International Journal of Computational and Experimental Science and ENgineering (IJCESEN)

Vol. 12-No.1 (2026) pp. 712-719
http://www.ijcesen.com

ISSN: 2149-9144

Research Article

Architectural Decoupling of Enterprise Planning Platforms: A Framework for Multi-Entity Organizations

Ravi Sankar Natukula *

Independent Researcher, USA
* **Corresponding Author Email:** ravinatukula.usgc@gmail.com - **ORCID:** 0000-0002-0047-6650

Article Info:

DOI: 10.22399/ijcesen.4898
Received : 29 November 2025
Revised : 25 January 2026
Accepted : 02 February 2026

Keywords

Enterprise Architecture,
Planning Systems,
Architectural Decoupling,
Integration Patterns,
Governance Frameworks

Abstract:

Enterprise architecture in multi-entity organizations has a permanent structural problem: embedded planning capabilities in transactional systems prevent scaling and flexibility across the organization. Another architectural approach separates global planning as a distinct enterprise capability from transactional execution platforms, such as enterprise resource planning (ERP) systems. A layered architecture allows for cross-entity uniform logic. Transactional platforms develop separately to meet local, regulatory, or organizational needs, and the architectural split helps firms cope with continuous structural and regulatory change. The well-designed decoupled architecture consists of three layers. The planning layer includes enterprise decision-making capabilities such as demand forecasting, supply planning, and financial alignment. The execution layer handles the transactional systems, specifically optimized to process transactions in high volumes. The integration layer consists of data transformation, master data management and data governance components. The predominant integration layer patterns are batch extract-transform-load and event-driven architectures. Canonical data models abstract specific system data representation to data entities relevant to the enterprise. Governance frameworks define approval gates for projects based on scope or cost. Methodological standardization ensures that operational and financial plans are aligned to baselines and, once implemented, that cross-functional forums are used to resolve definitional issues whilst the organizational structure evolves.

1. Introduction

Enterprise planning has evolved from low-level operational issues toward high-level calculated issues that support executive decisions such as capital allocation, network design, and post-merger integration strategy. The calculated potential of information technology has been, and continues to be, an important topic of information systems and information technology research. One way of reaching this potential is the alignment of IT and business. For years, planned alignment has been found to be one of the top priorities of senior IT leaders [1].

Despite its planned importance, little is known about where this capability is located in the architecture, nor how it can enable or constrain alignment. This gap applies to both the academic and practitioner literature on alignment mechanisms for aligning business strategy with IT infrastructure and processes [1]. This lack of knowledge complicates the efforts of organizations to achieve consistency in enterprise-wide planning.

Alignment across domains is difficult because business strategy is sometimes unknown, ambiguous, or hard to transform into operational reality. Senior management does not on the whole understand alignment and the role of IT in relation to achieving business objectives. In addition, the business environment is constantly changing, creating moving targets for alignment. IT investment is less systematic when the business strategy is unknown, ambiguous or very tightly controlled [1]. Without a plan, different business units will begin to develop their own planning practices.

A gap can also exist between IT and top management. Organizations that have no representation from IT in the top management could fail to appreciate the planned role enterprise systems can play. And uncertainty in the environment and competition from other firms within a particular industry can exacerbate the problem. [1]

For example, supply chain issues rank third among the most important sales challenges facing organizations in the sales and operations planning processes. This overselling can become a problem if the business infrastructure is unable to support the additional order volumes. S&op permits the income function to meet revenue dreams even as operations are stable [2]. With the right alignment, sales activities can be scaled, client service issues anticipated, and infrastructure for volume is provided.

Benefits for organizations include fewer surprises, improved relationships between departments, and better decisions as functional areas can be more transparent about their activities. Trust develops over time as all stakeholders increase their awareness of expectations and of changes to the plan [2]. Data-driven S&OP processes provide transparency into the organization. Tapping into inputs from multiple departments and appropriate analysis can help make better informed decisions.

Scenario management, applied to the planning phase, could be used to improve the agility of the business, as organizations are better prepared for unexpected shocks and surges in demand and can adapt to environmental demands instantaneously [2]. Informed forecasts lead to customer satisfaction by ensuring that there is sufficient bandwidth and inventory available for timely market delivery.

2. Related Work

Enterprise architecture literature has provided a foundation for planning platform design, with the Calculated Alignment Model linking business strategy with information technology infrastructure through architectural layers. Enterprise architecture frameworks like The Open Group Architecture Framework (TOGAF) formalize the process of aligning technology with enterprise strategies for a given architecture. In the enterprise integrating school, architecture is the design of all aspects of the enterprise for maximum strategy execution coherency. Systems thinking stresses designing wholes, rather than breaking down organizational components into parts.

Sales and operations planning literature describes cross-functional alignment difficulties. Successful alignment requires governance as well as a common treatment of ways of working, assumptions, and decision rights. Enterprise integration patterns describe a catalog of design patterns for connecting and integrating enterprise applications via messaging- and event-driven architectures. Master data management frameworks address semantic heterogeneity across heterogeneous enterprise systems via semantic data models and standard entity definitions.

The building blocks form a conceptual model. The model is based on separation of concerns in a three-tier architecture. It builds on the separation of concerns from software engineering and situates planning systems as distinct enterprise layers. Governance structures and data harmonization strategies operationalize the architectural separation. Decision criteria provide evaluative guidelines for deciding the planned benefit of decoupling compared with the benefits of integrated solutions.

3. Architectural Framework for Decoupled Planning

3.1 Conceptual Foundation

Decoupling global planning platforms from transactional systems creates a separate enterprise layer used solely for planning. Such planning platforms are fed by standardized data and are the source of optimized decision outputs. They form a separate component of the overall architecture. It follows from the separation of concerns as described in the software engineering literature that systems with diverging goals, or rates of change, are better layered than monolithic [3].

The separation principle manifests itself clearly in the enterprise planning context. Planning logic differs fundamentally from transactional execution logic in both nature and computational requirements. Planning processes require analytical optimization and what-if capabilities, while execution processes require high-volume transactional throughput and operational efficiency. This distinction mirrors the separation found in AI planning systems, where causal reasoning is distinguished from resource reasoning to prevent the integration of concerns from exploding the search space beyond action sets that are minimal with respect to logical goals [3].

This separation of concerns allows the structures of planning processes to be developed independently from the structures of the performance systems in which they are used. Experimental results demonstrate that treating resources separately from causal reasoning leads to improved planning performance and rational resource management, where increases in resources do not degrade planning performance. This allows, for instance, experimentation with new machine learning algorithms, advanced analytics, and new planning techniques, without affecting the stability of transactional systems, while execution systems remain focused on running the day-to-day operations of the enterprise [3].

3.2 Three-Layer Architecture

The ideal decoupled architecture consists of three distinct layers, with each layer satisfying a specific set of organizational needs. The planning layer is a set of enterprise decision-making applications, including demand forecasting, supply planning, and financial alignment. Transactional systems or the execution layer manage the high volume of transactions, while the integration layer takes care of data transformation, master data management and governance rules to stay within the limits defined by planning [4].

In contemporary service-oriented architecture, loose coupling is applied across the enterprise through stratified architectural layers that embrace a multi-dimensional separation of concerns. Each layer defines a set of constructs, roles, and responsibilities and leans on constructs of its predecessor layer to accomplish its mission. Loose coupling is a key factor in how components are organized to coordinate via contracts rather than hard connections. This provides an abstraction layer, hiding the planning logic from the implementation complexity, and using standardized interfaces to enable components to evolve independently [4].

Integration with planning activities occurs at the integration layer. Data integration extracts operational data from execution systems. Transformation translates domain-specific representations to generic representations understood by planning applications. Master data management ensures that the same definition of an entity is used across heterogeneous environments, which is required for integration. Process orchestration automates the planning cycles that refresh data, generate forecasts, and publish plans. The logical separation of functionality is based on the need to separate basic service capabilities from more advanced service functionality needed for composing services and to distinguish between the functionality for composing services from that of the management of services [4].

Empirical results from decoupled planning implementations demonstrate significant computational performance advantages. In the rocket domain experiments with 10 objects requiring transportation, normal planning with integrated resource reasoning completed in 0.13 to 0.55 seconds as resources increased from 2 to 8 rockets. In contrast, the decoupled approach (planning followed by declarative scheduling) completed in 2.97 to 2.99 seconds for abstracted planning with an average of only 0.03 seconds for scheduling. When the planner was optimized (GP-CSP), total times ranged from 0.28 to 0.31 seconds, demonstrating that abstracted planning efficiency is crucial. In the shuttle domain with non-sharable cranes and sharable shuttles, the decoupled approach maintained fairly constant and significantly lower runtime compared to integrated planning, which degraded sharply with increasing non-sharable resources. For shuffle problems across 4, 6, 8, and 10 blocks with varying robot quantities (1-10), the decoupled approach showed relatively flat performance as resources increased, while standard planning exhibited seemingly irrational performance degradation with increased resources [3].

The architecture provides organizational agility by allowing modules to plug into the existing integration contracts. Acquired organizations can be onboarded while remaining operationally independent, and planning technology can be refreshed separately from execution system technology upgrades. This flexibility addresses the operational conditions of multi-entity organizations undergoing permanent structural transformation [4].

4. Integration Patterns and Data Harmonization

4.1 Integration Approaches

The data flow between layers of a decoupled planning architecture is important in determining its performance, and there are several patterns of data flow, some of which are better suited to particular organizational contexts and planning horizons.

Batch extract-transform-load is pulling operational data into the data warehouse at scheduled intervals. This pattern is more appropriate when the planning activity's time horizon is longer, like monthly demand planning or quarterly capacity planning. Scheduled extraction is conceptually straightforward and many techniques are known to implement it, but if planning is dependent on the state of the operation, the latency between batch updates may harm the quality of planning.

Event-driven architectures work by continuously publishing changes in operational state and the execution systems publish events for important changes. The planning systems then need to be able to consume these events incrementally and asynchronously. However, integrating different information sources in enterprise software applications is difficult, as the core components of data management systems, content management systems and other enterprise software applications exist in silos [5]. Enterprise applications communicate with databases, application servers, content management systems and workflow systems. Enterprise applications use many different programming interfaces, programming languages, and data formats. They need to extract and interoperate data in multiple formats delivered by multiple mechanisms [5].

Hybrid approaches rely on patterns such as high transactional data rate from streams for time critical applications. Static reference data is refreshed by scheduled bulk updates, performed in batch processing mode. The principle is to match integration to decision cadence: real time for frequent, high-stakes decisions, and batch for deliberative decisions, where being first is less important. Data may be in real time data feeds, current databases, slightly stale caches, or historical data warehouses [5].

4.2 Canonical Data Models

A common tactical problem found in decoupled architecture is semantic inconsistency between execution systems. This can include product definitions, customer identifiers, location hierarchies, units of measure, or other specifications. The plan must remain explicit about these issues.

Canonical data models represent system-specific data representations into a set of common enterprise-wide canonical entities. The integration layer maps local structures to canonical data instead of enforcing a uniform schema across execution systems. This localizes the complexity, allowing the planning logic to operate on the same entities.

The data standard, which is chosen and adopted to define the master data, must be compatible with the data formats used in the entire organization and with the information of different departments of the organization [6]. It can also be difficult to come to an agreement within an organization of departments on harmonizing data or establishing master data management (in a large organization or program). [6] Data standards must be approved by all business units and departments.

Finally, hierarchical reconciliation is important since planning typically involves aggregating across organizational or geographic dimensions that do not match those of execution; thus, canonical models should support bidirectional mapping. Aggregation is for planning, disaggregation is for execution, and both should preserve traceability across transformations.

Data integration poses additional challenges for master data management. Integrating master data management with other data applications can add cumbersomeness to the integration process. This results from all of the above as well as the time-consuming nature of transmission and distribution, not to mention potential loss of data and its meaning [6]. The lossy nature of survivorship, merging and linkage algorithms used to combine multiple records into a single master data source produces obvious difficulties. This requires governance beyond technical design to sustain canonical models, for example, establishing cross-functional discussion forums to resolve definitional ambiguity, approve changes and maintain semantic coherence as organizations restructure.

5. Governance and Standardization

5.1 Process Governance

Architectural decoupling introduces a productive tension between technical decoupling and enterprise coordination. If their execution systems differ only by geographical region or acquisition history, a common planning cycle is possible across enterprises. Governance frameworks must answer questions about process authority, conflict resolution and boundary stewardship.

A good sales and operations planning process builds governance, decision rights and roles across the various functions and business units involved in the process. The company must clarify who has the responsibility for identifying and handling each major decision, including recommendations, approvals, implementation actions, feasibility engagement, and finally decision-making [7]. By specifying accountability for each major decision, we reduce uncertainty and make the planning-execution boundary clearer.

Planning calendars and cadence are important governance features, as predictable planning rhythms help coordinate functional work and ensure commercial teams know when to bring market inputs. Operations teams know when they will receive new supply plans. Finance teams know when operational changes feed into financial forecasts [7]. The demand and supply plans are typically frozen on a monthly basis and revisited only in the event of meaningful changes, for instance if the forecasting demand changes with a swing of 10%. This stabilizes the operations plan against constant adjustments further down the chain.

Empirical evidence from cross-functional S&OP teams demonstrates the quantifiable impact of governance structures on planning effectiveness. In studies examining collaboration within S&OP teams, social cohesion exhibited a positive and significant influence on collaboration (β=.25; p<.01), while centralization negatively impacted collaboration (β=-.15; p<.05). Among contextual influencers, information quality positively impacted both collaboration (β=.17; p<.05) and S&OP effectiveness (β=.18; p<.05). Procedural quality demonstrated significant positive associations with both collaboration (β=.21; p<.01) and S&OP effectiveness (β=.19; p<.05). Rewards and incentives showed strong linkage to collaboration (β=.29; p<.01) and influenced S&OP effectiveness (β=.14; p<.05). Notably, collaboration itself significantly and positively impacted S&OP effectiveness (β=.28; p<.01), with the overall framework exhibiting robust effects captured in adjusted R-squared values of .50 for collaboration and .52 for S&OP effectiveness [7].

Governance tends to emerge step-wise, with the earliest stages including defining access controls, data stewardship, and process execution. At the Intermediate level, governance focuses on cross-functional cadence and scenario discipline, while Advanced focuses on continuous improvement, metric focus, and capability building. The testing of both direct and indirect relationships through collaboration as a mediating variable revealed that collaboration partially mediated associations between all antecedents and S&OP effectiveness at modest levels, with variance accounted for ranging from 21% to 36% across different inputs [7].

5.2 Methodological Standardization

For common planning platforms, the governing principle for technique selection is to choose the same technique for similar demand patterns. Rather, standardization encourages context-aware technique selection, informed calibration, and using the same baseline assumptions for operational and financial planning through specific and integrated planning across time horizons. Diverging assumptions between teams result in continuous reconciliation and incoherent plans.

Software architecture acts as a bridge between requirements and implementation [8]. It exposes some properties and hides others by providing a high-level description of a system. Accordingly, this representation should provide an intellectually traceable guide to the whole system and a good architecture should ease the meeting of the performance, reliability, scalability, and interoperability requirements [8]. Enterprise architecture frameworks must address fundamental organizational needs including decreased costs related to business organization, improved quality of interplay between IT and business organizations, provision of new computer-aided support, and improved quality of IT systems in areas such as security, performance, availability, reliability, and data quality [8].Survey findings with Chief Information Officers reveal priority rankings for IT management expectations, with the top three being: (1) decrease costs related to business organization such as personnel costs, (2) improve quality of interplay between IT and business organization including support and end-user training, and (3) provide new computer-aided support to the business organization with new functionality and information. The survey results demonstrate that management expectations concentrate in better cost management, better collaboration between business and IT, and better architecture and solutions [8].

Coordinated cross-functional teams are also a pillar of governance. The marketing team must assess the effect of promotions on volume, and accurately and timely communicate planned promotions to the supply chain team [7]. Team members across departments must agree on operating assumptions, incentives and targets. Organizations must quickly attribute lagging sales of key products to root causes, such as misaligned incentives within the salesforce. Cross-functional team research demonstrates that internal team factors such as social cohesion and autonomy primarily impact overall effectiveness through collaboration, while contextual influencers including information quality, procedural quality, and joint rewards have both direct and indirect associations with effectiveness outcomes [7].

Implementation of governance frameworks may have a large learning curve and require teams of architects and practitioners to build or re-write systems [8]. As most people are comfortable with customary architectures, creating new ways of working is a costly undertaking. Analysis of enterprise architecture adoption challenges reveals that understandability of practical frameworks remains difficult, being viewed as complex utilities lacking fruitfulness for accommodating government culture fundamentals. There is no certainty of normative standardization for operation procedures, which reflects in capability design, fragmented maintenance, high complexity, and costs, especially when supporting new strategic announcements or regulatory compliance adoption [8]. Sustained success will depend on making governance decisions a capability of the organization, not just a technical deployment.

6. Implementation Considerations

The decoupling pattern can especially be useful for multi-business enterprises with different transactional systems and for organizations with fluid organization structures when the organization's planning function can assimilate new business entities with a standard integration model.

The key requirement is to have common semantic definitions of business entities and less tightly coupled integration patterns than scheduled batch processes.

When planned value can be obtained through architectural decoupling depends on the characteristics of organizations and their calculated goals. Different schools of enterprise architecture thinking have different views on scope and purpose. The enterprise integrating school views enterprise architecture as designing all aspects of the enterprise so that strategy may be executed by maximizing overall coherency [9]. This school has a systemic view of enterprise architecture and enterprise design and sees reductionism as inadequate on its own. All aspects of the organization are then seen as a complex web of reinforcing and attenuating couplings that must be globally optimized [9].

The overall philosophy is that you can get desired results by designing the enterprise to reinforce desired aspects and to dampen undesirable aspects, with one high priority being to eliminate conflicts between policies and other structures of the enterprise [9]. The design of all organizational dimensions is joined together instead of designing the components independently. Difficulties in the implementation of strategies arise from the incomprehension of the dynamics [9]. These types of organizations, which fit the various schools, shall be more effective by avoiding contradictions and paradoxes [9].

Enterprise integration patterns can also solve the problem of how to connect systems with loose coupling, and do so elegantly and in a timely manner. These patterns have been established for over a decade [10]. Patterns distill the concerns that affect a product in a consistent format, using a name to describe the behavior irrespective of any technology. The messaging pattern language is structured in six parts, as described below. This is the order of the concerns for a message from its creation, through its channeling, routing and transformation, into its consumption [10].

Architectural decoupling is matched by a need for organizational clarity around planning roles and responsibilities. Organizations need clear processes for communicating planning decisions and exceptions when decisions and execution are decoupled. The enterprise integrating school states that an enterprise architect is an inquiring facilitator [9]. Since dynamics present within an enterprise exceed the cognitive capabilities of a single person, the architect eases multi-functional team inquiry processes, to surface and map systemic dynamics [9].

Furthermore, facilitation and systems thinking skills, as well as the ability to illustrate systemic dynamics at a design phase are important to communicate across the enterprise [9]. Enterprise-wide commitment and team-level processes are also necessary because of the enterprise's intrinsic complexity as a system. As the enterprise becomes progressively distributed and connected, the integration of the various parts of an enterprise is also a challenge that is increasing in importance [10]. Understanding and collaboration appear to be the main problems, meaning exploring the systemic dynamics at play and contradictions, and coordinating the affected for a shared understanding of the redesigns [9].

Selective centralization is another implementation consideration. Not all planning needs to be centralized, as organizations use a tiered model where planned planning is centralized, while tactical planning is decentralized. Such a model can have scope and governance boundaries around it.

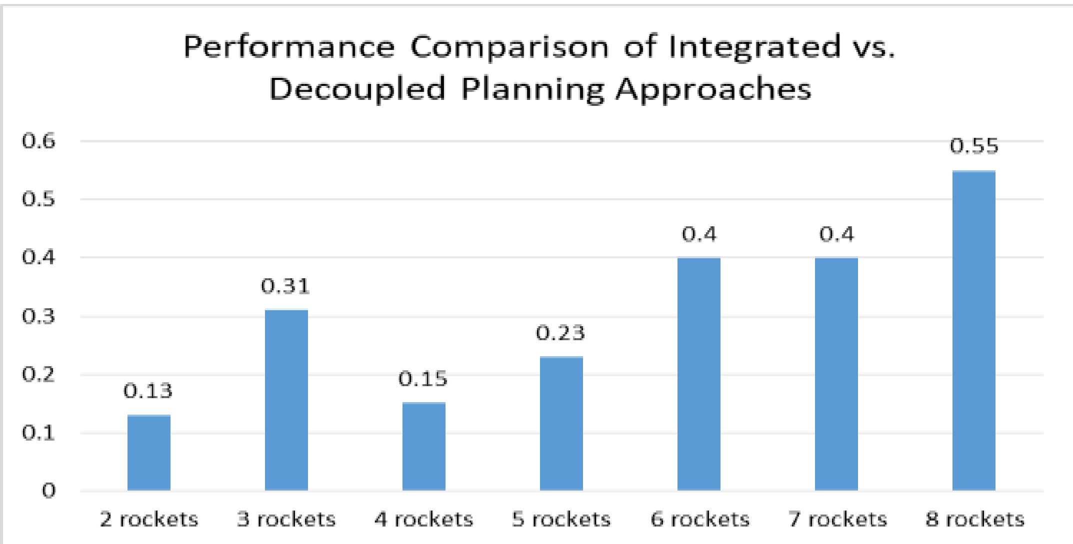

Figure 1: *Performance Comparison of Integrated vs. Decoupled Planning Approaches [3, 4].*

Table 1: *Integration Pattern Comparison [5, 6]*

Characteristic	Batch ETL	Event-Driven	Hybrid Approach
Data Latency	Hours to Days	Seconds to Minutes	Mixed (Context-Dependent)
Implementation Complexity	Low	High	Moderate
Suitable Planning Horizon	Monthly/Quarterly	Daily/Weekly	All Horizons
System Coupling	Moderate	Loose	Selective
Infrastructure Requirements	Standard	Specialized	Combined
Change Propagation	Scheduled Intervals	Real-Time	Data-Type Specific
Error Handling	Batch Reconciliation	Event Replay	Combined Mechanisms
Scalability	Vertical	Horizontal	Both
Best Application	Strategic Planning	Operational Planning	Enterprise-Wide Planning

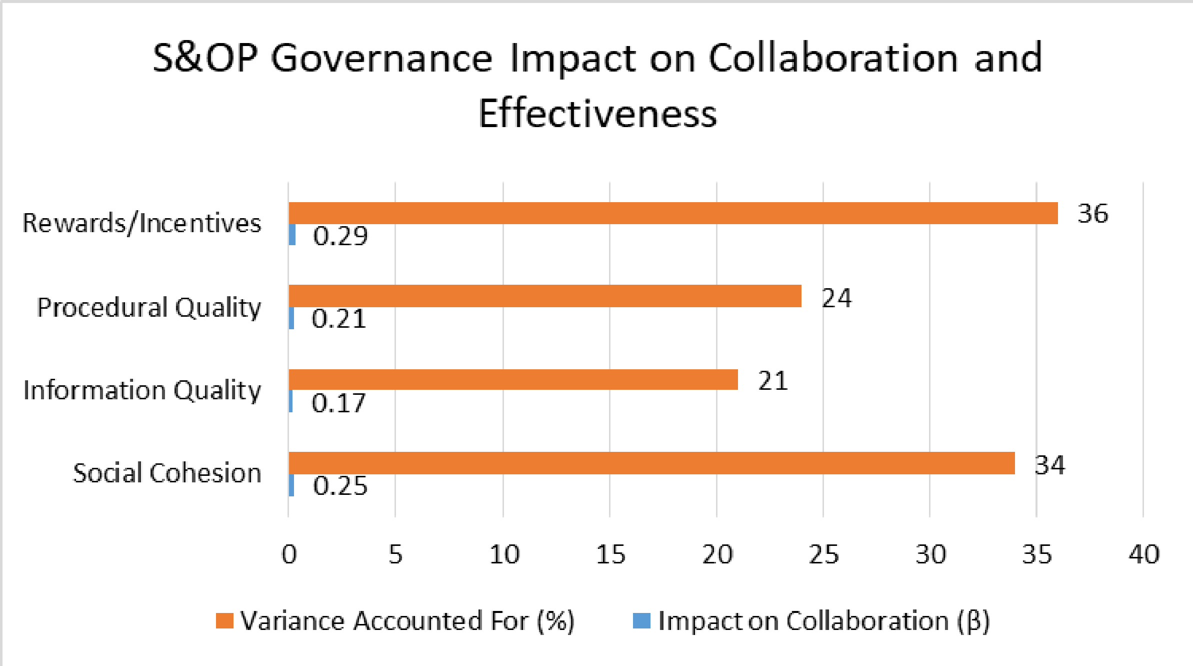

Figure 2: *S&OP Governance Impact on Collaboration and Effectiveness[7, 8].*

Table 2: *Architectural Decision Framework [9, 10].*

Organizational Characteristic	Decoupled Architecture Recommended	Integrated Architecture Sufficient
Number of Business Units	Multiple entities with heterogeneous systems	Single entity with unified system
Structural Change Frequency	High (frequent mergers, acquisitions)	Low (stable organizational structure)
Geographic Distribution	Multi-regional with regulatory variations	Single region with homogeneous requirements
Planning Complexity	Advanced analytics and optimization required	Standard planning capabilities adequate
Cross-Functional Collaboration	High visibility and coordination needs	Limited interdepartmental dependencies
Technology Evolution Rate	Rapid adoption of new planning techniques	Stable processes with infrequent changes
Post-Merger Integration Priority	Critical for synergy realization	Not a primary concern
Regulatory Compliance	Multiple jurisdictions with data residency	Uniform regulatory environment

7. Conclusions

Architectural decoupling of planning from execution represents one model shift in enterprise architecture thinking: from monolithic integration, to modular capabilities for realizing evolving sets of capabilities while retaining operational coherence. Decoupled architectures are useful when multiple business units within a multi- entity enterprise deploy different transactional systems. In this case, newly added entities are brought into the planning capabilities through standard integration. Shared semantic definitions of business entities and event-driven business patterns have a looser coupling than batch-processing-based periods. The company integrating school of architecture designs the organization for optimum coherency. The joint design of all these dimensions instead of considering them in isolation stands because much can be gained by eliminating contradictions and paradoxes. Enterprise integration patterns have been tested and proven with connecting disparate systems in a loosely coupled manner across products, vendors, and technology stacks. Success in implementation requires team-based processes and enterprise-wide commitment and clarified decision rights and planning responsibilities alongside architectural decoupling. Explicit processes for communicating planning decisions and resolving exceptions ensure that planning intent becomes operational reality.

Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
- **Conflict of interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper
- **Acknowledgement:** The authors declare that they have nobody or no-company to acknowledge.
- **Author contributions:** The authors declare that they have equal right on this paper.
- **Funding information:** The authors declare that there is no funding to be acknowledged.
- **Data availability statement:** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.
- **Use of AI Tools:** The author(s) declare that no generative AI or AI-assisted technologies were used in the writing process of this manuscript.

References

[1] Prithvi Bhattacharya, "Aligning Enterprise Systems Capabilities with Business Strategy: An extension of the Strategic Alignment Model (SAM) using Enterprise Architecture," ScienceDirect, 2018. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S1877050918317332

[2] Erin Hueffner, "What Sales and Operations Planning (S&OP) Is and How to Do it Right," Salesforce, 2025. [Online]. Available: https://www.salesforce.com/sales/sales-operations-planning/

[3] Biplav Srivastava, "RealPlan: Decoupling Causal and Resource Reasoning in Planning," 2000. [Online]. Available: https://cdn.aaai.org/AAAI/2000/AAAI00-125.pdf

[4] Mike P. Papazoglou and Willem-Jan van den Heuvel, "Service oriented architectures: approaches, technologies and research issues," The VLDB Journal, 2007. [Online]. Available: https://link.springer.com/content/pdf/10.1007/s00778-007-0044-3.pdf

[5] M. A. Roth et al., "Information integration: A new generation of information technology," IBM SYSTEMS JOURNAL, 2002. [Online]. Available: https://web.archive.org/web/20040720230310id_/http://researchweb.watson.ibm.com:80/journal/sj/414/roth.pdf

[6] Ronak Pansara, "Master Data Management Challenges," International Journal of Computer Science and Mobile Computing, 2021. [Online]. Available: https://www.researchgate.net/profile/Ronak-Pansara/publication/355780526_Master_Data_Management_Challenges/links/654058a2f7d021785f22513a/Master-Data-Management-Challenges.pdf

[7] Scott C. Ambrose and Brian N. Rutherford et al., "Sales and Operations Planning (S&OP): A Gr ations Planning (S&OP): A Group Effectiveness Approach," Academy of Marketing Studies Journal, 2016. [Online]. Available: https://commons.erau.edu/cgi/viewcontent.cgi?article=2220&context=publication

[8] Montree Thirasakthana and Supaporn Kiattisin, "Sustainable Government Enterprise Architecture Framework," MDPI, 2021. [Online]. Available: https://www.mdpi.com/2071-1050/13/2/879

[9] James Lapalme, "3 Schools of Enterprise Architecture," IEEE, 2011. [online]. Available: https://eapad.dk/wp-content/uploads/2014/11/jameslapalme-threeschools.pdf

[10] Olaf Zimmermann et al., "A Decade of Enterprise Integration Patterns A Conversation with the Authors," IEEE Software, 2016. [Online]. Available: https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7368007