HOW TO TACKLE UNASSIGNED PACKAGES

Guidelines to increase the percentage of assigned packages within the Philips Healthcare VB warehouse

Version 3
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Guidelines to increase the percentage of assigned packages within the Philips Healthcare VB warehouse.

Submitted to:

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Summary

Philips is a Dutch diversified technology company with primary divisions focused in the areas of electronics, healthcare and lighting. The group collaborated with the Healthcare department of Philips. The Healthcare division of Philips produces a various range of products including medical imagery such as X-rays scans, MRIs and many others.

Research, result and analysis

The group was given an assignment on behalf of Philips Healthcare at the VB warehouse located in Boschdijk. This assignment is composed of **2 parts**, **first part** is to identify the root causes leading to a high number of packages left without attention (meaning that there are some packages laying in the warehouse and no one knows how to deal with them), and **the second** part is to draft guidelines in order to fix this issue. A lot of research has been realized by the group through interviews with the Order Manager of the warehouse and the Project Manager. Moreover, based on investigations done at the warehouse, an Ishikawa diagram (to illustrate root causes) and swim lanes (describing the current and future state of the related processes) were drawn. The group also interacted a lot with the employees there by observing their work and then coming up with the relevant questions that lead to information necessary to complete the assignment.

Results of this research were used to identify the causes of the main issue (part 1 of the assignment). These causes were categorized based on the ILC model and then the root causes were determined.

In order to finalize the assignment and to draw conclusions regarding the solutions and recommendations for Philips Healthcare, analysis was yet to be done by the group. This was mostly to have a clear overview of the situation and to provide the company with the best solutions that fit their policies and expectancy. A RACI matrix and a cost benefit analysis were sketched to forecast the consequences of the solution and the cost of it.

Conclusion and recommendations

The results helped the group to find a solution that would decrease the amount of unassigned packages (packages no one takes care of). The guidelines written by the group were meant to fit the current policies of Philips Healthcare and to explain into what extent and domain each part of the company is involved and concerned by the changes operated due to the implementation of the solution. The 2 main issues turned out to be: **1) identifying the packages** and **2) taking action to deal with those packages.** Several solutions were considered, such as hiring new employees and creating a new storage unit in SAP. However, the solution had to be at the lowest cost possible. The group discussed some solutions with the employees at the warehouse to consider their points of view. Furthermore, a meeting with the Project Mentor was conducted to discuss what solutions should be chosen and how they should be implemented. In the end the solution and steps of implementation were reviewed and accepted by the company, the recommendations include creation of reports for returned items and more communication between all the parties involved into the handling of the unassigned packages, this will result in having less unassigned packages.

Preface

Information about the company

Koninklijke Philips N.V. (Royal Philips, commonly known as Philips) is a Dutch diversified technology company headquartered in Amsterdam with primary divisions focused in the areas of electronics, healthcare and lighting. It was founded in Eindhoven in 1891 by Gerard Philips and his father Frederik. It is one of the largest electronics companies in the world. Royal Philips Electronics is a versatile technology company, focused on improving people's lives through meaningful innovation. For Philips financial figures, see *Figure 1* and *Figure 3.*

Philips Healthcare division generates 42% of their total revenue, and is ranked 14 of the top 50 global green brands. Philips Healthcare provides a broad range of products, including: cardiographs, monitors, fluoroscopy system, x-rays, MRI's, and many more. With a century of history and more than 450 innovative products and services they are ready to face the challenges that are intertwined with health care services. They do this by creating solutions for better care to more people at lower cost.

Philips total work force is calculated to include 105,365 (2014) employees working in 100 countries, their mission is to assist you in creating lasting moments of care, whether in the hospital, the living room or the boardroom. To see the structure and relationships inside Philips Healthcare, go to the *Figure 2.* The project was carried out within the Benelux market under the EMEA branch.

Revenue	€21.39 billion (2014)
Operating income	€486 million (2014)
Profit	€415 million (2014)
Total assets	€28.35 billion (2014)
Total equity	€10.86 billion (2014)

The group's focus is on the logistics flow in Philips Healthcare, VB warehouse on Boschdijk, Eindhoven.

Figure 1. Financial data of Philips. Source: https://en.wikipedia.org/wiki/Philips)

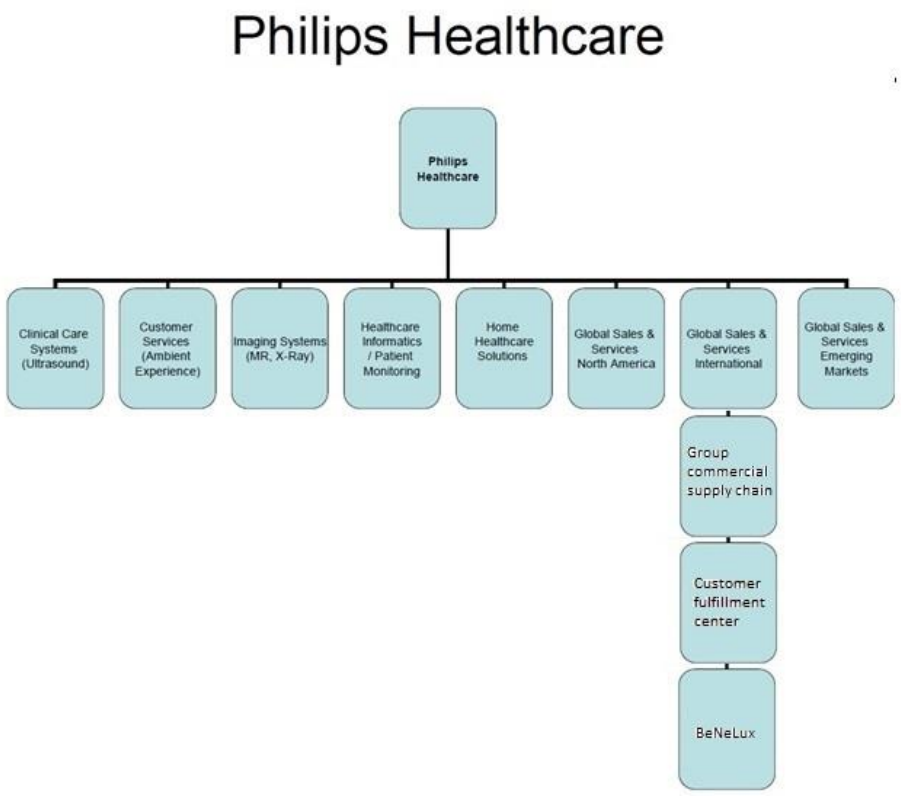


Figure 2. Philips Healthcare's organizational chart. Based on: http://www.ouderenjournaal.nl/n-brabant/2014/10/17/slimme-pleister-voor-copd-patienten/)

	investments in group companies	investments in associates	loans	total
Balance as of January 1, 2014	**13,591**	**71**	**5,873**	**19,535**
Changes:				
Reclassifications	35	(8)	–	27
Acquisitions/ additions	2,379	6	749	3,134
Sales/ redemptions	(1,107)	–	(348)	(1,455)
Net income from affiliated companies	(485)	16	–	(469)
Dividends received	(1,836)	(19)	–	(1,855)
Translation differences	687	7	676	1,370
Transfer to assets classified as held for sale	–	(7)	–	(7)
Other	(604)	–	–	(604)
Balance as of December 31, 2014	**12,660**	**66**	**6,950**	**19,676**

Figure 3. Financial fixed assets of Philips in millions of EUR. Source: http://www.philips.com/philips/shared/assets/Investor_relations/pdf/PhilipsFullAnnualReport2014_English.pdf

Relevance for the reader

Within the following report you will find group S201's investigation and analysis of a problem of logistics processes within the Philips Healthcare VB warehouse in Eindhoven, as well as the groups proposed solutions. All contents of this report are relevant for the school assessors, whereas the description of the company and of the problem are not relevant for Philips employees.

Word of thanks

To the management of Philips Healthcare that we worked with, we are thankful for the time you took to help with the project.

To the staff running the VB warehouse – employees of SPS, thank you for your time and cooperation.

To all of the teachers involved in the project, thank you for the time invested in helping the group with tackling the project.

Table of content

Glossary

- Assigned package – package at the free stock that is assigned for a new project
- Unassigned package – package at the free stock that is not assigned for a new project, is stocked for more than 3 months and/or is not registered in SAP
- KPI – Key Performance Indicator
- FSE – Field Service Engineer
- MSS – Modality sales specialist
- OM – Operations Manager
- PI – Performance Indicator
- PM – Project Manager
- S&OP – Sales & Operations
- SAP – enterprise resource planning software
- VSM – value stream map

Chapter 1: Introduction

1.1 Project situation

At the start of the assignment the warehouse at VB was heading into a possible overload of packages. A main contributing factor to this situation has been an increasing amount of **unassigned packages** within the warehouse. At this point the warehouse had a **total amount of 91 packages**, from these 91 packages **49 were unassigned** and 9 out of the 49 were not registered in **SAP**. It is important to remember that the **VB warehouse** is a **transit warehouse** and should have the least amount of inventory possible. With a relatively high amount of unassigned packages (53.8%) sitting there, something had to be done to tackle the situation and to stay within the intended purpose of the warehouse.

Figure 4. This situation is illustrated in the cause-effect chain below.

1.2 Central research question

What guidelines can Philips Healthcare adjust and/or impliment within its logistics policy to increase the percentage of assigned packages (compared to unassigned packages) from **46.2** to **98%** in the VB warehouse?

1.3 Assignment description

After discussing the current and desired situation of the warehouse and clarifying the expectations of Philips Healthcare for this assignment, the assignment was established as follows:

- Identify the root causes leading to a high number of unassigned packages.
- Draft solution guidelines that would tackle the unassigned packages and increase the ratio of assigned packages.

Although there was no time limit set by Philips Healthcare, this assignment had a pre-conditioned time limit of 5 months.

1.4 Objective of the assignment

The objectives of this research is to establish guidelines that will improve the current situation in the warehouse regarding unassigned packages. By making use of appropriate models and tools a provisional performance indicator is created. Then mapping out in greater detail the business process that is to be improved, and then positioning the performance indicator in the cause-effect chain. Based on this cause-effect chain improvement will be made taking into account the specific circumstances at the company and substantiating this advice with the expected costs and benefits of the proposed improvements. Finally, to formulate recommendations to achieve this improvement in the future.

1.5 Investigation methods & analysis tools

Observation
In order to get an overview of and to understand how the processes work within the warehouse, group S201 sent 2 members to the warehouse at least once a week. During these visits the members observed all the different processes within the warehouse.

Interviews
Interviews were conducted with multiple employees relevant to the project. This was done to obtain general information and to get an insight into the processes related to the causes and problems with the current situation at the warehouse.

Handy questionnaire
The handy questionnaire was used to conduct a culture research of the warehouse and the involved departments. By understanding the cultures involved, it is possible to make a more suitable recommendation that would fit within the organizational culture of the warehouse and departments involved.

Cause-effect chain
The cause-effect chain was used to describe the list of symptoms causing the high amount of unassigned packages within the warehouse. This method makes it easy to see the order of causes and effects.

Integral logistics concept (Visser and Van Goor, 2015)
The aspects of the integral logistics concept (structure, control, information & organization) were used to describe the current situation in the warehouse and to draw conclusions. The structure aspect addressed the physical layout of the warehouse. The control aspect addressed the procedure of the activities within the warehouse. The information aspect addressed the information and resources systems or software in place that facilitated the flow of information. The organisation aspect addressed the tasks and responsibilities within the process that was to be improved.

Fishbone diagram
The fishbone diagram was used for the determination of the root causes for the high amount of unassigned packages. This diagram gives a useful overview of the causes based on each aspect of the integral logistics concept.

System drawing
The system drawing was used to map out and provide a clear overview of the processes in the warehouse. With use of this tool, the interactions between different employees and information can be described. Also, the inputs and outputs to the system are visible there. By having a clear overview of these flows, it is easier to address where in the process the issues are starting, and where possible guidelines are missing.

Swim lanes
Swim lanes were used to describe the activities, and the people and/or departments that have to take actions within the processes. This tool is useful for describing current and future state of the process handling.

RACI matrix
The RACI matrix was used to find out what people will be involved if the solution is implimented. This is done by showing who is **R**esponsible, who is **A**ccountable, who is **C**onsulted, and who is **I**nformed for each suggested solution.

1.6 Structure and logical reasoning of the report

The report is divided in 3 main chapters, namely:
Chapter 1. Introduction
Chapter 2. Description of the research, results of the research, and analysis of the results
Chapter 3. Conclusions and recommendations

Chapter 1.
The introduction has served to explain the need and importance of the assignment and solutions, and the means to accomplish them. This is done by showing the severity of the background problem, and then qauntifying it. Then the assignment is specified together with the objective that it has. Lastly all investigation methods are listed and their relevance is briefle explained.

Chapter 2
Chapter 2 will address the reasearch approach of the group. First it will be explained how the above mentioned methods were used to obtain the necassary information for the completion of the assignment. The results will show what the **problem background** is, what the **current processes** are for handling the current situation, what the **root causes** are for the main problem (high ratio of unassigned packages) and all other information necessary for the research. These results will guide to possible solution directions which will be anylzed and worked out as final conclusions and recommendations in chapter 3.

Chapter3
The solution directions determined in chapter 2 are further elaborated in possible solution proposals. Each solution is then categorized in a **matrix in which the time required for implementation is set off against the required costs/investments.**
After listing the possible solution recommendations a **cost-benefit analysis** is done. In this analysis the costs and benefits of the solutions are worked out in quantitve terms. This overview of the costs and benefits is then used to support the final recommendation for Philips Healthcare.

Chapter 2: Description of the research, results of the research, and analysis of the results

This chapter will focus on the gap between the current KPI (46.2%) and the desired KPI (98%).

The chapter will start presenting different research methods conducted. After that, the results of the analysis based on the research are presented. This means addressing the issues to the particular aspects of the ILC model (structure, control, information system, and personnel organization), assessing severity and magnitude of the current situation, investigating the flows in the system drawings, stating causes and determining the root causes with help of the fishbone diagram.

2.1 Research description

Observation

To get an overview of and to understand how the processes work within the Philips VB warehouse, the warehouse was visited at least once every two weeks. During these visits the observations were made on the different flows in the warehouse and how the incoming and outgoing packages were handled by the personnel. The procedure on how these packages were handled and located in the warehouse was keenly observed.

To be able to quantify the defined key performance indicator (KPI), the following equation was formulated to measure the percentage of the assigned packages at the warehouse:

Calculation = (# assigned packages/total # packages) * 100%.

Measured in %.

Interviews and meetings

Three interviews were conducted. One interview was with the order and project managers, one with the project mentor within Phillips Healthcare, and one with the warehouse manager. The interview with the warehouse manager helped with getting more insight into the warehouse processes. The interview with the order and project managers helped to get an insight into how orders are handled, how complaints are handled and what their perspective was regarding the causes and problems with the current situation at the warehouse.

Weekly meetings with the project mentor were held in order to get general information necessary for the assignment (information such as the internal and external objective policies of Philips Healthcare division). Furthermore, meetings were held to get feedback from the project mentor on the direction of the research.

Handy questionnaire

The Handy questionnaire was given to the employees of the VB warehouse, the project mentor Rob van Leuken and Order managers. Due to the lack of time of the intended respondents, the group hasn't received replies for the questionnaire, therefore there are no data available for the culture research.

2.2 Results of the research

Observations

The key performance indicator was calculated based on a list from the warehouse manager from 30th October 2015, which is an excel sheet with all the packages in the warehouse.
Please refer to Annex 1 to view this list.

The calculation of the KPI will then be:

KPI = 42/91 * 100% = 46,2%

From the observation made at the VB warehouse, as illustrated in figure 5 below, the information gathered indicated that the level of assigned packages is low in the warehouse and it is running on low capacity. Communication problems did not affect the performance of the warehouse with regard to the assigned/unassigned packages. However, whenever there are miscommunications it places real issues in regards of processing the other flows.

The warehouse is ran by Swiss Post and their main objective is to process post for Philips. But Swiss Post's service gets involved with Order management and Project management because of retrieval of information. Therefore, Swiss Post gained additional workload without having the needed authority to deal with the missing information.
For example, a package came back from a project without any identification number (e.g. Project order number), this means it can't be registered in SAP, and since they don't have the authority to assign the identification number (this power belongs to the Order Management) or open the package to specify what's inside of it, the employee has to contact the order or project manager to identify the package. So he notifies the order/project manager that was mentioned on the package, but not always an action is taken to deal with the package.

Another example is when a part of the address is missing for sending a new package, the manager of the warehouse is not authorized to contact the customer first hand (which would save a lot of time), he has to contact Order Management in order to get the full address, and this would take 45 minutes usually, as observed.

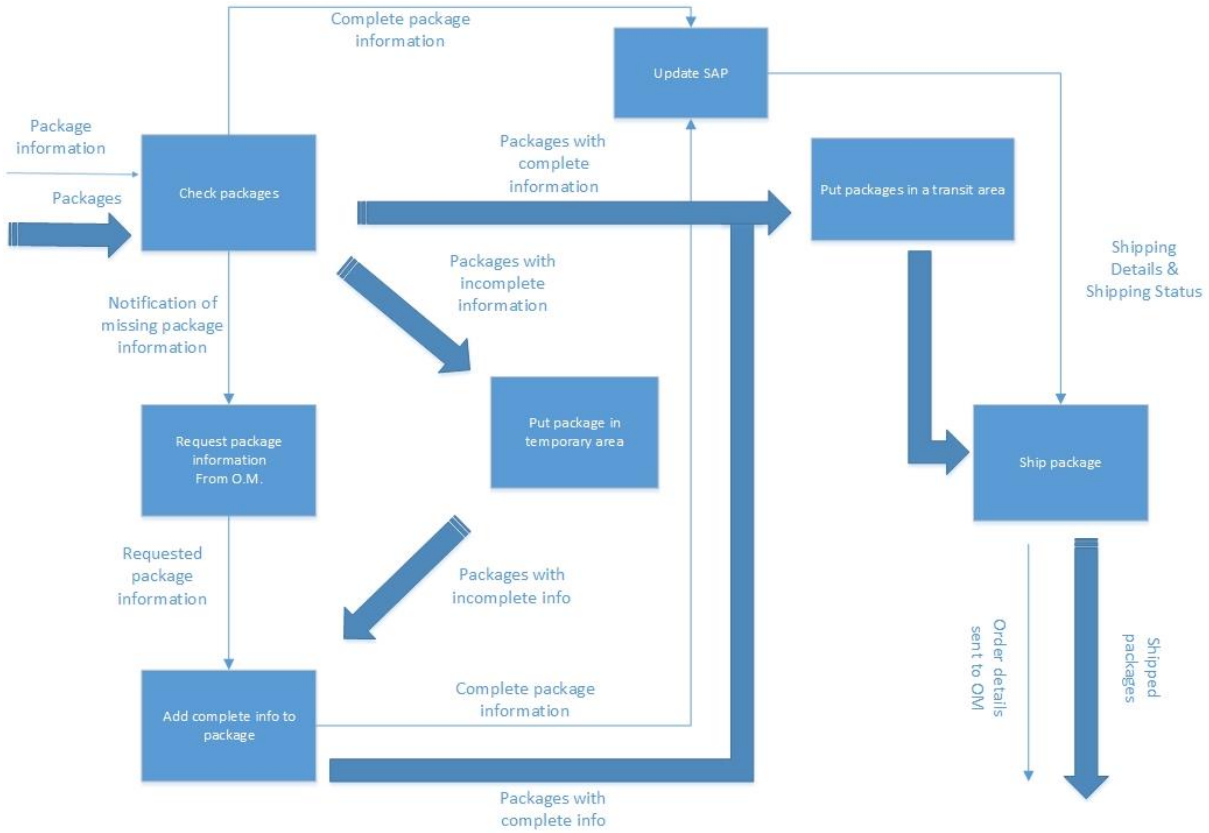


Figure 5. System drawing illustrating, from observation, the current situation of the flow of goods and information in the VB warehouse.

Insights obtained from the interviews

The following three paragraphs are the insights in the logistics objective of Philips Healthcare that were obtained from the conducted interviews. These made it possible to know what the objectives were and to what extent they were established and communicated in the VB warehouse.

Philips Healthcare Internal logistics objective

The internal logistics objectives are focused on realizing the external objectives at the lowest possible cost. In relation to the research question, the internal logistics objective of Philips is to have a stock reliability of 99% which involves having the packages at the VB warehouse identified and assigned to be delivered considering that the VB warehouse is simply a transit warehouse. In theory, the VB warehouse should have close to 0 inventory because it's not a storage warehouse. This is achieved by getting rid of the unassigned packages through international sell-through, refurbishing, part harvesting or scrapping. Philips also aims at having low integral logistics costs that go with the current level of customer service.

Philips follows ICS/SOX 110 (legal compliance stating real and booked value of the inventory), the research objective should help following and reaching this objective. Being able to realize a 98% of identified and assigned package(s) at the VB warehouse helps in terms of a having more accurate overview of the real value of the inventory in stock of the entire company.

Philips Healthcare External logistics objectives

SPS which handles the logistics of the VB-warehouse for Philips has two options for delivery: Boogaard or DHL. If Boogaard is chosen, the delivery costs depend on the distance it has to be delivered, the further the more expensive. But if DHL is chosen the costs depend on the size of the package. The preference is the cheaper option if it is applicable for the particular item that is to be delivered.

Philips aims to deliver to the customer at the time and location required and having the flexibility to be able to respond quickly to changes in customer demands such as regards to product returns.

Extent to which the logistics objectives of Philips Healthcare are established and communicated

The extent to which the internal logistics objective is established and communicated at the VB warehouse is not as desired compared to the target which is that 98% of packages should be identified and assigned.

The objective of having low integral logistics costs that go with the current level of customer service is not as effectively communicated because the percentage of the assigned packages at warehouse is currently 46,2% since there's no procedure for the warehouse personnel to handle these packages.

2.3 Analysis of the results

Description the current situation

In this part, the current situation will be described based on each aspect of the ILC model. The following figure 6 illustrates the four elements of the ILC model.

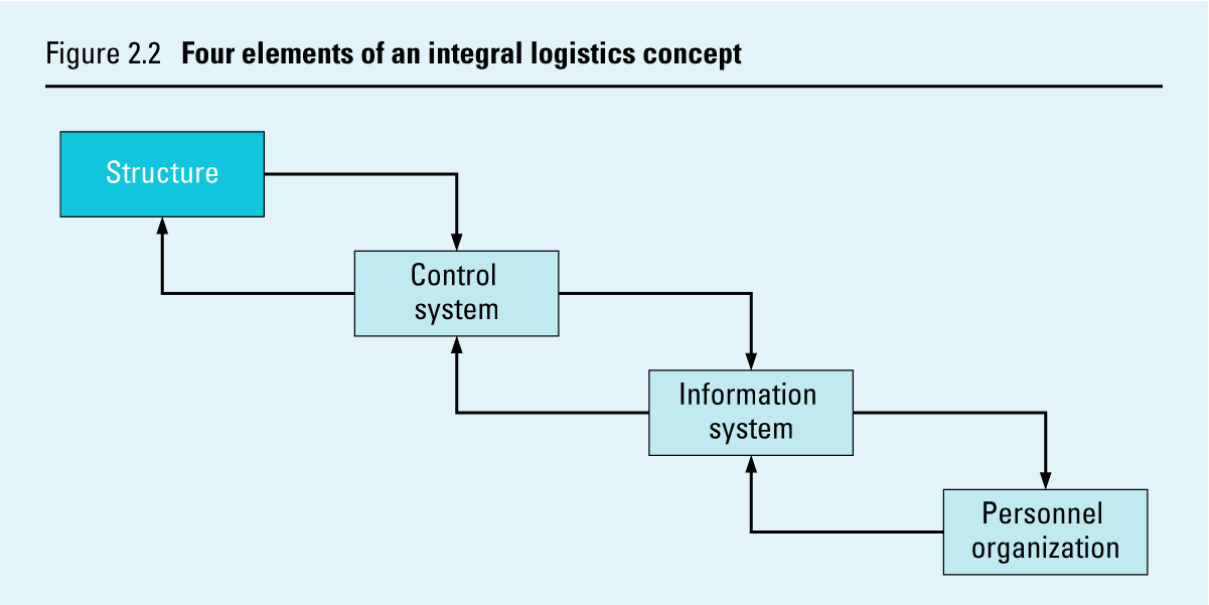


Figure 6. Four elements of an integral logistics concept

With the main focus being to increase the percentage of assigned packages from 46.2% to 98% at the VB warehouse, an in-depth analysis of the logistics aspects was necessary.

The purpose of logistics is to reduce the lead time, improve delivery reliability, increase flexibility, and reduce integral costs. Keeping in mind that all of these four aspects are mutually dependent.

The external logistics objectives at Philips are established as on time delivery and to be able to respond quickly to changes in customer demands.

The internal objectives are focused on realizing the external objectives at the lowest possible cost. The main internal logistics are to have Low inventory and high capacity utilization of the warehouse. Therefore, reducing the integral costs that go with the current level of customer service.

The following is the analysis overview of the integral logistics concept.

Structure

The figure below is illustrates the layout for the VB warehouse. This layout is structured to facilitate the average number and the type of packages that are in transit. These packages are to be delivered immediately or stored temporarily so that they can be used by departments within Philips or other customers. So, this layout design allows transport and storage to be efficient and effective.

The layout of the warehouse can be found in the Annex 2.

Control

This part deals with the work planning and how the processes are managed and monitored (the control system). This is not properly defined according to the Warehouse management document provided by Rob van Leuken. Nonetheless, a scope and the procedures of how the incoming and outgoing goods are handled are provided in this Warehouse management document. Also the level of access for certain areas are well indicated in the Warehouse management document for the VB warehouse.

The company is not currently using any performance indicators to measure the performance of the VB warehouse and is relying only on SAP to provide information from the warehouse. The investigation from the stock count at the warehouse indicated that the list in SAP , created by order management, has a low reliability due to not being real-time updated with the current state. Free stock is being stored at the VB warehouse for a long period.

Information

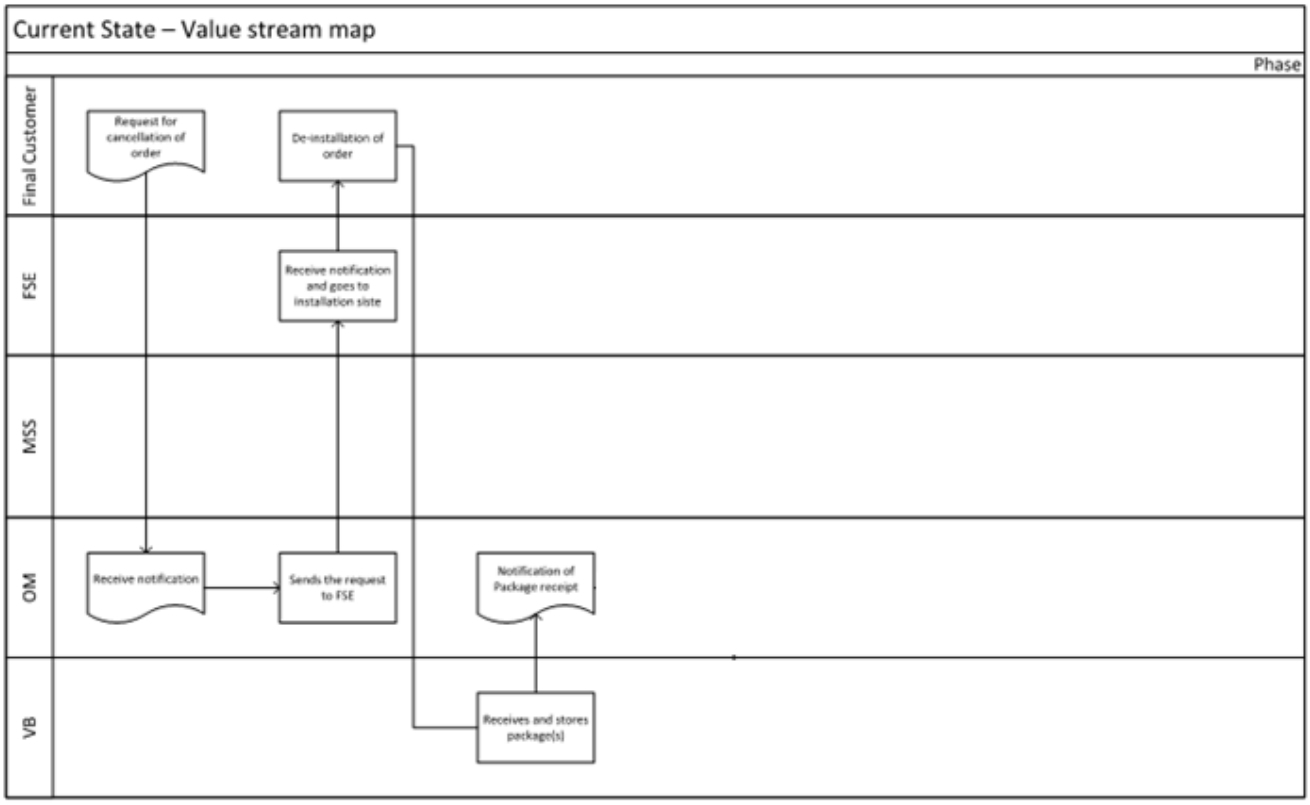
There is an information system in place to keep track of the stock in the warehouse. Philips Healthcare uses SAP which is an enterprise resource planning software to manage its business operations and customer relations. Therefore, all the logistics and inventory processes within Philips Healthcare and the VB warehouse are registered in this software. On the other hand, SPS makes use of an inventory system called I-track for their processes. Nevertheless, the objective is that all packages at the warehouse must be registered. This is where some issues arise, as some of the returning packages don't have an order number or a list with a 12 Number Code (hereafter referred to as **12NC**) which can be used to identify the package. Therefore, such packages cannot be registered in the SAP. Both the order number and 12 NC make it possible to book the package in SAP, which would make it possible to register the free stock. Furthermore, the stock count that the group assisted showed that the SAP list for the warehouse yields a reliability of 4%, thus it is not very reliable. Therefore, a more reliable list, which was an Excel list from the warehouse manager, was used for calculating the KPI.

Organization

According to the warehouse manager, the number of the personnel to handle the processes at the warehouse is sufficient. Only sometimes they are faced with higher workloads. The personnel at the VB warehouse is lacking authorization and are not instructed on how to proceed with handling of packages that are unidentified (and cannot be booked in SAP) or unassigned (being free stock and not assigned to any project). Furthermore, the communication between Order Managers at Philips and the VB warehouse is poor when it comes to creating a consistent and validated list of the items that are at

the warehouse. In addition, Project managers sometimes do not assign return information on packages in the warehouse. This leads to packages being held in storage while the warehouse manager has no authorization to look into them and to take any action to deal with these packages. The following swim lane diagram in figure 7 shows the communication flow between and activities done by the parties involved in the process of handling packages.

Figure 7. Current state – Value stream map



Causes of the unassigned packages (within all aspects of the ILC concept)

The fishbone diagram in figure 8 shows the causes divided into the ILC concept divisions, the reason that this diagram-model was chosen was due to its efficiency in showing where the problems connect with each other and to which aspect of the ILC model are they connected. Based on this the most critical and frequent causes will be considered as the root causes.

Structure

Now as for the structure investigation, we found that Philips relied on the flexibility of the staff of SPS, this resulted in negligence of the assigned packages flow since it takes time to identify unassigned packages. That caused a lot of issues since no one is responsible for this type of situation and no one has complete provision of information needed to deal with it. Moreover, there's no official storage place for those packages, which causes them to hinder the flow of the warehouse and causes bottle-necks.

Information systems

As for the information system, SAP is what Philips is relying on and SPS has access to it so they can find the information they need to ship the packages to their designated destination. While the investigation was taking place SAP crashed after the group tried to do a stock count using the information delivered by the OM. The list that was used is flawed, and it turned out that the order managers would forget to input data into the system due to them forgetting.

Control systems

Whilst investigating the control systems the group found the issue of workers ignoring their responsibilities due to people working on things that went wrong. There was a lack of communication between the OMs and VB, the PM doesn't even use SAP and communication is the key to a successful job here. One other key problem for SPS is that they have no authority over the packages, so they can't get contact information easily if it was missing from SAP, they have to call the OM responsible of that package.

Organizational

Now when you look at the organization as a whole entity *from the problem's point of view,* SPS and Philips do not communicate efficiently, this results in both of them doing more work and costing themselves money and time. Both entities have laid-off employees; SPS used to have 3.5 FTE's and Philips used to have 20 FTE's as Order managers, now they're down to 2.5 FTE's and 10 FTE's respectively which means less hands available for work.

Root Causes Conclusion

The group's investigation resulted in these findings. There is one issue related to the identification of the packages for their return to the VB warehouse. These packages cannot be booked in the SAP which makes it difficult to overview them as the free stock. Second issue is related to the lacking guidelines for handling of the free stock. Nobody is responsible or accountable for the free stock, and there aren't any actions taken towards reducing the free stock.

Conclusions of the analysis for each aspect of the ILC model will be worked out in the following:

Structure

The results show that structure has only little to do with the issue of unassigned packages. The physical flow is as little as possible, the real problem represents waiting of the unassigned packages. These are stored at the VB warehouse for a long time until scrapping takes place (once every 2-3 years). After that, the physical flow is not involved anymore.

Control

The process of handling free stock is not being controled or overviewed. There isn't any performance indicator set yet, nor is it possible to have reliable overview of the situation as the SAP list is not reliable. The only reliable list is the Excel list from the warehouse manager, but not very appropriate from the legal perspective as all the free stock should be booked in SAP.

Information

The main issue is caused by the fact that some returning packages are not assigned with any code, which would make it possible to book it in the SAP system. This lack of information causes unclarity of what are the exact kind of packages that are free stock at the warehouse. The truth is that the free stock packages are both registered and not registered packages in SAP, therefore this is just a minor information issue. Solving this information issue would clarify the category of free stock and would make the list in SAP more reliable.

Organization

This aspect is the most related with the handling of the free stock. There is no established guideline for handling the free stock. The free stock is available for reselling, though no one takes actions. This is due to the fact, that the list of the free stock is not maintained in an accessible and reliable way. Furthermore, there is nobody responsible and accountable for the handling of the free stock.

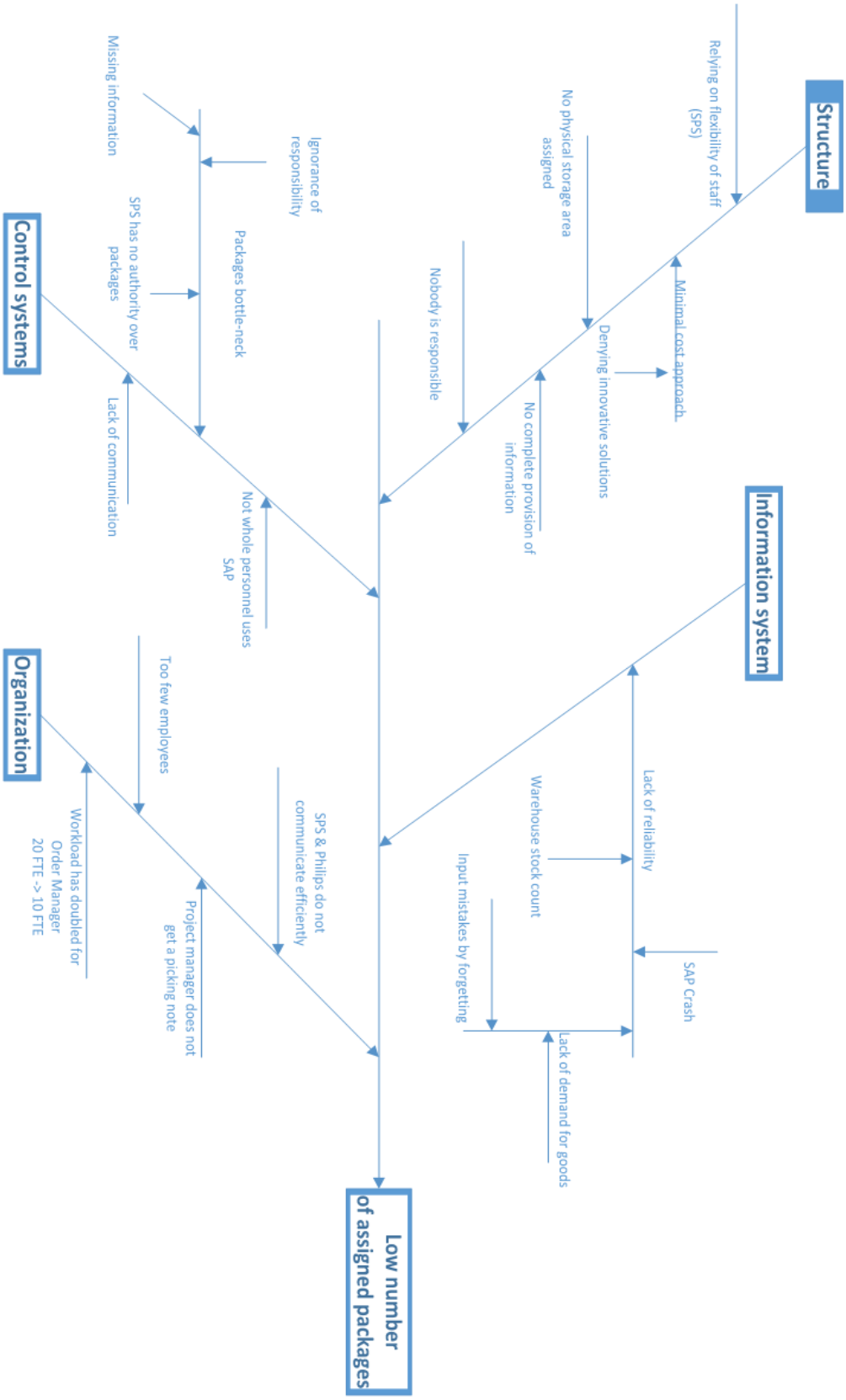


Figure 8. Ishikawa diagram

Chapter 3: Solutions

The goal of this chapter is to answer the research question: What guidelines can Philips Healthcare adjust and/or impliment within its logistics policy to increase the percentage of assigned packages (compared to unassigned packages) from **46.2** to **98%** in the VB warehouse?“

In this chapter, first the draft list of all brainstormed solutions is shown. Later, the recommendations are concluded in one solution with a set of guidelines, these were chosen in collaboration with the project mentor, order manager and project manager.

3.1 Draft list of solutions

The following is a complete list of solutions that the group came up with and/or was advised to consider by the project mentor, and managers during the investigation at Philips Healthcare:

1. Hire a new **employee** dedicated for handling of the free stock
2. Having a **list of free stock (the unassigned packages) in Excel** from the warehouse manager Samsu Khoja
3. Creating a **new storage location in SAP**
4. **Monthly meeting** to discuss handling of the free stock
5. Create a free stock **physical unit in the warehouse**
6. Every returning **package would be given list with 12 Nummer Codes** per item by the FSE at the site
7. Transfer returning package to a **non-revenue order**
8. Export a **report from SAP** to list the free stock and make a distribution list.
9. The **report would be rewieved** while processing an order by the modality sales specialist and order manager
10. Involve **refurbishing systems** as the last instance of the process after three months being stored at the free stock or **scrap**
    a. Refurbishing
    b. Selling through
    c. Part harvesting
    d. Scrapping
11. Having an **accountable person** for handling of the free stock
12. Establishing a KPI for measuring the performance

These solutions were placed in a matrix comparing investment efforts according to **time and money investments**. The graph below illustrates this matrix.

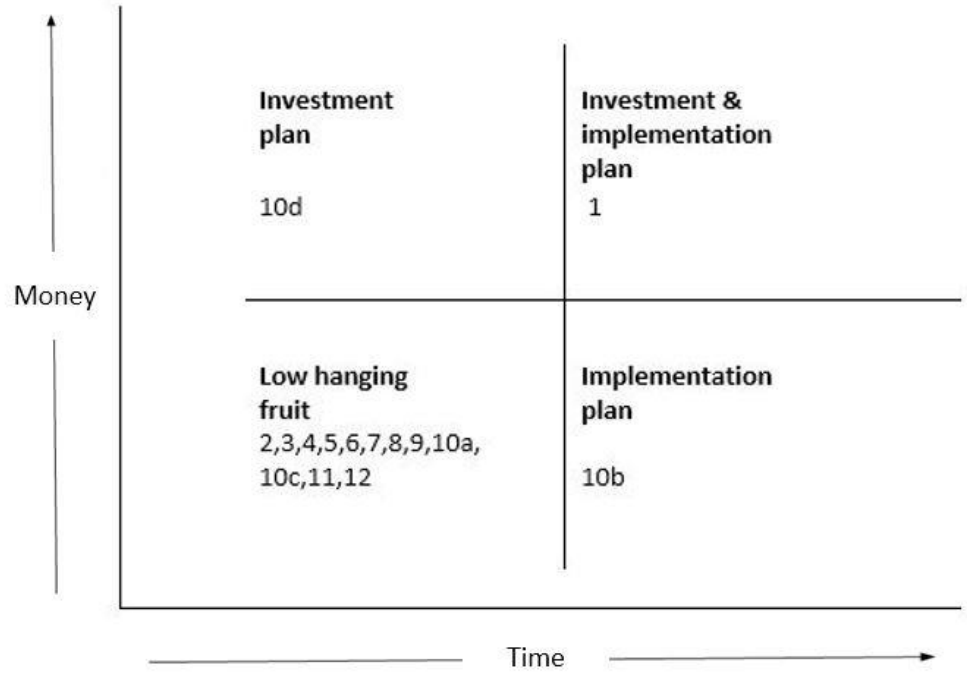


Figure 9. Time and money investment matrix.

3.2 Chosen solution

After formulating multiple solutions and discussing them with the project mentor and group mentor, the group decided to propose the following solution as the **final recommendation** to the company. This solution is a set of steps which address mainly the issue of identifying the returning packages and establishing guidelines for handling the free stock. Note that each step stated is vital to the others, it is like having many solutions that synergize together into one better solution.

1. Creating a **new storage location in SAP.**

   Setting a new storage location in SAP for the free stock in order to have a complete list. This would facilitate an improved way of working in regard to ICS/SOX 110 which is more convenient from the perspective of legal financial compliancy.

2. Create a free stock **physical unit in the warehouse.**

   Dedicating a specific area in the warehouse for physically storing the free stock. This would make it possible for having 100% reliability of what is in the free stock.

3. Every returned **package would be given a list with a 12 Nummer Code (12NC)** by the FSE (Field Service Engineer) at site.

   Whenever a project is cancelled or products are returned, the FSE at site would list all the products with a 12 NC per item, to know exactly which products are going back to the free stock.

4. Transfer returned packages to a **non-revenue order in SAP.**

   The order manager would then transfer and register the order from commercial to non-revenue order. This will help distinguish the „unassigned" packages in the system.

5. Export a **report from SAP** to a list of the free stock and make a distribution list.

   The order manager would export a report from SAP to list all packages that are at the free stock location. This report is to display demo products, the program for this is called ZXDEN and the report name is ZVR_DEMO_REPORT_ZXDEN. The order manager would share the report via e-mail using a distribution list with all the FSEs, the VB warehouse manager and other order managers every two weeks.

6. The **report would be rewieved** while processing an order by the modality sales specialist and order manager.

   The modality sales specialist is present during any meeting between a customer and the account manager from Philips Healthcare. While closing a deal, the modality sales specialist reviews the report from the OM, to see if he can offer any product from the free stock to the customer (instead of ordering a new one).

   The same applies for the order manager, whenever he is about to order any products for a new project, he or she reviews the report to see if there is an available product at the free stock.

Whenever a product/material is chosen from the free stock, the selected product/materials can be added to the order data sheet (input for the order managers to transfer the product/material to the commercial order).

7. After 3 months any free-stock product should be offered to the **refurbushing department.** If the refurbushing department does not want the package, then it will be scrapped.
    a. Refurbishing

    Refurbishing the product to look or perform like brand new.

    b. Selling through

    Selling the package (if possible) to another international market.

    c. Part harvesting

    Dismantling the products for the sake of part harvesting useful and valuable parts or materials.

    d. Scrapping

    The parts that were neither sold nor harvested will be scrapped.

8. Having an **accountable person** for handling of this whole process.

    Supply chain manager would be the person that is accountable for the whole process of handling of the free stock and overviewing the performance.

9. **Establishing a PI** for measuring the performance
    Performance indicator would be established for measuring the performance regarding the assigned packages. The performance indicator would be as follows: % of the assigned packages at the free stock. After the implementation of the solution, the packages older than 3 months fall in the category of unassigned packages. It was agreed that target is 98%.

10. **Monthly meeting** to discuss handling of the free stock
    During the monthly meeting the S&OP, local supply chain manager and supply chain officer of the market will discuss the issue of handling of the packages. Relevant topics would be: what the level of the free stock is in compare to the goal (PI review), the age of the packages at the free stock (whether there are some older than 3 months) and decisions about scrapping.

    The discussion will be based on the Stock view report that is retrieved by the S&OP. If the supply chain manager sees that the established PI is red, the actions will be discussed. In case of scrapping, the order for scrapping is given to the order manager, who forwards it later to the warehouse manager.

The group chose this solution because it has the most efficient outcome when increasing the amount of assigned packages within the scope of the assignment. Mr. Rob van Leuken was consulted during the process of choosing the final solution, he agreed with the particular steps of the solution as they are in line with the expectations of the company.

Impact of the solutions on the Performance Indicator (PI).

In ideal conditions, implementation of the solutions should eliminate any unassigned packages. In order to facilitate unseen circumstances and human error, the KPI is aimed to be 98%, therefore the 2% margin is built in. There is no way of knowing how much this percentage will be before actually implementing the solutions. Nonetheless, it is reasonable to assume that the KPI will improve somewhere near the goal KPI since the solutions will directly and immediately deal with any unassigned package.

The following swim lane diagram in figure 10 is showing the communication flow between and activities done by the parties involved in the process of handling packages if the proposed solution is implemented.

The difference between the current and the future state is highlighted in the custom **VSM** (value stream map) the group made. The first difference is the list of 12NC's that the FSE assigns to the returned items. After that, removing what is on that list to the non-revenue order by the OM and storing it in the free stock area in VB, and then booking it in SAP in the Free Stock unit. The OM will send a report exported from SAP every two weeks to the Modality Sales Specialist, VB and other Order managers. A screening of the PI will be conducted to review if the products have been there for 3 or more months. After 3 months the free stock will be offered to refurbishing systems for refurbishing, harvesting or selling through. If refurbishing systems are not interested in the packages, they will be sent for scrapping.

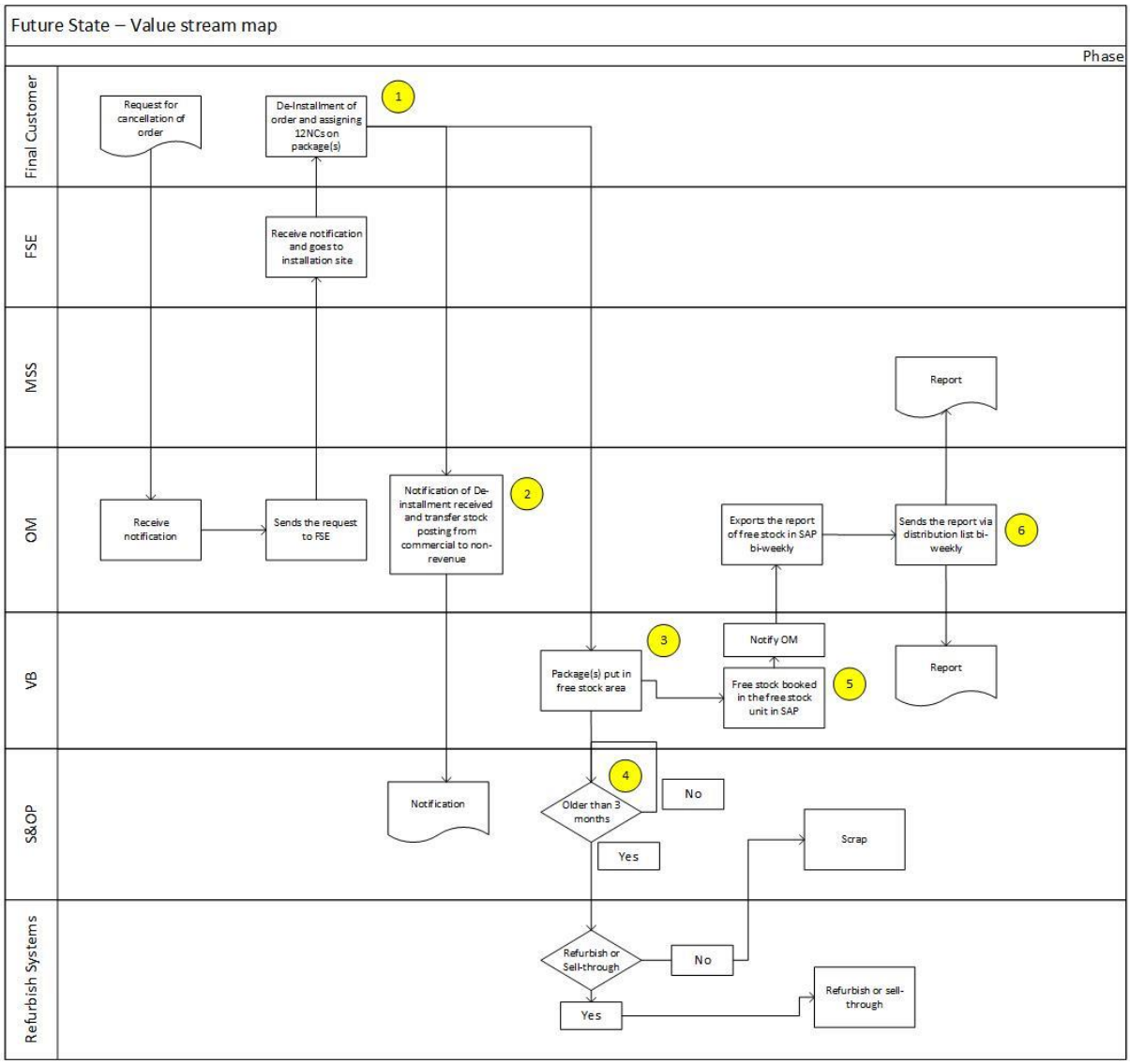


Figure 10. Future state

The Kaizen list below represents which steps have to be implemented in order to reach the future state. The numbers represent the yellow points in the future state (figure 10)

1. De-instalment of order and assigning 12NCs on package(s).
2. Notification of de-instalment received and transfer stock posting from commercial to non-revenue.
3. Package(s) put in free stock area.
4. Any packages older than 3 months will be sent to the refurbishing system, if rejected it will be scrapped.
5. Free stock booked in the free stock unit in SAP.
6. Sends the report (list with free stock) exported from SAP via distribution list bi-weekly.

RACI matrix

The RACI matrix below shows the responsibility allocation to reach the wanted future state.

Decision	FSE	SCM	OM	MSS	VB	S&OP
Create new unit in SAP		I, A, C	R, C		C, I	
Create physical storage in warehouse		I	I		R, A	
De-instalment of order and assigning 12NCs on package(s)		I	R, C		C, I	
Create non-revenue order list	R, A	A	I			
Writing a report	I		R			
Mail distribution list Bi-weekly			R			
Check the report			R	I	I	
Decide to refurbish		A	R	R		
Decide to scrap			A, I			R
Free stock booked in the free stock unit in SAP	I		R,A	I		
Package(s) put in free stock area	I, C		I		R, A	

Figure 12. RACI matrix

Cost-Benefit Analysis

Information for the cost-benefit analysis

The information needed for the cost-benefit analysis is as shown in the following table:

Information required	Comment	Cost	Trustworthy of the cost information
Creating a new storage location in SAP	-	**€2.470**	Yes, this is exactcost that has to be paid to IT department.
Hiring a new employee dedicated for handling of the free stock	Was not eventually used for the analysis.	**€60.000/year**	Yes, given by Rob van Leuken who has overview of the salary indication for the employees.
Monthly meeting to discuss the handling of the free stock	There are already monthly meetings, so this point would be just putted on the agenda	€2.500 → **neglected**	Cost information given by Rob van Leuken, neglection confirmed.
Labour cost	-	**€50/hour** (€19 wage + €31 indirect costs)	Estimated average given by Rob van Leuken based on the position of the involved employee.
Average value of the free stock package in the warehouse	The holding costs are 10% of the value of the package, this includes depreciation, inventory costs and interest	€20.000 → **€2.000**	Assumption made by Rob van Leuken, based on an average usual value of the healthcare packages that were eventually scrapped.
Create a free stock unit in the warehouse	There is plenty of unused space in the warehouse	**Neglected**	Confirmed by Rob van Leuken.
Time spent on giving 12 NC by Field Service Engineer at the site	Would take around 1-2 minutes		
Create a non-revenue order	Part of the regular work of OM		
Export a report from SAP with items on the free stock	Takes few minutes in the SAP, there is a direct fuction to export a list from the SAP		
Review the report while processing order	Report would be reviewed as a part of regular work of OM and MSS		
Refurbishing	Concerns for example repainting		
Part harvesting	Harvesting valuable materials from the packages, which would cover the costs		
Sales through	Selling the packages to a different branch of Philips, which would cover the costs		
Scrapping	Scrapping takes place already at the current situation	**Not relevant → costs of scrapping neglected**	Standard assumption for a financial analysis. Confirmed by Rob van Leuken

Having an accountable person for the handling of the free stock.	Supply chain manager was the one chosen for this after discussion with Rob van Leuken. This would be just a minor additional accountability	**Neglected**	Confirmed by Rob van Leuken

Figure 13. Information for the cost-benefit analysis

Trustworthiness of the information

Since the main contact person regarding the financial aspect was just one person – Rob van Leuken – the trustworthiness is limited. Not in the aspect that he would not have correct information, but in the aspect that the group was not able to double check this information with other sources. This was due to the fact that employees of Philips would hardly have time for the group to conduct further interviews. More about this is explained in the epilogue, where the bigger picture of the company is explained.

More trustworthy information would be obtained by interviewing employees from the financial department, who could provide more accurate (finacial) figures.

Benefits of the solution

Reductions in assets and activities

In this part, reduction in **assets** and **activities** will be presented with calculations. The calculations are only basic due to the character of solution that is proposed. The solution makes it possible to **handle the free stock packages**, but does **not ensure that the free stock will be resold**, therefore it is difficult to estimate in figures how many free stock packages are going to be resold. Instead of that, it is expressed how much would be saved per product.

Assets and employees

As there would be a new guideline for handling the free stuck, there will be a possibility to resell the free stock. Therefore the number of products that are part of Philips Healthcare's assets could be reduced, which leads to savings in scrapping and inventory costs. Theoretically this would lead to savings every time the free stock package is resold. In figures this would be, based on the estimated average value of a free stock package, €20.000 plus additionally holding costs which are 10% per year (€2.000) of the value of the package.

Activities

The manager of the warehouse usually has to contact the order management multiple times in order to get an order for resending the free stock, this is due to the lack of responsibility/authority for handling free stock. After implementation, the responsibility of the warehouse manager would require him to contact the order management only once. It would be hard to express this in financial numbers as it is more of a workload reduction for the warehouse manager.

Another activity reduced is the large scrapping like one that took place around two years ago when the VB warehouse was overfilled with free stock packages. Still, scrapping is an option in the proposed solution, but this would be a continuing process, in order to have a regulated number of packages in the warehouse. That would save costs related to doing a large scrapping, which would require organizing the whole scrapping, and thus, causing work overload. In case of large scrapping the **average** costs would be €20.000 (average value of a package) times the number of the free stock packages plus any costs regarding the activities related to the scrapping. In case of using the proposed solutions, the company would bear only the inventory costs of €2.000 (the costs of the €20.000 average value of package in case of scrapping are neglected).

Epilogue

Over the course of this semester, the members of group S201 learned and experienced how to investigate logistical, administrative, and managerial processes in the real world. Brainstorming propositions on how to make certain processes better –which are bound by the knowledge learned in school- under the guidance of our mentors. From the first meeting with Mr. Rob van Leuken the only encountered trouble was the environment: all of Philips employees were busy and the time with them was strictly limited. Nonetheless they all were as helpful as they could.

A word of guidance for anyone who would conduct a similar research: always be prepared when meeting or interviewing Philips professionals. Nobody approves wasting time without achieving any set goal. Another thing that should be taken into account is that the questions should be open ended. In this way the respondent can choose their own terms to answer a question without limitations.

This project has been a stepping stone in learning how to re-engineer business processes. Working in a big business entity such as Philips Healthcare instilled an insight on how they cooperate with each other. We would like to –again- thank our mentors and the people we worked with, for the experience and knowledge gained, S201 just regrets not being able to work there any more.

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Annexes

Annex 1: KPI calculation

The unassigned package is a free stock package at the VB warehouse that is stored for more than 3 months and/or is not registered in SAP. Therefore, any other package at the free stock is regarded as assigned.

For the calculation, the following figures were used:

Total number of packages: 91 (assigned packages: 42, unassigned packages: 49)

Following is the list of packages at the warehouse on the 30th of October 2015

SO Nummer	PO Nummer	Ontvangst datum	Lokatie	Typenr.	Aantal	Order Manager
6700127342	4505124288	14.05.2013	214A02	Spullen van bert Elderman	5doz	Bianca van Melis
6301964013	4507408386	17-04-2014	213B11	Upgrades for OmniDiagnost Eleva	1	B van melis
6600219097	4507722856	14.07.2014	213B14	NETYS RT 1.7KVA - 12 MIN	1	B van melis
6600219097	4507722852	03.09.2014	213A14	Trolley with ceiling column	1	Bianca van melis
6600219097	4507722852	03.09.2014	213A14	LED Exam. Lamp and extension-spring arm	1	Bianca van melis
6600219097	4507722852	03.09.2014	213A14	Lower body protector UT69	1	Bianca van melis
6600219097	4507722852	03.09.2014	213A14	Lead acrylic shield	1	Bianca van melis
6600219061	4507836840	05.09.2014	213A03	PC HP Z620/	1pal	Toon Vos
6600219061	4507914743	16.09.2014	215C13	LENS CAML22Z	2	Toon vos
6600219061	4507914743	16.09.2014	215C13	VROUWELIJKE BNC CONNECTOR VOOR CHASSIS	2	Toon Vos
6600218892	4507869774	10.10.2014	213B13	NETYS RT 1.7KVA - 12 MIN	1	Annemiek Braken
6600219604	4507881212	11.12.2014	213A02	NETYS RT 1.7KVA - 12 MIN	2	Annemiek Braken
6600219099	4508133811	18.11.2014	213B01	Sound absorption layer below MR	2	Bianca van Melis
6600225701	4508372152	04.02.2015	215C15	UID6520 TOBETOUCHED DIM DALI (90-260V)	1	Bianca van Melis
6600219061	4507925940	30.03.2015	215D07	BSS MTC-G1001	2	Bianca van Melis
6600219061	4507925940	30.03.2015	215D07	BSS VBC-4075-C11	2	Bianca van Melis
6600219061	4507925940	30.03.2015	215A09	UML-151-90	1	Bianca van Melis
6600219097	4507722852	03.09.2014	Gang2Floor	Ceiling track	1	Bianca van melis
6600238612	4508561724	13.04.2015	215D17	PCR Eleva Upgrade	1	Bianca van Melis
6600218491	4508589931	16.04.2015	213B15	DN481X 6xLED-3000 PSED-E WH KIT	1	Annemiek Braken
6700165803	4508629460	17.04.2015	215C29	REMSTAR PRO/PLUS/AUTO/LITE POLLEN (2)	40	Daniela Vargiu
6600238441	4508571093	24.04.2015	213B02	Display 19 inch	7	Sylvie de beer
6700144931	4507617549	24.04.2015	215C28	Operations Manual,Aeroneb Pro,Dutch	1	Nuria Vicioso
6700144931	4507617549	24.04.2015	215C28	Aerosol Generator Filler Cap(Pkg Of 5)	1	Nuria Vicioso
6700144931	4507617549	24.04.2015	215C28	Tubing,Hanger,Adult	1	Nuria Vicioso
6700144931	4507617549	24.04.2015	215C28	Aeroneb Tee,22 Mm Mx22mm F(Pkg Of 5)	1	Nuria Vicioso
6600230827	4508604848	29.04.2015	213A15	DN481X 6xLED-3000 PSED-E WH KIT	2	Angelina Zeegers
6700165463	4508688752	12.05.2015	215C31	CBL 5 Lead Set Snap IEC, ICU	1	Nuria Vicioso
6600236704	4508651732	19.05.2015	215C16	iU22 Upgrade	1	Eric van Dijk
6600232872	4508452077	01.06.2015	213B15	NETYS RT 1.7KVA - 12 MIN	1	Annemike braken
6600232872	4508323619	02.06.2015	215A07	Philips DoseAware	1	Annemiek braken
6600218892	4508660534	17.06.2015	215B09	Q-RB6 Base Station	1	Angelina Zeeges
6600218892	4508660534	17.06.2015	215B09	Q-RCH 6 port charger	1	Angelina Zeeges
6600218892	4508660534	17.06.2015	215B09	Retail Headset	6	Angelina Zeeges
6600218892	4508660444	17.06.2015	215B09	Retail Headset	2	Angelina Zeegers
RMA000253	Retour	12.05.2015	215B27	M1921A	15	Albert Lamberts

6600233121	4508851411	25.06.2015	215C14	Melody Media M-CR610	1	Angelina Zeegers
6600245253	4508879716	09.07.2015	214A16	AG-0021-60: Roll Stand Kit for IntelliVu	5	Linda Stevens
6600232876	Retour	27.07-2015	214A15	met vd boogaard uit Drachten opgehaald	1kist	Eshka de gast
6700170809	Albert	29.07.2015	215C30	989803104171	1	Nuria Vicioso
6600231544	4508833806	03.08.2015	213A06	DN481X 6xLLED-3000 PSED-E WH KIT	1	Bianca van Melis
7600164273	Retour	19.08.2015	214A04	Circuit Filter	9doz	Albert Lamberts
6302505410	Retour	19.08.2015	215C19	M1911A/B	1	Albert Lamberts
6302533216	4509086219	10.09.2015	215D13	MTP Receiver 60-1062-02	1	Linda Stevens
6600219099	4509086547	10.09.2015	215C18	UID8620/00 DALI Dimmer	2	Bianca van Melis
7600165147	Retour	10.09.2015	215C21	Gemini Zikenhuis/6302551907	1	Albert Lamberts
7600164876	Retour	14.09.2015	215C20	M1574A/6302560523	1	Albert Lamberts
6600225516	4508290637	14.09.2015	201A02	Stellant Dual Syringe Ceiling Mount CT	1	Angelina Zeegers
7600165146	Retour	16.09.2015	215D19	M4557B/989803147891/6302556441	1	Albert Lamberts
7600165105	Retour	25.09.2015	215C22	Rivierrenland zkh Tiel/6302561832	1	Albert Lamberts
7600166135	Retour	05.10.2015	215D21	989803145071	1	Albert lamberts
6302533216	4500573497	13.10.2015	215C17	Extron Item wat jan heuser meegenomen uit MCT	1	Linda Stevens
6600251264	4509180110	14.10.2015	215E13	BATTERY 10.8V 6Ah LiIon	1	Linda Stevens
6600251264	4509180110	14.10.2015	215E15	FilterLine H Set Infant/Neonatal	1	Linda Stevens
6600251264	4509180110	15.10.2015	215C07	M8002A Trade-up Options	1	Linda Stevens
6600251264	4509180110	15.10.2015	215C07	IntelliVue Mounting Solutions	1	Linda Stevens
6600249630	4509220885	16.10.2015	213A01	Philips 241P4QPYES Monitor	3	Linda Stevens
6600252916	4509225215	16.10.2015	215B12	Philips 241P4QPYES Monitor	1	Linda Stevens
6600238441	4509226137	19.10.2015	215C12	MTP Transmitter 60-1282-01	1	Linda Stevens
6600238441	4509226137	19.10.2015	215C12	MTP Receiver 60-1062-02	2	Linda Stevens
6600251176	4509203141	19.10.2015	215D18	CX50 Upgrade	1	Remy Hendriks
6600245252	4508877831	21.10.2015	214A13	AG-0021-60: Roll Stand Kit for IntelliVu	5	Linda Stevens
6600245644	4508877073	21.10.2015	213B02	AG-0021-60: Roll Stand Kit for IntelliVu	1	Linda Stevens
6600245644	4508877073	21.10.2015	213B02	AG-0021-60: Roll Stand Kit for IntelliVu	1	Linda Stevens
6600251663	4509219874	21.10.2015	215C11	IntelliSpace Portal Solutions	2doz	Angelina Zeegers
6600251663	4509219874	21.10.2015	215C11	Upgrade to IntelliSpace Portal 7	1	Angelina Zeegers
6600250067	4509156080	21.10.2015	215C09	Upgrade to IntelliSpace Portal 7	3doz	Angelina Zeegers
6600252615	4509229909	23.10.2015	213B16	AG-0021-60: Roll Stand Kit for IntelliVu	1	Linda Stevens
6700174428	4509248041	26.10.2015	215D30	Cable Pressure Adpt PH-FE	3	Nuria Vicioso
6600245251	4509244613	27.10.2015	215B07	Wall Channel POLYMOUNT 19" Seismic	10	Linda Stevens
6600245251	4509244613	27.10.2017	215B07	PH-0062-01: Rail/Pole/Wall Mount Kit for	2	Linda Stevens
6600245645	4508877477	27.10.2015	215D09	PH-0062-01: Rail/Pole/Wall Mount Kit for	2	Linda Stevens
6302579641	4509257540	27.10.2015	215D08	MTP Transmitter 60-1282-01	2	Linda Stevens
6302579641	4509257540	27.10.2015	215D08	MTP Receiver 60-1062-02	2	Linda Stevens
6700174022	4509224563	28.10.2015	215D28	CS770 IntelliSpace CC & Anesthesia	1	Nuria Vicioso
6600253139	4509251969	28.10.2015	215B15	Philips 241P4QPYES Monitor	2	Linda Stevens
6600252918	4509224875	28.10.2015	213A16	AG-0018-60 Roll Stand Kitewc	3	Linda Stevens

6302579641	4509257909	30.10.2015	215C07	Flush Tilt/Swivel Mount for Flat Panel	2	Linda Stevens
6302579641	4509257909	30.10.2015	215C07	WC-0002-03: Seismic 13"/33cm Wall Channe	2	Linda Stevens
6302594639	4509198676	30.10.2015	215B10	Matras Digital Diagnost	2	Bianca van Melis

Figure 14. Excel sheet from the warehouse manager

Annex 2: Layout of the warehouse

Below, the layout design of the VB warehouse is shown.

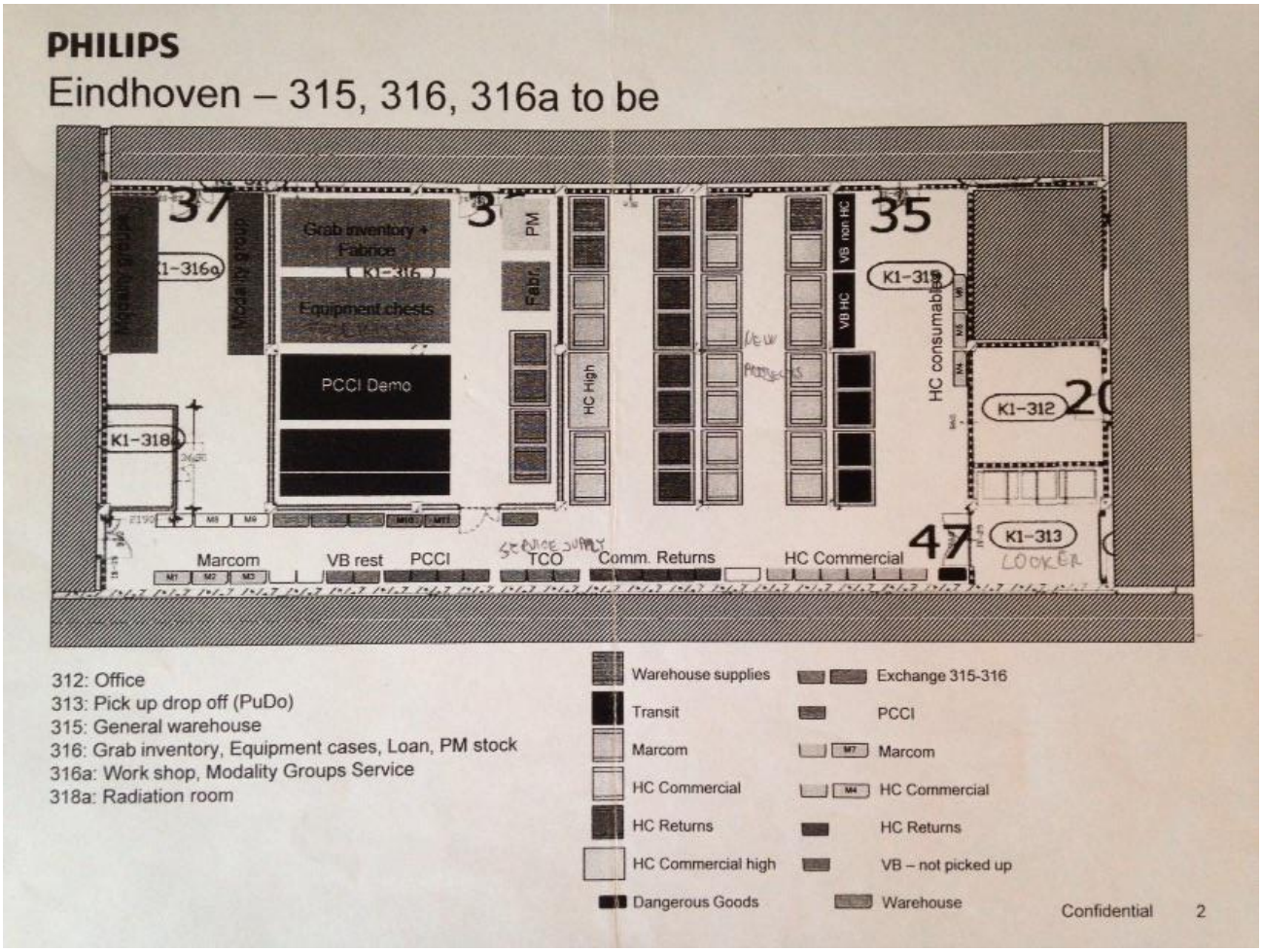

Figure 15. VB warehouse layout