Trd — Automated Excel Kpi Dashboard Generation System (final V1

# **Technical Requirements Document (TRD)**

## **Automated Excel KPI Dashboard Generation System**

**Document Version:** 1.0 (Final)  
**Date:** August 2025  
**Classification:** Technical Specification

## **1. EXECUTIVE SUMMARY**

### **1.1 Purpose**

Define the end‑to‑end technical requirements for a reusable system that ingests **multiple program documents** (PDF, DOCX, XLSX, CSV, etc.), extracts requirements/KPIs, and generates a **funder‑ready Excel dashboard** with automation, conditional formatting, and cross‑referenced data.

### **1.2 Scope**

The system shall process heterogeneous inputs, normalize content to a **Unified Data Model (UDM)**, and output a **single Excel workbook** that includes Executive roll‑ups, KPI dashboards (monthly + cumulative), Project Management, Calendar, Risk, Budget, and Impact/Logic Framework mapping—**with zero manual fixes** post‑generation.

## **2. SYSTEM REQUIREMENTS**

### **2.1 Input Specifications**

#### **2.1.1 Accepted Formats**

* Microsoft Word (.docx, .doc)
* PDF (.pdf) — native and scanned (OCR required for scanned)
* Excel (.xlsx, .xls, .xlsm), CSV (.csv)
* Plain text (.txt), Markdown (.md)
* XML/JSON data files
* Images (PNG/JPG) for timelines/schedules (OCR optional)

#### **2.1.2 Document Content Types (examples)**

* Program objectives/goals; logic models & frameworks
* Task lists/activities; timelines & milestones
* Roles, staffing plans, rates/hours; rosters
* Budget & financial metrics
* KPIs/targets/thresholds; evidence definitions
* Risk/issues & mitigations; approvals/compliance
* Site/school partnership notes; liaisons
* Training agendas & modules
* Prior dashboards; status reports; meeting notes

### **2.2 Data Processing Requirements**

#### **2.2.1 Natural Language Processing**

* **Entity Recognition:** names, roles, dates, sites/locations, metrics, currency, hours
* **Relationship Mapping:** tasks ↔ owners ↔ sites; activities ↔ KPIs; risks ↔ mitigations
* **Metric Extraction:** targets, quotas, thresholds, units; budget lines (hours × rate)
* **Status Detection:** completion states, progress indicators, approvals

#### **2.2.2 Standardization & Normalization**

Transformations:

- Dates → MM/DD/YYYY in Excel (retain ISO 8601 internally)

- Status → {Completed, In Progress, Not Started, Blocked}

- Percentages → decimal (0–1) storages; formatted as % in Excel

- Currency → numeric values; Excel currency format applied

- Names/Roles → canonicalized and deduplicated

## **3. DASHBOARD OUTPUT SPECIFICATIONS**

### **3.1 Workbook (Required Sheets)**

1. **Executive Command Center** – roll‑up of KPI highlights, risks, budget, and status matrix
2. **KPI Dashboard** – monthly and cumulative KPIs with thresholds (PASS/WARN/FAIL)
3. **Project Management** – task master (includes *School Partnership* column)
4. **Impact KPIs** – outcome/target table and evidence fields
5. **Logic Framework KPIs** – logic model alignment (inputs→activities→outputs)
6. **Roster** – people/roles/sites/rates/hours
7. **School Partnerships** – liaisons, approval artifacts, touchpoints
8. **Training Tracker** – onboarding + module completion
9. **Content Log** – content deliverables with moderation/metrics
10. **Event Log** – events/pop‑ups/kickoffs with attendance
11. **Risk & Mitigation** – risk register with severity and SLA
12. **Budget Tracker** – planned vs actual hours/$ by role/site
13. **Calendar View** – deadlines & milestones; color‑coded by site
14. **Program Performance** – variance/quality/efficiency metrics
15. **Barriers & Needs** – obstacles; actions; owners; status
16. **Top Successes** – notable wins and artifacts
17. **Reference Lists** – hidden named ranges (Sites, Roles, Status, Risk)

**Sheet Order** above is mandatory to ensure formula dependencies resolve without forward references.

### **3.2 Core Column Schemas (high level)**

* **Project Management:** Goal | Specific Action | KPI/Outcome | KPI Measurement | Owner | School Partnership | Deadline | Progress% | Status | Barriers/Notes
* **Content Log:** Date | Site | Owner | Type (Reel/Live/etc.) | Title | Link | Approved (Y/N) | Reach | Saves | Notes
* **Event Log:** Date | Site | Event Type | Audience | Attendance | Approval (Y/N) | Evidence Link | Notes
* **Training Tracker:** Person | Role | Site | Onboarding D1 | D2 | Module\_\* | Completion%
* **School Partnerships:** Site | Liaison | Email | Approval Artifact | First Staff Touch | Kickoff Date | Touchpoints/mo | Notes
* **Budget Tracker:** Role/Site | Planned Hours | Actual Hours | Rate | Planned $ | Actual $ | Variance $ | Variance %

### **3.3 Formula Requirements**

**Counting/Math:** COUNTA, COUNTIF(S), SUM, SUMIF(S), AVERAGE(IF/S)  
**Logical:** IF, AND, OR, nested IF (≤ 4 levels typical)  
**Error Handling:** IFERROR wrapping all divides/lookups  
**Date Logic:** EOMONTH, EDATE, comparisons with TODAY()  
**Cross‑Sheet:** Full‑column references for scalability (e.g., Sheet!A:A)  
**Status Logic:** Overdue if AND(TODAY()>Deadline,Progress%<1)  
**Thresholds:** KPI result → PASS/WARN/FAIL (plain text; **no emoji in formulas**)

**Examples:**

Monthly\_Reels := COUNTIFS('Content Log'!A:A, ">="&MonthStart, 'Content Log'!A:A, "<"&EDATE(MonthStart,1), 'Content Log'!D:D, "Reel")

Cumulative\_Reels := SUM( Jan:CurrentMonth!Monthly\_Reels )

Quota\_Status := IFERROR(IF(CurrentValue >= Target, "PASS", IF(CurrentValue >= Target\*0.8, "WARN", "FAIL")), "FAIL")

Overdue := AND(TODAY()>Deadline, Status<>"Completed")

### **3.4 Conditional Formatting**

**Status Column:**

| **Value** | **Fill** | **RGB** | **Font** |
| --- | --- | --- | --- |
| PASS/Completed | Green | #C6EFCE | #006100 |
| WARN/In Progress | Yellow | #FFEB9C | #9C5700 |
| FAIL/Not Started | Red | #FFC7CE | #9C0006 |

**Progress%:** 0% → Red; 1–99% → Yellow; 100% → Green  
**Alerts:** Overdue tasks; Missing owner; KPI < 80% of target; High open risks

### **3.5 Data Validation**

* **Dropdowns:** Status {Completed, In Progress, Not Started, Blocked}; Priority {High, Medium, Low}; Owner {from Roster}; Site {from Sites list}; Risk {Low/Med/High}
* **Dates:** Enforce MM/DD/YYYY; show input/help messages; error prompt on invalid

### **3.6 Formatting & UX**

* Centralized named styles (Header/Subheader/Body/Number/Percent/Currency)
* Consistent palette (Header Blue #004C97; Subheader #0070C0; Light #DDEBF7)
* Tables with alphanumeric headers only; avoid special characters
* **Merged‑cell policy:** Write values **before** merging; write only to top‑left cell; restrict merges to header bands

### **3.7 Compatibility**

* **Minimum:** Excel 2019; **Recommended:** Microsoft 365
* **File Format:** .xlsx by default (no macros required). Optional .xlsm add‑ins allowed but not required.

## **4. TECHNICAL SPECIFICATIONS**

### **4.1 Performance**

* Capacity: ≥ 1,000 rows per sheet (tested to 10,000+); columns up to Excel limits
* Processing: **Document analysis ≤ 30s** per document (avg); **Workbook build ≤ 60s**
* File size target: ≤ 50 MB

### **4.2 Automation & Linkages**

**Automated Metrics (examples):** task completion %, overdue count, resource utilization, budget burn, risk score, performance trend, milestone attainment, participant retention

**Cross‑Sheet Dependencies:**

Task\_Log → Executive/KPI: totals, status mix, completion rates

Participant\_Data → KPI: enrollment, retention, demographics

Risk\_Log → Executive: open risks, resolution rate, high‑severity count

Content/Event Logs → KPI: monthly & cumulative production, engagement, attendance

### **4.3 Visual Standards**

* Palette per §3.6; text colors: Primary #000000, Secondary #666666, Headers #FFFFFF
* Fonts: Calibri/Segoe UI; Headers 14pt bold; Subheaders 11pt bold; Body 10pt

## **5. UNIFIED DATA MODEL (UDM)**

**Program** {name, year, sites[], budget\_total, currency}  
**Site** {name, color, district, liaison, approval\_artifact}  
**Role** {title, hourly\_rate, stipend\_rules, capacity\_hours}  
**Person** {name, role\_ref, site\_ref}  
**Activity** {goal\_ref, type, description, site\_ref, owner\_ref}  
**KPI** {name, unit, target\_monthly, target\_total, direction, thresholds{pass,warn,fail}}  
**Deliverable** {type, date, site\_ref, owner\_ref, metrics{reach,attend,link,approved}}  
**Task** {goal, action, kpi\_ref, owner\_ref, site\_ref, deadline, progress, status, barriers, school\_partnership}  
**Risk** {category, severity, mitigation, owner\_ref, status, evidence}  
**BudgetLine** {role\_or\_item, planned\_hours, actual\_hours, rate, planned\_cost, actual\_cost}

**Rules:** every Activity maps to ≥1 KPI; every Task maps to KPI or Activity; all deadlines appear on Calendar; budget totals reconcile within ±0.5%.

## **6. PROCESSING PIPELINE**

1. **Ingestion:** store originals; checksum; capture metadata
2. **Parsing:** PDF/DOCX/XLSX/CSV extract; OCR for scans
3. **Classification:** tag as Logic Model, Timeline, Budget, Risk, Training, Roles, Partnerships, Prior Dashboard
4. **Extraction:** entities, tables, dates, metrics, targets, approvals
5. **Normalization:** map to UDM and KPI taxonomy; set thresholds
6. **Rules Engine:** generate PM tasks, calendar items, quotas from language
7. **Validation:** completeness, types, referential integrity
8. **Workbook Build:** create sheets in §3.1 order; write data; formulas; CF; validations
9. **Outputs:** XLSX + JSON (parsed model, mappings, run log)

## **7. QUALITY ASSURANCE**

* **Formula validation:** no errors; IFERROR around divides/lookups; avoid circular refs
* **Repair‑free open:** workbook opens without Excel “Repaired Records”
* **Data integrity:** no duplicate primary keys; referential checks; date consistency; % in 0–100%; no orphaned references
* **Load testing:** 10k+ rows sheets compute without timeouts
* **UAT:** end‑user validation of KPIs and visual design

## **8. DOCUMENTATION & USER SUPPORT**

* **Formula Documentation** sheet: inventory, purpose, ranges, refresh cadence, error handling
* **User Guide:** overview; data entry; formulas; troubleshooting; update procedures; best practices
* **Change Log:** semantic versioning; notable changes; compatibility notes

## **9. COMPLIANCE, SECURITY & ACCESSIBILITY**

* **Excel Compatibility:** Excel 2019+ / 365; standard functions only by default
* **Accessibility:** high contrast; clear labeling; logical tab order; screen‑reader friendly headers
* **Security/Privacy:** encrypt storage; redact PII on exports unless required; logs store hashes/metadata only; role‑based access

## **10. DELIVERABLES**

**Primary:** .xlsx dashboard with 17 sheets per §3.1, fully wired  
**Supporting:** Technical TRD (this document); User Manual; Formula Reference; Sample Data; JSON audit (UDM + mappings); Change Log

## **11. IMPLEMENTATION METHODOLOGY**

flowchart TB

A[Input Documents] --> B[Parser]

B --> C[Data Extraction]

C --> D[Normalization/UDM]

D --> E[Rules Engine]

E --> F[Workbook Builder]

F --> G[Formulas/Formatting]

G --> H[Validation]

H --> I[Output XLSX + JSON]

**Success Criteria:** 100% formula accuracy; zero manual fixes; full validation coverage; all cross‑sheet references functional; documentation complete.

## **12. TECHNICAL ARCHITECTURE (Reference)**

class DashboardGenerator:

def \_\_init\_\_(self, config):

self.parser = DocumentParser(config)

self.extractor = DataExtractor(config)

self.normalizer = Normalizer(config)

self.builder = ExcelBuilder(config)

self.formulas = FormulaEngine(config)

self.formatter = FormatManager(config)

self.validator = Validator(config)

def run(self, documents:list[str]):

raw = self.parser.parse\_all(documents)

structured = self.extractor.extract\_metrics(raw)

udm = self.normalizer.to\_udm(structured)

wb = self.builder.create\_workbook(udm)

self.formulas.apply(wb, udm)

self.formatter.apply(wb)

self.validator.check(wb, udm)

return wb

**Data Flow:** Inputs → Parse → Extract → Normalize (UDM) → Build → Formulas/CF → Validate → Output

## **13. GOVERNANCE & CHANGE CONTROL**

* Version with semantic tags (vMAJOR.MINOR.PATCH)
* Store configs/templates in version control; attach JSON audit to releases
* Maintain a KPI dictionary with definitions and calculation notes

## **14. ACCEPTANCE TESTS (AT)**

* **AT‑1 Inputs:** 8–15 files; system classifies/extracts ≥90% entities; JSON audit exists
* **AT‑2 Workbook:** opens w/out repair; sheet order matches §3.1; named ranges exist
* **AT‑3 KPI Correctness:** add 3 content rows + 1 event → KPI monthly/cumulative/Exec update
* **AT‑4 Calendar:** all PM deadlines appear; site colors applied; 100% coverage
* **AT‑5 Budget:** modify Actual Hours → Actual $ and variances recompute; totals correct
* **AT‑6 Risk:** set 1 High Open → Exec risk widget reflects accurately

## **15. APPENDICES**

### **Appendix A — Formula Library (Emoji‑Free)**

Task Count := COUNTA('Project Management'!A:A)-1

Completed Tasks := COUNTIF('Project Management'!I:I,"Completed")

Overdue Tasks := COUNTIFS('Project Management'!G:G,"<"&TODAY(),'Project Management'!I:I,"<>Completed")

KPI % Achieved := IFERROR(CurrentValue/Target,0)

Quota Status := IFERROR(IF(CurrentValue>=Target,"PASS",IF(CurrentValue>=Target\*0.8,"WARN","FAIL")),"FAIL")

Monthly Count (bounded) := COUNTIFS('Content Log'!A:A,">="&MonthStart,'Content Log'!A:A,"<"&EDATE(MonthStart,1))

Dynamic Lookup := INDEX(Range, MATCH(Lookup, LookupRange, 0))

### **Appendix B — Sample Input/Output Mapping**

| Input Type | Data Extracted | Dashboard Location | Example Formula |
| --- | --- | --- | --- |
| Project Plan (DOCX) | Tasks, milestones, owners | Project Management | COUNTIF(Status,"Completed") |
| Status Report (PDF) | Progress, metrics | Executive/KPI | % Achieved = IFERROR(Value/Target,0) |
| Participant List (XLSX) | Names, enrollment | KPI Dashboard | COUNTIFS(EnrollDate,">="&MS,EnrollDate,"<"&EDATE(MS,1)) |
| Budget Report (CSV) | Hours, rates, spend | Budget Tracker | Actual$=ActualHours\*Rate |
| Risk Guide (PDF) | Risks, severity | Risk Register | CF for High/Open |

### **Appendix C — KPI Taxonomy (Extensible)**

* Content Production; Youth Engagement & Events; Training & Readiness; School Partnerships; Risk & Compliance; Budget & Capacity

### **Appendix D — Field Dictionary (Selected)**

* **School Partnership (PM):** String (site name or “All Sites”); mandatory when site‑specific
* **Approval Artifact:** Evidence of school/district permission (e.g., liaison email, letter)
* **Evidence Link:** URL to artifact (drive/sharepoint); plain text if unavailable

## **APPROVAL**

**Prepared by:** Technical Requirements Team  
**Date:** August 2025  
**Version:** 1.0 (Final)  
**Status:** Approved for Implementation

**Sign‑off:**

* Technical Lead: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Project Manager: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Quality Assurance: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Client Representative: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*This TRD is the definitive specification. Any deviations require formal change control.*