

Stakeholder-Informed Exploration of Digital Twin Applications for Mitigating Environmental Risks in Nova Scotia's Offshore Wind Sector

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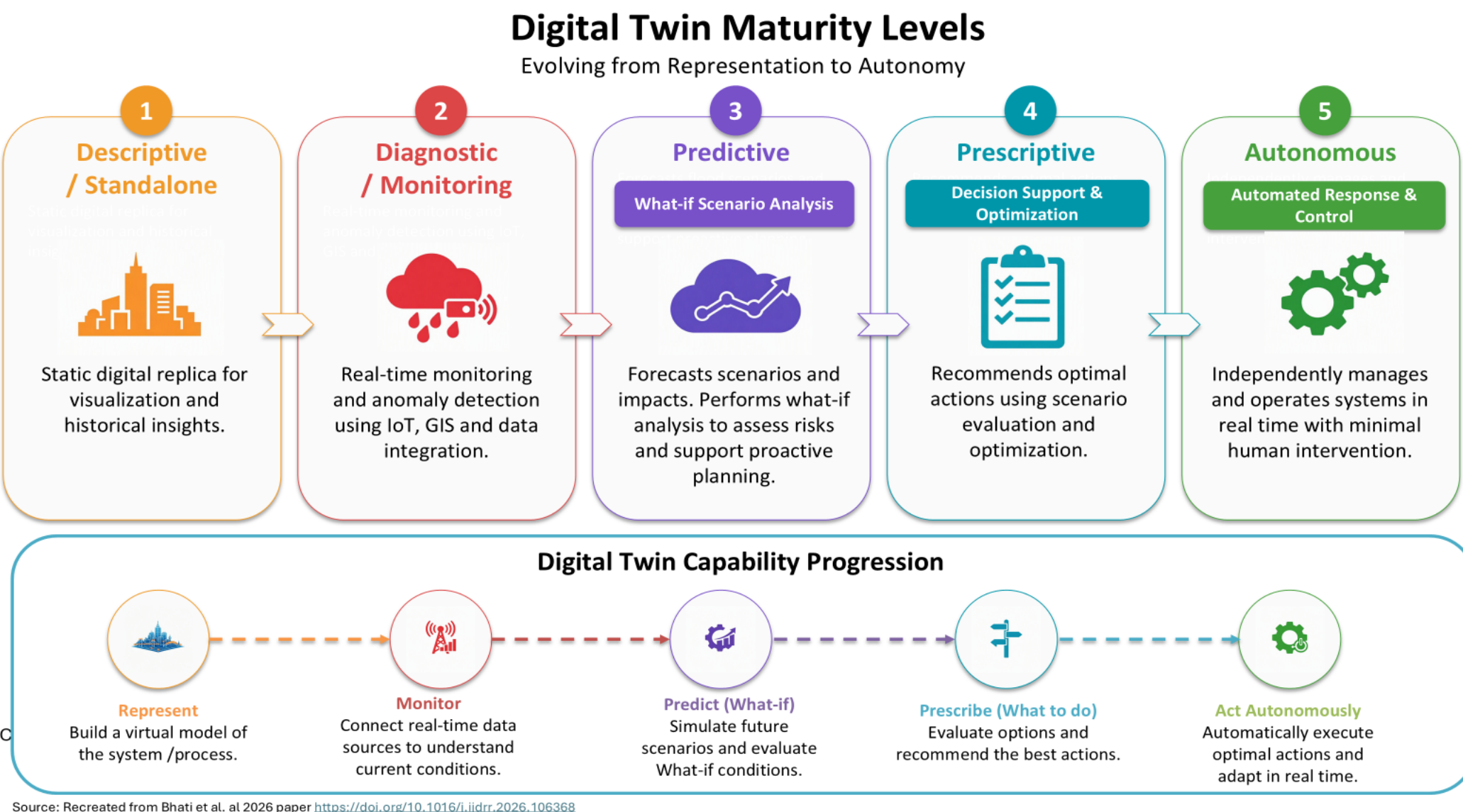
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BACKGROUND

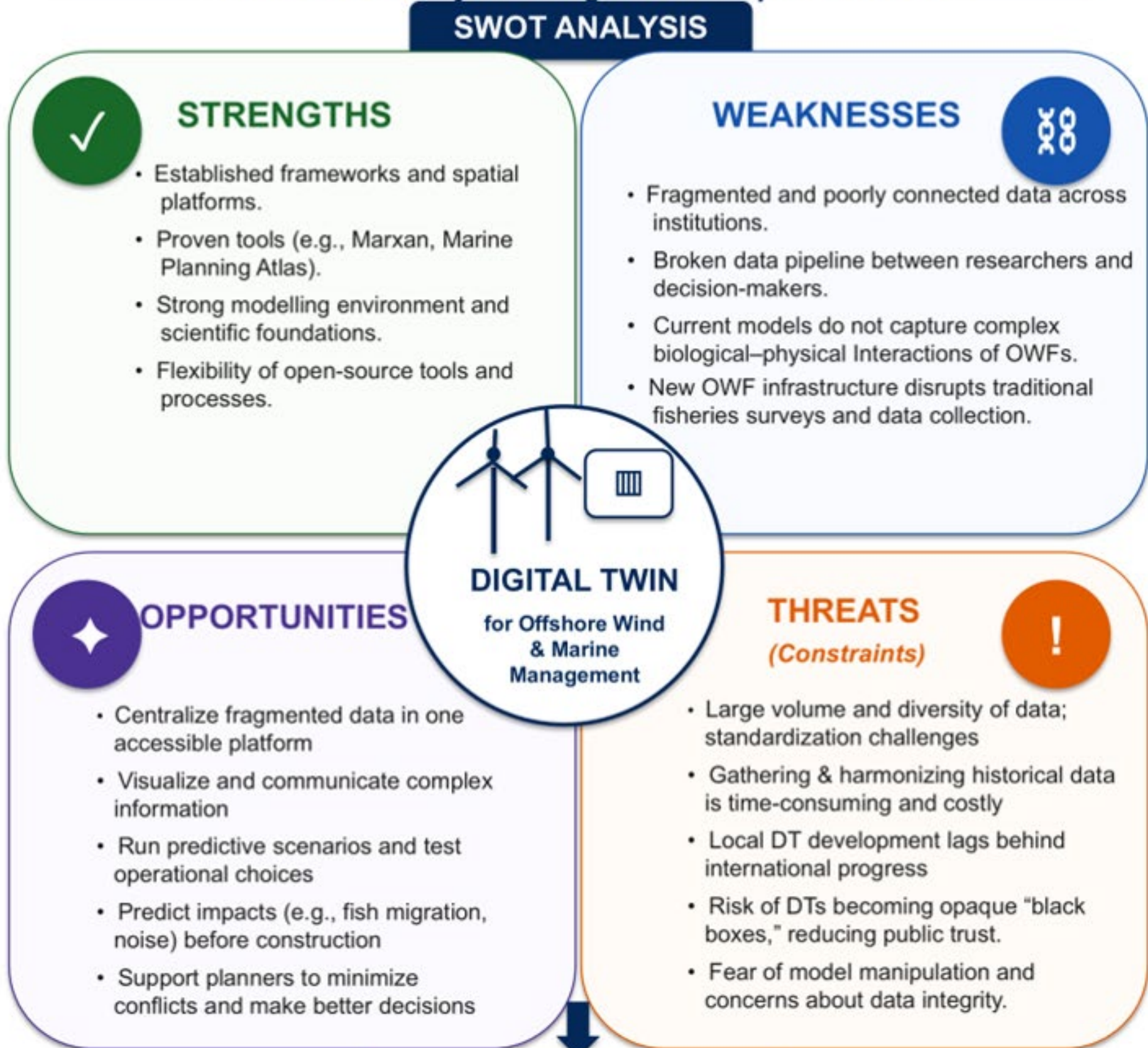
Nova Scotia (NS) is advancing Offshore Wind Farm (OWF) development to expand renewable energy, but this growth may pose risks to sensitive marine ecosystems, especially within Marine Protected Areas (MPAs). Balancing energy production with conservation priorities requires tools that support transparent, evidence-based decisions. Digital Twin (DT) technology offers a promising solution by integrating real-time data and environmental models to improve monitoring, forecasting, and operational planning. While DTs exist for OWF engineering performance and for ocean environmental dynamics, a combination of these systems has not yet been comprehensively explored. An integrated DT could transform environmental management by enabling continuous monitoring, scenario-based predictions, and climate-related impact assessments. This project explores the feasibility and value of such a DT, emphasizing its importance for responsible offshore energy development and strengthened environmental governance in NS.



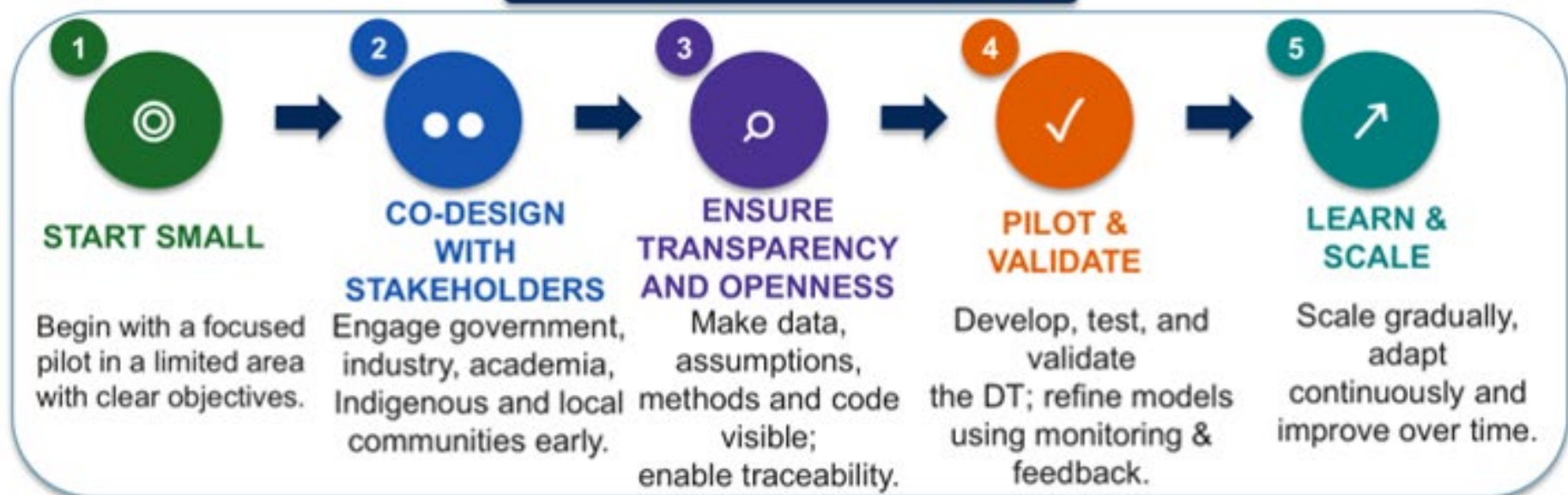
PRELIMINARY ANALYSIS: WORKSHOP

SWOT-DT FRAMEWORK

From SWOT Analysis to Digital Twin Implementation



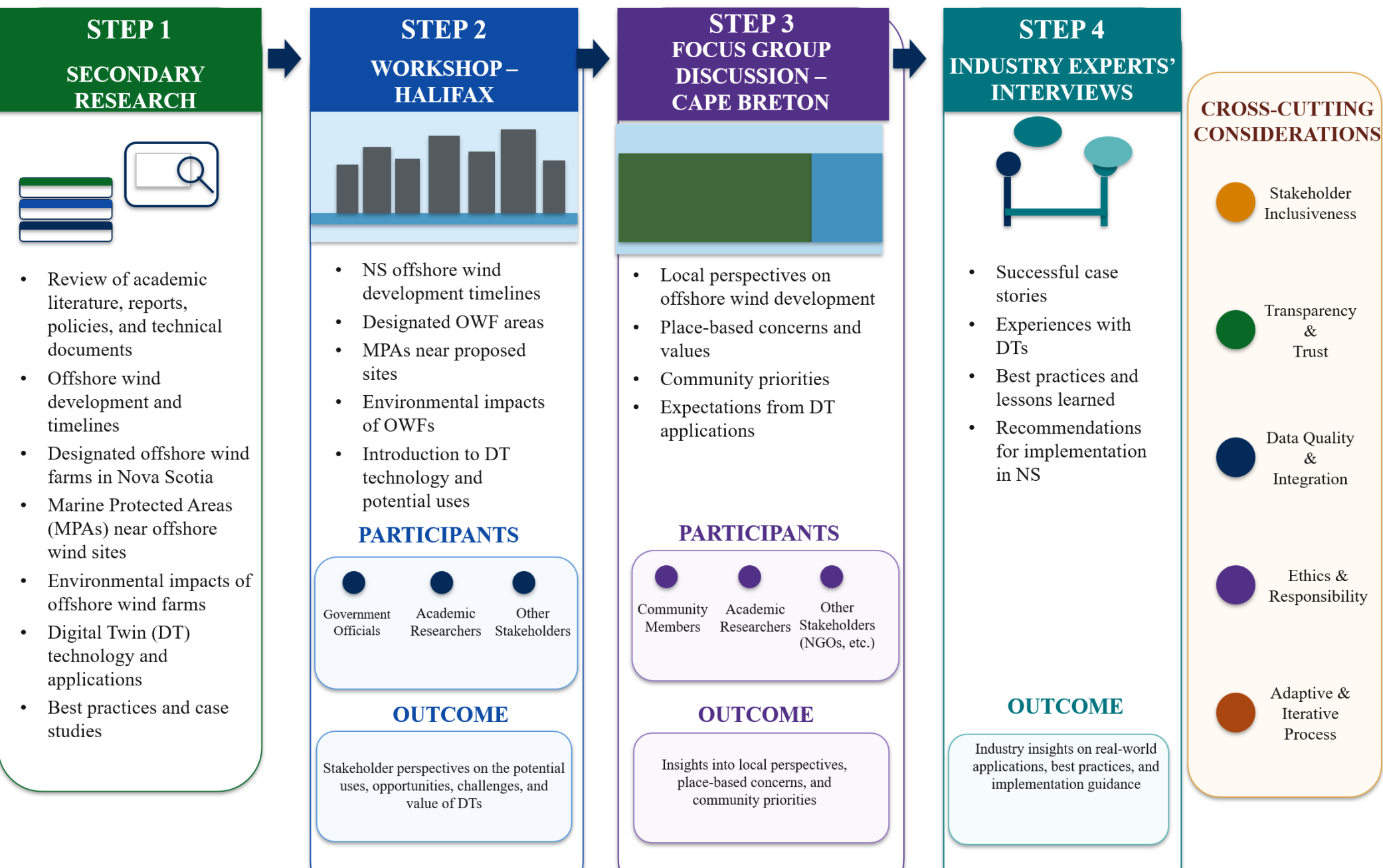
IMPLEMENTATION STRATEGY



OUTCOME A trusted, transparent and adaptive Digital Twin that supports environmentally responsible offshore wind development and marine conservation in Nova Scotia.



THEORETICAL AND METHODOLOGICAL APPROACHES



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