Predix is the platform for the Industrial Internet. Purpose-built for industry, it empowers organizations to develop, deploy, and operate industrial apps—driving outcomes such as reduced unplanned downtime, improved asset output, and greater operational efficiency.

GE Digital and its partners offer a complete portfolio of products, solutions and services that help leading industrial enterprises drive digital transformation.

At the heart of this portfolio is Predix, the platform for the Industrial Internet.
Delivered as a Platform-as-a-Service (PaaS), Predix combines GE’s industrial domain knowledge with proven technology, tools, and best practices to help companies:

- Capture and analyze the velocity, volume, variety, and complexity of industrial data
- Meet the demanding needs for industrial grade, end-to-end cyber, informational, and operational security
- Innovate faster by eliminating the barriers to entry to develop industrial apps for new business outcomes
- Take advantage of an industry-wide ecosystem of partners. Extend capabilities through integrated software, hardware, and services
EDGE SERVICES
Predix Machine, Connectivity and EdgeManager are services that connect, manage and optimize GE and non-GE assets.

Predix Machine can collect sensor and asset data, analyze it at the edge, then securely respond to changes based on that data.
- Predix Machine supports SSH, HTTPS, MQTT, WebSocket, OPC-UA, Modbus, and TCP.

Predix Connectivity provides a secure and global plug-and-play network over various access networks, including cellular, fixed line, and satellite communication.
- Predix Connectivity is built on strategic partner networks (IP QoS, Policing, Metering, ACL, NAT), and provides remote access via VNC, RDP, SSH, and HTTP.

Predix EdgeManager provides a single pane-of-glass view of edge devices, providing insights into device health and connections. It significantly eases managing edge devices, and enables you to administer apps and configuration files both at a device and fleet level.

Essential Industrial-Grade Services

1. EDGE SERVICES

Getting started with Predix

1. EDGE SERVICES
   - Connect your asset using Edge Services

2. DATA MANAGEMENT SERVICES
   - Model the asset, get and store data using Data Services

3. ANALYTICS FRAMEWORK
   - Get insights by building analytics using Analytics Services

4. VISUALIZATION SERVICES
   - Visualize using views or Mobile Services

5. SECURITY
   - Multi-tenancy, User Management, Access Control
DATA MANAGEMENT SERVICES
Predix Data Management Services are used to describe an industrial asset, persist data generated by the asset, and provide data storage.

The Asset Service provides REST APIs to support asset modeling. Application developers use the Asset service to create asset model data and asset instances. The models define asset properties as well as relationships between assets and other modeling elements. For example, you can create an asset model that describes the logical component structure of all pumps in an organization, and then create instances of that model to represent each individual pump. You can also create custom modeling elements to meet unique domain needs.

Asset models are measured in two quantities: Domain objects and Domain object instances. Domain objects are distinct entities that a customer manages and tracks, such as logical component structure of all pumps in an organization. Domain object instances are the runtime objects of the domain objects.

The Asset service includes a REST API layer, a presentation layer, a query engine, and a graph-based database.

The Time Series service is a REST API for querying and aggregating sequences of data points (discrete units of industrial device information) collected at set time intervals. You can use Time Series to efficiently manage, distribute, ingest, store, and analyze data points from a continuous stream of sensor information. The Time Series service maintains the arrival time of each stream and indexes it to enable faster queries. With millisecond precision, this service is horizontally scalable, has high availability, low latency, and is accessible from anywhere via REST API. The query API allows you to query data using groups, time ranges, values, aggregations, and data quality; and to filter by attributes.

SQL Database. Predix offers PostgreSQL as a service. Use this object-relational database management system to store data securely for retrieval at the request of other software applications. The database can handle workloads ranging from single-machine apps to internet-facing applications with many concurrent users.

The Blobstore provides a way to store large byte arrays. Benefits include: reliability (once uploaded, your data will be securely stored), scalability (add and remove resources when needed), high availability, multi-tenancy support (users in each tenant have specific privileges for accessing resources), S3 compatible APIs, and secure storage of byte arrays up to 10 GB.

ANALYTICS FRAMEWORK
Analytics services simplify the development of advanced business analyses then deploying them to business operations.

Pre-built analytics: In addition to the service catalog items listed below—which help you build, test and maintain your library of analytic services—Predix supplies a catalog of 100+ pre-built, out-of-the-box analytic models for developing analytic applications and workflows. To build the analytics for your use cases and shorten the time to market, you can subscribe to, configure, and deploy these analytics in your own Analytics Library. See https://www.predix.io/catalog/analytics.

Analytics Catalog provides a software catalog service to enable the portability and sharing of reusable analytics across development teams. Analytic developers upload their custom analytics and supporting files to the Analytics Catalog service for easy management and reuse. This service facilitates deploying analytics written in Python, Matlab, or Java into production on the Predix platform. Predix supports a REST API for managing entries in the catalog, a log retrieval API and a template file to support integration with Time Series.

Analytics Runtime is a cloud-based framework on which developers can implement, test, and deploy new combinations (orchestrations) of analytics. You can perform analytic orchestration through the framework’s configuration and parameterization capabilities, reducing the need for custom coding and point-to-point integrations. As business needs evolve and new analytics are developed, these configurations can be readily updated and redeployed. The framework is an efficient, scalable, cloud-based approach for both the development and production use of advanced business analytics. Predix supports analytics from the Analytics Catalog service.

Analytics User Interface (UI) enables data scientists to upload and test analytics by using a convenient web application interface instead of command line calls to REST API endpoints.

Benefits: Allows analytics developers to test and validate in the cloud; Facilitates discovery, publication and sharing through classification and cataloging; Accelerates application development solution deployment by favoring configuration over coding; simplifies changes to orchestrations.
VISUALIZATION SERVICES
Services to build browser based and native mobile device user interfaces.

- **View.** A View is the visual summary of the information that is displayed in a web application. A developer uses the View service database to share and recreate saved cards, as well as to send the context of a deck object (including cards and associated components) to render as a View in a web browser using a Predix UI component. This deck-based modular view framework gives a user the flexibility to select a specific View at run time to grasp information intuitively and make time-critical decisions.

- **Mobile** provides a Backend-as-a-Service to Industrial Internet mobile applications built using the Predix Mobile SDK. The Mobile service supports applications that require offline support and integration with the data domain, including enterprise systems, third-party services, and Predix microservices such as Machine, Asset, Analytics, and Security. Predix Mobile is available on the iOS, MacOS, and Electron for Windows® platforms.

- **Mobile SDK** includes Reference App Containers for Apple iOS, MacOS, and Windows Electron. A Mobile Reference App Container is a native application that includes the Predix Mobile Client Core Services framework to load, display, and run your Predix Mobile applications.

SECURITY
Security services handle users and access management.

- **User Account and Authentication Service (UAA)** helps developers authenticate their application users. As a Predix platform user, you can secure access to your application by obtaining a UAA instance and configuring it to authenticate trusted users. The UAA features include Identity Management, OAuth 2.0 Authentication Server, Login/Logout for UAA authentication, and SAML federation capabilities to meet third-party SAML identity provider requirements.

- **Access Control Services (ACS)** helps application developers add granular authorization mechanisms to access web applications and services without having to add complex authorization logic to their code. ACS works in conjunction with the User Account and Authentication (UAA) service. Benefits include the ability to maintain access-decision data as policies and attributes, exclusive security for multiple clients using the service, since the ACS services are tenant-aware, and support for fine-grained authorization policies.

- **Tenant Management Service.** In multi-tenancy, the tenants are logically isolated but physically integrated. That means even if the tenants use the same underlying resources, their data is isolated from each other. With role-based access control for fine-grained security, all users of a tenant have specific privileges to access the resources associated with that tenant.
Learn more

The Predix Catalog also serves as a marketplace for third-party IIoT services and analytics. A sampling of the many Catalog offerings provided by third parties appears below.

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<thead>
<tr>
<th>Intelligent Environments</th>
<th>Geospatial</th>
<th>Operations</th>
<th>Analytics</th>
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<td>Location Intelligence</td>
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<td>Optimize operations &amp; planning with vehicle traffic data.</td>
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<td>Manage all your app logs and save, search, and visualize them.</td>
<td>Filters noise in data and provides smooth signal.</td>
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<td>—Current</td>
<td>—Pitney Bowes</td>
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<td>Parking planning</td>
<td>Dynamic Mapping</td>
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<tr>
<td>Optimize operations and planning with vehicle parking data.</td>
<td>Enhance your asset data by recording the current and historical locations of moving assets.</td>
<td>Simplify collection and analysis of big data from infrastructure, security systems, and business applications.</td>
<td>Analyze continuously flowing data over long periods of time where low-latency incremental results are important.</td>
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<tr>
<td>—Current</td>
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<td>Public safety</td>
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<td>Obtain media such as photos and video to enhance safety awareness.</td>
<td>Enhance your asset and analytical data by visualizing and aggregating the data on a map.</td>
<td>Measure and monetize your service with subscription management, entitlements control, metering, and revenue management.</td>
<td>Use this standalone analytic service to identify threats and anomalous events in critical infrastructure and operations.</td>
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Learn More: See the complete Predix [Catalog of Services](#) and [Catalog of Analytics](#). Visit [www.predix.io](http://www.predix.io) to access our full catalog of microservices.

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