bpsglobal
Best Practice Solutions

Arena®

Simulation Software

模擬軟體系統分析診斷與改善工具

Rockwell Automation
Arena® Partner

What is Arena® Simulation Software?

甚麼是Arena®模擬軟件?

Arena is a discrete event simulation and automation software developed by Systems Modeling and acquired by Rockwell Automation in 2000. It is the world's leading Discrete Event Simulation Software and is used by majority of Fortune 100 companies across the world.

The software lets you determine the impact of your business decisions before they are implemented. It provides you the capability to capitalize on business performance. Arena combines the ease of use found in high-level simulators with the flexibility of simulation languages. It provides alternative and interchangeable templates of graphical simulation-modeling and analysis modules that user can combine to build a fairly wide variety of simulation models.

Arena 是一個離散事件仿真模擬軟件，由Systems Modeling開發、於2000年被Rockwell Automation收購。它是全球領先的離散事件仿真模擬軟件，並於世界100強企業廣為應用。

Arena擁有眾多同類軟件無法比擬的優勢，用戶可在實行最終決策前，通過其建立的模擬模型，提前進行分析預測及試運行。讓用戶更好地利用經營表現，創造更好的績效。Arena 結合高層次模擬程式簡單易用的好處，以及模擬語言的靈活性。Arena 提供多選擇可互換的圖形化模擬建模模板和分析模組，使用者可透過不同組合建立多種模擬模型。

Benefits

客戶收益

- Increase Throughput 增加吞吐量
- Identify And Eliminate Bottlenecks 辨認並消除瓶頸
- Improve Logistics 改善物流作業
- Evaluate Potential Process Change 評估潛在工序轉變
- Reduce WIP 減少半成品
- Optimize Resource Utilization 優化資源配置
- Test New Design Alternatives 測試新設計替代方案
- Improve System Performance 改善系統效能

Logistics Technology is at the heart of today's extended global supply chain. BPS Global helps our clients' businesses embracing Industry 4.0 with automated warehouse and logistics system to attain increased efficiency, reliability and responsiveness. We offer tailor-made solution for our clients with staged investment, flexibility and scalability for future expansion. Our all-round turnkey solution starting from professional business solution design and consultancy service, logistics automation consulting to first-class project execution and maintenance services.

物流科技是當今全球供應鏈的核心。威裕環球幫助客戶採用自動化倉庫和先進的物流系統來實現工業4.0，從而提高企業整體的效率，可靠性和反應能力。我們為客戶提供度身定制的解決方案，提供階段性的投資建議，協助企業將自動化設備靈活延伸到未來的商業模式中。我們的全方位一站式解決方案，包括專業的方案設計及顧問服務、物流自動化諮詢、項目執行和維修服務。

Hospital Shortens Patient Stays with Emergency Department Simulation Arena® Simulation

Background

In an effort to improve patients' experiences and to increase the system throughput in the emergency department (ED), a large urban hospital in central Staten Island, New York, turned to a successful health care consulting company to assist them in identifying key issues and to recommend changes in their system. At the time, the busy emergency department (ED) served about 200 patients per day. The high volumes, coupled with the chaotic service practices, contributed to the frustration of both the patients and the hospital staff.

Challenge

Hospital officials were concerned about a decline in ED service and realized that negative patient experiences had led to a loss of market share and an adverse impact on the hospital's reputation. Contributing to this decline were large patient wait times, lack of formal protocols for nurses and doctors, and unacceptable door-to-door patient times. Initial evaluations indicated that the process could be improved by implementing system changes to restructure nurse staffing and emergency department functional tasking in order to eliminate redundancy and to unify the procedures for better service and improved patient flow.

To quantify the assumptions made about the projected process improvement, the team needed a decision-support tool that would validate the initial recommendations. By developing an emergency department simulation model using healthcare simulation software, the system analysts would test their theories and use the tool to identify key bottlenecks and problem areas and ultimately seek a solution that would maximize the existing resources and reduce the duration of the patient stay.

Using Arena healthcare simulation software, Rockwell Automation Arena consultants created an emergency department simulation model of the existing ED to aid in the system analysis. By incorporating individual ED process spreadsheets, the analysts could evaluate a number of "what if" simulation model scenarios that allowed the hospital teams to visualize their departmental processes and interactions before making any significant system changes. Among the greatest challenges to the study was the considerable disparity in the decision making processes being used by the hospital staff. It was difficult to collect healthcare predictive analytics that accurately reflected the overall process as each patient moved through the system. It was also difficult to convince the hospital officials that the emergency department simulation model truly represented the operation of their facility.

Solution

Coupling an integrated excel user interface with the Arena emergency department simulation model allowed the team to easily change various input requirements and review specific output values. The interface gave the team the flexibility to change the patient mix flowing through the ED and analyze Arena generated reports for quantified results. Additional changes to process delay times and resource schedules allowed for the creation of multiple scenarios. The team could then compare key performance indicators (KPIs) among the alternative scenarios. Arena-generated reports provided the team with quantitative data for review. Average door-to-door patient times in the system, resources utilizations, and throughput statistics were of particular concern to the hospital officials.

The team was eager to see how the input factors affected the time each patient was spending in the ED. The project team created several scenarios with varying staff levels in order to determine whether increasing resources would significantly impact the patient time in the system. Additional scenarios allowed the project team to analyze the effect of decreased processing times on the service levels.

Results

The compelling results of the emergency department simulation study convinced the hospital officials that the key problem was due to an extensive amount of processing times and not insufficient resources. The healthcare simulation software validated and quantified the impact of incorporating a "system-driven" ED rather than a one with overlapping functions and differing methods and procedures. It proved that increasing efficiencies within each process would have the effect of increasing throughput and significantly reducing the patient time in the system.

Although service levels could be improved within the current structure, the project team developed another emergency department simulation model to analyze the impact of merging the Main 1 and Main 2 EDs into a single ED. The two areas had been functioning as separate emergency departments with very distinct resources and processes. With the help of Arena healthcare simulation software, the project team validated the perception that a single department with pooled resources and consistent protocols would dramatically improve the overall system effectiveness and, ultimately, enhance the patient experience.

醫院透過Arena®模擬軟件對急症室進行模擬運作，成功減省病人輪侯時間

背景

為求改善病人就醫體驗和提升急症室的整體流量，一間位於美國紐約市史泰登島中央的大型醫院求助於當地一間成功的醫療顧問公司以幫助他們分辨出主要的問題和提供急症醫療系統的改善建議。現時，急症室異常繁忙，每天處理求診人數多達200人。由於急症室就醫人數過度增加，人滿為患，加上服務上的混亂，讓病人及醫院職員倍感沮喪。

挑戰

醫院高層對急症室的服務質素下滑表示十分關注，他們也意識到不愉快的患者就醫體驗將造成醫院在市場份額上的損失和聲譽的影響。造成服務質素下滑的原因包括病人輪候時間過長、醫生和護士缺乏正規的手則、以及令人無法接受的病人"門到門"(door-to-door)過長的等候時間。初步評估表示整個流程可透過改變既有系統以作改善，包括重新編排醫護人員值班及重新組織急症室的工序，以消除冗餘的程序和統一標準化服務流程，藉此提高服務質素及改善病人流量。

為量化對流程上的轉變而作出的假設，醫院團隊需要一個能驗證改善措施的決策支援工具。透過使用醫療模擬軟件建立出一個急症室的模擬模型，系統分析師將驗證模型相關參數是否達到原始需求，並利用軟件找出最關鍵的瓶頸和問題所在，從而找出一個能將已有資源收益最大化和能確實減少病人逗留急症室時間的最終解決方案。

利用Arena醫療模擬軟件，Rockwell Automation的Arena軟件顧問為醫院建立完善健全的急症室模擬模型以幫助分析。透過結合每個急症室流程的試算表，分析師可以評估出一系列"what if"的模擬模型情景，此舉容許醫院團隊在執行任何重要的系統變更前，將部門內的工序和交流可視化。研究當中最大的挑戰是醫院職員之間在決策過程上存在不小的分歧。要收集能準確反映整個模擬流程 — 細微至每個病人在系統內的移動動向 — 的醫療預測分析相當困難。要說服醫院高層急症室模擬模型趨近真實反映急症室的日常運作也是十分困難。

解決方案

透過結合excel用家介面和Arena急症室模擬模型，研究團隊能輕易地改變各個輸入和覆核特定的輸出值。這個介面給予團隊在改變各種急症室病人組合流動上的靈活性及能夠為Arena產生的報告分析出量化的結果。通過創造多個不同情景，研究團隊也能額外地改變流程延誤時間和資源分配。研究團隊其後可以比較在各個不同情景的關鍵績效指標(KPIs)。Arena產生的報告也為團隊提供量化數據作覆核。一般病人"門到門"在急症室系統所需的時間、資源利用和流量的統計皆是醫院高層十分重視的問題。

研究團隊渴望能觀察到輸入的因素如何影響每個病人於急症室的逗留時間。研究團隊建立了多個有不同醫院職員數量的情景，以驗證資源上的增加會否大幅影響病人的逗留時間的假設。額外建立的情景讓研究團隊分析處理時間的減少對服務水準的影響。

結果

急症室模擬研究結果成功說服了醫院高層，急症室關鍵的問題在於病人輪候時間過長而非設備資源上的不足。該模擬軟件驗証和量化了推行"系統驅動"的急症室而非一個有功能重疊，且方法、程序皆不同的舊有急症室所造成的影響。它也証明了提升每個流程程序的效率能增加流量及大幅減省病人輪侯時間。

雖然服務水平能在既有醫院體系格局中改善，研究團隊也建立了另一個急症室模擬模型以分析將獨立的兩個急症室合二為一帶來的影響。兩個急症室一向是獨立運作，它們各自擁有自己的資源和流程。有賴於Arena醫療模擬軟件的幫助，研究團隊驗証得出：一個擁有資源整合、規劃統一的急症室部門能大幅改善整個系統效能，最終，病人就醫體驗也得以提升。

How BPS Global Helps You to Model Your Business with Simulation?

威裕環球如何透過仿真模擬軟件幫助你的企業營運?

We are helping clients across the world and across different industries in improving productivity, reducing costs, lean operations and lean supply chains. We may make use of Arena Simulation to evaluate complex business systems in our consultancy study. We can also provide optional training courses to our clients in using Arena Simulation to its best capabilities.

我們幫助來自世界各地不同產業的客戶提高生產率、減省成本、精簡操作和精益供應鏈。我們在諮詢的過程可使用Arena仿真模擬軟件分析和評估複雜的商業系統。客戶也可以選擇我們提供的Arena仿真模擬軟件培訓課程，以達致最佳使用效果。

Our Industries
行業應用

- Supply Chain 供應鏈
- Healthcare 醫療保健
- Airports 機場
- Ports & Terminals 港口&貨運碼頭
- Manufacturing 製造業

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