FabuBlox: An Intelligent Process Design and Collaboration Platform Connecting the Nanofabrication World

The nanofabrication world faces a critical communication and knowledge management challenge. Due to the lack of standardized frameworks for process data management, design, and knowledge transfer, repeat problem-solving is commonplace, thereby heavily stifling innovation. This fragmentation moreover creates significant hurdles for modern day R&D challenges requiring multi-facility, highly flexible, and custom nanofabrication solutions. Crucially, the gap in data standards also **impedes the effective harnessing of machine learning and AI-powered tools** that could revolutionize semiconductor and nanofabrication process development.

Developed by MIT engineers, the **FabuBlox** cloud platform (www.fabublox.com) addresses these challenges by providing an accessible, cross-facility data standard that seamlessly integrates process design and simulation, knowledge management, and communication. Since its first release in 2023, the freely accessible FabuBlox platform has gained 1,500 users, across nearly 100 mostly academic fabrication facilities in 12 different countries.

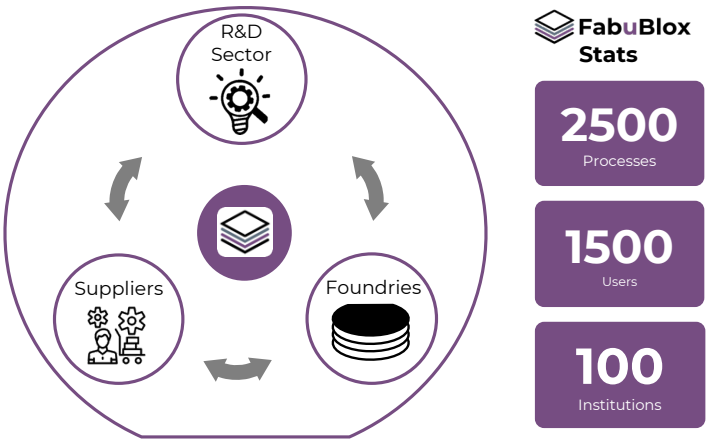
With its AI-driven **simulation and fab tracking features** in development, FabuBlox will accelerate lab-to-fab transitions, automate process-design co-optimization, and revolutionize fab service coordination. In a first real-world integration, FabuBlox recently partnered up with the California DREAMS Hub to power their MOSIS2.0 Fab Service storefront, enabling AI-assisted discovery of the Hub's nanofabrication capabilities. Looking ahead, the FabuBlox design platform will be seamlessly embedded in an AI-powered marketplace connecting foundries and fabless customers, R&D fab facilities, tool manufacturers and material suppliers.

Cleanroom facilities and R&D groups can leverage FabuBlox to create **private and secure repositories of process flows and standard processing modules**, thereby streamlining user onboarding, reducing friction in process design, and automating approval workflows. A key feature of the FabuBlox design interface is its ability to algorithmically generate cross-sectional images of fabricated structures on the fly, significantly lowering the barrier for process planning, design, and communication. Advanced features include automated cutline extraction from GDS design files to simulate the fabricated device cross-section at scale, and the instant generation of slide decks and run sheets for complete process flows.

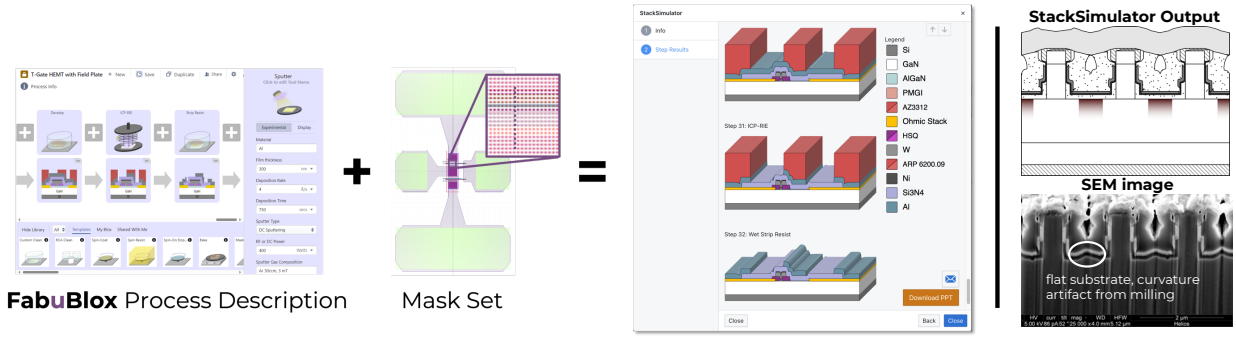
As a communication platform, FabuBlox has recently launched a **standalone forum interface** that seamlessly integrates with the FabuBlox process design interface, comprising both a public forum space as well as private discussion channels linked to private FabuBlox groups — bringing StackOverflow-style problem-solving to nanofabrication.

Beyond standardizing process data management, **FabuBlox Facility Portals** will be launched in Q2 2025, standardizing the documentation and management of tool infrastructure. Facility Portals enable association of templated tool blox with real-world tool capabilities and restrictions, thereby helping facilities **prevent tool downtimes due to contamination** and accelerating user and technician onboarding while optimizing tool usage and process execution.

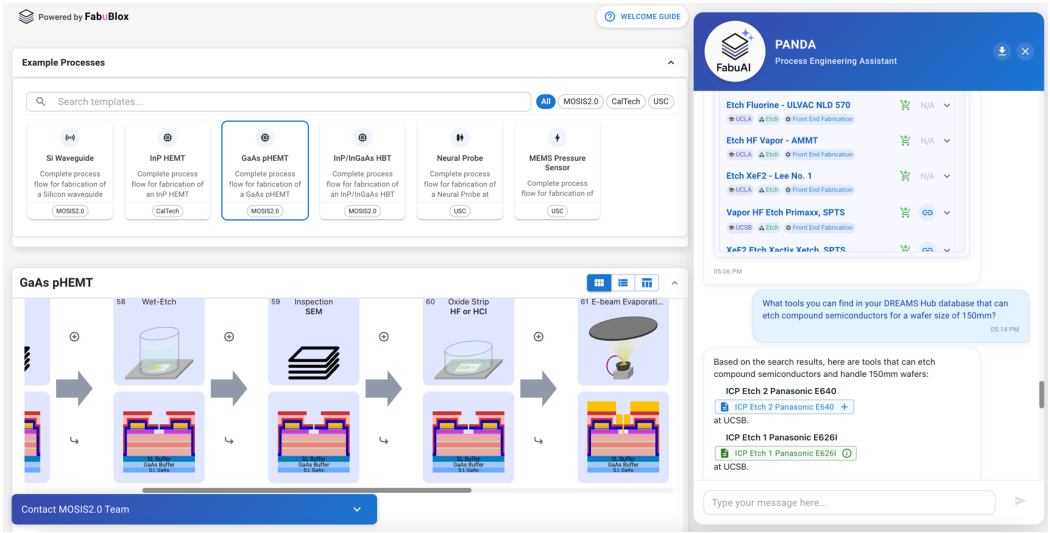
Leveraging its platform infrastructure, FabuBlox enables fabrication networks to unify process capabilities into shared, intelligently managed databases. This fosters cross-facility collaboration, enhances fab coordination, and creates an end-to-end marketplace for nanofabrication services — providing researchers faster access to expertise and unlocking new opportunities for innovation. In short, **FabuBlox connects the nanofabrication world**.



FabuBlox - An integrated design, marketplace & collaboration platform for automated nanofab service and asset management



The FabuBlox StackSimulator – A rapid prototyping simulation tool, originally developed for GaN transistor development at MIT, delivering highly-accurate 2D simulations of fabricated device cross-sections from GDS design files in under a minute.



The California DREAMS Hub's AI-assisted MOSIS2.0 Fab Service storefront portal powered by FabuBlox.