**Business Use Cases**

**1. Real-Time Aircraft Telemetry Monitoring**

* **Challenge**: Aircraft generate large volumes of telemetry (engine sensors, flight parameters) but data is siloed.
* **Solution**: Use **Auto Loader/NiFi + Databricks streaming** to ingest telemetry into Delta Bronze in near real-time.
* **Business Value**: Enables proactive monitoring of aircraft health and flight performance. Supports **predictive maintenance** and real-time alerts.

**2. Crew Assignment & Efficiency Tracking**

* **Challenge**: Crew scheduling and assignments are fragmented; inefficient tracking leads to compliance and fatigue risks.
* **Solution**: Model crew assignments in the **Business Vault** (hub for crew, satellites for shifts/logs).
* **Business Value**: Optimize crew utilization, ensure regulatory compliance with rest periods, and improve crew efficiency metrics.

**3. Predictive Maintenance & Delay Forecasting**

* **Challenge**: Maintenance logs and telemetry data are not integrated, making proactive maintenance difficult.
* **Solution**: Use **Silver/Gold layers + ML models** to correlate telemetry with historical failures and weather conditions.
* **Business Value**: Reduce unplanned downtime, improve fleet availability, and lower operational costs.

**4. Passenger Privacy & Compliance (GDPR, EASA, FAA)**

* **Challenge**: Sensitive data like passenger PII (email, passport) needs masking and auditability.
* **Solution**: Use **Purview catalog** to tag, mask, and trace lineage of passenger data.
* **Business Value**: Regulatory compliance, reduced risk of fines, and increased passenger trust.

**5. Route & Punctuality Performance Analytics**

* **Challenge**: Flight delay reasons (weather, maintenance, crew issues) are not systematically analyzed.
* **Solution**: Build **Gold layer star schema** for route punctuality, delay clustering, and efficiency KPIs.
* **Business Value**: Data-driven decisions for improving on-time performance, optimizing routes, and reducing operational costs.

**6. Automated Deployments & Governance**

* **Challenge**: Manual deployments cause delays and inconsistencies across dev/stage/prod.
* **Solution**: Implement **CI/CD pipelines (GitHub Actions + bundle.yml)** with rollback and validation.
* **Business Value**: Faster innovation cycles, reduced human error, better platform reliability.

**7. Data Quality & Trust**

* **Challenge**: Booking and passenger data often have inconsistencies or missing fields.
* **Solution**: Use **Great Expectations** for data validation checks with alerts.
* **Business Value**: Reliable reporting, reduced decision errors, stronger trust in analytics.

**8. Executive Dashboards for Operations**

* **Challenge**: Airline executives lack unified KPIs for fuel efficiency, route delays, and crew performance.
* **Solution**: Build **Power BI dashboards** on curated Gold data.
* **Business Value**: Improves decision-making, provides visibility into operations, supports cost reduction strategies.