

Advanced Analytics

An OSF Innovation Case Study

THE OPPORTUNITY

In 2013, OSF HealthCare functionally transformed its Healthcare Analytics team, a part of OSF Innovation, to enable and enhance its analytics capabilities to support a growing culture of data-driven and contextual decision-making. Among the team's many roles, it supports the strategic goals of OSF HealthCare, the clinical agenda and the execution of strategic initiatives. As part of the group's transformation, it was determined there was a need to integrate data into predictive models for the benefit of improving decision-making within the health care system.

THE SOLUTION

Healthcare Analytics established an Advanced Analytics team to specialize in utilizing advanced analytics techniques to serve high-performing care delivery teams and their patients. Composed of data scientists and statisticians, Advanced Analytics focuses on matching the best tools to project needs and audience to innovatively enhance the way the organization cares for patients.

THE IMPACT

Advanced Analytics team members closely collaborate with business and clinical leaders to understand problems, define focus questions, prepare appropriate data, build effective models and implement solutions to enable business and clinical actions guided by model results. Business value is often maximized when the deployment of the model is integrated with clinical workflow to provide prompt or near-real-time opportunity for intervention. The team receives an average of 29 data science requests and 20 statistician projects per quarter. In its current state, Advanced Analytics can handle 25-30 standard data science development projects, 10-14 standard data science production deployments and 65-70 standard statistician projects per year.



OSF HEALTHCARE

OSF HealthCare, headquartered in Peoria, is owned and operated by The Sisters of the Third Order of St. Francis, and consists of nearly 21,000 employees in 126 locations, including 13 hospitals, 11 Centers for Health and 15 OSF PromptCares throughout Illinois and Michigan. More at osfhealthcare.org.

OSF INNOVATION

Launched in 2016, OSF Innovation is the overall umbrella initiative for the planning, structure, goals and services OSF HealthCare uses to innovate for the improvement and transformation of health care.

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BUILDING DATA MODELS TO PREDICT THE FUTURE

The Healthcare Analytics team within OSF HealthCare has been translating data for leaders to make informed decisions for the Ministry for years. As the group was being functionally transformed in 2013, questions arose as to whether data collection and analysis could be taken a step further—in a way the organization hadn't done. That was to utilize advanced analytics techniques to drive changes and improvements in business practices.

As a result, the Advanced Analytics team was formed to specialize in using these methods including descriptive, predictive and prescriptive modeling, decision trees, machine learning, natural language processing, image processing, simulation and optimization as well as robust statistical analysis to serve high-performing care delivery teams and their patients.

The team is now made up of five data scientists, three statisticians and one director, who is also a practicing data scientist.

SCOPE OF WORK

The statisticians within the Advanced Analytics team have historically focused on clinical research projects. These members of the team provide statistical support for research and analyze any data that comes out of a particular study, write reports and help with publications. They now also support driver metric analysis and target setting for the organization's Key Results as well as provide statistical support to certain areas.

Data scientists tackle large-scale questions from business leaders within OSF HealthCare such as predicting whether a particular event is going to happen or forecasting the volume of some sort of service. This group analyzes historical data and predicts what that will look like on a future unknown dataset. As an example, the group's Pre-Lab Sepsis Model uses a patient's historic data to estimate the probability of that individual having sepsis. The improved model, along with associated, work has led to faster identification of sepsis risk by 68 minutes and a \$682,000 annual reduction in emergency department staff time.

To reliably predict the future, data scientists use a variety of tools. For example, *natural language processing* is a method of teaching a computer to read, extract information or interpret it. Using *simulation*, the team can build a model that safely estimates the

impact of certain processes without impacting the lives of patients or staff. The *optimization technique* allows Advanced Analytics to create a mathematical representation of a process to calculate the time spent performing that particular job.

The solutions built by the team have consistently helped the organization understand and improve performance in various areas. That includes helping OSF HealthCare impact 30-day readmissions; optimizing nurse staffing for inpatient units across the Ministry; improving performance and compliance with the organization's Sepsis Bundle; providing physicians increased visibility into historical Ejection Fraction values for Heart Failure patients; and reducing unnecessary documentation needs through a combination of workflow automations and effectiveness analyses.

FUTURE STATE

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As Advanced Analytics evolves, the team hopes to expand staffing or partner with others to meet the organizations growing needs. This projected growth includes the addition of roles similar to the following:

- **Mechanic** – This potential role would focus on monitoring live model performance, keeping deployed applications functioning and providing break/fix solutions where possible.
- **Decision Scientist** – This position would scientifically study the intersections of humans and analytical solutions, helping the team better refine its displays and approaches to maximize impact.
- **Epidemiologist** – This advanced quantitative professional would focus on the scientific study of the health of specific populations and the associated causes of health variances.

"It's beneficial to have an in-house Advanced Analytics team that's immersed in the internal and external data coming from various sources. We've been able to demonstrate improved performance on the things we've built internally. But, we understand building custom solutions isn't always the best strategy. So, we also help match needs to a variety of solutions."

—CHRIS FRANCISKOVICH, DIRECTOR, ADVANCED ANALYTICS

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