

Development of operations planning (Borealis - a case study)



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Development of operations planning
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Tehokas toimitusketjun hallinta on nykypäivän kovassa kilpailutilanteessa elinehto yritykselle kuin yritykselle. Prosessin eri osasten sujuva ja sulava yhteistyö on avainasemassa kustannustehokkuuden ja asiakaslupauten täyttämisen suhteen.

Tämä tutkimus keskittyy Borealisen Porvoon toimipisteessä sijaitsevan Operations Planning-ryhmän ja heitä sivuavien toimintojen toimintaan, tavoitteena potentiaalisten kehityskohteiden tunnistaminen.

Käytetyt tutkimusmenetelmät yhdistävät toimitusketjun hallintaan liittyvää teoriaa organisaatiossa tehtyihin haastatteluihin. Haastateltavaksi valittiin henkilöitä Operations Planning-ryhmästä sekä muista toiminnoista jotka tukevat tai sivuavat heidän toimintaansa. Haastateltavien valinnalla pyrittiin saavuttamaan tarpeeksi laaja osa organisaatiosta, kuitenkin niin, ettei tutkimuksen aihe harhaudu liikaa halutusta.

Haastattelujen tulokset on analysoitu, ja niiden perusteella on muodostettu päätelmiä ja kehitysehdotuksia liittyen Operations Planning-toiminnan kehitykseen.

Key words: toimitusketjun hallinta, Operations Planning, petrokemikaalit

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Efficient supply chain management is of vital importance in today's competitive environment. Smooth co-operation of the different parts of the processes is paramount to ensure cost-efficient operations that fulfill the promises given to customers.

This study focuses on the Operations Planning Team at Borealis Porvoo and examines their daily workings with adjacent departments with the goal of finding objects for development.

The research methods used combine theory on Supply Chain Management and operations planning with interviews carried out with key personnel from both the OPT and also other adjacent departments. The interviewees were chosen with the intent to cover a suitably broad area of the Supply Chain organization, whilst not straying too far in order to ensure that the data is topical.

Results of the interviews have been analyzed and based on them a set of conclusions and suggestions for developing the Operations Planning Team.

Key words: Supply Chain Management, Operations Planning, Petrochemicals

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1. Introduction of project

1.1 Background

Efficient supply chain management is of vital importance in today's tough economic environment where inventory levels and costs need to be kept low whilst still providing sufficient material to meet the demand from customers. Customer service today is valued highly so in order to increase customer satisfaction, the processes behind it need to be on a satisfactory level.

Operations planning teams in Borealis play a vital role in managing the material flow from raw materials all the way to the customers. Operations planning teams are responsible for arranging and maintaining production schedules, communicating with quality management and co-operating with the customer service representatives.

We will examine through personal interviews if and how the operations planning team in Porvoo can improve their efficiency and try to find areas where development and actions are needed. Personal interviews will be conducted with several people from different functions within and outside the organisation in order to measure the efficiency.

Our aim is to provide Borealis with a set of suggestions that will improve the quality of the aforementioned processes, so that a new level of excellence can be attained.

1.2 Objective and research problems

Our research problem can be summarized as *"What are the key objects for development in Borealis Porvoo's Operations Planning Team and how to identify them?"*

The objective of our thesis is to evaluate the performance of the Porvoo operations planning team and evaluate if there are certain areas where development is needed through qualitative measures. During the process we also hope to find best practices which could possibly also be used in other operations planning teams in other Borealis locations across Europe.

In order for us to find the correct questions to ask and the right set of data to analyze, we must first familiarize ourselves with various aspects of theoretical framework from the field of communication. In addition to the general theory of sales and operations planning, we will delve deeper into the field master production schedule and other related issues.

Once the survey is conducted and the data analysed, we will provide suggestions on how to further develop the operations planning team in Borealis Porvoo. We will also bring forth a conclusion based on all our research (both theoretical and data collection) and analysis, to bring forth closure for this study.

1.3 Professional targets

We hope to develop our current knowledge of the supply chain by examining one critical part of a global supply chain. We believe that good knowledge of the supply chain activities is important for the future working life in all possible areas of work. As one half of our team (Tuomo Hursti) is already working within the organisation, we believe our study can have a direct influence on his work.

While Matti Liski's current employer Elisa deals with a wholly different area of business (telecommunications,) it is certainly one where the quality and functionality of customer service is paramount. This will allow us to juxtapose the inner workings of the customer service processes between the companies and ultimately find differing practices in which some pointers from the other company might be in order.

1.4 Risks

The risks regarding our study mainly relate to scheduling between the interviewees and ourselves the authors. As both of us work fulltime positions at the moment, spare time can be difficult to come by - not to mention the difficulties with arranging suitable times with the respondents.

Other risks can be delays from the company's side as some changes are being made in the organization. Also as interviews were our preferred method of data collection, the availability of interviewees could cause problems in case of busy schedules or sick leaves. Summer vacations are also likely to be a factor during the season. To achieve all planned interviews we plan to keep the interviews as short as possible keeping in mind that we need to find answers and possible problems.

Another risk is the theoretical background. Operations planning is a typical part of a manufacturing company's supply chain but the written literature about it is scarce. We will try to identify the best possible references and use the theory as it applies to our study. Articles on the subject matter are also quite hard to come by, thus our choice is to focus on published books almost exclusively.

1.5 Structure and limitations

Our thesis will start by an introductory part where we describe our thesis and the goals we have set while also describing the limitations of our research. This is followed by the theoretical background we have gathered concerning the topic, as well as a company presentation. After the theoretical background we will present the actual project and the methods and tools used to conduct the research. Our research will be concluded by an analysis and conclusions as well as possible suggestions on the topic.

We will limit our research to cover a chosen section of Borealis' supply chain and therefore will not analyse earlier parts of the supply chain, such as raw-material suppliers, nor last parts of a supply chain, such as retailers, other than by conducting interviews with these functions. We will merely concentrate on the selected function within the supply chain - Operations planning. This limitation is relevant as we are only researching the efficiency of operations planning within Borealis Porvoo and therefore we will not analyse any other parts of a typical supply chain.

1.6 Timetable

We started sketching the interview form for the thesis during December 2009. The thesis was given for Borealis to be reviewed in July 2010. Due to some on-going organizational changes in the company, the review of the interview form took a bit longer than we expected. We planned to conduct the survey during the autumn of 2010 after which we would start analysing the results and finish the thesis by the end of the year.

Our work will be finished during November 2010 and the plan is to graduate in December 2010.

1.7 Resources

Our thesis didn't require a lot of resources. As one half of our group is currently working for Borealis, interviews can be conducted in the company's premises. The only resource spent is working hours for both of the team members but fortunately both have flexible works and timetables were changed where needed. As the interviews with participants were agreed upon quite early the timetables of our team could be adopted well in advance to meet the responder's needs.

2. Company background

Borealis was started in 1994 as a joint-venture of Neste and Statoil, two big oil companies who wanted to expand to plastics industry. The first plant was constructed in Porvoo and it began operating in October 1995. Since then the ownership has changed first when in 1997 Neste sold its 50% share of Borealis to OMV and IPIC (International Petroleum Investment Company). At that point Statoil retained its 50% share, but in 2005 Statoil decided to sell their share to OMV and IPIC. The current ownership of Borealis is 65% IPIC and the rest 35% OMV.

Borealis operates in the chemicals industry and describe the company's missions as being the leading provider of chemical and innovative plastics solutions that create value for the society. Borealis was formed in 1994 by the merger of Neste oil and Statoil. The current owners of the company are IPIC from Abu Dhabi (64%) and OBV from Austria (36%). In 2008, Borealis had a sales revenue of 6697 million euros, growing from the 6350 meur in 2007. Borealis' net profit for 2008 was 239 million euros. Borealis currently operates in 14 countries and employs approximately 5400 people from 35 countries. Company headquarters are located in Vienna, Austria.

Borealis has production plants in Finland, Sweden, Germany, Belgium, Austria, Italy, Brazil and United States. Borouge is a joint-venture between Borealis and ADNOC which has production plants in United Arab Emirates. Customer service centres are located in Finland (Porvoo), Belgium (Mechelen), Austria (Linz), Germany (Düsseldorf), Italy (Monza) and Turkey (Istanbul). Service centres are also located in United States, Russia, India, China, Hong Kong, Singapore, Australia, New Zealand, Spain, Lebanon and Saudi Arabia.

Borealis Finland is located in Kullo, near Porvoo, and is one of the oldest production plants of the company. Borealis in Finland has several production plants. The cracker produces ethylene, propylene and butadiene, out of which ethylene and propylene are also supplied directly to the polyolefin plants in the site. Borealis Finland also has the company's only phenol and aromatics plant. The site also has 2 polyethylene plants, 1 polypropylene plant and a compounding unit, all of which produce plastic solutions. The site employs nearly 900 people.

The Porvoo operations planning team employs 13 individuals and is part of the Borealis supply chain organisation. The OPT consists of operations planning manager, a raw material planner, two material flow planners, three operations planners and 6 operations planning assistants. The raw material planner is responsible for ordering raw material to be used in the polyolefin plants. Material flow planners organise the material handling resources concerning packaging

and warehousing. The operations planners are responsible for the production and operations planning for the polyolefin plants. Operations planning team in Porvoo, as well as in other Borealis locations, is responsible for planning and supplying the right materials in the right places at the right time.

2.1 Values

Borealis states its core values as responsible, respect, exceed and Nimblivity. Being responsible means emphasizing the importance of health, safety and environment, as well as operating ethically.

Respect means operating in straightforward way and working together helping and developing the company itself and the customers as well. Exceeding in Borealis is described as meeting and exceeding the expectations of the customers and owners.

Nimblivity is a term created by Borealis and translates to being fit, fast and flexible, creating and capturing opportunities, and seeking smart and simple solutions. (Borealis values)

2.2 Market situation

Borealis was the second largest producer of polyolefins in Europe in 2007 with a production capacity of approximately 4000 kilotons. Basell was the largest producer with approximately 5500 kilotons.

On the global scale the largest polyolefin producer is clearly Exxonmobil with a production capacity above 10 000 kilotons in a year, DOW being the second largest producer with capacity slightly below 9000 kilotons a year. Globally, Borealis is the seventh largest polyolefin producer measured by production capacity.

2.3 Production of polyolefins

Polyolefins, or plastics, have been produced since the early 1900s. Polyolefins are nowadays used in all areas of life. The production techniques have improved so much that plastics can be used in almost anything. Plastics are durable, elastic and light and can therefore be used as fibres, films, different pipe solutions and coatings, as well as in other industrial areas from vehicles to hygiene products.

The basic raw material for polyolefins is the olefins being extracted during processing of crude oil by the petrochemical industry. The basic production of polyolefins such as polyethylene (PE) and polypropylene (PP) are based on the polymerisation of the alkenes, or olefins, when the monomer is processed to molecule chains. Polymerisation is achieved by processing the alkenes and catalyst material in reactors where high pressure forces a reaction creating molecule chaining thus creating a polymer particle. The reaction is challenging to process as the pressures used range from 10 bars to 1000 bars. The primary polymer qualities that can be modified are the density and melt flow qualities which affect the usage of the material.

The production technologies are based on different reactor solutions. Material in loop reactors is polymerized in liquid form whereas in a gas phase reactor material is processed in gas conditions. These techniques can be mixed together and the basic principle is that the more reactors the material is processed through, the broader qualities the end product will have. After the initial reaction phase processed in high pressure conditions, the created molecule chains have a powder form. The powder is melted and run into extruders where any additives or colours are mixed with the powder formed material. The powder is processed into its final pellet form when the melted material is run through a die plate and cut into pellets in underwater conditions. After the material has been cut into pellets, it is forwarded to product silos. Material from the silos can be loaded as bulk material to containers or silo trucks, or packed into bags or cardboard octabins, after which material is ready to be delivered to the customers.

The production plants of today vary between annual capacities of 150 kilotons to 500 kilotons having hourly production speeds of 20 tons per hour to 60 tons per hour. The safety requirements in polyolefin plants are extremely strict due to the high amount of flammable and high pressure materials and conditions used.

3. Theoretical background

In this part of the study, we will explain the theoretical background behind our thesis.

3.1 Sales and operations planning

Operations planning is a critical part of an efficient supply chain. Inaccurate scheduling in raw materials, production schedules or deliveries of products can lead to delays or dissatisfaction among customers. (Waller 2003, 364.)

Vollmann, Berry, Whybark and Jacobs (2005, 55) describe sales and operations planning as a link between manufacturing units and top management. Operations planning provides the basis for an organisation to focus the production resources to meet a company's strategic objectives. They identify four basic fundamentals of operations planning as balance between demand and supply, as well as volume and mix. If demand exceeds supply, customer service will suffer as a company cannot meet all of the demand from the customers by manufacturing. Vice versa, when supply exceeds demand, business suffers due to high stock levels which again can lead to production reductions, or even drop of morale among production personnel, and drop of profit margins caused by price cuts and discounts. Balance between supply and demand is needed to guarantee customer satisfaction whilst controlling stock levels.

Volume and mix mean the quantities that need to be produced and what specific products need to be supplied to meet customer demand. These two fundamentals should be treated separately and the first thing that should be planned is the volume. If the volumes are planned well, it is much easier to make decisions concerning the product mix. The most important thing for sales and operations planning is to first get the big picture, the volumes, right and then concentrate on the smaller details, the mix.

Without a sales and operations plan, the expectation is that somehow the work will be done. In truth, it will be done but there will be costs from high stocks and reduced customer service and satisfaction among other problems.

Accurate planning of operations is extremely important for smooth functioning of a supply chain. Poor scheduling can lead to problems in raw material reception, production programs or delays in customer deliveries which all can affect customer satisfaction. (Waller, 2002, 364.)

Chase, Aquilano and Jacobs (2001, 485) identify several internal and external factors that affect the production planning processes. Internal factors listed are current physical capacity, current workforce, inventory levels and activities required for production. External issues to be taken into consideration are competitor's behaviour, external capacity, raw material availability, market demand and economic conditions. Typically, the external factors mentioned are out of the planning's reach and cannot be affected directly. Demand is an external factor where production planning can have an influence.

Together with sales and marketing the prices for example can be increased or decreased based on the demand. Demand cannot be anyhow completely controlled by for example price fluctuation so production planners need to use internal factors as variables to change production to meet the demand.

"Operations planning is part of the material flow organisation within Borealis supply chain department. There are 7 operations planning team is Europe. The Porvoo team consists of 12 people - team leader, raw material planner, two material flow planners, three operations planners and five operations planning assistants.

Porvoo OPT benefits from high integration as Porvoo is the only site in Borealis where the operations planning team, customer service team and production plants exist in the same location. For example, the customer service team of Borealis Beringen, Belgium, is located in Vienna, Austria, when the operations planning team and production plants are located in Beringen.

The main responsibilities for Porvoo operations planning team include packaging planning, raw material planning, monomer planning in co-operation with Porvoo olefins unit, as well as production scheduling based on monthly planning round where demand is balanced with availability. Demand planning activities play an important role in all planning and close communication between the two departments is of vital importance. Other responsibilities for the Porvoo OPT include batch selection for customer deliveries to meet customer requirements, as well as vendor managed inventory keeping for key customers.

The main interfaces of Porvoo OPT are material handling, dispatch, customer service representatives, production plants, quality control and laboratory services, demand management team, external warehouses and terminals, as well as monomer and raw material suppliers." (Interview, Jarmo Kela, Logistics manager.)

3.1.1 Sales and operations planning process

According to Vollmann, Berry, Whybark and Jacobs (2005, 60), the process of planning sales and operations usually starts shortly after each month's end. During this process each product family will be assessed and required changes to operations plan, sales forecasts and inventory development will be made. The process starts with running the sales forecasting reports. During this step data from the previous month needs to be analysed. The next phase is the demand planning phase. Demand planning uses the data from step 1 and reviews the actual sales, price changes and sales input of the previous month. This information is then used to update the sales forecast by involving marketing and sales personnel to give the operations planning a new and updated sales forecast for the coming months. During the next step in the process, operations planning uses the new sales forecast to update the operations plan to meet the demand where possible in terms of resources and capacity. When doing this, operations planning needs to consider also the inventory and the order backlog levels.

The next step described is the pre-SOP meeting which makes the required decisions concerning demand and supply balance, and resolves issues concerning differing recommendations in operations plan or sales forecast. The pre-SOP meeting also sets the agenda for the last step, the executive SOP meeting where the final decisions on sales and operations plans are made and finalised. Vollmann, Berry, Whybark and Jacobs also stress the importance of adjusting the sales and operations plan frequently to bring sales and production into a proper balance.

The planning process in Borealis follows the same basic guidelines. According to demand manager Sanna Ronkainen (haastattelu), the process in Borealis starts early in each month by the SAFO round where sales managers give their input on the expected sales for the upcoming two months. The SAFO figures are reviewed by demand management in all of the business units and they present the operations planning with the proposed SABU figures on grade level.

Operations planners review the SABU figures and balance the supply and demand based on the figures. Where the SABU figures are too high and cannot be fulfilled because of inventory or capacity issues, they have to cut sales and propose the demand management with SASU figures. SASI figures are the accepted sales figures which are achievable based on the operations plan and more accurately, the master production schedule.

The planning process ends with the demand planning reviewing the SASU figures and transforming the accepted volumes in each grade to product level on APSA round. APSA figures are finally the accepted sales plans for each of the products in all of the plants for the next 2 months.

3.2 Master production schedule

The master production schedule, or MPS, is a primary production planning tool indicating the future production needs. MPS indicates when and how much need to be produced and when the material is required to be in stock. Usually the MPS is a computer software which is linked to other planning and sales functions. The main objective of a MPS is to create a plan of production in order to guarantee customer satisfaction by enabling a company to supply according to customer needs. (Waller 2003, 375.)

According to Vollmann, Berry, Whybark and Jacobs (2005, 149), MPS is a statement of planned future output. Master production schedule translates a sales and operations plan into a specific plan for production by describing what, how much and when to produce. It is a statement of production, not demand, but it specifies how products will be supplied to meet the demand.

MPS shows when products will be available in the future, thus enabling sales planning and customer service. By doing this, delivery dates for customers can be agreed on as long as the production occurs according to plan. In case of problems or delays in production, MPS also provides the possibility to consider changes in production by changing quantities or products to meet said customer delivery dates.

The MPS needs to be updated periodically to ensure proper usage of production resources and perhaps more importantly, to guarantee smooth customer deliveries. Make-to-stock companies, as Borealis, produce in batches and carry inventory. MPS in make-to-stock companies is the implication of how much of what and when will be produced to stock to meet the demand.

MPS is also the basis for inter-company trade-offs, most importantly between production and sales. Should there be extra demand for one or multiple products, planning can take the demand into consideration and if necessary reduce the production of another product if necessary in terms of capacity and resources. If reduction of another product is not possible, possibilities for extra resources and capacity can be checked. Master production schedule can also be used as the basis of calculating future cash flow and profits by analysing the planned production output.

3.2.1 ERP

Waller (2003) describes an ERP as a computer-based tool that integrates all the business operations in a firm, such as sales, finance, human resources, manufacturing and distribution with the objective of providing the optimum company-wide efficiency. The core of an ERP system is a database which collects and routes data to functional units that support a firm's company-wide activities from procurement to invoicing.

Most enterprise resource planning (ERP) systems include an MPS module. MPS in an ERP system is the same as a typical master production schedule - it translates the sales and operations plan to a specific plan, indicates the future production and enables information for co-ordination of sales and manufacturing. (Vollmann, Berry, Whybark and Jacobs, 2005, 151.)

As described by Vollmann, Berry, Whybark and Jacobs (2005, 151), the SAP module of collaborative demand and supply planning, which Borealis has also modified to meet their specific needs, helps to match demand with supply. Demand planning side takes into account factors such as historical demand data, causal factors and sales objectives in order to enable the supply chain in a company to work with a single forecast of demand. For supply planning, the module creates an overall supply plan that covers for example material management and production volumes.

As discussed by Chase, Aquilano and Jacobs (2001, 423), SAP R/3, which Borealis also uses, is fully integrated to share data between different departments within a company. For example, if someone in the sales and distribution department posts a shipping transaction in SAP, employees in Account payable, in the Financial department, as well as inventory management employees can immediately see the transaction and take action where needed. SAP has several different application modules for all company activities. The operations planning teams in Borealis mostly use the production planning (PP), materials management (MM) and sales and distribution (SD) modules.

3.3 Demand management

Regardless of the company, demand management has an important role both internally and externally. One of the most important requirements for demand management communication is providing sales and operations planning with accurate sales forecasts where as sales and operations planning needs to provide demand management with clear operations plans. More detailed information about sales needs to be also communicated to the master production schedule. Externally it is important to communicate the availability of products to the cus-

tomers as well as inform internally the sales and operations planning of potential changes in demand with especially the big, important customers.

Interaction between master production scheduling and demand management has to be frequent and accurate. As customer orders, or demand, are entered to the MPS, master production scheduler needs to be aware of the changes. On the other hand demand management needs to be informed about order income levels and available capacity which could be supplied if more demand arises. (Vollmann, Berry, Whybark and Jacobs, 2005, 23.)

According to Weller (2002, 378), even with the best of tools and the most reliable information, the perfect balance between actual demand and capacity indicated by the master production schedule might not always be found. This is where demand management is needed. Demand planning must work closely with commercial employees to create accurate forecasts of demand. Demand management must also make decisions when sales are slow causing inventories to grow and perhaps consider decreasing the prices, which naturally needs to be discussed internally with sales personnel.

3.3 Extended supply chain

According to Lysons and Farrington (2006, 114) all supply chains are in principle series of suppliers and customers. Each customer in turn changes to a supplier to another downstream activity or function until the finished goods reach the end customer.

Mentzer (2001, 5) describes a supply chain as "a set of three or more companies directly linked by one or more of the upstream and downstream flows of products, services, finances, and information from a source to a customer." A basic supply chain only consists of a supplier, focal firm and a customer, but an extended supply chain is comprised of more participants. Typically these participants are the supplier's supplier and the customer's customer. Borealis is a part of an extended supply chain in this instance as the focal firm. Borealis' suppliers have their own suppliers and the customers of Borealis, who process Borealis' products as their own products, sell the processed and finished goods to the end customers.

3.4 Delivery process

Customer service centres are responsible for communicating with the customers and placing the orders they receive into the system. Customer service representatives are in constant contact with the customers in order to know their needs for specific material and when they

are to be delivered. Borealis customer service centres consist of customer service representatives and customer service centre leaders. (Borealis intranet.)

Order processing is a set of activities occurring between order entry and order release from the warehouse as described by Frazelle (2002, 84). He splits the order processing to four parts. The first activity is order pattern recognition where a customer's order is received and entered into the system according to the order from customer received by for example e-mail, fax or telephone. In the credit verification stage, the customer's credit is checked and if accepted, order can continue to the next stage. During order batching and assignment the correct type of transportation is selected for the order.

In the final stage, order changes and status communication, there is still a chance for the customer to change one's order. Once the delivery has left the warehouses and is en route to the customer, the customer should be made aware of this by automatic system message or in some companies, by other means such as a telephone call or e-mail.

In Borealis, one could split the activities so that customer service representatives take care of order and credit recognition, as well as order batching and assignment, while the operations planning in co-operation with the dispatch and warehouses takes care of the order changes and status communication.

The availability of products is a critical element in supply chain management. When the products the customer needs are available when required, the costs for the customer related with lack of raw materials can be reduced. Operational performance which includes issues such as flexibility to handle unusual customer requests or extra demand, is important for supply chain operations.

Another important factor in supply chain operations is the reliability as seen by the customer. When the supplier is reliable, customers can plan their operations and inventories to minimize costs. All of these factors have the ability to create customer value for the downstream customers. It is extremely important to remember that the objective of supply chain management is not just to improve the performance within a manufacturing firm, but to create greater customer value for the downstream customer. (Mentzer, 2001, 362.)

3.5 Inventory management and material handling

Mentzer (2001, 242) states that there are 7 types of stock. Cycle stock is produced according to production cycles to meet demand between replenishment productions. Cycle stock is de-

pendant on production lot sizes, cost-effective shipment quantities, storage space limitations, lead times as well as inventory carrying costs.

In-process stock consists of raw materials, semi-finished goods and goods that are in transit. Goods in transit still belong to the shipping company and therefore have financial effects as an asset for the firm supplying. Safety stock is a calculated minimum stock set by the company to protect inventory against uncertainties such as variations in demand, lead time length or production problems in plant. Safety stock helps the manufacturing company to protect against costs related to being out of stock in production units or sales products. Seasonal stock is based on the forecasted demand peaks caused by seasonal trends in sales, such as increased sales of winter goods during the winter period.

Promotional stock means the stock kept to meet future sales which are generated by marketing promotions. Promotional stock enables a company to react quick to sudden increases in demand caused by positive response to promotion through sales opportunities. Dead stock, or "non-moving" or "slow moving" represent the inventory where sales do not meet the inventory levels and therefore do not justify keeping the inventory in stock. The problem with dead stock is that it will continue to take space in warehouses instead of keeping profitable inventory items with sales in stock. Dead stock is actually a normal part of a products life cycle and it is important to keep an eye on declining products to minimize their effect on stock by getting rid of the material in time before becoming dead stock.

Bowesox and Closs (1996, 32) identify warehousing, material handling and packaging as integral parts of logistics in a company. When warehouses are required by the operations in a company, the firm can choose between operating its own facilities or obtaining services from a specialist company. In the warehouses, material handling is an important activity. Goods must be received, moved, sorted and stored. If material handling is not done in appropriate manner, it can lead to substantial damages in products and lead to future problems if delivered to customers when defected.

Packaging means packing single products into packed solutions, in Borealis these solutions are 25kg bags (combined to a 1375kg pallet) or 1100kg carton octabin. Packaging is done to protect material or to warehouse it, but also to meet customer requests as some customer cannot use bulk material. Warehousing, material handling and packaging, when effectively integrated to a company's operations, improve the speed and efficiency of the material flow from production to customer deliveries.

3.6 Quality control

According to Weller (2002, 93) quality control covers the operational techniques and activities used to satisfy quality requirements including monitoring a process and eliminating causes of unsatisfactory performances at all stages of the quality chain. Quality control measures used depend on the industry but in most industries manufacturing, purchasing, customer relations, transportation and warehousing could be monitored. Quality control departments in companies are responsible for establishing quality specifications and monitoring, measuring and reporting on the quality of products.

Quality control is required in all parts of a supply chain. Raw materials used for production of goods must be according to specifications and the raw material suppliers must be aware and able to meet these specifications. Each employee in production must be aware of quality control and needs to be responsible for reporting defects and problems in production. The finished goods delivered to the customer must also meet the quality requirements. These requirements are for example correct packaging, shipping and in some instances the installation of the product. If for instance packaging of a finished product is not up to the standard, even if the actual product meets the quality requirements, the quality perceived by the customer will be lower because of the packaging.

Poor communication can also lead to customer receiving products which are not up to the standard quality-wise.

Many areas of the process industry require a proof of origin of ingredients in a product to meet official requirements. In order to meet this requirement batches are given identification codes, often number sequences. This identification code is then linked to production information such as quantity, order ID and transaction date. Simultaneously this batch is also recorded as stock for the producing company. (Schönsleben, 2000, 292.)

4. Methodology

4.1 Qualitative vs. quantitative research methods

Grönfors (1985, 12-15) argues that the merits of qualitative research as opposed to quantitative research become evident when understanding the respondent's framework is paramount - a quantitative survey might in some cases provide a broader scratch on the surface of the issue at hand, but qualitative research methods offer deeper insight.

Creswell and Plano Clark (2007, 28) state that while quantitative research is often reserved for either supporting or refuting an existing piece of theory, the primary focus of quantitative research is on learning the participants' views on the subject at hand.

Further, Miles and Huberman (1994, 10) point out the flexibility of qualitative research methods as one of its inherent strengths. Qualitative research is shown as an ongoing process where practices to data collection can be refined as the research proceeds to further ensure that the researchers understand the nature of their study.

Hirsijärvi, Remes and Sajavaara (2004, 152) also conclude that the common theme for qualitative research is to find and reveal facts instead of measuring the veracity of a statement presented as fact.

4.2 Methodology

Since the focus of our study is on finding and identifying subjects for development within the Borealis operations planning department, it did not take us very long to conclude that qualitative research would be best suited for this particular undertaking.

In this particular case, the demerits for quantitative research were obvious quite early on - the most pressing of which was that since we did not know what the issues were, a survey-based research would simply not yield the type of data that we needed.

Considering that the respondents occupy positions with varying job descriptions, our hypothesis was that this would allow us to identify problems and issues that reach and effect positions throughout the organization.

As outlined in section 4.1, the existing theoretical framework on the merits of qualitative research (as opposed to quantitative) lends itself to the core concept that qualitative research is indeed better suited for this type of assignment.

4.3 Interviews as a research method

Upon deciding that we would focus on qualitative research methods for our study, we also had to formulate a plan for collecting data. Considering the nature of our study, it was our belief that interviews would be the method best suited for us - after all, we had already ruled out quantitative research methods and data collection through observation or focus groups was not feasible due to the finite resources available - especially in the context of time that could be used to conduct research.

Organizing a focus group discussion on the topic could also possibly corrupt or otherwise affect the data, as we were interested in seeing how much similarity there would be in the answers from the interviewees. Our belief is that it would not be beneficial to be given a consensus of sorts from the interviewees - rather isolated answers that are not influenced by points that others would bring up during discussions, for example.

One aspect about personal interviews that we also considered to be a strength was the flexibility - even though we would go through each respondent with the same basic set of questions, we could also make additional personalized questions "on the fly" to further gain context for each individual interview.

We limited the number of questions in our interview to 10. 9 questions for all participants were the same, but one question is different for everyone. This one question was about specific interaction between the operations planning team and the individual. Our plan was to limit each interview to 15 minutes and to record all of the interviews as well as write down some of the comments presented in order to help analysing the results.

4.4 Determining the size and other qualifications for the sample

Our main goal with choosing the group of personnel to be interviewed was twofold: we would have to cover a large enough organizational area to gain different insights to the issues, but we'd also have to make sure that the overlap and connectivity between duties was sufficient so that we could evaluate the responses as a whole and not just as isolated answers from different people throughout the company.

Ultimately, we decided to include personnel within the company located in Porvoo as well as in other Borealis locations. As operations planning team in Porvoo is in constant contact with multiple internal departments we decided to include personnel from customer service, production plants, material handling, demand management, quality control and dispatch.

Operations planning teams also communicate with logistic companies, haulliers, external storage depots, container inspectors and raw material suppliers, but as we decided to limit our study on only the core functions within the department, only one external partner was included - container terminal located next to the Porvoo production site. This terminal is used daily and is operated by an external company.

With these specifications for our sample, we decided on an initial sample of 22 people that we would want to interview. Of these 22, fifteen interviews were arranged and completed. Due to the length of time that planning and carrying out this research took us, some of our desired interviewees were not ultimately available, due to having changed organizations during the process or in some cases left the company altogether.

It is our belief that our sample gives us a fair representation of the duties and positions we identified as important in the context of our research.

5 Data collection

All interviews were scheduled with the interviewees in advance and agreed based on the interviewers and interviewees calendar so that enough preparation could be done. Each interviewee was informed about the subject of our thesis in the calendar invitation as well as a general overview about the questions that will be presented so that they would have enough information on the interview to prepare in advance. The interview was said to last from 15 to 30 minutes.

The interviews were conducted in the interviewees or the interviewer's office based on the interviewees preference. Phone interviews were agreed with those not located in Porvoo. 15 interviews were conducted and only one interview had to be cancelled due to the unavailability of the interviewee, because of an extended sick leave. One interviewee preferred to be interviewed on her previous role as well as present role. Each interview lasted more or less the maximum time scheduled, 30 minutes.

Each interview started with a presentation of our thesis. The goals were explained and it was also explained why we chose to conduct interviews rather than sending out questionnaires, or why qualitative research was preferred over quantitative research. Each interviewee was also reminded that the research only concerned the work and efficiency of the Porvoo operations planning team as some of the participants are also in contact with the other Borealis operations planning teams in other locations across Europe. All of the interviewees were also told to respond in an honest and truthful way in order to help us in our work and that all feedback, whether positive or negative, was highly appreciated. Interviews were conducted in Finnish and also English for foreign interviewees. All of the data from the interviews was written down and the reliability of the notes was checked after the interview was finished to avoid misunderstandings.

All interviews were carried out using the same questionnaire form. The presented questions where:

Please describe your position and job duties in Borealis.

How often and on what issues do you contact the Porvoo operations plan?

Do you have a clear picture of who to contact in the Porvoo operations planning team?

How do you rate the communication between the operations planning team and yourself? Is the operations planning team sufficiently available when needed and do the reply and take action quickly enough? When the operations planning team contacts you, are the questions or required actions clearly structured and do you have enough time to act or are you being rushed to make decisions where needed?

In which ways could the operations planning team in Porvoo support or help you in your duties?

How would you develop the Porvoo operations planning team? Are there any clear areas that could use development?

On a scale of 4 to 10, how would you rate the Porvoo operations planning team? Any other comments or feedback?

The questionnaire form was used as a guideline in all of the interviews but other, more accurate questions were asked where it was felt necessary. The last questions about the school grade from 4 to 10, we decided to use the old Finnish evaluation figures to get more accurate results instead of using a scale of 1 to 5.

5.1 Interview summaries

In the following part a summary with the main points included is presented of each conducted interview. Please see appendix 1 for the complete results. The interviews are listed in the order they were conducted in.

5.1.1 Interview 1

"My position in the company is demand planner for business units pipe and mobility and I am located in the company headquarters in Vienna, Austria. I take care of the short term demand planning issues. As a demand planner I also take care of customer and volume reallocations using the demand control tools in SAP. I am in contact with the Porvoo operations planning team usually several times a day and typically we discuss volume allocation issues, extra demand and possible market chances which can affect the demand for materials produced in Porvoo. I have a clear picture of who to contact in the operations planning team. I rate the communication between myself and the Porvoo operations planning team as efficient.

I believe that the Porvoo operations planning team, as well as the other planning teams, could benefit of a discussion held during the end of each month where the availability issues of materials could be discussed. As a development point for the Porvoo operations planning team, I expect even more support for myself during the future APSA rounds which I will take care of in the future.

With my relatively short experience in the company, I rate the Porvoo operations planning team very highly among the operations planning teams in Borealis. My grade for Porvoo would therefore be 9." (Demand planner, interview, 2010.)

5.1.2 Interview 2

“My job title is production engineer and I’m located in the Porvoo site. I am responsible maintaining and creating production instructions and recipes for the production plant. I’m also responsible for optimizing the production resources in line with the master production schedule. I am in contact with the operations planning team on a daily basis on issues related with the production schedule, possible problems and threats in the production process as well as on issues related to the raw materials.

I have a clear picture of who to contact in the operations planning team and I feel the communication and overall co-operations between myself and the planning team is efficient and quick. As a development idea, I feel it would be really beneficial both for myself and the operations planning team to arrange a meeting between the production plant personnel and operations planning team on a monthly basis. Especially the raw material related issues could be discussed and explained in these meetings. I also feel that it is important that the production schedule is always up-to-date and changes are informed quickly to production. This is the current way of working and it is important that this remains the same as it is the basis for good co-operation between production and operations planning.

As my grade for the operations planning team, I will give them a 9. There have been changes in the personnel over the past 2 years but these changes haven’t affected the good co-operations between the two organisations.” (Production engineer, interview, 2010.)

5.1.3 Interviews 3 and 4

“Our titles in Borealis laboratory services are classification officers. We are responsible for classification of production batches according to the IPSs (Internal product specification). We also maintain and update the IPSs and also send out certificates of analysis with customer deliveries if there are problems with sending them out automatically, as well as discussing the end uses of production batches that do not meet the classification criteria.

We are in contact with the operations planning team in Porvoo on daily basis. We discuss the classification of batches, blocking the usage of batches if needed and in general, control the quality within Porvoo. In a normal situation we have a clear picture of who to contact in the operations planning team but on many cases when responsibilities within the team change, the information is not given to us causing some confusion. Overall, the communication between us and operations planning is good, but some problems still exist.

The operations planning team could support us more in our jobs by informing us of test runs well in advance as more tests are needed during those cases. Another issue is the usage of the LIMS-system. Operations planning team members could personally use the LIMS-system to check specific values or issues of batches.

As a development issue, we think that familiarizing ourselves with each other's work duties would be highly beneficial to understand the issues both of our departments deal with. We both give the operations planning team a rating of 9." (Classification officers, interview, 2010.)

5.1.4 Interviews 5 and 6

"We both work as customer service representatives for business pipe and are located in Mechelen, Belgium. We are responsible for communicating with the customers, receiving their orders and entering them to our system. We are also in touch with the sales managers concerning the pricing issues and customer feedback and also discuss with the hauliers about customer deliveries.

We are both in contact with the Porvoo operations planning team usually many times a day. We discuss customer deliveries, loading and delivery dates, batch allocations for customer deliveries and occasionally about the quantities in the deliveries. Usually we know who to contact within the planning team but if we are unsure, we can see the responsible people from SAP. The communication between us and the planning team is efficient but the one hour time difference causes problems occasionally especially during the afternoons. The Porvoo operations planning team is seen as very professional in our office.

Unfortunately we didn't come up with any big development ideas the planning team. Our school grade for the department is 9 from both of us, we rate the Porvoo team as the best in Borealis." (Customer service representatives, interview, 2010.)

5.1.5 Interview 7

"I work as a customer service representative for business unit pipe and I'm located in Porvoo. My job is to internally get material for customers according to their needs based on the sales forecasts. I handle the customers' orders and follow up that material is delivered as promised and afterwards take care of the invoicing. I'm in contact with the operations planning team

on a daily basis on issues related to material availability and loading dates as well as extra demand from the customers.

The operations planning team is sufficiently reachable when I have questions or requests but sometimes I feel that I have to wait a bit too long. I feel that the procedure of contacting the demand management in cases of extra demand is sometimes a slow process and in those cases, especially if the excess demand is not high volume, calculated risks could be taken by the operations planning team.

As a development issue, I think that maintaining material availability in all packing forms (bulk, octabin, bags) could be developed. My school grade for the team is 8. Things are going well but there is room for development." (Customer service representative, interview, 2010.)

5.1.6 Interview 8

"I work as a production manager and I'm located in Porvoo. I'm responsible for the safe and reliable processing of the production plant. My other duties include production according to the production plan and quality specifications, human resources within my unit and setting yearly targets. I'm in contact with the operations planning team on a weekly basis. The contact persons within the planning team are clear to me, both in basic operational issues and in bigger, long-term issues.

I feel the overall communication and co-operation are on a good level. I feel the production planning issues work really well, but sometimes there are uncertainties in raw materials. From production plant point of view, our optimal situation would be that there would be only one contact person in operation planning where as now there is the operations planner for production planning issues and raw material planner for the raw material issues.

I feel that it would be extremely beneficial for both organisations to familiarize each other with the other department's work duties and this way further develop the co-operation. As a development point I think it would be important for the operations planning team to explain during perhaps a half-day training what the operations planning team actually does and what are the problems and issues they face. As a school grade I give the operations planning team 8." (Production manager, interview, 2010.)

5.1.7 Interview 9

"My previous job title was production engineer and since September I have been a product owner for business unit Pipe. In my previous post, I was involved in quality control through process supervision, arranging test runs and generally developing the production processes. In my new job, I'm responsible for managing the products and their IPSs (Internal product specification), customer selection for production batches that don't meet quality criteria, as well as product development. Communication with the operations planning team has been almost daily for me both in my previous and current position.

Concerning the contacts within the planning team, I had a clear picture in my previous job but there is some confusion in my current one. The communication between myself and the planning team has always been good, but in my job I have noticed that sometimes answers to questions directed at me are expected too quickly.

Overall the co-operations between me and planning are working well. What would really help my job is that people would propose me with solution instead of asking for them.

Borealis is currently using a monthly non-operative material list where the operations planning gives their comments on slow moving material after which product owners give theirs based on the information available. I believe this procedure is a bit too slow and operations planning could also communicate these issues separately to streamline the process. I would also like to see the operations planners being a bit more active in the process of downgrading slow moving or defected materials to get them out of the stock faster. As my verdict in terms of a school grade, I give the operations planning 9 based on my experience in both of my positions." (Product owner, interview, 2010.)

5.1.8 Interview 10

"My position in the company is a customer service representative for business units moulding and film and fibre. I receive orders from customers and enter them into our system. My other duties include maintaining demand forecasts, arranging customer deliveries with hauliers, invoicing and general customer service. I'm in contact with the operations planning team in Porvoo on a daily basis as the customers I handle order big volumes from Porvoo site.

I usually know who to contact in the operations planning team but due to many personnel changes during the past years, there have been some difficulties getting used to who handles which products. The planning team can help me in my duties by maintaining their level of performing especially in having the availability in SAP correct. The co-operation is on a good level and I feel it is important that the planning team is also rather customer-oriented giving them flexibility when needed from my side.

As a development idea, I would like to receive some sort of info in cases where there are problems or delays in the production process. I give the Porvoo team a 9 as my school grade." (Customer service representative, interview, 2010.)

5.1.9 Interview 11

"I work in Borealis as a group operations planning manager for polypropylene (PP) plants and I'm located in Vienna. I'm responsible for balancing the production volumes of all the PP plants keeping in mind the geographic sense with the grades. I'm involved in short-term planning through communication with operations planners and in the mid- and long-term issues through creating business plans and plant loadings. My other duties include setting stock targets for all PP plants as well as calculating safety stocks. I am in contact with the Porvoo team typically a few times a week depending on the current situation.

As there is only one PP plant in Porvoo, I have a clear picture of who to contact and I feel that the communication is on a good level. I receive fast replies to my enquiries and actions are taken quickly. The communication to me from the Porvoo team is also clear and I would like to emphasize the importance of explaining situations, especially during production problems, to help me in my decisions. As support for my work, I would still like to see more creative solutions from the Porvoo team in issues such as slow moving stock and production changes where I would prefer for actions to be taken beforehand instead of waiting for a request to do something.

My main problem, and also my development idea, is the back-up situation in the Porvoo team. My contact in the team is the PP plant operations planner but to me it is unclear who is the back-up if he is not in the office.

My school grade for the team is 8." (Group operations planning manager, interview, 2010.)

5.1.10 Interview 12

“My job title is customer service representative for business unit pipe. I serve the Russian markets and I’m located in Porvoo. I act as an assistant to the sales managers and handle orders received from the customers. I also deal with export and customs documents required by the customers. I’m in contact with the Porvoo operations planning team on a daily basis in issues such as batch allocations for customer deliveries, extra demand, changes of loading and delivery dates and also chamber of commerce documents.

I have a clear picture of who to contact in the Porvoo planning team as the information is always up-to-date in SAP. I feel the communication is on a good level as is the co-operation but I feel that sometimes we should all remember that we are working as a team and we should try to be polite with each other even during difficult circumstances.

As my development ideas, it would really help in me in my job if I was informed in advance if the planning team is planning for big volumes of packed material to be transferred to external warehouses. I also feel that it would still develop the customer-orientation of the operations planning team if members of the team would participate in customer awareness programs and also familiarize themselves with the work of customer service representatives.

My school grade for the team is 8. The co-operations between me and the team are on a high level but there is still room for development.” (Customer service representative, interview, 2010.)

5.1.11 Interviews 13 and 14

“We work as dispatch clerks in Porvoo. Our duties include coordinating outbound deliveries, warehouse management and issuing delivery documents. We are in contact with the operations planning team several times a day in issues such as availability of material, batch allocation questions and problems in loading.

The availability of people in the operations planning team is sometimes a problem. These problems occur especially early in the morning as first loadings start 7:00 but most people in the planning team arrive 8:00. Also, especially during lunch hours it is really hard to get in touch with people.

It would really help our job if the planning team would start using the loading schedule function in SAP. Operations planning team members often contact us to ask about when material is going to be loaded but this info is also easily available in the loading schedule. Also, it would help us especially during Monday morning loadings when it might be difficult to do batch allocations in advance (if production takes place during the weekend) to give some sort of information in the loading instructions sheet in deliveries in the system.

Another development idea is to more prioritize customer deliveries over internal stock transfers. We see it as a problem that sometimes the silos are emptied by stock transfers when instead they have been reserved for customer deliveries which shouldn't have to wait. We both give the operations planning team a school grade of 7. We feel that their activities have become weaker during the past years." (Dispatch clerks, interview, 2010.)

5.1.12 Interview 15

"I work as a shift supervisor in material handling. I am responsible for the scheduled packaging plan to be executed and also act as a link between the dispatch and the warehouses. The contacts between me and the operations planning team are on a daily basis the material flow planners being my main contacts. We discuss the personnel and equipment resources and make required changes to packing schedules.

I feel that there is sometimes some rushing on some issues such as repairing of broken pallets which are difficult to repair if all the packaging lines are running and everyone is busy with them. In general the co-operation is also working well. Due to the new shift system there have been some slight problems but I believe those will be solved through experience.

As development ideas, I would like to create some sort of system or at least an up-to-date list of the broken pallets that need to be repaired with some prioritizing in them. Material handling shift supervisors are also included in container inspection processes where an external supervisor sees out loadings for specific customers. There are currently too many participants in the process so I feel that should be simplified.

My school grade for the operations planning team is 8. Since the material flow planners have been a part of the planning team, things have been improving all the time." (Material handling shift supervisor, interview, 2010.)

5.1.13 Interview 16

"I work as a demand manager for business unit pipe and I'm located in Vienna. Demand planning on my part is divided into two parts, short-term planning which means actions for up to three months, and also mid- and long-term planning which includes planning issues and business plans for periods up to 36 months. I am in contact with the operations planning team in Porvoo on a weekly basis to get information about possible production changes or problems which could affect supply of material.

I have a clear understanding of the responsibilities in the Porvoo team. The time difference problem of course exists but that is something that I have gotten used to. The planning team in Porvoo could help me even more in my duties by keeping me posted on possible scenarios related to production problems or delays and maintenance breaks in production.

A development idea of mine is to have a monthly meeting with the operations planning team early each month where we could discuss availability of grades and the general order income before the actual planning round begins. My grade for the team is 9, and I believe that the Porvoo team works really well in comparison to other planning teams in Borealis." (Demand manager, interview, 2010.)

5.1.14 Interview 17

"I work as an operational assistant in the UBC terminal located next to the Borealis Porvoo premises. UBC terminal is an external container storage terminal which only Borealis uses and is capable of storing containers as well as arranging direct container deliveries and container tipplings into silo trucks. My job includes handling all terminal operations such as arranging loadings, warehousing and preparing containers for loading.

Communication with the operations planning team is daily on my part. We discuss loadings from Borealis' silos, customer deliveries and all issues related to the materials stored in the warehouse such as taking material samples from containers. To me it is sometimes unclear who to contact in the planning team as there have been so many changes with responsibilities. Quite a lot of rushing concerning actions occurs especially closer to the weekends.

The overall co-operation has improved over the years through mutual experience. As my development idea, I think it would be good for the operations planning team to familiarize themselves with the work we do in the UBC terminal. My grade for the team is 8." (UBC operational assistant, interview, 2010.)

5.2 Data analysis

A combined 17 interviews were conducted during the data collection phase. Only one of the planned interviews had to be cancelled due to unavailability of the respondent. The interviews were conducted in the interviewers or interviewees offices depending on the timetables, or by telephone where required.

The first question was about the interviewees own job title and responsibilities within Borealis. As described in the interview summaries, personnel in many different departments were interviewed and all had a clear picture of their own responsibilities and interfaces whether internal or external. 5 interviewees were a part of the customer service organisation, 3 of them located in Porvoo and 2 in Mechelen, Belgium. Three interviewees were located in Vienna, Austria, 2 of them working in the demand planning team and one acting as the group operations planning manager for polypropylene plants. Two individuals were production personnel, and a similar sample was also interviewed from the quality control department. Two individuals were operating in the dispatch center in Porvoo and as dispatch is a part of the material handling functions in Porvoo, the combined sample from material handling was three as one shift supervisor was also interviewed. One individual was a part of the product ownership team and was also located in Porvoo. One individual was also interviewed from an external function Borealis is using, the UBC container terminal.

The second interview question concerned the issues the interviewee discusses with the operations planning team and the frequency of contact. 13 of the interviewees answered that they communicate with the operations planning team on a daily basis. The rest of the respondents were in contact with the planning team on a weekly basis or a couple of times a week depending on the situation at hand.

Each interviewee had a clear picture on what issues to contact the operations planning team. The customer service representatives were in contact with the planning team on issues related to customer orders or deliveries. Usual issues were doing batch allocations for deliveries, updating the demand figures in SAP in order to get orders through in the system, change of loading dates as well as availability of materials in the SAP. It was also noteworthy in the customer service representatives' responses that many preferred face-to-face communication with the planning team. Naturally this is not possible with other planning teams located across Europe but this was seen as a big benefit. The dispatch personnel had many similar issues of discussion as the customer service representatives. This is because when customer deliveries are to be loaded, the trucks are always checked in the dispatch. Especially the batch allocations were seen as a vital part of smooth co-operation as if a batch

is not allocated, the dispatch always has to ask the planning team to do so. The material handling representative was mainly in contact concerning packaging resources and packaging schedules and his main contacts in the planning team are the material flow planners. The respondent also mentioned that the new position of material flow planners has been a big benefit especially recently though mutual experience. In the past the packaging schedules were maintained by personnel within the material handling department.

The demand planning interviewees mentioned their main issues to be market changes and extra demand from customers. In order for them to have a clear picture of possible extra supply possibilities, they both mentioned that mutual interaction, also from the operations planning team to the demand planning team is extremely important in order for them to have up-to-date information. The same notice about the importance of mutual communication was echoed by the production personnel. Especially problems concerning raw materials need to be informed quickly to the production plant to avoid any surprises, especially during the weekends when the raw materials are usually gathered in advance. The production engineer also wanted to emphasize the importance of smooth communication of production schedule changes as due to the nature of process industry, production changes can cause problems to the reliability of the plants.

The participant from group operations planning management mentioned that he wants to know the situation with the plants on a weekly basis but doesn't want to interfere too much with the normal, daily planning issues. He mentioned that he prefers to interact especially during the monthly planning rounds, which enables him to see the plant loadings and perhaps consider possible support of grades from other Borealis plants. He also mentioned that luckily the recent year has been very good looking at the reliability of the plants so there hasn't been any big problems with material availability caused by production or quality issues.

The interviewees from the quality control mentioned that they are usually on the receiving end of questions considering the communication between the two departments. They typically only inform when there are problems with the quality where as the operations planning team personnel contact them when they need classification for batches due to pending loadings or packaging procedures. The product owner who participated also wanted to point out that the communication works very much both ways as both departments reach out to the other on a frequent basis. Our only external participant mentioned also that even though they see Borealis as a customer of theirs, the communication between the departments is on such a good basis that they are not afraid to make requests to the operations planning team, something that might be out of question in normal customer-supplier circumstances.

The next question in the interview was that how well do the respondents know who to contact within the Porvoo operations planning team. During the past 2 years there have been a lot of personnel changes within the team so we saw it essential to find out whether the relevant interfaces indeed know who to contact when in need. Out of the current 13 individuals working in the planning team, only two have remained in their old position during these past two years. One individual, a raw material planner, has retired, the planning team manager has changed, the new position of material flow planner has been established, and other individuals' have either been relocated within the organisation or have left the company. We feel it is of vital importance especially in urgent issues to know who to contact so we were afraid that this might be unclear nowadays.

Fortunately, in general we found out that most interviewees had a clear picture of who to contact in the operations planning team and knew who is responsible for materials or actions. Some of the interviewees were in a position where they only have one individual who they are in contact with so for them it is easy to know who to contact but it was mentioned that during holiday seasons and in case of sick leaves, this issue might be a bit unclear. Many also replied that if they don't know who to contact initially, they can always rely on contacting someone in the planning team and they can trust he or she is forwarded to the correct responsible person. SAP also includes a function called the ZMMG list where all material responsibilities are visible. This function was also used by a few of the interviewees and they noted that this list is almost always up-to-date.

There were still a few respondents who were not always sure who to contact due to the high number of changes in the planning team. These individuals do not use the ZMMG list and would prefer to be kept up-to-date on personnel or responsibility changes by e-mail. Typically these changes can be viewed in the Borealis intranet but one shouldn't trust that everyone follows these changes there. Therefore it is important that especially these individuals that are not using the ZMMG list are informed separately by for example the responsible operations planners about changes in responsibilities in order to avoid confusion, delays and extra work for each individual involved.

Our next question was concerning the availability of people in the operations planning team. It was also asked that do they reply in time and when the operations planning team contacts one of our interviewees, are the questions and requests clear and are the respondents given enough time to act as requested rather than being rushed to answers or actions. This question was asked as we believe it is important that relevant people are available when needed in order to provide smooth operations between departments. We also felt that it is important to

measure the communication from the planning team to the interviewees to see if there are any development ideas or feedback which could be used.

All of the customer service representatives replied that communication generally works well both ways. The CSRs located in Mechelen, Belgium, noted that the one hour time difference causes problems occasionally but in really urgent cases, people can still be reached via mobile phones. They also noted that perhaps the most positive thing is they always get a reply to their questions, which for some reason isn't the case with all of the operations planning teams in Borealis. The representatives located in Porvoo noted that they often prefer to communicate face-to-face which enables fast replies. A few still reminded that as they are communicating directly with the customers, there are cases when the operations planning team should remember that the customer shouldn't have to wait too long. We fully agree with this statement that the customer's should be prioritized to create additional value as described in segment 3.4 but one also has to consider that people must have enough time to evaluate decisions before making them in order to avoid mistakes and further problems. It was also mentioned that naturally there are differences between individuals in their ways of communicating and the quickness of replies.

The production personnel also agreed that people are easily reached in most cases and reply in due time to requests and questions. One issue was raised by them however as one of the two interviewees from production plant noted that there are times when the production is missing information related to the raw materials. These problems can be caused by the production plants own stock-keeping of raw materials but it was mentioned that are there enough personnel resources available for raw material planning as only one person is responsible for all of the production plants in Porvoo. For the production it would be the best possible situation if there was only one individual who should be the contact in both production planning and raw material planning issues. As was also mentioned during this reply, due to the limited personnel in the operations planning team, unfortunately this is not possible at the moment. If and when there are more personnel recruited to the operations planning team, or the responsibilities within the team changed, this issue should be discussed again.

The demand planning interviewees felt that the communication is on an excellent level. They are also in contact with the other operations planning teams in Borealis so this feedback was extremely positive. The communication between the departments was described as clear and fast, the main problem being the time difference between Austria and Finland. One of the two respondents also gave positive feedback on the manner that she is contacted from Porvoo. She felt that she wasn't being rushed to decisions which is important as she is

relatively new in her role as a demand planner. The good feedback from demand management can be seen as very positive as due to the complex nature of make-to-stock industries, good co-operations between supply and demand, as described in theoretical chapter 3.3, is vital for smooth sales operations.

The shift supervisor mentioned that he feels that planning team is easily reachable, especially after the new material flow planning positions in the team and he feels that he is given speedy responses to his questions. He did anyhow mention that there is a tendency to rush and perhaps needlessly remind from the operations planning side in issues where actions are already taken. Perhaps communication could be a key solution here as most probably the problem is that the operations planning team doesn't know that actions are being taken as there is nothing to show that visible in the SAP system. This problem mostly occurs in cases where there are broken pallets of materials in stock but SAP is showing that material is ok and ready to be loaded. There are some actions taken to speed up the process to repair broken pallets but problems still exist. Perhaps it could be beneficial for material handling to enter enough information in the SAP stock keeping module about the status of questionable pallets and the timetable to repair them. The shift supervisor still mentioned that even though they are often reminded of problems with broken pallets and sometimes too often, he agreed that there is a reason for that as broken pallets visible in SAP give false availability for customer orders. As a development plan for the planning team it was mentioned that instead of reminding the material handling of individual broken pallets in separate e-mails, instead it could be helpful to gather more of these reminders into one e-mail or list to speed up the process and keep everyone informed.

The group operations planning manager we interviewed informed that he feels that the communication is easy for him as there is only one individual he is in contact with. Usually this person is available by phone and in urgent cases he can be reached by mobile phone. He also emphasized the importance of explaining situations clearly to him when he is contacted in order to help make decisions. We see this as very important, it's always better to give background to situations and explain the possible consequences instead of just explaining them and asking for a solution.

The operations planning manager felt that there is some uncertainty for him the back-up arrangements in the team. He feels that he is not always sure who should be contacted when his contact person is not in the office but instead on for example holidays. This situation should be looked into by the operations planning team as each individual should have a clear back-up person for cases when an individual is not working. These back-up cases are usually informed by at least an out of office e-mail message but perhaps it could be beneficial if key

people were also informed separately by e-mails about upcoming holidays and the back-up persons.

The product owner, who previously worked as a development engineer in production felt that his questions are answered quickly which is a positive thing. She explained that she feels that the communication directed at her is clear but perhaps sometimes she isn't given enough time to evaluate possible solutions especially as she is rather new in her role. It would also be beneficial for her to prioritize the actions required from her. She often receives many questions at once but more urgent issues should be prioritized. Our view is that this could be achieved by perhaps preferring to give a direct phone call to the product owner in more urgent issues whereas issues that can be solved later could be handled a bit later without of course delaying them too much. This is especially important as the product owner is playing a key part in creating customer satisfaction by knowing the customers' requirements so she should not be pushed to decisions quickly in order to avoid further problems or even customer claims.

The product owner also mentioned that she prefers for solutions to be proposed instead of asking for solutions. This is done occasionally but it would be beneficial to make it a common practise. Especially when customer selection is needed, it would be helpful to inform the product owner only of customers who are likely to buy materials based on demand planning information.

Many of the product owner's views were also echoed by the classification officers. They also felt that they are sometimes rushed to make decisions which shouldn't be the case as they are the ones who ultimately give the material a classification code based on the quality and should have enough time to make decisions based on the quality requirements, as described in chapter 3.6. Also, when asking for classifications, they noted that often they are not informed about the packaging the material is in, whether it's bulk, bags or octabins. Giving this information could speed up the process of making batch classification as one further question could be easily avoided by simply informing the packaging of the material where classification is needed. This should be made a common practise in the operations planning team to speed up the process of batch classification.

Both the dispatch clerks as well as the UBC operational assistant informed that they feel it problematic that especially during the lunch hours and team meetings, the operations planning assistants, who are responsible for loading and batch allocations, are not easy to reach. The simple solution to this is that people should take care of all urgent issues concerning silo loading to UBC terminal as well as the same day's loading's batch allocations

before they go for lunch. Especially concerning outbound deliveries and batch allocations, it should be remembered that if driver's need to wait excessively in the dispatch before loading if they have booked a loading time, they can charge waiting costs to Borealis. All of the interviewees still mentioned that even though the planning team isn't easy to get a hold of during lunch, usually after calling a few times someone still replies.

The UBC terminal assistant also mentioned that there are cases when the actions required from them are not properly instructed which can lead to confusion. It should be clear that if something is required, even if from an external partner, questions are clearly structured to avoid mistakes and further problems. This is especially relevant when dealing with samples from containers, as it should be clearly structured from which container material is needed for sampling. This is because if material from a wrong container is sampled, the real defected materials can pass the quality control checks and be delivered to customers which in turn created more problems.

The next part of the interviews was a question on how the operations planning team could help and support the respondents even more. We feel that this question also simultaneously measured the current level of co-operation. In order to work well as a team, members from different departments should help and support each other to keep the internal activities in a company functional. The customer service representatives felt that the co-operations in on a good level and it shows that the planning team is customer-oriented in its functions which is extremely important to provide the customers with appropriate service and hopefully create more customer value. As described in chapter 3.4, the customers, as well as the customer service representatives, highly appreciate flexibility in production planning and this was also mentioned as a positive thing in the Porvoo planning team.

It was also mentioned that the current procedure of having customer designated GRIDs, or sales forecasts which are the basis and limitation to customer orders, can be a bit problematic for CSRs. Flexibility here especially in case of small extra volumes is highly appreciated and will surely please the customers as well. The normal procedure is that these extra volumes should always first be checked with demand planning first and only after that given where possible. We still feel that the operations planning team has the best knowledge of the current situation in all of the grades and some flexibility should be considered especially when dealing these mentioned small volumes as there are times when customers need answers to their extra requests immediately to adapt their own production plans as visible in chapter 3.4 as well.

A few of the CSRs also mentioned that the availability kept in SAP is on a good level and reflects the current realistic situation of materials in stock, but on occasions, the availability of packed material is causing problems. This is because all material is in bulk form when produced and the operations planning assistants are responsible of arranging packing schedules when needed and also up-keeping the availability of packed material in SAP. This issue we see as extremely important and perhaps should be looked into as availability is one of the basis of being able to serve the customers and correct information should always be available in SAP.

The interviewee dealing with Russian markets also wanted to know whether it would be possible to inform especially the Russian CSRs about possible stock transfers to external warehouses. This is because the deliveries to Russia are often collected by the customers themselves and information concerning loadings is often received only during the day the material is planned to be loaded. As there is only a limited amount of loadings per day as per material handling resources, the customers might not be able to load their deliveries and instead for the next day. Stock transfers are often big volumes which heavily affect the number of available loading times so we feel that it could be arranged so that at least, these big transfers would be mentioned by e-mail or face-to-face conversation so that the customers could be informed of days with limited resources.

The production personnel felt that the co-operations is on a good level and flexibility works both ways. It was also mentioned that they are pleased that their master production schedule, (see 3.2,) is usually up-to-date as it is important for them to know what is required of them. They also emphasized the importance of communication in this issue as in case of fast changes, they should be communicated immediately. They still felt that it would be beneficial for the production as well as the operations planners especially to familiarize themselves with each other's work duties.

This could be done by the operations planners by keeping a small training in the production plants premises where they explain why decisions are made considering production plants, why stock has to be controlled, what are the driving forces behind production planning and so forth. The production plant on the other hand would be more than please to welcome operations planning team members to enjoy a day or two in the production plant in order to see how the actual processes in production works, their daily problems and limitations and other things related to production plants.

The participants working in demand management felt that it is important to continue informing them well in advance about possible threats or delays in production. This is

important for them as this directly affects the supply of materials and can require decrease of demand or customer prioritizing. Anticipation helps both the demand planning as well as operations planning so this should be continued and also informed to all possible new employees in the team. The group operations planned manager felt that the co-operation between him and his contact person is working well, emphasizing especially the open feedback given by both as well as the professional approach to their respective duties. He mentioned that he could be supported even more in his duties by given more solutions or at least propositions in problematic issues such as slow moving stock and production options. He prefers to see more actions beforehand without him needing to remind about them. Especially in slow moving stock this is understandable as the operations planners in the Porvoo team are responsible of reporting them further to get some actions from sales. More action should be taken in that issue. As for acting beforehand without the need to remind, in small scale issues this should be done but in bigger, long-term decisions support from the operations planning manager is needed as he has more knowledge of the overall situation in all of the company's plants and can therefore offer more solutions.

The quality control participants felt that the operations planning team could help them in a few ways. First of all, they would like to know well in advance about upcoming test runs in production plants. This is because test runs usually require more samples to be analysed during production and they need plan their personnel resources accordingly. They also recommended the planning team to familiarize themselves with a programme called LIMS. This program is used by quality control to input and store data about all production batches. The planning team could see specific results of a batch from LIMS instead of always calling the quality control people when they need specific information or want to know whether the analysis data of a batch looks according to requirements before actual batch classification is done.

The usage of LIMS in our view should be encouraged and perhaps the training could be done in co-operation with the quality control. This way the operations planning team members could see the data they are looking for and don't have to contact quality control directly streamlining the actual activities of the operations planning team in especially batch allocation for customer deliveries.

The material handling supervisor who was interviewed felt that the co-operations between the two departments has been working well. He did anyhow mention that because of the new shift arrangements in material handling packing and warehousing, there has been some complications perhaps because of little experience of working around the clock. Previously the material handling activities were handled in two shift, working from 7 to 15 and 15 to 21

respectively meaning that material could only be packed during days and only during the night by special arrangements, mainly working overtime. The new shift arrangement started in early October. In the new arrangement, there are five shifts that all work 12 hour shifts for four days and then have a leave of 6 days. This arrangement has already been used by all of the production plants in Porvoo for many years now. The new shifts now work from seven in the morning to seven in the evening twice in a row and then again from seven in the evening to seven in the morning twice after which they have the mentioned leave of six days. This new shift system has increased the volume that can be packed in a day as well as improved the internal warehousing activities. The material flow planners act as planners for the material handling personnel resources and are located in the operations planning team. As mentioned by the shift supervisor participant, this system is still new in material handling and situation will continue to improve through mutual experience.

The product owner who previously worked as a development engineer for a production plant mentioned that she feels that flexibility has been evident in both of her roles and co-operations has worked well. She emphasised the importance of the good communication between herself and the planning team as discussions together often lead to the better solutions instead of one person simply deciding the best practise to proceed with. As mentioned earlier in the data analysis, she could be supported in her role by keeping her more updated in the product responsibilities. A list with all relevant responsibilities should therefore be presented to her.

The dispatch clerks mentioned that even though the co-operations between the two departments in generally on a good level, some problems still exist, especially concerning missing batch allocations in customer deliveries. This issue should be looked into by the operations planning team. It is understandable that there are cases where batch allocation can't be done, such as on-going productions, early morning loadings of loadings after weekends but these should be communicated to the dispatch more clearly. This was also mentioned by the dispatch clerks as an issue in which the planning team could support them more in their roles. They would like to see more data inputted the loading instructions sheets in the deliveries. All deliveries have a designated reference number in the SAP system and a loading instruction sheet exists therefore for all deliveries.

The dispatch clerks would like to see some mention in the loading instructions in cases when the planning team knows in advance that the batch allocation cannot be done in time. This way the dispatch clerks wouldn't have to check the issue separately with the planning team but could instead simply delay the loading until the batch can be allocated. Other relevant information can also be inputted into the loading instructions such as required special

documents, required samples or in general, any information that the dispatch needs to have before the material can be loaded and sent to customers.

Another issue that was raised by the dispatch clerks as support for their work was the usage of the loading scheduling function in SAP. Loading scheduling is a function where all deliveries, either customer deliveries or stock transfers, can be found. The loading schedule shows the loading time and data, if booked, loading place and the haulier to be used. The reason this function was mentioned is that the dispatch clerks felt that this would decrease the amount of questions from the operations planning team as very often they contact the dispatch to ask when material will be loaded, especially in export deliveries. This information can be also seen in the loading schedule by simply inputting the delivery number. If there is a time for loading, loading has been agreed upon and if no loading time is visible, the haulier still hasn't contacted the dispatch for a loading time. The usage of this function should be encouraged within the operations planning team as it would not only help the dispatch, but the planning team would get the information they are looking for even faster than by calling the dispatch themselves.

The operational assistant from the UBC container terminal also discussed the importance of the loading schedule function. As mentioned, one can also change the loading place in the loading schedule function. Each time material is supposed to be loaded from the UBC terminal storage, loading place should be changed accordingly. This isn't always the case which can cause miscommunication between the hauliers, dispatch and the UBC terminal. This is another issue why the usage of loading scheduling should be emphasized and individuals trained accordingly. Again, if the hauliers need to wait when they are not properly informed, they can charge Borealis extra costs for the waiting time.

The interviewee also mentioned that occasionally there are delays in doing batch allocations for materials that are to be loaded from the UBC terminal or for materials that are to be loaded into the UBC terminal from Borealis' silos. He prefers that UBC are informed separately if the batch allocation cannot be done for whatever the reason so they do not need to wait. There are times when their loading capacity of incoming containers from Borealis' silos is fully booked so if they have to wait for batch allocations, it can cause them to have to work overtime.

Also, as for the batch allocation for outbound deliveries from the UBC terminal, it is important to take care of the batch allocations in good time as UBC stores containers in a relatively small area where containers are stored in four container piles. In many cases they

need the containers to be picked up from the bottom of these container piles which is naturally rather time-consuming. If the batch allocation is done on time, they will have enough time to prepare for upcoming loadings so the hauliers do not need to wait excessively. The operational assistant also informed that he feels that the co-operation between the operations planning team and UBC terminal is on a good level despite these minor issues he mentioned.

Before the actual rating of the operations planning team, we asked perhaps the most important question concerning our research - what could be developed in the operations planning team? Many participants had already given some development ideas before this part of their respective interviews, but it was a positive notice that almost all had already thought of something as development ideas. All interviewees were asked to think of some development ideas when the interviews were scheduled.

The customer service representatives had a few concrete ideas where development is needed. The first and possibly the most important one was the availability of material in SAP. As discussed earlier, it is generally on a good level but occasional problems. As up keeping the availability is one of the operations planning team's most important issues, as discussed in chapter 3.4 by Mentzer, this should be taken into consideration seriously. It might be beneficial to discuss this issue internally to see if there are different methods of working in order to find the best practises for this issue. One of the interviewees clearly felt that both the customer service representatives and operations planning team members could do with familiarizing each other with the other's duties as it was mentioned by her a couple of times during the interview.

This issue should be considered during the annual development discussion between the team leaders and employees. She also mentioned that even though she feels that the planning team is customer-oriented, participating in customer awareness programs would be beneficial to maintain the positive atmosphere of serving the customers. Customer awareness programs are composed of members from different organisations within Borealis with an aim of promoting some of Borealis' customer internally, thus creating customer awareness. Participation from the operations planning team has been scarce and we feel that more people should be encouraged to join some of these teams.

The last development idea from the customer service representatives was to create some sort of information tool for informing CSRs of major production problems. This would be preferred so the customers could be made aware in good time if delivery problems will occur. This could be done by sending out group e-mails to CSRs in relevant business units and could be

considered. This anyhow raises the question whether this information should be given to the customers in the first hand as informing them about problems can give a negative image of Borealis' capability of supplying materials. Instead, the demand management should do customer prioritization and selecting who gets the materials if stock is low and only after that the customers should be informed if no material is available.

The production personnel both gave their own ideas for development. As was mentioned earlier, the production manager felt that it would be beneficial for both the production staff and the operations planning team to familiarize with each other's duties. Therefore he asked if it would be possible for the operations planners to arrange a training or briefing about the duties of operations planning. He also mentioned that extra care should be paid in the future to the management of change as personnel in both organisations changes.

The production engineer had an excellent idea for development. He proposed to arrange a meeting each month where the operations planner, raw material planner and required production staff meet to discuss especially the raw material issues and upcoming test runs where extra materials could be needed. Similar meetings have been arranged in the past but not on a regular basis. As the operations planner is the production plants main contact in the operations planning team, all relevant information is not always passed on to the raw material planner. These issues could be discussed in this proposed meeting. The raw material planner could explain for example if there are any problems with deliveries of certain raw materials, the operations planner could inform of future production plans and the production staff could express their issues with raw materials, if there has been shortage of them or if the raw materials have arrived in defected packages. This meeting should in our view be held monthly in all of the production plants and this issue will be proposed to the operations planning team leader.

The demand management participants both felt the need for more communication about material availability situation during months. Typically, there are now actual meetings between operations planning and demand management. The interviewees felt that this issue should be changed. They proposed to have a short phone conference during early each month and during the last days of each month. During these meetings issues related to order income, stock situation and additional or shortage of availability could be discussed together to find solutions. This could be considered as highly welcome for the operations planning as typically the contact between demand planning is only during customer prioritization, extra demand through market changes and production problems.

If these meetings were to be held, if only perhaps once a month instead of two, other relevant issues could be discussed. Especially the issue of order income could be discussed early each month. If the production planning sees that order income is low on certain materials, they can communicate this information to demand management so that they can have contact with sales people and that way push for sales.

The group operations planning manager's main concern as a development idea is for the operations planning team to sort of the back-up situation if relevant individuals are out of the office. This was discussed earlier in our research and should be discussed immediately internally in the operations planning team. The planning manager also mentioned that perhaps the operations planning members could benefit of participating in training programs arranged by Borealis related to personal development growth related to future positions. This also should be discussed in the development discussion with the operations planning team leader annually to prepare personnel for possible future roles where interest is seen from the employees' side.

The quality control participant again stressed the importance of LIMS as their development idea. They see it is a useful tool for the operations planning team and training could therefore be considered for planning team members. The quality control, like many other participants before them, also mentioned the importance of familiarizing each other with each other's works. Borealis arranges briefings in almost all of the company's departments so both the quality control personnel and planning team personnel should be encouraged to participate in these short courses. By knowing the limitations and requirements of each other's works, different teams can develop their co-operations even more.

The material handling shift supervisor again stressed the importance of following up the situation of broken pallets in the warehouse. Some actions in Borealis have already been agreed between the operations planning and material handling to sort out the situation. He also mentioned that he is eagerly waiting for the finalisation of the project concerning the development of the container inspection process. According to him this process currently involves too many individuals from different organisations which makes the process way too complicated both internally and also for the container inspection companies.

Container inspection is a process which is requested by customers most typically from African continent. During the process, an external service provider inspects the loading of material into containers to guarantee that nothing besides the requested material is entered into the container before it is sealed. The current process of arranging these inspections requires participants internally from operations planning, dispatch and material handling. As

mentioned, a project for developing the inspection process and streamlining it is currently on-going and is expected to be finalised during first quarter of 2011.

The area which needs some development according to the participating product owner is the handling of slow moving stock. Currently Borealis is using monthly reporting as a tool but the product owner feels that monthly reporting is rather slow paced and information is not always clear so other methods should be considered. He proposed that perhaps these problematic grades could be informed to her directly without using the reporting tool to streamline the process of getting material out of the stock. She also mentioned that would like to see the operations planning team being a bit more active in the process of downgrading material in stock. Nowadays the process is that the product owner is requested to do so but nowadays the operations planners also have the authority to do so. Due to the new authorisation, we would support the product owner's views and would prefer to encourage the operations planners to take care of downgrading themselves.

The dispatch clerks again recommended the usage of loading scheduling as their development plan. As discussed, this should be looked into by the operations planning team to help the duties of both organisations. Another issue they raised for development is the prioritization of customer deliveries ahead of silo loadings to the container terminal. They feel that there are times when there are so much container reservations that they find it hard to give loading times to customer deliveries. This issue could be solved by a discussion between the dispatch and operations planning. The dispatch could perhaps recommend certain weekdays when the number of customer deliveries is typically lower than the other days and the operations planning team could try to book the container terminal loadings to those dates. Due to the limited number of production silos for each production plant, it might be hard for the operations planning team to do so as often the decision of emptying a silo to the terminal field is based on the shortage of production silos, situations that can happen unexpectedly, but maybe some sort of compromise could be found here.

Finally, the operational assistant from the UBC terminal recommended again familiarizing the operations planning team members with the activities they deal with. This could help the planning team members to understand why some tasks that might seem easy to handle, such as taking samples, in reality can be time-consuming and rather difficult to arrange. Perhaps this could be considered but it should still be considered that even though Borealis and UBC are often viewed as partners, one should still remember that in reality Borealis is a customer of UBC. Still, making excessive demands shouldn't be done to avoid problems with other tasks UBC has to handle.

As our final question we asked the participants to give the planning team a school grade from four to 10, which is the rating system in Finland for lower level schools. All participants also had the option to give any other feedback to the planning team. The general feedback was good, many saying that the operations planning team is a big help for their own duties. Many participants who are in contact with other planning teams in Borealis mentioned that the Porvoo team is the best and most professional in Borealis. It was also mentioned that the Porvoo team is highly trustworthy and can be relied on. A few mentioned that through mutual experience, development of the planning team can still be expected.

The shift supervisor from material handling also mentioned that the new role of material flow planners has been a big help. Generally, most viewed that the planning team has improved over the years. Perhaps worryingly, the dispatch clerks mentioned that the actions of the planning team have decreased in quality over the years. They added that they feel that one of the reasons can be the increased number of export deliveries where the loading times cause problems. They also mentioned that they feel that loading side of operations seems to have been forgotten and operations in other teams are considered to be automatic where as in reality they are also operated by individuals. They felt that there are times when the planning team only thinks about their own work and results and seem to forget about the rest.

The average grade given to the operations planning team by the participants was 8,4, which we feel is a good rating which shows that things are working well but through development, can still be improved. The lowest rating given was 7 and the highest 9 which shows that there aren't big variations in the perception of operations planning team. The mode number from the ratings was 9 which is a good figure in our view.

6. Conclusion and suggestions

The Porvoo Operations Planning Team (OPT) received good grades from the interviewees that work in other parts of the company. While the team is already working on a high level of performance, there is naturally always room for improvement and development as indicated by the overall grade given to the OPT.

As we initially expected, the results of our study reflect the large organizational coverage of our sample, and thus also one can somewhat easily identify common themes, challenges and problems that tend to show up in almost any large company today - it is not very rare to hear people from different fields complain or surmise about difficulties in inter-organizational communication or the "no one knows what the others do"-syndrome that ultimately results in redundant, overlapping work being done in different parts of the company.

The other common theme is the small, practical improvements to processes that ease of the burden of the actual work. One might even argue that findings like these are the reason why studies like this should be carried out. To expect that a company would make broad, sweeping strategical changes based on a study is usually unrealistic, but smaller, concrete improvements in our opinion show the true value.

As this relates to the operations planning organization within Borealis, there clearly seems to be a need for improved communications between them and departments such as production and demand management.

Based on above, we have divided our conclusion and suggestions into two categories: communication and practical improvements.

6.1 Communication

As the results show, there seems to be a generally vague understanding of the tasks, goals and functions of different departments to the effect that people experience difficulties in their work as they might not know the correct people to contact in hopes of solving particular problems.

Likewise, interaction between certain stakeholders seems to be limited and thus parties involved might not be up to date regarding current happenings - be they organizational changes such as temporary substitutions, matters concerning areas of responsibility or the availability of materials and produce.

Matters regarding organizational communication are often dependant on two things - regular workshops or meetings between parties involved and information coordination or announcements. We feel that the current situation could be remedied by adopting a process where problematic areas are examined, the involved parties identified and the communication between them reorganized to meet the needs.

Our suggestion is that based on these findings Borealis picks some of the identified problematic areas (such as issues with availability or sizes of production lots) and defines the group of personnel who are most involved with these issues within their respective processes. This would form a project group of sorts, and with their input and discussion the specifications and requirements for shared data could be determined.

Once the needed information is defined by each party involved, the group could work out the responsibilities of each party in the respect of whose task it is to make sure that the information is shared to those involved in the process. This type of solution also demands that it is constantly followed and nurtured to identify new problems and improve the practical aspects as needed.

Regarding the problem with areas of responsibility and finding the correct people, we feel that regular monthly or even bi-weekly meetings between different departments such as production, operations planning and raw materials planning. This also helps people stay in touch with current happenings in areas of business that affect their own job, so this is considered a very important idea for carrying out. Another example of inter-departmental meetings that would be in order is operations planning and demand management, as improved interaction between them would help with product availability and predictions concerning incoming orders.

6.2 Practical improvements

The suggestions within this section are smaller, more practical points that ease the everyday work of people in both operations planning and other departments.

As proposed by the dispatch clerks, we find that the improvements regarding the usage of SAP should be undertaken as soon as possible. One's responsible and diligent use of tools makes life easier for everyone. There should be no problems in instructing and requiring the OPT to utilize functions such as batch allocation and shipment-specific notes. Giving this information

out to the dispatch clerks automatically should reduce unnecessary time spent used in the form of phone calls, e-mails etc. that in essence ask for information that should have already been there.

Likewise, the suggestion regarding the adoption of the LIMS-program would be another way of streamlining the work and reducing the amount of unnecessary communication. As the information regarding any specific batch is already in the system, it does seem a bit redundant to specifically call about those same pieces of information. We highly recommend that the OPT be trained in the use of this program. As was mentioned, a few individuals in the operations planning team are already using this tool so training indeed shouldn't cause problems.

As with any company, focus on customer orientation is paramount and as such we welcome the customer service teams suggestion that members of the OPT partake in the customer awareness program. While it might seem that there is no direct link with the OPT's work and the customer experience, we would argue that is almost always useful to consider the on-going processes as contributors to real value to the customer. One should always remember that business in the end is providing customers with value in terms of goods or services.

7. Closing Words

It is our opinion that this study proved to be quite useful in our professional roles as it has given us a fresh perspective into things. Often when you step outside of your role as a participant in some organization, you can more accurately perceive and weight the importance of the different challenges and solutions that you see.

It is our hope that our suggestions are kept in mind as the OPT's role in the company is developed. Some of the suggestions are fairly straightforward and should not take immense resources to implement, but at the same time others call for real change (even if bit by bit) in the company culture, especially when it comes to information flow and cross-organizational communication. As was mentioned earlier in our research, one half of our team is already working in the Operations planning team in Porvoo so it is our hope that the results and suggestions from our research will have a direct, positive impact on Tuomo's own work.

We are both very grateful and excited having been given the chance to work with this exciting project and are sure to follow the development of the department with a keen eye. While we only have two sets of eyes that see the whole from certain points of view, we also hope that this study serves as a sort of inspiration for further development.

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Interviews:

Jarmo Kela, logistics manager

Sanna Ronkainen, demand manager

Appendix A: Interview materials

Interview 1

"My position in the company is demand planner for business units pipe and mobility and I am located in the company headquarters in Vienna, Austria. I take care of the short term demand planning issues. As a demand planner I also take care of customer and volume reallocations using the demand control tools in SAP. I will also be responsible of conducting the APSA phase in the monthly planning round in the future. I am in contact with the Porvoo operations planning team usually several times a day and typically we discuss volume allocation issues, extra demand and possible market chances which can affect the demand for materials produced in Porvoo. I have a clear picture of who to contact in the operations planning team. I rate the communication between myself and the Porvoo operations planning team as efficient, the replies are always fast and I am not rushed to make decisions but instead given enough time to think and evaluate.

I believe that the Porvoo operations planning team, as well as the other planning teams, could benefit of a discussion held during the end of each month where the availability issues of materials could be discussed. In these discussions the planning teams could explain if they have extra stock in specific grades so the demand planning could check if extra demand could be arranged. This discussion should take place after the monthly planning round and I believe it would benefit both the operations planning teams and the demand management. As a development point for the Porvoo operations planning team, I expect even more support for myself during the future APSA rounds which I will take care of in the future.

With my relatively short experience in the company, I rate the Porvoo operations planning team very highly among the operations planning teams in Borealis. My grade for Porvoo would therefore be 9." (Demand planner, interview, 2010.)

Interview 2

"My job title is production engineer and I'm located in the Porvoo site. I am responsible maintaining and creating production instructions and recipes for the production plant. I'm also responsible for optimizing the production resources in line with the master production schedule. I am in contact with the operations planning team on a daily basis on issues related with the production schedule, possible problems and threats in the production process as well as on issues related to the raw materials.

I have a clear picture of who to contact in the operations planning team and I feel the communication and overall co-operations between myself and the planning team is efficient and quick. Due to the fast-paced nature of process industry, it is highly appreciated that the operations planning team reacts quickly and takes care of necessary issues to ensure smooth operations of the plant.

As a development idea, I feel it would be really beneficial both for myself and the operations planning team to arrange a meeting between the production plant personnel and operations planning team on a monthly basis. Especially the raw material related issues could be discussed and explained in these meetings. The production plant is usually in contact with the operations planner or operations planning assistants but involving the raw material planner in these meetings would be important to give a better overview of possible threats and opportunities for all people involved. Some of these meetings have been arranged in the past but perhaps a 30 minute meeting each month could be arranged on a regular basis. I also feel that it is important that the production schedule is always up-to-date and changes are informed quickly to production. This is the current way of working and it is important that this remains the same as it is the basis for good co-operation between production and operations planning.

As my grade for the operations planning team, I will give them a 9. There have been changes in the personnel over the past 2 years but these changes haven't affected the good co-operations between the two organisations." (Production engineer, interview, 2010.)

Interviews 3 and 4

"Our titles in Borealis laboratory services are classification officers. We are responsible for classification of production batches according to the IPSs (Internal product specification). We also maintain and update the IPSs and also send out certificates of analysis with customer deliveries if there are problems with sending them out automatically, as well as discussing the end uses of production batches that do not meet the classification criteria. We act as a link between the production and the laboratory services.

We are in contact with the operations planning team in Porvoo on daily basis. We discuss the classification of batches, blocking the usage of batches if needed and in general, control the quality within Porvoo. In a normal situation we have a clear picture of who to contact in the operations planning team but on many cases when responsibilities within the team change, the information is not given to us causing some confusion. Overall, the communication between us and operations planning is good, but some problems still exist. Sometimes the operations planning team is rushing us to do decisions which we cannot make due to on-going testing of material. Another issue is the questions concerning batch classifications. Sometimes the operations planning team doesn't clarify which package the material is in. We need this info in order to have the classification visible in SAP.

Regardless of small issues, the co-operation between the two departments is on a good level. The operations planning team could support us more in our jobs by informing us of test runs well in advance as more tests are needed during those cases. Another issue is the usage of the LIMS-system. Operations planning team members could personally use the LIMS-system to check specific values or issues of batches so that contact with us wouldn't always be required.

As a development issue, we think that familiarizing ourselves with each other's work duties would be highly beneficial to understand the issues both of our departments deal with. This could positively affect our co-operation. We both give the operations planning team a rating of 9. There is still some room for development, but the co-operations has develop during the recent years which is a positive sign." (Classification officers, interview, 2010.)

Interviews 5 and 6

"We both work as customer service representatives for business pipe and are located in Mechelen, Belgium. We are responsible for communicating with the customers, receiving their orders and entering them to our system. We are also in touch with the sales managers concerning the pricing issues and customer feedback and also discuss with the hauliers about customer deliveries.

We are both in contact with the Porvoo operations planning team usually many times a day. We discuss customer deliveries, loading and delivery dates, batch allocations for customer deliveries and occasionally about the quantities in the deliveries. Usually we know who to contact within the planning team but if we are unsure, we can see the responsible people from SAP and if necessary, people within the operations planning team will always forward our calls and requests to the correct person.

The communication between us and the planning team is efficient but the one hour time difference causes problems occasionally especially during the afternoons. The most positive thing is still that somehow our calls and requests are still handled in appropriate manner and in due time. Overall the co-operation between us and the operations planning team is on a

good level. We are both in contact with other planning teams in Europe and we rate Porvoo very highly in terms of communication and flexibility. The Porvoo operations planning team is seen as very professional in our office.

Unfortunately we didn't come up with any big development ideas the planning team. We see the department as really transparent and effective. Our school grade for the department is 9 from both of us, we rate the Porvoo team as the best in Borealis." (Customer service representatives, interview, 2010.)

Interview 7

"I work as a customer service representative for business unit pipe and I'm located in Porvoo. My job is to internally get material for customers according to their needs based on the sales forecasts. I handle the customers' orders and follow up that material is delivered as promised and afterwards take care of the invoicing. I'm in contact with the operations planning team on a daily basis on issues related to material availability and loading dates as well as extra demand from the customers.

The operations planning team is sufficiently reachable when I have questions or requests but sometimes I feel that I have to wait a bit too long. The problem in this is that in those cases, also the customer needs to wait to get information. I feel that the procedure of contacting the demand management in cases of extra demand is sometimes a slow process and in those cases, especially if the excess demand is not high volume, calculated risks could be taken by the operations planning team. In a sense, more flexible planning would really help me in my job and also help the customer creating customer value.

As a development issue, I think that maintaining material availability in all packing forms (bulk, octabin, bag) could be developed. I see that as one of the most important issues in smooth and efficient planning and problems in availability in SAP will cause extra work for me in my job and also for the operations planning team itself. My school grade for the team is 8. Things are going well but there is room for development." (Customer service representative, interview, 2010.)

Interview 8

"I work as a production manager and I'm located in Porvoo. I'm responsible for the safe and reliable processing of the production plant. My other duties include production according to the production plan and quality specifications, human resources within my unit and setting yearly targets. I'm in contact with the operations planning team on a weekly basis. The contact persons within the planning team are clear to me, both in basic operational issues and in bigger, long-term issues.

I feel the overall communication and co-operation are on a good level. I feel the production planning issues work really well, but sometimes there are uncertainties in raw materials. From production plant point of view, our optimal situation would be that there would be only one contact person in operation planning where as now there is the operations planner for production planning issues and raw material planner for the raw material issues. It is still understandable that with the resources at hand in operations planning team that this split has been made. These reduced personnel resources can anyhow cause problems for us in production and for the operations planning team especially during holiday seasons or sick leaves.

I feel that it would be extremely beneficial for both organisations to familiarize each other with the other department's work duties and this way further develop the co-operation. As a development point I think it would be important for the operations planning team to explain during perhaps a half-day training what the operations planning team actually does and what are the problems and issues they face. This way the production personnel would understand

better why some things need to be done in production and for example throughput of production needs to be reduced to control stock.

As a school grade I give the operations planning team 8. Things are working well between production and operations planning at the moment but through development, it could be even better and more productive." (Production manager, interview, 2010.)

Interview 9

"My previous job title was production engineer and since September I have been a product owner for business unit Pipe. In my previous post, I was involved in quality control through process supervision, arranging test runs and generally developing the production processes. In my new job, I'm responsible for managing the products and their IPSS (Internal product specification), customer selection for production batches that don't meet quality criteria, as well as product development. Communication with the operations planning team has been almost daily for me both in my previous and current position. In my previous position, I was mainly in contact concerning quality problems and production schedule. Nowadays the communication works both ways with the planning team in issues related to customer selection, product quality problems as well as solving and managing problems with product complaints and claims.

Concerning the contacts within the planning team, I had a clear picture in my previous job but there is some confusion in my current one. As I'm a new product owner and changes have occurred also in the operations planning team, an updated list of who to contact and who is responsible of which product would be highly appreciated. The communication between myself and the planning team has always been good, but in my job I have noticed that sometimes answers to questions directed at me are expected too quickly. It is really important to have some time to consider before making decisions so rushing to solutions is not a good idea. It would also be beneficial if tasks directed at me would be prioritized so that I know which are the most important issues and which can wait a bit longer before taking action.

Overall the co-operations between me and planning is working well. What would really help my job is that people would propose me with solution instead of asking for them. If this is not possible, for example in questions related to customer selection, it would be helpful to check which customers are likely to order from us based on demand forecasts to limit the customer choices.

Borealis is currently using a monthly non-operative material list where the operations planning gives their comments on slow moving material after which product owners give theirs based on the information available. The information from product owners can be that customers are being looked for or that material should be downgraded and sold via non-prime team. I believe this procedure is a bit too slow and operations planning could also communicate these issues separately to streamline the process. I would also like to see the operations planners being a bit more active in the process of downgrading slow moving or defected materials to get them out of the stock faster.

As my verdict in terms of a school grade, I give the operations planning 9 based on my experience in both of my positions. Things are going well between me and planning but there is always room for development." (Product owner, interview, 2010.)

Interview 10

"My position in the company is a customer service representative for business units moulding and film and fibre. I receive orders from customers and enter them into our system. My other duties include maintaining demand forecasts, arranging customer deliveries with hauliers, invoicing and general customer service. I'm in contact with the operations planning team in Porvoo on a daily basis as the customers I handle order big volumes from Porvoo site. I see it

is a strong advantage that in Porvoo I can handle my issues face-to-face with the planning team instead of calling or sending e-mails.

I usually know who to contact in the operations planning team but due to many personnel changes during the past years, there have been some difficulties getting used to who handles which products. The communication has still remained on a good level. The planning team can help me in my duties by maintaining their level of performing especially in having the availability in SAP correct. The co-operation is on a good level and I feel it is important that the planning team is also rather customer-oriented giving them flexibility when needed from my side.

As a development idea, I would like to receive some sort of info in cases where there are problems or delays in the production process. Especially as we are located in the same premises, it would be nice to get this information quickly so that I have time to react and if necessary, inform the customers in advance that some delays might occur. This could be done by sending e-mails or if the customer base is small in a specific grade, by a phone call. In general, the operations planning team is the most flexible in all of Borealis. I also have experience as working as a demand planner and have been in contact with other planning teams as well but Porvoo really stands out as I feel I can trust that the Porvoo team knows what they are doing and as mentioned earlier, are customer-orientated. Therefore I give the Porvoo team a 9 as my school grade." (Customer service representative, interview, 2010.)

Interview 11

"I work in Borealis as a group operations planning manager for polypropylene (PP) plants and I'm located in Vienna. I'm responsible for balancing the production volumes of all the PP plants keeping in mind the geographic sense with the grades. I'm involved in short-term planning through communication with operations planners and in the mid- and long-term issues through creating business plans and plant loadings. My other duties include setting stock targets for all PP plants as well as calculating safety stocks. I am in contact with the Porvoo team typically a few times a week depending on the current situation. In problem cases I give my decision support more often. The issues I discuss with Porvoo team include issues such as market changes, stock development, production changes, monthly reporting, material availability. I also act as support during the monthly planning round especially keeping in mind the situation of the other PP plants and where production support is needed to meet demand.

As there is only one PP plant in Porvoo, I have a clear picture of who to contact and I feel that the communication is on a good level. I receive fast replies to my enquiries and actions are taken quickly. The biggest problem in communication is of course the one hour time difference but luckily I can always contact the site also by mobile phone in urgent issues. The communication to me from the Porvoo team is also clear and I would like to emphasize the importance of explaining situations, especially during production problems, to help me in my decisions. As support for my work, I would still like to see more creative solutions from the Porvoo team in issues such as slow moving stock and production changes where I would prefer for actions to be taken beforehand instead of waiting for a request to do something. In my opinion, the co-operation works really well, the feedback is open and honest, and the general approach to planning and business is good.

My main problem, and also my development idea, is the back-up situation in the Porvoo team. My contact in the team is the PP plant operations planner but to me it is unclear who is the back-up if he is not in the office. This situation should in my view be cleared by training personnel, especially the operations planning assistants, in the team to be able to act as back-up for the planner instead of asking another operations planner in the Porvoo team to act as back-up on top of his/her own duties.

My school grade for the team is 8. My contact person in the team changed for the year 2010 and has developed well in (Group operations planning manager, interview, 2010.)

Interview 12

“My job title is customer service representative for business unit pipe. I serve the Russian markets and I’m located in Porvoo. I act as an assistant to the sales managers and handle orders received from the customers. I also deal with export and customs documents required by the customers. I’m in contact with the Porvoo operations planning team on a daily basis in issues such as batch allocations for customer deliveries, extra demand, changes of loading and delivery dates and also chamber of commerce documents.

I have a clear picture of who to contact in the Porvoo planning team as the information is always up-to-date in SAP. I prefer face-to-face communication with the planning team as we are located in the same office. I feel the communication is on a good level as is the co-operation but I feel that sometimes we should all remember that we are working as a team and we should try to be polite with each other even during difficult circumstances. I can still count on the operations planning team for help and I have full trust in them as they are really customer-orientated which cannot perhaps be said about all operations planning team in Borealis that I have been in contact with.

As my development ideas, it would really help in me in my job if I was informed in advance if the planning team is planning for big volumes of packed material to be transferred to external warehouses. These big volumes can cause problems with direct customer loadings as there is only a limited amount of possible loading times available in material handling. I would also like to develop the issue of incomplete pallets. The problem is that many Russian customers are pre-paid orders where the exact quantity of material needs to be ordered. In case of incomplete pallets, there are cases where I have informed the customer of for example a 300kg pallet (instead of the full 1375kg) but after material has been loaded it has come to my knowledge that full pallet has been loaded instead which causes big problems with the payments and also with the customs in Russia. I also feel that it would still develop the customer-orientation of the operations planning team if members of the team would participate in customer awareness programs and also familiarize themselves with the work of customer service representatives. By knowing what each other deals with, it helps to understand why some issues cause problems.

My school grade for the team is 8. The co-operations between me and the team is on a high level but there is still room for development.” (Customer service representative, interview, 2010.)

Interviews 13 and 14

“We work as dispatch clerks in Porvoo. Our duties include coordinating outbound deliveries, warehouse management and issuing delivery documents. We are in contact with the operations planning team several times a day in issues such as availability of material, batch allocation questions and problems in loading. We have a clear picture of who to contact in the team as the list in SAP is up-to-date.

The availability of people in the operations planning team is sometimes a problem. These problems occur especially early in the morning as first loadings start 7:00 but most people in the planning team arrive 8:00. Also, especially during lunch hours it is really hard to get in touch with people. The problem is that usually when we call the planning team, our issues are really urgent as the drivers are waiting for material to be loaded and if they need to wait, it can even create costs through waiting time, and also create backlog for later parts of a day.

It would really help our job if the planning team would start using the loading schedule function in SAP. Operations planning team members often contact us to ask about when material is going to be loaded but this info is also easily available in the loading schedule. Also, it would help us especially during Monday morning loadings when it might be difficult to do batch allocations in advance (if production takes place during the weekend) to give some sort of information in the loading instructions sheet in deliveries in the system. In general the communication and co-operations works rather well between our teams but in our mind there are still some problems with missing batch allocation in deliveries which requires us to contact the planning team for action.

Another development idea is to more prioritize customer deliveries over internal stock transfers. We see it as a problem that sometimes the silos are emptied by stock transfers when instead they have been reserved for customer deliveries which shouldn't have to wait. We both give the operations planning team a school grade of 7. We feel that their activities have become weaker during the past years. There is a feeling that the planning team isn't sometimes thinking about the big picture in their activities. Another issue which affects the co-operations is the increased amount of export orders which are hard to arrange for us in dispatch and also seem to be problematic for the planning team as the loading times are usually unclear." (Dispatch clerks, interview, 2010.)

Interview 15

"I work as a shift supervisor in material handling. I am responsible for the scheduled packaging plan to be executed and also act as a link between the dispatch and the warehouses. I'm also in contact with the production plants to coordinate their silo needs according to production. The contacts between me and the operations planning team are on a daily basis the material flow planners being my main contacts. We discuss the personnel and equipment resources and make required changes to packing schedules.

I feel that the communication with operations planning team works well and actions are taken quickly. I feel that there is sometimes some rushing on some issues such as repairing of broken pallets which are difficult to repair if all the packaging lines are running and everyone is busy with them. In general the co-operation is also working well. Due to the new shift system there have been some slight problems but I believe those will be solved through experience.

As development ideas, I would like to create some sort of system or at least an up-to-date list of the broken pallets that need to be repaired with some prioritizing in them. As mentioned they are causing some problems for both organisations so maybe something could be done there. Material handling shift supervisors are also included in container inspection processes where an external supervisor sees out loadings for specific customers. There are currently too many participants in the process so I feel that should be simplified.

My school grade for the operations planning team is 8. Since the material flow planners have been a part of the planning team, things have been improving all the time." (Material handling shift supervisor, interview, 2010.)

Interview 16

"I work as a demand manager for business unit pipe and I'm located in Vienna. I plan the demand figures in cooperation with the sales managers and involve myself in the monthly planning round during the SABU and APSA steps. Demand planning on my part is divided into two parts, short-term planning which means actions for up to three months, and also mid- and long-term planning which includes planning issues and business plans for periods up to 36 months. I am in contact with the operations planning team in Porvoo on a weekly basis to get information about possible production changes or problems which could affect supply of material.

I have a clear understanding of the responsibilities in the Porvoo team. The time difference problem of course exists but that is something that I have gotten used to. The planning team in Porvoo could help me even more in my duties by keeping me posted on possible scenarios related to production problems or delays and maintenance breaks in production. By knowing more in advance helps the demand planning team to balance the future of supply and demand. There have been quite a few personnel changes in the Porvoo team but I still feel that the co-operations between me and the planning team works well.

A development idea of mine is to have a monthly meeting with the operations planning team early each month where we could discuss availability of grades and the general order income before the actual planning round begins. A report with current availability data which would be updated regularly would also be helpful as so many times e-mails about availability are old data as soon as they are sent. My grade for the team is 9, and I believe that the Porvoo team works really well in comparison to other planning teams in Borealis." (Demand manager, interview, 2010.)

Interview 17

"I work as an operational assistant in the UBC terminal located next to the Borealis Porvoo premises. UBC terminal is an external container storage terminal which only Borealis uses and is capable of storing containers as well as arranging direct container deliveries and container tippings into silo trucks. My job includes handling all terminal operations such as arranging loadings, warehousing and preparing containers for loading.

Communication with the operations planning team is daily on my part. We discuss loadings from Borealis' silos, customer deliveries and all issues related to the materials stored in the warehouse such as taking material samples from containers. To me it is sometimes unclear who to contact in the planning team as there have been so many changes with responsibilities. I find the planning team to be mostly available when I contact them but there are problems during especially the mornings and lunch hours. The communication from the planning team is usually clear and understandable but there are also some exceptions where it really is unclear what and where we should do. Also, quite a lot of rushing occurs especially closer to the weekends.

The overall co-operation has improved over the years through mutual experience. As my development idea, I think it would be good for the operations planning team to familiarize themselves with the work we do in the UNC terminal. This might help them understand the difficulties we deal with and how issues that might seem small, such as taking samples, actually require a lot of work. My grade for the team is 8. I believe that we can still improve our co-operation through even more experience of each other's works and work methods." (UBC operational assistant, interview, 2010.)