# Government Conversation Intelligence Blueprint (Final v1.0)

Audience: policy stakeholders, delivery leads, data/ML engineers  
Goal: surface ideas, topics, sentiment and interlinks from meetings across government; draft evidence‑backed policies; monitor issues by policy area.

## 1) Scope & Principles

- Policy Areas as first‑class: all analysis and access control are scoped by PolicyArea.  
- Explainability & traceability: every claim traceable to an utterance → meeting → source transcript.  
- Two‑tier utterances: preserve all content for FOI/audit; fully analyse only policy‑relevant parts.  
- Safety & markings: area‑scoped RBAC plus protective markings.  
- GNN‑augmented: use graph neural networks to exploit structure for classification, linking, and retrieval.

## 2) High‑Level Architecture

Ingestion: Audio → ASR → JSON transcripts.  
Processing:  
 1) Chunking (utterances/time windows)  
 2) Tiering: Utterances start as Tier‑P  
 3) Light screening  
 4) Promotion to Tier‑A if any screen passes  
 5) Full NLP on Tier‑A  
 6) Graph upsert + vectors to pgvector  
 7) Nightly GNN jobs on Tier‑A  
Serving: Neo4j, pgvector, RAG service, Dashboards

## 3) Data Model (Neo4j)

Nodes:  
 Meeting, Utterance (Tier‑A/Tier‑P), Topic, Entity, Issue, Policy, PolicyArea  
Relationships:  
 HAS\_UTTERANCE, ABOUT\_TOPIC, MENTIONS\_ENTITY, RELATED\_TO, INVOLVED\_WITH, CONCERNS\_TOPIC, ADDRESSES, CITES, IN\_POLICY\_AREA  
Constraints and indexes to ensure uniqueness and fast lookup.

## 4) Policy Areas & Categorisation

Top‑level areas: Health & Social Care; Education & Skills; Housing & Communities; Transport & Infrastructure; Environment, Energy & Climate; Justice, Home Affairs & Policing; Economy, Trade & Treasury; Digital, Data & Innovation; optional Foreign, Defence & Security.  
Categorisation thresholds (preliminary): ≥0.65 auto, 0.40–0.65 review, <0.40 low‑conf.  
GNN classification refines and resolves review items.

## 5) Two‑Tier Utterances

Tier‑P: provenance only, minimal metadata.  
Promotion to Tier‑A if:  
 - Area router ≥0.40  
 - Salient entity ≥0.35  
 - Topic sim ≥0.55  
 - Meeting whitelisted  
 - Analyst flag  
Tier‑A: full NLP, used in analytics and RAG.

## 6) Topic Discovery & Linking

Per‑area HDBSCAN clustering + LLM labeling.  
RELATED\_TO edges seeded by cosine/co‑mention; refined with GNN link prediction.  
Materialisation thresholds: gnn\_score ≥0.80 & text\_sim ≥0.55 OR gnn\_score ≥0.88.

## 7) Sentiment, Stance, and Smoothing

Valence (−1..1) and stance per utterance.  
Label propagation/GAT smoothing across Utterance↔Topic↔Entity.  
Aggregates by PolicyArea, dept, time.

## 8) Retrieval‑Augmented Generation (Policy Drafts)

Retriever: vector search (Tier‑A) + 1–2 hop KG context.  
Re‑ranker: 0.7·cos\_text + 0.2·cos\_graph + 0.1·node\_authority.  
Generator: LLM with template; enforces citations for audit.

## 9) APIs & Contracts

Read: topics, context, issues, evidence, provenance.  
Write: ingest meetings, promote utterances, review area labels.  
Default: analytics endpoints filter tier='A'.

## 10) GNN Integration

Nightly: node classification (HGT/R‑GCN), link prediction (GraphSAGE/GAT + DistMult/ComplEx), label propagation.  
Optional: temporal GNN for early‑warning.

## 11) Metrics & Finetuning

Categorisation: Precision/Recall/F1, calibration.  
Topics: coherence, distinctiveness, coverage.  
Sentiment/stance: Macro‑F1, Pearson.  
Retrieval/linking: nDCG@5, P@5.  
Tiering: promotion rate, precision, miss rate.  
Policy drafting: usefulness rating, citation completeness.  
Finetune quarterly with gold sets and PR curves.

## 12) Governance, Security & Privacy

Markings from meeting/area.  
RBAC by dept, areas, marking.  
PII redaction, hashed linkage.  
Provenance storage immutable; full audit logs.  
FOI readiness via Policy→CITES→Utterance→Meeting chain.

## 13) Delivery Plan (90‑day prototype)

Weeks 1–3: ingest, tiering, NLP, Neo4j, clustering, dashboards.  
Weeks 4–6: gold set, thresholds, review workflow, RAG MVP.  
Weeks 7–9: GNN link pred & node class, re‑ranking, metrics board.  
Dependencies: meeting whitelist, area taxonomy, SME labelling.

## 14) Open Decisions & Placeholders

Whitelisted meeting types: TBD.  
Demotion policy: deferred.  
Thresholds: preliminary; to be tuned via finetuning methodology.

## 15) Quick Stakeholder Summary

Analyses meetings by policy area; surfaces emerging topics & sentiment.  
Stores all utterances for audit; analyses only relevant ones deeply.  
Knowledge graph connects topics, entities, issues, policies.  
Graph AI (GNNs) improves accuracy by learning from structure + content.