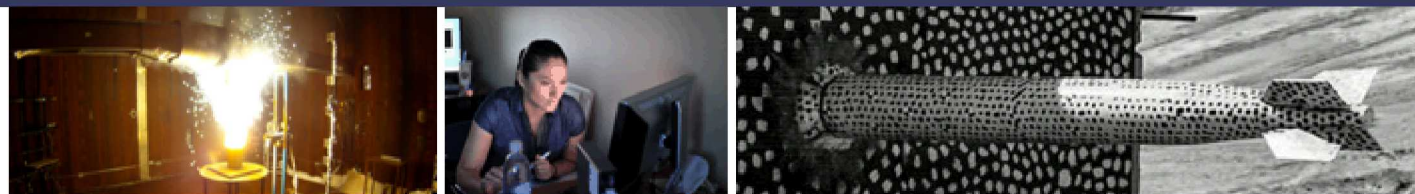


# Sandia's Journey to Mature Product Lifecycle Management



*Presented by*

Brenda Byrd, Engineering Program/Project Lead

Vanessa Alvarado, R&D Systems Engineer



Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

- About Sandia National Laboratories
- Sandia Enterprise Process and Tool Challenges
- Who We Are At Sandia
- How We Work With Our Customers
- Digital Thread Across the Product Lifecycle
- AEMS Capabilities and Roadmap
- Takeaways

# SANDIA NATIONAL LABORATORIES

## A Federally Funded Research and Development Center (FFRDC)

Managed by National Technology & Engineering Solutions of Sandia, LLC, a wholly-owned subsidiary of Honeywell International Inc.

FFRDCs serve as long-term strategic partners of the government, providing objective guidance in an environment without conflicts of interest. They work with their government partners (also called sponsors) to assist with:

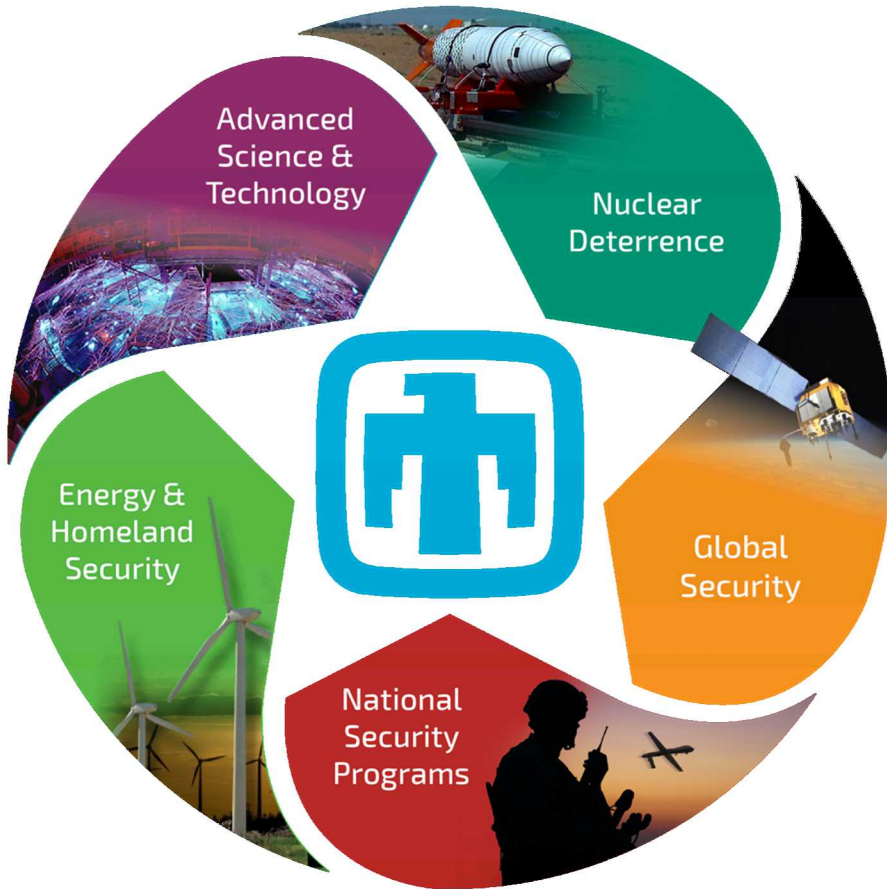
- Systems engineering and integration
- Research and development
- Study and analysis

Main sites: Albuquerque, NM / Livermore, CA

- Other locations: Kauai, HI / Carlsbad, NM / Amarillo, TX / Tonopah, NV



# Sandia Enterprise Challenges for Mission Delivery



- Five major portfolios with various missions and customers – primary is Nuclear Deterrence
- Various levels of requirements (external and internal) that are difficult to interpret
- Siloed/matrixed teams, practices, processes, and tools resulting in lack of standardization across programs
- Multiple tools needed to manage product information across the lifecycle



*Programs excel in delivering exceptional products,  
but not always with the level of systems engineering rigor necessary.*

# Who We Are At Sandia



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## ■ PEOPLE

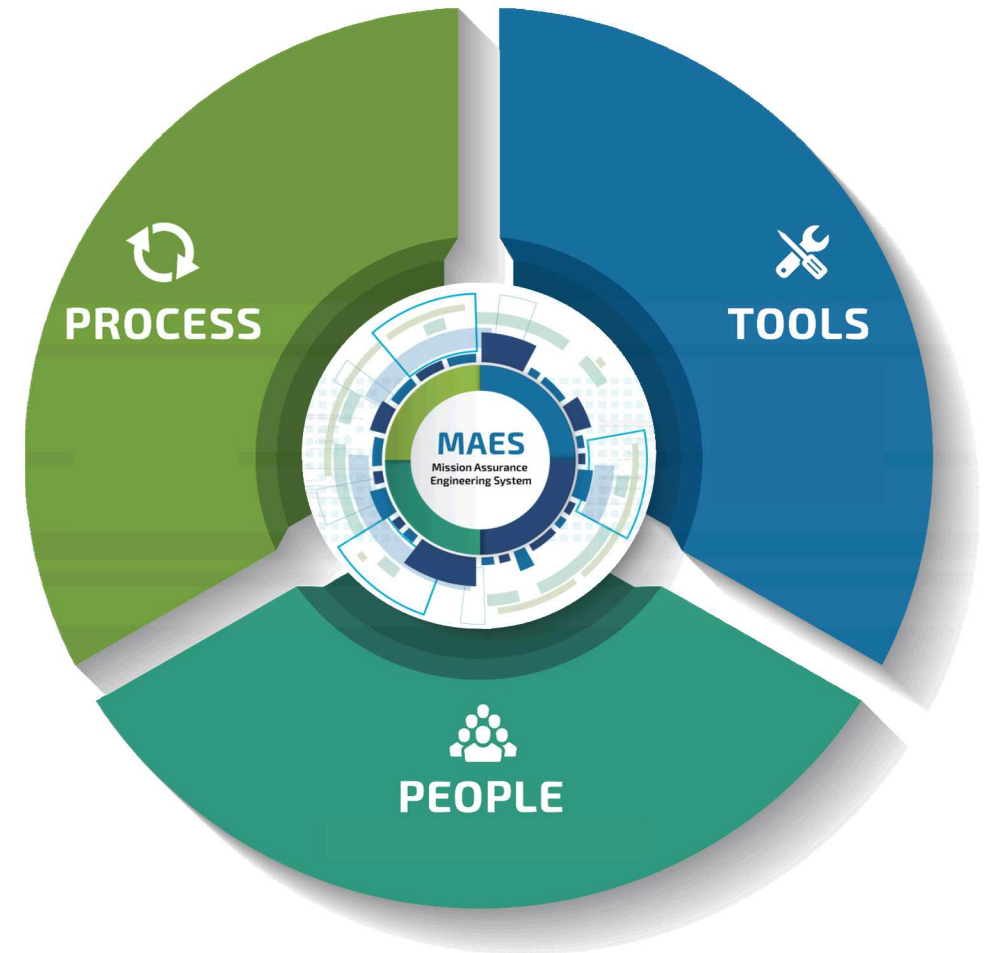
- Extensive knowledge and experience with mission delivery projects
- Partnerships that enable mission success

## ■ PROCESS

- Project Evaluation and Mission Assurance Plan with systems engineering, project management, and quality management procedures
- Processes based on accepted standards and industry best practices, to guide the execution of science and engineering projects

## ■ TOOLS

- Tailorable solutions that can be leveraged across projects
- Robust security models
- Functionality and usability proven out by mission customers



*We provide project teams with technical expertise, processes, and tools that enable them to deliver exceptional products that meet performance within scope, schedule, and budget.*

# Who is the Aras Engineering Management Solutions Team

## Science & Engineering Management

- Product Owner manages vision and roadmap
- Creates standard PLM processes, user help materials, and customer onboarding
- Manages change board and prioritizes work

## Science Engineering Information Systems

- Design, architecture, and technical solution owner
- Implements and maintains system
- Participates on change board

## Mission Delivery Programs

- Communicate needs; participate in process creation, implementation, and lessons learned
- Invest resources to create and prove out solutions that benefit follow-on programs and enable standard processes



*Partnering to build standard, tailorable, and repeatable solutions*

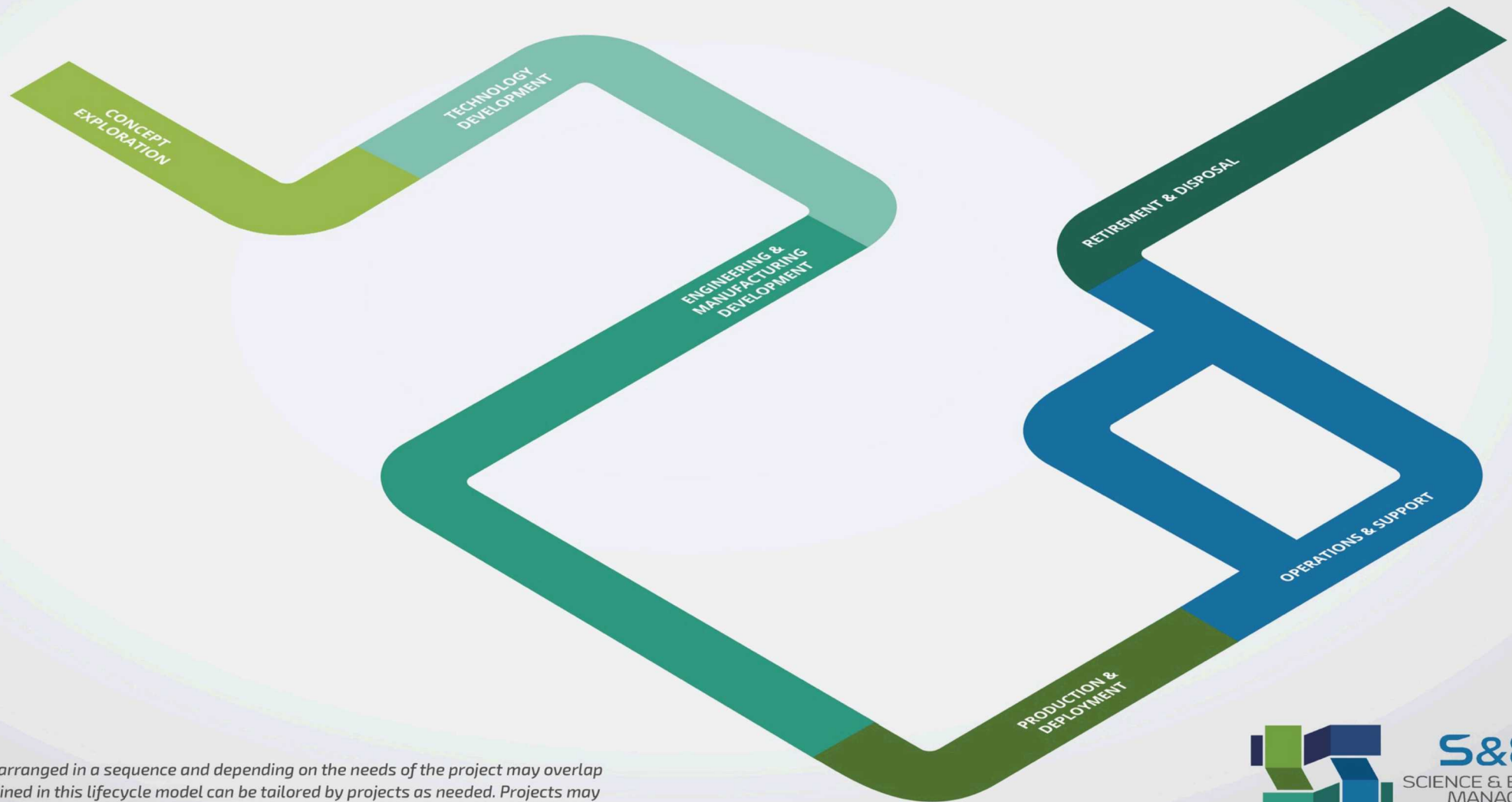
# How We Work With Our Customers

Request	Needs (Scope)	Evaluation	Implementation & Feedback	Adoption and Sustainability
<ul style="list-style-type: none"> <li>Identify project type and product</li> </ul> <p>Current project lifecycle phase</p> <p>Current product lifecycle phase</p>	<p>Identify problems</p> <p>Observe operations “a day in the life”</p> <p>Review processes</p> <p>Identify existing tools</p>	<p>Perform operations “live a day in the life”</p> <p>Gap assessment</p> <p>Process improvement</p> <p>Solution/tool recommendations</p>	<p>Process training</p> <p>Tool training</p> <p>Prove out process and tool</p> <p>Feedback loop</p>	<p>Project focal/specialist</p> <p>Defined, repeatable processes</p>



Onboarding and Partnership Materials				
<p>Project Evaluation (PrE) and Mission Assurance Plan (MAP)</p> <p>Product Lifecycle Management (PLM) graphic</p> <p>Onboarding questionnaire</p>	<p>Applicable subject matter experts (SMEs)</p> <p>Work Package Agreement (WPA) (if applicable)</p>	<p>PLM process maps</p> <p>Industry standards</p> <p>PLM Process Assessment Guide</p>	<p>PLM process maps</p> <p>PLM work instructions</p> <p>Tool help materials</p>	<p>PLM Process Assessment Guide</p> <p>Lessons learned</p> <p>Community of practice</p>

# DIGITAL THREAD ACROSS THE PRODUCT LIFECYCLE



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# DIGITAL THREAD ACROSS THE PRODUCT LIFECYCLE

PROPOSAL  
& FUNDING  
PROCESS



PROJECT  
EVALUATION  
& MISSION  
ASSURANCE  
PLAN



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CONCEPT  
EXPLORATION

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PROPOSAL  
& FUNDING  
PROCESS

PROJECT  
EVALUATION  
& MISSION  
ASSURANCE  
PLAN

1

Perform Stakeholder Analysis  
& Capture Mission Needs

CONCEPT  
EXPLORATION

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PROPOSAL  
& FUNDING  
PROCESS

PROJECT  
EVALUATION  
& MISSION  
ASSURANCE  
PLAN

1

Perform Stakeholder Analysis  
& Capture Mission Needs

2

Develop Mission  
Requirements

CONCEPT  
EXPLORATION

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PROPOSAL  
& FUNDING  
PROCESS

PROJECT  
EVALUATION  
& MISSION  
ASSURANCE  
PLAN

1

Perform Stakeholder Analysis  
& Capture Mission Needs

2

Develop Mission  
Requirements

3

Develop System  
Requirements

MISSION  
REQUIREMENTS  
REVIEW

CONCEPT  
EXPLORATION

TECHNOLOGY  
DEVELOPMENT

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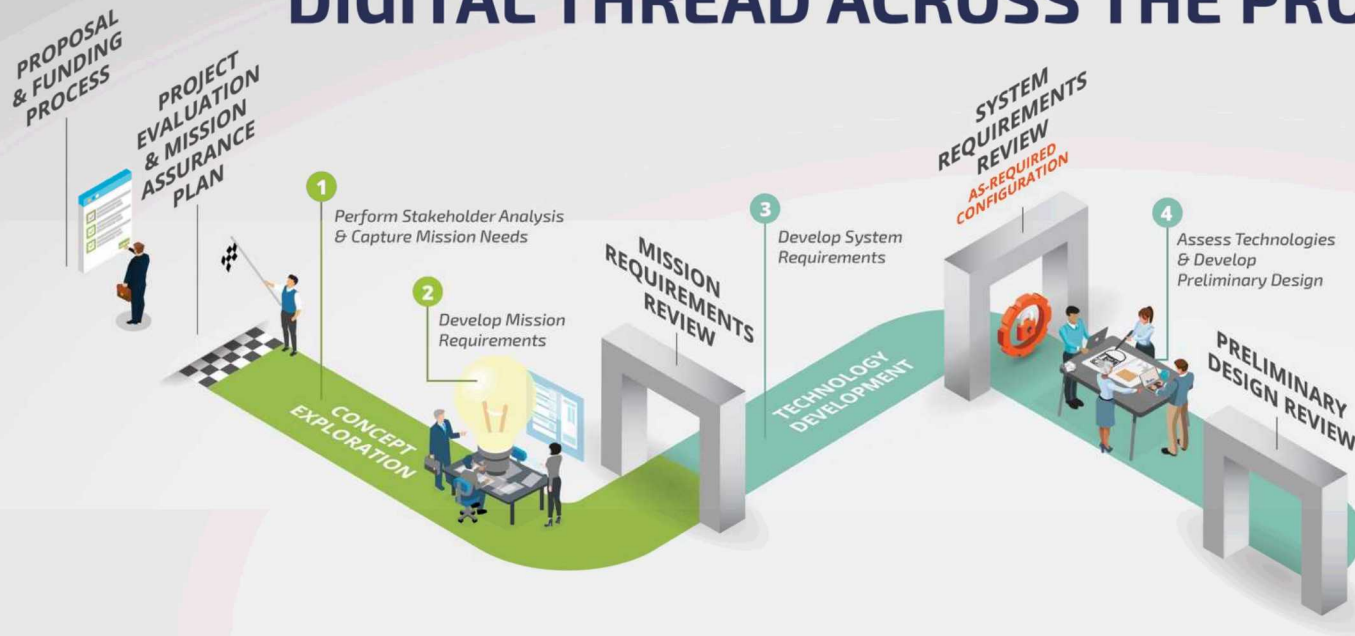
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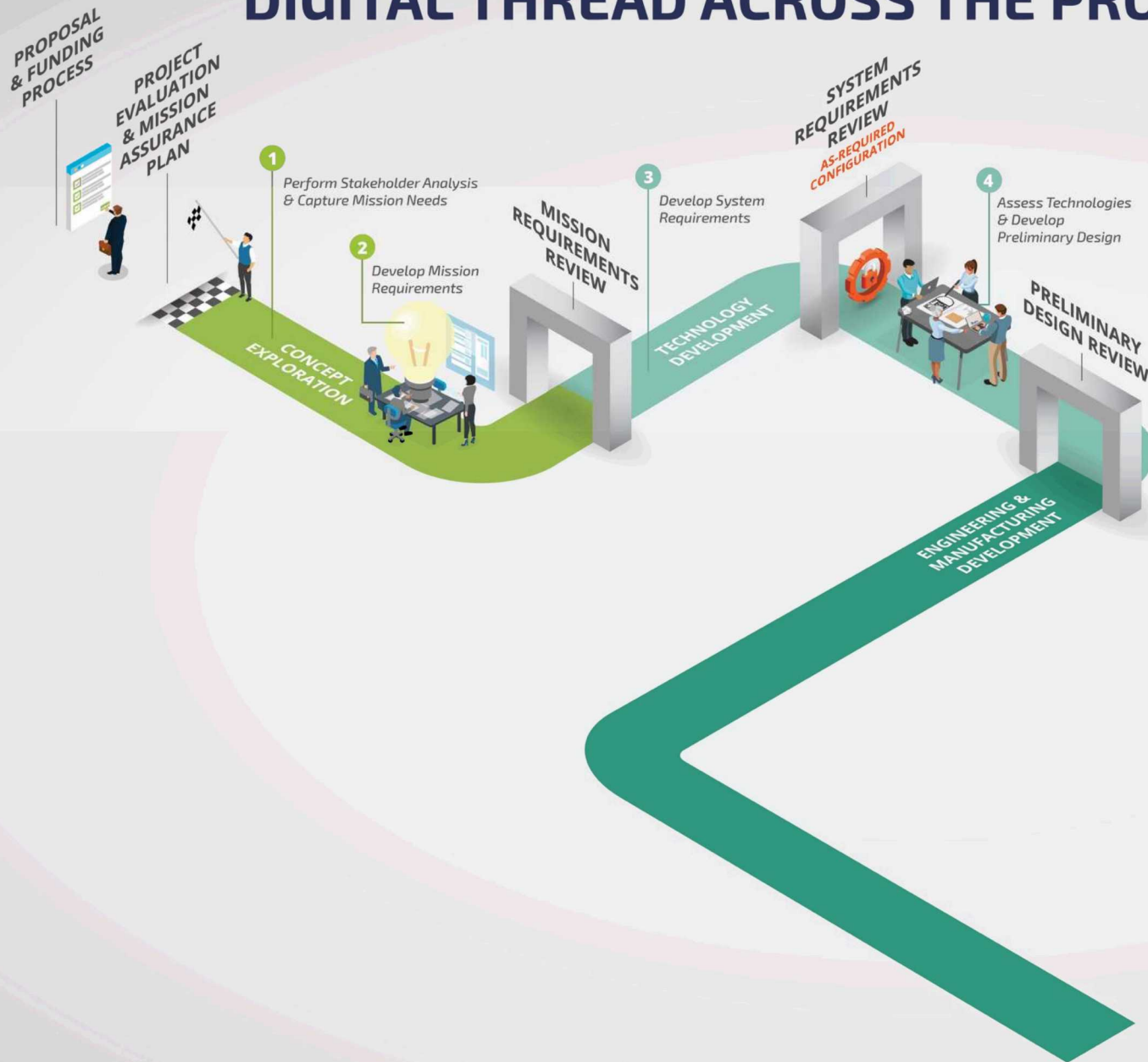


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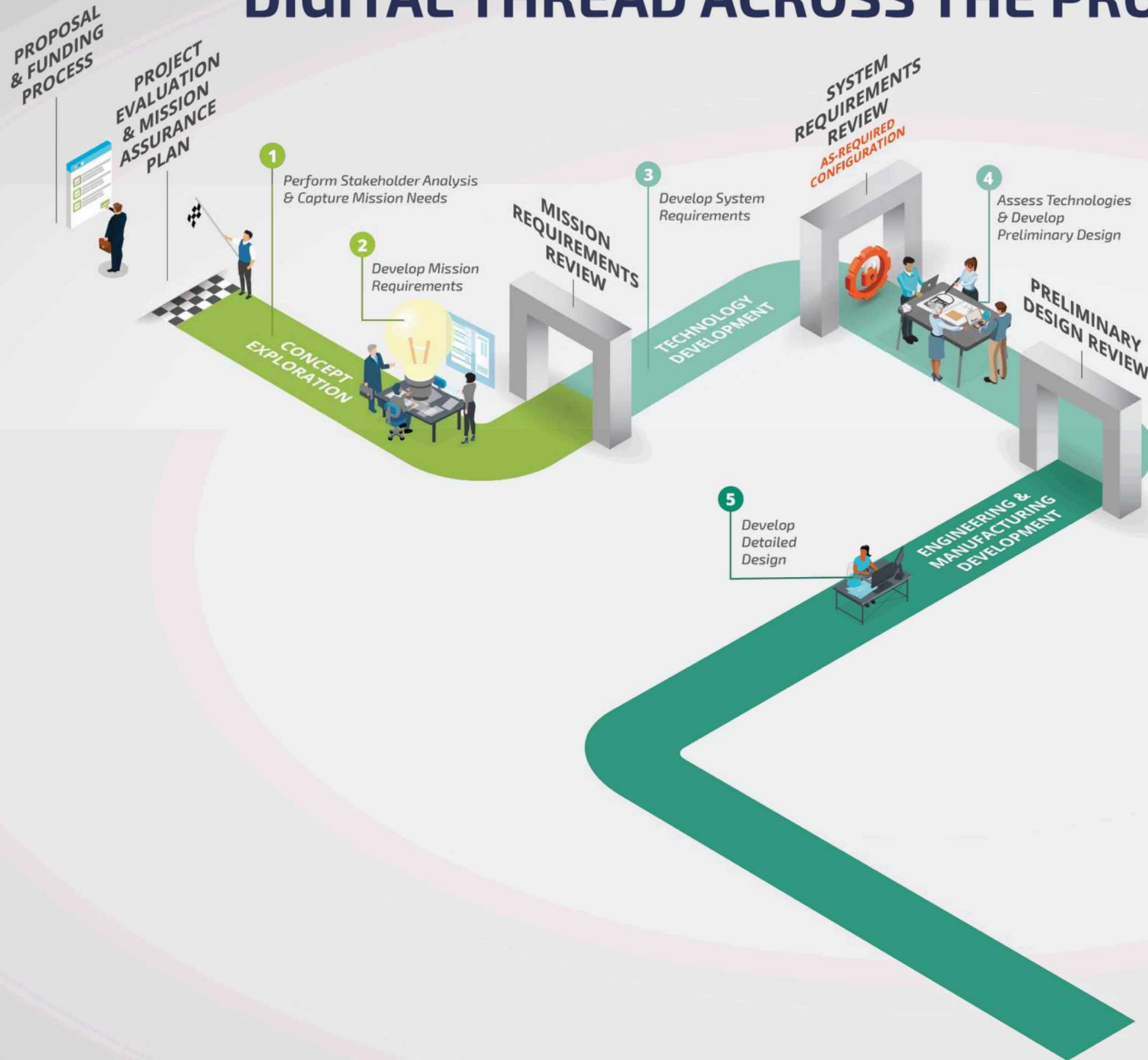
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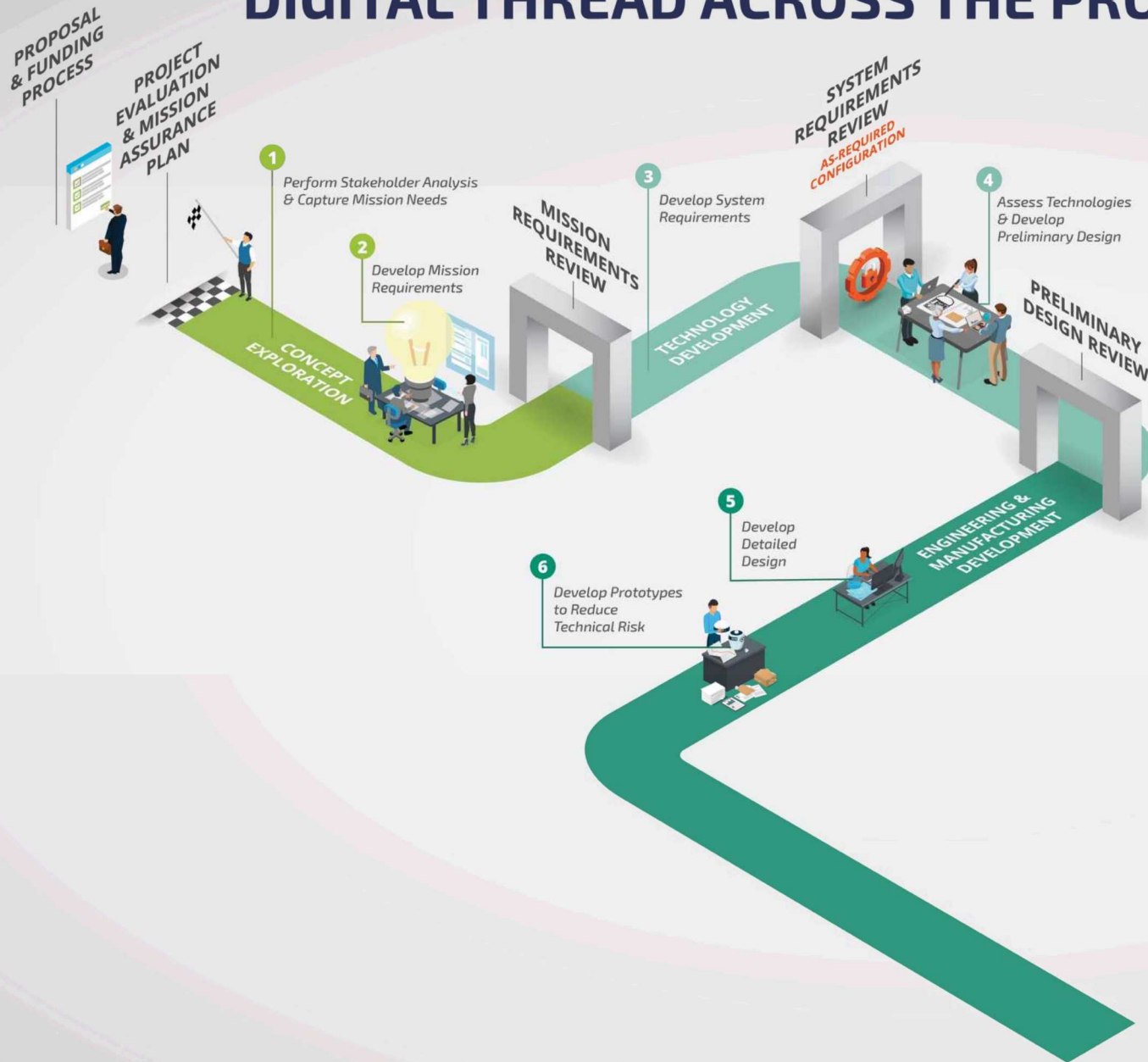
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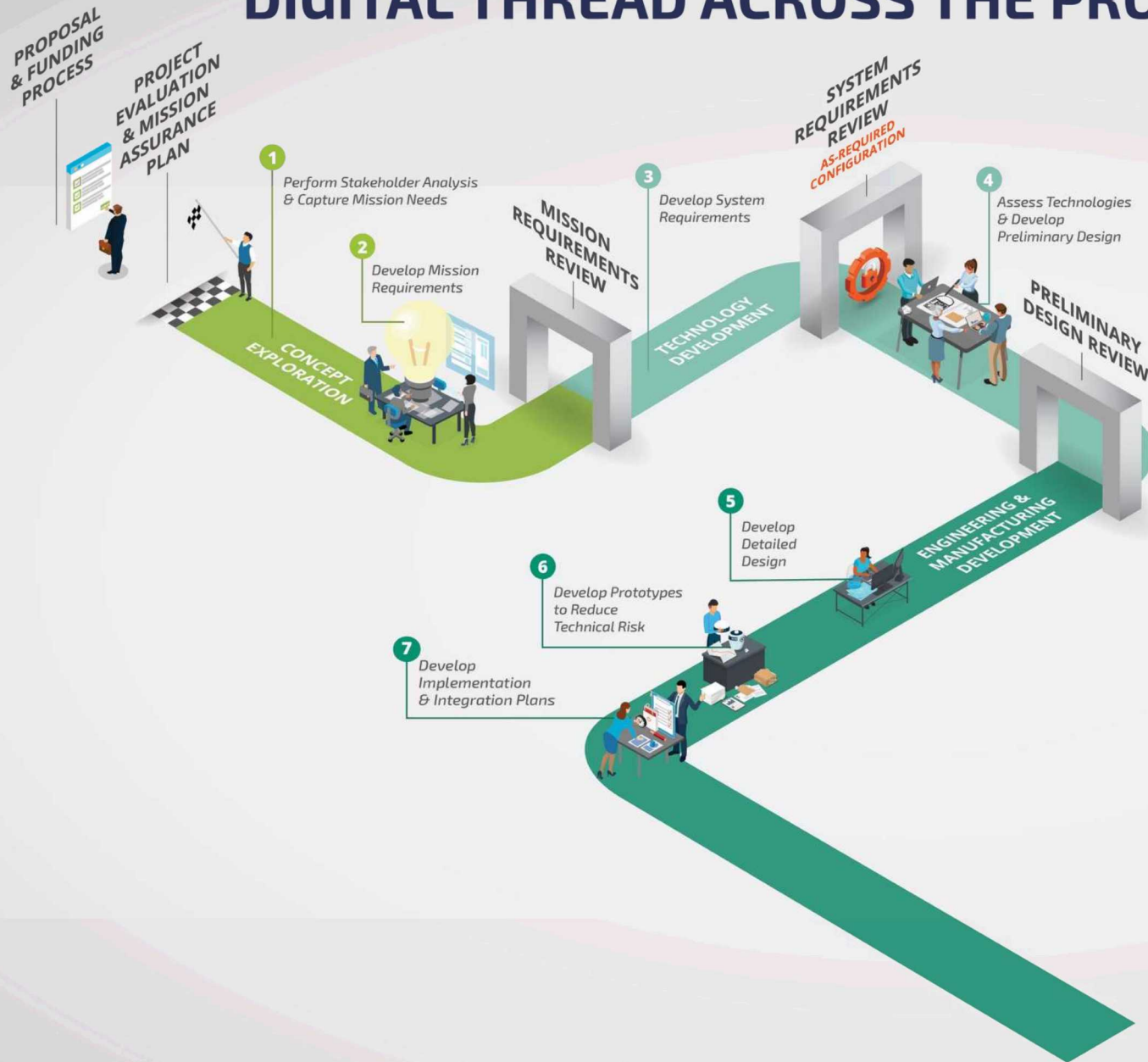
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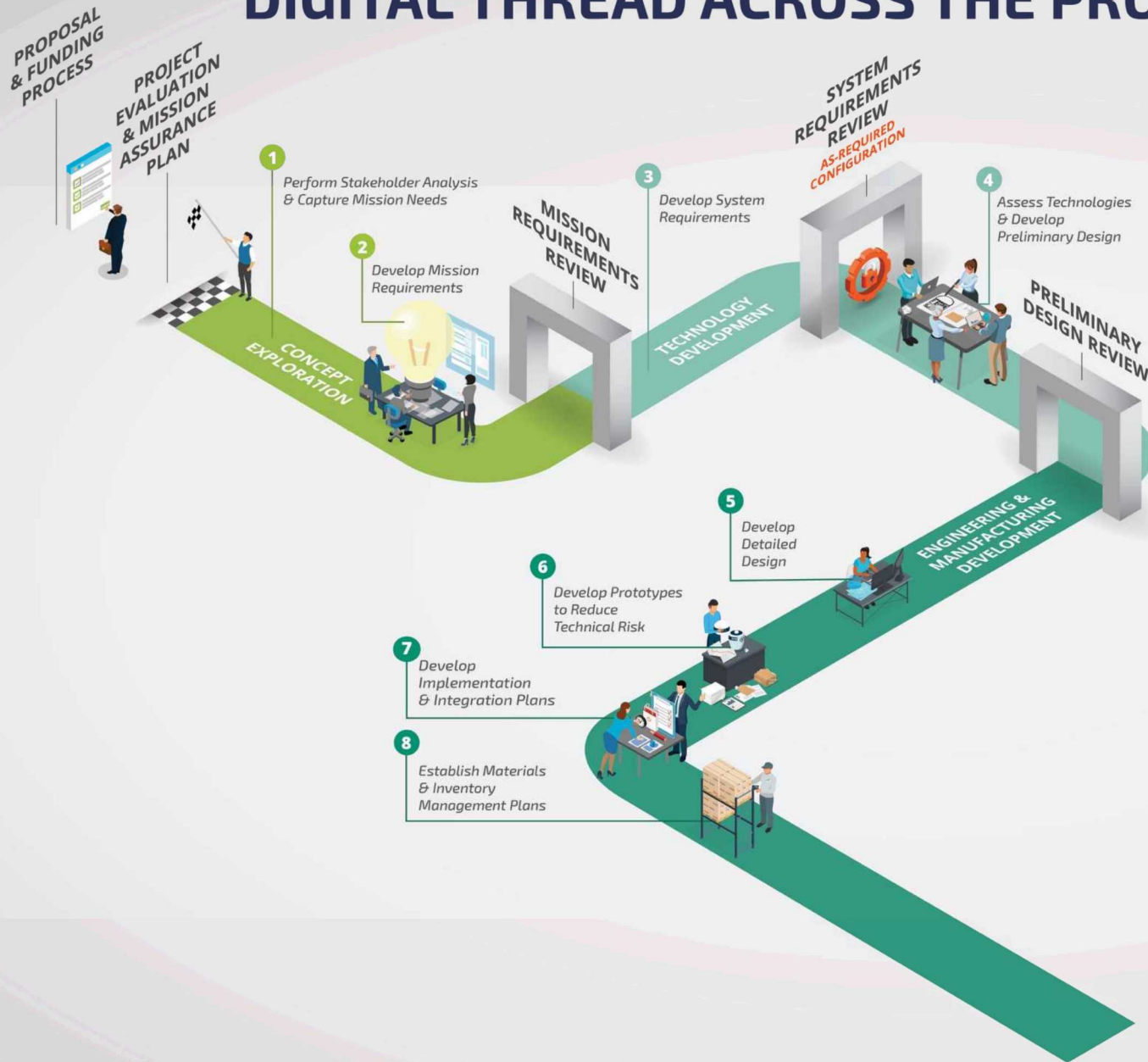
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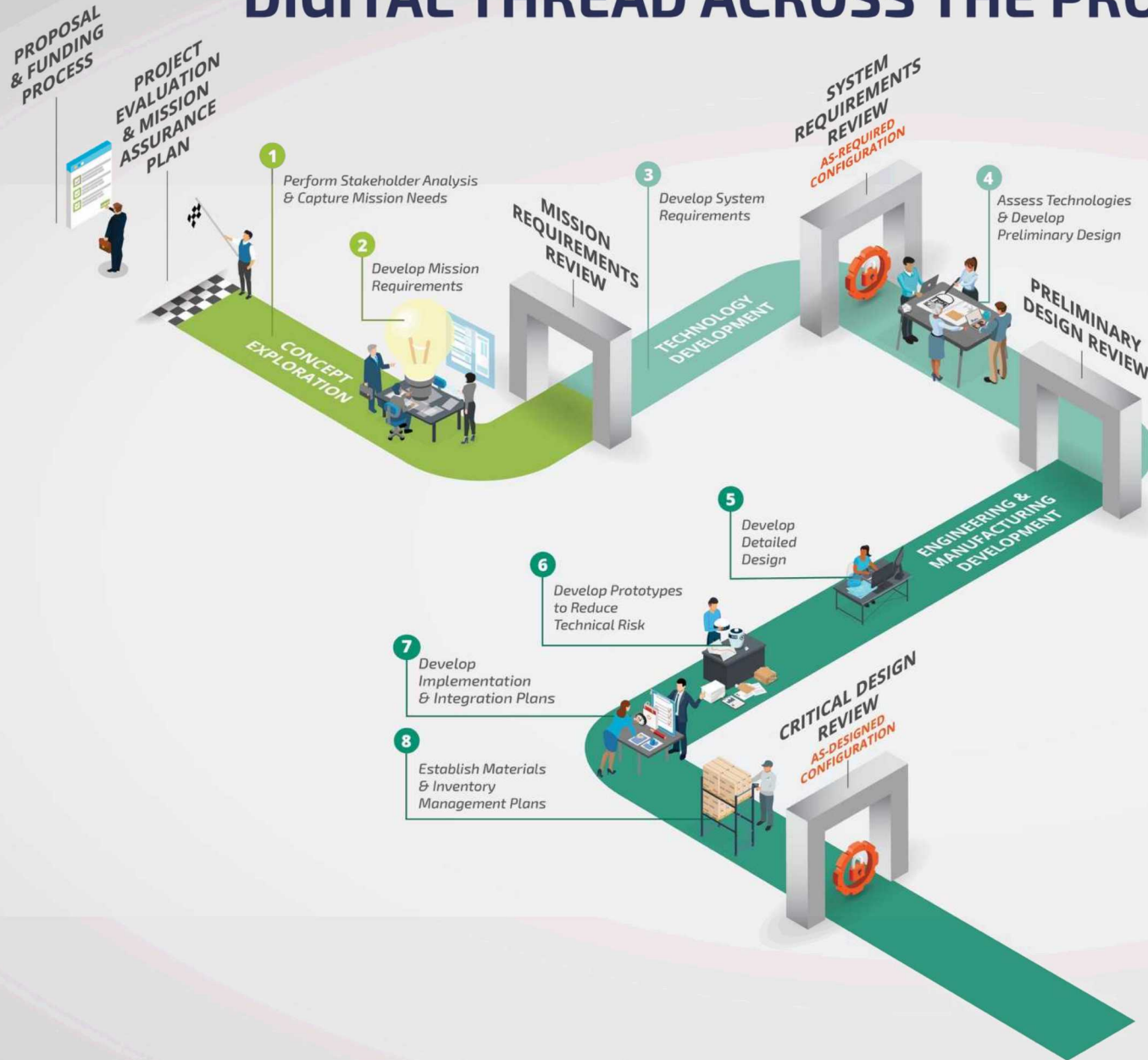
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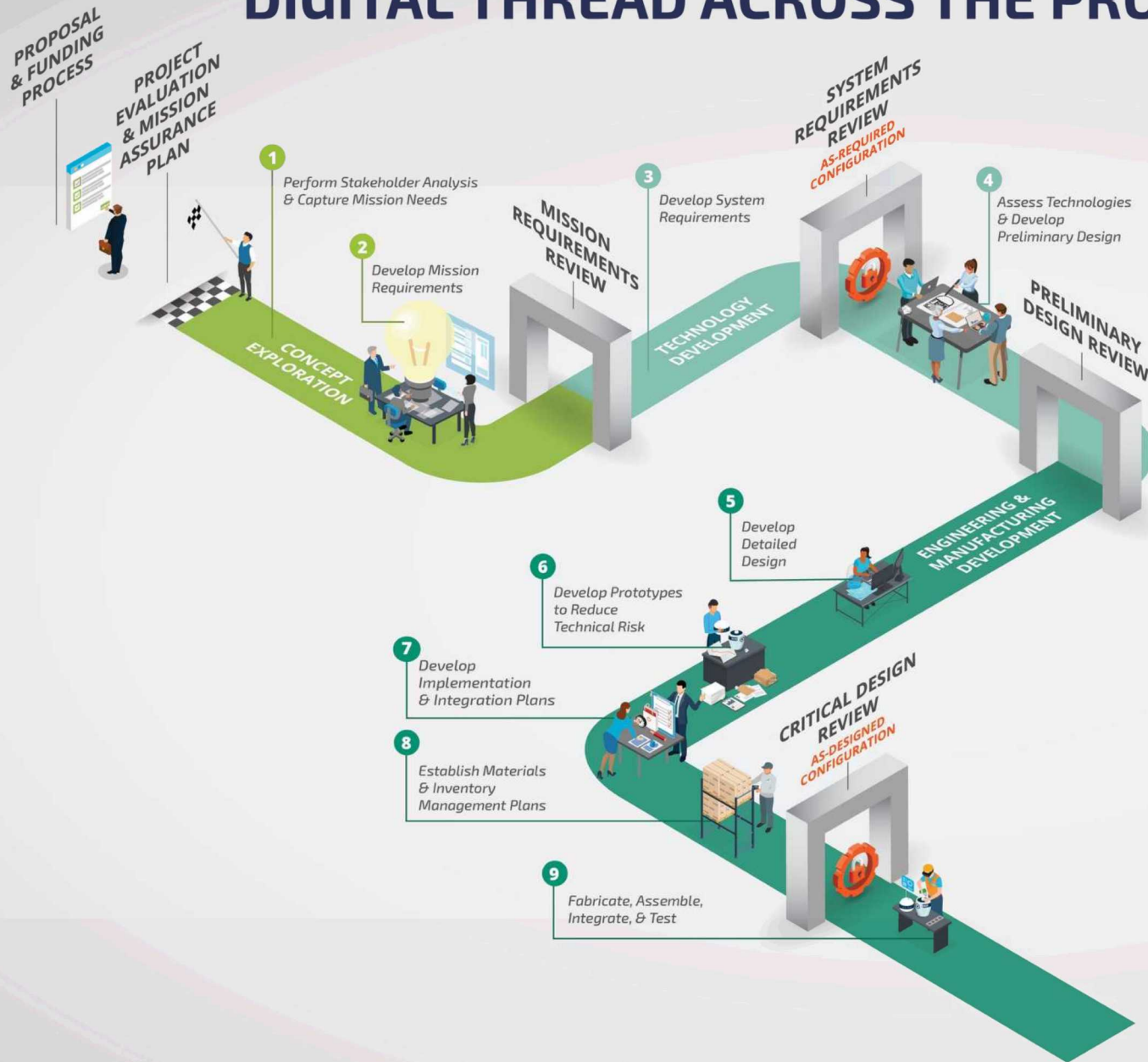


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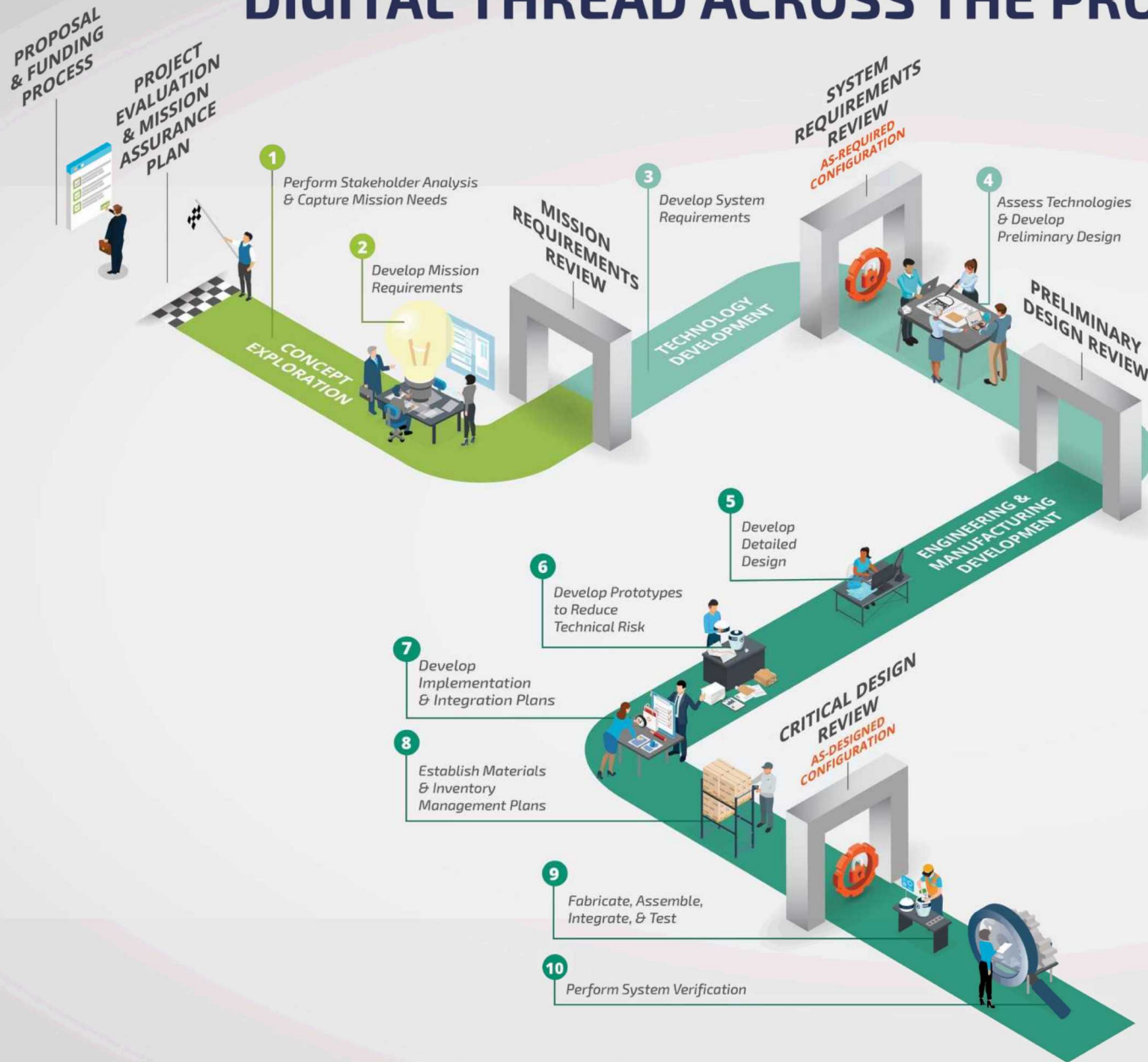
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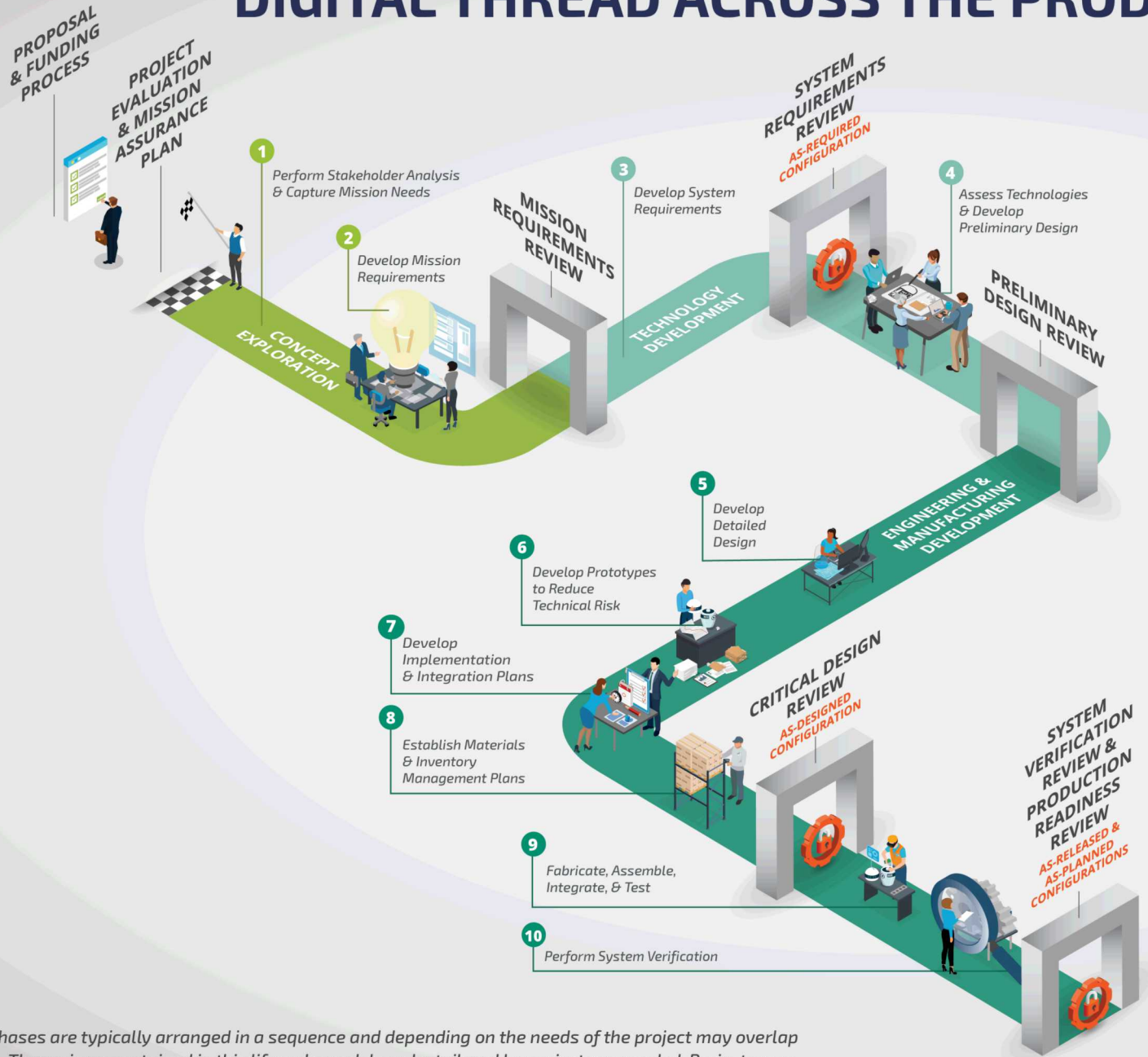


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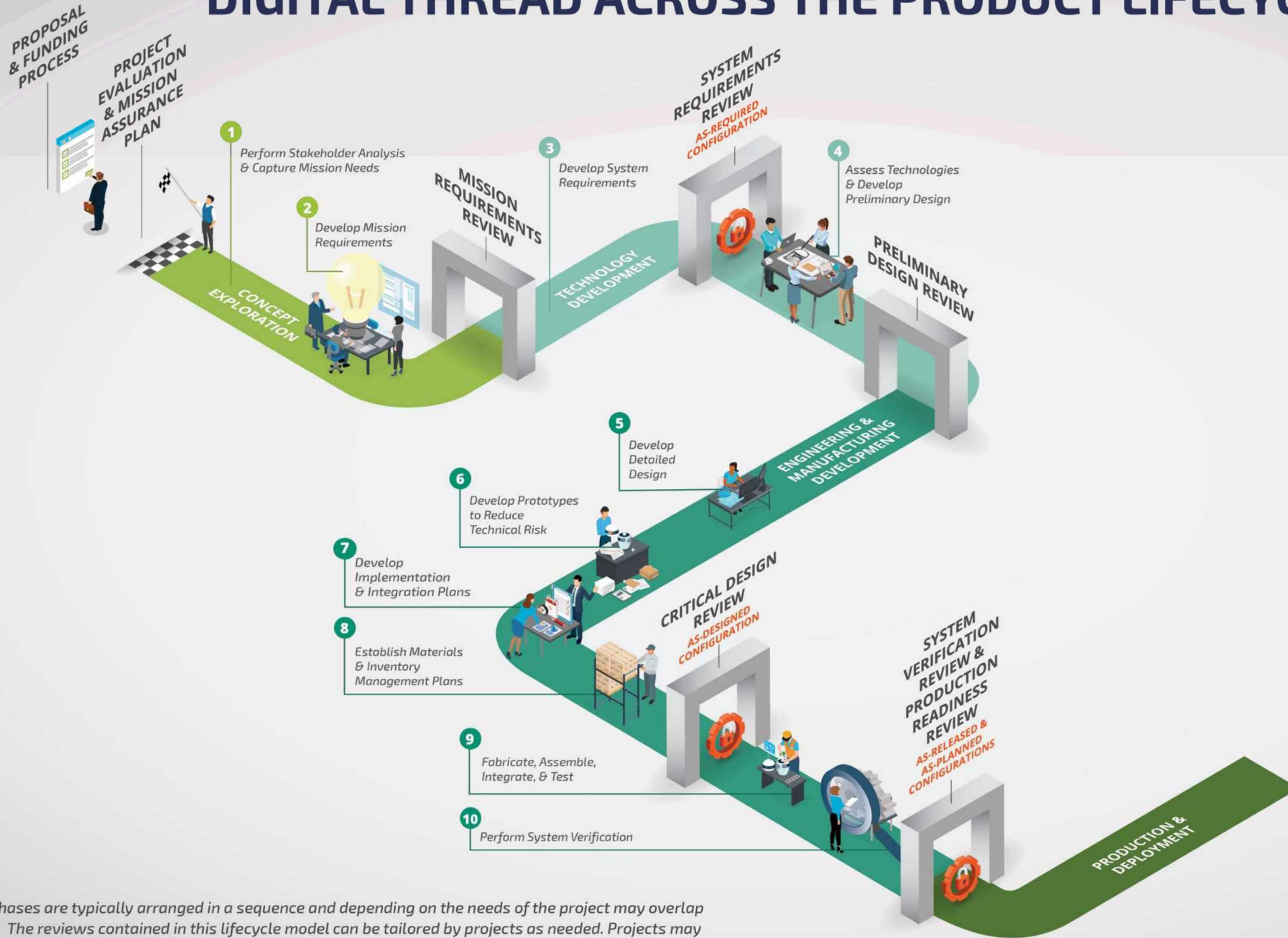
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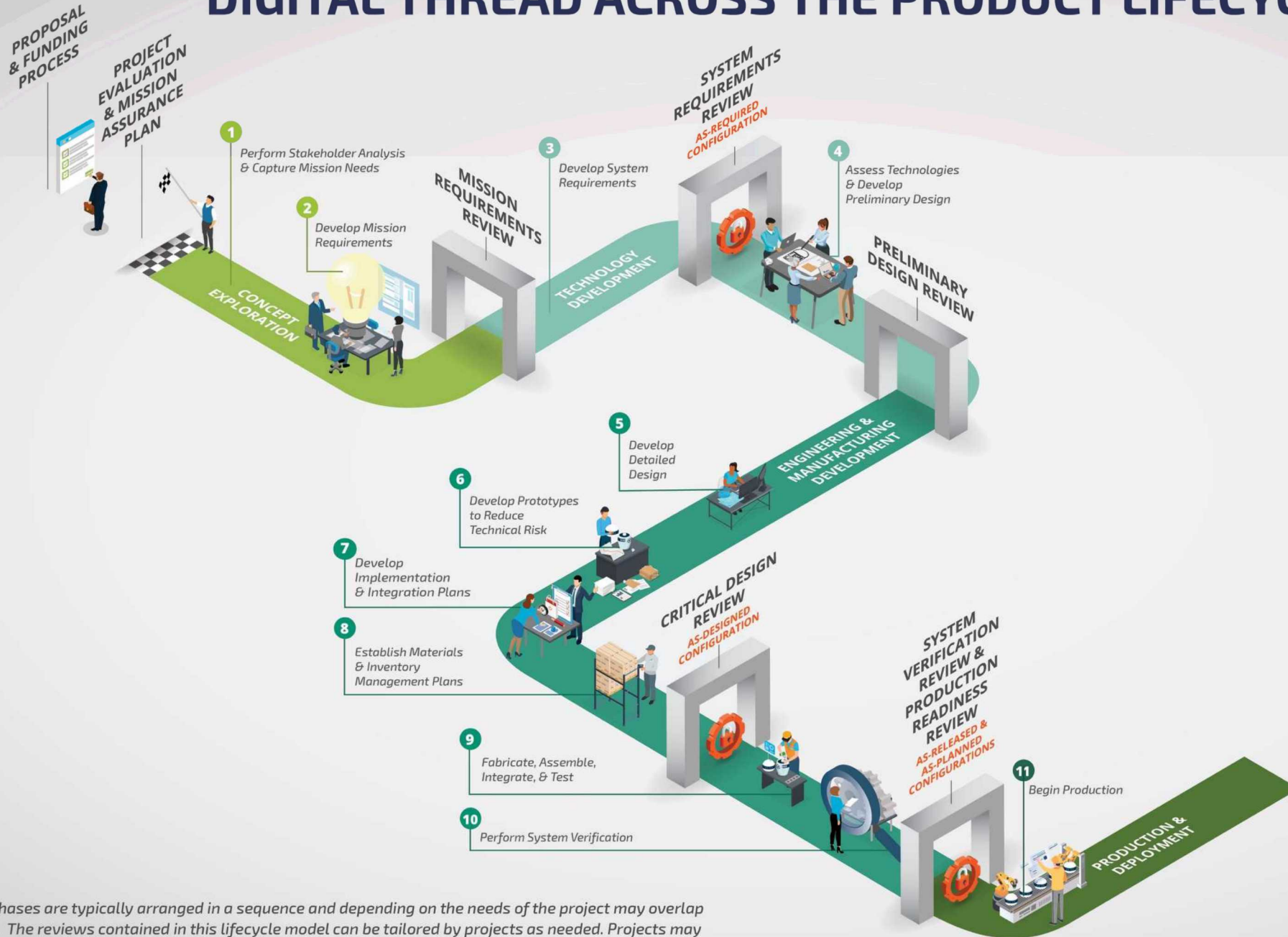
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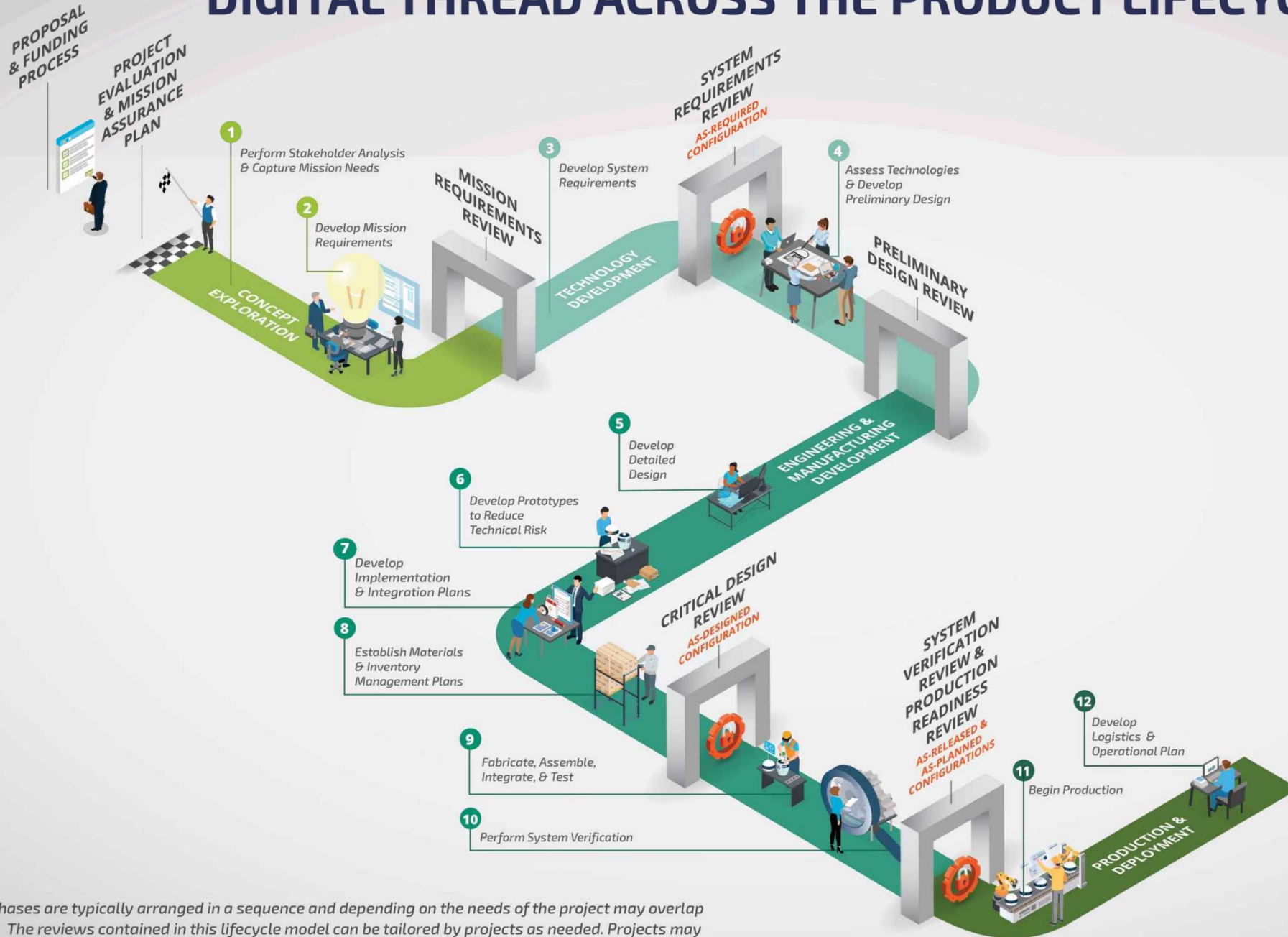
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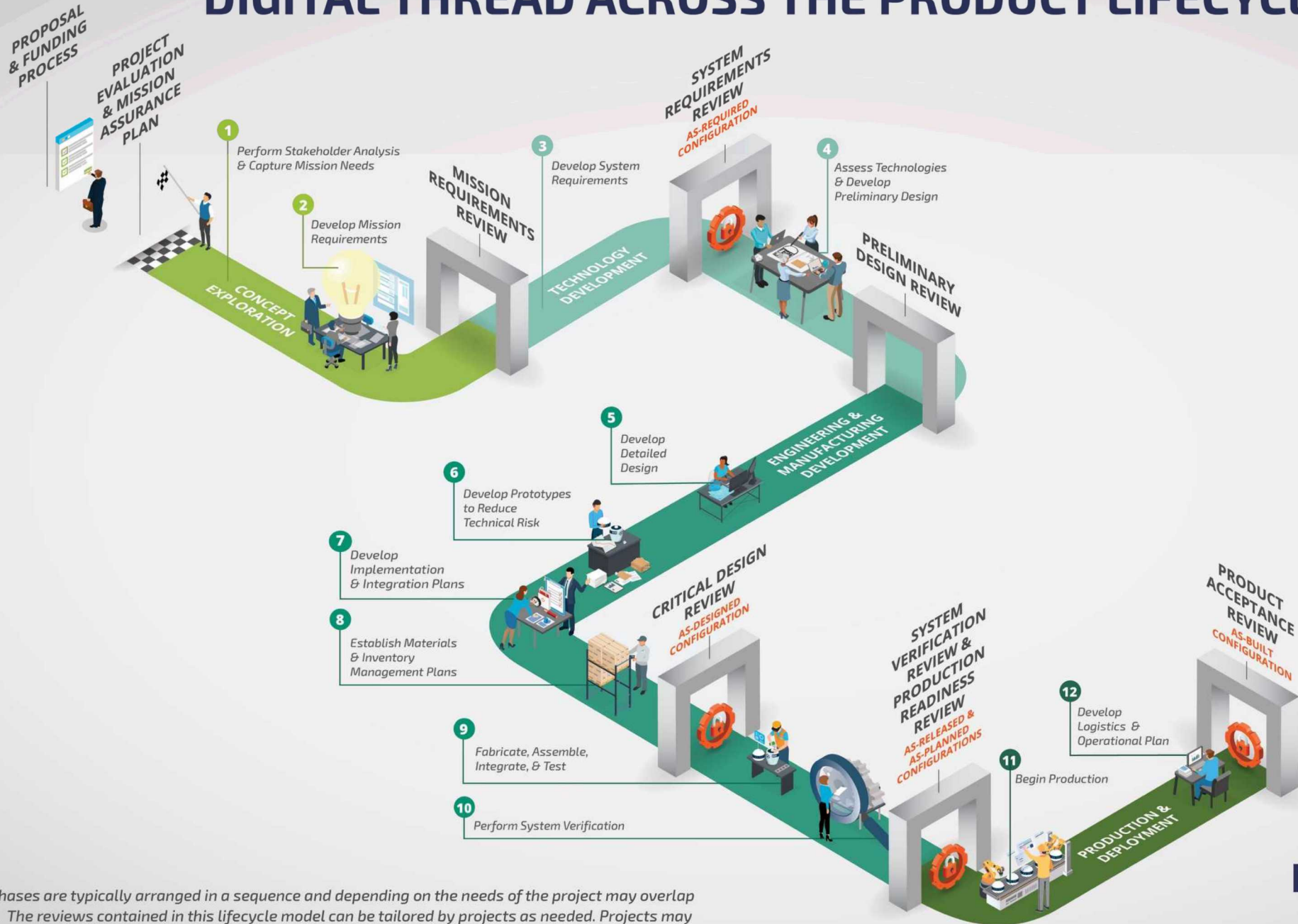
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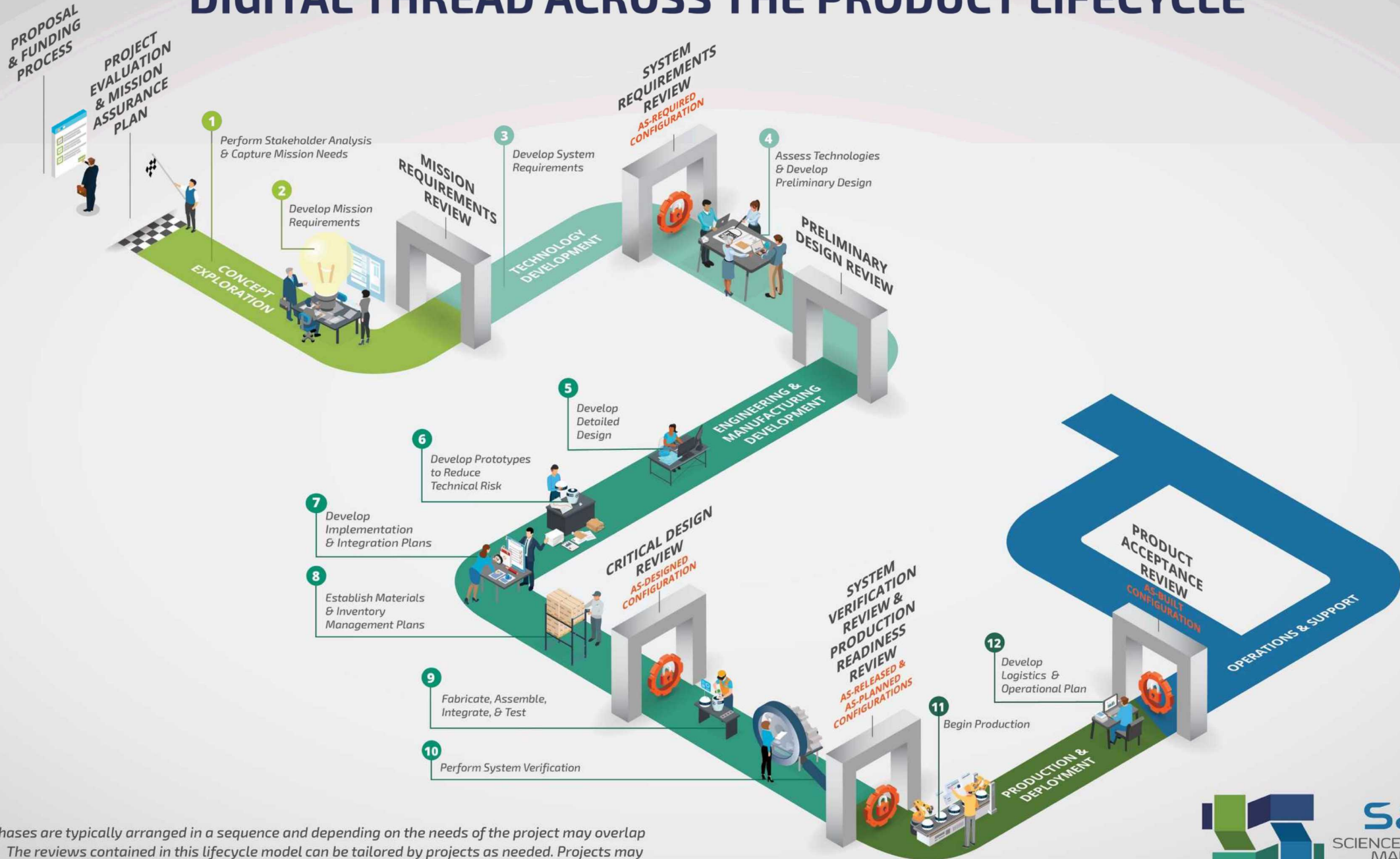
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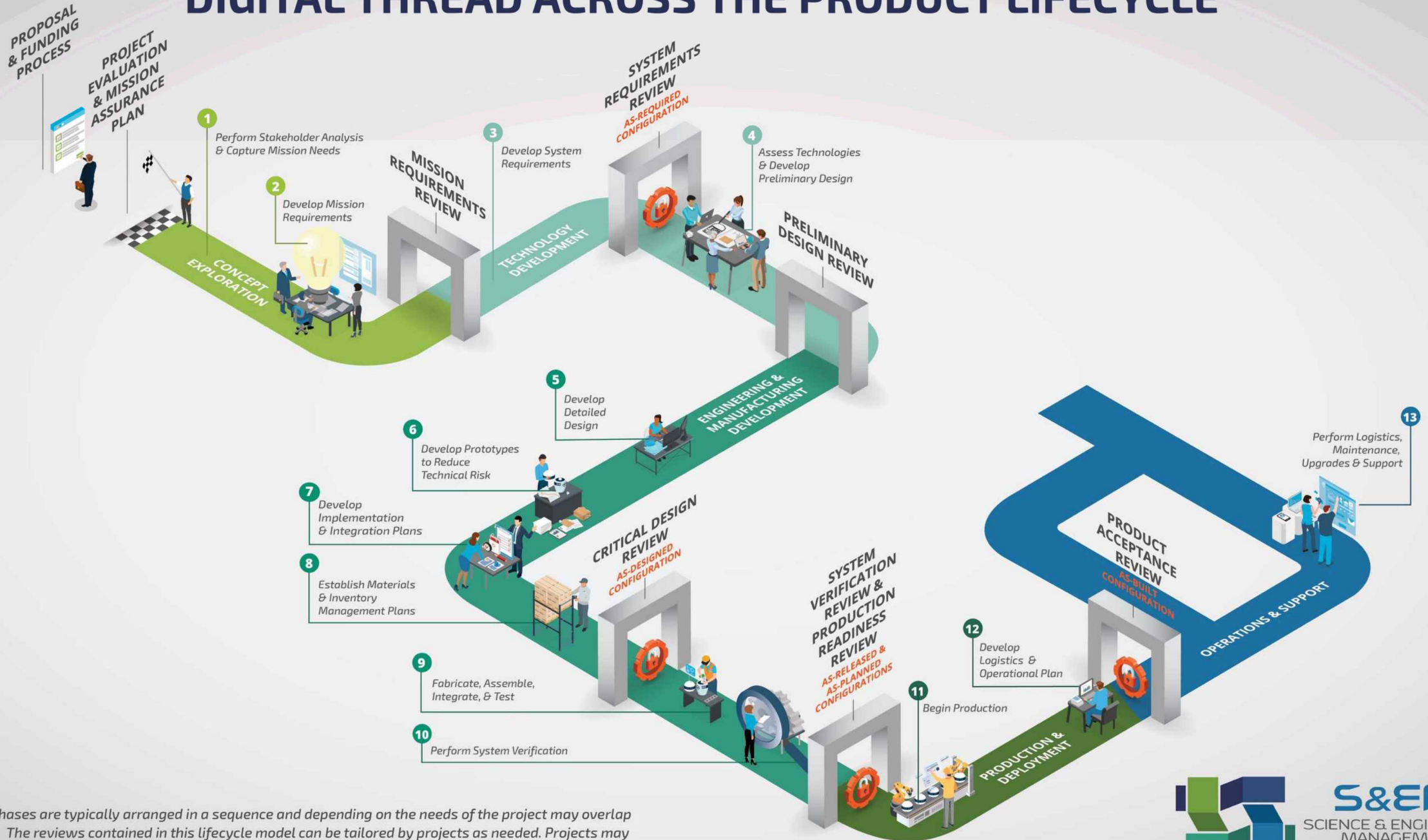
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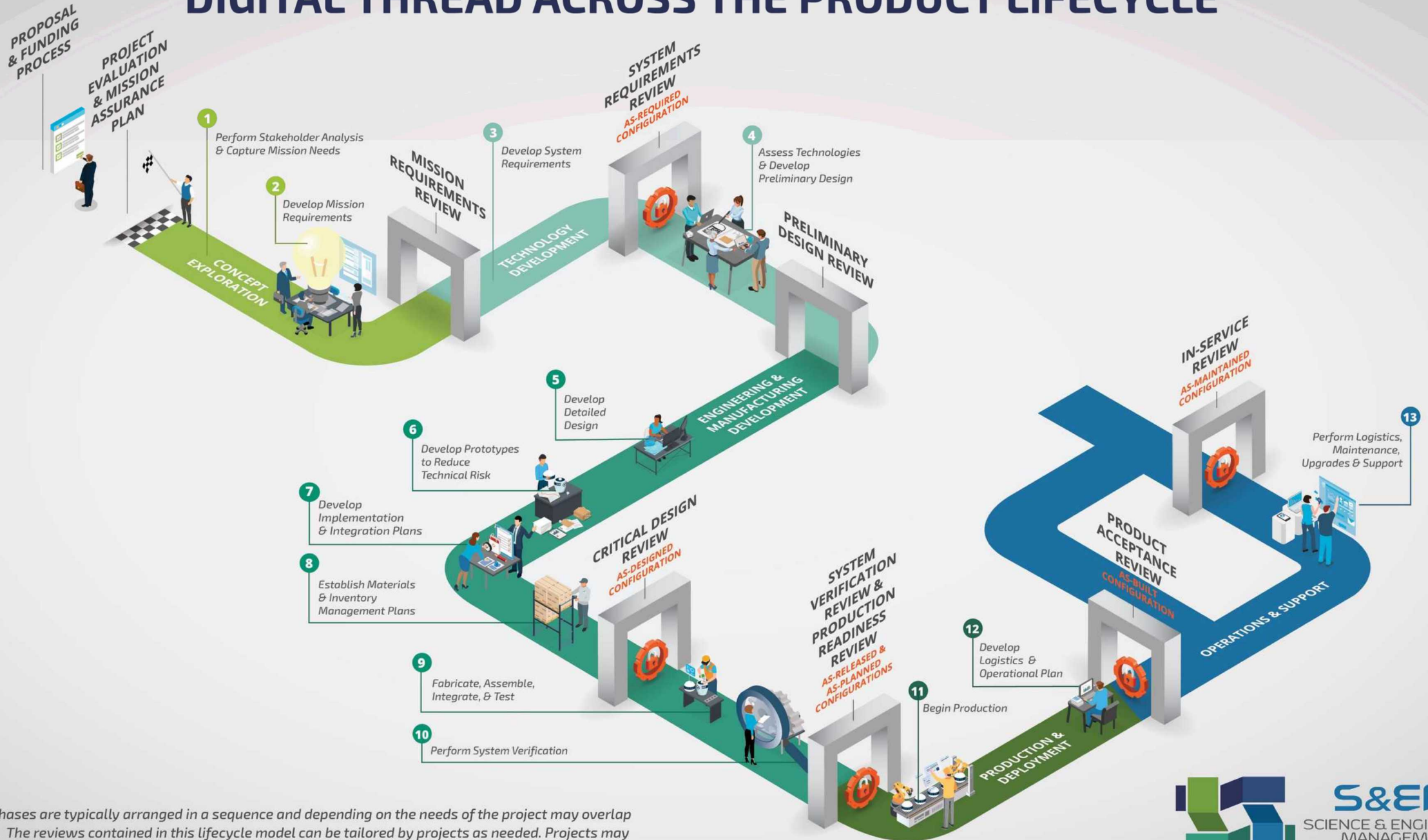
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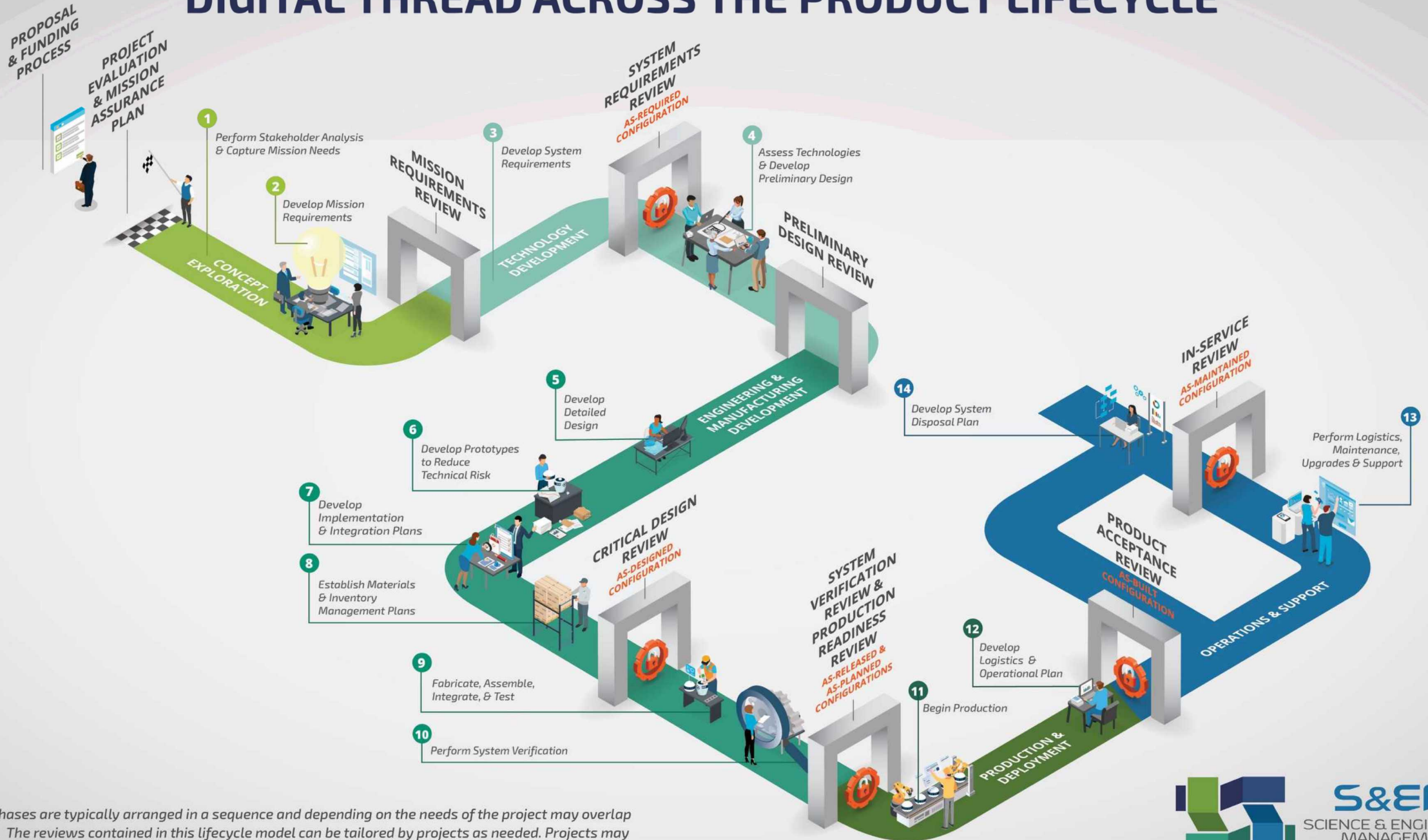
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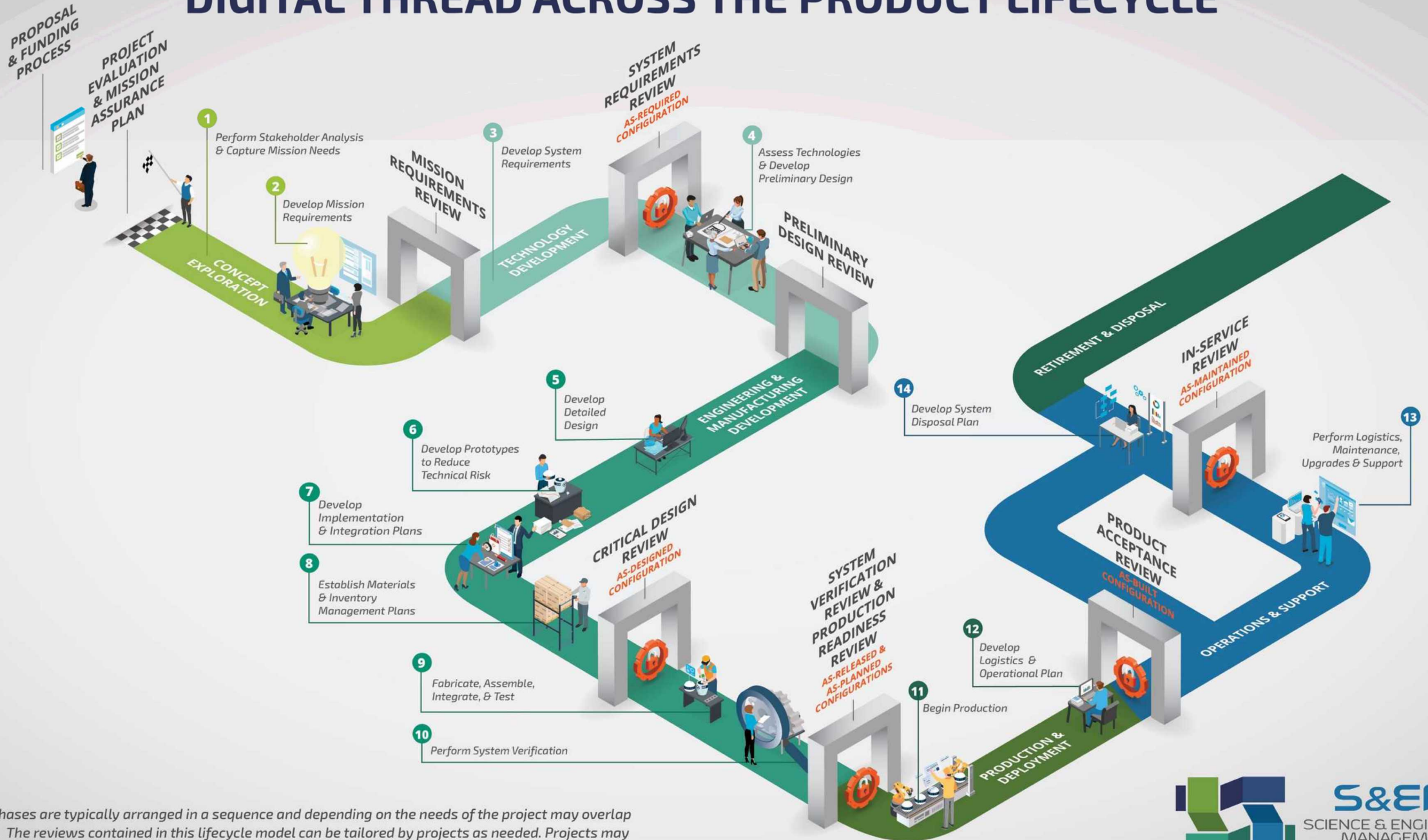
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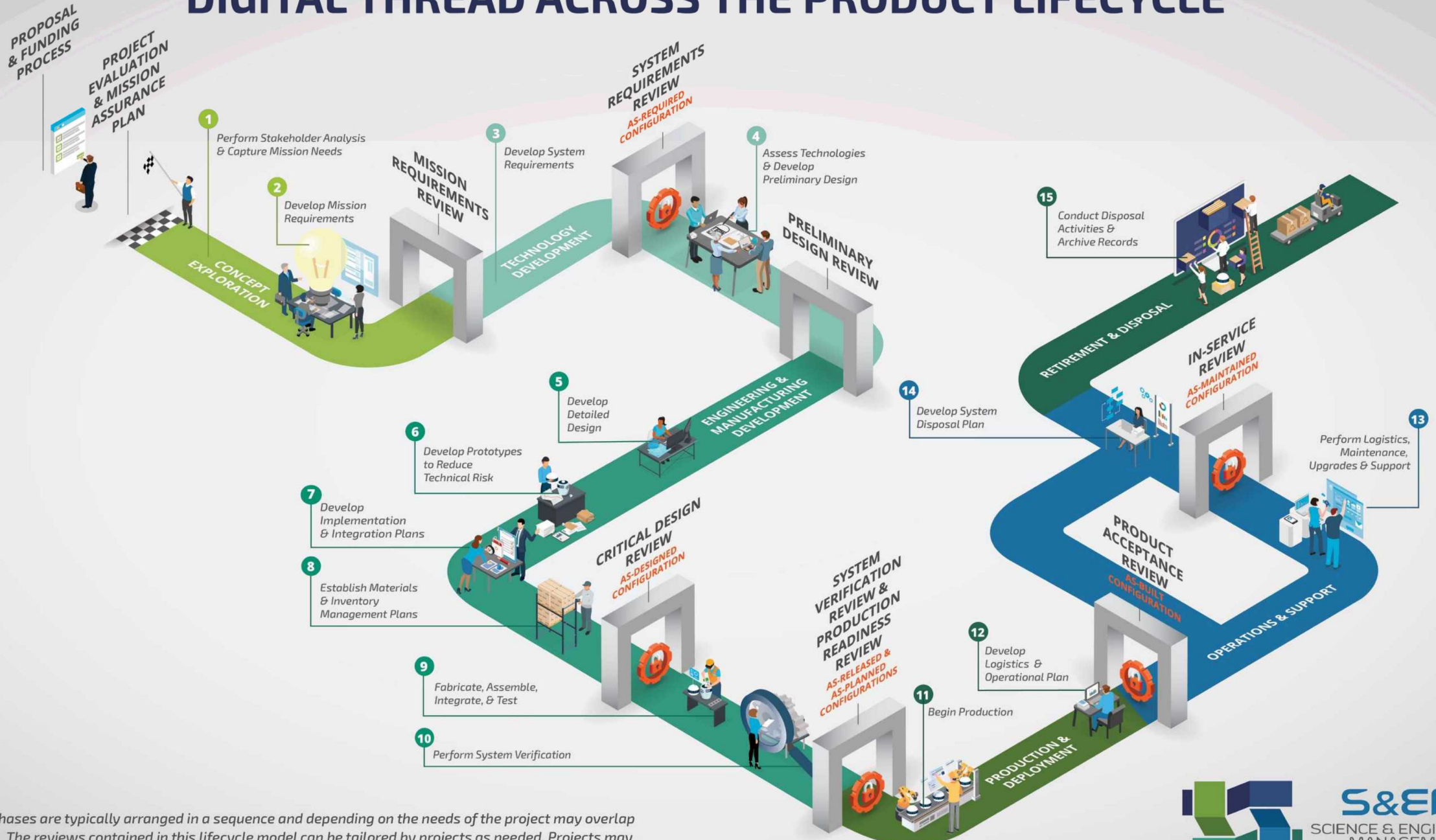
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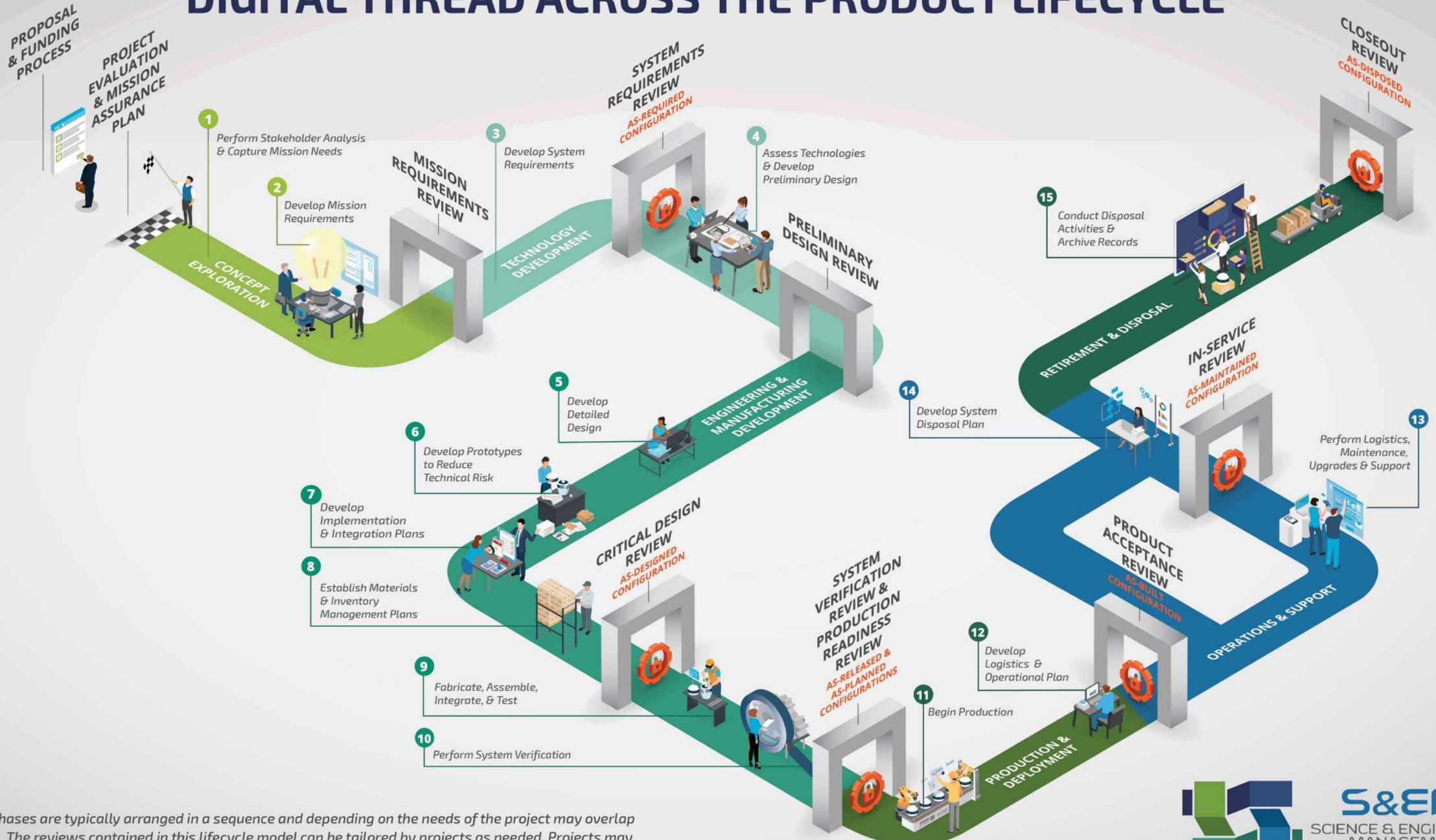
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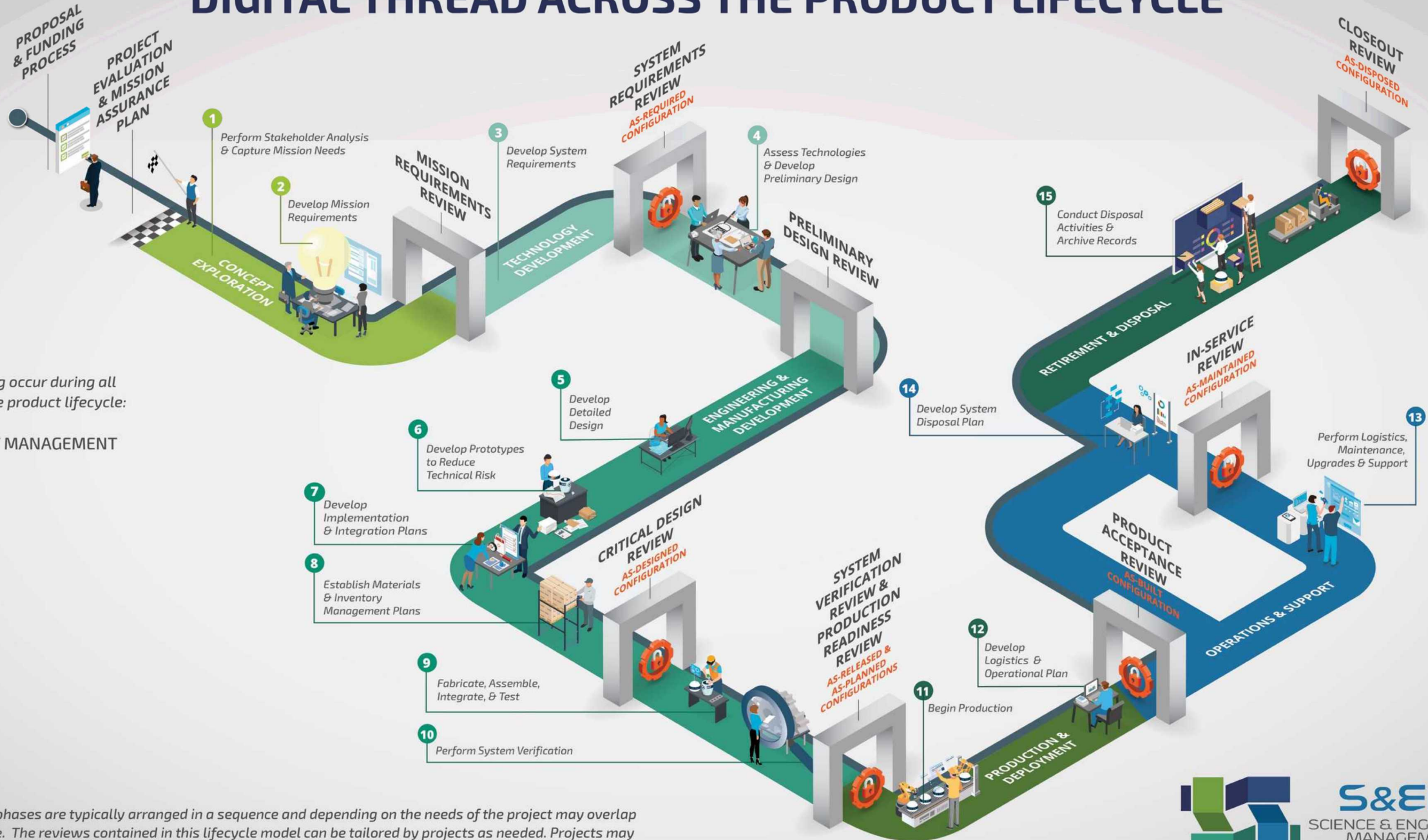
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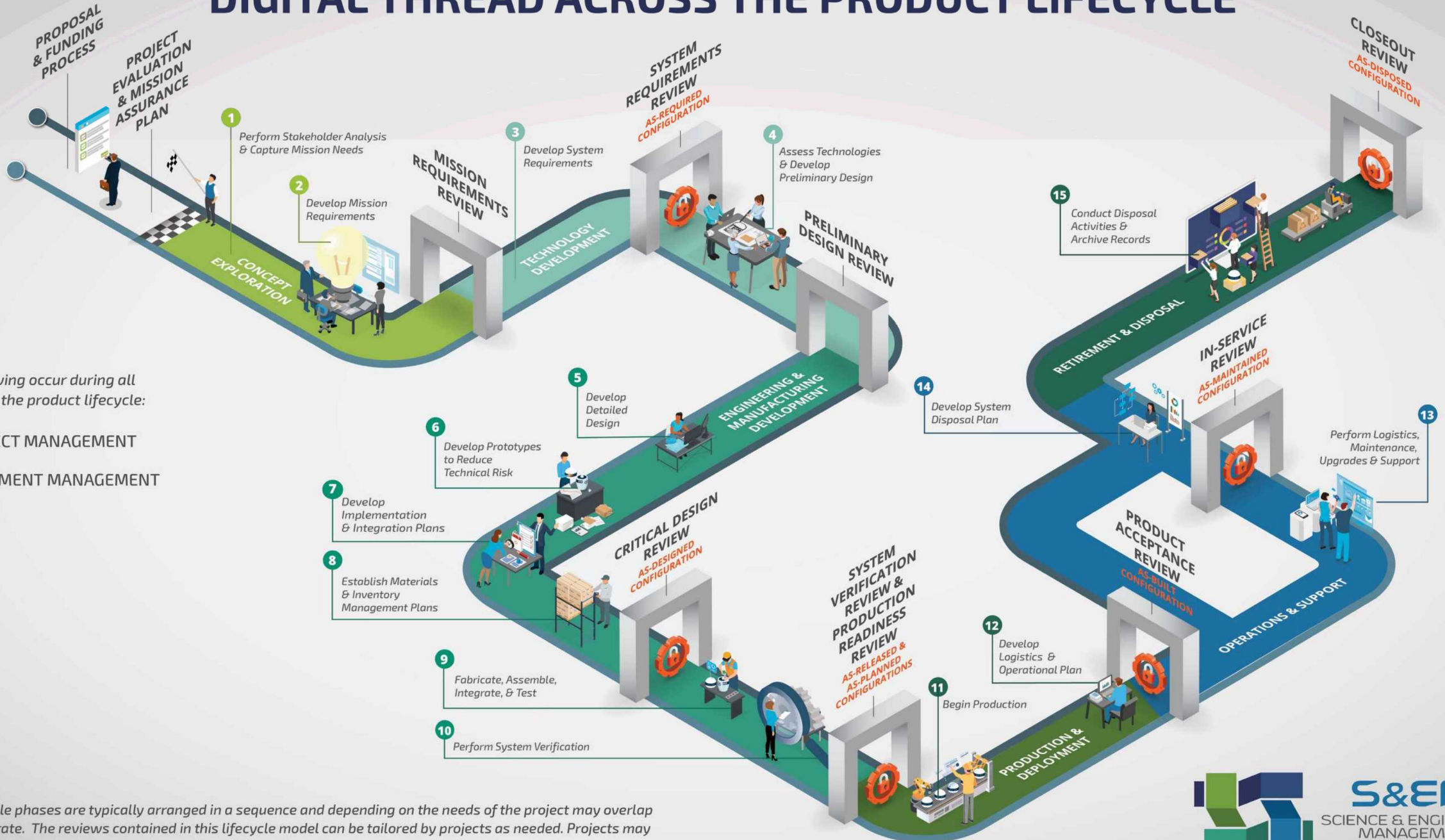


The following occur during all phases of the product lifecycle:

● PROJECT MANAGEMENT

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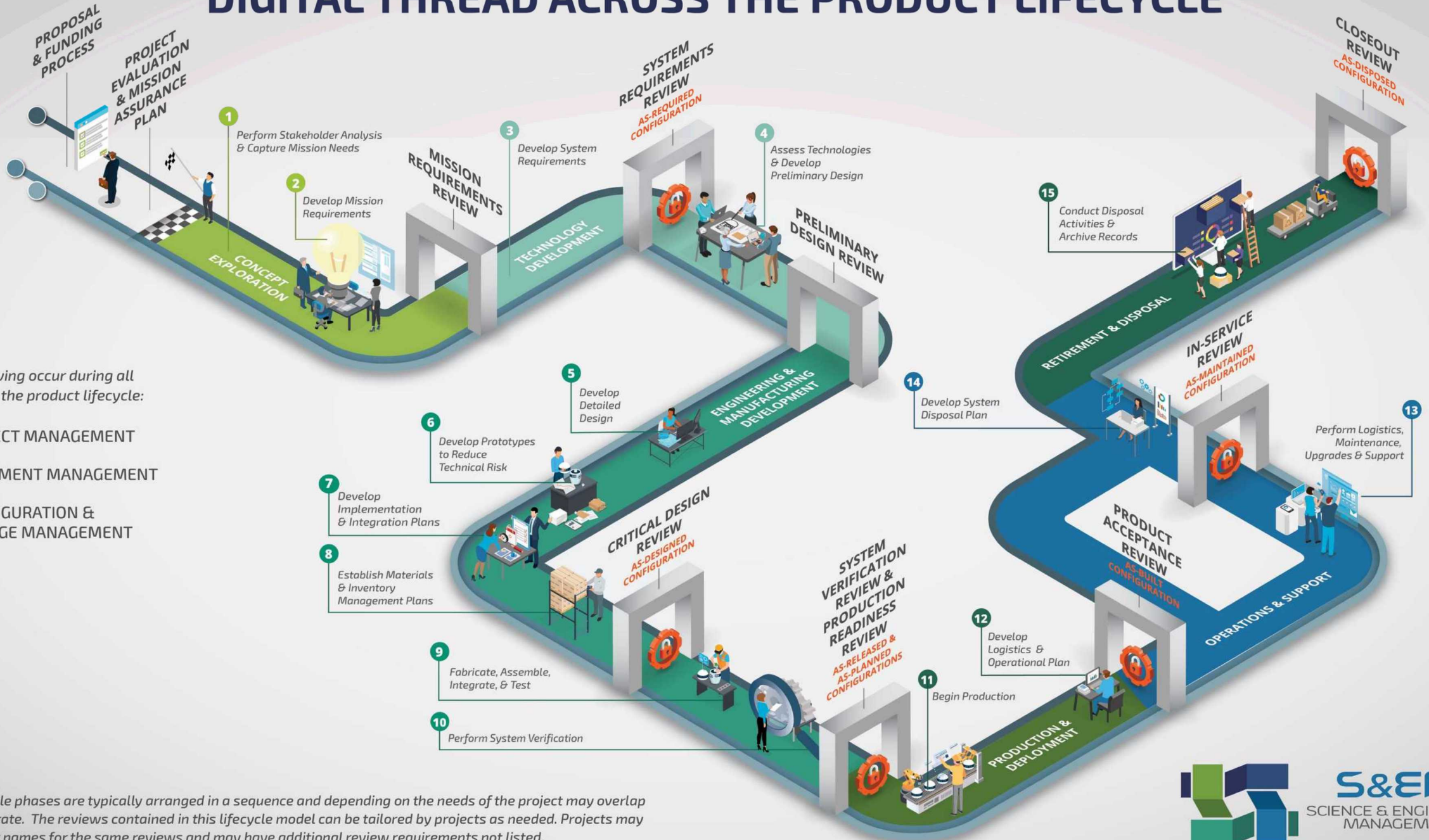


The following occur during all phases of the product lifecycle:

- PROJECT MANAGEMENT
- DOCUMENT MANAGEMENT

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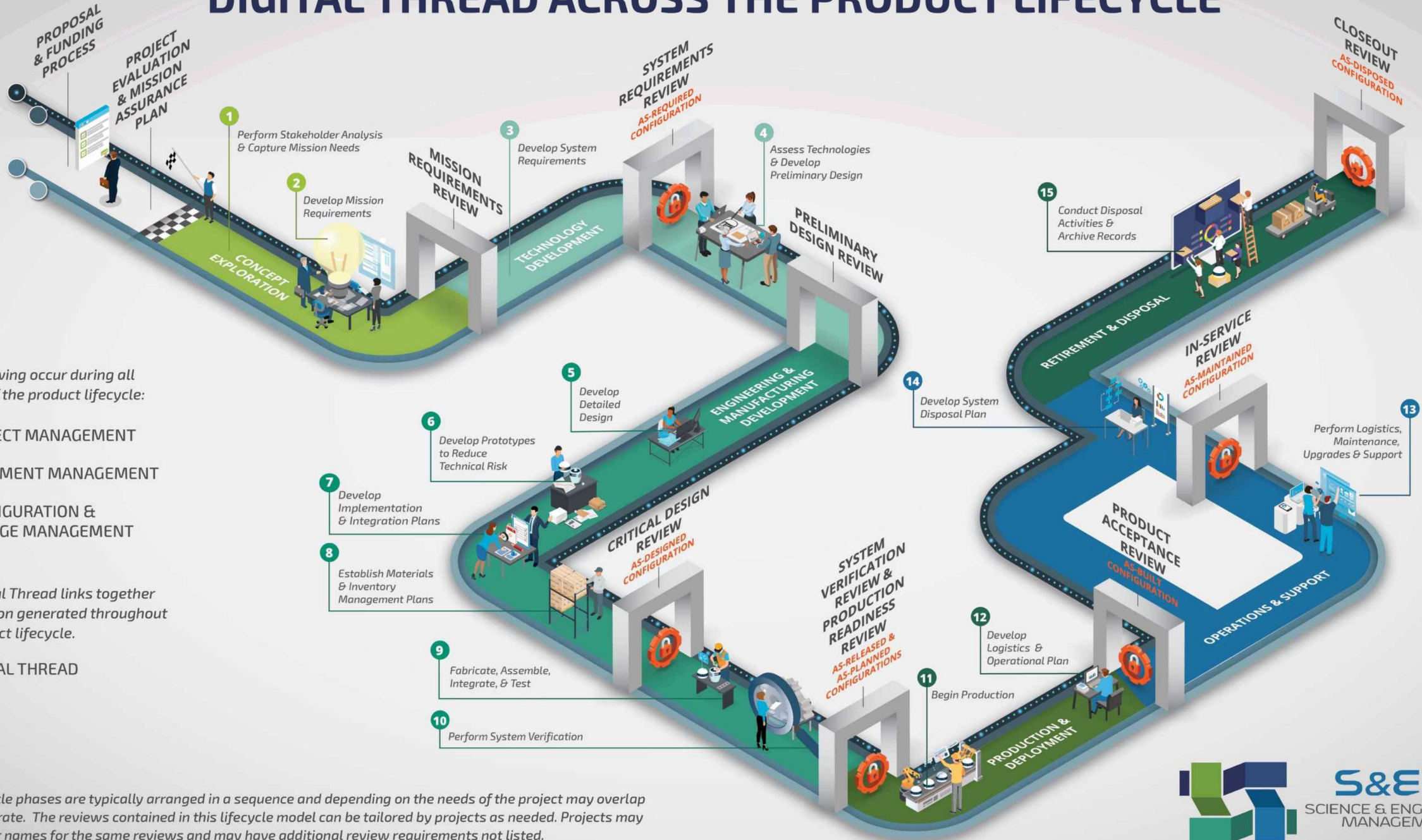


The following occur during all phases of the product lifecycle:

- PROJECT MANAGEMENT
- DOCUMENT MANAGEMENT
- CONFIGURATION & CHANGE MANAGEMENT

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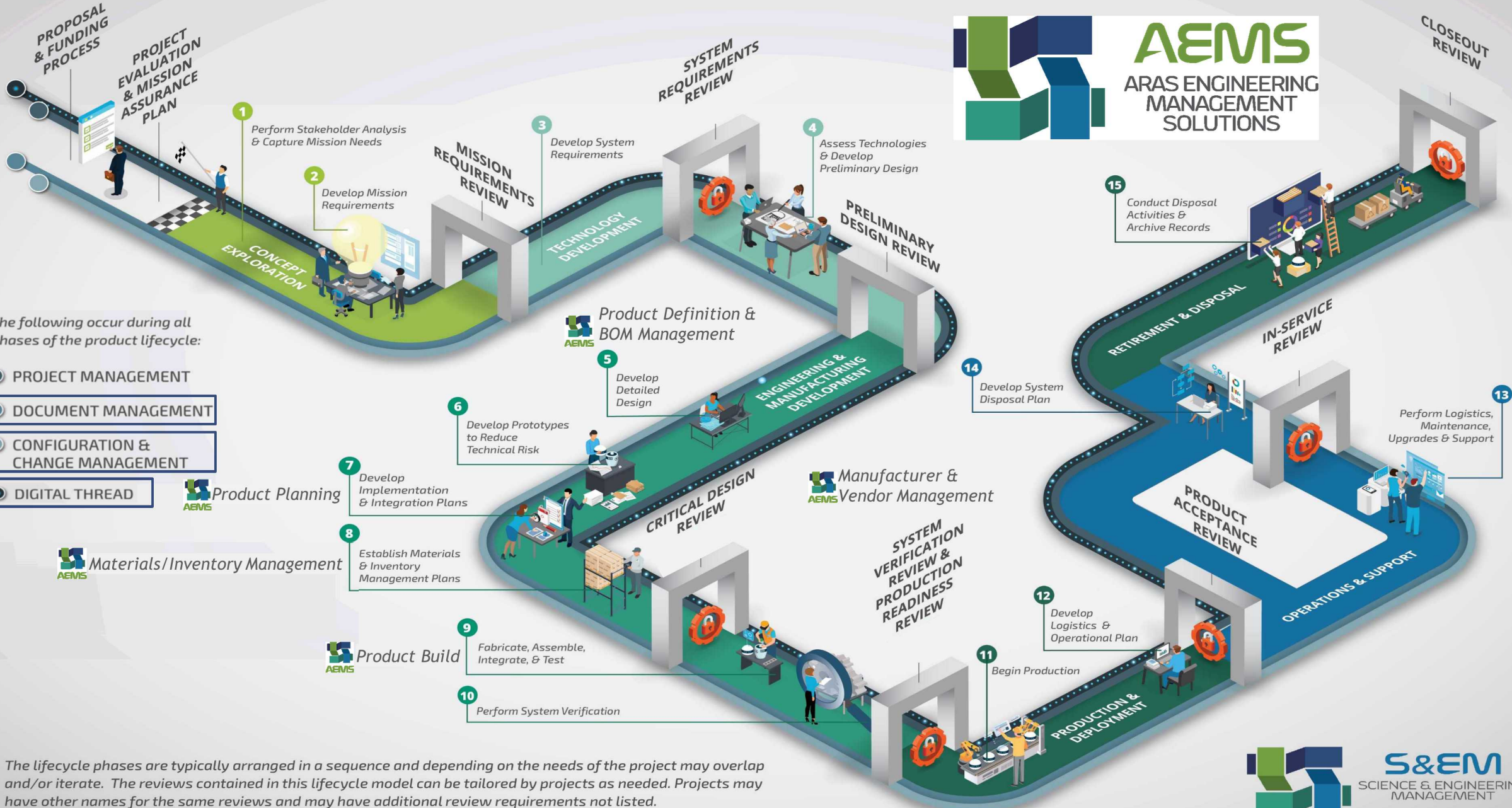
- PROJECT MANAGEMENT
- DOCUMENT MANAGEMENT
- CONFIGURATION & CHANGE MANAGEMENT

The Digital Thread links together information generated throughout the product lifecycle.

- DIGITAL THREAD

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The following occur during all phases of the product lifecycle:

- PROJECT MANAGEMENT
- DOCUMENT MANAGEMENT
- CONFIGURATION & CHANGE MANAGEMENT
- DIGITAL THREAD

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# AEMS Across the Product Lifecycle – Current



## Document & Record Management

- Document Control & Publishing

## Configuration Management

- Change Management (Disposition and Implementation)
- Data Package Generation
- Baseline, Release and Version Management

## Design Management

- Product Definition & Bill of Materials (BOM) Management
- Tool Integration - BOM Import from CSV

## Supply Chain Management

- Vendor and Manufacturer Management
- Traceability to Design and Physical Parts

## Engineering Manufacturing Management

- Materials/Inventory Management
- Product Planning
- Product Build
- Tool Integration – Physical Part Creation & Transaction Import

## Quality Management

- Checklist Template Management and Checklist Record Management

# AEMS Across the Product Lifecycle – Future



## Document & Record Management

- Microsoft Office Connector (Aras corp)

## Configuration Management

- Configuration Audits – Compare Configurations
- Improvements to Data Package Management & Generation

## Design Management

- Tool Integration with other Design Management Tools
- Software Part Management

## Supply Chain Management

- Tool Integration with Purchasing System

## Engineering Manufacturing Management

- Manufacturing Bill of Materials (mBOM)

## Quality Management

- Problem Reporting
- Non-Conformance Management

## Requirements Management

- Requirements Engineering (Aras corp)

## Structure Management

- Project Hierarchy
- Product Lines

PRODUCTION & DEPLOYMENT

OPERATIONS & SUPPORT

RETIREMENT & DISPOSAL

ENGINEERING  
MANUFACTURING  
DEVELOPMENT

# Key Takeaways

**1** PLM solution based on industry standards, best practices and lessons learned



**2** Partnerships critical to success



**3** Investment leveraged across customers



**4** Digital thread across the product lifecycle

