Structured Approach to Solution Architecture

Alan McSweeney

Solution Architecture Is …

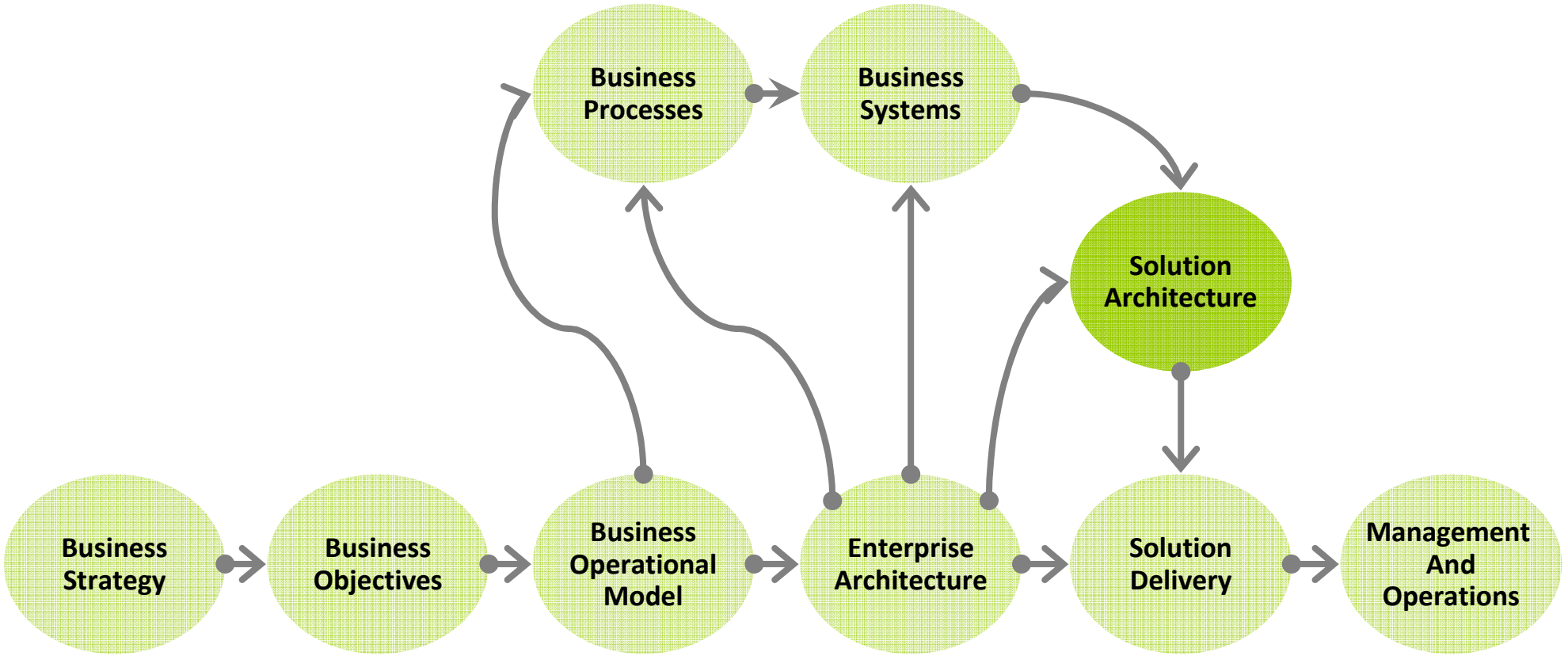
- Description of the structure, characteristics and behaviour of a solution
- The means by which the solution is defined, delivered, managed and operated

- A solution is an answer to a business problem that may or may not include a technology component
- Solution architecture is concerned with identifying that solution or set of solution options and their components
- Generally there are many potential solutions to a problem with varying suitability
- All solutions are subject to constraints

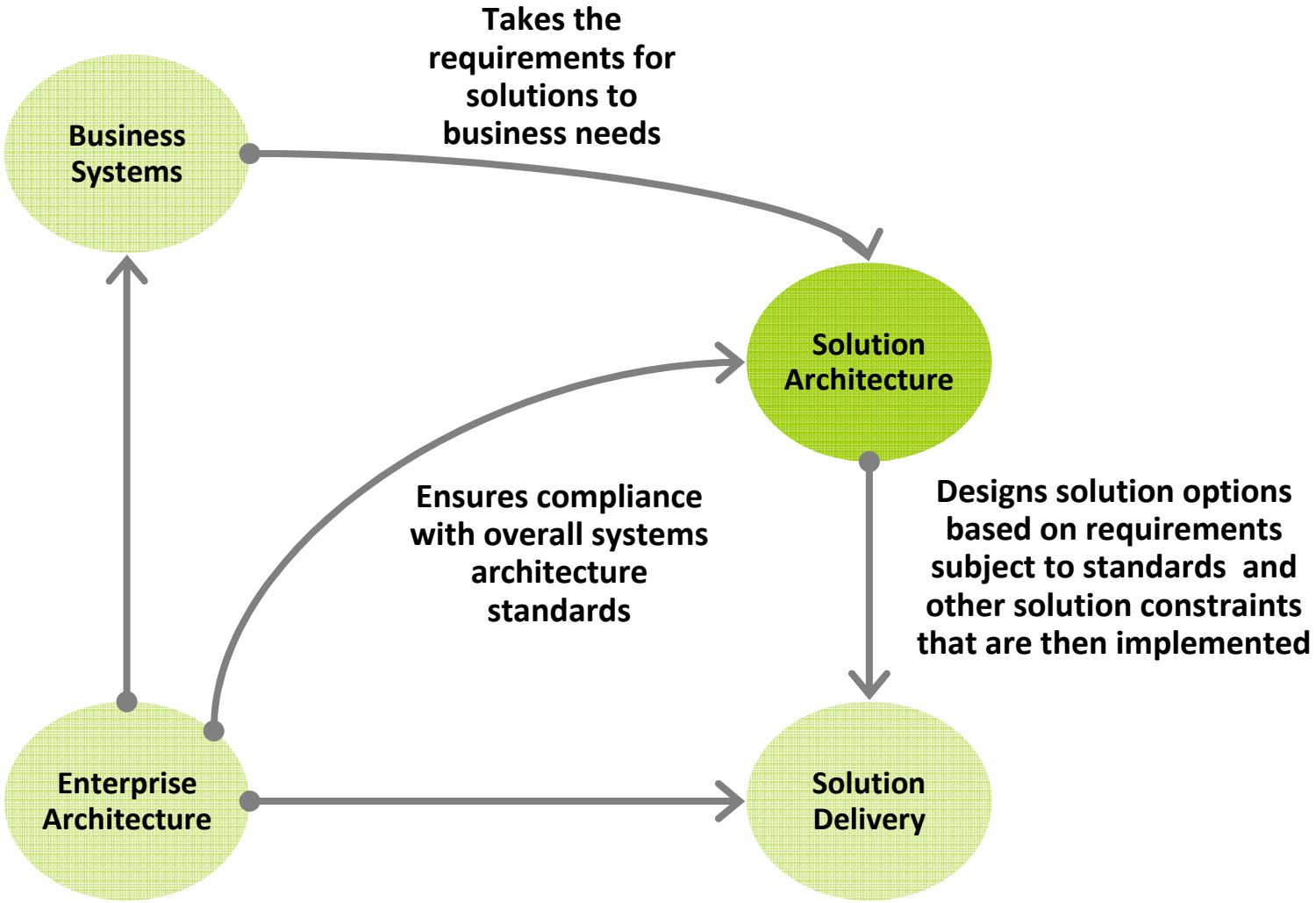
Structured Approach to Solution Architecture

- Objective is to ensure consistency in solution architecture design options
- Ensure solution addresses all business requirements
- Provide checklist to validate solution design options
- Design realistic and achievable solutions that meet the business needs
- Adapt elements of TOGAF to assist with structured solution design

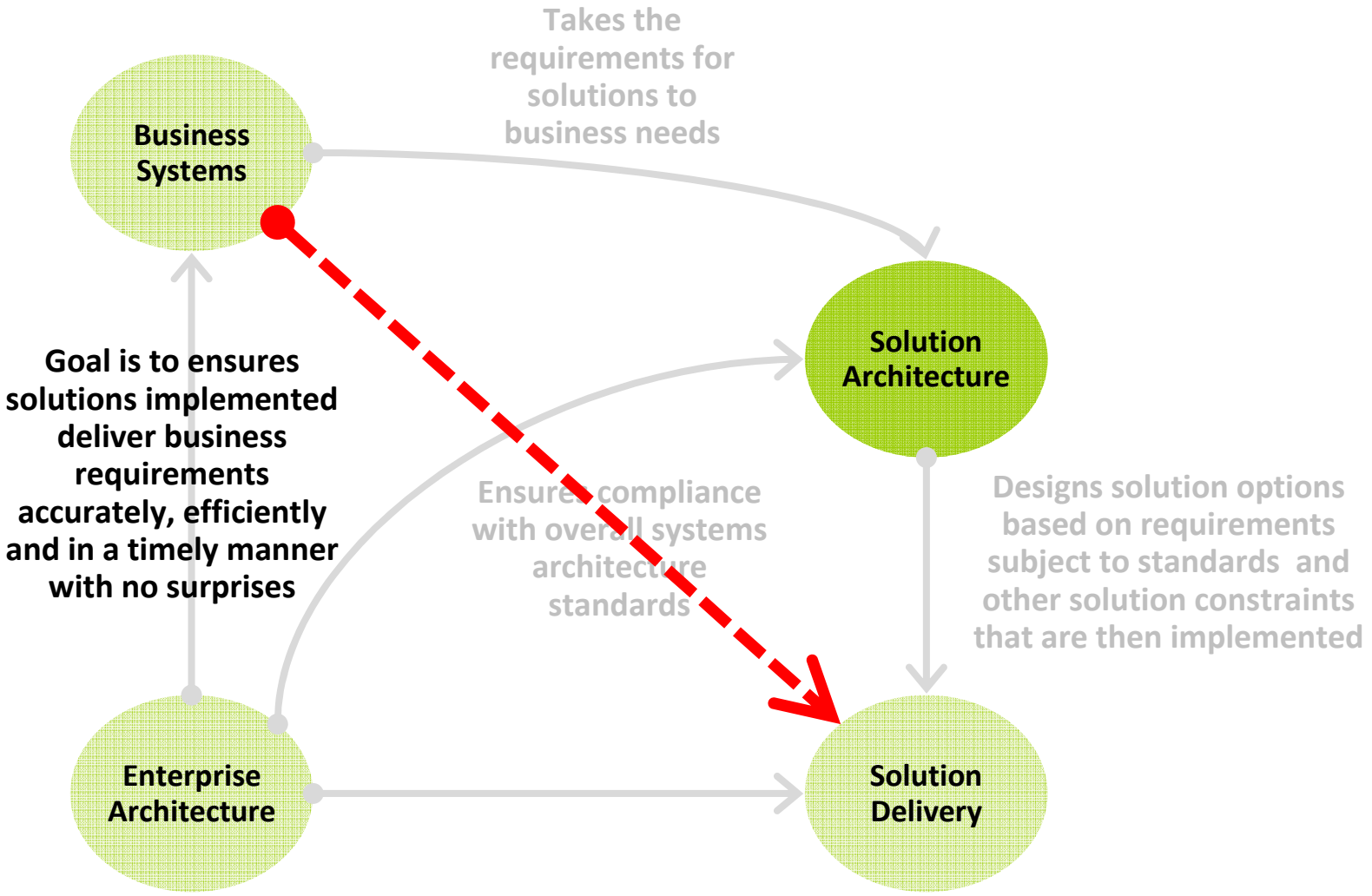
Solution Architecture In Context



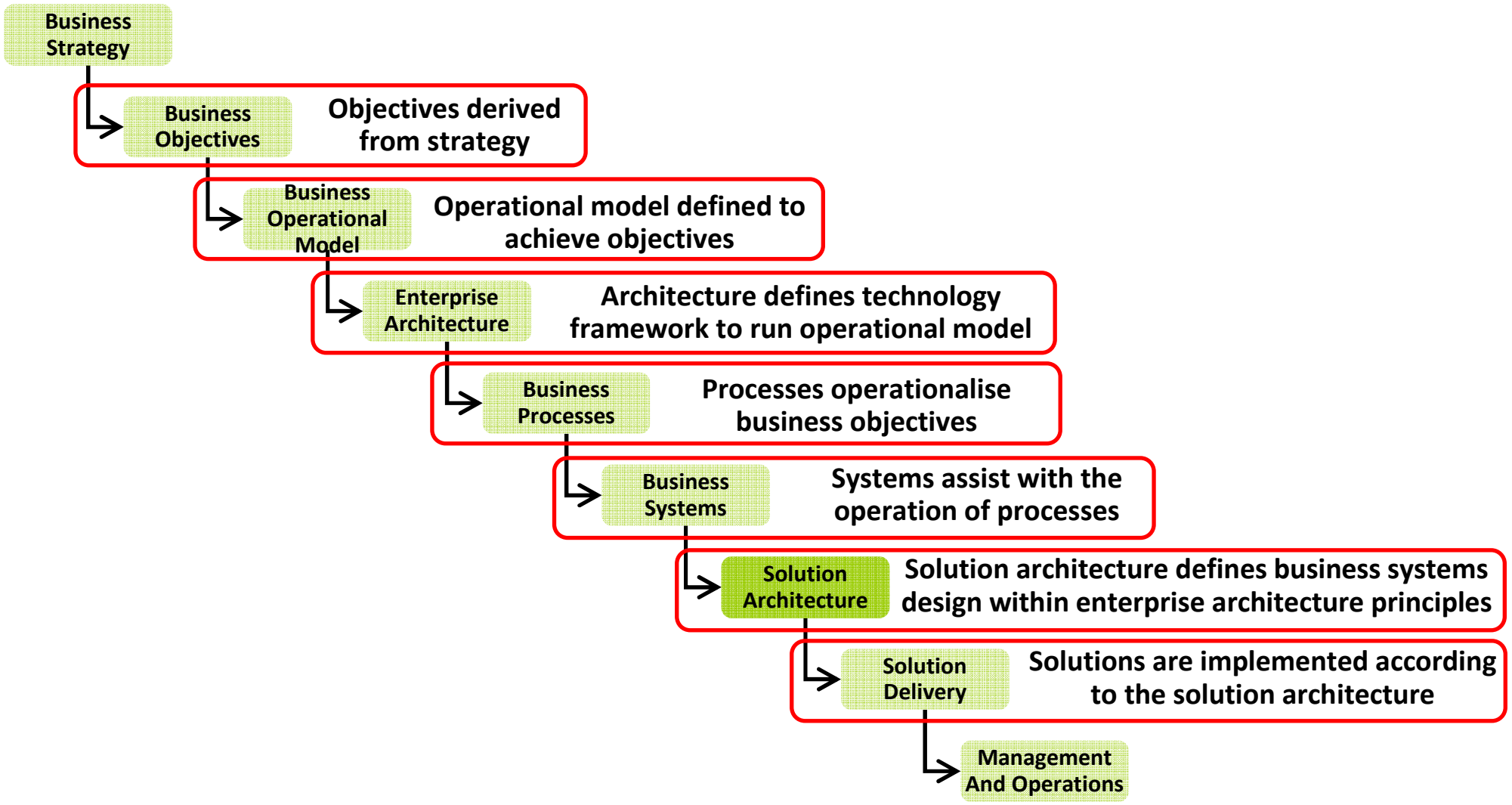
Solution Architecture



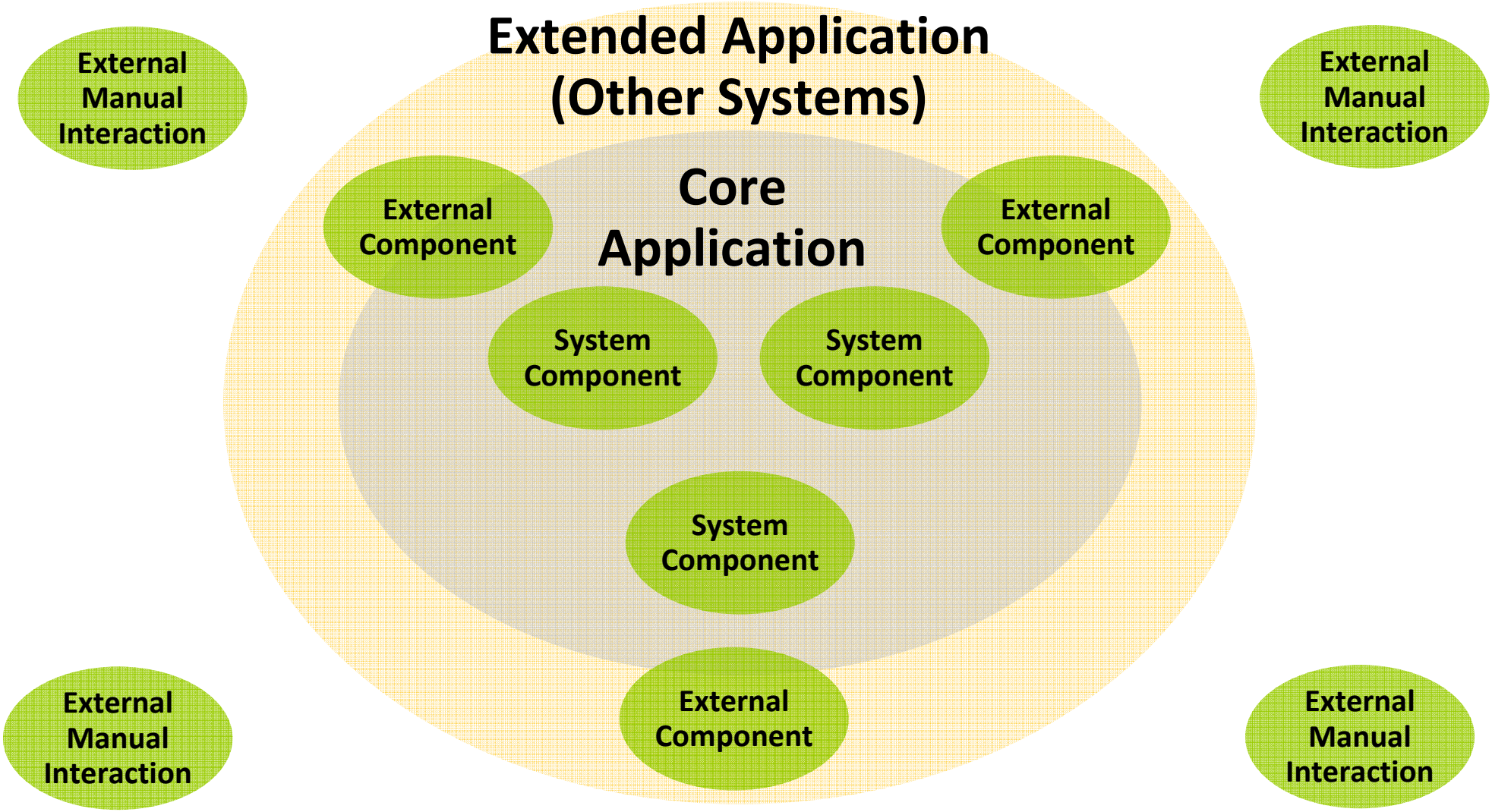
Solution Architecture



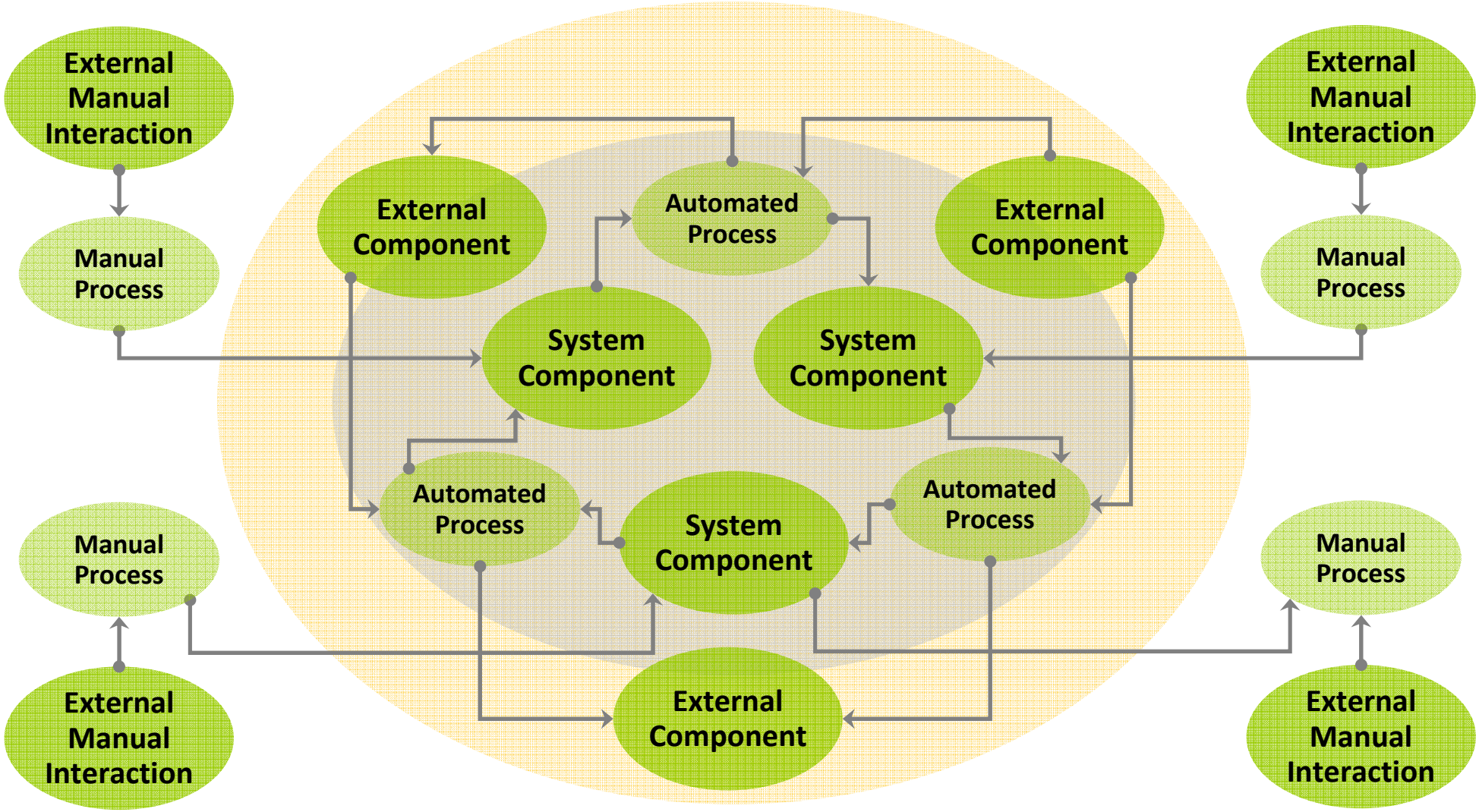
Solution Architecture In Context



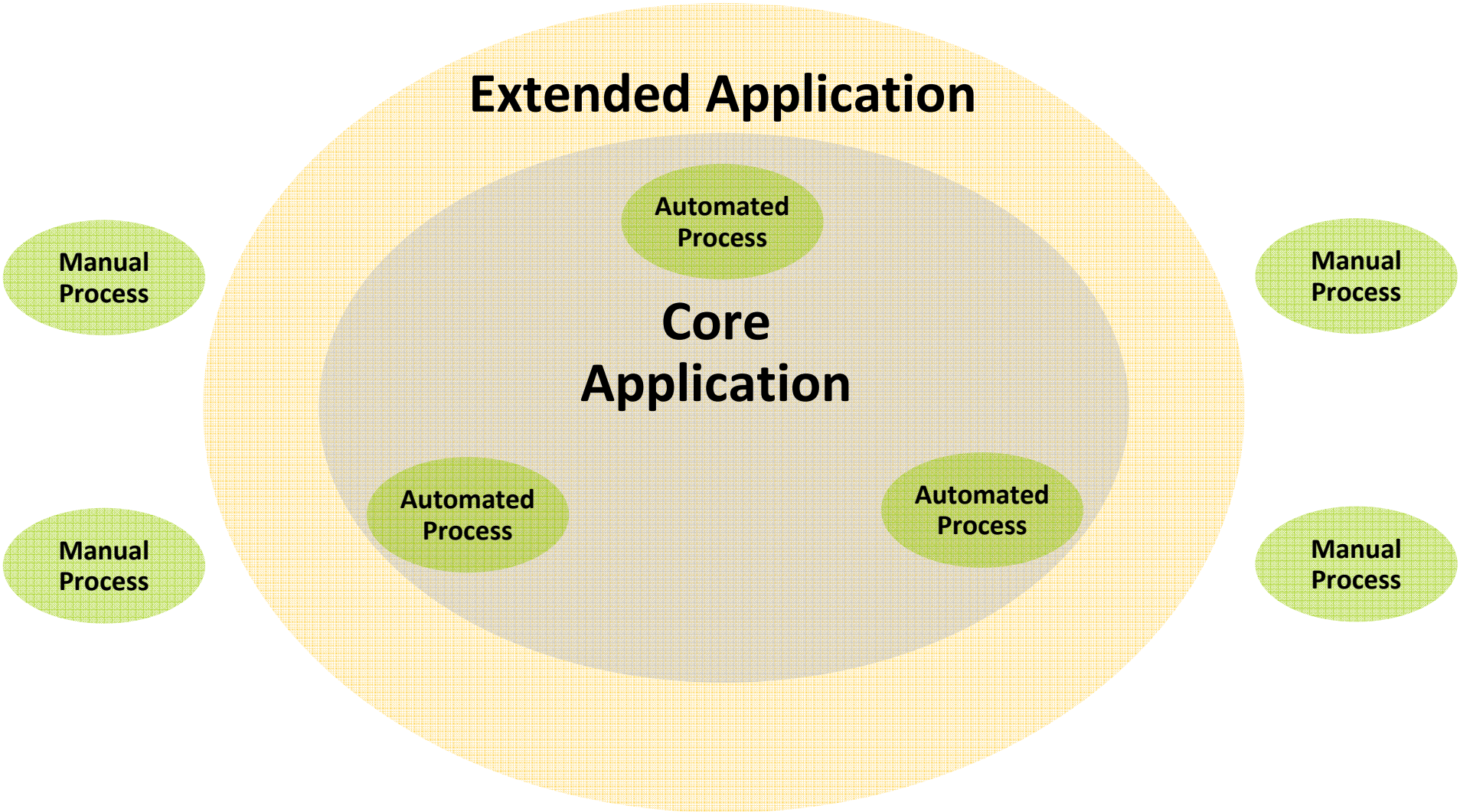
Solution Does Not Always Consist Solely Of A New Application



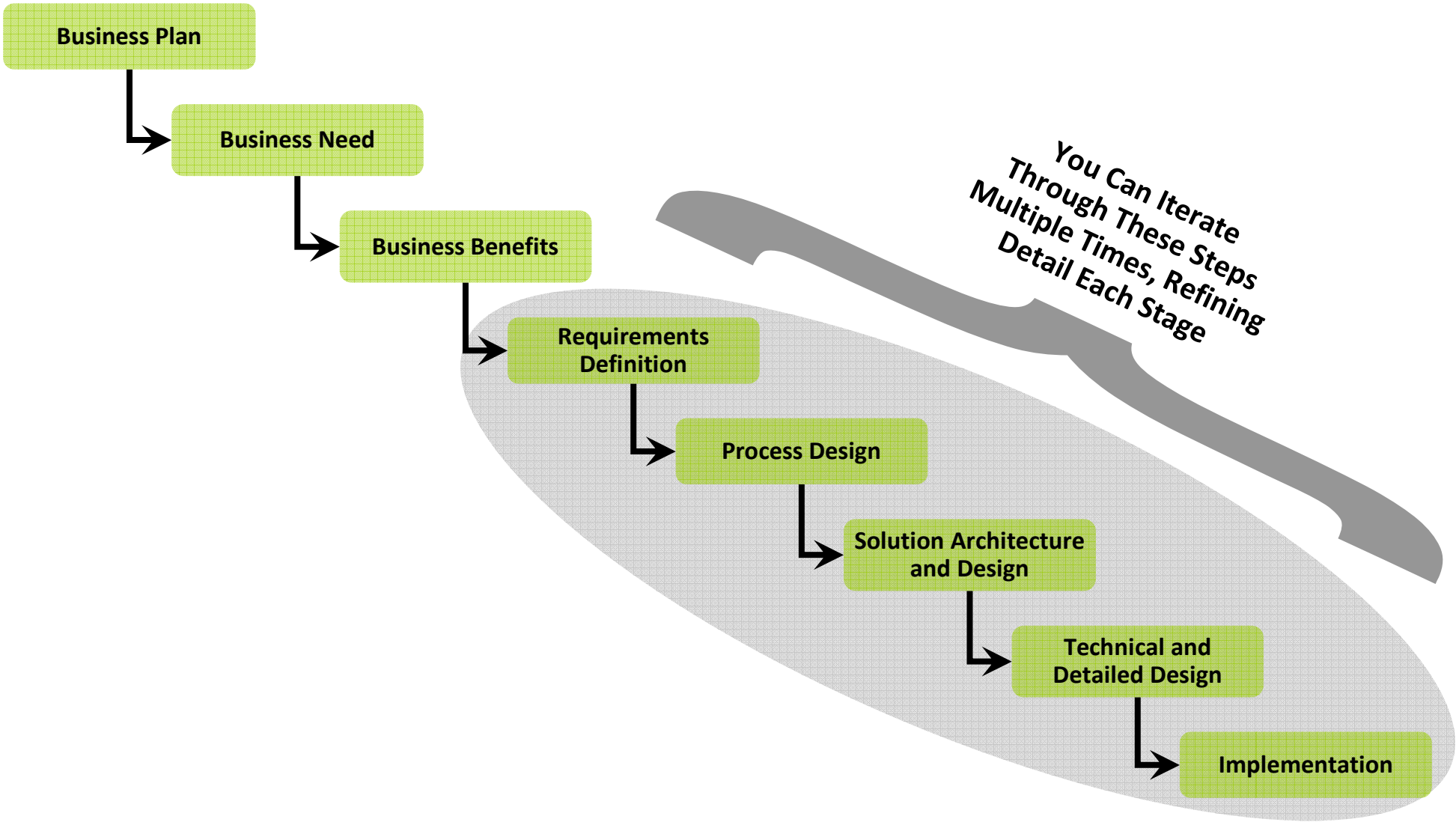
Complete View of Solution



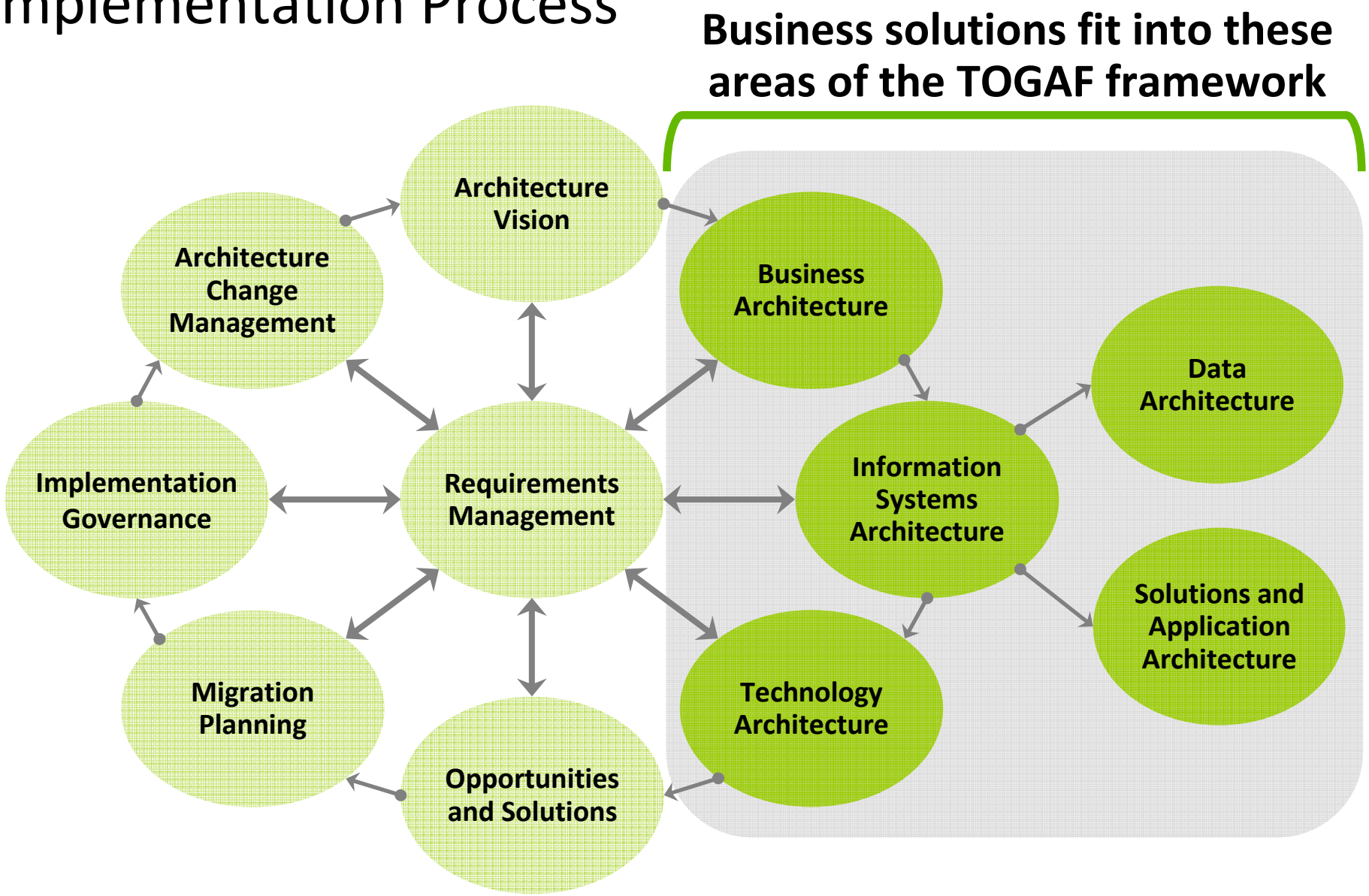
Overall Solution Can Be A Combination of Automated and Manual Processes



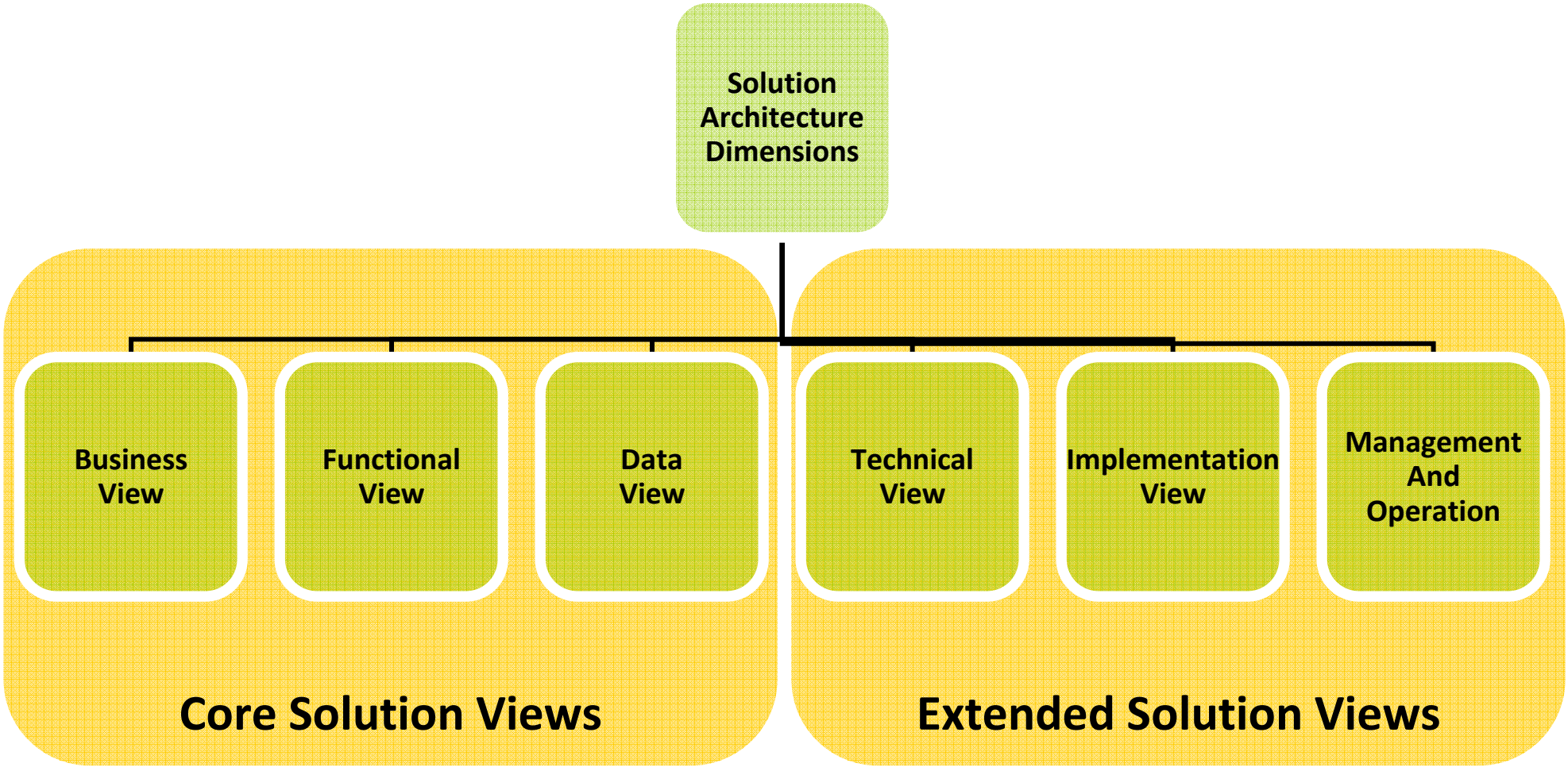
Solution Design and Implementation Sequence



TOGAF Enterprise Architecture Development and Implementation Process



Solution Architecture Dimensions/Views



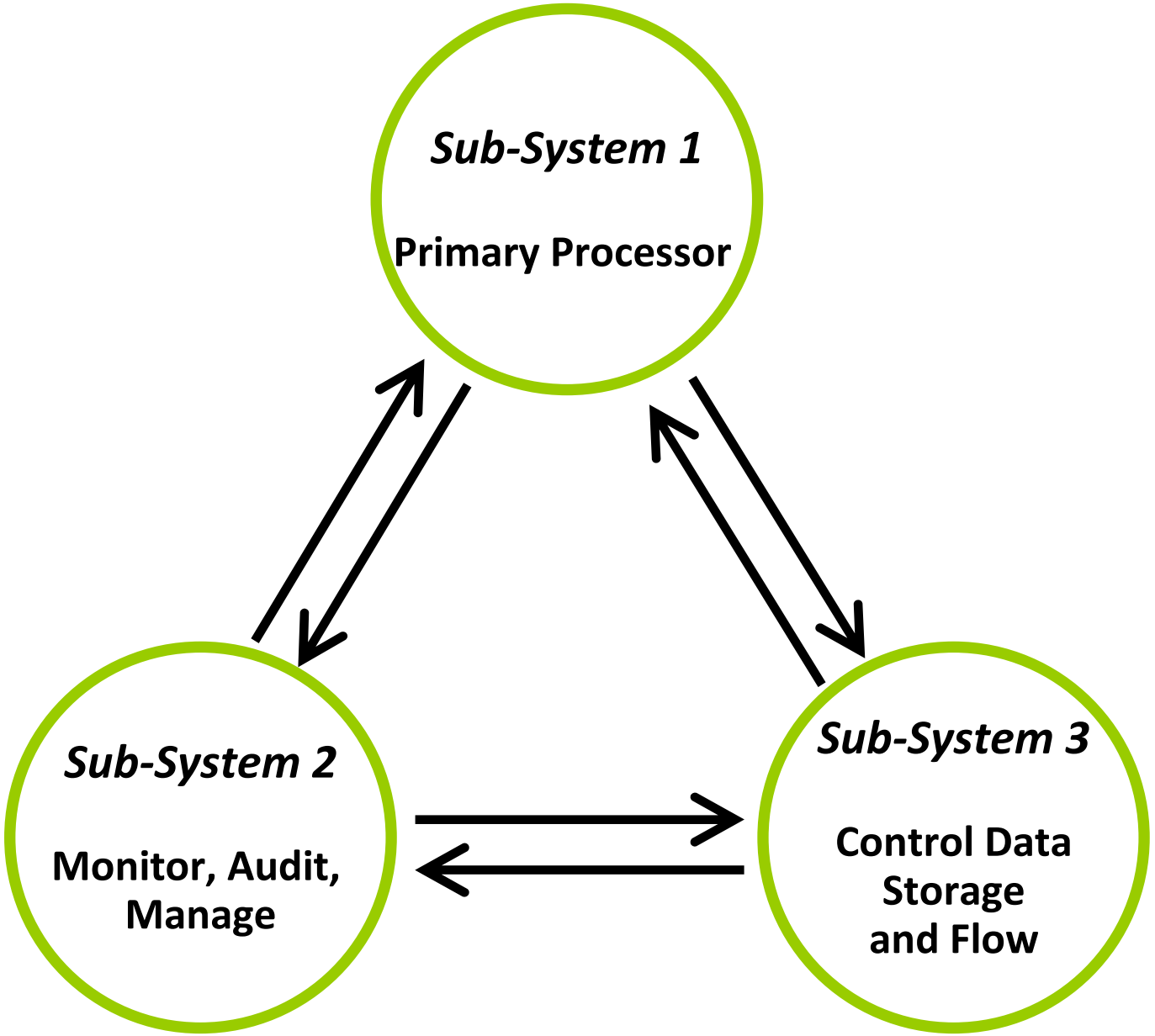
Core Views and Extended Views

- ***Core Solution Architecture Views*** – concerned with the kernel of the solution
  - Business
  - Functional
  - Data
- ***Extended Solution Architecture Views*** – concerned with solution implementation and operation
  - Technical
  - Implementation
  - Management and Operation

Solution Architecture Dimensions/Views

- Dimensions/views are structured sets of requirements, conditions, specifications, provisions, concerns and fundamentals for each dimension of the overall solution
- Core dimensions/views define what the solution must do and the results expected
- Extended dimensions/views define how the solution must be implemented, managed and operated

Generalised Solution Architecture



Generalised Solution Architecture

- ***Sub-System 1*** - performs primary activities, functions that accepts and process inputs, performs transformations and creates and presents outputs, divided into multiple components, implements and actualises processes and activities

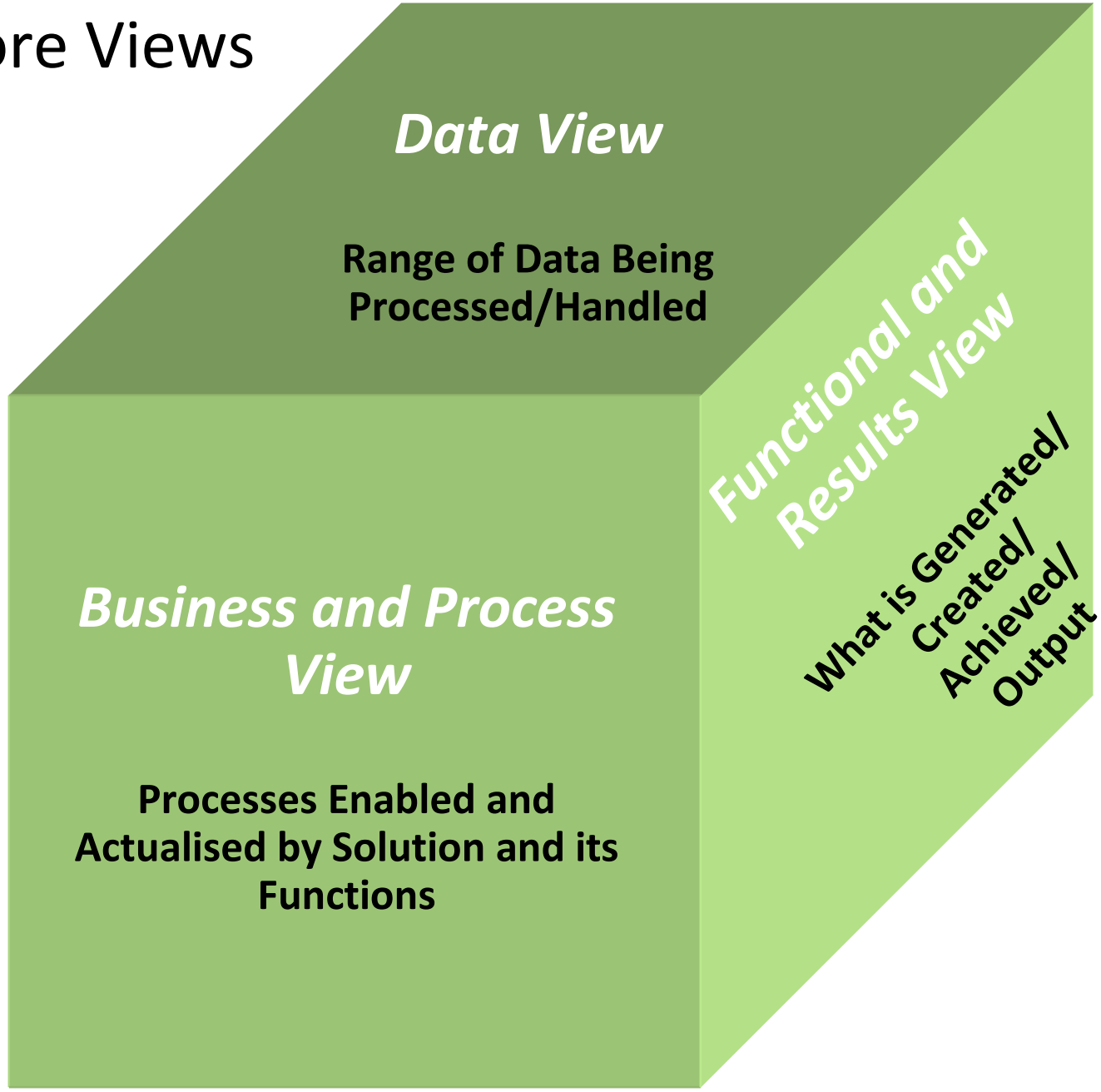
- ***Sub-System 2*** - monitors, audits, measures, manages performance and activities of the components of sub-system 1

- ***Sub-System 3*** - controls operation and communication and storage of data of an between the components of sub-system 1 and between sub-system 1 and sub-system 2

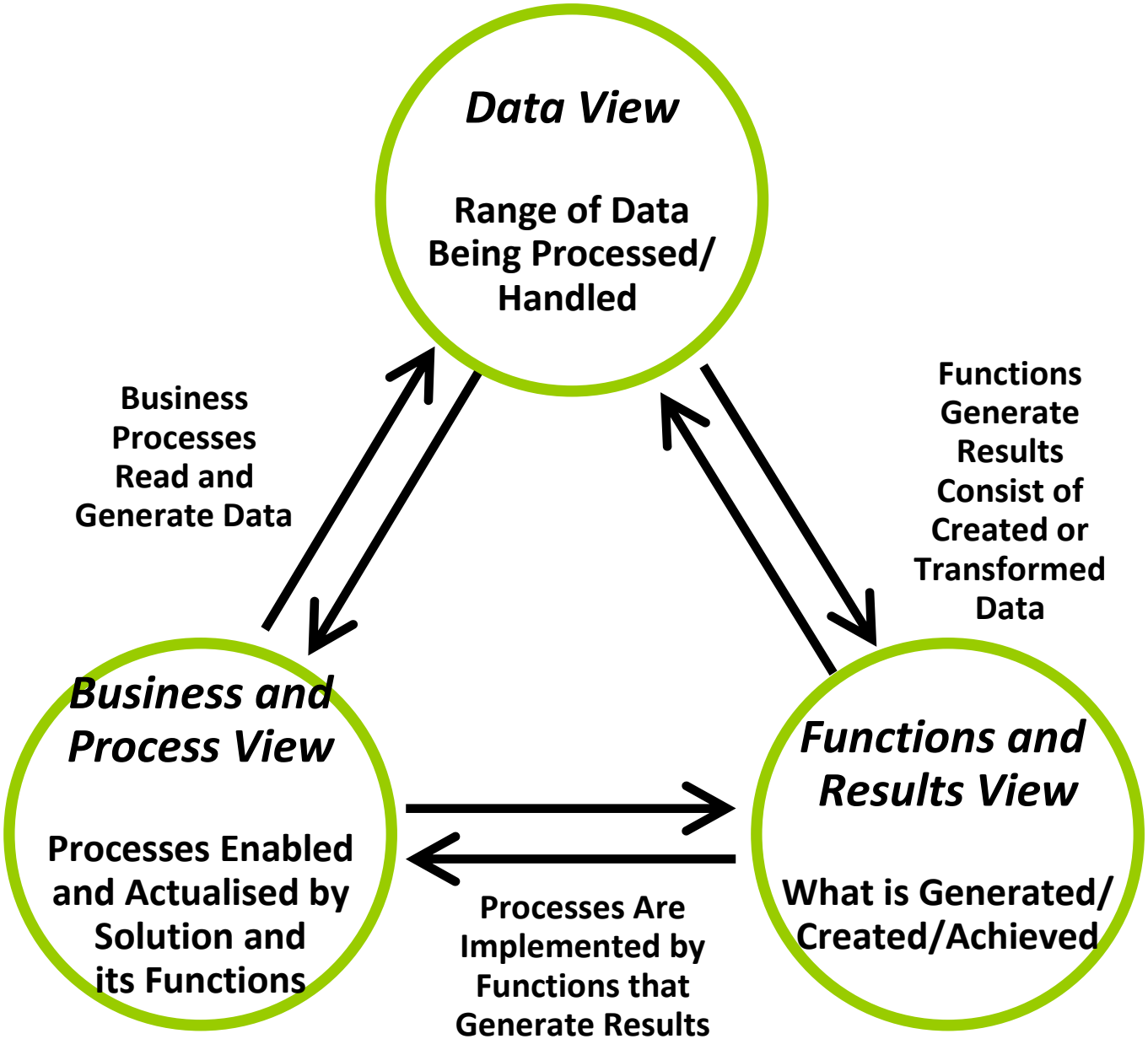
Generalised Solution Architecture

- Useful in defining the components of the solution

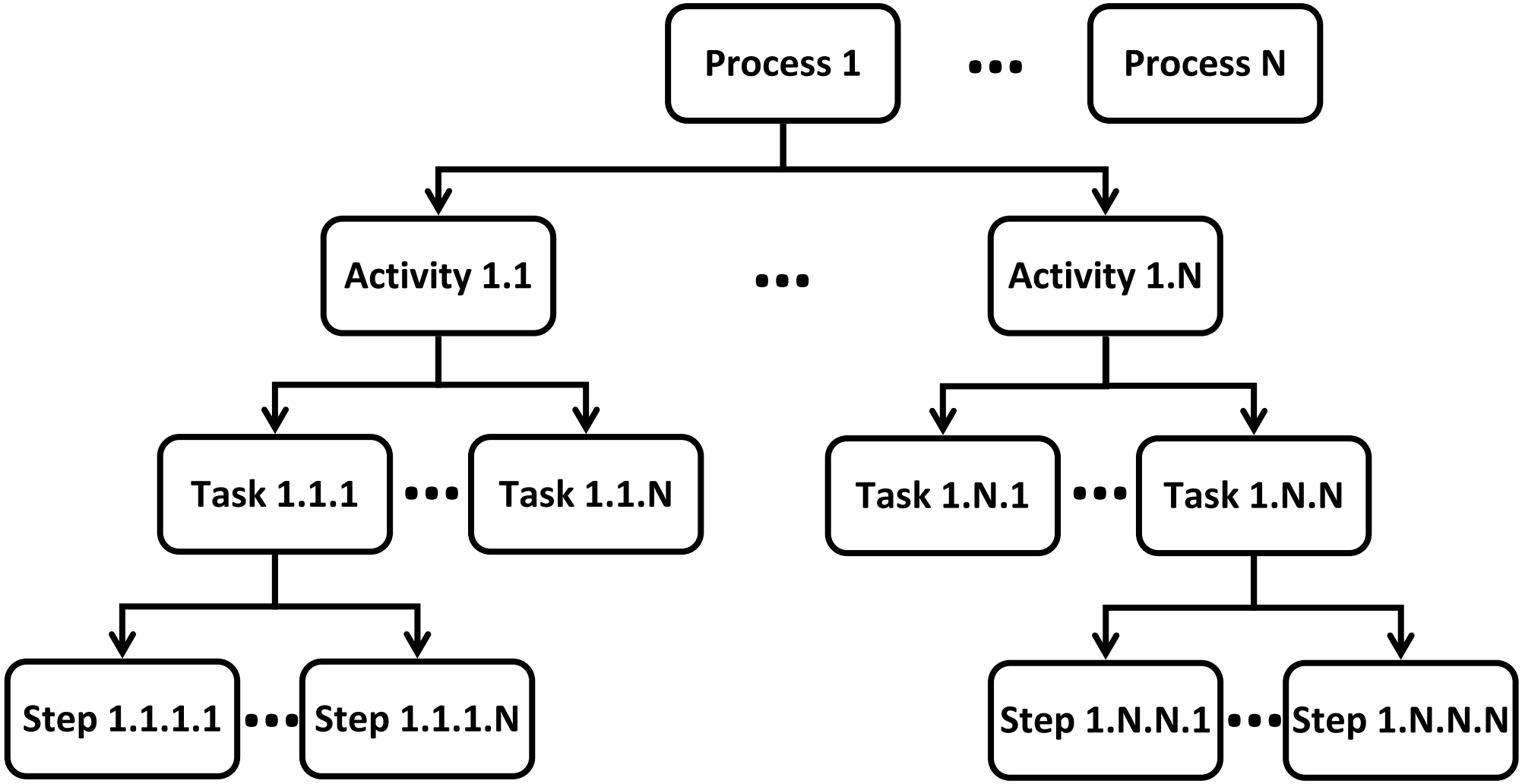
Solution Core Views



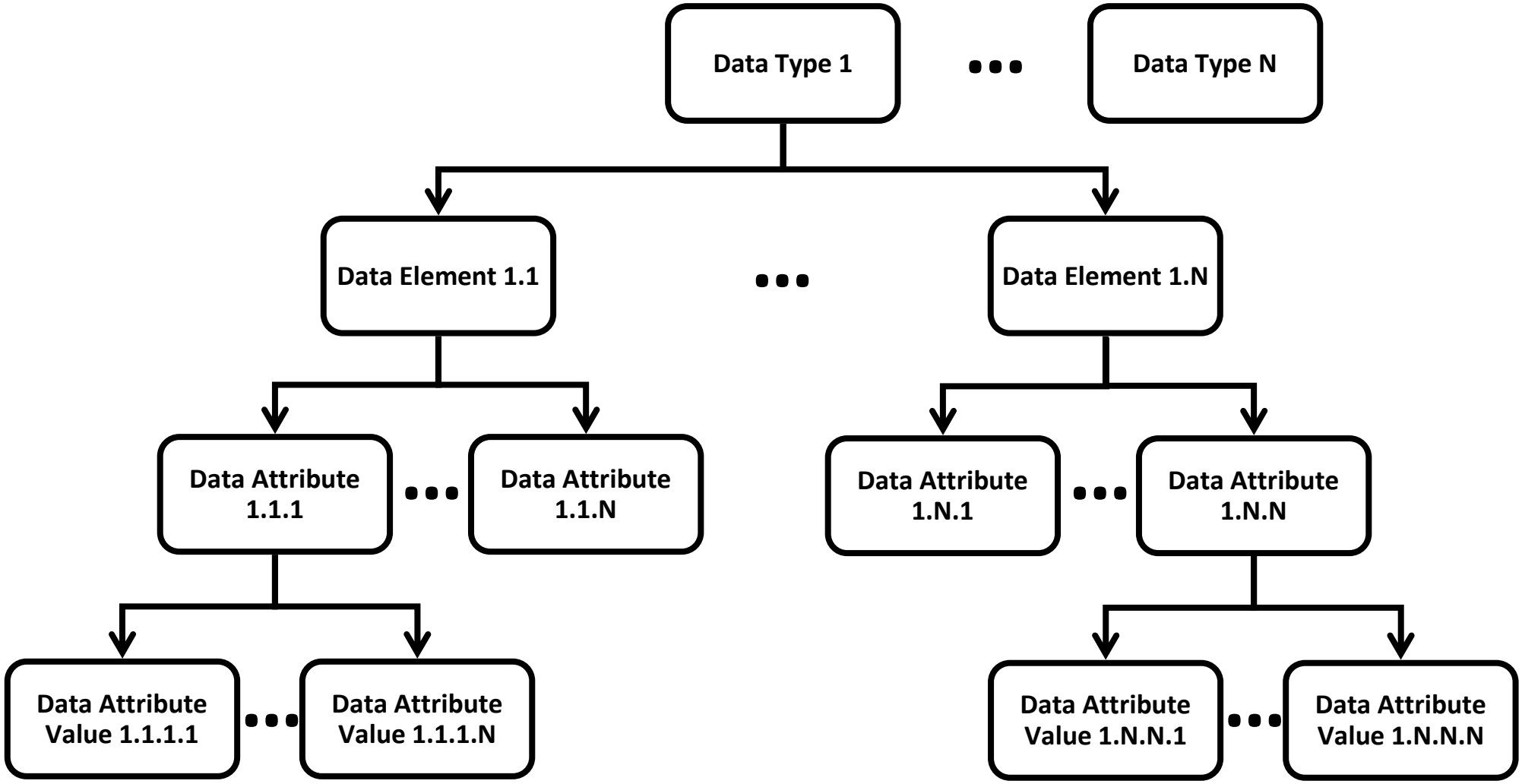
Solution Core Views And Their Interrelationships



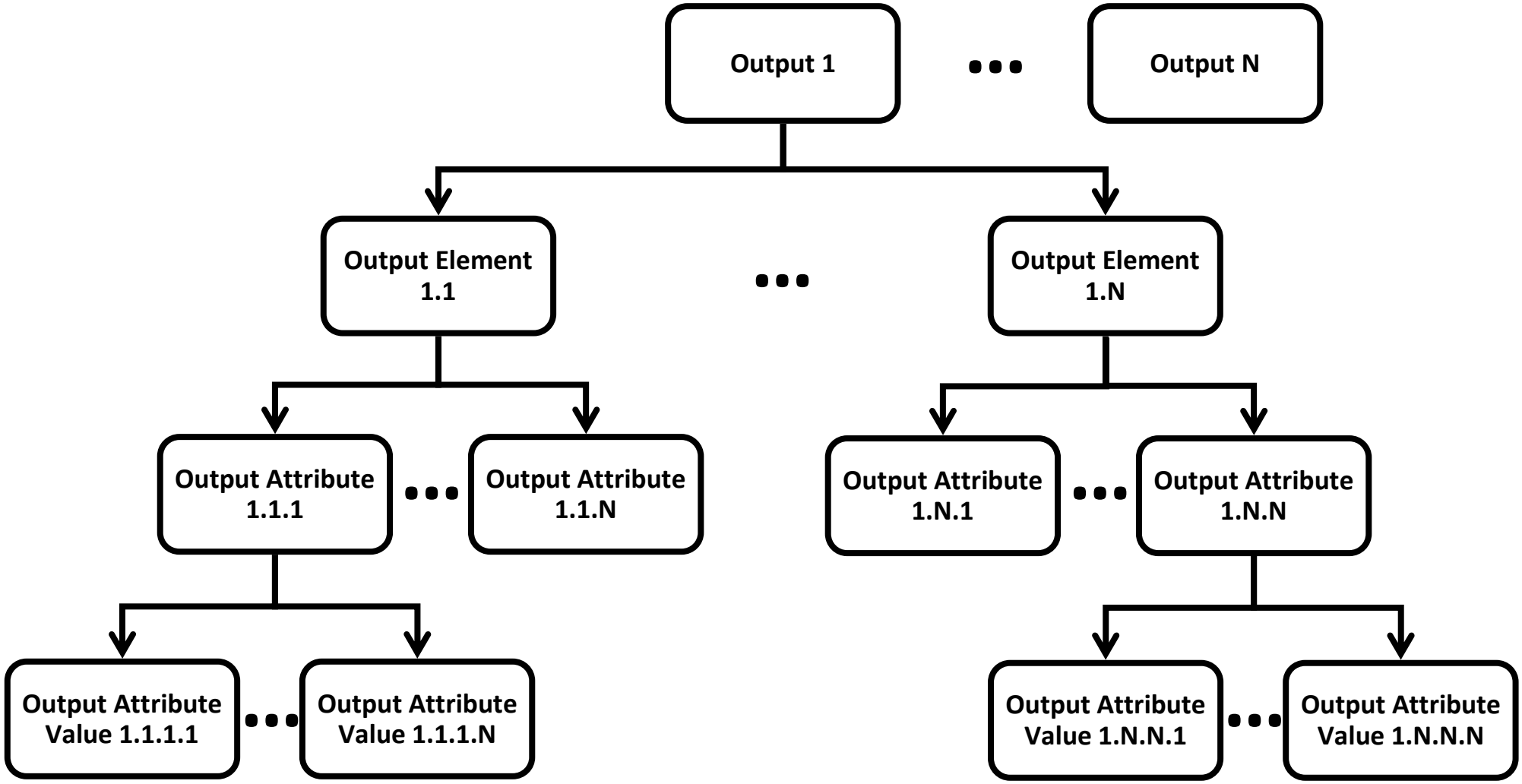
Business and Process View And Decomposition



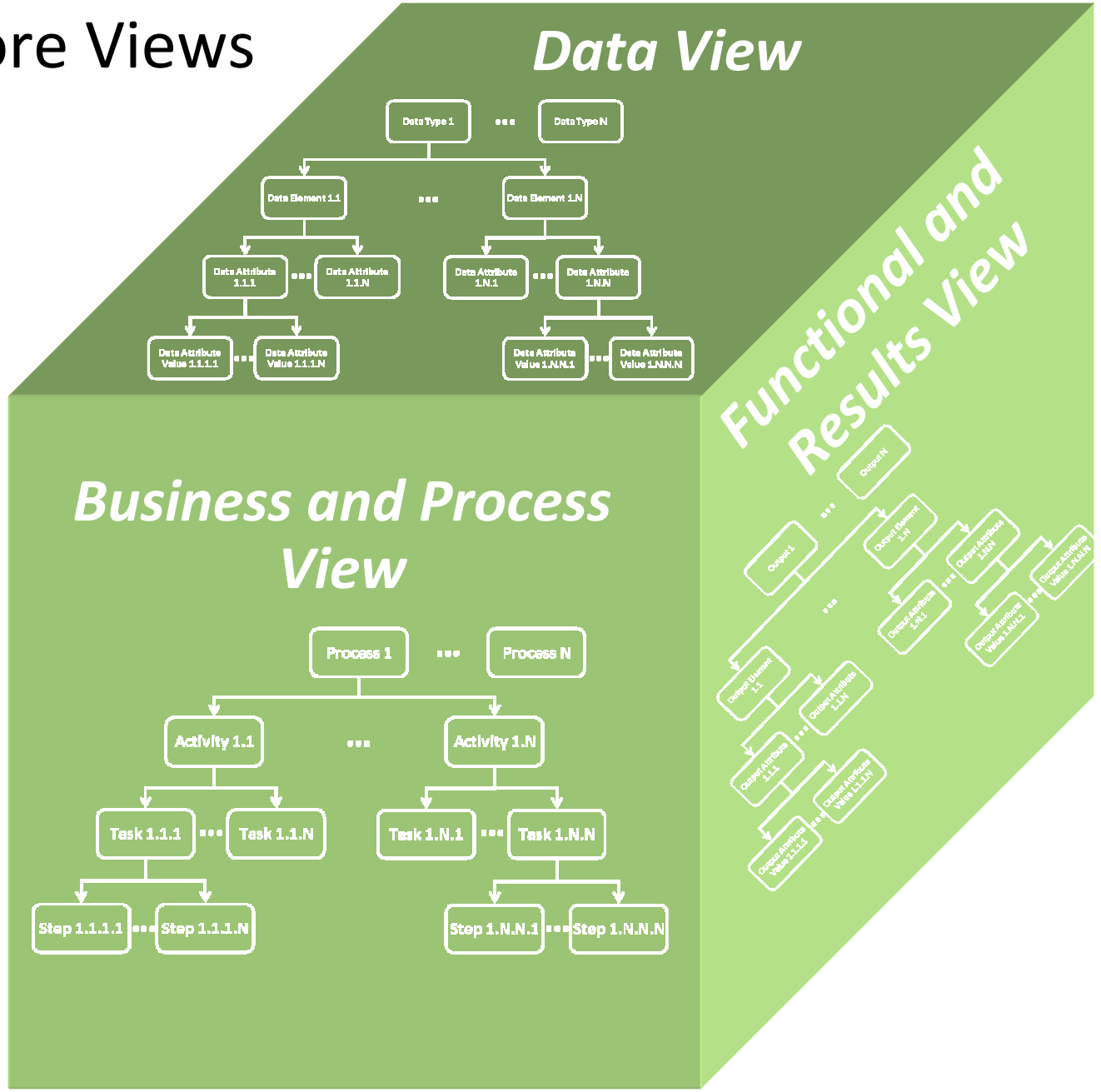
Data View And Decomposition



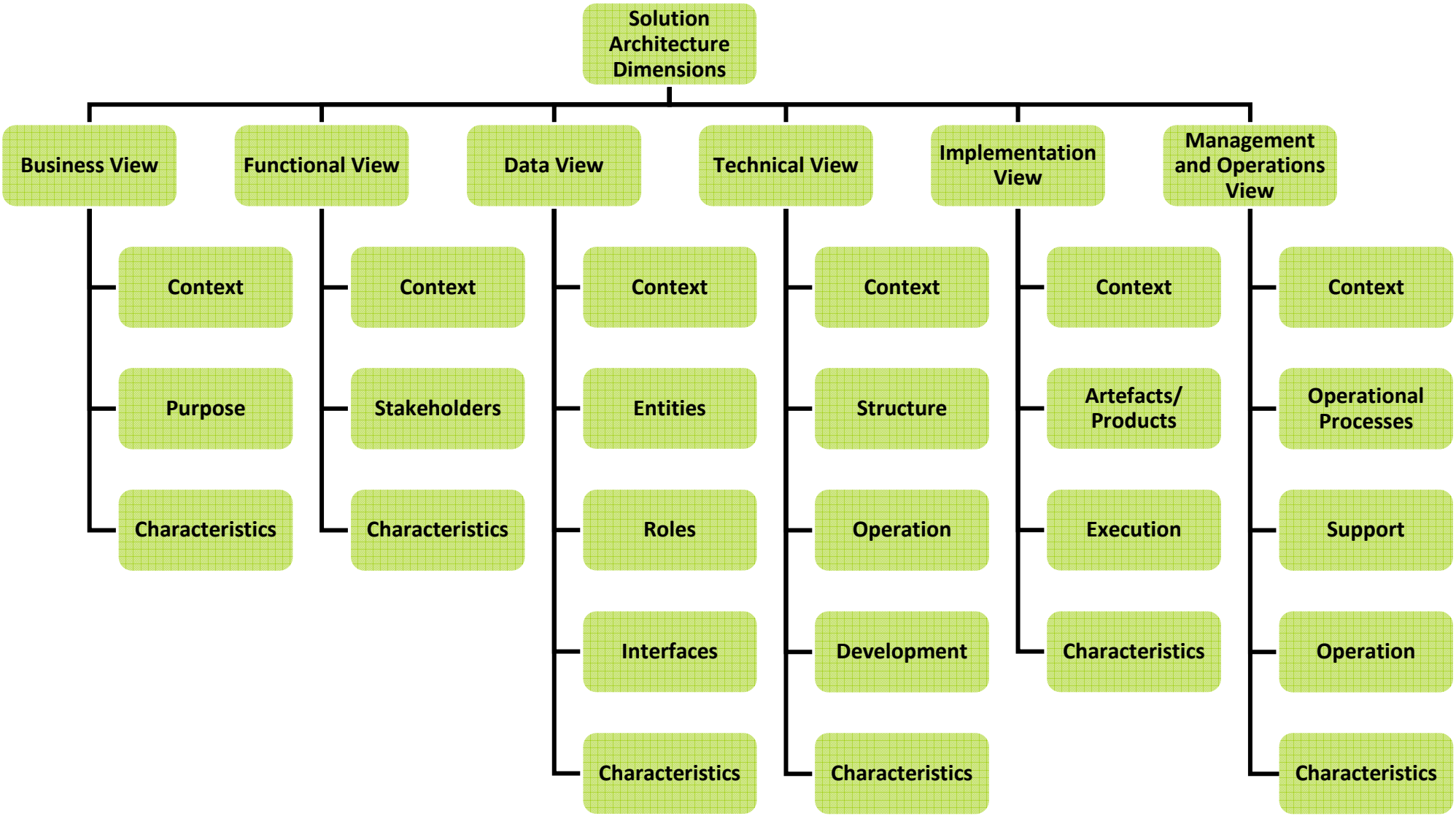
Functions/Results/Outputs View And Decomposition



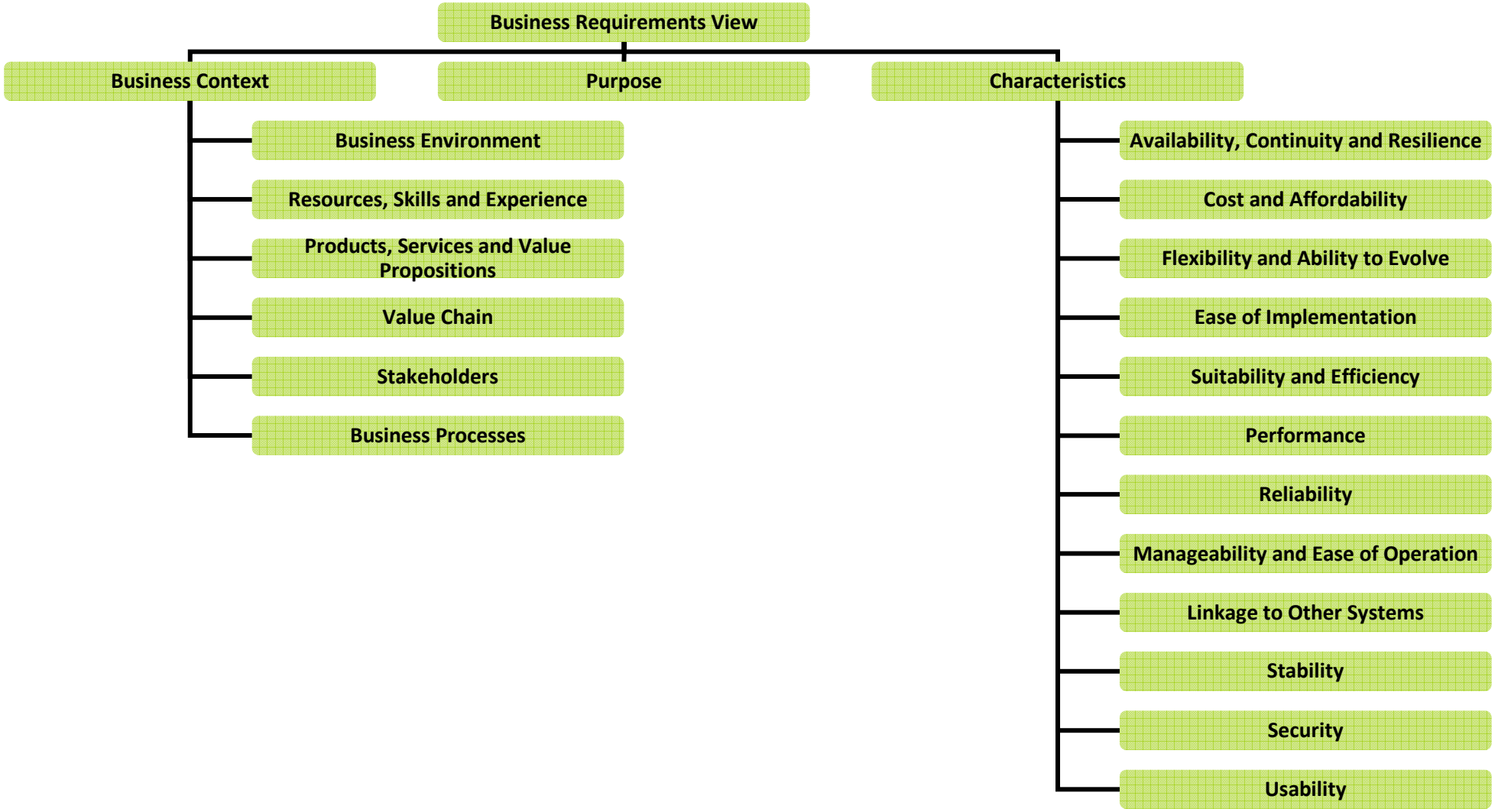
Solution Core Views



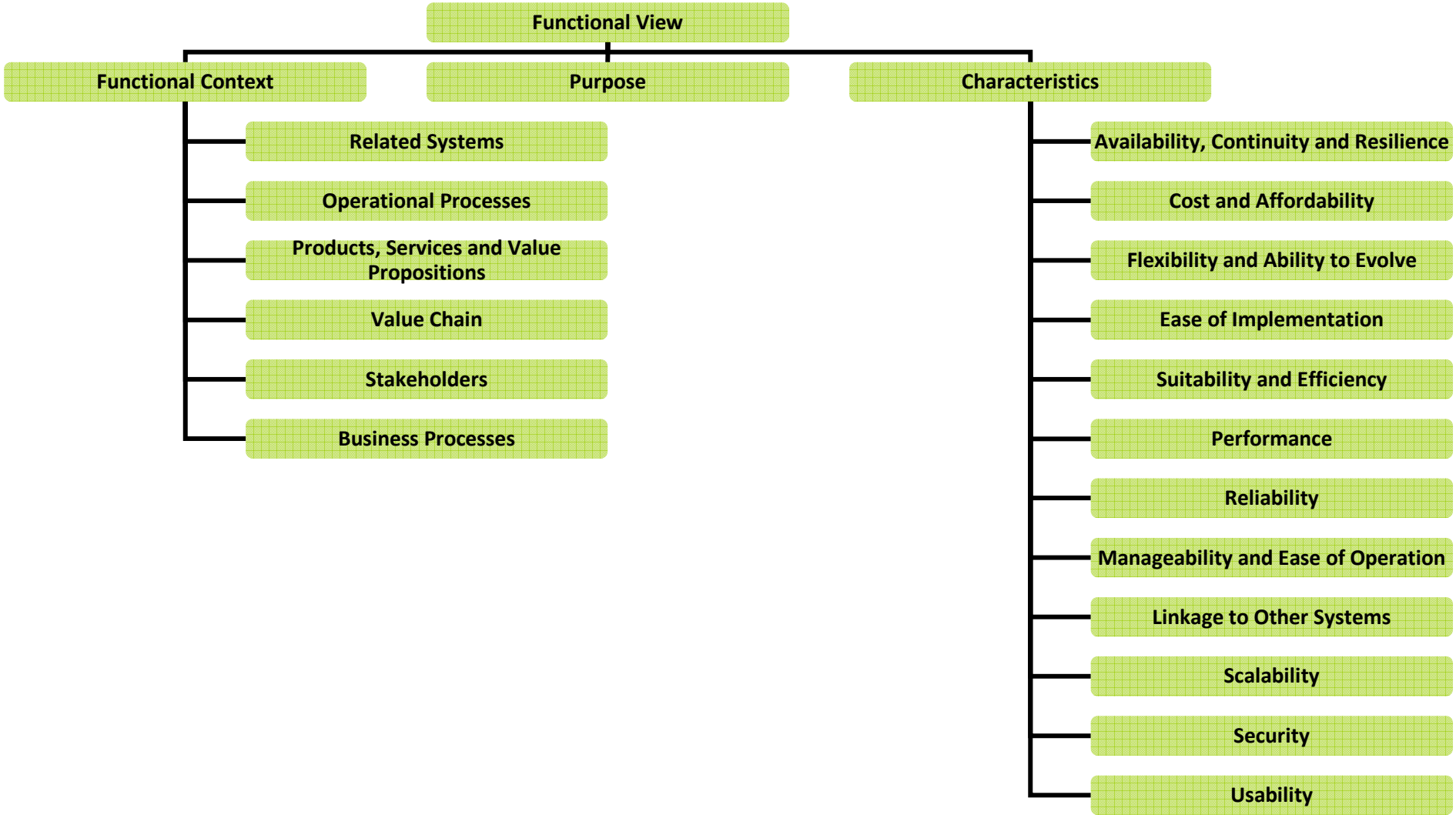
Dimensions/Views Of Solution Architecture



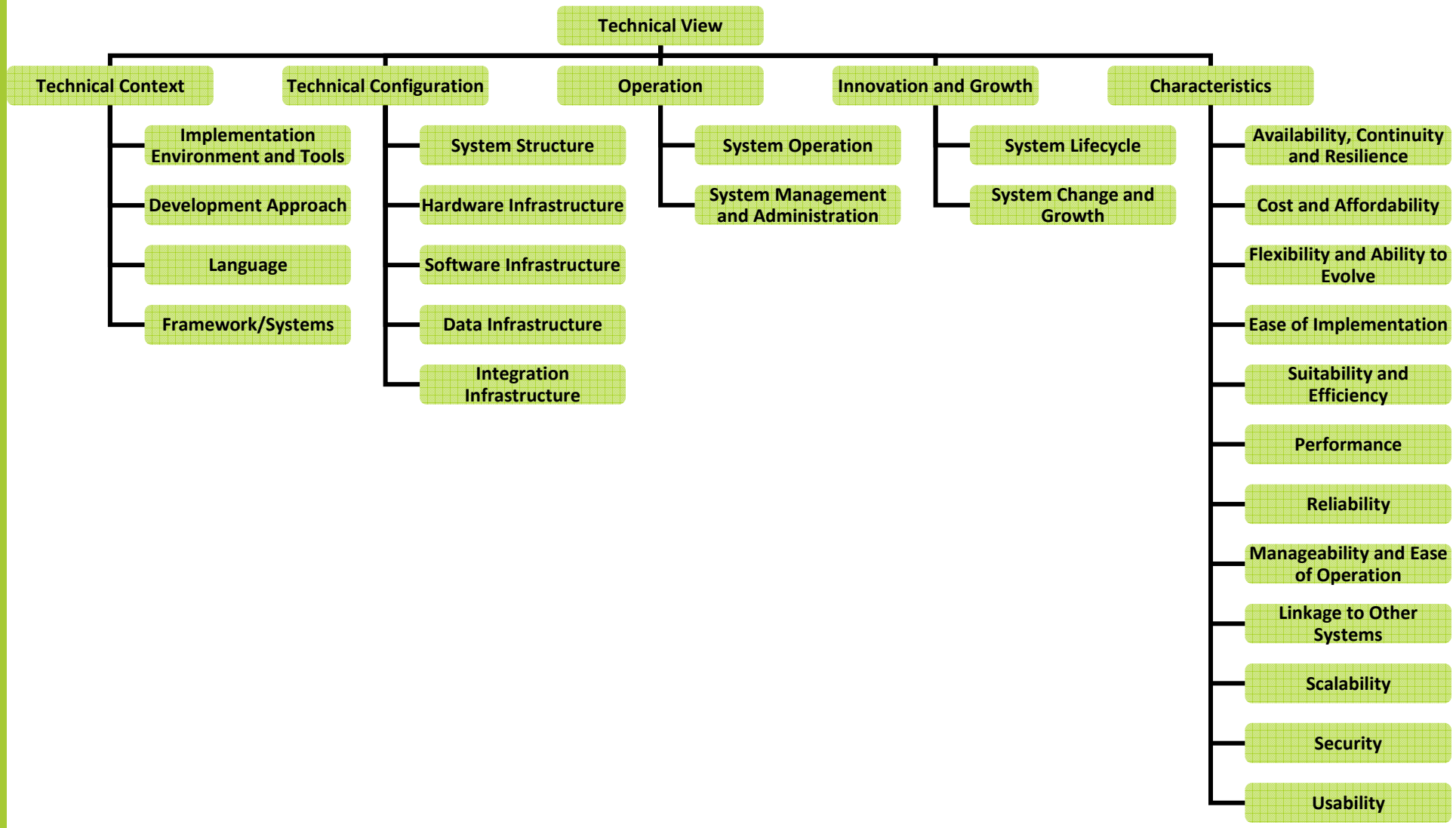
Business And Process View Topics



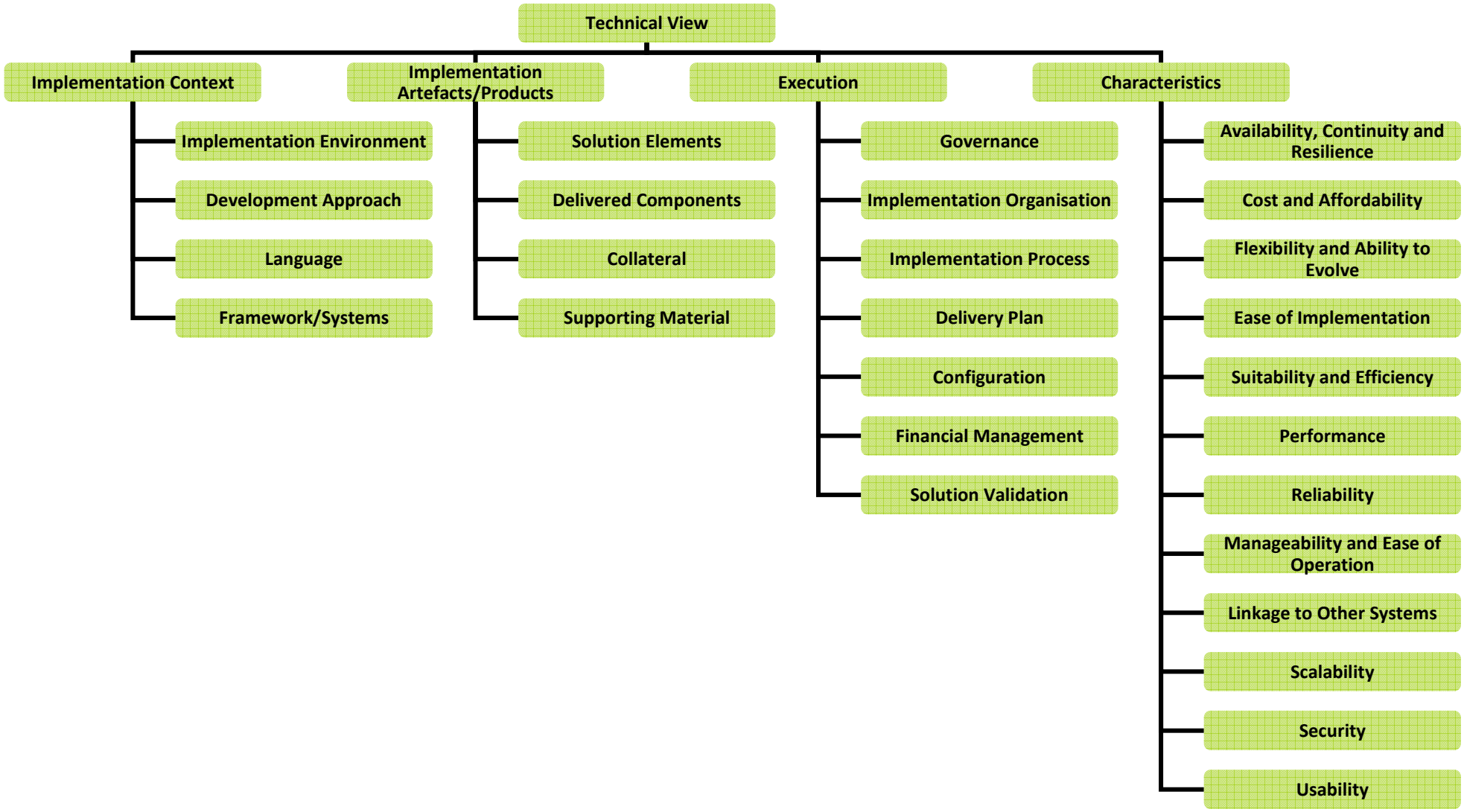
Functional And Results View Topics



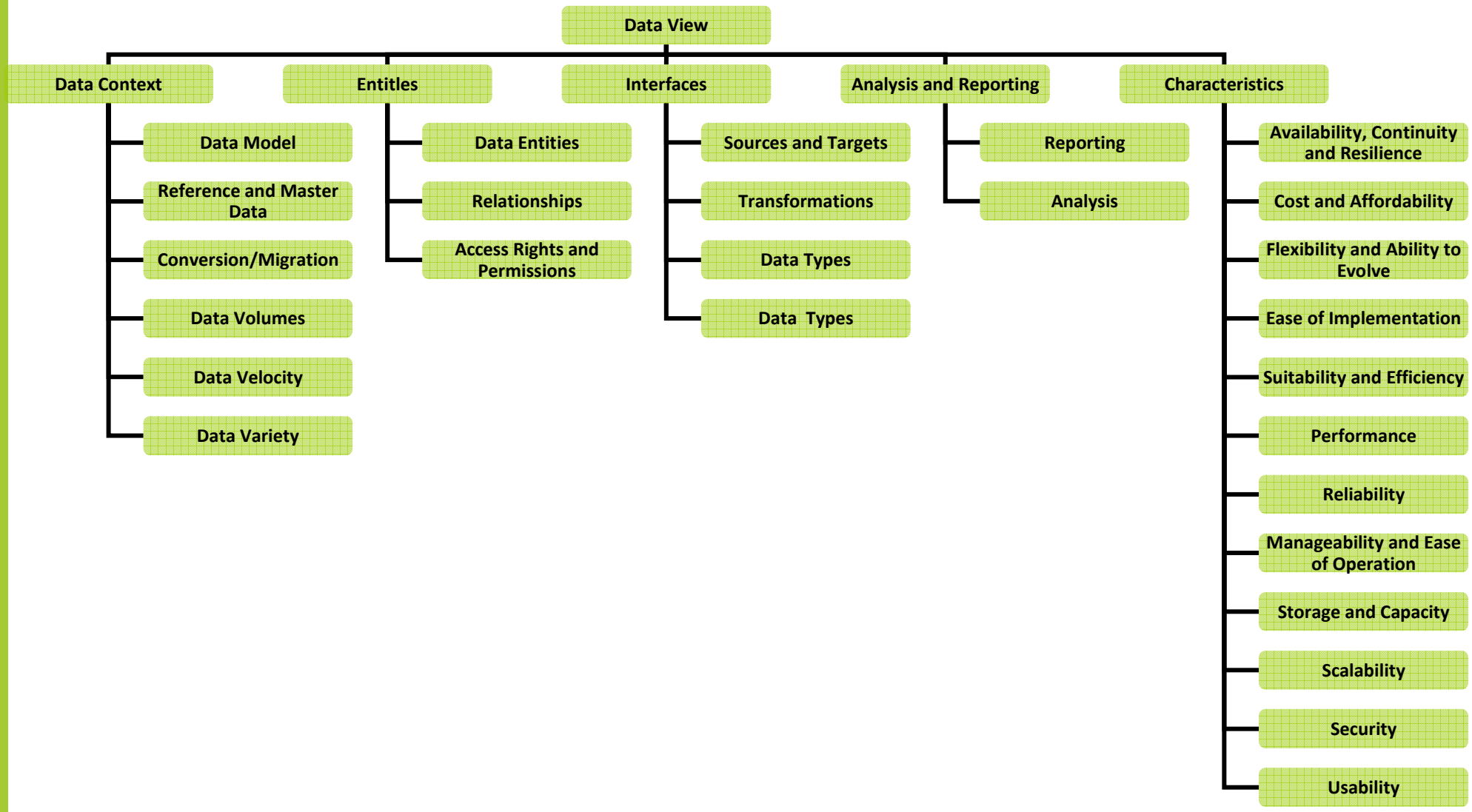
Technical View Topics



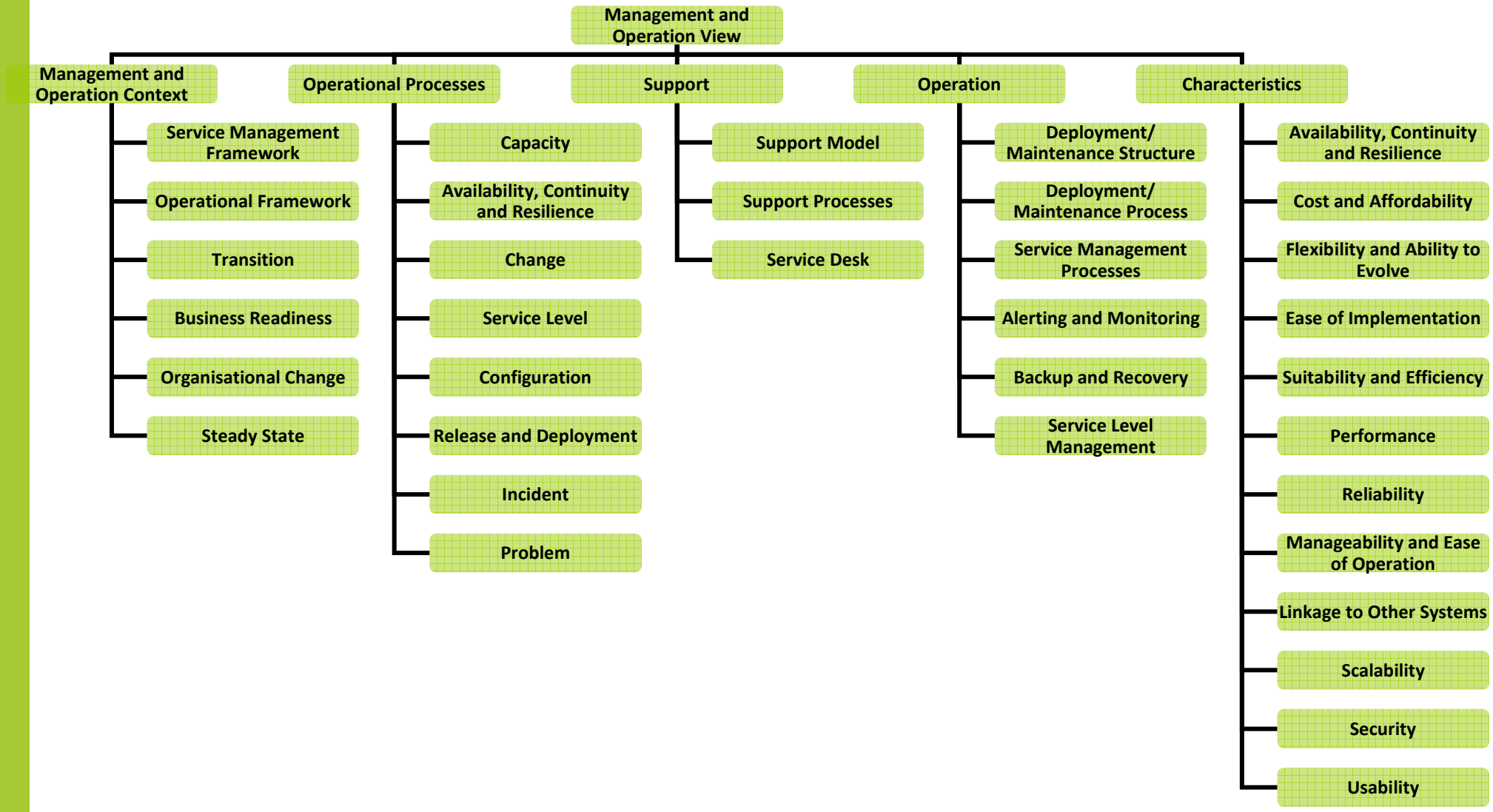
Implementation View Topics



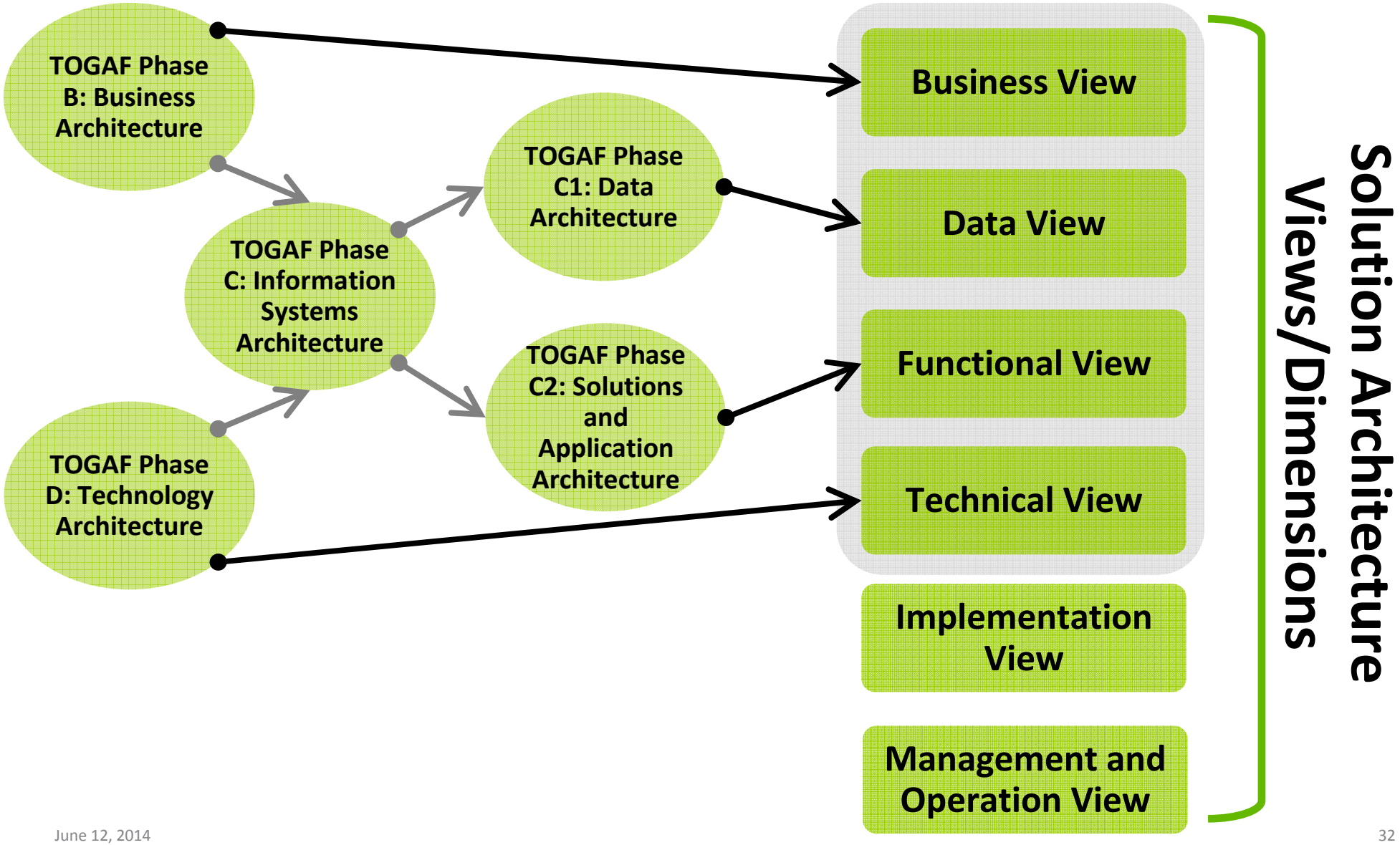
Data View Topics



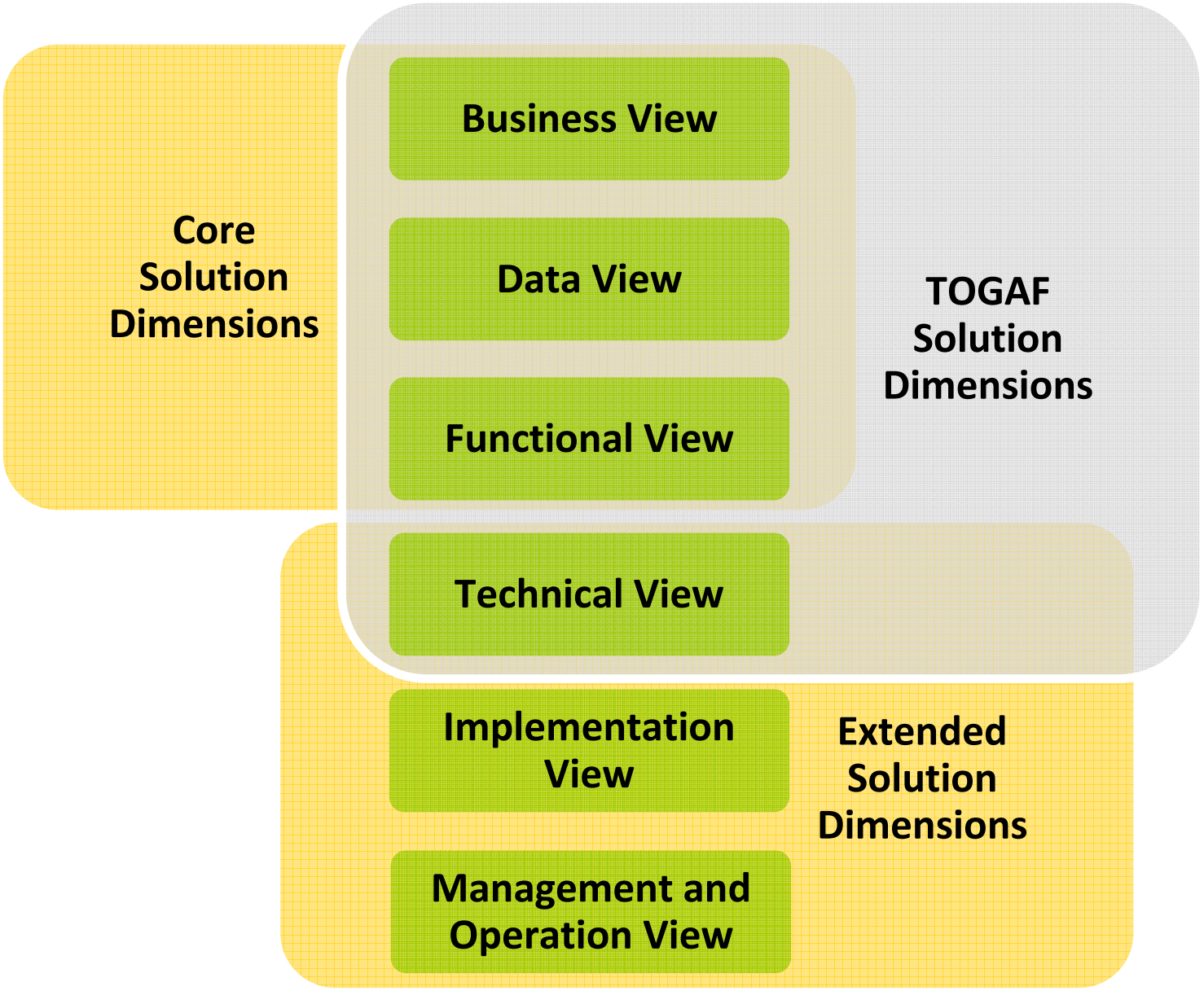
Management and Operation View Topics



Mapping TOGAF Enterprise Architecture Process To Solution Architecture Definition



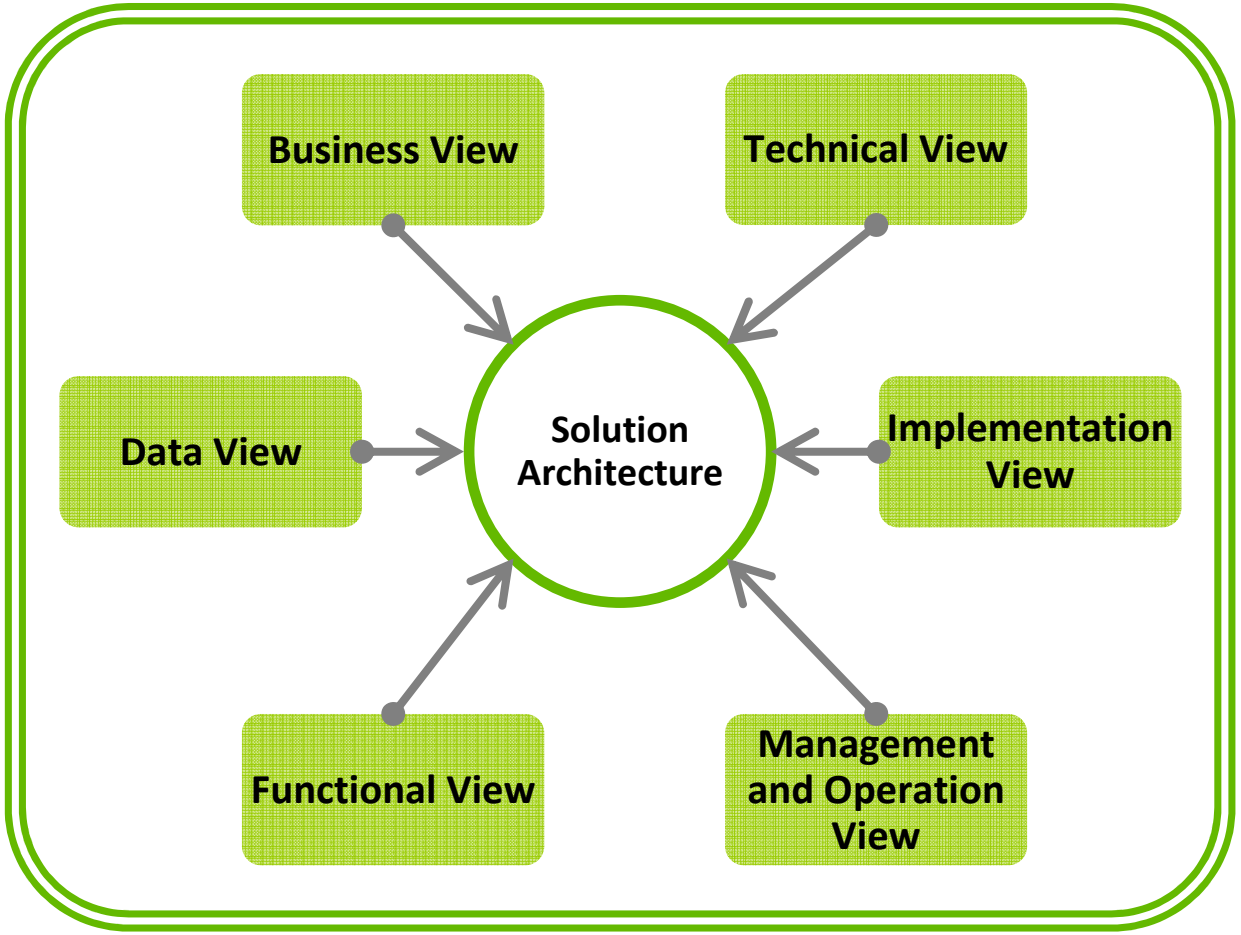
Solution Dimensions



Solution Architecture Design Boundaries

Solution Architecture Defines the Solution Scope Boundary

Enterprise Architecture Defines the Solution Technical Boundary



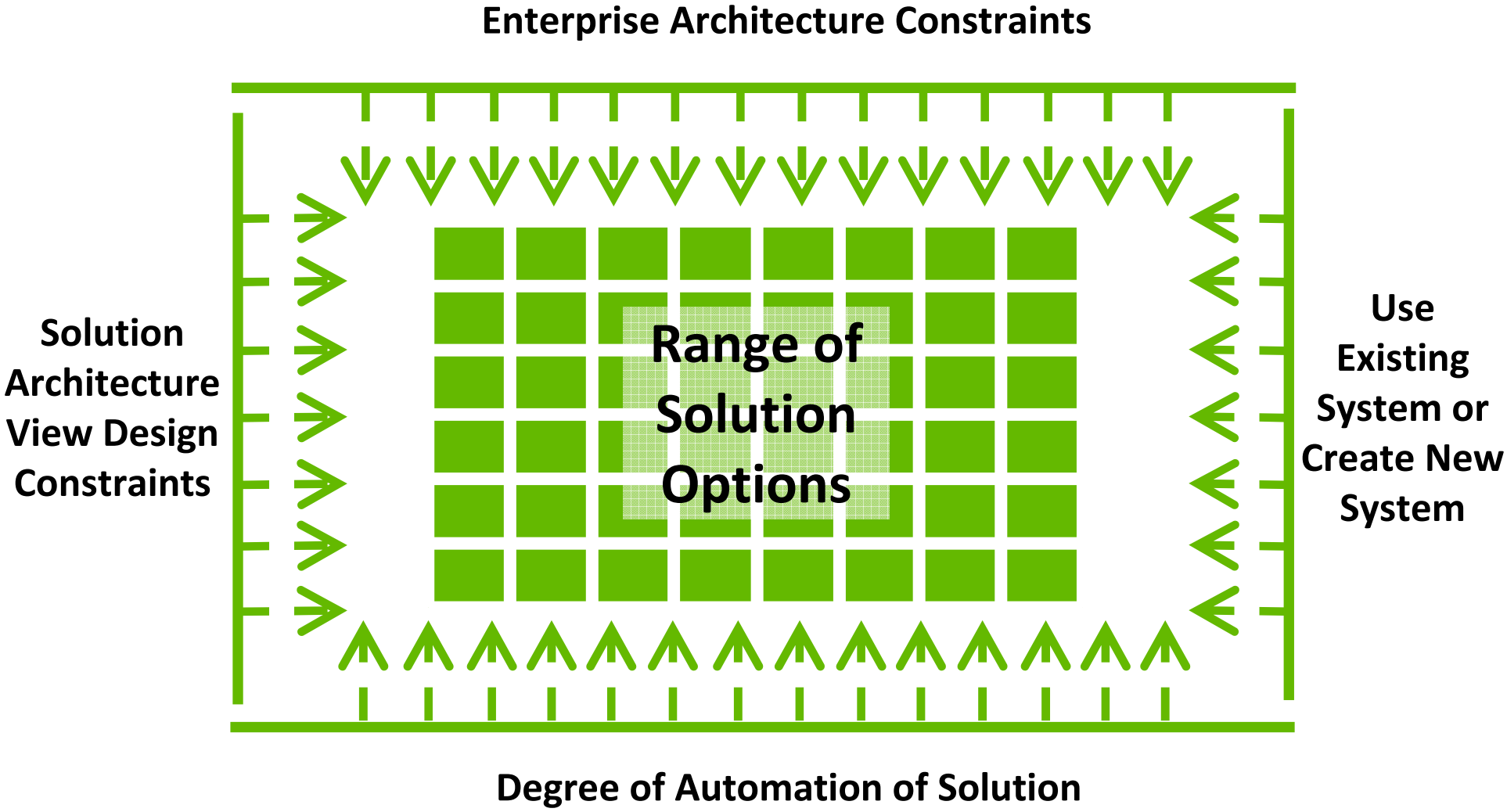
Designing The Solution

- Overall solution design is constrained both by enterprise architecture and solution architecture views
- There are many possible solution options to a business requirement or problem
  - Solution can be manual or automated to a lesser or greater extent
  - Solution can involve enhancing existing system and/or process or developing new system and/or process
  - These constraints form boundaries to the solution design

Solution Design Factors, Limitations And Boundaries

- ***Core Constraints*** – concerned with essential solution attributes
  - Enterprise Architecture
  - Solution Architecture Views/Dimensions
  - Existing or New System
  - Degree of Automation
- ***Extended Constraints*** – concerned with solution implementation and operation
  - Resources
  - Finance
  - Timescale
  - Expected Life

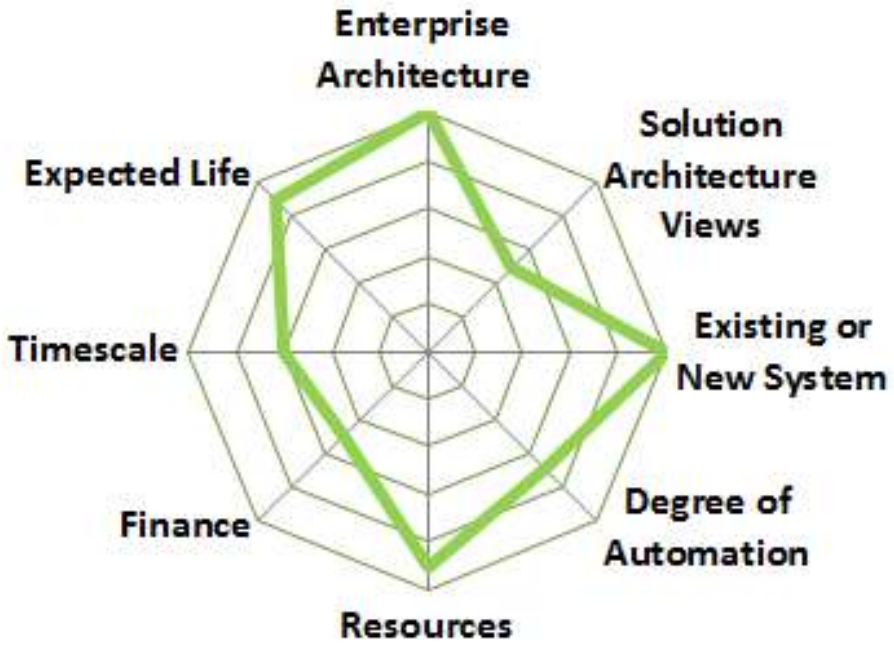
Core Solution Design Factors, Limitations And Boundaries

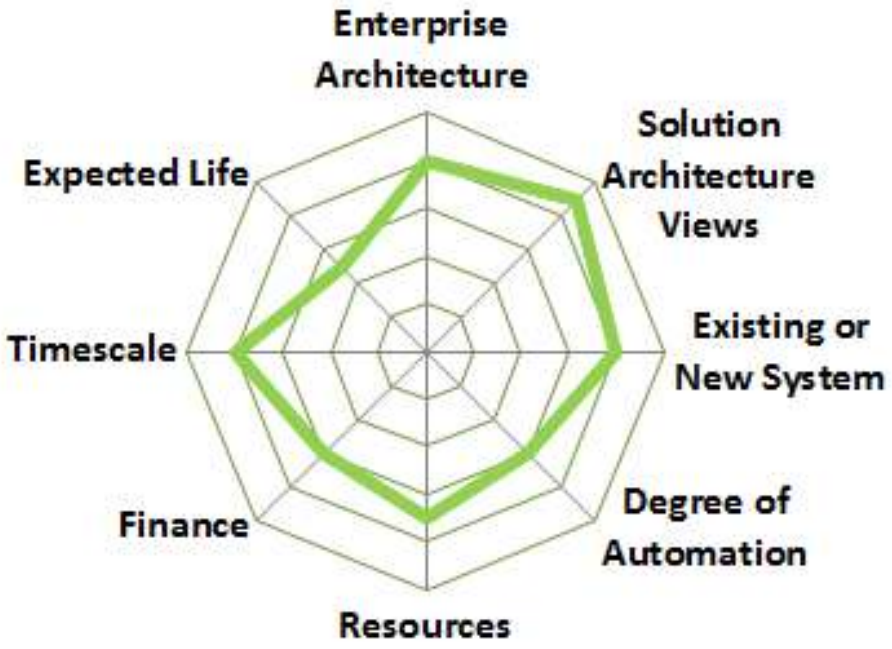


Extended Solution Design Factors, Limitations And Boundaries

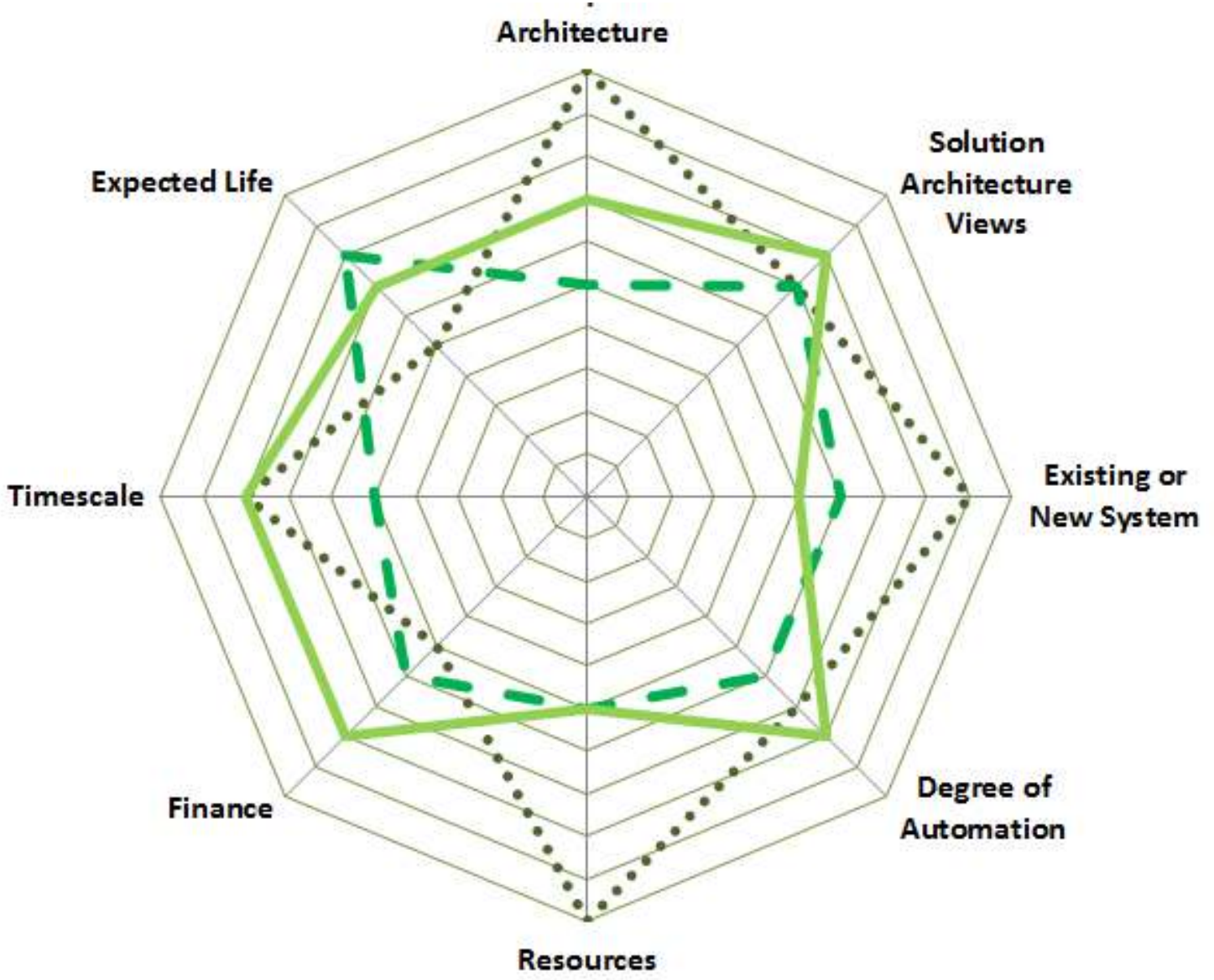
- Other implementation and operation-related constraints that will affect the solution options:
  - Resources and their availability
  - Timescale and urgency of solution
  - Cost and available finance
  - Likely duration of solution

Different Solution Designs And Options Can Comply With Constraints Differently

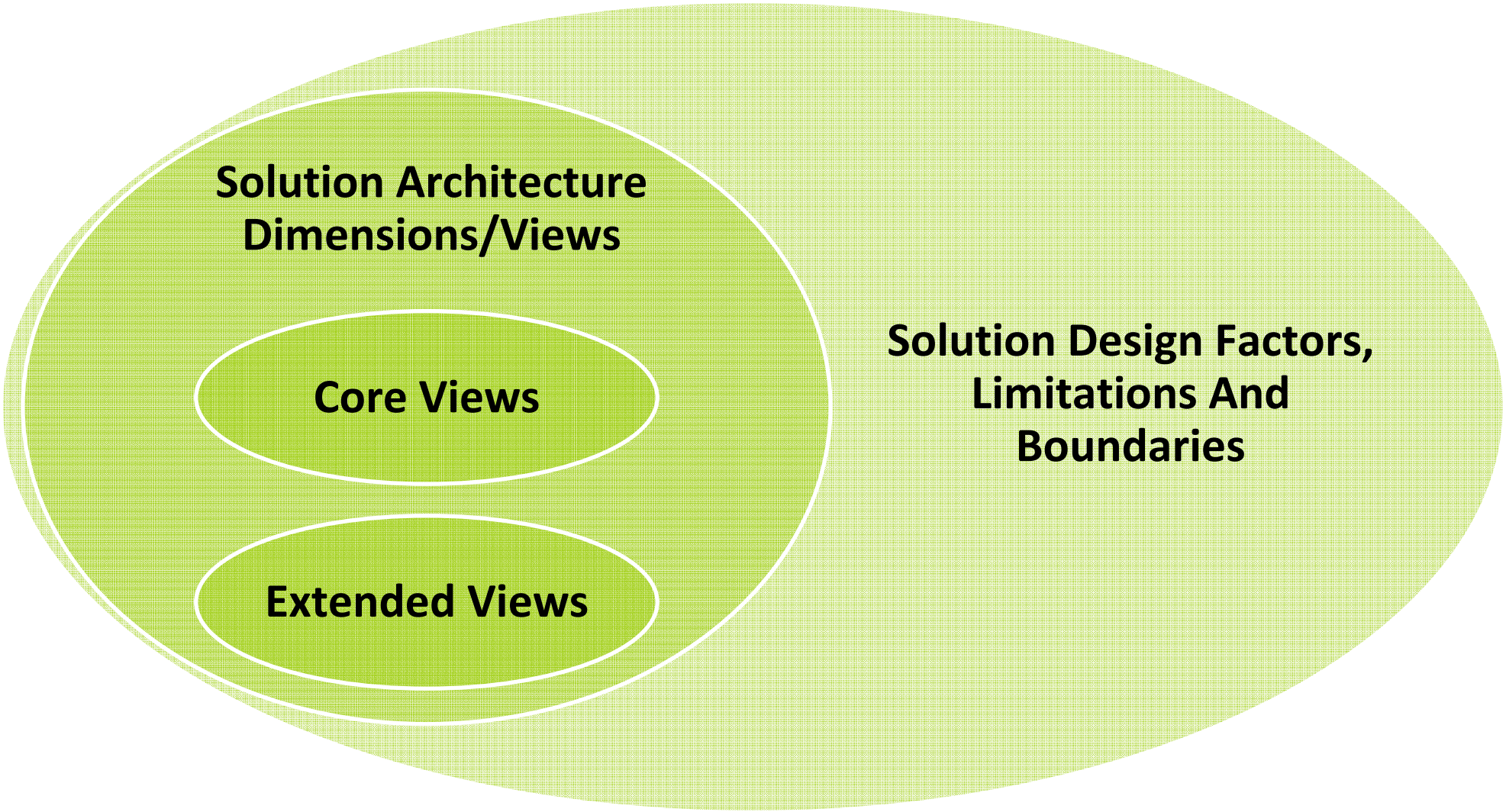




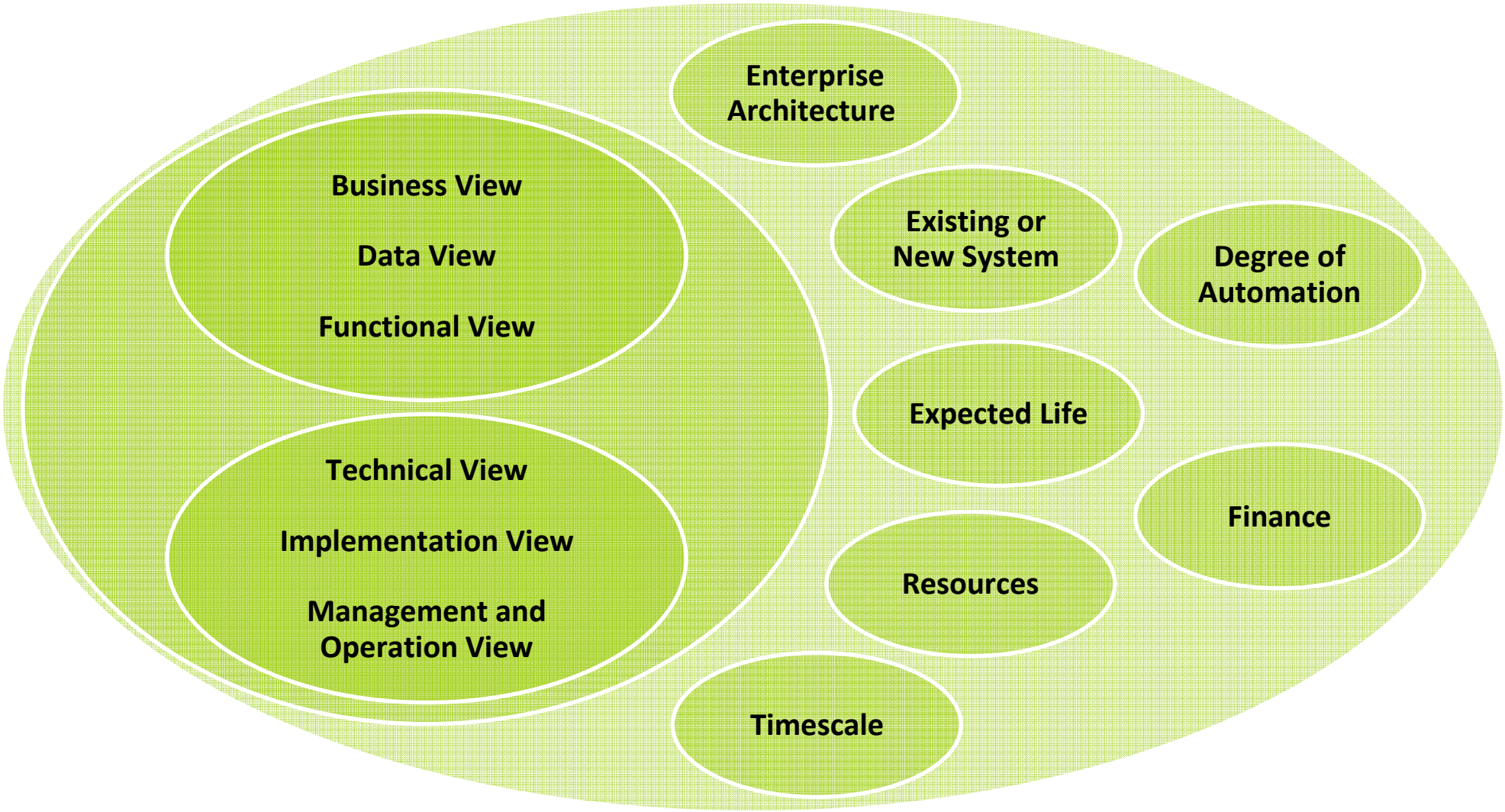
Comparison Of Possible Options For One Solution



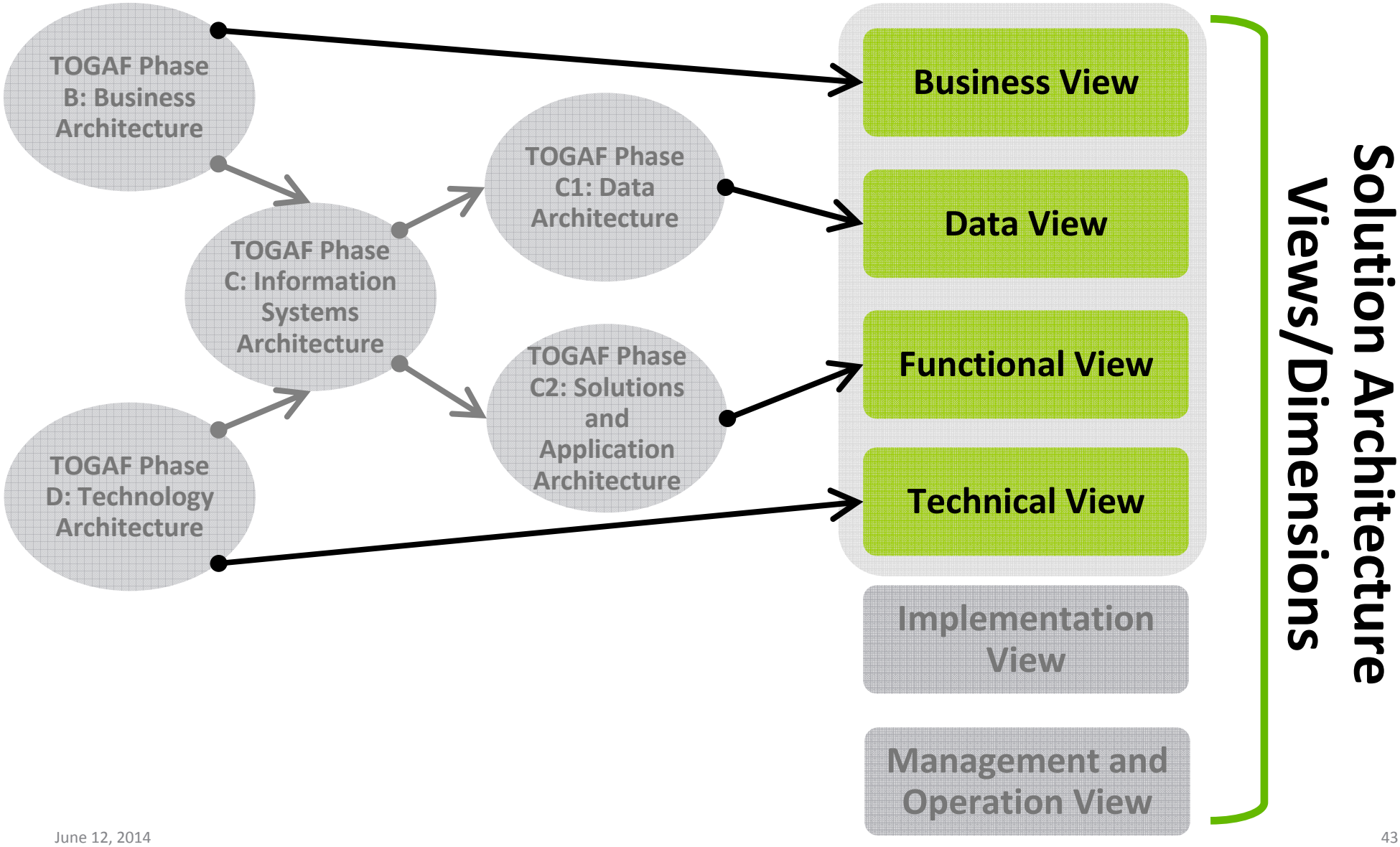
Solution Architecture Dimensions/Views And Solution Design Factors, Limitations And Boundaries



Solution Architecture Dimensions/Views And Solution Design Factors, Limitations And Boundaries



Mapping TOGAF Enterprise Architecture Process To Solution Architecture Definition



Steps For TOGAF View/Dimension Analysis And Development

- Common set of steps across four solution architecture views/dimensions common to TOGAF
  1. Select reference models, viewpoints, and tools
  2. Develop baseline view/dimension architecture description
  3. Develop target view/dimension architecture description
  4. Perform gap analysis
  5. Define roadmap components
  6. Resolve impacts across the architecture landscape
  7. Conduct formal stakeholder review
  8. Finalise the view/dimension architecture
  9. Create view/dimension architecture definition document

Steps For TOGAF View/Dimension Analysis And Development

- Use TOGAF framework to give a rigour to the solution architecture analysis and design
- Modify as required to suit the depth of the analysis
- Can iterate through the steps with varying levels of analysis as solution is articulated

TOGAF Steps For Business Dimension/View Analysis And Design

Step 1 - Select Reference Models, Viewpoints, and Tools (1)

- Select relevant Business Architecture resources (reference models, patterns, etc.) from the Architecture Repository, on the basis of the business drivers, and the stakeholders and concerns
- Select relevant Business Architecture viewpoints (e.g., operations, management, financial); i.e. those that will enable the architect to demonstrate how the stakeholder concerns are being addressed in the Business Architecture
- Identify appropriate tools and techniques to be used for capture, modeling, and analysis
- Determine Overall Modelling Process
  - For each viewpoint, select the models needed to support the specific view required, using the selected tool or method
  - Ensure that all stakeholder concerns are covered
  - Identify the key business functions within the scope of the architecture, and maps those functions onto the business units within the organisation
  - Breakdown business-level functions across actors and business units to allow the actors in a function to be identified and permits a breakdown into services supporting/delivering that functional capability
  - Breakdown a function or business service through process modeling to allow the elements of the process to be identified and permit the identification of lower-level business services or functions

Step 1 - Select Reference Models, Viewpoints, and Tools (2)

- Identify Required Service Granularity Level, Boundaries, and Contracts
  - Business Architecture phase therefore needs to identify which components of the architecture are functions and which are services
    - Business services are specific functions that have explicit, defined boundaries that are explicitly governed
    - Services are distinguished from functions through the explicit definition of a service contract
    - A service contract covers the business/functional interface and also the technology/data interface
  - Business Architecture will define the service contract at the business/functional level, which will be expanded on in the Application and Technology Architecture phases
  - Granularity of business services should be determined according to the business drivers, goals, objectives, and measures for this area of the business

Step 1 - Select Reference Models, Viewpoints, and Tools (3)

- Identify Required Catalogs of Business Building Blocks
  - Catalogs capture inventories of the core assets of the business
  - Catalogs form the raw material for development of matrices and views and also act as a key resource for portfolio managing business and IT capability
  - Develop some or all of the following catalogs:
    - Organisation/Actor catalog
    - Driver/Goal/Objective catalog
    - Role catalog
    - Business Service/Function catalog
    - Location catalog
    - Process/Event/Control/Product catalog
    - Contract/Measure catalog

Step 1 - Select Reference Models, Viewpoints, and Tools (4)

- Identify Required Matrices
  - Matrices show the core relationships between related model entities
  - Matrices form the raw material for development of views and also act as a key resource for impact assessment, carried out as a part of gap analysis
    - Business interaction matrix - showing dependency and communication between business units and actors
    - Actor/role matrix - showing the roles undertaken by each actor

Step 1 - Select Reference Models, Viewpoints, and Tools (5)

- Identify Required Diagrams
  - Diagrams present the Business Architecture information from a set of different perspectives according to the requirements of the stakeholders
    - Business Footprint diagram
    - Business Service/Information diagram
    - Functional Decomposition diagram
    - Goal/Objective/Service diagram
    - Use-case diagram
    - Organisation Decomposition diagram
    - Process Flow diagram
    - Events diagram

Step 1 - Select Reference Models, Viewpoints, and Tools (6)

- Identify Types of Requirement to be Collected
  - Once the Business Architecture catalogs, matrices, and diagrams have been developed, architecture modeling is completed by formalising the business-focused requirements for implementing the Target Architecture
  - Requirements may relate to the business domain, or may provide requirements input into the Data, Application, and Technology Architectures
  - Types of requirement
    - Functional requirements
    - Non-functional requirements
    - Assumptions
    - Constraints
    - Domain-specific Business Architecture principles
    - Policies
    - Standards
    - Guidelines
    - Specifications

Step 2 - Develop Baseline Business Architecture Description

- Develop a Baseline Description of the existing Business Architecture, to the extent necessary to support the Target Business Architecture
- Scope and level of detail to be defined will depend on the extent to which existing business elements are likely to be carried over into the Target Business Architecture

Step 3 - Develop Target Business Architecture Description

- Develop a Target Description for the Business Architecture, to the extent necessary to support the Architecture Vision
- Scope and level of detail to be defined will depend on the relevance of the business elements to attaining the Target Architecture Vision

Step 4 - Perform Gap Analysis

- Verify the architecture models for internal consistency and accuracy
- Perform trade-off analysis to resolve conflicts (if any) among the different views
- Validate that the models support the principles, objectives, and constraints
- Test architecture models for completeness against requirements
- Identify gaps between the baseline and target

Step 5 - Define Roadmap Components

- Create a business roadmap to prioritise activities over the coming phases
- Initial Business Architecture roadmap will be used as raw material to support more detailed definition of a consolidated, cross-discipline roadmap within the Opportunities and Solutions phase

Step 6 - Resolve Impacts Across the Architecture Landscape

- Understand any wider impacts or implications of proposed Business Architecture
  - Does this Business Architecture create an impact on any pre-existing architectures?
  - Have recent changes been made that impact on the Business Architecture?
  - Are there any opportunities to leverage work from this Business Architecture in other areas of the organisation?
  - Does this Business Architecture impact other projects (including those planned as well as those currently in progress)?
  - Will this Business Architecture be impacted by other projects (including those planned as well as those currently in progress)?

Step 7 - Conduct Formal Stakeholder Review

- Check the original motivation for the architecture project and the Statement of Architecture Work against the proposed Business Architecture
- Is fit for the purpose of supporting subsequent work in the other architecture domains?
- Refine the proposed Business Architecture but only if necessary

Step 8 - Finalise the Business Architecture

- Select standards for each of the building blocks re-using as much as possible from the reference models selected from the Architecture Repository
- Document each building block
- Conduct final cross-check of overall architecture against business goals
- Document reason for building block decisions in the architecture document
- Document final requirements traceability report
- Document final mapping of the architecture within the Architecture Repository and publish via the Architecture Repository
- Finalise all the work products, such as gap analysis results

Step 9 - Create Architecture Definition Document

- Document reasons for building block decisions in the Architecture Definition Document
- Prepare the business sections of the Architecture Definition Document
  - A business footprint (a high-level description of the people and locations involved with key business functions)
  - A detailed description of business functions and their information needs
  - A management footprint (showing span of control and accountability)
  - Standards, rules, and guidelines showing working practices, legislation, financial measures, etc.
  - A skills matrix and set of job descriptions

TOGAF Steps For Data Dimension/View Analysis And Design

Step 1 - Select Reference Models, Viewpoints, and Tools (1)

- Select relevant Data Architecture resources (reference models, patterns, etc.) from the Architecture Repository, on the basis of the business drivers, and the stakeholders and concerns
- Select relevant Data Architecture viewpoints (e.g., operations, management, financial); i.e. those that will enable the architect to demonstrate how the stakeholder concerns are being addressed in the Data Architecture
- Identify appropriate tools and techniques to be used for data capture, modeling, and analysis
- Determine Overall Modelling Process
  - For each viewpoint, select the models needed to support the specific view required, using the selected tool or method
  - Ensure that all stakeholder concerns are covered
  - Collect data-related models from existing Business Architecture and Application Architecture materials
  - Rationalise data requirements and align with any existing organisation data catalogs and models - this allows the development of a data inventor y and entity relationship
  - Update and develop matrices across the architecture by relating data to business service, business function, access rights, and application
  - Elaborate Data Architecture views by examining how data is created, distributed, migrated, secured, and archived

Step 1 - Select Reference Models, Viewpoints, and Tools (2)

- Identify Required Catalogs of Data Building Blocks
  - Capture organisation's data inventory as a catalog within the Architecture Repository
  - Create an inventory of the data needed to be in place to support the Architecture Vision
  - Refer to the Business Service/Information diagram created during the Business Architecture phase, showing the key data entities required by the main business services
  - Consolidate the data requirements in a single location
  - Refine the data inventory to achieve semantic consistency and to remove gaps and overlaps

Step 1 - Select Reference Models, Viewpoints, and Tools (3)

- Identify Required Matrices
  - Matrices show the core relationships between related model entities
  - Form the raw material for development of diagrams and also act as a key resource for impact assessment
  - Understand how data is created, maintained, transformed, and passed to other applications, or used by other applications
  - Note gaps such as entities that never seem to be created by an application or data created but never used
  - Update and refine the architectural diagrams of how data relates to other aspects of the architecture
  - Suggested matrices
    - Data Entity/Business Function (showing which data supports which functions and which business function owns which data)
    - Business Service/Information (developed during the Business Architecture phase)
    - System/Data (developed across the Application Architecture and Data Architecture phases)

Step 1 - Select Reference Models, Viewpoints, and Tools (4)

- Identify Required Diagrams
  - Diagrams present the Data Architecture information from a set of different perspectives according to the requirements of the stakeholders
  - Once the data entities have been refined, a diagram of the relationships between entities and their attributes can be produced
    - Class diagram
    - Data Dissemination diagram
    - Data Lifecycle diagram
    - Data Security diagram
    - Data Migration diagram
    - Class Hierarchy diagram

Step 1 - Select Reference Models, Viewpoints, and Tools (5)

- Identify Types of Requirement to be Collected
  - Once the Data Architecture catalogs, matrices, and diagrams have been developed, architecture modeling is completed by formalising the business-focused requirements for implementing the Target Architecture
  - Types of requirement
    - Functional requirements
    - Non-functional requirements
    - Assumptions
    - Constraints
    - Domain-specific Data Architecture principles
    - Policies
    - Standards
    - Guidelines
    - Specifications

Step 2 - Develop Data Business Architecture Description

- Develop a Baseline Description of the existing Data Architecture, to the extent necessary to support the Target Business Architecture
- Scope and level of detail to be defined will depend on the extent to which existing data elements are likely to be carried over into the Target Data Architecture

Step 3 - Develop Target Business Architecture Description

- Develop a Target Description for the Data Architecture, to the extent necessary to support the Architecture Vision
- Scope and level of detail to be defined will depend on the relevance of the business elements to attaining the Target Architecture Vision

Step 4 - Perform Gap Analysis

- Verify the architecture models for internal consistency and accuracy
- Perform trade-off analysis to resolve conflicts (if any) among the different views
- Validate that the models support the principles, objectives, and constraints
- Test architecture models for completeness against requirements
- Identify gaps between the baseline and target
  - Create gap matrix
  - Identify building blocks to be carried over, classifying as either changed or unchanged
  - Identify eliminated building blocks
  - Identify new building blocks
  - Identify gaps and classify as those that should be developed and those that should be procured

Step 5 - Define Roadmap Components

- Create a data business roadmap to prioritise activities over the coming phases
- Initial Data Architecture roadmap will be used as raw material to support more detailed definition of a consolidated, cross-discipline roadmap within the Opportunities and Solutions phase

Step 6 - Resolve Impacts Across the Architecture Landscape

- Understand any wider impacts or implications of proposed Data Architecture
  - Does this Data Architecture create an impact on any pre-existing architectures?
  - Have recent changes been made that impact on the Data Architecture?
  - Are there any opportunities to leverage work from this Data Architecture in other areas of the organisation?
  - Does this Data Architecture impact other projects (including those planned as well as those currently in progress)?
  - Will this Data Architecture be impacted by other projects (including those planned as well as those currently in progress)?

Step 7 - Conduct Formal Stakeholder Review

- Check the original motivation for the architecture project and the Statement of Architecture Work against the proposed Data Architecture
- Is fit for the purpose of supporting subsequent work in the other architecture domains?
- Identify any areas where the Solution and Application Architecture may need to change to cater for changes in the Data Architecture (or to identify constraints on the Solution and Application Architecture about to be designed)
- Refine the proposed Data Architecture but only if necessary

Step 8 - Finalise the Data Architecture

- Select standards for each of the building blocks re-using as much as possible from the reference models selected from the Architecture Repository
- Document each building block
- Conduct final cross-check of overall architecture against business goals
- Document reason for building block decisions in the architecture document
- Document final requirements traceability report
- Document final mapping of the architecture within the Architecture Repository and publish via the Architecture Repository
- Finalise all the work products, such as gap analysis results

Step 9 - Create Architecture Definition Document

- Document reasons for building block decisions in the Architecture Definition Document
- Prepare Data Architecture sections of the Architecture Definition Document
  - Business data model
  - Logical data model
  - Data management process model
  - Data Entity/Business Function matrix
  - Data interoperability requirements

TOGAF Steps For Functional Dimension/View Analysis And Design

Step 1 - Select Reference Models, Viewpoints, and Tools (1)

- Review and validate (or generate, if necessary) the set of application principles
  - Form part of an overarching set of architecture principles
- Select relevant Application Architecture resources (reference models, patterns, etc.) from the Architecture Repository, on the basis of the business drivers, and the stakeholders and concerns
- Select relevant Application Architecture viewpoints (for example, stakeholders of the applications, viewpoints relevant to functional and individual users of applications, etc.); i.e. those that will enable the architect to demonstrate how the stakeholder concerns are being addressed in the Application Architecture
- Identify appropriate tools and techniques to be used for data capture, modeling, and analysis
- Consider using platform-independent descriptions of business logic
  - Isolate the business logic from changes to the underlying platform and implementation technology

Step 1 - Select Reference Models, Viewpoints, and Tools (2)

- Determine Overall Modeling Process
  - For each viewpoint, select the models needed to support the specific view required, using the selected tool or method
  - Ensure that all stakeholder concerns are covered
  - Process steps
    - Understand the list of applications or application components that are required, based on the baseline Application Portfolio, what the requirements are, and the business architecture scope
    - Identify logical applications and the most appropriate physical applications
    - Develop matrices across the architecture by relating applications to business service, business function, data, process, etc.
    - Elaborate a set of Application Architecture views by examining how the application will function, capturing integration, migration, development, and operational concerns
  - The level of granularity should be sufficient to enable identification of gaps and the scope of candidate work packages

Step 1 - Select Reference Models, Viewpoints, and Tools (3)

- Identify Required Catalogs of Application Building Blocks
  - Capture organisation's Application Portfolio as a catalog within the Architecture Repository
    - Application Portfolio catalog
    - Interface catalog

Step 1 - Select Reference Models, Viewpoints, and Tools (4)

- Identify Required Matrices
  - Matrices show the core relationships between related model entities
  - Form the raw material for development of diagrams and also act as a key resource for impact assessment
  - Once the baseline Application Portfolio has been assembled, it is necessary to map the applications to their purpose in supporting the business
    - Initial mapping should focus on business services within the Business Architecture
  - Once applications are mapped to business services, it will also be possible to make associations from applications to data
    - Refer to Phase C1: Information Systems Architectures - Data Architecture
  - Identify user and organisational dependencies on applications
  - Specifically consider the operational support business unit
  - Update and refine the architectural diagrams of how data relates to other aspects of the architecture
  - Examine application dependencies on shared operations capabilities and produce a diagram on how each application is effectively operated and managed
  - Suggested matrices
    - System/Business Unit matrix
    - Role/System matrix
    - Application Interaction matrix
    - System/Function matrix

Step 1 - Select Reference Models, Viewpoints, and Tools (5)

- Identify Required Diagrams
  - Diagrams present the Application Architecture information from a set of different perspectives according to the requirements of the stakeholders
  - Once the desired functionality of an application is known, it is necessary to perform an internal assessment of how the application should be best structured to meet its requirements
    - Packaged applications
      - Numbers of configuration options, add-on modules
    - Custom developed applications
      - Identify the high-level structure of the application in terms of modules or sub-systems as a foundation to organise design activity
  - Once the application entities have been refined, a diagram of the relationships between entities and their attributes can be produced
    - Application Communication diagram
    - Application and User Location diagram
    - Enterprise Manageability diagram
    - Process/System Realisation diagram
    - Application Migration diagram
    - Software Distribution diagram
    - Software Engineering diagram

Step 1 - Select Reference Models, Viewpoints, and Tools (6)

- Identify Types of Requirement to be Collected
  - Once the Application Architecture catalogs, matrices, and diagrams have been developed, architecture modeling is completed by formalising the application-focused requirements for implementing the Target Architecture
  - Types of requirement
    - Functional requirements
    - Non-functional requirements
    - Assumptions
    - Constraints
    - Domain-specific Application Architecture principles
    - Policies
    - Standards
    - Guidelines
    - Specifications

Step 2 - Develop Application Business Architecture Description

- Develop a Baseline Description of the existing Application Architecture, to the extent necessary to support the Target Business Architecture
- Scope and level of detail to be defined will depend on the extent to which existing data elements are likely to be carried over into the Target Application Architecture

Step 3 - Develop Target Application Architecture Description

- Develop a Target Description for the Application Architecture, to the extent necessary to support the Architecture Vision, Target Business Architecture, and Target Data Architecture
- Scope and level of detail to be defined will depend on the relevance of the business elements to attaining the Target Architecture Vision

Step 4 - Perform Gap Analysis

- Verify the architecture models for internal consistency and accuracy
- Test architecture models for completeness against requirements
- Identify gaps between the baseline and target
  - Create gap matrix
  - Identify building blocks to be carried over, classifying as either changed or unchanged
  - Identify eliminated building blocks
  - Identify new building blocks
  - Identify gaps and classify as those that should be developed and those that should be procured

Step 5 - Define Roadmap Components

- Create an application business roadmap to prioritise activities over the coming phases
- Initial Application Architecture roadmap will be used as raw material to support more detailed definition of a consolidated, cross-discipline roadmap within the Opportunities and Solutions phase

Step 6 - Resolve Impacts Across the Architecture Landscape

- Understand any wider impacts or implications of proposed Application Architecture
  - Does this Application Architecture create an impact on any pre-existing architectures?
  - Have recent changes been made that impact on the Application Architecture?
  - Are there any opportunities to leverage work from this Application Architecture in other areas of the organisation?
  - Does this Application Architecture impact other projects (including those planned as well as those currently in progress)?
  - Will this Application Architecture be impacted by other projects (including those planned as well as those currently in progress)?

Step 7 - Conduct Formal Stakeholder Review

- Check the original motivation for the architecture project and the Statement of Architecture Work against the proposed Application Architecture
- Identify any areas where the where the Business and Data Architectures (e.g., business practices) may need to change to cater for changes in the Application Architecture (for example, changes to for ms or procedures, application systems, or database systems)
- Identify any constraints on the Technology Architecture (especially the infrastructure) about to be designed

Step 8 - Finalise the Application Architecture

- Select standards for each of the building blocks re-using as much as possible from the reference models selected from the Architecture Repository
- Document each building block
- Conduct final cross-check of overall architecture against business goals
- Document reason for building block decisions in the architecture document
- Document final requirements traceability report
- Document final mapping of the architecture within the Architecture Repository and publish via the Architecture Repository
- Finalise all the work products, such as gap analysis results

Step 9 - Create Architecture Definition Document

- Document reasons for building block decisions in the Architecture Definition Document
- Prepare Application Architecture sections of the Architecture Definition Document

TOGAF Steps For Technical Dimension/View Analysis And Design

Step 1 - Select Reference Models, Viewpoints, and Tools (1)

- Review and validate the set of technology principles
- Select relevant Technology Architecture resources (reference models, patterns, etc.) from the Architecture Repository
- Select relevant Technology Architecture viewpoints that will enable the architect to demonstrate how the stakeholder concerns are being addressed in the Technology Architecture
- Identify appropriate tools and techniques to be used for capture, modeling, and analysis, in association with the selected viewpoints

Step 1 - Select Reference Models, Viewpoints, and Tools (2)

- Determine Overall Modelling Process
  - For each viewpoint, select the models needed to support the specific view required, using the selected tool or method
  - Develop a Technology Architecture
    - Define a classification of platform services and logical technology components (including standards)
    - Identify relevant locations where technology is deployed
    - Carr y out a physical inventor y of deployed technology and abstract up to fit into the classification
    - Look at application and business requirements for technology
    - Is the technology in place fit-for-purpose to meet new requirements
    - Deter mine configuration of the selected technology
    - Determine impact
      - Sizing and costing
      - Capacity planning
      - Installation/governance/migration impacts

Step 1 - Select Reference Models, Viewpoints, and Tools (3)

- Determine Overall Modelling Process
  - Technology Architecture may be impacted by earlier decisions made around service granularity/level of detail and service boundaries
    - **Performance** - Coarse-grained services contain several units of functionality with potentially varying nonfunctional requirements, so platform performance should be considered
    - **Maintainability** - If service granularity is too coarse, then introducing changes to that ser vice becomes difficult and impacts the maintenance of the service and the platform on which it is delivered
    - **Location and Latency** - Services might interact with each other over remote links and inter-service communication will have in-built latency
    - **Availability** - Service invocation is subject to network and/or service failure so high communication availability is an important consideration during service decomposition and defining service granularity
  - Product selection processes may occur within the Technology Architecture phase where existing products are re-used, incremental capacity is being added, or product selection decisions are a constraint during project initiation
  - Where product selection deviates from existing standards, involves significant effort, or has wide-ranging impact, this activity should be flagged as an opportunity and addressed through the Opportunities and Solutions phase

Step 1 - Select Reference Models, Viewpoints, and Tools (4)

- Identify Required Catalogs of Technology Building Blocks
  - Catalogs are inventories of the core assets of the business
  - Catalogs for m the raw material for development of matrices and diagrams and also act as a key resource for portfolio managing business and IT capability
  - Based on existing technology catalogs and analysis of applications carried out in the Application Architecture phase, collect a list of products in use
  - If the requirements identified in the Application Architecture are not met by existing products, extend the product list by examining products available on the market that provide the functionality and meet the required standards
  - If technology standards are currently in place, apply these to the technology component catalog to gain a baseline view of compliance with technology standards
  - Create catalogs
    - Technology standards
    - Technology portfolio

Step 1 - Select Reference Models, Viewpoints, and Tools (5)

- Identify Required Matrices
  - Matrices show the core relationships between related model entities
  - Create System/Technology matrix

Step 1 - Select Reference Models, Viewpoints, and Tools (6)

- Identify Required Diagrams
  - Diagrams present the Technology Architecture information from a set of different perspectives (viewpoints) according to the requirements of the stakeholders
    - Provide a link between platform requirements and hosting requirements
  - For major baseline applications or application platforms (where multiple applications are hosted on the same infrastructure stack), produce a stack diagram showing how hardware, operating system, software infrastructure, and packaged applications combine
  - For each environment, produce a logical diagram of hardware and software infrastructure showing the contents of the environment and logical communications between components
    - Where available, collect capacity information on the deployed infrastructure
  - For each environment, produce a physical diagram of communications infrastructure, such as routers, switches, firewalls, and network links
    - Where available, collect capacity information on the communications infrastructure
  - Create diagrams
    - Environments and Locations diagram
    - Platform Decomposition diagram
    - Processing diagram
    - Networked Computing/Hardware diagram
    - Communications Engineering diagram

Step 1 - Select Reference Models, Viewpoints, and Tools (7)

- Identify Types of Requirement to be Collected
  - Once the Technology Architecture catalogs, matrices, and diagrams have been developed, architecture modeling is completed by formalising the data-focused requirements for implementing the Target Architecture
  - Identify types of requirement that must be met by the architecture implementation
    - Functional requirements
    - Non-functional requirements
    - Assumptions
    - Constraints
    - Domain-specific Technology Architecture principles
    - Policies
    - Standards
    - Guidelines
    - Specifications

Step 1 - Select Reference Models, Viewpoints, and Tools (8)

- Select Services
  - Services portfolios are combinations of basic services from the service categories in the Technical Reference Model that do not conflict
    - Requirements for organisation-specific elements or pre-existing decisions
    - Pre-existing and unchanging organisational elements
    - Inherited external environment constraints
  - For each building block, build up a service description portfolio as a set of non-conflicting ser vices
  - Set of services must be tested to ensure that the functionality provided meets application requirements

Step 2 - Develop Baseline Business Architecture Description

- Develop a Baseline Description of the existing Technology Architecture to the extent necessary to support the Target Technology Architecture
- Scope and level of detail to be defined will depend on the extent to which existing business elements are likely to be carried over into the Target Business Architecture
- Identify the relevant Technology Architecture building blocks, drawing on any artifacts held in the Architecture Repository
- Convert the description of the existing environment into the terms of the organisation's Foundation Architecture
- Set down a list of key questions which can be used later in the development process to measure the effectiveness of the new architecture
- Use the models identified within Step 1 of Phase D as a guideline for creating new architecture content to describe the Baseline Architecture

Step 3 - Develop Target Technology Architecture Description

- Develop a Target Description for the Technology Architecture, to the extent necessary to support the Architecture Vision, Target Business Architecture, and Target Information Systems Architecture
- Scope and level of detail to be defined will depend on the relevance of the business elements to attaining the Target Architecture Vision
- Process in the creation of a broad architectural model of the target system is the conceptualisation of building blocks
- Architecture Building Blocks (ABBs) describe the functionality and how they may be implemented without the detail introduced by configuration or detailed design
- Where new architecture models need to be developed to satisfy stakeholder concerns, use the models identified within Step 1 of Phase D as a guideline for creating new architecture content to describe the Target Architecture

Step 4 - Perform Gap Analysis

- Verify the architecture models for internal consistency and accuracy
- Note changes to the viewpoint represented in the selected models from the Architecture Repository
- Test architecture models for completeness against requirements
- Identify gaps between the baseline and target
  - Create gap matrix
  - Identify building blocks to be carried over, classifying as either changed or unchanged
  - Identify eliminated building blocks
  - Identify new building blocks
  - Identify gaps and classify as those that should be developed and those that should be procured

Step 5 - Define Roadmap Components

- Create a business roadmap to prioritise activities over the coming phases
- Initial Technology Architecture roadmap will be used as raw material to support more detailed definition of a consolidated, cross-discipline roadmap within the Opportunities and Solutions phase

Step 6 - Resolve Impacts Across the Architecture Landscape

- Understand any wider impacts or implications of proposed Technology Architecture
  - Does this Technology Architecture create an impact on any pre-existing architectures?
  - Have recent changes been made that impact on the Technology Architecture?
  - Are there any opportunities to leverage work from this Technology Architecture in other areas of the organisation?
  - Does this Technology Architecture impact other projects (including those planned as well as those currently in progress)?
  - Will this Technology Architecture be impacted by other projects (including those planned as well as those currently in progress)?

Step 7 - Conduct Formal Stakeholder Review

- Check the original motivation for the architecture project and the Statement of Architecture Work against the proposed Technology Architecture
- Is fit for the purpose of supporting subsequent work in the other architecture domains?
- Refine the proposed Technology Architecture but only if necessary

Phase Step 8 - Finalise the Business Architecture

- Select standards for each of the building blocks re-using as much as possible from the reference models selected from the Architecture Repository
- Document each building block
- Conduct final cross-check of overall architecture against business goals
- Document reason for building block decisions in the architecture document
- Document final requirements traceability report
- Document final mapping of the architecture within the Architecture Repository and publish via the Architecture Repository
  - From the selected building blocks, identify those that might be re-used (working practices, roles, business relationships, job descriptions, etc.),
- Finalise all the work products, such as gap analysis results

Step 9 - Create Architecture Definition Document

- Document reasons for building block decisions in the Architecture Definition Document
- Prepare the business sections of the Architecture Definition Document
  - Fundamental functionality and attributes - semantic, unambiguous including security capability and manageability
  - Dependent building blocks with required functionality and named interfaces
  - Interfaces - chosen set, supplied (APIs, data for mats, protocols, hardware interfaces, standards)
  - Map to business/organisational entities and policies
- Use reports and/or graphics generated by modeling tools to demonstrate key views of the architecture
- Route the document for review by relevant stakeholders and incorporate feedback

Summary

- The role of solution architecture is to identify answer to a business problem and set of solution options and their components
- There will be many potential solutions to a problem with varying suitability
- Solution options are derived from a combination of Solution Architecture Dimensions/Views which describe characteristics, features, qualities, requirements and Solution Design Factors, Limitations And Boundaries which delineate limitations
- Use structured approach to assist with solution design to create consistency
- TOGAF approach to enterprise architecture can be adapted to perform analysis and design for elements of Solution Architecture Dimensions/Views
- Solution architecture is part of the continuum from business problem to operable solution

More Information

Alan McSweeney

http://ie.linkedin.com/in/alanmcsweeney