



# Agile IndEA

*Vision, Velocity*

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## Chapter 1

### About Agile IndEA

#### 1.1 Introduction

Over the last few years, the global trends in designing Digital Governance models have been in terms of re-architecting Government adopting a **Whole-of-Government** approach and to break the digital silos created in the past. The Ministry of Electronics and Information Technology (MeitY), Government of India (GoI) had commissioned a project for developing a framework for designing Enterprise Architecture for Ministries of GoI, the States and large public organizations. The outcome is the notification (in October 2018) of **India Enterprise Architecture (IndEA)** Framework, which is a set of citizen-centric, efficiency-focused and event-driven architectural patterns, reference models and standards.

While IndEA has been notified as a standard framework for designing Enterprise Architectures, its adoption has been slow, due to the challenges posed by the resource-intensive and time-taking nature inherent in designing Enterprise Architectures in a *classical* way. Moreover, there is an apparent dichotomy between the “Architecture School” and the “Agile School”. Designing Enterprise Architecture for a large and complex organization typically takes months and years, requires big modeling upfront and involves the creation of scores of artefacts, even before the first line of code is written. The Agile methodology, on the other hand, postpones any kind of modeling to the eleventh hour, insists on very little planning and documentation, and promises delivery of working software in weeks.

There are merits in both the schools of development. It is expedient to harmonize and synthesize these schools into a single framework to derive the best of both worlds. Hence arose the concept of **Agile IndEA**, which is a sleek and simple-to-adopt framework that combines “**Vision**” with “**Velocity**”. Agile IndEA is centered around **Value**, and is characterized by – *lean, collaborative and business-oriented effort*.

#### 1.2 Purpose of Agile IndEA Framework

The purpose of the Agile IndEA framework described in this Handbook is manifold, as specified below:

- a. It provides the framework to infuse agile practices into IndEA.
- b. It simplifies the understanding of IndEA and promotes its widespread adoption by the Ministries of GoI, States and large organizations in the public sector.
- c. It provides simple methodologies for implementation of IndEA in an agile way, including agile procurement.
- d. It enhances the general awareness of the merits and methods of IndEA and enables building capacities required for its implementation.

#### 1.3 Using the Agile IndEA Handbook

The Agile IndEA Handbook has been designed targeting the following audience groups:

- Strategic Planners of e-Governance and Digital Governance (Secretaries, Heads of Department and CEO's)
- Architects of e-Governance and Digital Governance
- Designers of Digital Ecosystems
- System Integrators
- System Analysts
- Developers (Waterfall and Agile), and
- Start-ups

## 1.4 Common Concepts and Instruments in Agile IndEA

IndEA Framework and Agile Practices have been distilled and harmonized while designing Agile IndEA. The following key concepts and instruments are proposed to be the essential components of Agile IndEA. These are explained in the rest of the Handbook:

- Stakeholder Engagement
- Value Streams
- Portfolio of Services
- Minimum Viable Architecture
- Building Blocks
- Product Roadmap
- Epics and User Stories
- Templates for the Core Components of Agile IndEA
- Agile Procurement

Agile IndEA recommends referring to the IndEA Reference Models, where and when required for seeking more details - adopting the principle of **Just-Enough-Architecture**. Agile IndEA can be applied to both **Greenfield** and **Brownfield** Projects. While applying Agile IndEA to the brownfield projects, a careful assessment has to be made of the existing/ legacy applications using the self-assessment template provided by the **Digital Service Standard notified by MeitY**.

## 1.5 Goals of Agile IndEA

The following goals are sought to be achieved through the adoption of Agile IndEA Framework, advocated in this handbook:

- a. A pragmatic approach is adopted in the design, development, and implementation of enterprise-class digital projects, keeping in view the triple constraints of **Scope, Time and Budget**.
- b. The stakeholders will derive the best of both worlds – **Vision** and **Velocity (V<sup>2</sup>)**.
- c. There will be better coordination and collaboration between Promoters, Architects, Developers and Operation Teams.
- d. The stakeholders are assured of **Value-for-Money**
- e. **Time-to-Benefit** is shortened with compressed timelines, agile procurements, and **Quick Wins**.
- f. Adoption of Agile IndEA will form the stepping stone for the onward journey towards establishing **Digital Ecosystem(s)** in the related sector(s) to unleash the power of **innovation, creativity** and **value-added-services**, to be brought in by actors *outside* the 'Enterprise', but *inside* the ecosystem.

## 1.6 Normative References

The following referenced documents are indispensable for the application of this framework. This handbook is a companion to:

- a. India Enterprise Architecture (IndEA) Part 1, [download here](#).
- b. India Enterprise Architecture (IndEA) Part 2, [download here](#).
- c. Digital Service Standard, [download here](#).
- d. The Shillong Declaration, [download here](#).

## Chapter 2

### Principles of Agile IndEA

The core philosophy of the Agile IndEA Framework lies in the following set of six **Principles**, which, if followed scrupulously, would enable any enterprise to achieve the goals set out in section 1.5.

**PRINCIPLE #1**

Identify, Define and Assess Value

**PRINCIPLE #2**

Develop Just-Enough-Architecture (JEA), Just-In-Time (JIT)

**PRINCIPLE #3**

Adopt MINIMALIST approach in ALL aspects and at ALL stages

**PRINCIPLE #4**

Design a Federated Architectural Model

**PRINCIPLE #5**

Axiomize API-based access and Integration

**PRINCIPLE #6**

Evaluate and Enhance CITIZEN EXPERIENCE continuously

**PRINCIPLE #7**

Follow Agile Procurement methods.

The following guidelines supplement the above seven principles.

1. Combine the **Rigour** of Architecture with the **Pragmatism** in Implementation. The Principles of JEA, JIT, and Minimalist Approach help achieve the balance between the two.
2. Target launching **Quick Wins** that deliver **significant value** quickly- the first one typically within 3 months of the start, and the rest at, say, quarterly intervals.
3. Keep the Core Infrastructure, Core Data, and Core Applications to the **minimum**. Encourage the **'outside'** stakeholders of the ecosystem to design and develop the majority of the citizen-facing applications.
4. **Enhance and Integrate** the qualified legacy applications rather than developing them afresh.
5. **Publish the latest version of Architecture** as a short, precise, non-abstract document at frequent intervals to guide all the teams, as it evolves over the project period.

## Chapter 3

### Agile IndEA Framework

This Chapter describes the Agile IndEA Framework and the methodologies to implement the same by any Ministry of GoI, any State Government or any large public organization.

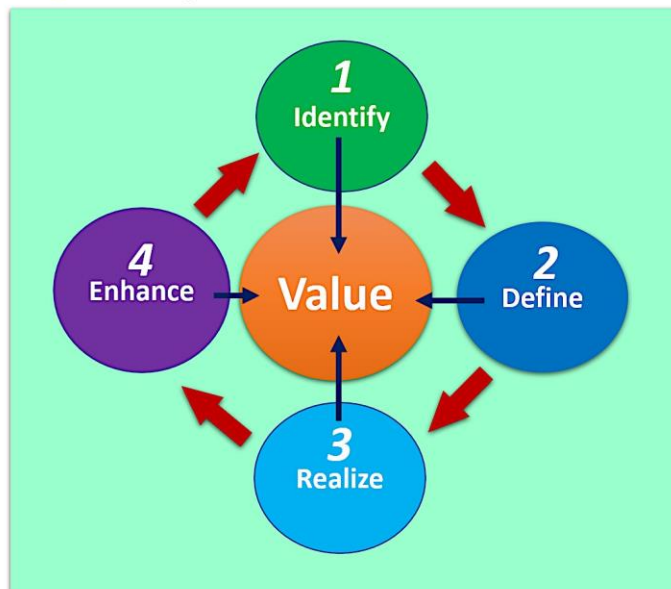
#### 3.1 Value of Value

Agile IndEA is all about **Value**. It is Value-Centric and Value-Driven. In sum, Agile IndEA is about

- *Identifying* Value
- *Defining* Value
- *Realizing* Value and
- *Enhancing* Value

The Virtuous Circle of Value depicted in **Figure 3.1** epitomizes the essence of Agile IndEA:

**Fig 3.1 - Agile IndEA is about Value**



Agile IndEA Framework emphasizes that **organizations need not, and should not attempt to identify the entire, long-term value at the very beginning**, nor try to realize it in the same cycle. The entire value can be realized in multiple cycles or **Waves**, typically 2 to 3, as explained in **Chapter 4**.

#### What, then, is Value, which is so central to Agile IndEA?

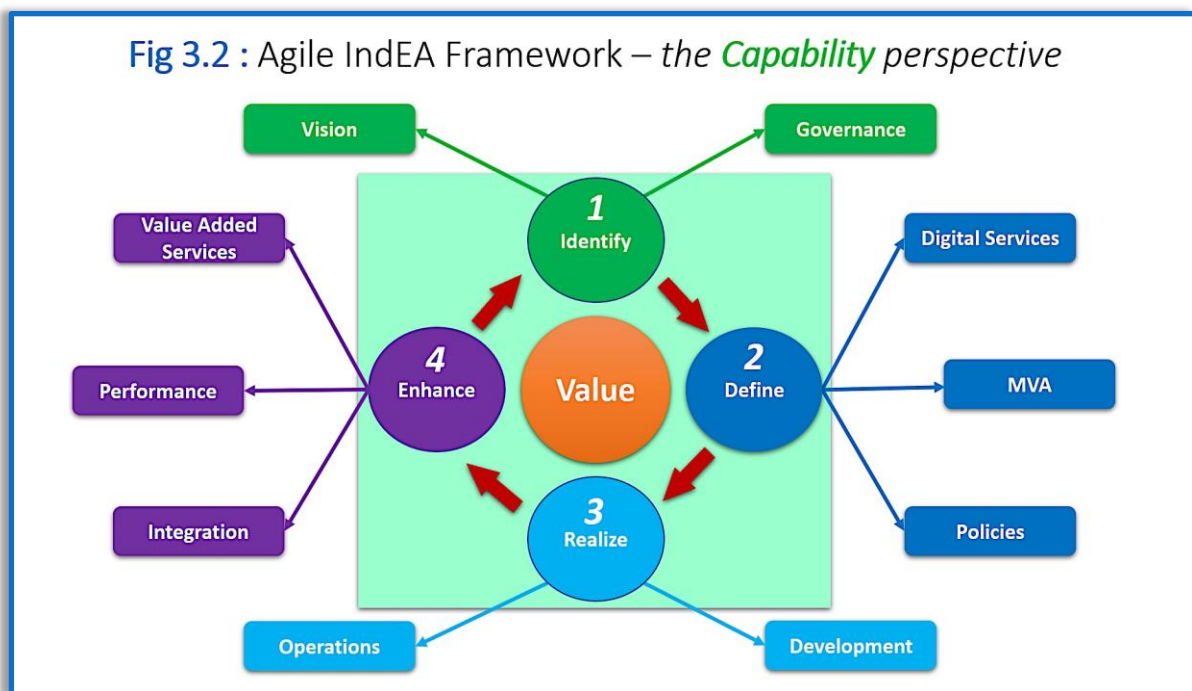
In the context of Agile IndEA, Value is the **stakeholder-perceived value**, which is an aggregation of the Functional Value, Economic Value, Social Value and Psychological Value of a service offered to the stakeholder. Value can be in different forms from the varying perspectives of different stakeholder groups. Value can also be time-dependent. In the context of Digital Governance, the stakeholders expect the services to have the following attributes (illustrative):

- i. Value is realized **early**
- ii. Services are **Efficient, Convenient, Cost-effective** and **Transparent**
- iii. Service Delivery results in a **transformed User Experience**, through **end-to-end, innovative** and **Value-Added-Services**

- iv. **User Satisfaction** is high.
- v. There is scope and a defined process for **continuous improvement** of the value a service provides.
- vi. The promoters *realize savings in cost and effort* in providing the service, and the customers too *experience* reduced cost and time in availing the service, with added convenience.
- vii. All Systems deployed to design, develop and deliver value are **Standards-based, Interoperable, futuristic** and **future-proof**.

### 3.2 Overview of Agile IndEA Framework

Against the above background, the Agile IndEA Framework calls for developing **Capabilities** around the four value-driven areas. In this context, capability is defined as '*the measure of the ability of an entity (department, organization, person or system) to achieve its objectives, especially about its overall vision, and to deliver/get value*'. **Figure 3.2** provides an overview of the ten capabilities required to be established for implementing an Agile IndEA initiative.



### 3.3 Agile IndEA Capabilities and Components

Capabilities are high-level concepts, not directly actionable. Each capability needs to be understood in terms its **Components**. In the context of Agile IndEA, Components manifest themselves in two basic forms – Artefacts and Actions.

An **Artefact** is a documented form that contains a clear *articulation* of the '**WHAT**', '**HOW**' and '**WHO**', about the Identification, Definition, Realization, and Enhancement of Value. Examples of Artefacts are Vision Statement, Architecture Principles, Policies and Plans.

An **Action** is a coordinated set of activities aimed to *translate* the *value articulated* in the Artefacts into *value realized* in the form of tangible services provided to the stakeholders. Examples of Actions are *decisions* taken by the Governance Structures, *software* developed and deployed to provide services, program *management*, receiving *feedback* and *enhancing the value* provided by a service.

- *Artefacts* arise out of the process of **thinking**, that culminates into formal work products;
- *Actions* require decisions to be taken, leading to **doing** something that results in significant impact; and
- All artefacts must lead to one or more actions.

**Table 3.1** provides a concise definition of each of the 10 Agile IndEA capabilities and specifies a set of artefacts and/or actions that can translate each capability into tangible contributors to the value streams, which, together would enable the fulfilment of the vision of the organization. Table 3.1 provides a list of 26 Components, out of which **12 are Artefacts and 14 are Actions**.

	Capability	Definition of Capability	Components of the Capability (Artefacts or Actions)	Category of Component
Identifying Value				
1	Vision	An aspirational description of what an organization would like to achieve in the long-term future. It is intended to serve as a clear guide for choosing current and future courses of action.	1.1 Vision Statement	Artefact
			1.2 Value Streams	Artefact
			1.3 Architecture Principles	Artefact
2	Governance	Establishment of policies, and continuous monitoring of their proper implementation by the designated structures.	2.1 Stakeholder Engagement	Action
			2.2 Governance System	Action
			2.3 Implementation Strategy	Artefact
Defining Value				
3	Digital Services	Digital Services are Whole-of-Government (WoG) services built on highly secure, reliable, scalable, replicable and open technologies.	3.1 Service Portfolio	Artefact
			3.2 Service Levels	Artefact
			3.3 Quick Wins	Actions
			3.4 Development of Epics	Actions
4	MVA	Minimum Viable Architecture is an architectural model that balances architectural rigour and speed-to-market.	4.1 Architectural Models for Data, Applications and Technology	Artefacts
			4.2 Building Blocks	Artefacts
5	Policies	A policy is a system of principles to guide decisions and achieve rational outcomes, and implemented through procedures.	5.1 Security & Privacy Policies	Artefacts
			5.2 Data Sharing Policy	Artefact
Realizing Value				
6	Development	Software development is the process of conceiving, specifying, designing, programming, documenting, testing, and de-bugging involved in creating and maintaining digital services and applications.	6.1 Product Roadmap	Artefact
			6.2 Development	Action
7	Operations	Activities associated with establishing, configuring and managing IT Infrastructure and for deploying and managing applications from the point of	7.1 Asset/ Service Acquisition	Action
			7.2 O& M	Action
			7.3 Capacity Building	Action



	Capability	Definition of Capability	Components of the Capability (Artefacts or Actions)	Category of Component
		availability, performance and security, and for building 'People Capabilities'.	7.4 Change Management	Action
<b>Enhancing Value</b>				
8	Integration	Process of linking together different computing systems and software applications to act as a coordinated whole through interoperability.	8.1 Integration Architecture	Artefact
			8.2 API Management	Action
9	Performance	The accomplishment of a given task or providing a planned service, measured against pre-set known standards of accuracy, completeness, cost, and speed.	9.1 Performance Management	Action
			9.2 User Feedback	Action
10	Value-Added Services	Additional Services that enhance the value of a digital service in the form of better user experience, intra- and inter-sectoral integration, and in the context of Agile IndEA, include new and innovative services.	10.1 Inducting 'External Developers'	Action
			10.2 Value-Added Services	Action

Table 3.1: Capabilities and Components

The list of Components (Artefacts and Actions) shown in Table 3.1 is illustrative

The set of Components required in the context of an enterprise depends on several factors such as the maturity level of the Information Systems already in place (legacy systems), the people capability of the enterprise, its appetite for change and transformation, and above all, the availability of time and budget. The list in Table 3.1 can, therefore, be expanded or contracted after assessing the specific goals and requirements of the enterprise.

### 3.4 Guidelines for Developing Artefacts

Artefacts can be categorized into two categories – *Directional* and *Prescriptive*.

**Directional Artefacts** provide a sense of direction, generally useful to guide all the actions and activities to be performed by various stakeholders for implementing the EA initiative. These are the items [1.1](#), [1.2](#), [1.3](#), [4.1](#) and [6.1](#)

**Prescriptive Artefacts** mandate the observance of certain critical norms, standards or regulations. These are [3.1](#), [3.2](#), [4.2](#), [5.1](#), [5.2](#) and [8.1](#)

The following guidelines make it easier for developing the artefacts as required for implementing IndEA in an agile way, w.r.t the environment of an enterprise.

1. **Decide whether to develop an artefact, drop it altogether or defer its development to a later stage.** Artefacts must be produced if and only if they can lead to actions that can **create or deliver value**.
2. **Ensure that every artefact is concise and precise.** Artefacts are mostly in the form of a document or a set of diagrams. The author(s) should articulate the intent and the actionable items in as little of language as possible, without compromising on its comprehensibility and usefulness. The typical size of any Agile IndEA Artefact is **3 pages** for a large Ministry.

3. **Leverage the templates, formats and standards for developing an artefact.** Most of the artefacts suggested in Table 3.1 can be based on standard templates, formats or ToC's available on the web or in the literature on the subject. This would save a lot of time and effort. While IndEA Framework has some useful templates, this handbook provides 6 useful templates in **Annexure II**.
4. **Prescribe responsibilities and timelines for developing the necessary artefacts.** Development of artefacts should not become a prolonged exercise by itself. The responsibility for developing each artefact should be assigned to a named person or a consulting firm, with specific calendar dates for delivery of the artefact.

### 3.5 Guidelines for Executing Actions

Actions can be categorized into three categories – *Decisions, Development and Operations*.

- A **Decision** is the option or course of action chosen by a designated body or actor on any matter that impacts the identification, definition, realization and enhancement of value. Decisions arise out of an event, like the Vision Workshop, Stakeholder Consultation or meetings of Architects, Developers and Operations teams. These are the items **2.1, 2.2, 7.1**.
- **Development** is the creation of software applications for delivering services and includes the methods adopted and the accompanying documentation. Various methodologies, predominantly, the Agile Methodologies, are adopted for the development. In most enterprises, Agile Methodologies may have to be used in conjunction with the conventional development methodologies, to take care of the enhancement and integration of legacy systems in the EA. The items **3.3, 3.4 and 6.2** in Table 3.1 relate to Development.
- **Operations** relate to the physical actions required to implement a digital transformation project, and/ or enable assessing the pace of implementation and quality of the service. These are the items **7.2, 7.3, 7.4, 8.2, 9.1, 9.2, 10.1 and 10.2**.

The following guidelines enhance the effectiveness of the execution of actions required for implementing IndEA in an agile way.

1. **Effective Governance Structure:** Establish multi-level (at most 3-level) decision-making structures at Leadership, Strategic and Operational levels. Bring out complete role clarity at each of the levels.
2. **Efficient Project Management:** Establish monitoring and issue-tracking systems, preferably automated and aided by real-time dashboards. Use standard tools suitable for IT Projects, especially with features to manage agile projects.
3. **Parallel Actions:** Contract timelines by undertaking several actions in parallel. For instance, multiple agile teams can be established to work in parallel on different modules, as soon as the Service Portfolio is firmed up [**component 3.1**] and the first cut of Architecture Models have been designed [**component 4.1**].
4. **Timelines:** Prescribe challenging timelines for all Actions.
5. **Procurement:** Put in place agile procurement procedures such that the lead times are the least possible and any critical dependencies do not upset the overall project timelines. Section 3.5 provides detailed guidelines on the procurement procedure recommended for the implementation of a digital transformation initiative using Agile IndEA Framework.

6. **Quick Wins:** Focus initially on Quick Wins, to spread the right messages on the benefits in store. This would greatly ease the otherwise onerous challenge of Change Management.
7. **Slice and Dice:** Plan to deliver value in tranches, not all at a time. Avoid the 'Big Bang' approach. Plan for delivering value over 2 or 3 cycles or waves. The slicing can be done in several different ways like, development goals, function-by-function, highest business value first, based on resource availability or by end-user (beneficiary) groups.

### 3.5 Mapping Agile IndEA Artefacts to IndEA Framework

IndEA Framework is elaborate and contains a set of 8 Reference Models, and methodologies to design the Architecture in 8 domains. Agile IndEA draws its motivation from IndEA, but considerably reduces the 'Architecture Development work' envisaged in IndEA. It is a desirable practice to refer to the relevant portion(s) of IndEA Framework, while implementing a Digital Governance Program or Project using Agile IndEA Framework. **Table 3.2** provides a mapping of the Artefacts and Actions recommended in section 3.3 (penultimate column of **Table 3.1**) with detailed **Informative Resources** available in the IndEA Framework, to be used **as and when needed**. Such an approach is in keeping with the Principles of Just-Enough-Architecture and Just-In-Time Architecture, specified in Chapter 2 of this Handbook. (**Principle #2**). Table 3.2 also recommends certain methodologies for designing of the Artefacts.

**Table 3.2 - Mapping Agile IndEA Components to IndEA Framework**

Artefact Code	Component Name	Informative Resource of IndEA	Recommended Intervention
<b>Capability 1: VISION</b>			
1.1	Vision Statement	Sec 1.3, Sec 4.3, Sec 4.5	Vision Workshop
1.2	Value Streams	Sec 3.6	Value Mapping
1.3	Architecture Principles	Table 2.1 of IndEA, Chapter 2 of Agile IndEA Handbook	Brainstorming
<b>Capability 2: GOVERNANCE</b>			
2.1	Stakeholder Engagement	Sec 11.3	<ul style="list-style-type: none"> <li>Stakeholder Engagement Plan (SEP)</li> <li>Annexure II of this Handbook.</li> </ul>
2.2	Governance System	Sec 10.4, 10.5	<ul style="list-style-type: none"> <li>Multi-tier decision-making</li> <li>Empowerment</li> <li>Agility in decision-making</li> </ul>
2.3	Implementation Strategy	Sec 11.5, 11.6	<i>(Specific to each project)</i>
<b>Capability 3: DIGITAL SERVICES</b>			
3.1	Service Portfolio	Sec 4.6, Sec 6.4.g, 6.4.h, 6.4.i	<ul style="list-style-type: none"> <li>AS IS Study</li> <li>Stakeholder workshop</li> </ul>
3.2	Service Levels	Digital Service Standard	Study of International, National Benchmarks
3.3	Quick Wins	-	<ul style="list-style-type: none"> <li>Stakeholder Workshop</li> <li>Priorities of Sponsor</li> </ul>
3.4	Epics	-	<ul style="list-style-type: none"> <li>Agile Methodology</li> <li>Annexure II of this Handbook.</li> </ul>

Artefact Code	Component Name	Informative Resource of IndEA	Recommended Intervention
Capability 4: MVA			
4.1	Architectural Models for Data, Applications and Technology	<ul style="list-style-type: none"><li>Chapters 5,6 and 7 of IndEA Framework</li><li>Chapter 4 of this Handbook</li></ul>	<ul style="list-style-type: none"><li>Brainstorming among Architects &amp; Developers</li><li>Industry Consultation</li><li>Annexure II of this Handbook.</li></ul>
4.2	Building Blocks		
Capability 5: POLICIES			
5.1	Security & Privacy Policies	Sec 9.7, Annexure VIII of IndEA	<ul style="list-style-type: none"><li>ISO methodologies for Security Policy</li><li>Discussion with Domain experts for Privacy Policy</li></ul>
5.2	Data Sharing Policy	Sec 5.6	<ul style="list-style-type: none"><li>Stakeholder Engagement</li></ul>
Capability 6: DEVELOPMENT			
6.1	Product Roadmap	-	<ul style="list-style-type: none"><li>DevOps</li></ul>
6.2	Development	-	
Capability 7: OPERATIONS			
7.1	Asset/ Service Acquisition	Sec 11.5.3	<ul style="list-style-type: none"><li>IT4IT (<i>Pl see Ref 3, pg 29</i>)</li></ul>
7.2	O& M	Sec 11.5.4, Sec 11.6	<ul style="list-style-type: none"><li>Project Management Tools</li><li>Engaging PMP Professionals</li></ul>
7.3	Capacity Building	-	( <i>Specific to each project</i> )
7.4	Change Management	-	<ul style="list-style-type: none"><li>ACMP Standard for Change Management</li><li>Annexure II of this Handbook.</li></ul>
Capability 8: INTEGRATION			
8.1	Integration Architecture	Sec 8.2, 8.5,8.6	Brainstorming
8.2	API Management	Sec 7.5.1, Sec 8.5, 8.6	API Gateway
Capability 9 : PERFORMANCE MANAGEMENT			
9.1	Performance Management Plan	Sec 3.5	Performance Management Tools
9.2	User Feedback Strategy	-	SEP (pl see 2.1 above)
Capability 10: VALUE ADDED SERVICES			
10.1	Entry criteria for VAS Developers	-	Discussions in Governance Bodies
10.2	Data Access Policy for VAS Providers	-	Industry Consultation

The Agile IndEA map shown in Table 3.2 can be used effectively adopting the following guidelines:

- The Artefacts and Actions needed for a particular EA Initiative may be firmed up, after the Vision workshop and Stakeholder consultation.

- b. The necessary Artefacts and Actions may be sequenced to take care of the dependencies in their development.
- c. Different teams may be commissioned to develop the artefacts in a parallel, but must be coordinated in a manner to achieve **convergence, congruity, and coherence** between various artefacts/actions to avoid duplication of efforts.

### 3.5 Recommended Procurement Procedures for Agile IndEA

The adoption of Agile methods of developing architecture and software may seem to pose a problem vis-à-vis the established methods of public procurement prescribed by the GFR. This perception is primarily on account of the requirement to follow the principles of (i) Just-Enough-Architecture, Just-in-Time (Principle #2) and (ii) iterative and continuous development and improvement. (Principle #6)

Essentially, the aforesaid principles in particular and the Agile philosophy in general, assume that the architecture and the 'requirements' are too high-level and coarse to begin with and evolve over the period of the project. How is it possible, in such a situation, to create a bid document that establishes a level playing field, enables the bidders to understand the scope similarly and also creates an objective way of evaluating the bids received, in a 'rational' and transparent way?

**Agile procurement** is a way of acquiring solutions according to the outcomes the organization seeks, rather than by prescribing a set of a detailed requirements and specifications. As per the current practices of the industry, agile procurement enjoins the following:

- a. The procuring organization is not just buying software. It is entering into a relationship with the selected entity, to jointly design and build a new and innovative system.
- b. Incremental pricing is preferred to the traditional fixed-price arrangements.
- c. The focus of the organization changes from contract management to performance management in the post-award period.

Ideally, a new set of procurement rules and guidelines need to be evolved to meet the peculiar requirements of agile procurement. US Government, for instance, has notified the TechFAR norms and guidelines that apply to the procurement of solutions adopting the Agile Development methodology.

Pending the evolution and notification of the rules for Agile procurement, the following guidelines are recommended as derived from the global good practices.

1. **Adopt a Hybrid Price Model:** The Agile IndEA Framework articulated in this handbook takes a holistic view of digital transformation. Software development is but one of the several other components like provisioning the IT and non-IT infrastructure, capacity building, change management and service delivery in the IT value chain. The IT Infrastructure, which forms a significant proportion of the project cost, consists of the hardware, system software and networking, which are amenable to a precise estimation and specification. The efforts involved in capacity building and change management, likewise, are quantifiable. Accordingly, it is possible to adopt a hybrid price model while formulating the RFP, whereby, a fixed-price model is adopted for all the components except the application software and a T&M model is adopted for the development of the application software. This reduces the 'variability' to a large extent.
2. **Adopt pay-per-use model for IT Infrastructure:** All IT infrastructure, including system software, is today available on a cloud-model, i.e. pay-per-use. Advantage of this model may

be taken while procuring for digital transformation projects. MeitY guidelines on selection of empanelled Cloud Service Provider (CSP) are useful in this regard.

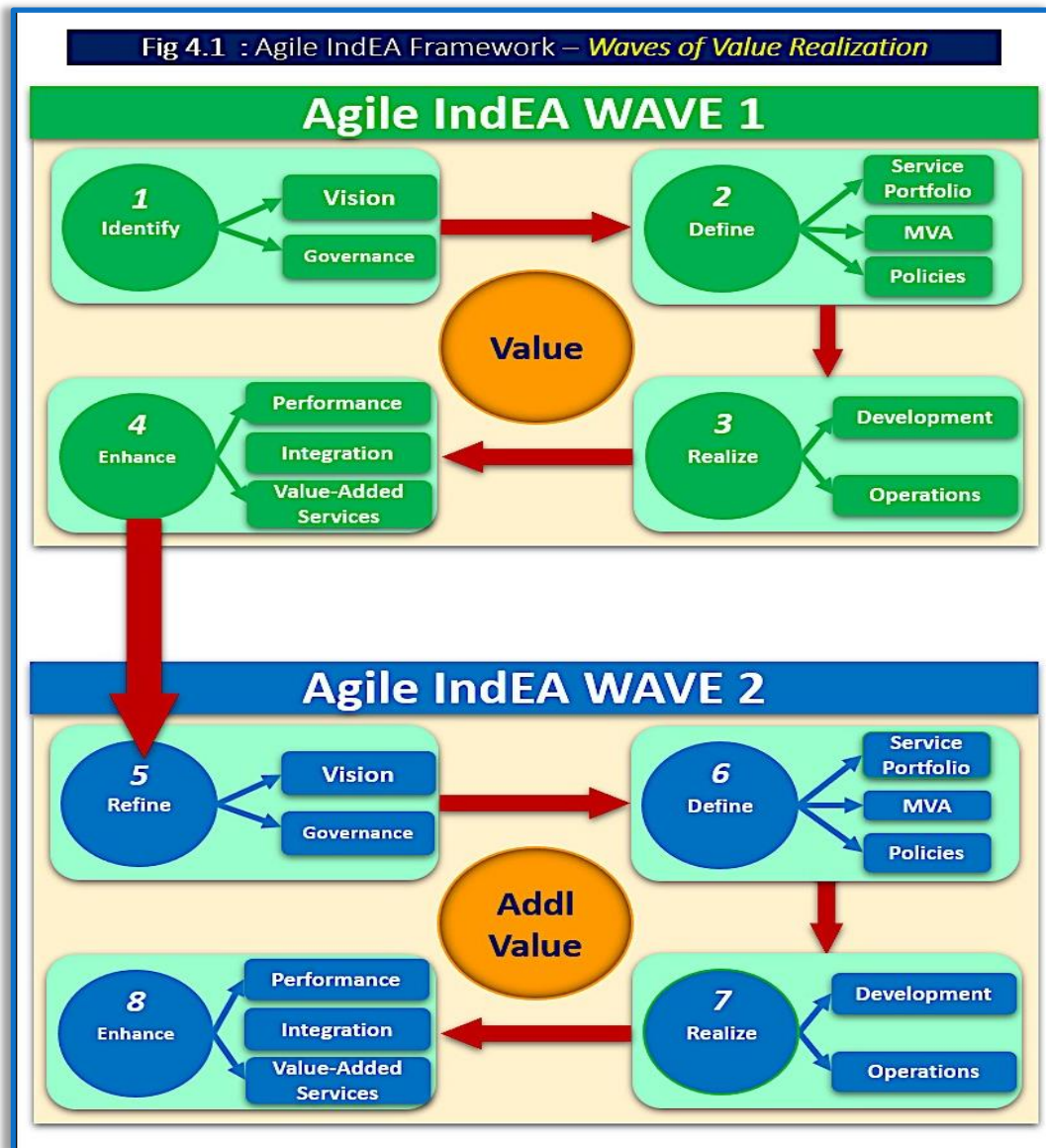
3. **Adopt Transaction Model:** Several projects have been implemented on a pay-per-transaction model. The earliest and the highly successful model is of the Passport Seva Project. Several digital transformation projects are amenable to be designed on a transaction model. The main difference in using such model adopting the Agile IndEA approach is that the sponsoring organization gets deeply engaged in the design and development of the project jointly with the selected implementing agency or partner.
4. **Use Statement of Objectives (SOO):** In a typical performance-based services contract, as exemplified in the previous paragraph, an SOO forms the key part of the RFP. The detailed specification of requirements is not undertaken. This is precisely the requirement in the adoption of the Agile IndEA framework, in so far as the application development is concerned. SOO is a precise and concise statement of the broad, basic, top-level objectives of the initiative and is used as a tool by both the Government and bidders in crystallizing on the approach to the solution.
5. **Areas of further work:** While the recommendations 1 to 4 above, provide a way forward in agile procurement, the following areas need a detailed examination by the procuring organization for successful procurement and outcome.
  - a. Agile Contract
  - b. Method for effort estimation for software development in an agile way.
  - c. Modular procurement to synchronize with the phased implementation in waves and deliver value with velocity (see Chapter 4)

## Chapter 4

### Realizing Value in Waves

#### 4.1 Iterative Development

The Agile IndEA Framework and methodology suggested in Chapter 3 is generic and assumes that most of the value is to be realized in one iteration, with the possibility of continuous enhancement. However, in real practice, and especially for very large organizations, it is very difficult to engage all their departments or lines of business in one phase. It is, therefore, necessary to provide for realizing the value for the enterprise in phased cycles or **WAVES**. **Figure 4.1** depicts the Agile IndEA framework in which the value is realized in **two Waves**.



The following guidelines help in the adoption of the wave-approach.

- Specialization/ Work Division:** All stakeholders need not 'digest' the methods for preparing all the artefacts. A **need-to-know** approach can be adopted. The matrix in **Table 3.3** indicates the capabilities and the artefacts that different stakeholder groups need to familiarize themselves with.



Table 4.1 : Stakeholder-Capability Matrix

	Stakeholder Group	Capabilities to focus on
1	Promoters of the Initiative	<ul style="list-style-type: none"> <li>• Vision</li> <li>• Governance</li> <li>• Performance</li> </ul>
2	Strategic Planners	<ul style="list-style-type: none"> <li>• Policies</li> <li>• Value-Added-Services</li> </ul>
3	Architects	<ul style="list-style-type: none"> <li>• MVA</li> <li>• Integration</li> </ul>
4	Designers	<ul style="list-style-type: none"> <li>• MVA, Digital Services</li> </ul>
5	System Integrators	<ul style="list-style-type: none"> <li>• Integration</li> <li>• Development</li> <li>• Operations</li> </ul>
6	System Analysts	<ul style="list-style-type: none"> <li>• Development</li> </ul>
7	Developers	<ul style="list-style-type: none"> <li>• Development</li> </ul>
8	Start-ups	<ul style="list-style-type: none"> <li>• Digital Services</li> <li>• Value-Added-Services</li> <li>• Integration</li> <li>• Operations</li> </ul>

- b. **Informative Resources:** The Promoters and the Strategic Planners need to fully digest the Preface and the Executive Summary of the IndEA framework, besides the Agile IndEA Handbook in its entirety. All other stakeholders should digest the relevant Chapters of IndEA and the Agile IndEA Handbook in its entirety.
- c. **Prioritization:** The essence of Agile methodology being just-in-time, the Strategic Planners should carefully **prioritize the services** and the artefacts, and farm them out in 2 or 3 phases or waves. This would enable all the other teams of stakeholders to align and sequence their efforts in the most efficient manner. **Gol Ministries and State Governments may preferably limit the initiative to a maximum of 3 Departments/Sectors in Wave 1.**
- d. **Triple Constraint:** The Promoters and Strategic Planners have to ‘scope’ the initiative, albeit in an iterative manner, to match the design, development and implementation tasks with the available resources and planned schedules of delivery.
- e. **Procurement Strategy:** One of the key responsibilities of the Promoters is to lay down a clear procurement strategy, fairly in the initial stages of the project. The following broad principles may be kept in view while designing the procurement strategy:
  - i. Centralized procurement should be kept to the minimum. Product Owners should be empowered to take most of the procurement decisions.
  - ii. Open Source Products may be preferred over proprietary products.
  - iii. A **Global Consultant** may be selected to support the enterprise in the design and implementation of the Agile IndEA initiative. (The term ‘Global’ is used in the context of the ‘*whole of the enterprise*’, spanning all its divisions, but not to mean an ‘*international consultant firm*’.)
  - iv. **Super System Integrator:** In the context of large and complex enterprises, it is necessary to select a Super System Integrator, with the mandate of designing the Core Systems, developing the common artefacts to be used across the enterprise, to coordinate between the various incumbent and new system integrators, made



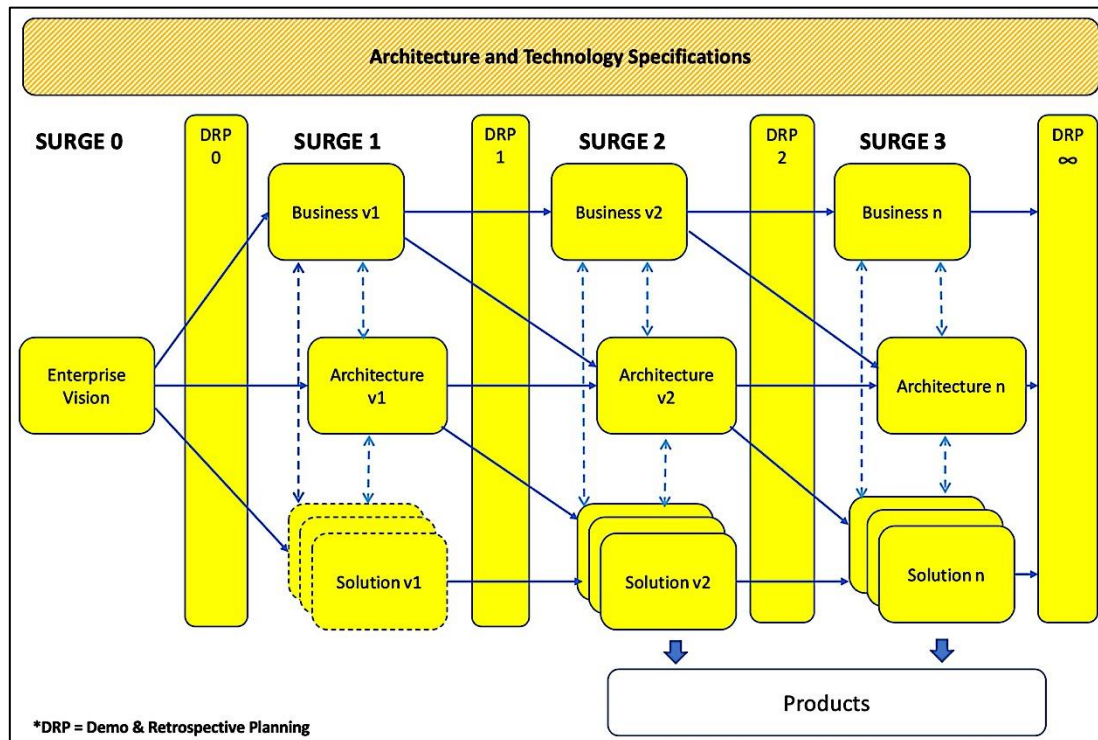
responsible to implement different ‘packages’ or segments of the initiative, and to program-manage the whole initiative.

## 4.2 Agile Development in Surges

Agile IndEA Framework envisages an iterative development of both the Architecture and the Services. This calls for an extraordinary degree of planning and coordination between the various actors, namely, the Top Management (Sponsor), Executives, Architects, Internal IT Team, Dev Teams, Ops Teams and the HR Team. Several related activities have to be undertaken and completed within tight deadlines, in the form of **Surges**, within a wave.

In the parlance of Agile IndEA, a **Surge** is a burst of activities focusing on a specific activity under the Transformation Program, with the objective of providing the **specified deliverables**, by the team charged with that responsibility. Once a wave is identified covering one full value cycle (see Figure 3.1), this can then be realized using a series of surges, undertaken by the different teams, some in parallel, and some in a sequential manner due to the dependencies. Figure 4.2 is a depiction of how the overall sequence of surges and outputs should play out. On completion of each wave, the outputs must deliver value.

**Figure 4.2: Recommended Sequence of Surges and Outputs in Agile IndEA**

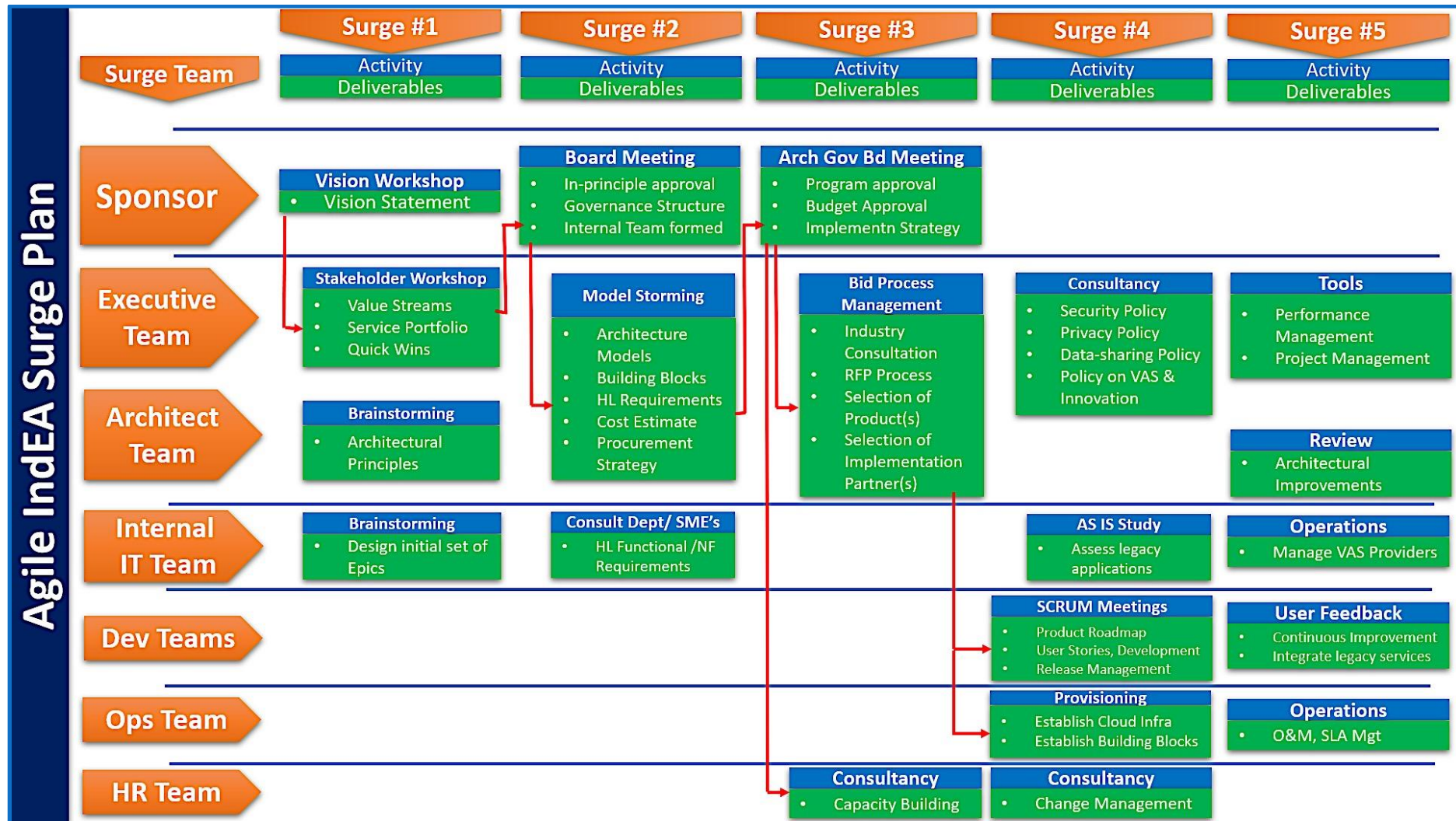


**Figure 4.3** is a detailed schematic representation of the **Agile IndEA Surge Plan** or the Action Plan for implementing a Digital transformation Program adopting the Agile IndEA Framework. The following guidelines help prepare the Agile IndEA Surge Plan:

1. The **Agile IndEA Surge Plan** (AISP) is a **template** for the creation of a work plan specific to an organization intending to adopt the Agile IndEA framework.
2. AISP classifies all the actions required in an IndEA initiative along 2 dimensions – the Actors/ Teams and the sequence of activities to be undertaken by them.
3. The interdependencies of the various activities are depicted in the AISP.

4. AISP is suited for the development of the Architecture and the Applications in a near parallel mode, after an initial period of identifying and defining the business value the enterprise intends to realize through the initiative.
5. All the capabilities and their components specified in Table 3.1 are contained in the AISP. In addition, certain other essential administrative and governance activities are also included to provide a holistic approach to the implementation.

Figure 4.3 – Agile IndEA Surge Plan



## Chapter 5

### Minimum Viable Architecture and Building Blocks

The Minimum Viable Architecture (MVA) is key to the Agile IndEA Framework. Hence it is being treated at some length in this Chapter. Keeping in view the factors such as reusability, openness and the need for enforcing some basic standards of data, the Minimum Viable Architecture is designed in terms of Building Blocks.

MVA consists of 2 interdependent elements – the Architectural Model and the Building Blocks. The Architectural Model should ideally consist of 8 individual architectures, in terms of the 8 Reference Models of IndEA. However, keeping in view the principle of minimalist approach, the Agile IndEA framework focuses on 3 Architectural Models, namely, Data Architecture, Application Architecture and Technology Architecture in the first Wave. The templates for these are given in **Annexure II**.

The MVA, therefore consists of the 3 Architectures and the essential Building Blocks required to establish the same. Developing the Architectural Models is not elaborated here, as the same can be adopted from the IndEA Framework. The rest of the Chapter deals with Building Blocks.

#### 5.1 Concept of Building Blocks

In architectural parlance, a building block is a package of functionality defined to meet business needs. Building blocks have to interoperate with other building blocks. A good choice of building blocks can lead to improvements in legacy system integration, interoperability, and flexibility in the creation of new systems and applications. Wherever interoperability is required, the interfaces to a building block are published and reasonably stable. A building block is intentionally designed to be cross-functional allowing its generic functionality to be applied to different contexts. Each Building Block must have the following characteristics:

- Provide a standalone, useful, reusable and implementable capability
- Cross-functional across the value chain by design
- Applicable to multiple use cases
- Interoperable with other building blocks
- Use shared digital infrastructure (to the extent feasible)
- Standards-based and
- Designed for scale

Each Building Block must have a clear “Business Owner” and “Technology Owner”. The business owner is responsible for defining the rules and policies essential to effectively manage the building block. The technology owner would be responsible for managing the business requirements and technical implementation of these requirements efficiently.

#### 5.2 Categories of Building Blocks

Building blocks are categorized as **Core Building Blocks (CBBs)** and **Common Solution Building Blocks (CSBBs)**. The CBBs represent the technical capabilities, while CSBBs capture the common business requirements. **Table 5.1** provides a list of Agile IndEA Building Blocks. The list is more comprehensive than required by any typical organization. Organizations have to select the BB's required for their Transformation Initiative.

Table 5.1: Catalogue of Building Blocks

Category	Agile IndEA Building Blocks
Core Building Blocks	<b>Core Building Blocks to be established in WAVE 1</b> <ol style="list-style-type: none"> <li>1. <b>Digital identity</b> – Enable unique identification and authentication of users, organizations or other entities</li> <li>2. <b>Digital Registries</b> – Centrally manage databases that uniquely identify and describe persons, service providers, facilities, assets, procedures, products, sites or other entities related to the organization.</li> <li>3. <b>Integration management</b> – Provide a gateway between external digital applications and other Building Blocks, thereby ensuring interoperability and implementation of standards, which is essential for integrating various Building Blocks and applications</li> <li>4. <b>Messaging</b> – Facilitate notifications, alerts, or two-way communications between applications and communications services, including short messaging service (SMS), unstructured supplementary service data (USSD), interactive voice response (IVR), email or social media platforms</li> <li>5. <b>Cloud Infrastructure</b> – For hosting data and applications, getting all the benefits of cloud</li> <li>6. <b>Security and access</b> – Provide ICT administrators the ability to centrally configure and manage user and group access permissions to network resources, services, databases, applications, and user devices</li> </ol>
	<b>Core Building Blocks to be established in WAVE 2</b> <ol style="list-style-type: none"> <li>1. <b>Mobility management</b> – Securely enable employee use and management of mobile devices and applications in a business context</li> <li>2. <b>Analytics and business intelligence</b> – Provide data-driven insights about business processes, performance, and predictive modeling</li> <li>3. <b>Artificial intelligence</b> – Package machine intelligence capabilities as reusable services to perform work, extract insights from data, or provide other business capabilities</li> <li>4. <b>Geographical information</b> – Provide functionality to identify, tag and analyze geographic locations of an object, such as a water source, building, mobile phone or medical commodity</li> <li>5. <b>Enterprise App Store</b> – Provide a single touchpoint (download point) for all the Apps of the Enterprise.</li> </ol>
Common Solution Building Blocks	<b>Common Solution Building Blocks to be established in WAVE 1</b> <ol style="list-style-type: none"> <li>1. <b>Registration</b> – Records identifiers and other general information about a person, place or other entity, typically for registration or enrolment in specific services or programmes and tracking of that entity over time</li> <li>2. <b>E-Payments</b> – Implement and log financial transactions receipts and payments online in multiple ways.</li> <li>3. <b>Workflow management</b> – Help to optimize business processes by specifying the rules that govern the execution of a sequence of activities and the exchange of associated information to orchestrate the process flow from initiation to completion.</li> <li>4. <b>Case management</b> – Register or enroll users and provide longitudinal tracking of services, often across multiple service categories, departments and locations</li> <li>5. <b>Feedback</b> – Provide the ability for consumers and providers of services to send, track and address any issues pertaining to service quality, including any kind grievance redressal.</li> <li>6. <b>Consent management</b> – Manage a set of policies allowing users to determine the information that will be accessible to specific information consumers, for which purpose, for how long, and whether it can be shared further</li> <li>7. <b>Reporting and dashboard</b> – Provide pre-packaged and custom presentations of data and summaries of an organization's pre-defined key performance metrics, often in a visual format</li> </ol>
	<b>Common Solution Building Blocks to be established in WAVE 2</b> <ol style="list-style-type: none"> <li>1. <b>eLearning</b> – Support facilitated or remote learning through digital interaction between educators and students</li> <li>2. <b>Collaboration management</b> – Enable multiple users to simultaneously access, modify or contribute to a single activity, such as content creation, through a unified access portal</li> <li>3. <b>Content management</b> – Support the creation, editing, publishing and management of digital media and other information</li> <li>4. <b>Scheduling</b> – Provide an engine for setting up events based on regular intervals or for triggering specific tasks in an automated business process, based on specific combinations of status of several parameters</li> <li>5. <b>Terminology</b> – Provide a registry of definitions and terms with defined nomenclature standards, metadata, synonyms and sometimes a knowledge map for a particular domain of knowledge (e.g. health) which can be used to facilitate semantic interoperability.</li> </ol>



### 5.3 Types of Building Blocks

Building Blocks are of 4 types:

1. **Infrastructure BB's**: E.g. - Cloud, SoC, Enterprise App Store, Unified Call Centre
2. **Data BB's**: E.g. - Digital Identity, Digital Registries, Enterprise Directories
3. **Technology BB's**: E.g. - Gateways (Integration, Messaging), Mobility Management (MDM), Collaboration Management, Consent Management
4. **Application BB's**: Analytics, AI, e-Payments, Workflow, Case Management, Dashboard.

It is useful to classify the Building Blocks along these 4 types to facilitate designing the Logical Architecture of the enterprise system.

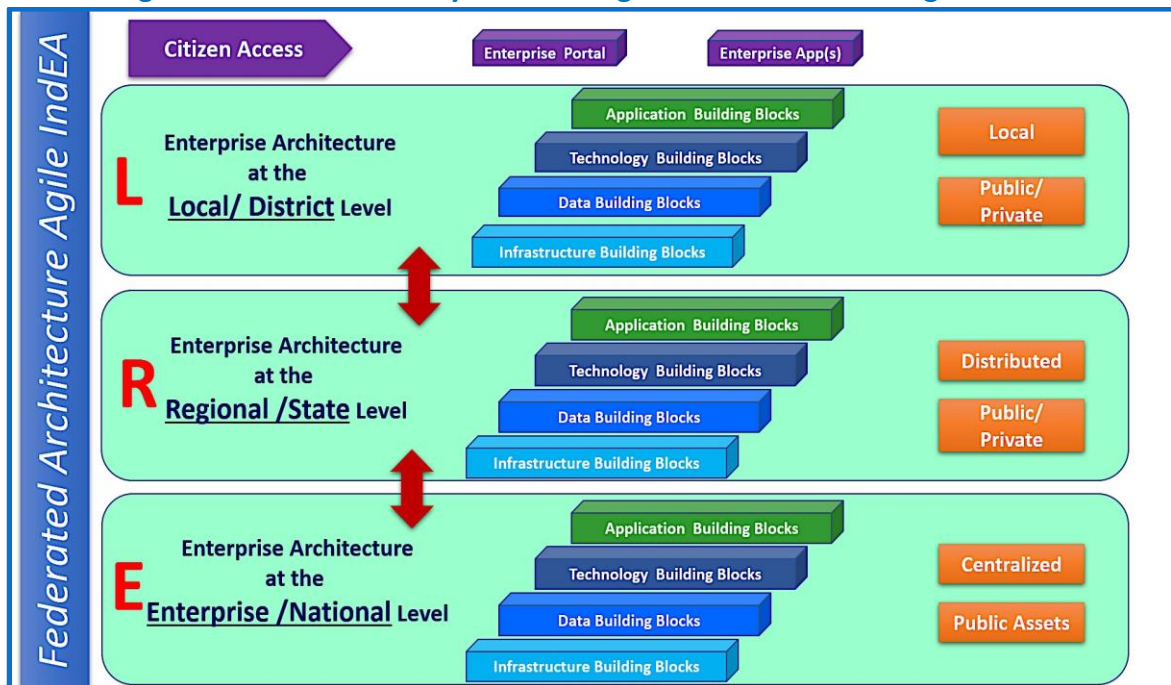
### 5.3 Levels of Building Blocks

The spirit of the Federated Architecture, enunciated as **Principle #4** (see Chapter 2), together with the principle of Minimalist approach, enunciated as **Principle #3** (see Chapter 2) is that data assets and capabilities are created and managed in a decentralized manner.

The Agile IndEA Framework recommends the design of the Physical Architecture at 3 Levels, namely, **Enterprise Level** (say, National Level), **Regional Level** (say, State Level) and **Local Level** (say, District/Institution Level). Such a 3-level design of the Enterprise Architecture enables clear division and articulation of responsibilities in various aspects like Detailed Design, Implementation, Management and Compliances.

**Figure 5.1** illustrates the use of the Types and Levels of Building Blocks in the design of the logical and physical architecture of the Enterprise.

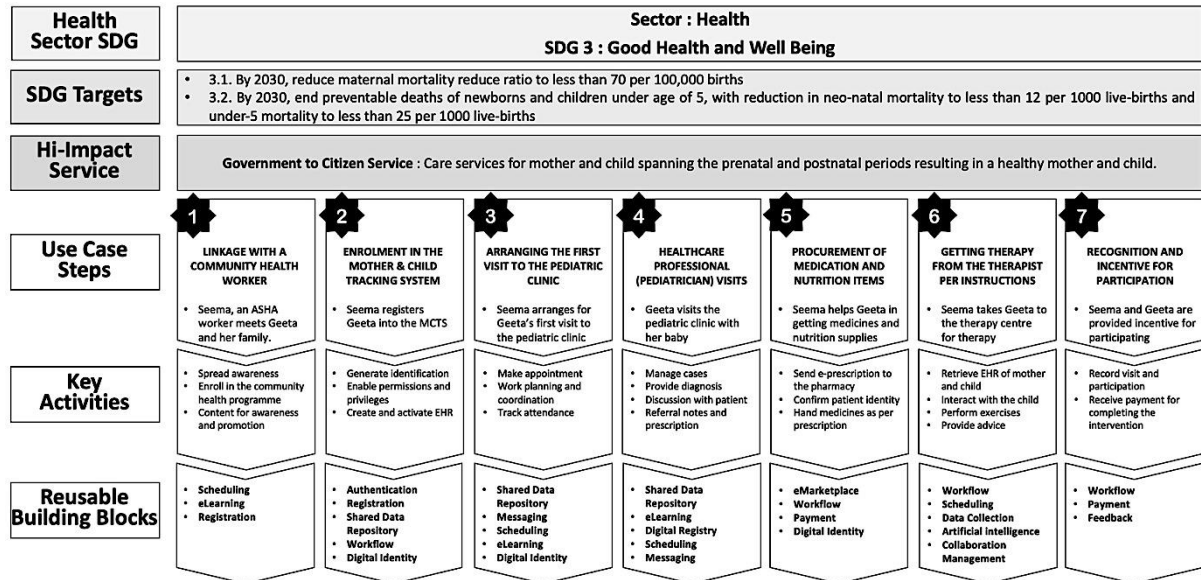
**Fig 5.1: Metamodel of Physical and Logical Architectures of Agile IndEA**



## 5.4 Building Blocks for Rapid Delivery

**Figure 5.2** illustrates the use of building blocks in a use case from the health sector. The use case diagram depicts the traceability from an identified SDG, the relevant targets and indicators, the steps involved in traversing the use case leading into the building blocks required to realize this G2C service.

**Fig 5.2 Use of Building Blocks Illustrated as a G2C Service Use Case**



## Chapter 6

### Organizational Changes for Adoption of Agile IndEA

#### 6.1 Team of Teams – Best Suited for Agile IndEA

The important reasons why adoption of Agile IndEA practices in the government sector is an imperative are based on a shared recognition of the following realities:

- a. One agency or ministry can no longer solve complex development challenges on its own.
- b. Each agency or group can contribute unique talents, skills, and expertise towards collective problem-solving.
- c. Wasteful expenditure on duplicated resources and bloated organizational structures can be reduced.
- d. Operational, business process, and cost efficiencies can be gained for all of government and public service delivery.
- e. A united, coordinated effort in government is needed when engaging with non-state stakeholders such as the private sector and donor agencies.
- f. A culture of sharing and collaborative problem-solving can be developed within the government.
- g. Above all the citizens and businesses get the benefit of integrated digital services, which are efficient, convenient and cost-effective.

Adopting Agile IndEA means that governments will need to challenge deeply-entrenched silo and territorial behavior consciously. Systemic changes are needed to make this happen pivoted around organization, process, technology, and governance. Interventions critical to the success of Agile IndEA are depicted in **Annexure III**.

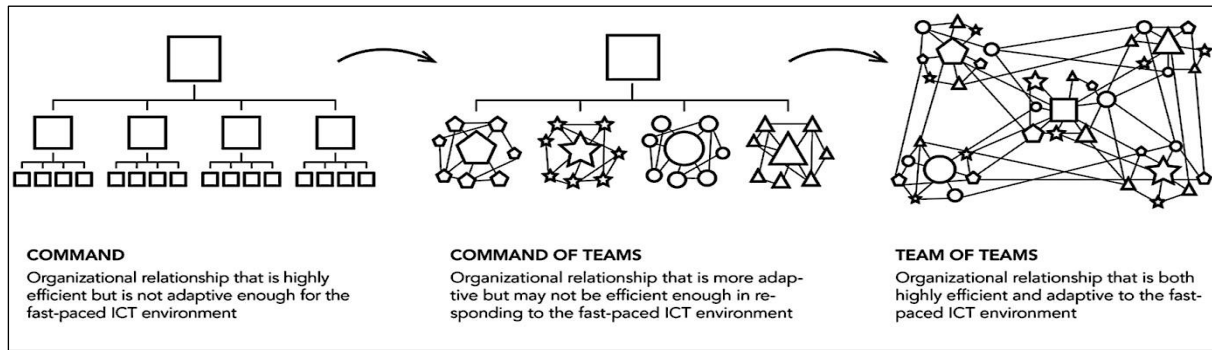
Traditional organizational structures in the government are still built on a centralized model (command and control), which offer benefits but also suffer from some disadvantages (owing to their inherent potential to create silos for the citizens they serve). They tend not to be flexible, connected or adaptive to the changing global ecosystem. This necessitates the adoption of organizational changes to derive full benefits from agile practices. These include:

- a. Understanding the organizational cultures that breed territorial and silo behavior to develop strategies that nurture a sharing and collaborative culture;
- b. Developing a clear understanding of the specific ways in which co-ordination will work across different ministries and government agencies;
- c. Developing strategies for collaboration that deal specifically with the way silo behavior exists within government ministries and institutions;
- d. Building trust, growing knowledge of different agencies and ministries within government and developing facilitation and collaboration skills within the government.

One key implication in this context is that new, flexible agencies are needed to meet the needs of agile practices. A shift from the prevalent practice of **Command-and-Control** to a more adaptive **Team-of-Teams** approach is required for government organizations to embrace Agile IndEA. This is depicted in Figure 6.1.



Figure 6.1 Team Structures Change Needed for Agile IndEA



## 6.2 Roles in Agile IndEA Team

Implementing a digital transformation initiative adopting the Agile IndEA Framework calls for a combination of new skills not usually available in any enterprise. A conscious effort has to be made to get the right team in place. The proposed roles in the Agile IndEA team are given in the Table 6.1 below.

Table 6.1 Proposed Roles for Agile IndEA Teams

Position	Role
<b>Business Architect</b>	Enables the line ministries / departments to articulate their vision, service profile, reengineering requirements.
<b>Technical Architect*</b>	Translates the business vision and requirements into technical solution options, selects the best way forward.
<b>Arch-Dev-Ops Process Engineer</b>	Advocates for ADOps, leads overall coordination activities and ensures method pragmatism.
<b>Project / Release Manager</b>	Coordinates and manages projects, products and service delivery.
<b>Automation Architect</b>	Designs, implements, and analyses continuous deployment strategies.
<b>Developer(s)</b>	Implements business requirements and test code for API or full stack development.
<b>UX Specialist</b>	Explores for new features and factors User Experience
<b>Security Specialist</b>	Ensures that security is built into design & development
<b>Solution Integration Engineer</b> /	Enables that various aspects of integration (data, application, technology and security) are realized to ensure that the overall business driven integration is realized.

\* May require involvement of various specialists like Data Architect, Application Architect, Infrastructure Architect from time to time.

### 6.3 Criticality of Capacity Building

Capacity building is the key to successful adoption. Before designing learning interventions and activities, it is important to assess the learning capabilities. The purpose is to determine the scale, magnitude, and complexity of the learning and development needed to ensure that the future state is successfully achieved. The assessment determines what stakeholders need to do differently and what will demonstrate the need for new competencies, capabilities, knowledge, skills, techniques, and behaviors required to successfully perform and sustain in the future state operations. It focuses on the future technical, social, and behavioral skills and abilities required. The process should determine the learning strategies and approaches and the need for learning equipment, educators, and logistics. It should also identify key constraints or barriers that may affect the learning program's success. The Learning Needs Assessment is used to develop the Capacity Building Strategy. It is also used to prepare resource and budget estimates and performance metrics. The Capacity Building Strategy should cover the following:

- Analysis and benefits of different learning methods and tools
- Resources, including trainers
- Estimated timelines and rollout plan
- Evaluation techniques
- Application mechanisms

### 6.4 Change Management – Critical Success Factor for Agile IndEA

In the government ecosystem adoption of agile approach to architecture, development, and operations (ADOPS) is new, therefore can bring in multiple disruptions. The changes to be brought in are shown in **Annexure III**, and most of these change elements are new in the government sector. It is recommended that these changes classified into four groups of – organization, process, technology, and governance, be subjected to the following five steps.

1. **Assess the impact of specific change element and organizational readiness:** Once a change element has been identified, its impact on the organization and the extent of organizational readiness to embrace the change is evaluated. The evaluation of readiness provides critical insights into gap areas that need to be addressed, so that the organization has a greater probability of accepting the change and derive the proposed benefits.
2. **Formulate the change management strategy:** Taking inputs from the previous step, an approach to adopt the change must be developed now. It is important to keep all the key stakeholders involved when the approach is developed. The approach should include governance, risks, resources, budget and reporting structure. Leadership alignment, communication, stakeholder engagement, learning, performance management, and organizational posturing are the key activities in this step.
3. **Develop the change management plan:** Deriving from the change management strategy, in this step the implementation of change management is elaborated by way of actions, timelines and resources needed to deliver change. While the first two steps provide the “why” and “what” of change, this step is used to document the “how” of change.
4. **Implement the change management plan:** In this step, the action plan put together in the previous step is put in practice. The specific change element needed for Agile IndEA is

introduced into the organization. Implementation usually comes with its usual set of enablers and impediments, which are balanced during the implementation. The success of the implementation is when the change element is internalized and does not need any external inputs or interventions to make it stay.

5. **Evaluate the change adoption success:** Once a new change element is adopted and internalized, the critical activity to evaluate the benefits derived is performed in this step. There may be many reasons when the benefits derived from bringing change is more or less than expected. These reasons are investigated and understood, and corrective actions taken as needed.

**Annexure IIF** provides a template for change management plan.

A critical accompaniment to the change management plan is a precise and concise communication plan, drawn with the following objectives in view:

- a. The Vision defined by the top management and redefined from time to time, percolates to all the levels of the organization, upto the operational levels.
- b. Protocols are laid down for discussion of new ideas, issues and bottlenecks, as also the forums for regular discussions on topics related to architecture, development and operations.
- c. There is an effective feedback loop created for the top management and executives to know the viability of a service or solution being developed and the performance of services already launched.

## 6.6 Conclusion

To conclude, Agile IndEA is an innovative construct that has been developed to enable quicker integration of architecture rigor into rapid development and delivery of government services. This is to enable and respond to the needs of governance, which cannot wait just by virtue bringing architecture thinking into the fold. Any additional time to ensure architecture rigor is balanced by the fact that governments are able to demonstrate greater citizen-centricity and responsiveness.

## Annexure I

### Glossary of Key Terms

Key Terms	Description
Citizen Experience	The sum of experiences across a citizen journey, including all interactions that the citizen has with the government and others in the ecosystem.
Change Management Process	A set of interrelated actions and activities that are specifically practiced to transition from the current state to the future state. This usually consists of evaluating change impact and organizational readiness, formulating change management strategy, developing the change management plan, executing the change management plan and completing the change management effort.
Digital Ecosystem	A network of organizations and individuals that co-evolve their capabilities and roles and align their investments to create additional value and/or improve efficiency using digital technologies.
Digital Service	Any service that is personalized, paperless, presenceless, cashless, frictionless and consent-based.
Service Portfolio	List of services with complete details usually consisting of yet-to-be-provisioned services (service pipeline), active services and retired (decommissioned) services.
Value	In the most general sense of usefulness, advantage, benefit, or desirability. The primary reason that an organization exists is to provide value to one or more stakeholders.
Value Stream	An end-to-end collection of value-adding activities (value stages) that create an overall result for a citizen, customer, stakeholder, or end-user.

## Annexure II

### Templates for Selected Agile IndEA Components

#### Annexure IIA

##### Component 2.1: Stakeholder Engagement (Component Type: Action)

###### A. Concepts and Definitions:

**Stakeholder:** Any group or individual who can affect or is affected by an organization and its activities, and, contextually, by its digital transformation initiatives. It encompasses citizens, civil society, employees, suppliers, service providers and others with an interest in the initiative.

**Stakeholder Consultation:** The process of gathering information or advice from stakeholders and taking these views into account when making project decisions and/or setting targets and defining strategies.

**Stakeholder Engagement:** A process in which an organization builds and maintains constructive and sustainable relationships with stakeholders impacted over the life of a transformation project.

**Stakeholder Engagement Plan:** A plan which assists the organization in effectively engaging with stakeholders throughout the life of the transformation project, and specifying activities that will be implemented to manage or enhance the engagement.

###### B. Template for Stakeholder Engagement Plan

###### 1. Introduction/Project Description

*<Briefly describe the project, the stage of the project, its purpose, and what decisions are currently under consideration on which stakeholder input is sought. Provide a link to, or attach a nontechnical summary of, the potential social benefits and impacts of the project.>*

###### 2. Brief Summary of Previous Stakeholder Engagement Activities

*<If consultation activities have been undertaken to date, including information disclosure and informal or formal meetings/or consultation, provide a summary of those activities >*

###### 3. Stakeholder identification and analysis

*<Identify key stakeholders who will be informed and consulted about the project, including (i) individuals, groups, or communities that are impacted or likely to be impacted by the project, (ii) may have an interest in the project, and (iii) disadvantaged individuals or groups. Categorize them with reference to the degree of impact and nature of communication best suited to each group. Determine the level of engagement of each group depending upon the interest and influence. The 5 levels of engagement, in increasing degree of engagement are – **Inform, Consult, Involve, Collaborate and Empower** >*

###### 4. Stakeholder Engagement Plan (SEP)

###### <4.1. Purpose and timing of stakeholder engagement

*Summarize the main goals of the stakeholder engagement program, the envisaged schedule for the various stakeholder engagement activities, and the specific issues on which stakeholders' comments and concerns are sought.>*

###### 4.2. Proposed strategy for consultation

*<Briefly describe the methods, formats and communication channels that will be used to consult with each of the stakeholder groups. Methods used may vary according to the target audience.>*

###### 5. Resources and Responsibilities for implementing stakeholder engagement activities

*<Create a matrix of responsibilities for implementing various activities envisaged in the SEP. Also, estimate and provide for budgetary and human resources required or the SEP >*

## 6. Monitoring and Reporting

*<Specify the methods and institutional structures or involvement of stakeholders in the project monitoring activities. Also define the method by which the organization will report back to the stakeholder groups on the extent and manner of incorporation of their suggestions.>*

## Annexure IIB

### Component 3.4: Development of Epics (Component Type: Action)

#### A. Concepts and Definitions:

**User Story:** A User Story is short, simple and specific statement of a requirement of the service or product, narrated from the perspective of an end-user. A user story describes the **WHAT** of a feature but not its **HOW**.

**Epic:** An Epic is a detailed description of the features and functionalities of the component of a product or, in the context of a digital transformation initiative, an entire digital service. An epic can be used to develop a set of user stories, which together are adequate to develop the entire service in the form of working software or solution.

**Product Backlog:** A product backlog is a prioritized list of all the features required in a product or digital service. It is an evolving list.

#### B. Characteristics of a User Story:

A good user story has to have certain characteristics to be useful in the development of a quality product or service. These are best described through the INVEST framework, given below.

To be most effective, a User Story must be

- **Independent:** It should be self-contained (i.e., not dependent on another user story).
- **Negotiable:** There should be room for discussion.
- **Valuable:** The story must provide value to stakeholders.
- **Estimable:** The effort to implement the story's functionality can be estimated.
- **Small:** It should be doable in a single sprint (of 2-3 weeks).
- **Testable:** Must contain tests that verify the functionality the narrative addresses.

#### C. Template for User Story: The most commonly used template or a User Story is shown below:

User Story Id	As a <type of user>	I want to <perform some task>	so that I can <achieve some goal>
1			
2			
3			
..			

#### D. Template for Epic: The commonly used template or an Epic is shown below:

Epic Id	As a <type of user>	I want to <provide / receive a service>	User Story Id 1	User Story Id 2	User Story Id 3	.....
1						
2						

Epic Id	As a <type of user>	I want to <provide / receive a service>	User Story Id 1	User Story Id 2	User Story Id 3	.....
3						
..						

## Annexure IIC

### Component 4.1.1: Data Architecture (Component Type: Artefact)

#### A. Concepts and Definitions:

**Data Architecture:** Data architecture refers to all of the processes and methodologies that address data at rest, data in motion, data sets and how these relate to data-dependent processes and applications. It is a set of rules, policies, standards and models that govern and define the type of data collected and how it is used, stored, managed and integrated within an organization. The data architecture provides the structure and description of the organization's data (metadata), the logical data model (depicting the relationship between various data entities and elements), taxonomy, the security associated with each data element and sharing methodology.

**Entity:** An Entity is an abstraction for a person, place, object, event, or concept described (or characterized) by common Attributes.

**Attribute:** An Attribute is a property or characteristic of an Entity. Different instances of an entity may have different values for an attribute.

**Data Asset:** Data Asset is a managed container for data. In many cases, this will be a relational database. However, a Data Asset may also be a Web site, a document repository, directory or data service.

**Data Steward:** A Data Steward is a person responsible for managing a Data Asset.

**Database Schema:** Database Schema is a representation of metadata in the form of logical data models or conceptual data models. A Database Schema usually defines the entities, attributes, tables, fields, relationships, views, indexes, packages, procedures, functions, queues, triggers, types, sequences, materialized views, synonyms, database links, directories, XML schemas, and other elements.

**Core Data:** Core Data is the set of data that is commonly used by most of the applications of an organization and, for this reason, is usually maintained centrally.

#### B. Template for Data Architecture

##### 1. Objectives of Data Architecture

*<Specify the objectives of developing Data Architecture in the specific context of the digital initiative undertaken by the organization. These could include, use of shared vocabularies, enabling the principle of 'Capture Data Once Only', improving the ease of discovery, access and sharing of data internally and externally, ensuring accountability for the quality and availability of data through the institution of Data Stewards, and above all, facilitating interoperability across the organization and its ecosystem.>*

##### 2. Data Description

*<Identify and describe the entities, their attributes and relationships, adopting standard methodologies. >*

### **3. Data Context**

*<Specify the responsibilities for Data Ownership, Collection, Storage, Management, Security and Access. Also document the methods, rules and policies to enforce the same. Specify the principles or establishing an appropriate Data Governance Policy and Structure.>*

### **4. Data Sharing**

*<Specify the rules, policies, privileges and procedures for data-sharing within and outside the organization. Also define the rules or API Management. Identify and define the requirements of interfaces for accessing the data by internal and external applications.>*

### **5. Master Data**

*<Identify the Master Data required to be established and maintained by the organization, the methods for collection/ access of the same and its maintenance.>*

### **6. Core Data**

*<Identify the Core Data required to be established and maintained by the organization, the criteria for such identification, the methods for collection/access of the same and its maintenance. Ensure that the Core Data set is minimal (in terms of the size of each record), forms the Single Source of Truth, and is managed with special security/privacy policies and rules.>*

### **7. Data Standards**

*<Identify the data elements for which industry standards exist in the particular domain, and define the processes by which such data standards can be enforced across the organization. (e.g. data standards for EHR).>*

### **8. Data Migration**

*<Assess the requirements of migrating legacy data from existing applications, with a special focus on the need to ensure that only the data that conforms to the data discipline (format and constraints) demanded by the Data Architecture is only allowed to be migrated to the new systems. Also, prepare an appropriate Data Migration Plan.>*

### **9. Data Analytics & Reporting**

*<Identify the data requirements, including the appropriate access requirements, for MIS, reporting and compliance. Identify the principal requirements of Data Analytics, including the Big Data Analytics and provide an approach for the same.>*

### **10. Data Model**

*<Create Logical Data Model and the Database Schema, adopting standard industry practices. This may be confined to the initial set of Digital Services to be targeted in the Wave 1 of the initiative.*

## **Annexure IID**

### **Component 4.1.2: Application Architecture (Component Type: Artefact)**

#### **A. Concepts and Definitions:**



**Application Architecture:** An Application Architecture is a model that describes the behavior of applications used or to be developed by an organization to deliver its digital services, focused on how they interact with each other and with users.

**Federated Architecture:** Federated Architecture is a pattern in enterprise architecture that allows interoperability and information sharing between semi-autonomous, de-centralized departments, IT systems and applications.

**Core Applications:** Core Applications are the applications with domain-agnostic functionalities required by all the departments of an enterprise, and as such, maintained centrally and shared by all the departments.

**Common Applications:** Common Applications are domain-agnostic but organization-specific functionalities required and used by all departments of an enterprise. These are also, most usually built and maintained centrally.

**Application Program Interface or API** is a code that allows two applications to communicate with each other and consists of two aspects – the specification (that describes how information is exchanged between programs, done in the form of a request for processing and a return of the necessary data) and a software interface written to that specification and published for use.

## C. Template for Application Architecture

### 1. Application Portfolio

*<Identify and list out all the Applications, existing and proposed to be developed to deliver all the services forming the Service Portfolio. Define the Applications in terms of the Modules, Sub-modules through which they deliver the services.>*

### 2. Assessment of the legacy applications

*<Assess all the legacy applications using the template for assessment provided in the Digital Service Standard. Basing on the assessment score, select the legacy application that can be incorporated in the Application Architecture of the transformation (IndEA) initiative. Also identify the enhancements and modifications to be undertaken for the selected legacy applications, before they can be on-boarded to the IndEA initiative.>*

### 3. Meta-model of Application Architecture

*<Design the meta-model of the Application Architecture, following the pattern suggested in Chapter 6 of the IndEA Framework. The model should depict the Application Portfolio in terms of Core, Common and Domain-specific Applications. It should also define/ depict the inter-relationships of the applications and the corresponding interoperability requirements. Adopt UML Standard for depicting the Application Architecture. >*

### 4. Make or Buy Decisions

*<Take a 'Make or Buy' decision in respect of all the NEW applications in the Application Portfolio. A decision matrix should be prepared indicating the pros and cons of 'make' and 'buy' for each application. The actors to be considered include, TCO, time for acquisition, size and complexity of the application, degree of robustness and scale required and availability of support for the product.>*

### 5. Choice of OSS Products

*<In respect of all the new applications explore the availability of proven OSS Products, which have been in the market for over 3 years and are supported in India. Features being*

*comparable, OSS may be preferred to proprietary products to reduce vendor lock-in. The procurement process may be simultaneously defined such that a competitive bidding environment is ensured.>*

## 6. Non-functional Requirements

*<Prepare a matrix of non-functional requirements, following the template provided in Chapter 6 of IndEA Framework>*

# Annexure IIE

## Component 4.1.3: Technology Architecture (Component Type: Artefact)

### A. Concepts and Definitions:

**Technology Architecture:** Technology Architecture defines, describes and depicts the hardware, software and infrastructure environment that is required to support the development and deployment of the applications defined in the Application Architecture.

**Interoperability** is the ability of one application/system to communicate with another application/system as per requirement. It is achieved by adhering to common standards and protocols during the 'build' phase.

**Open Standards** are standards made available to the general public and are developed (or approved) and maintained via a collaborative and consensus-driven process. Open Standards facilitate interoperability and data exchange among different products or services and are intended for widespread adoption. [ITU]

### B. Template for Technology Architecture

#### 1. Assessment of Technology Requirements

*<Specify and tabulate the requirements of various technology building blocks and assets needed to support the development and deployment of all the Applications forming part of the Application Architecture. These may range widely within each of the major areas of technology, namely, software (various kinds of servers like web servers, database servers, mail servers), hardware (compute, storage), communication (networks, access), security, and access devices. Also, identify the non-IT Infrastructure requirements like Data Centre Space and Physical Security.>*

#### 2. Technology Architecture Model

*<Define, describe and depict the target Technology Architecture Model, encompassing all the technology components identified in the Assessment stage, and arranging them in a logical model. Factor the IT assets already available with the organization that can form part of the target architecture and identify the gaps. The principles of **Federated Architecture** should be followed to **minimize** the assets to be established and managed centrally. The principle of **Cloud First** should be followed. **Government Community Cloud** should be the preferred choice in respect of all sensitive data and applications.>*

#### 3. Technology Standards

*<Identify the Open Standards applicable to the Technology components, from the list of Standards given in Annexures III, IV, and V of the IndEA Framework. Incorporate the identified standards in the procurement plan.>*

#### 4. Asset/ Service Acquisition Plan

*<Provide a precise and specific set of principles, along with the strategy for acquisition and procurement of assets and services. Minimization of TCO and meeting the defined service levels and quality requirements should be the cornerstones of the acquisition plan. Indicate the period-wise [quarter/half-year/year-wise requirement of the assets and services so that procurement can be staggered. Pay-per-use models may be preferred where relevant.>*

### Annexure IIF

#### Component 7.4: Change Management Plan (Component Type: Action)

##### A. Concepts and Definitions:

**Change** is a transition from a current state to a future state. The current state is the condition at which the transition is initiated and future state is when the benefit of the transition is realized. **Change management** is the practice of applying a structured approach to the transition of an organization from a current state to a future state to achieve expected benefits.

The purpose of the **Change Management Plan** is to document the actions, timelines, and resources needed to deliver the change. The Change Management Strategy provides the “why” and the “what,” and the Change Management Plan provides the “how.” The Change Management Plan is a series of component plans that define the scope of the change effort and how it will be undertaken, controlled, and monitored.

The Change Management Plan should reflect the overall complexity of the change effort and consider:

- Objectives/goals and intended outcomes of the change effort
- Steps to address the change and by whom
- How to facilitate the change effort
- How the change management effort will be implemented, transitioned, and sustained
- Dependencies of the change plan activities
- Assumptions, issues, and risks

When developing the Change Management Plan, questions to consider and respond to may include:

- What mechanisms will be used to ensure the workforce has or acquires the required skills and competencies?
- Will technology components be required to facilitate the transition? If so, how will they be incorporated?
- How will team adjustment logistics be managed?
- What mechanisms will be used to ensure the necessary behaviors and attitudes have been adopted? How will progress be monitored?

##### B. Template for Change Management Plan

The **Change Management Plan** should include required actions and baseline measures as they pertain to a change effort’s scope, expected benefits, role requirements, resources, activity schedule, risk, and measurement. The level of detail of the Change Management Plan should reflect the complexity and risk of the change effort.

**1. Resources**

*<Define what resources (e.g., people, capability or skill sets, location, equipment) will be necessary to accomplish the tasks.>*

**2. Sponsorship**

*<Identify the change sponsors and define a course of action to develop and strengthen the competencies required to effectively lead/sponsor a change initiative.>*

**3. Stakeholder Engagement**

*<Identify actions to engage groups and individuals affected by the change and then mitigate their resistance to and enlist their support, adoption, and ownership of the change.>*

**4. Communication**

*<Define internal and external audiences, information, and feedback requirements of those leading and affected by the change, and specific communication activities and events.>*

**5. Impact Assessment and Readiness**

*<Identify the actions, roles, and responsibilities for detailed impact analysis following the high-level impact analysis undertaken in the assessment phase. Provide details on how and when the impact will be captured during the design, build, and implement phase of the project, including impact categorization and mapping and ownership of impact mitigation and management. Identify the organization/customer readiness criteria and readiness management approach.>*

**6. Learning and Development**

*<Identifies needs and knowledge gaps of those affected by the change and provides a course of action to prepare end-users with the skills and knowledge necessary to navigate the change.>*

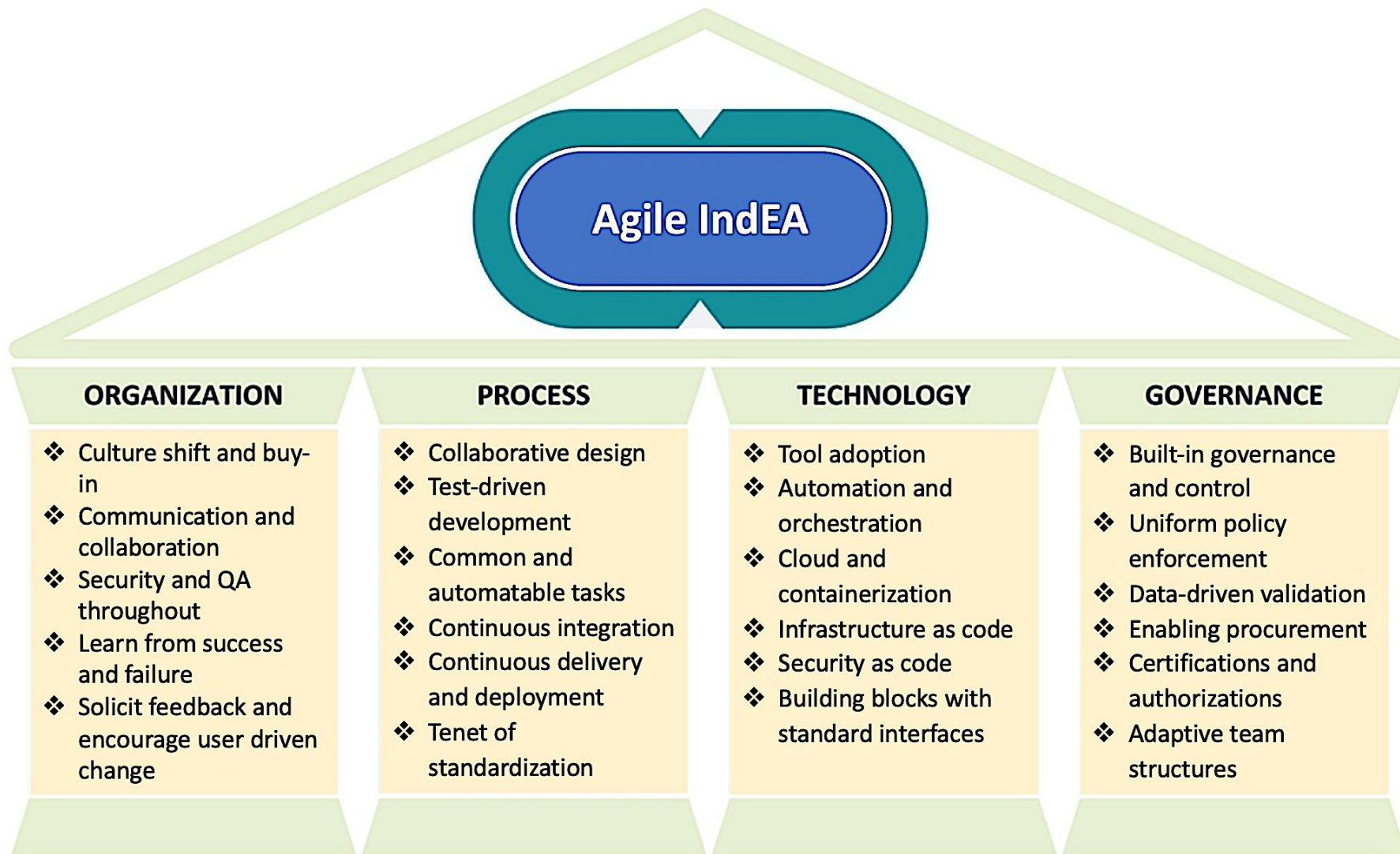
**7. Measurement and Benefit Realization**

*<Define processes and actions to monitor and track progress on the project's key performance indicators as defined in the project charter and identify when mitigation strategies need to be implemented if the change effort falls short of its goals.>*

**8. Sustainability**

*<Provide an approach to maintaining the new processes and achieving a day-to-day method of doing business once the change has become a way of working and business as usual.>*

## Annexure III – Interventions (Change Elements) Required for Agile IndEA Success



## Additional References

1. Agile Enterprise Architecture Management – An Analysis on the Application of Agile Principles; [Agile Enterprise Architecture ManagementAn Analysis on the Application of Agile Principles](#)
2. Hybrid Enterprise Architecture Practice for Bi-Modal Delivery; [The Open Group Library](#)
3. IT4IT Agile Scenario; [The Open Group Library for IT4IT Agile](#)
4. Scale Agile Framework (SAFe); [Scale dAgile Framework for SAFe 5 for Lean Enterprises](#)
5. Standard for Change Management; [Standard for Change Management \(ACMP Global\)](#)
6. Using Agile Practices in Enterprise Architecture; [The Open Group Library \(Using Agile Practices in Enterprise Architecture\)](#)