

# How to...Implement BI for PM, targeting 10 Multi-industry KPI's (session code 0112)

Johannes Lombard LSI Consulting  
Srikanth Palagummi LSI Consulting

**GLENN WINTER**  
ASUG INSTALLATION MEMBER  
MEMBER SINCE: 1998

**FALL FOCUS**  
BUSINESS MANAGEMENT

October 20-22 2008 • Dallas, Texas

**DIANE MOREHOUSE**  
INDUSTRY SIG PROGRAM CHAIR  
MEMBER SINCE: 2001

**LORI NORMAN**  
ASUG INSTALLATION MEMBER  
MEMBER SINCE: 2004

**ASUG**

## [ Introduction:



- Who is LSI Consulting?
  - Since inception in 1998, has been synonymous with cost-effective SAP for Public Sector implementations.
  - Collaborated with SAP on the design and development of its Public Sector and Higher Education & Research solutions.
  - Created the GovOne™ solution for State and Local government organizations, utilizing SAP's Public Sector business application software.
  - GovOne™ is our flexible, templated accelerator that provides pre-configured system options & controls.
  - In addition to Finance, Procurement and HCM solutions, also provides multiple pre-defined BI datamodels for Public sector, including GASB & CAFR reporting.

## [ Agenda:

- Learning points that attendees will be able to take away.
- Key Performance indicators:
  - What are KPI's?
  - List of suggested PM KPI's
  - Definitions
  - KPI's – the value...comments from SME's
- BI-related configuration in ECC.
- BI PM Datamodel, transformations and flow.
- Handling Order masterdata...
- Potential report listing, layout..:
- Business objects Xcelsius dashboard
- User Audience.
- Generic items for consideration.
- Return on Investment.

## [ Learning points:

- Learning points that attendees will be able to take away:
  - How to perform configuration in the Enterprise Central Component (ECC) to support a BI solution.
  - How to design a PM reporting solution in Netweaver BI.
  - The benefits of producing PM reports from Netweaver BI.
  - Proposed high value additions to the BI standard datamodel.
  - BI datamodel design & extractors.
  - Defining some high value Key Performance indicators, and incorporating them into the data warehouse model.

## [ What are Key Performance Indicators?

- A set of quantifiable metrics, which reflects strategic drivers that an organization uses to gauge performance in terms of meeting their strategic and operational goals & objectives.
- Always agreed to beforehand, and reflects the critical success factors of the organization or department.
- Helps an organization define and measure progress towards these goals.
- If a KPI is going to be of any value, there must be a way to accurately define and measure it.
- Is it critical to define the KPI and stick to the same definition from year to year.
- You need to set targets for each KPI, to ensure you reach and work towards the goals.

## [ What are Key Performance Indicators? (continued)

- You establish the strategic and operational goals and then choose the KPI's which best reflect those goals.
- For example, if an organization's goal is to have the fastest growth in its industry, its main performance indicator may be the measure of revenue growth year-on-year.
- Translating the enterprise vision into KPIs requires several steps - creating (a) strategies, (b) objectives and (c) critical success factors.
- The vision for the future is therefore supported by the how (strategy), the what (objectives), the focus areas (critical success factors), the metrics (KPIs) and the action plan (key action initiatives) to realize these objectives.

## [ List of suggested PM KPI's

- Preventive Maintenance schedule compliance
- Time taken to answer maintenance calls
- Backlog labor hours
- Critical Equipment with open orders against them
- Number of breakdowns (Unplanned maintenance)
- Ratio of Preventive Maintenance Hours to Corrective Maintenance Hours
- Ratio of Number of Emergency Orders to Total Number of Orders
- Total work order planned vs. actual costs
- Percent of Work Orders completed on schedule
- Estimated, Plan, Actual cost tracking by project & superintendent

## [ Definitions of some KPI's

### Preventive Maintenance schedule compliance

- Order type = preventative [AUFK-AUART = 'PREV']
- No Actual finish date yet, or Actual Finish date occurred after Basic finish date [AFKO-GLTRI = blank, or AFKO-GLTRI > AFKO-GLTRP]
- If the Actual Finish date occurs on/after the Basic start date, and on/before Basic finish date, then it's on time of course... [AFKO-GLTRI >= AFKO-GSTRP & <= AFKO-GLTRP]

### Time taken to answer maintenance calls

- Compare the Created date/time of an order, to the Actual date/time [May need to limit object status [JCDS-STAT]
  - Created' details per table JCDS, fields UDATE, UTIME.
  - Compare to 'Actual' details per table AFKO, fields GSTRI [Actual start date] & GSUZI [Actual start time].

## [ Definitions of some KPI's (continued)

### Ratio of Number of Emergency Orders to Total Number of Orders

- Total number of orders: Order type = \* [AUFK-AUART = '\*']
- Total number of Emergency orders: Order type = \* [AUFK-AUART = '\*'], and where AFIH – PRIOK = 'E']

### Percent of Work Orders completed on schedule

- Number of Orders completed on schedule = where the Actual Finish date occurs on/after the Basic start date, & on/before Basic finish date [AFKO-GLTRI >= AFKO-GSTRP & <= AFKO-GLTRP]
- Compare to Total Number of work orders as a %

## [ Definitions of some KPI's (continued)

### Number of breakdowns (Unplanned maintenance)

- Order type = preventative [AUFK-AUART = 'PREV']
- Identified as a breakdown [QMIH-MSAUS = checked]

### Ratio of Preventive Maintenance Hours to Corrective Maintenance Hours







- Compare the Number of Preventative maintenance hours [AFRU-ISMNW, where AUFK-AUART = 'PREV'] to
- Number of Corrective maintenance hours [AFRU-ISMNW, where AUFK-AUART = 'REPR']

## [ KPI's – the value...comments from SME's

- “The time to repair equipment on a reactive basis is generally longer than the same inspection/refurbishment on a preventive basis...staff must be reassigned; the best qualified technician may not be available; the parts to be used may not be known or may not be available. “
- “Unplanned downtime may or may not have a collateral cost: an air handler which is out of service may just make employees unproductive; a production line which is stopped will idle many workers. “
- “By tracking man-hours required for these corrective activities, a monthly cost can be quantified and annual cost estimated. This provides the data for cost/benefit analysis to improve PM strategy through the purchase of new vibration data collection equipment, acoustic detection equipment....”
- “Most industries already track the corrective maintenance performed at some regular interval. Comparing that data to the components maintained by preventive maintenance is easily done by hand or with a simple spreadsheet program. “
- “Knowing the health of a PM program provides the feedback loop vital to continuous improvement of the overall equipment reliability process. “

## [ BI-related configuration in ECC

- Install key transaction datasources, to ensure you collect all cost versions:
  - Actual [0CO\_OM\_OPA\_6],
  - Estimated & Planned [0CO\_OM\_OPA\_1] cost:

▼  Plant maintenance			PM_C01
 Orders: Actual Costs Through Delta Extraction			0CO_OM_OPA_6
 Orders: Costs and allocations			0CO_OM_OPA_1

# BI-related configuration in ECC (continued)

- Ensure you collect the Value Categories:

Value cat. descrpt.	Estimated costs	Planned costs	Actual costs	Crcy
Labor	0.00	3.44	3.44	USD
Purchased Material	0.00	0.00	0.00	USD
Services	0.00	0.00	0.00	USD
Stock Material	0.00	0.00	0.00	USD

- Accounting
  - Financial Accounting
  - Corporate Finance Management
  - Bank Applications
  - Treasury
  - Controlling
    - Cost Element Accounting
      - Master Data
        - Cost Element
        - Cost Element Group
          - KAH1 - Create
          - KAH2 - Change
          - KAH3 - Display**
        - Accrual Order
      - Planning
      - Actual Postings
      - Information System
      - Environment

**Display Cost element group: Initial Screen**

Cost element group: BI\_PM\_01

**Data Browser: Table SETLEAF Select Entries 3**

MANDT	SETCLASS	SUBCLASS	SETNAME	LINEID	VALSIGN	VALOPTION	VALFROM	VALTO	SEQNR
300	0102	UK00	PM_LABOR	2		EQ	0000900700	0000900700	2
300	0102	UK00	PM_LABOR	3		EQ	0000900701	0000900701	3
300	0102	UK00	PM_LABOR	4		EQ	0000900703	0000900703	1

## [ BI-related configuration in ECC (continued)

- Value Categories:
  - Cost element hierarchy in BI:

BI_PM_01	Value categories
PM_LABOR	Maintenance Labor
900703	PPD and MCPPD Management Services
900700	PM-MAINTENANCE LABOR
900701	CPMD Labor
PM_PARTS	Stock Materials for Maintenance Cost Ele
540020	Hospital and Medical Supplies - Variable
535011	Dues and Membership - Institutional
540329	Library Supplies
540341	Training Supplies
540344	Livestock
530139	Advertising and Promotion
639328	Job Order Charges
639303	Stores
540310	Building Supplies
540311	Chemicals and Laboratory Supplies
540313	Clothing and Uniform Purchases
540319	Electrical Supplies
540320	Electronic Supplies
540322	Food Products
540323	Food Service Utensils and Supplies
540028	Hospital and Medical Supplies Fixed
540327	Janitorial Supplies
533025	Maintenance and Repair of Building - Car
540331	Materials Handling Supplies
540301	Minor Equipment < \$2,000
540336	Plumbing and Heating Supplies
540339	Refrigeration and Air Conditioning Suppl
533060	Other Repairs and Maintenance
540349	All Other Materials and Supplies
PM_PURCHAS	External Procurement for Maintenance
PM_SERVICE	Maintenance External Services
PM_PROCARD	ProCard Purchases
PM_MTRPOOL	Motor Pool Charges
PM_COMM	Communications Charges

# BI-related configuration in ECC (continued)

BADI technology - implementation class Z\_PM\_ENHANCEMENTS – Method -  
 “COORDER\_ATTR” - calls the function module “Z\_PM\_COORDER\_ATTR ..

```

FUNCTION Z_PM_COORDER_ATTR.
*-----
***Local Interface:
** IMPORTING
** REFERENCE(I_UPDMODE) TYPE SBIWA_S_INTERFACE-UPDMO
** REFERENCE(I_T_SELECT) TYPE SBIWA_T_SELECT
** REFERENCE(I_T_FIELDS) TYPE SBIWA_T_FIELDS
** CHANGING
** REFERENCE(C_T_DATA) TYPE TABLE
** REFERENCE(C_T_MESSAGES) TYPE RSUS_T_MESSAGES
*-----
TABLES: AUSP.

TYPES: BEGIN OF ty_aufnr,
  aufnr LIKE aufk-aufnr,
  objnr LIKE jcds-objnr,
  kokrs LIKE csks-kokrs,
  kostv LIKE csks-kostl,
END OF ty_aufnr.

DATA: ls_aufnr TYPE ty_aufnr,
      lt_aufnr TYPE TABLE OF ty_aufnr,
      lt_afko TYPE TABLE OF afko,
      lt_afih TYPE TABLE OF afih,
      lt_jcdis TYPE TABLE OF jcdis,
      lt_afvv TYPE TABLE OF afvv,
      lt_qmih TYPE TABLE OF qmih,
      lt_afru TYPE TABLE OF afru,
      id_atinn LIKE ausp-atinn,
      id_aufpl TYPE CO_AUFPL,
      vobjnr LIKE jcdis-objnr,
      id_ismnw TYPE ISMNW,
      id_tismnw TYPE ISMNW,
      id_atwrt TYPE ATWRT.

FIELD-SYMBOLS: <aufnr> TYPE biw_coor,
               <biw_coor> TYPE biw_coor,
               <afko> TYPE afko,
               <afih> TYPE AFIH,
               <jcdis> TYPE jcdis,
               <qmih> TYPE qmih,
               <afru> TYPE afru.

* Get all the order numbers from i_t_data
LOOP AT c_t_data ASSIGNING <aufnr>.
  ls_aufnr-aufnr = <aufnr>-aufnr.
  CONCATENATE 'OR' <aufnr>-aufnr INTO ls_aufnr-objnr.
  ls_aufnr-kokrs = <aufnr>-kokrs.
  ls_aufnr-kostv = <aufnr>-kostv.
  APPEND ls_aufnr TO lt_aufnr.
ENDLOOP.
SORT lt_aufnr BY aufnr.
DELETE ADJACENT DUPLICATES FROM lt_aufnr COMPARING aufnr.

* Collect AFKO data
SELECT * FROM AFKO
INTO TABLE lt_afko
FOR ALL ENTRIES IN lt_aufnr
WHERE aufnr = lt_aufnr-aufnr.

* Collect AFIH data
SELECT * FROM AFIH
INTO TABLE lt_afih
FOR ALL ENTRIES IN lt_aufnr
WHERE aufnr = lt_aufnr-aufnr.

* Collect JCDS data
SELECT * FROM JCDS
INTO TABLE lt_jcdis
FOR ALL ENTRIES IN lt_aufnr
WHERE objnr = lt_aufnr-objnr.

* Final loop for data population
LOOP AT c_t_data ASSIGNING <biw_coor>.
  " AFKO data
  READ TABLE lt_afko ASSIGNING <afko>
  WITH KEY aufnr = <biw_coor>-aufnr.
  IF sy-subrc = 0.
    <biw_coor>-zzgltrp = <afko>-gltrp. "Basic finish date
    <biw_coor>-zzgstrp = <afko>-gstrp. "Basic start date
    <biw_coor>-zzgltri = <afko>-gltri. "Actual finish date
    <biw_coor>-zzgetri = <afko>-getri. "Confirmed Order Finish Date
    id_aufpl = <afko>-aufpl.
  ENDIF.

  CONCATENATE 'OR' <biw_coor>-aufnr INTO vobjnr.

  " JCDS data
  READ TABLE lt_jcdis ASSIGNING <jcdis>
  WITH KEY objnr = vobjnr stat = 'E0001'.
  IF sy-subrc = 0.
    <biw_coor>-zzstat = <jcdis>-stat. "Object status
    <biw_coor>-zzusnam = <jcdis>-usnam. "User name of the person respon.
    <biw_coor>-zzudate = <jcdis>-udate. "Creation date of the change docum.
    <biw_coor>-zzutime = <jcdis>-utime. "Time changed
  ENDIF.

```

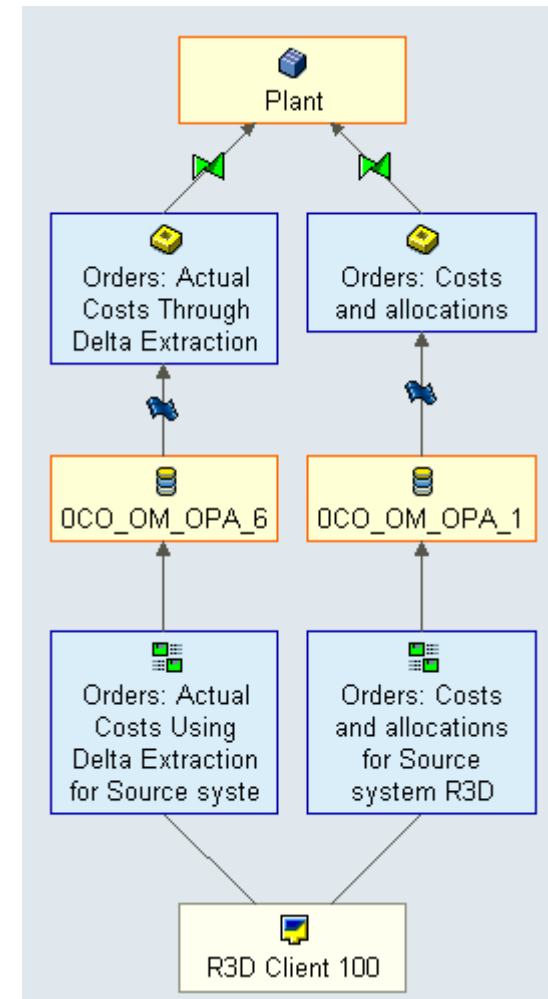
## BI PM Datamodel, transformations and flow

Some key characteristics:

- Plant, Material, Cost / Funds center
- GL account, Functional area, WBS
- Order, Partner cost objects
- Equipment, functional location, building
- Company code, business area
- Employee

Some key values:

- Actual Work, Planned Work
- Estimated, Planned costs of order
- Planned number of days for order
- Time taken to answer call [days]
- Actual cost, Actual cost in, Actual cost out
- Actual Input & Output quantities
- Planned quantity



# Handling Order masterdata...

The screenshot shows the SAP Order Master Data (OMD) interface. The main window displays order details for 'FIRE EXTINGUISHER 18039'. A callout bubble labeled 'BI' points to the 'Business Explorer' and 'Master data/texts' tabs. Another callout bubble labeled 'ECC' points to the 'First operation' section.

**Order Details:**

- Order: PREV 807000235972 FIRE EXTINGUISHER 18039
- Sys.Status: TECO PCNF PRT NMAT PRC SETC DON
- Person responsible: PlannerGrp MMP / UK10 PPDMC-PrevMaint, Mn.wk.ctr 12278 / MPPD WILLIAM MARTIN
- Dates: Bsc start 08/29/2008, Basic fin. 08/31/2008, Priority Scheduled Maint
- Reference object: Func. Loc. LX-0284-06, Equipment M-18039, Assembly
- First operation: Operation FIRE EXTINGUISHER: WkCtr/Pint 10633 / MPPD, Work durtn 5 MIN, Oprtn dur. 3

**Business Explorer - Assigned DataSource Attributes**

Attribute	Long description	Typ	Ti...	Or...	N...	Te...	Navigation att. descrip
BCOORDER	Order number						
Order	Order						
Active	Active						
Active, executable	Active, executable						
ZZGLTRP	Basic finish date	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Basic finish date
ZZGSTRP	Basic start date	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Basic start date
ZZFTRMS	Scheduled release date	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Scheduled release date
ZZGLTRS	Scheduled finish date	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Scheduled finish date
ZZGSTRS	Scheduled start date	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Scheduled start date
ZZGSTR1	Actual start date	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Actual start date
ZZGETRI	Confirmed Order Finish ...	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Confirmed Order Finis
ZZGLTRI	Actual finish date	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Actual finish date
ZZFTRMI	Actual release date	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Actual release date
ZZFTRMP	Planned release date	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Planned release date
ZZAUFPL	Routing # of operations i...	DIS	<input type="checkbox"/>	0		<input type="checkbox"/>	
ZZGLUZP	Basic finish time	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Basic finish time
ZZGSUZP	Basic start time	NAV	<input type="checkbox"/>	0		<input type="checkbox"/>	Basic start time

# Potential report listing, layout..:

- ▼ PM - Plant Maintenance
  - Planned vs Actual Costs, by value category
  - Total Work Order Estimated, Planned vs Actual Costs
  - Plan and Actual tracking by project
  - Inputs and outputs analysis
  - Number Of Breakdowns [Unplanned Maintenance]
  - Time Taken To Answer Maintenance Calls
  - Critical Equipment With Open Orders Against Them
  - Order date analysis
  - Orders by Dept and Resp Cost center
  - PM Backlog Labor Hrs
  - Percent Of Work Orders Completed On Schedule
  - Planned v Actual hours by planner group
  - Preventive Maintenance Schedule Compliance
  - Ratio Of No: Of Emergency Orders To Total No: Of Orders
  - Ratio Of Preventive Maint Hrs To Corrective Maint Hrs

Orders by Dept and Resp Cost center

Data Analysis Graphical display Information

Validity of Data: 02/06/2008 14:29:59

Save View Variable Screen Exceptions and Conditions Notes Export to Excel Export to CSV Print (Portrait) Print (Landscape)

Department	Resp. cost cntr	Order type	Number of Orders
3CC00 CAPITAL PROJECT MANAGEMENT	1043800150 C.P.M.D. - (R)	RENV	12
	1113000000 CPMD Default Cctr	RENV	67
	<b>Result</b>		<b>79</b>
3CM00 MED CTR PHYSICAL PLANT ADMIN	1043800470 MC PPD S.C.A.	CASH	264
		EVNT	5
		PREV	14,487
		RENV	349
		REPR	7,961
	1112000000 MCPD Default Cctr	CASH	311
		EVNT	2
		PREV	39,849
		RENV	1,851
		REPR	18,815
<b>Result</b>		<b>83,894</b>	
3CP00 PHYSICAL PLANT ADMIN & ENG SERVICES	1012700001 TAYLOR EDUCATION	REPR	1
		1043801050 PPD ADMINISTRATIVE S	CASH
	1111000000 PPD CC for Job Order	EVNT	264
		RENV	464
		REPR	9,281
	1111000000 PPD CC for Job Order	CASH	1
		EVNT	1,457
RENV		1,467	
<b>Result</b>		<b>47,320</b>	
3CP02 PHYSICAL PLANT CUSTODIAL SERVICES	1043800600 PPD CUSTODIAL SVCS	RENV	1

Row 1 / 69

# [ BOBJ Xcelsius dashboard:

- This is what the Controller wants...in dashboard format...!

	Associated labor cost per hour	Opportunity cost per hour, if prevented rather than corrected	Collateral hourly cost of unplanned downtime of the plant and equipment and staff	Total hourly cost of downtime & corrections for period
Preventative maintenance	34.75	-	-	-
Corrective maintenance	45.20	10.45	12.45	22.90
<b>Details:</b>				
<b>Preventative maintenance</b>				
Hours worked	200.00			
Labor cost	6,950.00			
Parts	2,250.00			
Opportunity cost	-			
Collateral cost	-			
	9,200.00			
Average cost / hr	46.00			
<b>Corrective maintenance</b>				
Hours worked	125.00			
Labor cost	5,650.00			
Parts	994.00			
Opportunity cost	1,306.25			
Collateral cost	1,556.25			
	9,506.50			
Total cost / hr	76.05			
Hourly saving of Preventative over Corrective:		30.05		

# [ BOBJ Xcelsius dashboard: (continued)

## [ User Audience

- Typical user audience:
  - C- Level Execs
  - Controllers
  - Plant manager
  - Operations manager
  - Maintenance managers
  - Posting clerks

→ All users above have different objectives, which can all be met through a variety of reporting tools, and deployment methods.

## [ Generic items for consideration

- Operational and support requirements:
  - Role of the super-user
  - Role of the ECC PM team
  - Report tool training
  - Overview of available report tools, and deployment methods
  - Central Reporting competency
  - Development process
    - published reports
    - ad hoc reports
  - Feedback from users

## [ Return on Investment:

- BI Reporting maximizes return from the data maintained in the Plant maintenance module.
- Creates a single reporting solution to serve multiple reporting requirements, with great presentation.
- Ease of use.
- Source for dashboards.
- Automates the distribution of daily, weekly & monthly reports.
- Supports the Control process of identifying and correcting posting errors for better data quality.

# Thank you for participating.

Please remember to complete and return your evaluation form following this session.

For ongoing education on this area of focus, visit the Year-Round Community page at [www.asug.com/yrcc](http://www.asug.com/yrcc)

SESSION CODE: 0112