Navigating the telecom ship

The CEM Control Center Catalyst

Catalyst Team

Authors

- **Ian Emsley** - Chief Architect, Subex. ian.emsley@subexworld.com
- **Josef Hartmann** - Nokia Siemens Networks. josef.hartmann@nsn.com
- **Dr. Lorien Pratt** – Quantellia. lorien.pratt@quantellia.com
- **Andrew Colby** – Netezza. acolby@netezza.com
- **Georg Panagos** - N-Pulse. georg.panagos@n-pulse.de

Abstract

This white paper describes the CEM Control Center Catalyst, launched by TM Forum's Decision Analytics team for the first time at Management World Nice 2010. This catalyst demonstrates a new approach to product management, where operational monitoring, data management and processing, and decision engineering and design approaches are used to provide a comprehensive "navigational" infrastructure to a product manager. We show how, by using this approach, the product manager can simultaneously balance cost, revenue, and investments that benefit customer experience KPIs to maximize outcomes of interest. We also show how operational monitoring can be used to manage repairs to the rollout process, as well as reconsidering decisions based in changes in key assumptions.

Executive Summary

A mobile operator wishes to start an app store that competes with entrenched players…another mobile telecom must launch a new product in the face of backhaul overload…a fixed-line market entrant wishes to offer a premium bundle to its enterprise customers. Each of these situations—and many more like them—requires the consideration of dozens of factors, including customer experience, bundles, costs, revenues, and investments in systems and processes. External factors must be taken into account as well, including competition and market demographics.

As the new product is rolled out, there are a number of measurements that must be tracked to ensure it is proceeding well. It is important to monitor for two categories of information: first, a telecom must monitor data that indicates that the system is broken in some way, such as a switch not generating CDRs, or a bug in a workflow that creates order fallout. Second, the assumptions upon which the original product launch decisions depended must be monitored to ensure they continue to hold. If a price was set based on a competitors' pricing, for instance, and that pricing changes, then the operator may need to select a new price. If a new system was deployed assuming a particular cost structure, and that cost increases, then the operator may wish to change its investment to another system.

The CEM Control Center Catalyst, launched for the first time at Management World Nice 2010, demonstrates an integrated approach to making telecom decisions, monitoring their outcomes, and changing direction as appropriate. This "control center" approach is illustrated in Figure 1.

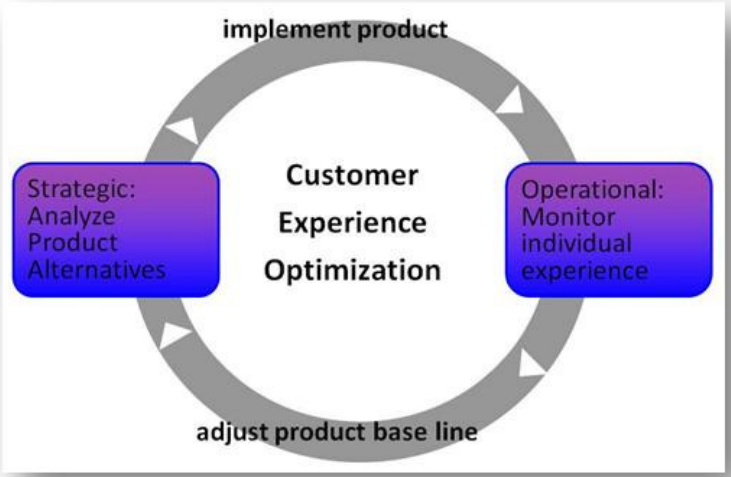

Figure 1: CEM Control Center Overview

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Introduction

In a typical telecom environment, data to support systematic decision making can feel like “feast or famine”. On the one hand, the amount of information available, when combined with the expertise of strategic planners with different backgrounds and experience, can be overwhelming. On the other hand, when launching new products into new markets, where the past is an unreliable guide to the future, data that provides guidance for critical decision-making elements such as pricing demand functions, demand for the product in particular geographies, or the cost of OSS/BSS implementation, may be missing or misleading.

This is particularly true of customer experience-related information, as **there is little industry expertise reflecting how customers’ overall impression of a CSP—its brand—responds to touchpoints such as the ordering or sales experience; nor how that brand reputation, in turn, impacts customer behavior such as the willingness to pay a higher price.** Product managers do make decisions that take brand into account, however, so their expertise is indeed available. It is not captured systematically, nor available for continuous improvement.

This Catalyst demonstrated three approaches to effective product management in this environment. First, we showed how customer experience data can be effectively gathered, summarized, and made available in full drill-down detail to product managers as input to effective decision making. Next, we showed how this information can be used for product management decisions, using a decision engineering and modeling approach. The model provides decision makers with holistic, forward-looking information about how investments in customer experience will achieve the operators’ goals surrounding margins and brand. In addition, it provides a comprehensive set of KPIs and associated thresholds that indicate a potential issue.

Then, we demonstrated how, following the product launch, operations can be carefully monitored in an operations center so that problems can be readily detected and repaired. Rollout problems can be fixed tactically, and addressed through a case management system. In addition, the early awareness of incorrect assumptions allows for course corrections in a product launch to be rapidly and systematically reviewed and implemented.

The catalyst included a collection of data from many customer touchpoints including BSS, OSS, and the network equipment itself. The team augmented this “raw” data by calculating aggregated customer experience metrics, including the Customer Experience Index (the weighted sum of technical and soft measurements on an individual customer basis), Customer Lifetime Value (the expected future revenue from this customer), Customer Propensity to Churn, and others.

Partner Roles

Consisting of software from Subex and Nokia Siemens Networks for operational monitoring, from Quantellia for decision engineering, and from Netezza for data management, the demonstration is the first of its kind, showing an integrated approach to managing costs, customer experience, investment, revenues, and pricing. Team collaborator N-Pulse provides data and standards expertise to the project, as shown in Figure 2. Project champions were a large North American service provider and Vodafone, both known as telecom innovators.

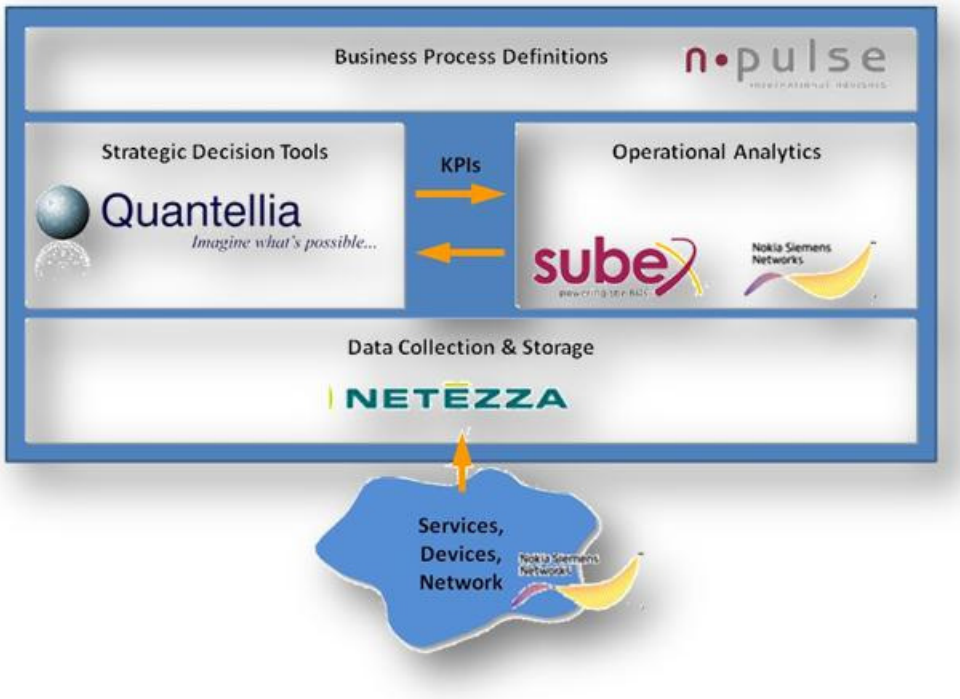

Figure 2: Contributing Partners and Roles

Benefits Demonstrated

The benefits demonstrated by the CEM Control Center are as follows:

- The CSP **maximizes the benefits of customer experience investments** to achieve goals involving revenue, costs, and customer retention.
- Departments responsible for decision making and operational monitoring are **aligned in a systematic way** through KPIs that represent key decision assumptions.

- The CSP **manages complexity** by visualizing the interactions between tangible and intangible factors such as revenues, brand, investments, and decision outcomes by simulating existing business parameters and metrics.
- The CSP uses a **systematic approach** to agile strategic and operational management, where the need to reconsider a decision is triggered by changes in operational KPIs.
- Feedback from customers and information gathered during product launch is used to continually improve the product management process. Nokia Siemens Networks showed how a "Customer Experience Intelligence" measure can be improved in this way. Furthermore, the decision model creates a structure within which new data (both in the form of external values as well as functional relationships) can be gathered during operations.
- **Brand**—an intangible asset that is difficult to measure and manage—is systematically incorporated into the decision-making process. Brand here is representative of a class of intangibles (which include morale, attitude, acceptance, net promotion as additional examples) that can be managed in the way shown within the CEM Control Center.

In the remainder of this project white paper, we describe the two product management scenarios that were demonstrated as part of this catalyst project, providing details of the operation of the CEM Control Center.

Scenario #1: Launch of a New Enterprise Telecom Product, Incorporating Customer Experience with Traditional Metrics

The first scenario demonstrated in this catalyst was based on a fictional operator wishing to launch a new product to its medium-sized enterprise customers. Recognizing that exemplary customer experience creates brand loyalty and leads customers to recommend a product to their colleagues, this operator wishes to invest in a variety of areas that will improve the customer experience in a way that will ultimately lead to market dominance but not "break the bank" in the short term. To achieve these goals, this operator must initially make a number of decisions, and then implement those decisions within its operations. We describe these processes below.

1) The first phase of the decision-making process was to determine the desired outcomes of the product launch. These outcomes consisted of financial goals and brand reputation, as described below:

   Short term: Every product sale should produce a positive contribution margin when only variable costs associated with that sale are taken into account and when campaign and capital expenditures are not considered. For instance, a sale to an insurance company resulting in $X per month revenues might have an associated monthly cost of $Y per month, leaving $X-$Y to pay back fixed expenditures associated with the product launch.

   Medium term: In the medium term, these contribution margins ($X-$Y, in the above example) must add up to enough to account for the fixed costs to launch the product, including marketing and sales activities.

Long term: Long-term, all expenditures associated with product launch, including capital costs, must be recouped.

Brand: This telecom recognizes the importance of brand value in increasing the demand for its products and reducing churn, so it also has a goal that its overall customers' experience, across multiple touchpoints, will improve over time.

2) The second phase of the decision-making process was to determine what **decision controls** are available to the product manager to achieve the outcomes above. For this scenario, the operator chose to investigate:

- For a number of product bundles offered to customers, should they be priced at, below, or above competitors' pricing?
- How much money should be invested in sales training?
- How much money should be invested in sales staffing?
- How much money should be invested in marketing?
- How much money should be invested in OSS/BSS/IT updates for this product line?
- How much money should be invested in process improvements?
- How much money should be invested in improvements to metrics and measurement?
- How much money should be invested into operations?
- How should the product be priced?

3) Next, **external variables** are determined. External variables are those aspects of the world that cannot be controlled, but which do impact the decision. When there is some uncertainty in an external value, it is commonly referred to as an "assumption." Assumptions that both have a strong impact on outcomes and also contain uncertainty are often called "key assumptions" because they are important to monitor as a decision is rolled out to an enterprise, and are therefore critical KPIs later on.

For this scenario, the external variables were:

- The price charged by the competition;
- The demand curve for products

4) The next step is to determine how decisions and external variables are connected. In this scenario, each decision impacts three separate flows of information toward outcomes.

- **Revenue flow:** Price drives demand, which drives sales, which produce revenues, which result, in part, in margins at periods in time.
- **Cost flow:** Various investments impact costs at various time periods, which impact margins through simple subtraction from revenues.
- **Customer experience flow:** Customer experience flows through the following three steps:

1. The impact of an investment in a touchpoint on the behavior of that touchpoint. For instance, how far does each sales staffing dollar go in expanding the sales force? Another example: how effective is money spent on improving the ordering process?
2. The impact of an improvement to a touchpoint upon the brand reputation of the CSP. For the second scenario, to be described below, Nokia Siemens Networks showed how multiple touchpoint experiences could be rolled up into an overall metric reflecting brand.
3. The impact of the brand reputation on customer behavior, such as likelihood to purchase at a certain price.

For this demonstration, the team designed a full decision model representing all of these flows in various views that the product management team could use to change the model. For instance, one view showed how an investment in sales staffing changed the number of sales people, and then how that number of sales people impacted the quality of the brand perception.

In most cases, there was not pre-existing data representing these relationships (especially the ones surrounding customer experience), and so here, the expertise of product managers was used to construct the decision model. Importantly, the decision model creates an analytical framework that allows hard data to be gathered going forwards, so that the quality of the decision model can be improved over time.

A number of parameters to the decision model were deemed particularly valuable to experiment with, so they were encoded as adjustable features of the model. These were:

- The degree to which CEM improves with greater capital expenditure
- The degree to which CEM improves with greater process improvement
- The degree to which improved marketing impacts CEM
- The degree to which sales effectiveness improves with additional training investment
- The degree to which CEM improves with greater sales effectiveness
- The degree to which sales improves when marketing improves
- The degree to which adding sales staff improves sales effectiveness

5) Build a decision model: This team designed models in Quantellia's 2D environment, and then executed them while interactively exploring their characteristics in a 3D, multi-touch environment. The 2D model is illustrated in Figure 3.

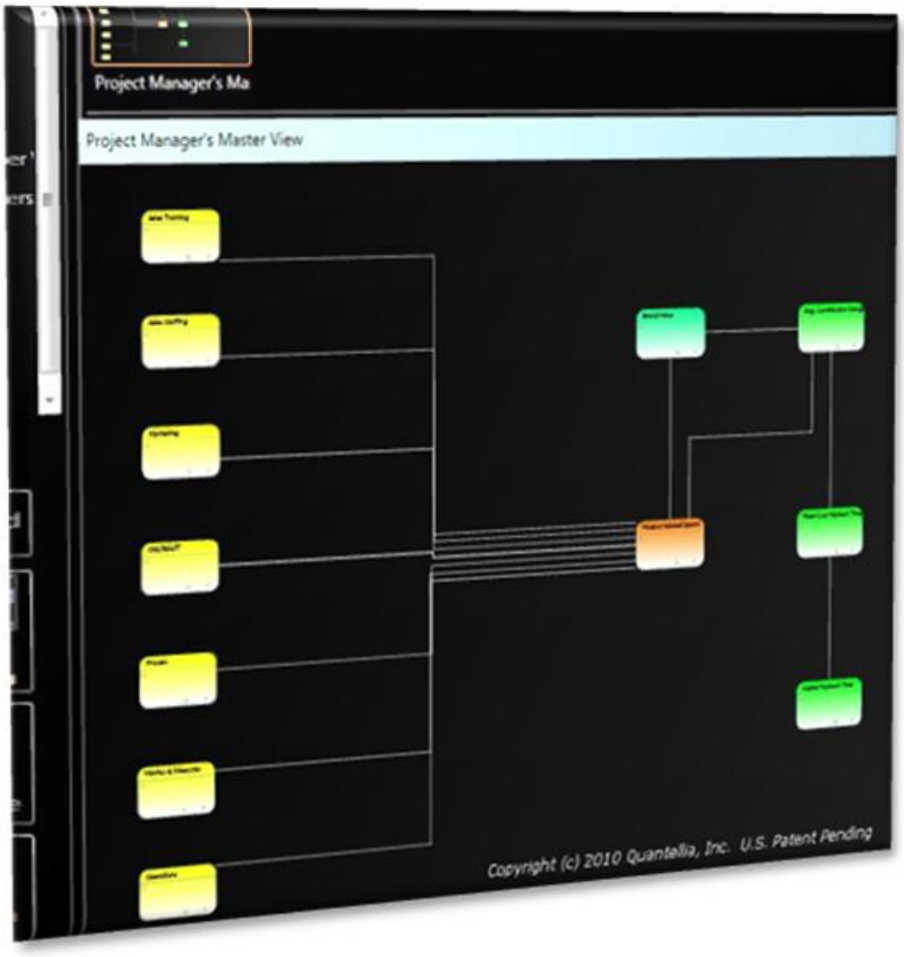

Figure 3: Quantellia's Product Manager Master 2D Decision Model View

In this model, yellow boxes represent decision choices, green boxes represent financial outcomes, and the blue box represents the brand outcome. The orange box is a rolled-up composite of various flows of cost and CEM through the model, which can be drilled into to view the individual model components.

6) Experiment with the decision model to determine a balanced set of investment decisions that lead to the CSP's goals. In addition to the use of expertise to determine relationships between parts of the decision model, this is a second way in which a product manager's expertise is used in a decision modeling exercise.

Here, the model allows the manager to interactively change decisions to understand how they affect an outcome. For instance, changing the price in an interactive 3D display allows the product manager to consider its impact on factors of interest. The 3D interactive view is illustrated in Figure 4.

Figure 4: Interactive 3D Product Manager's Decision Model

In the demonstration, we showed that, at a too-high price point, the product manager can make a number of decisions that impact the margins and brand targets. However, only the brand target can be achieved—not the operator's margin goals—because, at this price point, the interest in the product is too low for revenues to exceed costs.

By lowering the price, the product manager is able to determine a combination of the decisions (represented as yellow boxes above) that achieve the margin target payback timeframes as well as the brand goals.

As part of this demonstration, we showed that the product brand improves over time, as there is a feedback loop between improvements in customer experience, which impact brand, which in turn impacts the demand for the products at this particular price point. By making an appropriate investment in CEM at the product launch, this powerful dynamic takes hold, reducing churn as well.

7) **Launch** the product based on those decisions: Once decisions have been made about price and investments, now the product is rolled out and activities surrounding product launch are carried out.

8) **Monitor** multiple data elements, both to check for problems with the launch, as well as to monitor the validity of the assumptions in the original decision.

Generally speaking, management systems, like those provided by Subex and Nokia Siemens Networks, are used to track, in real time, a number of metrics with the goal of catching problems once they happen or, ideally, before they happen, before they are visible to the customer. A resolution process is then triggered and problems can be fixed.

In this scenario, the Subex Revenue Operations Center (ROC) allows a service provider to monitor a number of desired outcomes, such as the actual versus anticipated margin goals. Here, it draws data from a Netezza data appliance which can process high volumes of operational data in real time, allowing a rapid response from the operator. Netezza's high-volume data management and processing capability is able to support Subex in its ability to analyze trends in the outcome data to predict problems before they occur (such as margins not succeeding in the future, even though they are on track today). This can be done in situations where the pattern of margin growth is understood from previous data gathered and processed analytically.

Figure 5: Subex's Revenue Operations Center

9) Identify a problem in rollout: In this scenario, the ROC identifies that a KPI is trending out of range and alerts the relevant Product Management group via the ROC's Case Management module as shown in

Figure 7. This could be via email, SMS or periodic reporting. The case is assigned to a Product Manager, who investigates the problem.

10) The Product Manager turns to the ROC Product Management dashboard shown in Figure 5 and sees that some of the product's KPIs are out of range. In this scenario the medium term margin goal set for the product is trending towards missing its 12 month deadline. This is indicated as shown in the figure as a meter that has moved from the green into the yellow "warning" zone.

11) The Product Manager investigates the problem using the business process dashboards, slice/dice and "what if" capabilities of the ROC. The Product Manager is able to drill down into details of individual customers as shown in Figure 7 in order to fully understand how the product is being used and experienced by different demographics. Analysis of the data shows that the root cause in this case is because the Average Revenue Per User (ARPU) is lower than expected in one geographic region. This is because that region has set different sales targets for the product based on a different interpretation of the product's business goals.

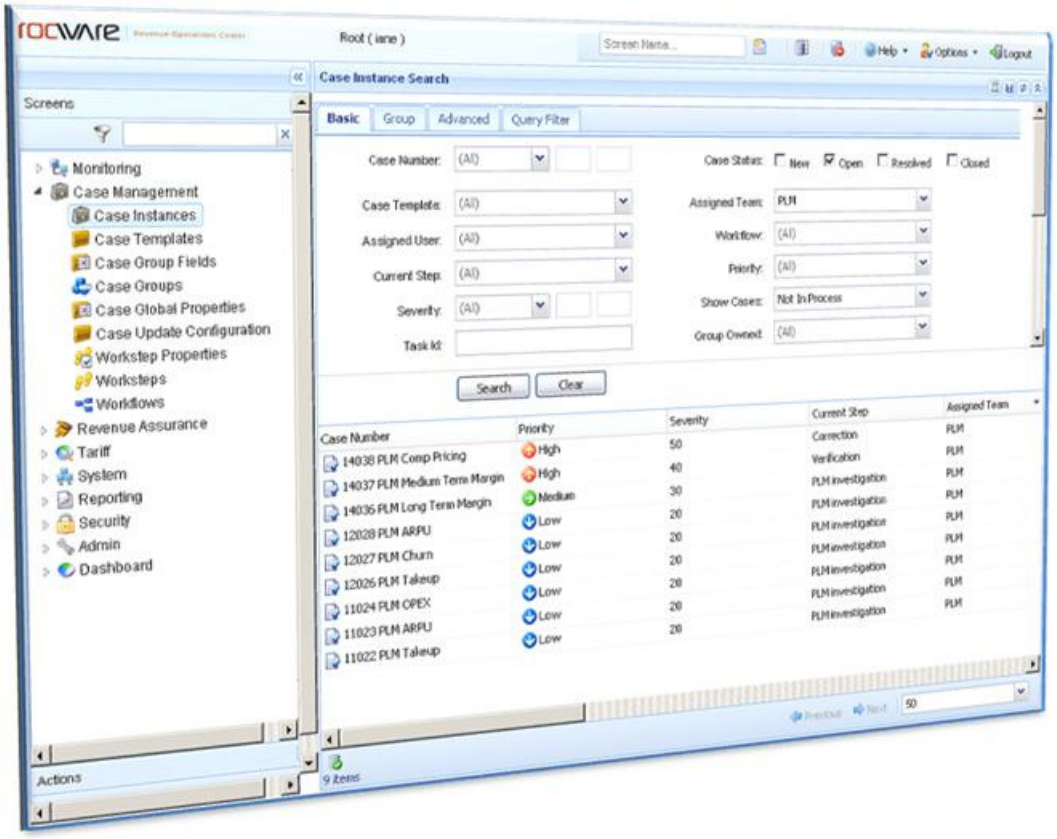

Figure 6: Subex ROC Case Manager

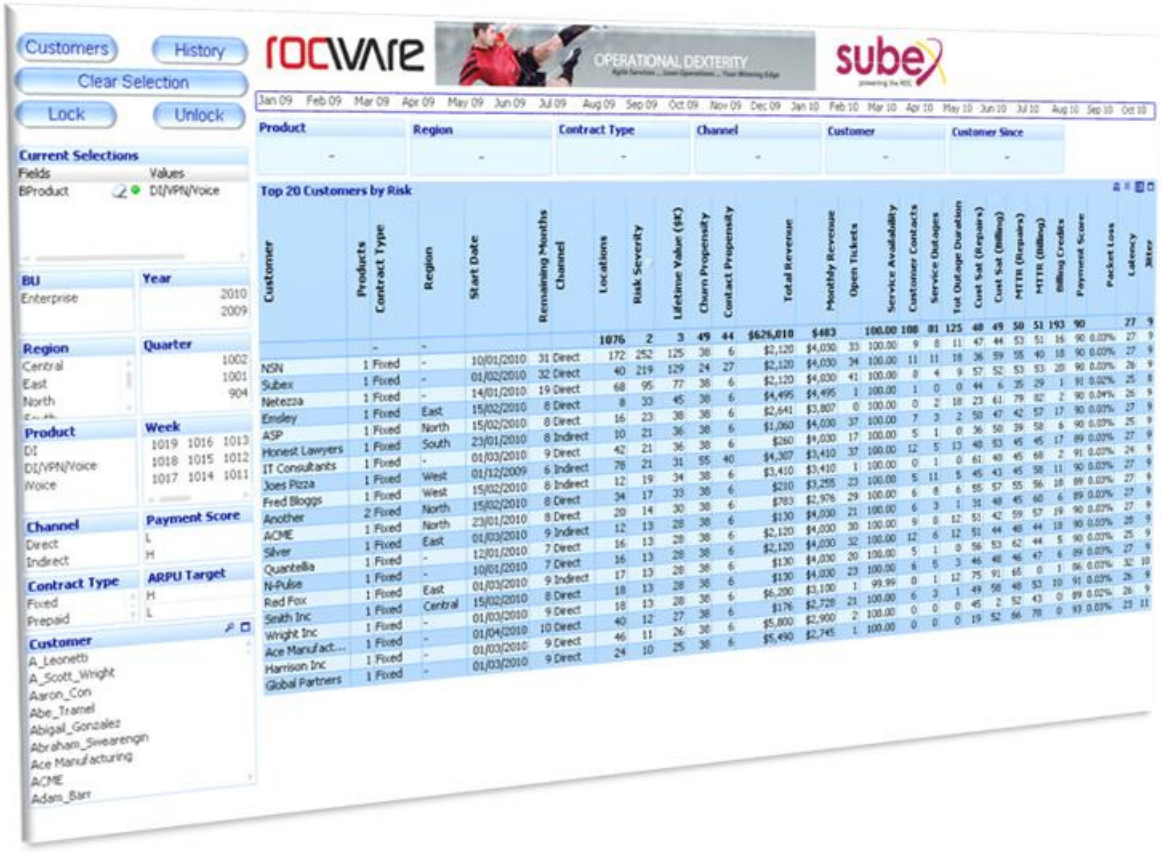

Figure 7: Subex ROC Customer Detail View

12) Armed with this insight, the product manager is able to discuss the situation with the regional manager and identify a corrective action. The product manager then decides to "park" the case for a few weeks to wait and see if ARPU begins trending towards the desired level. If this does not occur then the product manager will be reminded by the Case Management module that the case remains open.

A problem like the one identified here can be corrected before it has the opportunity to dramatically affect the bottom line. There is no call for returning to the product management strategic planning process as alternative solutions are already known.

13) As the product continues to roll out, a different type of issue may materialize: rather than an error in a system or process, there may have been an error in an underlying assumption to the decision-making process, as introduced above. This is shown via other metrics tracked by the Subex ROC, where key decision assumptions (such as competitor pricing, for example) can be monitored carefully.

Importantly, changes in decision assumptions provide a leading indicator to future problems which if caught early can allow the operator a greater likelihood of success. Because prediction is done through the cause-and-effect structure of the decision model—and do not depend on analysis of historical data—this is a complement to analytically derived relationships that are used in other future-predicting analytic processes. **This "future view" component of the CEM Control Center is an important contribution**

of this Catalyst project, because it allows a service provider to avoid obstacles, and to be more aggressive in its offerings because of its stronger risk prediction—and thus mitigation—capability.

14) Once the decision assumption violation has been detected, the product manager can return to the decision-modeling tool to determine the appropriate next step. In our example, the cost of a change to the ordering system is lower than expected, so there is more money available for other purposes.

Where will this investment have the most value? The decision model shows that, dollar-for-dollar, investing in sales training has the most value, so the product management team chooses to use the unexpected windfall for this purpose. Importantly, the reason that the sales training investment has a large impact is that it produces two benefits: first, sales values increase in the short term. Second, customer satisfaction improves and, in the long term, customers are willing to pay more for the same product offering.

Scenario #2: Launch of a New Mobile Broadband Product Bundle, onto an Already-Overloaded Network

The second scenario demonstrated by this catalyst was the launch of mobile broadband service to a variety of customers, each with varying degrees of need for service quality, performance, and price sensitivity. For instance, the typical teen user (Segment number 1, below) may wish for the lowest price option needing primarily game download capability, while the business user (Segment 2) is amenable to a higher cost but insists on high service quality. The casual user (Segment 3) may have altogether different priorities than either of the first two user types.

A one-size-fits-all plan fails to meet the diverse needs of these three consumer groups, so multiple offerings based on multiple decision models are helpful. Furthermore, in an environment where broadband data capacity is constrained, by offering multiple plans with different levels of data usage, the service provider may achieve much higher levels of customer satisfaction.

In this scenario, the operator begins by measuring existing customer satisfaction. Here, the Nokia Siemens Networks Customer Experience Intelligence tool is used by the product management team to explore the experiences of individual customers through multiple touchpoints.

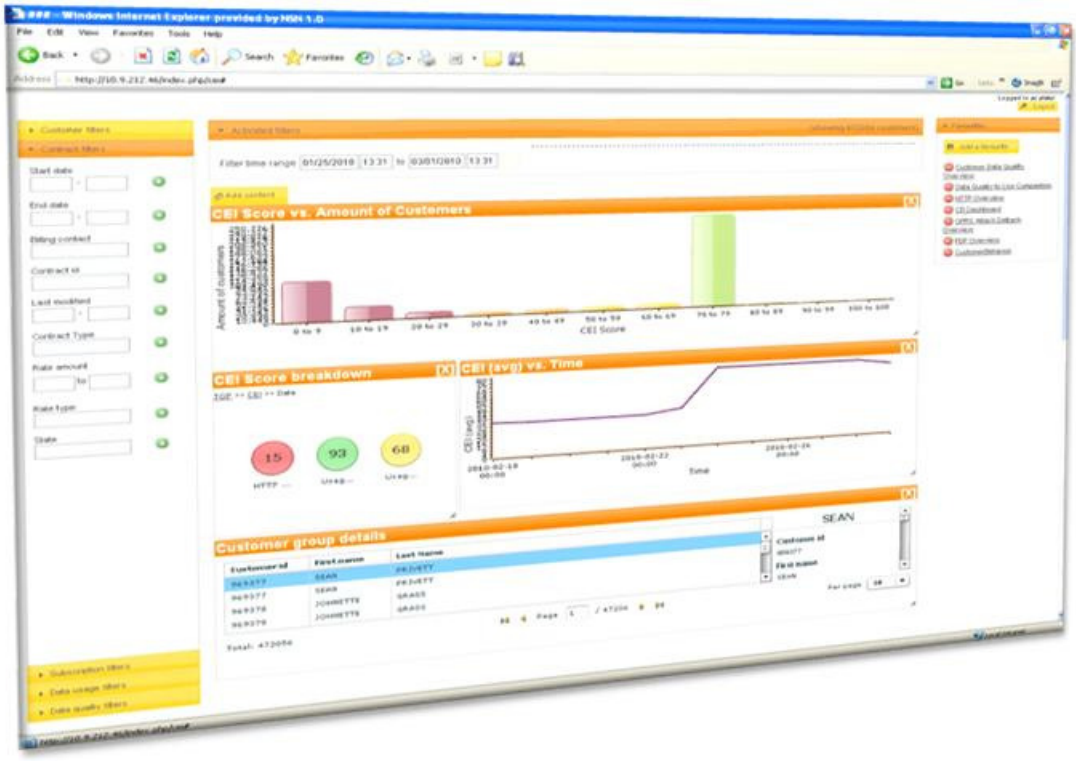

Figure 8: Nokia Siemens Networks Customer Experience Intelligence Dashboard

This dashboard provides a mechanism for a product manager to understand the experience of a large group of customers. As part of the Catalyst demonstration, it contained data from approximately a half million customers. Each one was represented by metrics gained from a number of customer experience KPIs. As shown in the histogram near the center of the dashboard, all customers are ranked based on their overall customer experience.

As shown in Figure 9, below, Nokia Siemens Networks provides an innovative approach to gathering and adjusting the mechanism for measuring customer experience, so that it provides valuable information for product managers. The metric uses both soft and technical quality measures, along with a proprietary weighting scheme for determining their values. **Importantly, feedback from customers is used to adjust the weighting scheme, which means that the customer experience metric improves over time, providing a better and better reflection of various customer groups' experiences.**

Figure 9: Nokia Siemens Networks Customer Experience Intelligence Calculation

The decision-making process for this scenario is similar to the previous one in structure, except that it is triggered by the mobile broadband operator using these customer experience metrics to determine that a set of customers is not having a strong experience. For this reason, the CSP desires to create several different product offers that meet the different needs of its customer groups.

After reaching this realization, the operator enters into a similar decision making process, as illustrated below. The steps are as follows:

15) **Determine desired outcomes:** The operator in this scenario wished to achieve the following:
   - **Number of Subscribers:** the operator wishes to maximize the number of subscribers to its plans.
   - **Total Revenue:** The operator wishes to maximize revenues from those subscribers
   - **Variable Costs:** The operator wishes to minimize costs

16) **Determine the decision controls:** The CSP in this scenario wished to change a number of aspects of three product offerings to determine what would lead to the greatest customer satisfaction in various categories The decision controls allow the operator to adjust the following decisions for each of the three products:
   - What data quota should be offered for data services?
   - What QoS level should be offered for the network?

- What price should be charged for the product?

17) **Determine external variables:** In this scenario, the external variables were:
    - The operator's variable and fixed costs per unit of data quota provided.
    - The operator's fixed and variable cost per unit of QoS provided
    - The relative size of Segments 1, 2, and 3.
    - Data reflecting the relative sensitivity to Price, QoS, and data quote provided for each of the three segments.
18) **Determine data flows:** As in the Scenario #1, information about revenue, cost, and customer experience flowed through the model.
19) **Build a decision model:** As in the previous scenario, the team constructed a decision model to allow the user to visualize the impact of the decision choices interactively.

Figure 10: Interactive 3D model for Decision Scenario #2

20) **Experiment with the decision model to determine a balanced set of investment decisions that lead to its goals.** For this decision-making process, the team first observed that by setting price to a very low level, most customer groups had a high degree of satisfaction, yet the operator was not able to reach its revenue targets. As price was increased, various groups—especially the teen users—decreased their level of satisfaction, yet the decreased subscribership resulting from this fact was offset by increasing

revenues per user. For each subscriber group, there was a “turnaround point” in the pricing where, as the price rose, margins rose gradually (reflecting lower volumes but higher revenues) until the price was too high to adequately attract subscribers, at which point the price began to lower again.

The team also found that changes to the data provided to users and/or to the QoS offered impacted these dynamics in unexpected ways.

Finally, the team found that for different bundles, the reaction of the three customer groups was different. Generally speaking, since business customers were more price-tolerant, it was possible to identify a high price for these customers if the QoS was raised significantly. The team was able to determine the right balance between these settings for each bundle

21) **Launch the product based on those decisions:** As in the first scenario, once decisions have been made about price and investments, now the product is rolled out and activities surrounding product launch are carried out.

22) **Monitor multiple data elements,** both to check for problems with the launch, as well as to monitor changes to the assumptions in the original decision: In this scenario, the Nokia Siemens Networks dashboard is used to monitor customer satisfaction. The product manager can choose to re-examine the product launch decisions if customer satisfaction is too low.

Standards eTOM Mapping

The CEM control Center has various impacts on the eTOM processes. For this project, the N-Pulse team analyzed both data and process information to understand the catalyst’s contribution to the eTOM, which is impacted down to Level 4.

The results are shown in the following three figures for the OFAB, SIP and Enterprise area respectively. The areas in red show the impacted eTOM processes.

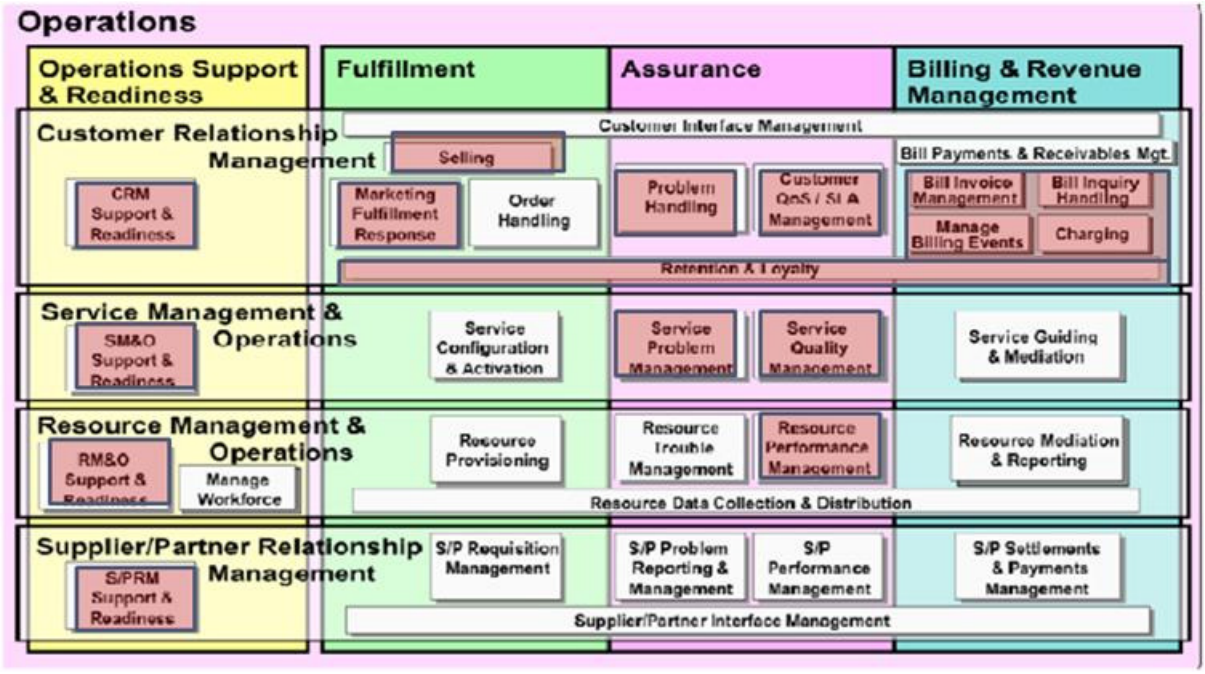

Figure 11: OFAB Processes Impacted

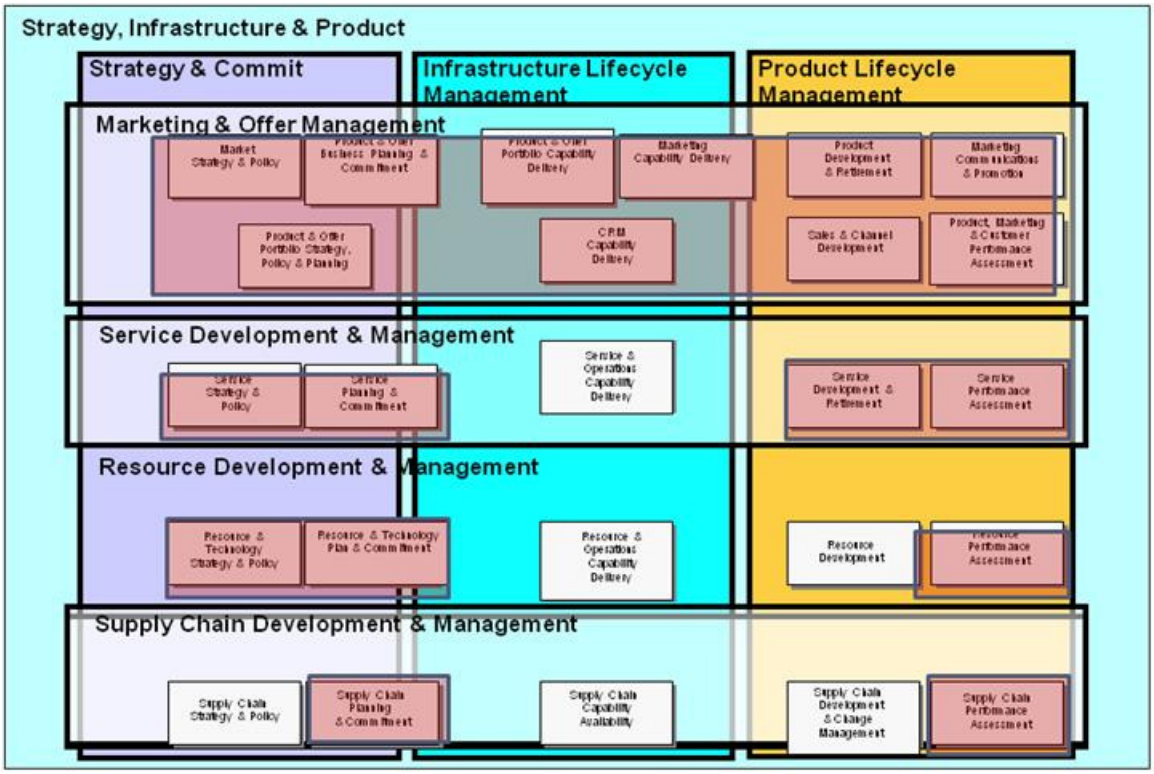

Figure 12: SIP Processes Impacted

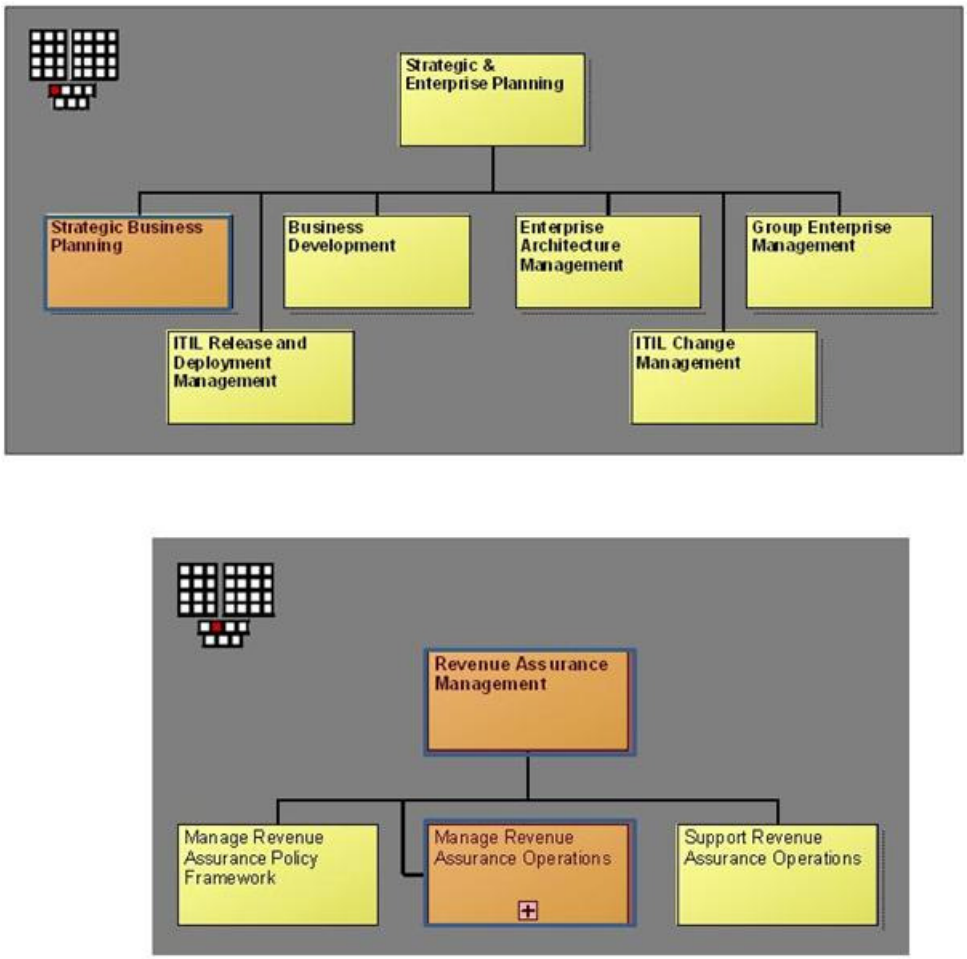

Figure 13: Enterprise Processes Impacted

The CEM control Center shows the missing link within the eTOM processes between CEM processes for:

- Planning processes (mainly in the strategy/product area)
- Customer interaction operational processes
- Service Assurance and Service Quality processes

In addition, to our knowledge, this project is the first time that the eTOM process give a direct feedback to the strategy processes (e.g. for executives) and links operative processes through simulations and predictive analytics to the SIP area.

In the Enterprise Area “Enterprise planning” and “Revenue Assurance Management” gain significant advantages through operative analytics and predictive processes. The scenarios shown above give a transparent picture of how revenue assurance processes can be impacted.

Specific process benefits include the following:

- The CEM with predictive analytics provides significant advantages to the Service Providers and are not only support processes;
- The practicability and existence of mature tools emphasizes the importance of the decision and predictive processes within the service providers CEM processes highlighted in the eTOM Processes above; and
- The catalyst provides a motivation for further investigation of the position of decision analytics processes within the eTOM Framework – not only for product management related processes.

Conclusion

In an increasingly competitive environment, service providers are seeking new points of differentiation. There is also strong evidence to suggest that an investment in customer experience can provide significant benefits, even if the initial costs are higher. The reason: customer experience improvements impact the CSP's brand, which changes the demand for the product and increase customer retention.

However, in today's economic climate, investment dollars are limited, even those for improving customer experience. For this reason, there is an opportunity for service providers to benefit from more systematic product management.

By harnessing the data already present in a CPS's various systems—including BSS, OSS and the network—the CSP can gain meaningful insights into its customer base. These insights can enable a CSP to provide a more personal customer experience tailored to particular customer communities. Two examples of this are more personalized product offerings and more personalized interactions at the various touchpoints. The key is to obtain data from the various sources, including the expertise of product managers, and to harmonize it into a consistent model. The CEM Control Center demonstrated that this can be done.

All together, the CEM Control Center showed how a CSP can improve strategic and tactical planning by using improved information about the present, through more intelligent analysis to predict the future, and by changing direction more effectively by communicating the decision-making rationale to stakeholders through visual tools. This allows the operator to identify issues within a timeframe to take corrective action if required. We also showed how new technologies for high-performance, high-volume data extraction, storage, and analysis can be used to reap valuable information from the network that reflects customer experience in a way that can be improved over time. **Ultimately, these techniques add up to the ability to better manage the inevitable risk, uncertainty, and complexity involved in every product launch. Because of this improved risk mitigation, operators can be more aggressive, gaining a stronger competitive foothold in today's rapidly changing telecom environment.**