**1. Introduction**

**1.1 Purpose**

This document details the design for a comprehensive Monthly Purchase Order (PO) Report to be realized in SAP ECC or S/4HANA using ABAP. The report delivers a detailed, period-specific, organization-level view into all purchase order activity, enabling operational, compliance, and strategic insights for Procurement, Finance, and Audit functions.

**Main objectives:**

* Consolidate PO information for any month, including PO header, item, vendor, material, goods and invoice receipts, change/audit logs, and custom SAP fields.
* Support legal, compliance, and business reporting requirements.
* Provide output in multiple formats (ALV grid, Excel, PDF), support filtering and selection on all key business axes.
* Automated scheduling and/or on-demand usage.
* Ensure SAP security and SOX-compliance for data access and audit logs.

**1.2 Audience**

* **Functional Consultants:** Understands business logic, requirements mapping.
* **SAP ABAP Developers:** For implementation and code reviews.
* **SAP Basis/Security:** For roles and access analysis.
* **IT and Support Teams:** For deployment, maintenance.
* **Power Users, Analysts, and Auditors:** As end users and testers.

**2. Business Requirements**

**2.1 Problem Overview**

Standard SAP transactions (ME2N, ME2L, ME2K, ME80FN) do not fully support flexible, monthly PO reporting, particularly where client-specific fields or cross-table analytics are required. Frequent business requirements unserved by SAP standard reports include:

* Integrating custom extension and Z-fields,
* Filtering by complex criteria (e.g., project code, plant+vendor+document status),
* Surfacing data lineage and traceability (e.g., who changed price, who created delivery),
* Generating outputs for meetings/audits/presentation directly from SAP,
* Highlighting business exceptions – overdue receipts, post-release changes, open invoices.

**2.2 Functional Requirements**

1.**Selection & Filtering:**

* Select POs by month or explicit date range.
* Optional further filtering: PO number, plant, purchasing organization/group, document type, vendor, status, project code.

2.**Flexibly Structured Output:**

* PO header, item, vendor, material, purchasing group/org, and receipt/invoice information.
* Audit/change log display for key fields (price, quantity, delivery date, vendor).
* Exception highlighting: overdue deliveries, open invoices, unauthorized changes.

3.**Export:**

* Support for ALV output (on-screen), Excel download, PDF print/export.
* Optional emailing of output.

4.**Compliance:**

* Full authorization checks on output, selection, and execution.
* Audit log of report executions including parameters/filters used and users running the report.

5.**Performance:**

* Optimized to perform well for 10,000+ POs per month.
* Smart use of SAP buffering and indexes.
* Background/batch scheduling capability.

**3. Solution Overview**

**3.1 Technical Architecture**

* Developed in **ABAP**, for SAP ECC or S/4HANA system.
* Selection-screen driven. Support for variant saving and batch call.
* Output via SAP GUI ALV Grid, plus Excel (OLE/CL\_GUI\_FRONTEND\_SERVICES/CL\_SALV\_TABLE EXPORT), PDF via SmartForm or PDF APIs.
* Security and authorization using SAP standard object checks.
* Data sourcing from join of PO headers/items (EKKO, EKPO), vendor/material masters (LFA1, MARA, MAKT), purchase history (EKBE), change/audit logs (CDHDR, CDPOS), purchasing org/group (T024, T024E), custom extension tables.

**High-Level Architectural Diagram**

[User/Batch]

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[Selection Screen/Inputs]

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[PO Data Extraction Layer] <-|

| |---> [Join Engine] -- [Custom Fields/Extension Data]

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[Computed/Aggregated Fields] [Change Log Aggregator]

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[Output Engine: ALV/Excel/PDF/Email]

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[Audit Log Writer + Security Check]

**3. Functional Design**

**Business Processes Supported**

**The report directly supports the SAP P2P (Procure-to-Pay) cycle:**

* **PO Creation: Recording and approval of purchase commitments.**
* **PO Changes: Modifications in quantity, price, delivery, vendors, or project codes.**
* **Goods Receipts: Tracking what has been delivered against ordered quantities.**
* **Invoice Receipts: Tracking invoice postings, accruals, open items for month-end closing.**
* **PO Lifecycle Management: Closure, partial delivery, over-delivery, undelivered items.**

**Each of these stages is surfaced in the report, ensuring operational transparency and actionable analytics.**

**Use Case Scenarios**

1. **Procurement Manager: Runs the report to find all POs issued this month, their current status, and any exceptions (e.g., overdue deliveries, open invoices).**
2. **Finance Analyst: Extracts all open POs at month end for GR/IR matching, highlights those with incomplete goods receipts, validates against budget.**
3. **Internal Auditor: Audits changes to POs post-approval (price increases, date shifts) using integrated change logs.**
4. **Project Controller: Tracks POs linked to a project code, compares ordered, delivered, and invoiced values to budget, validates compliance.**
5. **IT Support: Verifies logging, access control, and performance of the reporting application.**

**User Roles & Authorization**

* **Report access controlled by standard SAP authorization objects (M\_BEST\_BEK, M\_BEST\_WRK).**
* **Output automatically filtered by user’s plants and purchasing organizations.**
* **Sensitive/custom fields (pricing, internal codes) restricted based on role.**
* **Each report run logs user ID, selections, timestamp.**

**Selection Screen Design**

**Fields and logic (selection variants to be supported):**

* **Month or Date Range: User selects reporting month, or enters explicit start/end dates (YYYYMMDD).**
  + **Default to previous full month.**
* **Plant: F4 help; multi-select, restricted per user authorizations.**
* **Purchasing Organization/Group: F4 help; multi-select; mandatory for output.**
* **PO Number: Optional, for single PO analysis.**
* **Vendor: F4 drop-down; multi-select. Option to search by vendor name/number.**
* **Document Type: Drop-down (NB, FO, call-off, Z-types), supports blank (all).**
* **Status: Open, Closed, Released, GR not complete, IR missing, custom business states.**
* **Output Format: ALV grid (default), Excel (.xlsx), PDF (generated via SmartForm or PDF generator), Email option (provide recipient, subject, body).**

**Logical rules:**

* **If PO Number is specified, all other selection fields (except output format) become optional and are ignored.**
* **Date range/Month selection is inclusive.**
* **Unfilled optional fields imply “select all.”**

**Output Structure**

**ALV Grid (in transaction or WebDynpro/Fiori app), with columns:**

* **Document-level**
  + **PO Number, PO Creation Date, Purchasing Document Type, Status**
  + **Vendor Number, Vendor Name, Payment Terms**
  + **Purchasing Org, Purchasing Group, Plant**
  + **Buyer (User), Project/Cost Center, Internal Order (custom)**
  + **Net Order Value, Currency**
  + **Delivery/Completion Indicator, Final Invoice Indicator**
  + **Last Changed Date/By (change history)**
* **Item-level**
  + **PO Item, Material Number, Material Description, Material Group**
  + **Ordered Qty/Unit, Price per Unit, Net Price/Amount, Currency**
  + **Tax Code, Delivery Date/Deadline, Storage Location**
  + **Open Quantity, Goods Receipt Qty, Invoice Quantity**
  + **Overdue (computed), Exception Flags**
  + **Custom fields (Z-fields, e.g., Budget Code, Project Reference)**

**Output features:**

* **Sorting, subtotaling (by vendor, group, material).**
* **Row/column color coding for exceptions: red for overdue delivery, yellow for open invoice, green for completed.**
* **Filters on output (post-processing).**
* **Export to Excel/XLSX (column mapping, formatting), PDF generation for archiving/reporting.**
* **Optionally, embed hyperlinks to ME23N for direct PO display.**

**Report Navigation**

* **User can double-click PO to jump (ME23N), vendor to XK03, or materials to MM03.**
* **Exception flags are clickable to show justification or change history popup.**
* **Output supports multi-level subtotal, expand/collapse by organization, vendor, material group.**

**4. Functional Logic & Business Calculations**

**Core Functional Rules**

* **Date Filtering POs are included if their creation date or latest change date falls within the selected range.**
* **Open/Closed Determination Based on status flags (LOEKZ for deletion, ELIKZ for delivery completion, REKAZ for invoice completion); custom logic to flag “Partially Completed.”**
* **Pending Delivery Computed as Ordered Qty minus Delivered Qty (from EKBE, goods receipt records), per PO item.**
* **Pending Invoice Computed as Ordered Qty minus Invoiced Qty (from EKBE, invoice history), per PO item.**
* **Vendor/Material mapping Names/descriptions pulled using foreign keys with proper language/organizational filters.**
* **Change History Tracking Changes to price, quantity, delivery date, vendor, or key custom fields flagged, with old/new values shown (from CDHDR/CDPOS).**

**5. Technical Design**

**5.1 Primary SAP Database Tables**

| **SAP Table** | **Role/Description** | **Key Fields** | **Major Use** |
| --- | --- | --- | --- |
| EKKO | Purchasing Document Header | EBELN | Root PO metadata |
| EKPO | Purchasing Document Item | EBELN, EBELP | PO line items |
| EKBE | PO History: Goods Receipts, Invoice Receipts | EBELN, EBELP | GR/IR and doc mapping |
| LFA1 | Vendor Master (general section) | LIFNR | Vendor info (name, etc.) |
| MARA | Material Master (basic data) | MATNR | Material info |
| MAKT | Material Descriptions (multi-language) | MATNR, SPRAS | Material desc |
| T024 | Purchasing Group | EKGRP | Purchasing group info |
| T024E | Purchasing Organization | EKORG | Org info |
| CDHDR | Change Doc Header | OBJECTCLAS, OBJ\_KEY | PO change logs |
| CDPOS | Change Doc Items | OBJECTCLAS, OBJ\_KEY, CHANGENR | BO changes |
| ZPOEXT | Custom extension table (if needed) | EBELN, EBELP | Custom business fields |
| Z\_LOG\_MPR | Execution/audit log for the report | LOG\_ID, USER | Track use/tests |

**Additional Tables:**

* T001W (Plant master), T161 (PO document types), T006 (Units of measure), any custom (Z/Y) tables per client.

**5.2 Table Join Logic**

Below is how key tables are logically and technically joined for comprehensive report extraction. This is laid out first in plain logic, then as pseudo SQL/ABAP code.

**Entity Relationship Logic**

* Each PO (EKKO) can have multiple items (EKPO).
* Each PO item may have multiple history entries (EKBE: GR, IR, others).
* EKKO and EKPO join via EBELN.
* EKKO's vendor (LIFNR) and EKPO's material (MATNR) join to LFA1 and MARA respectively.
* Material texts (MAKT) come via MATNR, SPRAS = user language.
* CDHDR and CDPOS used for change tracking, joined on OBJECTCLAS (='EINKBELEG') and OBJECTID (EBELN).
* ZPOEXT extension, if present, linked via EBELN, EBELP.