



# PREDICTIVE ANALYTICS FOR THE B-2 WEAPON SYSTEM SUPPLY CHAIN

Case Study

## Highlights

### Industries

- DoD/USAF
- Logistics and supply chain

### Outcomes

- Predictive model to rank parts based on supply chain risk
- Probable risk severity and actionable information
- Outage prediction with 2.5 times greater accuracy in less time—hours versus days
- Sorted and visualized predictions to optimize work loads
- Automated prediction process

### Technical Areas

- Advanced and predictive analytics
- Data simulation
- Algorithm development
- Machine learning
- Data collection and ingestion
- User interface development
- Data modeling and federation
- Risk mitigation

### Technologies

- Python
- MySQL
- R
- scikit-learn

### Statistics

- 10 datasets
- 50,000+ observations
- 20 observables

### Data

- Availability
- Fleet usage
- Parts reliability

## Data Science & Advanced Analytics to Predict Part Shortages for Improved Mission Capability

### Business Challenge

**The Air Force is seeking new methods for optimizing the supply chain—ensuring the right parts, at the right time, while keeping inventory costs down**

The availability of planes in the fleets are severely impacted when parts necessary to fly are unavailable. The Air Force requires an improved methodology to more accurately predict which parts will lead to a mission incapable incident with particular interest in incidents more likely to have long durations—effectively grounding the planes. This large, multivariate problem requires ingestion of decades of supply, demand, and usage data. Furthermore, use of obvious indicators by item managers have not prevented shortages in the supply chain; therefore, the solution must find a method for identifying unforeseen issues.

### Innovative Solution

**ILW data scientists implemented the Markov Chain Monte Carlo method to develop an innovative model to predict outages with 2.5 times greater accuracy and in far less time—predictions in hours versus days**

ILW's prediction model identifies the probable severity of the risk to the Air Force B-2 weapon system's supply chain in terms of impact to aircraft availability as well as the timing for when that impact will be felt, and produces actionable information to prevent future problems. Leveraging robust analytic methods, advanced data simulation, and historical data encompassing the plane, inventories, repair shops, and procurement systems, ILW developed the model to forecast part failures to mitigate delays in operational aircraft availability and identify long-term trends and less obvious indicators to predict which parts will lead to mission incapable incidents with long durations. ILW's analytical algorithms are successfully predicting demands, highlighting potential shortages, and prescribing the means to resolve Air Force B-2 aircraft part shortages that were previously unidentified.



[www.illuminationworksllc.com](http://www.illuminationworksllc.com)