



Newsletter

Google Cloud

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[REDACTED] Factory creates opportunities for data insights

Google Cloud capabilities help bring deeper meaning to data inside the Mayo Clinic Cloud. Go inside the [REDACTED] Factory to learn how.

**Dale M. [REDACTED]**

[REDACTED] Contributor

Punxsutawney Phil predicted spring would come early this year. For those of us in Minnesota, you might call that pure luck. But, predicting that the Kansas City Chiefs would win this year's Super Bowl wasn't so much luck as it was artificial intelligence (AI). Many news outlets predicted the win based on AI's mix of data, analytics, algorithms, and technologies to mimic intelligent behavior.



When combined with machine learning (ML), AI—which is becoming part of everyday life (think: smartphones)—helps to identify process inefficiencies in healthcare, reduce costs, and improve payer, provider, and patient outcomes. In Mayo Clinic Cloud (MCC), AI plays a big role in how researchers and data scientists will process their data in the [REDACTED] Factory. In this post, I explain the factory concept and how we're using AI to help deliver meaningful insights for the future of health care.

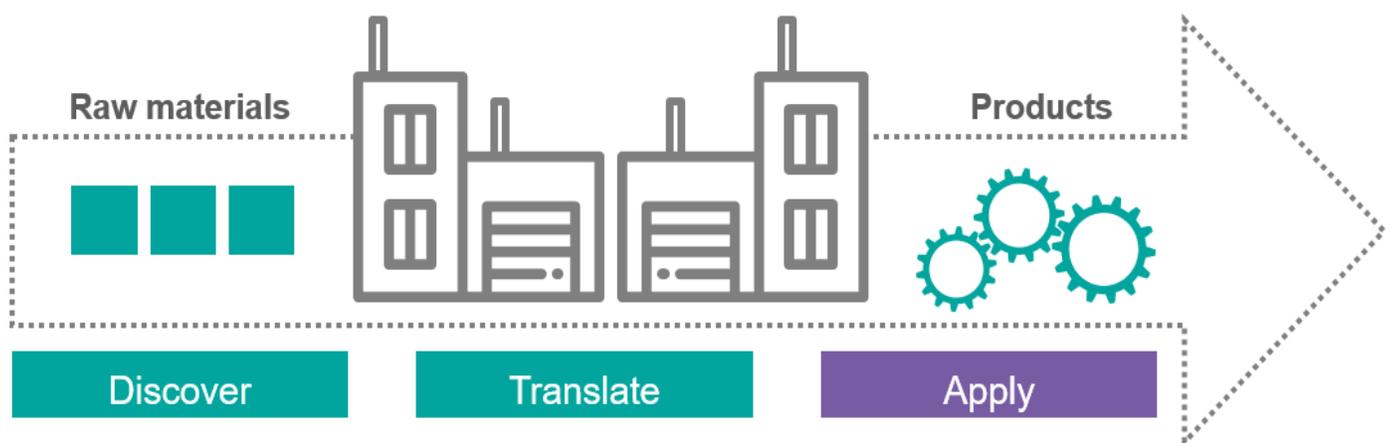
Raw material to usable output

To demonstrate how we're building [REDACTED] Factory, consider the general concept of a *factory* where you transform *raw materials* into a usable output. For example, at a furniture factory, employees saw tree logs into boards that are further processed—trimmed, glued, nailed, sanded, and finished—into a table, chair, or bed frame. Or, at an automotive company, workers shape and assemble various parts made of steel, aluminum, glass, rubber, plastics, or fabric to make cars or trucks.

The concept is similar for [REDACTED] Factory (Figure 1). Our raw material is the *patient and research data* we've gathered. In some cases, researchers and data scientists can take advantage of bring your own data (BYOD) to combine their data with our unified data platform (UDP) and electronic medical record (EMR) data to generate even greater insights. The usable output is in the form of *meaningful insights* that are gained from processed data. Plus, health care clinicians and researchers have greater confidence in knowing that the data complies with the Health Insurance Portability and Accountability Act (HIPAA) and is in a secure, Health Information Trust Alliance (HITRUST)-certified environment.

[REDACTED] Factory enables discovery and translation (Figure 1) to create new insights or ideas to improve patient care by using various Google capabilities. In the discovery phase, researchers look at data and create hypotheses to determine insights or patterns that haven't been discovered before. Once they prove these hypotheses, in the translation phase, they write a project charter, define use cases, develop AI models (coding), verify the outcomes, and document the details.

The Google capabilities will include Jupyter Notebooks, Deep Learning Virtual Machines, and Python or R environments, which will be available in the first development phase. In the second development phase, they'll also include dedicated project storage, development and analysis environments, data processing and AI services, as well as Kubeflow and Kubernetes. Future capabilities from Google Cloud will include AI Hub, Cloud AI Building Blocks, and the AI Platform.



Why we need [REDACTED] Factory

Currently, our AI users have various fragmented environments, creating confusion and frustration for everyone. Some areas don't have anything set up and don't know where to start. But, others, like Radiology, have mature AI environments that are making tremendous

progress in providing better patient treatment plans.

For example, Radiation Oncology clinicians, including physicists, dosimetrists, and physicians, spend significant time— 10 to 20 hours per case, depending on the type of cancer— determining the ideal dosages of radiation per patient. For someone with a head or neck tumor, this time lapse is a long time. With Google's AI capabilities, they're developing algorithms to reduce contouring and treatment planning times and anticipate reducing this time to down to 30 to 60 minutes per case. By developing tools and AI models that leverage the  Factory, they can significantly reduce the amount of time it takes to build the treatment plan and reduce the total treatment time for the patient. Ultimately, this technology should improve accuracy and may lead to new areas for treatment that hadn't been considered previously.

Because  Factory has the data and compute in the same environment, it allows for the most cost-effective and efficient way to do discovery. By standing up the  Factory, we're creating one common environment that everyone, from novice to expert, can leverage. While the  Factory may not meet 100 percent of everyone's needs, our goal is for it to become the "go-to" environment for discovery and translate capabilities.

Until next time

If you'd like to learn more about AI at Mayo Clinic, see the following resources.

- **Learn:**

- Introduction to Machine Learning (Google)
- Learn from ML experts at Google
- How Google does Machine Learning (Coursera)

- **Read:**

- Mayo to transform, digitize health care, leaders say at international conferences
- AI won't replace your doctors, but could make them better
- 12 ways AI will revolutionize healthcare in the next year
- Radiology creates 'factory' for artificial intelligence projects
- Using artificial intelligence to identify most helpful treatments for depression

- **Watch:**

- Introduction to Machine Learning (MIT Open Courseware, 51 min., 30 sec.)
- How artificial intelligence and automation could impact roles at Mayo Clinic (2 min., 48 sec.)
- Artificial Intelligence at Mayo Clinic (18 min., 58 sec.)
- Radiology Framework for AI Software Technology (FAST) (44 min., 39 sec.)

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