

Abstract: The Research Story

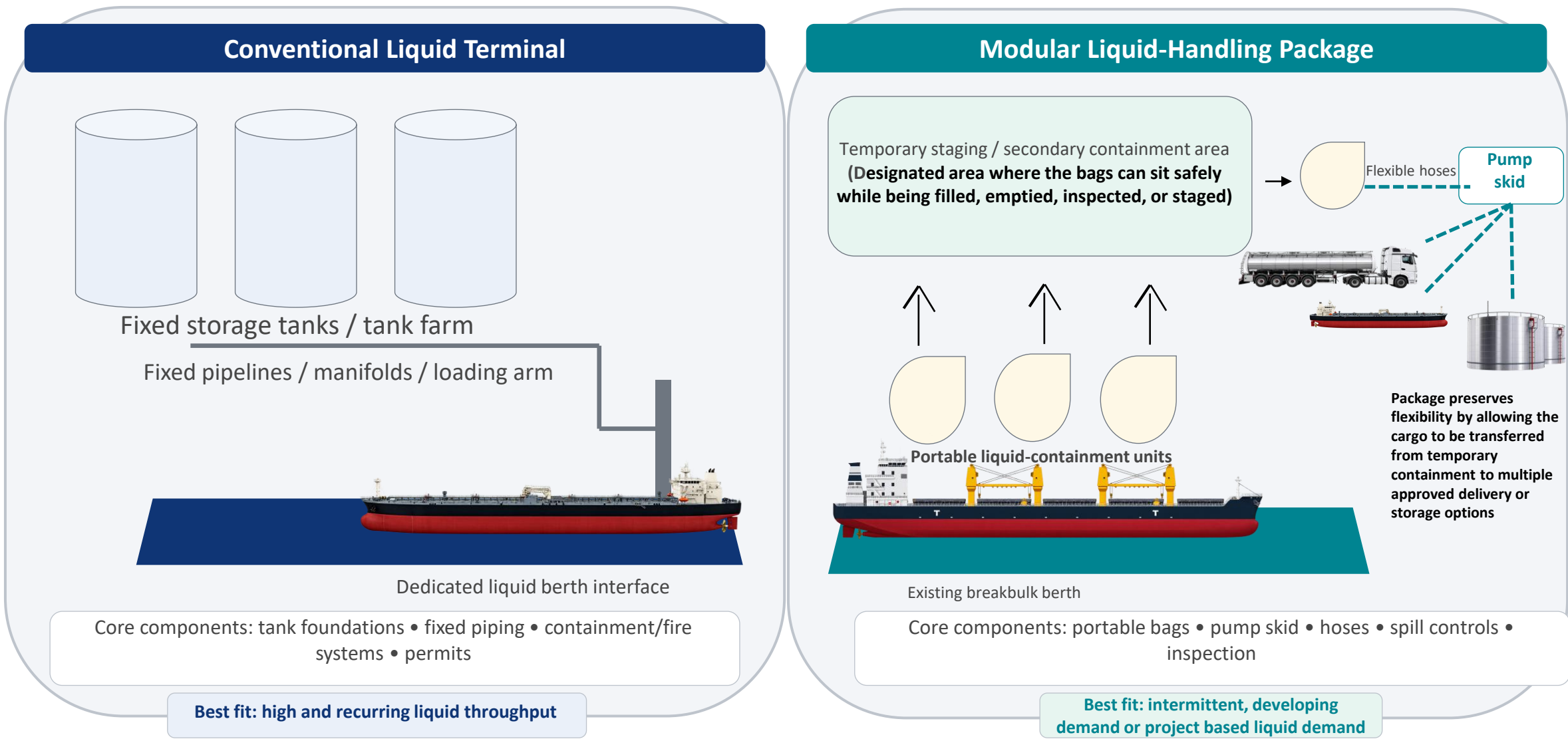
Research focus: When does a modular liquid-handling package become a viable port service, and what operational gates decide if it should be used?

Breakbulk ports are built for project, general and dry cargo—not recurring bulk-liquid flows. When a compatible liquid opportunity appears, fixed tanks, pipelines and dedicated berth systems may be too expensive or too slow for uncertain demand yet. Rejecting the cargo leaves revenue on the table.

This study evaluates portable bulk-liquid containment as an interim infrastructure model: a removable storage/transport interface that could allow selected liquid cargoes to be staged or moved through breakbulk assets without converting the port or vessel into permanent liquid service.

The finding is conditional: The concept is not a substitute for mature liquid terminals. Its value is strongest when demand is real but intermittent, the cargo is compatible, the site can control transfer and secondary containment, and incremental revenue exceeds added handling, inspection, insurance and delay risk.

Port Infrastructure Model: Permanent Specialization vs. Modular Liquid-Handling Package



Application

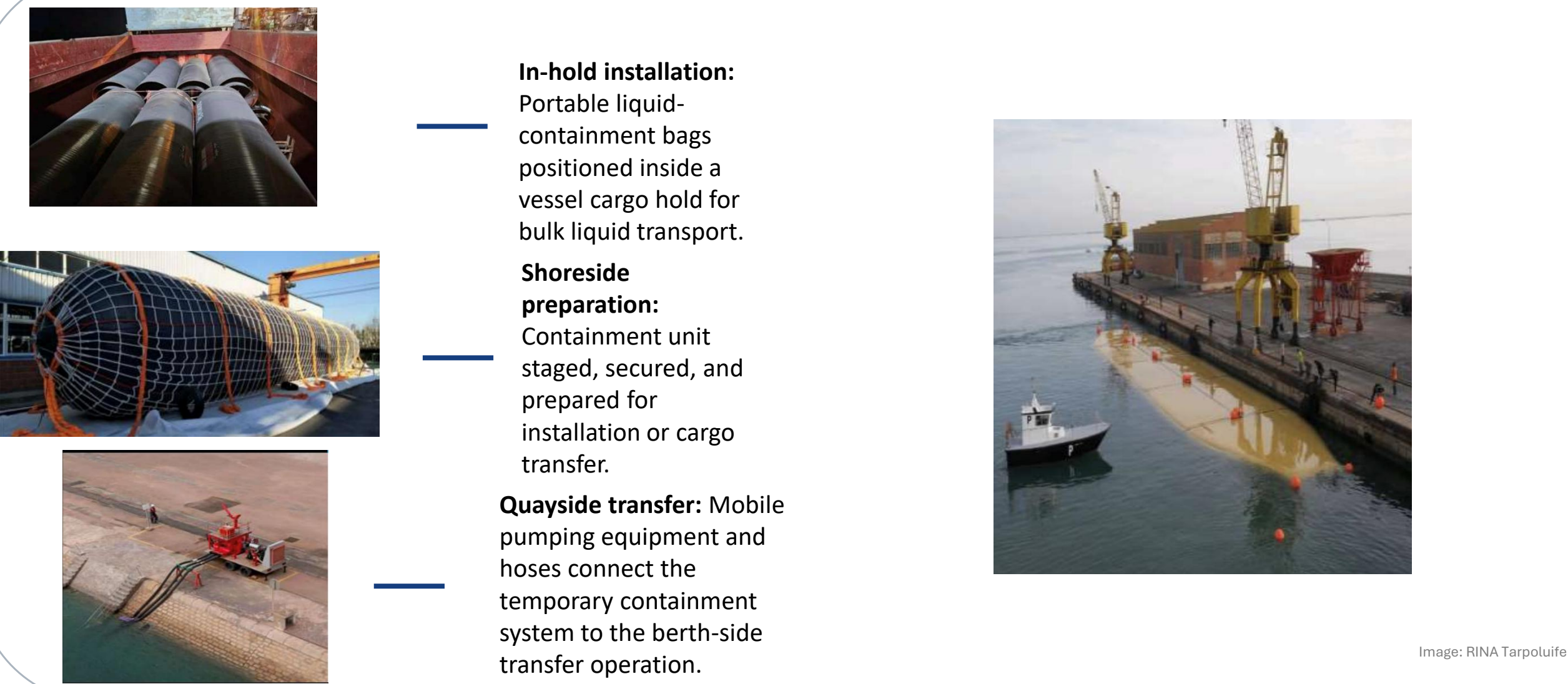


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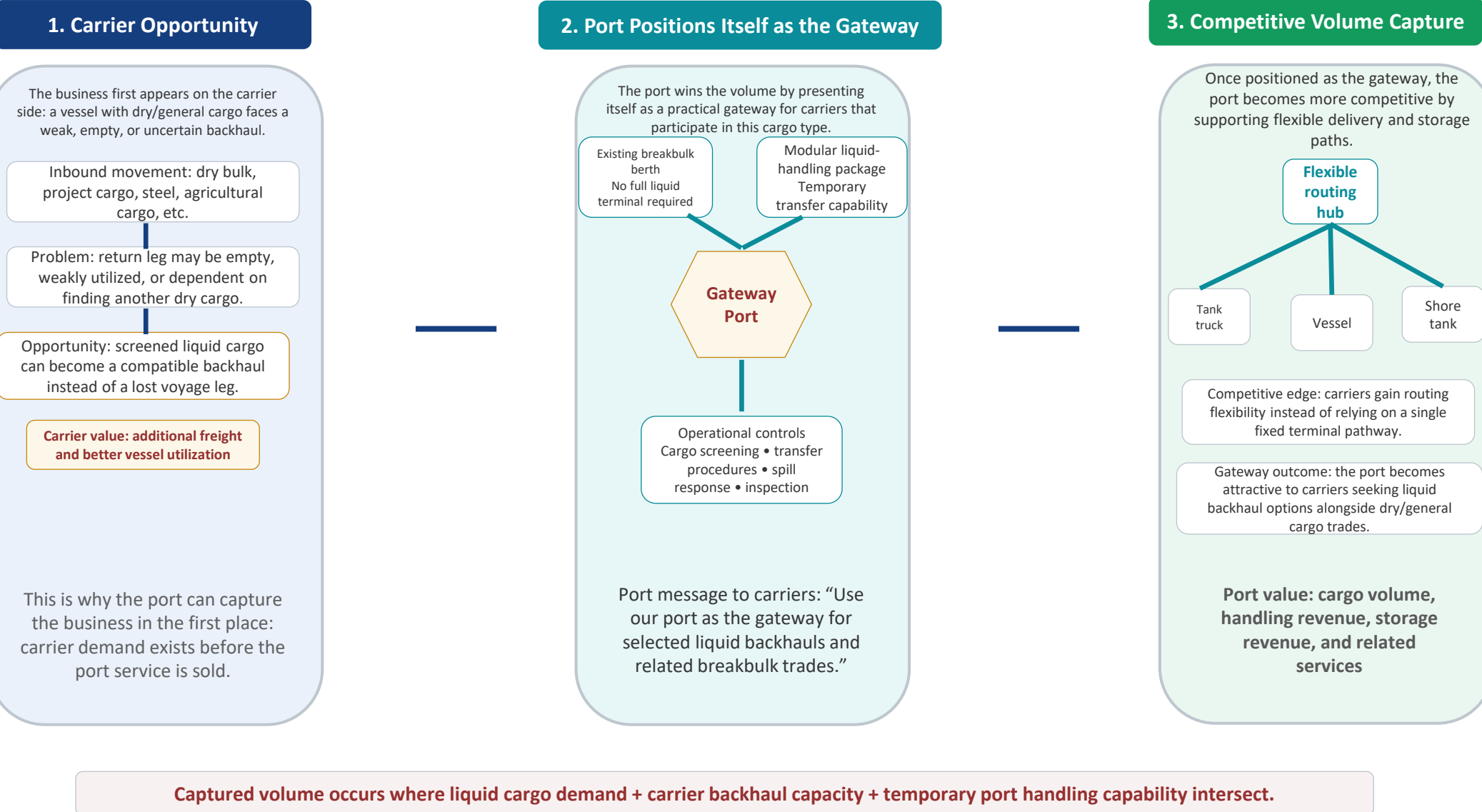
Methodology: Feasibility Study

- A Infrastructure comparison
- B Scenario economics
- C Feasibility
- D Pilot framework

The poster is structured as a feasibility framework, NOT a product pitch. It follows the competition guidance to combine literature review, case evidence, and industry relevance.

Carrier Opportunity: Where Can Ports Capture Liquid Volumes?

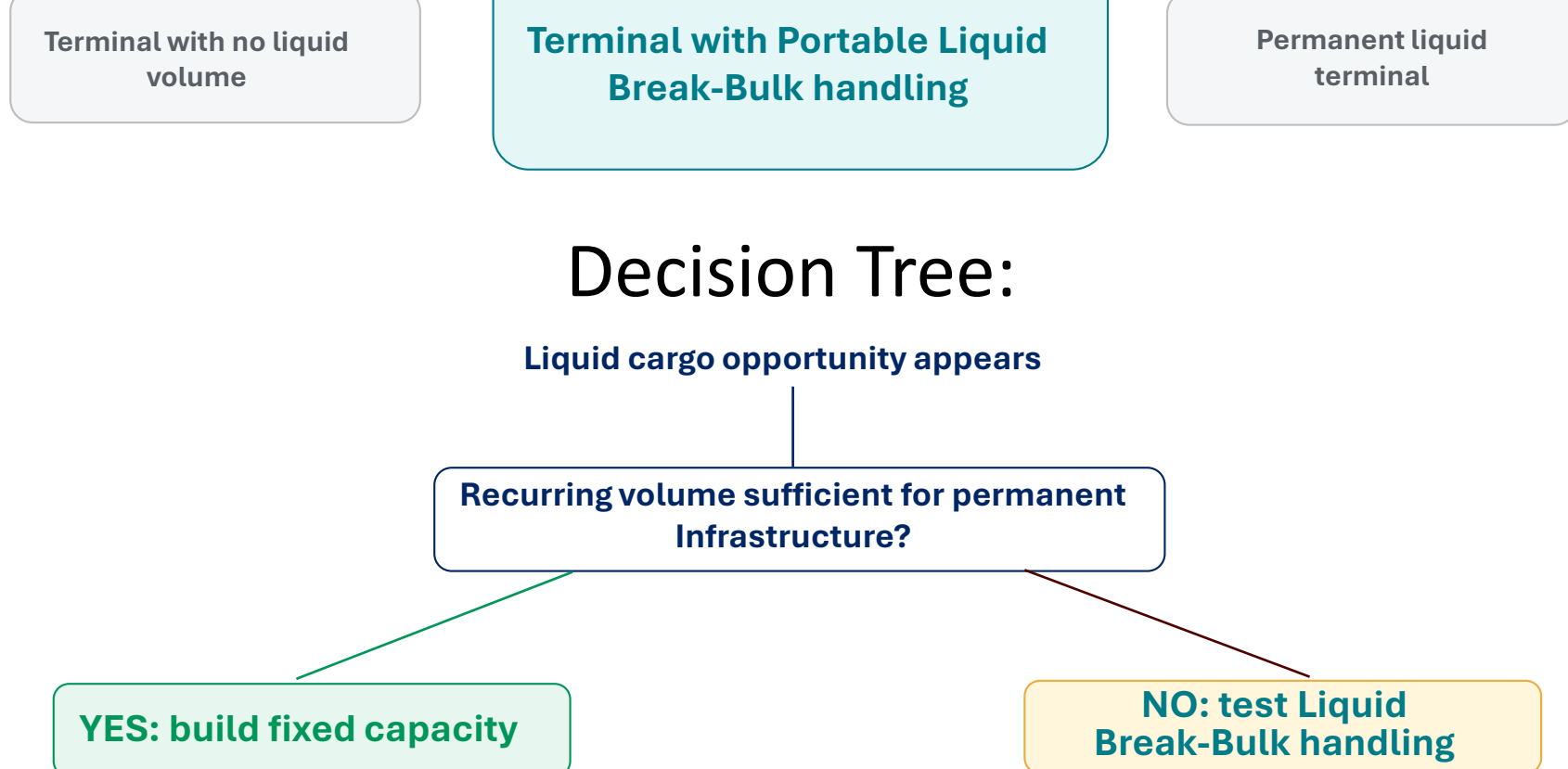
The purpose of this visual is to show where the business originates, how the port positions itself, and why carriers may choose the gateway.



Author's own elaboration; permanent terminal elements synthesized from both terminal descriptions and port liquid handling practices.

Market Gap: The Bridge

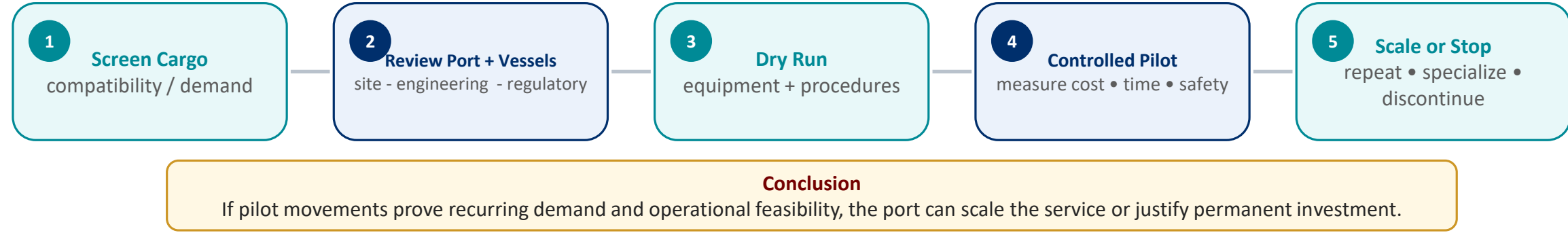
The product is designed to help ports capture liquid-cargo opportunities when demand exists, but current volume or frequency does not justify investment in permanent liquid-terminal infrastructure. As illustrated below, portable liquid breakbulk handling is most viable in the gap between no liquid-cargo demand and the point at which recurring volumes justify permanent liquid-terminal infrastructure.



Author's own decision framework; permanent terminal fit depends on cargo volume, permit pathway, land and mooring demand.

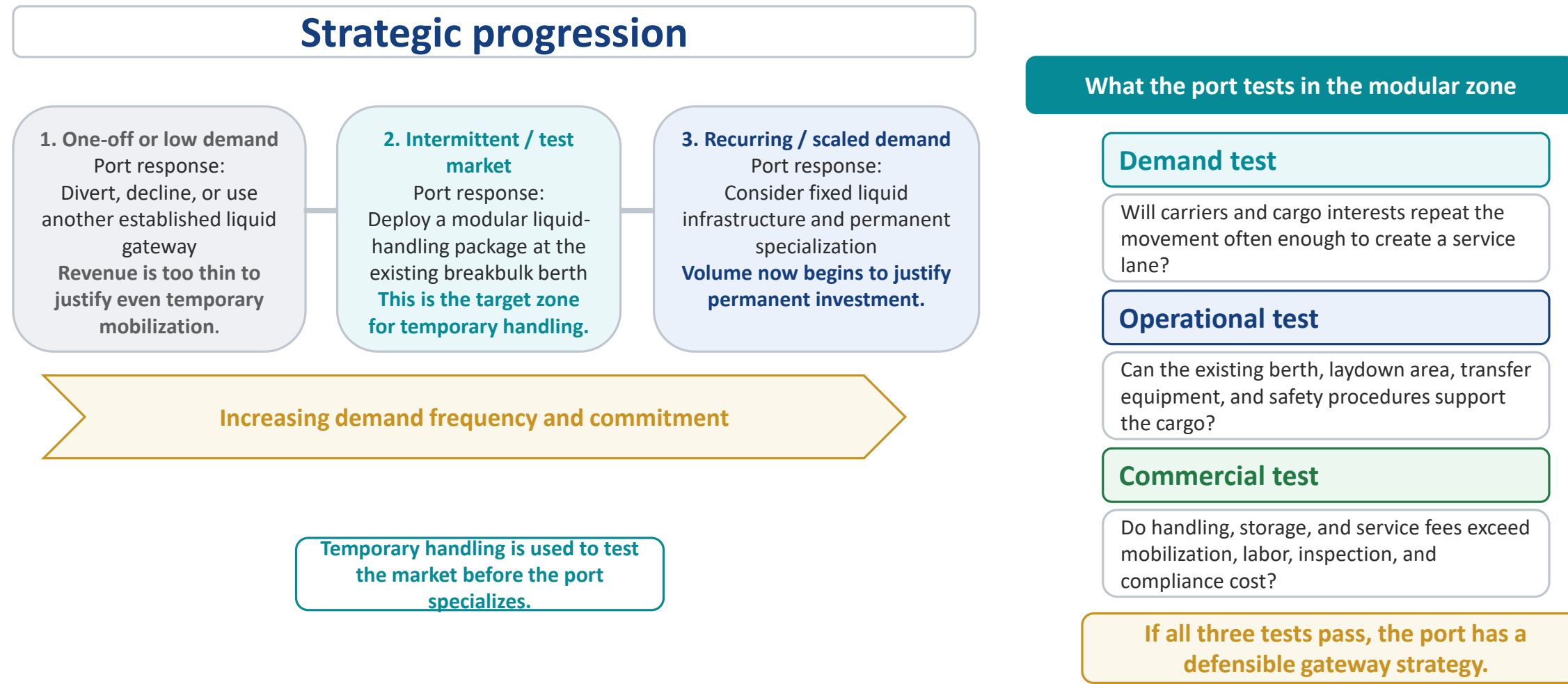
Path Forward + Conclusion

Recommended Pilot Path



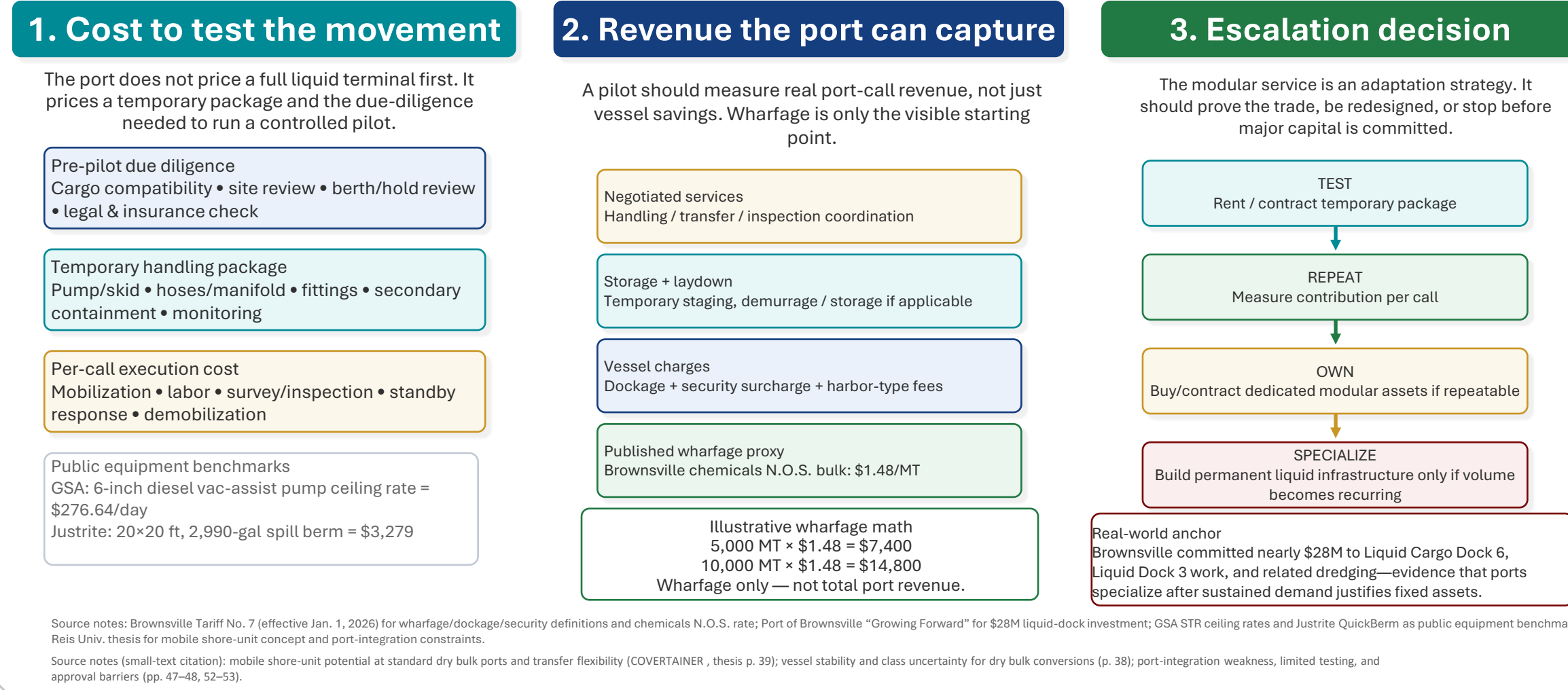
Port Adaptation Strategy: When Temporary Handling Makes Sense

The port should escalate commitment only as cargo demand becomes more recurring and commercially defensible.



Conceptual model informed by thesis discussion that mobile shore units may enable operations at standard dry bulk ports, while port integration and approval remain key constraints (COVERTAINER, pp. 35, 44).

Feasibility Gates: Where the Concept Fails or Proceeds



Source notes: Brownsville Tariff No. 7 (effective Jan. 1, 2026) for wharfrage/dockage security definitions and chemicals N.O.S. rate; Port of Brownsville "Growing Forward" for \$28M liquid-dock investment; GSA STR ceiling rates and Justina QuickBerm vs public equipment benchmarks; PFI Reiss Unit, thesis for mobile shore-unit concept and port-integration constraints. Source notes (small text charters): mobile shore-unit potential at standard dry bulk ports and transfer flexibility (COVERTAINER, thesis p. 39); vessel stability and class uncertainty for dry bulk conversions (p. 38); port integration weaknesses, limited testing, and approval barriers (pp. 47-48, 52-53).

Sources



Expansion of Liquid Break-Bulk

Capt. Esra Konak; Reagan Robinson

Faculty Advisor: Dr. Mawuli Afenyo, Dr. Mazen Brho

Texas A&M University

Industry Advisor: Capt. Guner Kara