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Professional Summary

I translate fragmented datasets and legacy bottlenecks into deployable decision-support architectures for unstructured, high-stakes environments. Integrating data engineering, simulations, and Systems Design, I build system architectures that actively augment the user in the loop when conceptual frameworks collide with operational reality. My applied systems research has consistently driven measurable operational impact, including eliminating 94.8% of SLA breaches in stochastic service networks and reducing critical clinical software error rates to 8.3%.

Technical Implementation & Tools

- **Data Analysis & Simulation:** R Studio, AnyLogic (Discrete-Event, Agent-Based Modelling, & Optimisation), IBM SPSS, Regularised Regression (glmnet), PostgreSQL/JSONB schema design.
- **Research, Evaluation & Design:** Design Ethnography & Contextual Inquiry, Workflow Immersion, Mixed-Methods Research (Quantitative & Qualitative), Post Mortem Data Triangulations, Heuristic Evaluations, Stakeholder Analysis, Cognitive ergonomics in Design, Operations Research, Human Performance & Human Factors.
- **Product Telemetry & Workflows:** Figma, Jira, Atlassian Suite, Microsoft Clarity, Google Analytics.

Applied Research & Case Studies

Clinical EPR Decision Infrastructure | User Research & Systems Design

- **Diagnosed structural system flaws:** Identified that presenting patient data as static, retrospective ledgers-rather than interdependent information-was the root cause of recurring clinical safety failures.
- **Prototyped & Validated:** Designed an atomic data model prototype, testing it against the incumbent interface in a counterbalanced study with 12 clinical domain experts (validated via IBM SPSS).
- **Quantified Systemic Impact:** Slashed task execution time by **61% (352s→136s)** and critical error rates to **8.3% (from 66.7%)**. Dropped NASA-TLX cognitive load by **56%**, increased mean SUS scores from **52.9 to 85.6**, and eradicated forced context switches (**7→0**).
- **Isolated environmental bottlenecks:** Investigated a **stalled 25% adoption rate** for a psychosocial tag. Proved the remaining **75%** were blocked by **throughput-optimised ward**

constraints that penalised bedside rapport, identifying a systemic operational failure rather than a product flaw.

- **Uncovered systemic paradoxes:** Rejected surface-level aggregate success to investigate a "Preference vs. Performance Paradox," proving that operators actively rejected mathematically safer architectures in favor of familiar legacy workflows.
- **Authored production specifications:** Drafted the architecture spec (PostgreSQL/JSONB, rule-based dependency engine, OCC-based concurrency control, FHIR-compliant alerting) to transition the prototype toward live deployment.

Sparse Network Anomaly Detection | Data Engineering & Visualisation

- **Engineered fault-tolerant ETL pipelines:** Normalised 75,000+ inconsistent identifiers and 37,857 untyped edges via regex parsing and boolean normalisation, transforming raw data into a stable, joinable schema using R Studio.
- **Deployed anomaly-scoring models:** Utilised R's glmnet regression framework with custom algorithmic weighting to generate anomaly scores, successfully neutralising a massive 11,360:1 class imbalance without distorting the core signal.
- Mined beyond basic graph topology to uncover latent network relationships; engineered composite features for influence & popularity via custom heuristics, converting raw, disconnected edge data into actionable deployment scores.
- Shipped a D3.js interface (time-series + outlier views) making the scores usable by non-technical stakeholders.

Resource Load Equilibrium Simulation & Optimisation | Operations Research

- **Architected hybrid simulations:** Built an AnyLogic agent-based/discrete-event simulation of a two-node service network to model a **60/40 spatial demand bias** against fixed staffing misalignments.
- **Isolated failure modes:** Ran 1,000 replications varying a routing-information layer (0%, 50%, 80%) while holding staffing constant, proving that network failures stemmed from information flow bottlenecks rather than physical capacity constraints.
- **Quantified non-linear system levers:** Demonstrated that information adoption acted as a lever rather than a linear gradient. Reaching **50% adoption triggered a disproportionate 82.9% drop in SLA breaches (140.07→23.91)** but retained cascading stochastic variance. Pushing to 80% crossed a critical stability threshold, finalising a **94.8% reduction (7.31 mean)** and locking the system into load equilibrium with zero added staff.
- **Diagnosed systemic brittleness:** Uncovered a bimodal variance ($\sigma=12.68 > \text{mean}$) even at **80% adoption rate**, proving that stochastic shocks (e.g., weather events) forced agents into default behaviors. Concluded this required structural resilience mechanisms rather than resource optimisation.
- **Executed constrained optimisation:** Ran OptQuest (Anylogic) (500 iterations × 100 replications at 90% adoption) to identify a cost-minimal **£5,778/shift** staffing optimum. Minimised wages and a £50/SLA-breach penalty, subject to capacity caps and a hard 0.3 burnout limit to prevent artificial savings via staff exhaustion.

Experience

Makerble | UX Design Intern | 2024-2025 | 8 Months

- **Optimised enterprise workflows:** Analysed quantitative platform telemetry to identify user drop-off points, translating raw client activity data into shipped system improvements that reduced interaction costs for enterprise clients.
- **Executed decision-support enhancements:** Translated product requirements within an Agile sprint workflow to overhaul critical CRM modules, turning raw data into actionable visualisations to facilitate rapid decision-making.

Education

- University of Nottingham, MSc Human-Computer Interaction | 2025 - 2026 (Present)
- National Institute of Fashion Technology, Bachelor of Design | 2019 - 2023