction between the systems and its users. The overall diagram shows the capability of DPubS to provide a user friendly system due to the high automation of the system.

Expected improvement

The improvements that DPubS would bring as compared to the traditional publishing systems are not so different from the ones described in table 1. This shows that the main aim of these systems is similar. The most obvious improvements that can be spotted on figure 6 above are: reduced administration work, saved time, eliminated manual interaction with the authors and the tracking system prevents possible omission.

2.7.4 Conclusion

In general all the open access systems had one similar goal of eliminating manual administration work and making publishing an easy and friendly process. Due to lack of adequate information on the editorial and publishing process of Hyperjournal, the system would not be used in the comparison for the selection of the one most suitable for SAJIE.

The completion of this chapter concludes the research work done for the project. The chapter that follows describes the application of appropriate methods for the problem and the development of a solution.

The DPubS metadata system

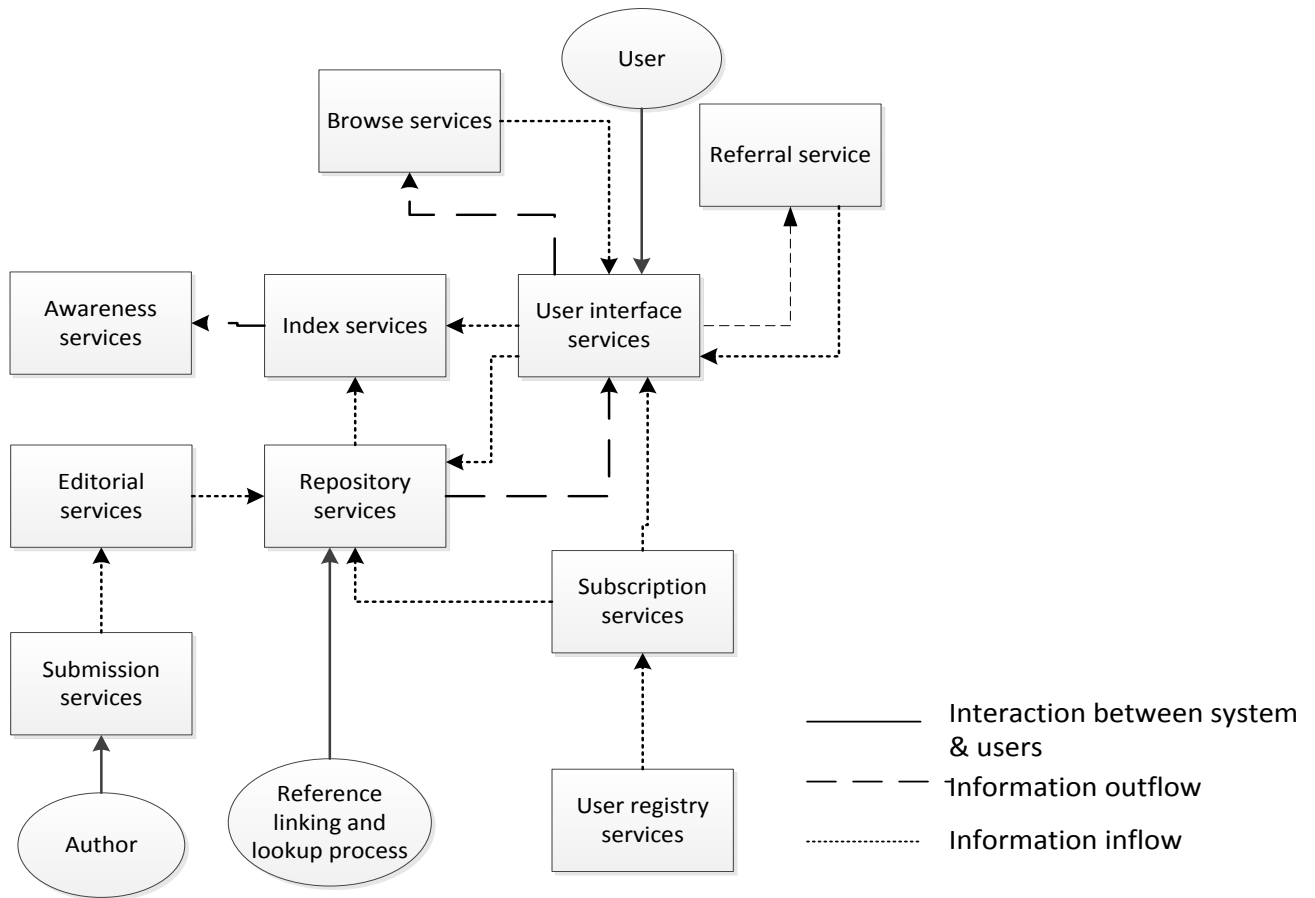


Figure 7: The DPubS metadata process.

3 Development of a solution

This chapter entails the application of selected methods in an attempt to develop a solution to SAJIEs current problem of non-standardised process and inadequate database. Business process reengineering (BPR) along with change management has been used to develop a solution model that can be used by the journal to solve its current problem.

3.1 BPR implementation

3.1.1 Prepare for BPR

Cross functional team

The first aspect of the preparation stage requires the development of a team that would be responsible for the planning and execution of the project. It is important that a representative from management is a part of the team in order to give strategic direction. For this project, the selected team consists of the candidates listed below:

- Prof Susan Adendorff (Journal editor)
- Prof Chris Van Schoor (Journal sub editor)
- Prof Corne Schutte (Journal sub editor)
- Valetia Matsekangope (Engineering student)
- Wilna DuPlessis (Project leader)

Customer driven objectives

The identified customer driven objectives to be considered for the development of a solution are as follows:

- Increased access to research material for the scholars/authors world wide
- Reduce the time lag between manuscript submission and its publication
- Increase the number of articles published per journal publication
- Elimination of shortcomings of the peer review process as perceived by scholars/authors

Strategic purpose

The main purpose of the improvement, as described by SAJIE management, is to reduce time and effort spent on compiling a journal and targeting a higher citation of the articles.

3.1.2 Map and analyse as-is process

The mapping and analyses of SAJIEs as-is process requires the creation of activity models, process models, simulation, performing activity based costing and the identification of problems within the process. Figure 8 & 9 below illustrates the current process flow of the journal. These diagrams were studied in order to identify existing problems within the process. Below is a list of identified problems.

- Excessive administration work is required for a constant flow of information between activities
- Different working platforms are utilised to complete administration work of the journal (i.e. Amadala, GroupWise & the database)
- Lack of automation (most activities require manual performance)

3.1.3 Design to-be processes

a) Adopt an online publishing system

The first process to be acquired by the journal is the online publishing system which requires less manual performance. The system which can satisfy this requirement is an automated one with the following capabilities:

- Online submission, reviewing, editing & publishing of the journal.
- Ability to send automatic notifications to authors when the status of the article is updated and feedback is available.
- Trigger automatic prompts to remind referees of the due date of the reports for the article being reviewed.
- Ability to compile reports provided by referees and updates the status of the reviewed article.
- Built-in software for plagiarism test.

Figures 11 & 12 below illustrate an improved and automated process that the journal can acquire in order to achieve system's objectives listed above. The information contained in these figures would be used in the selection of system that best meet the journal's objectives.

b) Define roles and responsibilities

The objectives of defining roles and responsibility are listed below:

- To eliminate inconsistency of task being done by different people
- To establish a standardised workflow direction

c) Validation of processes

The three elements of process validation are listed and discussed in the paragraphs below.

Installation Qualification

This refers to the correct installation of equipment with applicable input and required conditions. The journal should acquire OJS software for installation. The desired website should be set as soon as the software have been installed.

Operational Qualification

This element requires that the process be tested for conformance of products. A bad combination of inputs can be used in order to confirm the system is capable of producing acceptable products in cases of mistakes. In a case of SAJIE, the journal members could register themselves in different roles including authors and referees, to produce a copy of journal. This can be used as a testing mechanism for the system.

Performance Qualification

The final element of process validation demonstrates that the system produces acceptable products consistently. SAJIE members in their role play described in the previous paragraph can produce a couple of test journals and compare them to confirm that the system works properly and produces products of the same standard.

d) Trade-off analysis

Trade-off analysis is a process whereby two or more items are analysed and compared based on criteria. These criteria are treated according to the importance of each relevant to the objectives of the project. Table 4 below addresses the selecting process used in choosing an appropriate system for the journal. The rankings below are to be used to illustrate an extent to which the system has achieved a particular criterion. The sum of all criterion ratings will determine which system is more suitable for SAJIE.

- 3 Highly achieved
- 2 Achieved
- 1 Not achieved

Table 4: The criterion matrix for online system selection.

SAJIEs requirements	Open Journal System	Digital Publishing System
Handle multiple users	3	2
Automated notifications & reminders	3	3
Automated reviewers' report compilation	2	3
Track article progress	3	2
Build-in plagiarism software	3	1
Better coordination of activities	3	2
Provide single platform for performing activities	3	2
Reduce manual work	3	3
Administration simplified	2	2
Total	25	20

Open Journal System (OJS) received a higher rating, therefore it can be concluded that OJS should be the system that SAJIE chooses because it addresses the journal's requirements better than Digital Publishing System does.

3.1.4 Implement reengineered processes

Initiate training program

Prof Corne Schutte, a sub editor of the journal, is more informed concerning the open journal system (OJS) and how it works. Therefore, he will be responsible for training the editor, sub editor, administrator and the other assistants of the journal. He may also develop a summarised user manual that would be placed in the website for prospective authors and referees. New members of the journal would be trained by the administrator on arrival.

Implement transition plans

This stage is the most difficult one as people resist change because of discomfort. For this reason change management is crucial when there is change in processes of the organisation. Section 3.2 below explains in details how change management would be implemented in the journal's improved process. Therefore refer to the details in section 3.2 to understand the process of transition from one system to the other.

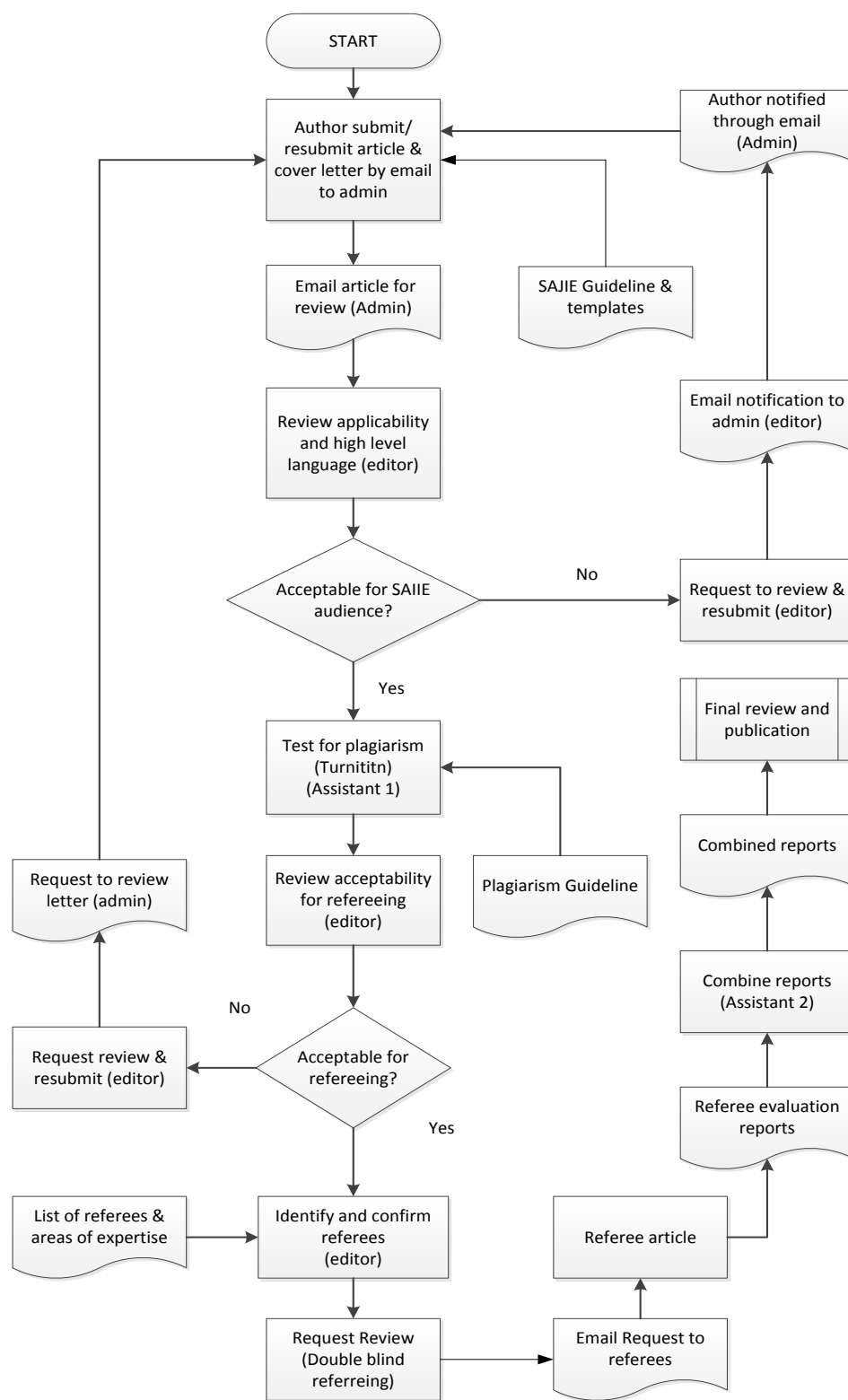


Figure 8: Desk review of as-is process.

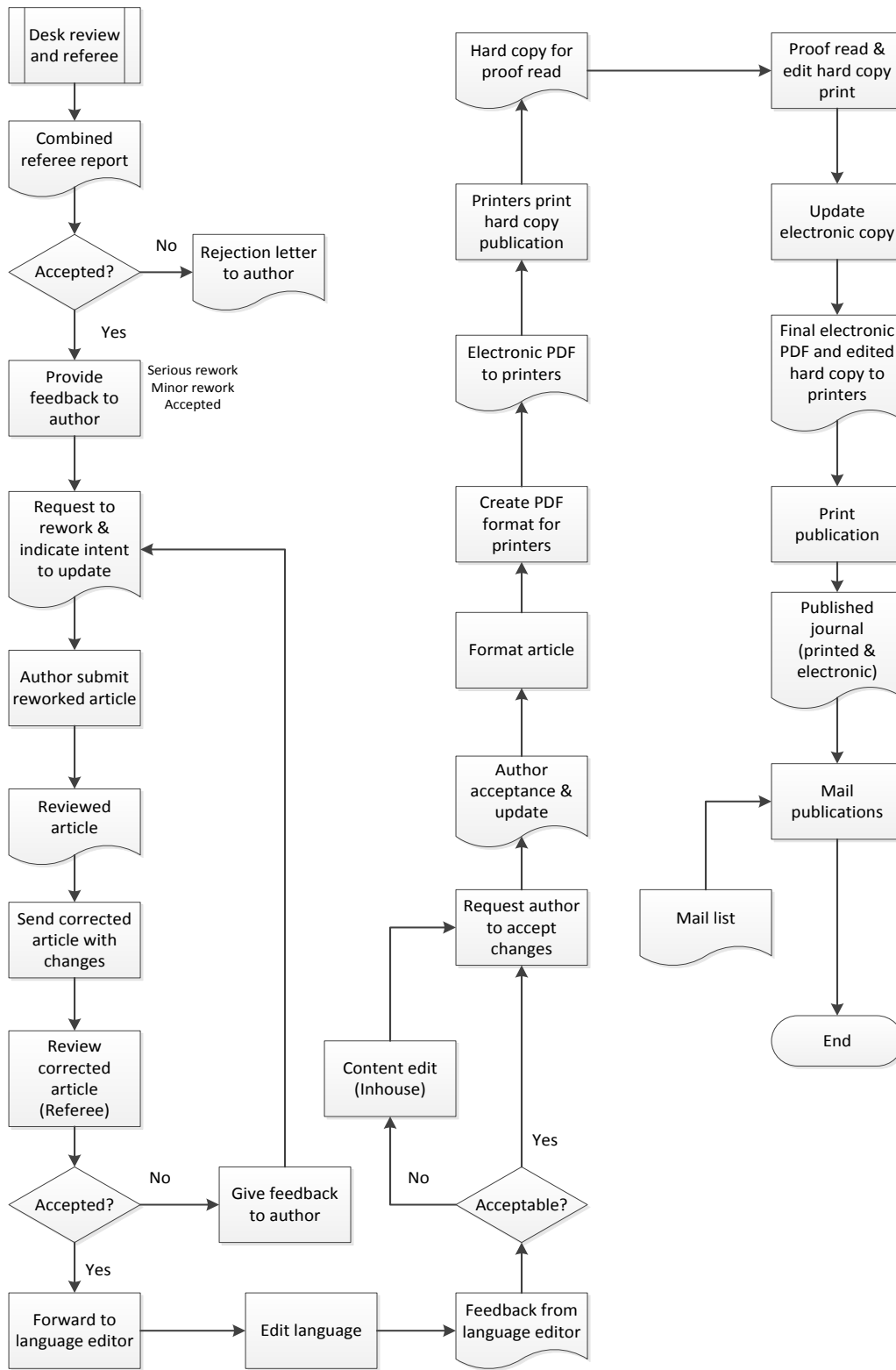


Figure 9: Final review and publication of the as-is process.

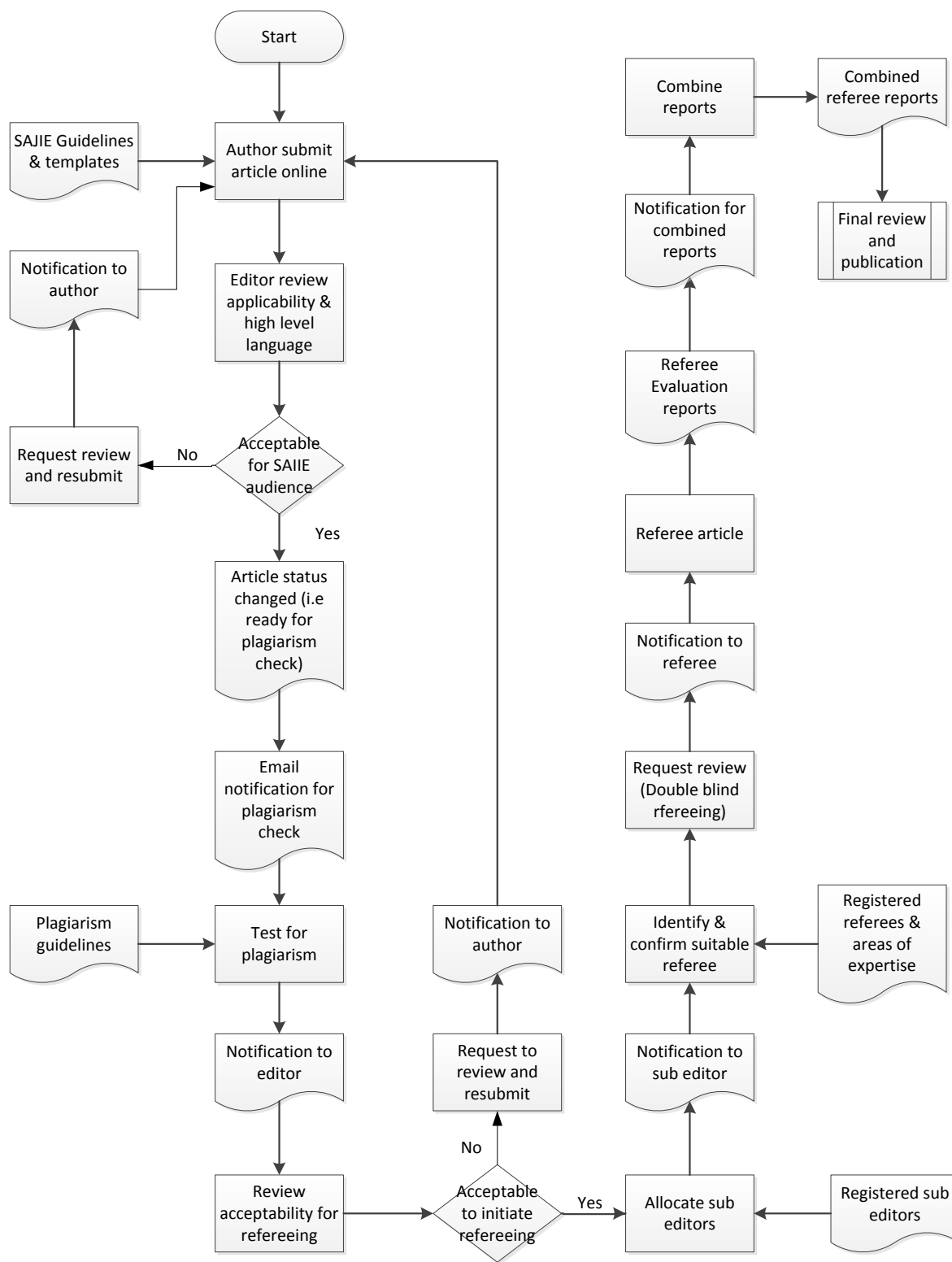


Figure 10: Desk review of to-be process.

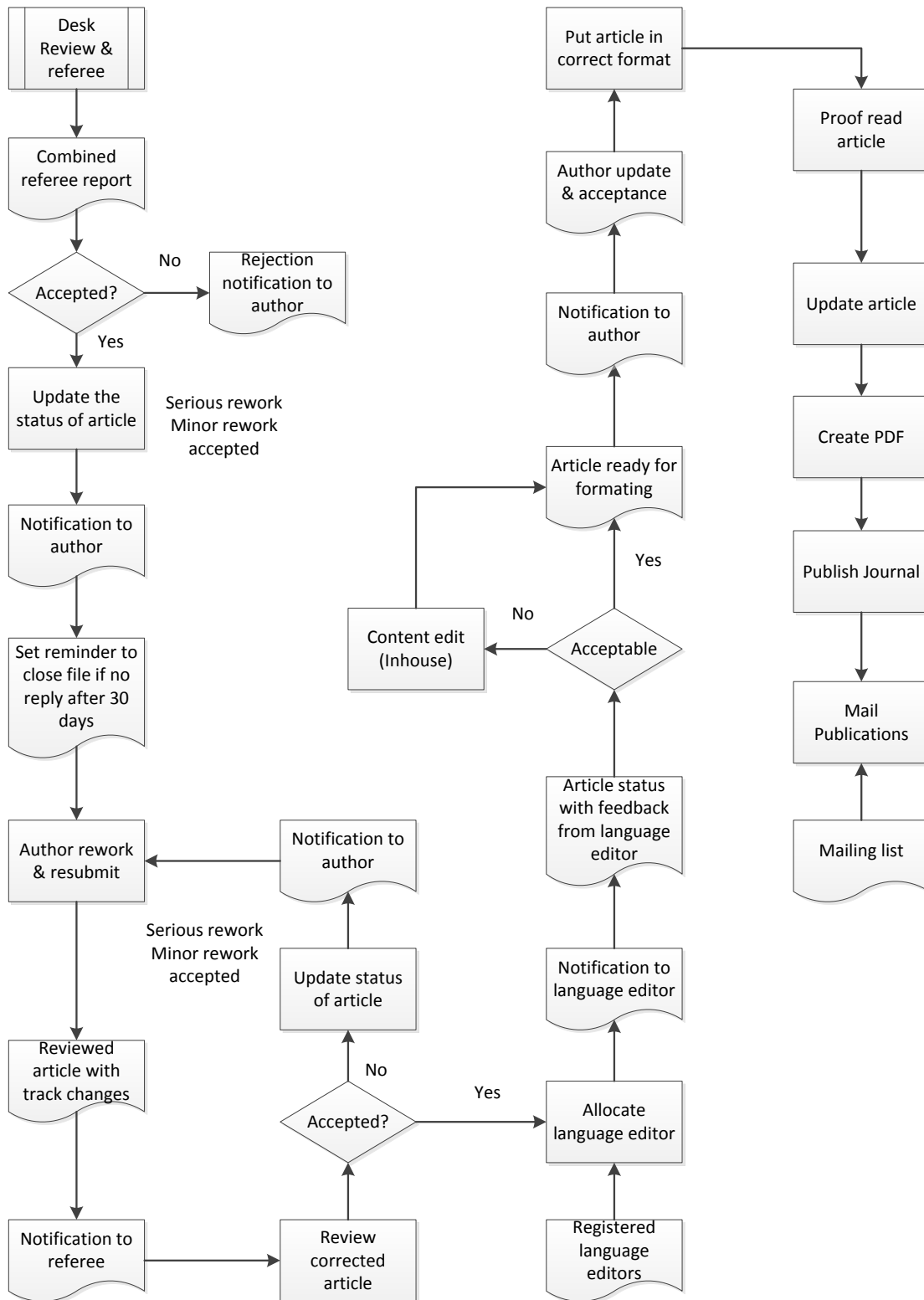


Figure 11: Final review and publication of to-be process.

3.1.5 Improve continuously

Initiate on-going measurement

This aspect of continuous improvement can be done by making use of employee, author and reader surveys. This gives employees, readers and authors a platform to express their opinions of the system. It also enables them to propose future changes that the journal could consider.

Review performance against target

The management team of SAJIE can easily compare the performance of the system by setting goals and standards they wish to achieve. The extent to which the goals and standards have been achieved without difficulty would determine whether the system enhances the journal's potential. These create an opportunity for the journal to consider upgrading the software in the future depending on the availability. Typical performance indicators that can be used by the journal are:

- The number of articles covered in one journal issue
- The amount of time spent in completing the issue
- The number of citations of the articles contained in the issue

Improve process continuously

Continuous improvement on the process is very important because it ensures that the process is well maintained and emerging problems do not build-up in the system. It enables growth of an organisation and encourages high quality invention. The following aspects can be considered for continuous improvement in an organisation:

- Constant reviewing of the process and identifying possible disconnects.
- Consider software upgrade for higher capability and lessening the workload.
- Consider best practices in journal publication and reduce non-value adding activities.

3.2 Implementation of change management

The paragraphs below explain how SAJIE can implement the four aspects of change management which were discussed in the literature study in chapter 2 of this document.

3.2.1 Communication

The need for change should be communicated to every member of SAJIE. This can be done by highlighting the shortcomings of the current process compared to the benefits of an improved system. SAJIE members should be informed of the progress and the major decisions being taken during the process of improvement. Once SAJIE management has approved and chosen to implement the suggested solution to the current problem, all stakeholders of the journal including authors and readers should be informed of the change that is about to be implemented. This allows authors and readers to register and familiarise themselves with the new system.

3.2.2 Empowerment

- Encourage all members to participate by assigning important tasks to show that their ability is valued
- Create an open environment for everyone to make suggestions, comments and remarks about the proposed system
- Allow employees to address issues with the current process and specific changes they would like the new system to have.

3.2.3 Training and education

Implementing a new system in an organisation requires training and educating users about the system to be implemented. Training on a new system requires a significant amount of time, thus it is prudent to familiarise users with the system before an organisation evolves to it. For the purpose of this project, OJS was chosen as the best system that suits SAJIEs requirements. Therefore, all members responsible for the administration work of the journal should receive knowledge and training before the journal completely adopts the system. This would give the journal members time to acquaint themselves with the new system while they continue doing work using the old system. It also gives them an opportunity to compare the systems and realise the improvements presented by the new system.

A one day training session should be organised for administration members of the journal mentioned in paragraph 3.1.4 above. This would take place at The University of Pretoria's computer laboratory. One of the journal members employed at The University of Pretoria would have to book a time slot in one of the laboratories for the training session.

Prof Corne Schutte should continuously interact with members to ensure they understand their working platform on the system. During the scheduled meetings every member should give feedback on how the system is working for them. These feedback reports can be compared in the subsequent meetings to monitor members' progress with the new system.

3.2.4 Create culture of change

There are steps one can follow when initiating an organisational culture change. For the purpose of this project only three major steps have been considered and are detailed in the paragraphs below.

Understand the current culture

- Observe employees and their interaction within the organisation
- People get upset or excited about important things, therefore look out for employees' emotions
- Take note of the important things that come up in conversations as that indicates interest

Decide what the organisational culture should be

In order for an organisation to create a culture, a vision and the mission should be stated clearly and understood. The organisation should first identify the changes that need to be made about the current culture in order to decide on the culture that supports the success of the organisation. This can be achieved if the organisation practices effective communication.

For example: If employees spend too much time agreeing with each other, but with no action, a decision should be made on when exactly the action should start in cases of agreed upon suggestions.

4 Project conclusion

4.1 Recommendations

Although the modelled solution for SAJIEs current problem of non-standardised process and insufficient database, document in the previous chapter found OJS to be the best system that the journal can adopt for use. There online systems described in chapter along with OJS are continuous projects and could overhaul OJS in the future provided the intended potentials are thoroughly considered before prototypes are released.

Hyperjournal contains dynamic contextualization as one of its features. This feature enables the system to automatically transform cross references into hyper textual bidirectional links. Because of this feature, when a user clicks on the author's name, the system automatically searches across the entire network of linked hyperjournals and produces citation list. The citation list consists of articles written by the author, articles the author cited and all articles that cite. This capability gives Hyperjournal a competitive advantage over OJS and could, in the future, help the system top-up the competing ones.

Further consideration on different systems could be made in order for the journal to keep improving and being at a competitive level.

4.2 Conclusion

Technology has taken over human's way of life in today's society. Experts in this field battle each day to come up with better, easy and quick ways man can do their everyday jobs. For this reason so many online systems for publishing exist today to eliminate manual labour and increase productivity.

The journal's problem of non-standardised process and insufficient database, like many other problems, are not very horrific because there's always a solution. The solution lies within a set of methodologies that researchers and technology have made accessible to anyone.

Industrial Engineering tools such as the BPR, BPM and PADM, discussed in the literature study are brilliant methods that do not only apply to technical problems, but can be used to solve many different problems in different industries and thus they are generic and not only for the engineering field.

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Appendices

Appendix A: SAJIEs editorial policies

Plagiarism

All material submitted for publication to the South African Journal of Industrial Engineering (SAJIE) will be subjected to a plagiarism test. Based on the results of the plagiarism test, the editor's discretion will be used to determine whether an article will be accepted or rejected. In addition, the editor reserves the right at any time before publication to repeat the plagiarism test to ensure that the material is original. The editor reserves the right to reject a publication should the plagiarism test at any time before publication provide evidence of significant overlap with another publication, even if the publication shares one or more of the authors of the article submitted to SAJIE. Submission of an article should therefore indirectly imply that the work published is the author's original work, and where work of others has been used the necessary recognition was given. The work submitted to SAJIE may not have been published elsewhere (except as part of an academic thesis) and may not be submitted for consideration at any journal or publication. SAJIE does not condone plagiarism.

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