Project Implementation Evaluation Metrics

1. Infrastructure as Code (IaC) Evaluation Metrics

Used to assess misconfiguration detection efficiency.

Metric	Description
Detection Accuracy	Ratio of correctly identified misconfigurations to total misconfigurations.
False Positive Rate (FPR)	Incorrectly flagged configurations / total flagged.
False Negative Rate (FNR)	Undetected misconfigurations / total actual misconfigurations.
Scan Time (Performance)	Time taken to scan `.tf` files.
Coverage	Number of IaC rule types (S3, IAM, SG, etc.) detected by the scanner.

2. Policy Decision Point (PDP) Evaluation Metrics

Evaluates decision quality and policy enforcement accuracy.

Metric	Description
Decision Accuracy	Correct PDP decisions (ALLOW/DENY) / Total requests.
Policy Match Rate	% of requests matching a defined policy rule.
Latency per Request	Average time to return a PDP decision.
Error Rate	% of invalid or incomplete evaluations.
Policy Coverage	Number of actions/resources covered by defined policies.

3. Policy Enforcement Point (PEP) Evaluation Metrics

Measures enforcement reliability and integration with PDP.

Metric	Description
Enforcement Accuracy	Times PEP correctly enforces PDP's output / Total enforcement actions.
Request Handling Latency	Time taken to forward request and receive decision.
Policy Violation Rate	Instances where access was granted/denied incorrectly.
Integration Reliability	Successful PEP ↔ PDP communication attempts / Total requests.

4. Auto Remediation Module Metrics

Evaluates the automation and effectiveness of remediation actions.

Metric	Description
Remediation Success Rate	Number of successful fixes / Total remediation attempts.
Average Remediation Time	Time from detection → successful mitigation.
Manual Intervention Rate	% of remediations that still required human review.
Cross-Cloud Coverage	% of supported clouds (AWS, Azure, GCP).
Action Audit Completeness	% of logged remediations with full context (timestamp, reason, user).

5. Monitoring & Logging Metrics

These metrics measure observability, data completeness, and consistency.

Metric	Description
Log Completeness	% of events successfully logged vs generated.
Log Latency	Time delay between event occurrence and log entry creation.
Metric Consistency	Alignment between log data and metric counters.
Thread Safety Reliability	% of successful concurrent log writes without data corruption.
Event Type Distribution	% breakdown of event types (ACCESS_REQUEST, REMEDIATION, REVIEW, etc.).

6. Overall Framework Metrics

System-wide evaluation for Zero Trust Multi-Cloud (ZTMC) performance.

Metric	Description
End-to-End Request Time	Total time from request → enforcement → remediation.
System Throughput	Number of requests processed per second.
Availability/Uptime	% of time all modules are operational.
Scalability Score	Ability to handle concurrent requests with minimal performance drop.
Security Effectiveness	% of malicious or risky actions correctly denied.