

# The Next AI Frontier: **Foundation Models for Business and Science**

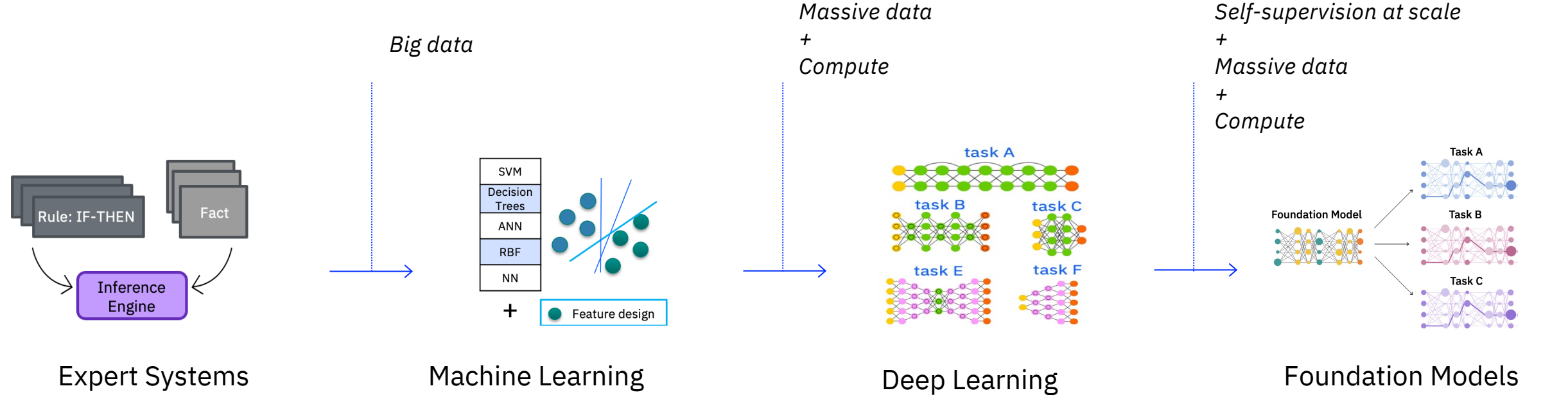
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**Sriram Raghavan**

Vice President, IBM Research AI



# Foundation Models: An AI inflection point



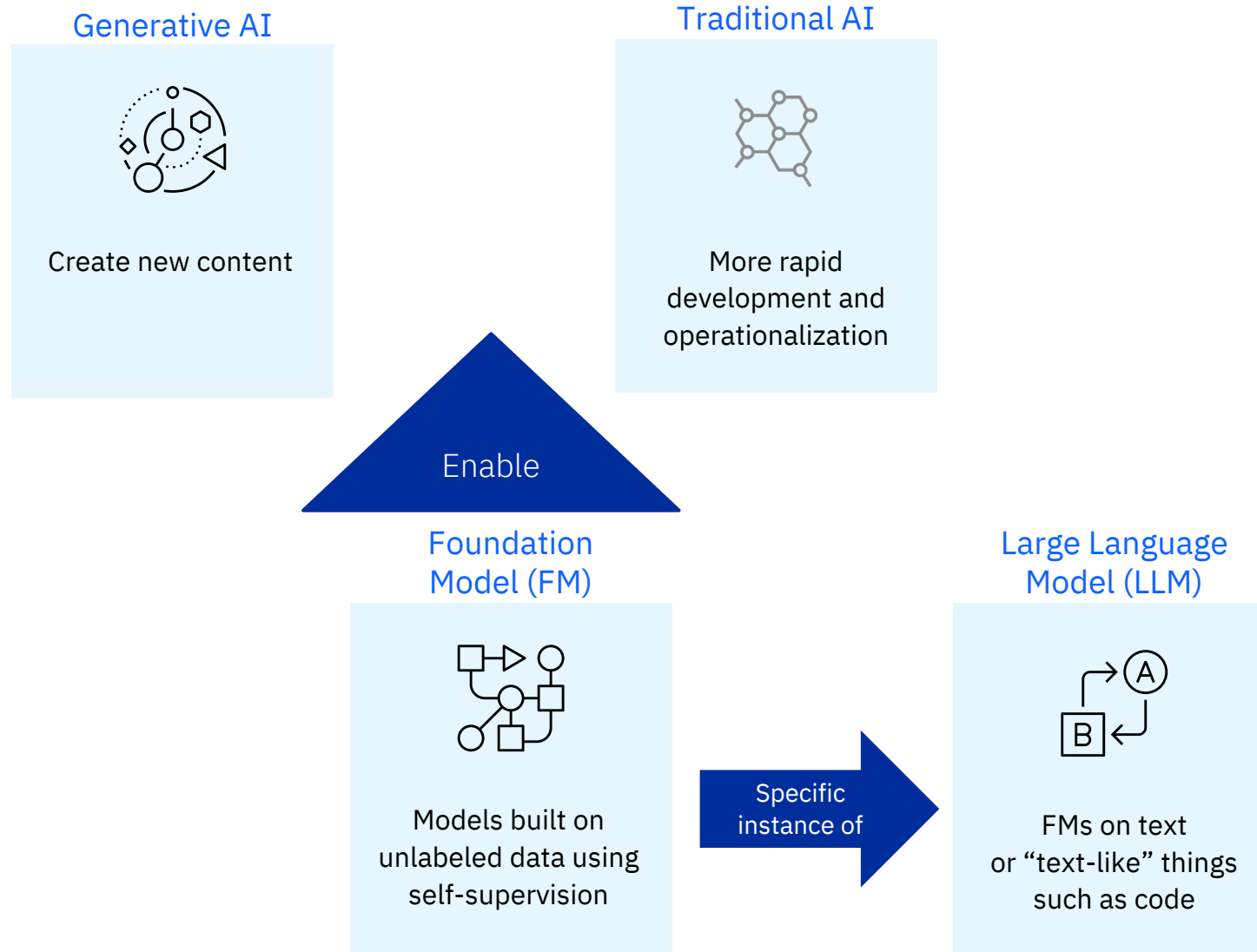
- No use of data
- Manually authored rules
- Brittle

- Less brittle but labor intensive
- Demanding data prep and feature engg.

- Automatically learn if you have enough labeled data
- Enterprise adoption limited by availability of labeled data

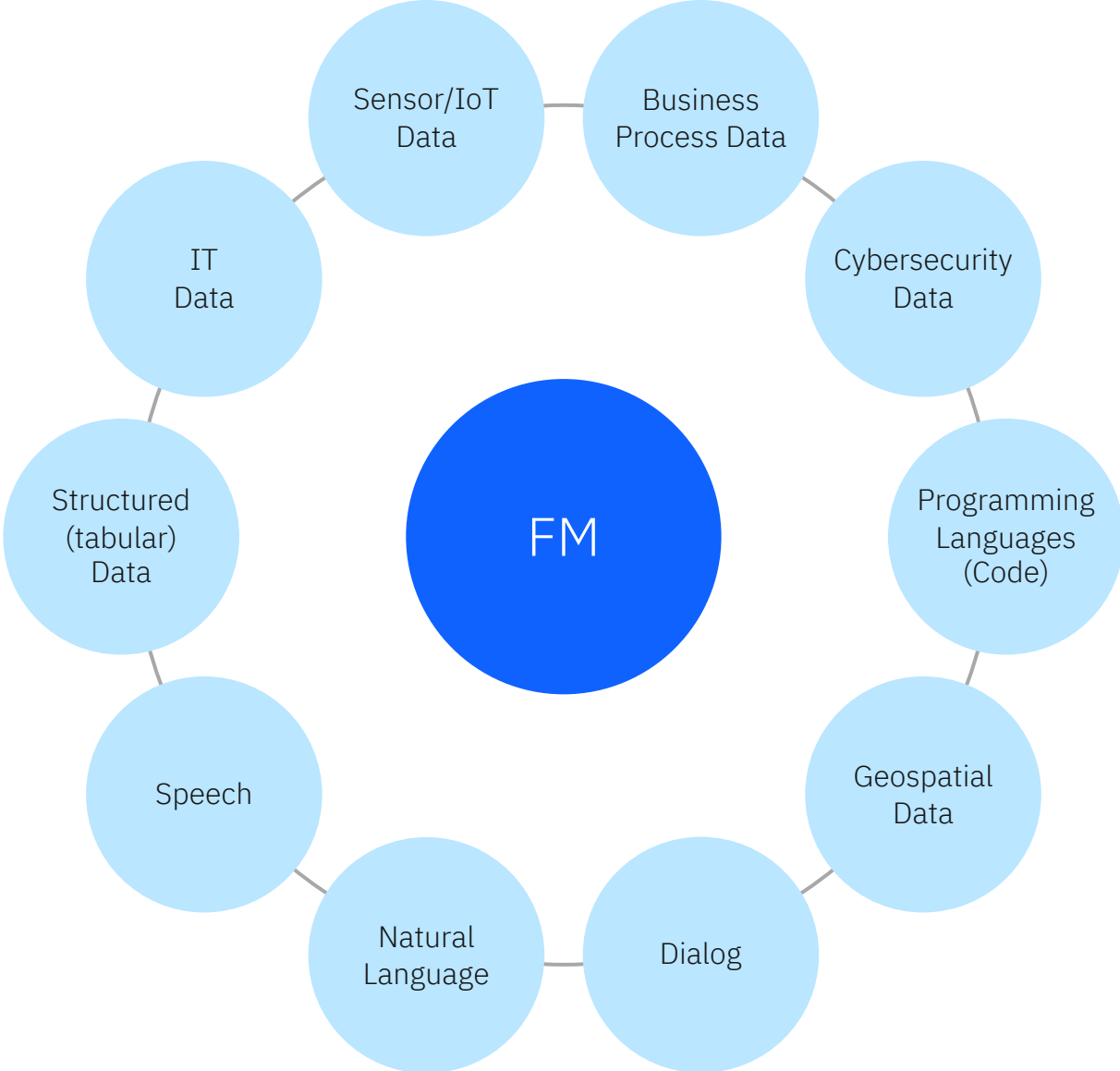
- Learn from lots of data without requiring labels
- Adapt quickly to many tasks
- Accelerate enterprise adoption

# Foundation Models, Large Language Models, and Generative AI



# Foundation Models for Business: Incredible opportunities with enterprise data

+AI → AI+



# Foundation Models for Business: Emerging use case areas



Digital labor



IT Automation



Cybersecurity



Sustainability

# Example: Project Wisdom – Bringing the power of AI to IT Automation

Content  
Generation



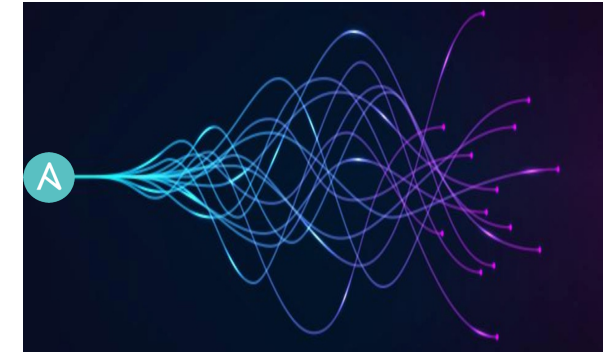
Content  
Discovery



Content  
Explanation



Content  
Optimization



# IBM's approach to Foundation Models for Business

## Open innovation

Design for a multitude of open and proprietary models

## Flexibility & Efficiency

Optimize for performance, latency, cost and to run close to your data/apps

## Enterprise Value

FMs built on enterprise data are valuable assets, not to be outsourced

## Responsible use

Govern the AI that is created and used with rigor and transparency

Train world-class models



Turn them into business value



Data Scientist



App Developer

Workbench/Tooling for Tuning & Customization

CodeFlare RAY PyTorch

Middleware for Training & Validation

Pre-trained foundation models



PyTorch

Middleware for Tuning & Inference

Hybrid Cloud Platform



Scale-out Infrastructure



AWS



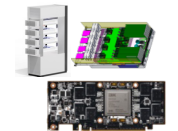
Azure



IBM Cloud



On-Prem



# Innovations across the stack

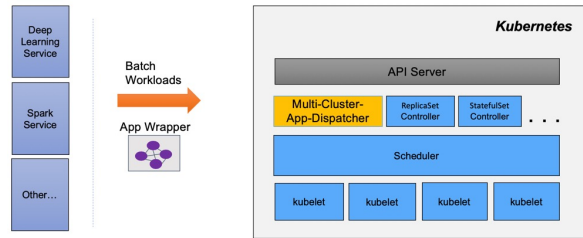


Scaling PyTorch FSDP for Training Foundation Models on IBM Cloud

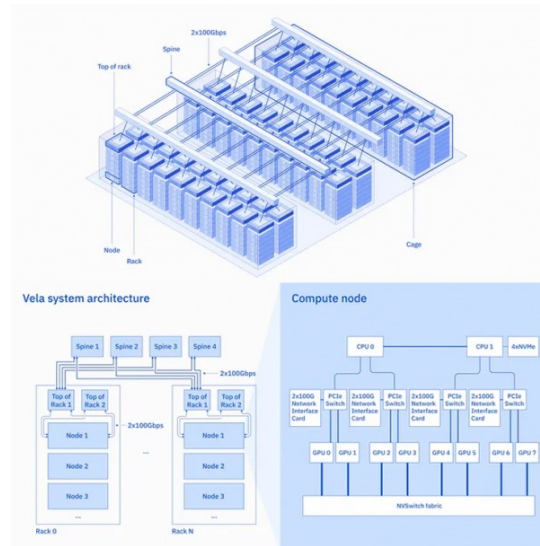
Distributed training innovations



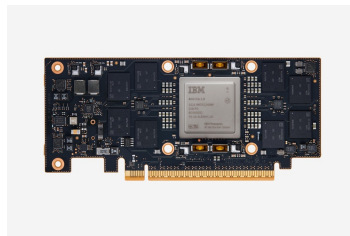
Multi-NIC operator



Multi-cluster app dispatcher



Vela AI supercomputer



IBM AIU

Train world-class models



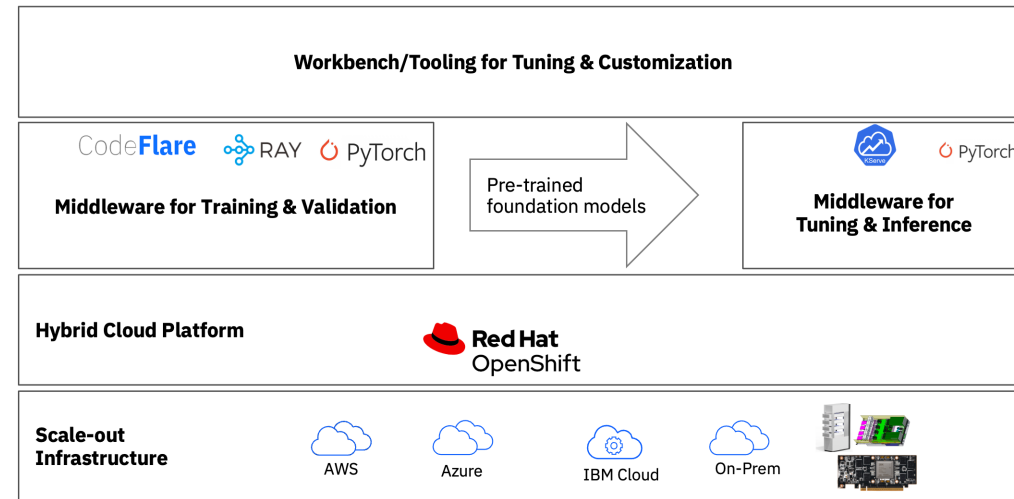
Turn them into business value



Data Scientist



App Developer





# Foundation Models for Science: Again, incredible opportunities

## Chemistry and Materials

FASTCOMPANY

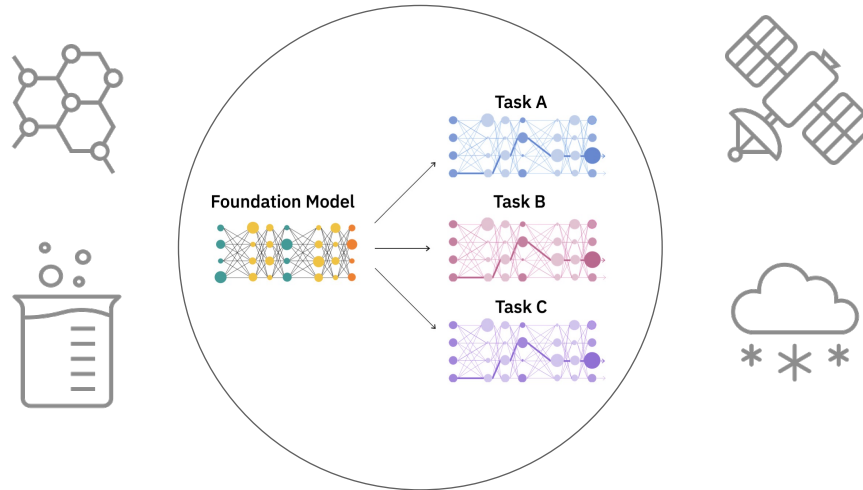
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### Moderna and IBM are exploring how to advance mRNA tech using generative AI

As part of a new agreement, the vaccine maker will have access to IBM's quantum computing system, research expertise, and AI model.



[Photos: IBM, Moderna]



## Geospatial Data

### NASA partners with IBM to build AI foundation models to advance climate science

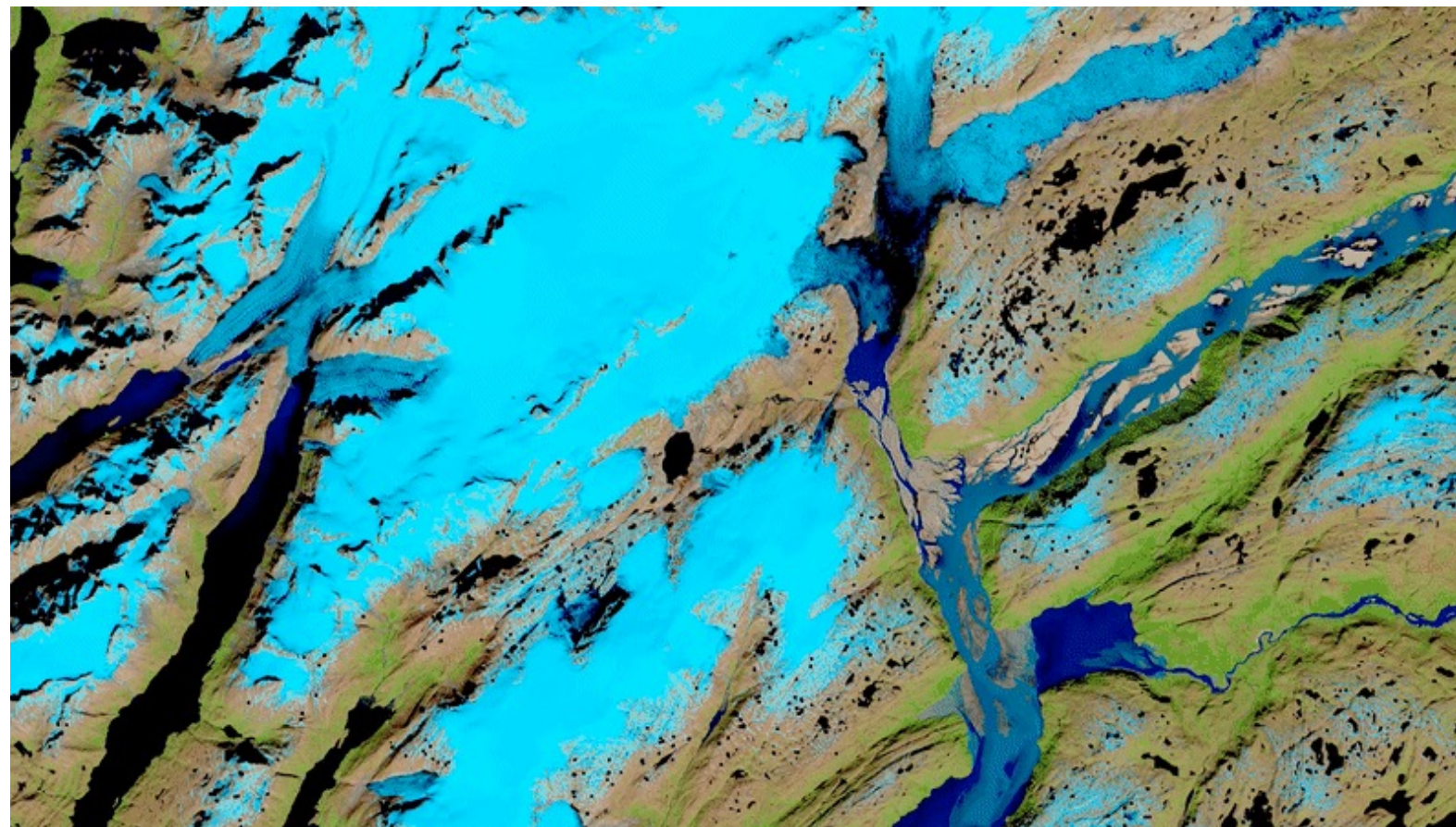
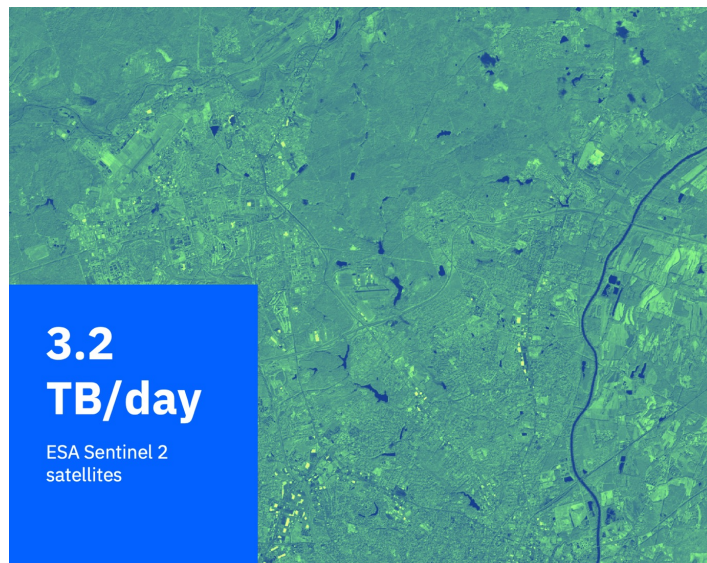


# NASA-IBM Partnership to build Geospatial FMs

"The beauty of foundation models is they can potentially be used for many downstream applications," says Dr. Rahul Ramachandran, IMPACT manager at Marshall.

## Satellite and aerial imagery

Multimodal images from multiple satellites (Landsat8, Sentinel, etc.) representing different spectral bands

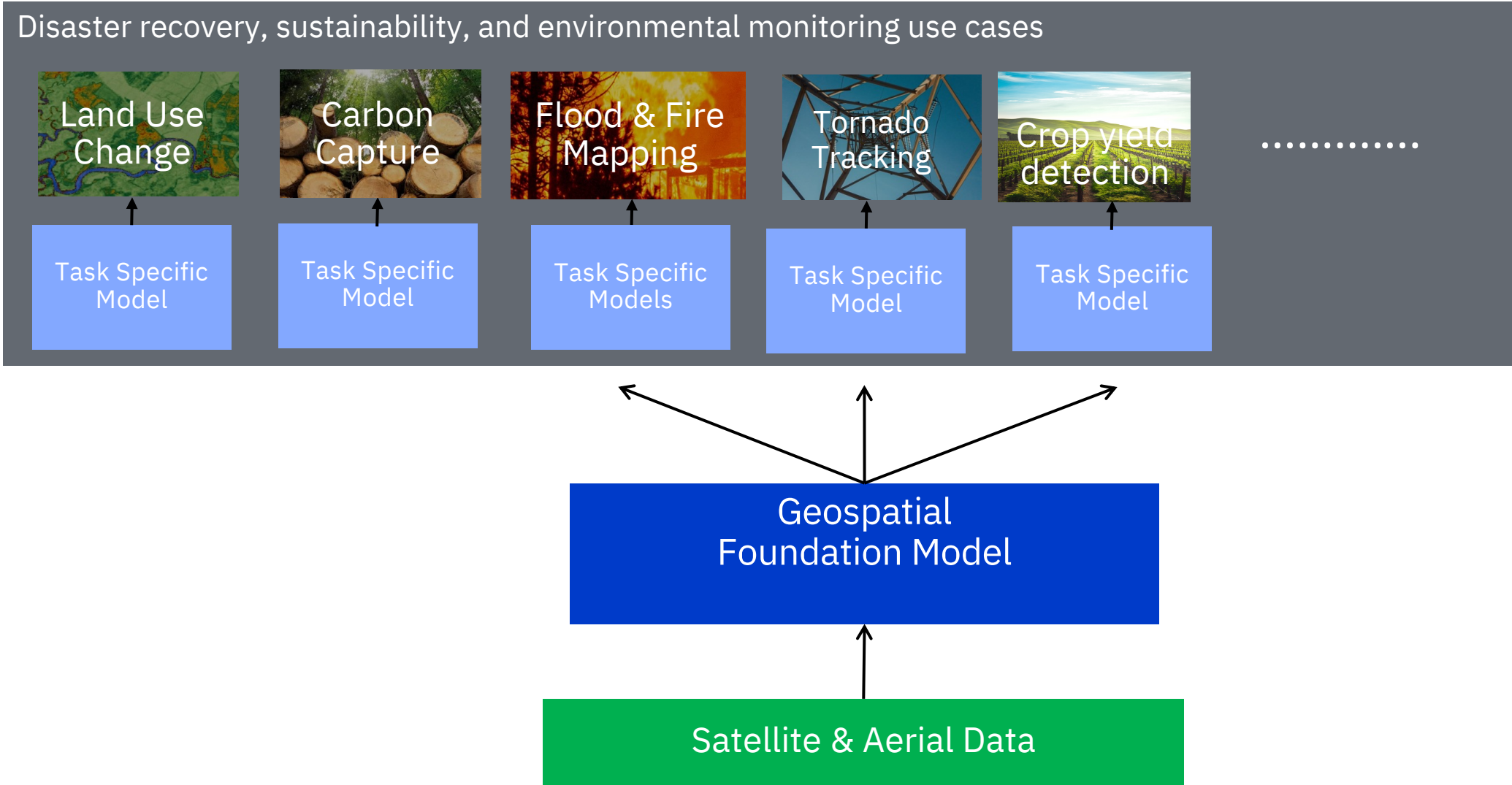


Short-wave infrared (SWIR) false color composite of glacial retreat near Innarsuit, Greenland from 2013 – present. (Source: NASA IMPACT)



Harmonized Landsat Sentinel-2

# Use Cases for Geospatial Foundation Models



**IBM**