

Digital Engineering in Thailand

Vithaya Suharitdamrong
INCOSE Thailand

27 Sep 2024
Singapore



A hand is shown holding a glowing blue brain with white circuitry lines extending from it, set against a dark background with a network of white nodes and lines. The overall theme is digital engineering and artificial intelligence.

Why Thailand Needs Digital Engineering

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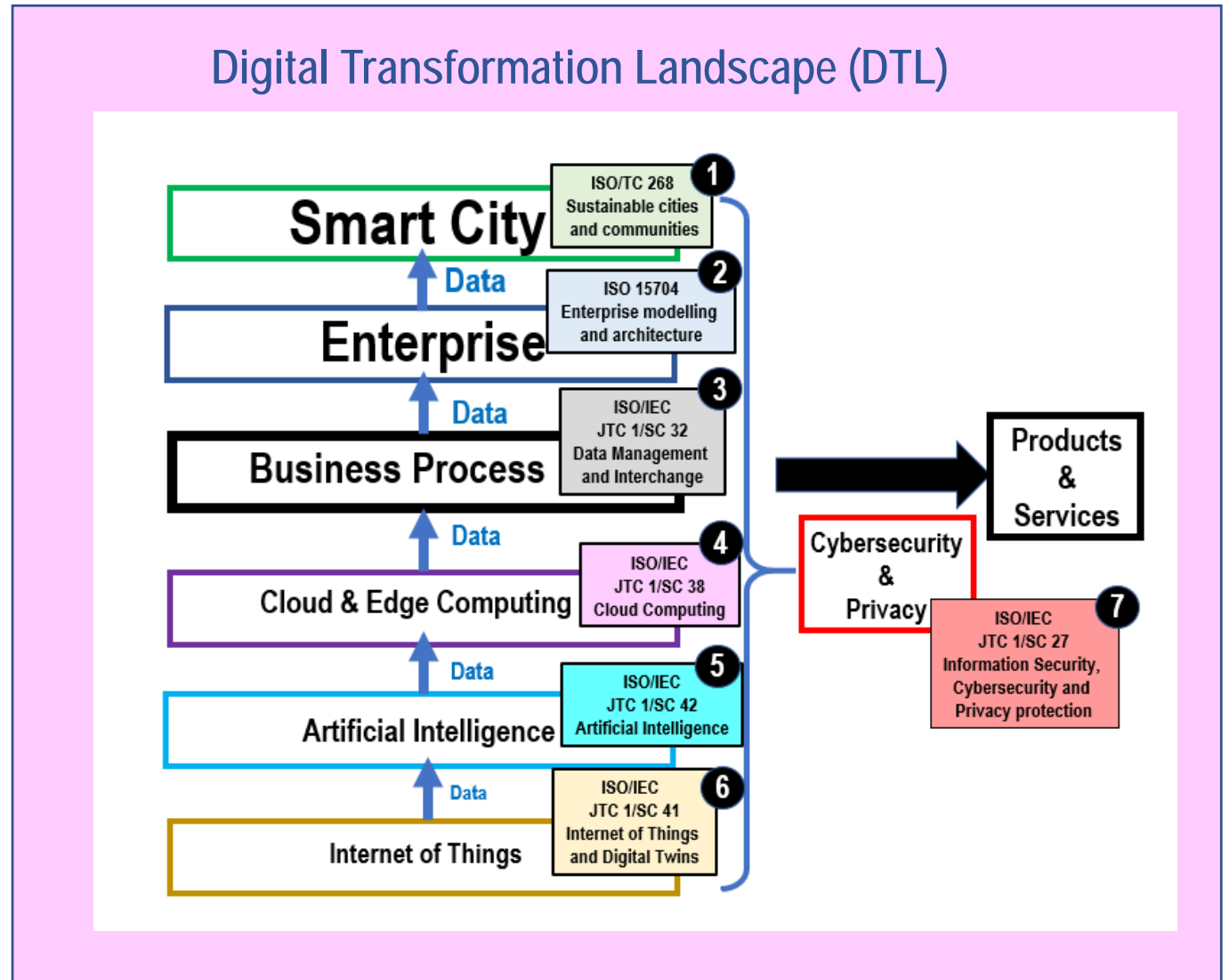
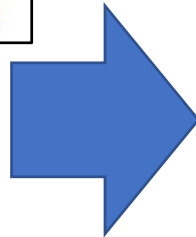
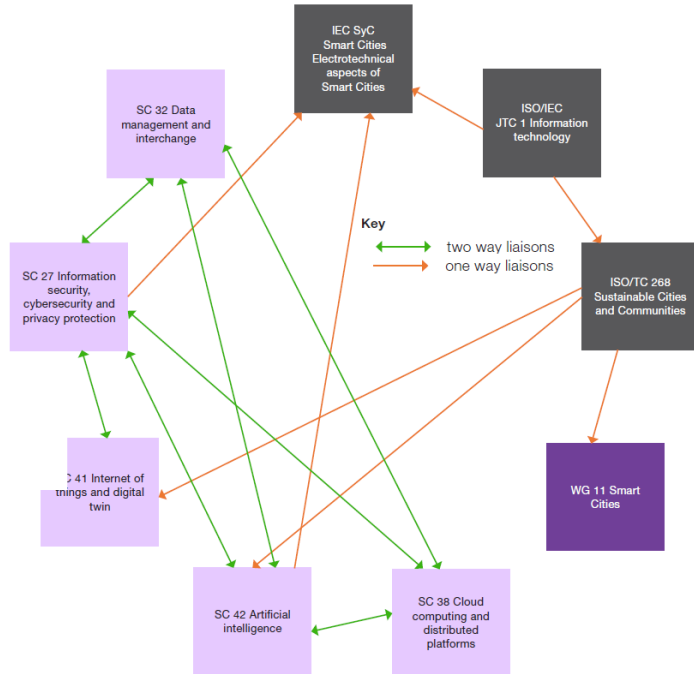
- DE provides a framework for managing the complexities associated with the development, deployment, and maintenance of AI-powered systems. It emphasizes a model-based approach, data integration, and collaboration throughout the system's lifecycle, ensuring that AI solutions are not only technically sound but also aligned with strategic goals and address potential challenges.

• Specific Needs for DE in Thailand's AI Adoption

- Complex System Integration
- Data Management and Governance.
- Collaboration and Knowledge Sharing:
- Safety and Security:
- Ethical and Responsible AI

Developing EIT's Digital Transformation Landscape (DTL)

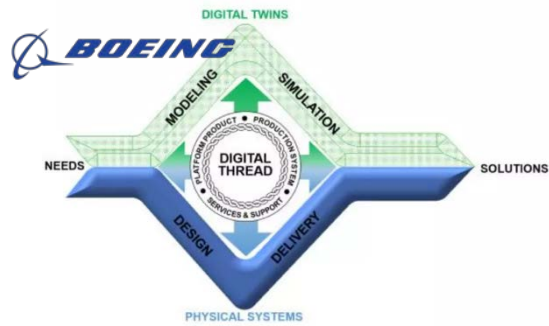
From Smart City Standards to Data and Digital Standards



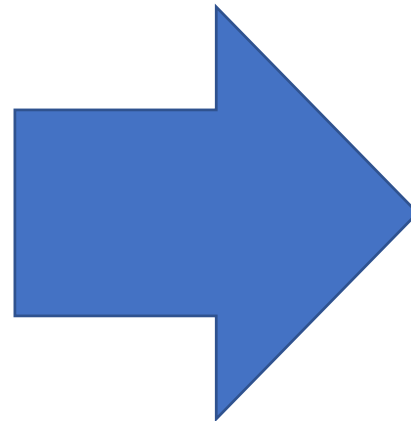
Developing EIT's Digital Engineering Framework

DOD's Digital Engineering Strategy

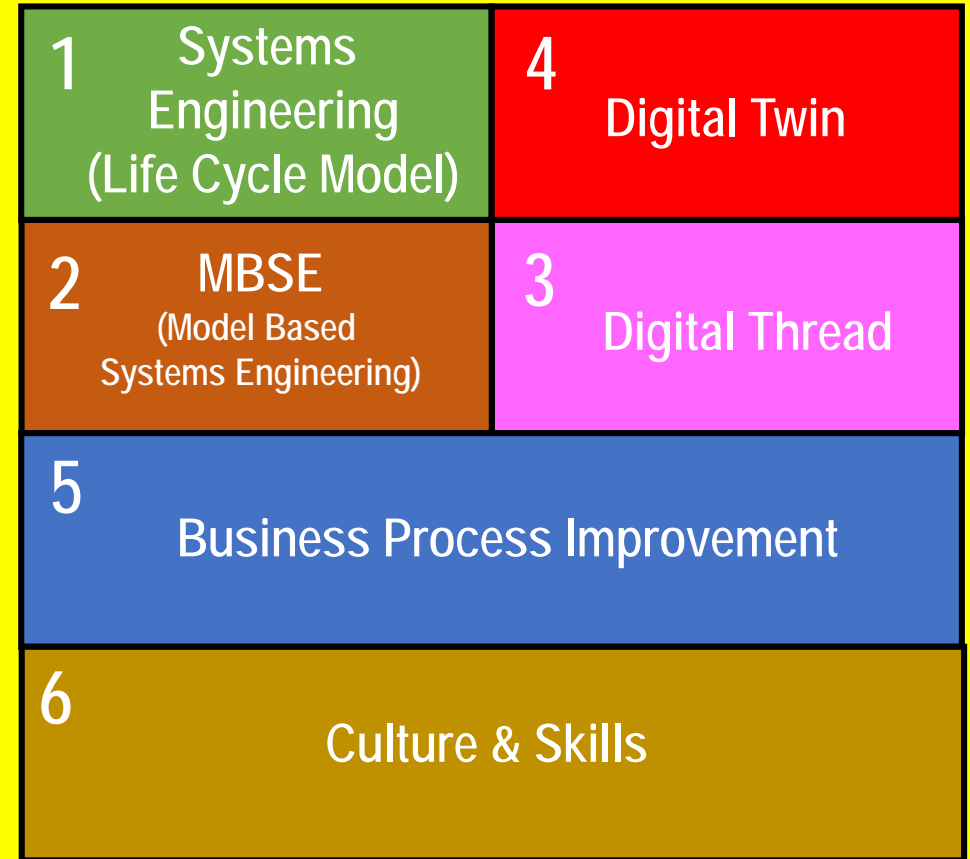
- 1 Formalize the **development, integration and use of models** to inform enterprise and program decision making
- 2 Provide an enduring **authoritative source of truth**
- 3 Incorporate **technological innovation** to improve the engineering practice
- 4 Establish supporting **infrastructure and environments** to perform activities, collaborate, and communicate across stakeholders
- 5 Transform a **culture and workforce** that adopts and supports Digital Engineering across the lifecycle



Boeing Diamond System Lifecycle



Digital Engineering Framework (DEF)





DEF's Role in Facilitating AI Implementation (1/2)

The Digital Engineering Framework (DEF), with its focus on model-based approaches, data integration, and digital representations, provides a structured and systematic way to incorporate AI into complex systems and processes across different domains.

- **Model-Based Systems Engineering (MBSE):** MBSE enables the creation of comprehensive digital models that represent the entire system, including AI components. This allows engineers to:
 - **Simulate and Test AI Algorithms:** Test and validate AI algorithms in a virtual environment before real-world deployment, ensuring their effectiveness and safety.
 - **Integrate AI with Existing Systems:** Model the interactions between AI components and existing systems, identifying potential conflicts and ensuring seamless integration.
 - **Optimize System Design:** Evaluate the impact of AI on the overall system performance and identify areas for improvement.

DEF's Role in Facilitating AI Implementation (2/2)

• **Digital Twin:** A digital twin creates a virtual replica of the physical system, including AI components. This enables:

- **Real-time Monitoring & Optimization:** Use AI algorithms to analyze data from the digital twin and optimize system performance in real-time.

- **Predictive Maintenance & Anomaly Detection:** Predict equipment failures and identify deviations from normal behavior, allowing for proactive maintenance and preventing disruptions.

- **Scenario Testing:** Simulate various scenarios to evaluate the performance of AI algorithms and identify areas for improvement.

• **Digital Thread:** The digital thread concept within DEF ensures traceability and data continuity throughout the lifecycle of AI-enabled systems. This allows for:

- **Data Collection and Management:** Gather data from various sources to train and refine AI models.
- **Continuous Monitoring and Improvement:** Track the performance of AI algorithms in real-time, identify potential issues, and implement updates or retraining as needed.
- **Collaboration and Knowledge Sharing:** Facilitate collaboration among stakeholders by providing a shared platform for accessing and analyzing data and models.

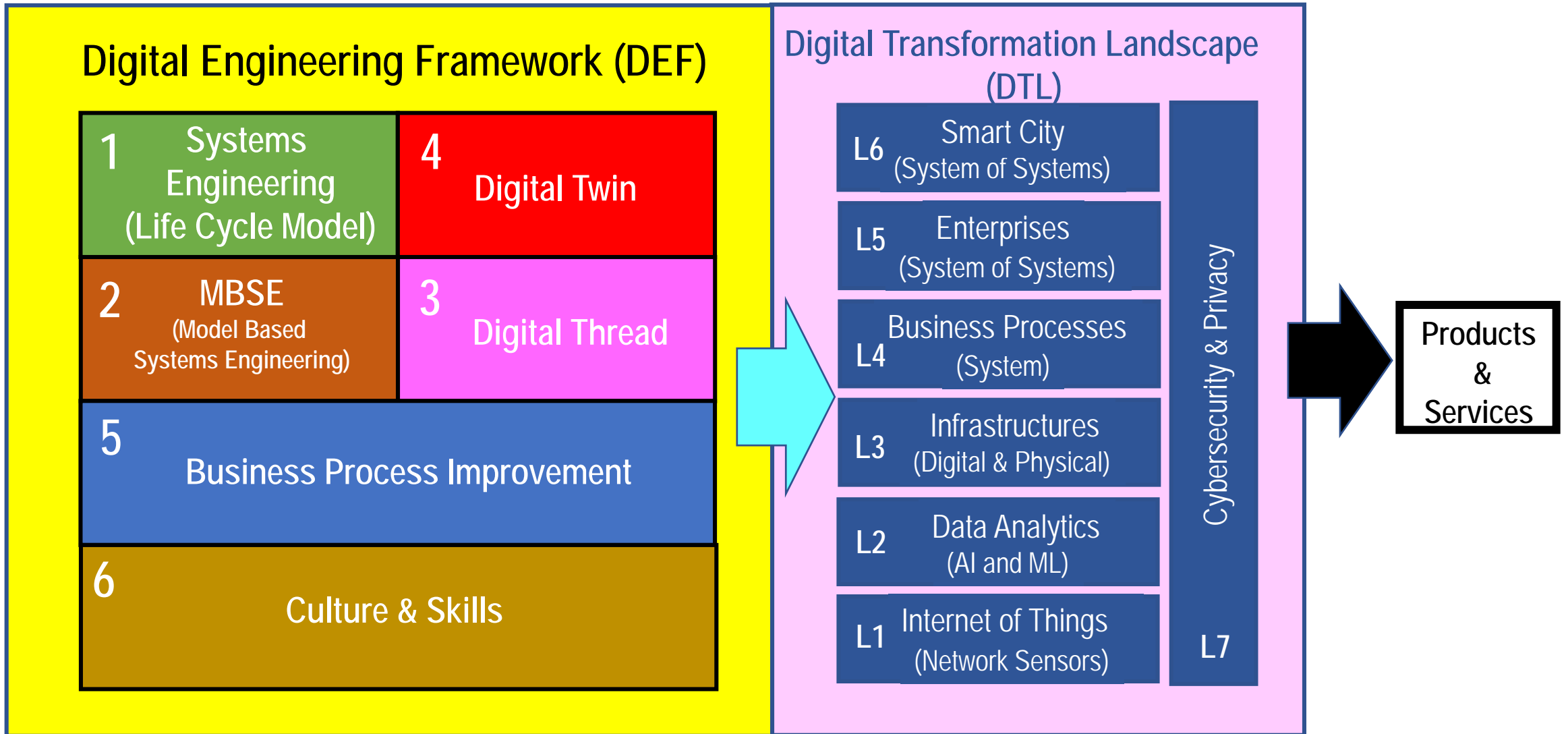
DTL's Role in Facilitating AI Implementation

The DTL provides a strategic perspective on digital transformation across various domains, guiding the effective and responsible adoption of AI.

- **Identifying Opportunities and Challenges:** DTL helps identify areas where AI can create the most significant value and address critical challenges. It also helps anticipate potential obstacles and risks associated with AI deployment, such as data privacy concerns, ethical considerations, and the need for a skilled workforce.
- **Cross-Domain Integration:** DTL emphasizes the importance of seamless data exchange and integration across different domains. This enables AI to leverage data from multiple sources and create more holistic and intelligent solutions.
- **Data-Driven Decision Making:** DTL highlights the critical role of data in driving digital transformation. It encourages the use of AI-powered analytics and visualization tools to extract insights from data, supporting evidence-based decision-making and policy development.
- **Stakeholder Engagement and Ethical Considerations:** DTL recognizes the importance of stakeholder engagement and ethical considerations in AI deployment. It encourages the use of AI to enhance transparency, accountability, and fairness, ensuring that AI solutions benefit all members of society.



EIT's Digital Engineering for Digital Transformation

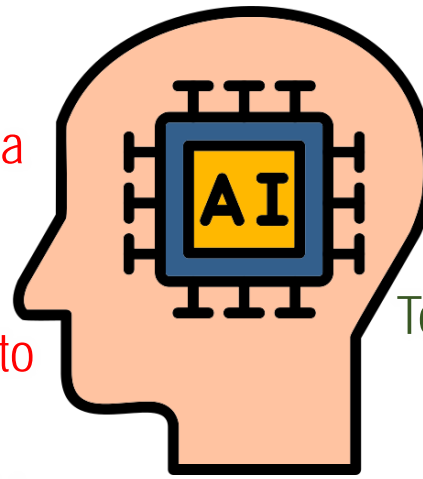


The combined application of DEF and DTL creates a powerful synergy that facilitates successful AI implementation across various domains.

- **DEF** provides the technical foundation and tools to develop and deploy AI solutions effectively.
- **DTL** provides the strategic guidance and context to ensure that AI initiatives are aligned with organizational goals and create value in the broader digital transformation landscape.

Conclusion

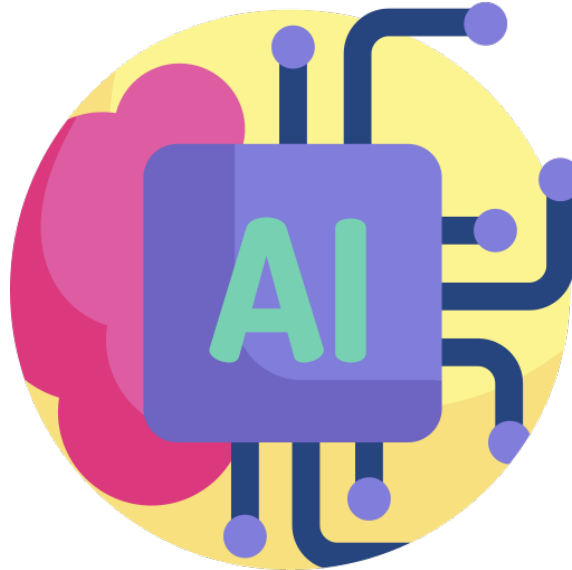
- The synergy between DEF and DTL offers a comprehensive approach to AI implementation, ensuring that AI initiatives are not only technically sound but also strategically aligned, ethically responsible, and contribute to the organization's overall digital transformation journey across various domains



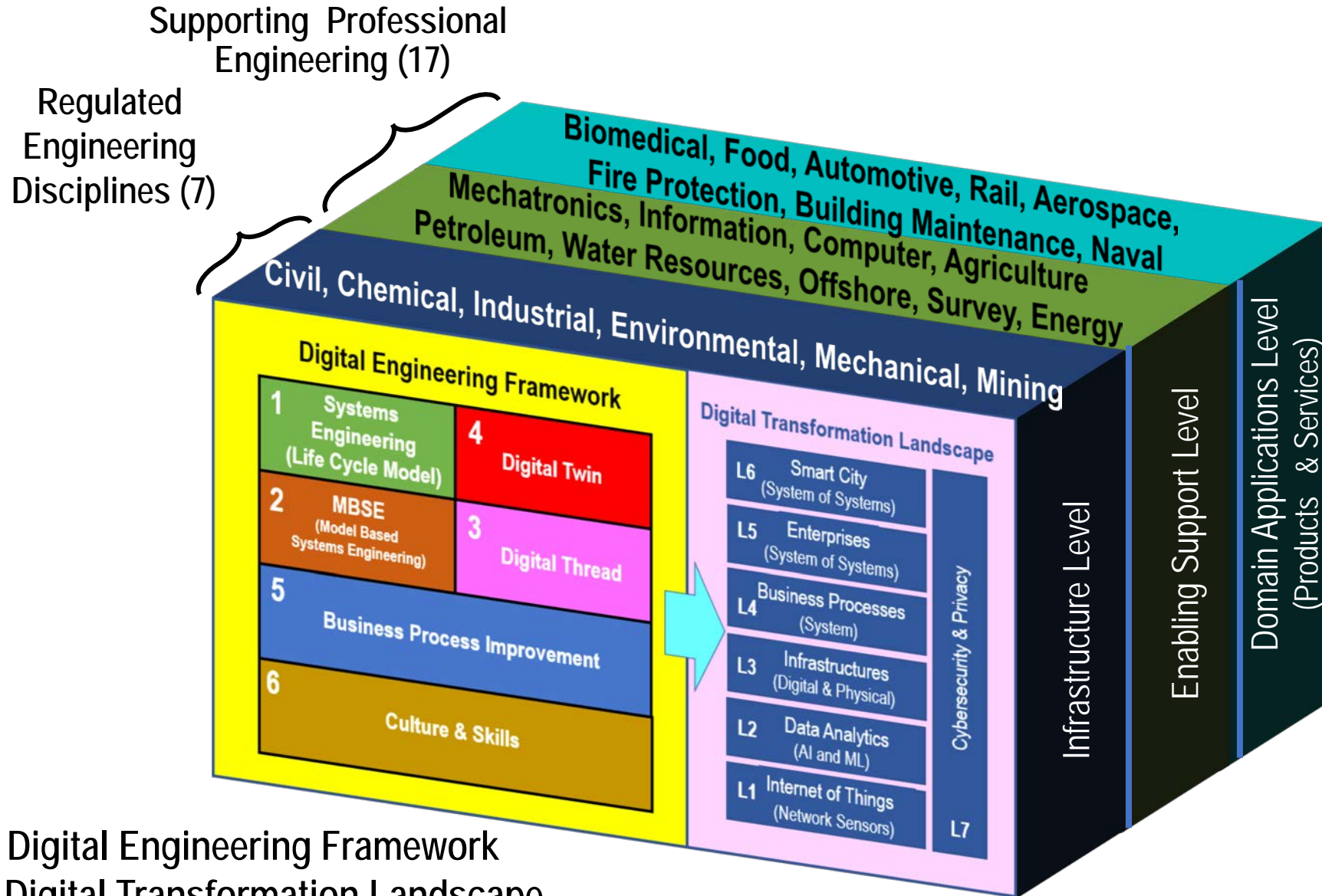
Synergistic Impact of DEF and DTL

Together, they enable organizations to:

- **Make informed decisions** by providing a holistic view of the digital landscape and the potential impact of AI.
- **Develop and deploy AI solutions efficiently** through structured processes, modeling, and simulation.
- **Ensure interoperability and data integration** by promoting open standards and data-sharing mechanisms.
- **Monitor and improve AI performance** through real-time data collection and analysis.
- **Address ethical and societal implications** by promoting responsible AI practices and transparency.



Digital Engineering for Domains of Engineering



DEF : Digital Engineering Framework
DTL : Digital Transformation Landscape

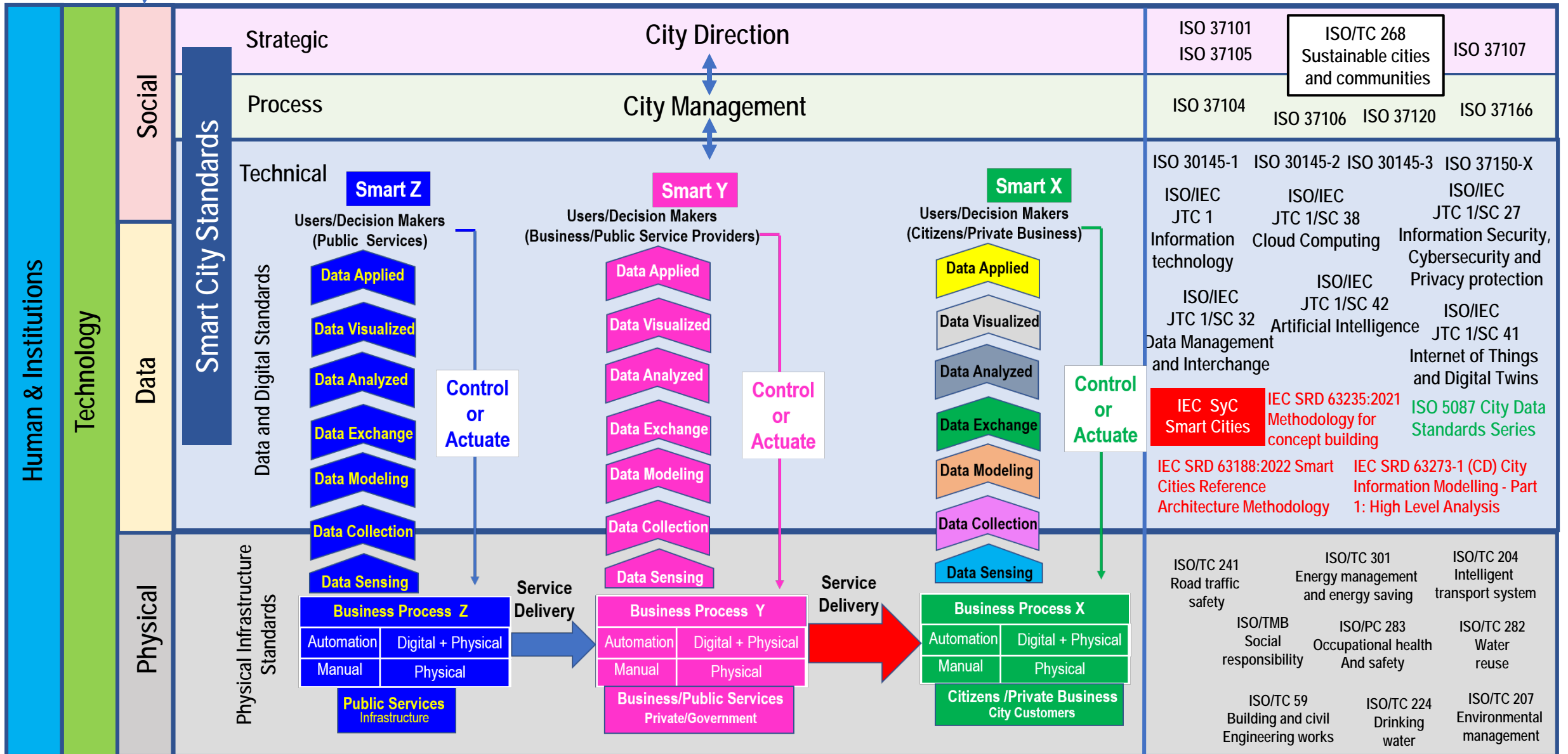
DEF & DTL applied to Various Domains of Engineering Disciplines

Infrastructure Level

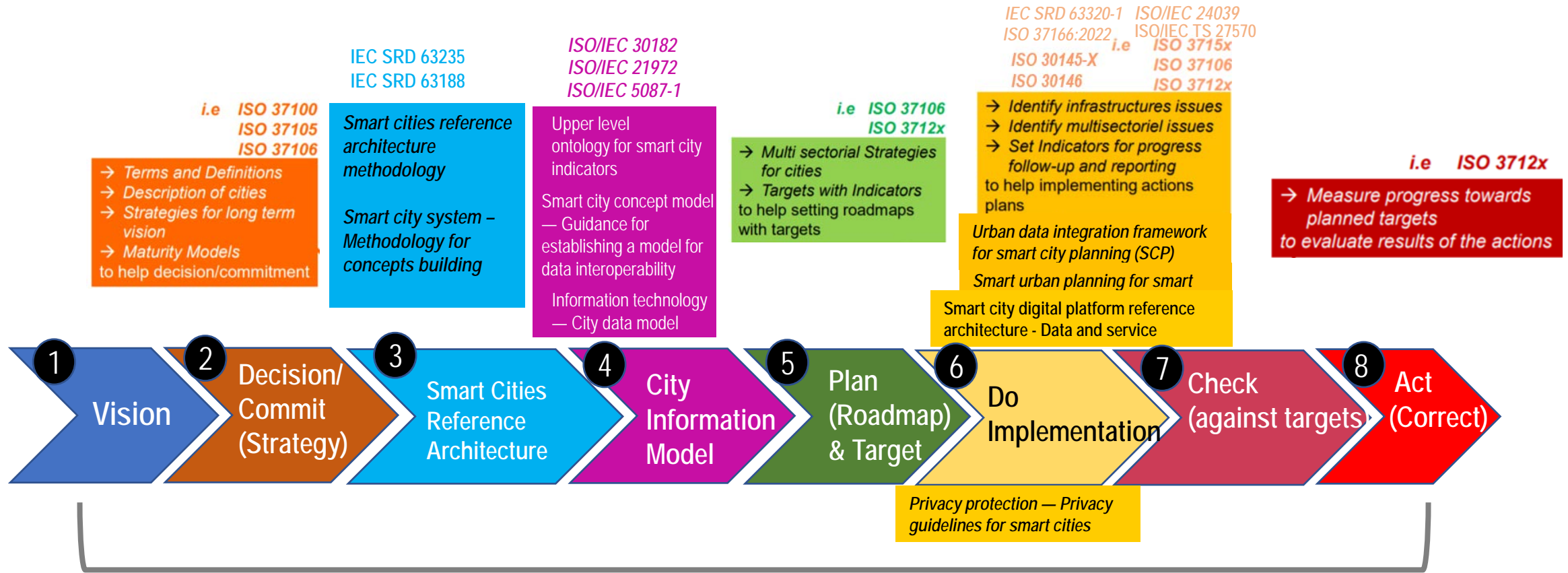
Engineering Discipline	How DEF Can Be Applied	How DTL Can Be Applied
Civil Engineering	<p>* MBSE for designing and simulating large-scale infrastructure projects like bridges, tunnels, and buildings. * Digital thread for managing construction data, inspections, and maintenance records throughout the infrastructure lifecycle. * Digital twin for real-time monitoring and predictive maintenance of infrastructure assets.</p>	<p>* Identify opportunities for AI and automation in areas like structural health monitoring, construction management, and traffic flow optimization. * Assess the impact of new technologies on the built environment and identify potential risks and opportunities. * Foster collaboration and data sharing between different stakeholders involved in infrastructure development and management.</p>
Mechanical Engineering	<p>* MBSE for designing and simulating complex mechanical systems like engines, turbines, and manufacturing processes. * Digital thread for managing product design, manufacturing, and maintenance data throughout the product lifecycle. * Digital twin for real-time monitoring and optimization of machine performance and predictive maintenance.</p>	<p>* Identify opportunities for AI and automation in areas like product design, manufacturing process optimization, and predictive maintenance. * Assess the impact of new technologies on the manufacturing industry and identify potential disruptions. * Foster collaboration and data sharing between different stakeholders in the product development and manufacturing process.</p>

Portfolio of Smart City Standards (PSCS 2.0)

City Drivers City Structure



Framework of Smart City Standardization Roadmap



Diagnostic of city's « readiness level » (maturity)
 ...for setting a long term vision
i.e. ISO 18091, ISO 37107

Quality Management through the whole process

Management & Governance and guidelines
 ISO 37101
 ISO 37104

ISO/IEC/IEE 15288 ISO/IEC/IEEE 420x0 and Digital Engineering Framework(DEF) & Digital Transformation Landscape(DTL)

Smart City Development Landscape



Smart City Applications

Value chain analysis in Smart City

Cross Domain Interoperability Landscape

Digital Engineering Framework(DEF) & Digital Transformation Landscape(DTL)



Framework of Smart City Roadmap

International Program at PIT (IP@PIT)

Cross-Domain Thinking Platform

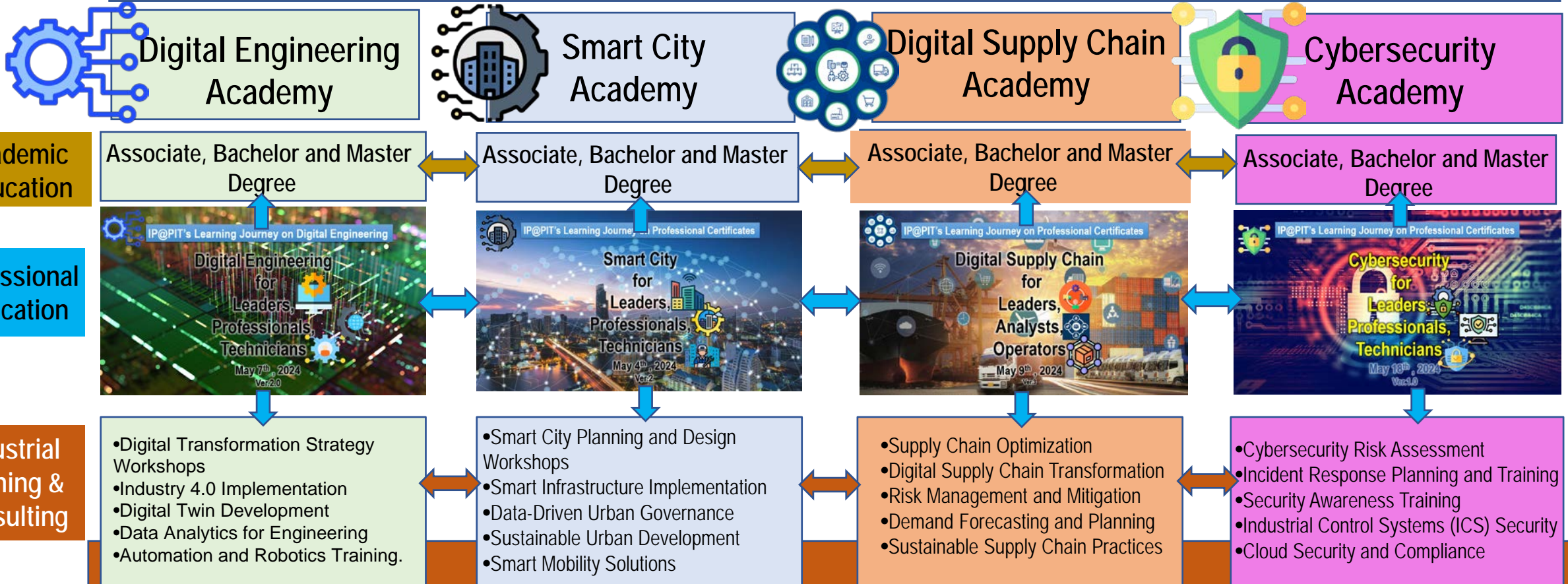
Digital Engineering Ecosystem Lab (DEEL)

Professional Learning Platform



Just one lab rules them all !

Systems Engineering (SE) ← Foundation Courses → Model based Systems Engineering (MBSE)



Tailored Solutions: Offer customized training and consulting packages to meet the specific needs of each client.

Industry Partnerships: Collaborate with industry leaders and technology providers to stay at the forefront of innovation.

Case Studies and Success Stories: Showcase successful projects and client testimonials to demonstrate your expertise.

Digital Engineering in Thailand

THAILAND TH
INCOSE
INCOSE Thailand



Council of
Engineers
(Thailand)



Engineering
Institute of Thailand
EIT

Pathumwan Institute
of Technology
(PIT)

Thailand Adoption of
ISO/IEC/IEEE 15288

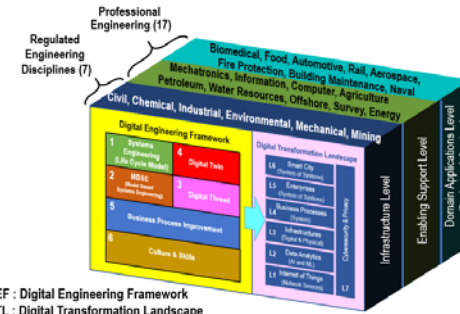
Introduction of DEF to all
engineering disciplines

Implementation of DEF
in Smart City Framework

Digital Engineering
Professional Certification

INTERNATIONAL
STANDARD
ISO/
IEC/IEEE
15288
Second edition
2023-05

Government
Adoption



DEF : Digital Engineering Framework
DTL : Digital Transformation Landscape



DEF Adoption in
Smart City Project



Upskill/ Reskill
for
Digital Engineering

INCOSE Thailand

The International Council on Systems Engineering
(INCOSE) Emerging Chapter in Thailand

สภาระหว่างประเทศวิศวกรรมระบบประเทศไทย

E-Mail : drvithaya@gmail.com

MB : +66(0)622598555

<https://www.facebook.com/groups/330195568186607>

