Historical Simulation Leverage from MS Planner Data

Agentic Congress Planner (ACP) - Architecture Document
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What We Can Extract & Leverage for Upcoming Congress

Running historical twin simulations on past MS Planner data yields actionable intelligence across six major categories. Each leverages specific Planner fields to produce predictive models for the upcoming congress.

1. Task Duration Intelligence

What We Extract:

- Actual vs planned duration per task type (completedDateTime - startDateTime vs dueDateTime - startDateTime)
- Systematic estimation bias: Are planners consistently optimistic or pessimistic?
- Duration variance by task category (bucket), assignee, and congress phase

What We Leverage for Upcoming Congress:

- Calibrated duration estimates: Replace guesswork with data-driven PERT parameters (a, m, b)
- Auto-correction factor: If historically "Venue Booking" takes 1.4x planned time, auto-inflate
- Confidence intervals: "This task will take 5-8 days (P90)" instead of a single-point estimate
- Phase-aware estimates: Tasks in final 2 weeks before congress historically take 30% longer (crunch time effect)

2. Dependency & Bottleneck Patterns

What We Extract:

- Implicit dependencies: Task B consistently starts only after Task A completes (even without explicit links)
- Bottleneck tasks: Tasks that, when delayed, cascade into the most downstream delays
- Hidden dependencies: Cross-bucket relationships not captured in Planner structure
- Parallel execution patterns: Which tasks historically run concurrently vs sequentially

What We Leverage for Upcoming Congress:

- Auto-generated dependency graph: Richer than what humans manually define
- Bottleneck early warning: Flag tasks that historically cause cascading delays -- prioritize these
- Parallelization opportunities: "These 5 tasks ran sequentially last year but have no real dependency -- parallelize"
- Critical path prediction: Before the congress even starts, predict which path will be critical

3. Resource Performance Profiles

What We Extract:

- Per-person throughput: Tasks completed per week, by category
- Response latency: Time from assignment (assignedDateTime) to first progress
- Multi-tasking capacity: How many concurrent tasks before quality/speed degrades
- Specialization patterns: Which people are fastest at which task types
- Availability patterns: When people go dark (vacation, conference travel, weekends)

What We Leverage for Upcoming Congress:

- Optimal task assignment: Match tasks to people based on historical performance, not assumptions
- Workload balancing: Prevent over-allocation using empirical capacity limits
- Staffing recommendations: "Based on historical data, you need 2 additional coordinators for Speaker Management"
- Early warning triggers: "Person X hasn't started their task -- historically they have 70% chance of missing deadline when response latency exceeds 3 days"

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4. Risk & Failure Pattern Recognition

What We Extract:

- Task cancellation patterns: Which tasks get cancelled and why (from description/comments)
- Blocked task frequency: How often tasks get blocked, by category, and typical block duration
- Late-breaking changes: Tasks added in final 4 weeks -- frequency, impact, type
- Scope creep indicators: Checklist items added after task creation (growing scope)
- Rework cycles: Tasks that go from 50% back to re-planning (percentComplete regression)

What We Leverage for Upcoming Congress:

- Risk heatmap: Pre-identify high-risk tasks before they start
- Buffer allocation: Add empirical buffers where historical data shows frequent delays
- Contingency planning: "Travel tasks have a 12% historical disruption rate -- pre-approve backup plans"
- Scope management: Flag tasks showing early signs of scope creep based on checklist growth rate
- Proactive mitigation: "Last 3 years, AV setup was blocked by venue access -- this year, secure access 2 weeks earlier"

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5. Timeline & Milestone Intelligence

What We Extract:

- Phase duration patterns: How long each congress planning phase actually takes
- Milestone achievement rates: What % of milestones are hit on time
- Acceleration patterns: Which phases can be compressed and which cannot
- Seasonal effects: Impact of holidays, fiscal year-end, summer on task completion
- Lead time requirements: Minimum viable lead time per workstream

What We Leverage for Upcoming Congress:

- Realistic master timeline: Data-driven phase durations, not wishful thinking
- Milestone health scoring: "At this point last year, 60% of Speaker Management tasks were complete. This year you're at 40% -- behind pace"
- Go/No-Go decision support: "Based on current progress vs historical pattern, there's an 85% probability of being ready by

congress date"

- Compression analysis: "Content workstream can be compressed by 2 weeks without risk. Travel cannot."

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6. KOL & Speaker Behavioral Models

What We Extract:

- Speaker confirmation latency: Days from invitation to confirmation (from task lifecycle)
- Speaker-specific reliability: Cancellation/change rates per speaker
- Topic-speaker affinity: Historical assignment patterns and audience feedback
- Travel complexity: Which speakers require complex travel arrangements (international, visa, etc.)
- Communication patterns: How many follow-ups needed per speaker (checklist completion rate)

What We Leverage for Upcoming Congress:

- Invitation timing optimization: "Dr. Smith takes an average of 14 days to confirm -- send invitation by date X"
- Backup speaker pre-identification: For speakers with >20% historical change rate, line up alternates early
- Session-speaker matching: Data-driven recommendations based on historical success
- Travel risk scoring: Flag speakers with complex travel early for proactive booking
- Communication cadence: Auto-schedule follow-ups based on speaker-specific response patterns

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7. Aggregate Predictive Models

Combining all the above, the simulation produces:

Congress Readiness Score (at any point in time):

- Current progress vs historical baseline
- Weighted by task criticality
- Output: "78% ready -- 5 points behind historical average at this stage"

Predicted Completion Distribution:

- P50: Most likely completion date
- P75: Comfortable estimate
- P95: Worst realistic case
- Output: "95% confident all preparations complete by March 15"

Resource Demand Forecast:

- Predicted workload peaks by week
- Resource conflicts identified 4-6 weeks in advance
- Output: "Week of Feb 10 will require 3x normal coordination capacity"

Risk-Adjusted Budget:

- Expected cost based on historical actuals
- Contingency allocation driven by simulation variance
- Output: "Base budget $X, recommended contingency buffer $Y (covers P90 scenarios)"

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8. Data Quality Requirements

For maximum leverage, the historical MS Planner data should have:

- Minimum 2 years of congress data (3+ preferred for statistical significance)
- Consistent bucket/category naming across years
- Task completion timestamps (not just created/due dates)
- Assignment data with actual user IDs (not generic accounts)
- Checklist items with completion timestamps
- Task descriptions with enough detail for NLP extraction

Data Quality Scoring:

- Grade A: All fields populated, 3+ years -> Full simulation capability
- Grade B: Core fields, 2 years -> Standard simulation with wider confidence intervals
- Grade C: Minimal fields, 1 year -> Basic pattern matching, limited predictive power

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Summary Matrix

Category -> What Historical Data Reveals -> What Upcoming Congress Gets

1. Duration Intelligence: Estimation bias, actual distributions -> Calibrated PERT estimates, auto-correction

2. Dependency Patterns: Hidden links, bottleneck tasks -> Auto-generated DAG, critical path prediction

3. Resource Profiles: Per-person throughput, capacity limits -> Optimal assignment, workload balancing

4. Risk Patterns: Failure modes, block frequency -> Risk heatmap, proactive mitigation

5. Timeline Intelligence: Phase durations, milestone rates -> Realistic timeline, progress health scoring

6. Speaker Models: Confirmation latency, reliability -> Invitation timing, backup planning

7. Aggregate Predictions: Combined statistical models -> Readiness score, completion forecast, budget