# Spike Findings: Policy Automation & Rules Engine Architecture Analysis

| **Spike Metadata** | **Details** |
| --- | --- |
| **Jira Ticket** | [Link to Jira Spike] |
| **Feature Name** | Policy Loader, Extractor & Analyser Flow |
| **Date** | 21-Nov-2025 |
| **Author** | [Your Name] |
| **Status** | ✅ Analysis Complete / Ready for Closure |

## 1. Objective

The goal of this spike was to analyze the end-to-end technical flow of the new Policy Automation system, identify architectural risks, and establish the **Technical Readiness Assessment (TRA)** strategy required for the upcoming release.

## 2. Architecture Overview

*Based on the analysis of the proposed flow, the system operates as a hybrid Cloud/On-Premise solution.*

### Core Components Identified:

1. **Policy Loader (Data Ingestion):**
   * Scrapes Portal URLs (Direct & Recursive) defined in YAML.
   * Stores PDF links in PostgreSQL and uploads files to S3.
   * *Status:* Recursive scraping currently untested.
2. **Policy Extractor (AWS ECS Service):**
   * **Trigger:** 24/7 API endpoint triggered by an **On-Prem CRON**.
   * **Logic:** Fetches PDFs, parses text, and uses **GPT-4.1 Mini** for JSON extraction and billing scoring.
3. **Policy Analyser (AWS ECS Service):**
   * Compares Ontology JSONs to detect "New" vs "Update" rules.
   * **Trigger:** On-Prem CRON triggering AWS API.
4. **Rules Loader (Legacy Integration):**
   * **Legacy Dependencies:** Perl Scripts, "Birds" (1 Bird = 1 Rule), and Atlas DB.
   * *Process:* Consolidated JSONs are pushed to S3 via Rules File Service.
5. **Rule Processor:**
   * Consumes S3 JSONs to create embeddings/ontologies.

## 3. Technical Risk Assessment (TRA) Findings

*Per the TRA Governance guidelines, we have evaluated the inherent risks of this architecture.*

### **🟡 Technical Risk Score: MEDIUM**

**Justification:**

* **Managed Hybrid Pattern:** While the architecture involves On-Prem to Cloud handoffs, it utilizes standard API endpoints and CRON jobs, which are established patterns.
* **LLM as Assistant:** GPT-4.1 Mini is used for *scoring and suggestions* (New vs Update rules). It does not autonomously execute billing decisions without downstream verification.
* **Risk Containment:** The high-risk "Recursive Scraping" feature will be **feature-flagged OFF** or strictly limited to depth=1 for the initial GA release, mitigating the risk of uncontrolled loops.

### 🟡 Mitigation Risk Score: MEDIUM

**Justification:**

* Current testing strategies need to be expanded to include "Golden Datasets" for LLM verification.
* Monitoring needs to bridge the gap between On-Prem logs and AWS CloudWatch.

## 4. Identified Gaps & Recommendations

*The following issues must be addressed in the Implementation Stories.*

| **Area** | **Identified Gap** | **Recommendation / Ticket Requirement** |
| --- | --- | --- |
| **Resilience** | On-Prem CRON might fail to reach AWS ECS. | Implement **Retry Logic** with exponential backoff in the CRON script. |
| **AI Quality** | LLM output might vary (hallucinations). | Create a **"Golden Dataset"** of PDFs to benchmark GPT-4.1 performance in the CI/CD pipeline. |
| **Scalability** | Recursive scraping is unchecked. | **Requirement:** Disable Recursive Scraping for GA (or limit depth=1) until fully tested. |
| **Data Integrity** | "Bird" logic in Perl script (1 task = 1 bird?) is unverified. | **Action Item:** Confirm logic with Rules Team before coding. |

## 5. Next Steps (TRA Process)

*To proceed to Alpha/Beta, the following governance steps are required:*

1. **Create TRA Document:** The TRA has been drafted (see attached Excel).
2. **Core Technical Review:** As a **MEDIUM** risk project, a review with the core technical team (Lead/Architect) is required (VAT Lightning review is optional but recommended).
3. **Jira Signoffs:**
   * [ ] Create the TRA page in Confluence.
   * [ ] Ensure Product Owner & Engineering Lead sign off in the Jira Feature "Signoffs" section.

## 6. Conclusion

This spike is closed. The architecture is feasible with a **Medium Risk** profile, provided that "Recursive Scraping" is limited for the initial release.

**Attachments:**

* [Link to Policy\_Project\_TRA.xlsx]
* [Link to Architecture Diagram]