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The Strategic Business Value of Process Simulation

What is it, Why is it important, and How To Apply It

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ORANGE PAPER

Process Simulation: What is It?

The use of simulation tools is nothing new. NASA has used them for years to train astronauts. Weather services use them continually to predict weather using other supporting data gathering tools like doppler radar. However, using simulation tools to improve business processes has taken on a new look, given the recent surge in big data and Artificial Intelligence (AI) technology development combined with traditional Lean 6-Sigma methods.

Process simulation software tools simply enable management and operations users to build graphical process flow diagrams that dynamically model the impacts of how materials, people, orders, service requests, and any other business data or entity moves through a process over time. These process models can look like any standard Visio static process diagrams but differ in that they allow the user to add dynamic attributes to each activity and step, including cycle times, input and output feed rates, human resource utilization, and even quality error rates based on statistical distributions.

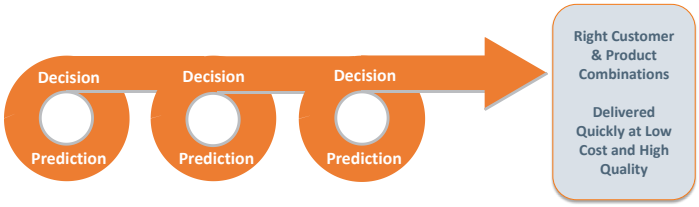
Because these attributes depict rate/time-based flows and decision points, they can be modeled to show the impacts at any point in time across any timescale; minutes, days, months, or years. This modeling advantage gets more powerful as the process gets more complex flow paths, decision points, and resource deployments, and is particularly powerful in showing aggregated "end-to-end" impacts of multiple linked processes. Consequently, each set of attributes can be changed slightly or dramatically and then remodeled to test a different end-to-end process scenario in a matter of minutes. This greatly accelerates business decision making, using the most desirable scenario outcome(s) to plan the execution and deployment of those process scenarios.

Why Process Simulation is an effective tool for business strategy

Any business strategy contains 2 major elements;

1. Determining the right products and services to sell to the right set of customers.
2. Determining how to deliver those products and services faster and cheaper at higher quality.

Each of the 2 strategy legs involves hundreds of prediction-to-decision cycles. For example, predicting which demographic of customers will buy your latest style of boots or Bluetooth headphones, and then making the decision to run a marketing campaign targeting them.



Similarly, predicting which brick & mortar stores or electronic channels and corresponding supply chains most efficiently deliver those products to that customer demographic, and then making the decision to build those infrastructures and processes to execute them. Feedback is received on the accuracy and effectiveness of the decisions, ideally through measurable means. The predictions are then revised, and the new decisions are executed. And the cycle repeats many times over.

Operational business process optimization continues to be the gold mine for improving the ability to deliver efficiently to customers. Process simulation accelerates the cycles of business predictions and decision

making on the operational process optimization fronts that impact efficient customer delivery. Simulation provides the models for the complexities of interconnected operational business processes to do 3 primary things:

1. Gain a more thorough understanding of current processes
2. Enable a credible data-driven ability to predict and verify the outcomes of proposed future process changes
3. Accelerate decisions to implement the actual changes predicted according to the data-driven model results

Strategic Decision-Driving Outputs

Models can drive data driven strategic decision making that allows users to test outcomes of scenarios without risking the unknown in daily production.

Real data from the models can predict outcomes of tested scenarios, reducing risk and unknown

Models can inform business decisions and drive efficiencies in undiscovered processes

And develop compelling business cases for funding for future process improvement initiatives

The data-driven aspect of process simulation is important. With the increased collection and recognized value of customer, supplier, and internal operational performance and behavior data, business decisions are increasingly being driven by the trends and patterns of insight this data provides. No longer are "thumb in the air" SWAG approaches to strategic decisions and predictions acceptable. The simulation models provide a compelling and convincing approach that management and operations alike can agree on as a data-based foundation for confidently making decisions before a large amount of implementation investment is committed.

This data-driven process simulation approach can be used as a strategic decision accelerator across a host of common but critical business operations and capabilities. Some customer-facing examples include customer service contact centers, sales order fulfillment, supply chain planning, and sales returns. In addition, the marketing operations group can get into the simulation act by modeling the flow of creative asset collaboration-to-campaign release and impact on sales. Similarly, market share penetration and growth can be simulated using certain assumed preconditions, such as distribution channel flow, rate of customer product adoption, and pricing.

Similarly, the process simulation method of "data proof first" evaluation can be **applied across many industry sectors**. With healthcare insurance, high volume back office operations like claims and front office operations like commercial group sales and enrollment can be modeled to determine the impact of taking manual paper-ridden activities out of the entire end-to-end process cycle. With B2C retail and B2B wholesale distribution and manufacturing, the value chain processes encompassing supply chain procurement and customer order fulfillment are big high volume simulation targets. In media and entertainment, logistics operations including staging setup, camera crew & equipment flow, and event audience queuing/service balance can be modeled and optimized for throughput, cost, rework minimization (quality), or even customer satisfaction. In short, simulation models provide data driven means of proving the impact of proposed reorganization, reengineered processes, and redesigned IT systems.

What Business Value Can Simulation Provide?

A **data-driven** process simulation approach can be used as a **strategic decision accelerator** across **common but critical** processes using operational and financial factors

OPERATIONAL

- Simulation is less costly than real life implementation
- Test different operational ideas under the same circumstances
- Determine throughput impacts across varying timeframes
- Drive staffing & fulfillment decisions using impartial data-driven insight

FINANCIAL

- Facilitate materials & staffing cost forecasts
- Predict product revenue resulting from what-if scenarios
- Calculate ROI on projects before investing
- Improve stakeholder communication and build buy-in

Process Simulation: How to Apply It

I. Choose the right processes to simulate

Great candidate processes are ones where high volume workflow throughput is a primary measurement or objective. The processes should have enough enterprise criticality that either significant or continuous incremental improvement will have a big impact. Typically, processes connected to customer satisfaction or employee productivity issues jump to the top of the priority list. Contact center or helpdesk data logs can be good sources of data to further define or narrow the candidate processes for initial targeting – and for current state measures to provide a baseline for later improvement comparisons.

Along with enterprise criticality, the target processes should also have enough current problems or risk to provide significant room for improvement. The highly "Leaned-out" and well running processes are only good candidates for simulation if they are being compared as the desired state against similar processes that are running inefficiently. Ideally, the targets should be complex processes with multiple interconnected or optional workflow paths. The more complex and difficult a process is to understand and model by other more traditional analysis (ie. spreadsheets), the better target it is for process simulation. Processes identified with poor throughput, quality, or cost performance outcomes, but where pinpointing and predicting their future performance challenges is hard, are good potential targets.

Where do We Start- An Ideal Simulation Project Should:

- Impact end to end performance measurements that matter
- Drive downstream decisions that impact employees, customers, and partners
- Have robust operational data for model creation and improvement
- Contain complex workflows and processes within interconnected systems

Customer Service
- CSR staffing validation
- Call resolution time
- Capacity planning

Healthcare Enrollment
- Anticipate peak activity & system capacity
- Identify processing bottlenecks
- Processor capacity & productivity

Claims Processing
- Mitigate process waste & downtime
- Target process steps & systems for targeted upgrades

Hospital Capacity & Materials Flow
- Patient wait times
- Staff and beds utilization
- Balance medical supply with patient use

Supply Chain & Order Fulfillment
- Predict buying patterns
- Determine fulfillment bottlenecks
- Anticipate demands spikes & valleys

Workforce Hiring & Training
- Staffing productivity & capacity
- Leverage model staffing scenarios
- Time to reach full capacity of staff

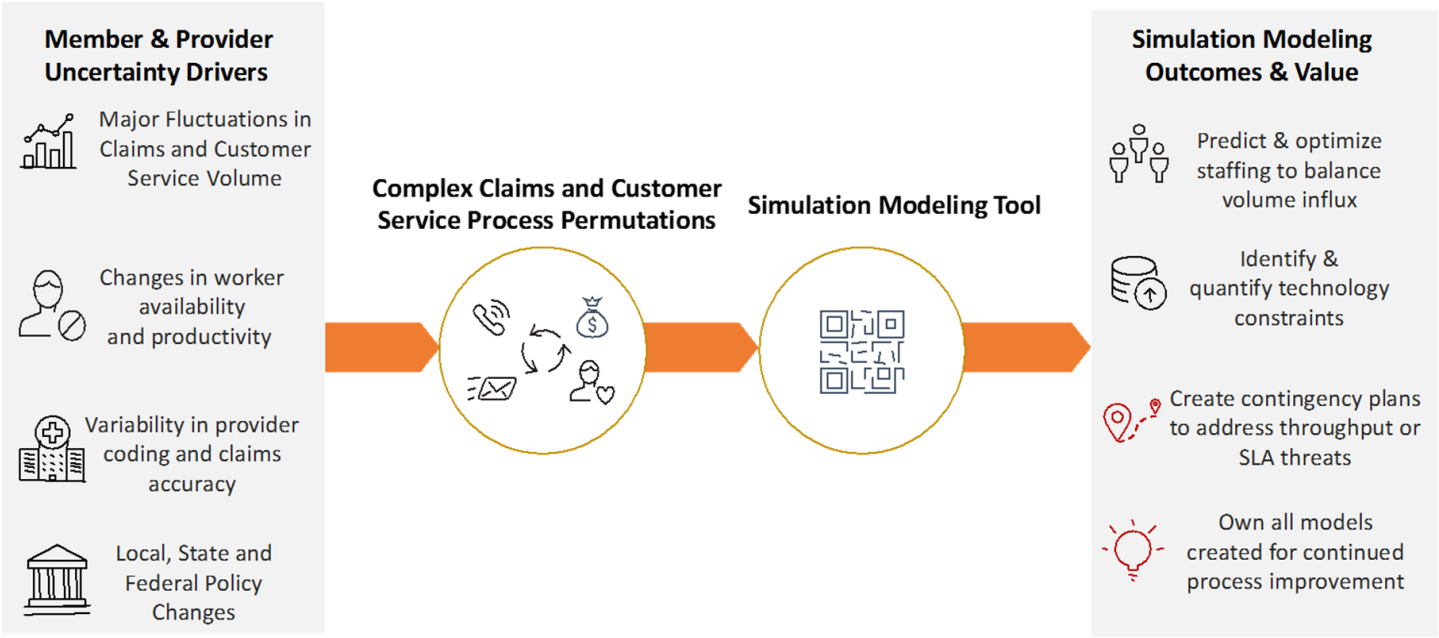
Media Events
- Event setup supply logistics
- Event equipment and personnel scheduling validation

Product Marketing Operations
- Product market acceptance scenario testing and impacts
- Digital asset creation-to-campaign process

Emergency Care Services
- Care pathway optimization
- Capacity limits
- Overflow routing procedures
- Physician scheduling

Consider processes candidates with a significant level of people interaction - either completely manual, or semi-automated where people interact occasionally with IT systems. If targeting semi-automated processes with people and IT interaction, leverage the high volume transactional data to surface areas of process variability 'hot spots' using 6-sigma statistical methods to:

- Reveal measurable performance problems, where both current state and future state scenarios can be simulated and compared quantitatively
- Surface potential user experience (UX) issues or constraints that may be partly responsible for process inefficiency or underperformance



II. Conduct the process simulation & optimization analysis on the chosen process

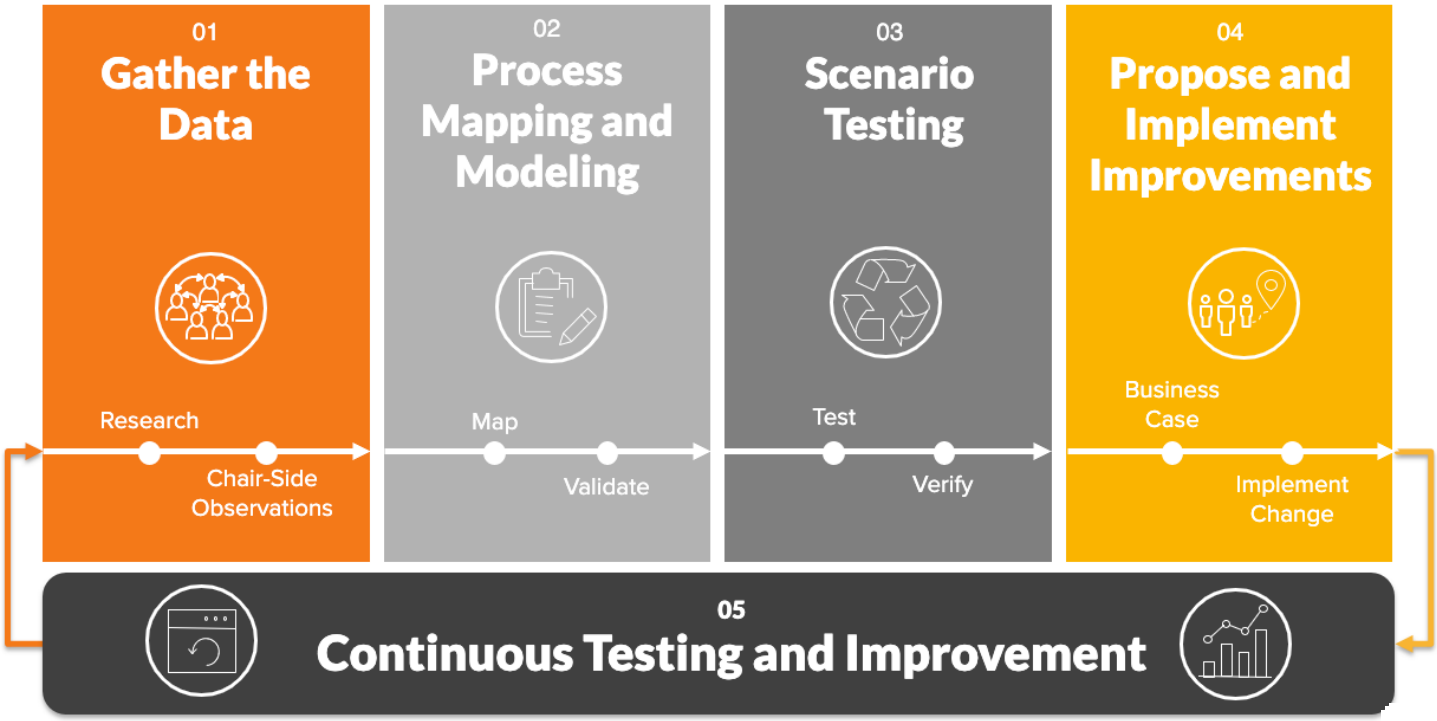
The following is a proven, but definitely not the only, set of high level steps that can be used to conduct the analysis.

1. Gather all IT system transactional data directly generated by the process or impacted processes downstream or upstream
2. Gather existing relevant process flow diagrams
3. Verify the operational flow of the process and impacts reflected in the transactional data using workshops with process owners, and document them with:
   - Visio diagrams
   - SIPOC (Supplier, Inputs, Process, Outputs, Consumer) process attribute tables
4. Create the current state simulation model and iterate its modeled cycle times, feed rates, flow paths, and resource loading to produce an end to end result as close to the current reality as possible.
   - Use the Lean/6-sigma **TIMWOODS** "8 deadly sins of process waste" filters to identify, categorize, and then quantify the primary bottlenecks and constraints as a part of the current state process model:

T Time
I Inventory
M Motion
W Waiting
O Over Processing
O Over Production
D Defects
S Skills Mismatch

5. Led by the TIMWOODS waste filters, and the process constraints they surface, hypothesize the future state fixes to those constraints, and then create the A-B testing scenarios to prove or disprove them.
6. Model simulated future state testing scenarios in structured order of simplest solutions to most complex:
   - Collect simulation output data on individual scenarios as standalone
   - Collect the output data on compounded combinations of scenarios where the next scenario builds on the previous one.
   - The more complex and varied the combination of scenarios, the more powerful the simulation tool and approach becomes as it enables the process re-designer to get predictable end state results quickly that can be compared against each other for the most optimal result.

How To: Standing Up Process Simulation



III. Highlight the main entity being optimized

When summarizing and presenting the primary outcomes and noted results of the analysis. This is important when planning, running, and comparing scenario iteration results. Typically, those optimized entities are one or more of these:

- End-to-end process cycle times
- Resource usage
- Error rates or rework cycles
- Work in process (WIP) reduction
- Cost to operate
- Revenue produced

What to expect

The process simulation modeling approach produces verifiable data-driven conclusions that stand out as compelling to most executives and management who are trying to decide on 1) Fiscal year budget allocation for projects, 2) strategic product or customer direction, and 3) operational expense forecasting, given the ability to successfully execute the simulation modeled plans and deploy the process improvements expected.

The modeling approach also empowers the process operators and system users to apply their own Lean thinking to continuously improve their own process activities. Most of the time, the best continuous improvement ideas come from the people doing the activities and recognizing the inefficiencies. Part of many corporate Lean program rollouts include educating these operations users on how to recognize, surface, communicate, and ideally quantify their processes' TIMWOODS 8 deadly sins of waste to their teams and team leads. Simulation modeling takes that a step further allowing the user's waste-cutting operational improvement ideas to be test run in future state scenarios in the simulation tool. Within minutes - not days or weeks - the Lean teams can evaluate the impacts of their ideas before a much larger amount of time, money, and resources are invested in implementing their improvements. This not only encourages operational team members to double down on their improvement discovery and recommendations, but the simulation models also provide a more demonstratable method for showing employee contributions to the business at management levels. Not a bad tool to increase employee morale and individual buy-in to company direction, especially during performance evaluation periods.

Simulation Metric	Current State - Regular Enrollment Volume	Short Term Future State - Regular Enrollment Volume	Short Term Future State - Open Enrollment Volume
Resource Allocation (Total)	**30**	**30**	**30**
Data Intake (Enrollment / Mail Tech)	8	8	8
Enrollment Processing (w/ OPL)	12	12	12
QA	10	10	10
Resource Utilization (Average)	**83%**	**64%**	**89%**
Data Intake (Enrollment / Mail Tech)	59%	64%	74%
Enrollment Processing (w/ OPL)	100%	100%	100%
QA	91%	91%	92%
Average Cycle Time - Intake to Fulfillment (days)	**5.82 (SD: 1.71)**	**4.26 (SD: 1.69)**	**7.02 (SD: 1.69)**
Total Items Processed	17,039	17,542	18,490
Items Remaining in Queues	3,679	1,484	14,000

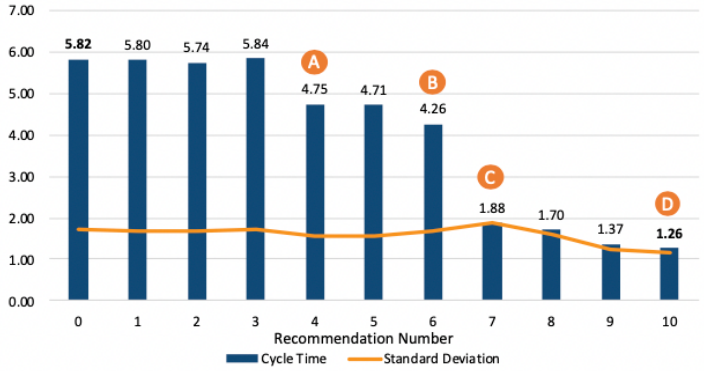
A Prior recommendations reduce utilization in Enrollment intake, but do not address Enrollment processor backlog

B Intelligent Character Recognition (ICR) has major impact on average time, but causes std. dev to rise

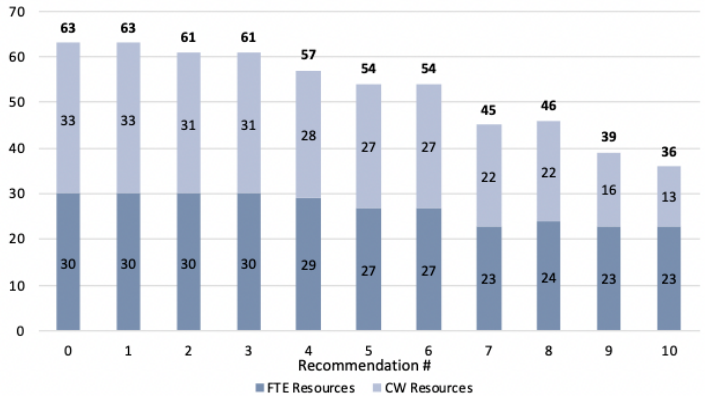
C Changes in UI and integration of TPL work and resources reduced standard deviation

D The overall impact of recommendations – 78%-time savings in future state

Cycle Time Impact – with Compounding Solutions



Required Resources per Recommendation



Finally, process simulation models provide an effective and productive application home for the ever-expanding volumes of operational big data, now increasingly seen as the gold mine for artificial intelligence and machine learning initiatives. As AI and machine learning tools grow in their ability to trend, categorize, and predict the direction of business operation data, the simulation model activity flow parameters and cycle time KPIs can be continually updated with this same data. This enables each model to more accurately show the end-to-end process impacts of operating efficiency moves, as the machine-learned algorithms become more accurate in feeding it the trended cycle time measurements. The partnership of process simulation modeling and machine learning may be the most powerful combination of all the business levers available for business decision makers to pull.

1

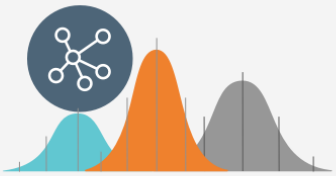
Train AI Algorithms on Operational Data

2

Integrate With Simulation Model

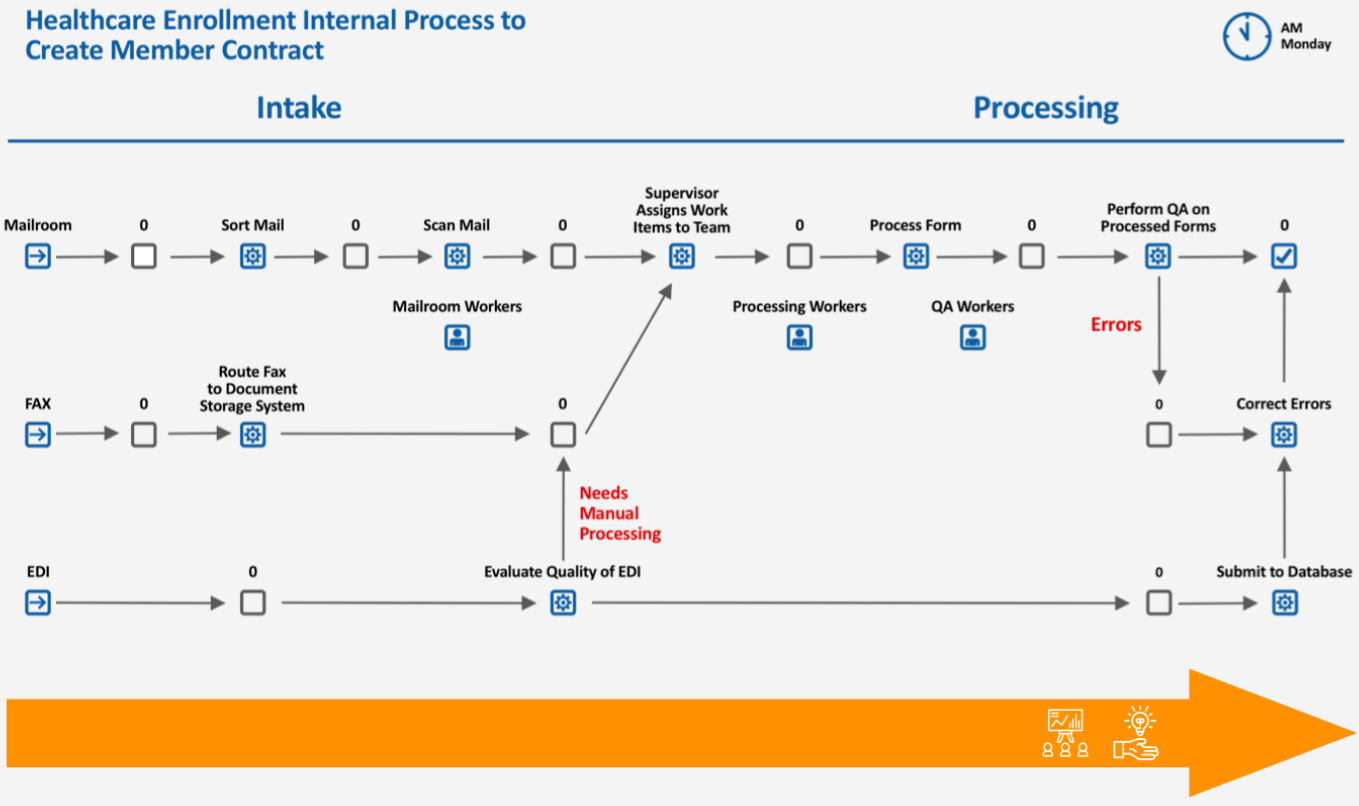
3

Trends Update Model Activities



4

Model Dynamically Predicts End-to-End Impacts



Meet the Author

Scot Alexander, Managing Director in Optimity's Minneapolis Office

Scot has 25 years of experience delivering solutions impacting customer, partner, and employee experience He focuses on the engagement management and business architecture within health payer, provider, and life sciences industries. Scot has led multiple programs redesigning benefit products, broker sales channels, and core administration platforms. Specifically, he has led engagements to stand up new healthcare payer operational models, IT systems, and business processes - implementing customer intake to enrollment, medical management, claims payments, and customer service. Additionally, Scot brings cross-industry Industrial Engineering perspective and solutions from consumer goods manufacturing, distribution, and retail operations.

THANK YOU

Thank you for your valuable time. For further information, please contact:

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