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**Analysis of the Main Processes in an
Engineering Department based on Complex
Product Systems**

Tese de Mestrado

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Everything should be made as simple as possible, but not simpler.

Albert Einstein

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ABSTRACT

Currently, for any Complex Product Systems dealing effectively with the existing information can create competitive advantages. However, due to the high numbers of parties involved and the constant changes, managing the existing knowledge and ensuring its integration is not an easy process. Thus, standardization turns out to be an important aspect.

Considering this research problem, the main goal of this master's thesis is to analyse, describe and redefine some of the existing processes of the Development Centre in Bosch Car Multimedia, S.A.. Due to the complexity and the continuous growth of the Department, the existing information is not meeting the teams' needs and the existing guidelines are not consistent. As the information is also not properly shared, the idea of creating a "Department Handbook" turned out to be a relevant topic.

To achieve the proposed objectives a case study methodology was applied and a qualitative analysis was made. This project began with an in-depth analysis over the existing documents and processes directly associated with information sharing – Directives and Work Instructions. After understanding the current needs of the department and identifying the existing problems, the documents content was updated and reorganized, as well as the overall process for creating new documents. Lastly, all the improvement process, led to the possibility of creating the bases of the "Department Handbook".

By organizing the existing information and by getting to know the department needs, allowed the creation of guidelines more relevant and useful for the Handbook. Although many aspects still need to be analysed, this project helped to evidence the current need and advantages of standardize and organize the internal communication of the department.

KEYWORDS

Work Instruction, Knowledge Process, Standardization, Complex Product System

RESUMO

Nos dias de hoje, saber como lidar de forma eficaz com a informação existente num *Complex Product Systems*, pode criar vantagens competitivas. No entanto, como consequência do grande número de partes envolvidas e da mudança constante, a gestão do conhecimento existente e a sua integração torna-se bastante complexa. Assim, standardizar os processos revela-se um aspeto crítico.

Tendo em conta este problema de investigação, o principal objetivo desta dissertação passa por analisar, descrever e redefinir alguns dos processos adotados no Centro de Desenvolvimento da Bosch Car Multimedia, S.A.. Devido à complexidade e ao crescimento contínuo deste Departamento, a informação existente para além de não ir ao encontro das necessidades das equipas, não é devidamente partilhada, e as *guidelines* atuais não são adequadas. Surge assim a ideia de criar o *Handbook* do Departamento.

Recorrendo à metodologia de investigação *case study* e a uma análise qualitativa, numa primeira instância foi feita uma análise detalhada sob os documentos existentes e os processos diretamente associados à partilha de informação – Diretivas e Instruções de Trabalho. Após compreender as necessidades atuais do departamento e identificar os diferentes problemas, o conteúdo dos documentos foi atualizado e reorganizado bem como os processos associados à criação de novos. Por último, todos os processos de melhoria possibilitaram a criação das bases do *Handbook* do Departamento.

Apesar de alguns tópicos não terem sido aprofundados, este projeto realçou as necessidades atuais do Departamento, assim como as vantagens de standardizar e organizar a comunicação interna do mesmo.

PALAVRAS-CHAVE

Instrução de Trabalho, Processo de Conhecimento, Standardização, *Complex Product Systems*

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ACRONYMS

BBE - Energy and Building Technology

BBG - Consumer Goods

BBI - Industrial Technology

BBM - Mobility Solutions

BD - Business Development

BES - Bosch Product Engineering System

BGN - Bosch Global Network

BPS - Bosch Production System

BrgP - Bosch Car Multimedia Portugal, S.A.

CC - Chassis Systems Control

CM - Car Multimedia

CoPS - Complex Product Systems

CptM - Competence Management

ENG - Bosch Braga Development Center

ENG-LAB - ENG Laboratory

ENG-PO-PE - Project Office and Project Engineering

EPT - Engineering Processes, Methods and Tools

KM - Knowledge Management

KS - Knowledge Sharing

MFI - Manufacturing Industrialization

NPD - New Product Development

PDM - Product Data Management

PE - Project Engineering

PEP - Product Engineering Process

PO - Project Office

1. INTRODUCTION

This master thesis project was carried out in the field of Systems Engineering, at the University of Minho, and it was developed in collaboration with Bosch Car Multimedia S.A., Braga, Portugal.

The following section presents the background and motivation that support this study, as well as the main objectives. Then, after a short description of the key steps of the project, the selected research methodology is described and justified. Finally, the overall thesis structure is presented.

1.1 Background and Motivation

Over the years, due to the high standards on market demand and the rapid development of science and technology, the competitive pressure among product manufacturing companies is increasing (Bai et al., 2017; Ringen et al., 2016). Only those who continuously pursuit new development strategies can generate competitive advantages, and so, survive to the rapidly changing business environment and guarantee sustainability (Aleixo & Tenera, 2009). Hence, innovation and, consequently, New Product Development (NPD) are vital aspects to the organizational existence (Millson & Wilemon, 2006). In order to be one step ahead of their competitors, NPD teams cannot ignore the competitive environment despite the complexity and high risks that might be involved (Bai et al., 2017). Although the competitive level is higher than ever, a study reported by Mohamed (1995) over the implementation of innovations by eight manufacturing firms in Malaysia, already concluded that the more innovation-active firms were more successful they were in their implementation efforts than the less innovation-active ones. It is noteworthy that regardless of the diversity papers concerning innovation, the actual process of NPD and knowing how to improve the performance is still considered among the researchers as a “black box” (Aleixo & Tenera, 2009; Bai et al., 2017).

Complex Product Systems (CoPS) involve a high degree of technological novelty and innovation as well as a high level of coordination and collaboration during the different stages (Ranjbar & Cho, 2016). Naghizadeh, Manteghi, Ranga, & Naghizadeh (2017) characterize CoPS as customized, interconnected components that have high cost, are produced in low volume, require a wide range of knowledge and capabilities, and involve multiple players. With the view of managing diverge knowledge, skills and tools, CoPS developers and producers should be able to make effective and efficient decisions in both strategic and operational levels. Moreover, being a major complex capital goods, CoPS have an important role in diffusion of modern technology (Ranjbar & Cho, 2016).

Having in mind the innovation issues that CoPS might face, the importance of systems integration, software and project management becomes relevant (Hobday, Rush, & Tidd, 2000). As each new product tends to be different and unique, and its development and production can go from later to early stages, non-functional organizational structures are required (Hobday et al., 2000). Hobday et al. (2000) stress that key capabilities are no longer the manufacturing volume but systems design, systems engineering and integration.

In order to deal with the incremental complexity, standardization and heterogeneity of (within) some processes can be a good strategy that may allow production learning, cost reduction and new waves of innovation (Hobday et al., 2000). By creating effective means of information flow and cross-functional integration, companies might improve their organizational learning and knowledge structures and consequently generate competitive advantages and sustain competitiveness in a complex and dynamic business environment (Aleixo & Tenera, 2009; Bai et al., 2017; Ringen et al., 2016). Millson & Wilemon (2006) conclude from their research in the electrical equipment manufacturing industry that an overall integration over the NPD process is associated with greater proficiency. However, collecting knowledge and information is insufficient and not an easy task. This leaves decision-makers with an important question such as “How to collect knowledge?” and “How to use the collected knowledge?” (Ogiela, 2015). Being the exchange of information a successful tool on project management, the creation of Handbooks intends to address, in an effective and controlled way, each company needs by establishing processes, such as project schedule, documents, meetings, phases and risk monitoring. (Barbosa & Azevedo, 2012; Dennehy & Fesq, 2012). According to a research over NASA (National Aeronautics and Space Administration), Dennehy & Fesq (2012) made the FM (Fault Management) Handbook. The goal of this Handbook is to offer guidelines and recommendations, establish processes and disciplines.

Bosch Car Multimedia Portugal, S.A. (BrgP), located in Braga, Portugal, is one of the main plants in the Bosch division Car Multimedia (CM) and the largest Bosch unit in the country. Aware of the necessity of being innovative and having competitive advantages, in 2002, the Bosch Braga Development Centre (ENG) was created. This department is composed by several groups responsible for mechanical, hardware and software development, other specialists from other fields (accounting, management, etc.) and some teams dedicated to the innovative projects that exist in partnership with the University of Minho. Moreover, the department benefits with some groups responsible for managing shared services that collaborate in activities directly associated with the innovative products as well as in activities of management and control.

Over the past few years, the department has been in continuous growth, having a 100% increase of the number of collaborators when compared to the previous year. The fast growth on the number of employees aligned with the inherent necessity of creating new teams for the emerging projects, has created difficulties regarding the organization and communication within the department as well as the management of some of the current activities. Therefore, the need of establishing and describe the main processes related to the ENG Department organization and management, either between the development teams or between these and the support groups led to the idea of creating the “Department Handbook”.

1.2 Objectives

As described before, the department taken under consideration although not new for the Bosch Car Multimedia Portugal is now facing a huge increase on the number of employees. Besides this, the rapidly increase of the number of projects and collaborators leads to some difficulties regarding the communication and organization inside and between the different teams.

The main objective of this work is to analyse and describe the existing processes and, if needed, suggest to establish new ones, having in consideration the current necessities regarding the organization and management of the department. Although some of the processes are already standardized within each team, common activities are lacking between the different groups. Therefore, the company methodology will not be totally redefined but yet, adapted to the actual necessities turning it into a more practical and useful tool. Due to the complexity and the continuous growth of the ENG Department, the goal is to focus the research in some of the teams and not on the overall department. Through these steps, it is intended to start to create the foundations for the Department Handbook, i.e., suggest some initial content and defining a possible layout.

1.3 Research Methodology

The investigation techniques and methods used during the project development as well as a short justification of the chosen methodology are now presented.

1.3.1 Investigation Approach

According to Saunders, Lewis, & Thornhill (2009), two different approaches are possible when doing an investigation project: the deductive approach and the inductive approach. On one hand, the deductive approach deducts and tests a specific hypothesis based on general scientific principles. The results aim

to confirm or perhaps suggest the redefinition of the theory (Ary, Jacobs, & Sorensen, 2010; Saunders et al., 2009). Usually, it is based on significant quantitative data since it aims to generalize the results. On the other hand, the inductive approach involves a deeper understanding of the project context, being normally characterized by qualitative data with no need for generalization. After collecting data, as a result of its analysis a theory is developed with no need for generalization. Despite the clear defined purpose (objectives), no initial conceptual framework is predetermined. Moreover, the theory developed will be subsequently related to the literature (Saunders et al., 2009).

An inductive approach seems to be the most appropriate as the research problem is not intended to be generalized and to support any specific theory. Due to the detailed analysis needed and the specification inherent to any organization a deductive approach might not be accurate.

1.3.2 Investigation Strategy

The main purpose of any strategy is to enable to effectively achieve the different objectives. It will depend not only on the predefined goals but also on the existing knowledge and the amount of time and resources available. There are several strategies to be considered, namely, experiment, survey, case study, action research, grounded theory, ethnography and archival research (Saunders et al., 2009). According to Yin (1994), in order to select the most appropriate strategy, three conditions must be taken under consideration: the type of research question, the existing control over the different events, and the temporal focus.

The strategy “case study” is normally used when the investigator has little control over the events and when the focus is centralized in contemporary phenomena. Saunders et al. (2009) and Yin (1994) define the case study strategy as “an empirical inquiry that investigates a contemporary and complex phenomenon within its real-life context using multiple sources of evidence especially when the boundaries between phenomenon and context are not clearly evident”. This investigation strategy is not simply based on collecting data but in a comprehensive and exhaustive research strategy (Naghizadeh et al., 2017; Yin, 1994). A case study, although being focused on a single unit (e.g. individual, group, organization or program) can result in data from which generalizations to theory are possible (Ary et al., 2010). Due to the direct relation with reality, the case study allows an investigation to retain the holistic and meaningful characteristics of real-life, for example, understand the existing dynamics (Ranjbar & Cho, 2016; Yin, 1994).

Considering the motivation and objectives that support the research project, the case study strategy was the one identified as being the most appropriate as it allows an in-depth analysis over the whole case that at a first sight reveals to be multifaceted and context-dependent.

According to Yin (1994) each strategy can be used for exploratory, descriptive and explanatory research. An exploratory study is normally used when a clear and deeper understanding over a certain problem is wished. By seeking for new insights, the researcher will easily understand if he is following the right direction and what the next step should be (Saunders et al., 2009). An explanatory study aims to establish the relationship between different variables of a particular problem. The main purpose of the different associations is to reach a specific outcome (Chong, Son, & Wang, 2014; Saunders et al., 2009). A descriptive research works uniquely as a description of a certain situation in its real context. The researcher directly observes the current situation and later tries to make an accurate representation of it. This strategy can work as an extension of the other two methods, being the descript-explanatory study a common procedure (Saunders et al., 2009). In fact, this synergy reinforces the idea that a case study is not only tacit data collection but yet a comprehensive research strategy (Yin, 1994).

As the research project can be seen as a complex research object, by adopting a descript-explanatory methodology, a more flexible and complete examination is possible. In particular, on one hand by looking into the existing documents a descriptive analysis is made; on the other hand, throughout this analysis it is intended to understand the influence of new documents within the company communication and adapt one aspect to the other.

In any study, there must be a logical sequence and links between the collected data, the initial problem and the conclusions, i.e. a research design. When considering a case study strategy, four different designs are relevant, based on a 2x2 relation: single case vs multiple case and holistic case vs embedded case (Saunders et al., 2009; Yin, 1994). A single case design consists on analysing, from multiple perspectives, an independent phenomenon that was barely considered before. Conversely, a multiple case incorporates more than a single case and it is normally used with generalization as the main goal. Despite the advantages of a multiple case study, it can require extensive resources and time and, in some cases, the actual problem is rare or even unique. The pair holistic vs embedded concerns to the unit of analysis, i.e., if the case study only includes one unit of analysis then it is consider a holistic case, otherwise is an embedded case (Murale & Preetha, 2014; Rajala & Tidström, 2017; Saunders et al., 2009; Yin, 1994). For this particular investigation problem, the presented research design is a single and holistic case study. Considering the main focus of the whole project – create the initial guidelines for the Department

Handbook, a single case is the most accurate as it is a unique and personal aspect of any organization. In addition, the case study is holistic as the whole work is focused on a unique topic and goal.

1.3.3 Data Management

Besides establishing a methodology, any research work is characterized by systematically collecting and interpreting data with a clear goal in mind. Concerning data collection techniques and data analysis procedures, a qualitative or quantitative research can be made. According to Saunders et al. (2009), a qualitative approach is associated with non-numerical data (e.g. words, pictures and video clips). In fact, researchers aim to understand a certain scenario by focusing on the global picture rather than dividing it into several variables. Some of the advantages of any qualitative research are that it focuses on understanding a real context and later it attempts to explain the different relationships, activities and situations. However, it is important to mention that a qualitative analysis is subject to abstraction and personal opinion (Ary et al., 2010; Ranjbar & Cho, 2016). Due to the different advantages and considering that a Handbook aims to represent in detail the main activities and information of the department, a qualitative research seems to better meet the necessities.

One of the main strengths of any case study it is the ability to deal with a full variety of evidences (Yin, 1994). The case study strategy normally relies on different techniques such as interviews, discussions, direct observation, questionnaires and archives, in order to gather data. The most widely used tools in qualitative research are interviews, document analysis and observation (Ary et al., 2010). For this research, these three methods are taken under consideration. Initially an exhaustive analysis over the existing documents is made and later, based on the collected information and some feedback from informal meetings, the initial structure for the Department Handbook is created.

1.4 Work Description

The ENG Department is formed by several teams and projects that share knowledge and resources. Hence, the department can be seen as a complex system case study. At an early stage of the project, it is crucial to have a clear understanding of how the department is currently organized. The organizational chart will be drawn and the different projects will be identified. Moreover, the main different activities will be assigned to each group. It will be considered not only the groups directly related to product development but also those that play support activities.

After this preliminary overall understanding of the department, the existing processes will be analysed. First, some internal research will be made in order to collect all the processes already documented. Then,

in order to validate the various documents, meetings will be scheduled with the teams and projects leaders. With the different meetings, it is intended to get an accurate picture of the existing processes, needs and, perhaps, expectations regarding the processes standardization – always having in mind the future creation of the initial guidelines for the Department Handbook. The main goal is, besides describing some of the existing processes, to improve others and perhaps recognize some that are not created or stabilized.

Currently, the department follows a predefined methodology for processes sharing. Regarding the new necessities that might be identified, a validation of the model becomes pertinent, leading to some potential suggestions and reformulations. In order to guarantee that the new Work Instructions will be useful, of easy access and easy to understand, the current ways of communication within the company must be analysed. After identifying the different means of information sharing and storing, it is important to understand if the content is successfully adapted to the information. At the end, with some information collected and some feedback from different teams, an initial structure for the Department Handbook will be designed. Some initial content will be selected as well as the information channels used.

1.5 Document Structure

This thesis is divided in six chapters. Chapter 2 reviews the relevant literature, providing an insight on some of the topics such as CoPS, Information Sharing, Handbooks and Flow Diagrams. Throughout Chapter 3, a brief description about the Bosch history, culture and organization is made with the goal of getting an overall overview and so easily integrate the project within the company. Chapter 4 introduces the case study by describing and critically analysing the current situation. Based on the analysis over the current situation, some improvements are suggested and implemented in Chapter 5. The conclusions in Chapter 6 briefly summarizes the overall project and maps out future research directions.

2. STATE OF THE ART

In this chapter is made a critical review over the state of knowledge about some relevant topics considering the project. The chapter provides some foundation on which the thesis is built particularly: Complex Product Systems, Learning Challenges and Standardization.

2.1 Complex Product Systems

Complex Product Systems are complex high-technology capital goods that involve not only complex products but also complex systems (Brady, Marshall, Prencipe, & Tell, 2002; Ren & Yeo, 2006). Over the years, a large number of studies and articles have been published concerning this topic and, consequently, several definitions have been presented, such as:

- Hobday (1998), one of the pioneer researchers on this field, defines CoPS as being capital-, engineering-, and IT-intensive, business-to-business products, networks, constructs and systems.
- Ranjbar & Cho (2016) state that CoPS are high cost, high technology complex capital goods made in projects and small batches that are made up of many interconnected customized components, exhibit emerging properties through time as they respond to the evolving needs of large users.
- Naghizadeh et al. (2016) characterizes CoPS as being customized, interconnected components that have high cost, are produced in low volume, require a wide range of knowledge and capabilities, and involve multiple players.

In order to give a clear understanding of what CoPS represent, Ren & Yeo (2006) provided a list of some characteristics, such as: CoPS are Business to Business (B2B) capital goods and are customized for specific customers; CoPS have an elaborate architecture and consist of many interconnected control units, sub-systems and components; CoPS are a complex system that can perform multiple and important functions; CoPS involve a certain degree of technological novelty and innovation; CoPS involve a high level of coordination and collaboration during design, production and implementation; CoPS involve a wide breadth of knowledge and skills; CoPS involve a high level of system integration.

As major complex capital goods, CoPS play a critical role in diffusion of modern technology, being considered by many as the “technological backbone” of modern industry and economy (Hobday et al., 2000; Ranjbar & Cho, 2016).

CoPS involve a high number of capabilities, knowledge, skills, tools and players, which leads to a high degree of complexity and customization throughout all its projects. The technological novelty, the degree of innovation and the necessary level of coordination and collaboration makes it hard to make effective and efficient decisions (Ranjbar & Cho, 2016; Ren & Yeo, 2006). According to Acha, Davies, Hobday, & Salter (2004), when considering CoPS, the term “complex” denotes the high number of integrated and customized components, the breadth and depth of the technological capabilities, knowledge and skills required, and the degree of new knowledge involved.

One of the major problems concerning system complexity is integration. The multiple technical and functional disciplines demand a range of specialized knowledge inputs, which creates the problematic of how to integrate and co-ordinate the different areas (Brady et al., 2002). All CoPS projects demand effective innovation networks despite of the integration challenges (Hobday, 2000). Complex Product Systems cannot be studied simply by looking at the parts, but to the parts and their interactions. Hence, complexity can be seen as a measure of the interactions between product, process and organizations and it can be measured by the number of parts in a system (Moody & Dodgson, 2006). An increase on the system complexity can lead to new problems that, again, reinforces the intrinsic difficulty in making decisions. Considerable effort needs to be made in order to understand the real requirements and the appropriate solutions. Regarding knowledge integration mechanisms, Naghizadeh et al. (2016) claims that understanding the specific conditions of the project and the environment, as well as having problem-solving initiatives, are vital aspects.

Besides the integration problem, complexity can also be associated with the non-existing routines in CoPS projects. The frequently changes of requirements during production, caused by the novelty and complexity of each product, lead to unclear goals, uncertainty and unpredictable risks (Hobday, 2000). According to Ren & Yeo (2006) some of the common problems associated with CoPS are: the technical uncertainty; ineffective systems and procedures; inability to capture necessities; inappropriate organizational structures; inadequate task definition. These raises two important questions: how to improve the performance and productivity of projects and how to ensure long-term learning and innovation at the wider organizational level (Hobday et al., 2000).

2.2 Learning Challenges

Organizational learning capability is a weak area in project-based organizations (Hobday, 2000). In fact, the high level of complexity, coupled to the unique and temporary nature of projects, presents several challenges concerning effective learning between projects and teams (Brady et al., 2002; Hobday et al., 10

2000). The faster a new product is developed the more it depends on effective networking (Thomas, 2013). Managers and engineers often have to proceed from one production stage to the next with incomplete information, which makes project tracking and guidance important aspects to achieve established goals (Hobday, 2000; Hobday et al., 2000). During the CoPS projects, soft and intangible skills, such as leadership, communications and team building are key to good performance. Based on a case study in the aero engine sector, firms can reconfigure organizational knowledge in order to reduce uncertainty associate with design changes and enable more informed choices (Hobday et al., 2000).

Knowledge Management (KM) consists on extracting and distributing employees' knowledge so it becomes available to the whole organization. Brady et al. (2002, p. 2) state that "If tacit knowledge can be captured, mobilized, and turned into explicit knowledge it would then be accessible to others in the organization and enable the organization to progress rather than have its members having to relearn the same stage at all time". To address the usual multi-learning challenges, firms rely on different learning mechanisms and practices characterized by variations in knowledge activities, levels of formality, technologies, social relations, and communicative interactions (Brady et al., 2002; Hobday, 2000). With good knowledge management systems and simplified mechanisms and strategies, the communication among all participants of the innovation network can be improved and the experiences and knowledge derived from the development process can be better used in future projects. Reciprocally, by transferring knowledge from project to project, and from one phase of a project to another, firms improve their knowledge management and their organizational learning capabilities (Hobday et al., 2000; Ren & Yeo, 2006).

2.2.1 Knowledge Management

Concerning Learning Challenges, it becomes evident that KM, and consequently Knowledge Sharing (KS), play an important role inside a company. Nowadays, managing the knowledge and experiences from working in project teams is undoubtedly more important than the single specialized skills required by a specific individual task (Moody & Dodgson, 2006). Consequently, gaining the knowledge and later knowing how to share it and how to apply it to another process is of great importance. In fact, even small, incremental knowledge can distinguish an organization from its competitors (Loebbecke, Fenema, & Powell, 2016; Otero, Pastor, Portela, Viguera, & Huerta, 2013).

KM is the process of capturing, sharing, developing, and using the knowledge efficiently (Jafari & Charband, 2016). Considering KS, Oyemomi, Liu, Neaga, & Alkhurairji (2016) and Wang, Nidhi, & Cao (2016) refer to it as the continuous process of transmission, communication, interaction, and

coordination of knowledge or expertise that facilitates, throughout a proper channel, to improve organizational productivity, absorptive and innovation capacity, and sustain competitive advantage. As Oyemomi et al. (2016, p. 5223) say: “knowledge sharing is a journey from having to sharing”. Wang, Nidhi, & Cao (2016) support this idea by stating that KS helps to transform individual knowledge into organizational knowledge and consequently improve the firm’s performance. However, not all the KS methodologies within a company will guarantee the necessary intellectual capital for significant improvements in the overall performance (Wang et al., 2016). Understanding the right communication level regarding the company necessities is, therefore, essential to make the most of KS advantages and so, ensure success (Barbosa & Azevedo, 2012; Naghizadeh et al., 2017).

Although it might seem easy to diffuse the different activities within the network, the integration of the different events is a challenge for researchers and managers (Naghizadeh et al., 2017; Sugimoto, Larivière, Thelwall, & Ding, 2014). In fact, the integration of business processes and knowledge sharing is a complex process that can potentially influence the integration of business-knowledge processes (Oyemomi et al., 2016). Regarding the factors that might influence the integration of business-processes and knowledge-sharing integration, diverse perspectives exist, for example, leadership support, learning and training, and communication (Darroch & McNaughton, 2002; Oyemomi et al., 2016).

Currently, firms that deal with innovation are increasingly aware of the necessity of establishing cooperation, both external and in-house. Besides the internal network, collaborating with other firms and institutions is also crucial. All sorts of interactions will allow efficient knowledge transfer, resource exchange and organizational learning (Becker & Dietz, 2004). Despite potential barriers, such as people inherent hostility, search and transfer costs, KS by enhancing organizational knowledge can lead to work outcomes improvement, a more efficient and effective decision-making process, and so support innovation (Wang et al., 2016; Wang, Wang, & Liang, 2014).

A study conducted by Oyemomi et al. (2016), based on the analysis of 28 cases, demonstrates how implementing KS and business-knowledge process directly contribute to the improvement of organizational performance, despite the organization. Considering a more micro perspective, Alsharo, Gregg, & Ramirez (2017) conclude that knowledge sharing within a team will bring more trust and consequently more collaboration, synergies and effectiveness – what reinforces the whole idea of team work. In the same way, Jafari & Charband (2016, p. 732) conclude from the research that: “team members share their knowledge when they trust their partners, and when they feel dependent.”

2.2.2 Organizational Learning Orientation

According to Calantone, Cavusgil, & Zhao (2002) innovation consists on generating, accepting and implementing new and creative ideas, processes, products, or services within an organization. Therefore, it is correct to say that innovation involves the acquisition, dissemination and use of new knowledge. With this, the correlation between learning and innovation is high and more evident than ever.

When considering the learning process within a company, some authors present the concept of Organizational Learning Orientation. Organizational Learning Orientation refers to the processes associated with the creation and use of knowledge for the enhancement of innovation. It refers to the act of creating knowledge by, for instance, obtaining and sharing information or developing new technologies (Calantone et al., 2002; Sheng & Chien, 2016). It is worth mentioning that this type of learning might cause changes over the firm's standards that have a huge impact on its behaviour (Celuch, Kasouf, & Peruvemba, 2002). For instance, four key components of Learning Orientation are (Calantone et al., 2002):

- Commitment to Learning: degree to which an organization values and promotes learning; more commitment will increase the odds of occurring learning;
- Shared Vision: organization-wide focus on learning; create a common direction for learning;
- Open Mindness: encourage creativity and accept new ideas;
- Intraorganizational Knowledge Sharing: create routines to share knowledge among the different teams; keep the existing information alive and avoid switching costs.

With this, Innovation can be considered closely related to Organizational Learning. Numerous studies emphasize the importance of a firm's learning orientation and its impact on innovation (Calantone et al., 2002; Sheng & Chien, 2016). For example, a study from Sheng & Chien (2016) over dozens of high-tech companies in Taiwan, shows that a high level learning orientation promotes myopic learning and incremental innovation.

All in all, the positive relation between experience and learning, leads firms to efficiently use new knowledge over the existing knowledge. This process will encourage new activities that will possibly lead to radical innovation. Through accumulation of knowledge, and consequently experience, firms enhance their absorptive capacity that will enhance their competitive advantage (Sheng & Chien, 2016).

2.3 Standardization

CoPS companies deal with complex products and systems and for each new project, the existing design solutions, skills, and technical knowledge may become obsolete. Although not all the steps are totally new, project novelty makes it difficult to apply lessons learned from previous projects directly to new projects. However, despite the limited degree of repetition, this does not mean that any form of learning is impossible (Brady et al., 2002; Karina, 1998).

Standardization of old routines can also be seen as a way of simplifying mechanisms and strategies. Besides allowing knowledge sharing and cost reduction it can raise new waves of innovation (Hobday et al., 2000). In many cases, previous problem-solving efforts can be used on similar project activities as they increase the adaptability to changes. By considering existing procedures, it can lead to better insights into each practice, enhancing the critical spirit (Brady et al., 2002; Gross & Macleod, 2017; Otero et al., 2013).

On one hand, innovation can enhance the company flexibility and responsiveness as it adopts, integrates and implements new knowledge. On the other hand, standardization enables the company to achieve economies of scale, to reduce complexity and facilitates coordination among internal departments (Wang, Zhang, Sun, & Zhu, 2016). Wang et al. (2016) show that standardization positively influences innovation and, both, can directly improve organizational capability and performance. By facilitating concurrent and collaborative product development, standardization significantly and positively improves innovation. However, a proper balance between standardization (old experiences) and innovation is needed – if not properly defined standardization can create learning barriers (Brady et al., 2002; Gross & Macleod, 2017; Wang et al., 2016). Wang et al. (2016, p. 85) conclude, from a research over 207 Chinese manufactures, that “managers should apply standardization and innovation simultaneously because they complement each other”.

Hence, when thinking of standardization, informal guidelines, e.g., work instructions, and Handbooks are normally associated. By defining standard procedures within each company, it will not only benefit a single project but all the future projects (Dennehy & Fesq, 2012; Gross & Macleod, 2017). Formalization can then influence how organizations learn and perhaps improve their internal activities (Karina, 1998). Guidelines can help companies to rapidly adjust and adapt to change (Wang et al., 2016).

2.3.1 Handbooks

Associated with the idea of standardizing processes new corporate strategies have been adopted (Hobday et al., 2000). In general, development teams' projects have a series of activities that need to be manage

in an effective and controlled way. Therefore, it is common for firms to rely on internal systems that help on projects management and that keep track of all the necessary activities to be developed (Barbosa & Azevedo, 2012).

Handbooks work as an experience-based learning tools that aim to responded to company needs – educational purpose (Dennehy & Fesq, 2012; Karina, 1998; Sugimoto et al., 2014). By creating standards, this form of documentation addresses the firm necessities by offering guidelines, requirements and recommendations, and establishing processes and methodologies that can be later applied to future projects (Barbosa & Azevedo, 2012). Dennehy & Fesq (2012) state that Handbooks represent the means by which strategy is implemented and, as in any documentation system, it must be frequently updated according to experiences. The different content is usually the result of the organizational memory that captures lessons from personal experience. Furthermore, a successful management will strongly depend on having common processes related to planning, executing and controlling. Thus, managers can easily control all the company activities and so operate with precision and in a short period of time (Dennehy & Fesq, 2012; Karina, 1998).

Dennehy & Fesq (2012) article addresses the creation of NASA FM Handbook. Namely, it enumerates several bullets that outline the addressed contents. Table 2.1 identifies the different topics as well as the given explanation of its necessity.

All in all, the main point of any Handbook is to support the employees in their daily activities – given a particular problem, easily identify the most appropriate way to deal with it (Marsa-maestre, Klein, Jonker, & Aydo, 2014). However, it is important to keep in mind that this type of documentation must allow the different stakeholders to constantly improve it according to their new involvements. On one hand, formalization codifies the best-practice routines in order to stabilize and diffuse new organizational capabilities. On the other hand, it needs to provide a proper balance between dictating the way things are made and allowing employees to learn and optimize the process – learning-in-working methodology. In fact, results from a case study show that organization members do not perceive Handbooks as an efficient means for experience transfer (Karina, 1998).

Table 2.1. NASA FM Handbook Overview (adapted from CM/MBC, 2017)

Foreword	Why NASA needs the FM Handbook.
Scope	Define FM and its relevance. Identify the intended users of the Handbook.
Definitions	Define key terms.
Concepts and Guiding Principles	Define standard concepts and the guidelines principles.
Organization, Roles and Responsibilities	Suggests project organizational structure to support FM, its interfaces and its tasks.
Process	Overview of the project (key activities, expected work products and reviews).
Requirements Development	Define FM requirements categories, identifies driving requirements and flow down. Provides guidance in the development of typical FM requirements.
Design and Architecture	Explains the impacts of mission risk posture, goals and characteristics on FM priorities; provides insights into FM architectures, design features and approaches; and highlights mission-specific considerations.
Assessment and Analysis	Identify the analysis needed to be performed
Verification and Validation (V&V)	How to plan and prepare, perform and analyse FM verification and validation
Operations and Maintenance	Identify the operations activities throughout the project life-cycle.
Review and Evaluation	Provides feedback over the different stages of the FM functions.
Appendix	Relevant lessons learned.

Hence, enabling features, like a Handbook content, that gives users a better understanding of their work; user involvement; and flexibility in changing the Handbook content, are essential if the formalization system is supposed to support experience-based learning (Karina, 1998).

For instance, Dennehy & Fesq (2012) claim that some aerospace institutions, that have made changes to their organizational structure, development processes and test programs, in response to a preliminary version of the Handbook, are already seeing improvements in holding to cost and schedule.

2.3.2 Guidelines – Work Instructions

Considering now guidelines as a standardization procedure, Glogger-frey, Gaus, & Renkl, (2017) state that direct forms of instruction can lead to favourable learning outcomes. By relying upon quality work

instructions, possibly caused by poor quality data/information, employees became more efficient, make less errors and have higher job satisfaction (Haug, 2015). In turn, companies can have significant negative economic and social impacts on an organization such as inefficient decision making processes and lower performance. All in all, instructions should focus on key information in order to accomplish the intended task (Haug, 2015; Kahn, Strong, & Wang, 2002).

By keeping guidelines simple and not overlooking the importance of their presentation design can lead to an increase over the instructions quality. If possible, instructions should provide feedback for both correct and incorrect actions so that error can be eliminated and, managers can easily know and understand the different activities that are being performed (Boyce et al., 2017; Haug, 2015). Hence, for high quality instructions unambiguity, integrity and meaning must be taken under consideration, otherwise it may lead to the need of reason, guess, or gather additional information to correctively perform the task (Haug, 2015).

To improve the overall performance, guidelines should rely on relationships that help individuals transfer knowledge acquired from their previous experiences (Boyce et al., 2017). From a learning perspective, in many cases, the main focus of instruction processes is not to help someone acquire new skills or knowledge, but yet provide someone with a description of what to do or how to do it. This can be a problematic routine as usually the provided information is simply reported and not later used (Haug, 2015). For example, effective instructions can use graphics to provide step-by-step instructions as they provide a clear framework that can easily help with comprehension (Boyce et al., 2017). From the KS perspective, it is worth to mention that the aim of a guideline is not only to share the knowledge of the instruction writer but also to ensure that the instruction recipient acquires all the information needed to carry out the task in a satisfactory way (Haug, 2015).

3. ENTERPRISE PRESENTATION

In this chapter, a short description of the company where the project was developed is presented. At a first stage, an overall review over the Bosch Group is made, referring the company subdivisions and culture. Besides, a gradual framing is made in order to position the Bosch Braga Development Centre in the overall Bosch Group. For that, a short introduction to Bosch Portugal leads to a global overview of Bosch Braga and lastly to a more detailed analysis over the Development Centre – working areas and current organization.

3.1 Bosch Group

In 1886, at the age of 25, Robert Bosch founded, what would become the leading point of Bosch Group, the “Workshop for Precision Mechanics and Electrical Engineering” in Stuttgart, Germany. The invention of the first low-voltage magneto ignition device led to the creation of the current brand logo (Bosch, 2017g). Based on the motto “Invented for Life”, Bosch Group has become a leading global supplier and manufacturer of technology and services. Over the past six years, it has invested more than 27 billion euros in research and development, which makes her a competitive brand and enhance their competitive advantage (C/CCB & C/CCD, 2017). Counting with more than 440 subsidiary companies and regional subsidiaries in 60 countries, Bosch Group employs more than 390 000 associates worldwide and generated sales of 73.1 billion euros in 2016 (C/CCB & C/CCD, 2017). Nowadays, Bosch Group operates in four Business Sectors which are divided in different Divisions (Table 3.1) (BrgP/DBE, 2015).

Table 3.1. Bosch Business Sectors (adapted from (BrgP/DBE, 2015)

BUSINESS SECTORS	
Mobility Solutions (BBM)	Industrial Technology (BBI)
GS - Gasoline Systems	DC - Drive and Control Technology
DS - Diesel Systems	PA - Packaging Technology
CC - Chassis Systems Control	Consumer Goods (BBG)
ED - Electrical Drives	PT - Power Tools
SG - Starter Motors Generators	BSH - Hausgeräte GmbH (firms as subsidiary)
CM - Car Multimedia	Energy and Building Technology (BBE)
AE - Automotive Electronics	ST - Security Systems
AA - Automotive Aftermarket	TT - Thermotechnology
AS - Robert Bosch Automotive Steering GmbH	SO - Bosch Global Service Solutions

Since BrgP is part of Car Multimedia, it is important to mention that BBM generates the highest percentage of sales for Bosch Group, near 60%. This business sector works under three domains – connectivity, automation and electrification; and offers to Bosch clients integrated mobility solutions (Bosch, 2017c).

3.2 Bosch Car Multimedia Division

Bosch Car Multimedia (CM) main focus is developing smart integration solutions that are aimed to better integrate the entertainment, navigation, telematics and driver assistance functions, making them more flexible and efficient. The development of hardware and software are focused on the driver needs and can be divided in five main areas: Automotive Navigation & Infotainment Systems (AI), Instrumentation Systems (IS), Professional Systems (PS), Manufacturing Systems (MS) and Bosch SoftTec (BrgP/DBE, 2015; CM/MBC, 2017). By creating technologies that enhance safety and driving convenience and, at the same time, reduce energy consumption, CM aims to maximize Driving Convenience. Currently, CM counts with one central division, five places only responsible for development and six others where development and production happen (Table 3.2) (BrgP/DBE, 2015).

Table 3.2. Car Multimedia Divisions (adapted from BrgP/DBE, 2015)

Central Division	
Hildesheim, Germany	
Development	Development and Production
Farmington Hills, USA	Braga, Portugal
Palo Alto, USA	Budapest, Hungary
Coimbatore, India	Hatvan, Hungary
Bangalore, India	Suzhou, China
Tokyo-Kariya, Japan	Shanghai, China
	Penang, Malaysia

3.3 Bosch Culture

As stated before, Bosch Group is a worldwide reference in technology and services. Settled with a clear objective and motivation, the company identifies its strengths as being its corporate culture, the ability to innovate by creating technological solutions, the offered guarantee of quality and reability and its global presence. This four aspects, aligned with the strategic focal points (focusing on customers, shaping

change and strive for excellence), are on the bases of Bosch Group success and support the current Mission – “We are Bosch” (Bosch, 2017m).

Coupled with a strong mission, Bosch Group relies on a well establish vision as well as solid values (Bosch, 2017l). Bosch Group believes that their products must spark people’s enthusiasm, improve their quality of life, and contribute to conserving natural resources. Currently, the business is build on seven strong values, being that some of them can be traced back to its founder Robert Bosch (Bosch, 2017k): Future and Result Focus; Responsibility and Sustainability; Initiative and Determination; Openness and Trust; Fairness; Reliability, Credibility and Legality; and Diversity.

Parallel to the mission statement “We are Bosch”, Engineering at Bosch is represented by the Bosch Product Engineering System (BES). BES is a strategic initiative that points out all the elements required for the successful creation of a product, and to ensure its successful market launch. Based on five principles (create value, understand products, work smart and agile, lead by content and strengthen competences), BES aims to enhance the spirit of creating fascinating products delivering outstanding quality at attractive costs (Bosch, 2017a).

3.4 Bosch in Portugal

Bosch Group appeared in Portugal in 1911 when Gustavo Cudell established the first Sales Office in Lisbon. Currently, Bosch Portugal is located in three other cities, namely Bosch Thermotechnology, in Aveiro, Bosch Car Multimedia, in Braga, and Bosch Security Systems, in Ovar. At these locations Bosch develops and manufactures a wide range of products, being 85% of them exported to international markets (Bosch, 2017f). Based on the 2017 report, Bosch Portugal had an income of 1.102,07 Million € in Sales and counts with 4495 associates what makes the company one of the largest industrial employers at the national level (BrgP/DBE, 2016).

3.5 Bosch in Braga

As it can be seen in the Figure 3.1, Braga unit plays an important role for Bosch Portugal. Besides being the largest Bosch unit in Portugal, it is the main plant in the Bosch division Car Multimedia (Bosch, 2017e).

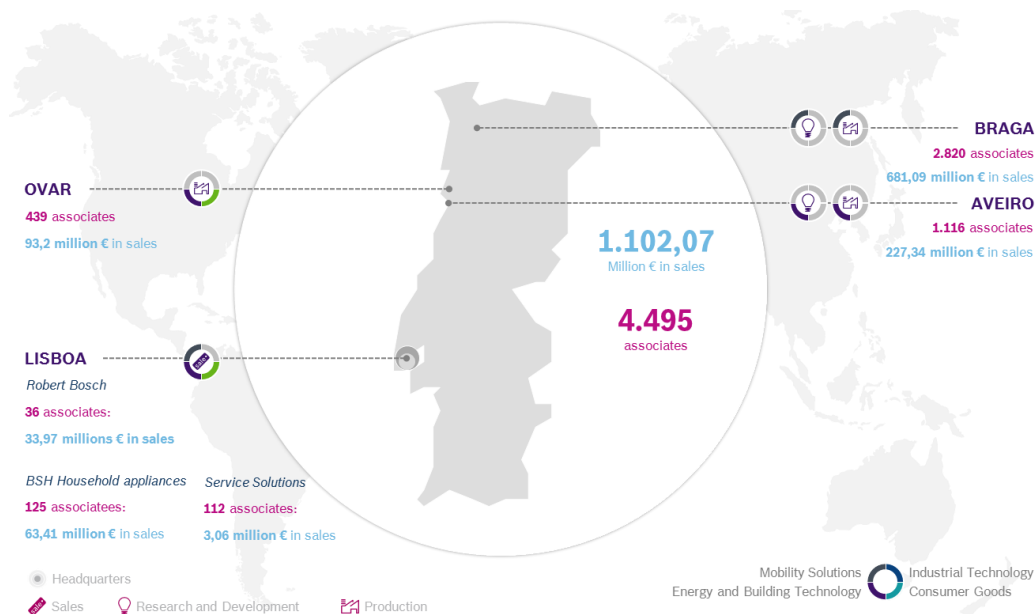


Figure 3.1 Bosch in Portugal (BrgP/DBE, 2016)

In the beginning (April 1990), the plant was founded under the name Blaupunkt Auto-Radio Portugal Lda. and the main activity was producing car radios. Eighteen years later, the CM division was restructured and the Blaupunkt brand was sold along with the aftermarket radio business segment. The plant was renamed Bosch Car Multimedia Portugal, S.A. and the activities started to be on original equipment for the car industry, from the prototype construction to the mass production (BrgP/DBE, 2015).

Among others, BrgP produces navigation systems, instrumentation systems and high-end car radios for the automotive industry, steering angle sensors for ESP-system (Electronic Stability Program), electronic controllers for heating equipment, and controllers for household appliances (Bosch, 2016b). It is important to mention that BrgP works for the five production areas of CM mentioned in the section 3.2. The company's portfolio also offers services from a Research & Development Centre, a Competence Centre of production-specialized engineers, an Assistance and Repair Centre, as well as an IT-service (Information Technology) Hub for Iberia (Bosch, 2016b).

With the belief that innovation will assure the future, BrgP has been investing in R&D (Research and Development) activities by hiring specialized people and creating partnerships with universities. The current innovation projects aim to improve quality, create a future oriented product portfolio and reduce costs. Some of the innovation projects are head-up displays, sensors and testing (BrgP/DBE, 2015).

The company is organized in two functional areas: Commercial Area (BrgP/PC) and Technical Area (BrgP/PT), subdivided in 19 departments. Figure 3.2 presents the current plant layout.

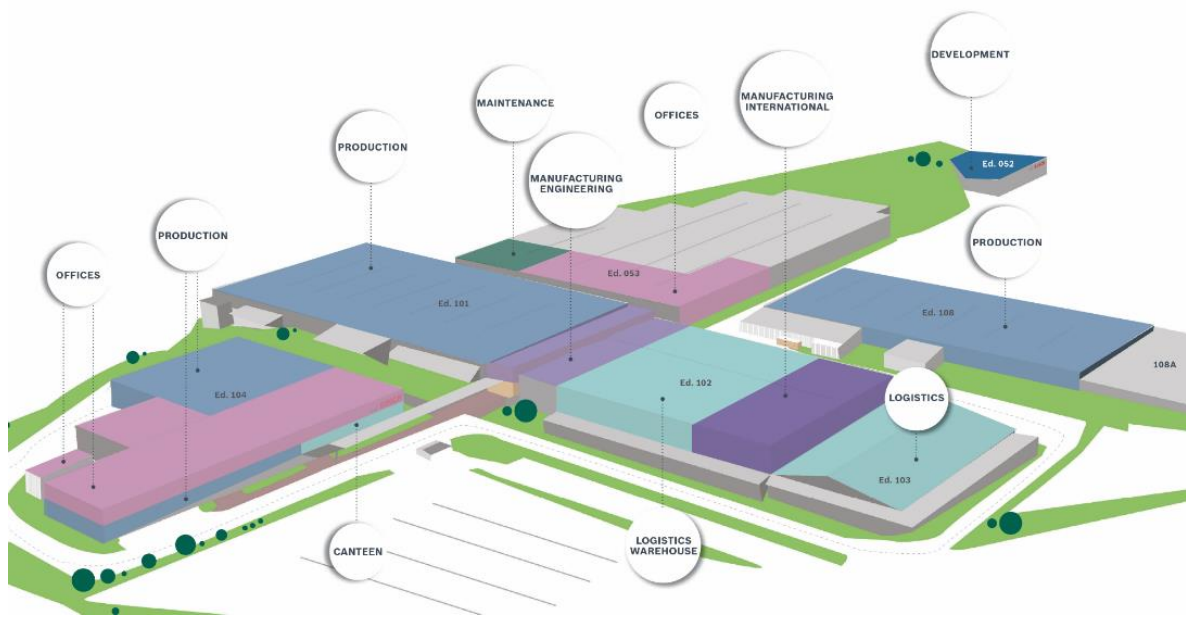


Figure 3.2. BrgP Plant Layout (BrgP/DBE, 2016)

3.5.1 Development Centre

Bosch Braga Development Centre (BrgP/ENG), part of the BrgP/PT, was born in 2002 and it is now one of the 94 Bosch R&D Centrees. The department was initially called BrgP/ENG_CM/MFI2, meaning that, besides the current activities, the department had a direct connection with the Manufacturing Industrialization (MFI). With the continuous growing of the employees' number, the ENG activities originated in 2013 the creation of an individual department what caused some changes within its teams. Besides being responsible for product development of two distinct Bosch business units: Car Multimedia and Chassis System Control (CC), it also provides engineering services to all other business units at Bosch Braga by giving support directly to Braga Plant (Bosch, 2017b; BrgP/DBE, 2016).

BrgP/ENG supports its work on its particular vision: to be a Development Centre of reference for Bosch; and its mission: promote Innovation and passion for Engineering by developing excellent products - "we create value for Bosch, for our customer and for our region" (BrgP/EPT1, 2017a). These strong philosophy allows the department to have three main unique selling points (Bosch, 2017b):

- Product Diversity: allows a constant growth despite potential know-how and knowledge;
- Proximity to Braga Plant: allows a natural usage of synergies that potentiate a higher diversity of engineering resources;

- Implementation of Agile Methods: enhance the engineering workflows and the team work in order to lead to a more competitive and fast response to the current changes and market challenges.

Furthermore, the main goal of the Bosch Braga Development Centre is to ensure a sustainable growth with a solid BES implementation as well as strong bet in partnerships and projects that support innovation and potentially allow the centre to achieve new competencies and fresh ideas (Bosch, 2017b). A big part of the ENG Department tasks are part of the Product Engineering Process (PEP). PEP integrates all the relevant steps required to create a project and to bring a new idea successfully to the market (Bosch, 2017h).

3.5.2 BrgP/ENG Organization

BrgP/ENG Department is currently divided in Innovation, Development and Support Teams, in a total of 17 sections (Figure 3.3). Each Team has its functions well defined and, besides some common activities, they all work independently.

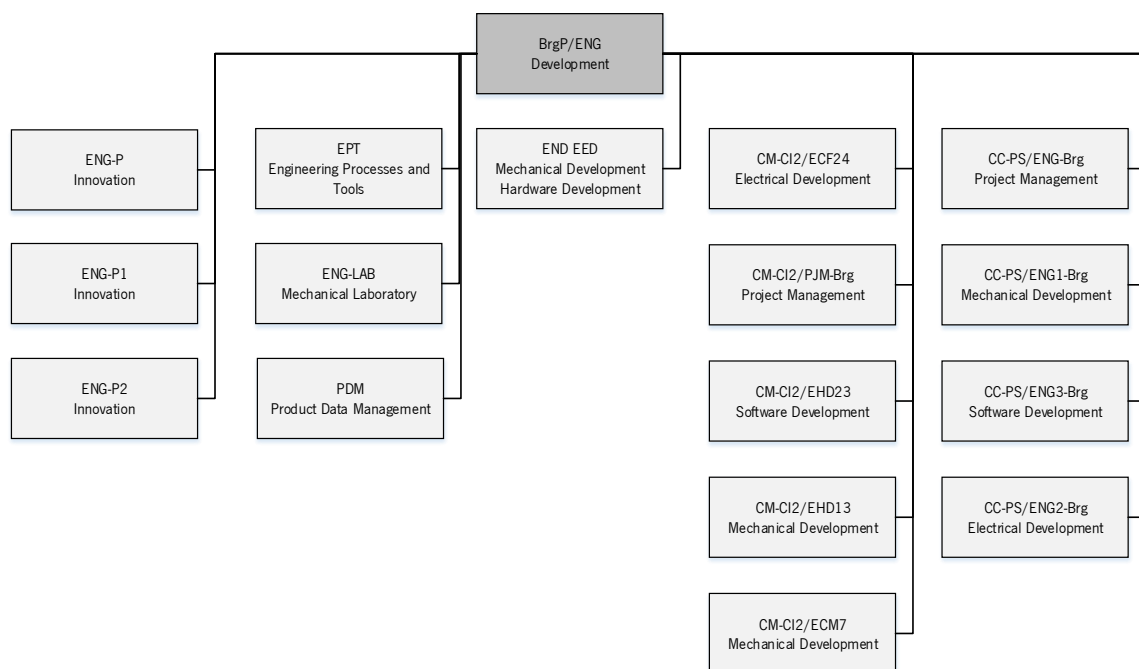


Figure 3.3. BrgP/ENG Organization Chart

Regarding Innovation, the department is organized around 9 teams being all lead by a single person (all represent the same section). Each team has its own responsible and it is responsible for different projects, existing a total of 13 projects. These teams work directly with the universities and with some departments within the plant.

Regarding Support Teams, there are three in the BrgP/ENG Department respectively EPT (Engineering Processes, Methods and Tools), ENG-LAB (ENG Laboratory) and PDM (Product Data Management). Each team has its own leader who is expected to provide support services to the remaining teams that integrate the department.

Development Teams represent the department majority and are divided in different business areas: CM and CC. Most of the Development Teams are divided into Electrical, Mechanical and Software Development Teams as well as Project Management Teams. Each individual team is involved in more than one project and, within each field, information and knowledge is shared.

This project concerns all the different teams of the ENG Department but takes place on the section EPT. Earlier, since 2011, EPT activities were part of ENG-PO-PE team that stands for Project Office and Project Engineering, respectively. In general, PO functions are the current EPT functions and PE functions were related to PEP (Product Engineering Process). With the ENG_CM/MFI2 Division, PO-PE activities were divided and PE activities were, all in all, no longer part of the ENG Department. In July 2016, PO originated the EPT team as it exists today.

The team tasks are now divided into four main areas: Project Office (PO), Business Development (BD), Bosch Engineering System (BES) - Processes & Tools, and Competence Management (CptM); and all together, aim to implement, improve and control engineering' processes, methods and tools, and provide support to customers and internal projects (BrgP/EPT, 2017).

4. DESCRIPTION AND CRITICAL ANALYSIS OF THE CURRENT SITUATION

Over the last years, the ENG Department had a huge increase on the number of people, projects and consequently, processes. The fast growth has led to a restructuring of some of the main activities, as well as the reallocation of some people functions. More, as a development department, the need for being one step ahead of the competition, makes some tasks much more urgent than others. Specifically, activities regarding the internal communication and thus, internal organization, have been left aside or, in some cases, without being given the necessary attention. This has created the necessity of re-establish the department processes and, ideally, create the department Handbook. It is with this main goal that this project was created and why it plays an important role within the department.

In order to improve any process or situation it is indispensable to have a clear view of everything that exists, as well as the different resources available within the ENG Department. It is important not only to identify the present situation but, if possible, the various phases until the current state. This chapter aims to describe the current situations concerning the main focus of this project – process optimization. Regarding the pre-defined methodology and approach, a detailed analysis is made over each project phase. At an early stage, some research was made in order to understand and recognize what other departments have been making regarding managing internal processes and creating Handbooks. Later, the department current situation was identified – analysed how the information is shared and where it is stored, the templates and official documents used and the existing documents. After a clear view of what is available in the ENG Department and the way everything works regarding processes management, it became important to confront the current situation with the different teams' needs. With all the necessary information collected, the creation of a Handbook, as well as, the internal processes organization becomes possible.

4.1 Analysing other Departments

A good approach to understand and perhaps improve the current situation of the ENG Department is to identify and analyse other departments' position. Based on some internal research, some keywords were used such as "Handbook" and "Work Instruction". After each search, a quick overlook was taken into the different results in order to identify some patterns and standard requirements that might be useful when defining the content for the ENG Department Handbook. It is important to mention that although a lot of content appear within each research, in most of the cases access to content was not allowed or, sometimes, no longer available. All the research was made using some of the internal communication

channels, respectively, Bosch Connect and BGN inside.portal. Concerning “Handbook”, some results appear:

- CRI Handbook

This Handbook is about Customer Related Incidents (CRI). It is an online table formed by some topics and respective links, being each topic associated with a Work Instruction. For each activity, the teams involved are marked so the process interveners are easily identified.

- PT/SAO Handbook

This Handbook is about Power Tools Division and it is divided into 5 main sub-headings (General, Finance, Human Resources, Tool of Trade Vehicles and Corporate Information) divided in different topics. All the information is shared online using links. Some of the links are, for example: “How to add a printer”, “New employee induction policy”, “PT org chart”, etc.

- Denham Employee Handbook

As stated, “The Handbook is intended to be a guide for employees throughout their employment with Bosch at Denham”. Its content goes from Bosch Mission and Vision to specific Denham information such as Employment Benefits. One of the main goals of the document is to help new recruits to get started in an easier way. All in all, it gives general and important information to Denham employees.

- BPS Handbook

BPS stands for Bosch Production System, a subsystem of the Bosch Business System, and, as the name implies, represents the internal production system. The BPS Handbook relies on a solid structure mostly because of its importance to the entire group. Some of the topics addressed are BPS Vision, BPS Principles, What is a Production System, BPS Implementation and BPS Success Factors. Last but not least, it also makes reference to a Glossary (Definitions and Technical Terms) and an Abbreviation List.

- RBCB/TEF41_MAE_Handbook

Although lacking organization, this Handbook consists on online files regarding Standards, Checklists and Requirements. Despite the reduced number of available documents, they are updated and easily identified.

- Testing Handbook

As an online list of contents, this Handbook addresses General Guidelines, Templates, Checklists, Proceedings and some relevant Instructions.

- DS/ETC-IN Department Handbook

The access to the different links that form this Handbook was denied. However, it consists on an introduction about the purpose of the Handbook, an overview over the Organization and its Targets, some standard Documents and all the important Instructions regarding the different internal tasks.

Apart from the Handbooks presented, more results appeared. The Handbooks integrate templates, general guidelines and information, and Work Instructions that, all together, aim to help and guide its users within the daily tasks. These topics can later be a good kick-off for the ENG Department Handbook. Regarding “Work Instruction”, the results were, in general, documents describing how to proceed in certain situations, i.e., how should some tasks be performed and under which situations. All the documents also indicate to whom the process is directed to and the main authors and approvals of it. Some of the Work Instructions were: “Purchase Order Types”, “Create a Framework”, “Create Documentation”, “Chemical Handling”, “Accident Reporting”, “Change Request”, “Organization Chart”, etc. Although some Work Instruction were online and others as a formal document, the content was pretty much the same: Title, Introduction, Target Audience, Method Description and Scope. It is relevant to notice that all the collected information was dated from between 2016 and 2017.

4.2 Information Channels

With the goal of keeping knowledge inside the company and to avoid its misuse, Bosch Group uses its own Channels to share information and enhance communication between the different associates. Furthermore, by having its internal platforms, the repetition of the same content is more likely to be avoided and each member can easily find the information and the documents that is looking for. Besides the personal internal email, the other four available ways to Share Information are the inside.Portal, the Share Point, the Network Folders and the Bosch Connect (BrgP/EPT1, 2017b).

The inside.Portal offers Bosch associates a central access point to various applications, processes and overviews, so that each user can access to relevant content according to its tasks. Some of the features available are Bosch Global Network (BGN), Workflow applications, myHR self-services and others, My IT Services (MITS) or inside.Docupedia. It is an institutional platform and each Bosch associate owns its own user account with individual permissions and responsibilities. Some of the benefits are the personalized and secure accesses, the consistent user interface as well as standardized visualization of content and that it facilitates international collaboration (Bosch, 2017d). As mentioned, BGN is one of

the inside. Portal applications and it also presents a uniform navigation structure. Bosch GlobalNet works as the intranet of the Bosch-group and aims to facilitate the internal communication. It is the primary and trusted source of information for official content, and the official communication instrument of the Bosch Group. However, it is important to mention that, BGN is not a collaboration tool but yet the central information platform (Bosch, 2016a).

Bosch Group relies on digital networking technologies to maintain competitiveness. Bosch Connect works as Bosch internal social network to connect employees and allow them to share knowledge, exchange ideas and opinions, and work together more efficiently. It promotes cooperation, communication and creativity among the different departments and the different locations. Comparing with the BGN, Bosch Connect is more focused in social functions and, regarding files storage, it is more suitable to publish documents and to collect feedback as it allows comments. Both platforms complement each other by means of links and the interplay between specific functions (Bosch, 2017d).

With a more restrict access, but yet usually shared with a large number of users, are the Folders store in the O:/Drive. Folders present no limit for the maximum file size, sharing is easy and it is the most cost-effective storage solution. Users need to ask for access to the different folders which assures confidentiality. This channel is recommended when members intend to access files only locally and in general, for all the collaborative functions and for stable users groups (BrgP/EPT1, 2017b).

Microsoft SharePoint is another platform that supports collaboration, being currently focused on Document Collaboration with Microsoft Office documents. The goal is to simplify and improve the cooperation between associates and to support the idea of “work anywhere – efficiently”. With SharePoint it is possible to share documents, co-edit shared documents, synchronize documents and have a simultaneous access from different users to the same file. All in all, work can be easily distributed and team members can work remotely and in a collaborative way (Bosch, 2017i).

Regarding Communication within the BrgP/ENG department, there are:

- Department Meetings: during the department meetings, important aspects are addressed between all its members, such as: feedback regarding meetings and visits; projects acquisitions and progress; headcount evolution and overview; innovation; organizational changes (plant and department); company situation; meet new team members.
- Department Newsletter: with monthly releases the newspaper approaches the innovation topic, interviews, market research, changes in the department, presentation of the new associates, company situation.

- Department TV: similar to the newsletter, the TV aims to keep the collaborators always informed; some of the topics are: company's mission, future audits and visits, environmental issues, external relations, changes in the department, accomplishments.

4.3 Standard Procedures

With a clear idea of what other departments and teams have made about Process Management, respectively “Handbook” and “Work Instructions”, it is now possible to have a critical opinion when analysing the ENG situation. Moreover, it will support and perhaps justify some future suggestions regarding the creation of the Department Handbook. At an early phase, it was identified what has been made concerning Process Management, in particular, what documents exist, where are they stored, who is responsible for managing them and also understand why things have been done the way they were.

Concerning Process Management, Bosch Company relies on three types of documents: Directives, Processes and Work Instruction. A Directive works as a written definition of target standards, i.e., it defines some of the main goals. One of the most relevant Directives for the CM Division is the Divisional Directive DD-DIR-001 (Appendix I – DD-DIR-001_PEP) as it defines the Division regulations – it provides the binding agreement for the implementation of rules at CM. Having its first Version published on the 30th of March, 2012, the fourth and last update dates the 23rd of November, 2016. The Directive DD-DIR-001 is also relevant as it states important definitions (Directive, Process and Work Instruction) and defines how a Directive and, consequently Work Instruction, should be written and reported.

A Process is a graphical sequence of interrelated or interdependent actions used to convert input into output, i.e., it associates different tasks to different members and places their actions throughout the time. In turn, Work Instruction is a description for the execution of individual tasks for a specific role, for detailed implementation of a specific activity. Due to its specifications, typically a Work Instruction is only applicable within one department or one location. During the project phases, although not totally forgotten, documents regarding processes will not be taken into consideration as they do not play an important role in the overall project.

In order to better understand the adopted process that handles with the existing Work Instructions and Directives, it is important to talk about them in a more general and formal way, and then, put the learned concepts and information into practice. Considering the organizational importance, it is relevant to identify possible patterns in the way fields are identified, created and stored.

4.3.1 General Understanding over Directives

As stated above, Directives and Work Instructions are, in its own way, formal documents that dictate and guide some of the company main activities. Due to its relevance for the daily activities, as well as for possible audits, it makes sense for them to follow specific rules and steps, and to involve different people. The Directive DD-DIR-001 is then a good starting point to describe the overall process, as it specifies the requirements for the general handling of Directives in the CM division, in particular:

- The different types of specifications used in CM and their differentiation;
- The numbering scheme, structure and content of Directives;
- The procedure applied for creating, coordinating, releasing and reviewing Directives.

Regarding Directives' Name, as well as Work Instructions' Name, each uses a unique code formed by: <Process Code> "-" <Type> "-" <Subject> "-" <Number>. The Process Code defines the corresponding business process, for example, HR stands for Human Resources. The Type changes between D for Directives and W for Work Instructions. The Subject specifies the key subject in the business process. The Number is simply a three-digit sequential number for a better identification of each document. An example given on the DD-DIR-001 is PEP-D-PM-100 that stands for Product Engineering Directive for Project Management, n° 100. After the <Number>, the author should try to shortly describe the document content – usually it matches the document main title.

By defining the required roles for implementation, Directives establish all the parts involved, as well as the roles to be informed if any changes are made in the Directive. Each role has a unique position in the organization (department or project), therefore must be properly select and well identified. According to DD-DIR-001, the typical roles involved and respective tasks are included in Table 4.1.

Table 4.1. Directives main Roles and Tasks

Role	Main Tasks
Owner	Defines the goal and content of a regulation. Defines the management authority to track effective implementation in all required areas. Responsible for monitoring compliance with the regulation, risk analysis and mitigation, and for improvements.
Author	Responsible for writing the contents of a Directive and ensuring its correctness. Performs content-driven reviews with all areas affected.
Area Manager	Responsible to implement a regulation in a particular area/section.
Area Coordinator	Responsible to coordinate a regulation in an area by: <ul style="list-style-type: none"> • distributing information; • organizing review participation; • supporting and tracking the implementation; • reporting potential improvements.
Board	Group of managers in charge of making a decision with respect to the introduction, validity and area of application of a Directive.
Approver	Puts the Directive into force by signing it. Decides on the inclusion of the relevant boards for implementing the adjustment process.

An important aspect to know, is that typically the Owner is the manager of the issuing area, and thus the Approver in personal union. In parallel to the previous roles and not less relevant, are the Users. They represent the persons involved in the implementation of a Directive and must be informed about the latter. Moreover, this group must be described as precisely as possible, in order to ensure the correct and efficient diffusion of the corresponding information. All the activities, roles and responsibilities, previously mention, must be properly described and allocated using a specific template called RASI Matrix (Responsible, Approval, Support and Information Matrix).

Regarding the chosen language, any document must be issued in English or in the national language, as long as all the affected parties are able to understand.

Consequently, to the constant content-driven reviews and monitoring, any official document can undergo through some approvals and disseminations and, consequently, updates. Therefore, it is essential to identify each one of the different versions in a clear and logical way. Concretely, according to DD-DIR-001, the correct way is: “V” <main version> “.” <sub-version> “_d” <draft version>, with main version and draft starting in 1 and sub-version in 0. If only an editorial revision is made, the sub-version is incremented. If a major concept changes, the main version is incremented and the sub-version resets to

zero. For example, V1.0 states for the First Released Version and V1.0_d1 for First Draft for Target Version 1.0. As a curiosity, currently DD-DIR-001 version is V2.2 having previously V1.0, V2.0 and V2.1.

4.3.2 Directives within the ENG Department

As seen before, Directives follow some specific rules and, concerning its layout, a general template is also provided as an attachment of DD-DIR-001 (Figure 4.1). Notice that this Directive is applicable to all CM Divisions and, consequently, includes the BrgP Plant and, so, the ENG Department.



	CM Directive <number>	Issue/Amendment V1.0 Draft 1	Page 1/5
From <Issuer>	<Directive Title>	Author CM/xxx	Date Mar 16, 2015

Figure 4.1. DD-DIR-001 Directives' Template – Header

Based in Figure 4.1, Directives' Header must refer the corresponding version, the total number of pages, the title, the issuer and author, and the date. Moreover, in the front page the users must be identified (usually named as the distribution list). A table of contents should be part of the document as well as some indispensable topics (objective/purpose, relevant definitions, main content, attachments and revision history). Although there is a general template, some others can be created as long as they remain similar to the original one. The ENG Department uses its own document as a Directives template (Figure 4.2).

BOSCH	PEP- BrgP Internal Directive "Process Name"	PEP-D-BrgP_I_”_” Page 1 of 5	Version, Status VX.X_dX Draft
Owner Org. Signature, Name	"Directive Name"	Author Org. Signature, Name	Date dd.mm.yyyy

Figure 4.2. ENG Department Directives' Template – Header

Comparing the two Headers, it can be concluded that both deal with the same topics, being the Issuer the same thing as the Owner. Besides the expected distribution list and table of contents, ENG Template has an approval and release section, where the owner and the different approvers are identified.

4.3.3 Work Instructions within the ENG Department

Focusing now on Work Instructions, the applicable guidelines are more or less the same. As stated above, the Directives' rules regarding title, version, language and roles, are the same when considering Work Instructions. Figure 4.3 represents the current Header of the Work Instructions Template. Although, at a first sight, it might seem that information is missing, the document relies on a Footer to identify the Area Coordinator, Author (*Autor*), Approver (*Aprovação*), Version (*Versão*), Date (*Data*) and Page (*Página*) - Figure 4.4.


 BOSCH	Instruções de trabalho	PEP-W-BrgP_I_XXX-XXX
	"Nome"	

Figure 4.3. ENG Department Work Instructions' Template – Header

Area Coordinator	Autor	Aprovação	Versão	Data	Página
			x.0_dx	dd.mm.yyyy	1 / 1

Figure 4.4. ENG Department Work Instructions' Template – Footer

In addition to a standard Header and Footer, the Work Instructions Template is already subdivided into four main chapters: Introduction, Description, Flow Chart and Norms and References. The target Users are identified just after the Header, as it was supposed to.

4.3.4 WorkON – Workflow Platform

Most of the multiple roles involved in a Work Instruction and Directive have to sign the document in order to validate it. Considering that Bosch projects might involve people located in different plants, paper based systems can increase approval times and, consequently, the total time of any project. Therefore, the use of predefined electronic workflows, as well as the use of standard approval templates available on the intranet, can dramatically reduce processing times. Hence, another internal platform used by Bosch collaborators is the WorkON – a platform with an easy-to-use interface for people-centric workflows

processes in many areas of the Bosch Group. WorkON handles part of the overall business process by, for example, getting approval from one or more employees or start a business process (Bosch, 2017j). Figure 4.5 illustrates the workflow when a new request is submitted on the WorkON platform. It is important to notice that when a request is rejected by one of the stakeholders, the process ends and a new request must be submitted and, again, approved by all.

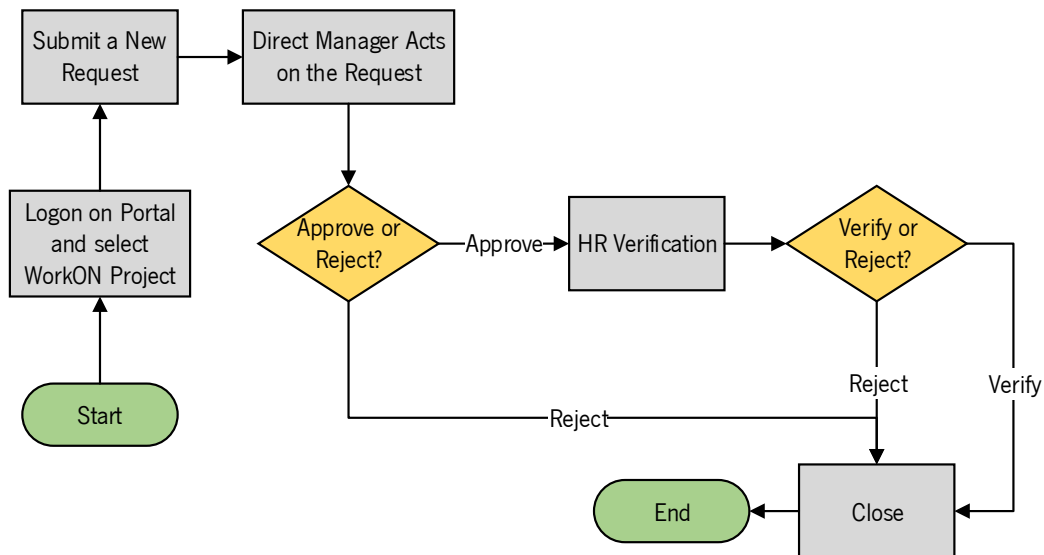


Figure 4.5. Workflow Template of a Generic Request (adapted from Bosch, 2016c)

The platform focuses on stand-alone workflows and uses only interfaces to “infrastructure systems” in order to provide basic functionalities like single-sign-on or email sending. Besides the user-friendly graphical and interface, WorkON benefits from a better control of approval processes to a higher transparency of request status, during the different stages of the workflow (Bosch, 2016c). WorkON integrates user interactions into business processes and focuses on simplicity. Moreover, its workflows can directly interact with other Bosch systems such as SAP or inside.Portal which increases the overall integration within the company (Bosch, 2017j).

For the particular case of Work Instructions and Directives, all the roles must be associated with the WorkON workflow for the concerned document. In the ENG Department, a Work Instruction normally involves the Area Coordinator, the Approver and the Author itself; and for a Directive, the Owner, the Author and the several Approvers.

4.3.5 Road Map for Implementation

The road map for implementing a new Work Instruction or Directive relies, parallel to the DD-DIR-001 Directive instructions, on an internal procedure – DD-DIR-001_PEP Road Map for Implementation V1.6 (Appendix II – Directives and Work Instructions Implementation Road Map V1.6). This guideline dates the 6th of December of 2013, it was made by BrgP-ENG-PO Team and when compared to the previous versions, few changes were made. The document starts by describing the possible types of Directives: Directives (generally), Divisional Directives, BrgP PEP Directives and PEP L3 Industrialization Sub-Process Directives. The different divisions cover, respectively, Directives from the Bosch Group, Directives applicable on the overall CM Division, Directives directed to the BrgP location concerning PEP and Directives concerning a single sub-process of PEP (typically at a third level). Then it follows the definition of Work Instructions alongside with the BrgP Ownership Matrix. The matrix identifies the BrgP Area Coordinator and, for each PEP Sub-Process its owner and its' Area Coordinator. Next, it follows the Process Codes (Table 4.2 and Table 4.3), as well as a short description about how to name a Directive and a Work Instruction.

Table 4.2. Industrialization Sub-Process Codes

Industrialization Sub- Process	Code
Project Management	IPM
Sample Build	SBD
Competence Centre	COC
Production	PROD
Process Engineering	TEF
Logistics and Production Planning	LOG
Purchasing	CP

Table 4.3. Other Process Codes

Development Processes	Code
Hardware_ Electronic Engineering	HWEE
Hardware_ Mechanic Engineering	HWME
Software_ Engineering Process	SWEP
Engineering Change Management Process	Code
ECM_ Engineering Change Management	ECM
Non Process Related IT's (ENG-Department	Code
BrgP_ENG_W	BrgP_ENG

After a brief explanation on how to name and create a Directive or a Work Instruction, comes a description regarding publication and availability. First, all the owners must sign the document – they must review the content and the requisites in DD-DIR-001. Then, by using a proper table – link table (one for Directives and other for Work Instructions – Figure 4.6 and Figure 4.7), the document can be published.

MFI Manufacturing International		PEP-D-BrgP_I"_"_"_"_" (Released PEP Directive for BrgP Industrialisation Sub. Process Description)				Contact: Miguel Santos (CM/MFI2)	
		Link to BFR VA directives (PEP and FF for MFI2) Link to ABS PEP Level 3 Industrialisation Process				Status: 19.11.2015	
Directive number (link to document)	Status	English Name/Area coordinator	Edition	Date	Approver	Area Coordinator	Author
PEP-W.BrgP_I_IPM.xxxx		Project Management Miguel santos (CM/MFI2)	dd-mm-yyyy	dd-mm-yyyy	Name/Dept	Name/Dept	Name/Dept
PEP-W.BrgP_I_SBD.xxxx		Sample build Ricardo Fragoso (MFI2Z.23)	dd-mm-yyyy	dd-mm-yyyy	Name/Dept	Name/Dept	Name/Dept
PEP-W.BrgP_I_COC.xxxx		Competence Center	dd-mm-yyyy	dd-mm-yyyy	Name/Dept	Name/Dept	Name/Dept
PEP-W.BrgP_I_PROD.xxxx		Production	dd-mm-yyyy	dd-mm-yyyy	Name/Dept	Name/Dept	Name/Dept
PEP-W.BrgP_I_PENG.xxxx		Process Engineering	dd-mm-yyyy	dd-mm-yyyy	Name/Dept	Name/Dept	Name/Dept
PEP-W.BrgP_I_LOG.xxxx		Logistics	dd-mm-yyyy	dd-mm-yyyy	Name/Dept	Name/Dept	Name/Dept
PEP-W.BrgP_I_PUR.xxxx		Purchasing	dd-mm-yyyy	dd-mm-yyyy	Name/Dept	Name/Dept	Name/Dept

Figure 4.6. Directives Release Table

		PEP-W-BrgP_HWME (Released Work Instructions for Hardware_ Mechanic Engineering Process)			Contact: M. Santos (BrgP/ENG)		
		CM Process Landscape Index CM Directives Link to PEP-W-BrgP_I_ Work Instruction Template			Status: 24.01.2014		
Work Instruction number (link to document)	Status	Name	Edition	Date	Approver	Owner	Author
PEP-W.BrgP_HWME.000	Rel.						

Figure 4.7. Work Instructions Release Table

For a better understanding of the Approval and Release Process a workflow follows in the Implementation Road Map (Figure 4.8).

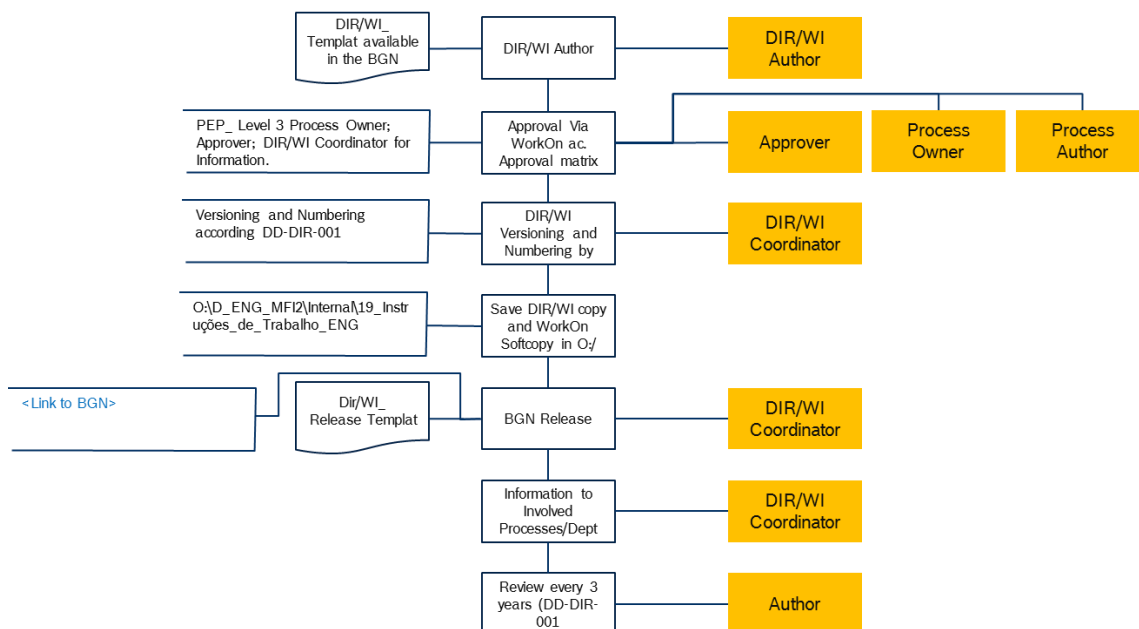


Figure 4.8. Approval and Release Process

The workflow addresses the different stages of the process (writing, approving, reviewing and releasing) and the corresponding roles (yellow). Subsequently, and as a complement of the workflow and the Ownership Matrix, the Approval Matrix is presented. This new Matrix identifies for the different processes the Author, the Approval, the Process Owner and the DIR/IT Coordinator (Figure 4.9). At the end of the Road Map File, some links to support documents are presented, namely, the Work Instructions and Directives Templates, the DD-DIR-001 Directive and a presentation with additional information from CM/QMM1.

Process	Author	Approval	Process Owner	DIR/IT Coordinator*
Sample Build	Associate that issue the work Instruction. 1- Starts the approval process by Signature in P&P or workOn Workflow. 2- Responsible for Review according CM DD-DIR-001. 3- Align with PEP Area coordinator Code and Numbering	According Scope		
Industrialization PM				
HW_ Elect. Eng.				
HW_ Mech. Eng				
Sw_ Eng- Process				
ECM				
Non Process related IT's			Head of section	Head of department

Figure 4.9. Approval Matrix

4.4 Existing Documents

After having a clear view of what type of documents are expected to be found, it was then possible to identify the existing ones when looking into the different store locations, particularly in the O:/ Drive. The BrgP O:/ Drive is, roughly, divided according to its departments. However, in some cases individual team folders might be found at a first level. For this particular case, at a first level the relevant folder is the Department one – ENG. At a second level, two folders were identified: ENG-PO-PE and INTERNAL. The ENG-PO-PE refers to the EPT activities previous folder and the INTERNAL, although it does not belong to any particular team, has some of the most important information of the ENG Department.

On one hand, the ENG-PO-PE folder, in particular the subdivision PO, has a folder named IT Work Instructions. In turn, this folder is subdivided into five folders: 01_Work Instructions, 02_Directivas PEP, 03_Apresentação Sistemática, 04_Release Note email Template and 08_Working Systematics. On the other hand, INTERNAL folder, subdivision 19_Instruções_de_Trabalho_ENG, consists of four folders being them the same as in ENG-PO-PE except for 08_Working Systematics. In general, each of the previous folders are subdivided in “Historic”, “Released Version”, “Draft Version”, “Template” and “Link Tables”. This previous one concerns the Release Tables (Figure 4.6 and Figure 4.7). After a detailed overview of the different folders, the files were identified as being, Work Instructions, Directives, Process or Templates. Later, an Excel file was made in order to sum up the documents founded (Appendix III – Existing Documents). The document name, the different roles, the version, the date, the target users and the introduction are identified.

Doing a quick analysis over the previous tables, in particular regarding the creation date, important information and patterns can be identified. Figure 4.10 shows the distribution of the documents creation date and compares it with the changes on the responsible team as well as the department organization (from BrgP/ENG_MFI2 to BrgP/ENG in 2013).

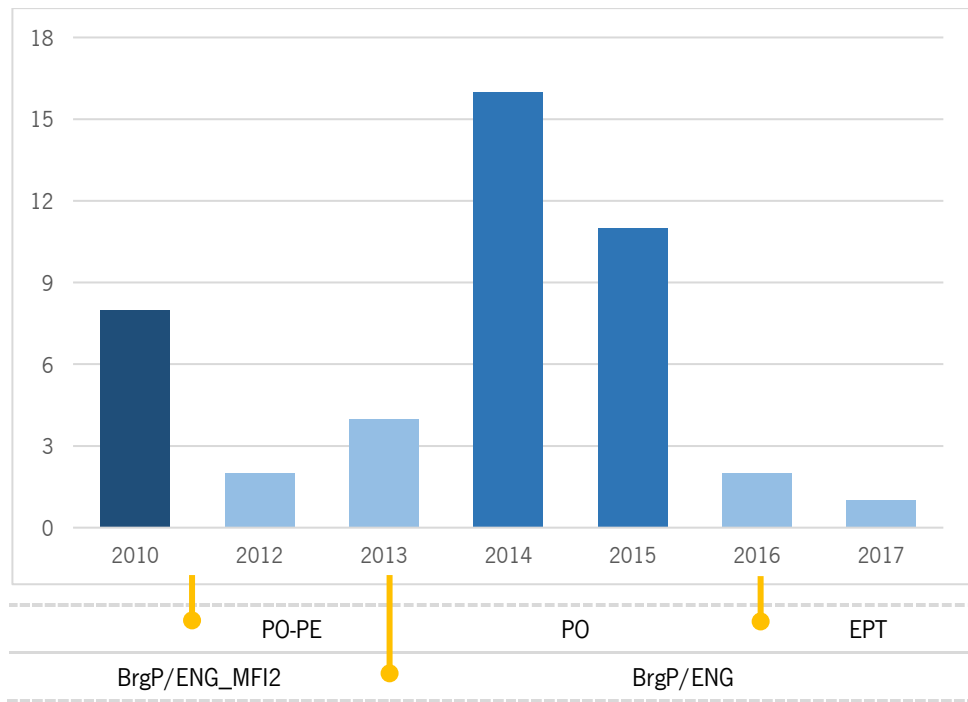


Figure 4.10. Documents Creation Date

Although the team PO-PE was only created in 2011, the oldest documents date from 2010. A relevant Work Instruction identified is the one that concerns “How to deal with Work Instructions”. Between 2011 and 2013, the number of documents created decreased significantly. The only Directives founded date these years and some of the Work Instructions concern those Directives. With the PO-PE division the time and resources dedicated to Work Instructions and Directives increased, what led to a notorious growth on the documents number. Later, in 2016, when the PO team changed to EPT, the person in charge for managing Directives and Work Instruction changed its responsibilities and only few documents were created since then.

5. ANALYSES AND IMPROVEMENT SUGGESTIONS

Without losing the main focus of this project – creating the bases for the Department Handbook, some steps were taken regarding the current situation. After a clear understanding of the current situation, some problems can be identified and, consequently, significant improvements can be made.

This chapter aims to describe and justify the changes made concerning the current situation and then presents the bases created for the Department Handbook. Directives are considered more relevant, as they approach a higher number of users and topics more relevant to CM Division. For that reason, it was decided to focus, from now on, in the study of Work Instructions.

5.1 Update Templates

One of the problems earlier identified was the selected language. Almost all documents are written in Portuguese and, according to the DD-DIR-001 Directive, this is only achievable if all the interveners are able to understand the same language – which is not the case. In addition, the majority of the Work Instructions and Directives are directed to a large number of users, what increases the odd of approaching foreign collaborators. Hence, one essential change is to replace the use of Portuguese for English.

Before changing each existing document, the templates must be changed. Although the department already owns templates, they do not present clear guidelines and are not always used. Besides creating a new standard procedure, it will avoid creating new documents in another language. Furthermore, both templates, Work Instructions and Directives, refer to PEP. This association makes sense as the technical features of PEP demand well established processes and an overall standardization. However, ENG activities are not necessarily related to PEP activities and this reference should not be included in the template.

Regarding the Directives' Template no changes were made as it is rarely used and it's provided as an attachment of DD-DIR-001 Directive. Since it is already written in English, no other relevant problems were identified. The Work Instructions' Template, on the other hand, is not well defined and is written in Portuguese and so, some adjustments are needed. The first step was to edit the header and footer (Figure 5.1 and Figure 5.2).


 BOSCH	Work Instruction	XXX-W-XXX-XXX
	Title	

Figure 5.1. Work Instructions New Template - Header

Area Coordinator	Author	Approver	Version	Date	Page
				dd.mm.yyyy	1 / 1

Figure 5.2. Work Instructions New Template – Footer

All in all, both, header and footer, were translated and the document name was redefined (from PEP-W-BrpP_I_XXX-XXX to XXX-W-XXX-XXX). This last adjustment aims to generalize the template and not only focusing it on the PEP process. Regarding the body of the template, the four main existing subdivisions were kept. Some standard rules were defined such as what font to use and how to insert a caption. These rules aim to uniform the documents structure, something that is not happening on the existing files. Regarding the section Flow Chart, it was suggested the use of Visio Software to create the different charts and, as an example, a simple exemplary was defined (Figure 5.3).



Figure 5.3. Example of Flow Chart

Appendix IV – Work Instructions New Template presents the new template for an overall look of it. Not directly related to the template, but yet an important step for any new document is the approval process. Chapter 4 describes the WorkON platform as a tool for obtaining approval from the different roles. Although using this tool might seem the correct and fastest way some concerns still exist. As in any Information System, entropy is not totally inevitable particularly when it depends on the user. According to some associates, some roles take too long to give personal feedback on a document. Hence, people try to get approval personally instead of using the normal channels. From the organizational point of view all roles must, despite the existing reasons, use WorkON instead of using documents. However,

considering that Work Instructions are not daily reproduced and, in general, all the roles interact on daily basis, personal approval is understandable. In brief, the use of WorkON reduces the number of resources, but can increase the waiting time so a proper balance should be made between both processes.

5.2 Validate the existing Documents

After redefining the standards procedures for creating a Work Instruction, it becomes relevant to analyse the existing ones. So, in the future, all the documents are up to date and follow the same guidelines. One of the aspects identified from the beginning is that although there exists a template, documents present different layouts. With a new established template, it will be possible to, with up to date content, properly rewrite the existing documents – if needed.

The first step, for the update process, was to identify, for each document, the different roles (using Appendix III – Existing Documents), particularly the author as it was the responsible for creating the Work Instruction. Later, an individual email was sent with the intention of getting some feedback from the authors regarding the Work Instructions content. For each document, the author had to identify if it was still valid, if it was out of date (the process exists but the procedure is not well described) or if it was obsolete (the process is no longer part of the ENG activities). Figure 5.4 illustrates the received feedback for each year.

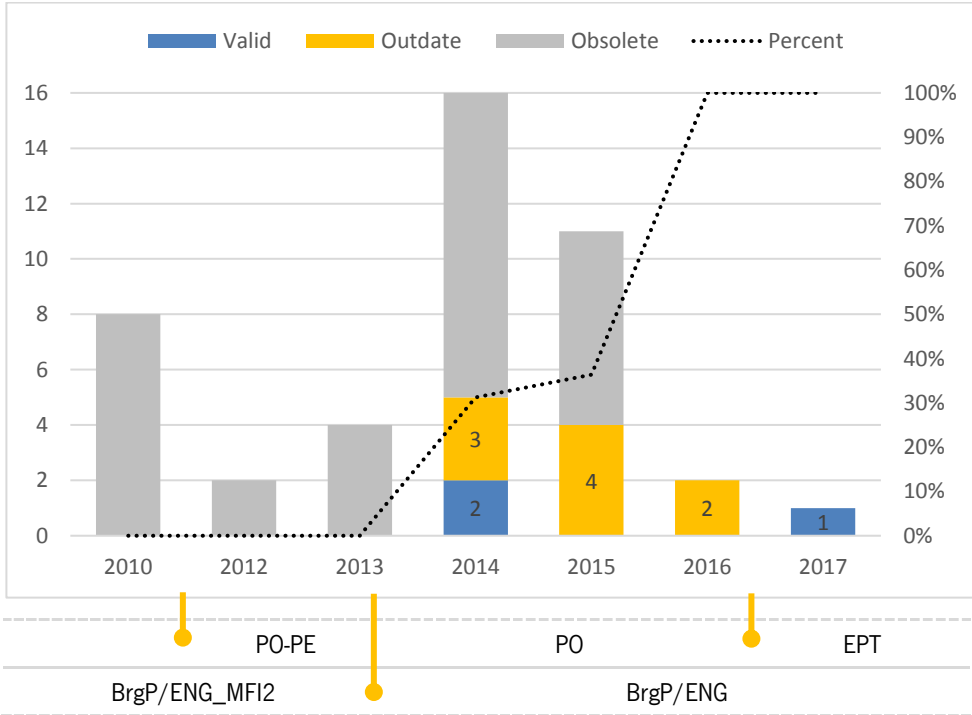


Figure 5.4. Work Instructions feedback

Considering the years 2010 through 2013, all the documents were classified as obsolete. Although not totally guaranteed, the received feedback was the expected one due to the changes in the department organization and activities since then. Looking now over the remaining years, it is noticed an increase on the percentage of documents outdated or valid. However, 73% of the 44 documents analysed is obsolete. This is a negative aspect for the overall department information management, as it represents a lot of needless documents that do not bring any added value to the daily work.

Hence, this information leads to the need of eliminating the old and no longer useful documents, as well as update and reformulate the remaining ones. For that, the authors were again contacted by email and asked to update the related documents using the new template. Although Work Instructions are an important part of the internal organization, is not seen as a priority within the department. Therefore, the updating is still an ongoing process and no further study was possible. Based on some received feedback, seven of the nine outdated documents are currently being updated and, in order to replace some of the obsolete documents, new Work Instructions are also being created.

5.3 Adjust Implementation Road Map

Besides updating the existing templates and organized the existing documents, it is vital to re-establish the implementation road map, so new documents are properly created, written and shared. The current process does not meet the needs and standards of the department, which means that some changes need to be made. For example, the processes codes do not match the departments' activities. Therefore, it was important to design a new procedure concerning the road map for implementation (check Appendix V – Directives and Work Instructions New Implementation Road Map for the new guideline). More, with a new road map, new process codes will be defined and, besides changing the content and layout of the different Work Instructions, the file name can also be adjusted.

First, and simply to comply with the internal policies, the overall template was change. Then, the types of Directives were redefined, concretely, the definitions were rewritten in a clear way and the definition for PEP L3 Industrialization Sub-Process Directives was removed as it is too specific for the context. Besides, the definition of Work Instructions was also reformulated. Having clear definitions of the different documents will facilitate its recognition in the future and reduce the chances of wrongly defining them. Regarding the BrgP Ownership Matrix, it was decided to eliminate it. Although it holds important information there is the constant associated need of updating it. Due to the constant change in the department organization the area coordinators are regularly changing as well as the teams' names. To

prevent incorrect information in a near future and to keep the guideline easily updated, removing the matrix seemed the right decision to be made.

Besides clear definitions, standardizing the process of naming a Directive or a Work Instruction is equally relevant. Therefore, an individual focus is given to this part of the document. The guideline is exactly the same as in the DD-DIR-001 Directive but presented in a simplistic way.

Next, it follows the Process Codes Matrix. The Codes used until today no longer match the ENG activities. Since the ENG_MFI2 division, Table 4.2 is no longer applicable as it is more associated with MFI2 business areas. To define the new process codes, the first edition of the DD-DIR-001 Directive was used as it presents a table with some suggestions. Besides, some inputs from departments' members were also taken under consideration. This table, cross referenced with the ENG business areas, resulted in Table 5.1.

Table 5.1. New Process Codes

Process	Code	Process	Code
Controlling	CTG	Business Planning	BP
Innovation	INN	Product Engineering	PEP
IT Management	IT	Non-Process Related	BrgP_ENG
Continuous Improvement	CIP		

For example, BrgP_ENG - W - <Subject> - <Number> states for Braga ENG Department Work Instruction. Next, for similar reasons, Sub-Process Codes were defined in order to better describe each Work Instruction, when considering activities related to the development process (Table 5.2).

Table 5.2. New Sub-Process Codes

Development Process	Code	Development Process	Code
Hardware Development	HW	Software Development	SW
Mechanical Development	MEC	SAP Process	SAP

For example, PEP - W - MEC - <Subject> - <Number> stands for Product Engineering Work Instruction applicable to Mechanical Development. If the author considers that the process code and the sub-process code are sufficient to identify the document field, there is no need on adding the <Subject>. The sub-process code will, in this case, replace the <Subject>.

Considering Publication and Availability, the information was kept almost the same but organized in a simpler and clear way. In order to keep the same layout among the templates, Figure 4.6 and Figure 4.7 were updated. Although it wasn't mentioned before, the link tables have on the header important links: CM Process Landscape and CM-Directives Index (file with the CM main Directives). So, besides redefining the general layout, the links were also updated as well as the remaining information (Figure 5.5 and Figure 5.6).

		<Process Code> - D - <Subject> - <Number> (Released Directive)			Contact: Process Owner Name (Org. Signature)		
		CM Process Landscape Index CM-Directives			Status: dd.mm.yyyy		
Directive Number (document link)	Status	Name	Edition	Date	Aprover	Owner	Author
XXX-D-XXX-000	REL	Directive Name	V1.1	DD-MM-YYYY	CM/MF/22	BrgP/XXX	BrgP/XXX

Figure 5.5. Directives New Link Table - Header

		<Process Code> - W - <Subject> - <Number> (Released Work Intructions)			Contact: Process Owner Name (Org. Signature)		
		CM Process Landscape Index CM-Directives			Status: dd.mm.yyyy		
Work Instruction Number (document link)	Status	Name	Edition	Date	Aprover	Owner	Author
XXX-W-XXX-000	REL	Work Instruction Name	V1.1	DD-MM-YYYY	BrgP/XXX	BrgP/XXX	BrgP/XXX

Figure 5.6. Work Instructions New Link Table - Header

Regarding the Approval and Release Process, some simple changes were made to the old workflow (Figure 5.7).

Again, the new workflow also addresses the different stages of the process (writing, approving, reviewing and releasing) and the corresponding roles (blue). Additionally, the grey rectangles indicate the use of DD-DIR-001 Directive and the other grey boxes the use of one of the templates.

Concerning the Approval Matrix, some relevant changes were made: similar to the BrgP Ownership Matrix, all the data that can easily become out of date were removed. Instead of associating individual names to each role, a general definition is given so the guideline remains updated for a longer period of time (Table 5.3).

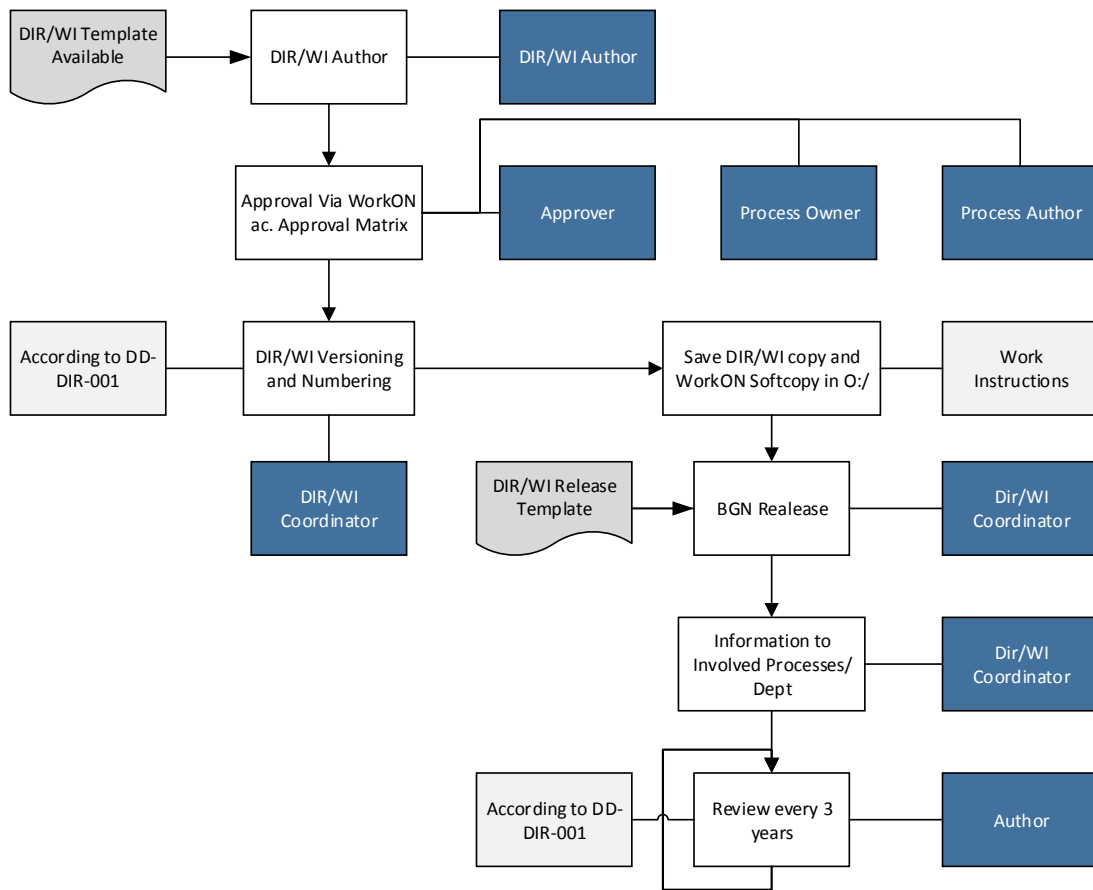


Figure 5.7. Implementation Road Map - Workflow

Table 5.3. New Approval Matrix

	Author	Approval	Process Owner	D/W Coordinator
Process	Responsible for writing the Content of a Regulation and ensuring its Correctness with Reviews	Puts the Regulation into force by Signing it Decides on the inclusion of Relevant Boards or to add Additional Approver	Defines the Goal and Content The Management Authority has to track Effective Implementation Responsible for Monitoring Compliance and for Improvements	Responsible for Link Tables Update and Process Review

At the end of the New Implementation Road Map, similar to the original guideline, some support documents are presented, namely, the Work Instructions and Directives New Templates and the DD-DIR-001 Directive.

With a re-established Implementation Road Map, new process codes and sub-process codes were identified. This allows to rename the documents previously identified as outdate or valid. Not only the code was changed but also the file name that is often in Portuguese. Table 5.4 represents the several changes made. The “CE_Transporte_interno_edificio052_16052016” file, although not written as a Work Instructions was consider when studying the existing documents due to its content information. Although the documents are not yet updated, besides re-establishing the file name it was also possible to create the Link Tables of each process code – see Appendix VI – Link Tables.

Table 5.4. Redefining Work Instructions Name

Old Files Name	New Files Name
PEP-W-BrgP_HWEE-002_Atribuição_Numero_peça_range_BrgP	PEP-W-HW-001_Assigning Piece Number_V1.1
PEP-W-BrgP_HWEE-005_Criar_Documentos_para_as_Peças_de_Catálogo	PEP-W-HW-002_Create Documents for the Catalog Pieces_V1.1
PEP-W-BrgP_SWEP-001_Organizacao_Laboratório_PVT	PEP-W-HW-003_PVT Laboratory Organization_V1.1
ECM-W-BrgP-001_Tratamento_Distribuição_Propostas_Protocolos_Alteração	BrgP_ENG-W-SAP-001_Treatment and Distribution of Modification Proposals and Protocols_V1.1
PEP-W-BrgP_ENG-004_Identificação de Inventário de novos equipamentos V1.0 d1	BrgP_ENG-W-001_Identification of New Material Inventory_V1.0_d1
PEP-W-BrgP_I_SBD-003_Criação_Stock_Fase_Projecto	BrgP_ENG-W-SAP-002_Stock Creation in Project Phase_V2.0
PEP-W-BrgP_I_SBD-004_Elaboração_Banf	BrgP_ENG-W-SAP-003_Banf Elaboration_V2.0
BrgP_ENG_W-004_V1.0_d_1_Procedimento-Transp.-Ed.52 V1.0	BrgP_ENG-W-002_Transport Proceeding_V1.0
CE_Transporte_interno_edificio052_16052016	(This document is not a Work Instructions so no changes were made.)
PEP-W-BrgP_ENG-003_Centros de Custo ENG V1.1	CTG-W-001_ENG Cost Center_V1.1
CC_Weekly Hour Reporting and Debiting V1.0_d3_08042015	CTG-W-002_Hour Reporting and Debiting_V1.0_d1

5.4 Teams Needs

With a clear view of what exists within the ENG Department, and after organizing some of the existing information, it is now important to understand if everything meets the current needs of the different teams. The first approach, already described in section 5.2, was the validation of the existing documents. This allowed to know if the currently work instructions are up to date and, therefore, are still useful. In general,

as they were considered outdated, and not obsolete it is correct to say that the described process still exists and these documents are therefore relevant despite some small changes. The idea now is to see if, besides these validated documents, teams feel the need to document other processes and information. It is important to understand if, regarding the Handbook creation, there is anything that should be taken under consideration.

For this phase of the project, individual informal meetings took place with members from four different teams: one support team (ENG-LAB), one CM team, one CC team and END EED team. The meetings started by outlining the context of the entire work and then by mentioning the work already done regarding Work Instructions. Some of those interviewed were already aware of the work done as, in some cases, they were the authors of some of the Work Instructions. Later, having the handbook creation in mind, it was asked which contents should be in it.

Some topics for the Handbook were previously selected and were presented during the informal meetings. Besides agreeing with the different suggestions and making some contributions, everyone shared some of the documents and webpages links used daily within their teams. More, even after the meetings other inputs were sent via email. Some of the shared information is exclusively from each team, but other is transversal to several teams of the Department. This type of suggestions allows the Handbook to become easily more generic and complete. In fact, the idea is to make it common to the different sections, but also meet each team individual needs.

5.5 Handbook Creation

At this point, with some information collected, and a more stable environment concerning the internal processes organization, it is possible to start creating the bases for the Department Handbook. Again, it is important to mention that, the main goal is not to write the whole Handbook but define some initial and standard guidelines. Moreover, the Handbook is more to be a practical book – with guidelines, and not only informative – with general and formal information.

5.5.1 Analysing the Information Channels

Before selecting the overall content of the Handbook, it is relevant to understand how Work Instructions, Directives and General Information have been shared across the department, and if necessary make some changes. One way was already identified: Link Tables. They were already updated and it was decided to keep them as they are a simple way for listing and easily identify the different documents (see chapter 5.3).

Concerning the O:/ Drive, it is mandatory to keep all the relevant information stored in it. Therefore, Work Instructions and Directives will continue to be saved there but in a different folder. Although PO-PE does no longer exist as a section of the ENG Department, it was decided to keep this location due to the inherent difficulty on creating a new folder - accesses and security. Hence, it was decided to reorganize the current Work Instructions folder into two different sub-sections: Before ENG Handbook and After ENG Handbook. This allows to keep a record of obsolete document that might become useful without mixing it with updated and currently useful information. This new organization is, perhaps, temporary as with the daily use of the Handbook new necessities will appear.

Note that, both Link Tables and O:/ Drive represent storage locations for the Work Instructions and Directives. It is still necessary to define how Handbook information will be stored. Again, it is important to first analyse how and what information is currently being shared.

Inside Bosch Connect there exists a community entirely dedicated to the ENG Department named Be One BrgP/ENG. On the front page, there are some subdivisions being one dedicated to Work Instructions - "*Instruções de Trabalho*" (Figure 5.8).



Figure 5.8. Be One BrgP/ENG initial page

Once again, a problem immediately identified is having the community content not written in English. Inside the subdivision "*Instruções de Trabalho*" exists a table, again not in English, with a Work Instruction file (Figure 5.9).

Instruções de Trabalho

Gosto | Atualizado em 15 de janeiro de 2015 por [Teixeira Sara \(CM-CI2/EHD23\)](#) | Etiquetas: *Nenhum* [Adicionar etiquetas](#)

[Editar](#)
[Acções de página](#)
[Traduzir](#)

Instrução	Link	Secção
HW Development Process Checklist	PEP-W-BrgP_HWEE-001-HW_Development_Process_Checklist.doc Ver detalhes	EED

Figure 5.9. Work Instructions inside Be One BrgP/ENG Community

This document is one of the previously identified as “outdated”, so there is no reason for keeping it available. As stated in Section 4.2, Bosch Connect promotes cooperation and communication, and it is more suitable to publish documents and to collect feedback. Also, Be One BrgP/ENG by being the ENG Department community is expected to already have all the co-operators as members. Thereby, the identified subdivision seems like a good place for implementing the Department Handbook and it will be the one taken under consideration.

Concerning BGN, it works as a central information platform and is the official communication instrument of the Bosch Group. Hence, it should make reference to the Handbook as it will contain relevant information about the ENG Department. In BGN, each Department has its own page and the BrgP/ENG one is divided in three topics: About ENG, Organization and Guidelines & Standards. The section Guidelines & Standards, as the name suggests, is the right place to make any kind of reference to the Department Handbook. Figure 5.10 and Figure 5.11 illustrate the current layout with approached subjects of the BrgP/ENG Guidelines & Standards webpage.



Figure 5.10. BrgP/ENG BGN page



Figure 5.11. BrgP/ENG - Guidelines & Standards

5.5.2 Information Selection and Organization

After analysing the different Information Channels, the situation in other Departments and the existing needs of ENG Department teams it is now possible to start defining some guidelines for the ENG Department Handbook. The first step was to define where and how all the information used during the Handbook creation should be saved. Although it is going to be created on one of Bosch internal online platforms, a formal (O:/ Drive) location is mandatory. Therefore, concerning the Drive O:/, it was decided to keep all the documents, images and texts used on the EPT fold and, as it is, currently, the responsible team for updating the Department Handbook. For that, a new folder was created named Handbook@BrgP.ENG. All the information used must be stored, in case, in the future, some change needs to be done or new information needs to be added. Not only a consistent layout will be possible but also the opportunity of reusing/adapting old content while saving time and effort.

In order to share the information in a more simplistic way, it was decided to choose one of the online channels – BGN or Bosch Connect. Due to the higher level of informality, Bosch Connect, in particular, Be One BrgP/ENG Community, seemed the right decision. However, it was also decided to make some type of reference on BGN, namely on the Guidelines & Standards section. Hence, the Handbook becomes easily accessible and shared, and its importance becomes more evident as BGN is the official communication platform within Bosch. In brief, the core of the Handbook will be written on Bosch Connect and, regarding BGN, should be added a link leading to the Bosch Connect Community.

One problem early identified was the lack of space within Be One BrgP/ENG Community. To work around this problem, it was decided to create from scratch a new community and then, having the “*Instruções de Trabalho*” as a shortcut for it. The new community was named Handbook@BrgP/ENG and, for now on, all the referred content belongs to this community (Figure 5.12).

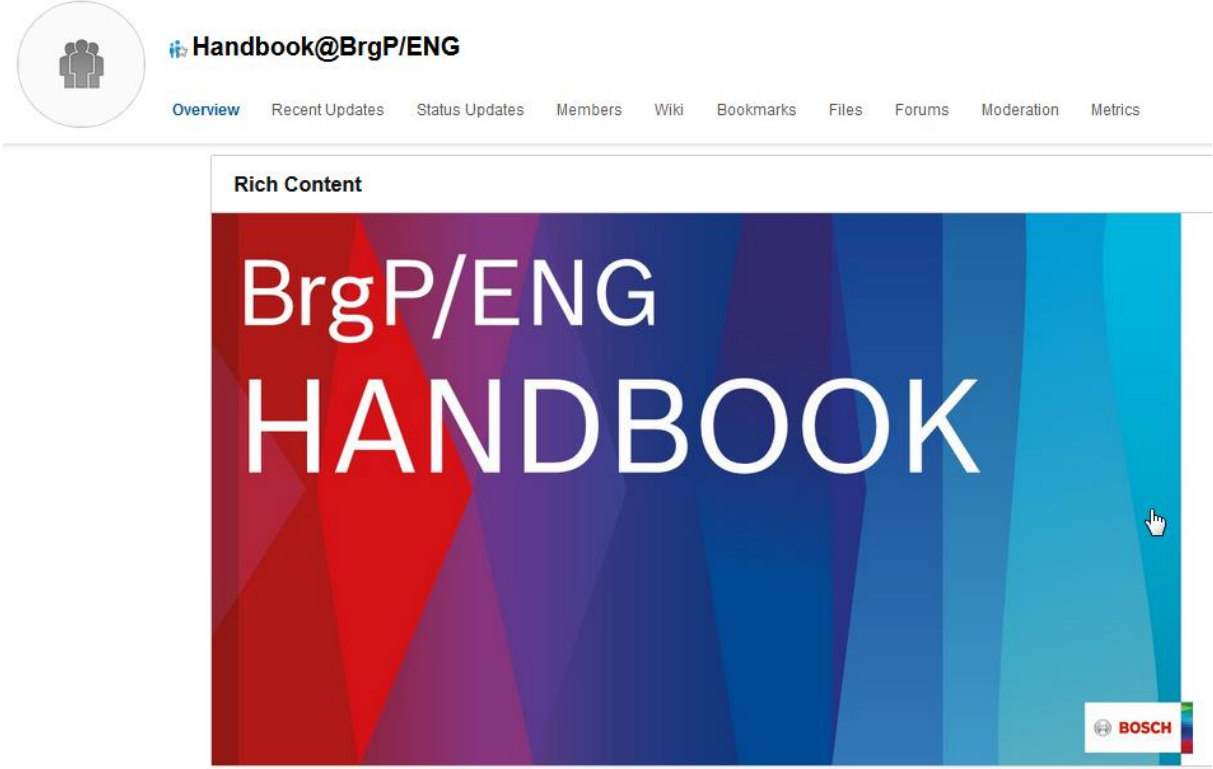


Figure 5.12. Handbook@BrgP/ENG Front Page

Parallel to this, and with the same purpose - fight the lack of space, a new SharePoint account was created also named Handbook@BrgP/ENG. As in any SharePoint account, the goal is to easily share the documents needed by allowing simultaneous access, a quickly updating the existing content and no need for access request. Note that the SharePoint does not replaces the O:/ Drive. In fact, all the SharePoint files must be stored in the O:/ Drive.

With all the store locations defined and the information channels selected it is now possible to proceed with the creation of the Handbook Department. First, four main chapters were identified: Information, General Procedures, Projects and Innovation (Figure 5.13). The first chapter aims to give a global idea of the ENG Department and to share information transversal to all the department. General Procedures intends to describe information regarding Work Instructions and Directives, and the main guidelines

regarding 5S Methodology. The remaining chapters will address, respectively, relevant information and guidelines for the different projects and for the innovation teams.

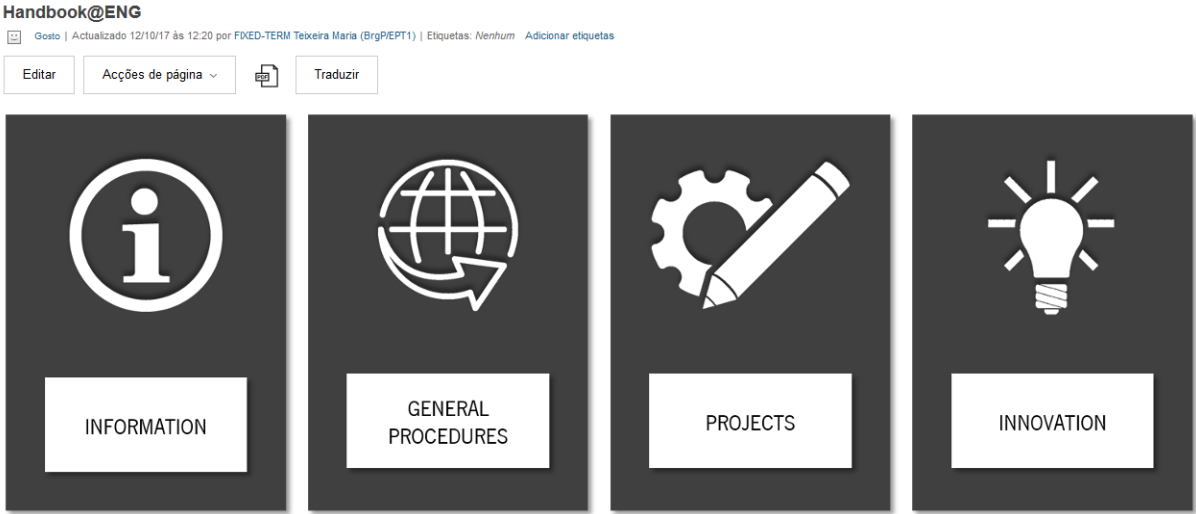


Figure 5.13. BrgP/ENG Handbook Home Page

For the first topic – Information, four different subjects were defined: About ENG, Organogram, Definitions and Practical Information (Figure 5.14).



Figure 5.14. Information Subsections

The topic About ENG links to BrgP/ENG BGN page and aims to give a general idea of the Department (e.g. Mission and Vision). By linking to BGN, instead of having written content, guarantees more coherence between both information channels. The Organogram section presents a document, stored in the SharePoint account, with the current department organization. The section Definitions, presents some relevant concepts such as “Directive”, “Process” and “Work Instruction”, and a link to Bosch Acronyms Webpage, with the goal of clarifying some of the daily used definitions and acronyms. This section aims to clarify some words and expressions that are misused in the Department and consequently improve the

internal communication. The Practical Information division is more directed to everyday activities. It is divided in three different sections: Integration Process, IT for Dummies and Internal Communication (Figure 5.15).



Figure 5.15. Practical Information Subsections

Integration Process addresses some guidelines regarding the ENG internal integration process. It links to SharePoint, for a short presentation that describes the overall process, and to a Work Instruction (outdated) regarding the same topic (Figure 5.16).



Figure 5.16. Integration Process Layout

The IT for Dummies consists on several links to the IT for Dummies Community. Some relevant links were selected in order to quickly answer common doubts (Figure 5.17). This reinforces the main goal of the Handbook: provide to its users the existing information in a clear and simple way.

IT for Dummies

Gosto | Atualizado em 22/08/17 por FIXED-TERM Teixeira Maria (BrgP/EPT1) | Etiquetas: Nenhum Adicionar etiquetas

Editar

Acções de página ▾

Traduzir



- [Internet Access](#)
- [Access to Shared Folders](#)
- [Laptop Responsibility Declaration](#)
- [Add Profile Photo](#)
- [PowerPoint Mandatory Layout](#)
- [Install a Printer](#)
- [Full Quota in e-mail box](#)
- [Configure Outlook Signature](#)
- [Divre "U" not available](#)
- [Internet Problem \(FireFox Browser\)](#)
- [Skype Sign-In Problem](#)



Figure 5.17. IT for Dummies Layout

Regarding the Internal Communication section, as stated in chapter 4.2, ENG Department owns its internal communication methods: Department Meetings, Department Newsletter and Department TV. Although all the employees have access to the information shared throughout these channels, this Handbook section will allow them to keep a track over the previews news as well as share relevant and spontaneous information and events. All the important meetings happening in the department can be easily shared, as some informal activities that may occur. This will not substitute any of the previous methods or the email but yet, complement and support them. For now, any content was added to this section.

Analysing now the topic General Procedures, two main divisions were identified: Work Instructions and 5S. For the Work Instructions sub-section, four documents were immediately chosen as mandatory information: the DD-DIR-001 Directive, the Implementation Road Map presentation and the Work Instructions and Directives Templates (Figure 5.18). These four documents are general guidelines and are applicable to any team of the ENG Department, therefrom its reference on this section. All the files are stored on the SharePoint Handbook@BrgP/ENG due to future need for space and updates. Regarding the Work Instructions identified in chapter 5.2 as out of date, as any of the new documents was finalized within time, it was decided to not make any reference to them in the Handbook for now.

Work Instructions

Gosto | Actualizado em 10/10/17 por FIXED-TERM Teixeira Maria (BrgP/EPT1) | Etiquetas: Nenhum Adicionar etiquetas


Editar Acções de página ▾  Traduzir




Figure 5.18. Work Instructions Section

As far as the 5S sub-section, the ENG Department is currently redefining the existing rules and procedures of the 5S methodology. This section aims to, in a near future, combine all the existing files concerning this topic. For now, only a sub-section was created.

The section Projects was essential built based on the feedback collected from the different informal meetings. It was divided into the different sections with the corresponding information associated. The two existing documents are saved on the SharePoint account and all the information presented in the webpage is links (Figure 5.19). Although a lot of information is missing, some of it is confidential and each team must be responsible for it. More, only a few informal meetings took place and, on a daily basis, new ideas will arise.

Projects

Gosto | Atualizado hoje às 15:48 por FIXED-TERM Teixeira Maria (BrgP/EPT1) | Etiquetas: Nenhum Adicionar etiquetas

Editar Acções de página ▾ Traduzir 

BrgP/END BrgP/EED

CC-PS/ENG1-Brg

BrgP/ENG-LAB

Important Links

[PGL \(Planning Guide Line\)](#)
[Mechanics Domains \(CI1\)](#)
[Hardware Domain \(CI1\)](#)
[Design GuideLines \(CI1\)](#)
[Process Rules \(Guidelines\)](#)
[PCB Specifications](#)
[Others](#)



Communities

[Be One BrgP](#)
[BrgP/END](#)
[FMEA@Bosch](#)
[LWS mechanics](#)
[LWS - Lenkradwinkelsensor, Steering wheel angle sensor](#)

Figure 5.19. Projects Section

Last but not least, the section Innovation was created but no content was added. The idea is, as explained before, to provide quick hyperlinks to files and webpages that are usually used by the innovation teams. Some of these teams' members are not directly part of the ENG department which made it difficult to collect information. Furthermore, due to the time line of the project, it was not possible to meet with representatives from the different sections.

It is important to mention that everything that was added to the Handbook is nothing more than an initial draft. More sections can and will be added in the future, in order to complete it. By being a practical tool within the department, it is expected for the updating to be a continuous and progressive work, and to have multiple identities involved.

Besides defining the new community Handbook@BrgP/ENG, it was also necessary to make a small change on the Be One BrgP/ENG community ("Instruções de Trabalho"). The current image (Figure 5.8) on the front page is totally outdated so a new design was established. Besides, as the previously used files were not properly saved it becomes impossible to use the same framework. Figure 5.20 shows the new front page of the Be One BrgP/ENG Community.



Descrição geral

Subcomunidades

Etiquetas

Rich Content



Bosch Braga Development Center was born in 2002 and it's currently responsible for the **product development** of two distinct Bosch business units: **Car Multimedia (CM)** and **Chassis System Control (CC)**. Our development center also provides engineering services to all other business units at Bosch Braga by **giving support directly to Braga Plant**.

Figure 5.20. Be One BrgP/ENG New Front Page

6. CONCLUSIONS AND FUTURE WORK

This chapter presents the main conclusions of this dissertation, followed by a discussion of possible future work.

6.1 Main Conclusions

Throughout the project, the main goal was to analyse, adjust and standardize internal communication processes while creating the initial guidelines for the Department Handbook. At an early stage the focus was to understand what exists not only in the ENG Department but also in other departments concerning Handbooks, Work Instructions and Information Channels. This initial research allowed to get an introduction to the topic and with the organizational learning orientation of the company. Then, the different standard procedures were comprehensively analysed, in particular, Directives and Work Instructions. For this part of the project, Directive DD-DIR-001 played an important role, as it works as a manual for all the Directives and Work Instructions creation and implementation. For instance, each department can create its own templates and document release process but always by taking into consideration the DD-DIR-001 Directive. Besides understanding the different rules and procedures, the existing documents were identified and studied as they have a direct impact on the teams' activities.

At this stage of the project, several problems were immediately identified such as: misalignment between the DD-DIR-001 Directive and the templates, and the implementation road map of the ENG Department; different layouts over the existing documents; lack of organization on storing and sharing documents; erroneous and out of date information; and no common and appropriate information channels being used. The lack of standardization, coherence, organization and sharing can lead, for example, to spending more time on completing a specific task, sharing wrong information that might lead to mistakes and not taking advantages of the existing documents. This leads to the need of change and improvement, allowing the proper use of the existing information and so bring competitive advantages to the department.

In the attempt to overcome the identified problems some changes were made. The first step was to re-establish the existing templates so, in the future, the documents created have the same layout. With the same purpose – standardization, the documents previously analysed (work instructions and implementation road map) were validated and reorganized. All these initiatives, besides bringing more internal organization to the department helped on encouraging teams to correct wrong files and start to create new ones. In general, almost all the information studied was outdated and not being used by the

department due to the bad organization. By removing unnecessary documents and renaming the important ones, the access to needed information can be done in a faster and easier way.

With more clear and organized processes and aware of teams' needs, it was possible to start creating the bases for the Department Handbook. For that, some important aspects were taken in consideration, such as: selecting a common and easy access information channel, identifying topics that meet teams' individual needs and the common activities of the department, establishing a user-friendly layout, and understanding how the Handbook can be successfully made. By considering all these aspects, the odds of having a complete and up to date Handbook and ensuring its daily used by all the ENG Department members, increase drastically.

6.2 Future Work and Limitations

Despite the improvements already made, some suggestions for further development of the research can be made. ENG internal communication involves a lot of variables and only a few were taken under consideration for this case study. Considering more processes is undoubtedly a step in the long run and will help to complete and improve the Handbook content.

In the near future, the documents being updated must be finalized and stored properly. Considering the few number of valid Work Instructions, more resources should be allocated to define new ones. In order to upgrade the Handbook content, more informal meetings can be done. By giving ENG members' free access to change the Handbook, can also encourage the users to add content to it, instead of relying only on one team. In fact, throughout the project some of the identified limitations were directly related to this aspect. For example, the limited access that each user has to information and information channels, created difficulties when trying to edit or sharing it. More, as a lot of the information is specific to each team and sometimes confidential, collecting it can be hard and time consuming.

Another problem identified is the uniqueness of each complex system. As a matter of fact, one of the limitations identified from the beginning is not only the lack of information from other case studies, but also the impossibility of adapting it to different contexts.

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APPENDIX I – DD-DIR-001_PEP

 BOSCH	Divisional Directive	DD-DIR-001 Page 1 of 12	Version, Status V1.0 REL
Owner CM/QM Steiner	Directives in the Car Multimedia (CM) Division	Author CM/QMM1-Wagener	Date 30.03.2012

Distribution: CM-QM-Hi, CM-QM-GB, CM Process Owners

Approval and release

The directive DD-DIR-001, version 1.0, becomes effective as from 1 April 2012.
The Process Instructions QSR_VA001, version 7 and QSR_VA002, version 4, thus become null and void.

Owner	sgd. CM/QM	<i>Steiner 30.03.2012</i>
Approver	sgd. CM/EC	(signature in german reference)
	sgd. CM/EE	(signature in german reference)
	sgd. CM/EM	(signature in german reference)
	sgd. CM/P	(signature in german reference)

Definition „Status“ for a Directive

DRAFT Non-binding draft, not suitable for use
REL Released, version has been released

Valid edition see <https://bgn.bosch.com/alias/cm/directives>

Printed editions and copies are not covered by the amendment service.



 BOSCH	Divisional Directive	DD-DIR-001 Page 2 of 12	Version, Status V1.0 REL
Owner CM/QM Steiner	Directives in the Car Multimedia Division (CM)	Author CM/QMM1-Wagener	Date 30.03.2012

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 BOSCH	Divisional Directive	DD-DIR-001 Page 3 of 12	Version, Status V1.0 REL
Owner CM/QM Steiner	Directives in the Car Multimedia Division (CM)	Author CM/QMM1-Wagener	Date 30.03.2012

1. Goal and purpose

Directives provide the binding agreement for the implementation of rules at CM, based on the "Management System Manual for Quality, Environment, Safety and Security in the BOSCH Group with Amendments of the CM Division" and the requirement "We write down what we do. We do what we have written down".

This directive DD-DIR-001 describes the requirements for the general handling of directives in the CM division.

- The different types of specifications used in CM and their differentiation
- The numbering scheme, structure and content of directives
- The procedure applied for creating, coordinating, releasing and reviewing directives

2. Area of application

The content of this directive is binding for the CM division including its associated business units, plants and regional subsidiaries. To provide a standardized implementation approach to the greatest possible extent, it is recommended that the associated subsidiaries and affiliated companies use this directive as well.

In the event that individual requirements stipulated in this document do not allow to be implemented within six months, the corresponding area must request a deviation permit from the owner of this document in writing. The reference language of this document is German.

3. Definitions

Directive	Binding written or graphic definition of target standards to be observed for processes and rules, including description of available room for tailoring
Process	Sequence of interrelated or interdependent activities used to convert input into output (ISO 9000, ISO 16949)
Work instruction	Description for the execution of individual tasks for a specific role, for detailed implementation of a specific activity, including definition of any existing room for tailoring, if available.

4. Elements of the QM system at CM

4.1 Management System Manual for Quality, Environment, Safety and Security

The "Management System Manual for Quality, Environment, Safety and Security in the BOSCH Group with Amendments of the CM Division" [1] is the central specification document to be adhered to in accordance with ISO/TS 16949 and defines the basic systems, processes and working modes of the CM business division.


In order to further detail the processes involved, the manual refers to the CM process landscape and to directives. Rules for the RB Management Manual are defined by C/QM, see BGN.

RB directives and CDQs have to be implemented by the individual functional owner in charge at CM.

4.2 CM process landscape

The CM process landscape [2] defines the highest level of the processes valid for CM and provides structured access to all downstream standards and information.

CM process management is defined in greater detail in [3].

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Owner CM/QM Steiner	Directives in the Car Multimedia Division (CM)	Author CM/QMM1-Wagener	Date 30.03.2012

4.3 Directives

By issuing a directive, the owner claims binding compliance with rules for a defined area of application. Further directive-related details are explained in the following chapters.

5. Creating directives

5.1 Procedure

When creating a new directive or updating an existing one to a considerable extent, a prior coordination with CM/QMM1 is required. In this context, take account of the following:

- a. Goal of directive
- b. Required input and expected benefits
- c. Type of implementation and success control procedure
- d. Impact on other directives and processes

5.2 Directive name


The definition of the structure and rules applied for creating directives and processes is described in two divisional directives: DD-DIR-001 for directives and DD-DIR-002 for processes.

With the exception of these two divisional directives, all other directives use the contents allocation to the CM process landscape as a primary classification feature. Each directive and the related processes or work instructions use a unique name code set up in accordance with the following scheme.

Directive name = <Process code> "-" <Type> "-" <Subject> "-" <Number>

Process code Code used for the corresponding business process, see table below
 Type D = Directive / W = Work Instruction
 Subject Key subject in the business process (for better structuring, optional, e.g. PM, LOG or CDQ)
 Number Sequence number, three-digit starting with 001, centrally managed by CM/QMM1

Process	Code
Strategy planning	SP
Business planning	BP
Policy deployment	PD
-----	-----
Acquisition	ACQ
Product engineering	PEP
Fulfillment	FF
-----	-----
Human Resources	HR
Finance	FIN
Controlling	CTG
Innovation	INN

 BOSCH	Divisional Directive	DD-DIR-001 Page 5 of 12	Version, Status V1.0 REL
Owner CM/QM Steiner	Directives in the Car Multimedia Division (CM)	Author CM/QMM1-Wagener	Date 30.03.2012

IT management	IT
Quality management	QM
Facility management	FCM
Change management	CHG
Continuous Improvement	CIP

Examples:


PEP-D-PM-100	PEP directive for project management, no. 100
FF-D-LOG-777	FF directive for logistics, no. 777
FF-D-CDQ9999	FF directive as add-on for CDQ9999
QM-W-099	QM work instruction, no. 99

5.3 Roles

Every directive provides a reference to all roles required for implementation as well as all roles to be informed about changes in the directive. Every role has to be mapped uniquely to a position in the organization (department or project).

Typical roles involved are:

- Owner** This role defines the goal and contents of a directive in line with the function and responsibility assigned. This role is responsible for the contents and the implementation within the organization, for monitoring compliance with the directive and for installing changes and improvements. Typically the owner is the manager of the issuing area, and thus the approver in personal union. If further approvers are required, coordination by CM/QMM1 is required to ensure consistency of the management system.
- Author** On behalf of the owner, the author is responsible for writing the contents of a directive and ensuring its correctness. This role performs content-driven reviews with all areas affected.
- Users** Users are persons involved in the implementation of a directive or to be informed about the latter. This group must be described as precisely as possible, in order to ensure the correct and efficient dissemination of the corresponding information.
- Area coordinator** The area coordinator distributes information and organizes participation in a review. S/He ensures a 4-eye principle and checks interfaces to the own domain. Current members see Outlook distribution lists CM-QM-GB, CM-QM-Hi.
- Boards** A group of managers in charge of making a decision with respect to the introduction, validity and area of application of a directive (examples: EWS, BES Steering Committee, PMR in CM-AI, Process Control Board)
- Approver** The approver role is normally also assumed by the owner in a dual-role function. Being the highest organizational body – depending on the corresponding area of validity – the approver decides on the inclusion of the relevant boards

 BOSCH	Divisional Directive	DD-DIR-001 Page 6 of 12	Version, Status V1.0 REL
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for implementing the adjustment process and puts the directive into force by signing it.

5.4 Contents

To create a directive, the template linked in Appendix 1 is used. All activities, roles and responsibilities including inputs / outputs are described in this context. A RASI matrix is used to define the allocation of activities and roles in line with the following code matrix:

R = Responsible	Responsible for execution
A = Approval	Approval required
S = Support	Supports the "Responsible" role in the execution
I = Information	Information on activities

An assignment of tasks in brackets, e.g. (A), is used to limit the responsibility to a specific area. As a matter of course, however, there is always one responsible owner "R" to be defined per line.

5.5 Language

Directives have to be issued in English and in the national language. Creating a directive in only one of these languages is permissible if all parties affected are able to understand this language.

If necessary, it is also possible to prepare translations into other languages. Each directive defines a reference language (see chapter 2) to be authoritative in the event of discrepancies in interpretation. The directive version in the reference language is released by the owner and any other approving parties that may be required (in acc. with 5.7). Translations into other languages are released by the owner only.

5.6 Review and coordination


First document editions or major revisions of existing documents are discussed with the areas involved to explain the corresponding contents and achieve a common understanding.

Prior to its release, each directive shall be reviewed for correctness and possible implementation problems by the areas affected and representatives of the executing parties (in acc. with 5.3). The scope of a review depends on the amount of content changed. New releases or major revisions have to be reviewed completely. In the event of formal changes, minor extensions or translations into other languages, the owner of the directive document decides on the scope of possible omission of such review.

The participants will be defined by the owner of the directive as a function of the process and area of application as well as the scope of changes implemented.

All directives applying to the CM area of application are to be disseminated for review to the Outlook distribution lists CM-QM-GB and CM-QM-Hi (see Appendix 5). QM is involved in the review in accordance with the following table.

Process	QM representative
PEP	BU/QMM(s), CM/QMM1
FF	Plant/QMM(s), CM/QMM1
Other processes	CM/QMM1

 BOSCH	Divisional Directive	DD-DIR-001 Page 7 of 12	Version, Status V1.0 REL
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To perform the review, the draft directive incl. any appendices is filed in a BGN/Intranet directory including information of the review team. Review comments are collected and evaluated; the implementation of any steps resulting from the review is to be documented. It is recommended to use the existing review framework of CM-AI for automated review support (see [Appendix 6](#)). The review minutes including the reviewed version of the directive are to be filed by the author.

The final decision on the consideration of review comments lies with the owner of the directive. In this context, any contradictions found have to be resolved by the owner within a reasonable period of time or noted down for the next upcoming review session.

Depending on the results of a review, the owner decides whether the updated directive is finally disseminated for approval or if it is to be released directly without further approval.

Any escalation activities that may become necessary are addressed to the approver group (or bodies acc. to 5.3) as well as to the QM manager of the area affected.

5.7 Approval and dissemination

Each directive is put into force by the owner and any approvers (or bodies acc. to 5.3) the involvement of which may become necessary. Such approval can be effected by either manual or electronic signing in eSignature ([Appendix 7](#)). Existing review minutes have to be presented for approval.

First editions and very extensive updates (e.g. V1.0, V2.0, see 5.11) have to be approved by all parties involved. Minor changes (e.g. V1.1, V1.2) are approved by the owner only.


The approved directive becomes effective as of the date of the last signature at the earliest. Following availability of all signatures, the validity date is documented on the directive's cover sheet.

After its approval, the directive is published by the owner (templates see [Appendix 3](#)) and linked into the QM system in accordance with [\[5\]](#) or into the process landscape in accordance with [\[3\]](#).

5.8 Empowerment of executing parties

The owner defines a dedicated roll-out plan for each directive to make sure that the performing parties involved are informed about the correct implementation of the requirements in due time. The roll-out plan takes account of the following aspects depending on the directive's complexity and scope of change:

1. Definition of areas or roles involved, for CM worldwide
2. Form of communication, e.g.
 - a. Self-training (e.g. charts, web-based training)
 - b. Classroom training (e.g. incl. lessons)
 - c. Training-on-the-job
 - d. Individual coaching
3. Binding character of the measures, e.g.
 - a. Non-binding, voluntary: offer, disseminated without documentation
 - b. Binding, mandatory: documented participation, classroom training with signature, confirmation of receipt via Outlook or eSignature, consequences of non-observance
4. Schedule and procedure used to verify the effectiveness of measures
5. Repetition frequency of training measures and verification
6. Consideration in role profiles of competence management or in job familiarization plans for new staff

 BOSCH	Divisional Directive	DD-DIR-001 Page 8 of 12	Version, Status V1.0 REL
Owner CM/QM Steiner	Directives in the Car Multimedia Division (CM)	Author CM/QMM1-Wagener	Date 30.03.2012

5.9 Implementation and verification

Each directive has to define a deadline until all the requirements described are fully implemented, normally within six months after announcement. Guidelines for implementing permissible adjustments of the requirements (tailoring) have to be documented in the directive.

The implementation of a directive is deemed to be completed as soon as evidence of successful application is available. To verify the implementation process, each directive shall define a dedicated procedure applied for success control, for instance by using objective KPIs (Key Performance Indicators). The owner shall use these KPIs to verify the compliance with the directive requirements once its implementation has been completed and at regular intervals afterwards.

In the event that specific requirements of a directive do not allow to be fully implemented by an area involved, a corresponding deviation permit has to be requested from the owner within the implementation deadline, CM/QMM1 needs to be informed.

The following regulation applies for the implementation of DD-DIR-001: Existing process instructions remain valid until their next major revision, up to three years after the publication of DD-DIR-001 at the latest. As a basis for proper implementation and success control, the overview lists of the valid directives in each area will be evaluated and analyzed for any remarks with respect to updates related to DD-DIR-001.

5.10 Updates

The contents of each directive is to be checked for possible updating needs resulting from new requirements or at least once every three years (in due time before external recertification audits such as ISO/TS 16949 or ISO 14001). Divisional directives are reviewed on an annual basis.

In addition to making contents-related checks, care must also be taken to verify the correctness of organization codes and the correct function of links. The inspections performed are documented by the owner

- either in separate lists, without changing the document
- or in the document itself, including a remark and changed version/date in the header

Every version of a directive must be complete and unique, including all mandatory procedures and templates. It is not allowed that old and new versions are valid at the same time. An example for this is QSR_VA005 (version 13) which describes the new QG procedure as well as the old QA procedure used in parallel.

If old procedures have to be removed completely, a change request has to be issued to still existing users, in order to agree on further steps.


Following the release of the updated version, the owner informs all areas involved of the corresponding changes and the validity date by e-mail using [Appendix 3](#). The withdrawal of a directive requires prior consent by CM/QMM1 as well as an information in accordance with [Appendix 4](#). Invalid or withdrawn directives are to be archived in accordance with QSR_VA013 [\[4\]](#).

5.11 Versioning

Versioning and the nomenclature applied for directives are based on the procedure described in [Appendix 2](#).

Version code = "V" main version "." sub-version "_d" draft version

Main version	starting with 1
Sub-version	starting with 0

 BOSCH	Divisional Directive	DD-DIR-001 Page 9 of 12	Version, Status V1.0 REL
Owner CM/QM Steiner	Directives in the Car Multimedia Division (CM)	Author CM/QMM1-Wagener	Date 30.03.2012

Draft version “_d” = draft, starting with 1

Examples:

V1.0_d1 First draft for target version 1.0
V1.0 First released version
V2.2_d3 Third draft for target version 2.2

The first edition of a directive starts with V1.0. The draft versions issued prior to the release are marked by adding a draft version suffix, e.g. V1.0_d1, V1.0_d2. Draft approval leads to the publication of the aspired version V1.0.

In the event of editorial revisions, the main version number remains unchanged while the sub-version is incremented, e.g. V1.1, V1.2. Draft versions prior to release are named V1.1_d1, V1.1_d2.

The directive’s validity date on the cover sheet remains unchanged. Notifying the organization is optional.

Following major concept changes, the main version is incremented by one while the sub-version is reset to zero, e.g. V2.0, V3.0. In this case, full approval and release is required and the directive’s validity date on the cover sheet is updated. Notifying the organization is mandatory.

The directive date indicated in the document header is updated for each change.

Following the initial release, changes compared to the predecessor version have to be marked in an appropriate way, either by a bar at the page margin, with a blue font color or in any other suitable form as adjusted with CM/QMM1.

In the change history, concrete information is provided for the changes made, including date, chapter and a comprehensible justification. If the directive document has been revised completely, it is not necessary to indicate and mark all changes made, provided that the version history is updated accordingly.

5.12 Status

Each directive is provided with a clear code representing its validity class in accordance with the following codes (see QSR_VA013) [4]:

DRAFT	Non-binding draft, not suitable for use
AFR	Available for review
REV	Reviewed, review has been performed
REL	Released, version has been released
VOID	Rejected, version is void and has been cancelled

5.13 Appendices to directives


In order to be identified clearly, each directive appendix is represented by an unequivocal naming scheme set up as follows:

Appendix name = <name of the directive> “_” <AppendixX>

_ underscore _

X sequence number, starting with 1

Example: DD-DIR-001_Appendix2 Appendix 2 to DD-DIR-001

 BOSCH	Divisional Directive	DD-DIR-001 Page 10 of 12	Version, Status V1.0 REL
Owner CM/QM Steiner	Directives in the Car Multimedia Division (CM)	Author CM/QMM1-Wagener	Date 30.03.2012

Each appendix has its own version independent of the related directive. The corresponding version, the approver group, status and date must be visible on every single appendix. If technically possible, each directive and other valid documents have to be connected with the directive by means of a link.


The directive stipulates the party responsible for approving an appendix for every appendix document (regulation for DD-DIR-001 see 7.2).

Approver group for appendix	Application, effect	Examples
As for directive	Binding, controlled by owner, approver	Key contents and process workflows, definitions
Defined in directive	Binding, control delegated	Details, templates, checklists
Defined elsewhere	Non-binding information only	Intranet page, external link

5.14 Technical administration

The following matrix is recommended for the filename nomenclature, depending on the IT platform used (e.g. operating system, RB portal, document management system):

Filename = <directive> _ <Appendix> _ <Language> _ <Version> _ <Status> . <File extension>

 BOSCH	Divisional Directive	DD-DIR-001 Page 11 of 12	Version, Status V1.0 REL
Owner CM/QM Steiner	Directives in the Car Multimedia Division (CM)	Author CM/QMM1-Wagener	Date 30.03.2012

6. Responsibility matrix

	Author	Owner	Approver (boards if required)	CM/QMM1	Reviewer	Users
Order for creating or updating a directive	I	R				
Creation of draft concept	R	S				C
For first creation of new document and major changes: review with CM/QMM1 (see 5.6)	R			A		
Execution of review, adding comments	R			S	S	
Release by owner and approver (see 5.7)	R	A	A			
Information about new/updated directive (see 5.7)	I	R	I	I	I	I
Roll-out, enabling measures (see 5.8)	S	R		I		I
If necessary application for deviation permit		A		I		R
Verification of successful implementation (see 5.9)		R	I	I		
Check for update requirements (see 5.10)		R		I		

R = Responsible Responsible for execution
A = Approval Approval required
S = Support Supports in the execution
I = Information Information on activities

7. Appendices


7.1 **Appendices released by approving the directive**
none

7.2 **Appendices released by CM/QMM1**

- Appendix 1 Directive template (Word)
- Appendix 2 Directive versioning
- Appendix 3 Template for notification of new release (first edition)/update (Outlook)
- Appendix 4 Template for notification of invalidation (Outlook)
- Appendix 5 Template for notification of review (Outlook)

Valid edition see <https://bqn.bosch.com/alias/cm/directives>

Printed editions and copies are not covered by the amendment service.

 BOSCH	Divisional Directive	DD-DIR-001 Page 12 of 12	Version, Status V1.0 REL
Owner CM/QM Steiner	Directives in the Car Multimedia Division (CM)	Author CM/QMM1-Wagener	Date 30.03.2012

7.3 Appendices for information purposes

Appendix 6 [Review Framework CM-AI EWR_VA567](#)

Appendix 7 Intranet page [eSignature](#)

8. Other valid documents

- [1] [Management System Manual for Quality, Environment, Safety and Security in the Bosch Group with amendments of the CM division](#)
- [2] [CM Process Landscape](#)
- [3] [DD-DIR-002 Process management at CM](#)
- [4] [QSR VA013 Document control at CM](#)
- [5] [Filing of directives on the BGN \(under revision\)](#)
- [6] [CDQ Implementation at CM](#)

9. Change history

Version	Department, name	Chapter	Amendment	Date
1.0	REL	CM/QMM1 Wagener	All Initial version in english. Signed by owner only , acc. chapter 5.5 <u>Introduction Plan:</u> - Introduction DD-DIR-001 for area coordinators, worldwide (short-term after release) - Coaching for specific cases - Update of area coordinator coverage - Update of DD-DIR-001, if relevant feedback is available	30.03.2012

Valid edition see <https://bgn.bosch.com/alias/cm/directives>

Printed editions and copies are not covered by the amendment service.

APPENDIX II – DIRECTIVES AND WORK INSTRUCTIONS IMPLEMENTATION ROAD MAP V1.6

BrgP PEP Board Meeting- 06-Dec-2013

DD-DIR-001_ Types of directives

Directives_ Written or graphical (must not exist contradiction with ARIS PEP process description and other released Directives, central or Divisional):

Divisional directives: application to CM Division world Wide, ex. EWR_ VA's or DD-DIR-xxx. To PEP L3 "Industrialization process", Directives with scope in more than one location approval must be done via Process Owner.

BrgP PEP directives: applicable to BrgP Location. Issue when several BrgP processes or organizational Units are involved. Approved with information in the BrgP PEP Board by protocol and released in the BGN;

PEP L3 Industrialization Sub-Process directives: Applicable to a Single Sub-process. If more than one organizational unit is involved, the approval must be required. Approved by L3 Industrialization Sub-Process Area coordinator (Ownership list in the next slide);

1

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BOSCH

BrgP PEP Board Meeting- 06-Dec-2013

DD-DIR-001_ Work Instructions

Work Instructions: description for the execution of individual tasks for specific role or detailed Implementation of a specific action. Applicable to one department or Location.

Approved by BrgP PEPL3 Industrialization Sub-Process Area coordinator;

BrgP ownership Matrix:

BrgP Area Coordinator	Miguel Santos	
L3 Sub-Process	CM L3 Sub-process Owner	BrgP L3 Area coordinators
Plant Project Management	Bernd Pagel (CM-AI/ERM-P CM/PMO)	António Pereira (CM/MFI2)*
Sample Build	Manuel J. Gomes (CM/MFI1- COSM)	R. Fragoso (CM/MFI22)
Production	Rainer Haase (CM/MFC)	Carlos Jardim (BrgP/MOE2)
Process Engineering	Rainer Haase (CM/MFC)	Pedro Pereira (BrgP/TEF)
Logistics and Production planning	Gottschalt Werner (CM/LOG4)	P. Ferreira (BrgP/LOG)
Purchasing	Hering Fabien (CP/PPM)	J. Patricio (CP/PPM-brg)
Center of Competencies		TBD

* From January Onwards.

2

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L3 Industrialization Process Codes

Directives and Work Instructions, Numbering for Braga:

- PEP_ Code for PEP Process (In the scope of PEP Process)
- D or W_ Directive or Work Instruction
- BrgP_ I_ Directive or Work Instruction only applicable for BrgP Location and in the scope of Industrialization process with Sub-Process Code_ according list below:

Industrialization Sub- Process	Code
Project management	IPM
Sample Build	SBD
Competence Centre	COC
Production	PROD
Process Engineering	TEF
Logistics and Production Planning	LOG
Purchasing	CP

Sequential numbering given by the owner. In is area of coordination.

Example: **PEP-W-BrgP_I_SBD-0001_** PEP Work Instruction for BrgP Industrialization Sub-Process Sample Build, nb 0001.

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Others Process Codes

Directives and Work Instructions, Numbering for Braga

Development processes	Code
Hardware_ Electronic Engineering	HWEE
Hardware_ Mechanic Engineering	HWME
Software_ Engineering Process	SWEP

Sequential numbering given by the owner. In is area of coordination.

Example: **PEP-W-BrgP_HWEE-001_** PEP Work Instruction applicable to Braga, Hardware_ Electronic Engineering, nb 0001.

Engineering Change management Process	Code
ECM_ Engineering Change Management	ECM

Example: **ECM-D-BrgP-001_** ECM Process Directive applicable to Braga, nb 0001.

Non Process related IT's (ENG-Department)	Code
BrgP_ENG_W	BrgP_ENG

Example: **BrgP_ENG_W-001_** Braga ENG department work Instruction, nb 0001.

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BrgP PEP Board Meeting- 06-Dec-2013

BrgP PEP publication and availability

Directives and Work instructions are considered released:

- After signature by all Sub- Process owners involved (in case of Work Instruction the Sub- Process Owners);
- Directive publication by the Owner in the BGN Internet Page using template below (Available Link to a PDF Softcopy);
- Review of contents and review requisits in DD-DIR-001 is under Sub-Process Owner Responsibility;

DocId	DocName	Status	Author	Date	Approve	Area Coordinator	Author
PEP-01-BrgP_1_010-xxxx	Project Management Mgmt system (PMMS)						
PEP-01-BrgP_1_020-xxxx	Sample build kit/kit Program (MKI/216)						
PEP-01-BrgP_1_030-xxxx	Competition of Lines						
PEP-01-BrgP_1_040-xxxx	Production						
PEP-01-BrgP_1_050-xxxx	Process Engineering						
PEP-01-BrgP_1_060-xxxx	Logistics						
PEP-01-BrgP_1_070-xxxx	Manufacturing						

Page 1

Work Instructions
One file Pre BrgP PEP process (Owner Oriented)

DocId	DocName	Status	Author	Date	Approve	Area Coordinator	Author
PEP-01-BrgP_1_010-xxxx	Project Management Mgmt system (PMMS)						
PEP-01-BrgP_1_020-xxxx	Sample build kit/kit Program (MKI/216)						
PEP-01-BrgP_1_030-xxxx	Competition of Lines						
PEP-01-BrgP_1_040-xxxx	Production						
PEP-01-BrgP_1_050-xxxx	Process Engineering						
PEP-01-BrgP_1_060-xxxx	Logistics						
PEP-01-BrgP_1_070-xxxx	Manufacturing						

Page 1

Directives
-One single file for BrgP Directives

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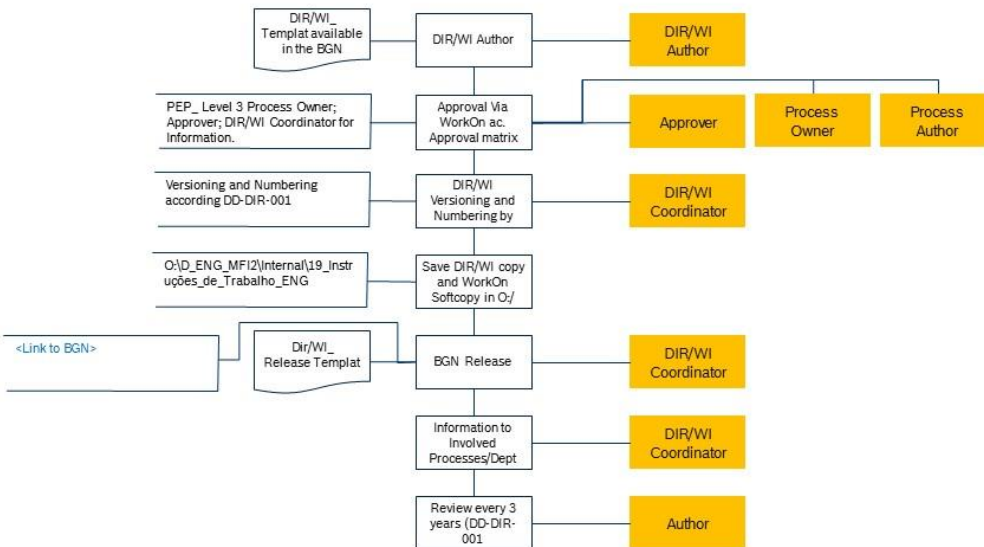
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BrgP PEP Board Meeting- 06-Dec-2013

Approval and Release Process



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BrgP Approval Matrix (Work Instructions)

Process	Author	Approval	Process Owner	DIR/IT Coordinator*
Sample Build	Associate that issue the work instruction. 1- Starts the approval process by Signature in P&P or workOn Workflow. 2- Responsible for Review according CM DD-DIR-001. 3- Align with PEP Area coordinator Code and Numbering	According Scope	R. Fragoso	Ana Rodrigues
Industrialization PM		M. Soares	A. Pereira	Ana Rodrigues
HW_ Elect. Eng.		Hernani Correia	M. Santos	Ana Rodrigues
HW_ Mech. Eng		J. Azevedo	M. Santos	Ana Rodrigues
Sw_ Eng- Process		Rui Cardoso	M. Santos	Ana Rodrigues
ECM		J. Soares	M. Santos	Ana Rodrigues
Non Process related IT's		Head of section	Head of department	Ana Rodrigues

* Responsible for IT Link tables update and process review.

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DD-DIR-001_ Support Documents

Do we have a new Template for Work Instructions?



Do we have a Template for BrgP Directives?



[..\04 Others\02 Divisional Directives DD-DIR\01 DD-DIR-001\DD-DIR-001 V1.0 REL-en.pdf](#)



Additional information from CM/QMM1 for DD-DIR-001



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APPENDIX III – EXISTING DOCUMENTS

Document Name	Author	Approval	Version	Date	To	Introduction
IT_ENG_MFI2_001_10_Contrlo_chaves_Produção_Amostras_I01.doc	CM/MFI22	CM/MFI22_23	1	18.02.2010	CM/MFI22_23 - colaboradores	Serve esta instrução de trabalho (I.T.) para sistematizar o controlo de Chaves na área de Produção de Amostras (MFI22_23).
Controlo de Chaves na área de Produção de Amostras	I. Freitas	M. Pereira				
IT_ENG_MFI2_003_10_Gestão_de_Materiais_Producao_Amostras_I01.doc	CM/MFI22	CM/MFI22_23	1	08.02.2010	BrgP/ENG MFI2; LOG; MOEx; PUQ - colaboradores	Serve esta instrução de trabalho (I.T.) para sistematizar a Gestão de materiais para Produção de Amostras.
Gestão de Materiais para Produção de Amostras	C. Ferreira	M. Pereira				
Anulada_IT_ENG_MFI2_001_10_Contrlo_chaves_Produção_Amostras_I02.	CM/MFI22	CM/MFI22_23	2	13.10.2010	CM/MFI22_23 - colaboradores	Serve esta instrução de trabalho (I.T.) para sistematizar o controlo de Chaves na área de Produção de Amostras (MFI22_23).
Controlo de Chaves na área de Produção de Amostras	I. Freitas	M. Pereira				
IT_ENG_MFI2_000_10_Trat._das_Instrucoes_de_Trabalho_I01.doc	CM/MFI22	BrgP/ENG CM/MFI2	1	15.02.2010	BrgP/ENG_MFI2 - Colaboradores	Esta instrução de trabalho descreve o procedimento para a emissão, registo, tratamento e controlo das I.T.'s emitidas em BrgP/ENG CM/MFI2
Tratamento das Instruções de Trabalho	Isabel Freitas	Miguel Santos				
IT_ENG_MFI2_000_10_Trat._das_Instrucoes_de_Trabalho_I02.doc	CM/MFI22	BrgP/ENG CM/MFI2	2	13.10.2010	BrgP/ENG_MFI2 - Colaboradores	Esta instrução de trabalho descreve o procedimento para a emissão, registo, tratamento e controlo das I.T.'s emitidas em BrgP/ENG CM/MFI2.
Tratamento das Instruções de Trabalho	Isabel Freitas	Miguel Santos				
IT_ENG_MFI2_008_10_Regras_de_autorizacao_do_substituto.doc	CM/MFI2-PM	BrgP/ENG CM/MFI2	1	15.02.2010	BrgP/ENG_MFI2 - Colaboradores	Esta Instrução de Trabalho (I.T.) tem como objectivo descrever o procedimento que assegura a substituição dos colaboradores CM/MFI2.
Sistemática para Regras de Autorização do substituto	Patricia Guimarães	Miguel Santos				
PEP-W-BrgP_I_XX_XXXX_VX.0_d_X_Work Instruction Templat V1.0 d1.doc				17.11.2014		
IT_ENG_MFI2_000_10_Trat._das_Instrucoes_de_Trabalho_I02.doc	CM/MFI22	BrgP/ENG CM/MFI2	2	15.05.2010	BrgP/ENG_MFI2 - Colaboradores	Esta instrução de trabalho descreve o procedimento para a emissão, registo, tratamento e controlo das I.T.'s emitidas em BrgP/ENG CM/MFI2.
Tratamento das Instruções de Trabalho	Isabel Freitas	Miguel Santos				
IT_ENG_MFI2_031_12_Elaboração_Banf_I01.doc	CM/MFI2-PO	BrgP/ENG MFI2	1	18.02.2012	BrgP/ENG_MFI2 - Colaboradores	Esta instrução de trabalho descreve o procedimento para elaboração de Banfs (PR) no sistema SAP
Elaboração de Banf (purchase requisition)	I. Freitas	M. Santos				
IT_ENG_MFI2_000_10_Envio_Amostras_I01.doc	CM/MFI22	CM/MFI22_23	1	22.02.2010	BrgP/ENG_MFI2 - Colaboradores	A instrução de trabalho (I.T.) consiste em sistematizar o envio de amostras por parte de ENG para o cliente e desenvolvimento (HI).
Envio de Amostras	Isabel Freitas	M. Pereira				
IT_ENG_MFI2_000_12_Ordens_SAMOS_I01.doc	CM/MFI2-PO/ CM/MFI22	BrgP/ENG MFI2	1	19.09.2012	BrgP/ENG_MFI2 - Colaboradores	Esta instrução de trabalho descreve o procedimento para tratamento das ordens SAMOS (samples ordering of Sales).
Tratamento de ordens SAMOS	I. Freitas/N. Lourenço	M. Santos				
IT_ENG_MFI2_000_13_Criação_Stock_em_fase_Projecto_I01.doc	CM/MFI2-PO	BrgP/ENG CM/MFI2	1	06.11.2013	BrgP/ENG_MFI2 - Colaboradores	Esta instrução de trabalho descreve o procedimento para criação de stock de peças compradas em fase de Projeto, através de PR (Purchase Requisition). O stock a ser criado será apenas o necessário para uso, por parte da produção (MOEx) de peças excedentes da produção de amostras.
Criação de stock em fase de Projecto	Isabel Freitas	Miguel Santos				
PEP-W-BrgP_ENG-002_Identificação de Inventário de novos equipamentos.docx				27.11.2014		


Document Name	Area Coordinator	Author	Approval	Version	Date	To	Introduction
BrgP_ENG-W-001_Gestão_Tratamento_Imobilizado_ENG_MFI2.doc	BrgP/ENG	ENG-PO	BrgP/ENG-PO	V1.1	18.11.2014	BrgP/ENG, CM/MFI2 - Colaboradores	Esta I.T. descreve o procedimento para a gestão e tratamento do imobilizado corpóreo e não corpóreo de ENG e MFI2
Gestão e tratamento do Imobilizado de ENG e MFI2	Miguel Santos	Ana Rodrigues	I. Freitas				
BrgP_ENG-W-002_Debito_Material_Projetos.docx	V. Saraiva	Ana Paula R.	M. Santos	1.0	11.06.2017	BrgP/ENG colaboradores	Esta Instrução de trabalho tem por objetivo descrever: a)- Sistemática de transferência de materiais comuns para PVB_ENG para posterior débito aos projetos; b)- Definição de débito de materiais aos projetos
Débito de Materiais ao Projeto	BrgP/EPT1	BrgP/EPT1	BrgP/ENG				
ECM-W-BrgP-001_Tratamento_Distribuição_Propostas_Protocolos_Alteração.doc	BrgP/ENG	BrgP/ENG10	BrgP/ENG10	V 1.1	11.11.2014	BrgP/ENG10 - Colaboradores	Esta instrução de trabalho descreve o procedimento para o tratamento e distribuição de propostas e protocolos de alteração no sistema SAP - P45
Tratamento e Distribuição de Propostas e Protocolos de Alteração	Miguel Santos	Rosário Lemos	João Soares				

Document Name	Area Coordinator	Author	Approval	Version	Date	To	Introduction
PEP-W-BrgP_I_SBD-001_Prog_Func_Cam_Climatica.doc	CM/MF12	CM/MF12-COSE	CM/MF12	V1.1	13.11.2014	BrgP/MF12 - Colaboradores	Esta instrução de trabalho descreve o procedimento para a programação e funcionamento da Câmara Climática em BrgP/MF12.
Programação e Funcionamento da Câmara Climática	COSE/COSM	José Esteves	COSE/COSM				
	Fragoso Ricardo		Fragoso Ricardo				
PEP-W-BrgP_I_SBD-002_Message_Management_System.doc	CM/MF12	CMF12-COSE	CM/MF12	V1.1	13.11.2014	BrgP/ MF12- Colaboradores	Esta IT destina-se a orientar qualquer colaborador de ENG que pretenda criar ou consultar mensagens (tickets) no sistema de gestão de mensagens de defeito (Message Management System - MMS).
Message Management System	COSE/COSM	José Esteves	COSE/COSM				
	Fragoso Ricardo		Fragoso Ricardo				
PEP-W-BrgP_I_SBD-003_Criação_Stock_Fase_Projecto.doc	CM/MF12-COSM/COSE	BrgP/ENG-PO	CM/MF12-COSM/COSE	V 2.0	18.11.2014	BrgP/ENG_MF12 ; PPM- Colaboradores	Esta instrução de trabalho descreve o procedimento para criação de stock de peças compradas em fase de Projeto, através de PR (Purchase Requisition). O stock a ser criado será apenas o necessário para uso, por parte da produção (MOEx) de peças excedentes da produção de amostras.
Criação de stock em fase de Projecto	Ricardo Fragoso	Isabel Freitas	Ricardo Fragoso				
PEP-W-BrgP_I_SBD-004_Elaboração_Banf.doc	CM/MF12	BrgP/ENG-PO	CM/MF12 COSM/COSE	V 2.0	18.11.2014	BrgP/MF12 – Colaboradores	Esta instrução de trabalho descreve o procedimento para elaboração de Banfs (PR) no sistema SAP.
Elaboração de Banf (purchase requisition)	A. Pereira	I. Freitas	R. Fragoso				
PEP-W-BrgP_I_SBD-005_Tratamento_Sucata_Serie_Piloto.doc	CM/MF12	BrgP/ENG-PO	CM/MF12	V 1.1	18.11.2014	BrgP/MF12 – Colaboradores; BrgP/MOEx; BrgP/CF1	Esta I.T. descreve o procedimento para tratamento de sucata a nível de sistema de Amostras da Série Piloto.
Tratamento de Sucata das Amostras da Série Piloto	A. Pereira	Isabel Freitas	Ricardo Fragoso				
PEP-W-BrgP_HWEE-001_Development_Process_Checklist.doc	BrgP/ENG	BrgP/EED	BrgP/EED	V1.1	13.11.2014	ENG/EED - Colaboradores de desenvolvimento elétrico	Esta Instrução de Trabalho (I.T.) tem como objetivo descrever o procedimento para o preenchimento da checklist do processo de desenvolvimento elétrico. Esta checklist tem como objetivo descrever todas as tarefas realizadas durante as fases de desenvolvimento.
HW Development Process Checklist	Miguel Santos	Raúl Cunha	Hemâni Correia				
PEP-W-BrgP_HWEE-002_Atribuição_Numero_peça_range_BrgP.doc	BrgP/ENG	BrgP/EED	BrgP/ED	V1.1	5.01.2015	BrgP/ENG CM/MF12 - Colaboradores	Esta Instrução de Trabalho (I.T.) tem como objectivo descrever o procedimento para a atribuição de número de peça no range de BrgP.
PEP-W-BrgP_HWEE-003_Key_User_Criar_Eliminar_Userids_no_SAP.doc	BrgP/ENG	ENG/EED	ENG/EED	V1.1	28.01.2015	BrgP/ENG e MF12 - KeyUsers	Esta instrução de trabalho descreve o procedimento de como criar e eliminar "Userid's" no SAP.
"Key-User" Criar/eliminar "Userid's" no SAP	Miguel Santos	Paulo Silva	Hemani Correia				
PEP-W-BrgP_HWEE-004_Key_User-Criar_Apagar_Acessos_no_SAP.doc	BrgP/ENG	ENG/EED	ENG/EED	V1.1	28.01.2015	BrgP/ENG e MF12 - Colaboradores	Esta instrução de trabalho descreve o procedimento de como criar e eliminar acessos no SAP.
"Key-User" Criar e Apagar Acessos no SAP	Miguel Santos	Paulo Silva	Hemani Correia				
PEP-W-BrgP_HWEE-005_Criar_Documentos_para_as_Peças_de_Catálogo.doc	BrgP/ENG	ENG/EED	ENG/EED	V1.1	28.01.2015	BrgP/ENG-EED-Parts Lists Group	Esta instrução de trabalho descreve o procedimento como criar documentos das peças de catálogo e como fazer o "check-in" e ligação ao SAP usando um ECN tipo 30 (protocolo directo).
Criar documentos para as peças de catálogo	Miguel Santos	Paulo Silva	Hemani Correia				
PEP-W-BrgP_HWEE-006_Key_User_Procurar_WA_Role_ou_TC.doc	BrgP/ENG	ENG/EED	ENG/EED	V1.1	28.01.2015	BrgP/ENG e MF12 - KeyUsers	Esta instrução de trabalho descreve os procedimentos como procurar uma "Working Area", "Role" ou "Transaction Code".
"Key-User" Procurar WA, Role ou TC	Miguel Santos	Paulo Silva	Hemani Correia				
PEP-W-BrgP_HWEE-007_Key_User_Estado_de_um_Pedido.doc	BrgP/ENG	ENG/EED	ENG/EED	V1.1	28.01.2014	BrgP/ENG e MF12 Key-Users	Como saber o estado de um pedido no ServUs
"Key-User" Estado de um Pedido no ServUs	Miguel Santos	Paulo Silva	Hemani Correia				
PEP-W-BrgP_HWEE-008_Key_User_Function_and_tasks.doc	BrgP/ENG	ENG/EED	ENG/EED	V1.1	28.01.2015	BrgP/ENG e MF12 - Colaboradores	Function and tasks of Key Users (KU).
"Key-User" Function and tasks (KU)	Miguel Santos	Paulo Silva	Hemani Correia				
PEP-W-BrgP_SWEP-001_Organizacao_Laboratório_PVT.doc	BrgP/ENG	ENG-PVT	ENG-PVT	1.1	13.11.2014	BrgP/ENG	O laboratório de Iluminação de ENG-PVT está integrado no departamento ENG e desenvolve as seguintes atividades
Organização do laboratório ENG-PVT	Miguel Santos	Pedro Fernandes	Rui Cardoso				

Document Name	Area Coordinator	Author	Approval	Version	Date	To	Introduction
PEP-W-BrgP_ENG-003_Centros de Custo ENG V1.0d2.docx	I. Freitas	A. Paixão	M. Santos	1.0_d2	13.04.2015	BrgP/ENG colaboradores	Esta Instrução de trabalho tem por objetivo descrever os centros de custos disponíveis em ENG e que tipo de custos se pode alocar.
Centros de Custos de ENG	BrgP/ENG-PE ENG-PO	BrgP/ENG-PO	BrgP/ENG				
PEP-W-BrgP_ENG-003_Work_Instructions_and_directives_Release V1.0 d1.docx					19.11.2014		
PEP-W-BrgP_ENG-004_Identificação de Inventário de novos equipamentos V1.0 d1.docx	M. Santos	A. Paixão	I. Freitas	V1.0_d1	27.11.2014	BrgP/ENG-colaboradores; BrgP/CFA2_Carlos Anjos	A presente instrução de trabalho tem como objectivo a descrição do processo para identificação de bens de investimento novos no departamento de ENG.
Identificação de inventário de novos equipamentos	BrgP/ENG	BrgP/ENG-PO	BrgP/ENG-PO ENG-PE				
BrgP_ENG_W-004 V1.0_d_1_Procedimento-Transp.-Ed.52 V1.0 d1.doc	I.Freitas ENG_PO	A.Paixão ENG-PO	M. Santos ENG	1.0_d1	04.09.2015	ENG Employes; BrgP Employes	A presente instrução de trabalho visa descrever o procedimento interno para transporte de produtos, consumíveis, equipamentos e outros entre BrgP e o Ed.052. Existem dois tipos de transporte: - Transportes de itens rececionados via LOG3; - Transportes de itens de departamentos Internos;
"Transporte para Ed.052"							
BrgP_ENG_W-004 V1.0_d_1_Procedimento-Transp.-Ed.52 V1.0.doc	I.Freitas ENG_PO	A.Paixão ENG-PO	M. Santos ENG	1.0	04.09.2015	ENG Employes; BrgP Employes	A presente instrução de trabalho visa descrever o procedimento interno para transporte de produtos, consumíveis, equipamentos e outros entre BrgP e o Ed.052. Existem dois tipos de transporte: - Transportes de itens rececionados via LOG3; - Transportes de itens de departamentos Internos;
"Transporte para Ed.052"							
CE_Transporte_interno_edificio052_16052016.doc		BrgP/ENG	BrgP/ENG	1.1	21.03.2016		
Operação Logística – Transportes edificio Brg052							
PEP-W-BrgP_ENG-003_Centros de Custo ENG V1.0 d1.docx	I. Freitas	A. Paixão	M. Santos	1.0_d1	09.02.2015	BrgP/ENG colaboradores	Esta Instrução de trabalho tem por objetivo descrever os centros de custos disponíveis em ENG e que tipo de custos se pode alocar.
Centros de Custos de ENG	BrgP/ENG-PE ENG-PO	BrgP/ENG-PO	BrgP/ENG				
PEP-W-BrgP_ENG-003_Centros de Custo ENG V1.1.docx	I. Freitas	A. Paixão	M. Santos	1.1	25.02.2016	BrgP/ENG colaboradores	Esta Instrução de trabalho tem por objetivo descrever: 1- Os centros de custos disponíveis em ENG e a respectiva alocação de custos; 2- Definição de responsáveis de realização de BANF's para aquisição de; - Equipamentos, ferramentas, Peças e material em projetos em fase de Desenvolvimento; - Projetos de ECR (Engineering Change Management); - Serviços externos; - Equipamentos e serviços para o departamento de BrgP/ENG
Centros de Custos de ENG	BrgP/ENG-PE ENG-PO	BrgP/ENG-PO	BrgP/ENG				

Document Name	Author	Owner	Version	Date	To	Introduction
PEP-D-I-PD-0106 - Production Equipments Assessment at C and D Sample Phase - V1 0 DRAFT22.docx Production Equipments Assessment at C and D Sample Phase	BrgP/ENG-PO Paixão	CM/MFI2	V1.0 DRAFT 22	01.12.2014	CM-QM-GB, CM PEP Manufacturing Area Coordinators, CM/MFI, CM/MFI1, CM/MFI1-COSM, CM/MFI2, CM/MFI3, CM/MFI5, CM/MFI6, CM/EPS, BrgP/QMM, PgP1/QMM, BCMW/QMM, CM/QMM-CN	The directive aims to describe the process for Production Equipments Assessment (MAE and EWAK) at the first C Sample Built and the last D Sample Built
PEP-D-BrgP_I_PM-0002_Planning, Production and Internal Transportation of Samples Without HU V1.0_d1.docx "Planning, Production and Internal Transportation of Samples without HU"	ENG-PO, A. PAIXÃO		V1.0_d1 Draft			The directive aim to describe the process to plan, identify and delivery parts produced during and after D sample Phase without HU (13 Digits) for Internal delivery.
PEP-D-BrgP_I_SB-0001_ Criação de Stock de peças Novas para Fase de Amostras D V1.0 d1.docx Criação de Stock de peças Novas para Fase de Amostras D	CM/MFI2-PO I. Freitas	CM/MFI22 R. Fragoso	V1.0 - DRAFT	18.11.2013	BrgP	A presente diretiva visa estabelecer o procedimento para Inventário, Criação de Stock em SAP e envio para PQA de peças novas após QGC2 aprovada
PEP-D-BrgP_I_SB-0001_ Criação de Stock de peças Novas para Fase de Amostras D.doc Criação de Stock de peças Novas para Fase de Amostras D	CM/MFI2-PO I. Freitas	CM/MFI22 R. Fragoso	V1.0 - DRAFT	18.11.2013	BrgP	A presente diretiva visa estabelecer o procedimento para Inventário, Criação de Stock em SAP e envio para PQA de peças novas após QGC2 aprovada
PEP-D-BrgP_I_SB-0001_ Criação de Stock de peças Novas para Fase de Amostras D V1.0 d1.docx Criação de Stock de peças Novas para Fase de Amostras D	CM/MFI2-PO I. Freitas	CM/MFI22 R. Fragoso	V1.0 - DRAFT	18.11.2013	BrgP	A presente diretiva visa estabelecer o procedimento para Inventário, Criação de Stock em SAP e envio para PQA de peças novas após QGC2 aprovada
PEP-D-I-PD-0106 - Production Equipments Assessment at C and D Sample Phase - V1 0 REL(1).pdf Production Equipments Assessment at C and D Sample Phase	BrgP/ENG-PO Paixão	CM/MFI2	V1.0 REL	01.12.2014	CM-QM-GB, CM PEP Manufacturing Area Coordinators, CM/MFI, CM/MFI1, CM/MFI1-COSM, CM/MFI2, CM/MFI3, CM/MFI5, CM/MFI6, CM/EPS, BrgP/QMM, PgP1/QMM, BCMW/QMM, CM/QMM-CN	The directive aims to describe the process for Production Equipments Assessment (MAE and 52 EWAK) at the first C Sample Built and the last D Sample Built.
CC_ Weekly Hour Reporting and Debiting V1.0_d3_08042015.docx Hour debit report to ENG-CC	BrgP/ENG-PO A. Paixão	BrgP/ENG-PO P. Rodrigues	V1.0_d1	04.03.2015	BrgP/ENG; BrgP/ENG-CC; BrgP/CFA1_ R. Abreu	This systematic describes the Information and responsibilities in the process flow between ENG-PO, ENG-CC, and CFA1 for Hour report, validation, debit and information to Business unit CC.

APPENDIX IV – WORK INSTRUCTIONS NEW TEMPLATE

 BOSCH	Work Instruction	XXX-W-XXX-XXX
	Title	

To:

1. Introduction

The Work Instruction aims to ...

Use Bosch Office Sans: size 10 normal text, size 12 for titles and size 9 for Figures

2. Description

2.1. Subdivisions (if needed add as a second level reference)

1. Use this format
2. To enumerate processes

For relevant titles (if needed)

Figure 1 – Use this format to enumerate figures (insert capitulation automatically)

3. Flow Chart

To create a Flow Chart use, for example, Visio software. Try to keep it as simple as possible. Write "Not applicable." if it is the case.



4. Norms and References

Write "Not applicable." if it is the case.

Area Coordinator	Author	Approver	Version	Date	Page
				dd.mm.yyyy	1 / 1

APPENDIX V – DIRECTIVES AND WORK INSTRUCTIONS NEW IMPLEMENTATION ROAD MAP



DD-DIR-001

Directives

Directives: written definition of target standards

(must not exist contradiction with ARIS PEP process description and other released Directives, central or Divisional):

Divisional Directives: application to CM Division World Wide (DD-DIR-xxx)

BrgP PEP Directives: applicable to BrgP Location

Work Instructions

Work Instructions: description for the execution of individual tasks for a specific role (typically only applicable within one department or one location)

BrgP Directives and Work Instructions Name

<Process Code> - <Type> - <Subject> - <Number>

Process Code: corresponding business process (see next slide)

Type: D (Directive) or W (Work Instruction)

Subject: key subject in the business process

Number: three-digit sequential number (starting with 001) managed by CM/QMM1

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BrgP/ENG Process Codes

Process	Code
Controlling	CTG
Innovation	INN
IT Management	IT

Process	Code
Continuous Improvement	CIP
Business Planning	BP
Product Engineering	PEP

Example: IT-W-<Subject>-<Number> _ IT Management Work Instruction

Process	Code
Non-Process Related	BrgP_ENG

Example: BrgP_ENG-W-<Subject>-<Number> _ Braga ENG Department Work Instruction

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BrgP/ENG Sub-Process Codes

Development Processes	Code
Hardware Development	HW
Mechanical Development	MEC
Software Development	SW
SAP Processes	SAP

Example: PEP-W-MEC-<Subject>-<Number>

Product Engineering Work Instruction applicable to Mechanical Development

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BrgP Publication

Directives and Work Instructions are considered **Released**:

- ✓ After is signed by all **Sub-Process Owners** Involved
- ✓ Directive is published by the **Owner** in the BGN Internet Page

Note: Review of Contents and Review Requisites in DD-DIR-001 is under **Sub-Process Owner** Responsibility

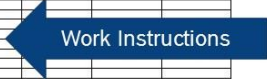
BrgP/ENG BGN Availability

		<Process Code> - D - <Subject> - <Number> (Released Directive)				Contact: Américo Paiva (CM/MFQ-FMO) Status: dd.mm.yyyy		
Directive Number (document link)	Status	Name	Edition	Date	Approver	Owner	Author	
XXX-D-XXX-000	REL	Directive Name	V.1.1	DD-MM-YYYY	CM/MFQ	BrgP/XXX	BrgP/XXX	

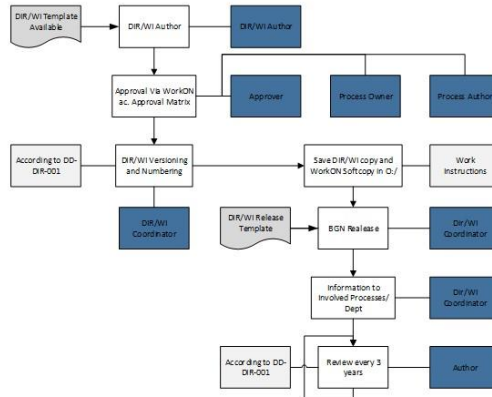


BrgP/ENG BGN Availability

		<Process Code> - <Type> - <Subject> - <Number> (Released Work Instructions)				Contact: Process Owner Name (Eng. Signature) Status: dd.mm.yyyy		
Work Instruction Number (document link)	Status	Name	Edition	Date	Approver	Owner	Author	
XXX-W-XXX-000	REL	Work Instruction Name	V.1.1	DD-MM-YYYY	BrgP/XXX	BrgP/XXX	BrgP/XXX	



BrgP Approval and Release Process



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BrgP Approval Matrix (Work Instructions)

	Author	Approval	Process Owner	DIR/IT Coordinator*
P R O C E S S	Responsible for writing the Content of a Regulation and ensuring its Correctness with Reviews	Puts the Regulation into force by Signing it ----- Decides on the inclusion of Relevant Boards or to add Additional Approver	Defines the Goal and Content ----- Has the Management Authority to track Effective Implementation ----- Responsible for Monitoring Compliance and for Improvements	Responsible for Link Tables Update and Process Review

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DD-DIR-001 Support Documents



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APPENDIX VI – LINK TABLES

		CTG - W (Released Work Instructions)			Contact: Process Owner Name (Org. Signature) Status: dd.mm.yyyy		
		CM Process Landscape Index CM-Directives					
Work Instruction Number (document link)	Status	Name	Edition	Date	Aprover	Owner	Author
CTG-W-001_ENG Cost Center_V1.1	DRAFT	ENG Cost Center	V1.1	25-02-2016	M. Santos BrgP/ENG	I. Freitas BrgP/ENG-PE ENG-PO	A. Paixão BrgP/ENG-PO
CTG-W-002_Hour Reporting and Debiting_V1.0_d1	DRAFT	Hour Reporting and Debiting	V1.0 d1	04-03-2015		BrgP/ENG PO P. Rodrigues	BrgP/ENG-PO A. Paixão

		PEP - W (Released Work Instructions)			Contact: Process Owner Name (Org. Signature) Status: dd.mm.yyyy		
		CM Process Landscape Index CM-Directives					
Work Instruction Number (document link)	Status	Name	Edition	Date	Aprover	Owner	Author
PEP-W-HW-001_Assigning Piece Number_V1.1	DRAFT	Assigning Piece Number	V1.1	05-01-2015	ENG/EED Hemani Correia	BrgP/ENG Miguel Santos	BrgP/EED António Matos
PEP-W-HW-002_Create Documents for the Catalog Pieces_V1.1	DRAFT	Create Documents for the Catalog Pieces	V1.1	28-01-2015	ENG/EED Hemani Correia	BrgP/ENG Miguel Santos	ENG/EED Paulo Silva
PEP-W-HW-003_PVT Laboratory Organization_V1.1	DRAFT	PVT Laboratory Organization	V1.1	13-11-2014	ENG-PVT Rui Cardoso	BrgP/ENG Miguel Santos	ENG-PVT Pedro Fernandes

		BrgP_ENG - W (Released Work Instructions)			Contact: Process Owner Name (Org. Signature) Status: dd.mm.yyyy		
		CM Process Landscape Index CM-Directives					
Work Instruction Number (document link)	Status	Name	Edition	Date	Aprover	Owner	Author
BrgP_ENG-W-SAP-001_Treatment and Distribution of Modification Proposals and Protocols_V1.1	DRAFT	Treatment and Distribution of Modification Proposals and Protocols	V1.1	11-11-2014	BrgP/ENG10 João Soares	BrgP/ENG Miguel Santos	BrgP/ENG10 Rosário Lemos
BrgP_ENG-W-SAP-002_Stock Creation in Project Phase_V2.0	REL	Stock Creation in Project Phase	V2.0	18-11-2014	CM/MF12- COSM/COSE R. Fragoso	CM/MF12- COSM/COSE R. Fragoso	BrgP/ENG-PO Isabel Freitas
BrgP_ENG-W-SAP-003_Banf Elaboration_V2.0	REL	Banf Elaboration	V2.0	18-11-2014	CM/MF12 COSM/COSE R. Fragoso	CM/MF12 A. Pereira	BrgP/ENG-PO I. Freitas
BrgP_ENG-W-001_Identification of New Material Inventory V1.0_d1	DRAFT	Identification of New Material Inventory	V1.0_d1	27-11-2014	I. Freitas BrgP/ENG-PO ENG-PE	M. Santos BrgP/ENG	A. Paixão BrgP/ENG-PO
BrgP_ENG-W-002_Transport Proceeding_V1.0	DRAFT	Transport Proceeding	V1.0	04-09-2015	M. Santos BrgP/ENG	I. Freitas ENG-PO	A. Paixão ENG-PO