Systemic Framework for Enterprise Architecture & Transformation

Systemic Levels

Introduction

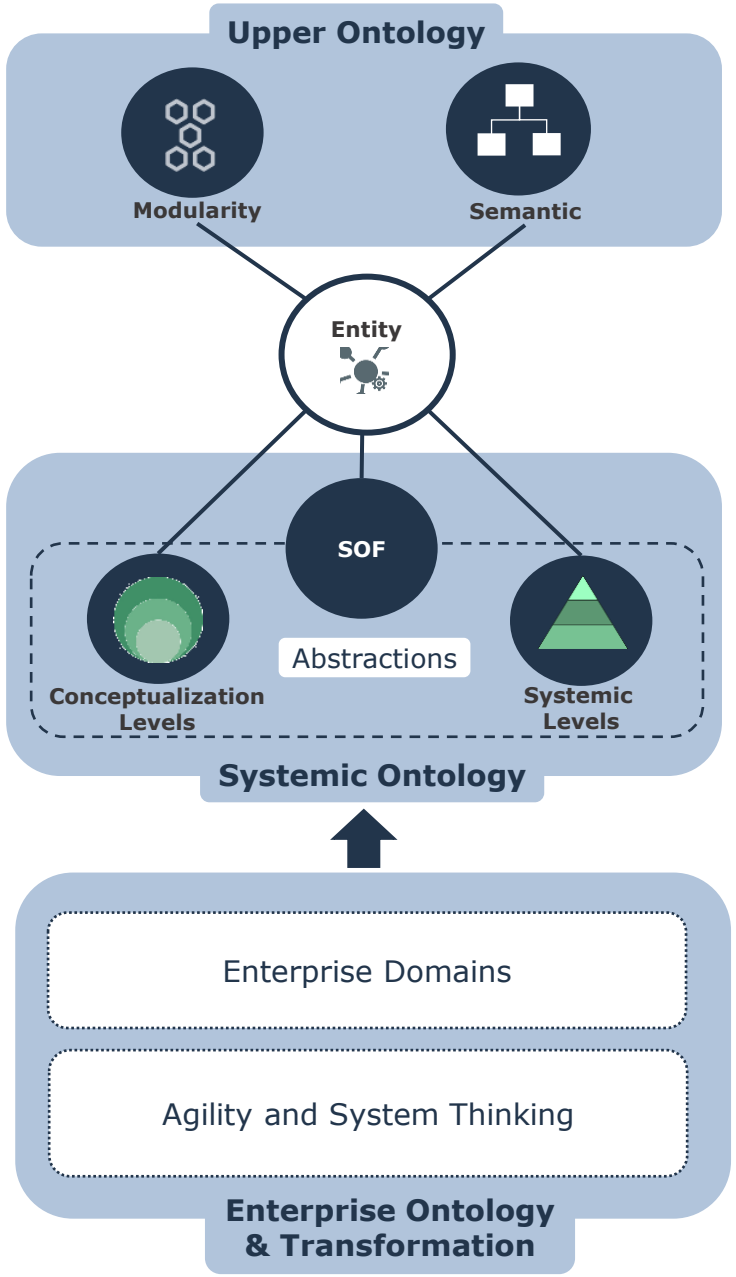
- This document is an integral component of the SysFEAT architectural framework. It provides foundations to address the challenges posed by Enterprise Architecture in the 21st century, which include :
  - Increasing complexity in system structures and behaviors.
  - Growing intricacy in architecture, management and governance of these systems.
  - The mission of the framework is to demystify these complexities, ensuring they are comprehensible to a broad audience, thereby facilitating the design and management of complex-systems across all scales, from micro-systems to enterprise level systems.

- Enterprise Modeling refers to the overarching language and conceptual framework used to describe, understand, and communicate the complex structures and dynamics of an enterprise.
- It integrates both the operating aspects of the enterprise (how it functions and interacts within its ecosystem), the transformational aspects (how it evolves and sustains over time through initiatives, asset management) and how these transformations are governed to ensure effectiveness, efficiency and reliability.

- The following slides present the foundations of enterprise modeling.

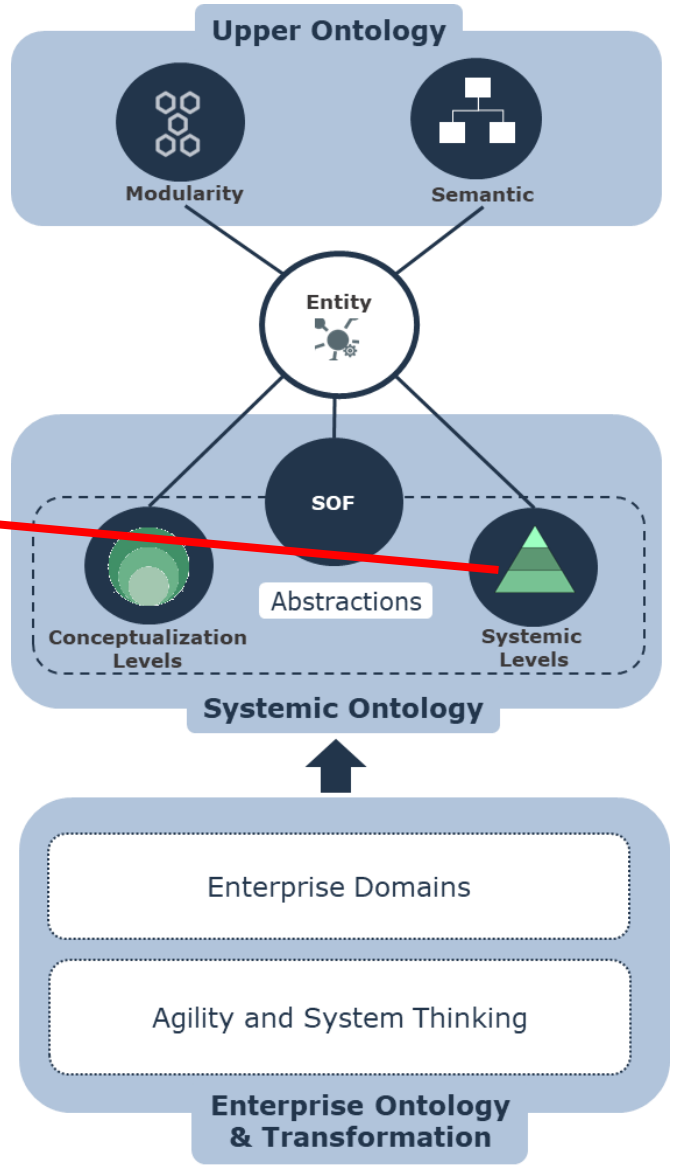
Foundations of enterprise modeling

- **Modularity** provides the syntax for building robust, manageable, and scalable architectures, based on the principles of composability and packaging.
- **Semantic** provides robust capabilities for classifying and composing entities, from time-bound entities (individuals) to families of concepts, enabling effective representation of meaning.
- The **Systemic Operating Framework (SOF)** serves as the overarching language that describes why and how a system operates and interacts within its ecosystems.
- **Abstractions** organizes systems and concepts in degree of abstractions, including systemic levels and conceptualization levels.
- **Enterprise Domains** formalize the various disciplines that make-up EA, ranging from enterprise road-mapping to System ArcDevOps.
- **Agility and System Thinking** ensure that the enterprise evolves and sustains over time through governed initiatives, architected for flexibility and responsiveness in complex and dynamic business environments.



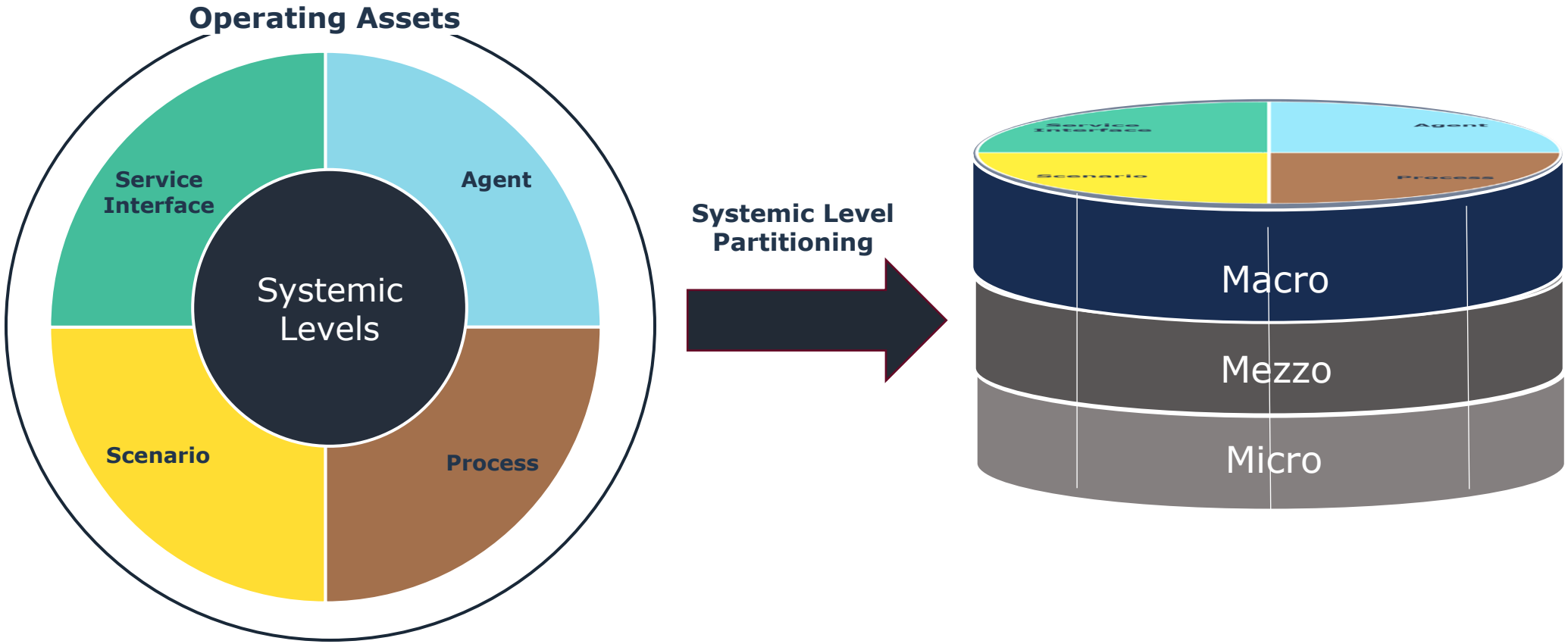
The Systemic Levels in the Architecture Framework landscape

- Systemic levels refer to the different granularities in which a complex system can be described or analyzed, by decomposition and analysis of interactions, at each level of composition.
- Systems levels help model the structure and behavior of complex systems to understand how individual elements come together to form a coherent whole, and how system properties and functionality emerge from their interactions at different levels.
- Emergent properties result from nonlinear interactions, feedback, and self-organization that occur at different systemic levels, and are often difficult to anticipate or control.
- Emergence is a key concept for understanding the complexity, resilience and evolution of complex systems.



Systemic Levels of Operating Assets

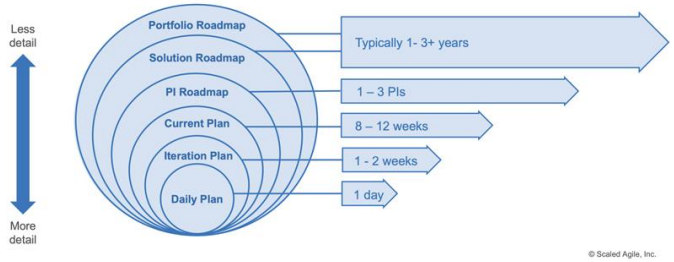
- Systemic levels apply to Operating Assets which describes the way Outcomes are produced and consumed: how (Behaviors) and by whom (Agents).
- Operating Assets systemic partitioning provides foundations for architecture granularity. For instance, software agents are partitioned in Application Systems (macro), Applications (mezzo) and Micro-Services (micro).



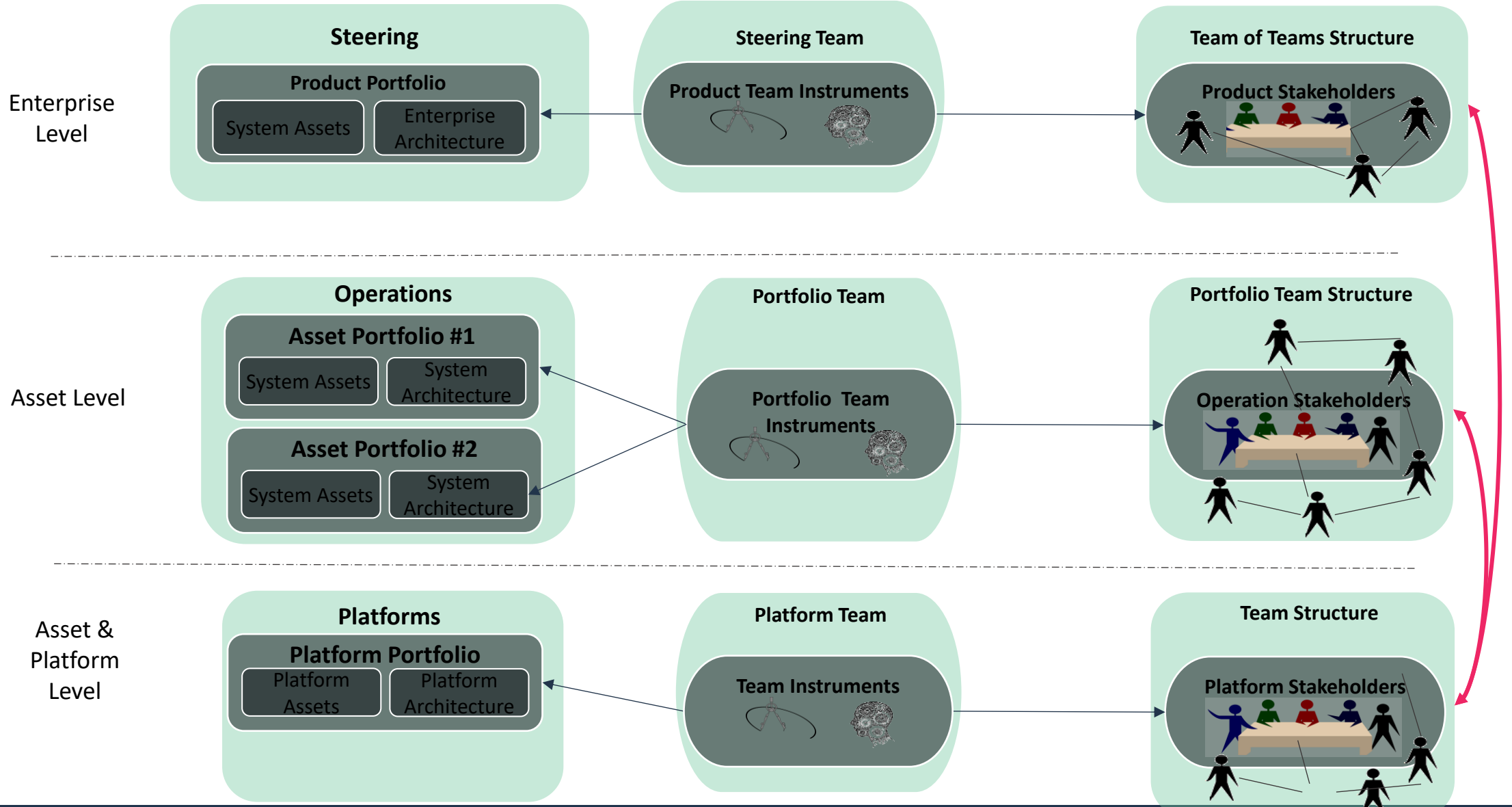
Systemic levels & architecture granularity

- Architecture granularities associated with timescale are the basic foundations for an architecture framework to support agile@scale.
- SEAF provides native architecture granularity as presented in the Figure below. Based on user roles in architecting activities, each community only sees the granularity that fits its concerns and duties.

	Human organizations	Business & Technology Systems			Transformation & Governance
		Software Systems	Technology Systems	Hardware Systems	
Enterprise / Large Solutions	Legal Entity	Application System		Data Center / Facility	Enterprise & Enterprise Phases
System Level	Department Team of Teams	Application	Software Technology Stack	Deployment Architecture Infrastructure	Application Portfolios
Component Level	Team / Position	IT Service Micro-Services	Software Technology	Deployment Package Computing Device Cloud Service	Micro-Service Portfolios Micro-Service Catalogs Technology Portfolios
Operations Activity Level	Handover with development & operational environments (Technology/data discovery, Audit, SQL generation, MS Team connector, etc)				



Systemic levels & management of architecting



Architecture granularity in other frameworks

- As expressed in TOGAF and SAFe, there are three different architecture granularities associated to the time horizon: not everything can be changed at once from enterprise strategy down to small teams and low-level components.
  - There needs to be a level of autonomy between the level of architecture granularity and planning as well as coordination to ensure common directions.
  - Roadmap are managed at different timescale according the various architecture granularity
- As for ArchiMate, it is missing support for architecture granularity, beyond using the fragile concept of "grouping". ArchiMate cannot be qualified for agile@scale architecture.

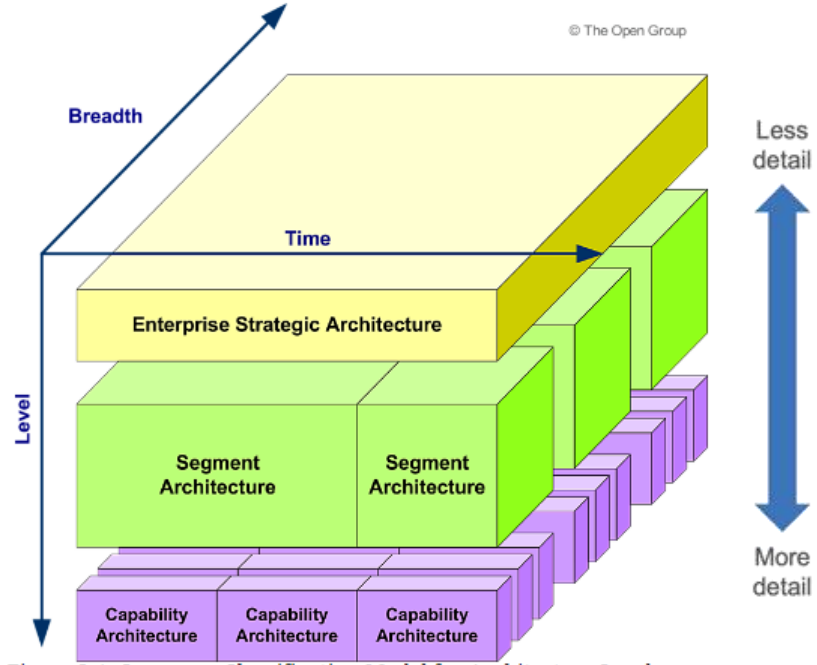
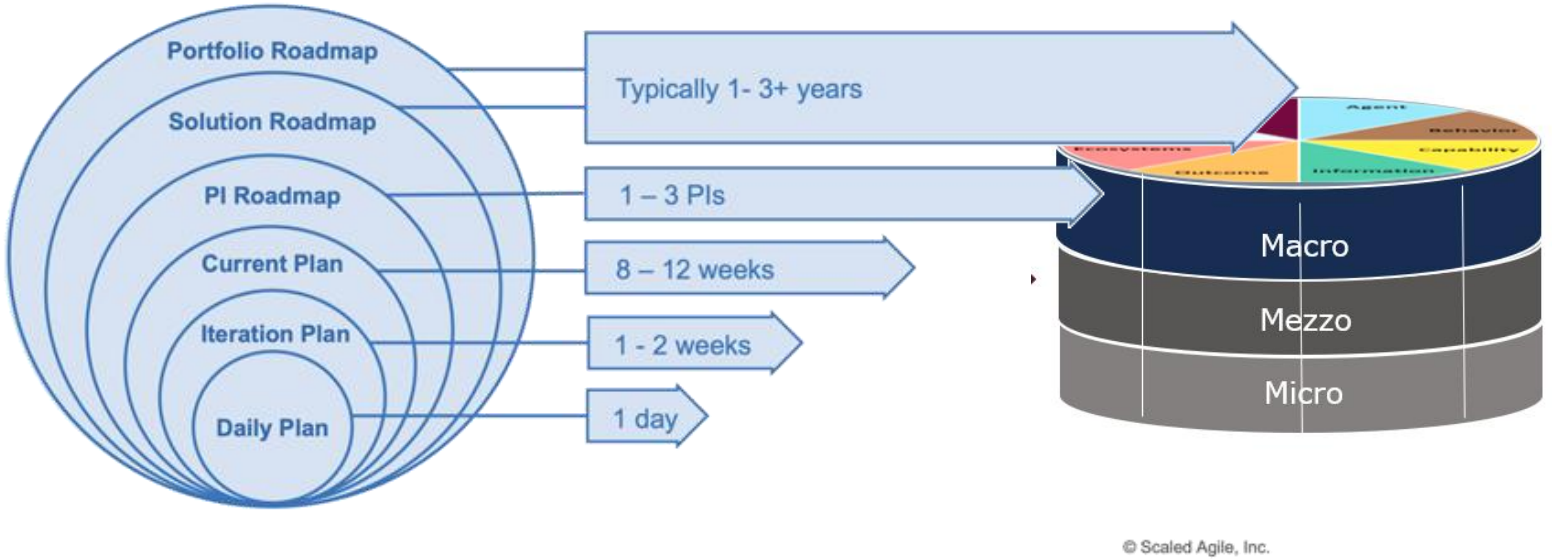


Figure 3-1: Summary Classification Model for Architecture Landscapes

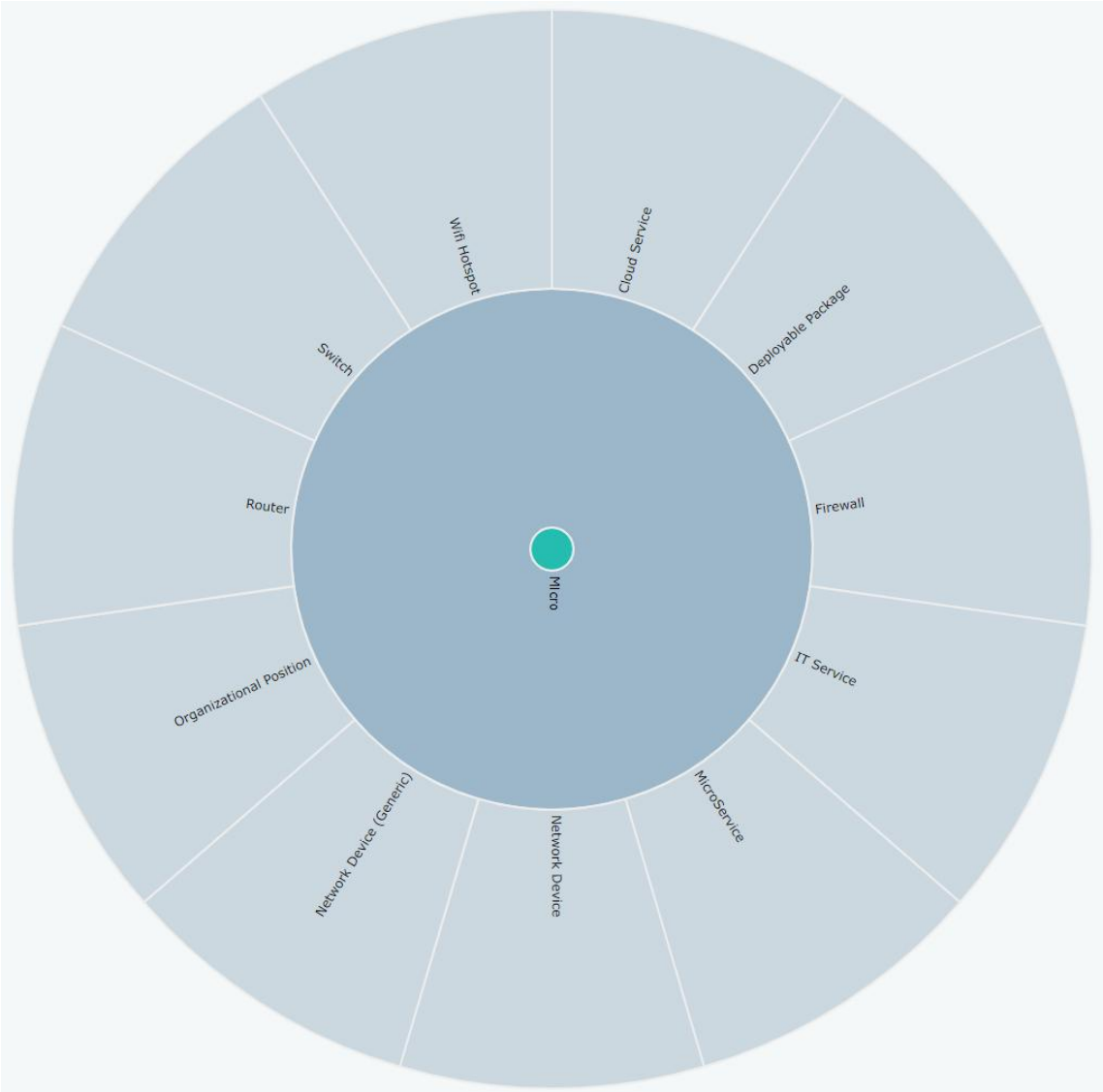
TOGAF



SAFe

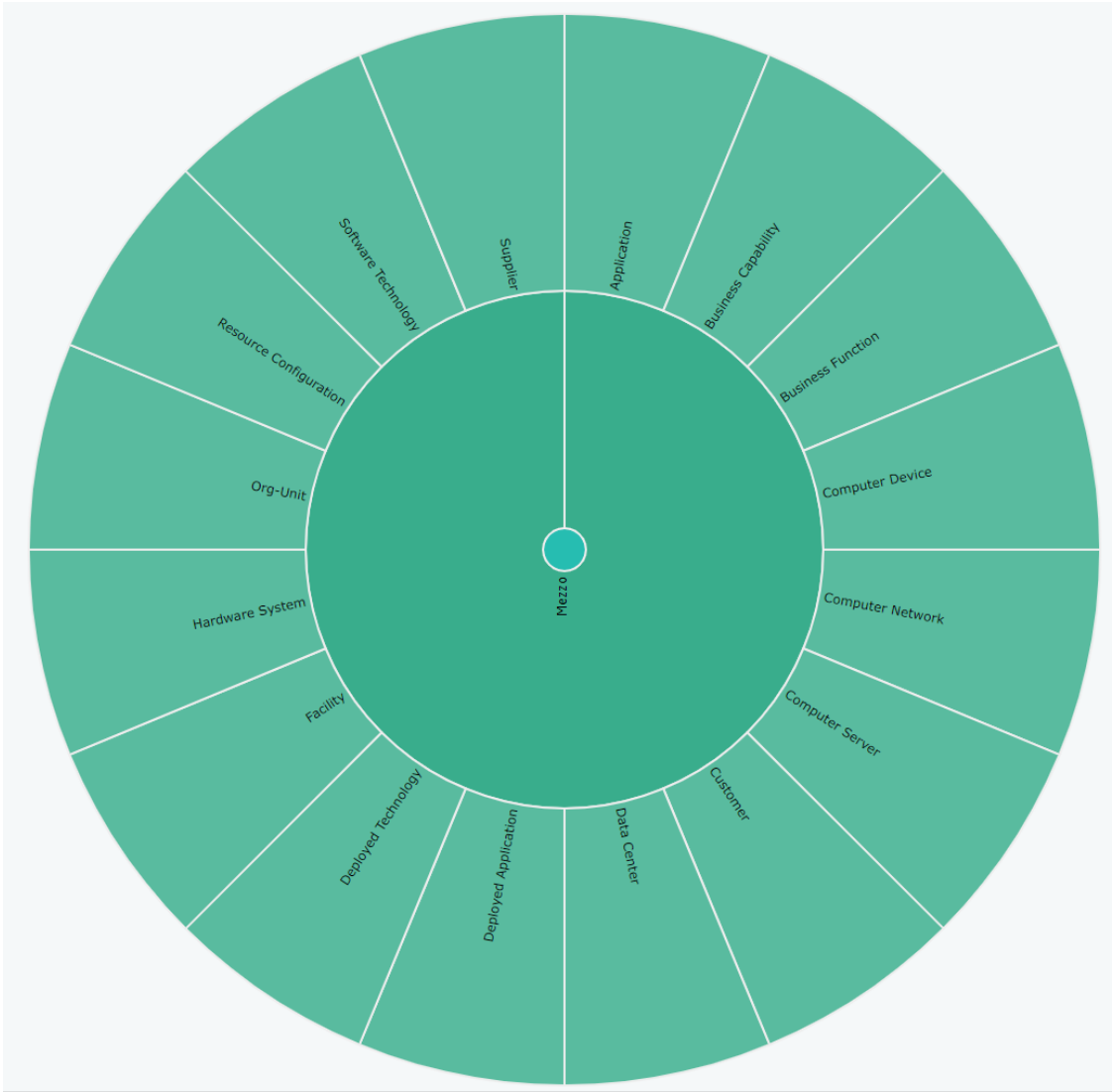
Micro Level

- The micro level represents the foundational layer at which a system's structure and interactions can be analyzed without further subdivision into smaller constituent parts.
- The micro level sets the stage for how higher-level behaviors emerge. As one moves up to higher hierarchical levels (mezzo, macro, etc.), the signals and boundaries at each of those levels are influenced by the foundational interactions set at the micro level.



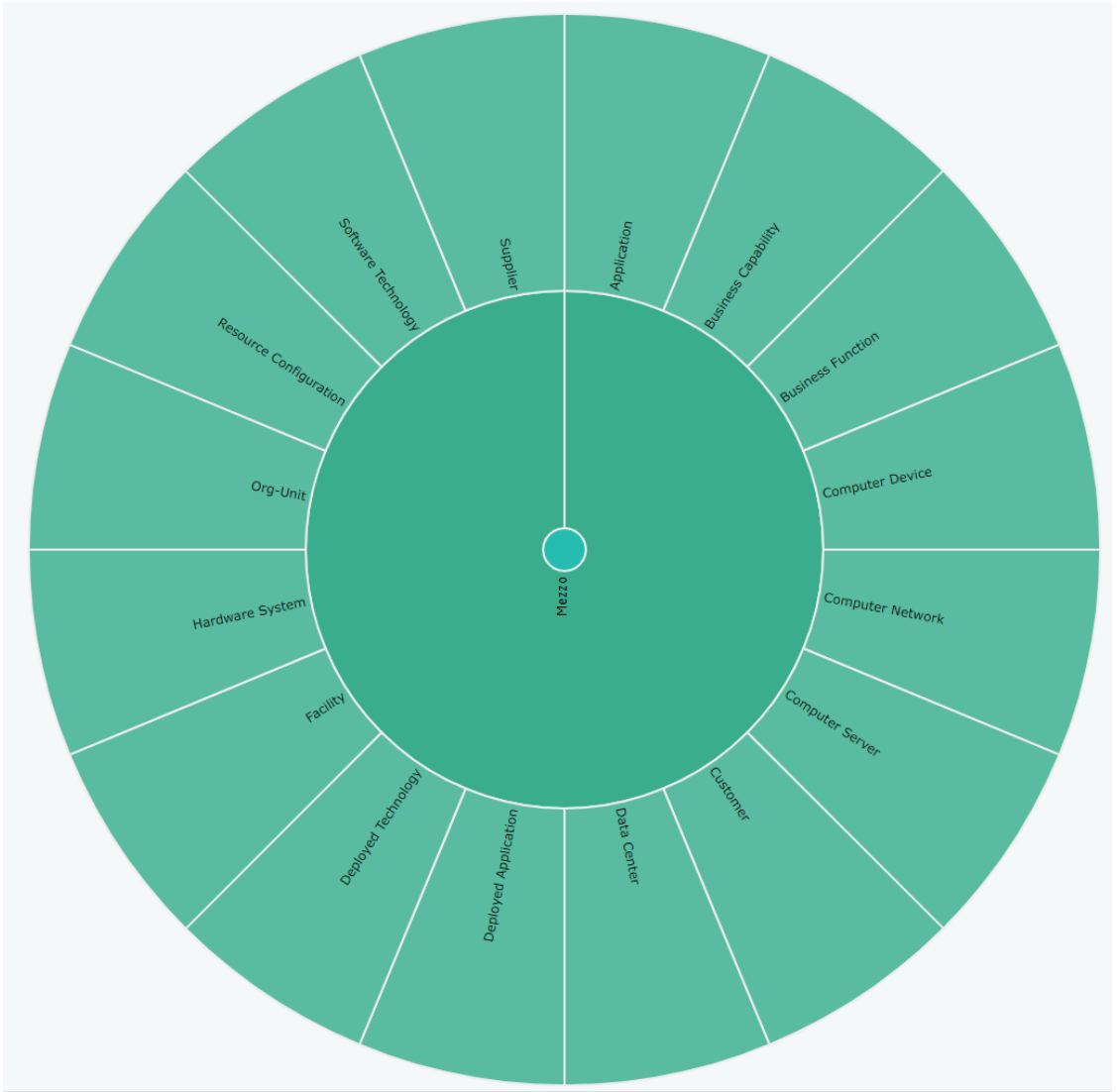
Mezzo Level

- The Mezzo level is the intermediate layer between the foundational "micro" level and the overarching "macro" level.
- At the mezzo level, aggregates or collections of micro-level components come together to form larger entities or sub-systems.
- Boundaries and signals at the mezzo level arise from the interactions and emergent behaviors of micro-level components, yet they also have their own distinct properties and rules not strictly reducible to the micro behaviors.
- Emergence at the mezzo level can be analyzed:
  - Bottom-up: Looking at how interactions and behaviors at the micro level give rise to emergent phenomena, structures, or behaviors at the mezzo level.
  - Top-down: Understanding how meso-level structures influence and constrain the behaviors and interactions of the micro-level components within them.

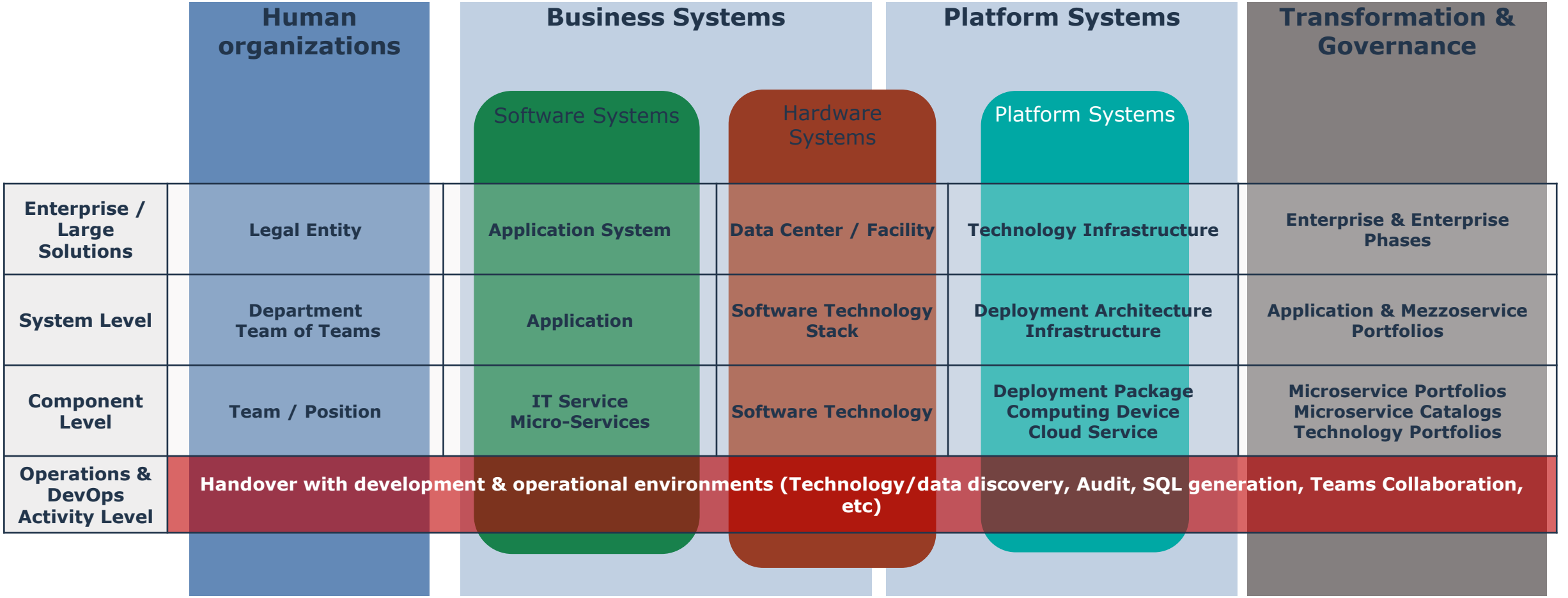


Macro Level

- The “macro” level is the highest or most encompassing level in a given hierarchy of system analysis.
- The macro level consists of large-scale structures or the system as a whole, which is formed by the aggregation and interaction of entities at the mezzo (and thus indirectly, micro) levels.
- Signals and boundaries at the macro level encapsulate broad systemic behaviors and constraints, influencing and being influenced by the entire system's dynamics.
- Emergence at the macro level can be analyzed:
  - Bottom-up: Observing how the behaviors and interactions at both the micro and mezzo levels, through several layers of emergence, give rise to large-scale patterns or phenomena at the macro level.
  - Top-down: Analyzing how the overarching structures, constraints, or patterns at the macro level influence, shape, or constrain behaviors at the mezzo and micro levels.



Systemic Levels & Architecture granularity & DevOps



Systemic Levels – IT Architecture