Business Metric Driven Customer Engagement for IT Projects

Michal Morciniec, Mike Yearworth
Trusted Systems Laboratory
HP Laboratories Bristol
HPL-2004-130(R.1)
August 16, 2006*

business metric, benchmarking, customer engagement, business activity monitoring

It is the general case that business process improvements can be achieved through a range of possible projects ranging from pure business process reengineering through to IT deployment. When IT forms part of the process improvement project Service Level Agreements (SLAs) and functional solution requirements provide the means of linking the business performance goals to the IT project. In this paper we show how competitive benchmarking and standard operations reference models can be combined with Business Activity Monitoring (BAM) in order to capture the value of an IT solution in terms of key business metrics agreed with the business stakeholders at the outset of a customer engagement.

* Internal Accession Date Only
Approved for External Publication

Business Metric Driven Customer Engagement for IT Projects

Michal Morciniec, Mike Yearworth
28th July 2004
HP Labs, Bristol

{michal.morciniec,mike.yearworth}@hp.com

Abstract

It is the general case that business process improvements can be achieved through a range of possible projects ranging from pure business process reengineering through to IT deployment. When IT forms part of the process improvement project Service Level Agreements (SLAs) and functional solution requirements provide the means of linking the business performance goals to the IT project. In this paper we show how competitive benchmarking and standard operations reference models can be combined with Business Activity Monitoring (BAM) in order to capture the value of an IT solution in terms of key business metrics agreed with the business stakeholders at the outset of a customer engagement.

1 Benchmarking and Metric Driven Engagements

Performance benchmarking provides a powerful technique for obtaining customers' attention and is based on

1. the use of standard, well understood and accepted metrics
2. access to sufficient data from a number of customers in a similar business area in order to make meaningful comparisons.

An example of this approach can be found in the PRTM benchmarking service [PRTM 2004].

Typically, measurement of a customer's actual performance against these benchmark metrics would be obtained and comparisons made to median and/or 'best in class' performance – which represents the competition. Significant gaps in the specific customer's performance against one or more metrics would then be highlighted and used to trigger a project to improve performance. The metric improvement would thus be used as the project driver and could reasonably be used as the means of measuring the impact of the project post completion – did it achieve the objective of improving performance against the benchmarked metrics?

It is not the intention of this paper to describe the analysis required to elicit what project is needed to achieve the desired improvement in performance metrics. However, we make two assertions that we use as guiding principles in this paper.

1. *There must be some financial equivalence or calibration of the benchmark metrics if the metric is not itself a financial one*. For example, cash to cash cycle time is usually measured in days and is literally the difference between the amount of time taken to receive cash from customers for goods and the amount of time taken to pay suppliers for raw materials. However, the financial impact of improving cash to cash cycle time performance is reasonably easy to understand and can thus be used as a project driver with well understood financial benefit if the project achieves its objectives

2. *Not all business process improvement projects require an IT solution to achieve objectives*. There is a large space of pure business process management (also known as process re-engineering or process improvement) projects that can meet objectives through change in existing people and process dynamics. However, some projects *do* touch IT although we always treat them within the context of a project driven by metric improvement.

In this paper we are interested in the subset of process improvement projects that require an IT resolution through a motivation to answer questions about measuring and/or predicting Return on IT investment (RoIT) [Idc 2004]. By making use of the concept of metrics improvement driven projects and the fact that before our project even determines that IT is a factor, the expected return is already on the table as a target. Coming back to the example of the cash to cash cycle time metric; if this has been used as a project driver then the project might conclude (after suitable analysis) that customer cash collection is failing badly and that resolution should be achieved through rolling out a new accounts receivable system.

2 Engagement Models

Using the metric driven project approach we can illustrate a number of ways in which solutions and services vendors can interact with a customer

1. BPM-oriented consulting (with benchmarking capability) without IT solution capability. IT is provided by partners or is put out to RFP as and when required. Typified by an ability to engage at the C-level in the customer and able to be part of the metric driven project from the start. The contractual agreement with the customer could include meeting the metric improvement as part of the terms.
2. IT-oriented consulting and solution selling. Typified by responding to RFPs and/or partnering as the IT provider. Engagements with the customer tend to be at the IT/General manager level. Any business metrics improvement tends to be hidden because the customer already knows why an IT solution is required and the IT provider will be contractually bound to delivering a system that is fit for purpose.
3. Managed service. Such contracts tend to be IT oriented and driven by cost of delivering against IT metrics such as performance and availability. The business processes that the infrastructure is supporting and their associated metrics are not typically part of the deal.
4. Business Process Outsourcing. The full benchmark metric set could be used as the performance attributes of the Service Level Agreement.

Of these types of engagement, HP is active in IT-oriented consulting and solution selling, as typified by most HPS Manufacturing Industries engagements, and managed IT service deals. HP is growing its activity in Business Process Outsourcing in the area of financial services. The reason that we have taken some time to provide this, albeit simplistic, description of engagement models is because we have been working on the problem of enabling HPS to deliver a strong RoIT message to its customers in the current absence of BPM-oriented consulting engagements. This categorisation makes it clear that without owning the metric driven project, or at least understanding this metric driven context, it is difficult for the IT-oriented consultant and solution seller to provide a strong RoIT message since the expected return is a target known only to the customer (and/or its BPM-oriented consultants). Of course, for IT-oriented engagements where the IT is a fundamental business enabler then this type of metric driven project analysis is less appropriate.

3 Solution Browser

The IT solution browser [Browser 2003] is a tool that has been developed to enable consultants who are currently engaging with customers in IT-oriented consulting and solution selling to step into the initial stages of BPM-oriented consulting. The solution browser uses benchmarking around high level metrics[1] and matches metric 'pain points' with specific IT solution architectures through the use of

1. standard operations reference models that describe the linkage between process elements, best practices and metrics;
2. metrics interdependencies; and
3. mapping of best practices to specific types of IT solution.

In this paper we are concentrating on the use of the solution browser as part of a pseudo BPM-oriented engagement; i.e. one where an IT solution provider has used the benchmarking and mapping to IT capabilities of the tool to focus on a specific solution rollout which is justified by its predicted impact on the benchmarked metrics and then to look at the necessary BAM design. This has been motivated by a requirement from the HP Adaptive Enterprise Program Office to describe how high level business metrics as project drivers link through to the BAM capabilities of the deployed solution.

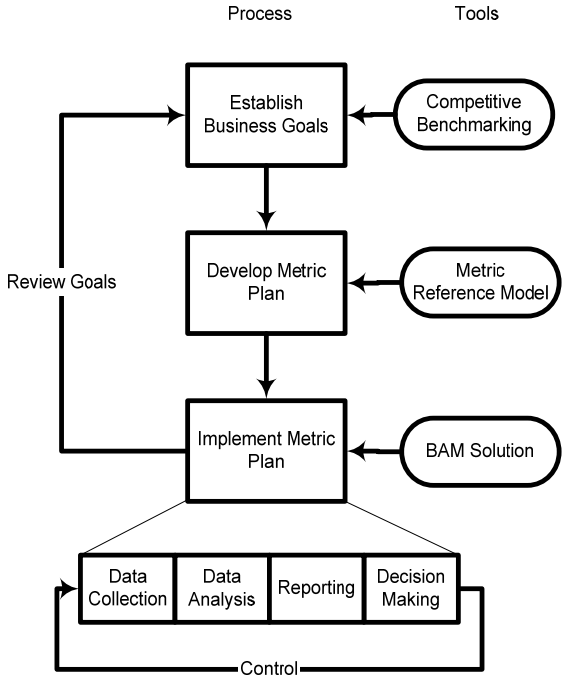

Figure 1 Metric Driven Engagement Process Model

We have attempted to do this by taking a narrow slice through a supply chain problem; making use of the IT solution browser, which contains an enhanced version of the Supply Chain Operations Reference (SCOR) model, and a mapping to functional areas that are based on HP's own KeyChain business processes and their implementation as one or more

[1] By high level metric we mean a key performance indicator of interest to the business stakeholder (SCOR level 1 metrics constitute a good example).

orchestrations on the Microsoft BizTalk Server 2004 (BTS2004) infrastructure – marketed as the HPS Manufacturing Industries CBI.Net solution.

Figure 1 shows the outline of the process model for metric driven project engagement [MetricMod 1999] and indicates tools and technologies that support the activities of the process. The model specifies three main stages: identification of the business goals of the stakeholders, creation of a metric plan supporting these goals and implementation of the metric monitoring plan. They are discussed in more detail in the following sections.

4 Business Goals Identification

Competitive benchmarking is one of the techniques [ProcPerf 1999] that can be used to identify business goals during the interview with the customer. The comparison of the enterprise performance with that of the competitors is based on a set of metrics drawn from the domain specific reference model. For the supply chain domain that we use in our scenario the SCOR model [SCOR2003] is applicable. Basing the benchmarking tool on an established, standardized reference model has the advantage that consistent metrics and their definitions are used, facilitating the construction of a benchmarking database. The benchmarking tool forming part of the solution browser is shown in Figure 2.

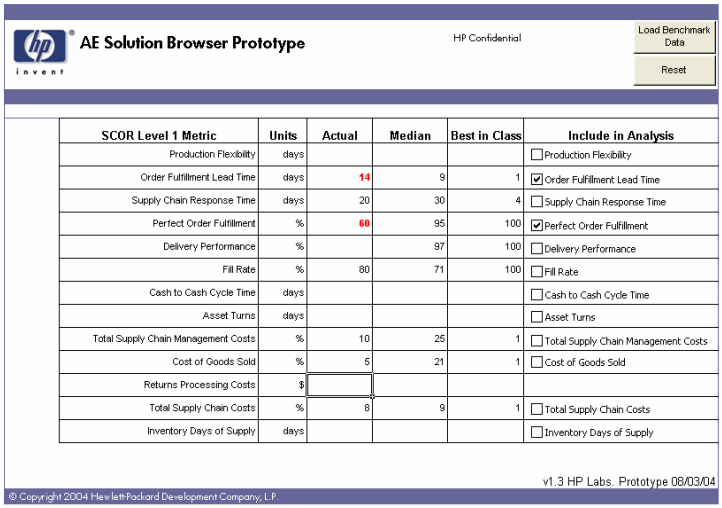

Figure 2 Benchmarking using SCOR metrics in order to identify business goals

Let us assume that the enterprise has identified as a top priority the business goal of improving customer satisfaction. The benchmarking tool facilitates structured discussion an the identification of potential concern areas by comparing "Best in Class" and "Median" values for the high level SCOR metrics with the "Actual" values supplied by the business stakeholder. We will assume that "Perfect Order Fulfilment" and "Order Fulfilment Lead Time" have been identified as problem areas because the values for these metrics are significantly below the average values achieved by competitors.

At this stage the abstract goal of improving customer satisfaction can be restated more precisely, in terms of the target improvement for the given metric:

G1. *Reduce* Order Fulfilment Lead Time to 7 days (i.e. halve the actual values to get close to the median performance)

G2. *Increase* Perfect Order Fulfilment to 80% (i.e. obtain an increase closer to the median performance)

For each of the level 1 metrics, lower level metrics that have a specified impact on the parent metric can be identified (this is the feature of the proprietary HP SCOR extensions). This allows us to focus the conversation with the customer on specific sub-problem areas. Table 1 shows a small sub-set of sub-metrics impacting level 1 metric "Perfect Order Fulfilment".

Table 1 Metrics impacting Perfect Order Fulfilment

Production Plan Adherence	Production Plan Adherence is calculated at the shippable end-product level in units, using the following formula: Production Plan - Sum of Variance Production Plan Where: Production Plan = The sum of the units planned to be completed (i.e., placed into inventory or shipped) in each month based upon the plan generated in the previous month. Sum of Variances = The sum of the absolute values, at the end item level, of the differences between each month's production plan as defined above and actual production for the same month.
Schedule Achievement	The percentage of time that a plant achieves its production schedule. This calculation is based on the number of scheduled end-items or total volume for a specific period. Note: over-shipments do not make up for under-shipments.
Supplier On-Time Delivery Performance	The percentage of orders that are fulfilled on or before the original customer requested date (suppliers performance measured by the customer).

Further discussion with the customer may reveal that the low percentage of perfect orders is due to the fact that some suppliers deliver late. The reason for this may be due to non-existence or inefficiency in processes (e.g. lack of forecasting, unmanaged purchase order negotiations, etc.), lack of suitable technology (e.g. paper, fax handling, vs. electronic messaging) or most likely a combination of both.

As we mentioned earlier, typically the business stakeholders have a good understanding of the financial benefit over time that will be obtained when the target goals are achieved. It is not likely that this information will be shared with the consulting team. However, certain high level metrics such as cash to cash cycle can be calculated based on the balance sheet view of the company.

During the interview the IT Solution Browser can be used to apply a scoring procedure that identifies, on the basis of top level metrics, potential IT solutions that could be considered for implementation. The reader is referred to [Browser 2003] for the details of the algorithm.

We will assume that an IT solution has been identified that will provide the required functionality to enable effective purchase order and forecast collaboration between the suppliers and the enterprise. The decision to go ahead with the project, or not, will be based on the cost-benefit analysis [CostBen 1997].

The benefits to the customer can be demonstrated in terms of cost saving and improved business performance. The IT solution provider should have an understanding of how changes in business parameters affect the cost saving so as to negotiate effectively with the customer. Standard reference models like SCOR can help with the qualitative analysis (e.g.

establish that improvements in Supplier on Time Delivery Performance will increase Perfect Order Fulfilment Rates). Quantitative analysis requires data derived from the actual business processes and systems deployed in the enterprise.

5 Metric Plan Development

Business performance of the enterprise depends not only on technology but people and processes. Values of key performance indicators are influenced by the design of business processes and by the way people interact with them. Consequently, a metric measurement plan has to be established in order to determine the amount of improvement in key performance indicators that can be attributed to the solution investment.

Fortunately, business activity monitoring (BAM) is rapidly becoming a commodity [BamS 2004] and is now part of most IT integration solutions. Deploying BAM component as part of the primary solution (in our example purchase order and forecast collaboration) provides the business stakeholder with a monitoring, analysis and reporting capability. Informed decisions can be made on the basis of the information provided by the BAM solution.

Metric plan development is a joint activity between a business stakeholder and business analyst and is designed after the business goals are clearly established. In other words the control loop shown in Figure 1 occurs within in the context of the enterprise goal setting loop.

The purpose of the metric measurement plan is to specify how each metric is going to be measured, presented and interpreted. The type of information collected for each metric includes [MetricMod 1999] the following:

- definition of the metric
- identification of partial measurements necessary to calculate the metric
- formula for calculating the metric from partial measurements
- identification of data sources for measurements, frequency of data collection
- agreement on how metric will be presented to the stakeholder, frequency of reporting.

Table 2 Example metric data collection card

Metric	Definition	How to Measure	Measurements	Who measures	How Often	How to Present	Impacting metrics
M1 Supplier On Time Delivery Performance	% of Orders fulfilled on or before original customer requested date	The Order Request Date is the date specified in the Purchase Order document by the Buyer by which the order must be filled. The order is considered fulfilled when Buyer generates Shipment Receipt Acknowledgement. The number of On Time Orders is the count of supplier orders that meets the requirement Order Request Date - Actual Order Fulfilment Date>0. The metric is calculated as a ratio Number of On-Time Orders*100/Total Number Of Orders	Number of On Time Orders (to be counted per supplier), Total Number of Orders (to be counted per Supplier), Actual Order Fulfilment Date, Order Request Date.	Buyer	Cont.	View by Supplier and Year and Month	M2 Supplier Order Negotiation Time, M3 Supplier Build Time, M4 Supplier Order Shipment Time

An example metric data card for “Supplier On-Time Delivery Performance” is shown in Table 2. The metric is defined as the percentage of orders fulfilled on or before original customer request date. In order to calculate this metric we have to know per each supplier the proportion of On-Time Orders among the Total Number of Orders that have been sent to them. We have to know the Actual Order Fulfilment Data and compare it with the Order Request Date to decide if the order is an on-time order or not. These data items are defining measurements for the “Supplier On-Time Delivery Performance” metric. The measures will be obtained from the data sources available in the enterprise. In our scenario most of the measurements are available directly from the integration process engine.

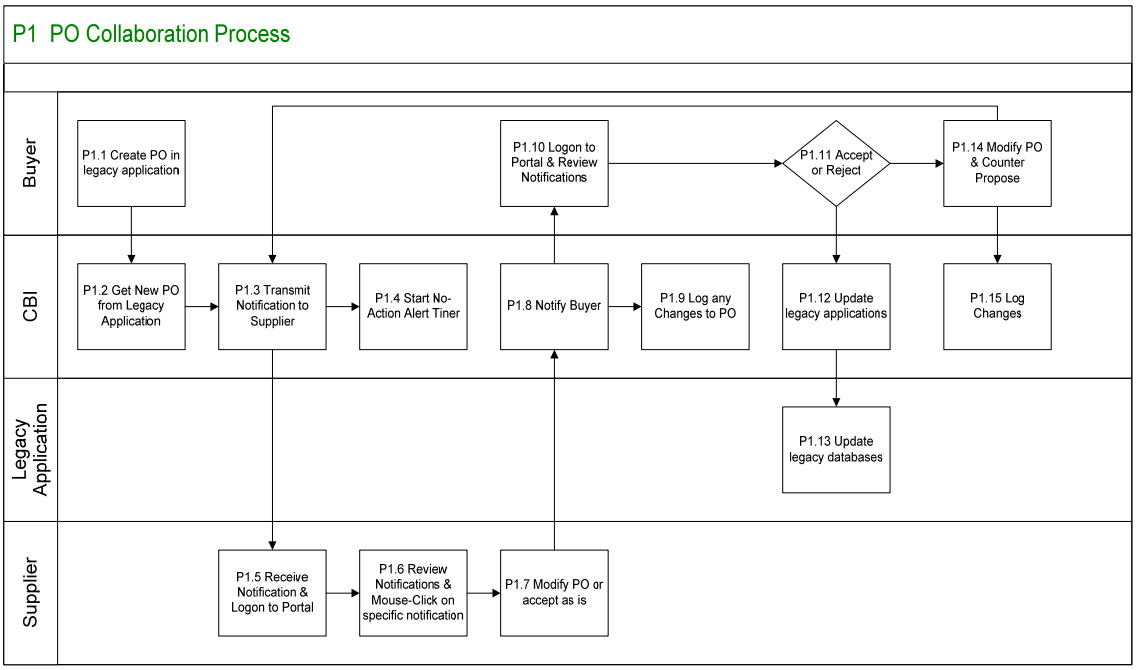

Figure 3 Purchase Order Collaboration Process Specification

The specification for a purchase order collaboration process is shown in Figure 3. The Buyer stores an electronic purchase order on the portal to which suppliers can log in upon e-mail notification. Suppliers can change the purchase order or accept it. If the purchase order is changed then it will be reviewed by the Buyer who may make additional changes, accept changes proposed by supplier, or reject the changes terminating the collaboration process.

This re-engineered purchase order collaboration process should reduce the time that is spent negotiating with suppliers due to the notification mechanism and ease of information management. We will assume that the collaboration process will be implemented using a suitable process-oriented IT infrastructure.

The measurements from Table 2 can be mapped to the process specification to indicate process activity where the measurement will take place (in the same way as metrics in the SCOR model are linked to the SCOR process elements). This information may form a part of the specification for the actual metric implementation.

6 Metric Plan Implementation

We should emphasize that the metric implementation project is in effect a sub-project of the primary Forecast and Purchase Order solution. It is beneficial to take into account the metric measurement plan in the primary solution design phase to identify appropriate data sources for the measurements that need to be taken.

In our scenario the primary solution consists of a set of re-engineered processes that will be deployed into a process based integration engine coordinating the flow or data between the applications. Because the primary solution is process-centric, a lot of measurements for metric calculation can be collected directly from the process layer as discussed above.

As indicated in Figure 1 the implementation of the metric plan consists of data collection, data analysis, reporting and making decisions based on the reports. We discuss implementation of these aspects with the Microsoft BizTalk 2004 integration engine.

7 Data Collection

Data required for metric calculations can reside in a variety of sources such as enterprise applications, databases or process engines. The advantage of a process based integration engine is that it provides consistent data integration method though the use of adapters and integration processes.

In BizTalk 2004, data from enterprise data sources is passed via an adapter into the integration process through a port. As shown in

Figure 4 data from ports encapsulated as a message are passed into or out of the process. Data items that are of interest (e.g. for control flow decisions or data logging) are addressable within the context of the process schema and are stored as part of the process trace in the database.

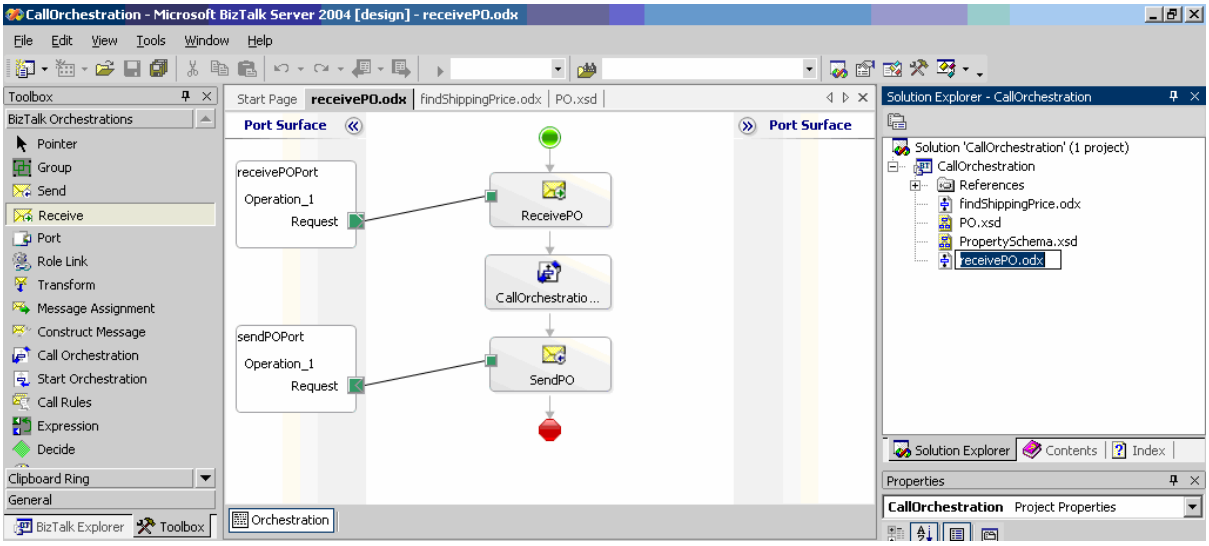

Figure 4 Example BizTalk integration process

In our scenario, purchase order and forecast collaboration process specifications are implemented as a set of correlated BizTalk process schemas (orchestrations). The BizTalk BAM solution provides a set of tools that allow definition of data items from the process data flow that should be stored, aggregated and made available for analysis.

The first step involves specification of how each metric will be calculated. In BizTalk this is done by specifying business activity (it is really a logical process specification). Business activity will later be mapped to the data items in the process flow of the orchestration. It defines the measurement itself as well as it describes the dimensions of the presentation space for the measurement. As shown in Figure 5 the business activity items in BizTalk have simple primitive data types (number, string and date-time). Measurements for metrics are based on a given business activity item and may include an aggregation function that should be applied to it; e.g. average purchase order negotiation time measurement is based on the purchase order negotiation time business activity item with average aggregation function applied. Once a metric measurement has been specified one or more dimensions can be assigned to it. Typically, they would be of date-time or string data type. In our example, average purchase order negotiation time can be assigned to the supplier business activity item as a dimension which will allow viewing the average negotiation time for different suppliers.

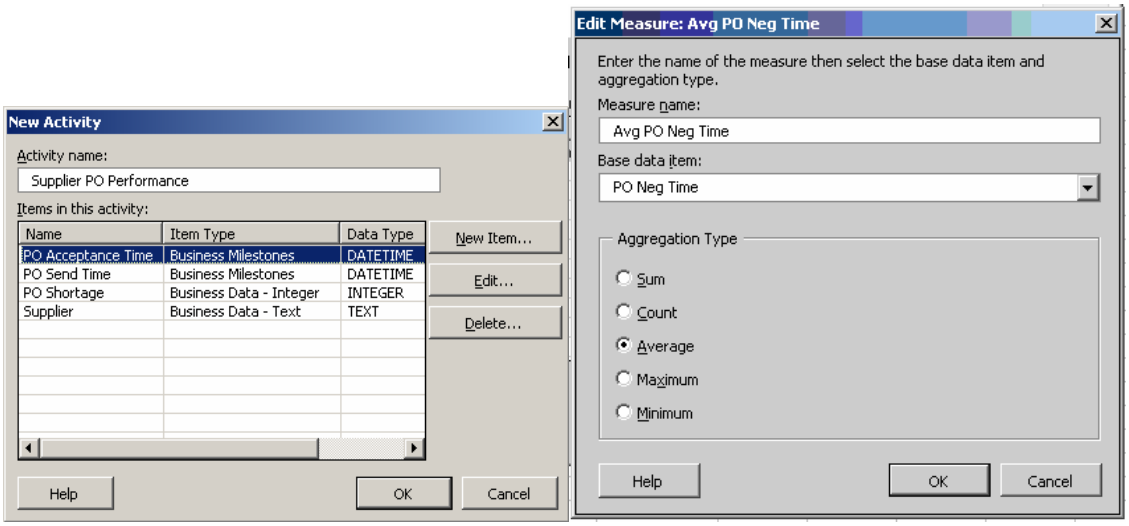

Figure 5 BizTalk measurements – data types and an aggregation function can be specified for each measurement

Once all measurements for metrics and their dimensions have been defined they are mapped to the process data items by defining a tracking profile. Business activity items of the date-time data type can be mapped to the process activities. In effect their values will correspond to the process activity completion times. Other items can be mapped to the message data items that are available within the context of the data-flow of the process. This is shown in Figure 6 where a tracking profile for purchase order collaboration orchestration is defined. The editor is used to map business activity items onto the orchestration activities or data items of messages associated with the orchestration.

The process engine generates, on the basis of the tracking profile, appropriate instrumentation for the associated process schema. The instrumentation framework consists of interceptors for the process data flow and a set of database tables where the results will be stored. At run time, the instrumentation framework collects the data from running process instances and stores them in the database.

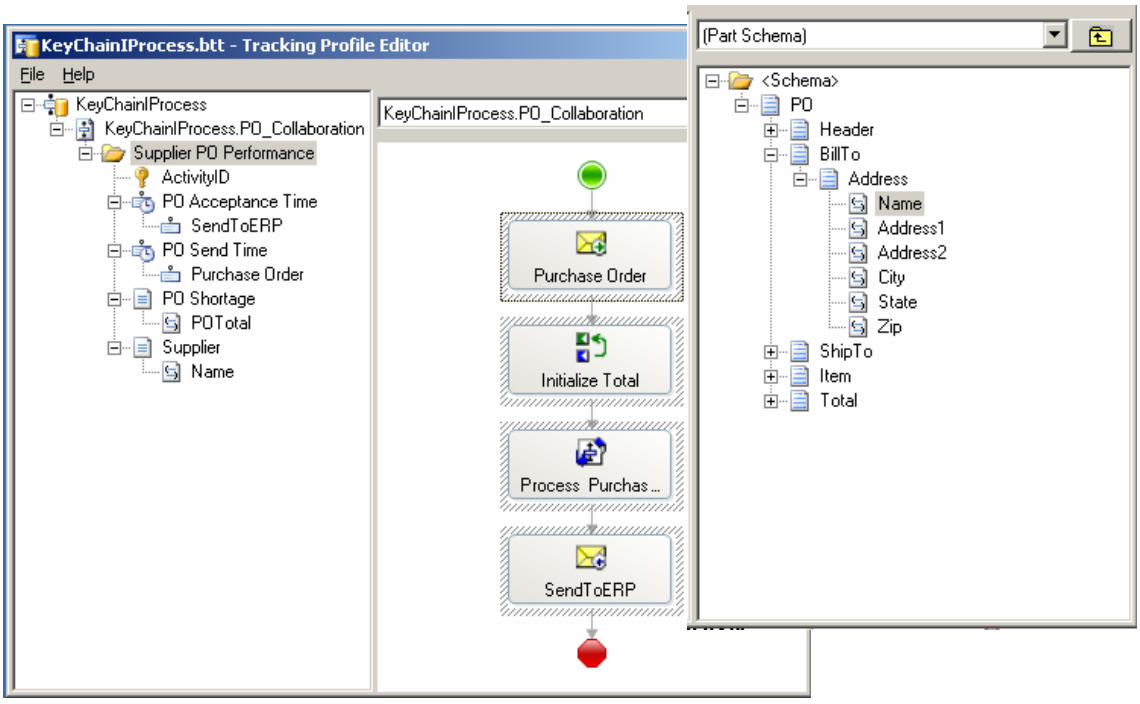

Figure 6 Tracking profile mapping business activity to process data items

8 Data Analysis and Presentation

The metric instrumentation framework can be generated automatically from the business activity specification. The instrumentation framework consists of a set of database schemas that will hold the measurement values collected from the process instances as well as a set of analysis cubes in the Microsoft Analysis server as shown in Figure 7.

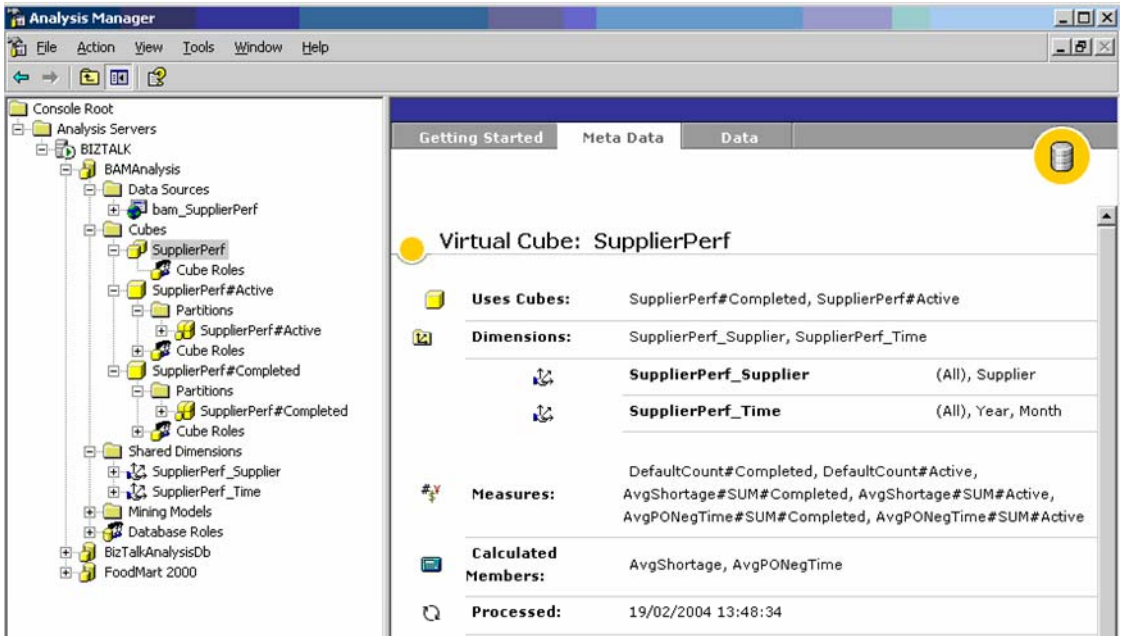

Figure 7 Specification of the analysis cubes

Microsoft Excel can be used to view the data from he analysis server using the pivot table connecting to the selected analysis cube. Because Microsoft Analysis Server does not support real-time cube processing data in the analysis cubes and the Excel spreadsheet may be out of date. A DTS (Data Transformation Service) package exists in the SQL Server that performs cube processing. It can be invoked from the Excel spreadsheet on demand or a scheduled task can be defined that will invoke it periodically. The near real-time availability of data for analysis should be sufficient because typically reporting involves metrics that include only daily, weekly or monthly aggregates.

9 Summary and Conclusions

We have discussed different types of consulting engagements ranging from pure business process consulting, IT implementation and the mixture of both. For the latter we have presented a process model and indicated tools that can support a given step of the process. We used a worked example to illustrate the use of the benchmarking to elicit business goals that the IT solution should help to accomplish. We then showed how the use of standard operations reference models can help to identify related metrics and how a Business Activity Monitoring solution can be used to provide data necessary for the calculation of the metrics and their visualization.

The approach that we presented is greatly facilitated by the domain specific operations reference model (such as SCOR) because it includes candidate metrics that may be used directly with a Balanced Scorecard or BAM solution. In the case where such model is not available the operations reference model schema (i.e. process elements linked to metrics, best practices for processes, etc) can be reused and populated with the help of a domain expert.

10 References

[PRTM 20004] http://www.prtm.com/benchmarking/

[ProcPerf 1999] Kueng P., Krahn AJW, 1999, “Building a Process Performance Measurement System: some early experiences”, Journal of Scientific and Industrial Research vol. 58, no 3/4, pp. 149-159.

[CostBen 1997] Kurnia S., Swatman P., 1997, “EDI Cost Benefit Analysis: Developing a metric for Australian Industry”, http://citeseer.com

[MetricMod 1999] Augustine T., Schroeder C., 1999, “An Effective Metrics Process Model”

[BamS 2004] DeFee, J., M., Harmon P., 2004, “Business Activity Monitoring and Simulation”, Business Process Trends, http://www.bptrends.com.

[Idc 2004] Rainge E., 2004, “Maximizing the Value of the IT Investments Through Business-Aware Performance Management”, IDC white paper, http://www.idc.com.

[Browser 2003] Morciniec M., Yearworth M., 2003, “Using the SCOR Model to Assess the Potential Impact on Business Metrics of an IT Solution”, HPL-2003-187.