

GRADUATION PROJECT

Appendices

An improved Preventive Maintenance process



Jorick Machiel de Vries
June 2016
Version 2.0
HZ University of Applied Sciences
Shell Nederland Raffinaderij B.V.

Appendices

This is separated document that serves as a collection of all appendices. These appendices belong to the research report of the graduation project.

Contents

Appendices.....	2
Appendix 1 – Plot map Shell Pernis	4
Appendix 2 – GAME contents	5
Appendix 3 – Maintenance Strategy model	6
Appendix 4 – Steps to understand an As-Is process	7
Appendix 5 – Steps to design a To-Be process	8
Appendix 6 – PM Maturity matrix	9
Appendix 7 – Report of Improvements; From As-Is process to To-Be process	11
Appendix 8 – Implementation report	35
Appendix 9 – Manual of the Living Program tool (NL).....	49
Appendix 10 – Preventive Maintenance process Work Instruction (NL).....	70
Appendix 11 – Project logbook on problems/obstacles	81
Appendix 12 – Workshop for Preventive Planners	83
Appendix 13 – Presentation to Maintenance Supervisors	92

Appendix 1 – Plot map Shell Pernis

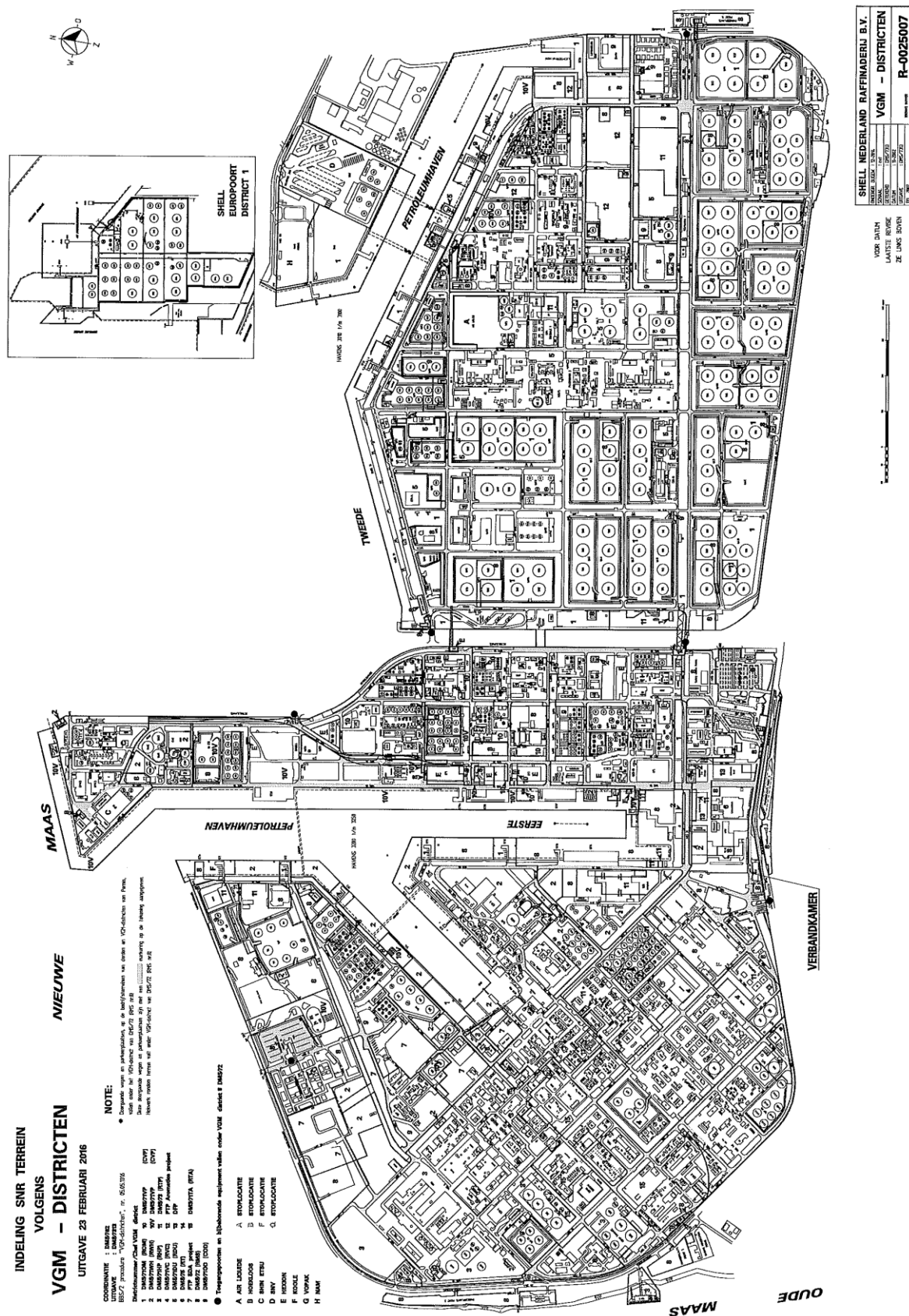


Figure 1. Plot plan Shell Pernis

Appendix 2 – GAME contents

Within Shell Global a program was created to improve the asset management performances of all Shell sites. This program is called GAME which stands for Global Asset Management Excellence. This program can be divided into eight processes:

GLOBAL ASSET MANAGEMENT EXCELLENCE	
AIM	Documentation management system
OTM	Continuously monitoring equipment
ESP	Determining operation windows, parameters and alarm rate settings
IPF	Instrumentations Preventive Functions
RCM	Reliability-Centered Maintenance
EI	Equipment Integrity (Risk Based Inspections)
TA	Turn Around, efficient execution of stops
ME	Maintenance Execution, the process of controlling equipment risks

Table 1. Contents of GAME (Brands, 2013)

Appendix 3 – Maintenance Strategy model



Figure 2. Maintenance Strategy model (Márquez, 2007)

Appendix 4 – Steps to understand an As-Is process

Building a team;

To start off, we should identify all participants of the relevant organizational units and areas. Where “relevant” means they play a role in the AS-IS process, or directly depend on it in a significant way. Very important in building an AS-IS process is to inform the team about all aspects of the project; Being background, the goal (well-explained), approach of the research and his/her contribution of all participants.

Organizing and initiating the modelling session;

For me, being the researcher, it is important to initiate and organize the project. That means that sessions/interviews with the participants are planned and hosted by me. During a session/interview we will try to extract and summarize key points from the charter and process frame: event, result, key actors, milestones, relevance to mission, strategy and goals. Subsequently, let a participant describe the problem, business imperative, and goals.

Getting started by building the handoff (level 1) model;

For all sessions with different participants the researcher should make workflow sketches to ensure that multiple perspectives are assessed. Start with the initiating event and proceed by putting a cloud for all events in that actor’s swim lane. Why a cloud? To show that we are intentionally keeping it vague right now. It correctly implies it’s nebulous and imprecise. After every event ask the question: “Who gets the work next?” Repeat this until the process is finished according to the participant.

Adding detail with a flow (level 2) model;

The next step is to find missing details which are not revealed so far. The most effective way to do this is to review each step in the swim lane diagram, one by one, and ask each of five specific questions about it. Those five questions are:

What makes it go?

This shows required preconditions or triggers for each event of the process

Is anyone else involved?

This shows if a single-actor event is truly performed by one actor. Next to that, it discovers the client, supplier and, eventually, a service provider.

“Does the name of the step accurately convey the result?”

The purpose of this question is to ensure that there really is a legitimate step, the participants agree on what the outcome of that step is, and that the name conveys the result.

“Are all outcomes shown?”

To avoid that one neglects to show that there are two or more possible outcomes and to avoid that one misses a parallel flow line.

“How does it get there?”

This question uncovers missed actors (intermediaries or transport mechanisms).

Developing a task (level 3) model, and even doing some task analysis if the situation warrants it;

Too much detail in one diagram is useless. It can actually be harmful, since the finer the level of detail, the more variation there will be. Even if it is irrelevant, there will be a temptation to show it, creating a vicious cycle. Thus, it is important to stop before you slip into modeling useless detail. After detail level 1 and 2 ask the question: “Do we really need to add more detail?” In general, stop when you understand why the process behaves the way it does.

(Sharp & McDermott, 2009)

Appendix 5 – Steps to design a To-Be process

1. Post and review key materials from previous phases

As first, we should go along the materials delivered during the phase of determining the AS-IS process. In that way we make sure that the same process vision and goals are covered, to ensure we focus on the right things. In particular, the facets of the process that must be improved to satisfy the key stakeholders.

2. Collect ideas

Begin with the major structural elements—the “bones”—we are after the central features of the new process. The details can be worked out later on when we develop the To-Be workflow and the mechanics of individual tasks. We’re not just gathering new ideas—we will also identify aspects of the current process to consider retaining. Finally, it’s extremely important to remind participants not to judge the ideas while collecting them. The ideas will be assessed in a separate step.

3. Bring forward ideas generated during assessment

During the interviews/sessions the participants should provide suggestions on revisions or extensions, or capturing new ideas that they inspire. We do this because suggestions evolve, often unconsciously, during the downtime between sessions.

4. Steal ideas by reviewing best practices

A common situation is that one organization contains multiple parallel departments. Within those organizations it often occurs that a process is not uniformly applied. Therefore when assessing several of those departments by interviewing their participants we could extract the best practices and learn from them. Those best practices can significantly contribute to the TO-BE process.

5. Brainstorming

Let all participants brainstorm and let them hand in a list of ideas in a period of time. This works because judgment is specifically held until a later moment. Without the fear of immediate criticism, participants are more likely to join in and make suggestions. Many believe that brainstorming works because the human brain can’t effectively be creative and critical at the same time.

6. Develop ideal To-Be workflow

By ideal we mean a TO-BE workflow that is applied in an ideal world where resources are unlimited and technology is completely developed. This might be getting science-fictional but it could provide new insight or perspectives where we would never have thought of.

7. Develop To-Be workflow

In fact we approach this last step as we did in the AS-IS phase. So in short we develop three models where ultimately the last one is our key deliverable: The TO-BE process workflow

- Handoff (level 1) shows contiguous activities by the same performer;
- Milestone (level 2) adds significant milestones;
- Logic/Task (level 3) adds individual tasks and more indication of “how.”

(Sharp & McDermott, 2009)

Appendix 6 – PM Maturity matrix

Elements		LEVEL 1 NOT ENGAGED	LEVEL 2 EXPERIMENTING	LEVEL 3 ENLIGHTENED	LEVEL 4 GOOD PRACTICE	LEVEL 5 BEST PRACTICE
PM MATURITY ELEMENTS	PM Workflow Process Maps	No Process Maps exist	Process Maps developed for 20% of the Proactive Workflow Model	Process Maps developed for 50% of the Proactive Workflow Model	Process Maps developed for 80% of the Proactive Workflow Model	Process Maps developed for 100% of the Proactive Workflow Model with RACI charts and step descriptions
	Equipment Catalog	Does not meet any standard	20% of assets completed to standard	50% of assets completed to standard	100% of assets completed to standard	Database meets and exceeds ISO 14224 and validated by an outside organization
	Criticality Assessment	No formal Criticality Assessment performed	Informal Criticality Assessment performed (little or no granularity)	Formal Criticality Assessment performed (good granularity)	Good granularity, could be used to identify asset coverage and work priority	Good granularity, could be used to identify asset coverage and work priority
	Expectations	No PMs are based on Failure Modes	MTBF trending upward on 60% of equipment	PM Evaluation performed on top 10% of assets and PMs developed based on Failure Modes	Enable Proactive Workflow Model	Prevention of failure is the #1 goal
	Employee Certifications and Qualifications	Nothing formal	A full-time lubricator (Best Maint Tech) has been identified and has started training	Level I certification with written practices - MTBF of lubricated equipment begins	Level II certification with written practices	Certifications plus task qualification
	Standards and Controls	Nothing formal	None found, Lube Program has standards and controls	Some basic database standards created with controlled input	Standards created with controls to monitor, formal workflows exist	Advanced standards created and MOC process used for changes
	Alarming Methods	Nothing formal	No operator alarms are used to identify failure modes	Alarms present, but are generic or overall alarms	Alarms present, both standard and statistical	Alarms present, both standard and statistical, with review process
	Missed Opportunity / Investment	Limited and informal RCA	RCA only when prompted, informal in nature	RCA only required on high profile failures	RCA activity based on good triggers (e.g. Criticality)	RCA on failures of all monitored equipment
	PM Procedures	None found with steps, standards, and specifications	Operator Checks are in place - coordination and response successful	Repeatable PMs are written based on specific failure modes on top 10% of assets	Effective PM Procedures are written based specific failure modes on 50% of assets	Task Qualification for all personnel who perform PM, operators and maintainers - 100% coverage of critical assets
	Technology Integration	None	Operator Checks developed	PDAs for Operator Rounds implemented	PDAs for Maintenance personnel implemented	Fully integrated (database)
	Operations Involvement	None	Some buy-in on Operator Checks but not totally successful	Some buy-in, looking at PM metrics but not utilizing	Good integration, reviewing Asset Health, understand importance	Fully integrated, operations accountable for reliability efforts
SUPPORTING WORKFLOW ELEMENTS	PM Compliance using 10% Rule	Cannot measure - PM Program is not functional	More than 20% of PMs are measured to standard	More than 50% of PMs are measured to standard	100% of PMs are measured to standard	FRACAS in place to modify PMs based on this reporting process
	Work Order Creation	No PM work orders created, informal rounds are established	PM Procedure standard developed and implemented on 5% of assets	Most PM findings generate work orders	All PM findings generate work orders	All PM findings generate work orders and are reviewed for proper close out 100%
	Planning and Scheduling	Nothing formal	Planner/Schedulers in position	Planner/Schedulers are training and Task Qualified	Planner/Schedulers planning and scheduling 40% of work	Planning/Scheduling at 100%
	Metrics / Justification	Nothing formal	Possibly tracking production outputs or PM Compliance	Tracking Availability, EM vs. PM Labor Hours (lagging indicators)	10% Rules of PM applied to top 20% of assets (most critical)	Track lagging and leading indicators and take corrective actions
	Resource Allocation	None	Maintenance Techs inspect and repair equipment	Dedicated personnel are dedicated to PM; all PMs have written instructions	Maintenance personnel who perform PM are task qualified to execute to standard	Dedicated resources, multi-discipline trained to increase effectiveness
	Requalification / Commissioning	None	Spot check based on request	Quantitative and qualitative procedures in place	All equipment failure modes have been identified with maintenance strategy applied	Completed to established criteria (e.g. all equipment in PdM Program)
Continued on back...						

Figure 3. PM; Maturity matrix (Smith, 2012)

Continued

Elements		LEVEL 1 NOT ENGAGED	LEVEL 2 EXPERIMENTING	LEVEL 3 ENLIGHTENED	LEVEL 4 GOOD PRACTICE	LEVEL 5 BEST PRACTICE
PREVENTIVE MAINTENANCE PROCEDURES	Failure Mode Driven	No PM tasks are mapped to the prevention or detection of a specific failure mode; OEM recommendations are followed with no analysis	A few PM tasks are mapped to the prevention or detection of a specific failure mode; most OEM recommendations are followed	Some PM tasks are mapped to the prevention or detection of a specific failure mode; some OEM recommendations are followed	Most PM tasks are mapped to the prevention or detection of a specific failure mode	All PM tasks are mapped to the prevention or detection of a specific failure mode
	Scheduling Discipline	PMs worked into the schedule where possible	PMs completed within the month they are scheduled; completed within +/-40% of allotted time	PM scheduling occurs +/- 20% of scheduled time and frequency	PM scheduling occurs +/- 10% of scheduled time and frequency	PM scheduling occurs +/-10%/-0% of scheduled time and frequency
	Feedback Mechanism	No feedback from crafts	A few PM procedures have crafts' feedback when returned	Some PM procedures have crafts' feedback when returned; critical feedback is processed by Planner	Most PM procedures have crafts' feedback when returned; most feedback is processed by Planner; feedback process is formalized	All PM procedures have crafts' feedback when returned; all feedback is processed by Planner; feedback process is formalized
	Repeatability	PM details left to the interpretation/skill of the craftsperson	Some PM procedures have detailed task and steps	Most PM procedures have detailed tasks and steps, some have instructions where needed	Most PM procedures have detailed tasks, steps, and instructions to ensure repeatability	All PM procedures have detailed tasks, steps, and instructions to ensure repeatability
	Quantitative Inspections	Some are quantitative, most are not	Most PM tasks require at least one measurement of some kind	Most PM tasks are quantitative with detailed maximum and minimum values	Most PM tasks are quantitative with detailed maximum and minimum values and action items when limits are reached	All PM tasks are quantitative with detailed maximum and minimum values and action items when limits are reached
RESULTS / SCORECARDS	ROI	Unknown - Probability "0"	Minimal to no ROI	4:1	8:1	16:1
	% Failure Maintenance	>70%	>50%	<40%	<25%	<10%
	PM/PdM Balance	100% / None	95% / 5%	85% / 15%	>65% Overall 25% PdM 40% PM	>80% Overall 50% PdM 30% PM
	Asset Health	Not measured	Not measured	Exists on critical assets >65% Green*	Exists on all assets >75% Green	Exists on all assets >90% Green
	Route Adherence	Not measured	<50%	>70%	>85%	>90%
	% Lube and PM Recommendations Implemented	<15%	<30%	>50%	>75%	>90%
	MTBF - Mean Time Between Failure	Not measured	Experimenting on 10% of critical assets	Exists on critical assets >40%	Exists on all assets	Exists on all assets - FRACAS applied
	PM Compliance using the 10% Rule	Not measured	10%	>50%	>85%	>90%
	% PM Recommendations Implemented	<15%	<30%	>50%	>75%	>90%

Figure 4. PM; Maturity matrix *Continued* (Smith, 2012)

Report of Improvement

*Improvement of the preventive maintenance process
From As-Is to To-Be situation*

Contents

1. Preventive maintenance As-Is process
2. Bottlenecks and problems
3. Suggested improvements
4. Preventive maintenance To-Be process
5. Quick wins and plan of implementation

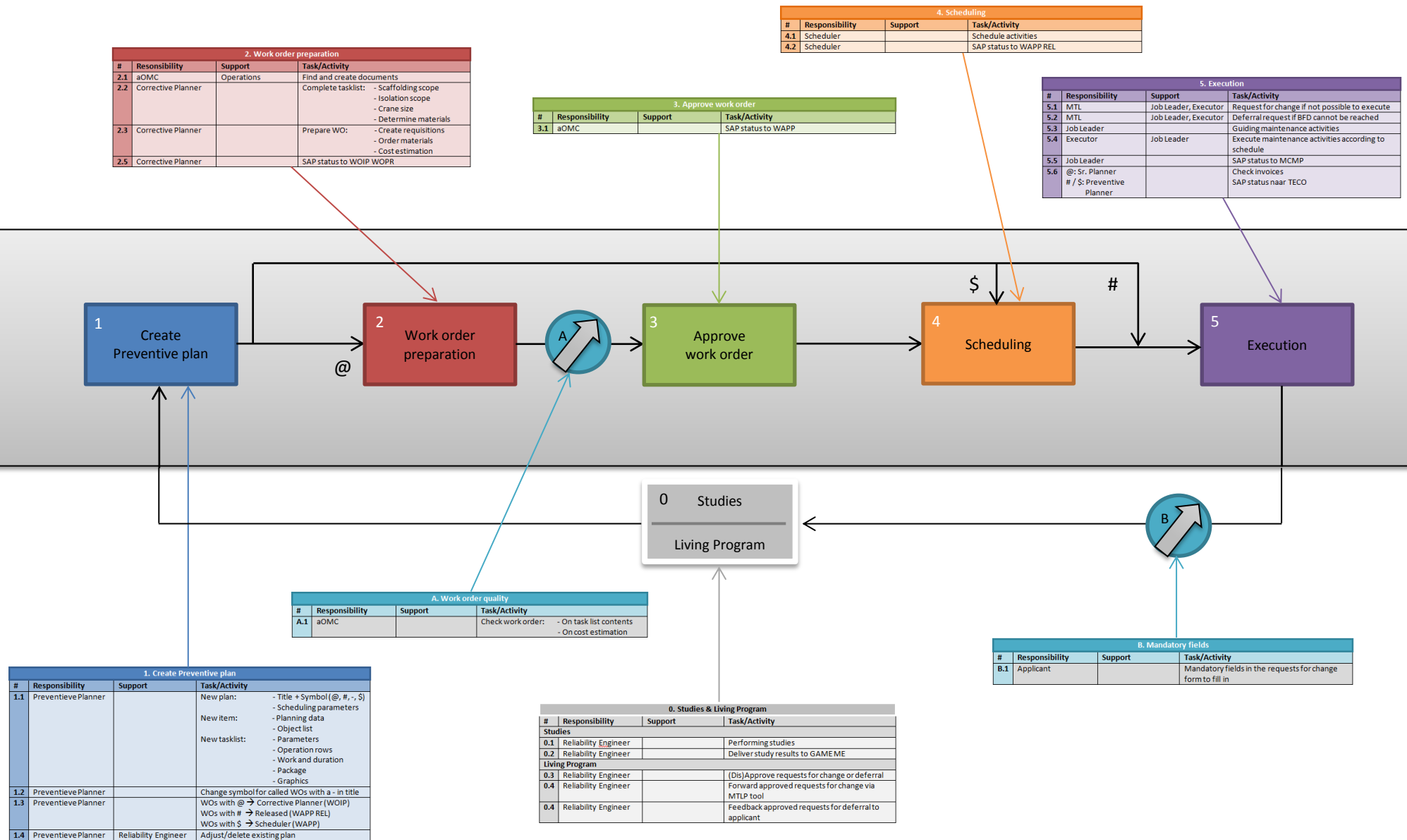
*Developed by Jorick de Vries
May 2016*

1. Preventive maintenance As-Is process

This report is made to wrap up the product of the first part of the research. It contains the new end-to-end process of preventive maintenance to be applied at the Shell Pernis refinery. A research on improvement often starts with describing the current situation to form a basis of knowledge and insight. This so-called As-Is process represents the preventive maintenance process as it is applied currently. However, our research scope contains several departments which almost certainly mean that the preventive maintenance process deviates from one department in respect to another. The As-Is process is therefore built as most common used which provides the opportunity to apply a best practices more accurately in the new To-Be process.

The preventive maintenance process as it is currently applied contains six major steps. Those steps are shown in the graph of the As-Is process workflow with additional task tables attached to it. To support this workflow every step is explained in more detail in the subsequent pages.

Preventive Maintenance process – As-Is



0. Studies

0.1 Performing the study

The process initially starts with an RCM, IPF, HEMP or EI study. Reliability Engineers perform the studies based on literature, laws/regulations, cost calculations and equipment specifications. We will not focus on how this is exactly performed since the studies are not part of the GAME ME program. Since the studies provide the input for the sequel of the preventive maintenance process it is mentioned in the process description.

0.2 Providing study results to PP

The RE of relevance subsequently sends through the results which are tasks to be done and an execution interval to the Preventive Planner by mail.

1. Creation of preventive plans

1.1 Creating a new plan

As soon as the preventive planner receives the mail with a new preventive plan request from the RE a new plan is created in SAP. Every plan contains of one or more items with a task list attached to it. An item is the mechanism that generates work orders twelve weeks before the basic finish date (BFD) and every item contains of a task list.

A preventive maintenance plan in SAP contains of three fields. The plan data, the item data and the task list data.

a. Plan data: Title + Symbol (@, #, \$, -)

The symbol determines what route a work order generated by the plan will follow.

@ The task list of this plan contains a task for a contractor. This means one or more requisitions have to be made so work preparation is required.

The task list of this plan does not contain any tasks for contractors. No work preparation is required.

- Assume that a task list of a maintenance plan contains a task for a contractor with a one year frequency and a task for Shell personnel with a frequency of six months. This means that the odd work order generated by the plan has to be a #, and every even work order a @.

\$ The task list of this plan contains a task for the SBKD. The SBKD is a team of Shell personnel trained both as fire fighters and mechanics for supportive maintenance jobs such as inserting safety flanges to mechanically block equipment.

b. Item data: Planning data and an object list.

c. Task list data: Parameters, operation rows (tasks), work and duration, a package, graphics.

1.2 Determine called work orders

The applied ERP system, SAP, weekly calls all work orders with a BFD <12 weeks from that moment in the night from Tuesday to Wednesday. As explained previously some plans contain a - (stripe) in front of the title. However, when a work order from this specific plan is called it should either be a # or a @ work order. This has to be determined by the Preventive Planner by inspecting the task list of that work order. The SAP status of work orders automatically called by the system is WAPP (Work order Approved)

1.3 Distribute called work orders

A list of work orders, containing a @, # or \$, is now remaining. Those should be distributed throughout the paths drawn in the process chart.

@ SAP status is changed from WAPP to WOIP (Work Order In Process). The Preventive Planner sets up a work map and supplies it to the Corrective Planner of the PU of relevance.

SAP status is changed from WAPP to WAPP REL. This means the Preventive Planner releases the work order so the tasks contained in the work order are automatically scheduled by the system.

\$ SAP status remains WAPP. The Preventive Planner informs the Scheduler about the work order. This mean enables the Scheduler to arrange a suitable execution date with the SBDK.

1.4 Adjustment of existing plans

Besides creating new preventive maintenance plans the Preventive Planner should also adjust existing plans. Those desired changes which could also mean deletion of a plan, are coming from the Living Program which is to be explained in the last part of this explanatory section. However, the RE informs the Preventive Planner by mail with some required adjustments to a specific plan. Those adjustments will be applied to the plan which results in an adjusted work order generated by SAP 12 weeks before the planned BFD.

2. Work order planning and preparation

2.1 Create documents

Documentations have to be attached to a work order. These are supportive documents such as a photo of the location and a P&ID. However, if a preventive maintenance tasks has to be performed on non-operational equipment there are some other required documents which are a separation map, this is a map with instructions on how to take that specific equipment out of operations, a list of flanges which have to be blocked and a product information sheet. These operational documents are made by the aOMC on request of the Corrective Planner. The Corrective Planner scans the documents and stores them as attachment to the work order in SAP.

2.2 Complete task list

As explained the corrective planner receives preventive work orders with a @ in front of the title. If the contractor involved is a contractor for scaffolding or insulation (dis)assembly a field scope has to be made. This includes estimating heights, widths and lengths of the to be (dis)assembled scaffolding or insulation.

2.2 Prepare work order

Preparation of a work order contains of three main things: Creating requisitions, order materials and estimating the costs of the maintenance job. This is all done by the Corrective Planner.

a. Requisition: The requisition is a request or order to do maintenance and is based on the contract and sort of tasks to be performed. The requisition is saved in the work order in SAP. Besides, a job description is written in a word file. Also several required information for the contractor is given such as vendor number, FLOC, name of client, person of contact, date of request and contact details of the (a)OMC, Scheduler, Plant Inspector and Job Leader. This job description is saved in the long text of the relevant task line in the work order in SAP.

b. Order materials: Ordering materials is done in the same way as maintenance activities are requested by making a requisition. The codes and costs for specific materials can be found in SAP. However, it might occur that the required material is not available in SAP. If so, a quotation is sent by the vendor. The order is placed in SAP and will be delivered by the supplier in the proposed warehouse.

c. Cost estimation: The Corrective Planner has to estimate the costs involved. This is done with the help of tools or quick reference cards, both based on contracts. The corrective planner adds requisitions and material costs as the final cost estimate and saves the work order.

2.5 Change SAP status

The Corrective Planner now changes the SAP status to WOIP WOPR (Waiting on Operations) which indicates that the work order has to be approved by the aOMC.

A. Work order quality

A.1 Check work order

a. Task list contents: Next, the (a)OMC checks the contents of the task list. For example; The (a)OMC sees a task which states lubrication of layers of a pump. However, the aOMC knows that for that specific pump no layers need to be lubricated because it is new type of pump. Since the task lists are not standardized but manually typed in the work order there might be some faults in the task list in terms of sequence. Tasks for separating equipment are multiple tasks not standardized and not for everyone clear how to compose. It is likely for faults to occur in such a situation. The (a)OMC therefore performs a check on it.

b. Cost estimation: This is done on gut feeling as comparison of the activities to be performed and the costs attached to it. This is only a brief check if no extreme costs are estimated by for example a type error or miscalculation.

3. Work order approval

3.1 Adjust work order if required

Out of the three previous points some changes and adjustments could be required. The aOMC that noticed the errors or doubts about exactness discusses or adjusts the work order supported by the Corrective Planner.

3.2 Change SAP status

After the change, if required, the aOMC changes the SAP status from WOIP WOPR to WAPP and gives the work map to the scheduler.

4. Scheduling

4.1 Scheduling of tasks

The scheduler receives work orders labelled as @ and \$. This means the tasks included have to be scheduled as last part of the pre-maintenance phase. The scheduler agrees upon a date with the SBKD for \$ work orders and schedules all tasks of both \$ and @ work orders.

4.2 Change SAP status

If all tasks are scheduled and saved in the Primavera software the scheduler releases the work orders by changing the SAP statuses from WAPP to WAPP REL. Now all types of work orders have been released and are ready for execution.

5. Maintenance execution

5.1 Request for change

During the start-up of the maintenance activities some problems might be faced. Those obstacles could make the work unable to be performed. Examples are scaffolding or insulation is not (dis)assembled, equipment is still in operation while it the maintenance tasks requires non-operational equipment. If this is the case, the Job Leader firstly asks the Corrective Planner or aOMC, dependent on what the obstacle is, to solve the problem so the maintenance can be performed anyway. If the obstacle is regarding the contents of the maintenance job such as cleaning a filter which already appeared clean when opening, the MTL or Job Leader makes a request for change of the maintenance plan in the so called MTLP (Mid-Term Living Program) tool. How this is handled is explained in the related section of Living Program.

5.2 Deferral request

If, before or during, the maintenance activities the basic finish date cannot be reached a deferral is required. An approved deferral gives the maintenance executor the permission to exceed the BFD

with an arranged amount of time. This request should be approved or disapproved by the Reliability Engineer who has made the study where the work order is indirectly originating from.

5.3 Guiding activities

Every maintenance execution is guided by the assigned Job Leader. The Job Leader could both be a Technical Assistant or a Field Supervisor and sometimes even a Corrective Planner.

5.4 Execute maintenance

If obstacles are no longer faced and all preparations are done correctly, in first or second instance, the planned preventive maintenance can be performed. All tasks are done according to schedule by all involved parties such as contractors, operators, SBKD or craftsmen.

5.5 Change SAP status

After all activities are finalized the Job Leader should change the SAP status into MCMP (Maintenance Complete).

5.6 Financially close work order

Finished work orders with a @ in the title have to be closed financially. The contractor sends an invoice to the Sr. Planner, which the contractor can easily find because of the contact data in the long text. The Sr. Planner compares the invoice with the estimated costs. If the costs in the invoice are equal or less than the estimation the Sr. Planner sets the SAP status as TECO (Technical Complete). Assume the costs in the invoice exceed the estimation the Sr. Planner should take care of it and ultimately set the SAP status to TECO as well. If a work order contains a # or \$ in the title, the SAP status is changed into TECO by the Preventive Planner immediately after a work order is declared MCMP

B. Request for change of study contents

B.1 Mandatory fields in request form

When it seems necessary according to the maintenance executor to change the contents of a study he/she can do a request for change. This can for example be to expand the interval for cleaning a filter if the filter appeared totally clean several times when it was opened to be cleaned. The control point here however is that this request for change has to be done via a digital tool where several fields are mandatory to be filled in. If these are not filled in the request cannot be sent.

0. Living program

0.3 (Dis)Approve request for change or deferral

The Living Program is a program that is used as a tool to take care of requests for plan changes. Those changes can arise from wrong plan contents and plans where maintenance activities were impossible to execute or considered unnecessary. The program derives the related RE and PP of that specific equipment out of the FLOC. By this mean the request always arrives at the right person. The RE sees if the request is possible to approve according to the study which is performed before the creation of the maintenance plan. The RE can either approve or disapprove the request. If disapproved the request will be closed and stored in the database. If approved, the RE should indicate if the PP should perform any adjustments.

0.4 Forward approved requests for change via MTLP tool

It is almost always the case that the PP has to perform an action resulting from a request in the MTLP tool. The PP receives the request in the tool under the button 'Approved Requests' with all information which tells him what to do. The process all starts over again as the PP makes a new plan, adjusts an existing plan or deletes one.

0.5 Feedback (dis)approved requests for deferral to applicant

Besides the requests for changes in the plan there is another procedure resulting from issues in the maintenance execution phase. Since it frequently appears that preventive maintenance orders can not be finished within the BFD a deferral is requested. A deferral is confirmed new BFD which is approved by the RE. This has subsequently to be approved or disapproved by the RE. If he has done so, the should feedback his answer to the requestor as he can act upon this. If approved, the new BFD is arranged which is the new final date of completion of the preventive work.

2. Bottlenecks and suggested improvements

As we chase the goal of a new improved end-to-end process we seek for improvements. Those improvements are based upon problems and bottlenecks we find in the As-Is process as described in the previous part of this report. The problems are listed below and numbered as the numbers correspond with the same red number in the graph containing the points of discussion. In order to improve, the problems and bottlenecks are tried to be tackled by providing a solution. Those solutions are not yet conducted as this report is a proposal

Bottlenecks and problems

1. Incorrect/Incomplete input from the studies

It appears to be that deliveries of study results from the RE to the PP are often inadequate and incomplete. This either leads to incorrect, unclear preventive plans or to a delay since the PP has to chase the information required to build a proper plan. As the RE sends his input by mail, often containing just a few sentences, he is likely to forget to mention necessary information.

2. Contents of the preventive plans

Task lists do not seem to be standardized over the PUs of Shell Pernis. Moreover, task lists of preventive plans within one PU are not build similarly. As result craftsmen, operators or contractors do not always know what is meant by the task in the task list. For example; If rotating equipment needs to be blocked this should be done both electrically (by electricians) and mechanically (by operators). However, if the taks list in the plan only contains a task "Block/Set-free equipment" for the operational discipline, electricians will not see a task in their schedule. Subsequently, the operator mechanically blocks the rotating equipment but sees it is not electrically blocked. This means new work preperation is required, shifts in schedule are required, overal; delay.

A somewhat similar problem to the sequential content of a plan is a problem on the tasks itself. It appears to be that the maintenance executors, the people who actually have to perform the studied preventive plans, do not always seem to understand what is meant by the text in a task bar. He/she either performs it incorrectly or do not carry out the maintenance on time.

3. No control on all work orders

In the process of preventive maintenance at Shell Pernis very few checks are integrated. One of the controls missing is the total overview of all work orders. This includes connection possibilities with corrective work orders, a check on the symbols attached to a work order and a total cost overview.

4. No ownership

Work orders generated by a maintenance plan often need some more preperation before it can be executed. This preperation is done by the corrective planners. Preparation entails making the purchase orders for the contractors, checking the first/last start and finish planning and more. However, the corrective planner sees the preventive work orders as possession of the PP instead. The other way around, the PP sees the preventive plans as his possession and the corrective planner as the owner of the work orders generated by a plan. This results in preventive work orders where no one feels responsible for which does not improve the quality of the work orders in principle.

5. No continuation of changes in work order to plan

All actions done in the preparation phase by the corrective planner are not fed back to the PP and so, not changed in the plan. As a result the corrective planner does the same thing every time a plan generates a work order.

6. Repeatable work (redundancy)

Since a plan is not filled enough with data, information, documents and more the preparation by the corrective planner and the (a)OMC is still required. However, this means that for every work order generated by a plan this preparation has to be performed. In theory this could all be done during the creation of a plan which means that work preparation by a Corrective Planner (purchase orders, field scope) and an (a)OMC (separation map, product info, documentation) of a work order is redundant repeatable work.

7. No tackling of operational issues

During the WOIP WOPR phase an (a)OMC does not focus on operational possibilities of performing maintenance. This means that in that phase it is for example not checked on what date equipment can be separated because of available by pass or integrated spares. Separation activities are scheduled in the next phase unknown of what dates are available. Therefore operational issues as explained previously are tackled just a few weeks before planned execution in the LTPO which might result in schedule changes and overdues.

8. Work orders by-passing scheduler

As we can see in the graph beneath the work orders with a # are manually released by the PP and so automatically filled in the schedule. However, during interviews the schedulers mentioned that they desire full control on the schedule without being surprised with automatically scheduled activities which they didn't know. In short, the problem is that the scheduler is not fully in control on the schedule.

9. No quality control and assurance on maintenance

In terms of assurance the process lacks on quality control. This means that no assurance is built in on the translation of the study results with the actual maintenance execution. On this moment the translation is done like the whisper game where several people sitting in a circle. The first person whispers something to the second, the second to the third and so on. In the end the last person often receives a complete different input as initially started at the first person. To be clear; It is not always the case that the outcome (the maintenance execution) is deviating from the input (study) but the problem is that no assurance on this case is present.

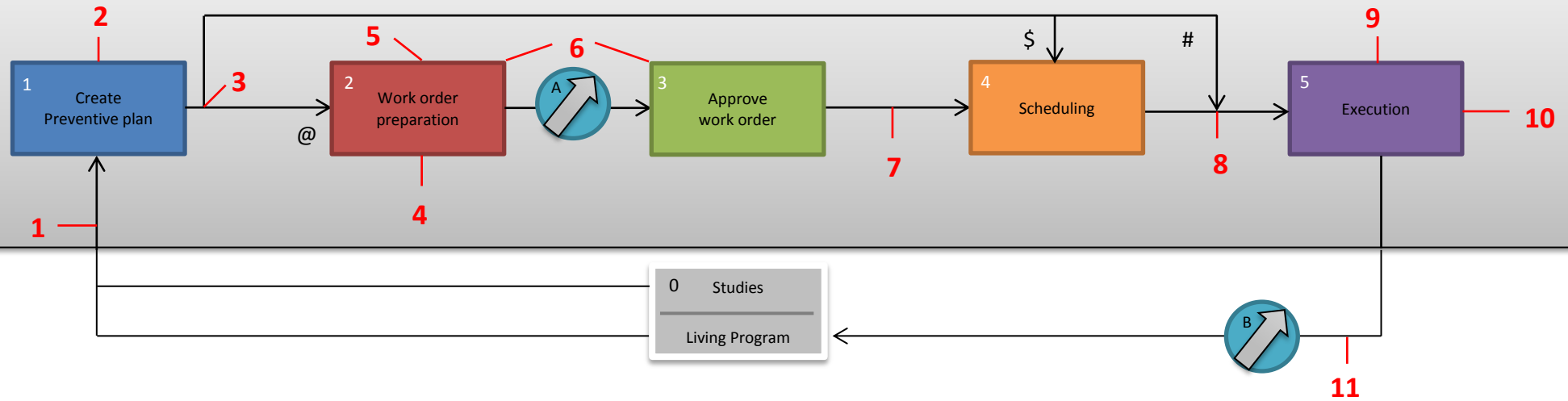
10. No history on findings is written

For long term analysis or maintenance policy improvements on specific equipment some history on findings during preventive maintenance is required. However, on this moment this history is not written. A short term loop in terms of plan changes or changes on practicability is already present as a long term history writing to evaluate and learn is absent.

11. No processing of feedback on practicability

On the front sheet of a work map a field for feedback purposes is available. This is actually filled in sometimes by the Job Leader however, those work maps are often archived without anything is done with the written feedback. Separate from what exactly is written on the feedback field the problem is that often nothing is further done with that feedback which could be very helpful.

Preventive maintenance As-Is process with points of discussion



Suggested improvements

1. Integrating study deliverables in the MTLP tool (QUICK WIN)

By means of a standard template, designed by the REs and the PPs, new study deliverables are received by the PP completely. By this template it is made sure that always the correct (amount of) information is forwarded by the RE to the PP.

Besides the usage of a standard template another suggestion is to integrate this information flow in the MLTP tool. This results in a central database and overview of all new plans and plans to be adjusted. Control is created since every stakeholder can access the database. Next to that, possible absence of stakeholders is covered since for example another PP can easily see if new plans have to be made during that period and whom have to take action.

What should be done to further elaborate this improvement is:

- a. Extend the MTLP tool so it is capable of processing the flow for new plan requests with new database for storage.
- b. Design the standard template with the REs and the PPs together.
- c. Determine sample size for check on new plans.

2. Build in assurance by sample checks of RE

The second quality assurance for the process is that an RE should perform a check on new made plans by means of sampling. This could be done on small big plans but also on small plans regarding critical equipment. This check contains the main question: "Is this plan conform my study results?". If this is the case the new preventive plan is saved and set as active which means that the calling of work orders is scheduled conform intervals attached to the tasks.

The Reliability Engineers will check 5%-10% of new made plans randomly or on preference for e.g. plans concerning critical equipment.

3. Discuss new plans with maintenance craftsmen

To further shorten the links in the process chain the craftsmen should be involved in the creation of new plans. In the previous improvement suggestion a new plan is checked by the RE and now the craftsmen are in. By implementing these control points in the process, the effectiveness of preventive maintenance will increase since both the initiators as the executors are involved in the preparation phase. What definitely should not be discussed is the plan in content such as which tasks or what interval should be applied. What should be discussed is how specific tasks should be formulated or structured to make sure that the executors understand what is meant by tasks in a plan. In this case a control point is implemented which creates assurance between maintenance preparation and maintenance execution.

4. New planning process

Because of the repeatability that the As-Is process contains a new planning process is designed. This was done by commonly discuss the issue with two Sr. Planners and two Preventive Planners. The main adjustment is that the Preventive Planner has to complete a preventive plan as much as possible. This involves scoping the isolation, crane and scaffolding, mentioning required materials and documents with numbers.

5. Adjustments in work preparation should directly be changed in the plan

In order to improve the quality of the plans both in contents as in practical feasibility a short feedback loop from the preparation phase should be present. This means in fact that all big or small changes on a work order, regardless what those changes might be, should directly be adjusted in the concerning preventive plan. By this mean, the next work order generated by the preventive plan is does not require the change again. If this is done disciplinary the quality of the preventive plans

increase as the time passes. Less and less work in the preparation of work orders will be required in the future and will minimize more and more.

6. Online storage of documents

As known, PM is an reoccurring matter. This means that in fact the work order and attached documents required for PM on a specific equipment today are the same for the exact same PM in for example one year. Therefore documents must be stored on FLOC in AIM.

7. Work order releasing by scheduler only

As explained in the section about bottlenecks and problems in the As-Is process a discussion point was the manual release of # work orders which results in automatic scheduled tasks that by-passes the control of the scheduler. To arrange with the PPs and the schedulers that # work orders from now on will not be released by the PPs but only by the schedulers it will improve the control over the schedule for the Scheduler. Besides, the Scheduler is aware of corrective maintenance jobs from the recent past and short term future. He/she can easily connect or cancel preventive maintenance activities. This improvement is agreed by the PPs during a workshop. During the pilot it will be introduced and shared with all stakeholders.

9. Writing history and evaluation

It is very relevant for the REs to have the oppertunity to evaluate maintenance history of equipment. The purpose is to analyze the main findings, substituted parts or proceedings of performed maintenance over the past 5 or 10 years. Especially on equipment that often seem to fail and require corrective maintenance.

The preventive plans that generate work orders with tasks APKs, inspections and overhauls need to be evaluated. To make sure that history will and can be written those work orders has to be coded as MX02 instead of MX01 like other preventive work orders.

When closing a MX02 order it is obliged to write history before it is able to be closed. This is actually already how the system works which means no further effort has to be spend on that. What should be done is setting all preventive maintenance plans containing APKs, inspections and overhauls in such a way it generates MX02 work orders.

To make sure this will happen the standard template for delivering a study to the Preventive Planner should contain a field where should be indicated if the new plan concerns MX01 or MX02 work orders.

10. Deliver work map to planner after maintenance completion

As explained previously, the feedback written on the front page of a work map is often ignored. This can be solved by adding a line to this page which indicates that the person who has prepared the work order has to sign the work map. That secures that this person always receives and processes the feedback. This feedback will often regard issues on practicability of maintenance such as scaffolding, isolation or other practical things. The responsibility for delivering the work map at the work preparer lies at the Job Leader of concern.

11. Reintegrate the POR meeting

Even indicated as mandatory event the POR meeting is not complied in all departments of Shell Pernis. Since the POR meeting seems to be effective in tackling and solving problems at the RWH, it should be integrated in the system of all other departments as well. In the POR meeting a monthly review is done on executed preventive maintenance, actual preventive maintenance work orders in the execution phase, scheduled work orders and work orders which are still in the prepartion phase. What should be done right now is determining the best moment in the month to plan this event and doing a POR, hosted by the PP, once a month. Secondly, their might be some additions in the meeting outline and attendees.

- Opportunities for connecting corrective/preventive work orders
- Involvement of the RE of the department
- Discuss general improvements of the preventive planning process

12. Clean up existing plans

A. On quantity

Shell Pernis has approximately 30.000 preventive plans in use. However, a lot of them appeared incorrect or should be deleted. Therefore a clean up is required. All of the existing plans should be checked. The following action should be done:

- Remove plans with the deletion flag
- Check plans without MAT code
- Discuss PMO plans
- Check stop plans
- Check notification plans
- Remove loose items
- Remove plans without tasklist
- Check unstarted plans
- Remove active IBIS plans
- Check Z-redun tags
- Remove inactive plans
- Check plans with RCM + PREV in title

B. On quality

As the process containing the suggested improvements are implemented the existing plans will as the time passes automatically improve. However, this will take a very long time since frequencies of tasks in plans deviate from once a week to once per 10 year or more. This means that all plans are "cleaned up" in content in multiple years. To fasten this procedure the existing plans should be cleaned up by just going allong all existing plans by the PPs. This will be a very big job to do so it will take a lot of time and effort. Since it is definitely not desired, and maybe impossible, to go along al thousands of existing plans more than once it is highly important to make sure the steps for cleaning up the plans is set properly before the start. A failure of setting the right scope for this clean up is both a waste of time and effort. Therefore a proper list of subjects to be checked and corrected during the clean up must be done. Some suggestions for these subjects are:

- Determine symbol for plans without symbol
- Standardized task lists
- Correct graphics
- Determine field scope
- Add documents in AIM

13. Arrange existing plans content with craftsmen

One of the first suggested improvements is to involve the craftstmen in the early phase of the preventive maintenance process. Craftsmen can contribute with valuable information or ideas for making the maintenance more effective. Since a lot of plans already exist it should be wise to perform a review on these plans with the craftstmen periodically. At a certain point in time all plans are reviewed. To keep control on which plans are reviewed and which are still to be done the PP should maintain an spreadsheet with all plans related to a specific craftsman for a discipline.

On the RWH this periodical meeting is already implemented and it appears to be very effective. Every time the PP discusses a list of plans with the craftsman in content several issues come to the surface which are dealt with immediately. What should be done right now is to analyze how it is done at the RWH and copy this approach to other departments as well.

3. Preventive maintenance To-Be process

This final part of the report on improvements is the process of preventive maintenance with the suggested and approved improvements implemented. In short the process itself is not changed this way that the six major steps are changed in sequence or deleted. What is mainly changed in the process in order to improve the effectiveness of preventive maintenance can be divided into a few items. The most important one is involving the Living Program in the preventive maintenance process by adding several control points to secure assurance. Secondly, a few feedback loops are added to close the loop in multiple aspects. Finally, the preventive planning process is newly set up in such a way repeatable, redundant work is minimized.

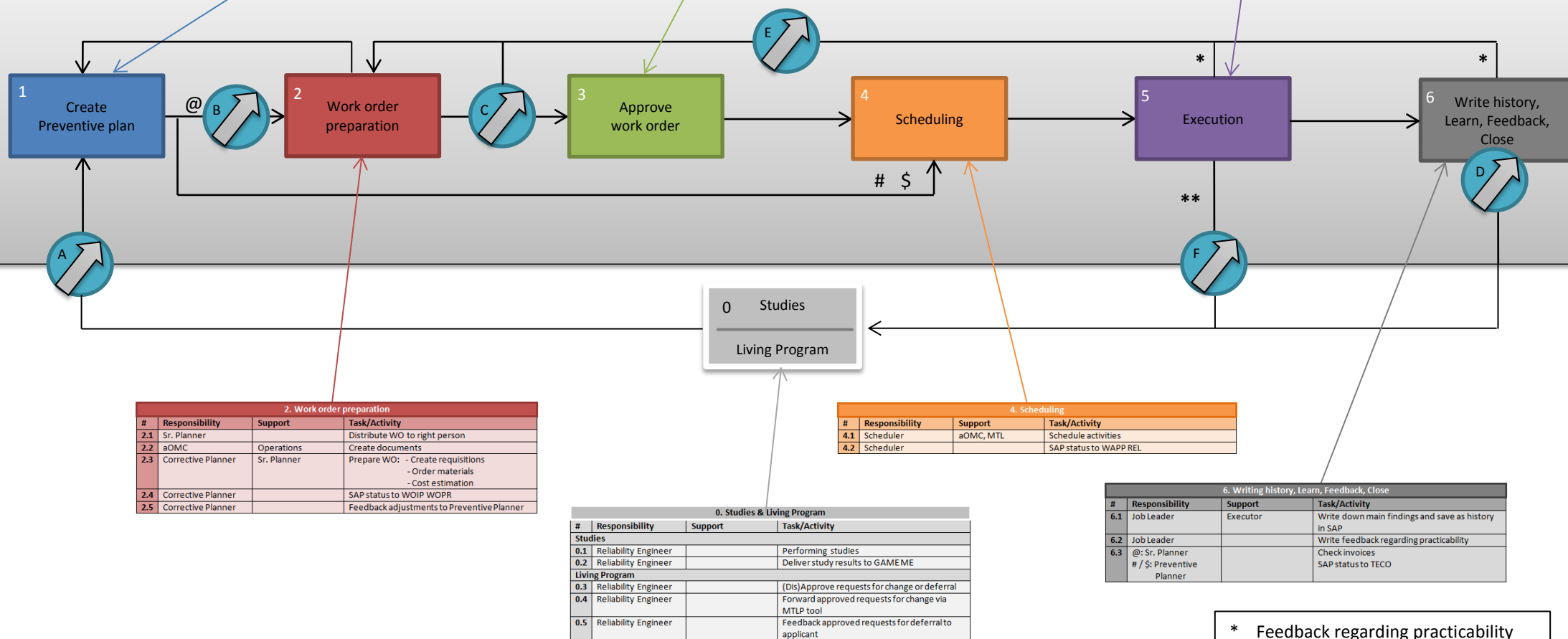
Similarly to the As-Is process description the flow chart is shown as first. Subsequently to the flowchart with additional tables with steps and tasks, the more detailed job description of every numbered step in the tables are provided.

Preventive Maintenance process – To-Be (1/2)

1. Create preventive plan			
#	Responsibility	Support	Task/Activity
1.1	Preventive Planner		New plan: - Title + Symbol (@, #, -, \$) - Scheduling parameters New item: - Planning data - Object list New tasklist: - Parameters - Operation rows - Work and duration - Package - Graphics
1.2	Preventive Planner	Craftsmen aOMC	Complete tasklist:- Scaffolding (with sizes) - Isolation (with sizes) - Crane (with weight class) - Materials (only to mention) - Document numbers
1.3	Preventive Planner	Craftsmen	Discuss tasklist, adjust where needed
1.4	Preventive Planner		Change symbol for called WOs with - in title to @ or #
1.5	Preventive Planner		WOs with @ → Sr. Planner (WOIP) WOs with # → aOMC (WOIP WOPR) WOs with \$ → Scheduler (WAPP)
1.6	Preventive Planner	Reliability Engineer	Adjust/delete existing plan
1.7	Preventive Planner		Process received feedback

3. Approve work order			
#	Responsibility	Support	Task/Activity
3.1	aOMC		SAP status to WAPP

5. Execution			
#	Responsibility	Support	Task/Activity
5.1	MTL	Job Leader, Executor	Request for change if not possible to execute
5.2	MTL	Job Leader, Executor	Deferral request if BFD cannot be reached
5.3	Job Leader		Guiding maintenance activities
5.4	Executor	Job Leader	Execute maintenance activities according schedule
5.5	Job Leader		SAP status to MCMP



2. Work order preparation			
#	Responsibility	Support	Task/Activity
2.1	Sr. Planner		Distribute WO to right person
2.2	aOMC	Operations	Create documents
2.3	Corrective Planner	Sr. Planner	Prepare WO: - Create requisitions - Order materials - Cost estimation
2.4	Corrective Planner		SAP status to WOIP WOPR
2.5	Corrective Planner		Feedback adjustments to Preventive Planner

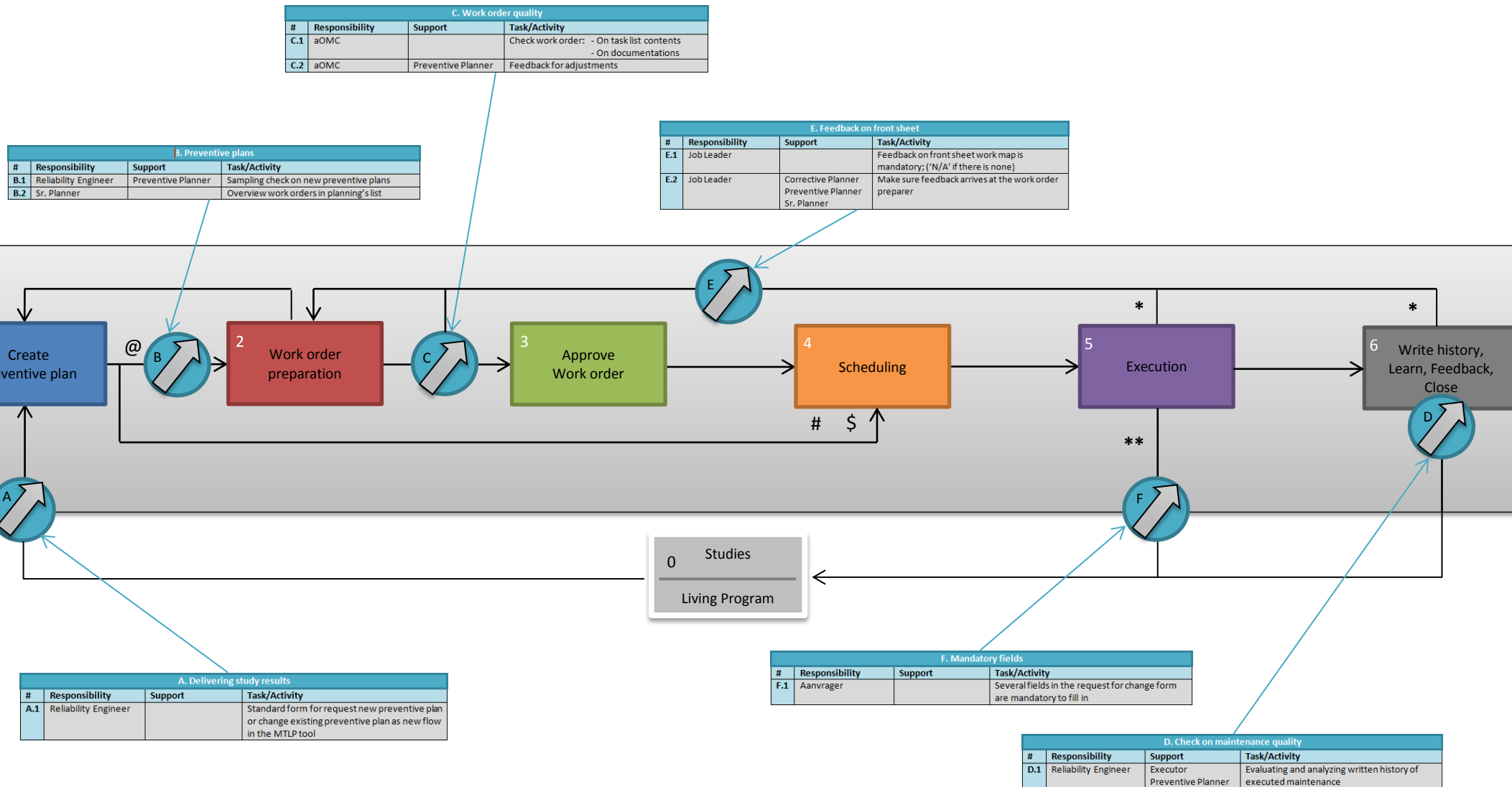
4. Scheduling			
#	Responsibility	Support	Task/Activity
4.1	Scheduler	aOMC, MTL	Schedule activities
4.2	Scheduler		SAP status to WAPP REL

0. Studies & Living Program			
#	Responsibility	Support	Task/Activity
Studies			
0.1	Reliability Engineer		Performing studies
0.2	Reliability Engineer		Deliver study results to GAMEME
Living Program			
0.3	Reliability Engineer		(Dis)Approve requests for change or deferral
0.4	Reliability Engineer		Forward approved requests for change via MTL tool
0.5	Reliability Engineer		Feedback approved requests for deferral to applicant

6. Writing history, Learn, Feedback, Close			
#	Responsibility	Support	Task/Activity
6.1	Job Leader	Executor	Write down main findings and save as history in SAP
6.2	Job Leader		Write feedback regarding practicability
6.3	@: Sr. Planner # / \$: Preventive Planner		Check invoices SAP status to TECO

* Feedback regarding practicability
** Feedback regarding study contents

Preventive Maintenance process – To-Be (2/2)



0. Studies

0.1 Performing the study

The process initially starts with an RCM, IPF, HEMP or EI study. Reliability Engineers perform the studies based on literature, laws/regulations, cost calculations and equipment specifications. We will not focus on how this is exactly performed since the studies are not part of the GAME ME program. Since the studies provide the input for the sequel of the preventive maintenance process it is mentioned in the process description.

0.2 Request for new plan

The RE of relevance makes a new request in the LTLP tool. He enters the right data which are date, requestor (RE), department, plant, FLOC and PP. Subsequently, he indicates the required system for the new plan, what study is done and if the plan should generate MX01, MX02 or MX09 orders. The order type is important because of history writings. So, the RE determines if history is required for that specific plan.

From the APM system, the RE and easily load his study results from an export to the request with one click. Now all information the PP needs is filled in and the request can be saved and closed.

A. Delivering study results

A.1 Standard form for requesting a new plan

As the RE has finished his study, the results have to send to the PP. To make sure the right information is forwarded a standard template is created. This is done in cooperation of the PP and the RE. This standard form is implemented in the LTLP tool.

1. Creation of preventive plans

1.1 Creating a new plan

The PP sees in his list in the LTLP tool that a new request for him is handed in. He sees all information put in by the RE and can now make a new preventive plan in SAP.

Every plan contains of one or more items with a task list attached to it. An item is the mechanism that generates work orders twelve weeks before the basic finish date (BFD) and every item contains of a task list.

A preventive maintenance plan in SAP contains of three fields. The plan data, the item data and the task list data.

a. Plan data: Title + Symbol (@, #, \$, -)

The symbol determines what route a work order generated by the plan will follow.

@ The task list of this plan contains a task for a contractor. This means one or more requisitions have to be made so work preparation is required.

The task list of this plan does not contain any tasks for contractors. No work preparation is required.

- Assume that a task list of a maintenance plan contains a task for a contractor with a one year frequency and a task for Shell personnel with a frequency of six months. This means that the odd work order generated by the plan has to be a #, and every even work order a @.

\$ The task list of this plan contains a task for the SBKD. The SBKD is a team of Shell personnel trained both as fire fighters and mechanics for supportive maintenance jobs such as inserting safety flanges to mechanically block equipment.

b. Item data: Planning data and an object list.

c. Task list data: Parameters, operation rows (tasks), work and duration, a package, graphics.

1.2 Complete task list

When a new plan is made in SAP the task list cannot be completed with the input from the RE only since no information on practicability is involved. Therefore, to avoid repeatability in the work order preparation phase the PP should complete the task list for a plan with:

- Scaffolding sizes
- Isolation sizes
- Crane weight class
- Material's MESC number
- Document numbers in AIM

1.3 Discuss task list with craftsmen

In order to assure quality and avoid problems in the execution phase, the new made plan should be discussed with the craftsmen that need to carry out the maintenance activity.

Go along the operation rows in the task list. If things are not understood it should be explained by the PP. If something seems to be wrong, adjust this in the plan.

The new plan is now totally complete. The PP has to enter the plan number in SAP in the LTLP tool.

1.4 Change symbols

SAP weekly calls all work orders with a BFD <12 weeks from that moment in the night from Tuesday to Wednesday. As explained previously some plans contain a - (stripe) in front of the title. However, when a work order from this specific plan is called it should either be a # or a @ work order. This has to be determined by the PP by inspecting the task list of that work order. The SAP status of work orders automatically called by the system is WAPP (Work order Approved)

1.5 Distribute called work orders

A list of work orders, containing a @, # or \$, is now remaining. Those should be distributed throughout the paths drawn in the process chart.

@ SAP status is changed from WAPP to WOIP (Work Order In Process). The Preventive Planner sets up a work map and supplies it to the Sr. Planner of the PU of relevance.

SAP status will remain WAPP. The PP informs the Scheduler about the work order and the Scheduler will ultimately schedule this order.

\$ SAP status will remain WAPP. The PP informs the Scheduler about the work order. This means enables the Scheduler to arrange a suitable execution date with the SBDK.

1.6 Adjust/delete existing plans

Out of the MTLP tool the PP sees approved requests for change or deletion of existing plans. These requests only regard to study contents. Those desired changes or deletions are to be seen by the PP in the 'Approved Requests' button. Those adjustments will be applied to the plan which results in an adjusted work order generated by SAP 12 weeks before the planned BFD.

1.7 Process feedback

Besides the requests for change or deletion regarding study contents, there might also be requests for change regarding practicability (scaffolding, materials, isolation, work and duration etc.). These requests are coming from feedback on the front sheet of the work map of a work order. These are collected and processed by the PP.

B. Preventive plans

B.1 Check on new preventive plans

The RE sees in the LTLP tool that a new plan is made on a request he has done previously. As explained in section 1.3 the PP enters the SAP plan number in the tool after final completion of the plan. The RE can copy the number, open the plan in SAP and do a check. In this check he sees if the

study results are correctly translated in a preventive maintenance plan. If so, he selects the 'Accepted' button in the tool and the request will be closed. If not, the PP gets a sign that something is not alright as the RE selects the 'Declined' button. If this is the case, the plan will remain in the list and the PP should make a change in the plan.

B.2 Overview of work orders in planning list

All orders that require preparation (@) appear on a so called planning list together with the corrective work orders. The Sr. Planner controls this planning list which is renewed weekly. Because of this list, the Sr. Planner has an overview on all orders in the work preparation. He can therefore intervene when an order is (almost) overdue in this phase specifically.

2. Work order planning and preparation

2.1 Distribute work orders

The Sr. Planner distributes the preventive work order map to the right Corrective Planner for further preparation.

2.2 Create documents

Documentations have to be attached to a work order. These are supportive documents such as a photo of the location and a P&ID. However, if a preventive maintenance task has to be performed on non-operational equipment there are some other required documents which are a separation map, this is a map with instructions on how to take that specific equipment out of operations, a list of flanges which have to be blocked and a product information sheet. These operational documents are stored for every FLOC in AIM. The aOMC only has to look up the right FLOC and print the documents.

2.3 Prepare work order

Preparation of a work order contains of three main things: Creating requisitions, order materials and estimating the costs of the maintenance job. This is all done by the Corrective Planner.

a. Requisition: The requisition is a request or order to do maintenance and is based on the contract and sort of tasks to be performed. The requisition is saved in the work order in SAP. Besides, a job description is written in a word file. Also several required information for the contractor is given such as vendor number, FLOC, name of client, person of contact, date of request and contact details of the (a)OMC, Scheduler, Plant Inspector and Job Leader. This job description is saved in the long text of the relevant task line in the work order in SAP.

b. Order materials: Ordering materials is done in the same way as maintenance activities are requested by making a requisition. The codes and costs for specific materials can be found in SAP. However, it might occur that the required material is not available in SAP. If so, a quotation is sent by the vendor. The order is placed in SAP and will be delivered by the supplier in the proposed warehouse.

c. Cost estimation: The Corrective Planner has to estimate the costs involved. This is done with the help of tools or quick reference cards, both based on contracts. The corrective planner adds requisitions and material costs as the final cost estimate and saves the work order.

2.4 Change SAP status

The Corrective Planner now changes the SAP status to WOIP WOPR (Waiting on Operations) which indicates that the work order has to be approved by the aOMC.

2.5 Feedback adjustments to Preventive Planner

Even though a preventive plan is made as complete as possible it won't be totally perfect. Every change a Corrective Planner is forced to make should be feedback to the PP. The PP will change this

in the plan so the next time a work order is generated the change won't be needed again. To perform this process for a longer period of time, the plan will ultimately reach perfection.

C. Work order quality

C.1 Check work order

a. Task list contents: Next, the (a)OMC checks the contents of the task list. For example; The (a)OMC sees a task which states lubrication of layers of a pump. However, the aOMC knows that for that specific pump no layers need to be lubricated because it is new type of pump. Since the task lists are not standardized but manually typed in the work order there might be some faults in the task list in terms of sequence. Tasks for separating equipment are multiple tasks not standardized and not for everyone clear how to compose. It is likely for faults to occur in such a situation. The (a)OMC therefore performs a check on it.

b. Cost estimation: This is done on gut feeling as comparison of the activities to be performed and the costs attached to it. This is only a brief check if no extreme costs are estimated by for example a type error or miscalculation.

C.2 Feedback for adjustments

If the aOMC finds an error some changes and adjustments could be required. The aOMC that noticed the errors or doubts about exactness discusses or adjusts the work order supported by the Corrective Planner. If something is changed the Corrective Planner has to feedback to the PP if necessary.

3. Work order approval

3.1 Change SAP status

The aOMC changes the SAP status from WOIP WOPR to WAPP and gives the work map to the scheduler.

4. Scheduling

4.1 Scheduling of tasks

The scheduler receives work orders labelled as @, # and \$. This means the tasks included have to be scheduled being the last phase before execution. The scheduler agrees upon a date with the SBKD for \$ work orders and schedules all tasks of @, # and \$ work orders.

4.2 Change SAP status

If all tasks are scheduled and saved in the Primavera software the scheduler releases the work orders by changing the SAP statuses from WAPP to WAPP REL. Now all types of work orders have been released and are ready for execution.

5. Maintenance execution

5.1 Request for change if not possible to execute

* Practicability: During the start-up of the maintenance activities some problems might be faced. Those obstacles could make the work unable to be performed. Examples are scaffolding or insulation is not (dis)assembled or equipment is still in operation while the maintenance task requires non-operational equipment. If this is the case, the Job Leader firstly asks the Corrective Planner or aOMC, dependent on what the obstacle is, to solve the problem so the maintenance can be performed anyway

** Study contents: If the obstacle is regarding the contents of the maintenance job such as cleaning a filter which already appeared clean when opening, the MTL or Job Leader makes a request for change of the maintenance plan in the so called MTLP (Mid-Term Living Program) tool. How this is handled is explained in the related section of Living Program.

5.2 Deferral request if BFD cannot be reached

If, before or during, the maintenance activities the basic finish date cannot be reached a deferral is required. An approved deferral gives the maintenance executor the permission to exceed the BFD with an arranged amount of time. This request should be approved or disapproved by the Reliability Engineer who has made the study where the work order is indirectly originating from.

5.3 Guiding maintenance activities

Every maintenance execution is guided by the assigned Job Leader. The Job Leader could both be a Technical Assistant or a Field Supervisor and sometimes even a Corrective Planner.

5.4 Execute maintenance

If obstacles are no longer faced and all preparations are done correctly, in first or second instance, the planned preventive maintenance can be performed. All tasks are done according to schedule by all involved parties such as contractors, operators, SBKD or craftsmen.

5.5 Change SAP status

After all activities are finalized the Job Leader should change the SAP status into MCMP (Maintenance Complete).

5.6 Financially close work order

Finished work orders with a @ in the title have to be closed financially. The contractor sends an invoice to the Sr. Planner, which the contractor can easily find because of the contact data in the long text. The Sr. Planner compares the invoice with the estimated costs. If the costs in the invoice are equal or less than the estimation the Sr. Planner sets the SAP status as TECO (Technical Complete). Assume the costs in the invoice exceed the estimation the Sr. Planner should take care of it and ultimately set the SAP status to TECO as well. If a work order contains a # or \$ in the title, the SAP status is changed into TECO by the Preventive Planner immediately after a work order is declared MCMP

D. Request for change of study contents

D.1 Mandatory fields in request form

When it seems necessary according to the maintenance executor to change the contents of a study he/she can do a request for change. This can for example be to expand the interval for cleaning a filter if the filter appeared totally clean several times when it was opened to be cleaned. The control point here however is that this request for change has to be done via the MTLT tool where several fields are mandatory to be filled in. If these are not filled in the request cannot be sent.

6. Write history, Learn, Feedback, Close

6.1 Write history and save in SAP

For work orders of the MX02 type it is required to write history. This history is main findings that the RE wants to have or further analysis on equipment. As explained, during the requests of a new plan the RE has to indicate what type of order the preventive plan needs to generate. A MX02 order has a notification attached to it. SAP only allows one to close a MX02 order if the notification is filled with the required history.

6.2 Write feedback on practicability

All though feedback on practicability can be done before or during the execution of maintenance activities it also has to be done afterwards. Every work orders labelled as @ have a work map. On the front sheet of this map there is a field for eventual feedback. This needs to be filled in as 'Not

applicable' if there is no feedback on practicability. If so, this needs to be written on the work map which subsequently needs to be handed in at the Corrective Planner.

For the remaining orders (# and \$) this can be done by mail to the Preventive Planner and/or Corrective Planner. They make sure this will be changed in the preventive plan.

6.3 Check invoices and change SAP status

Every order labelled as @ has some kind of costs attached. The costs can be for materials or contractor services. Within SAP every order that is closed (MCMP) subsequently needs to be financially checked. The contractor or material supplier sends an invoice. The Sr. Planner has to check this invoice(s) and approve or disapprove the received invoice. If disapproved the contractor or supplier needs to be contacted to solve the problem. If approved the Sr. Planner changes the SAP status to TECO (Technically Complete).

For orders with # or \$ in the title no check is required since no costs are involved. However, these orders still need to be set to TECO. This will be done by the Preventive Planner.

E. Feedback on front sheet of work map

E.1 Make sure the work map arrives at the work order preparer

In section 5.1 and 6.2 it is explained that feedback on practicability of the preventive maintenance orders have to be done via mail or the front sheet of the work map. In terms of control points in the process this is a maturity thing. It has to be disciplinary brought to the Corrective Planner so the feedback can furtherly be processed. In other words; The Job Leader has to make sure that the work map does arrive at the Corrective Planner.

F. Check on history

F.1 Evaluate and analyze written history

The MX02 orders carry written history after completion of the maintenance activities. The REs have to evaluate and analyze this history in order to optimize the quality of the preventive maintenance plans. The RE will perform this analysis in two ways. The first is a fixed periodical analysis every 2 year. The second and more effective analysis is following the BAP (Bad Actor Process). This is a process where based on corrective maintenance an analysis of the preventive plan and an evaluation of written history is done. In this way the RE provides another piece of assurance to the quality of preventive maintenance. If changes are required this will be done via the Living Program tools as explained previously.

O. Living Program

O.3 (Dis)Approve request for change or deferral

The Living Program is a program that is used as a tool to take care of requests for plan changes. Those changes can arise from wrong plan contents and plans where maintenance activities were impossible to execute or considered unnecessary. The program derives the related RE and PP of that specific equipment out of the FLOC. By this mean the request always arrives at the right person. The RE sees if the request is possible to approve according to the study which is performed before the creation of the maintenance plan. The RE can either approve or disapprove the request. If disapproved the request will be closed and stored in the database. If approved, the RE should indicate if the PP should perform any adjustments.

O.4 Forward approved requests for change via MTLT tool

It is almost always the case that the PP has to perform an action resulting from a request in the MTLT tool. The PP receives the request in the tool under the button 'Approved Requests' with all

information which tells him what to do. The process all starts over again as the PP makes a new plan, adjusts an existing plan or deletes one.

0.5 Feedback (dis)approved requests for deferral to applicant

Besides the requests for changes in the plan there is another procedure resulting from issues in the maintenance execution phase. Since it frequently appears that preventive maintenance orders can not be finished within the BFD a deferral is requested. A deferral is confirmed new BFD which is approved by the RE. This has subsequently to be approved or disapproved by the RE. If he has done so, the should feedback his answer to the requestor as he can act upon this. If approved, the new BFD is arranged which is the new final date of completion of the preventive work

Implementation Pilot

Implementing the preventive maintenance process
Location: Refinery Oil Movements (ROM)

Contents

Introduction

Phase 1 – **P**lan and prepare

Phase 2 – **D**o

Phase 3 – **C**heck and **A**ct

Phase 4 – **P**lan rebound

Developed by Jorick de Vries
May 2016

Introduction

The preventive maintenance process currently contains several bottlenecks and problems. This process, the As-Is situation, needs improvements to become a new process, the To-Be situation. The To-Be process is designed and needs to be tested in a pilot at the ROM (Refinery Oil Movements), one of the PUs of Shell Pernis. The improvements that we have thought up will be implemented. This implementation is done according to this implementation plan.

This plan is built up according to the PDCA (Plan, Do, Check, Act) principle. This is furtherly introduced in the main report. Four parts form this plan as four different phases based upon the PDCA principles: Plan and Prepare, Do, Check and Act, Do again.

Phase 1 – Plan and prepare

To first phase of implementing the new To-Be situation is preparation to acquire all required preconditions and to plan the implementation as all preconditions are achieved. In fact it is the first step in the PDCA cycle; Plan and prepare. There are several things to be done in order to enable the ROM to perform the new process.

These preparations are mentioned in the following tables and state the action to be done, involved participants, results of the action (to be filled in if completed) and the date of completion of an action.

Plan

1. Explain new planning process

1. Explain new planning process				
Action		Participants	Results	Date
A	Getting the Preventive Planner, Corrective Planner, aOMC and Sr. Planner informed about new tasks or task adjustments.	Preventive Planner Corrective Planner aOMC Sr. Planner	Done	30.03 05.04

2. New plan requests via standard template in Living Program tool

2. New plan requests via standard template and new flow in MTLP tool				
Action		Participants	Results	Date
A	Determine contents of standard template with Preventive Planner.	Preventive Planner	List of requirements.	01.04
B	Design standard template.	GAME ME WPI Lead	New standard template with all required entry fields and specs.	04.04
C	Finalize the new MTLP tool containing a flow for new plan requests.	Preventive Planner GAME ME WPI Lead RCM Focal point	Done	12.04
D	Upload all existing data in database.	GAME ME WPI Lead	Done	12.04
E	Explain tool for requesting a new plan.	Reliability Engineer Preventive Planner	Done	13.04

3. RE assurance in preventive maintenance process

3. RE assurance in preventive maintenance process				
Action		Participants	Results	Date
A	Determine how to enable the RE to check newly made preventive plans.	RCM Focal Point	A field in the new tool that presents the SAP plan number.	01.04
B	Determine how much and what plans to check.	RCM Focal Point	All single plans, 10% of bulk plans for instance on sorts of plans.	01.04
C	Determine on which preventive maintenance history must be written and how to do so.	RCM Focal Point	Set APK, inspections and overhauls as MX02 order and SAP asks required information. Indicate required order type in study result delivery.	01.04
D	Determine how to evaluate and analyze history.	RCM Focal Point	Result: RE periodically evaluates and analyzes preventive maintenance history on basis of Bad Actor Process. Responsibility lies at RE.	01.04

4. Sr. Planner overview

4. Sr. Planner overview				
Action		Participants	Results	Date
A	Determine how to get preventive work orders on the planning list with corrective work orders.	Sr. Planner	SAP; Work order list editing (Display).	13.04
B	Instruct Sr. Planner how to make this planning list.	Sr. Planner	Done	20.04
C	Instruct Preventive Planner to set work orders with @ to WOIP.	Preventive Planner Corrective Planner	Done	15.04

5. Complete task lists of work orders with BSD in next two months

5. Complete task lists of work orders with BSD in next two months				
Action		Participants	Results	Date
A	Set right all task lists of plans that will generate a work order for the coming two months at ROM.	Preventive Planner Corrective Planner	Done	05.04

6. Saving documents

6. Saving documents				
Action		Participants	Results	Date
A	Discuss optimal practice with aOMC, Preventive Planner and Corrective Planner.	Preventive Planner Corrective Planner aOMC	Storage of documentation in AIM on equipment FLOC	08.04
B	Creating FLOCs in AIM for usage.	aOMC AIM Focal Point		10.05

7. Secure feedback on practicalities

7. Secure feedback on practicalities				
Action		Participants	Results	Date
A	Instruct Job Leader to write feedback and to hand in the work map at the Corrective Planner always.	Job Leader Corrective Planner	Done	12.04

8. POR meeting

8. POR meeting				
Action		Participants	Results	Date
A	Determine meeting outline.	Preventive Planner aMS	1. Overdue 2. Overdue in <2 wk 3. WOIP orders 4. Correct. vs Prevent.	09.05
B	Schedule meeting	aMS	31.05.2016 first POR	31.05

Phase 2 – Do

Do

First application - During this phase we will actually use the new process in all phases of the preventive maintenance process. All preparations are done and the 'Do' can start. During the preparations, all involved people are told what to do and so they are all up to date. During the applying period we will walk along with several people involved as they make a new plan, prepare, approve and schedule a work order and during the maintenance execution.

This implementation is to assess successfulness of the new To-Be situation. But what does success look like for the PM process of Shell Pernis? In the following tables all steps of the To-Be situation are explained. After every step an indication is given if after the first implementation the step was successfully implemented. This is done good (■), moderate (■) or bad (■) with additional description attached if necessary.

0. Studies & Living Program

0. Studies & Living Program					
#	Responsibility	Support	Task/Activity	Status	Argument
Studies					
0.1	Reliability Engineer		Performing studies		N/A
N	Reliability Engineer		Deliver study results to GAME ME		LTLT for evidence
Living Program					
0.3	Reliability Engineer		(Dis)Approve requests for change or deferral		Already worked
0.4	Reliability Engineer		Forward approved requests for change via MTLP tool		MTLP tool for evidence
0.5	Reliability Engineer		Feedback approved requests for deferral to applicant		Already worked

A. Delivering study results

A. Delivering study results					
#	Responsibility	Support	Task/Activity	Status	Argument
A.1	Reliability Engineer		Standard form for request new preventive plan or change existing preventive plan as new flow in the MTLP tool		LTLT tool for evidence

1. Create preventive plan

1. Create preventive plan					
#	Responsibility	Support	Task/Activity	Status	Argument
1.1	Preventive Planner		New plan: - Title + Symbol (@, #, -, \$) - Scheduling parameters New item: - Planning data - Object list New task list: - Parameters - Operation rows - Work and duration - Package - Graphics		Done.
1.2	Preventive Planner	Craftsmen aOMC	Complete task list:- Scaffolding (with sizes) - Isolation (with sizes) - Crane (with weight class) - Materials (mention only) - Document numbers		No interests by PP.
1.3	Preventive Planner	Craftsmen	Discuss task list, adjust where needed		Done. Resulted in valuable output.
1.4	Preventive Planner		Change symbol for called WOs with - in title to @ or #		No orders in schedule with -
1.5	Preventive Planner		WOs with @ → Sr. Planner (WOIP) WOs with # → aOMC (WOIP WOPR) WOs with \$ → Scheduler (WAPP)		PP does not perform this task and leaves it to the CPs which is against agreements.
1.6	Preventive Planner	Reliability Engineer	Adjust/delete existing plan		MTLP tool for evidence
1.7	Preventive Planner		Process received feedback		Job Leader absent, no substitution = bottleneck

B. Preventive plans

B. Preventive plans					
#	Responsibility	Support	Task/Activity	Status	Argument
B.1	Reliability Engineer	Preventive Planner	Check on new preventive plans		Check done. LTLP tool for evidence.
B.2	Sr. Planner		Overview work orders in planning's list		Sr. Planner weekly checks WOIP (WOPR) list

2. Work order preparation

2. Work order preparation					
#	Responsibility	Support	Task/Activity	Status	Argument
2.1	Sr. Planner		Distribute WO to right person		Work map for @ orders are weekly delivered to CP
2.2	aOMC	Operations	Create documents		Dirk contacts OMC to discuss possible risks
2.3	Corrective Planner	Sr. Planner	Prepare WO: - Create requisitions - Order materials - Cost estimation		Already worked
2.4	Corrective Planner		SAP status to WOIP WOPR		Already worked
2.5	Corrective Planner		Feedback adjustments to Preventive Planner		Weekly mail with adjustments CP → PP

C. Work order quality

C. Work order quality					
#	Responsibility	Support	Task/Activity	Status	Argument
C.1	aOMC		Check work order: - On task list contents - On documentations - On cost estimation		All @ work orders are processed
					All # orders are facing problems
C.2	aOMC	Preventive Planner	Feedback for adjustments		Close communication add significant value

3. Approve work order

3. Approve work order					
#	Responsibility	Support	Task/Activity	Status	Argument
3.1	aOMC		SAP status to WAPP		aOMC is only person able to do so

4. Scheduling

4. Scheduling					
#	Responsibility	Support	Task/Activity	Status	Argument
4.1	Scheduler	aOMC, MTL	Schedule activities		Already worked for @ and \$, works for # as well
4.2	Scheduler		SAP status to WAPP REL		Already worked for @ and \$, works for # as well

5. Execution

5. Execution					
#	Responsibility	Support	Task/Activity	Status	Argument
5.1	MTL	Job Leader, Executer	Request for change if not possible to execute		MTLP for evidence
5.2	MTL	Job Leader, Executer	Deferral request if BFD cannot be reached		Already worked
5.3	Job Leader		Guiding maintenance activities		Already worked
5.4	Executer	Job Leader	Execute maintenance activities according schedule		No proactive behavior
5.5	Job Leader		SAP status to MCMP		Work orders are not always set as completed

D. Mandatory fields

D. Mandatory fields					
#	Responsibility	Support	Task/Activity	Status	Argument
D.1	Applicant		Several fields in the request for change form are mandatory to fill in		MTLP tool for evidence

E. Feedback on front sheet

E. Feedback on front sheet					
#	Responsibility	Support	Task/Activity	Status	Argument
E.1	Job Leader		Feedback on front sheet work map is mandatory; ('N/A' if there is none)		Feedback fields are filled in; Feedback or 'N/A'
E.2	Job Leader	Corrective Planner Preventive Planner Sr. Planner	Make sure feedback arrives at the work order preparer		Job Leader absent, no substitution = bottleneck

6. Write history, Learn, Feedback, Close

6. Writing history, Learn, Feedback, Close					
#	Responsibility	Support	Task/Activity	Status	Argument
6.1	Job Leader	Executor	Write down main findings and save as history in SAP		SAP assures with mandatory fields to fill in, otherwise notification can't be closed.
6.2	Job Leader	Executor	Write feedback regarding practicability		Job Leader absent, no substitution = bottleneck
6.3	@: Sr. Planner # / \$: Preventive Planner		Check invoices SAP status to TECO		Already worked

F. Check on maintenance quality

F. Check on maintenance quality					
#	Responsibility	Support	Task/Activity	Status	Argument
F.1	Reliability Engineer	Executor Preventive Planner	Evaluating and analyzing written history of executed maintenance		Agreements are made with REs to analyze by Bad Actor Process (BAP) and by annual evaluation.

Other

Other					
#	Responsibility	Support	Task/Activity	Status	Argument
1	aMS	Preventive Planner	POR meeting twice a week		First POR meeting 31th May
2	Preventive Planner	Reliability Engineer	Clean up (Quantity)		31582 total; 10402 Elek-PTO 9181 plans deleted; 1376 plans in discussion → +/- 750 expected to be deleted. Expected total plans after clean up: 10402 (Elek-PTO) + 11249 (OK) = 21651
3	Preventive Planner	Corrective Planner aOMC Job Leader Executors	Clean up preventive plans (Quality) Title correctly set Standardized task list Task list complete Documentation in AIM		ROM plans: approximately 50% OK Based on call list of last four weeks Standard task list are “under construction”.

Phase 3 – Check and Act

We have now implemented the new PM process at the ROM department of Shell Pernis. During this period we have taken track on progression by filling in and updating the colors and argument fields in the tables on previous pages. Now all steps are colored which automatically means that we should perform a first evaluation. Again this is according W.E. Deming's good old PDCA cycle (Deming, 1950). We have done the **P** (Plan) and the **D** (Do) which means we're now up to the **C** (Check) and the **A** (Act).

Check

Since we colored all the process steps it is very easy to see what should be acted upon and what is yet implemented in the organization without remaining obstacles. Our analysis is therefore scrolling through the performances of the first application and listing the steps marked orange or red. Beneath every incompletely implemented process step an explanation is provided.

#	Responsibility	Support	Task	Result
1.2	Preventive Planner	Craftsmen aOMC	Complete task list:- Scaffolding (with sizes) - Isolation (with sizes) - Crane (with weight class) - Materials (mention only) - Document numbers	
PP has postponed this task to a later moment as he had to go in full gear inside the plant.				
1.5	Preventive Planner		WOs with @ → Sr. Planner (WOIP) WOs with # → aOMC (WOIP WOIPR) WOs with \$ → Scheduler (WAPP)	
PP denies taking up called work orders to check and distribute. Delegates it to CP.				
2.2	aOMC	Operations	Create documents	
Risks need to be managed first as the control on documents cannot be secured.				
C.1	aOMC		Check work order: - On task list contents - On documentations - On cost estimation	
Work orders with # were checked on execution date. However, in the meantime from check to execution a lot of CM was scheduled which makes the check strongly reduces the added value of this check. The check worked for @ orders.				
1.7	Preventive Planner		Process received feedback	
Job Leader is loaned to a turnaround. No substitution is arranged and so the feedback flow is disturbed.				
5.4	Executor	Job Leader	Execute maintenance activities according schedule	
There is a lack of proactive behavior as this process step contains a lot of waiting waste.				
5.5	Job Leader		SAP status to MCMP	
There is a lack of discipline in changing the SAP status into MCMP when all operation rows are indicated as 'C'. This results in unrepresentative KPI scores on overdues.				
E.2	Job Leader	Corrective Planner Preventive Planner Sr. Planner	Make sure feedback arrives at the work order preparer	
Job Leader is loaned to a turnaround. No substitution is arranged and so the feedback flow is disturbed.				
6.2	Job Leader		Write feedback regarding practicability	
During the implementation phase no MX02 orders were generated or executed.				
2	Preventive Planner	Reliability Engineer	Clean up (Quantity)	
1376 plans are forwarded to Reliability Engineering and need to be reviewed. 10402 ELEK-PTO plans have to be cleaned-up.				

After the review is done, some consecutive actions need to be done.

In addition, after some research on the existing plans it appeared that still loads of plans are double which can't be seen in first sight. These 'hidden' plans need to be clean-up as well.

3	Preventive Planner	Corrective Planner aOMC Job Leader Executors	Clean up preventive plans (Quality) Title correctly set Standardized task list Task list complete Documentation in AIM	
----------	--------------------	---	--	--

Needs to be done. No quick win yet.

Act

After analyzed the causes that denied the implemented changes to become successful we should come up with new ideas that should make the change successful in a second implementation. For every step we have analyzed and identified as unsuccessful we assign a new action. The list of actions to be done is shown below:

1. Set up a meeting with PPs and Supervisor to discuss this process disturbance. Apparently there is a lack of motivation to complete the task lists when a new preventive plan is made. Secondly, the PP does not take step 1.5 as his task despite having arranged this together with Sr. Planners and the PPs. A confronting approach is obviously needed to make this step work.
2. The Maintenance Supervisor, the OMC and the aOMC of the ROM department need to discuss and manage risks before step 2.2 can actually be implemented properly.
3. Called work orders carrying a # in their title should not be given to the aOMC but have to be delivered to the Scheduler instantly. The thought up change did not have the added value as we have accidentally overlooked a problem.
4. A change in mentality or optional tasks for executive employees is needed. After some observations it appeared that the mechanical craftsmen suffered a lot of waiting time. The reasons were legit accepted and inevitable. Though, a lot of tasks scheduled for the coming days could have been done if they were proactively set.
5. Arrange replacements when someone is absent or temporary moved. As we can see, the feedback loop regarding practicalities before, during or after execution does not come back to the PP. The reason for this during this pilot seemed to be an absent Job Leader which is not replaced.
6. Further research on the existing plans has to be done. There is a very big win to make for Shell Pernis on these existing preventive plans.

Phase 4 – Plan rebound

PDCA theory of Deming (Deming, 1950) is a cycle principle. This means after a first track of Plan, Do, Check and Act a new Plan has to be done for a second application (rebound). We will use the same approach as the first time to identify the new planning and preparations.

Plan

1. Tasks of the Preventive Planner

1. Tasks of the Preventive Planner			
Action	Participants	Results	Date
A Appoint a meeting to discuss this matter.	MS Excellence MS aMS Preventive Planner Corrective Planner Sr. Planner	Done	14.06
B Make new agreements and instructions	"		14.06
C Weekly check on called work orders and contribution of the Preventive Planner.	MS Excellence		>14.06

2. Manage risks of operational document storage

2. Manage risks of operational document storage			
Action	Participants	Results	Date
A Appoint a meeting to discuss the risks	MS OMC aOMC	Done	31.05
B Discuss the risks and how to manage or avoid them.	"	Mandatory check on every document	06.06
C Identify best outcome.	"	Using decentralized AIM database	06.06

3. Different route work orders with # in title

3. Different route work orders with # in title			
Action	Participants	Results	Date
A Getting the Preventive Planner, Corrective Planner, aOMC and Sr. Planner informed about new route.	Preventive Planner Corrective Planner aOMC Sr. Planner	Done	10.05
B Change work instruction and other documents		Done	11.05

4. Problem in execution phase of no proactive behavior and a lot of waiting time

4. Problem in execution phase of no proactive behavior and a lot of waiting time			
Action	Participants	Results	Date
A Discuss problem with Supervisor	MS Excellence	Done. Received advice to delegate to aMS of the ROM	27.04
B Delegate to observe to aMS in order to create another perspective on the problem.	aMS	Done. aMS will discuss with his supervisor and take further action.	28.04

5. Replacements in case of absences

5. Replacements in case of absences			
Action	Participants	Results	Date
A Inform aMS about this problem.	aMS		01.06

6. Further research on existing plans

6. Further research on existing plans			
Action	Participants	Results	Date
A Search of specific types of equipment and look carefully in GSAP if PM tasks are double or multiple time in different plans		Lots of PM tasks seem to be double after further research.	20.05 21.05 23.05
B Appoint and host a meeting to discuss several types of equipment with research results of the previous action.	Preventive Planner Corrective Planner Technical Assistant	7 preventive plans are deleted.	24.05
C Another research on other type of equipment.		Again multiple double plans are found.	26.05
D Appoint and host a meeting with results of previous research.	Preventive Planner Corrective Planner Technical Assistant	Again X plans are deleted. It appears this clean-up research needs to be done a lot of times in the coming period.	31.05

Note: Implementation of a process is part of the management of change. Implementation is a continuous improving activity and the PDCA cycle should be carried out on and on. This document can be used by Shell Pernis for further implementation purposes. After multiple PDCA rounds on the ROM department, this process should be expanded to implementation on all 8 remaining PUs within the Shell Pernis fences.

Handleiding Living Program tool

*Een handleiding voor gebruikers van de Living Program tool
Shell Nederland Raffinaderij B.V., Pernis-Rotterdam*

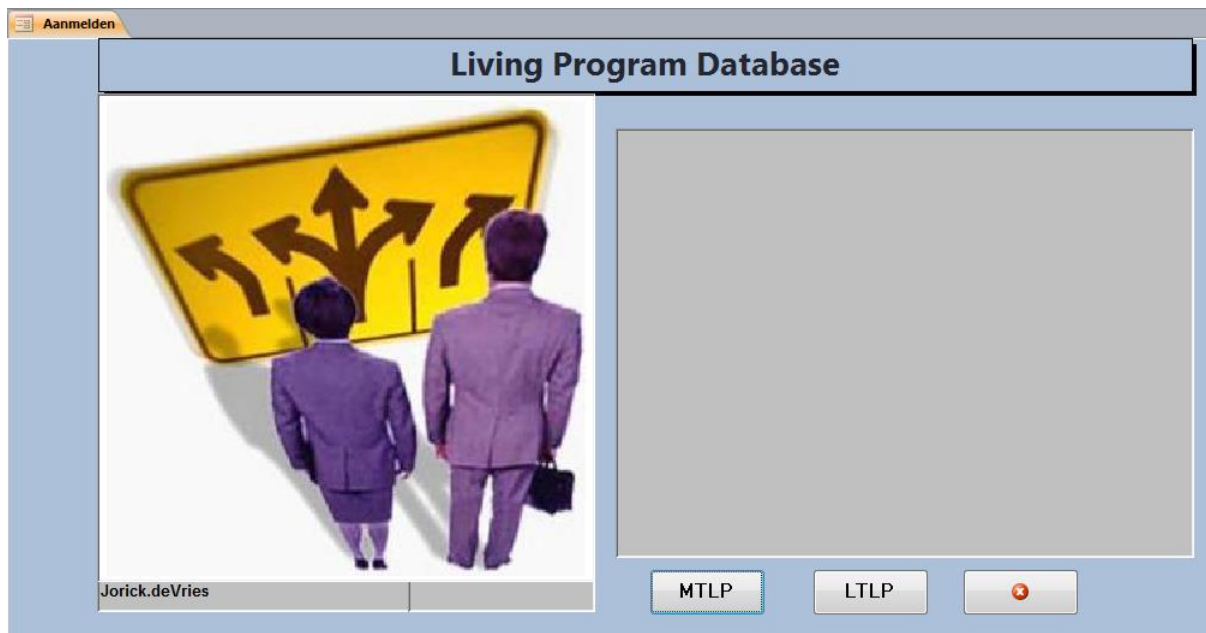
Inhoud

Living Program tool
Mid-Term Living Program (MTLP)
Long-Term Living Program (LTLP)

*Developed by Jorick de Vries
May 2016*

Living Program tool

De Living Program tool bestaat uit twee stromingen; Het MTLP (Mid Term) en het LTLP (Long Term). In deze stromingen kunnen verzoeken gedaan, verwerkt, gecontroleerd en opgeslagen worden.



Het verschil in deze twee stromingen zit hem in de afkomst van de verzoeken. Voor het MTLP komt de input vanuit het veld. Namelijk:

1. Preventieve plannen die voor of tijdens uitvoering overbodig en/of incorrect blijken.
2. Bevindingen in het veld waar mogelijk nieuwe preventieve plannen nodig zijn.

Voor het LTLP komt de input vanuit de Reliability Engineering. Namelijk:

1. Reliability studies die aantonen dat er nieuwe preventieve plannen gemaakt moeten worden.

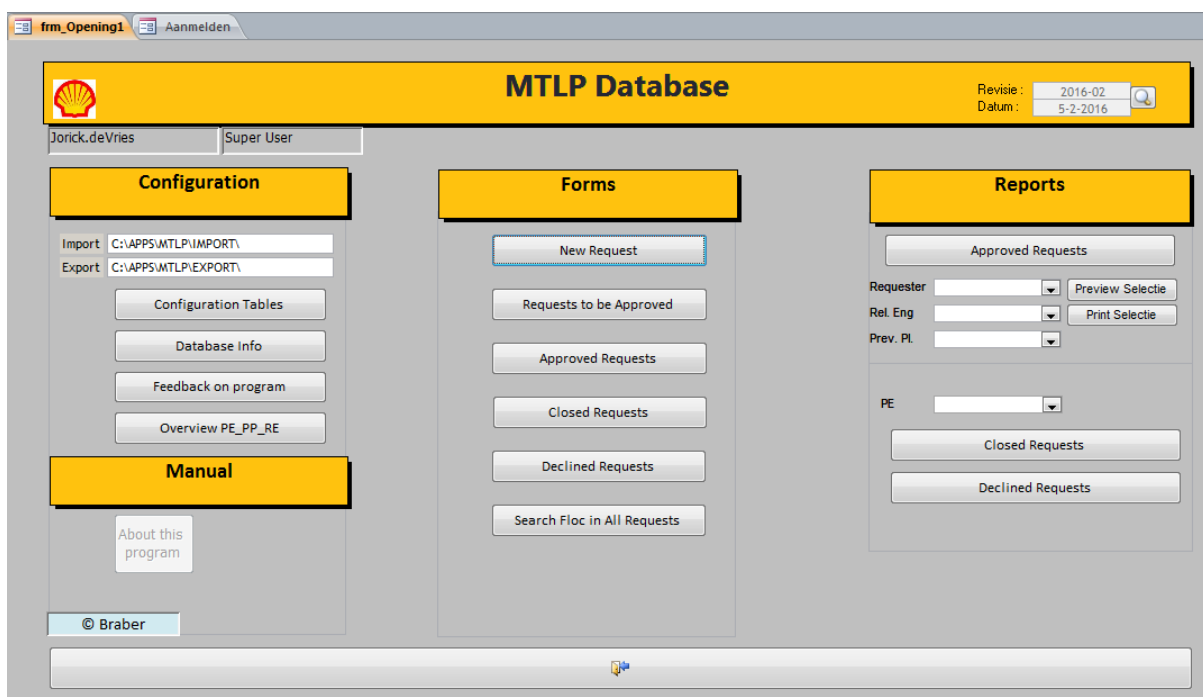
Alle namen van Shell personeel zijn in de afbeeldingen door een zwart vlak afgeschermd t.b.v. privacy.

Mid-Term Living Program (MTLP)

Het MTLP is bedoeld voor de uitvoerende partij van preventief onderhoud. In deze stroming kan de Job Leader, MTL of TA namens zichzelf of namens de vakmannen een wijzigingsverzoek indienen. Dit zal gebeuren wanneer er een preventief order uit een plan incorrect of overbodig blijkt. Een aanvraag kan echter **alleen** gedaan worden als het plan incorrect blijkt op basis van studie inhoud.

Wanneer een preventief niet uitgevoerd kan worden op basis van praktische zaken (zoals geen/foutieve stelling, niet (volledig) verwijderde isolatie etc.) dan moet er **geen** wijzigingsverzoek gedaan worden in de MTLP tool. Dit zal dan middels feedback op het voorblad van het werkmapije of middels communicatie met de Planner opgelost moeten worden.

De afbeelding hieronder geeft het startmenu van de MTLP Database aan. Hier zijn vier onderdelen te zien: *Configuration, Manual, Forms, Reports*.



De onderdelen *Configuration, Reports* en *Manual* zijn ondersteunende functies.

Configuration: In dit onderdeel zitten verschillende functies en overzichten verwerkt. Hier is extra informatie en data beschikbaar voor de gebruiker.

Manual: Hier kan men de handleiding voor uitleg van de Living Program tool vinden voor hulp of begeleiding tijdens het gebruiken van de tool.

Reports: Voor overzichten van alle verzoeken die zijn gedaan (zowel nog open als gesloten verzoeken) kunnen hier gevonden worden. Hier zit een handige filter en print functie op zodat er een rapport van bijvoorbeeld een persoon (Aanvrager, Reliability Engineer, Preventieve Planner) gemaakt kan worden.

Het meest belangrijke onderdeel van de MTLP tool is het onderdeel *Forms*. Dit onderdeel zal per button uitgelegd worden.

New Request (Nieuw Verzoek)

De aanvrager selecteert de button *New Request* in het startmenu.

De aanvrager vult alle velden in. Hiervan zijn een aantal verplicht; Deze zijn aangegeven met een *. Wanneer de aanvrager op de *Requester Department* button drukt worden een aantal velden automatisch ingevuld omdat de tool de aanvrager herkent.

Dit scherm is zo opgebouwd dat de ontvanger alle benodigde informatie aangeleverd krijgt.

New Request

Date: 02-mei-16 ID: 169 Choose Attachment to Copy to Server

Requester: de Vries, Jorick Requester Department: Open Document

Department: DMS/720

Plant: * CC2 PE: RVC Floc: * N011-CC2-P1234

Preventive Pl.: Reliability Eng.:

Options:

- ☒ Change Existing Plan
- ☐ Delete Existing Plan
- ☐ Create New Plan

Shutdown Required:

- ☐ Yes
- ☒ No

Order: * 12345678

Plan: * 123456

Description: * <Description>

Reason: * <Reason>

Estimate: * <Estimate>

Exit Without Save Preview Request Exit with Save

In het middelste gedeelte kan de aanvrager aangeven om wat voor soort verzoek het gaat en of er wel of geen Shutdown Required (*Stop Benodigd*) is. De soorten verzoeken kunnen zijn:

Optie 1: Change Existing Plan (*Aanpassen Bestaand Plan*)

Optie 2: Delete Existing Plan (*Verwijder Bestaand Plan*)

Optie 3: Create New Plan (*Maak Nieuw Plan*)

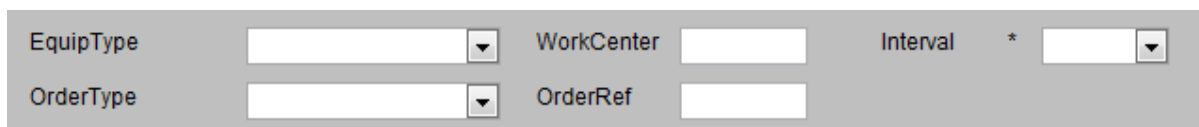
Voor Optie 1 en Optie 2 komen de volgende velden tevoorschijn:



A form with two rows. The first row has the label 'Order' followed by an asterisk and a text input field. The second row has the label 'Plan' followed by an asterisk and a text input field.

Omdat het om een bestaand plan en order gaat, moet er aangegeven worden om welk plan en order het gaat.

Voor Optie 3 komen de volgende velden tevoorschijn:



A form with two rows. The first row contains 'EquipType' with a dropdown menu, 'WorkCenter' with a text input field, and 'Interval' with an asterisk and a dropdown menu. The second row contains 'OrderType' with a dropdown menu and 'OrderRef' with a text input field.

Omdat het om een bevinding gaat in het veld en omdat er een nieuw plan aangevraagd wordt moet het verzoek verder compleet gemaakt worden door bovenstaande velden in te vullen.

Wat nu rest, voor zowel Optie 1, 2 en 3, is het invullen van de laatste velden Description (*Beschrijving*), Reason (*Reden*) en Estimate (*Kostenschatting*).



A form with three rows. The first row is labeled 'Description' with an asterisk and contains a text input field with the placeholder '<Description>'. The second row is labeled 'Reason' with an asterisk and contains a text input field with the placeholder '<Reason>'. The third row is labeled 'Estimate' with an asterisk and contains a text input field with the placeholder '<Estimate>'. The form has a vertical scrollbar on the right side.

Description: Beschrijving van het verzoek.

Reason: Reden van het verzoek.

Estimate: Schatting van de kosten.

Het verzoek is nu klaar. Een overzicht van het verzoek kan getoond worden door op *Preview Request* te drukken. Dit overzicht is een word-file en kan dus ook geprint worden wanneer dit gewenst is.

De aanvrager drukt nu op *Exit with Save* wanneer hij/zij het verzoek wilt opslaan en indienen. De aanvrager drukt op *Exit without Save* wanneer hij/zij het verzoek niet wilt opslaan en indienen.

Wanneer de aanvrager op *Exit with Save* heeft geklikt verschijnt er automatisch een nieuwe e-mail aan de ontvanger (de Reliability Engineer). Wanneer dit gewenst is kan hier nog tekst aan toegevoegd worden. Zo niet, dan kan deze verstuur worden.

Zie volgende pagina:

Send	To...	<name>@shell.com
	Cc...	
	Subject:	Creation/Change/Deletion of Preventive Plan

Dear Reliability Engineer,

This is a message because of a new request in the MTLP database that concerns you.


It's about a Change of a Preventive Plan on the CC2, Functional location N011-CC2-P1234.

Request ID is 169.

Kind regards,

Jorick de Vries
SNR-DMS/729
Maintenance Excellence

CK6 Open Office
Loc. Shell Nederland Raffinaderij B.V.
P.O. Box 3000, 3190 GA Hoogvliet-Rotterdam, The Netherlands



Email: jorick.deVries@shell.com
Internet: <http://www.shell.com>

Het verzoek is nu geplaatst en de ontvanger is ingelicht.

Het verzoek wordt automatisch voorzien van een ID nummer. Dit ID nummer blijft verbonden aan een verzoek door alle fases van de tool. Het verzoek vervolgd zijn weg door de tool en komt in de volgende button Requests to be Approved. Dit scherm is enkel te zien voor Reliability Engineers en Super Users.

Via de button *Requests to be Approved* heeft de Reliability Engineer een overzicht van alle verzoeken die gedaan zijn. Dit kunnen ook verzoeken zijn voor collega-Reliability Engineers. Omdat de tool op deze manier ingericht is kan (lange) absentie van collega's opgevangen worden. De verzoeken van collega's zijn dus voor andere Reliability Engineers toegankelijk.

Requests to be Approved

DoubleClick on ID for Details

Search in field: Description

Contains:

Undo Selection

ID	Request Date	Requester	Department	PE	Plant	Floc	Type	EquipType	Interval	Order Type	Work Center	Reliability Engineer	Description	Reason	Estimate
109	02-mar-16	de Vries, Jorick	DMS/720	RVC	CC2	N011-CC2-F1234	C						<Description>	<Reason>	<Estimate>

Requester

Department

PE

Plant

Type

Reliability Engineer

Reset Filter

Close

55

Approve Request (Keuren Verzoek)

De Reliability Engineer ziet in dit scherm het verzoek dat ingediend is. Het verzoek wordt nu onderzocht door de Reliability Engineer.

Approve Request

Date: 02-mei-16 ID: 169

Name: de Vries, Jorick

Department: DMS/720

Plant: CC2 PE: RVC Floc: N011-CC2-P1234

Preventive Pl.: Preventive Plan Reliability Eng.: Reliability Engineer

Options:

- ☒ Change Existing Plan
- ☐ Delete Existing Plan
- ☐ Create New Plan

Shutdown Required: ☐ Yes ☒ No

Order: 12345678

Plan: 123456

Description: <Description>

Reason: <Reason>

Estimate: <Estimate>

Status:

Approve/Declined: ☒ Approved ☐ Declined

Work for RE: ☐ Yes ☒ No

Work for PP: ☒ Yes ☐ No

Approved By: 10-mei-16 Jorick de Vries

Close

Voor de verschillende opties zijn twee aanpakken.

- | | |
|--|--------------------------------------|
| Optie 1: Change Existing Plan (<i>Aanpassen Bestaand Plan</i>) | : Bijbehorende studie wordt herzien. |
| Optie 2: Delete Existing Plan (<i>Verwijder Bestaand Plan</i>) | : Bijbehorende studie wordt herzien. |
| Optie 3: Create New Plan (<i>Maak Nieuw Plan</i>) | : Nieuw studie wordt gedaan. |

De Reliability Engineer kan via het opgegeven plannummer en ordernummer refereren naar een studie die in het verleden aan de basis van desbetreffende plan stond. Op basis van het resultaat van bovenstaande acties wordt het verzoek goed- of afgekeurd.

Wanneer een verzoek goedgekeurd is selecteerd de Reliability Engineer de 'Approved' optie.
Wanneer een verzoek afgekeurd is selecteerd de Reliability Engineer de 'Declined' optie:

Status	Approve/Declined	Work for RE	Work for PP
Approved	<input checked="" type="radio"/> Approved <input type="radio"/> Declined	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
Approved By	21-apr-16 Jorick de Vries		

Vervolgens geeft de Reliability Engineer aan of hij/zij en de Preventive Planner nog verder werk te doen heeft voor dit verzoek onder de kopjes Work for RE (*Werk voor RE*) en Work for PP (*Werk voor PP*) door Yes (Ja) of No (Nee) te selecteren. De volgende selecties moeten gedaan worden:

Goedgekeurd verzoek voor een nieuw plan:	Work for RE = Yes, Work for PP = Yes
Goedgekeurd verzoek voor verandering of verwijdering:	Work for RE = No, Work for PP = Yes
Afgekeurd verzoek voor een nieuw plan:	Work for RE = No, Work for PP = No
Afgekeurd verzoek voor verandering of verwijdering:	Work for RE = No, Work for PP = No

De Reliability Engineer slaat het verzoek op en sluit het scherm af. Het verzoek verdwijnt nu uit de lijst van Requests to be Approved (*Verzoeken nog te Keuren*). Goedgekeurde verzoeken worden nu doorgezet naar het de button Approved Requests (*Goedgekeurde Verzoeken*). Afgekeurde verzoeken worden doorgezet naar de button Declined Requests (*Afgewezen Verzoeken*). Deze zijn te vinden in het hoofdmenu van de MTLP tool.

Approved Requests (*Goedgekeurde Verzoeken*)

De Preventive Planner ziet in de button Approved Requests alle door de Reliability Engineer goedgekeurde verzoeken staan. Het scherm ziet er als volgt uit.

The screenshot shows a table titled "Approved Requests". At the top, there is a search bar with "Search in field: Description" and a "Contains:" filter. Below the search bar is a table with the following columns: ID, Input Date, Requester, Department, PE, Plant, Floc, Type, EquipType, Interval, Order Type, Work Center, Approved By Reliability Engineer, App. Date RE, Work Ready RE, Preventive Planner, and Work Ready PP. The first row of data shows: ID 169, Input Date 02-mei-16, Requester de Vries, Jorick, Department DMS/720, PE RVC, Plant CC2, Floc N011-CC2-P1234, Type C, and others. Below the table, there are filter buttons for Requester, Department, PE, Plant, Type, Reliability Engineer, and Preventive Planner, along with "Reset Filter" and "Close" buttons.

Het goedgekeurde verzoek behoudt zijn ID nummer, wederom te zien uiterst rechts in bovenstaande afbeelding. Door op een ID nummer te klikken, waar de naam van de Preventive Planner staat onder de gelijknamige kolom, wordt het goedgekeurde verzoek getoond.

The screenshot shows the "Approved Request" detail form. It contains the following fields and sections:

- Header:** Date (02-mei-16), ID (169), Bijlage (empty), and an "Open Document" button.
- Form Fields:** Name (de Vries, Jorick), Department (DMS/720), Plant (CC2), PE (RVC), Floc (N011-CC2-P1234), Preventive PI. (redacted), and Reliability Eng. (redacted).
- Options:** A group of radio buttons for "Change Existing Plan", "Delete Existing Plan", and "Create New Plan". A "Shutdown Required" section with "Yes" and "No" radio buttons.
- Form Fields:** EquipType, WorkCenter, Interval, Order (12345678), OrderType, OrderRef, and Plan (123456).
- Description:** A text area with a placeholder "<Description>".
- Reason:** A text area with a placeholder "<Reason>".
- Estimate:** A text area with a placeholder "<Estimate>".
- Update Remarks:** A text area with "Update Remarks" and "Edit Remarks" buttons.
- Remarks:** A text area.
- Status:** A dropdown menu showing "Closed".
- Approve/Declined:** Radio buttons for "Approved" and "Declined".
- Work for RE:** Radio buttons for "Yes" and "No".
- Work for PP:** Radio buttons for "Yes" and "No".
- RE Work Ready:** Radio buttons for "Yes" and "No".
- PP Work Ready:** Radio buttons for "Yes" and "No".
- Approved By:** A text field showing "10-mei-16" and "Jorick de Vries".
- Work Ready By:** A text field showing "10-mei-16" and "Jorick de Vries".
- Buttons:** "Open Tasklist" and "Save and Close".

Er zit hier nog een extra mogelijkheid op om tussentijds een opmerking te plaatsen of aan te passen. Dit kan gedaan worden door de Reliability Engineer en de Preventive Planner om informatie toe te voegen. Door in het veld Update Remarks (*Opmerkingen Updaten*) een opmerking te typen en vervolgens op de button Update Remarks te klikken voegt het programma de opmerking toe aan het grotere veld Remarks (*Opmerkingen*) daaronder.

The screenshot shows a form with two main sections. The top section is labeled 'Update Remarks' and contains a text input field. Below this field are two buttons: 'Update Remarks' and 'Edit Remarks'. The bottom section is labeled 'Remarks' and contains a larger, empty text area for additional comments.

Bestaande opmerkingen kunnen aangepast worden door de opmerking te selecteren en vervolgens op Edit Remarks (*Opmerkingen Aanpassen*) te klikken. De opmerking komt nu weer in het bovenste veld terecht en kan op de zelfde manier als een nieuwe opmerking toegepast worden.

In het voorbeeld die we in deze handleiding gebruiken is er geen werk voor de Reliability Engineer omdat het gaat over het aanpassen van een bestaand plan. Er hoeft dus geen nieuwe studie gedaan te worden. Work for RE staat dus op No. Dit betekent dat RE Work Ready (*RE Werk Klaar*) automatisch op Yes staat.

Dat is voor de Preventive Planner het sein om het verzoek verder op te pakken. De Preventive Planner moet nu een belangrijke taak voldoen. Sterker nog, de volgende stap is eigenlijk waar de MTLT tool om draait. Het uitvoeren van het goedgekeurde verzoek in het preventieve plan. Wanneer de Preventive Planner dit gedaan heeft selecteert hij/zij Yes onder het kopje PP Work Ready (*PP Werk Klaar*).

The screenshot displays a form with several sections. On the left, the 'Status' is set to 'Closed'. To the right, there are two columns of radio buttons. The first column, 'Approve/Declined', has 'Approved' selected. The second column, 'Work for RE', has 'No' selected. The third column, 'Work for PP', has 'Yes' selected. The fourth column, 'RE Work Ready', has 'Yes' selected. The fifth column, 'PP Work Ready', has 'Yes' selected. Below these columns, there are two rows of dates and names. The first row shows '10-mei-16' for both 'Approved By' and 'Work Ready By'. The second row shows 'Jorick de Vries' for both 'Approved By' and 'Work Ready By'.

Wanneer een of beide van RE Work Ready en PP Work Ready nog op No staat blijft het verzoek staan in de lijst van Approved Requests als er op Save and Close geklikt wordt. Wanneer zowel RE Work Ready als PP Work Ready op Yes staan zal het verzoek doorgezet worden als er op Save and Close geklikt wordt.

Het verzoek wordt dan doorgezet naar Closed Requests (*Gesloten Verzoeken*).

Closed Requests (Gesloten Verzoeken)

In deze button, te vinden in het hoofdmenu van de MTLP tool, staan alle verzoeken die goedgekeurd en afgehandeld zijn. De aanvrager kan op deze manier zien dat zijn/haar verzoek goedgekeurd, opgepakt en afgehandeld is.

Closed Requests

DoubleClick on ID for Details

Search in field: Description

Contains:

Undo Selection

ID	Input Date	Requester	Department	PE	Plant	Floc	Type	EquipType	Interval	Order Type	Work Center	Approve By Reliability Engineer	Work Ready RE	Preventive Planner	Work Ready PP
169	02-mei-16	de Vries, Jorick	DMS/720	RVC	CC2	N011-CC2-P1234	C					Jorick de Vries	10-mei-16	Piet Legerstee	10-mei-16

Reset Filter

Close

Een gesloten verzoek ziet er als volgt uit. In geen enkel veld kan nu nog iets aangepast of toegevoegd worden:

Closed Requests

Date ID Bijlage

Name

Department

Plant * PE Floc *

Preventive Pl. Reliability Eng.

Options

☒ Change Existing Plan
☐ Delete Existing Plan
☐ Create New Plan

Shutdown Required

☐ Yes
☒ No

Order *
Plan *

Description *

Reason

Estimate

Remarks

Status

Approve/Declined

☒ Approved
☐ Declined

Work for RE

☐ Yes
☒ No

Work for PP

☒ Yes
☐ No

RE Work Ready

☒ Yes
☐ No

PP Work Ready

☒ Yes
☐ No

Approved By Work Ready By

Declined Requests (*Afgekeurde Verzoeken*)

Er bestaat natuurlijk altijd de kans dat een verzoek afgewezen wordt. Wanneer dit het geval is wordt het verzoek vanuit de button Requests to be Approved (Verzoeken nog te Keuren) meteen doorgezet naar deze lijst.

Long-Term Living Program (LTLP)

Het Long-Term Living Program (LTLP) is bedoeld voor de aanlevering van resultaten van nieuwe studies. De studies worden gedaan door de Reliability Engineers. De LTLP stroming van de Living Program tool is bedoeld voor de connectie tussen het Living Program en het GAME ME process.

De reden dat dit via een tool gebeurt is dat er op deze manier een goed overzicht voor welk equipment, door wie en wanneer er preventieve plannen gemaakt zijn. Daarnaast zijn er nog twee toegevoegde waarden aan deze stroming. De eerste is dat de Reliability Engineers assurance kunnen bieden door een nieuwe mogelijkheid tot controle op nieuwe plannen. Ten tweede, wanneer er iemand (een Reliability Engineer of Preventive Planner) langdurig absent is zijn alle openstaande zaken zichtbaar voor potentiële vervangers. Zo blijft iedereen in controle en creëert de tool een goed overzicht.

The screenshot shows the LTLP Database web application interface. At the top, there is a yellow header bar with the Shell logo on the left, the title "LTLP Database" in the center, and revision/datum information on the right: "Revisie : 2016-03" and "Datum : 4-5-2016". Below the header, the user "Jorick.deVries" is logged in as "Super User". The main interface is divided into three primary sections: "Configuration", "Forms", and "Reports". The "Configuration" section includes fields for "Import" and "Export" paths (both set to "C:\APPS\MTLP\IMPORT\" and "C:\APPS\MTLP\EXPORT\" respectively) and a "Feedback on program" button. The "Forms" section contains buttons for "New Plan Request", "Add Plan Tasklist", "Plans to be made", "Closed Requests", and a "Search Floc in All Requests" button. The "Reports" section includes a "Preview Selectie" button, dropdown menus for "Requester", "Rel. Eng", and "Prev. PL", and a "Closed Requests" button. A "Manual" section is also visible, containing an "About this program" button. The footer of the application shows the copyright "© Braber".

De LTLP tool start, net als de MTLP tool met een startscherm/hoofdmenu. In deze stroming zijn er wederom vier verschillende onderdelen te zien. De onderdelen zijn *Configuration*, *Reports*, *Manual* en *Forms*.

Van deze onderdelen zijn *Configuration*, *Reports* en *Manual* ondersteunende functies.

Configuration: In dit onderdeel zitten verschillende functies en overzichten verwerkt. Hier is extra informatie en data beschikbaar voor de gebruiker.

Manual: Hier kan men de handleiding voor uitleg van de Living Program tool vinden voor hulp of begeleiding tijdens het gebruiken van de tool.

Reports: Voor overzichten van alle verzoeken die zijn gedaan (zowel nog open als gesloten verzoeken) kunnen hier gevonden worden. Hier zit een handige filter en print functie op zodat er een rapport van bijvoorbeeld een persoon (Aanvrager, Reliability Engineer, Preventieve Planner) gemaakt kan worden.

Het meest belangrijke onderdeel van de LTLP tool is het onderdeel *Forms*. Dit onderdeel zal per button uitgelegd worden.

New Plan Request (Nieuw Plan Aanvraag)

De Reliability Engineer heeft een studie gedaan. Deze studie wijst aan dat er verschillende preventieve taken gedaan moeten worden op een bepaalde equipment op het terrein van zijn afdeling.

De aanvrager klikt op de button New Plan Request (*Nieuw Plan Aanvraag*) om een nieuw verzoek voor een preventief plan te doen. De aanvrager vult alle velden in. Hiervan zijn een aantal verplicht; Deze zijn aangegeven met een *. Wanneer de aanvrager op de *Requester Department* button drukt worden een aantal velden automatisch ingevuld omdat de tool de aanvrager herkent.

Dit scherm is zo opgebouwd dat de ontvanger alle benodigde informatie aangeleverd krijgt.

New Request

Date: 10-mei-16 ID: 185

Requester: de Vries, Jorick Requester Department: [button]

Department: DMS/720

Plant: * CD5 PE: RDU

Preventive PI.: [redacted] Reliability Eng.: [redacted]

System: GSAP Study: RCM

Description: <Description>

[Exit Without Save] [Close with Save]

Het verzoek krijgt automatisch een ID nummer toegekend die altijd aan dit verzoek verbonden blijft. In dit voorbeeld is dat ID 185.

De aanvrager drukt nu op *Exit with Save* wanneer hij/zij het verzoek wilt opslaan en indienen. De aanvrager drukt op *Exit without Save* wanneer hij/zij het verzoek niet wilt opslaan en indienen.

Het verzoek wordt nu doorgezet naar de volgende button Add Plan Task list (*Plan Taaklijst Toevoegen*).

Add Plan Tasklist (*Plan Taaklijst Toevoegen*)

Het verzoek is niet compleet zonder de studieresultaten zelf toe te voegen. Dit gebeurt in een aparte button Add Plan Tasklist (*Plan Taaklijst Toevoegen*).

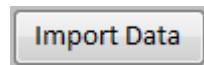
De aanvrager opent zijn nieuw gemaakte verzoek in deze button die te herkennen aan het verkregen ID nummer. Het volgende scherm wordt geopend:

The screenshot shows the 'Add Plans' form. At the top, there is a search bar with 'Search in field: Description' and a 'Contains:' field. Below this is a table with the following columns: ID, Request Date, Requester, Department, PE, Plant, Reliability Engineer, and Description. The first row contains the following data: ID: 185, Request Date: 10-mei-16, Requester: de Vries, Jorick, Department: DMS/720, PE: RDU, Plant: CD5, Reliability Engineer: [redacted], and Description: <Description>. Below the table, there are several input fields for Requester, Department, PE, Plant, and Reliability Engineer, each with a dropdown arrow. At the bottom left, there is a 'Reset Filter' button. At the bottom right, there is a 'Close with Save' button.

Wanneer de aanvrager dubbelklikt op het ID nummer opent de LTLP tool het verzoek waar nu de taken geladen kunnen worden. Een lege aanvraag ziet er als volgt uit:

The screenshot shows the 'Add Plans' form in a detailed view. At the top, there are input fields for Date (10-mei-16), ID (185), Name (de Vries, Jorick), Department (DMS/720), Plant (CD5), PE (RDU), and Reliability Eng ([redacted]). Below these are fields for System (GSAP), Study (RCM), and Description (<Description>). At the bottom, there is a table with the following columns: ID, ObjectID, Floc, Asset Nr, Recommended Action, Notes, Trade, Freq, Action, PM Task Notes, 1st BFD, and Plan. Below the table, there is a 'Records' section with a search bar and a 'No Filter' button. At the bottom left, there is a 'Status' section with a 'Submitted' button and an 'Approve' section with 'Yes' and 'No' radio buttons. At the bottom right, there is an 'Approved By' field. At the very bottom, there is a 'Close and Save' button.

De aanvrager zet in de Import map een export uit APM. Deze kan met een druk op de knop worden geladen in het verzoek voor een nieuw plan. Rechtsboven in het verzoek staat de knop Import Data (*Importeren Data*).



Door hier op te klikken zoekt het programma automatisch het bestand in de Import map dat op de schijf van de computer staat. De regels uit het bestand worden een op een overgenomen en in het verzoek geladen:

ID	ObjectID	Floc	Asset Nr	Recommended Action	Notes	Trade	Freq	Action	PM Task Notes	1st BFD	Plan
185	302026	N011-SDA-E2002A	100000773754	CLEAN ON CONDITION: spoelen van de ROSE heat	PEFS R-0848620 voor SDA-E2002A/F;	Operator (RCM, NL)		As soon as nec	New	Opnemen in TMP	
185	302027	N011-SDA-E2002A	100000773754	SCHEDULED CLEANING: openen en reinigen van de	PEFS R-0848620 voor SDA-E2002A/F;	Craftsman (RCM, NL)	Turn Around	New	Opnemen in TMP		
185	281230	N011-SDA-E2002B	100000773755	SCHEDULED MONITORING: monitor ROSE heat excl	K-waarde monitoren in PTM	Technology	month3				
185	281233	N011-SDA-E2002B	100000773755	CLEAN ON CONDITION: spoelen van de ROSE heat		Operator (RCM, NL)		As soon as nec			
185	281234	N011-SDA-E2002B	100000773755	SCHEDULED CLEANING: openen en reinigen van de	PEFS R-0848620 voor SDA-E2002A/F;	Cleaning & Waste coordinator	Turn Around				
185	294527	N011-SDA-E2001A1	100000810067	SCHEDULED CLEANING	Luchtoelers inwendig reinigen;	Staff (RCM, NL)	Turn Around	New	Nieuw preventief plan aanr		
185	294528	N011-SDA-E2001A1	100000810067	SCHEDULED CLEANING	Luchtoelers uitwendig reinigen;	Cleaning & Waste coordinator	year1	New	Nieuw preventief plan aanr		
185	294833	N011-SDA-E2001A1	100000810067	MONITOR FOULING	Vervulling (drukval) monitoren in TMP, elke 3 me	Staff (RCM, NL)	month3	New	Nieuw preventief plan aanr		
185	281086	N011-SDA-E2002A	100000773754	SCHEDULED MONITORING: monitor ROSE heat excl	K-waarde monitoren in PTM	Technology	month3	New	Opnemen in TMP		
185	281235	N011-SDA-E2002C	100000773756	SCHEDULED MONITORING: monitor ROSE heat excl	K-waarde monitoren in PTM	Technology	month3				
185	281237	N011-SDA-E2002C	100000773756	CLEAN ON CONDITION: spoelen van de ROSE heat		Operator (RCM, NL)		As soon as nec			
185	281238	N011-SDA-E2002C	100000773756	SCHEDULED CLEANING: openen en reinigen van de	PEFS R-0848620 voor SDA-E2002A/F;	Cleaning & Waste coordinator	Turn Around				
185	281240	N011-SDA-E2002D	100000773757	SCHEDULED MONITORING: monitor ROSE heat excl	K-waarde monitoren in PTM	Technology	month3				
185	281242	N011-SDA-E2002D	100000773757	CLEAN ON CONDITION: spoelen van de ROSE heat		Operator (RCM, NL)		As soon as nec			

Records: 14 of 57

Status: Approved ☒ Yes ☐ No

Approved By: Jorick de Vries

De aanvrager selecteerd nu Yes onder het kopje Approve wanneer alle data goed staat. Het verzoek is nu compleet en kan verzonden en gesloten worden door op Close with Save (*Afsluiten met Opslaan*) te klikken onderaan het scherm.

Het verzoek wordt doorgezet naar Plans to be Made (*Plannen nog te Maken*).

Plans to be Made (*Plannen nog te Maken*)

De Preventive Planner heeft nu de taak om de opgegeven taken te vertalen in een of meerdere nieuwe plannen. Dit doet hij/zij door in de button Plans to be Made (*Plannen nog te Maken*) op het ID nummer te klikken waar zijn naam staat onder het kopje *Preventive Planner*.

Plans to be made

DoubleClick on ID for Details

Search in field: **Description** Contains: Undo Selection

ID	Input Date	Requester	Department	PE	Plant	Approved By	Approved	Preventive Planner	Work Ready PP	Checked Done	Description
185	10-mei-16	de Vries, Jorick	DMS/720	RDU	CD5	Jorick de Vries	10-mei-16				<Description>

Requester: Department: PE: Plant: Reliability Engineer: Preventive Planner:

De Preventive Planner ziet alle taken staan die uit de studies komen. De Preventive Planner bestudeert eerst of er al plannen bestaan waar een taak in toegevoegd kan worden. Wanneer dit niet het geval is wordt er een nieuw plan gemaakt in SAP.

Plans to be made

Date: 10-mei-16 ID: 185

Name: de Vries, Jorick

Department: DMS/720

Plant: CD5 PE: RDU

Preventive PI: Reliability Eng.

System: GSAP Study: RCM

Description: <Description>

Update Remarks: Update Remarks Edit Remarks

Remarks:

ID	ObjectID	Flec	Asset Nr	Recommended Action	Notes	Trade	Freq	Action	PM Task Notes	1st BFD	Plan
185	30202/N011-SDA-E2002A		100000773754	CLEAN ON CONDITION: spoelen van de ROSE heat	PEFS R-0848620 voor SDA-E2002A/F	Operator (RCM, NL)		As soon as nei/New	Opnemen in TMP		
185	30202/N011-SDA-E2002A		100000773754	SCHEDULED CLEANING: openen en reinigen van de PEFS R-0848620 voor SDA-E2002A/F		Craftsmen (RCM, NL)		Turn Around	New	Opnemen in TMP	
185	281230/N011-SDA-E2002B		100000773755	SCHEDULED MONITORING: monitor ROSE heat exch K-waarde monitoren in PTM		Technology		month3			
185	281233/N011-SDA-E2002B		100000773755	CLEAN ON CONDITION: spoelen van de ROSE heat		Operator (RCM, NL)		As soon as nei			
185	281234/N011-SDA-E2002B		100000773755	SCHEDULED CLEANING: openen en reinigen van de PEFS R-0848620 voor SDA-E2002A/F		Cleaning & Waste coordinator		Turn Around			
185	294527/N011-SDA-E2001A1		100000810067	SCHEDULED CLEANING: Luchtkoeler invendig reinigen		Staff (RCM, NL)		Turn Around	New	Nieuw preventief plan aanr	
185	294528/N011-SDA-E2001A1		100000810067	SCHEDULED CLEANING: Luchtkoeler uwendig reinigen		Cleaning & Waste coordinator		year1	New	Nieuw preventief plan aanr	
185	294533/N011-SDA-E2001A1		100000810067	MONITOR FOULING: Vervulling (drukval) monitoren in TMP, elke 3 mei		Staff (RCM, NL)		month3	New	Nieuw preventief plan aanr	
185	281086/N011-SDA-E2002A		100000773754	SCHEDULED MONITORING: monitor ROSE heat exch K-waarde monitoren in PTM		Technology		month3	New	Opnemen in TMP	
185	281235/N011-SDA-E2002C		100000773756	SCHEDULED MONITORING: monitor ROSE heat exch K-waarde monitoren in PTM		Technology		month3			
185	281237/N011-SDA-E2002C		100000773756	CLEAN ON CONDITION: spoelen van de ROSE heat		Operator (RCM, NL)		As soon as nei			
185	281239/N011-SDA-E2002C		100000773756	SCHEDULED CLEANING: openen en reinigen van de PEFS R-0848620 voor SDA-E2002A/F		Cleaning & Waste coordinator		Turn Around			
185	281240/N011-SDA-E2002D		100000773757	SCHEDULED MONITORING: monitor ROSE heat exch K-waarde monitoren in PTM		Technology		month3			
185	281247/N011-SDA-E2002D		100000773757	CLEAN ON CONDITION: spoelen van de ROSE heat		Operator (RCM, NL)		As soon as nei			

Record: 1 of 57 No Filter Search

Status: Approved ☐ Yes ☐ No

Approved By: 10-mei-16 Jorick de Vries

PP Work Ready: ☐ Yes ☐ No

Work Ready By:

Check Done: ☐ Yes ☐ No

Close with Save

In het verzoek waar de plannen in staan moet de Preventive Planner vervolgens het plannummer toevoegen in de tabel (uiterst links in de kolom *Plan*). Dit zou voor elke regel in het verzoek een ander nummer kunnen zijn. Het zou ook kunnen dat elke taak in het zelfde preventieve plan terecht gekomen is in SAP.

Dit ziet er als volgt uit (omcirkeld):

ID	ObjectID	Floc	Asset Nr	Recommended Action	Notes	Trade	Freq	Action	PM Task Notes	1st BFD	Plan
185	302026	N011-SDA-E2002A	100000773754	CLEAN ON CONDITION: spoelen van de ROSE heat	PEFS R-0848620 voor SDA-E2002A/F;	Operator (RCM, NL)	As soon as ne	New	Opnemen in TMP		123456
185	302027	N011-SDA-E2002A	100000773754	SCHEDULED CLEANING: openen en reinigen van de	PEFS R-0848620 voor SDA-E2002A/F;	Craftsman (RCM, NL)	Turn Around	New	Opnemen in TMP		123456
185	281230	N011-SDA-E2002B	100000773755	SCHEDULED MONITORING: monitor ROSE heat exci	K-waarde monitoren in PTM	Technology	month3				123456
185	281233	N011-SDA-E2002B	100000773755	CLEAN ON CONDITION: spoelen van de ROSE heat		Operator (RCM, NL)	As soon as ne				123456
185	281234	N011-SDA-E2002B	100000773755	SCHEDULED CLEANING: openen en reinigen van de	PEFS R-0848620 voor SDA-E2002A/F;	Cleaning & Waste coordinator	Turn Around				123456
185	294827	N011-SDA-E2001A1	100000810067	SCHEDULED CLEANING	Luchttoeler inwendig reinigen;	Staff (RCM, NL)	Turn Around	New	Nieuw preventief plan aanr		789012
185	294828	N011-SDA-E2001A1	100000810067	SCHEDULED CLEANING	Luchttoeler uitwendig reinigen;	Cleaning & Waste coordinator	year1	New	Nieuw preventief plan aanr		789012
185	294833	N011-SDA-E2001A1	100000810067	MONITOR FOULING	Vervulling (drukval) monitoren in TMP, elke 3 m	Staff (RCM, NL)	month3	New	Nieuw preventief plan aanr		789012
185	281086	N011-SDA-E2002A	100000773754	SCHEDULED MONITORING: monitor ROSE heat exci	K-waarde monitoren in PTM	Technology	month3	New	Opnemen in TMP		345678
185	281235	N011-SDA-E2002C	100000773756	SCHEDULED MONITORING: monitor ROSE heat exci	K-waarde monitoren in PTM	Technology	month3				345678
185	281237	N011-SDA-E2002C	100000773756	CLEAN ON CONDITION: spoelen van de ROSE heat		Operator (RCM, NL)	As soon as ne				345678
185	281239	N011-SDA-E2002C	100000773756	SCHEDULED CLEANING: openen en reinigen van de	PEFS R-0848620 voor SDA-E2002A/F;	Cleaning & Waste coordinator	Turn Around				345678
185	281240	N011-SDA-E2002D	100000773757	SCHEDULED MONITORING: monitor ROSE heat exci	K-waarde monitoren in PTM	Technology	month3				345678
185	281242	N011-SDA-E2002D	100000773757	CLEAN ON CONDITION: spoelen van de ROSE heat		Operator (RCM, NL)	As soon as ne				345678

Er zit hier nog een extra mogelijkheid op om tussentijds een opmerking te plaatsen of aan te passen. Dit kan gedaan worden door de Reliability Engineer en de Preventive Planner om informatie toe te voegen. Door in het veld Update Remarks (*Opmerkingen Updaten*) een opmerking te typen en vervolgens op de button Update Remarks te klikken voegt het programma de opmerking toe aan het grotere veld Remarks (*Opmerkingen*) daaronder.

Update Remarks

Update Remarks

Edit Remarks

Remarks

Bestaande opmerkingen kunnen aangepast worden door de opmerking te selecteren en vervolgens op Edit Remarks (*Opmerkingen Aanpassen*) te klikken. De opmerking komt nu weer in het bovenste veld terecht en kan op de zelfde manier als een nieuwe opmerking toegepast worden.

Wanneer dit alles gedaan is geeft de Preventive Planner aan dat hij/zij klaar is door Yes te selecteren onder het kopje PP Work Ready (*PP Werk Klaar*). Tevens kan er een Excel Export gemaakt en geprint worden wanneer dit gewenst is, door op de Export button te klikken.

Export

PP Work Ready

Yes

No

11-mei-16

PPWorkReadyBy

Jorick de Vries

De plannen zijn nu gemaakt en de uit studie geresulteerde taken zijn vertaald in een preventief plan. Echter, om de kwaliteit te waarborgen is er nog een laatste (verplichte) functie toegevoegd.

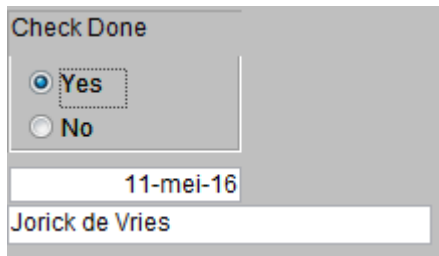
Het verzoek blijft staan in de lijst Plans to be Made (*Plannen nog te Maken*). Onder de kolom Work Ready PP (*Werk Klaar PP*) staat nu een datum:

ID	Input Date	Requester	Department	PE	Plant	Approved By	Approved	Preventive Planner	Work Ready PP	Checked Done
185	10-mei-16	de Vries, Jorick	DMS/720	RDU	CD5	Jorick de Vries	10-mei-16		11-mei-16	

Dit is het sein voor de aanvrager, de Reliability Engineer, dat de taken vertaald zijn in (nieuwe) plannen. Er moet nu een check gedaan worden. De aanvrager opent het verzoek met een dubbelklik op het ID nummer. De aanvrager opent de door de Preventive Planner toegevoegde plannummers in SAP. De preventieve plannen worden gecontroleerd met de vraag: "Zijn de studieresultaten correct vertaald in een preventief plan?".

Wanneer dit niet het geval is neemt de aanvrager contact op met de Preventive Planner. Dit wordt dan besproken en opgelost.

Wanneer het antwoord op de controlevraag 'Ja' is selecteert de aanvrager Yes onder het kopje Check Done (*Check Gedaan*).



Check Done

☒ Yes

☐ No

11-mei-16

Jorick de Vries

De aanvrager klikt nu op Close with Save (*Afsluiten met Opslaan*).

Het verzoek wordt nu doorgezet naar de button Closed Requests (*Gesloten Verzoeken*).

Closed Requests (Gesloten Verzoeken)

Het verzoek is nu ingediend, behandeld, gecheckt en afgesloten. In de button Closed Requests (Gesloten Verzoeken) staan deze verzoeken. Zoals zichtbaar in de afbeelding hieronder staan alle namen en data van de uitgevoerde acties hier vermeld.

Closed Requests									
DoubleClick on ID for Details		Search in field: Description		Contains:		Undo Selection			
ID	Input Date	Requester	Department	PE	Plant	Preventive Planner	Work Ready PP	Checked By	Check Done
185	10-mei-16	de Vries, Jorick	DMS/720	RDU	CD5		11-mei-16	Jorick de Vries	11-mei-16
<Description>									

Reset Filter

Close

Onderaan het scherm is een filterfunctie toegepast. Naarmate de tool langer in gebruik is zal er een langere lijst met gesloten verzoeken staan. Met het filter kan er makkelijk gezocht worden op verschillende variabelen zoals Aanvrager, Afdeling, Fabriek en Preventive Planner.

Werkinstructie

Preventief Onderhoudproces

*Een werkinstructie ter ondersteuning voor het preventief onderhoudproces
Shell Nederland Raffinaderij B.V., Pernis-Rotterdam*

Contents

Introductie
Preventief Onderhoudproces – To-Be (1/2)
Preventief Onderhoudproces – To-Be (2/2)
Stap voor Stap uitleg

Developed by Jorick de Vries

Introductie

Ten behoeve van ondersteuning voor het preventief onderhoudproces is er een werkinstructie gemaakt. Deze werkinstructie is voor Shell personeel die onderdeel uitmaken van dit proces. Wanneer een bepaalde (kern)taak, rol of actie niet duidelijk is kan men terugvallen op deze instructie waar een stap voor stap uitleg gegeven is.

In deze werkinstructie worden verschillende termen en afkortingen gebruikt. Hieronder een overzicht ter verklaring;

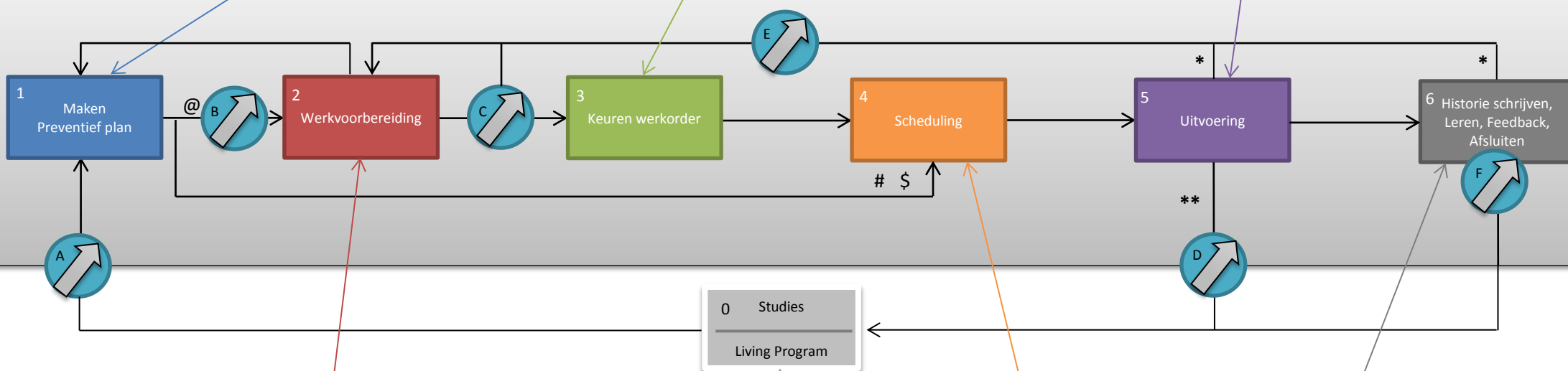
Afkorting/Term	Verklaring
RCM	Reliability Centered Maintenance (studie)
IPF	Instrumental Protective Functions (studie)
HEMP	Hazard Environment M P (studie)
EI	Equipment Integrity (studie)
LTLP en MTLP	Long-Term Living Program en Mid-Term Living Program
FLOC	Functional Location
PP en CP	Preventive Planner en Corrective Planner
RE	Reliability Engineer
TA	Technical Assistant
aOMC	Assistant Operational Maintenance Coordinator
SAP	Naam van ERP systeem dat door Shell gebruikt wordt
APM	Naam van systeem dat door Reliability Engineering gebruikt wordt
AIM	Asset Information Management systeem dat door Shell gebruikt wordt
BSD en BFD	Basic Start Date en Basic Finish Data
Werkorder status (SAP)	Verklaring
WOIP	Work Order In Process – Voorbereidingsfase
WOIP WOPR	Waiting on Operations – Goedkeuringsfase
WAPP	Work Order Approved – Schedulingfase
WAPP REL	Released – Uitvoeringsfase
MCMP	Maintenance Complete – Afsluitingsfase
TECO	Technical Complete – Gesloten

Preventief Onderhoudproces – To-Be (1/2)

1. Maken preventief plan			
#	Verantwoordelijke(n)	Support	Taak/Activiteit
1.1	Preventive Planner		New plan: - Titel + Symbool (@, #, -, \$) New item: - Planning data - Object lijst New tasklist: - Parameters - Operatieregels - Work & Duration - Package - Graphics
1.2	Preventive Planner	Vakman aOMC	Compleet maken taaklijst: - Stelling (afmetingen) - Isolatie (afmetingen) - Kraan (gewichtsklasse) - Materialen (vermelden) - Document nummers (AIM)
1.3	Preventive Planner	Vakman	Bespreken taaklijst, aanpassen waar nodig
1.4	Preventive Planner		Veranderen symbool gecallide WO's met - in titel naar @ of #
1.5	Preventive Planner		WO's met @ → Sr. Planner (WOIP) WO's met # → aOMC (WOIP WOIPR) WO's met \$ → Scheduler (WAPP)
1.6	Preventive Planner	Reliability Engineer	Aanpassen/Verwijderen bestaand plan
1.7	Preventive Planner		Verwerken ontvangen feedback

3. Keuren werkorder			
#	Verantwoordelijke(n)	Support	Taak/Activiteit
3.1	aOMC		SAP status naar WAPP

5. Uitvoering			
#	Verantwoordelijke(n)	Support	Taak/Activiteit
5.1	MTL	Job Leader, Uitvoering	Indienen wijzigingsvoorstel wanneer taak niet uitvoerbaar is (studie inhoudelijk)
5.2	MTL	Job Leader, Uitvoering	Aanvragen deferral wanneer BFD niet gehaald kan worden
5.3	Job Leader		Begeleiden onderhoudsactiviteiten
5.4	Uitvoering	Job Leader	Uitvoeren van onderhoudsactiviteiten volgens het schedule
5.5	Job Leader		SAP status naar MCMP



2. Werkvoorbereiding			
#	Verantwoordelijke(n)	Support	Taak/Activiteit
2.1	Sr. Planner		Verdelen werkmap naar juiste person
2.2	aOMC	Operatie	Toevoegen documentatie
2.3	Corrective Planner	Sr. Planner	Voorbereiden WO: - Aanmaken requisities - Bestellen materialen - Kostenestimatie
2.4	Corrective Planner		SAP status naar WOIP WOIPR
2.5	Corrective Planner		Terugkoppelen aanpassingen naar Preventive Planner

4. Scheduling			
#	Verantwoordelijke(n)	Support	Taak/Activiteit
4.1	Scheduler	aOMC, MTL	Schedule activiteiten
4.2	Scheduler		SAP status naar WAPP REL

0. Studies & Living Program			
#	Verantwoordelijke(n)	Support	Taak/Activiteit
Studies			
0.1	Reliability Engineer		Uitvoeren van studies
0.2	Reliability Engineer		Aanvragen nieuw preventief plan
Living Program			
0.3	Reliability Engineer		Goed- of afkeuren wijzigingsvoorstel en/of deferral aanvraag
0.4	Reliability Engineer		Doorzetten goedgekeurd wijzigingsvoorstel in MTLP tool
0.5	Reliability Engineer		Terugkoppelen goedgekeurde deferral aanvraag met nieuwe BFD

6. Historie schrijven, Leren, Feedback geven, Afsluiten			
#	Verantwoordelijke(n)	Support	Taak/Activiteit
6.1	Job Leader	Uitvoering	Historie schrijven en opslaan in SAP
6.2	Job Leader		Feedback schrijven betreft praktische uitvoerbaarheid
6.3	@: Sr. Planner # / \$: Preventive Planner		Controleren invoices en SAP status naar TECO

* Feedback betreft praktische zaken
** Feedback betreft studieinhoud

#	Verantwoordelijke(n)	Support	Taak/Activiteit
B.1	Reliability Engineer	Preventive Planner	Checken nieuw gemaakte preventieve plannen
B.2	Sr. Planner		Overzicht en checken via plannerslijst

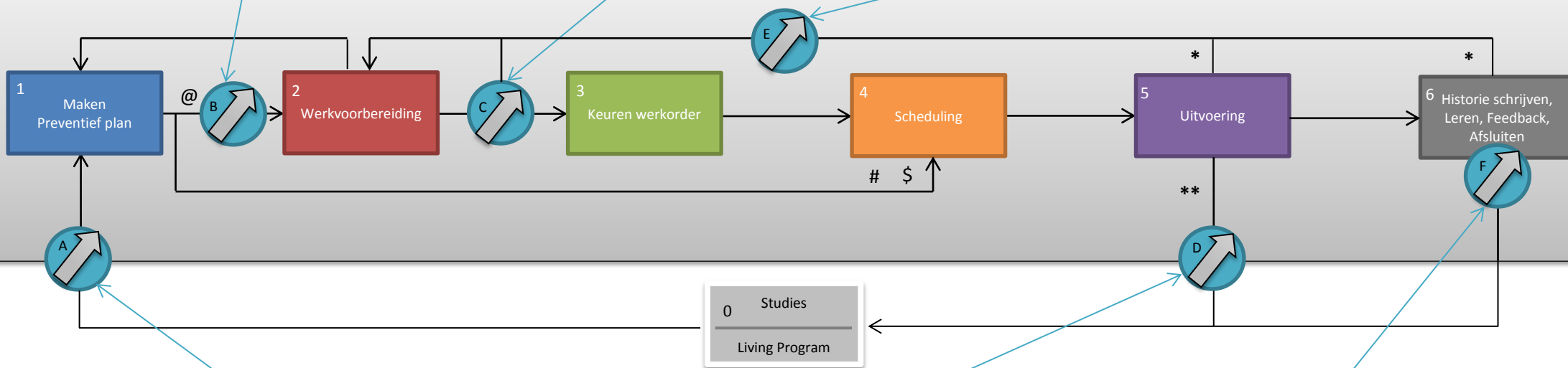
#	Verantwoordelijke(n)	Support	Taak/Activiteit
C.1	aOMC		Checken werkorder: - Op taaklijst - Op documentatie - Op kosten estimatie
C.2	aOMC	Preventive Planner	Terugkoppelen aanpassingen

#	Verantwoordelijke(n)	Support	Taak/Activiteit
E.1	Job Leader		Verplicht invullen feedback op het voorblad van werkmap; (Bij geen bijzonderheden 'N.v.t.' opschrijven)
E.2	Job Leader	Corrective Planner Preventive Planner Sr. Planner	Zekerstellen dat werkmap bij de voorbereider terugkomt

#	Verantwoordelijke(n)	Support	Taak/Activiteit
A.1	Reliability Engineer		Standaard formulier voor aanvraag nieuw preventief plan + nieuwe stroming in Living Program tool

#	Verantwoordelijke(n)	Support	Taak/Activiteit
D.1	Aanvrager		Verschillende verplicht in te vullen velden in de MTLP tool voor indienen wijzigingsvoorstel

#	Verantwoordelijke(n)	Support	Taak/Activiteit
F.1	Reliability Engineer	Uitvoering Preventive Planner	Evalueren en analyseren geschreven historie van uitgevoerd preventief onderhoud



0. Studies

0.1 Uitvoeren van studies

Het process start met bijvoorbeeld een RCM, IPF, HEMP of EI studie. Reliability Engineers (RE) doen die studie op basis van literatuur, wet- en regelgeving, kostenberekeningen en equipment specificaties. In deze handleiding gaan we niet verder in op hoe de studies exact uitgevoerd worden omdat die buiten de GAME ME grenzen valt. Echter omdat de studieresultaten de input zijn van het preventieve onderhoudprocess wordt dit wel benoemd in deze beschrijving.

0.2 Aanvragen nieuw preventief plan

De RE maakt een nieuwe aanvraag in de LTLP tool. Hij/zij vult de juiste data in zoals datum, aanvrager (RE), afdeling, fabriek, FLOC en Preventive Planner (PP). Vervolgens geeft hij/zij aan in welk systeem er actie genomen moet worden. Voor preventief onderhoud in het GAME ME is dit in alle gevallen SAP. Verder moet er in deze aanvraag aangegeven worden welke studie er gedaan is en welk ordertype (MX01, MX02 of MX09) het nieuwe plan moet genereren. Dit laatste is belangrijk i.v.m. het schrijven van historie (MX02 orders). De RE geeft aan of er historie geschreven moet worden of niet. Uit het APM systeem laadt de RE een export in de aanvraag met de taken die verwerkt moeten worden in een preventief plan. De aanvraag is nu compleet en wordt opgeslagen en afgesloten.

A. Aanleveren studieresultaten

A.1 Standaard template voor aanvragen preventief plan

Wanneer de RE zijn studie gedaan heeft moeten de resultaten doorgestuurd worden aan de PP. Om zeker te stellen dat alle benodigde informatie doorgestuurd wordt is er een standaard template gemaakt. Deze template is gemaakt in overleg met de PP en de RE. Deze standaard template is verwerkt in de LTLP tool.

1. Maken preventief plan

1.1 Maken nieuw preventief plan

De PP ziet in zijn lijst in de LTLP tool dat er een nieuwe aanvraag gedaan is voor zijn/haar afdeling. Door de aanvraag te openen ziet de PP alle informatie die de RE daar in gezet heeft. De PP kan nu een nieuw plan maken in SAP. In het plan voegt de PP een titel + symbool*en Schedule parameters toe. Elk preventief plan bestaat uit een of meerdere items met een taaklijst er aan gebonden. Een Item is hetgeen dat 12 weken voor de BFD werkorder(s) genereerd en bestaat uit Planning data en een Object list. De taaklijst bestaat uit Operatieregels, Work&Duration, Intervallen, Parameters en Graphics. Een preventief plan in SAP bestaat dus uit Plan data, Item data en Taaklijst data:

a. Plan data: Titel + Symbool (@, #, \$, -)

Het symbool in de titel bepaald welke route een door het plan gegenereerd werkorder zal volgen.

@ De taaklijst van dit plan bevat een taak voor een contractor of er moeten materialen besteld worden. Voor dit werkorder is werkvoorbereiding benodigd.

De taaklijst van dit plan bevat geen taken voor contractors en er hoeven geen materialen besteld worden. Er is dus geen werkvoorbereiding benodigd.

- Stel een taaklijst bevat een taak voor een contractor met een jaarlijkse frequentie en een taak voor Shell personeel met een halfjaarlijkse frequentie. Dit betekent dat alle oneven werkorders een # in de titel moeten, en alle even een @ in de titel moeten.

\$ De taaklijst van dit plan bevat een taak voor de SBKD. De SBKD is een team van Shell personeel zowel getraind als brandweer en als monteur voor ondersteuning tijdens onderhoudactiviteiten.

b. Item data: Planning data en object lijst.

c. Taaklijst data: Parameters, Operatieregels (taken), Work&Duration, Package(s) en Graphics.

1.2 Compleet maken taaklijst

Wanneer er een nieuw preventief plan gemaakt is in SAP kan de taaklijst niet compleet gemaakt worden met enkel de input van de RE omdat deze input geen informatie bevat betreft praktische zaken. Daarom, om herhalend werk te voorkomen in de werkvoorbereiding, moet de PP de taaklijst compleet maken met:

- Stelling afmetingen
- Isolatie afmetingen
- Gewichtsklasse kraan
- Vermelden benodigde materialen
- Document nummers in AIM

1.3 Bespreken taaklijst met vakman

Om te zorgen voor kwaliteit en om problemen in de uitvoering te voorkomen wordt een nieuw gemaakt preventief plan besproken met de vakman van het Main Workcentre. De taaklijst wordt door de PP met de desbetreffende vakman doorgenomen. Wanneer er dingen onduidelijk zijn zal dit uitgelegd worden door de PP of, bij onjuistheden, wordt de taaklijst aangepast door de PP. Het plan is nu helemaal compleet en kan opgeslagen worden. Het SAP nummer van het preventief plan zal in de LTLP tool gezet worden door de PP.

1.4 Veranderen symbool

SAP genereert wekelijks all werkorders met een BFD van <12 weken vanaf dat moment. Dit gebeurt in de nacht van dinsdag op woensdag. Zoals eerder uitgelegd in sectie 1.1 bevatten sommige orders een - (streepje) in de titel. Echter wanneer een werkorder gegenereerd wordt zal dit of een @ of een # moeten worden. De PP bepaalt welk symbool dit moet zijn en past het werkorder zodoende aan. De SAP status van alle gegenereerde orders staan automatisch op WAPP (Work order Approved).

1.5 Verdelen werkorders

Een lijst met werkorders met een @, een # of een \$ blijft nu over. Deze werkorders krijgen verschillende SAP statussen en worden verdeeld naar verschillende mensen:

- @ SAP status verandert van WAPP naar WOIP (Work Order In Process). De PP maakt een werkmap en geeft deze af aan de Sr. Planner van de juiste afdeling.
- # SAP status blijft WAPP. De PP informeert de Scheduler over het werkorder.
- \$ SAP status blijft WAPP. De PP informeert de Scheduler over het werkorder. De Scheduler spreekt een geschikte datum af met de SBKD.

1.6 Aanpassen of verwijderen bestaand plan

De PP ziet goedgekeurde verzoeken, voor het aanpassen of verwijderen van bestaande plannen of het verzoek voor een nieuw plan, in de MTLP tool. Deze verzoeken gaan enkel over studieinhoudelijke zaken. De gewenste aanpassing, verwijdering of het nieuwe plan kan gevonden worden onder het kopje 'Approved Requests'. Deze aanpassingen worden toegepast in een bestaand plan wat vervolgens resulteert in een aangepast werkorder 12 weken voor de BFD.

1.7 Verwerken feedback

Naast de wijzigingsvoorstellen in de MTLP tool, die gaan over studieinhoudelijke zaken, zijn er ook mogelijke wijzigingen in een plan gewenst die gaan over praktische zaken. Dit zou bijvoorbeeld geen stellingregels of verkeerde stellingmaten in de longtext. Deze feedback komt vanuit de uitvoering of voorbereiding en wordt via de mail of via het voorblad van het werkmapje. Deze feedback wordt bekeken en verwerkt door de PP.

B. Preventieve plannen

B.1 Checken nieuwgemaakte preventieve plannen

De RE ziet in de LTLP tool dat een nieuw plan gemaakt is op verzoek van hem/haar. Zoals uitgelegd in sectie 1.3 vermeldt de PP het SAP nummer van het nieuwe plan in de LTLP tool nadat het plan gereed

is. De RE zoekt het plan op in SAP en checkt of de studieresultaten correct vertaald zijn in een preventief plan. Wanneer dit het geval is drukt de RE op 'Accepted' in de LTLP tool en het verzoek tot nieuw plan wordt afgesloten en opgeslagen. Wanneer dit niet het geval is drukt de RE op 'Declined' en krijgt de PP een seintje dat er iets niet goed is in het preventieve plan. Het verzoek blijft dan op dezelfde plek in de tool staan.

B.2 Overzicht en check via plannerslijst

Alle orders die werkvoorbereiding nodig hebben (orders met een @) verschijnen op een plannerslijst gezamenlijk met alle correctieve werkorders. De Sr. Planner houdt deze lijst bij en vernieuwt deze wekelijks. Door deze lijst krijgt de Sr. Planner overzicht over de werkvoorbereiding en kan hij werkorders die van de lijst af zijn controleren op kwaliteit. Wanneer een werkorder zijn WOIP duedatum lijkt te overschreiden kan de Sr. Planner op tijd ingrijpen.

2. Werkvoorbereiding

2.1 Verdelen werkmap

De Sr. Planner verdeelt de preventieve werkmap aan de juiste werkvoorbereider voor verdere voorbereiding.

2.2 Toevoegen documentatie

Aan het werkmapje van een werkorder moet de nodige documentatie toegevoegd worden. Deze documenten zijn bijvoorbeeld P&ID, separatiemap, flenzenlijst en productinfo. Deze documentatie staat opgeslagen per FLOC in AIM en wordt vanaf daar geprint en in de map bijgevoegd.

2.3 Voorbereiden werkorder

Vorbereiding van een werkorder houdt drie voorname dingen in: Aanmaken requisities, bestellen materialen en het maken van een kostenschatting van de totale onderhoudactiviteiten. Dit wordt gedaan door de Corrective Planner (CP).

a. Requisitie: De requisitie is een verzoek of bestelling van de services van een contractor. Dit is gebaseerd op het contract die Shell met desbetreffende vendor heeft. De requisitie wordt gemaakt en opgeslagen in SAP en krijgt een requisitite nummer. Daarnaast wordt er door de Corrective Planner een longtext gemaakt waarin verschillende gegevens, opdrachtomschrijving en andere data gezet wordt. Een longtext is gekoppeld aan een operatieregel in de taaklijst.

b. Materialen bestellen: Het bestellen van materialen gebeurt op dezelfde manier als het bestellen van services door contractors namelijk door het maken van een requisitie. Sommige MESC codes en kosten van materialen staan in SAP opgeslagen, zo niet, dan kan er een offerte aangevraagd worden bij de leverancier. De bestelling wordt gedaan in SAP en de leverancier levert deze op de afgesproken leverdatum af in het juiste magazijn.

c. Kostenestimatie: De CP maakt een schatting van de kosten van de desbetreffende onderhoudactiviteiten. Dit wordt gedaan met behulp van tool en quick reference kaarten beiden gebaseerd op contracten. De CP voegt de kostenestimatie in het werkorder in SAP en slaat het SAP werkorder op.

2.4 Verander SAP status

De CP verandert de SAP status van WOIP naar WOIP WOPR (Waiting on Operations). Dit geeft aan dat het werkorder gekeurd moet worden door de aOMC. Het order verdwijnt nu van de plannerslijst.

2.5 Terugkoppelen aanpassingen naar Preventive Planner

Ook al is een preventief plan zo compleet mogelijk gemaakt dan nog is het niet perfect. Elke aanpassing die nodig is in de werkvoorbereiding door de CP moet teruggekoppeld worden aan de PP. De PP past vervolgens het bijbehorende preventieve plan aan. Hierdoor komt het volgende werkorder uit dit plan verbeterd op in SAP wat resulteert in minder herhaaldelijk werk in de

werkvoorbereiding. Wanneer dit proces voor een langere tijd nageleefd wordt stijgt de kwaliteit van de preventieve plannen en dus ook van de werkorders.

C. Werkorder kwaliteit

C.1 Checken werkorder

- a. Taaklijst inhoud: De aOMC checkt de inhoud van de taaklijst. Dit zouden onjuistheden qua taken kunnen zijn maar ook verkeerde regels voor bijvoorbeeld separeren van equipment. Ook typefouten kunnen eventueel opgemerkt en aangepast worden.
- b. Documentatie: De documentatie staat zoals beschreven in sectie 2.2 in AIM en wordt geprint en in het werkmapje gevoegd. Deze documentatie kan echter verouderd zijn en wordt gecontroleerd door de aOMC.
- c. Kostenestimatie: Dit wordt gedaan als korte check op bijvoorbeeld typefouten in de kostenschatting. De kostenschatting is het geld dat gereserveerd wordt voor een bepaald werkorder. Wanneer er perongeluk een nulletje teveel of te weinig of een komma te verkeerd getypt is kan dit dus onnodige gevolgen hebben.

C.2 Terugkoppelen aanpassingen

Wanneer de aOMC genooddaakt is aanpassingen te doen zal dit teruggekoppeld en overlegd worden met de CP. De CP zal vervolgens deze aanpassingen verder terugkoppelen aan de PP zodat dit in het preventieve plan gewijzigd kan worden. Hierdoor zal het volgende werkorder dezelfde fout niet weer bevatten.

3. Keuren werkorder

3.1 Verander SAP status

De aOMC verandert de SAP status van WOIP WOPR naar WAPP en levert het werkmapje aan de Scheduler.

4. Scheduling

4.1 Scheduling activiteiten

De Scheduler ontvangt werkorders betiteld met @ met werkmap van de aOMC en werkordersnummers betiteld met # en \$ via de mail. Wanneer voorgaande stappen correct zijn uitgevoerd staan alle orders nu op WAPP. De activiteiten worden gescheduled door de Scheduler als laatste voorbereidende fase voor de uitvoering. Voor werkorders met een \$ wordt een geschikte uitvoerdatum afgestemd met SBKD.

4.2 Verander SAP status

Wanneer alle activiteiten gescheduled zijn in Primavera moet de SAP status verandert worden. De SAP status gaat van WAPP naar WAPP REL (Release). Alle verschillende orders staan nu in het schedule en zijn klaar om uitgevoerd te worden.

5. Uitvoering

5.1 Wijzigingsvoorstel wanneer uitvoering niet mogelijk is

Voor of tijdens de start van uitvoering van activiteiten kunnen problemen aan het licht komen die uitvoering niet mogelijk maken. Er moet hier onderscheid gemaakt worden tussen twee soorten.

* Praktische uitvoering: Problemen die gaan over praktische zaken, zoals geen of verkeerde stellingen en/of isolatie, foutieve documentatie, foutieve Work&Duration, dan wordt dit teruggekoppeld middel email of het feedbackveld op het voorblad van de werkmap. Tevens kan dit probleem eenmalig opgelost worden door de Job Leader en de CP zodat de uitvoering door kan gaan. Er moet hier geen wijzigingsvoorstel gedaan worden in de MTLP tool.

**** Studieinhoudelijk:** Wanneer het probleem gaat over de studieinhoud, zoals reinigen van een filter die voor de zoveelste keer schoon bleek na opening, maakt de MTL of Job Leader een wijzigingsvoorstel in de MTLP tool. De RE wordt op de hoogte gesteld van het wijzigingsvoorstel t.b.v. keuring.

5.2 Aanvragen deferral wanneer BFD niet gehaald kan worden

Wanneer blijkt dat de BFD niet gehaald kan worden wordt er een deferral aangevraagd. Dit is een verzoek tot uitstel van de BFD zodat het order niet overduide raakt en de RE op de hoogte is van de uitloop. In de deferral staan ook de mitigerende maatregelen. De RE geeft goed- of afkeuring voor het verzoek.

5.3 Begeleiden onderhoudactiviteiten

Alle onderhoudsuitvoering wordt begeleid door een toegewezen Job Leader. De Job Leader kan zowel een Technisch Assistent (TA) als een Field Supervisor en zelf een CP zijn.

5.4 Uitvoeren onderhoud

Wanneer er geen problemen (meer) zijn en alle voorbereidingen correct gedaan zijn kan het geplande preventieve onderhoud uitgevoerd worden. Alle taken worden uitgevoerd volgens het schedule door monteurs, operators of SBKD'ers. Wanneer een operatieregeling gereed is wordt deze afgemeld in SAP door een 'C' te plaatsen.

5.5 Veranderen SAP status

Wanneer alle activiteiten gedaan zijn (en dus alle operatieregelingen in SAP op 'C' staan) verandert de systeem status in CNF. De Job Leader verandert in dit geval de SAP status van WAPP naar MCMP (Maintenance Complete).

D. Verplichte velden in MTLP tool

D.1 Verplicht in te vullen velden

Als blijkt dat vanuit het veld het plan gewijzigd/verwijderd of nieuw gemaakt moet worden omdat er studieinhoudelijk iets mist of incorrect is wordt er een wijzigingsvoorstel gedaan in MTLP. Voorbeeld; Het verlengen van een reinigingsinterval omdat het filter brandschoon bleek tijdens het openen van het filter voor geplande reiniging. Dit voorstel kan echter alleen ingediend worden wanneer door het invullen van alle verplichte velden in de MTLP tool.

6. Historie schrijven, Leren, Feedback, Afsluiten

6.1 Historie schrijven en opslaan in SAP

Voor werkorders van het type MX02 wordt er historie geschreven. Deze historie zijn de voornaamste vondsten die de RE nodig heeft voor verdere analyse op equipment. Zoals uitgelegd staat er bij het aanmaken van een nieuw preventief plan aangegeven welk ordertype het plan moet genereren. Een MX02 order heeft een notificatie aangehecht gekregen. SAP laat het enkel toe dit order te sluiten wanneer deze notificatie voorzien is van historie.

6.2 Schrijven van feedback betreft praktische zaken

Om extra zekerheid te geven dat preventieve plannen continu verbeterd worden wordt er feedback geschreven op het voorblad van elke werkmap. Door dit af te geven bij de voorbereider komt dit altijd op de goede plek terecht. Wanneer er geen feedback is wordt er 'N.v.t.' gezet en alsnog ingeleverd bij de voorbereider om deze feedbackloop te borgen.

Voor de werkorders zonder werkmap (# en \$) kan er wanneer nodig feedback gegeven worden middels een email naar de CP of de PP. Op die manier wordt feedback altijd verwerkt in het preventieve plan.

6.3 Controleren invoices en veranderen SAP status

Alle werkorders met een @ vooraan in de titel dragen kosten met zich mee. Deze kosten kunnen zijn voor contractor services, materialen etc. Wanneer een werkorder in SAP gereed gemeld wordt (MCMP) wordt deze financieel gecontroleerd. De contractor of leverancier stuurt een invoice (rekening) en deze moet gecontroleerd en gekeurd worden. Dit wordt gedaan door de Sr. Planner. De Sr. Planner vergelijkt de invoice met de kostenschatting (en eventueel de goedgekeurde meerwerkbonnen). Bij goedkeuring verandert de Sr. Planner de SAP status van MCMP naar TECO (Technically Complete). Bij afkeuring wordt er contact opgezocht met de indiener om dit op te lossen.

Voor werkorders met een # en \$ zijn geen invoices en deze orders kunnen dus meteen op TECO gezet worden. Dit wordt gedaan door de PP.

E. Feedback op het voorblad van de werkmap

E.1 Verplicht invullen feedback op voorblad

Zoals uitgelegd in sectie 5.1 en 6.2 wordt feedback betreft praktische zaken gedaan via de mail of via het voorblad van de werkmap. Om zekerheden en controlepunten toe te passen in het preventieve onderhoudprocess worden feedbackloops toegepast. Deze loop is echter een manier van feedback geven die niet te borgen is. Dit is een kwestie van opvoeden door het verplicht inleveren van de werkmap na uitvoering van het onderhoud.

E.2 Terugkoppelen aanpassingen

Zoals bij alle feedbackloops is het voor de CP verplicht deze te verwerken en eventuele aanpassingen terug te koppelen naar de PP.

F. Checken kwaliteit/resultaat preventief onderhoud

F.1 Evalueren en analyseren geschreven historie

De MX02 orders dragen geschreven historie met zich mee na uitvoering van het onderhoud. De RE's evalueren en analyseren de historie om de kwaliteit te optimaliseren. De RE doet de analyse op twee manieren: De eerste is door periodiek elke twee jaar de gesloten MX02 orders te analyseren. De tweede manier is via het Bad Actor Process te bepalen equipment te analyseren. Deze equipment falen blijkbaar nog steeds ondanks preventief onderhoud; Hier is dus aandacht en eventueel een nieuw of aangepast preventief plan voor nodig.

O. Living Program

0.3 Goed- of afkeuren wijzigingsvoorstel of deferral aanvraag

Het Living Program wordt o.a. gebruikt om wijzigingsvoorstellen of deferral aanvragen te keuren. In eerdere secties is uitgelegd waar deze vandaan komen. Voor wijzigingsvoorstellen ziet de RE in de MTLP tool de voorstellen staan. Deze keurt de RE op basis van de uitgevoerde studie of een herziene studie. Een deferral aanvraag wordt niet via de MTLP tool gedaan. Ook deze wordt door de RE in behandeling genomen en goed- of afgekeurd op basis van een studie.

0.4 Doorzetten goedgekeurde wijzigingsvoorstellen in de MTLP tool

Wanneer de RE een voorstel goedgekeurd geeft hij/zij aan of er werk gedaan moet worden door de PP. Dit is echter bijna altijd het geval. De PP ziet een goedgekeurd voorstel in de MTLP staan onder het kopje 'Approved Requests' met alle informatie die hij/zij nodig heeft om het voorstel toe te passen. Het process start nu weer van voor af aan bij stap 1 (zie sectie 1.1).

0.5 Terugkoppelen goedgekeurde deferral aanvraag

Zoals uitgelegd is er naast het wijzigingsvoorstel ook een deferral procedure. Hier wordt een aanvraag gedaan voor uitstel van de BFD en dus van het preventieve onderhoud omdat de BFD niet gehaald kan worden. Wanneer deze goedgekeurd is door de RE koppelt de RE dit terug naar de aanvrager met een nieuwe BFD. De BFD wordt niet aangepast in Primavera en SAP omdat het

systeem dit niet toelaat zodra het order op WAPP staat. Alternatief: Vermeld nieuwe BFD in description of titel van het werkorder.

Appendix 11 – Project logbook on problems/obstacles

This is an overview of problems that we have faced during the project period. Any person that performs a research will know that in any project one or more obstacles will appear which need to be bypassed or which need to be forcibly broken through. This research is in this respect no exception.

1. In the first phase we suffered some problems regarding scope.
 - **Problem:** Looking too much at studies and how the RE's do their work with received input.
 - **Action:** Discussion with supervisor during a periodical meeting. In this meeting it came clear that my scope had to be set more precisely to improve the project proceedings.
 - **Result:** Clear scope. Only focusing on the preventive maintenance process instead of outside this loop. Taking study input as given without assessing it's quality.
2. Unclear how to identify the quick wins
 - **Problem:** Found potential changes were in my opinion no quick wins. Did not know how to go through the implementation phase.
 - **Action:** Initiated a meeting with my in-company supervisor to solve the problem by setting out a strategy how to identify the quick wins by involving stakeholders. By this mean we more or less outsourced the quick win identification by explaining all improvements/changes with them and extracting their ideas about it in terms of approval and feasibility.
 - **Result:** 2.5 hour workshop with preventive planners and 2x 1 hour session with senior planners. In this meeting the stakeholders have told me which improvements they believed in and we discussed how it could be implemented. In this way we commonly decided what improvements are quick wins.
3. Two parties opposite to each other regarding preventive planning
 - **Problem:** PPs claim that work preparation of preventive work orders is not their job but the job of corrective planners. The Sr. Planners and corrective planners claim it is the job of the PPs.
 - **Action:** Meeting with the PPs to discuss this point considering both options. Meeting with the Sr. Planners to discuss this point as well. Since after the two meetings still two camps were present I have lined up a meeting with two experienced Sr. Planners and two experienced PPs together with me and my supervisor. In this meeting I showed all the steps to be taken from a new plan to an available and complete work package. I then asked them two questions per step: 'Who has to do this?' and 'Should it be done in the plan or in the work order?'
 - **Result:** A new planning process which both parties has accepted and agreed upon. Very effective meeting, desired outcome has been achieved.
4. Phases in implementation
 - **Problem:** I made a big mistake in underestimating the process of implementation. In my opinion the new process thought up by myself would only have been explained to participants before it could indeed be applied for the first time. What I totally forgot is that implementation requires a lot of preparation besides informing involved stakeholders. In this case I owe a lot of thank to my in-company supervisor as she showed me all things that needed to be prepared in order to be able to implement.

- **Action:** I've set up a plan with all required actions that enabled me and the PU to apply the new process. This plan contains of preparations such as designing the new template, setting right all plans that generate a work order in the coming period, informing and discussing with stakeholders etc.
- **Result:** Smooth implementation because of good planning and preparations

5. Measuring implementation success

- **Problem:** During any implementation you want to know what success looks like by measuring the results. I didn't know how to do this since it the changes we have made were really hard to measure by numbers.
- **Action:** The action was to have a discussion about this with my supervisor. I've raised the problem stated above. It became clear that numerical measurements on this implementation were impossible. The following question was asked: What does success look like? I replied that success would be that all steps of the process were indeed applied. For this reason we decided to set out all steps of the process and mark it green, yellow or red with additional remarks/arguments if necessary.
- **Result:** A very clear overview on the entire implementation. An possibility to see for myself where the non-successful parts appeared. In short: Very clear measurement of what success looks like for the implementation.

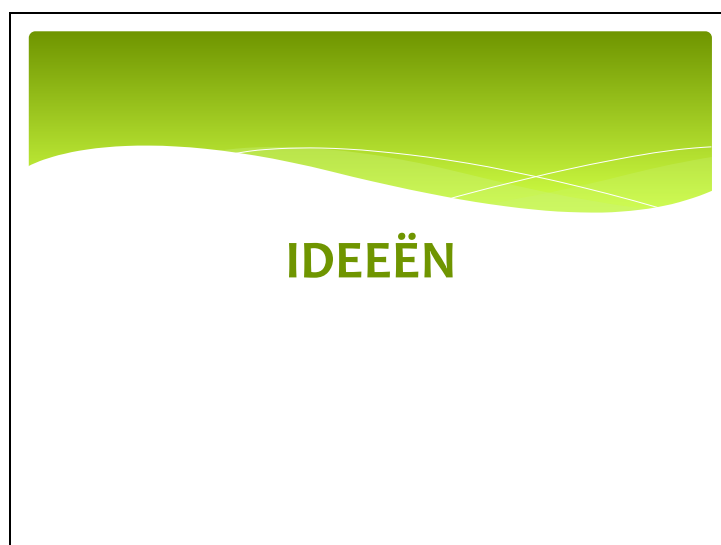
Appendix 12 – Workshop for Preventive Planners



A presentation slide with a green gradient header. The title "Doel van de workshop" is in white. Below the header, on a white background, are four bullet points with green asterisks. To the right of the text is a 3D illustration of three white figures holding hands and standing on a small white platform. The bottom of the slide has a green wavy line graphic.

Doel van de workshop

- * Wat?
Samen verbeteren van de kwaliteit preventief onderhoudproces
- * Wie?
Preventieve Planners
- * Waarom?
Aandeel in het proces is groot
Kennis van inhoud
- * Hoe?
Voorleggen ideeën voor verbetering
Brainstormen nog meer ideeën
Bepalen quick wins + hoe te implementeren



Idee 1

- * Kortsluiten FLOC met RE bij nieuwe studie
- * Controle over aanlevering studieresultaten
 - * Standaard formulier i.p.v. mail
 - * Door RE verplicht in te vullen velden



Voordelen (1/2)

* De voordelen voor Preventieve Planners:

1. Preventieve Planner krijgen altijd de juiste informatie
2. Preventieve Planner hoeft niet meer achter info aan



Voordelen (2/2)

* De voordelen voor het proces:

1. Geen dubbele plannen meer op equipment
2. Geen onjuiste plannen door onduidelijke input

* De voordelen voor de uitvoering:

1. Geen overtollig preventief onderhoud op equipment
2. Geen foutief preventief onderhoud



Taak 1 Preventieve Planners

- * Ontwerpen standaardformulier met RE's
- * Op basis van benodigde informatie voor maken plan



Idee 2

- * Vergroten controle en input Preventieve Planners

Belangrijkste schakel in het process



Voordelen (1/3)

* De voordelen voor Preventieve Planners:

1. Preventieve Planner wordt belangrijker
2. Preventieve Planner houdt controle en overzicht
3. Preventieve Planner draagt veel bij aan verbeteren kwaliteit



Voordelen (2/3)

* De voordelen voor het proces:

1. Persoon met meeste kennis is in controle
2. Betere communicatie;
PP heeft korte banden met zowel RE als met de afdeling
Minder communicatie-schakels
3. Er ontstaat eigenaarschap
4. Minimaliseren herhalend werk (= efficiënt!)



Voordelen (3/3)

* De voordelen voor de uitvoering:

1. Uit te voeren werkzaamheden zijn altijd duidelijk
2. Verminderd wijzigingsvoorstellen
3. Verminderd deferrals
4. Verbetering in KPI compliance



Taak 1 Preventieve Planner

* Studieresultaten → Preventieve Plannen

- * Maken nieuw plan: Data, Items, Taaklijst
- * Kortsluiten taaklijst layout met uitvoerder
- * Field scope: Stelling, Isolatie
- * Symbool voor titel
- * Aanvragen Sep.map, Steekflenzenlijst, Productinfo, PEF, 10 HSE's
- * Maximaal vullen preventief plan
- * Aanpassen bestaande plannen



Taak 2 Preventieve Planner

- * Preventieve Plannen → Uitvoerbare WO's
- * WO's met @: Maken PO's



Taak 3 Preventieve Planner

- * Afsluiten en leren
- * SAP status naar TECO
- * Verwerken feedback



Idee 3

- * Nieuwe routes WO's

Takenlijst	Symbool:	SAP status naar:
Met contractor	@	WOIP
Met/Zonder contractor	-	n.v.t.
Equipment wel uit bedrijf	#	WOIP WOPR
Equipment niet uit bedrijf	\$	WAPP
Equipment wel/niet uit bedrijf	%	n.v.t.



Voordelen (1/2)

* De voordelen voor het proces:

1. WO's waar equipment uit bedrijf moet komen langs (a)OMC
Indentificiëren problemen in een vroeg stadium
2. Verminderen verschuivingen in schedule na LTPO
3. Scheduler houdt alleen controle over schedule



Voordelen (2/2)

* De voordelen voor de uitvoering:

1. Stijging in schedule compliance
2. Operatie weet eerder van werkzaamheden
= Beter te plannen



Samenvatting ideeën

- * Idee 1: Controle op aanleveren studieresultaten
- * Idee 2: Vergroten controle en input Preventieve Planners
- * Idee 3: Nieuwe routes en symbolen WO's



BRAINSTORMEN

Brainstormen



Brainstormen

- * **Discussiepunten algemeen:**
 - * Controle op werkpakket voor uitvoering?
 - * Feedback: Uitvoering → Living Program

Brainstormen

* Discussiepunten Preventieve Planning:

- Opnieuw invoeren POR meeting
- Inhoudelijk bespreken bestaande taaklijsten met vakmannen
- Best practices → Bij bouw nieuwe fabriek
- Inhoudelijk opschonen bestaande preventieve plannen
 - Taaklijsten → Nieuwe standaard
 - Field scope → Opnemen of halen uit closed WO's
 - Bijlagen → SAP issues
 - Nieuwe symbolen → @ # - \$ %
 - Meer..?



QUICK WINS

Bepalen quick wins

- * Wat kunnen we op korte termijn oppakken?
- * Hoe gaan we dit doen?



RONDVRAAG

Afsluiting

Bedankt voor jullie aandacht en medewerking!



Appendix 13 – Presentation to Maintenance Supervisors



Afstudeerproject
Preventief Onderhoudproces
Shell Pernis

Jorick de Vries
31-05-2016

1



Downstream-One
Simple, standard processes - more satisfied customers

OVERZICHT

- INTRODUCTIE
- PROJECT
 - BEVINDINGEN
 - HET PROCES
 - RESULTATEN
 - OPSCHONING

2

INTRODUCTIE

- Jorick de Vries
 - 20 Jaar, Zierikzee
 - Afstudeerder
 - International Maintenance Management (HBO)
 - Engelstalige TBK opleiding volledig gericht op onderhoud

Copyright of Royal Dutch Shell

3

PROJECT

- Onderzoek naar proces preventief onderhoud
- Waar te verbeteren?

Welk end-to-end proces heeft Shell Pernis nodig om PM uit te voeren?

- Aanpak
 - As-Is situatie
 - Verbeteringen
 - To-Be situatie
 - Implementatie

Copyright of Royal Dutch Shell

4

BEVINDINGEN (1/2)

- As-Is situatie
 - Slechte aanlevering studieresultaten
 - Incomplete preventieve plannen (Nieuw)
 - “Vervuiling” preventieve plannen (Bestaand)
 - Geen clustering van preventieve plannen (Bestaand)
 - Amper controle punten
 - Geen assurance Reliability Engineers
 - Geen/matige feedbackloops
 - Geen/matige historie geschreven
 - Afschaffing POR overleg

Copyright of Royal Dutch Shell

5

BEVINDINGEN (2/2)

- Resultierend in:
 - Herhalend werk in voorbereiding
 - Geen continue verbetering preventieve plannen
 - **Te veel en foutief preventief onderhoud**
- = Overbodige kosten

Copyright of Royal Dutch Shell

6

HET PROCES – LONG TERM LIVING PROGRAM

- Aanleveren studieresultaten door **Reliability Engineer** in LTLP tool:
 - Altijd de goede informatie
 - Overzicht
 - Inzicht voor relevante personen
 - Centrale database (nieuwe plannen, aanpassingen)
 - Check op nieuw plan

Copyright of Royal Dutch Shell

7

HET PROCES – PREVENTIVE PLANNING (1/2)

Taak Preventive Planner	Fase
Juiste symbool (@, #, - of \$) in titel	Plan
Studienaam in titel (RCM, IPF, HEMP etc.)	Plan
Invoeren juiste parameters	Plan
Standaard taaklijst	Plan
Compleet maken taaklijst	Plan
Bespreken taaklijst met vakman	Plan
Invoeren plannummer in LTLP tool	Plan
Check uitvoeren op nieuwe werkorders (evt. aanpassen)	Werkorder
Werkorder met @: Werkmap maken + afgeven Sr. Planner, op WOIP zetten,	Werkorder
Werkorder met # en \$: Inlichten Scheduler	Werkorder
Taak Corrective Planner	Fase
Aanmaken requisities	Werkorder
Bestellen materialen	Werkorder
Kosten estimatie	Werkorder
Werkorder op WOIP WOPR	Werkorder

Copyright of Royal Dutch Shell

8

HET PROCES – CONTROLEPUNTEN

- Controle door **Reliability Engineer** (LTLP tool)
 - Checken nieuw preventief plan op juiste vertaling vanuit studie
- Controle door **Sr. Planner** (Plannerslijst)
 - Werkorders met WVB op WOIP + Werkmapje
 - Plannerslijst
- Controle door **aOMC** (GSAP)
 - Werkorders op WOIP WOPR
 - Behandelen als werkorders op WRTA
- Controle door **Reliability Engineer** (LTLP tool en GSAP)
 - Evaluatie op geschreven historie

Copyright of Royal Dutch Shell

9

HET PROCES – FEEDBACK LOOPS

- 1. Tijdens of na werkvoorbereiding:
 - Wat: Onjuistheden en aanpassingen in werkorder
 - Wie: Corrective Planner/aOMC
 - Naar: Preventive Planner
- 2. Tijdens of na uitvoering (A):
 - Wat: Feedback betreft praktische zaken
 - Wie: Job Leader/MTL
 - Naar: Preventive Planner
- 3. Tijdens of na uitvoering middels MTLP tool (B):
 - Wat: Feedback betreft studiehoud
 - Wie: Job Leader/MTL/Corrective Planner
 - Naar: Reliability Engineer

Copyright of Royal Dutch Shell

10

RESULTATEN

- Implementatie ROM
 - Toepassing LTLP tool
 - Assurance Reliability Engineering
 - Toepassing preventive planning
 - Feedbackstromingen
 - Herinvoeren POR meeting
- Documentatie *(allen te vinden op PM webpagina)*
 - Werkinstructie Preventief Onderhoudproces
 - Handleiding Living Program tool
 - BBS Procedure:
 - Aanleveren gegevens Living Program → ME
 - Preventieve Planning
 - Preventieve Voorbereiding + Uitvoering

Copyright of Royal Dutch Shell

11

OPSCHONING

- Ontwikkelen standaard taaklijsten
- Opschoning bestaande preventieve plannen
 - Dubbelingen, Inactieve en Overbodige plannen
 - Standaard en complete taaklijst, Symbool en Studie in titel
- Clusteren bestaande preventieve plannen
- Toepassen nieuw proces voor nieuw plannen
- Implementeren op alle PE's

Copyright of Royal Dutch Shell

12



Bedankt voor jullie aandacht!

Vragen?

13