



# ADVANCING SMART LOGISTICS

an

## NSF ENGINES

DEVELOPMENT AWARD

led by



*Governors State*  
UNIVERSITY



ILLINOIS  
INNOVATION  
NETWORK

*Transforming Transportation and  
Logistics with ASL  
by creating a Placed-Based Innovation  
Ecosystem that include more people and  
perspectives*

ASL is actively seeking to engage a diverse range of stakeholders, including government and nonprofit organizations, entrepreneurs, and risk capital investors and is extending an invitation to all interested parties to join and contribute to its mission.

**1. ASL Initiative**

- a. The Advanced Smart Logistics (ASL) initiative is a pioneering effort to revolutionize transportation and logistics in Illinois.
- b. Aim: Integration of cutting-edge technologies for a smarter, more efficient, and sustainable logistics ecosystem.

**2. Collaborative Endeavor**

- a. ASL is a collaborative initiative that brings together industry leaders, innovators, and research institutions.
- b. Emphasis on the collective effort to reshape the future of transportation and logistics.

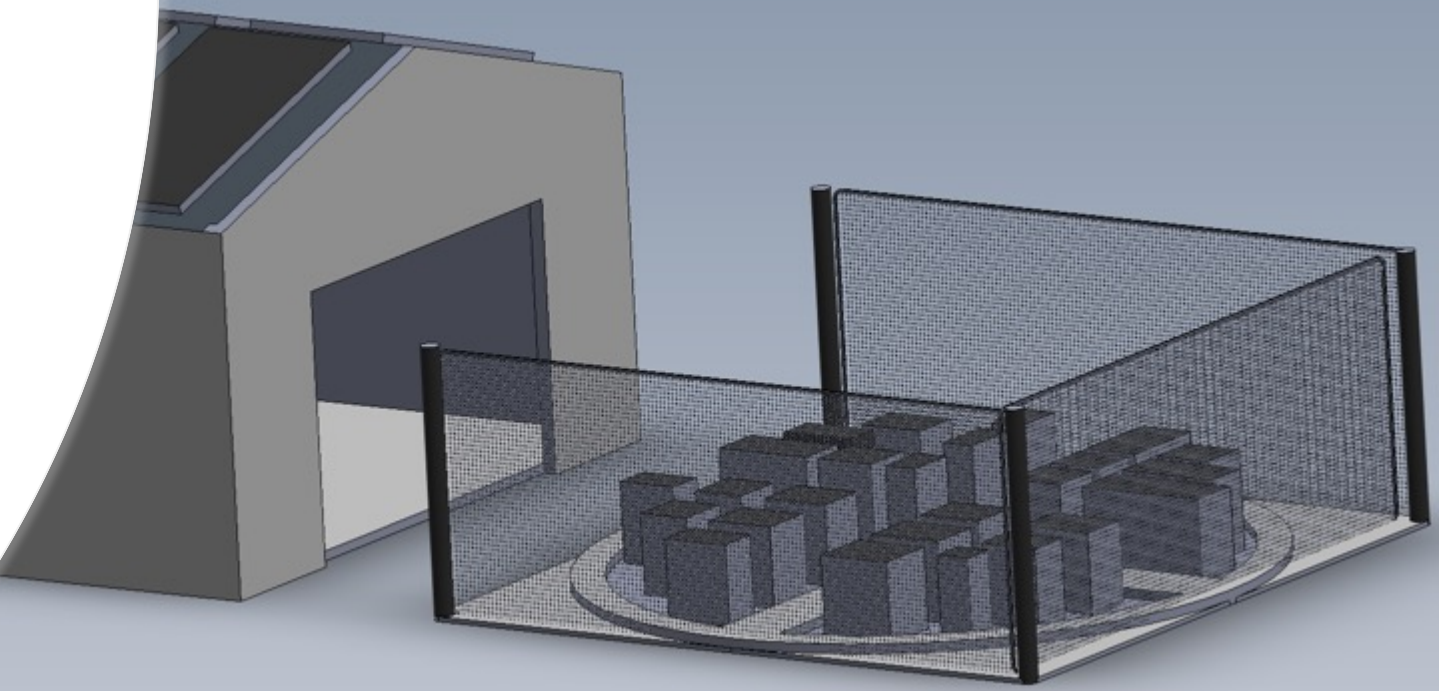
**3. Key Stakeholders**

- a. Diverse collaboration involving academic institutions, corporate partners, government agencies and the community.
- b. A united front of key stakeholders driving innovation in the logistics landscape.



# Autonomous and Electric Vehicles Testing

- **Last-Mile Logistics**
  - ❖ Micro transit integrated with last-mile delivery.
  - ❖ Autonomous shuttles and drones ensuring seamless connectivity.
- **Mid-Mile Cargo Transportation**
  - ❖ Testing autonomous electric trucks for efficient mid-mile cargo transport.
- **Smart Infrastructure Integration**
  - ❖ Advanced battery and fuel cell charging systems.
  - ❖ Microgrid integrated with solar and wind farms.
  - ❖ Command and control for vehicles, drones, electric bicycles and safety assurance.



# Intermodal Terminal and DC Tractor Testing Facility

- **Control Room and Simulation Lab**

- ❖ Facility equipped with advanced software for real-time data analysis.
- ❖ Simulation lab with high-capacity computers for extensive autonomous truck simulations.

- **Open-Air Replica**

- ❖ Features of the open-air replica including loading docks, warehouse spaces, and parking zones.
- ❖ Realistic environment for testing autonomous trucks' maneuvering, docking, parking, and navigation.

- **High-Precision Monitoring**

- ❖ Use of high-precision GPS and sensor stations with cameras, lidar, and radar for data collection.
- ❖ Collaboration with corporate partners Mi-Jack Products, Hilburg Tractors, and Phantom Auto.

# 3D Design and Prototyping Center

- **Innovation Hub**

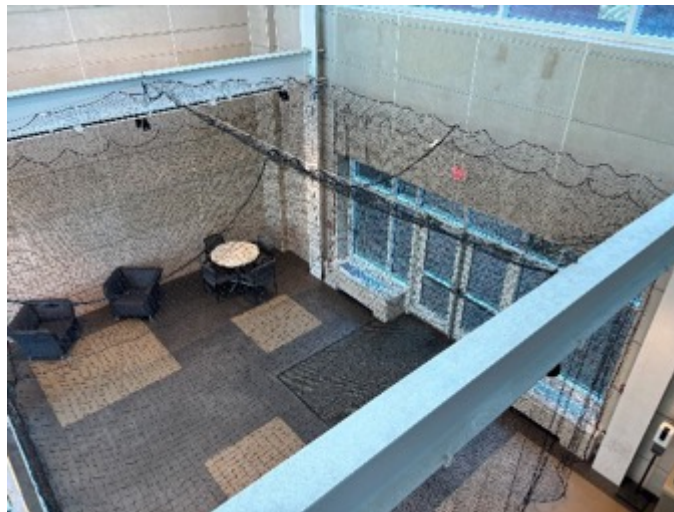
- ❖ State-of-the-art 3D design and printing center at the SIUE testing facility.
- ❖ Equipped with various scales of 3D printers.

- **Research Team Collaboration**

- ❖ Collaborative efforts involving faculty, lab managers, technicians, and students.
- ❖ Focus on product design and rapid prototyping of drone models.

- **Testing at Multiple Locations**

- ❖ Drone prototypes designed and printed for testing in the drone cage and at GSU, SIUE, and St. Louis testbed.

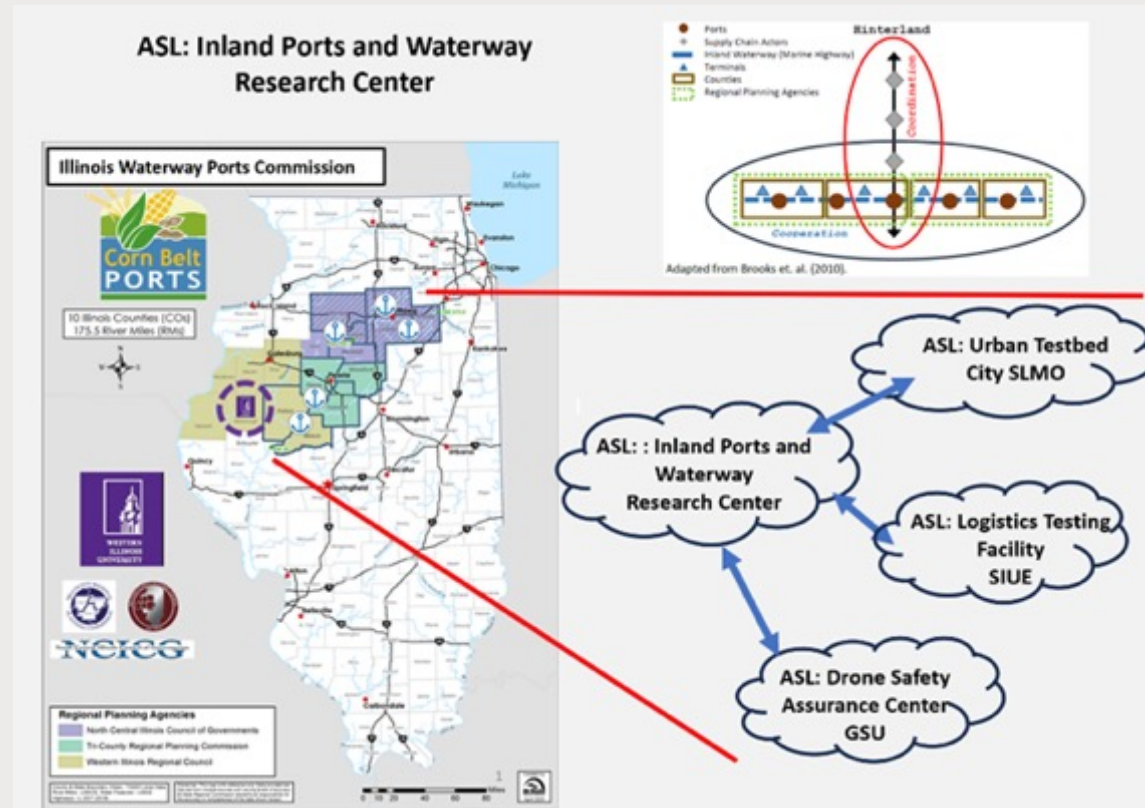




## eVTOL and eSTOL Aircraft Incubator Testing Facility

- **Collaborative Partnership**
  - ❖ Collaboration between Hanson Professional Services, Skyway, Skyport Infrastructure, and Transverse Drone Manufacturer.
  - ❖ Testing facility located at the Rantoul infrastructure of Illinois Alliance for Clean Transportation (I-ACT) and Bult Field.
- **Testing Infrastructure**
  - ❖ Outdoor platform at Bult Field for testing electric motors of eVTOL and eSTOL aircraft.
  - ❖ Integration with Nidec Aerospace and Boeing for comprehensive testing.
- **Planned I-ACT Facility**
  - ❖ A net-zero energy, high-speed test track for electrified, connected, and autonomous vehicles.

# Inland Ports and Waterway Research Center



- **ASL Inland Ports and Waterway Research Center (IPAWRC)**
  - ❖ Leveraging smart logistics for efficient movement of barges across ports, truck routes, and rural areas.
  - ❖ Essential role in informing and influencing technology design and development in testing facilities.
- **Base Technologies of Industry 4.0**
  - ❖ Utilization of Industry 4.0 technologies: cloud services, big data, data analytics, and IoT.
  - ❖ Development of a robust big data collection and analysis program.

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# Battery and Hydrogen Fuel Cell Testing Center

- **Illinois EV Innovation Hub**
  - ❖ Addressing high-priority challenges to accelerate electrification efforts.
  - ❖ Collaborations with Northern Illinois University, University of Illinois at Urbana-Champaign, and corporate partners.
- **Battery and Hydrogen Fuel Cell Testing**
  - ❖ Collaboration with Upgrade Energy, Bitrode, and TCCI for testing battery and hydrogen fuel cell performance.
  - ❖ Cutting-edge climate chamber for battery systems.






# Microgrid Testing Infrastructure

- **Microgrid Overview**

- ❖ Realistic load patterns and environmental impact emulation.
- ❖ Advanced energy management system for optimizing energy flow and distribution.

- **Renewable Energy Integration**

- ❖ Utilizing wind and solar energy for enhanced energy reliability.
- ❖ Hydrogen hub for storing surplus renewable energy.



Flying drones and electric Vertical Takeoff and Landing (eVTOL) aircraft face a range of regulatory issues and challenges, as they introduce new technologies and operational paradigms into the airspace.

**Airspace Management:**

**Registration and Identification:**

**Operational Restrictions:**

**Remote ID and Tracking:**

**Licensing and Certification:**

**Safety Standards:**

**Insurance and Liability:**

**Privacy:**

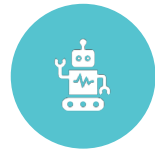
**Noise and Environmental Impact:**

**Urban and Infrastructure Integration:**

# Delivery Scenarios and Impact Analyses



Plausible and Optimal Delivery Scenarios



Integration of eVTOL, eSTOL, drones, electric bicycles and electric vehicles



Collaborative efforts with partners for efficient logistics.



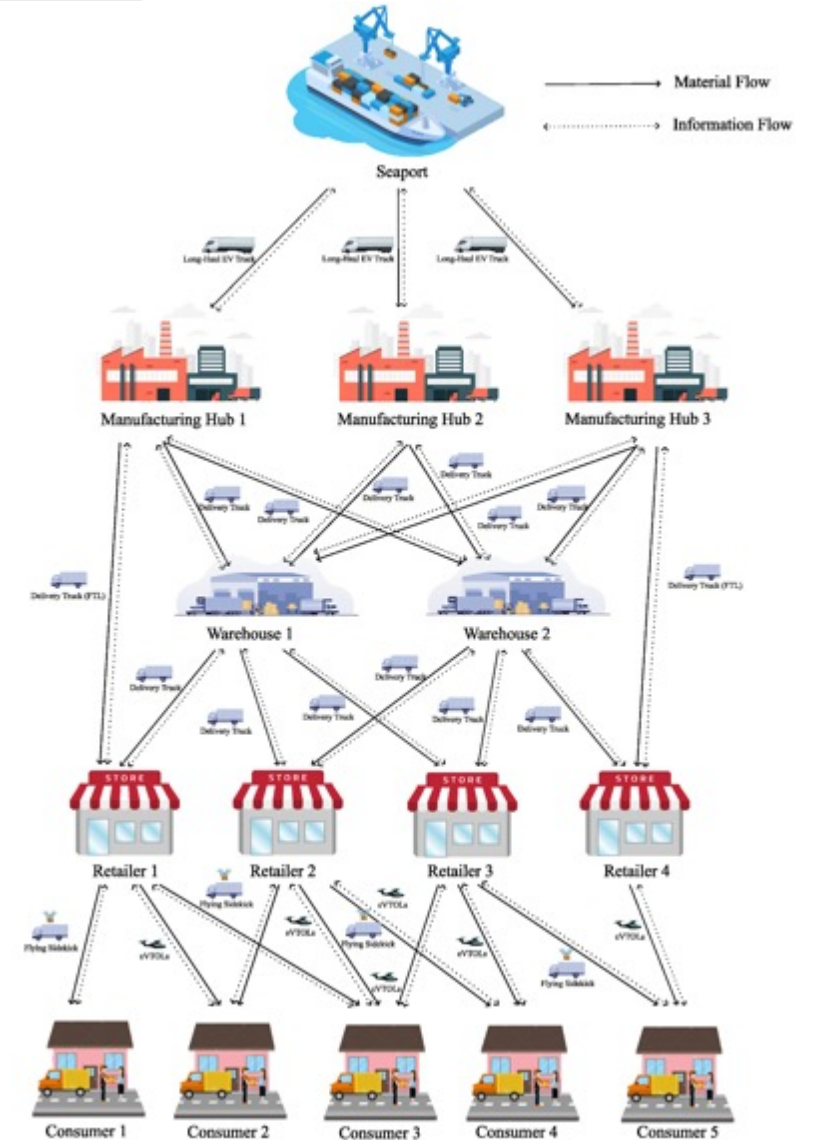
Collaborative Partnerships



Involvement with Chicago Quantum, Scannell Properties, Valqari, Lockheed Martin, Sierra Nevada Corporation, NASA, and AVIATE



Impact analyses for optimized delivery routes and logistics networks



# **Economic, Community, and Environmental Impact Request for Qualifications is being released**

## **Logistics Company Support**

Attraction, expansion, and initiation of logistics companies.

Utilization of testing facilities for cost-effective prototyping.

## **DEIA-Focused Career Development**

K-14 to university career paths with a focus on Diversity, Equity, Inclusion, and Accessibility (DEIA).

Enabling logistics companies to provide services for employment and career growth.

## **Economic, Community, and Environmental Impact**

Contribution to local economies through technology and logistics innovation.

Reduced carbon footprint and equitable access to logistics opportunities.

# Examples of Collaborators and Partners

- **Technology, Manufacturing, Applied Use, and Maintenance Collaborators**

- ❖ *Labyrinth Technologies*

- ❖ *Skyway*

- ❖ *Valqari*

- ❖ *Lockheed Martin*

- ❖ *Siemens*

- **Infrastructure and Energy Partners**

- ❖ *Ameren Corporation*

- ❖ *Hanson Professional Services*

- ❖ *Midwest Hydrogen Hub*

- **Incubators and Research Institutions**

- ❖ *Argonne National Laboratory*

- ❖ *NASA*





## Next Steps

Implement a statewide marketing campaign to engage a diverse range of potential partners who are interested in collaborating with ASL.

Host the ASL Symposium on April 11<sup>th</sup> at GSU develop a wide reach and significant of ASL.

The ASL network will seek stakeholders to attend or present their work in the facet of smart and clean logistics.