ABSTRACT

Adoption of Service Oriented Architecture (SOA) caught momentum several years ago in the IT industry. With organizations increasingly investing in technology, governance process and delivery aspects of SOA, the overall maturity levels have increased. But has the same resulted in proportionate gains and benefits for the organizations? This paper analyzes the current trends and practices of various organizations, across industry domains in the SOA & Integration landscape, and attempts to understand its linkage to value realization as well as challenges encountered. The paper will provide insights into the future initiatives planned by these organizations in the integration space such as multi-channel enablement, extended enterprise and process integration.

Based on the existing trends & pain-points, as well as the SOA maturity levels, a set of recommendations and best practices are provided to achieve the NextGen SOA / SOA 2.0. This includes scenario-based problem statement and possible solutions covering technology, processes and delivery aspects of SOA.

KEY FINDINGS

- 40% of all organizations surveyed fall in the “high SOA maturity quadrant” which indicates the effectiveness and efficiency of their SOA journey
- Organizations are twice more likely to realize their platform objectives than others in engagements with effective Central Governance and/or Center of Excellence (CoE)
- Multi-channel adoption is the top-most ranked future initiative by 60% of the respondents
- 80% of respondents rate increased reusability and reduction in point-to-point interfaces as the top-ranked benefits resulting from SOA initiatives
- Widespread interest to use Agile methodology (80-90%) but organizations lack the maturity to operationalize it
- Adoption of Cloud platforms is uniformly split across capabilities like CRM & HCM but iPaaS adoption (< 10%) is minimal

RECOMMENDATIONS

- A 'Pragmatic' integration capability towards multi-channel programs, and a roadmap towards the target state
- Governance and technology refresh should be recommended at large engagements fairing low on value realization
- Delivery automation is an opportunity than can be piloted at small engagements, and matured into an offering
- Scope of open source adoption in low complexity engagements which can be combined with delivery automation to make an efficient and cost-effective solution
TABLE OF CONTENTS

Introduction ........................................................................................................................................................................5

Current Trends & Practices ......................................................................................................................................................6

Platform Capability – Integration Patterns & Monitoring ....................................................................................................7

Process Capability – SOA Governance ..................................................................................................................................8

Process Capability – Data Model Adoption ...........................................................................................................................9

Execution Capability – Delivery Model & Accelerators .........................................................................................................9

Integration Pain-points ..........................................................................................................................................................10

Challenges in SOA Journey ...................................................................................................................................................10

Value Realization .................................................................................................................................................................11

Recommendations .................................................................................................................................................................12

Middleware as a factor in Omni-Channel/E-Commerce programs ..........................................................................................12

Opportunity for Delivery Industrialization ...........................................................................................................................16

Governance as a Factor in Delivering Integration Goals ..................................................................................................17

Case for Open Source Middleware Adoption .........................................................................................................................18

Methodology ..........................................................................................................................................................................18

About the Authors .................................................................................................................................................................19
<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SOA Investment – Value Realization Trends</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>SOA Capabilities – Business Domain Heat Map</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Integration Patterns &amp; Monitoring Trends</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>SOA &amp; Data Governance Adoption Trends</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>Data Model Adoption</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Delivery Model &amp; Accelerators Usage Trends</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>Integration Pain-points</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Challenges in SOA Journey</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>SOA Tenets &amp; Value Realization</td>
<td>11</td>
</tr>
<tr>
<td>10</td>
<td>Overall Value Realization Trends</td>
<td>11</td>
</tr>
<tr>
<td>11</td>
<td>Middleware &amp; Omni-channel Adoption</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Target Integration Architecture for Omni-Channel Oriented Programs</td>
<td>14</td>
</tr>
<tr>
<td>13</td>
<td>Delivery Accelerator Adoption Trends</td>
<td>16</td>
</tr>
<tr>
<td>14</td>
<td>SOA Governance Trends</td>
<td>17</td>
</tr>
</tbody>
</table>
INTRODUCTION

While some organizations have chosen to focus on traditional Enterprise Application Integration (EAI) in the last decade or so, most of them have increasingly adopted SOA. It is predicted that organization’s spending on application integration will increase by 33% by year 2016*.

Companies across industry domains are at different maturity levels and have achieved varied degree of success in adopting and implementing SOA. Whether this has resulted in proportionate benefits has always been an interesting conundrum. Figure 1 answers this by depicting a relation between the SOA investments made and benefits obtained.

![Figure 1: SOA Investment – Value Realization Trends](image)

This survey was conducted on Wipro’s 40 key integration accounts across business domains. SOA investment was determined based on the level of maturity observed in the following foundational capabilities:

- **Technology capabilities** describes the integration middleware platform, patterns, monitoring as well as Cloud Integration and open source adoption in the SOA landscape (Weightage: 5)
- **Process capabilities** describe the SOA Governance structure and processes operationalized to ensure that integration projects follow standards and best practices (Weightage: 10). Higher weightage is provided as this is perceived as a key differentiator in SOA engagements
- **Delivery capabilities** describes the development model and accelerators used for successful execution of integration projects (Weightage: 5)

The observed integration capabilities were then linked to the reported realized benefits to plot the graph above (Figure 1). The realized benefits are detailed in the section for ‘Value Realization’. This maturity analysis will form the basis of the inferences and recommendations in the subsequent sections of this paper.

* Gartner - 2013 Strategic Road Map for Integration
Key Observations

- 40% of the organizations fall in the “high maturity quadrant” and their success rate is found to be proportional to the platform, governance, and delivery capabilities that were adopted/enhanced.
- Organizations in BFSI and Retail business domains consistently depicted higher levels of SOA maturity majorly because they embarked early on the SOA journey.
- Accounts considered for Energy & Utilities (ENU) domain are in nascent stage of SOA adoption and hence have not realized the benefits yet.

CURRENT TRENDS & PRACTICES

Current state of customers in the integration landscape was ascertained by capturing attributes related to Technology, Process & Delivery capabilities (Existing & Planned) as depicted in the Heat Map in Figure 2:

<table>
<thead>
<tr>
<th>Capability / Business Domain Heat map</th>
<th>Technology</th>
<th>Process</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services in ESB</td>
<td>BFSI</td>
<td>Energy &amp; Utilities</td>
<td>Telecom</td>
</tr>
<tr>
<td>Platform Capability</td>
<td>54.76%</td>
<td>35.71%</td>
<td>21.90%</td>
</tr>
<tr>
<td>Monitoring Capability</td>
<td>52.78%</td>
<td>38.89%</td>
<td>26.19%</td>
</tr>
<tr>
<td>Cloud Integration</td>
<td>10.42%</td>
<td>20.83%</td>
<td>13.10%</td>
</tr>
<tr>
<td>Open Source Adoption</td>
<td>10.00%</td>
<td>TBD</td>
<td>6.67%</td>
</tr>
<tr>
<td>Design-time Governance</td>
<td>44.44%</td>
<td>27.78%</td>
<td>27.78%</td>
</tr>
<tr>
<td>Service Re-use as a structured process</td>
<td>75.00%</td>
<td>8.33%</td>
<td>33.33%</td>
</tr>
<tr>
<td>Data Governance</td>
<td>63.64%</td>
<td>TBD</td>
<td>41.67%</td>
</tr>
<tr>
<td>Governance Tools Usage</td>
<td>47.22%</td>
<td>16.67%</td>
<td>32.29%</td>
</tr>
<tr>
<td>Delivery Model Maturity</td>
<td>36.11%</td>
<td>45.56%</td>
<td>16.67%</td>
</tr>
<tr>
<td>Delivery Accelerators Usage</td>
<td>40.00%</td>
<td>25.00%</td>
<td>35.19%</td>
</tr>
</tbody>
</table>

Figure 2: SOA Capabilities – Business Domain Heat Map

Key observations:

- Adoption for Cloud platforms is uniformly split across capabilities like CRM & HCM so far, but iPaaS adoption (< 10%) is not yet a reality.
- Multi-channel adoption is a key business driver across business domains such as Banking/Healthcare/Retail and a top-ranked future initiative across the respondents. Roadblocks have been observed when this is not matched by integration agility.
- Need for ‘pragmatic’ integration capability tuned towards multi-channel programs, and a realistic roadmap to grow it.
- Organizations with security and regulatory considerations (such as BFSI) are still reluctant to invest in Open source products (< 10%) in their integration landscape.
- Increased reusability & reduction in point-to-point interfaces (approx. 80%) are the top-ranked benefits resulting from SOA initiatives across business domains.
- Distinct co-relation has been observed between effective service portfolio management & governance with the value realization achieved.
- Canonical model adoption is high (> 60%) in most of the business units which indicates increased focus on standardization and interoperability.
- Lack of successful adoption of Agile methodology has been observed which has resulted in 60% of the accounts relying on the Waterfall/Iterative model.
- Delivery accelerators such as automated deployment and on-demand testing capabilities rank highest in customer’s wishlist.

In addition to the summarized view, subsequent sections will highlight comparison between high maturity & other (low/medium maturity) customers.
Even though “SOA services in ESB” pattern usage is high (e.g. > 80% in BFSI & RCTG), usage of point-to-point integrations is widespread (ranked 3rd highest by respondents)

Low usage of Process Integration (< 30%) cannot be attributed entirely to maturity and its adoption is dependent on the domain-specific requirements

Interface monitoring is in place but lack of run-time governance to measure the success of SOA and perform optimization for better returns was observed
Process Capability – SOA Governance

- Design-time governance has been adapted to high degree and proportionate service reuse has also been achieved.
- Service re-use as a process is prevalent with majority of organizations for both business and technology services.
- Common data model is a key enabler and has been adopted (83% for high maturity; 60% for others) across organizations. Refer to split of overall data model usage patterns in Figure 5.
- CoE-driven delivery of integration projects (75% for high maturity organizations) has been observed as the more effective and efficient means of obtaining high value realization.

Figure 4: SOA & Data Governance Adoption Trends

- Service modeling methodology has not gained traction and has minimal impact on overall benefits.
- Several respondents reported that the central Governance body is similar to Enterprise Architecture group.
- Governance tooling adoption has been moderate with 32% usage of SOA Registry & Repository, while others are using tools like SharePoint or custom applications to manage the service catalog.

Common Enterprise-wide Governance Body  CoE-driven Project Delivery  Service Modeling Methodology  Service Re-use as a Process  Canonical Model Adoption  Governance Tools Adoption

- Customers with Low SOA Maturity  
- Customers with High SOA Maturity

66.67% 75.00% 30.43% 8.33% 83.33% 83.33%

47.83% 45.65% 83.33% 60.87% 27.54% 33.33%

39.13%
Widespread interest to use Agile methodology (> 90%) but organizations lack the maturity to operationalize it and gain any significant benefits out of it.

**Process Capability – Data Model Adoption**

![Data Model Usage Chart]

*The figures may not add up to 100% due to usage of multiple data-model approaches for a given respondent.*

**Execution Capability – Delivery Model & Accelerators**

![Delivery Model & Accelerators Usage Trends]

- Widespread interest to use Agile methodology (> 90%) but organizations lack the maturity to operationalize it and gain any significant benefits out of it.
- Continuous integration aspects such as automated deployment and testing are key contributors to efficient delivery and cost reduction.
Interface proliferation and long delivery cycles are inter-related pain-points, mentioned by 60% of respondents, which indicates lack of SOA Governance.

Challenges in SOA Journey

- Interface proliferation and long delivery cycles are inter-related pain-points, mentioned by 60% of respondents, which indicates lack of SOA Governance.
- 56% respondents have marked legacy integration as a major challenge which indicates that legacy modernization initiatives and cloud adoption needs to be explored.

- Emphasis on a Shared Service Model, instead of Line of Business (LoB) driven integration, is a key success factor.
- SOA Governance body in conjunction with CoE-enforced best practices is required for achieving true service orientation.
- Ownership and funding model from business stakeholders is a key characteristic of successful SOA initiative.
As was depicted in Figure 1, the benefits obtained from SOA are proportionate to the investments done. Another aspect of value realization is the degree to which the fundamental tenets of SOA are fulfilled.

### Figure 9: SOA Tenets & Value Realization

- **Agility** is a combination of responses indicating improved delivery times, increase in frequency of B2B transactions, multi-channel enablement and BPM rollout/Process integration achieved.
- **Cost Reduction** has been derived from responses indicating reduction in point-to-point interfaces, delivery efficiency and reduction in cost of developing and maintaining interfaces.
- **Reuse** is derived as a factor of reusability of business/technical services & the resultant cost efficiency, as per the respondents.
- **Interoperability** is combination of responses indicating increase in coverage of B2B transactions, multi-channel enablement and ease of integration with legacy systems within the enterprise.

Organizations in high maturity quadrant have performed significantly better in all aspects which are vindicated by overall value realization trends created by capturing responses across customer accounts.

### Figure 10: Overall Value Realization Trends

- **Enterprise BPM Rollout/Process Integration**
- **Increased Interoperability with Legacy Systems**
- **Multi-channel/Mobile rollout**
- **Increased reusability of Business/Technical Services**
- **Reduction in cost of developing and maintaining interfaces**
- **Increase in frequency and/or volume of B2B transactions**
- **Improvement in delivery times**
- **Reduction in point-to-point interactions**
RECOMMENDATIONS

Given below are key recommendations and best practices which have been derived from the current trends and initiatives as well its impact on the value realization.

Middleware as a factor in Omni-Channel/E-Commerce programs

57% of respondents who reported existing or planned omni-channel programs are posing new capability challenges for middleware platforms. The respondents were queried whether the middleware platform has acted as an enabler for these programs to which close to 25% respondents said the middleware is a pain-point for such programs, to an extent that middleware refactoring programs are required as part of the overall omni-channel program. Around 15% responded that middleware has been an enabler for omni-channel adoption. The results of the investigation into middleware capabilities of these respondents are below:

**Figure I I: Middleware & Omni-channel Adoption**

Based on the observations in Figure I I, and studying the middleware refactoring projects cited earlier, following is presented as a “pragmatic” middleware capability refresh plan for omni-channel adoption.
**Category** | **Middleware Capability Refresh: Iteration 1** | **Middleware Capability Refresh: Iteration 2**

**Governance**
- Finalize a canonical model for channel interaction
- Ensure all channels interact via the canonical model
- Govern interaction patterns usage

**Technology**
- Catalog cross-channel interaction
- Secure edge traffic via gateway products
- Add caching preferably via distributed caches
- Surface master data, catalogs, campaigns, customer/account data to the cache from SORs/MDM-Hubs in the canonical format
- Support device dependent ad-hoc entity querying via the cache
- Update services typically need a robust orchestration/BPM engine
- Add monitoring & policy enforcement to the edge gateway

**Delivery**
- Align to the wider omni-channel projects, which typically run agile
- Consolidate Integration projects as a shared service – run as agile if supported by previous success
Figure 12 represents the learnings from leading organizations pursuing multi-channel programs and refactoring the integration tier to support it. This is an architectural view of the key components in a target state multi-channel solution:

**Figure 12: Target Integration Architecture for Omni-Channel Oriented Programs**
**Category**

**Query Services & APIs**
- Enterprise/MDM data is exposed off ESB or via direct application APIs
- Social/External data is stored in NoSQL/SQL tables, grids or accessed in real-time
- An aggregated view of the entity is represented in the data virtualization layer. This can selectively be cached
- Channel APIs are ad-hoc & query virtualized data - can be channel specific
- Real-time analytics provide content suggestions by matching entity data to context

**Update/Long Running Services & APIs**
- Services are mapped to enterprise capability models
- Realized via BPM & ESB orchestrations
- Provide harmonized entity change behaviors across LoBs
- Supported by composable & atomic ESB services

**Architectural Elements**

**Governance**
- Key enterprise entities are modelled formally, and governed on the data virtualization layer
- Rest of the entities and layers are governed for exceptions
- Typically, the traditional enterprise SOA Governance is apt here.
- Alignment of Information & Integration Governance is recommended
Opportunity for Delivery Industrialization

40% respondents have cited addressing costs as an urgent IT & middleware goal. A similar number mentioned long middleware delivery cycles as a pain area. This perception is more pronounced in high maturity organizations, with 64% respondents citing these reasons. As this trend is only likely to accelerate, the current state of delivery automation across respondents were captured.

![Delivery Accelerator Adoption, % respondents](image)

**Figure 13: Delivery Accelerator Adoption Trends**

Based on these observations, a middleware industrialization offering can be created with open-source tools covering:

- Test-oriented development via Continuous Integration – effectively collapse the build, unit and system test phases
- Regression & Performance Test automation – increase reliability of the iterative multi-channel delivery process
- Delivery process modelling via a workflow

Such an offering can be co-developed with a stable engagement with a small middleware footprint. The resultant framework can subsequently be leveraged in solutions offered to prospective customers.
Governance as a Factor in Delivering Integration Goals

The survey compared the adoption and results of integration governance, from respondents reporting higher value realization from the platform and overall maturity (Figure 14: SOA Governance Trends).

There is a demonstrated linkage between adoption of effective centralized governance & shared services CoE setups, and value realization from middleware i.e. agility, cost reduction, reuse & interoperability (high maturity is defined with a strong linkage to value realization).

The existence of governance does not, by itself, change the challenges faced by foundational platforms like middleware – LoB-oriented project structures and focus or lack of Enterprise Architecture (EA) / business sponsorship. However, effective governance establishes the requisite balance between LoB / delivery orientation and the shared-service aspects of the middleware platform.

1. 65% of the middleware organizations (< 10-15 member teams) achieve higher maturity with stable, shared services teams without a specialized integration governance structure. The survey further recommends that periodic reference architecture and best-practice reviews should be conducted to allow for course corrections.

2. For handling integration complexity in the front (channels) or back (enterprise applications), canonical model usage is a clear differentiator between high and low maturity organizations (80% v/s 30% adoption). The leader organizations are driving canonical usage for all new initiatives in channels and back-end systems as well.

3. All run-time monitoring & enforcement capability reported to us was directly linked to non-functional business requirements, and were not tied to collecting SOA metrics or planning. Overall, 70% respondents said they possess monitoring/alerting capability, 10% have or will plan end-to-end transaction monitoring, and 45% have policy enforcement enabled/planned.
Case for Open Source Middleware Adoption

There is overall 17% adoption for open-sourced ESBs and messaging, and at the moment confined to non-critical functionality. Most early adopters are typically large organizations (90%) piloting the capabilities.

However, there is a significant cluster of smaller organizations (50% of non-BFSI organizations outside the ‘high maturity’ quadrant in the survey were classified as ‘small’), that can be targeted for open source adoption. The most important drivers are likely to be cost efficiency and relative ease of the migration. This can be more compelling when clubbed with the recommendation for delivery process automation described earlier.

METHODOLOGY

The survey was completed via interviews with Wipro Integration & Enterprise Architects assigned to 40 client organizations across business units. The possibility of introduction of a perception bias in the report was mitigated by gathering view-points from different respondents from each organization.

The respondent split by domain is:

- BFSI – 33%
- ENU – 17%
- Telecom – 8%
- Healthcare – 11%
- Manufacturing – 8%
- Retail – 23%
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