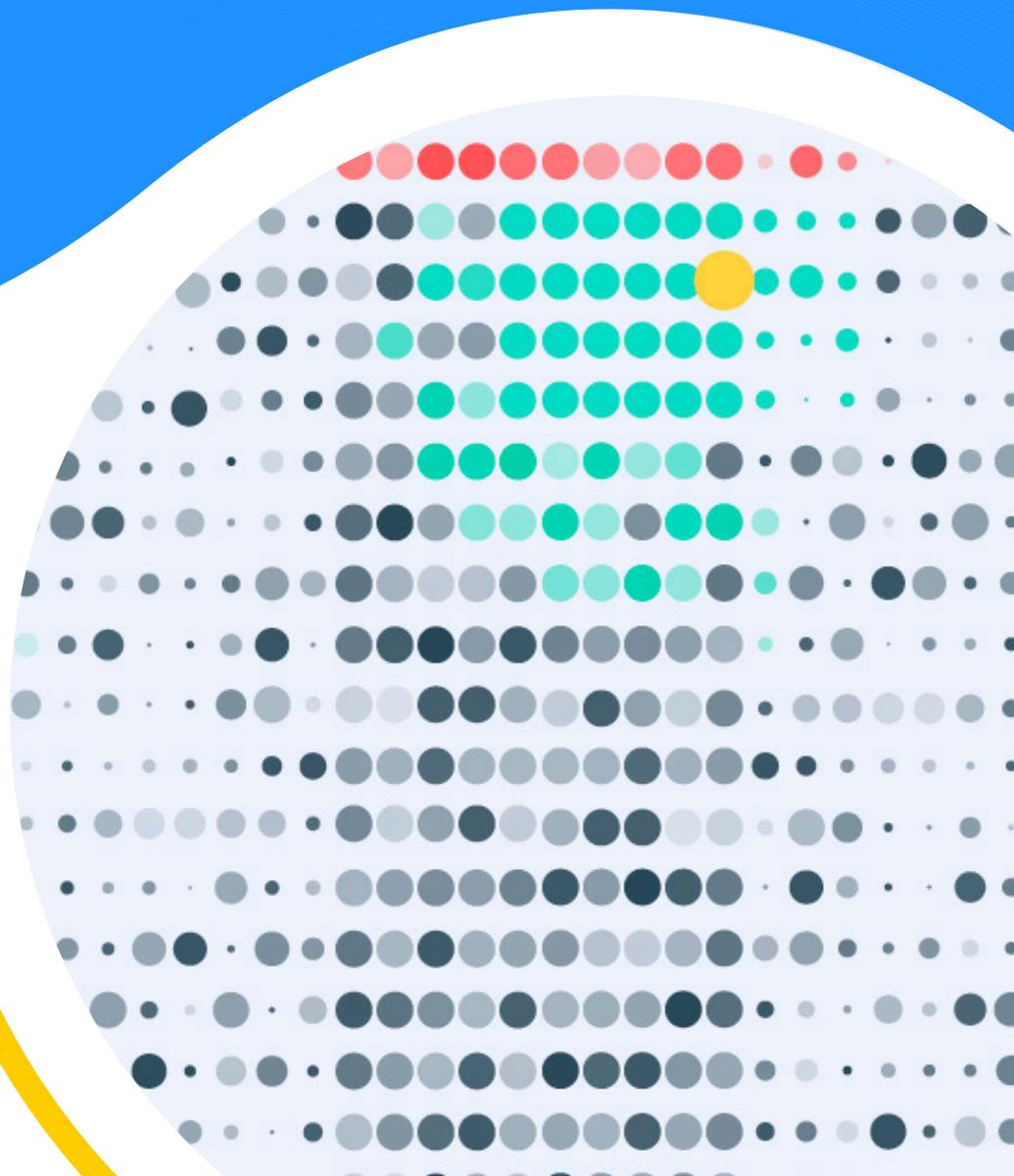


Cogynt.ai – a Continuous Decision Intelligence Platform Overview



Introduction

Intelligence analysts and decision makers, and by extension the enterprise, are largely behind the curve when it comes to implementing effective predictive intelligence solutions. This is due to the ever-expanding flow of data and the limitations of current IT and analytic systems. Analysts are simply overwhelmed, resulting in unquantifiable risk exposure and lost opportunity for the enterprise.

At Cogility, we regularly hear from executives and operational managers that the intelligence solutions and staffing in place can, at best, adequately track only Level 1 and Level 2 risks (i.e., the highest level risks). Their concern is Level 3 and Level 4 risks: these cannot be adequately tracked with existing resources, could at any moment evolve into higher risk, and will evade detection because their current intelligence solutions and staffing don't have the level of automation or bandwidth to identify and monitor them. This challenge is common to both government and industry: it forces a conscious decision to monitor less than the entire risk surface.¹

Cogility has spent more than 10 years researching and developing technology to address this critical issue. The result of this effort, Cogynt.ai, is a decision intelligence platform (DIP) which we believe provides the most comprehensive, versatile, and integrated solution in the market, capable of taking on the most complex real-time decision-making challenges — efficiently and cost-effectively.

“Without big data analytics, companies are blind and deaf, wandering out onto the web like deer on a freeway.”

GEOFFREY MOORE , AUTHOR , AND CONSULTANT

1 Risk Surface is normally referred to in the context of cyber. In this paper, a risk surface considers all types of risk that include both technical and socio related risks.

What is Cogynt.ai?

Cogynt.ai is a DIP that delivers continuous decision intelligence (DI) for analysts, data scientists, and decision makers. The platform integrates event stream processing, advanced analytics, investigative analysis tools, case management, and a Business Intelligence (BI) dashboard into a single unified platform solution. Cogynt.ai's expert based approach enables analysts and data scientists easily to translate hypotheses into hierarchical models, all with no-code, providing explainable results and allowing decision makers to make highly informed decisions.

Cogynt.ai accomplishes this by ingesting all available data and matching this data in real-time to targeted patterns of behavior. Targeted behaviors are those impacting risk levels or identifying the emergence of opportunity. These behavioral patterns, as discussed below, are in almost all instances well known by the enterprise's subject matter experts (SMEs), and can be easily incremented or modified as new information and insights dictate. Further, Cogynt.ai continuously assesses risk (or opportunity) for each entity or developing scenario of interest to the enterprise.

During the continuous, real-time processing of data (which represent events), if an analyst defined behavioral pattern meets a specified threshold, Cogynt.ai publishes a new detection event. This instantly informs Cogynt.ai Analyst Workstation (the investigative and visualization tool) and can be communicated to other applications in the enterprise.

Each event notification provides a wealth of information, including a quantified risk assessment with full provenance of all the underlying event history. This allows the analyst to quickly validate and understand the context of a given notification. In intelligence work, developing context is an essential, challenging, and time consuming task. Since Cogynt.ai delivers this context on a continuous basis, precious analyst time and effort are saved. This results in timely alerts, improved decision making, and greatly expanded knowledge of the entire risk surface.

Cogynt.ai is a proven, scalable platform that is currently being deployed in two broad market areas — insider risk management and cyber threat intelligence. In both, the demand for extensive, timely, and actionable decision intelligence is crucial. However, its capabilities to solve complex intelligence challenges extends well beyond these application areas.

What makes the Cogynt.ai platform so powerful? Its highly integrated architecture, event stream processing and behavioral analytics, and ease of use that includes no-code authoring, investigative and visualization capabilities, and case management.

At its core, Cogynt.ai is a DIP that delivers decision support (DI) for analysts, data scientists, and decision makers.

Cogynt.ai Architecture

The Cogynt.ai DI platform is a modern DIP augmented with Cogility's patented real-time analytic, no-code authoring environment, and extensive integration capabilities. This system was built for big data problems that can be elastically scaled within cloud environments. Today, Cogynt.ai supports VPC deployment in an organization's private cloud within cloud service environments: Amazon Web Services (AWS) and Google Cloud Platform (GCP). Figure 1 is a logical depiction of the Cogynt.ai DIP, summarized in the bulleted paragraphs below:

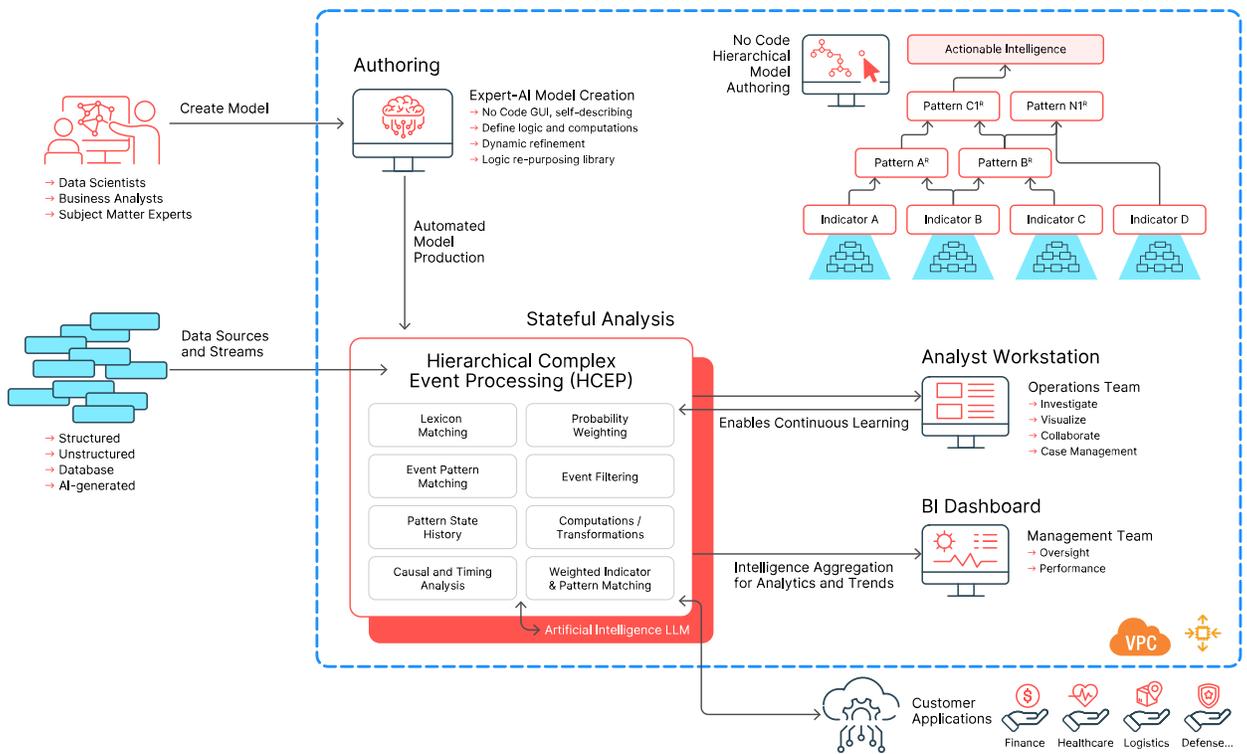


Figure 1. Cogynt.ai Decision Intelligence Platform

The Cogynt.ai platform components and their role within the architecture include:

- **Data Sources:** Streaming or batched data, including structured, unstructured, database and AI-generated data, are ingested via Apache Kafka connectors.
- **Cogynt.ai Authoring Tool:** Used by the analyst to define/manipulate lexicon, event patterns, computation logic, and risk models that comprise the Expert AI modeling created within a no-code GUI. Developed models are automatically produced for use in the HCEP engine.
- **Cogynt.ai HCEP Analytic Engine:** Models are automatically configured within HCEP to produce analytic results that are streamed from Apache Flink to Apache Kafka and Apache Pinot for analytics and visualization. Results are displayed in the Workstation and Superset tools.
- **Analyst Workstation:** A dynamic and interactive user interface enabling the analyst to view insights, examine with widget apps, and trace predictive findings. Workstation enables the analyst to assess and add notation, as well as invoke extensive case management workflow features.
- **Artificial Intelligence LLM:** Forthcoming AI LLM will further enhance analyst experiences.
- **Business Intelligence (BI) Dashboard:** Provides overall performance and program oversight within a BI dashboard and enables access to any other preferred dashboards through Cogynt.ai's open system architecture.
- **Applications:** As an open system, Cogynt.ai insights can be shared with any event driven system or application.

Cogynt.ai Analytic

The heart of the Cogynt.ai DIP is the Hierarchical Complex Event Processing (HCEP) engine, which is a real-time behavioral analytic. The principles of HCEP are rooted in system theory² and CEP.³ Figure 2 is a logical depiction of the end-to-end analytic process, as shown in the HCEP conceptual solution. The diagram illustrates how event patterns are defined from the top-down, starting with a hypothesis. The top-level event pattern is then decomposed into lower-level patterns until the user reaches the raw event level, or observation. Once the model has been established and events are flowing into the HCEP analytic engine, events are matched from the bottom up. Within HCEP, the organic component of a behavior is an event pattern, and an event pattern follows the principles of CEP, where an event pattern, if fully matched, creates a new complex event that can trigger a higher-level event pattern. This process continues until it satisfies the full behavioral profile —hence the reference to Hierarchical in HCEP. While this process is ongoing, Cogynt.ai is continuously assessing risk, applying a Bayesian Belief Network⁴ or other weighted statistical methods, and calculating a statistical likelihood of future events occurring. The event generated from this analysis is known as “actionable intelligence” — contextualized intelligence that a human or system can act upon. Cogynt.ai maintains the state of the event patterns over time, which allows analysts to look for trends and changes in event patterns and risks. This allows analysts to advise decision makers of maturing risk profiles and can allow for implementation of early mitigation strategies. Alternatively, Cogynt.ai can continuously assess opportunities to allow analysts to advise decision makers of maturing opportunity profiles and can allow for implementation of early acquisition strategies for competitive advantage.

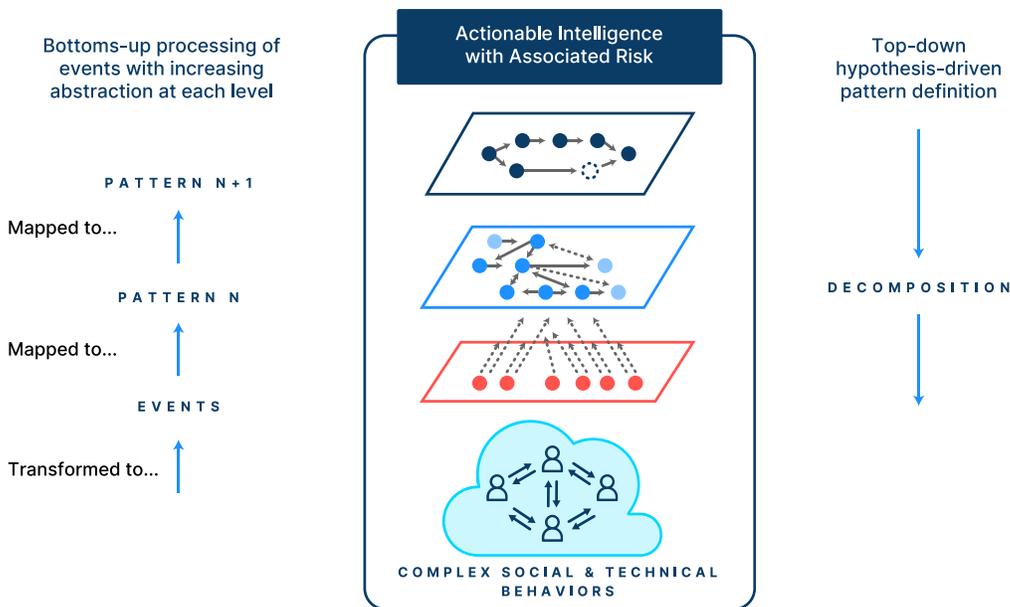


Figure 2. Logical depiction of Hierarchical Complex Event Processing

2 https://en.wikipedia.org/wiki/Systems_theory#:~:text=Systems%20theory%20is%20the%20interdisciplinary,and%20expressed%20through%20its%20functioning.

3 https://en.wikipedia.org/wiki/Complex_event_processing

4 Bayesian Belief Network: https://en.wikipedia.org/wiki/Bayesian_network

Applying an Expert AI approach, Cogynt.ai is most strongly suited where AI/ML falls short — specifically, the ability to detect critical but infrequent events, and to track complex patterns of behavior that evolve over long periods of time. This includes areas such as human behavior, or certain sophisticated cyber-attack scenarios such as persistent threats.

The types of big data problems HCEP is well suited to solving are typically difficult to treat with current AI/ML analytics solutions. AI/ML have proven to be very effective in detecting certain types of patterns, such as speech translation, speech recognition, facial recognition, and many others. Applying an Expert AI approach, Cogynt.ai is most strongly suited where AI/ML falls short — specifically, the ability to detect critical but infrequent events, and to track complex patterns of behavior that evolve over long periods of time. This includes areas such as human behavior, or certain sophisticated cyber-attack scenarios such as persistent threats. The approach provides full event traceability and negates potential AI hallucination and bias effects. In addition, Cogility’s forthcoming use of AI LLM within the Cogynt.ai DIP further enhances the assessment of unstructured data, no-code authoring, and its Analyst Workstation experiences.

As stated earlier, event pattern models are created using the no-code Cogynt.ai Authoring tool, depicted in Figure 3, which describes the analytic process workflow.

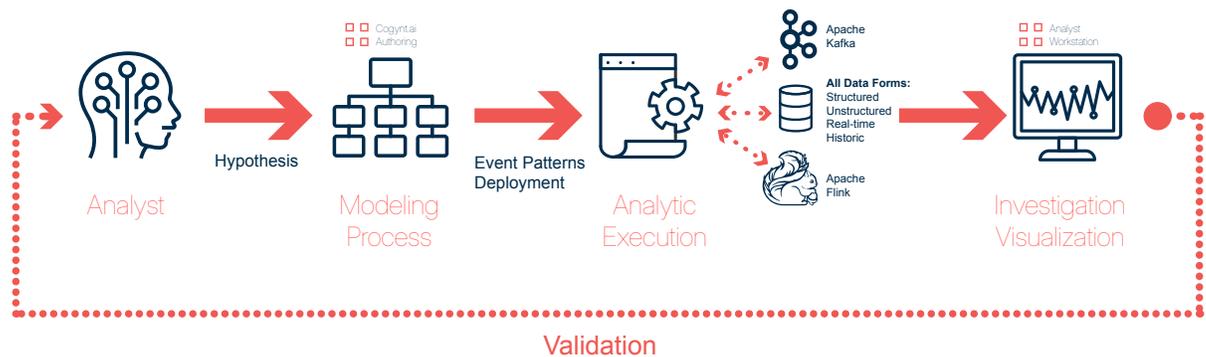


Figure 3. Cogynt.ai End to End Analytic Process and Workflow

Figure 3 describes the basic Cogynt.ai analytic process and workflow. Starting with the authored model (using The Cogynt.ai Authoring Tool), the analyst can publish the model to the HCEP engine operating on Apache Flink. The model deployment is completely handled by the platform and transparent to the user. The HCEP event pattern model deployment converts the model into a Directed Acyclic Graph (DAG), which defines the processing data flow within Apache Flink. At execution, the data source data is process in Apache Flink, via Apache Kafka, and the analytic results are then stored back into Apache Kafka (not shown) and displayed within the Cogynt.ai Analyst Workstation for viewing and analysis.

The Cogynt.ai Authoring Tool, which is seamlessly integrated with Apache Kafka and Flink, greatly simplifies the challenge of creating, refining, and repurposing event patterns against streaming data. Its elegant modeling notation and semantics are easy to learn, enabling a novice analyst or data scientist to be productive in a matter of days. To accelerate an enterprise's learning, Cogility also offers training where team members develop the knowledge and skills to develop powerful event patterns and apply HCEP to solving what are typically very challenging analytic problems. The Cogynt.ai Authoring tool provides a no-code modeling environment. This expands the analyst user base, who traditionally have limited coding skills, thus avoiding the need to involve software engineers to implement the analytic design through long software development lifecycles.

Typically, analysts must possess detailed technical knowledge of data sources and associated schemas and collaborate with data scientists to ingest them. The Cogynt.ai Authoring tool eases this burden with its built-in Kafka Topic schema discovery — eliminating manual schema creation and mapping to source data. Cogynt.ai Authoring tool and analytic process also handles changes elegantly. For example, a data scientist may wish to change a behavioral pattern. This can simply be done by adding or changing the existing model logic and redeploying and ingesting the data. This can be done in a fraction of the time as compared to traditional software code and test cycles.

Cogynt.ai Visualization Tools

Cogynt.ai Analyst Workstation

One of the key objectives of Cogynt.ai is to make analysts more effective and efficient in delivering decision intelligence products to their stakeholders. To achieve this, Cogility has developed the Analyst Workstation (shown in Figure 4) which provides a rich suite of investigative analysis tools and visualizations, increasing analyst productivity, context, insight, timeliness, and overall efficiency.

The Analyst Workstation is a modern web-based tool that is highly configurable to the analyst's preferences. It delivers a great user experience in terms of flexibility and interoperability between the tools (widgets⁵) and the ability to seamlessly perform multiple analytic functions. Cogynt.ai Analyst Workstation allows the "drag and drop" of information objects between UI widgets — eliminating the need to jump between tools and applications. This powerful interaction allows the analyst to work at "think speed" within their workflow, providing a direct boost in analyst productivity.

For example, a notification containing critical information about an event that poses a risk can be dropped on a map widget, identifying location.

The analyst may also wish to use Cogynt.ai's auto-generated link chart, enabling the analyst to see any connections to other pertinent events or entities. Of critical importance is the drill down on the notification event, allowing the analyst to review and validate the source events that generated the notification event. Furthermore, the Analyst Workstation facilitates a flexible workflow approach and sharing of analysis with other analysts, using "Collections" as a means of collecting data relevant to intelligence task and tagging that analysis for others to review. All user actions are also auditable, ensuring compliance with enterprise policies and regulations.

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Figure 4. Cogynt.ai Analyst Workstation User Interface

5 Widget: A widget is a single purpose software tool among many types of single purpose tools within Cogynt.ai Analyst Workstation. Example widgets include a search widget, notifications widget, map widget, and link analysis widget.

Cogynt.ai Superset — BI Dashboard

The Cogynt.ai Superset Tool provides BI dashboard functionality (Figure 5) and is the perfect complement to the Cogynt.ai Analyst Workstation. It provides aggregate analysis and context for the domain under study, while the Cogynt.ai Analyst Workstation provides the means to perform detailed, forensic analysis of the data.

The Superset Tool provides four essential BI functions that all enterprises need, which include:

- Situation Awareness – A comprehensive view of metrics and status.
- Trend Analysis – A determination of if and how the metric is changing over time.
- Change Point Detection – A significant change in a trend means that there is an underlying change in behavior of the metric being monitored, which could warrant further investigation.
- Forecasting – Given the trend history, this allows the analyst to forecast future trends.

The Superset Tool, like the Analyst Workstation, allows data to be visualized in real-time and can handle any scale of data. This allows analysts to explore the data easily and to create new views of various types within minutes. Figure 4 shows examples of the types of views provided by the Superset BI Dashboard, including event timelines, aggregate change analysis, heatmaps, pie charts, and many others that you would normally find in other popular BI solutions.

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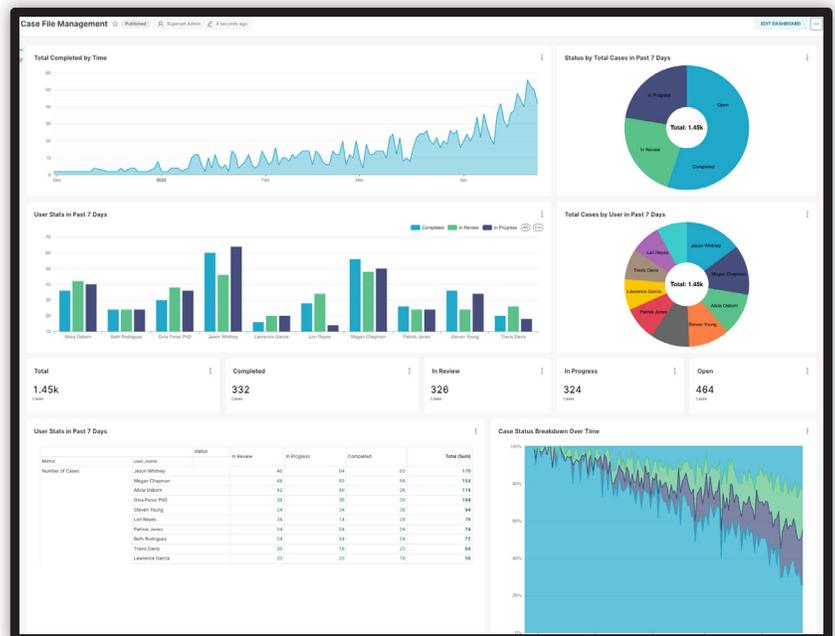


Figure 5. Cogynt.ai Superset BI Dashboard

Cogynt.ai Big Picture Wall Monitor Dashboard

To augment the Cogynt.ai DIP, Cogility can support a big picture wall monitor dashboard to enhance operational management. This enables command and control visualization to provide shared situation awareness, support decision making, and to enhance collaboration. This big picture dashboard capability can support various formats — on multiple monitors, as shown in the following photo (Figure 6), on a single monitor, or in a desktop configuration.



Figure 6. Cogynt.ai Big Picture Wall Monitor Dashboard

Cogynt.ai Deployment and Packaging

Additional features of the Cogynt.ai DIP are its automated deployment, integrated packaging, and operational resiliency. Cogility has fully automated the deployment of the Cogynt.ai platform in AWS and GCP, supplemented with management tools to monitor the health of the platform. Figure 7 is a depiction of the Cogynt.ai platform and enabling software components, including Apache Flink, Apache Kafka, Apache Pinot, etc. Cogynt.ai can be effectively managed, because the entire platform and associated software components are containerized images, orchestrated using Kubernetes. By leveraging Kubernetes, Cogynt.ai can be centrally managed, elastically scale in the cloud, self-heal to ensure reliability and resilience, and is self-contained — it does not need to make external API calls to run. Finally, the packaging of this solution and enabling use of Kubernetes is a significant engineering achievement that allows the customer to focus on their mission without having to look under the hood.

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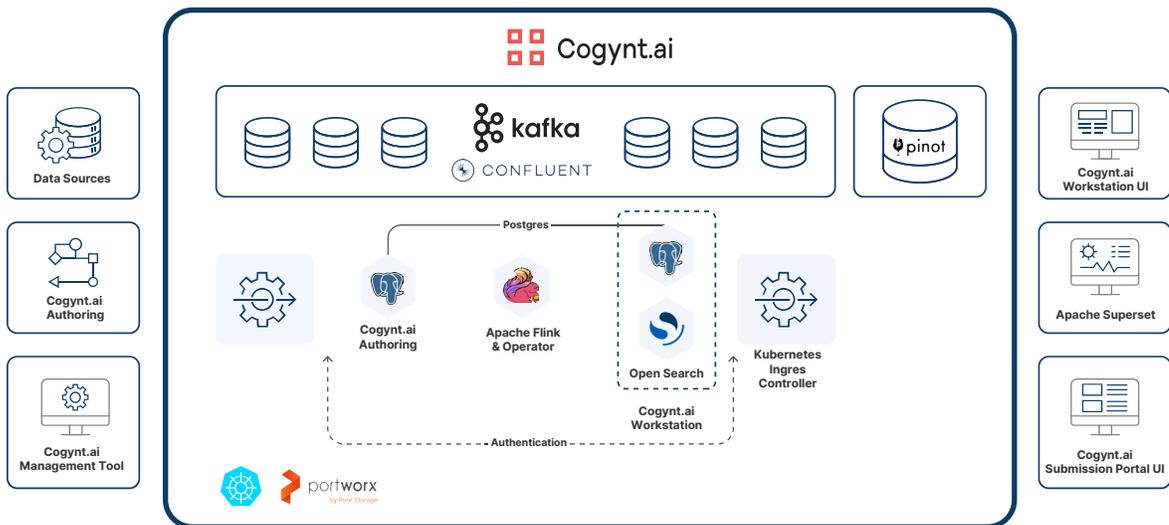


Figure 7. Cogynt.ai DI Platform Deployment Solution

Conclusion

Cogility Cogynt.ai is a decision intelligence platform that provides comprehensive, versatile, and integrated continuous intelligence and decision support. It allows enterprises to achieve decision advantage by delivering contextualized, predictive insights regardless of data volume and diversity, and pattern complexity.

With Cogynt.ai, analysts, data scientists, and subject matter experts can quickly connect to various data sources and more easily model complex event patterns within Cogynt.ai's no-code Authoring tool — expanding the scope of what can be monitored and enabling the means for continuous model improvement. The Cogynt.ai platform also publishes resulting events to external systems and provides contextual notifications to analysts within the Analyst Workstation — enabling them to deliver timely, high quality intelligence products to decision makers. The Superset Tool provides BI dashboard capabilities that facilitate performance insight and operational management.

Cogynt.ai makes this possible with its flexible data ingestion, event streaming, behavioral analytic engine (HCEP), powerful visualizations, integrated packaging, and streamlined deployment. This is available to organizations as a cloud-scalable solution that has faster time-to-value, greater repurposeability, and lower total cost of ownership compared to a piecemeal, “build your own” event-driven analytics architecture. Leveraging Cogynt.ai, organizations can more efficiently and effectively build CI applications that can address a wide range of government and commercial use cases such as supply chain intelligence, logistics optimization, fraud detection, customer intelligence, and operational intelligence.

If you'd like to learn more about Cogynt.ai DIP for continuous decision support, please visit www.cogility.com or contact Cogility sales at sales@cogility.com.

COGILITY

Visit www.cogility.com to obtain more information and request an expert demo.

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