Enterprise Gateway Business Pipeline for Production Planning and Reporting – and Integration to SAP

Business Process Integration Scenarios between SAP-PP and the Plant using EG	Availability in EG
Organize Plant Data Items into user defined "Business Contexts" inside EG for building business rules	✓
Organize SAP-PP Data items into user defined "Business Contexts" for building business rules	✓
Perform Reference Mapping between Plant and Enterprise Data Items	✓
Download Production Orders from SAP to the Plant in any open standards format (S95, etc.)	✓
Store the Production Order data in a user defined EG object for reconciliation	✓
Monitor the plant for real time execution of downloaded production orders	✓
Aggregate real time production/consumption data based on production orders, lots, product ids, etc. Monitor consumption levels and trigger if levels are too high or low using "reflex action" utility.	✓
Reconcile plant production data and order data from SAP PP module and/or other pieces of related data from other sources – for instance, a material lot id or supplier code that is only available in a MM module can be linked to real time consumption data of that material for creating a unified report of material consumption to PP module in real time	✓
Generate meta data from raw data via multiple aggregation mechanisms – create product based or production order based performance metrics and track them in real time – to provide visibility of activity based performance in a customer portal.	✓
Send the meta data extractions as a OPC item to remote OPC clients/webservices clients for triggering business process in remote applications	✓
Create production report schedules using a Graphical Scheduler – assemble report items by simple drag and drop – could be raw data , meta data such as performance tracking reports, etc.	✓
Create User defined rules for sending specific information at scheduled times or at the occurrence of plant events or user defined events inside EG	✓
Create a process to send the data in a defined format as per the requirements of the destination application	✓
Create a process to receive data in a defined format as per the requirements of the source application	✓

1. Connectivity Definitions

Collaboration between the plant and ERP means different things to different people. At the lowest level , collaboration can just be data connectivity – meaning, data exposure between ERP and the plant floor.

At a higher level of collaboration, beyond first level data exposure, there is integration of business process functions.

For the production planning function, a native utility of SAP, SAP-PP-PCS allows for plant floor connectivity – but caters mainly to the first type of connectivity. It does not provide collaboration between the plant floor and enterprise business processes. A product such as Enterprise Gateway fills this gap and adds value to an existing SAP-PP implementation.

2. SAP-PP to Plant Connectivity Objectives

Normally, this connectivity is established for exchanging plan and order execution data between the enterprise and the plant floor - related specifically to the following:

- Production Order Download;
- Production Order Status feedback;
- Production Events Monitoring;
- Up to date OEE /Resource Utilization/Quality data;
- Lot based reconciliation;
- Material Consumption data;
- Labor/Material Tracking, Traceability, etc.

3. What does Enterprise Gateway Offer?

All of the above and beyond just mere data connectivity, Enterprise Gateway provides a "business pipeline" beween the plant and the enterprise. First, Enterprise Gateway can convert raw data from the production floor into meta data that is useful at a business level. Second, it can trigger rules based on achieving

certain threshold levels or trends in the meta data. Thirdly, the triggered rules can generate actions in a third party application such as SAP-PP automatically. The purpose here does not end in achieving visibility of the plant to the enterprise – that is, in fact, just the beginning – the real value add is in automatic and seamless business process integration in the production planning and reporting domain between the plant and the enterprise which will eliminate unnecessary costs of paperwork, non value added labor activity, such as, duplication, rework, etc., improve efficiencies, utilization, etc.

Here are some examples of the "collaboration" that occurs between the enterprise and the plant floor systems using Enterprise Gateway's " Business Pipeline" for Production Planning and Reporting :

- **Recipe and Process Management:** SAP-PP provides a comprehensive set of tools for performing the business functions of recipe management, resource and process management. However, a feedback from the plant is required on the process status, utilization, consumption, etc., periodically, or upon reaching certain phases of production, or when certain "process events" are triggered – (this objective as can be seen, is identical to what the native SAP-PP-PCS also achieves through its PCS interface - but the methodology in which this objective is achieved in Enterprise Gateway is by means of a user defined set of process triggers, process events, process conditions, process alarms, process actions, rules, events, messages, etc., which is extremely flexible, modifiable, expandable and configurable using a GUI).

- **Production Order/Reporting, Performance Analysis**: Order dispatch information presented to the plant from the enterprise (arising out of an enterprise process) typically needs to collaborate in real time with a plant process – namely, scheduling - due to alterations that may be needed due to real time events occurring in the plant floor such as break downs, rework, etc. Upon the order being started in the plant, the status of the order needs to be reported to the enterprise system on a periodical basis – could be based on pre-defined time sequence or at the end of the order or any other event the user may want to choose. This is possible by just a couple of drags and drops in a graphical user interface of Enterprise Gateway.

- **Reconciliation of Plan with Production:** Real time execution of production orders need to be reconciled with the plan and variances between the plan and the order is usually needed across lots, product ids, orders, etc., to analyze performance based on activity, production area or region within the plant. EG provides a natural interface and a real time reconciliation of plans with orders and can deliver the output of such reconciliation to SAP-PP. Reconciliation often also involves some pieces of data that is neither available in the plant nor the destination system, but available in a third party system or another module of SAP. For instance, the material lot supplier id may not be available to the plant nor to the SAP-PP module but may be resident in the SAP-MM module. EG can integrate information of consumption reports with material lot supplier id as part of the reconciliation process and deliver a report to the PP module based on a time or event based schedule.

- **Labor/Product Tracking and Traceability:** EG can be configured to track labor which relates to labor management functions of the enterprise or tracking materials by supplier, by lot, by material id, etc., especially when rejects occur, which needs to be integrated to enterprise functions that organize material purchased by suppliers, reconcile between contract obligations and actual rejects in the supply, etc.

- **Asset Utilization, Health and Maintenance:** Such functions on the plant floor include optimization of asset utilization, real time monitoring of degrading machine health trends, initiating maintenance functions based on number of cycles, etc., which needs to be integrated to the enterprise maintenance management business processes such as devising maintenance plans, maintenance strategies, bill of materials, maintenance resource allocation, etc.

- **Alarm Management:** Plant floor exception control systems may identify exception situations that need to be escalated to corresponding enterprise business processes when such exceptions occur. EG rules can signify those exception conditions.

In summary, Enterprise Gateway provides the following to SAP-PP:

- Provides data/asset mapping between the plant floor and enterprise reference systems

based on a graphical, easily usable, point-and-click task;

- Converts complex metadata structures from the plant floor side or the enterprise side into simple hierarchical tree views;

- Triggers business work flows inside SAP automatically with user-specified events, alarms, conditions, rules, etc.;
- Communicates bi-directionally – production orders can be downloaded to the plant via EG and/or status reports can be fetched by Enterprise Gateway (from the plant floor) and delivered to SAP;
- Can compare data (information) between plant and the enterprise – in other words, reconciliation of data can be done before relevant data is passed to the enterprise
- Makes "on the fly" adaptations of data to differences such as units of measurement between the plant floor and enterprise systems;
- Logs messages for troubleshooting and archiving;
- Makes real time performance data available based on either time based or event based triggers;
- Built-in EAI infrastructure for transport of documents and protocol management;
- Guarantees information delivery to the plant floor and/or the enterprise systems using reliability queues;
- Based on standard XML technology for transfer of documents – can adapt to any XML format dictated by SAP BC – has a built-in XSLT engine.

4. How does Enterprise Gateway connect to SAP?

Enterprise Gateway offers multiple options to interface with SAP:

(a) SAP-Business Connector

EG communicates with SAP's middleware component, SAP-BC for exchanging files between the various modules within SAP.

EG adapts to the XML formats that are native to SAP-BC system which are mapped in turn to the various RFCs that are responsible for carrying out the work flows inside SAP.

(b) SAP .NET Connector

This is an integration component at the application level provided by SAP. EG's infrastructure components can be used to work with SAP .NET Connector.

(c)SAP Exchange Infrastructure.

A certification process has been initiated to get EG a "Powered by NetWeaver Certification". This will ensure that EG communicates with any module within SAP that has webservices capability to interface with an external application.

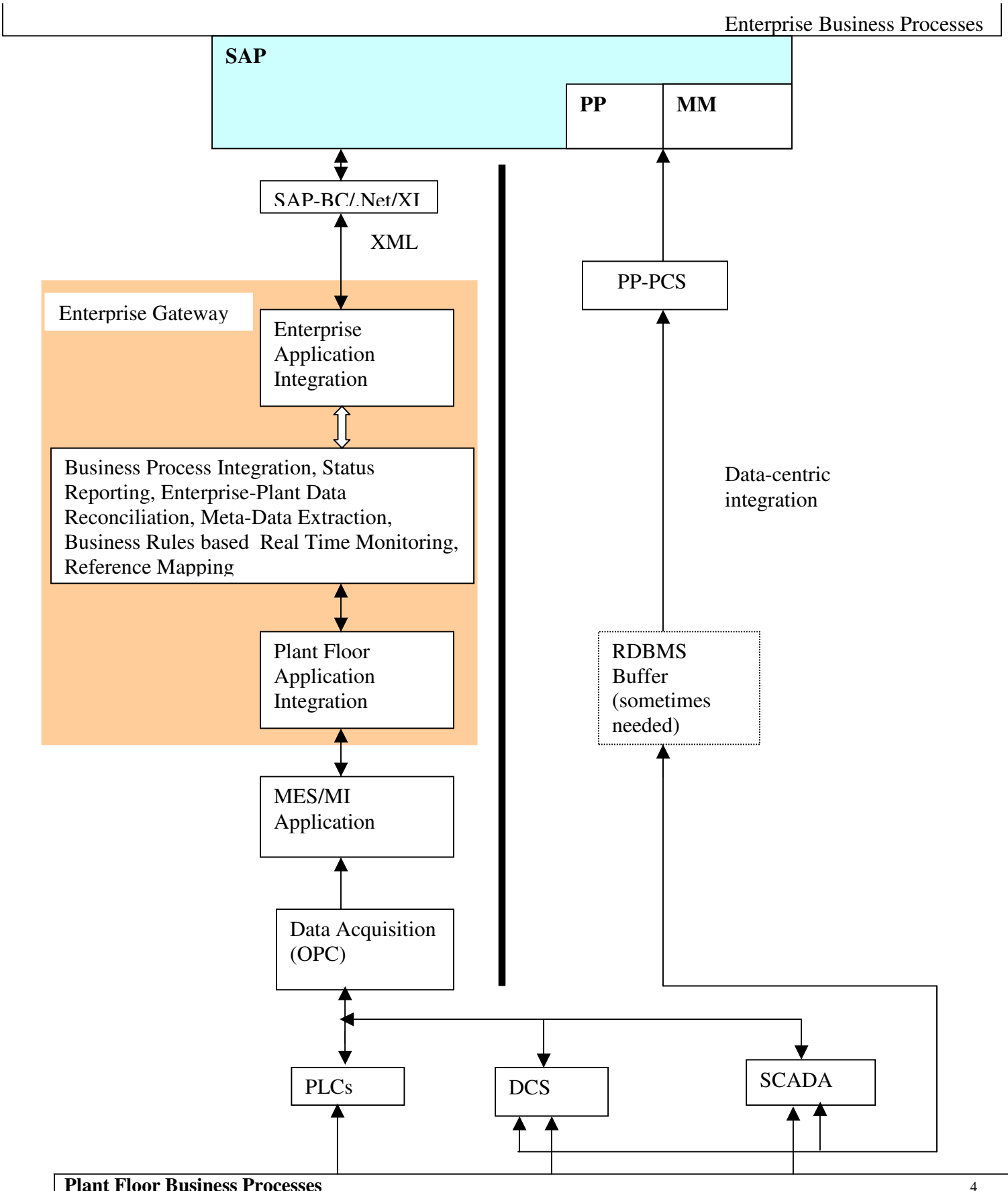
5. Contact Information

For further information on enterprise gateway integration to SAP-PP please contact the following address:

Automatika- Enterprise Gateway
45 St. Clair Avenue West,
Suite #1102
Toronto, ON, M4V 1K9
Canada.

Tel: (416) 920-2010, ext 222
Or
(416) 968-2364

Attn.: Mr. Craig Lauder


Enterprise Business Processes
SAP
PP
MM
SAP-BC/.Net/XI
XML
PP-PCS
Enterprise Gateway
Enterprise Application Integration
Business Process Integration, Status Reporting, Enterprise-Plant Data Reconciliation, Meta-Data Extraction, Business Rules based Real Time Monitoring, Reference Mapping
Data-centric integration
Plant Floor Application Integration
RDBMS Buffer (sometimes needed)
MES/MI Application
Data Acquisition (OPC)
PLCs
DCS
SCADA
Plant Floor Business Processes