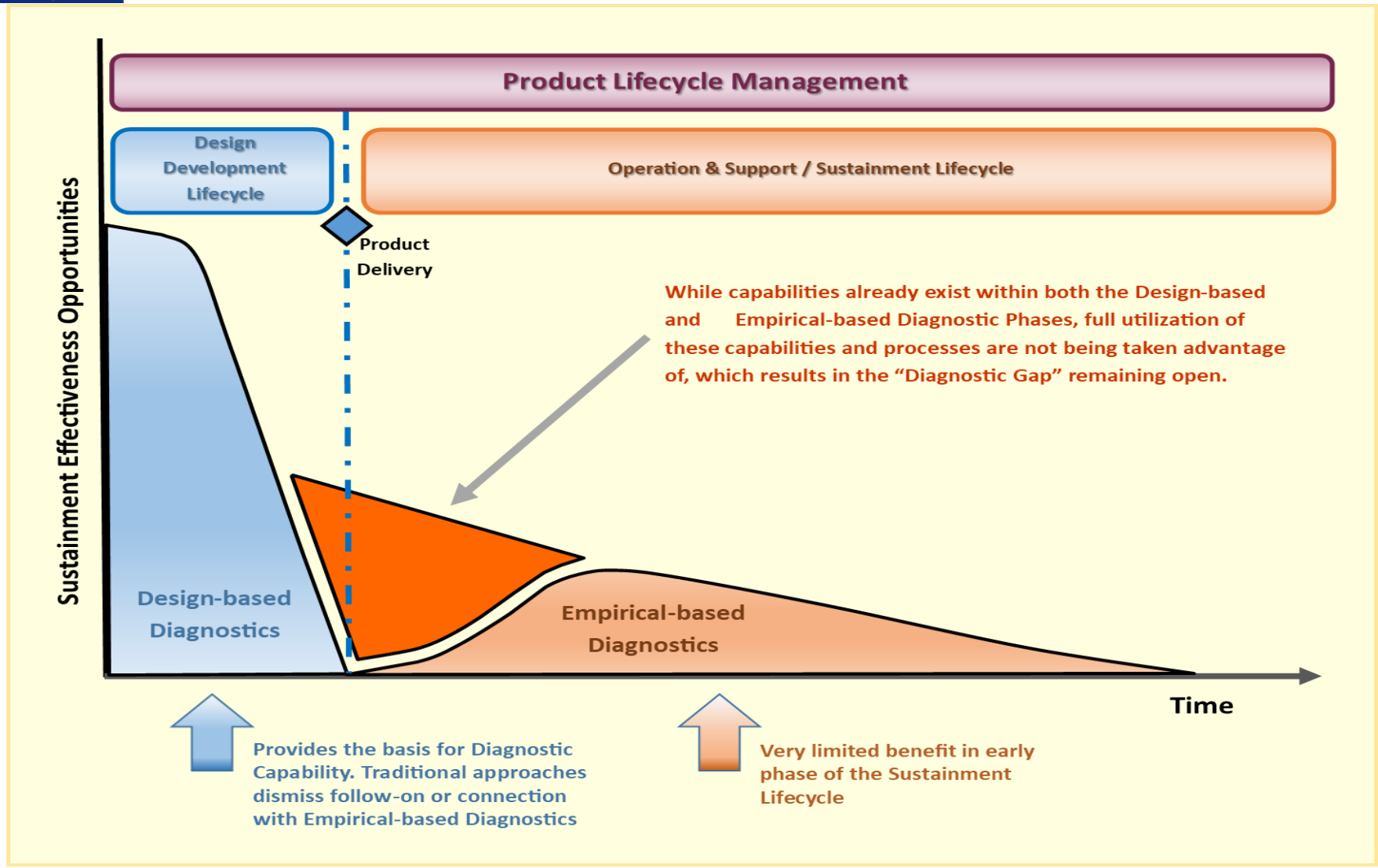
Design-Based & Empirical-Based Diagnostics

Current Practice - Diminishing Returns



Current Practice - Diminishing Returns

Two Separate / Non-Integrated Diagnostic Approaches

Design-based Diagnostics

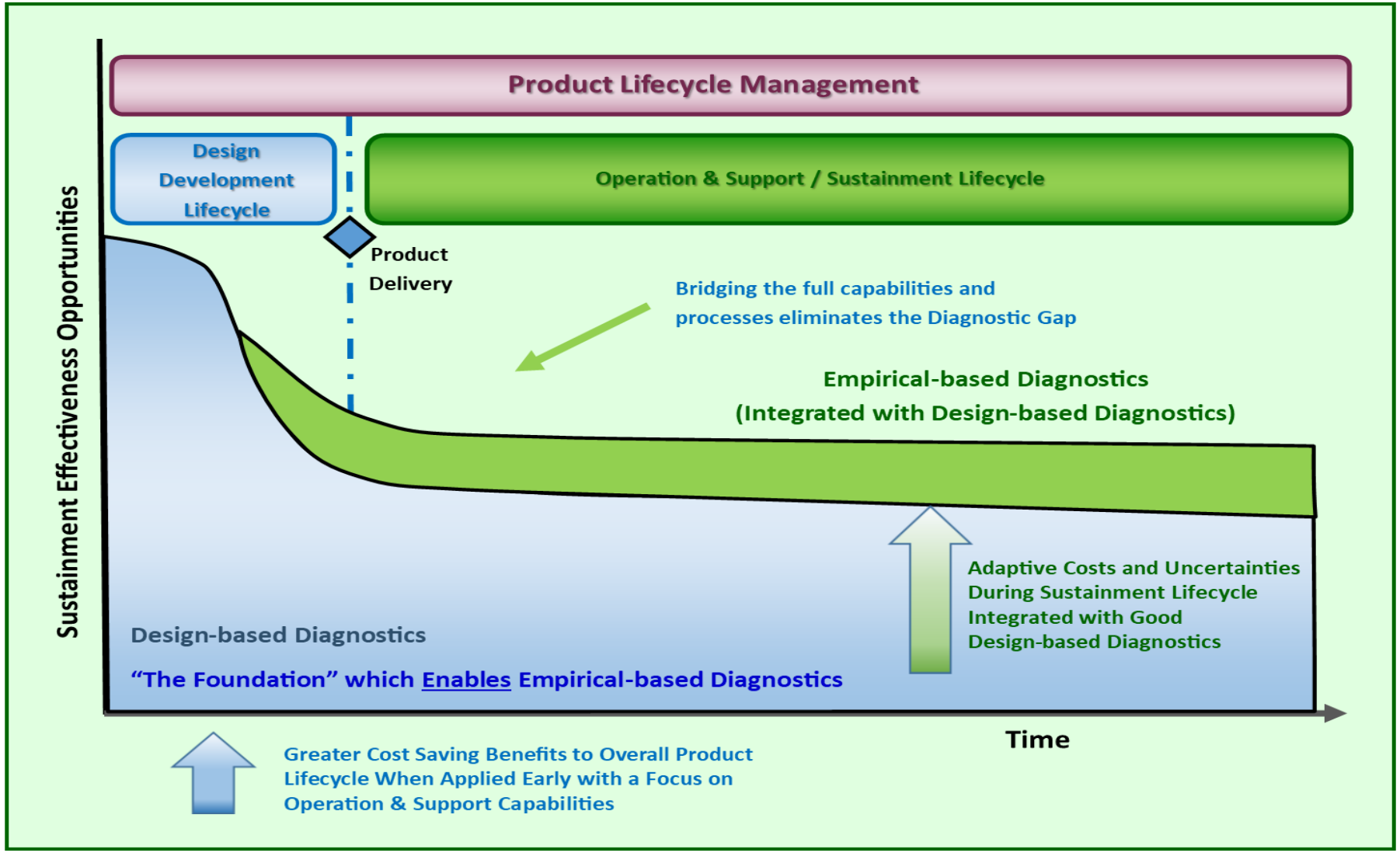
- Knowledge Capture & Design Influence
- MBSE compatible
- Product “Lifecycle” Management – Optimization
- First Failure Accountability
- Model & Data Interoperability/Reusability
- Requirements Traceability
- Multidisciplinary Collaboration
- Iterative Design Assessment & Cross-Validation
- SysML, ATML, NGATS & ATS compatibility
- Diagnostic (Failure-to-Test) & BIT Validation
- Reliability/Supportability/Safety Constraints
- PdM vs. RCM vs. Corrective Maintenance Effectiveness
- RAMS-to-Diagnostic Constraints Time-based Simulations
- Test Paradigm independence
- Sustainment Technology Uniformity and Scalability
- Fully Integrated Health Management
- Proactive approach
- Diagnostic Reasoning
- Diagnostic Certainty
- “Digital Twin” / “Digital Thread” Readied

Empirical-based Diagnostics

Mostly deficient when not coupled with Design-based Diagnostics

- Trending Analyses
- Diagnostic sequence biasing enrichment
- Not able to Influence the design’s diagnostic integrity
- Test Methods/Tools Restricted
- Limited Data Reusability
- Restricted Data Interoperability
- First Failure Uncertainty
- Variables Restrict Achievement of High Level Certainty
- Reactive approach
- Diagnostic Correlation
- Diagnostic Uncertainty

Future Potential – Filling the Diagnostic Gap

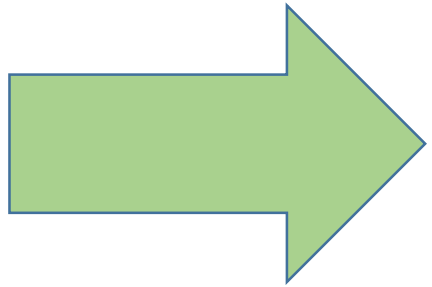


Integrated Diagnostic Design

Comprehensive Diagnostic Capability Through the Complete Lifecycle

Design-Based & Empirical-Based Diagnostics

- MBSE: “Digital Thread” – “Digital Twin” readied
- Product “Lifecycle” Management – Optimization
- First Failure Accountability
- Data Analytics & Maturation
- Model & Data Interoperability/Reusability
- Requirements Traceability
- SysML, ATML, NGATS, ATS, etc. compatibility
- Diagnostic (Failure-to-Test) & BIT Validation
- Reliability/Supportability/Safety Constraints
- PdM vs. RCM vs. Corrective Maintenance Effectiveness
- RAMS-to-Diagnostic Constraints Time-based Simulation
- Test Paradigm Independence
- Sustainment Technology Uniformity and Scalability
- Fully Integrated Health Management
- Diagnostic Certainty
- Trending Analyses
- Diagnostic sequence optimization
- Test Methods/Tools Integrated
- Adaptable to Future Technologies



Optimized
Operation & Support
and
Minimized Lifecycle
Cost

Balancing both Design-based and Empirical-based diagnostics is the key for an optimized lifecycle solution with the Design-based diagnostics forming the Foundation without which the Empirical-based diagnostics is only marginally effective.