

Integrating Diverse Life Sciences Data to Provide Actionable Insight — Responding to COVID-19

The rapid spread of COVID-19 has highlighted biosurveillance, public health, logistics and computational challenges. For instance, the emergence of COVID-19 has highlighted a gap in our ability to rapidly integrate, analyze and use diverse data sources for better modeling and prediction. With the diversity and amount of data available beyond past outbreaks, there remains a need to rapidly synthesize this data to help decision-makers get ahead of the epidemiological curve or respond more efficiently to future challenges.

Noblis is deploying innovative approaches to rapidly analyze the data.

As an industry leader in developing best-in-class bioinformatics tools, Noblis has been turning genomic data into actionable information using big data, advanced analytics and high-performance computing (HPC) for over 25 years. Our custom-designed bioinformatics tools enable us to respond to our nation's rapidly evolving biosurveillance challenges. Our team provides a high-trust partnership with the speed, scope and scale necessary to drive COVID-19 biosurveillance expansion. Our bioinformatics are immediately applicable to COVID-19 response, future waves of COVID-19 incidences should they occur, as well as future emerging pathogen outbreaks worldwide. These capabilities provide computational analytic tools and subject matter expertise for improving diagnostics, surveillance and response to this pandemic in the U.S. and abroad.

Noblis Solutions in Action

By comparing all whole genome sequences (WGS) of the virus as they become available daily, Noblis is rapidly tracking mutations affecting diagnostic assay sequences, identifying signature erosion, and generating new assays *in silico*. "Signature erosion" refers to the potential false-positive and false-negative results from PCR assays due to mutations in the primers, probe or target sequences.

Noblis' unique bioinformatics application called [BioLaboro](#) features several Noblis developed tools including:

- BioVelocity® – our patented tool which identifies unique signature regions in a set of target sequences
- Primer3 – an open source tool which determines potential PCR assay regions in the identified signatures
- PCR signature erosion tool (PSET) – our tool which tests the efficacy of the new and existing assays against all sequences in standard public databases such as the National Center for Biotechnology Information

Noblis is an OASIS Pool 1 and Pool 4 Contract Holder.

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We are applying BioLaboro to COVID-19 today.
See our press release at <https://noblis.org/coronavirus/>

Harnessing the Power of HPC and Machine Learning (ML) to Respond to COVID-19

Noblis has blended our knowledge of HPC, cloud-based solutions development and biology to provide a system to analysts that helps them analyze seemingly disconnected, large, and diverse sets of data, called CBRNE-wire. This system allows analysts to stay ahead by alerting them to emerging trends and novel threats in the CBRNE space by revealing underlying patterns in massive open source data sets such as news articles, foreign press, conference transcripts, publications, and even Dark-Web data sources.

Noblis scientists leverage multiple on-premise HPC clusters containing thousands of compute cores, terabytes of memory and petabytes of storage, as well as multiple graphics processing unit servers for ML and neural network training.

Today there are large amounts of COVID-19 data available and at a more highly geo-based granular level than other pandemics. Across the spectrum of COVID-19 datasets Noblis can combine our analytic approaches, HPC solutions and subject matter experts for use cases including:

- [Acquisition and program management](#)
- [Data modeling and visualization](#)
- [Research and development](#)
- [Prototyping and test and evaluation](#)
- [Dashboard development and UI/UX for new software](#)
- [Cyber security](#)

OUR PROCESS

Our end-to-end approach to advanced analytics systematically moves the stakeholder data through a repeatable process.

1	REQUIREMENTS Use Case Identification and Value Analysis	We work with stakeholders to identify use cases and business value with the understanding that these elements drive the architecture of the big data solution.
2	ANALYTICS Data Capture, Data Transfer, and Data Preparation	Combining our understanding of mission needs with deep domain expertise enables us to rapidly identify, acquire and exploit the right data for the task.
3	DATA ACQUISITION Tools, Techniques, and Platforms	Expertise in modern, predictive analytics, automation techniques and HPC, including HPC clusters, supercomputers and cloud-based supercomputing.
4	POST PROCESSING Organizational Value Extraction and Visualization	We extract business value from the raw output of analytics. This is iterative, resulting in multiple outputs that depend on previously identified use cases.

About Noblis

Noblis is a dynamic science, technology, and strategy organization dedicated to creating forward-thinking technical and advisory solutions in the public interest. We bring the best of scientific thought, management, and engineering expertise together in an environment of independence and objectivity to deliver enduring impact on federal missions.

Noblis works with a wide range of government clients in the defense, intelligence and federal civil sectors. Together with our wholly owned subsidiary, Noblis ESI, we tackle the nation's toughest problems and support our clients' most critical missions.



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