

Structuring a storage methodology for current and
future information.
Minimum requirements for the Tender Process at
Sandvik Mining and Construction RSA

by

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Executive Summary

Sandvik Mining and Construction RSA believes that by building strong partnerships between mining companies and themselves successful mechanisation of mining operations can best be achieved.

In order for Sandvik to receive a new contract, a tender/proposal for the project needs to be done and submitted to the clients to be accepted and approved. The higher the standard, quality and accuracy and the more timeous the submission of the tender/proposal, the more likely Sandvik's chance will be of the tender being accepted over other companies.

In order to assist account managers and the ESS (Equipment sales support) team to achieve this in terms of creating a tender document, a structured storage methodology for storage of current and future information pertaining to COP's-Code of Practices, from the mines, and tenders/proposal will be developed. This includes all the information that was used in past tenders and that which could be used for future tenders. All the information will be stored in a central place accessible to all the applicable users. This also reduces the risk of documentation being lost by Sandvik if an individual/employee leaves Sandvik for another company

A set of documents that stipulate the minimum requirements (according to standards, legislation and customer requirements to be included in a tender) was compiled. This was achieved by the consolidation of the COPs of the different mines in conjunction with the applicable legal requirements and standards. These documents should be used during the compilation of a tender as well as the approval thereof before it is sent to the customer.

In conjunction, a method has been defined for regular updating of the information and the usage of the information storage facility when new tenders are given to account managers to work on.

Applicable Industrial Engineering methods were used to analyse the processes currently used for information storage. Methods were also used to assess the available alternatives in order to construct an effective and efficient storage, updating and retrieval method.

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Part 1

1.1 Introduction

Company Background

The Sandvik Group

Sandvik is an engineering group with a high-technology focus and advanced products and world-leading positions within various areas. They conduct business activities through representation in over 130 countries worldwide. The Sandvik Group had over 50,000 employees and their sales exceeded SEK 94 billion in the 2011.

Sandvik's operations are based on unique expertise in materials technology and extensive insight into customer processes. This combination has provided world-leading positions in three primary areas:

- Tools for metal cutting in cemented carbide and high-speed steel as well as components in cemented carbide and other hard materials.
- Equipment and tools for the mining and construction industries.
- Products in advanced stainless materials, titanium, special alloys, metallic and ceramic resistance materials and process systems.

Business concept

Their business concept is to develop, manufacture and market high-tech products and services that will result in higher customer productivity and profitability.

Research and development

Sandvik is dedicated to invest in research and technology. 2,400 Employees are active in this area and they invest close to SEK 3 billion each year. The Group has over 5,000 active patents.

Sandvik Mining and Construction



Sandvik Mining and Construction RSA (Pty) Ltd is based at Jet Park, Johannesburg and Delmas. They form part of the Sandvik AB Group and they serve the whole of Africa.

They are one of the leading suppliers of equipment to the Underground and Surface mining industry as well as to the Exploration and Construction industry. Some of the equipment supplied to these fields include underground and surface drill rigs, roof bolters, load haul dumpers, trucks, continuous miners and shuttle cars, to mines that have adopted a policy of mechanising their operations. The fact that they have the most extensive range and depth of products on the market, and also have the ability to understand their customers' business enables them to develop new products which offer real solutions to mining problems. Their motto is "**customer performance through partnership**".



Sandvik's positioning around the globe

1.2 Problem statement

Currently the account manager/ ESS (Equipment Sales Support) team members responsible for a new tender/proposal has to collect or draw up a new set of documents (COP-Code of Practice/Tender/Proposal document) for every new contract. This is due to the fact that information used for previous tenders/proposals are not stored and managed in an effective way for future use.

Management involved with this project has established that the present method of obtaining relevant information for new tenders/proposals is inefficient.

1.3 Project aim

The aim of the project is to Structure a methodology for storage of current and future information used in previous tenders/proposals and will be needed for any future tenders/proposals. In conjunction a method will also be defined for the regular updating of the information being used.

It is also necessary to determine the minimum requirement for the compilation of a tender document in terms of customer requirements and legislative standards.

In order for this to be accomplished all the information from the different mining houses, account managers and applicable legislation and regulations needs to be consolidated. In conjunction a software package should be chosen.

1.4 Project scope

This project will be done through Sandvik Mining and Construction within the Sandvik AB group. All possible Mining houses forming part of Sanvik Mining and Construction's cliental will also be consulted.

-The current process used by Account Managers when new tenders/proposals are done will be analysed.

-The extent to which information regarding new tenders/proposals is kept will be determined.

-Alternative methods/systems of information storage will be considered and weighed in order to choose the most relevant alternative

It has been decided that the principles of BPR (Business Process Re-engineering) will be used for this project.

1.5 Deliverables

1. Structured storage methodology for storage of current and future information (COPs and tenders/proposals) in a central place, accessible to users with the relevant access clearance. - eg. folder hierarchy after sufficient research on alternatives has been done.
2. Methodology for regularly updating information (based on COP changes, new tenders and standards/regulations/legislation changes). Different access levels will be incorporated determining individual user's access rights eg. read, edit etc.
3. A list of relevant standards extracted from COP and tender documents.
4. A document containing the consolidation of the requirements as per COP documents.

Part 2

Literature review

2.1 Introduction

The Literature review will aid in getting a better understanding of the alternative data storage methods to be used. There will also look at different software packages available that will be able to meet the requirements of the different storage methods to be used. The literature study will also give one a better idea of what the hardware's capacity/capability should be in order to implement the alternative methods.

2.2 Alternative software packages

A better understanding of the capabilities of the different software packages will be obtained by researching each from the relevant Software web-pages. Reading blogs that have been posted by users of the different software packages will also give one a better idea of where and how each of the packages can be implemented and used.

2.2.1 Lotus Domino Document Manager

As explained in the manual of Lotus Domino Document Manager, the software is implemented to arrange documents for shared access. Users can review or approve documents as well as publish and archive documents provided that they have the appropriate security access rights. Depending on every user's different access rights he/she can either:

- Create and delete folders
- Add new documents
- Edit and delete documents

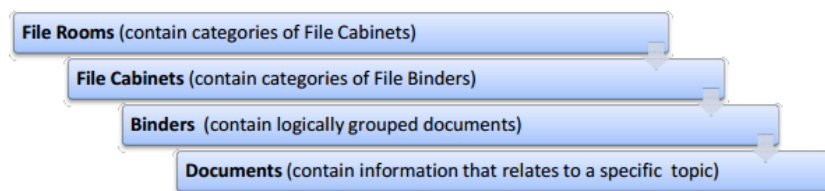


Figure 1: File structure in Lotus Domino Document Manager

The user can either set the document security when creating a new document, or let it default to the binder user list. The different access levels for users include:

- Readers- Has access to view the document
- Editors- Has access to view /edit document content, properties and its profile information.
- Draft Editors- Only has access to view/edit a draft version of document.
- Managers- Has full access to all documents

(Lotus Domino Document Manager 6.5- User Manual)

2.2.2 Share Point

By reading an article by Scott Robinson, 10 things you should know: Microsoft's SharePoint Services, number 2, 5, 7 and 10 highlights relevant features. (Robinson, 2005)

[2. SharePoint collaboration solutions are scalable](#)

SharePoint is used to create sites for team interacting and managing/sharing documents and files.

An aspect of SharePoint that has been less accentuated is that this collaborative function is very scalable. Something can start as a resource library shared by a single team and eventually be easily expanded to accommodate an entire organisation.

[5. The use of Metadata can assist in creating dynamically construed storage systems](#)

Metadata is essential to the SharePoint Server concept, and comes in several flavours. You can effectively create personalized search arguments that assist you to organise your data dynamically by using Metadata.

[7. The Task Pane within Word and other libraries can be used to turn it into highly collaborative systems with integrated admin](#)

Seeing that SharePoint Services are essentially about document management; saving documents from Office to SharePoint, saving documents in libraries, and checking the documents in/out are SharePoint's most evident functions.

But the addition of those functions into shared workspaces is where they become particularly beneficial, instead of merely functional. There is a Task Pane that links documents to different libraries. Through the Task Pane, one can:

- Track the status/version of a document
- Define and track who has access to sites/documents
- Monitor tasks
- Set alerts

You can save from all Office applications, and not just Word, to SharePoint.

[10. With one easy operation an entire site/site collections can be backed up](#)

One shouldn't under-appreciate the ability to be able to move an entire site with its sub-sites and all their contents in one step. SharePoint Services include two utilities that will greatly reduce frustration: STSADM and SMIGRATE.

The negative effects associated with the moving of a site with the SMIGRATE utility is that all security settings do not move with it. Settings need to be checked after the move. Where, if STSADM is used, the security settings will be preserved.

The image below shows the different sections of SharePoint's capabilities. Insights and Search are the sections pointing out relevant capabilities. (What is SharePoint?)

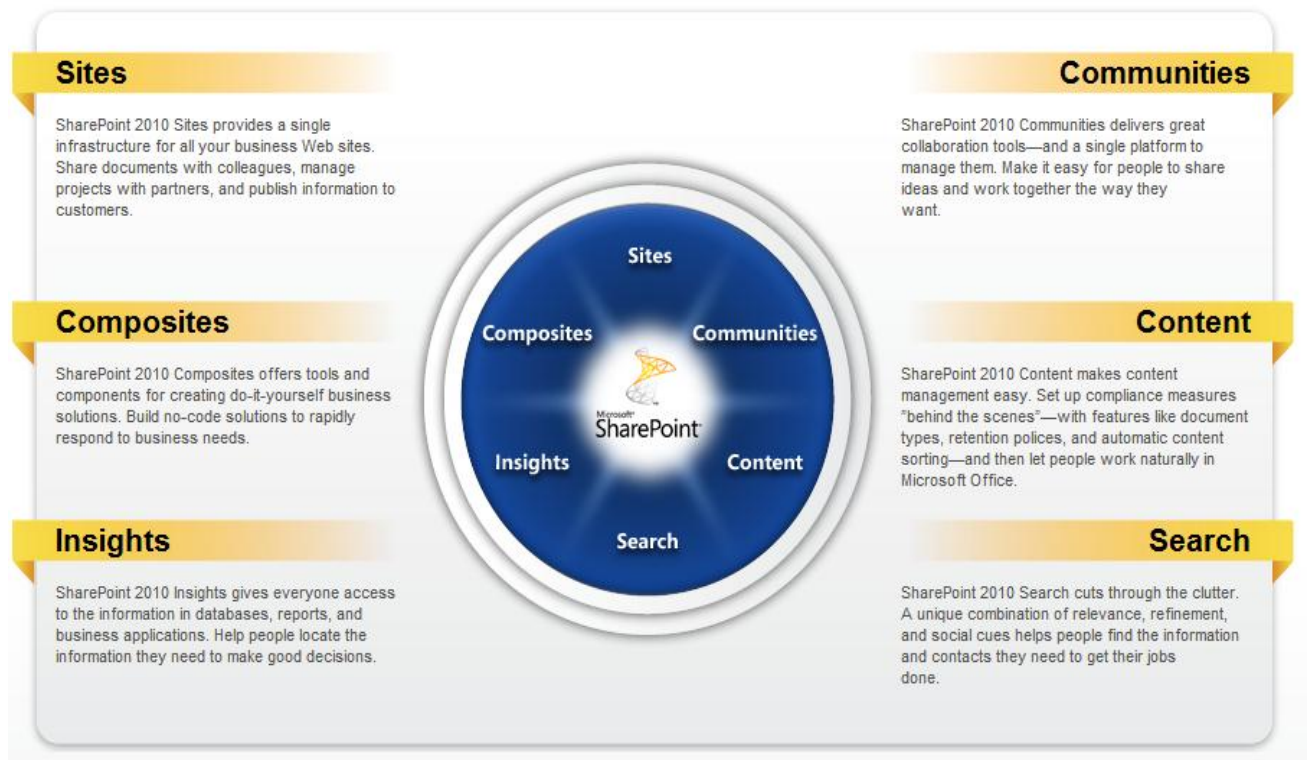


Figure 2: Sections of SharePoints capabilities

SharePoint 2010 Insights: BI for Everyone

SharePoint Insights enables all users to access the necessary information to make good decisions.

Owing to the fact that SharePoint Insight uses familiar applications, it is user friendly, and users find it easy to locate the data they need. An entire team can access and work with the same data with the knowledge that everyone has the correct information.

SharePoint 2010 Search: Relevance, Refinement, and People

SharePoint Search enables users to locate the data they require to get their jobs done.

Table 1 below showing the minimum hardware requirements in order to use SharePoint was obtained from a blog on TechNet. (Singh, 2009)

Component	Minimum requirement
Processor	64-bit, dual processor, 3 GHz
RAM	4 GB for stand-alone 8 GB for single server/multiple server cluster installation for use in production
Hard disk	80 GB
Other	DVD drive

Table 1 Minimum hardware requirements for Sharepoint

The Following document formats are supported by SharePoint

- HTML
- PDF
- TIFF
- Word
- Excel
- Other Office document

Additional useful features of SharePoint

- Optical Character Recognition (OCR) which enables one to find documents by content, that is, by words or phrases in the particular documents.
- Workflow for business process management which will enable one to define a multiple-step workflow to route a specific document to “inbaskets” of different users for processing.

Security/Permission levels

- **View Only-** User is only able to view items.
- **Limited Access-** User only able to view specific items.
Note: If this permission level is removed, group members might be unable to navigate the site to access items, even if they have the appropriate permissions for an item within the site.
- **Read-** Includes permissions that enable users to view items on the site pages.
- **Edit-** Includes permissions that enable users to add, edit and delete lists; can view, add, update and delete list items and documents.
- **Contribute-** Includes permissions that enable users to add or change items on the site pages or in lists and document libraries.
- **Design-**Includes permissions that enable users to view, add, update, delete, approve, and customize the layout of site pages
- **Full Control** Includes all permissions.

2.2.3 Document locator

Document Locator is a less known package but also included in the review to give a broader view of what is available.

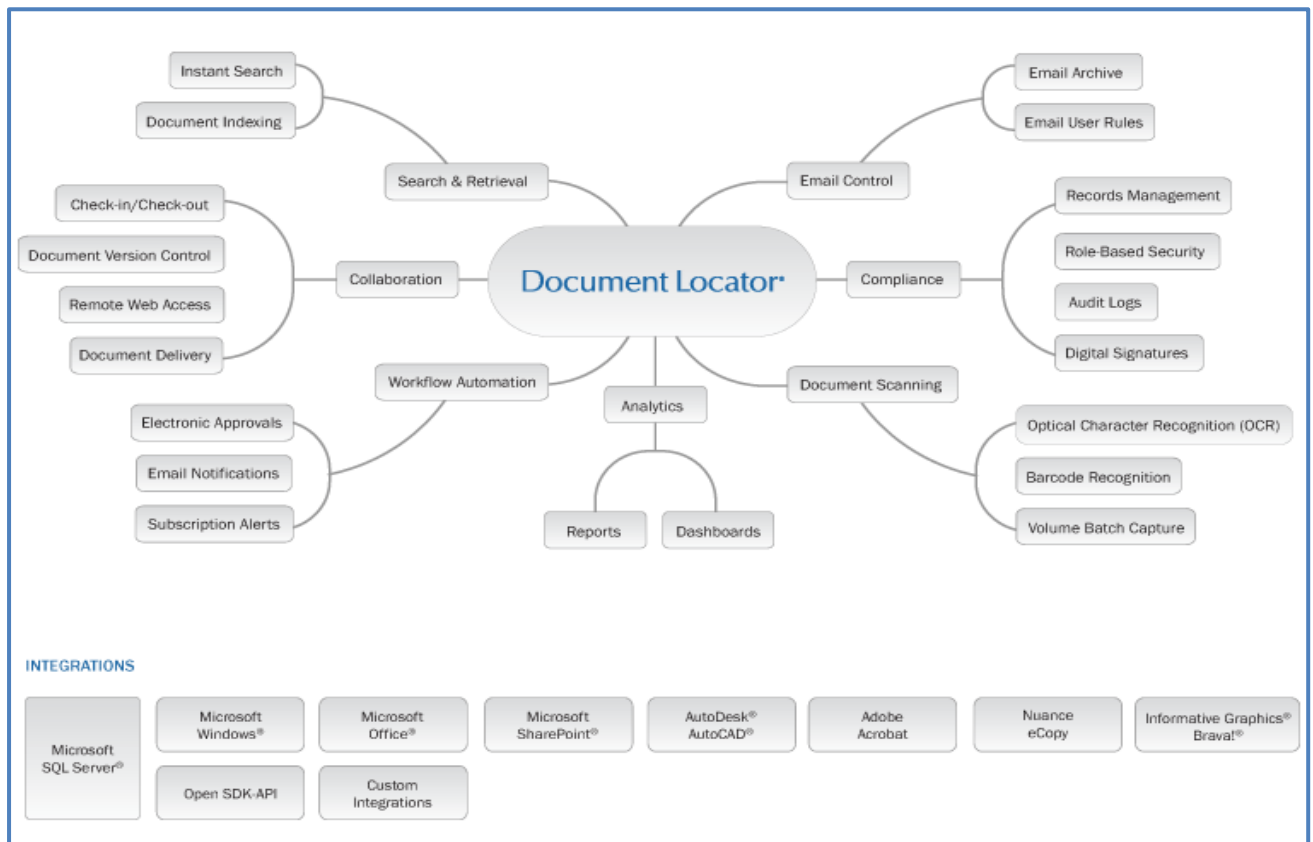


Figure 3: Document Locator Features and Integration

The following table was obtained from the website of Document Locator and it shows most of the important features as well as some additional features which are not necessarily relevant in the context of this document.

Table 2 Document management aspects that increases flexibility and control

Features	Standard	Optional
Document Management		
Document Searching	✔	
Full-Text Indexing	✔	
Check-in and Check-out	✔	
Version Control	✔	
Notifications	✔	
Profile & Metadata	✔	
Document Importing	✔	
Scanning and Imaging		✔
Automated Workflow	✔	
Task Manager	✔	
Remote Web Access		✔
Records Policies	✔	
PDF Creation	✔	
Document Delivery	✔	
Email Archive		✔
Administrative		
Scalability	✔	
Performance	✔	
Reliability	✔	
Document Log	✔	
Reporting	✔	
Security	✔	
Folder Consistency	✔	
Differencing Tools	✔	
Digital Signatures	✔	
Integrations		
Windows Integration	✔	
SharePoint Connector		✔
Adobe Acrobat	✔	
Office Integration	✔	

Document Locator System Requirements were obtained from Document Locator's website.
(System Requirements/ Document Locator)

- Admin rights to install software
- Windows XP with SP3/Vista/Windows 7 required
- 32-bit/64-bit OS environment is supported with Document Locator 5.3 or higher
- Microsoft Internet Explorer 6.0 SP1 or newer required
- Pentium 4 or higher processor required
- RAM-1 Gigabyte or more recommended (2 Gigabyte when working on Windows 7)
- Network Speed of 100/1000 Base-T
- Super VGA monitor (resolution 800 x 600 or more, small fonts)
- 128 MB video RAM or more

2.2.4 eDoc's Open Text

How eDoc increases productivity?

Using eDoc can minimise the time required to find and work with any documents as well extract and process/edit information these documents. By organising the management of important documents business operation can be improved.

eDoc's Capabilities and Features

The following list of features and capabilities could be compiled by reading through the answers to eDoc's 'User's Questions' on the eDoc customer support web page. (Support)

- **Supported document formats:** eDoc can process all different image files as well as PDFs, text files, Office files.
- **OCR (Optical character recognition) functionality supported**
- **Backup functions:** eDoc easily backs up files with its Metadata.
- **Organize documents:** Easy to create multiple folders with subfolders to categorise documents.
- **How/where are the data stored:** Stored on document server and accessed through Windows Sharing from eDoc clients.
- **Security access levels:** Access rights per folder. A folder can either be private, public or accessed by specific user which is determined by the administrator.
- **Supported user access rights:** Creating, Deleting, Renaming folders, Importing, Renaming, Deleting, Copying documents and Changing document properties.
- **Connection with other Office programs:** With the installation of eDoc, a toolbar, "eDoc bar", gets added in Word, Excel and PowerPoint. It has two buttons: "Send to eDoc" and "Get from eDoc".
- **Deletion of documents and folders:** Deleted documents or folders will be sent to eDoc's "Deleted documents" folder. For permanent deletion you will need to delete it from the "Deleted documents" folder.

2.3 Indexing/ Tagging

Document indexing is the method of connecting or tagging documents with different “search” terms. (Indexing Digital (Electronic) Documents -- It's Not an Option; Pay Now or Pay (More) Later)

Embedded indexing comes down to the fact that a marker is put at every location in a document where a term is relevant. The markers are used by software to generate the index. Should text be moved, the markers will move with it, and the index can be regenerated easily. In the case of text being deleted, so would the markers and once again the index can be regenerated. The index still requires manual checking. For example, possibly, cross-references become invalid after text is deleted. (Indexing technical documents, 2009)

One might be amazed to know at what speed a search engine selects documents matching your specific search, out of thousands and thousands of documents. Instead of going through every one of these numerous documents one by one, it searches for the words you entered in an index already created and then displays all the documents that contain these words. (12 Things to Know About Document Indexing, 2012)

The “12 Things to know about document indexing” follows below.

1. An inverted list index is the type where the words are listed and then the documents corresponding to each word. Straightforward indexing would have listed the documents first which would make it much more difficult to list all the documents that contain the words you searched.
2. The main use of indexing is to help with document retrieval.
3. In General search engines will search based on full-text indexing.
4. A document can also be indexed by ‘tagging’ its metadata.
5. Metadata indexing reduces the storage requirements but the user will need to have a better idea of what exactly he is searching for.
6. Indexing is especially important for information without a set structure.
7. Some DMSs might be able to extract metadata from a document automatically.
8. If a user does not know exactly how to specify his search it might be necessary to rate documents according to their seeming relevance to a search.
9. If a document is not structured to enable relevance-based ranking to accurately identify the document’s topic, the results of the search become less accurate.
10. Scientific notations can be used to index scientific documents.

11. OCR (Optical character recognition) programs are used to convert text on images to machine-readable text because DMSs aren't able to read it. The better OCR system you use the higher the quality of the index will be.
12. DMSs usually have well organized directories which can also be browsed to find a specific document.

Indexing documents is a very powerful technique to aid the retrieval of documents from data stores that contain a large number of documents. Documents can either be indexed by their full-text content, which enables retrieval by any word in the document, or parts of it such as the main topic of the document. (12 Things to Know About Document Indexing, 2012)

Organizational Benefits of Indexing

According to the Journal, *Indexing Digital (Electronic) Documents -- It's Not an Option; Pay Now or Pay (More) Later*, indexing documents offers tangible as well as intangible benefits to an organisation. Financial, employee, and value-added benefits are some of the tangible benefits. A benefit such as, improved perception of the organisation, as seen by both the employees and the customers, is less tangible. These benefits eventually result in financial gain for the organisation by an increase in employee productivity, customer service and a competitive advantage in the marketplace. (Indexing Digital (Electronic) Documents -- It's Not an Option; Pay Now or Pay (More) Later)

Employee Benefits:

- Users can easily add new documents and if it is properly indexed when it is added, other users can access it immediately. It ultimately comes down to the fact that people can do their jobs more effectively.
- Better version control indexing will help users determine which version of a document they are working on.
- If a standard of indexing is used throughout an organisation it will enable users with the appropriate access rights to access documents from anywhere around the world.
- More than one user can access the same document at the same time.
- Less time is needed to train users.

Financial Benefits:

- Production will increase due to the fact that basic office procedures such as document retrieval will be done faster.
- Less staff will be needed in future/same staff will be able to process more work.
- Access to documents throughout the entire organisation will improve.
- Customer service will improve by decreasing time needed for service.
- The amount of filing mistakes will decrease.

Value-Added Benefits:

- By improving customer service a company will most likely gain the loyalty of customers and in doing so increase business.
- Seeing that 'time is money' and indexing saves time a company will have a competitive advantage if they can retrieve information faster and more accurately.
- Perceived excellence. Organisations that display an image of excellence will attract more clients and better employees.

2.3.1 Tagging Microsoft documents/Changing Properties

(Add tags or other properties to a file, 2012)

Information on your files such as the author, date modified etc. are listed under its properties. Even though your files have a lot of properties associated with it, you can add tags to it containing specific words and phrases that might make it easier to locate the file.

You can easily narrow down the view of your documents /files in the Documents folder to show only the files with a specific property when you search using file properties. In order to do this you first need to add the specific properties.

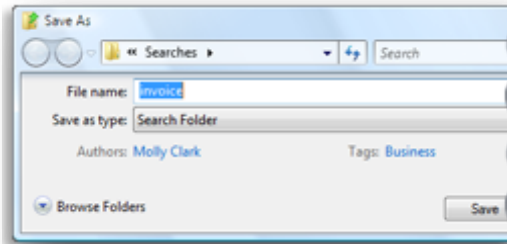
Note

You might not be able to add or change the properties of certain file types. For ex, you will be able to edit the properties of a Microsoft Office document, where you cannot edit the properties of TXT or RTF files.

You can edit/add properties when you save a file

If you add the properties to each file as you create and save it you do not have to locate the file later to edit the properties.

1. Click **Save As** in the **File** menu of the Program you are using
2. Add tags and other properties in the provided boxes in the **Save As** dialog box,



Adding properties to a file in the Save As dialog box

3. After adding tags and properties of your choice, insert a file name and click **Save**.

You can remove a file's properties

In the case where you possibly want to share a file with someone and the tags allocated to the file contain personal information, the following steps can be followed to remove the tags.

1. Right-click on the file, click and open **Properties**.
2. Select the **Details tab** in the **Properties** dialog box.
3. Click on the **Remove Properties and Personal Information** link.
4. By clicking on **Create a copy with all possible properties removed** followed by **OK**, you will create a copy appropriate for sharing while simultaneously keeping your original file.

Or

by clicking on **Remove the following properties from the file** you can select which properties you want to remove and then click **OK**.

Note

In the case where a file was tagged or properties added to it using a different program than Windows, you might need to remove the desired properties using the same program if Windows is unable to remove the properties.

2.4 Engineering Methods

2.4.1 Business Process Reengineering- BPR

In order to understand the concept of BPR one should first consider the definition of “Re-engineering” in context. Re-engineering is the *essential* rethinking and *essential* redesign of business *processes* to accomplish *drastic* improvements in various measures of performance including cost, quality, service and speed. (Subramanian Muthu, 1999)

BPR essentially comes down to the following five steps

1. Preparing for BPR
2. Mapping and Analysing the As-Is Process
3. Designing the To-Be Process
4. Implementing Reengineering process
5. Improving continuously

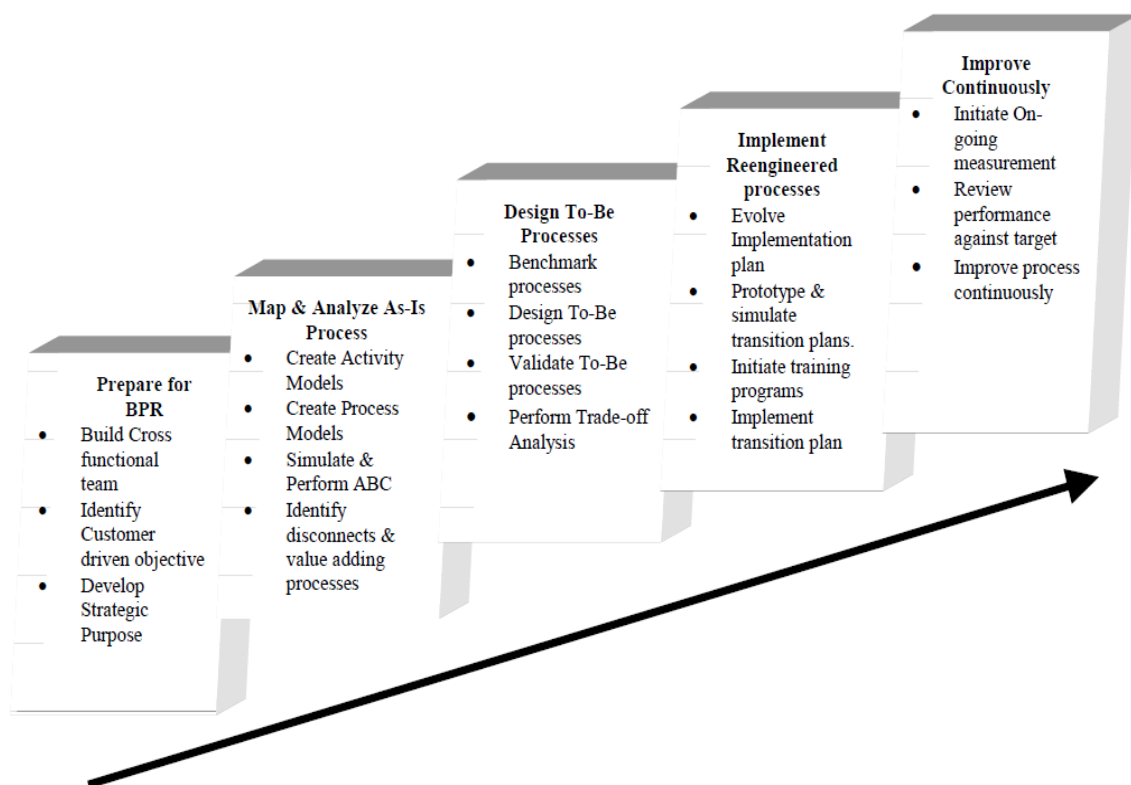


Figure 4 BPR: The surest way to the top!

Success with BPR

The mayor of the city of San Diego initiated a BPR project that helped improve the efficiency and effectiveness of the government which, as a result, maximises the services offered to citizens. Through the BPR efforts undertaken the city has begun to realise significant cost savings and efficiencies. (Business Process Reengineering, 2008)

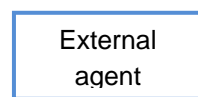
BPR studies have also been initiated/ completed for the following functions/ processes:

- Grants and Gifts
- 1472 Processing
- Records Management
- Reservoir Recreation

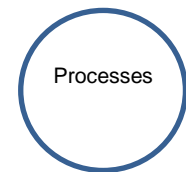
2.4.2 Data Flow diagrams

As explained in a tutorial on Data Flow Diagrams found on the SmartDraw website, a data flow diagram shows the process of how data is processed by a system with regards to inputs and outputs. (Software Design Tutorials)

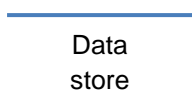
Data flow diagrams are very easy to read and interpret because it only consists of three symbols and one connector. The symbols are as follows:



The external agent is either a person/organisation/other system that interacts with the system from outside the system. The external agents will provide inputs and also receives output from the system



Each process in the system is represented by a circle. Data will most likely be processed into another format as it passes through a process.



The open ended boxes represent data stores. After information has been processed it is stored for future use. It can be seen as an inventory of data.



The flow of data is represented by an arrow.

The diagram on the next page is an example of a Data Flow diagram.

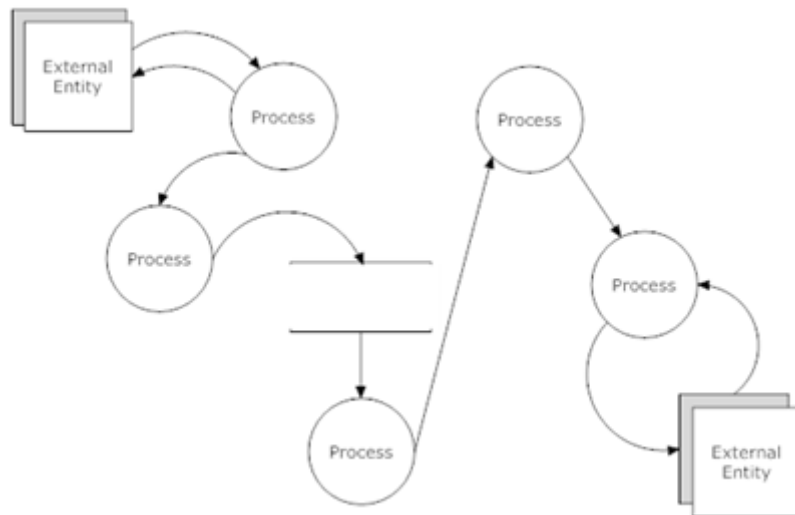


Figure 5: Example Data Flow Diagram

The processes in a data flow diagram are not necessarily a sequential representation of the system. The processes can run in parallel. It essentially shows how data flows throughout the system.

2.4.3 Value engineering

Value engineering is process of evaluating alternatives by applying numbers and forming a payoff matrix. Alternatives are compared with each other by following the steps below:

1. Determine a set of benefits that are obtained when choosing an alternative (for example: low cost, good quality, decrease in injuries).
2. Assign a weight to each benefit. A benefit that is considered the most important is assigned the highest value.
3. Create a matrix with the alternatives and the benefits of the alternatives.
4. Score each alternative in terms of the benefit they deliver.
5. Multiply the score with the appropriate weight.
6. Sum all of the products to get a final score for each alternative.
7. The highest final score indicates the best alternative.

It is important to note that the relative weights that are assigned to the benefits will differ for each unique case (Niebel B, 2003)

Part 3

Data Gathering and analysis

Evaluating alternative DMS packages

Required features/functions of the DMS to be implemented

Versioning: The process during which documents are checked in and out of a document management system. This will enable users to retrieve previous versions of documents. It will be useful to have a versioning function in order to keep track of the updates to a document.

Access levels: The administrator of the system or the creator of a document should be able to determine the access rights. This in effect means that access and functional rights such as: creating, deleting, renaming of folders, importing, renaming of documents, deleting, copying documents, changing properties etc. should be able to be defined by the administrator.

Document types: The DMS should be able to support any document type and format. It should not be necessary to request different document formats for the sake of the DMS's inability but possibly if another format is required for the sake of other functions such as tagging the document.

Effective search functions: The user should be able to find documents using different properties given to a respective document.

Effective Folder structures: The user should be able to create an effective and logical folder structure in order to organise the documents and files in an effective manner to be easily navigated and used.

Comments on alternative DMS

After the literature study on the alternative DMS software packages one has a better understanding of what is available and what each package offers.

Currently Sandvik's IT dept. is looking into the possibility of implementing SharePoint throughout the organisation. Because of Sandvik's recent restructure it has become very difficult to implement something like new software due to the fact that it needs to be approved by a few higher levels of management.

As seen in [Table 3](#), weights have been assigned to the different requirements of the alternative DMS packages in order to get an overall score of each to assist in the choice of which DMS to use.

A weight determining the significance of each criterion was allocated to each, which adds up to 100%. A score (out of 100) is then given to each criterion with respect to every DMS. The score of each criterion is then multiplied with the weight of the specific criteria, which gives the numbers in the brackets as seen below. Adding up all the scores in the brackets gives the total score for each DMS in relation to the res.

Criteria	Supported document type	Security levels	Effective file search	Efficient folder structure	Already available	Total before availability	Total
Weight	20%	15%	15%	20%	30%	70%	100%
Lotus notes	100% (20)	80% (12)	70% (10.5)	70% (14)	100% (30)	56.5	86.5
SharePoint	100% (20)	90% (13.5)	80% (12)	80% (16)	0	61.5	61.5
Document Locator	100% (20)	70% (10.5)	60% (9)	70% (14)	0	53.5	53.5
eDoc Open Text	100% (20)	90% (13.5)	70% (10.5)	70% (14)	100% (30)	58	88

Table 3 Evaluation of different DMS software

Because of the difficulty of implementing new software in Sandvik, a quite significant weight has been allocated to whether the software is already available in the company.

Looking at the scores in [Table 3](#) of the different packages before taking into account whether it is already available, SharePoint would be the first choice. Alternatively one of the packages already available to the company might be used, ie. either Lotus Notes or eDoc having similar scores for the different features.

As will be mentioned in the implementation phase (part [4.4.2](#)) it has been considered to rather construct a database after the completion of the entire project instead of implementing a DMS (Document Management System) for this part of the project. For theoretical purposes the different DMSs were still evaluated and a selection made.

Part 4

The BPR Process

In this section Business Process Reengineering (BPR) principles as previously discussed in the literature review in part 2 to improve the current process followed to complete a tender document for an existing/prospective client.

The following deliverables set out in part 1 will be completed by using these BPR principles:

1. Structured storage methodology for storage of current and future information (COPs and tenders/proposals) in a central place, accessible to users with the relevant access clearance. - eg. folder hierarchy after sufficient research on alternatives has been done.
2. Methodology for regularly updating information (based on COPS changes, new tenders and standards/regulations/legislation changes). Different access levels will be incorporated determining individual user's access rights eg. read, edit etc.
3. Method/procedure for using the storage facility (for tender information) when new tenders are given to account management to work on. Different access levels will be incorporated determining individual user's access rights eg. read, edit etc.
4. A set of documents stipulating minimum requirements in terms of legislation, standards and customer requirements to be used in compiling and approving a tender/proposal.

4.1 Prepare for reengineering

Understanding the need for change

In order to prepare for reengineering you first have to understand the need thereof.

Currently the account manager/ ESS (Equipment Sales Support) team members responsible for a new tender/proposal has to collect or draw up a new set of documents (COP-Code of Practice/Tender/Proposal document) for every new contract. This is due to the fact that information used for previous tenders/proposals are not stored and managed in an effective way for future use.

This is not a full-blown BPR project and only minor changes or rather additions to the existing process will be made. As a result the different steps of the BPR process will contain less detail and more emphasis on the required inputs necessary for the changes which include:

- Minimum requirements for compiling a tender document
- Gathering and storing of the COP documents
- Gathering and storing past tender/proposal documents
- Consolidation of the COPs and tender documents
- Compiling a list of standards and legal requirements pertaining to trackless mobile machinery
- Structuring a storage methodology and procedures for using and updating above mentioned documents and information.

When considering the complexity of processes at the mines and technology used, one starts to grasp the continual need for improvement.

4.2 Map and analyse As-Is process

4.2.1 Understanding the current system

Before attempting to change anything, it is necessary to have a thorough understanding of the current process followed in compiling a tender/proposal. The process currently followed is as follows.

1. A client/mine sends a request
2. An account manager meets at the mine to discuss customers request
3. The account manager gathers necessary background information needed to confirm the validity of the request
4. The tender/proposal opportunity gets accepted or declined
5. Necessary information is gathered and received from the mine to compile/complete the tender/proposal document
6. A scope meeting is held with all the team members involved in the tender process
7. The tender/proposal document gets compiled
8. The tender/proposal document gets sent for approval
9. The tender/proposal document is either approved or sent back with comments to change and fix
10. The tender/proposal document gets sent to the client
11. The client either accepts or rejects the tender/proposal
12. The tender/proposal gets moved to Won deal

What the system/process is lacking is mapped in the fishbone diagram in **Figure 6**:

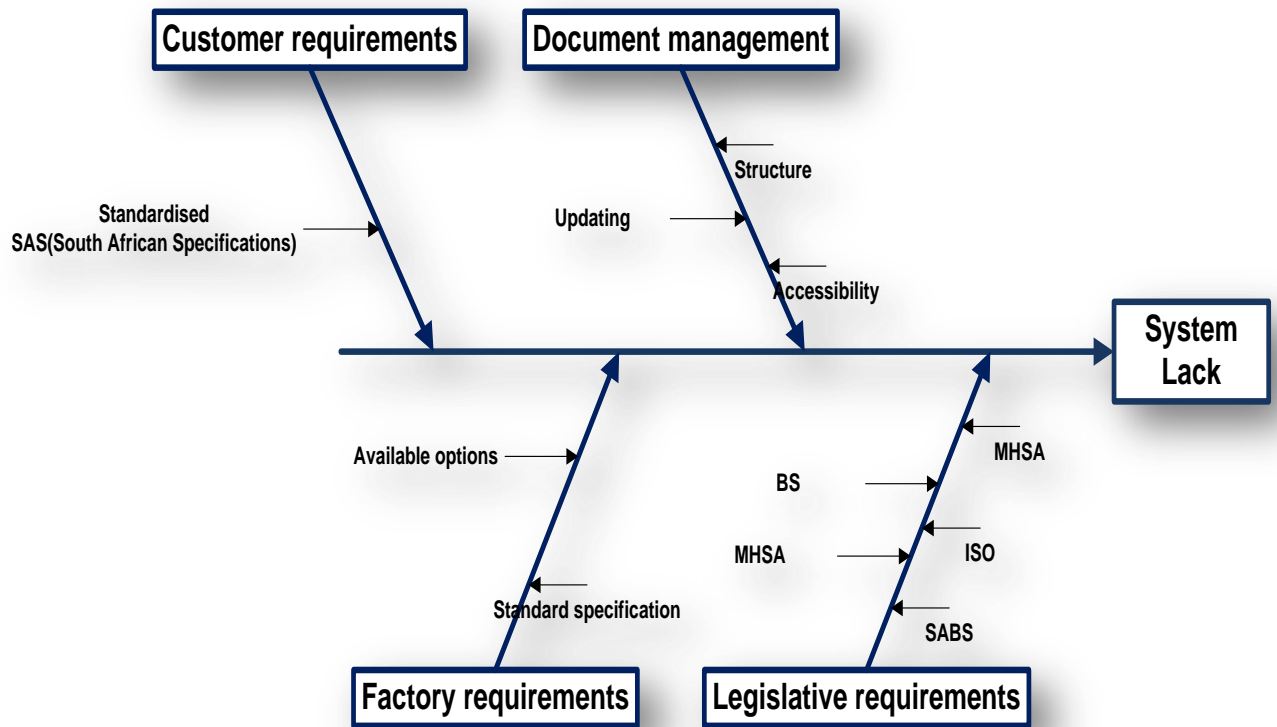


Figure 6: Fishbone diagram of what the current system lacks

The fishbone diagram, also known as the Ishikawa diagram is used to identify, analyse and solve problems. The diagram begins with the problem experienced drawn to the right hand side of the diagram as the 'head' of the fish. The possible causes of the problem are drawn as the 'bones' off the main 'backbone' of the fish. Other possible causes are then drawn around the main 'bones'.

4.2.2 Modelling the existing process

The tender process is depicted in Figure 7. Indicated with a red circle is the part of the process related to compiling and approving tenders/proposals. This is the also the part of the process with the shortcomings that has been listed and is being addressed.

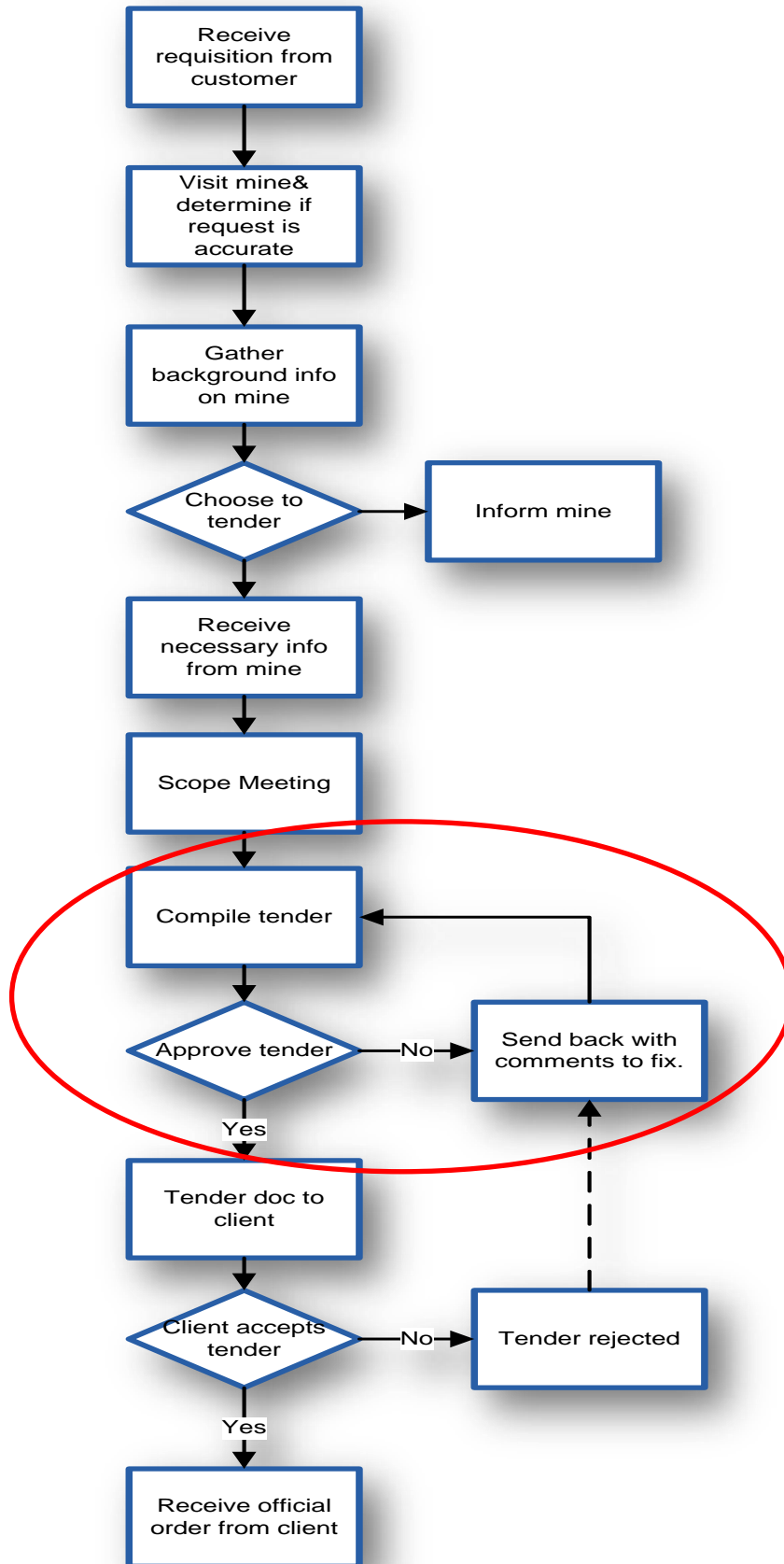


Figure 7 Tender Process (Affected process)

The Data Flow Diagram in **Figure 8** depicts the current flow of data during the compilation of a tender/proposal for a contract from one of the mines in Sandvik's client base.

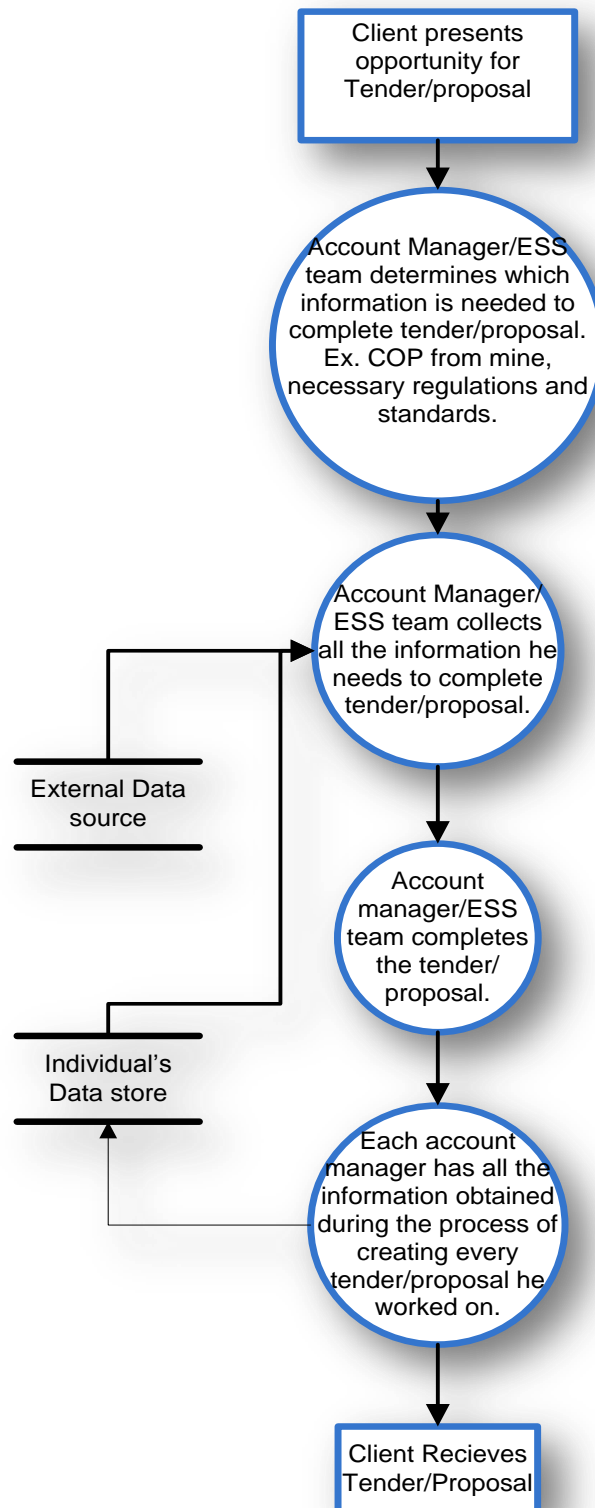


Figure 8 Current DFD for tender compilation

4.3 Design To-Be process

In creating a set of documents stipulating the minimum requirements that need to be met during the compilation of a tender document the following are being used.

Tender documents

Past tender documents which include all the information of what the clients required when submitting an order to Sandvik. This will include machine specifications. The following 'worst case' tenders (tenders not awarded) from the following mines were added to the collection:

- Venetia (De Beers)
- Stylsdrift (Anglo Platinum)
- Kalagadi (Arcelor Mittal)
- Ashanti (Anglo Gold)
- Black Rock (Assmang)

Rectifying what caused Sandvik to lose these contracts could minimise the chance of losing more contracts.

The COPs from the relevant mines in Sanvik's client base

COPs are not legally binding documents and are not intended to replace the provisions of national laws or regulations, or accepted standards. A code of practice merely provides guidance on safety and health at the workplace in certain economic sectors.

COP's from the following mines were used:

- Eland Plats (X-strata)
- Bathopele (Anglo Platinum)
- Bafokeng Rasimone (Anglo Platinum)
- Marikana (Lonmin)
- Hossy (Lonmin)
- Target (Harmony Gold)
- Burnstone (Great Basin Gold)
- Murray and Roberts
- Rio Tinto (Phalabora Mining Corporation)

As the COPs from more mines are acquired it should be added to the document collection and the information added to the current consolidation of the COPs.

Standards and legal requirements pertaining to mining equipment being supplied to the mines

A list comprising of all the different laws and standards pertaining to TMM (Trackless Mobile Machinery) used in underground mining will be compiled and used in conjunction with the COPs.

The following sources are to be used:

- Mine Health and Safety Act
- Occupational Health and Safety Act
- Standards in SANS (South African National Standards) library.
- BS- British Standards
- SAE- Society for Automotive Engineering
- ISO- International Organisation for Standardisation

A list of relevant standards which were identified is given in [Appendix B](#)

The following diagram depicts how the sources are arranged as a hierarchy according to the degree of compliance required. (DoL, 2002)

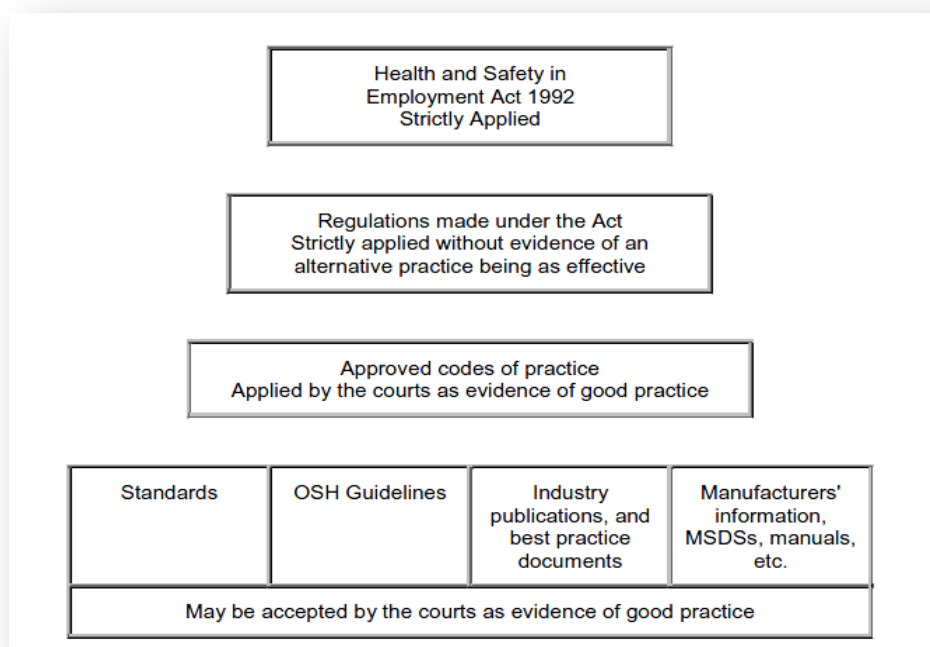


Figure 9 Hierarchy of sources according to the degree of compliance required

Approach to compiling the set of minimum requirement documents

A spread sheet was used to consolidate the COPs from the different mines. All the different aspects in a code of practice are listed and ticked off against the different mines which has the different aspects in their COP. In doing so, a list of common aspects can be extracted and listed.

The spread sheet used is included as **Appendix D**

The document summarising the consolidation of the COPs is included as **Appendix A**

A Similar to as was used to consolidate the COPs could be used to consolidate the 'worst case' tenders. A list of specifications requested by clients during an RFT (request for tender)/ order could be extracted to determine what could be included in a SAS (South African Specification) list. This will improve the process of an order by standardising a product and fewer customisations being necessary.

By working through the tender documents and COPs a list of standards and legal requirements were extracted. After compiling the list the applicable standards can be purchased from the applicable institutions.

By combining all the outputs mentioned above a document stipulating the minimum requirements for a tender document can be compiled and used during the compilation and approval of a tender/proposal.

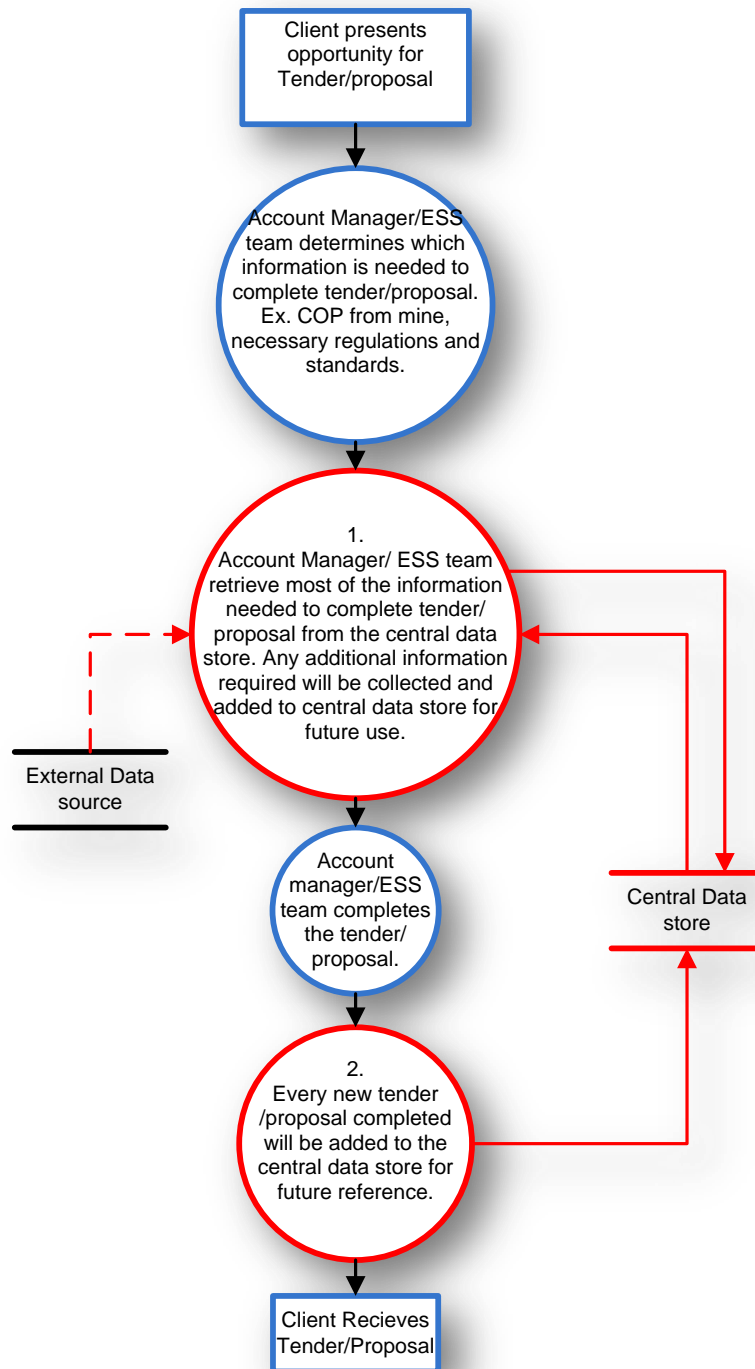


Figure 10 To-Be DFD of tender compilation

Represented by the red steps in the DFD is the change in the specific stages of the flow of data during the compilation of a tender/proposal once the data management system (or alternatively a database) has been implemented.

Change 1 in the flow: Due to the fact that the account managers/ESS team members will have most of the information available on the DMS to compile a new tender/proposal the time needed to collect data will be drastically reduced.

Change 2 in the flow: Currently, while the information of all the account managers/ESS team members is kept individually and not stored in a central place and accessible to other members, Sandvik runs the risk of losing valuable data. If one of the team members, for which ever reason, ends their employment at Sandvik without having to have stored the information they used on previous contracts, the information will be lost by Sandvik.

Also seen in the proposed flow is a central data store where all the relevant information will be stored to prevent data being lost or inaccessible to all members.

4.4 Implement Reengineered process

To implement the changes the following needs to be done.

- After finishing the collection of all the documentation and information previously mentioned, it should be organised and stored in a structural manner in central place within the parameters of the chosen DMS (or alternatively a database created for the tender process), accessible to all the members requiring the documents.

4.4.1 Folder structure

The folder structure for the documents will be as follow:

- **Tender Process**
 - **COPS**
 - Mining Houses
 - Mine
 - COP Document
 - **Standards**
 - ISO (International Organization for Standardization)
 - SABS (South African Bureau of Standards)
 - BS (British Standards)
 - SAE (Society of Automotive Engineers)
 - MHSA (Mine Health and Safety Act)
 - OHSA (Occupational Health and Safety Act)
 - DMR (Department of Mineral Resources)
 - **Tender Documents**
 - Mine
 - Tender Documentation

Figure 11 through to Figure 14 show the folder structures

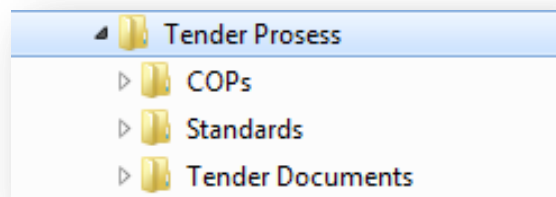


Figure 11 Folder structure for Tender Process documents

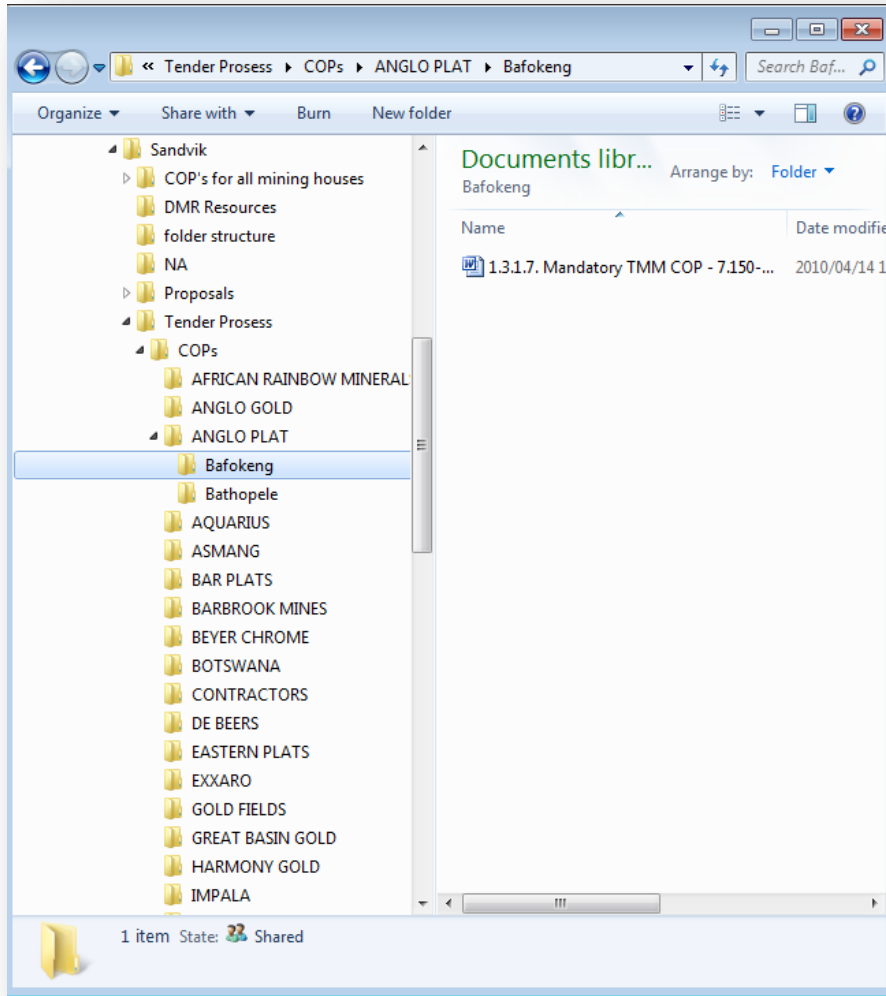


Figure 12 Folder structure for Codes of Practice

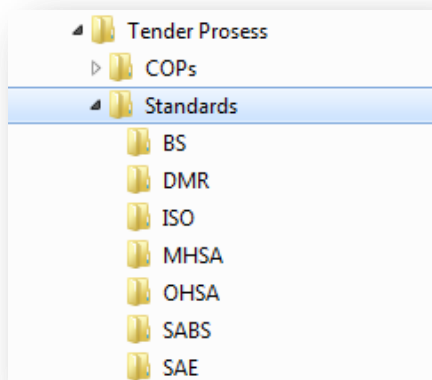


Figure 13 Folder structure for Standards

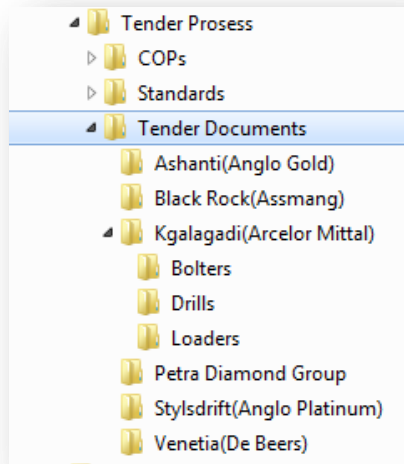


Figure 14 Folder structure for Tender Documents

4.4.2 Database

During the course of the project it has been considered to have the IT team build a database within the scope of the bigger project. The database is to be used during the tender proses and it will be more interactive between the users. Owing to the fact that it is part of the original scope of the project, a DMS was still chosen during the information analysis phase for theoretical purpose. The database will have the same basic features, and more, that were required in the DMS.

4.4.3 Instructions

It was not possible to create an instruction manual for using and updating the information during the tender process. This was due to the fact that a DMS will not be implemented anymore and a database only constructed at a later stage.

After completion of the database, an instruction manual should be compiled and include the following:

- Where and how to access the information
- How to update the information
- What properties should be added to the documents, for example a tender document will have: Creator, Revision, Mining House, Mine etc.
- How to add security/access rights to the documents
- How to set reminders for notifications to do updates
- How to send notifications to other users
- Etc.

4.5 Improve and monitor process continuously / Update information continuously

A Code of practice is to be seen as a living document reflecting best practice. As processes and technology change and incidents occur a COP will be altered to incorporate the changes.

The same goes for standards and legal requirements. Laws are constantly being added and amended to be relevant to the current state of operations.

As soon as one is made aware of any significant changes it should be added to the collection of documents and information being used for compiling a tender/proposal document. In doing so one can ensure Sandvik will meet the minimum requirements legally and simultaneously satisfy customer requirements.

To keep the information up to date the following will need to be done

- Annually request the latest revision COP from each mine
- Load every new tender/proposal on the central data store with the prescribed folder structure
- Keep informed of any amendments to standards bought so that the amendments can be added to the collection
- As one becomes aware of more applicable standards it should be added to the collection

After all the information has been stored and organised and made available to all the users there will be looked at creating a more interactive database containing all the information.

Conclusion

By considering the project and the implication of the changes to be made to the tender process (which can be summarised by: collecting and organising the documents and information necessary for the compilation of a tender/proposal as well as structuring a storage/retrieval/updating methodology for the documentation) it is evident that the time and effort to compile a tender /proposal will be significantly reduced.

Owing to the fact that all requirements during a tender/proposal will be considered more thoroughly, Sandvik will benefit from the changes and additions to the system/process in the following ways:

- Sandvik will be covered legally with regards to any projects they are working on, due to the fact that all standards and legislative requirements are taken into account
- Sandvik will have an increase in customer satisfaction by having a better understanding of customer requirements
- The quality, accuracy and timeliness of completing tenders/proposals will improve because the time and effort needed to gather the information required for a tender/proposal will be minimised by having the majority of the information available and accessible

After meeting with the team compiling/completing the tender documents it was determined that it currently takes up to 5-6 weeks to complete a single tender. It was concluded that the required time can be minimised to 2-3 weeks in an optimal situation where all the information needed was readily available and less correspondence between Sandvik and the customer is necessary.

I therefore propose these changes as a suitable means of improving the functioning of this process within Sandvik Mining and Construction – Jetpark.

Appendices

Appendix A – COP Consolidation

Consolidation and extraction of information from COP documents

The following information pertains to requirements stipulated in the codes of practice of a few mines in Sandvik's client base with regards to TMM (Trackless Mobile Machinery).

The requirements are listed under sections similar to those categorised in the guideline for compiling a COP on trackless mobile machinery as required by the DME (Department of Minerals and Energy).

The sections are as follow:

1. Brakes
2. Protection of operator
3. Inadvertent movement of TMM
4. Safe boarding/ alighting and/or access to/exit from TMM
5. Design and operation of tow-bars and coupling devices
6. Lights fitted to TMM
7. Physical constraints to operator's/driver's vision
8. Remote controlled TMMs
9. Maintenance
10. Health and safety devices on TMM
11. Visibility of TMM and persons
12. Warning devices and signals
13. Safe height, width and turning circle clearances
14. Visual or Audible signals/signs

All requirements listed are common requirements extracted from the various COP documents and should be included to the SAS (South African Specifications).

1. Brakes

- Every TMM shall be fitted with a service brake, park brake and emergency brake
- Every TMM shall be fitted with a fail-to-safe braking system which has spring applied hydraulic release
- When the service and park brakes are combined, the braking system should comply with the requirements of both systems
- When the park and emergency brakes are combined, the braking system should comply with the requirements of both systems
- When the service, park and emergency brakes are combined, the braking system should comply with the requirements of each system and a fail-to-safe principle employed
- OEM manual should specify maintenance procedures and intervals
- Before commissioning a break test should be conducted as per SANS 3450 test procedures
- A brake test certificate should be supplied to the client

2. Protection of operator

- Every TMM shall be fitted with a safety belt for the driver and each passenger
- There should be a safety belt light.
- Every TMM shall be fitted with a ROPS (Roll-Over Protective Structure) meeting the following requirements:
 - Complying with SABS 1563
 - Prevent limbs from being extended outside
- Every TMM shall be fitted with a FOPS (Falling-Object Protective Structure) which complies with SANS 3449
- All moving parts shall be sufficiently covered
- If the TMM was designed with FOBS and ROPS it should be labelled with the following:
 - The ROPS or FOPS serial number
 - Vehicle weight
 - Approval numbers
 - Model number and Engine model and serial numbers

3. Inadvertent movement of TMM

- All TMM shall be fitted with a lock-out switch

4. Save boarding/ alighting and/or access to/exit from TMM

- Alternative exit where platform is higher than 3m above ground level
- Boarding/ exit surfaces should be slip resistant
- Sufficient legroom provided for boarding/ exit
- Height from roadway to first step should be practicable to reach
- Height of lowest handhold should be practicable to reach
- Circumference of handhold should allow for a fully closed grasp
- Doors and latches should be easy to reach
- Accidental operation of controls should not be possible
- Handrails should be fitted to working surface on TMM more than 1.5m above ground level

5. Design and operation of tow-bars and coupling devices

- Methods and procedures for towing between TMMs should be provided by the OEM
- Coupling devices should be provided/ approved by the OEM
- OEM shall specify the ratio of the mass of the towing vehicle in relation to the mass of the towed vehicle

6. Lights fitted to TMM

- Lights should be sufficient to illuminate the FLOOR at least 5 m in front of the TMM
- Lights should illuminate at 20lux and at least 20m in the direction of travel
- Minimum of 2 lights on the front/rear-Direction of travel
- The lights will have the following colouring:
 - Red rear/brake/warning lights
 - White front lights
 - Yellow indicator lights
- Front and rear lights should be on the furthest corners to indicate the width of the TMM
- Alignment should be easy to adjust
- The bucket load should not obstruct headlight output
- Reflectors/ yellow reflective tape should be attached to the front rear and sides

- There should be a green light indicating the driver's side
- There should be a red light indicating the driver's blind side
- All lighting shall be SABS approved
- TMMs shall be fitted with a revolving light to warn when approached from the side

7. Physical constraints to operator's/driver's vision

- The OEM shall provide sight line diagrams/visibility diagrams for all TMMs. The diagram shall provide for a height of 1.5m and 7m radius or more to encompass the machine.

8. Remote controlled TMMs

- Remote controlled TMMs should be fitted with a device clearly signalling its activation
- The OEM should design the remote controlled TMM with a operation radius of 30m unless otherwise recommended

9. Maintenance

- OEM shall supply maintenance and repair manuals to the client
- OEM should supply recommended maintenance and service procedures and intervals

10. Health and safety devices on TMM

- Every TMM shall be fitted with a fire suppression system
- Every TMM shall be fitted with a fire extinguisher
- OEM should design seats (suspension seats) ergonomically to minimize vibration
- The TMM design should comply to noise regulations
- TMMs should be fitted with a noise attenuation device on the exhaust
- TMMs should have dead man joystick control (form off fail-safe in case of operator incapacitation)
- All TMMs shall have an EMERGENCY STOP
- OEM shall provide an operating manual

11. Visibility of TMM and persons

- TMMs should be painted a light colour for higher visibility
- All TMMs should be fitted with PDS (Personnel Detection System)/ VDS (Vehicle Detection System)

12. Warning devices and signals

- TMMs shall have an automatic reverse warning alarm
- TMMs shall have an automatic start-up/ set-in-motion alarm
- TMMs should be fitted with a flashing strobe light
- All TMMs should have a hooter
- There should be a sign on all TMMs carrying passengers indication the maximum number of passengers allowed
- TMMs should have an engine protection system
- TMMs should not be able to start before safety belt is fastened
- TMMs should have a siren indicating a disengaged safety belt
- TMMs should be equipped with two red emergency triangles

13. Safe height, width and turning circle clearances

- OEM should design and specify safe height, width and turning clearances for all TMMs allowing 0.5m between TMM and side walls, 0.5m between TMM and the roof, 0.5 m from the tipping point and 10 degrees around the corners

14. Visual or Audible signals/signs

- All controls shall be marked with function and direction of operation
- All gauges shall be labelled
- All major components shall be marked with lifting points and weights for transportation
- Emergency stop buttons shall be red
- Colour codes should be adopted: red – danger/emergency; amber – caution/abnormal; green – safe/normal; blue – mandatory significance
- Audible signals should exceed background noise by a minimum of 10 dB

Appendix B – List of Standards

List of Applicable Standards

SABS Standards from COPs, tenders and SABS catalogue

Braking

- **SANS 1589** - The braking performance of trackless underground mining vehicles - Load haul dumpers and dump trucks
- **SANS 1447** - Trailer brakes
- **SANS 3450** - Earth-moving machinery - Braking systems of rubber-tyred machines - Systems and performance requirements and test procedures
- **SANS 255** - Earth-moving machinery - Crawler machines - Performance requirements and test procedures for braking systems

Lighting

- **SANS 20004** - Uniform provisions concerning the approval of devices for the illumination of rear registration plates of power-driven vehicles and their trailers
- **SANS 20074** - Uniform provisions concerning the approval of category L1 vehicles with regard to the installation of lighting and light-signalling devices
- **SANS 20048** - Uniform provisions concerning the approval of vehicles with regard to the installation of lighting and light-signalling devices
- **SANS 12509** - Earth-moving machinery - Lighting, signalling and marking lights, and reflex-reflector devices
- **SANS 20053** - Uniform provisions concerning the approval of category L3 vehicles with regard to the installation of lighting and light-signalling devices

Protection & Safety

- **SANS 6683** - Earth-moving machinery - Seat belts and seat belt anchorages - Performance requirements and tests
- **SANS 1564** - Strength of seats and their anchorage's of large passenger busses
- **SANS 1429** - Motor Vehicle Safety Specification for strength of Seat belts
- **SANS 1430** - Motor Vehicle Safety Specification for anchorage's for restraining devices in motor vehicle
- **SANS 1563** - (ISO347: 1994 & ISO3449: 2005) The strength of large passenger vehicle superstructures (roll over protection)

- [SANS 3471](#) - Earth-moving machinery - Roll-over protective structures - Laboratory tests and performance requirements
- [SANS 3449](#) - Earth-moving machinery - Falling-object protective structures - Laboratory tests and performance requirements
- [SANS 20474-1](#) - Earth-moving machinery - Safety Part 1: General requirements
- [SANS 20474-2](#) - Earth-moving machinery - Safety Part 2: Requirements for tractor-dozers
- [SANS 20474-3](#) - Earth-moving machinery - Safety Part 3: Requirements for loaders
- [SANS 20474-4](#) - Earth-moving machinery - Safety Part 4: Requirements for backhoe loaders
- [SANS 20474-5](#) - Earth-moving machinery - Safety Part 5: Requirements for hydraulic excavators
- [SANS 20474-6](#) - Earth-moving machinery - Safety Part 6: Requirements for dumpers
- [SANS 20474-7](#) - Earth-moving machinery - Safety Part 7: Requirements for scrapers
- [SANS 20474-8](#) - Earth-moving machinery - Safety Part 8: Requirements for graders
- [SANS 20474-9](#) - Earth-moving machinery - Safety Part 9: Requirements for pipe layers
- [SANS 20474-10](#) - Earth-moving machinery - Safety Part 10: Requirements for trenchers
- [SANS 20474-11](#) - Earth-moving machinery - Safety Part 11: Requirements for earth and landfill compactors
- [SANS 20474-12](#) - Earth-moving machinery - Safety Part 12: Requirements for cable excavators
- [SANS 20474-13](#) - Earth-moving machinery - Safety Part 13: Requirements for rollers
- [SANS 20474-14](#) - Earth-moving machinery - Safety Part 14: Information on national and regional provisions

General

- [SANS 2867](#) - Earth-moving machinery - Access systems
- [SANS 2860](#) - Earth-moving machinery - Minimum access dimensions
- [SANS 261](#) - Earth-moving machinery - Basic types - Identification and terms and definitions
- [SANS 259](#) - Earth-moving machinery - Operator's field of view - Test method and performance criteria
- [SANS 765](#) - Off-the-road (OTR) tyres - Earth-moving tyres for earth-moving machinery - Repairs and retreading
- [SANS 254](#) - Earth-moving machinery - Rubber-tyred machines - Steering requirements
- [SANS 10968](#) - Earth-moving machinery - Operator's controls
- [SANS 868-1-1](#) - Compression-ignition engine systems-Basic explosion protected engines
- [SANS 868-1-2](#) - Compression-ignition engine systems- Explosion protected engine systems

- **SANS 868-1-3** - Compression-ignition engine systems- Machines
- **SANS 16714** - Earth-moving machinery - Recyclability and recoverability - Terminology and calculation method
- **SANS 1550** - Motor vehicle and rims
- **SANS 10205** - The measurement of noise emitted by motor vehicles in motion

ISO standards from COPs

- **ISO 2631** - Evaluation of human exposure to vibration
- **ISO 3411** - Earth moving machinery- Human physical dimensions of operators etc.
- **ISO 3471** - Earth moving machinery- ROPS- Laboratory tests and performance requirements
- **ISO 6683** - Earth moving machinery- Seat belts and seat belts anchorages
- **ISO 9249** - Net engine power

SAE standards from Tenders

- **SAE J38** - Lift arm support device for loaders
- **SAE J209** - Instrumentation face design and location for construction and industrial equipment
- **SAE J276** - Steering frame lock for articulated loaders and tractors
- **SAE J731** - Component nomenclature for loaders
- **SAE J732** - Specification definitions for front end loaders
- **SAE J742** - Capacity rating for loader bucket
- **SAE J898** - Control locations for Off-Road Work Machines
- **SAE J950** - Gradeability test code

STANDARDS NOT DIRECTLY RELATED
GENERAL
SANS 1507- Electric Cables
SANS 1222 - Enclosure for electrical equipment
BSS 162- Electric Power Switchgear
IEC60056- High Voltage Switchgear
IEC 60947- Low Voltage Switch- and Control gear

SANS 1091- Colour code

BS 7608 1993- Code of practice for fatigue design and assessment of steel structures.

BS ISO 1940-1- Mechanical Vibration - Balance quality requirements for rotors in a constant (rigid) State - Part 1: Specification and verification of balance tolerances.

SANS 1700- Fasteners

SANS 10094- The use of High Strength Friction Grip Bolts

SANS 1143 Mushroom and Countersunk Head and Nuts

CAST AND WROUGHT IRONS

SANS 1034- Grey Iron Castings.

SANS 1465-1- Carbon & low alloy steel castings

SANS 1465-2- Wear resistant carbon & low alloy steel castings.

SANS 1465-3- Corrosion – resistance & Heat resistance steel.

SANS 936- Spheroidal Graphite Iron Castings.

SANS 937- Austenitic Spheroidal Graphite Iron Castings.

BS EN 1561 - Founding Grey Cast Irons.

BS EN 1563- Founding. Spheroidal Graphite Cast Iron

NON-FERROUS METALS

SANS 200- Copper alloy ingots and castings.

SANS 991- Aluminium and Aluminium alloy sand castings and gravity die castings.

SANS 992- Aluminium and Aluminium alloy pressure die castings.

SANS 1303-1- Chemical composition of copper – zinc alloys (non-leaded & leaded)

BS EN 1559-4- Founding. Technical conditions of delivery. Additional requirements for aluminium alloy castings

BS EN 12420- Copper and copper alloys. Forgings.

BS EN 12163- Copper and copper alloys. Rod for general purposes.

BS EN 12164- Copper and copper alloys. Rod for free machining purposes.

BS EN 12165- Copper and copper alloys. Wrought and unwrought forging stock.

BS EN 12167- Copper and copper alloys. Profiles and rectangular bar for general purposes.

BS 3332- Specification for white metal bearing alloy ingots.

BS EN 12420-Copper and copper alloys. Forgings.

BS EN 1676- Aluminium and aluminium alloys. Alloyed ingots for remelting. Specifications.

BS EN 1706- Aluminium and aluminium alloys. Castings. Chemical composition and mechanical properties.

BS EN 1559-1- Founding. Technical conditions of delivery. General.

BS EN 1559-2- Founding. Technical conditions of delivery. Additional requirements for steel castings.

BS EN 1559-3- Founding. Technical conditions of delivery. Additional requirements for iron castings.

BS EN 1559-4- Founding. Technical conditions of delivery. Additional requirements for aluminium alloy castings.

BS EN 1559-5- Founding. Technical conditions of delivery. Additional requirements for magnesium alloy castings.

BS EN 1559-6- Founding. Technical conditions of delivery. Additional requirements for zinc alloy castings

STEEL

SANS 10162-1- Limit state design of hot rolled steelwork.

SANS 10162-2- Limit state design of cold formed steelwork.

SANS 10162-4- The design of cold formed stainless steel structural members.

BS 4 – Part 1- Structural steel sections, specification.

BS EN 10250-2- Open steel die forgings for general engineering purposes – Non alloy quality and special tools.

BS EN 10162- Cold rolled sections. Technical delivery conditions. Dimensional and cross sectional tolerances.

BS EN 10293- Steel castings for general Engineering Uses.

BS 7668- Weldable Structural steel. Hot finished structural hollow sections in corrosion resistant steel Specification.

B SEN 10056-1- Specification for structural steel equal & Unequal angles – Dimensions.

BS EN 10029- Specification for tolerances on dimensions, shape & mass for hot rolled. Steel plates 3 mm thick & above.

BS EN 10025-1- Hot rolled products of structural steels. General technical delivery conditions.

BS EN 10025-2- Hot rolled products of structural steels. Technical delivery conditions for non-alloy structural steels.

BS EN 10025-3- Hot rolled products of structural steels. Technical delivery conditions for

normalized / normalized rolled weldable fine grain structural steels.

BS EN 10025-4- Hot rolled products of structural steels. Technical delivery conditions for thermo-mechanical rolled weldable fine grain structural steels.

BS EN 10025-5- Hot rolled products of structural steels. Technical delivery conditions for structural steels with improved atmospheric corrosion resistance.

BS EN 10025-6- Hot rolled products of structural steels. Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition.

BS EN 10210-1- Hot finished structural hollow sections of non-alloy and fine grain steels. Technical delivery requirements.

BS EN 10210-2- Hot finished structural hollow sections of non-alloy and fine grain steels. Tolerances, dimensions and sectional properties.

Appendix C

Table 4 List of mines and contact numbers

MINE	CONTACT
SAMANCOR	0132307000/94
X-STRATA	H.O 0145906000
ANGLO PLAT	0115353600
ANGLO GOLD	0116376000
LONMIN	0112188310
IMPALA	0145690000(Rustenburg) 0132146000(Marula)
GOLD FIELDS	0115629700
CONTRACTORS	
M&R (Cementation)	0112015000
AQUARIUS	0112015000
DE BEERS	0538394111
HARMONY GOLD	0114112000
EXXARO	0123075000
ASSMANG	0117791000
RIDGE MINING	0116561140
GREAT BASIN GOLD(Southgold Expl)	011 301 1800
Petra Diamond Group	0117026900
NAMIBIA	
AFRICAN RAINBOW MINERALS	Procurement 011 7791223 HO 0117791300
EASTERN PLATS	0114630090
BARBROOK MINES	0114472499
BOTSWANA	
RIO TINTO	
BEYER CHROME	
BAR PLATS	
MVELAPHANDA	0113255323
Phokathaba	0117065333
URANIUM ONE	0114653772
GOLD 1	0117307600(Modder east)

FIRST URANIUM	
Lace Diamond Mine	0562122318
PHAMADOZI	
BHP	
Sino Steel	0116666050
Central Rand Gold	0873104400
Hernic	0123811100
JIC Mining	0113153789
AGA	
DRA	0112028600
Vantage Goldfields	0137533046
Palabora Mine	0157802911
Grinaker	0115786161
Gold One	
ACM	Tenille Vestey 0893223488
Arcelor Mittal	0168899111
Other	
Group 5	HO 0118060111
ByrneCut International	

Appendix D

Table 5 Spread Sheet for COP Consolidation

COP Aspects	X-STRATA	ANGLO PLAT	Bathopele	Bafokeng Rasimone	LONMIN	Lonmin Hossy	Marikana	CONTRACTORS	M&R (Cementation)	HARMONY GOLD	Target	GREAT BASIN GOLD	Burnstone	RIO TINTO	Phalaborwa Mining Corporation
		Eland Plats													
		x		x	x		x	x		x			x		x
Brakes															
Service, park and emergency		x		x				x		x			x		x
Separate service and park		x									x				
fail-to-safe					x										
Spring applied hydraulic release					x								x		
Testing std							x								
Perform tets proc							x						x		
Perform dynamic test on UG TMM proc							x								
Pre-use checklist							x								
OEM catalogue		x		x	x				x				x		x
Service, park combined comply to both req													x		
Park and emergency combined comply to both req		x		x					x						x
Service, park and emergency combined comply to all req		x							x				x		x
OEM test certificate required		x											x		
SIMRET brake test		x							x						
Protection of operator															
Canopy unless permission otherwise								x		x			x		
ROPS		x		x				x		x			x		x
(SANS Specification 1563: 1992 (ISO347: 1994 & ISO3449: 2005))								x							x
SANS 3471:2003.		x													x
Prevent limbs from being extended outside		x		x				x		x					
FOPS		x		x				x		x			x		x
Labelled if designed with FOPS+ROPS															
The ROPS or FOPS serial number														x	
vehicle weights														x	
approval numbers														x	
model number and engine model and serial numbers														x	
Safety belt		x		x	x			x		x			x		
safety belt light		x													
Personnel/collision avoidance system								x							
Cover- Moving parts					x										
Inadvertent movement of TMM															
Lockout switch		x		x	x			x					x		x
Safe boarding/alighting and/or access to/exit from TMM															
Alt exit if operator platform is 3m above GL(Preferably if 2m+)								x							
Boarding/exit surfaces slip resistant								x						x	
sufficient legroom for access/exit														x	
sufficient height from floor to canopy for easy access/exit														x	
height from roadway to first step practicable to reach														x	
height of lowest handhold within practicable reach														x	
Fully closed grasp on handhelds														x	
Doors and latches easy to reach														x	
Accidental operation of controls not possible														x	
working surfaces 1.5m above ground- handrails															
Design and operation of tow-bars and coupling devices															
The methods and procedures to be used for safe coupling, towing / pushing and de-coupling of TMMs		x						ref		x					
The ratio of mass of the towing vehicle in relation to the mass of the towed vehicle		x		x				ref					x		
Supplied by OEM		x								x					x
equally matched		x		x						x			x		
combined braking power		x						ref		x			x		
Lights fitted to TMM															
illuminate floor/sides at least 5m in front								x	x						
vehicle painted light colour for visibility								x	x						
min 2 lights at rear/front- direction of travel		x		x	x					x			x		x
OEM specify alternatives															
10Lux, 20 m in direction of travel		x		x	x			x	x				x		x
red brake warning lights(rear)								x	x				x		x
spotlight+service lights in all directins								x	x				x		x
White- front					x			x	x				x		x
Red -rear					x			x	x				x		x
Yellow- indicators					x			x	x						x

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