



NAC Executive Insights

Industry Structural Deficiencies in Technology Adoption (Part 4)

Key Points

- A comprehensive analysis of the structural deficiencies that inhibit technology adoption in the engineering and construction (E&C) industry is provided and valuable insights into the complexities and challenges faced by organizations in this E&C sector are offered.
- Effective strategies for overcoming these deficiencies, including the importance of strong leadership, strategic planning, and stakeholder engagement, which are crucial for successful technology integration are presented.
- The need for continuous learning and skill development within the workforce to ensure proficiency with new technologies is emphasized and the role of educational institutions in preparing future professionals highlighted.
- The benefits of collaboration among industry players and the potential of data commons to enhance data management and security, ultimately driving innovation and informed decision-making in the industry is discussed.

Introduction

In Group 1, 2 and 3 of this series we have looked at a range of risks that the engineering and construction industry faces with respect to technology adoption and deployment. These risks are reflected in Table 1. In this fourth part of this Executive Insight series, we look at some structural deficiencies in technology adoption.

Table 1
Technology Adoption and Deployment Risks in the Engineering and Construction Industry
Group 1- Technology Related Risks
Cybersecurity Threats
Technological Obsolescence
Data Privacy Concerns
Interoperability Issues
Vendor Lock-in
Scalability Issues
Intellectual Property (IP) Risks

Table 1
Technology Adoption and Deployment Risks in the Engineering and Construction Industry
Group 2 – Management Related Risks
Integration Challenges
Skill Gaps
Supply Chain Disruptions
Resistance to Change
Maintenance and Support
Cultural Barriers
Group 3 – Financial Related Risks
High Implementation Costs
Regulatory Compliance
Economic Uncertainty
Return on Investment (ROI) Uncertainty
Environmental Impact
Market Competition
Customer Expectations

Structural Deficiencies in Technology Adoption

The risks described in Groups 1, 2 & 3 of this Executive Insight series on Technology Adoption and Deployment highlight the complexities and challenges that the engineering and construction industry must navigate to successfully adopt and deploy new technologies. Let us turn now to some structural deficiencies which exist in the industry and inhibit technology adoption and deployment.

Addressing structural deficiencies in technology adoption within the engineering and construction industry requires a multifaceted approach. Some effective strategies include:

- **Leadership and Vision**
 - Strong Leadership: Leaders must champion technology adoption, setting a clear vision and demonstrating commitment. This is important at the company level but perhaps as important at the industry level.
 - Strategic Planning: Develop a comprehensive technology roadmap aligned with business goals. Similarly, the industry requires a robust technology roadmap that facilitates cooperation and risk sharing.

- **Education and Training**
 - Skill Development: Invest in training programs to upskill the workforce, ensuring they are proficient with new technologies. University curriculum must remain relevant to

industry needs and the new skills required must be anticipated and provided for by the education system both at the professional and craft levels.

- Continuous Learning: Encourage a culture of continuous learning and innovation.
- **Change Management**
 - Stakeholder Engagement: Involve all stakeholders early in the adoption process to gain buy-in and address concerns. This engagement must also occur at the industry level engaging owners, regulators and the building trades.
 - Communication: Maintain open lines of communication to manage expectations and reduce resistance to change.
- **Pilot Programs and Incremental Implementation**
 - Pilot Projects: Start with small-scale pilot projects to test new technologies and demonstrate their value. A framework for industry pilot projects must be strengthened.
 - Incremental Adoption: Gradually scale up successful pilots to full implementation, reducing risk and managing costs.
- **Collaboration and Partnerships**
 - Industry Collaboration: Partner with technology providers, research institutions, and other industry players to share knowledge and resources. This can occur at the individual company level but also needs to occur at a broader industry level.
 - Cross-Functional Teams: Form cross-functional teams to integrate diverse perspectives and expertise.
- **Regulatory and Compliance Alignment**
 - Proactive Compliance: Stay ahead of regulatory changes and ensure new technologies meet all compliance requirements.
 - Standardization: Advocate for industry-wide standards to facilitate smoother technology integration.
- **Investment and Budgeting**
 - Dedicated Budget: Allocate a specific budget for technology adoption and innovation.
 - ROI Analysis: Conduct thorough ROI analyses to justify investments and demonstrate long-term benefits.
- **Data Management and Security**
 - Data Strategy: Develop a robust data management strategy to handle the influx of data from new technologies.
 - Data Commons: The industry benefits of a shared data commons similar to what exists in other industries should be considered. (See Box)
 - Cybersecurity: Implement strong cybersecurity measures to protect sensitive information.

Data Commons

A data commons is a collaborative platform that brings together data, cloud computing infrastructure, and commonly used software tools to create an interoperable resource for a specific community. It allows users to manage, analyze, and share data more efficiently by providing a unified framework that integrates various datasets and tools.

Examples of Data Commons in various industries

- **Healthcare:**
 - National Institutes of Health (NIH) Data Commons: This initiative aims to make biomedical data more accessible and usable by integrating diverse datasets, tools, and cloud computing resources. It supports research in genomics, imaging, and other biomedical fields.
- **Environmental Science:**
 - Earth System Grid Federation (ESGF): This data commons provides access to climate data from various sources, enabling researchers to study climate change and its impacts. It integrates data from climate models, observations, and reanalysis.
- **Social Sciences:**
 - Harvard Data Commons: This platform co-locates social science data with cloud computing infrastructure and analytical tools, facilitating research in areas such as economics, sociology, and political science.
- **Agriculture:**
 - Ag Data Commons: Managed by the USDA, this platform provides access to agricultural research data, including datasets on crop production, soil health, and pest management. It supports researchers, policymakers, and farmers in making data-driven decisions.

By leveraging data commons, industries can overcome challenges related to data fragmentation, accessibility, and interoperability, ultimately driving innovation and informed decision-making.

- **Feedback and Continuous Improvement**
 - Feedback Loops: Establish mechanisms for continuous feedback and improvement based on user experiences.
 - Iterative Processes: Use iterative processes to refine and optimize technology adoption strategies.

Summary

The engineering and construction industry stands at a pivotal stage where the successful adoption of technology can significantly enhance efficiency, safety, and innovation. By addressing the structural deficiencies identified in this Executive Insight, organizations can create a robust framework for technology integration that not only meets current challenges but also anticipates future needs. Emphasizing strong leadership, continuous education, and collaborative efforts will be essential in fostering a culture of innovation.

As we move forward, it is imperative for industry stakeholders—leaders, educators, and practitioners—to unite in their commitment to embracing technological advancements. Action today can shape the future of the industry for generations to come.

For Further Reading – Other Executive Insights

- Technology Adoption and Deployment – Technology Related Risks (Group 1)
- Technology Adoption and Deployment – Management Related Risks (Group 2)
- Technology Adoption and Deployment – Financial Related Risks (Group 3)

About the Author

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