# 📊 Phase 3.6 – Analytics & Insights (Summary)

## 📜 Background

* Phase 3 introduced a fresh AdminLTE-based RAG application.
* Previous sub-phases delivered:
  + **3.1 – 3.2:** Modular RAG pipeline, embeddings, retrieval.
  + **3.3:** Admin UI for comparisons & history.
  + **3.4:** Prompt engineering modes (zero-shot, few-shot, role, RAG, hybrid).
  + **3.5:** History filters, exports, Docs Module, Bootstrap 5 migration.

## 🎯 Objectives of Phase 3.6

* Provide **Analytics Dashboard** for data-driven insights.
* Visualize:
  + SLA compliance
  + Latency performance
  + PromptStyle usage
  + Trends over time
* Enable **filters** (date, SLA status, PromptStyle).
* Add **drill-down navigation** from charts to detailed RAG history.

## 🔹 Key Deliverables

### 1. **Analytics Backend**

* Extended **IRagService** with analytics methods:
  + GetAverageLatenciesAsync
  + GetSlaComplianceAsync
  + GetPromptStyleUsageAsync
  + GetTrendsAsync
* Added filter support:
  + startDate, endDate
  + slaStatus (ok/slow)
  + promptStyle
* LINQ queries with grouping & aggregation over RagComparisonHistories.

### 2. **AnalyticsController**

* New endpoints under /Analytics:
  + /Analytics/GetAverageLatencies
  + /Analytics/GetSlaCompliance
  + /Analytics/GetPromptStyleUsage
  + /Analytics/GetTrends
* JSON responses consumed by frontend (Chart.js).

### 3. **Analytics Dashboard UI**

* Index.cshtml with Bootstrap grid layout.
* Four charts via **Chart.js**:
  + Pie: SLA Compliance ✅⚠️
  + Bar: Average Latencies
  + Pie: PromptStyle Distribution
  + Line: SLA & Latency Trends

### 4. **Filters**

* Added toolbar with:
  + Date Range (start/end)
  + SLA Status
  + PromptStyle selector
* Apply button reloads all charts with filtered results.

### 5. **Drill-Down Navigation**

* Chart click events redirect to **RAG History** with query params.
* History page auto-applies filters from URL.
  + SLA chart ➝ filter by SLA.
  + PromptStyle chart ➝ filter by style.
  + Trend chart ➝ filter by date.

## 📅 Timeline Recap

* **Week 1:** Analytics methods added in RagService.
* **Week 2:** AnalyticsController with endpoints.
* **Week 3:** Dashboard UI with charts.
* **Week 4:** Filters + Drill-down integration.

## ✅ Outcome

* Admins can now:
  + Monitor SLA performance.
  + Compare average retrieval vs LLM vs total latency.
  + Track PromptStyle adoption.
  + Spot trends over time.
  + Drill into history for detailed answers.
* The system is **data-driven** and ready for **Phase 3.7+ enhancements** (provider-based analytics, KPI widgets, advanced exports).

## 🔮 Next Steps (Phase 3.7+ Candidates)

* **Provider/Model Analytics** (OpenAI, Gemini, Claude).
* **Export Analytics** datasets (CSV/Excel).
* **Drill-down Enhancements** (filter chaining, multi-select).
* **KPI Widgets** (small-box highlights for SLA %, avg latency, total runs).