BAXTER PLANNING

Your partners in planning

Service Part Planning

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Prophet by Baxter

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Introduction

Service Part Planning (SPP) requirements vary significantly from a manufacturing planning process. This paper documents the critical differences and the overall business impact of using Prophet by Baxter (Prophet) a service inventory designed planning solution versus an Enterprise Resource Planning (ERP) system to address these unique requirements.

Part Chaining and Substitution

Description:

In a service parts environment, parts are often replaced with new revisions, or new models of a product have parts that are backwards compatible with a similar part of a previous model. To effectively plan in a complex service parts environment, the planning solution must consider part replacements and substitution options during all phases the planning process: forecasting, target stock level recommendations, supply order recommendations, replenishment and transfer order recommendations, demand fulfillment, and excess determination.

Prophet Functionality:

Prophet considers both two-way interchangeability relationships and one-way substitution possibilities at *every* step of the planning process. In one-way chaining, Prophet dynamically adjusts targets based on available field inventory. Prophet also includes a real-time material sourcing solution that considers this advanced chaining knowledge to optimize material sourcing as part of the customer demand fulfillment process.

ERP Challenges:

ERP applications are not designed to comprehend two-way interchangeability and one-way substitution material chaining relationships throughout the entire planning process. The lack of this core functionality forces planners to plan parts individually versus as a comprehensive chain. This in turn negatively impacts planner productivity and increases inventory investment, excess inventory and inventory write-offs. ERP systems may not fully consider all available interchangeable spares when demand occurs, directly and unnecessarily impacting service levels and increasing expedite costs.

Prophet Benefit Summary:

- **Planner Productivity –** Prophet plans all chained/related parts as a single entity, which reduces the overall planning effort
- **Better Inventory Optimization –** Prophet forecasts related parts together and creates non-overlapping stocking recommendations between alternative parts
- **Reduced Excess and Better Identification of Excess –** Non-duplicated stocking means less future excess. Understanding chaining during excess identification means more accurate financial accounting of excess
- **Higher Customer Fill Rate –** Prophet uses part interchangeability and substitution during demand fulfillment, so all possible substitute parts, are considered when filling a customer demand, rather than expediting the requested part if it is unavailable locally
- **ERP Expense –** Extensive customization of ERP to support chaining features is a large IT expense to maintain and makes ERP version upgrades difficult

Reverse Logistics and Repair Operations

Description:

Reverse logistics and repair are a common features of complex service parts environments. High cost spares are collected and returned when replaced, so they may be refurbished and reused to minimize inventory investment and purchase spend. Repair processes typically have fall-out where items are determined to be beyond economic repair, and are scrapped during the repair process. To generate an effective supply plan, the planning system must independently forecast expected defective returns, account for the scrap rate in the repair process, and balance repair orders with other sources of supply.

Prophet Functionality:

Prophet provides multiple ways to forecast defective returns and can calculate historical scrap and yield in a repair process on a per-part basis. Prophet will also delay spend on repair if sufficient good stock is available. The result is that the inventory supply plan is optimized over a long term time horizon.

ERP Challenges:

ERP solutions lack rigorous service parts return and repair loop planning capabilities, comprehending return rates and scrap rates in the repair planning process. ERP systems may also not understand that some parts may be upgraded to new revision levels (chaining) during the repair process.

Prophet Benefit Summary:

- **Planner Productivity –** ERP may require planners to manually consider returns and repair and the impact on the purchase plan, creating additional work. Prophet has built-in algorithms and support for returns forecasting, repair order recommendation, and calculation of scrap rates
- **Inventory Reduction and Excess Avoidance –** ERP will likely either assume that all defectives are returned and immediately repaired or require planners to manually account for this process. Prophet will recognize if demand is decreasing and sufficient good inventory is available, and not recommend defectives need be immediately repaired. This will reduce unnecessary repair spend and avoid long-term additional excess
- **Service Level Improvement –** ERP will not account for high scrap repair parts effectively as Prophet does, so it may not recommend enough purchases to make up for the expected scrap rate. Prophet accounts for repair scrap rate when developing and recommending an overall purchase and supply plan

Unique Service Part Forecasting Needs

Description:

Service parts networks often have multiple demand sources including demand associated with unplanned failures, planned maintenance activities, remote warehouse replenishment, requirements transfer (in one-way chaining), part sales to third parties, and other demand sources. Each of these demand sources may exhibit unique behavior that requires independent visibility and unique forecasting techniques. Some of these demand streams may be very low volume, some may be seasonal, and some may be based on a known forward-looking schedule. All of these individual forecasts need to be brought together to drive the overall stocking and ordering plan for each item in a user friendly way on a single screen that provides total visibility to the overall plan.

Prophet Functionality:

Prophets allows for multiple individual demand sources to be independently viewed, forecasted, and manipulated as needed to generate an overall demand plan, and provides this capability on a single screen. Prophet has algorithms unique to service parts that cover seasonality, scheduled events such as preventative maintenance that may be linked to complex service bill of materials with fixed and variable part attach rates, and low-volume forecasting that understand demand may be probabilistic rather than high-volume.

ERP Challenges:

ERP solutions for planning have often been criticized for the lack of flexibility and configurability required for service parts planning needs. Multiple forecasts may need to be managed on separate screens. The variety of algorithms needed for service parts may not be available. ERP systems may try to manage PM/scheduled activity planning via an MRP model that does not align with standard service parts just in case forecasting and planning models that must also account for random, unscheduled demand.

Prophet Benefit Summary:

- **Planner Productivity –** ERP may require either all demand be forecasted together, or require planners to visit multiple screens to manage different sources of demand and demand forecasts. Prophet combines part planning activity (all forecasts, plus target stock levels and order recommendations) on a single screen for maximum planner productivity.
- **Inventory Reduction –** Prophet's forecasting algorithms that are specifically tailored to service parts means higher overall forecast accuracy and confidence, and less requirement for safety stock as a hedge against forecast quality.

Installed Base Planning

Description:

Service parts support often includes contractually agreed service level and response level agreements with customers. These agreements may have uptime requirements with penalties, and may have short response commitments of two or four hours. Deploying an inventory planning solution that will ensure that these client expectations are fulfilled is even more complicated when parts have a low failure rate and demand history by itself is not a good indicator of where or when demand will occur. In this situation, it is critical for the service parts planning system to know where products are located and the terms of the associated service agreements. Install base planning allows for intelligent inventory planning so parts can be placed in the correct inventory locations even if failure rates are low.

Prophet Functionality:

Prophet functionality understands the location and response of service contracts for installed base and automatically maps the installed base to the most appropriate stocking location for parts support. In situations where service level requirements are high and there are many low failure rate items, Prophet can determine appropriate spare parts stocking even if a specific location supporting a customer has never received a demand for the low volume part. This is accomplished via service bills of material for the products under support contract and aggregate calculated or provided failure rates for the individual components. This way Prophet comprehends that there is a statistical likelihood of a part demand even before failures have actually occurred, and plans appropriate inventory sparing.

ERP Challenges:

ERP demand forecasting is based on history, not on the introduction of installed base. ERP is reactive when demand occurs rather than proactively positioning appropriate stock before demand occurs.

Prophet Benefit Summary:

- **Inventory Optimization –** Prophet will produce a better demand forecast and a better inventory plan based on prior knowledge of where supported equipment is located and that it might fail, even in situations of very low demand.
- **Service Level Improvement –** Prophet doesn't need to wait for a demand to occur or have demand occur at a particular frequency before deciding to need to stock a part at a specific location. This proactive planning results in higher service levels to your customers.

Field Service Technician Inventory Planning

Description:

Field Service Technicians often carry service parts in their vehicles or service vans to provide a high first pass fix rate on the initial service call visit to a customer with equipment requiring repair. Planning target inventory balances for technicians can be particularly challenging as compared to physical warehouses.

Technicians are mobile, change product responsibility, and technician territory assignments may change frequently to maintain workload balance. This creates a unique set of problems to be solved.

- **Turnover**: It's not unusual for a technician workforce to have 10% turnover in a year. Newly added technicians don't necessarily service the same population of customers and products as the technician they replace, so field service managers regularly shuffle technician territories and assignments to match their workforce and customer base.
- **Incomplete or Incorrect Demand History**: Demand history based planning will always be reactive; as there is no plan until that individual technician has experienced demand. When demand occurs before there's a plan, broken service calls and return visits are the inevitable result.
- **Training:** Technician training may change over time. As new products are introduced, a limited subset of technicians may be trained to service those products.
- **Multi-echelon Planning:** Technicians are often supported by 3PL warehouses or regional/branch offices that carry parts

Prophet Functionality:

Prophet's technician inventory planning moves beyond traditional demand history based models. Unique features specifically developed to support the planning of technician inventory make Prophet by Baxter the most specialized and successful solution for planning technician inventory available.

- **Technician Teams and Territories**: Baxter's technician planning logic understands technician and installed base team/territory assignments. Our algorithms understand that multiple technicians may be candidates to service a specific customer or piece of equipment in the future, even if a specific technician hasn't serviced that customer or product recently.
- **Technician Training and Proficiency**: Baxter's technician planning algorithms considers each technician's training and proficiency on individual products and the likelihood of taking specific service calls when planning for technician inventory.
- **Multi-echelon Planning:** If a group of technicians is supported by a regional warehouse such as a 3PL location, Prophet will optimize the stocking of the secondary location based on the demand forecast and stocking targets of the technicians that location supports.

ERP Challenges:

ERP demand forecasting is based on history, and will not consider technician team work relationships, or the training of specific technicians on specific products or product lines. When new technicians are introduced, those technicians will have no demand history, so in ERP the only option may be manual stocking overrides. As new products are introduced into a territory, the parts for those products will have no demand history, so service failures may occur until demand history is established, or manual overrides may be required which can lead to long-term excess. ERP will also likely not comprehend the hierarchical relationship of stocking support locations in a multi-echelon stocking environment with technicians and regional support locations or 3PL locations.

Prophet Benefit Summary:

- **Inventory Optimization –** Prophet will produce a better demand forecast and a better inventory plan for technicians and their supporting locations, even as new technicians are introduced or technician territories or training levels change
- **Service Level Improvement –** Prophet doesn't need to wait for an individual technician to experience demand before deciding to need to stock a part with that technician. This proactive planning results in higher service levels to your customers.

Service Parts Specific Reporting

Description:

Service inventory planning drives unique reporting requirements. Baxter's servicer parts planning specific Hit Rate/Root Cause Reporting is an example of a unique requirement. Additional detail related to this report is included after this section of material. Out of the box reporting that captures both strategic and tactical reporting will drive efficiencies in personnel utilization as well is system setup cost.

Prophet Functionality:

Prophet offers a variety of reports that uniquely help visualize and manage a service parts environment. Below are some key examples:

- Management by Exception reporting to review planning issues and planner performance
- Exchange Curve analysis of inventory investment vs service level in a service parts environment
- Excess / Scrap Recommendation reporting that understands defective inventory, repairs, part chaining, last buy, and other service parts-specific requirements
- Stocking target net change reporting dealing with large numbers of parts and locations to quickly identify service parts stocking trends
- Override management reporting to make sure that the planning system remains well-tuned and does not become a system of overrides

A detailed list of standard Prophet reports is included in the following attachment. Additionally, all Prophet reports are customizable (selection criteria enables the user to define unique selection criteria) and all reports may be executed immediately or scheduled for future execution. Report formats and the distribution list are also determined by the person requesting the report.

Prophet by Baxter Reporting.pdf

ERP Challenges:

ERP out of the box reporting will mostly be generic supply chain information, and not tailored to service parts. Applying an ERP solution to service parts may require custom-built reporting that takes time and cost to design and implement, and will be problematic for system upgrades.

Prophet Benefit Summary:

- **Planner Productivity** – Planners have the reporting tools they need to do their job as an out-of-the-box solution
- **Management Productivity** – Managers have KPI management and modeling reporting to analyze and improve supply chain and planning group performance
- **ERP Expense –** Extensive customization of ERP to support customized reporting can be a large initial and ongoing IT expense and makes ERP version upgrades difficult.

Hit Rate / Root Cause Reporting

Description:

Service inventory planning includes unique reporting requirements. In particular, it is critical that a planning system be able to do root cause analysis when inventory is not available to fill a service request (an inventory miss), so data quality issues, planning configuration issues, and execution issues can be addressed quickly.

Prophet Functionality:

Prophet's Hit Rate / Root Cause reporting analyzes every part demand to determine if inventory was available in the correct location at the point the demand occurred. If inventory was unavailable, Prophet not only flags this as a miss for the hit rate calculation, but also does a root cause analysis to report the likely reason for inventory not being available. The root cause for inventory misses may be a data quality issue, such as missing installed base data or a bad bill of material; or a supply chain execution issue, such as late delivery of parts from a supplier causing an overall inventory shortage; it may be determined that based on an overall service level target of 98% that this miss fell into the 2% category and is an acceptable event. Prophet recognizes and reports over 20 root causes that can be reviewed and corrected to make sure you are getting optimal performance out of your service parts supply chain.

ERP Challenges:

ERP offers no root cause analysis, so inventory root cause failure analysis is either not done at all or is done manually and inefficiently by planners, typically in spreadsheets or custom-built reporting.

Prophet Benefit Summary:

- **Service Level Improvement –** The ability to quickly identify and correct root causes for service misses helps maintain the highest possible service level for your inventory investment. Via this unique functionality, the root cause identification for a single inventory failure may generate global improvement.
- **Planner Productivity** – Planners don't need to spend time and resources doing manual analysis or building complicated spreadsheets to do root cause analysis.
- **ERP Expense –** Extensive customization of ERP to support customized reporting can be a large initial and ongoing IT expense and makes ERP version upgrades difficult.

Intelligent Replenishment

Description:

Inventory shortages occur even in the best planned service parts network. Specific parts may suddenly start failing at a higher rate as they age or suppliers may deliver parts later than expected due to supply chain issues or simply poor performance. When shortages occur, it is critical that a service parts planning system react quickly identify the shortage situation and deploy the available inventory such that it will give the most customer-facing benefit with the smallest risk of downtime.

Prophet Functionality:

Prophet's cost-based optimization logic understands the cost-based criticality of inventory shortages in a service parts network. Not all shortages are of equal criticality. Specific locations stocking a part may be supporting a more critical customer or a customer where the downtime costs are much higher or where emergency expedite options may not be as available. Prophet will deploy shortage inventory to minimize stockout cost risk throughout your network, but reducing overall supply chain costs and reducing downtime.

ERP Challenges:

ERP solutions have simple approaches for replenishment of inventory. The options are typically either first-in / first-out (FIFO) or manual releases. The FIFO approach gives no consideration to the criticality of shortages and ships available parts to the locations that first experience a shortage. In a manual release process, the planner to attempts to determine relative criticality, but this manual effort will be both time consuming and subjective, and often devolves into a "who is yelling the loudest gets the parts" approach.

Prophet Benefit Summary:

- **Planner Productivity –** Prophet's approach is based on the optimization and relative priority of stocking targets already determined as part of the planning process, so manual planner intervention isn't required, saving planner time and reducing subjective decision-making.
- **Reduced Operational Costs and Increased Customer Service Level –** Prophet's targeted replenishment means shortage inventory is automatically deployed to where it will reduce the risk of critical stockouts occurring, minimizing penalties and maximizing equipment uptime.

Solution Scalability / Management by Exception

Description:

Most service supply chains have many field locations and tens of thousands of parts with complex part relationships as defined in the Part Chaining and Substitution section. Planning organizations cannot manually and proactively review the volume of part/location combinations in a typical service network. This drives the need for a scalable planning system that can systemically review and process all part/location pairs within the planning engine and via a management by exception process alert the appropriate planning resource of issues that require their attention.

Prophet Functionality:

Prophet is proven to scale to tens of millions of part/location pairs driven by any combination of high to low part count combined with high to low location count. Prophet provides robust planning automation within client defined tolerances, *and* management by exception processes that will proactively flag the appropriate planner when an out of tolerance condition occurs. Alerts for out of tolerance conditions include forecast quality issues, ordering issues, and inventory availability issues for immediate planner attention in a prioritized work queue.

ERP Challenges:

ERP Planning may become cumbersome as part/location pairs approach the tens of thousands due to its architecture. This works fine in manufacturing where the number of parts and locations is lower, but does not scale well to the typical service environment. Planner productivity is hindered and IT resources may need to be dedicated to tuning of the ERP environment to support a very large scale service parts planning solution. ERP may offer basic management by exception, but unique service parts issues may not be automatically flagged, so customization may be required.

Prophet Benefit Summary:

- **Planner Productivity –** Prophet is built to eliminate productivity issues that are scaled to tens-of-thousands of unique part numbers to be planned over, dozens, hundreds or thousands of locations. The application architecture combined with the robust management by exception capabilities uniquely targeted to service parts means lower overall staffing requirements.
- **Inventory and Service Level –** Prophet's scalability, automation and alert process design are key components in the delivery of an optimized inventory plan that reduces inventory levels and increases service levels.

New Product Introduction (NPI) Planning

Description:

Service parts planning requirements for the rollout of new parts and products are unique. A service parts solution requires multiple techniques to support the introduction of new products to the field. NPI techniques should support establishing initial stocking levels for parts without established demand history in order to reduce excess and obsolete inventory while increasing customer satisfaction.

Prophet Functionality:

Prophet offers multiple techniques to handle new product introductions. Leading indicators or installed base forecasting will use estimates of future equipment population/installs and manufacturing/engineering failure rates when no historical demand is available. Part chaining and substitution logic will attach a new part to the history of an interchangeable or substitutable replacement part. Similar materials logic allows you to associate the new part with a more established part, that while not a direct substitute, is similar enough that the established part's history pattern can be used.

ERP Challenges:

ERP planning may support "like part" modeling, but it is not necessarily optimized for service parts use. As mentioned before, there is also no little or no support for part supersession chaining through the forecasting and target stock level process. ERP solutions will not support an installed base forecasting model that is critical to the success of companies that require same-day support and have high downtime costs. Subsequently, planners using ERP for service parts may need to manually evaluate NPI requirements in spreadsheets outside of the ERP planning environment.

Prophet Benefit Summary:

- **Planner Productivity –** NPI functionality native to Prophet means planners can manage and review NPI plans directly in the planning system, allowing for both process consistency and higher productivity.
- **Inventory Reduction –** Manually executed NPI processes may significantly over-estimate initial provisioning requirements, causing more inventory to be carried in the network than needed and potentially creating future excess.

End of Life (EOL) Planning

Description:

Service parts planners are often required to support equipment long after the manufacturing process for key components of the equipment has been shut down. This results in the need to do an end of life parts requirement estimate so a last buy can be executed to acquire the inventory needed to support a product for the next five years or more. The planner must specify a final buy quantity of a part to last over a long-term time horizon.

Prophet Functionality:

Prophet incorporates functionality that supports this last buy procurement recommendation by considering such factors as anticipated end of support life rate, salvage rate, decommissioning rate, anticipated last repair date, and projected repair scrap rate changes as inventory ages.

ERP Challenges:

ERP planning solutions focus on the unique manufacturing requirements of discontinuing a product, but not the long-term service perspective. The manufacturing life of a product is very short compared to the service life. ERP's manufacturing-centric EOL planning does not consider the impact of install base decommissioning, repairability, and long-term forecasts.

Prophet Benefit Summary:

- **Planner Productivity –** Prophet has a documented best practice flow and supporting interfaces to allow a planner to efficiently plan for EOL and last buys, even if it's not a common occurrence.
- **Excess Avoidance / Shortage Avoidance –** Prophet's EOL planning mode allows planners to do an effective long-term plan and not make last buys that are too big or too small.

Support and Planner Mentoring

Description:

A new service parts planning solution should provide an immediate benefit. However, traditional software delivery models focus on getting the client "to the finish line" of implementation go-live. User training of a few days or a week is common. Ongoing customer support is reactive and is typically focused on more basic "how do I do function X" type questions. The planning team is essentially on their own unless the company is willing to pay for additional training or consulting. This may become a requirement if results are not forthcoming.

Baxter Approach:

As part of every service parts planning system implementation, Baxter provides three months of ongoing, proactive planner mentoring of the planning staff. Weekly, scheduled meetings managed by experienced Baxter service parts planners, review a series of predefined, yet flexible topics to ensure the successful adoption and deployment by the planning team. A pre-mentoring and post-mentoring business review process documents business results and identifies ongoing opportunities for improvement.

ERP Challenges:

ERP subsystem implementations are often more complex and expensive than projected. Often external consultants are required to implement, configure, and train users on ERP modules, so even the "included" modules ends up having a high price tag for a solution that is not as well tailored to service parts requirements as a dedicated best-of-breed tool like Prophet.

Prophet Benefit Summary:

- **Planner Productivity –** Planner mentoring makes helps ensure your planning team is immediately productive as possible and fully understand the planning software and are using it in the most efficient way post-implementation. This will also accelerates other benefits, such as service level improvements and inventory optimization/reduction, and adoption of automation.

Additional Areas of SPP Functionality and Support

Description:

Additional SPP focused items that warrant inclusion in this document also include:

- Sandbox and Simulation Modeling
- Logistics Network Modeling
- Ongoing Software as Service (SaaS) support and maintenance
- Planning as a Service (PaaS)

Baxter Approach:

Each of these areas represent specific additional functionality or capability within Baxter's products and services. Simulation modeling is commonly used for large scale modeling exercises that may include analyzing the inventory impact of changes to a logistics network or to understand the impact of winning a significant new customer contract. Logistics Network Modeling provides the tools needed to perform what if modeling related to the number of global warehouse locations and the impact of meeting service contract commitments. Baxter's SaaS model provides each client a dedicated team of IT professionals focused on system uptime, reliability and advance identification of data issues before inventory levels and orders are impacted. Our PaaS solution provides clients with professional planning services and a support team comprised of these professional planners.

ERP Challenges:

ERP systems offer limited if any functionality in Simulation and Logistics Network Modeling, and while ERP SaaS deployment models are possible, many ERP deployments are still managed by an internal staff that is focused on ERP financials, human resources, and manufacturing. Service Part PaaS is not a core competency of any ERP organization.

Prophet Benefit Summary:

- **Breadth of Solution –** Service Parts Planning is a highly specialized area of planning and Baxter provides a unique depth of solution, service, and support that is not matched by ERP solutions or ERP companies.