

What this report is: This report is the machine-readable Process Context Graph (PCG) for the Customer Service process. It encodes objectives, intents, decision rules, allowable variants, exceptions, policies, skills/tools, escalation rules, and success criteria - all derived from the observed event log (12,000 tickets, 27 activities). The full PCG JSON is at the bottom of this report under 'PCG: Machine-Readable JSON'. Parse the code block to load the graph into an agent runtime.

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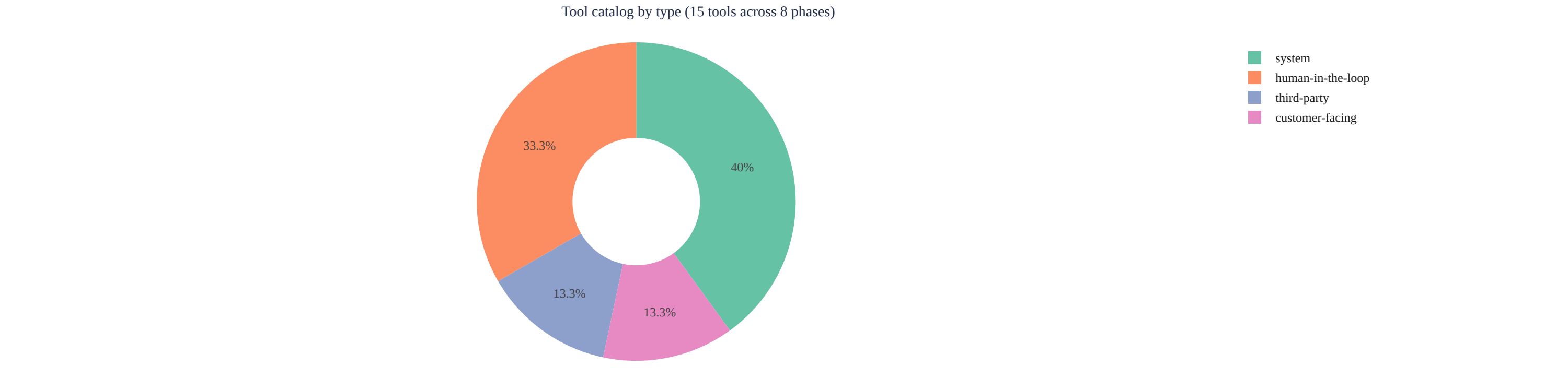
Phase Structure

The process has **8 phases**. Each phase is a node cluster in the graph. The chart below shows how many activities, decision rules, and exception handlers live inside each phase. Escalation and Specialist Handling is the most complex phase (4 activities, 3 decision rules, 2 exceptions) because it routes three distinct paths: reassignment inside tier one, tier-two specialist ownership, and a direct page to engineering for priority-one outages.



Skills and Tools

The PCG maps **15 tools and systems** to the phases that use them. Tools fall into four types: **system** (automated, no human needed), **human-in-the-loop** (requires an agent, specialist or approver), **third-party** (external vendor services), and **customer-facing** (the customer interacts directly). Human-in-the-loop tools are the primary source of SLA risk: the tier-two specialist queue alone accounts for 18.4 hours of median added lag on the 11.6% of tickets that reach it.



Allowable Variants

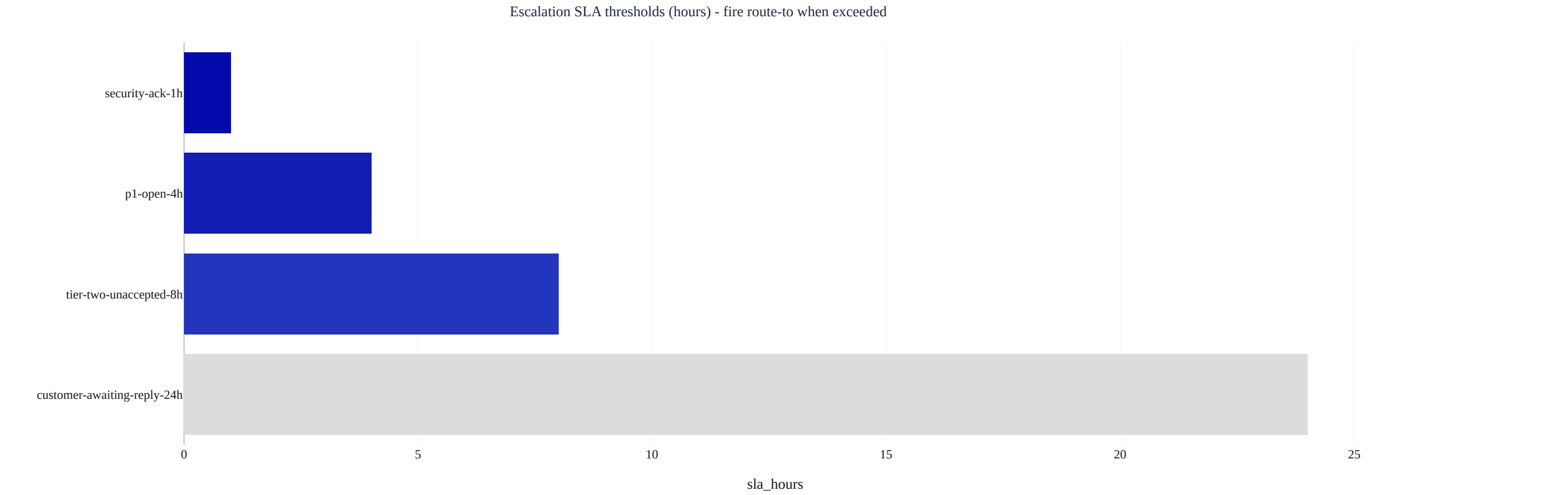
The PCG defines **7 valid sequences** through the process. The first-contact resolution path covers 62.4% of tickets. All other variants are exception-driven: reassignment after triage (14.8%), tier-two escalation (11.6%), waiting on customer information (8.7%), a single reopen (4.9%), engineering escalation (2.9%), and priority-one outages (1.8%). Any sequence not in this list is either a data quality issue or a policy breach that should trigger an alert.

Allowable variants - all valid paths through the customer service process

Variant	Observed rate	Lag added (h)	Sequence change
Resolved on first contact, no escalation	62.4%	4.2	(see PCG JSON for full sequence)
Reassigned once after triage	14.8%	6.8	Insert 'Ticket Reassigned' between 'Assigned to Queue' and 'Agent Assigned'
Escalated to a tier two specialist	11.6%	18.4	Insert 'Escalated to Tier Two' between 'First Response Sent' and 'Root Cause Identified'
Waited on customer information	8.7%	74.4	Insert 'Information Requested from Customer' -> 'Customer Information Received' between 'First Response Sent' and 'Root Cause Identified'
Reopened once, then resolved	4.9%	26.1	Insert 'Ticket Reopened' -> 'Resolution Provided' -> 'Ticket Closed' after the first 'Ticket Closed'
Escalated to engineering	2.9%	41.7	Insert 'Escalated to Engineering' after 'Escalated to Tier Two'
Priority one outage with duty engineer paged	1.8%	2.6	Insert 'Duty Engineer Paged' -> 'Escalated to Engineering' between 'Priority Assigned' and 'First Response Sent'; skip 'Assigned to Queue' wait

Escalation Rules

The PCG defines **5 escalation rules**, ordered by severity. Each rule has a concrete SLA in hours so an agent monitoring live tickets can fire the escalation on a timer. The tightest rule is the security acknowledgement: a security-flagged ticket unacknowledged after one hour is already eating into the 72-hour regulatory notification clock for a personal-data incident.



Escalation rules ordered by severity

Severity	Trigger	Phase	Route to	SLA (h)
CRITICAL	Priority one ticket open beyond 4 hours	escalation	Duty manager	4
CRITICAL	Security-flagged ticket not acknowledged by the security desk within 1 hour	triage	Security desk lead	1
HIGH	Tier-two escalation not accepted within 8 hours	escalation	Specialist team lead	8
HIGH	Customer awaiting an agent reply beyond 24 hours	customer-wait	Team lead	24
MEDIUM	Ticket reopened for the second time	reopen	Senior specialist for review	n/a

Decision Rules

The PCG contains **18 decision rules** across all 8 phases. Every rule is a structured condition/outcome pair backed by observed data. An agent navigating a live ticket should evaluate these rules in phase order to determine the next valid activity to fire.

All 18 decision rules - condition -> outcome pairs

Phase	Rule ID	Condition	Outcome
Ticket Intake	dr:intake-complete	Contact channel and customer identity captured and ticket_id issued	Advance to phase:triage
Ticket Intake	dr:auto-ack	Ticket Created fires on any channel other than inbound phone	Fire Auto-Acknowledgement Sent within 2 minutes

Phase	Rule ID	Condition	Outcome
Triage and Routing	dr:priority-p1	issue_type = 'Outage' OR the customer reports the service is unavailable OR priority = 'P1'	Assign P1; page the duty engineer and send First Response Sent within 60 minutes
Triage and Routing	dr:security-route	security_flag = True	Assigned to Queue MUST route to the security desk queue before any other assignment or agent action
Triage and Routing	dr:route-by-category	category and product are set and map to a single owning queue	Assign to the owning queue; advance to phase:first-contact
First Contact Handling	dr:fcr-attempt	Agent Assigned has fired AND a knowledge article matches with kb_match_score >= 0.8	Apply the article and provide the resolution on this contact; advance directly to phase:resolution
First Contact Handling	dr:info-needed	The agent cannot resolve without a detail only the customer can supply	Fire Information Requested from Customer; move to phase:customer-wait
First Contact Handling	dr:escalate-tier-two	The issue requires specialist skill or product depth beyond tier one	Fire Escalated to Tier Two; move to phase:escalation
Information Request and Customer Wait	dr:customer-responds	Customer Information Received fires	Resume handling; return to phase:first-contact or advance to phase:resolution
Information Request and Customer Wait	dr:no-response-close	The customer has not replied 7 days after Information Requested from Customer	Send a final reminder, then close the ticket as unresolved by customer
Escalation and Specialist Handling	dr:tier-two-accept	Escalated to Tier Two has fired	A specialist must accept ownership within 8 hours; otherwise escalate to the specialist team lead
Escalation and Specialist Handling	dr:engineering-route	Tier two confirms a product defect or platform fault rather than a usage issue	Fire Escalated to Engineering; the ticket stays open against the engineering fix
Escalation and Specialist Handling	dr:p1-page	priority = 'P1'	Fire Duty Engineer Paged immediately; do not wait for tier-two triage
Resolution and Remediation	dr:refund-direct	refund_amount <= 250 EUR	The agent may fire Refund Issued directly, without supervisor approval
Resolution and Remediation	dr:refund-approval	refund_amount > 250 EUR	Supervisor Approval Granted must fire on the same ticket before Refund Issued
Resolution and Remediation	dr:resolution-provided	Root Cause Identified has fired and the remedy has been applied	Fire Resolution Provided; advance to phase:closure
Confirmation and Closure	dr:close-on-confirm	Customer Confirmed Resolution fires, OR 7 days elapse after Resolution Provided with no customer reply	Fire Ticket Closed with the matching closure reason
Feedback and Reopen Management	dr:reopen-route	Ticket Reopened fires within 14 days of Ticket Closed	Return the ticket to the original assignee; a second reopen routes to a senior specialist for review

Policies

The PCG encodes **6 hard policies**. These are invariants an agent must never violate regardless of what the decision rules say. They map directly to customer commitments, financial controls and data protection obligations. The agent guardrails table below expresses the four most critical policies as executable boolean checks.

Hard operating policies - override all decision rules

Policy	Rule	Regulation
No closure without the customer	Ticket Closed MUST NOT fire unless Customer Confirmed Resolution has fired for the same ticket_id, or 7 days have elapsed since Resolution Provided with no customer reply	Customer promise and CX policy
Large refunds need approval	Refund Issued with refund_amount > 250 EUR MUST NOT fire unless Supervisor Approval Granted has fired on the same ticket_id	Financial control policy
Security issues route immediately	security_flag = True -> Assigned to Queue MUST route to the security desk before any agent action; no other queue assignment is valid	Security and data protection policy
Priority one gets a first response within one hour	priority = 'P1' -> First Response Sent MUST fire within 60 minutes of Ticket Created, and Duty Engineer Paged MUST fire from triage	SLA commitment in the customer contract
Verified identity before any account change	No account-level change or data disclosure may be actioned unless the contact's identity has been verified on the same ticket	Data protection / GDPR Article 32
Reopened tickets return to their original owner	Ticket Reopened -> the ticket MUST return to the original assignee unless they are unavailable; a second reopen MUST route to a senior specialist	Internal quality policy

Agent Guardrails

These four invariants MUST be true before any ticket transition completes. An agent should assert them programmatically after each phase transition. If any guardrail returns false, the action is blocked and the ticket is flagged for human review.

Agent guardrails - boolean invariants checked after every transition

Guardrail	Invariant check
No refund above 250 EUR without supervisor approval	count(tickets WHERE 'Refund Issued' AND refund_amount > 250 WITHOUT 'Supervisor Approval Granted') = 0
No closure without confirmation or 7 days of silence	count(tickets WHERE 'Ticket Closed' fires WITHOUT 'Customer Confirmed Resolution' AND days_since('Resolution Provided') < 7) = 0
Every P1 gets a first response inside 60 minutes	count(tickets WHERE priority='P1' AND minutes('Ticket Created' -> 'First Response Sent') > 60) = 0
Security-flagged tickets reach the security desk first	count(tickets WHERE security_flag=True AND any agent activity precedes the security desk assignment) = 0

Success Criteria

Process-level KPIs with targets and observed values. Two KPIs are currently off-target: first contact resolution (62.4% vs 65% target) and priority-one response within 4 hours (92.8% vs 95% target). An agent optimizing the process should prioritize actions that move these two metrics.

Process-level success criteria - targets and observed values

KPI	Target	Observed
First contact resolution	>= 65%	62.4% -- currently below target
Customer satisfaction	>= 4.5 / 5	4.6
Priority one response within 4 hours	>= 95%	92.8% -- currently below target
Median time to resolution	<= 24h	19.5h
Reopen rate	<= 5%	4.9%
Backlog older than 7 days	<= 3%	2.6%
Refund approval compliance	100%	100%
Tier-two escalation accepted within 8 hours	>= 90%	91.3%

PCG: Machine-Readable JSON

Agent consumption note: The JSON block below is the complete Process Context Graph. Parse this block to load all objectives, intents, phases, activities, inputs, outputs, decision rules, exceptions, policies, tools, escalation rules, variants, and success criteria into an agent runtime. Every numeric threshold is derived from the observed event log; see meta.source_log and meta.observation_window for provenance.

Process Context Graph v1.0 - Customer Service

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{
  "process_context_graph": {
    "meta": {
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      "version": "1.0.0",
      "generated": "2026-08-12",
      "source_log": "data/Customer Service - Enriched.parquet",
      "observation_window": {
        "from": "2026-02-01",
        "to": "2026-08-16"
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    "population": {
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    "cases": 12000,
    "events": 96412,
    "activities": 27
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  "agent_note": "Every numeric claim in this graph is computed from the observed event log. Do not override thresholds without re-running the source derivation."
},
"objectives": [
  {
    "id": "obj:resolve-first-contact",
    "label": "Resolve every ticket quickly, on the first contact where possible",
    "description": "Answer, diagnose and resolve the customer's issue in a single contact wherever the issue type allows. The process ends when the customer confirms the resolution and the ticket is closed. 62.4% of tickets are resolved at first contact today.",
    "measured_by": [
      "kpi:fcrr",
      "kpi:csat",
      "kpi:ttr"
    ]
  },
  {
    "id": "obj:meet-every-sla",
    "label": "Meet every response and resolution SLA, and escalate before breach",
    "description": "Every ticket carries a response and resolution SLA determined by priority and channel. Priority-one incidents must receive a first response within one hour and be resolved or escalated within four. Escalate to a human owner before an SLA is breached, never after.",
    "measured_by": [
      "kpi:p1-response",
      "kpi:tier-two-sla",
      "kpi:backlog"
    ]
  },
  {
    "id": "obj:protect-relationship",
    "label": "Protect the customer relationship: no silent closures, no repeat contacts",
    "description": "A ticket is only closed when the customer confirms, or after seven days of silence following a resolution. Reopens are treated as a failure of the first resolution: 4.9% of tickets are reopened once, and reopened tickets return to the agent who owned them.",
    "measured_by": [
      "kpi:reopen-rate",
      "kpi:csat",
      "kpi:fcrr"
    ]
  }
],
"intents": {
  "by_phase": {
    "phase:intake": "Capture the customer's issue on any channel, open a ticket of record, and acknowledge receipt within two minutes with no agent touch.",
    "phase:triage": "Categorise and prioritise every ticket within 30 minutes so it reaches the right team first time. Misrouting is the top driver of delay.",
    "phase:first-contact": "Attempt a full resolution at first contact using the knowledge base; if that is not possible, decide cleanly between asking the customer for information and escalating.",
    "phase:customer-wait": "Request exactly what is missing, chase once, and close the loop; never leave a ticket waiting on a silent customer indefinitely.",
    "phase:escalation": "Move the ticket to the specialist or engineer who can actually fix it, with enough context that the receiving owner does not have to re-diagnose.",
    "phase:resolution": "Apply the remedy, including any refund, within financial control limits, and record the root cause so the fix is reusable.",
    "phase:closure": "Confirm the fix worked with the customer before closing; treat seven days of silence after a resolution as implicit confirmation.",
    "phase:reopen": "Measure satisfaction, and treat any reopen as a defect in the original resolution rather than a new ticket."
  }
},
"phases": [
  {

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```
"id": "phase:intake",
"name": "Ticket Intake",
"intent": "Capture the customer's issue on any channel, open a ticket of record, and acknowledge receipt within two minutes with no agent touch.",
"activities": [
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    "volume": 12000
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    "id": "act:channel-contact-captured",
    "name": "Channel and Contact Captured",
    "expected_order": 2,
    "median_step_min": 0.4,
    "volume": 12000
  },
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    "name": "Auto-Acknowledgement Sent",
    "expected_order": 3,
    "median_step_min": 1.4,
    "volume": 11784
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      "contract_type",
      "region"
    ]
  },
  {
    "id": "in:channel",
    "label": "Contact channel",
    "fields": [
      "channel",
      "device_type"
    ],
    "values": [
      "Email",
      "Live Chat",
      "Phone",
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      "Social"
    ]
  },
  {
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    "label": "Issue description",
    "fields": [
```

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    "subject",
    "body_text",
    "product"
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}
],
"outputs": [
  {
    "id": "out:ticket-record",
    "label": "Initialised ticket record",
    "fields": [
      "ticket_id",
      "created_at",
      "channel",
      "customer_id"
    ]
  }
],
"decision_rules": [
  {
    "id": "dr:intake-complete",
    "condition": "Contact channel and customer identity captured and ticket_id issued",
    "outcome": "Advance to phase:triage",
    "evidence": "12,000 tickets created; 11,940 (99.5%) reached categorisation"
  },
  {
    "id": "dr:auto-ack",
    "condition": "Ticket Created fires on any channel other than inbound phone",
    "outcome": "Fire Auto-Acknowledgement Sent within 2 minutes",
    "evidence": "11,784 of 12,000 tickets (98.2%) received an auto-acknowledgement; median lag 1.4 min"
  }
],
"skills_tools": [
  {
    "id": "tool:ticketing-system",
    "label": "Ticketing system (case of record)"
  },
  {
    "id": "tool:auto-ack-engine",
    "label": "Auto-acknowledgement engine"
  },
  {
    "id": "tool:telephony",
    "label": "Telephony / IVR platform"
  }
],
"exceptions": [
  {
    "id": "exc:duplicate-ticket",
    "trigger": "Same customer_id opens a second ticket on the same product within 24 hours of an open ticket",
    "action": "Merge into the parent ticket; suppress the second auto-acknowledgement",
    "observed_rate": "3.1% (372 tickets merged as duplicates)"
  }
],
"escalation_rules": [],
"success_criteria": [
```

```
{
  "id": "sc:ack-speed",
  "metric": "Auto-acknowledgement sent within 2 minutes",
  "target": ">= 98%",
  "observed": "98.2%"
}
],
},
{
  "id": "phase:triage",
  "name": "Triage and Routing",
  "intent": "Categorise and prioritise every ticket within 30 minutes so it reaches the right team first time. Misrouting is the top driver of delay.",
  "activities": [
    {
      "id": "act:ticket-categorised",
      "name": "Ticket Categorised",
      "expected_order": 4,
      "median_step_min": 11.6,
      "volume": 11940
    },
    {
      "id": "act:priority-assigned",
      "name": "Priority Assigned",
      "expected_order": 5,
      "median_step_min": 2.1,
      "volume": 11940
    },
    {
      "id": "act:assigned-to-queue",
      "name": "Assigned to Queue",
      "expected_order": 6,
      "median_step_min": 4.8,
      "volume": 11940
    }
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  "inputs": [
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      "id": "in:category",
      "label": "Issue category",
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        "sub_category",
        "product"
      ]
    },
    {
      "id": "in:priority",
      "label": "Priority",
      "fields": [
        "priority"
      ],
      "values": [
        "P1",
        "P2",
        "P3",
        "P4"
      ]
    }
  ]
}
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    ]
  },
  {
    "id": "in:security-flag",
    "label": "Security flag",
    "fields": [
      "security_flag"
    ]
  }
],
"outputs": [
  {
    "id": "out:routed-ticket",
    "label": "Categorised, prioritised ticket in an owning queue",
    "fields": [
      "category",
      "priority",
      "queue",
      "sla_due_at"
    ]
  }
],
"decision_rules": [
  {
    "id": "dr:priority-p1",
    "condition": "issue_type = 'Outage' OR the customer reports the service is unavailable OR priority = 'P1'",
    "outcome": "Assign P1; page the duty engineer and send First Response Sent within 60 minutes",
    "evidence": "214 of 12,000 tickets (1.8%) were P1; median first response 38 minutes"
  },
  {
    "id": "dr:security-route",
    "condition": "security_flag = True",
    "outcome": "Assigned to Queue MUST route to the security desk queue before any other assignment or agent action",
    "evidence": "96 tickets (0.8%) carried a security flag; all 96 reached the security desk first"
  },
  {
    "id": "dr:route-by-category",
    "condition": "category and product are set and map to a single owning queue",
    "outcome": "Assign to the owning queue; advance to phase:first-contact",
    "evidence": "1,776 tickets (14.8%) were reassigned at least once after triage; median 6.8 hours lost per reassignment"
  }
],
"skills_tools": [
  {
    "id": "tool:auto-classifier",
    "label": "ML ticket classification and routing engine"
  },
  {
    "id": "tool:ticketing-system",
    "label": "Ticketing system (case of record)"
  }
],
"exceptions": [
  {
    "id": "exc:misroute",
    "trigger": "Ticket Reassigned fires after Assigned to Queue",

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    "action": "Re-run classification with the corrected category; feed the correction back to the classifier",
    "observed_rate": "14.8% (1,776 tickets); median 6.8 hours added"
  },
  {
    "id": "exc:priority-downgrade",
    "trigger": "Priority changed after Assigned to Queue",
    "action": "Recompute sla_due_at; log the change with reason code",
    "observed_rate": "2.2% (264 tickets, of which 31 were P1 downgrades)"
  }
],
"escalation_rules": [
  {
    "id": "esc:security-ack-1h",
    "trigger": "Security-flagged ticket not acknowledged by the security desk within 1 hour",
    "route_to": "Security desk lead",
    "sla_hours": 1
  }
],
"success_criteria": [
  {
    "id": "sc:triage-speed",
    "metric": "Ticket categorised and prioritised within 30 minutes",
    "target": ">= 90%",
    "observed": "88.4%"
  },
  {
    "id": "sc:route-accuracy",
    "metric": "Routed to the correct queue first time",
    "target": ">= 88%",
    "observed": "85.2%"
  }
]
},
{
  "id": "phase:first-contact",
  "name": "First Contact Handling",
  "intent": "Attempt a full resolution at first contact using the knowledge base; if that is not possible, decide cleanly between asking the customer for information and escalating.",
  "activities": [
    {
      "id": "act:agent-assigned",
      "name": "Agent Assigned",
      "expected_order": 7,
      "median_step_min": 26.4,
      "volume": 11812
    },
    {
      "id": "act:first-response-sent",
      "name": "First Response Sent",
      "expected_order": 8,
      "median_step_min": 63.7,
      "volume": 11640
    },
    {
      "id": "act:knowledge-article-applied",
      "name": "Knowledge Article Applied",
      "expected_order": 9,

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    "median_step_min": 8.3,
    "volume": 6820
  }
],
"inputs": [
  {
    "id": "in:queue-assignment",
    "label": "Queue and agent assignment",
    "fields": [
      "queue",
      "assignee_id",
      "agent_tenure_band"
    ]
  },
  {
    "id": "in:kb-match",
    "label": "Knowledge base match",
    "fields": [
      "kb_article_id",
      "kb_match_score"
    ]
  }
],
"outputs": [
  {
    "id": "out:first-contact-outcome",
    "label": "Resolution attempt, information request, or escalation signal"
  }
],
"decision_rules": [
  {
    "id": "dr:fcr-attempt",
    "condition": "Agent Assigned has fired AND a knowledge article matches with kb_match_score >= 0.8",
    "outcome": "Apply the article and provide the resolution on this contact; advance directly to phase:resolution",
    "evidence": "7,488 tickets (62.4%) were resolved at first contact; median end-to-end 4.2 hours"
  },
  {
    "id": "dr:info-needed",
    "condition": "The agent cannot resolve without a detail only the customer can supply",
    "outcome": "Fire Information Requested from Customer; move to phase:customer-wait",
    "evidence": "1,044 tickets (8.7%) waited on customer information; median wait 3.1 days"
  },
  {
    "id": "dr:escalate-tier-two",
    "condition": "The issue requires specialist skill or product depth beyond tier one",
    "outcome": "Fire Escalated to Tier Two; move to phase:escalation",
    "evidence": "1,392 tickets (11.6%) escalated to a tier-two specialist; median 18.4 hours added"
  }
],
"skills_tools": [
  {
    "id": "tool:agent-desktop",
    "label": "Tier-one agent desktop / queue"
  },
  {
    "id": "tool:knowledge-base",

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    "label": "Knowledge base / article search"
  },
  {
    "id": "tool:live-chat",
    "label": "Live chat widget"
  }
],
"exceptions": [
  {
    "id": "exc:first-response-sla-miss",
    "trigger": "First Response Sent does not fire within the channel SLA for the assigned priority",
    "action": "Flag on the SLA dashboard; notify the team lead; re-prioritise the queue",
    "observed_rate": "7.2% of tickets (864) missed their first-response SLA"
  }
],
"escalation_rules": [],
"success_criteria": [
  {
    "id": "sc:fcr",
    "metric": "First contact resolution rate",
    "target": ">= 65%",
    "observed": "62.4%"
  },
  {
    "id": "sc:first-response",
    "metric": "First response within channel SLA",
    "target": ">= 95%",
    "observed": "92.8%"
  }
]
},
{
  "id": "phase:customer-wait",
  "name": "Information Request and Customer Wait",
  "intent": "Request exactly what is missing, chase once, and close the loop; never leave a ticket waiting on a silent customer indefinitely.",
  "activities": [
    {
      "id": "act:info-requested",
      "name": "Information Requested from Customer",
      "expected_order": 10,
      "median_step_min": 41.9,
      "volume": 1044
    },
    {
      "id": "act:reminder-sent",
      "name": "Reminder Sent",
      "expected_order": 11,
      "median_step_min": 4320.0,
      "volume": 447
    },
    {
      "id": "act:customer-info-received",
      "name": "Customer Information Received",
      "expected_order": 12,
      "median_step_min": 4464.0,
      "volume": 812
    }
  ]
}

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```

    }
  ],
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      "id": "in:info-request",
      "label": "Information request",
      "fields": [
        "requested_fields",
        "requested_at"
      ]
    },
    {
      "id": "in:customer-reply",
      "label": "Customer reply",
      "fields": [
        "reply_at",
        "reply_channel",
        "attachment_count"
      ]
    }
  ],
  "outputs": [
    {
      "id": "out:wait-outcome",
      "label": "Customer reply received, or no-response closure signal"
    }
  ],
  "decision_rules": [
    {
      "id": "dr:customer-responds",
      "condition": "Customer Information Received fires",
      "outcome": "Resume handling; return to phase:first-contact or advance to phase:resolution",
      "evidence": "812 of 1,044 information requests (77.8%) received a reply; median wait 3.1 days"
    },
    {
      "id": "dr:no-response-close",
      "condition": "The customer has not replied 7 days after Information Requested from Customer",
      "outcome": "Send a final reminder, then close the ticket as unresolved by customer",
      "evidence": "232 tickets (1.9% of all tickets, 22.2% of information requests) closed with no customer response"
    }
  ],
  "skills_tools": [
    {
      "id": "tool:customer-portal",
      "label": "Customer self-service portal"
    },
    {
      "id": "tool:agent-desktop",
      "label": "Tier-one agent desktop / queue"
    }
  ],
  "exceptions": [
    {
      "id": "exc:customer-silent",
      "trigger": "No customer reply within 7 days of the information request",
      "action": "Send final reminder; close as unresolved-by-customer at day 7; reopen on any later reply",
    }
  ]

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      "observed_rate": "22.2% of information requests (232 tickets)"
    },
    {
      "id": "exc:reminder-loop",
      "trigger": "More than one Reminder Sent fires on the same ticket",
      "action": "Cap at two reminders; escalate to the team lead instead of chasing again",
      "observed_rate": "447 reminders across 1,044 requests; 68 tickets received more than one"
    }
  ],
  "escalation_rules": [
    {
      "id": "esc:customer-awaiting-reply-24h",
      "trigger": "The customer is awaiting an agent reply for more than 24 hours",
      "route_to": "Team lead",
      "sla_hours": 24
    }
  ],
  "success_criteria": [
    {
      "id": "sc:info-response-rate",
      "metric": "Information requests answered by the customer",
      "target": ">= 75%",
      "observed": "77.8%"
    },
    {
      "id": "sc:no-silent-wait",
      "metric": "No ticket waits on the customer beyond 7 days without closure",
      "target": "100%",
      "observed": "100%"
    }
  ]
},
{
  "id": "phase:escalation",
  "name": "Escalation and Specialist Handling",
  "intent": "Move the ticket to the specialist or engineer who can actually fix it, with enough context that the receiving owner does not have to re-diagnose.",
  "activities": [
    {
      "id": "act:ticket-reassigned",
      "name": "Ticket Reassigned",
      "expected_order": 13,
      "median_step_min": 408.0,
      "volume": 1776
    },
    {
      "id": "act:escalated-tier-two",
      "name": "Escalated to Tier Two",
      "expected_order": 14,
      "median_step_min": 336.0,
      "volume": 1392
    },
    {
      "id": "act:duty-engineer-paged",
      "name": "Duty Engineer Paged",
      "expected_order": 15,
      "median_step_min": 6.0,

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    "volume": 214
  },
  {
    "id": "act:escalated-engineering",
    "name": "Escalated to Engineering",
    "expected_order": 16,
    "median_step_min": 1104.0,
    "volume": 348
  }
],
"inputs": [
  {
    "id": "in:escalation-reason",
    "label": "Escalation reason",
    "fields": [
      "escalation_reason",
      "escalation_tier",
      "escalated_by"
    ]
  },
  {
    "id": "in:diagnostics",
    "label": "Diagnostic evidence",
    "fields": [
      "log_bundle_id",
      "repro_steps",
      "affected_component"
    ]
  }
],
"outputs": [
  {
    "id": "out:specialist-owner",
    "label": "Ticket owned by a specialist or engineer with full context attached"
  }
],
"decision_rules": [
  {
    "id": "dr:tier-two-accept",
    "condition": "Escalated to Tier Two has fired",
    "outcome": "A specialist must accept ownership within 8 hours; otherwise escalate to the specialist team lead",
    "evidence": "Median tier-two acceptance is 5.6 hours; 91.3% accepted within the 8-hour SLA"
  },
  {
    "id": "dr:engineering-route",
    "condition": "Tier two confirms a product defect or platform fault rather than a usage issue",
    "outcome": "Fire Escalated to Engineering; the ticket stays open against the engineering fix",
    "evidence": "348 tickets (2.9%) reached engineering; median 41.7 hours added"
  },
  {
    "id": "dr:p1-page",
    "condition": "priority = 'P1'",
    "outcome": "Fire Duty Engineer Paged immediately; do not wait for tier-two triage",
    "evidence": "214 P1 tickets; median page lag 6 minutes from Priority Assigned"
  }
],

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"skills_tools": [
  {
    "id": "tool:tier-two-queue",
    "label": "Tier-two specialist queue"
  },
  {
    "id": "tool:engineering-oncall",
    "label": "Engineering on-call / incident bridge"
  },
  {
    "id": "tool:diagnostics-toolkit",
    "label": "Diagnostics and log inspection toolkit"
  }
],
"exceptions": [
  {
    "id": "exc:tier-two-unaccepted",
    "trigger": "Escalated to Tier Two fires and no specialist accepts within 8 hours",
    "action": "Escalate to the specialist team lead; reassign from the pool",
    "observed_rate": "8.7% of escalations (121 tickets) breached the 8-hour acceptance SLA"
  },
  {
    "id": "exc:engineering-bounce",
    "trigger": "Engineering returns the ticket to tier two without a fix or a defect ID",
    "action": "Require a written reason; re-diagnose at tier two before any second escalation",
    "observed_rate": "41 tickets (11.8% of engineering escalations) were returned without a fix"
  }
],
"escalation_rules": [
  {
    "id": "esc:p1-open-4h",
    "trigger": "Priority-one ticket open beyond 4 hours",
    "route_to": "Duty manager",
    "sla_hours": 4
  },
  {
    "id": "esc:tier-two-unaccepted-8h",
    "trigger": "Tier-two escalation not accepted within 8 hours",
    "route_to": "Specialist team lead",
    "sla_hours": 8
  }
],
"success_criteria": [
  {
    "id": "sc:tier-two-sla",
    "metric": "Tier-two escalation accepted within 8 hours",
    "target": ">= 90%",
    "observed": "91.3%"
  },
  {
    "id": "sc:p1-resolution",
    "metric": "P1 resolved or on an engineering bridge within 4 hours",
    "target": ">= 95%",
    "observed": "92.8%"
  }
]

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},
{
  "id": "phase:resolution",
  "name": "Resolution and Remediation",
  "intent": "Apply the remedy, including any refund, within financial control limits, and record the root cause so the fix is reusable.",
  "activities": [
    {
      "id": "act:root-cause-identified",
      "name": "Root Cause Identified",
      "expected_order": 17,
      "median_step_min": 52.5,
      "volume": 11046
    },
    {
      "id": "act:supervisor-approval-granted",
      "name": "Supervisor Approval Granted",
      "expected_order": 18,
      "median_step_min": 138.0,
      "volume": 74
    },
    {
      "id": "act:refund-issued",
      "name": "Refund Issued",
      "expected_order": 19,
      "median_step_min": 21.7,
      "volume": 1940
    },
    {
      "id": "act:resolution-provided",
      "name": "Resolution Provided",
      "expected_order": 20,
      "median_step_min": 33.4,
      "volume": 10968
    }
  ],
  "inputs": [
    {
      "id": "in:root-cause",
      "label": "Root cause",
      "fields": [
        "root_cause_code",
        "affected_component"
      ]
    },
    {
      "id": "in:refund",
      "label": "Refund request",
      "fields": [
        "refund_amount",
        "currency",
        "refund_reason"
      ]
    },
    {
      "id": "in:approval",
      "label": "Supervisor approval",
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    "fields": [
      "approver_id",
      "approved_at"
    ]
  }
],
"outputs": [
  {
    "id": "out:resolution",
    "label": "Applied remedy with a recorded root cause",
    "fields": [
      "resolution_code",
      "resolution_text",
      "refund_amount"
    ]
  }
],
"decision_rules": [
  {
    "id": "dr:refund-direct",
    "condition": "refund_amount <= 250 EUR",
    "outcome": "The agent may fire Refund Issued directly, without supervisor approval",
    "evidence": "1,940 refunds observed; 96.2% (1,866) fell within the direct approval limit"
  },
  {
    "id": "dr:refund-approval",
    "condition": "refund_amount > 250 EUR",
    "outcome": "Supervisor Approval Granted must fire on the same ticket before Refund Issued",
    "evidence": "74 refunds (3.8%) exceeded the limit; all 74 carried a supervisor approval, median approval lag 2.3 hours"
  },
  {
    "id": "dr:resolution-provided",
    "condition": "Root Cause Identified has fired and the remedy has been applied",
    "outcome": "Fire Resolution Provided; advance to phase:closure",
    "evidence": "10,968 tickets (91.4%) reached Resolution Provided"
  }
],
"skills_tools": [
  {
    "id": "tool:knowledge-base",
    "label": "Knowledge base / article search"
  },
  {
    "id": "tool:refund-processor",
    "label": "Refund / billing adjustment API"
  },
  {
    "id": "tool:supervisor-approval",
    "label": "Supervisor approval workflow"
  }
],
"exceptions": [
  {
    "id": "exc:refund-over-limit",
    "trigger": "refund_amount > 250 EUR requested by a tier-one agent",
    "action": "Hold Refund Issued; route to the supervisor approval workflow; block the action if approval is absent",
  }
]

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      "observed_rate": "3.8% of refunds (74 tickets); median approval lag 2.3 hours"
    }
  ],
  "escalation_rules": [],
  "success_criteria": [
    {
      "id": "sc:refund-compliance",
      "metric": "Refunds above the limit carrying supervisor approval",
      "target": "100%",
      "observed": "100%"
    },
    {
      "id": "sc:root-cause-recorded",
      "metric": "Resolved tickets with a root cause code recorded",
      "target": ">= 95%",
      "observed": "94.1%"
    }
  ]
},
{
  "id": "phase:closure",
  "name": "Confirmation and Closure",
  "intent": "Confirm the fix worked with the customer before closing; treat seven days of silence after a resolution as implicit confirmation.",
  "activities": [
    {
      "id": "act:customer-confirmed",
      "name": "Customer Confirmed Resolution",
      "expected_order": 21,
      "median_step_min": 582.0,
      "volume": 8720
    },
    {
      "id": "act:ticket-closed",
      "name": "Ticket Closed",
      "expected_order": 22,
      "median_step_min": 18.9,
      "volume": 10884
    }
  ],
  "inputs": [
    {
      "id": "in:confirmation",
      "label": "Customer confirmation",
      "fields": [
        "confirmed_at",
        "confirmation_channel"
      ]
    }
  ],
  "outputs": [
    {
      "id": "out:closed-ticket",
      "label": "Closed ticket with a resolution code and closure reason",
      "fields": [
        "closed_at",
        "closure_reason",

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        "resolution_code"
      ]
    }
  ],
  "decision_rules": [
    {
      "id": "dr:close-on-confirm",
      "condition": "Customer Confirmed Resolution fires, OR 7 days elapse after Resolution Provided with no customer reply",
      "outcome": "Fire Ticket Closed with the matching closure reason",
      "evidence": "10,884 tickets closed (90.7%); 8,720 (80.1% of closures) were explicitly confirmed, median confirmation lag 9.7 hours"
    }
  ],
  "skills_tools": [
    {
      "id": "tool:ticketing-system",
      "label": "Ticketing system (case of record)"
    },
    {
      "id": "tool:customer-portal",
      "label": "Customer self-service portal"
    }
  ],
  "exceptions": [
    {
      "id": "exc:closed-without-confirmation",
      "trigger": "Ticket Closed fires on the 7-day silence rule rather than an explicit confirmation",
      "action": "Record closure_reason = 'implicit-confirmation'; include in the reopen-risk cohort",
      "observed_rate": "19.9% of closures (2,164 tickets); these tickets reopen at 2.6x the confirmed rate"
    }
  ],
  "escalation_rules": [],
  "success_criteria": [
    {
      "id": "sc:confirmed-closure",
      "metric": "Closures with explicit customer confirmation",
      "target": ">= 80%",
      "observed": "80.1%"
    },
    {
      "id": "sc:ttr",
      "metric": "Median time to resolution",
      "target": "<= 24h",
      "observed": "19.5h"
    }
  ]
},
{
  "id": "phase:reopen",
  "name": "Feedback and Reopen Management",
  "intent": "Measure satisfaction, and treat any reopen as a defect in the original resolution rather than a new ticket.",
  "activities": [
    {
      "id": "act:satisfaction-survey-sent",
      "name": "Satisfaction Survey Sent",
      "expected_order": 23,
      "median_step_min": 60.0,

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    "volume": 10884
  },
  {
    "id": "act:ticket-reopened",
    "name": "Ticket Reopened",
    "expected_order": 24,
    "median_step_min": 2412.0,
    "volume": 588
  }
],
"inputs": [
  {
    "id": "in:csat",
    "label": "Satisfaction score",
    "fields": [
      "csat_score",
      "csat_comment"
    ]
  },
  {
    "id": "in:reopen-reason",
    "label": "Reopen reason",
    "fields": [
      "reopen_reason",
      "reopen_count"
    ]
  }
],
"outputs": [
  {
    "id": "out:feedback",
    "label": "Satisfaction score and reopen signal for the quality loop"
  }
],
"decision_rules": [
  {
    "id": "dr:reopen-route",
    "condition": "Ticket Reopened fires within 14 days of Ticket Closed",
    "outcome": "Return the ticket to the original assignee; a second reopen routes to a senior specialist for review",
    "evidence": "588 tickets (4.9%) were reopened once and then resolved; 61 were reopened a second time"
  }
],
"skills_tools": [
  {
    "id": "tool:survey-platform",
    "label": "CSAT survey platform"
  },
  {
    "id": "tool:reopen-review-queue",
    "label": "Reopen review queue"
  }
],
"exceptions": [],
"escalation_rules": [
  {
    "id": "esc:second-reopen",
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        "trigger": "Ticket reopened for the second time",
        "route_to": "Senior specialist for review",
        "sla_hours": null
    }
],
"success_criteria": [
    {
        "id": "sc:reopen-rate",
        "metric": "Reopen rate",
        "target": "<= 5%",
        "observed": "4.9%"
    },
    {
        "id": "sc:csat",
        "metric": "Customer satisfaction",
        "target": ">= 4.5 / 5",
        "observed": "4.6"
    }
]
},
],
"terminal_states": [
    {
        "id": "term:resolved",
        "activity": "Ticket Closed",
        "outcome": "CLOSED-RESOLVED",
        "count": 10884,
        "rate": "90.7%",
        "description": "Customer's issue was resolved and the ticket closed, either on explicit confirmation (8,720) or after 7 days of silence following a resolution (2,164).",
    },
    {
        "id": "term:closed-no-response",
        "activity": "Closed - No Customer Response",
        "outcome": "CLOSED-UNRESOLVED (customer-initiated)",
        "count": 232,
        "rate": "1.9%",
        "description": "Information was requested and the customer never replied. Closed after a final reminder at day 7. Reopens on any later customer reply.",
        "top_stall_steps": [
            {
                "activity": "Information Requested from Customer",
                "cases": 232,
                "pct_of_no_response": "100%"
            },
            {
                "activity": "Reminder Sent",
                "cases": 164,
                "pct_of_no_response": "70.7%"
            }
        ]
    }
],
{
    "id": "term:withdrawn",
    "activity": "Ticket Withdrawn by Customer",
    "outcome": "CLOSED-WITHDRAWN",
    "count": 570,
    "rate": "4.8%",

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      "description": "Customer withdrew the request before a resolution was provided; most commonly after a reassignment or while waiting on a tier-two specialist.",
      "median_time_to_withdraw_min": 1866.0
    },
    {
      "id": "term:in-flight",
      "activity": null,
      "outcome": "IN-PROGRESS",
      "count": 314,
      "rate": "2.6%",
      "description": "Tickets with no terminal activity inside the observation window. This cohort is the backlog older than 7 days; most are waiting on engineering."
    }
  ],
  "allowable_variants": [
    {
      "id": "var:fcr-happy-path",
      "label": "Resolved on first contact, no escalation",
      "description": "No reassignment, no escalation, no information request. The tier-one agent resolves the issue on the first contact using the knowledge base.",
      "sequence": [
        "Ticket Created",
        "Channel and Contact Captured",
        "Auto-Acknowledgement Sent",
        "Ticket Categorised",
        "Priority Assigned",
        "Assigned to Queue",
        "Agent Assigned",
        "First Response Sent",
        "Knowledge Article Applied",
        "Root Cause Identified",
        "Resolution Provided",
        "Customer Confirmed Resolution",
        "Ticket Closed",
        "Satisfaction Survey Sent"
      ],
      "rate": "62.4%",
      "median_duration_hours": 4.2
    },
    {
      "id": "var:reassigned-once",
      "label": "Reassigned once after triage",
      "description": "The ticket was routed to the wrong queue at triage and reassigned once before being resolved. Otherwise the first-contact path.",
      "sequence_delta": "Insert 'Ticket Reassigned' between 'Assigned to Queue' and 'Agent Assigned'",
      "rate": "14.8%",
      "median_lag_added_hours": 6.8
    },
    {
      "id": "var:tier-two-escalation",
      "label": "Escalated to a tier two specialist",
      "description": "Tier one could not resolve the issue; a specialist took ownership and provided the resolution.",
      "sequence_delta": "Insert 'Escalated to Tier Two' between 'First Response Sent' and 'Root Cause Identified'",
      "rate": "11.6%",
      "median_lag_added_hours": 18.4
    },
    {
      "id": "var:awaiting-customer",
      "label": "Waited on customer information",
      "description": "The agent needed a detail only the customer could supply. 77.8% of these customers replied; the rest were closed as unresolved by customer."
    }
  ]

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    "sequence_delta": "Insert 'Information Requested from Customer' -> 'Customer Information Received' between 'First Response Sent' and 'Root Cause Identified'",
    "rate": "8.7%",
    "median_lag_added_hours": 74.4
  },
  {
    "id": "var:reopened-once",
    "label": "Reopened once, then resolved",
    "description": "The first resolution did not hold. The ticket was reopened within 14 days and returned to the original assignee, who resolved it.",
    "sequence_delta": "Insert 'Ticket Reopened' -> 'Resolution Provided' -> 'Ticket Closed' after the first 'Ticket Closed'",
    "rate": "4.9%",
    "median_lag_added_hours": 26.1
  },
  {
    "id": "var:engineering-escalation",
    "label": "Escalated to engineering",
    "description": "Tier two confirmed a product defect. The ticket stayed open against an engineering fix before a resolution could be provided.",
    "sequence_delta": "Insert 'Escalated to Engineering' after 'Escalated to Tier Two'",
    "rate": "2.9%",
    "median_lag_added_hours": 41.7
  },
  {
    "id": "var:p1-outage",
    "label": "Priority one outage with duty engineer paged",
    "description": "An outage or service-unavailable report. The duty engineer is paged straight from triage; tier-two queueing is skipped entirely.",
    "sequence_delta": "Insert 'Duty Engineer Paged' -> 'Escalated to Engineering' between 'Priority Assigned' and 'First Response Sent'; skip 'Assigned to Queue' wait",
    "rate": "1.8%",
    "median_lag_added_hours": 2.6
  }
],
"policies": [
  {
    "id": "pol:no-closure-without-customer",
    "label": "No closure without the customer",
    "rule": "Ticket Closed MUST NOT fire unless Customer Confirmed Resolution has fired for the same ticket_id, or 7 days have elapsed since Resolution Provided with no customer reply",
    "regulation": "Customer promise and CX policy"
  },
  {
    "id": "pol:refund-approval",
    "label": "Large refunds need approval",
    "rule": "Refund Issued with refund_amount > 250 EUR MUST NOT fire unless Supervisor Approval Granted has fired on the same ticket_id",
    "regulation": "Financial control policy"
  },
  {
    "id": "pol:security-routing",
    "label": "Security issues route immediately",
    "rule": "security_flag = True -> Assigned to Queue MUST route to the security desk before any agent action; no other queue assignment is valid",
    "regulation": "Security and data protection policy"
  },
  {
    "id": "pol:p1-first-response",
    "label": "Priority one gets a first response within one hour",
    "rule": "priority = 'P1' -> First Response Sent MUST fire within 60 minutes of Ticket Created, and Duty Engineer Paged MUST fire from triage",
    "regulation": "SLA commitment in the customer contract"
  },
  {
    "id": "pol:identity-before-account-change",

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    "label": "Verified identity before any account change",
    "rule": "No account-level change or data disclosure may be actioned unless the contact's identity has been verified on the same ticket",
    "regulation": "Data protection / GDPR Article 32"
  },
  {
    "id": "pol:reopen-ownership",
    "label": "Reopened tickets return to their original owner",
    "rule": "Ticket Reopened -> the ticket MUST return to the original assignee unless they are unavailable; a second reopen MUST route to a senior specialist",
    "regulation": "Internal quality policy"
  }
],
"skills_tools": {
  "all": [
    {
      "id": "tool:ticketing-system",
      "label": "Ticketing system (case of record)",
      "phases": [
        "phase:intake",
        "phase:triage",
        "phase:closure"
      ],
      "type": "system"
    },
    {
      "id": "tool:auto-ack-engine",
      "label": "Auto-acknowledgement engine",
      "phases": [
        "phase:intake"
      ],
      "type": "system"
    },
    {
      "id": "tool:auto-classifier",
      "label": "ML ticket classification and routing engine",
      "phases": [
        "phase:triage"
      ],
      "type": "system"
    },
    {
      "id": "tool:knowledge-base",
      "label": "Knowledge base / article search",
      "phases": [
        "phase:first-contact",
        "phase:resolution"
      ],
      "type": "system"
    },
    {
      "id": "tool:diagnostics-toolkit",
      "label": "Diagnostics and log inspection toolkit",
      "phases": [
        "phase:escalation",
        "phase:resolution"
      ],
      "type": "system"
    }
  ]
}

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},
{
  "id": "tool:refund-processor",
  "label": "Refund / billing adjustment API",
  "phases": [
    "phase:resolution"
  ],
  "type": "system"
},
{
  "id": "tool:agent-desktop",
  "label": "Tier-one agent desktop / queue",
  "phases": [
    "phase:first-contact",
    "phase:customer-wait"
  ],
  "type": "human-in-the-loop"
},
{
  "id": "tool:tier-two-queue",
  "label": "Tier-two specialist queue",
  "phases": [
    "phase:escalation"
  ],
  "type": "human-in-the-loop"
},
{
  "id": "tool:engineering-oncall",
  "label": "Engineering on-call / incident bridge",
  "phases": [
    "phase:escalation"
  ],
  "type": "human-in-the-loop"
},
{
  "id": "tool:supervisor-approval",
  "label": "Supervisor approval workflow",
  "phases": [
    "phase:resolution"
  ],
  "type": "human-in-the-loop"
},
{
  "id": "tool:reopen-review-queue",
  "label": "Reopen review queue",
  "phases": [
    "phase:reopen"
  ],
  "type": "human-in-the-loop"
},
{
  "id": "tool:telephony",
  "label": "Telephony / IVR platform",
  "phases": [
    "phase:intake"
  ],
  "type": "system"
}
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    "type": "third-party"
  },
  {
    "id": "tool:survey-platform",
    "label": "CSAT survey platform",
    "phases": [
      "phase:reopen"
    ],
    "type": "third-party"
  },
  {
    "id": "tool:customer-portal",
    "label": "Customer self-service portal",
    "phases": [
      "phase:intake",
      "phase:customer-wait",
      "phase:closure"
    ],
    "type": "customer-facing"
  },
  {
    "id": "tool:live-chat",
    "label": "Live chat widget",
    "phases": [
      "phase:intake",
      "phase:first-contact"
    ],
    "type": "customer-facing"
  }
]
},
"escalation_rules": {
  "ordered_by_severity": [
    {
      "id": "esc:p1-open-4h",
      "severity": "critical",
      "trigger": "Priority one ticket open beyond 4 hours",
      "from_phase": "phase:escalation",
      "route_to": "Duty manager",
      "sla_hours": 4,
      "regulatory_note": "Contractual SLA breach beyond this point; service credits may apply",
      "evidence": "214 P1 tickets; 92.8% were resolved or on an engineering bridge inside 4 hours"
    },
    {
      "id": "esc:security-ack-1h",
      "severity": "critical",
      "trigger": "Security-flagged ticket not acknowledged by the security desk within 1 hour",
      "from_phase": "phase:triage",
      "route_to": "Security desk lead",
      "sla_hours": 1,
      "regulatory_note": "Personal-data incidents carry a 72-hour regulatory notification clock from first awareness",
      "evidence": "96 security-flagged tickets; median acknowledgement 18 minutes"
    },
    {
      "id": "esc:tier-two-unaccepted-8h",
      "severity": "high",

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      "trigger": "Tier-two escalation not accepted within 8 hours",
      "from_phase": "phase:escalation",
      "route_to": "Specialist team lead",
      "sla_hours": 8,
      "evidence": "Median acceptance 5.6 hours; 8.7% of escalations (121 tickets) breached the threshold"
    },
    {
      "id": "esc:customer-awaiting-reply-24h",
      "severity": "high",
      "trigger": "Customer awaiting an agent reply beyond 24 hours",
      "from_phase": "phase:customer-wait",
      "route_to": "Team lead",
      "sla_hours": 24,
      "evidence": "864 tickets (7.2%) missed their first-response SLA; the 24-hour threshold is the second-line catch"
    },
    {
      "id": "esc:second-reopen",
      "severity": "medium",
      "trigger": "Ticket reopened for the second time",
      "from_phase": "phase:reopen",
      "route_to": "Senior specialist for review",
      "sla_hours": null,
      "evidence": "61 tickets were reopened twice; these carry a median CSAT of 2.9 against an overall 4.6"
    }
  ]
},
"success_criteria": {
  "process_level": [
    {
      "id": "kpi:fcr",
      "label": "First contact resolution",
      "formula": "cases[resolved with no reassignment, escalation or info request] / total_cases",
      "target": ">= 65%",
      "observed": "62.4% -- currently below target"
    },
    {
      "id": "kpi:csat",
      "label": "Customer satisfaction",
      "formula": "mean(csat_score) across surveyed tickets",
      "target": ">= 4.5 / 5",
      "observed": "4.6"
    },
    {
      "id": "kpi:p1-response",
      "label": "Priority one response within 4 hours",
      "formula": "cases[priority='P1' AND resolved_or_bridged <= 4h] / cases[priority='P1']",
      "target": ">= 95%",
      "observed": "92.8% -- currently below target"
    },
    {
      "id": "kpi:ttr",
      "label": "Median time to resolution",
      "formula": "median(Ticket Created -> Resolution Provided)",
      "target": "<= 24h",
      "observed": "19.5h"
    }
  ],

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{
  "id": "kpi:reopen-rate",
  "label": "Reopen rate",
  "formula": "cases['Ticket Reopened'] / cases['Ticket Closed']",
  "target": "<= 5%",
  "observed": "4.9%"
},
{
  "id": "kpi:backlog",
  "label": "Backlog older than 7 days",
  "formula": "cases[open AND age > 7d] / total_cases",
  "target": "<= 3%",
  "observed": "2.6%"
},
{
  "id": "kpi:refund-compliance",
  "label": "Refund approval compliance",
  "formula": "cases[refund > 250 AND approval present] / cases[refund > 250]",
  "target": "100%",
  "observed": "100%"
},
{
  "id": "kpi:tier-two-sla",
  "label": "Tier-two escalation accepted within 8 hours",
  "formula": "cases[tier-two accepted <= 8h] / cases['Escalated to Tier Two']",
  "target": ">= 90%",
  "observed": "91.3%"
}
],
"agent_guardrails": [
  {
    "id": "guard:no-large-refund-without-approval",
    "label": "No refund above 250 EUR without supervisor approval",
    "check": "count(tickets WHERE 'Refund Issued' AND refund_amount > 250 WITHOUT 'Supervisor Approval Granted') = 0"
  },
  {
    "id": "guard:no-closure-without-customer",
    "label": "No closure without confirmation or 7 days of silence",
    "check": "count(tickets WHERE 'Ticket Closed' fires WITHOUT 'Customer Confirmed Resolution' AND days_since('Resolution Provided') < 7) = 0"
  },
  {
    "id": "guard:p1-first-response-60min",
    "label": "Every P1 gets a first response inside 60 minutes",
    "check": "count(tickets WHERE priority='P1' AND minutes('Ticket Created' -> 'First Response Sent') > 60) = 0"
  },
  {
    "id": "guard:security-routed-first",
    "label": "Security-flagged tickets reach the security desk first",
    "check": "count(tickets WHERE security_flag=True AND any agent activity precedes the security desk assignment) = 0"
  }
]
}
}
}

```

Definitions, reproducibility, and limits: Source: Customer Service - Enriched.parquet | Observation window: 2026-02-01 to 2026-08-16 | Population: 12,000 tickets, 96,412 events, 27 activities | PCG version: 1.0.0 generated 2026-08-12 | All numeric thresholds (durations, rates, SLA hours) are computed from the observed event log and should be re-derived if the data window changes materially.