Membership Impact Chatbot Rulebook (Aligned to BigQuery Tables) — v3

MEMBERSHIP IMPACT CHATBOT RULEBOOK (ALIGNED TO BIGQUERY TABLES) — V3

Goal of this POC: Demonstrate an explainable analytics chatbot using **Vertex AI (Gemini) + ADK multi-agent orchestration + BigQuery tools + RAG**. This rulebook is the **reasoning knowledge base** for RAG. The chatbot should combine: - **Facts** from BigQuery tables (membership impact + provider config changes) - **Signals** computed from those facts - **Rules** (this document) to produce **auditable, non-hallucinated** explanations

> **Important:** Most “why” answers are **correlations** from available signals, not guaranteed root cause. Use cautious language unless there is explicit movement/crosswalk evidence in the data.

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1) TABLES & FIELDS THIS RULEBOOK IS ALIGNED TO

1.1 MEMBERSHIP IMPACT TABLE (FACTS) **Table:** `membership_analytics.membership_impact`

Common fields (names may vary slightly by your load): - `org_cd` (e.g., `H0524_P003`) - `class` (e.g., `MCRMA`, `ALFA`) - Prior & current member counts (e.g., `mbr_cnt_x202511_prd`, `mbr_cnt_x202512_prd`) - Change metrics: - `com_mbr_cnt_x202512_prd_vs_x202511_prd` (net) - `dropped_mbr_cnt_x202512_prd_vs_x202511_prd` - `new_mbr_cnt_x202512_prd_vs_x202511_prd` - `dropped_per` - `new_members_percentage` - Optional movement fields (if present): - `moved_from_org_cd` - `moved_to_org_cd` - Optional retro fields (if present): - `retro_term_mem_count` - `retro_add_mem_count`

1.2 PROVIDER CONFIGURATION CHANGES TABLE (SIGNALS) **Table:** `membership_analytics.provider_config_changes`

Expected fields: - `change_period` (e.g., `2025-12_vs_2025-11`) - `org_cd` - `class` - `org_tag` (often `ORG_CD`) - `org_cd_type` (**new org_cd**, **existed org_cd**, **termed org_cd**) - Key change indicators: - `keys_changed` (or `keys_changed_*`): values like `file_id`, `network_id`, `plan_carrier_id`, etc. - `key_type`: `new key`, `updated key`, `termed key` - `test_type` (or `Test_type`): often repeats the key name - Optional sources: - `src_for_new_value`, `src_for_termed_value`

> **Interpretation rule:** Provider configuration changes are **provider/network-side**. They often explain **attribution/reporting shifts**, not member intent.

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2) SIGNALS THE BOT SHOULD COMPUTE (DETERMINISTIC, AUDITABLE)

Compute these booleans/numbers per `org_cd`:

2.1 MEMBERSHIP SIGNALS - **prior_members** = prior count - **current_members** = current count - **drop_cnt** = dropped count - **new_cnt** = new count - **net_change** = current - prior - **drop_high** = (`dropped_per` ≥ 10) OR (`drop_cnt` ≥ 50_000) - **new_high** = (`new_members_percentage` ≥ 10) OR (`new_cnt` ≥ 50_000) - **net_small** = `abs(net_change) <= 0.05 * prior_members` (5% band; guard prior>0) - **movement_present** = moved_to/moved_from is not null (if those fields exist) - **retro_dominant** = `retro_term_mem_count >= 0.30 * drop_cnt` (guard drop_cnt>0)

2.2 PROVIDER CONFIG SIGNALS From provider changes rows for the org: - **org_cd_type** in {new, existed, termed} - **has_termed_key** = any `key_type == "termed key"` - **has_file_id** = any `keys_changed` contains `file_id` - **has_network_id** = any `keys_changed` contains `network_id` - **has_plan_carrier_id** = any `keys_changed` contains `plan_carrier_id` - **change_count** = number of provider change rows for org in the period

2.3 CROSS-SIGNAL PATTERNS - **attribution_shift_likely** = drop_high AND (has_network_id OR has_file_id OR has_termed_key OR org_cd_type in {new, termed}) - **churn_like** = drop_high AND new_high AND net_small

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3) CORE RULE LIBRARY (RETRIEVAL CHUNKS)

Each rule below should be retrieved as a chunk in RAG. The chatbot should **only** mention a reason if the rule’s trigger is satisfied.

RULE A — TERMED ORG_CD (ORG RETIRED / DECOMMISSIONED) **Trigger** - `org_cd_type == "te

Meaning This org code was retired for the period. Membership “drop” in this org is commonly a **re-attribution** effect (members likely appear under replacement org codes) rather than true loss of covered lives.

What to say - “This org_cd is **termed** in provider configuration. The drop is likely a **reassignment** to other org codes rather than disenrollment.”

Confidence - High (explicit termination signal)

RULE B — NEW ORG_CD (ORG INTRODUCED / ONBOARDING) **Trigger** - `org_cd_type == "new or

Meaning A new org code was introduced. Growth can reflect **new attribution/mapping** rather than organic acquisition.

What to say - “This org_cd is **new** in provider configuration. Increases likely reflect onboarding or reclassification.”

Confidence - Medium–High

RULE C — EXISTED ORG_CD + KEY CHANGES (MAPPING UPDATE / RE-ATTRIBUTION) **Trigger** == "existed org_cd"` AND `change_count > 0`

Meaning Org existed; some configuration changed. If membership changed materially, this can indicate **mapping updates** that shift attribution.

What to say - “Org existed; configuration keys changed. Membership drop may reflect **attribution/reporting shifts**.”

Confidence - Medium (upgrade to Medium–High if `drop_high`)

RULE D — “TERMED KEY” DETECTED (HARDER DISRUPTION) **Trigger** - `has_termed_key == true

Meaning A key was explicitly termed. This often coincides with network/provider removals or mapping removals.

What to say - “A **termed key** was detected. This can lead to member attribution moving away from this org/network.”

Confidence - Medium–High (High if `drop_high`)

RULE E — NETWORK_ID CHANGE (NETWORK RECONFIGURATION) **Trigger** - `has_network_id =

Meaning Network configuration changes can shift member attribution across orgs, especially if reporting is network-based.

What to say - “A **network_id** change suggests network realignment; membership may have been **re-attributed**.”

Confidence - Medium

RULE F — FILE_ID CHANGE (FEED/SOURCE MAPPING CHANGE) **Trigger** - `has_file_id == true`

Meaning File/source mapping changes can create “step changes” in counts due to reclassification.

What to say - “A **file_id** change suggests a feed/mapping update; counts can shift due to **reclassification**.”

Confidence - Medium

RULE G — PLAN_CARRIER_ID CHANGE (PLAN-CARRIER MAPPING CHANGE) **Trigger** - `has_pla
true`

Meaning Plan/carrier mapping updates can move members across reporting buckets.

What to say - “A **plan_carrier_id** change suggests plan/carrier mapping updates; membership may shift across reporting buckets.”

Confidence - Medium

RULE H — RETROACTIVE CORRECTIONS DOMINATE (IF RETRO FIELDS EXIST) **Trigger** - `retro_
true`

Meaning Drop is largely driven by retroactive terminations (late corrections / reconciliation).

What to say - “A large share of the drop appears due to **retroactive termination corrections**.”

Confidence - Medium–High

RULE I — MOVEMENT PRESENT (EXPLICIT REASSIGNMENT) **Trigger** - `movement_present == tru

Meaning Your data explicitly indicates member/org movement between org codes.

What to say - “Movement fields indicate reassignment between orgs; drop likely reflects **transfer** rather than loss.”

Confidence - High

RULE J — GEO-DRIVEN REASSIGNMENT (SCENARIO-BASED, CAUTIOUS) **Trigger** - `attribution_s
== true` AND (has_network_id OR has_file_id) *(If you later add geo fields like state/county/region, upgrade confidence.)*

Meaning Config changes sometimes coincide with changes in **service area boundaries** or **geo attribution**. Without explicit geo fields, treat as plausible, not certain.

What to say - “This pattern is consistent with **geographic attribution/service area updates**. Without explicit geo fields, treat as a likely contributor rather than a proven cause.”

Confidence - Low–Medium

RULE K — CHURN-LIKE PATTERN (DROP + NEW, NET STABLE) **Trigger** - `churn_like == true`

Meaning High drop and high new with small net change suggests reclassification/churn rather than sustained decline.

What to say - “High drop and high new with relatively stable net suggests **re-attribution or churn** rather than pure shrinkage.”

Confidence - Medium

RULE L — OUTCOME ONLY (NO SUPPORTING SIGNALS) **Trigger** - No provider changes found AN
dominance AND no movement fields

Meaning The dataset captures “what changed” but not a direct “why”. Provide numeric summary and list what evidence is missing.

What to say - “Counts changed, but no supporting attribution/config signals were found in the

available tables. Additional operational logs would be needed for root cause."

Confidence - Low

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4) CLASS-LEVEL REPORTING RULES (MCRMA / ALFA)

RULE M — "SHOW ME A REPORT FOR CLASS X" **Trigger** - User asks for a class: `MCRMA`, `ALFA

What to return - Class totals: prior/current/drop/new/net - Top 5 orgs by dropped_per - Top 5 orgs by net increase - Count of `termed org_cd` and `new org_cd` within class (from provider config table)

Confidence - N/A (reporting, not causal)

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5) RESPONSE CONTRACT (WHAT EVERY ANSWER SHOULD CONTAIN)

5.1 STANDARD RESPONSE STRUCTURE 1) **Summary (facts)** - prior, current, drop_cnt + drop%, ne new%, net_change

2) **Likely reasons (ranked, 1–3 bullets)** - Only include triggered rules (A–L)

3) **Evidence used** - List the exact fields used (e.g., dropped_per, keys_changed, org_cd_type, key_type)

4) **Confidence + disclaimer** - High/Medium/Low per rubric below - "Rule-based correlations from available data; not guaranteed root cause."

5) **Analysis details (JSON-like)** - The computed signals (drop_high, has_network_id, etc.)

5.2 CONFIDENCE RUBRIC - **High:** movement_present OR org_cd_type in {termed, new} with consist membership change OR (drop_high AND has_termed_key) - **Medium:** drop_high with network/file/carrier changes OR churn_like OR retro_dominant - **Low:** only membership deltas; no supporting signals

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6) DEMO SCENARIOS (FOR PRESENTING THE POC)

Use these in your presentation to prove you understand the domain + tooling.

SCENARIO 1 — TERMED ORG → "MEMBERS MOVED" (PROVIDER-SIDE) **User asks:** "Why did H **System finds:** `org_cd_type = termed org_cd` **Answer:** Drop likely due to org retirement and reassignment to replacement orgs. (Rule A)

SCENARIO 2 — NEW ORG → "GROWTH DUE TO ONBOARDING" **User asks:** "Why did S4802_P14 **System finds:** `org_cd_type = new org_cd` **Answer:** Increase likely due to new attribution/mapping. (Rule B)

SCENARIO 3 — EXISTED ORG + NETWORK_ID CHANGE → ATTRIBUTION SHIFT **User asks:** "Wh 15%?" **System finds:** `org_cd_type = existed`, `keys_changed contains network_id`, `drop_high=true` **Answer:** Likely network realignment causing re-attribution. (Rules C + E)

SCENARIO 4 — FILE_ID CHANGE → REPORTING SHIFT (STEP-CHANGE) **User asks:** "Why the su month?" **System finds:** `file_id` change, drop_high=true **Answer:** Feed/mapping update can reclassify counts (Rule F)

SCENARIO 5 — CLASS REPORT: MCRMA VS ALFA **User asks:** "Show me report for MCRMA" **Sy action:** Class totals + top drops + new/termed org counts (Rule M)

SCENARIO 6 — GEO REASSIGNMENT (SCENARIO-BASED) **User asks:** "Did members move due t **System finds:** network/file changes + drop_high **Answer:** "Consistent with geo attribution/service area updates; not proven without geo fields." (Rule J + disclaimer)

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7) SAMPLE QUESTIONS (READY FOR UI BUTTONS)

Org-level - “For H0524_P003 why is there membership drop?” - “Explain membership changes for S4802_P141.” - “What changed in provider configuration for H2001_P837?”

Class-level - “Show me a report for MCRMA.” - “Which ALFA orgs had the highest dropped %?” - “How many termed org codes in MCRMA?”

Key-change driven - “List orgs with network_id changes and dropped_per > 10%.” - “Show orgs with file_id changes.”

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8) GUARDRAILS (MUST-FOLLOW, TO AVOID HALLUCINATIONS) - Never mention a reason unless the satisfied by data. - Use cautious language (“likely”, “consistent with”) unless movement/org_cd_type explicitly indicates it. - If fields are missing (movement, retro), do not infer them. - Always include evidence fields + confidence + disclaimer.

APPENDIX A — SUGGESTED BIGQUERY TOOL QUERIES (AGENT TOOLS)

TOOL: GET_MEMBERSHIP(ORG_CD) SQL: SELECT * FROM membership_analytics.membership_impa = @org_cd LIMIT 1;

TOOL: GET_PROVIDER_CHANGES(ORG_CD) SQL: SELECT * FROM membership_analytics.provider_ WHERE org_cd = @org_cd;

TOOL: GET_CLASS_REPORT(CLASS) SQL: SELECT class, COUNT(DISTINCT org_cd) AS org_cou SUM(mbr_cnt_x202511_prd) AS prior_members, SUM(mbr_cnt_x202512_prd) AS current_members, SUM(dropped_mbr_cnt_x202512_prd_vs_x202511_prd) AS dropped_members, SUM(new_mbr_cnt_x202512_prd_vs_x202511_prd) AS new_members, SUM(com_mbr_cnt_x202512_prd_vs_x202511_prd) AS net_change FROM membership_analytics.membership_impact WHERE class = @class GROUP BY class;

TOOL: GET_HIGH_DROP_ORGS(CLASS OPTIONAL) SQL: SELECT org_cd, class, dropped_per, dropped_mbr_cnt_x202512_prd_vs_x202511_prd AS dropped_cnt, new_mbr_cnt_x202512_prd_vs_x202511_prd AS new_cnt, com_mbr_cnt_x202512_prd_vs_x20251 net_change FROM membership_analytics.membership_impact WHERE dropped_per >= 10 ORDER BY DESC LIMIT 20;