A data driven approach to building healthcare asset rosters

1. HANDLE Global
   HANDLE Global is a data-driven healthcare supply chain analytics and fulfillment solutions provider.
   HANDLE is focused on improving data quality, enhancing transparency, and empowering strategic decision-making for their clients.

2. Problem statement
   No data driven approach currently exists for making budget allocation and capital asset expenditure decisions in sequence:
   - How many dollars should be spent next year?
   - Which business units should receive funding and which specific assets should be replaced?

3. The HANDLE ecosystem
   - Core Capabilities
     - Data Management
     - Financial
     - Financial Planning
     - Technology
     - Technology Services
   - Transformational Services
     - Data Engineering
     - Strategic Planning
     - Asset Disposition
   - HANDLE is a solutions provider

4. Data
   - Elementary data analysis
     - Add features
     - Add asset scores and active status
     - Impute missing data
     - Aggregates across a chosen category and compute mean, std, minimum and maximum
   - Dataset and insights
     - New plotting functionality
     - Historic fleet analysis

5. Methodology
   - Dataset creation & feature engineering
     - Machine learning
     - Predict budget allocation
     - Optimization
     - Prescribe asset acquisition
     - Improved care environment
   - 5.1 Machine learning
     - Predict healthcare system budgets for the upcoming year(s)
     - Linear models, tree-based models, and traditional timeseries
     - Used as input for optimization
     - 74% improvement over baseline
   - 5.2 Optimization
     - Prescribe optimal purchasing decisions via binary optimization modeling
     - Objective: minimize average asset scores
     - Constraints: budget, fleet allocations, maximum average score allowed, etc...
     - Optimal decisions concerning 10s of thousands of assets provided within 1 minute
     - Novel scenario/counterfactual simulation tool

6. Business impact
   6.1 Current strategy
     - Prediction
       - No predictions whatsoever – exclusively user input
       - Prescription
         - Greedily select assets within user inputted splits until money runs out given no fleet context.
   - Make predictions to provide a strong default budget and improve purchase prescriptions to save money and/or improve fleet health
   - 6.2 Decision making support tool
     - Make decisions confidently by using a model tailored to your specific needs and ambitions
     - 18% improvement in overall fleet health with no budget impact
     - 68% reduction in categories past useful life on average
   - 6.3 Scenario / counterfactual simulation
     - Test various scenarios to analyze optimal purchasing decisions under different conditions
     - Provide clients the flexibility to run the optimization model under customizable settings to simulate various scenarios
     - Aggregate across scenarios to identify what decisions are consistent, and what are scenario dependent

7. Transition plan & handover
   - Well documented code
   - Early alignment on tech stack
   - Meetings with all key stakeholders
   - Two weeks dedicated to handover

8. Project extensions
   - Extend binary optimization model to a multi-year optimization for long-term horizon planning
   - Incorporate growth modeling and consider fleet shrinkage
   - Include category priority classes

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Put me in, coach!

Smarter spending
Improved patient care

Can we predict budget allocation and use this to inform asset acquisition prescriptions using historical client data?

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