

Understanding EA Approaches: Middle-Out

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Because the primary goal of enterprise architecture (EA) is to "enable effective enterprise change," the *middle-out* approach to EA strives to provide an EA that is the most adaptable to the widest range of possible future states. It focuses on managing the key dependencies among those parts of the enterprise that have the biggest impact on the ability to change. It models such dependencies as interfaces and endeavors to make such interfaces as general, stable and shareable as possible.

Key Findings

- Middle-out starts in the middle: a particular set of standards that has an open-ended set of possible uses and implementations.
- Because middle-out focuses primarily on the interfaces among parts of the enterprise, it can be considered a type of enterprise *integration* architecture.
- Because it is focused on open-ended uses by many different processes, middle-out is primarily focused on enterprise information architecture — specifically the information shared across the enterprise.

Recommendations

- Architect the lines, not the boxes.
- Apply middle-out to extended-enterprise or industry architectures where the participants are peers in some sort of value network — hence the obvious need to "architect the lines."
- Middle-out should be used when the business wants the ability to pursue a more open-ended range of possible strategies.

ANALYSIS

This research is part of a set ("What Is the Right Approach to Developing an EA?") that explores several different approaches to supporting EA. Several of these reports outline very new and emerging approaches to EA, as well as more-traditional approaches. We encourage clients to read this research to understand which EA approach or combination of approaches would make the most sense for their business demands, culture, processes, technologies and future-state visions. Clients can also use this research to help educate and inform business and IT leaders on how EA is evolving to support new business and IT models.

Middle-out architecture is an approach to EA that architects the lines not the boxes. It focuses on managing the key dependencies among those parts of the enterprise that have the biggest impact on the ability to change. Middle-out architecture is also sometimes referred to in Gartner research as "emergent architecture" and "EA Lite."

Characteristics

The first key characteristic of the middle-out approach is best summarized by the slogan "Architect the lines, not the boxes." As Gartner highlights in our research defining EA, architecture is "the fundamental organization of a system, embodied in its components, their relationships to each other and the environment" (see "Gartner Defines the Term 'Enterprise Architecture'"). Our research indicates that, as organizations become more complex, it is the relationships (the lines) that most impede adaptability and change. Accordingly, improving the architecture of these relationships is where EA can have the biggest positive impact toward enabling effective enterprise change.

The second key characteristic of middle-out is the way in which it models such relationships or dependencies. It models all relationships as interactions via some set of interfaces. Such interactions and interfaces can range from completely informal and manual (for example, sending handwritten invitations to a party via postal letters) to highly formal and automated (such as credit card transactions across the Visa network). Whatever the style of interface, middle-out describes it according to three fundamental facets: identifiers, formats and protocols (IFaPs).

For example, if the interface is between a customer and a Starbucks barista, these would be the IFaPs:

- Identifiers: Words like "tall," "venti," "grande," "double," "triple" and "foam"
- Format: The grammar of a drink order — for example, "May I please have a grande vanilla latte extra foam for here?"
- Protocol would be the sequence of interactions:
 - Barista says "Next."
 - Customer orders.
 - Barista says the price.
 - Customer gives card.
 - Barista returns card and receipt.
 - Customer moves to drink delivery area.

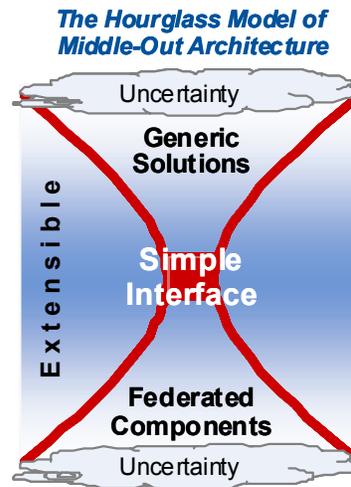
- Customer waits.
- Barista delivers drink.

The final key characteristic is the one that motivates the name itself: middle-out. Not just any kind of line architecture qualifies as middle-out. A middle-out-style line can be thought of as having the shape of an hourglass: open-ended at the top (application-neutral), open-ended at the bottom (implementation-neutral), and narrow in the waist (a simple set of IFaPs) (see Figure 1). Thus, middle-out design does not start at the top (a particular use), nor at the bottom (a particular implementation). It starts in the middle: a particular set of IFaPs that has an open-ended set of possible uses and implementations.

Figure 1. Middle-Out Architecture

Middle-out is an architectural style that enables decentralized change through the following minimal constraints:

- **Generic solutions:** Underlay a wide range of unexpected uses
- **Simple interface:** Minimal specification of easily applied identifiers, formats and protocols (IFaPs)
- **Federated components:** Overlay a wide range of unexpected implementations
- **Extensible:** Easy and dynamic forward and backward compatibility



Source: Gartner (December 2009)

Type/Degree of Control

Middle-out uses both high and low degrees of control and centralization. When it comes to the most core interfaces in the enterprise, a high degree of control and centralization of decision making is applied. When it comes to the endpoints on either side of the interface (especially at the edge of the business, where the business interfaces with the customer and the market), there is little or no control, and decisions about the internals of such endpoints can be made in a decentralized fashion.

Furthermore, extensions to the core interfaces are made in a decentralized fashion. For example, if a particular business unit wants to extend the enterprise shared information model for customers with some additional attributes that are unique to that unit, such a decision is delegated to the business unit. Note that Tim Berners-Lee did not need to seek permission from a central authority to extend the Internet with the Web, since it did not change the stable IFaPs of the Internet; it only extended them.

Focus Area

Because middle-out focuses primarily on the interfaces among parts of the enterprise, it can be considered a type of enterprise *integration* architecture. Often, EA teams are charged with two major roles: (1) standardizing the applications, services and IT infrastructure components (for example, servers, storage and networks) that support them; and (2) standardizing the integration

among such applications, services and components. If an EA initiative were given unlimited resources (an unprecedented scenario), then it might make sense to standardize both. But given the reality that most EA initiatives are woefully resource-constrained, the middle-out approach focuses such precious resources on the most important challenge: integration.

For example, the Web has revolutionized the access (integration) of information across companies, applications, technologies and so on by standardizing such access based on the URL (identifier), HTML (format) and HTTP (protocol). But it has done nothing directly to standardize servers, desktops or applications.

However, middle-out's emphasis on open-ended uses and implementations makes it much more than just an enterprise integration architecture. Because it is focused on open-ended uses by many different processes, middle-out is primarily focused on enterprise information architecture — specifically the information shared across the enterprise. Accordingly, middle-out focuses on a few key information architecture principles: network-effect sharing, consistency, usability and extensibility.

Example

The Internet is the paradigm of a middle-out EA. The Internet is based on a set of rigorously enforced standards for how packets of data (formats) can be shared between endpoints with addresses (identifiers) using IP (the Internet Protocol). The Internet has shown a remarkable combination of stability and extensibility, which is why it is still a source of sometimes disruptive innovation more than 30 years after its creation. How many architectures can one say that about? Note that the Internet is not only a set of specifications, it is also the governance body and process that enables its extension and evolution — the Internet Engineering Task Force (IETF).

While the Internet/IETF is the paradigm of the middle-out approach, there are examples that are more business-domain-specific than the Internet. One good example is the Information Sharing Environment (www.ise.gov) — an EA for sharing terrorism information across five communities: intelligence, law enforcement, defense, homeland security and foreign affairs. The ISE standardizes the IFaPs for sharing terrorist information without standardizing any of the applications that produce or consume such information. And the IFaPs are not merely some low-level standards for transporting data across the network, they are business-level standards defining a holistic information architecture (including semantics) for the intelligence community business domain: threats, suspicious activities and so on. In fact, the information architecture is based on the National Information Exchange Model developed by the U.S. Department of Justice (see www.niem.gov).

Advantages (Value Proposition)

The major advantage of the middle-out approach is the focus it brings to EA. All too often, EA initiatives attempt to apply a little bit of standardization to everything in the enterprise, from master data standards to desktop software standards. In doing so, it fritters away its precious resources on many activities that have relatively little impact on the major impediments to effective change.

An indirect advantage of the middle-out approach is that, because it focuses on integration, both within a single organization and across an industry or many industries, there are many publicly documented and described examples of such architectures. For example, www.ise.gov has published its EA ("[ISE Enterprise Architecture Framework](#)," October 2008) and seeks public input to improve it. Other public examples of middle-out (that is, open-ended integration-focused architectures) abound.

Disadvantages

The main disadvantage is the immaturity of approach. It is harder to sell the middle-out approach to senior management, because it is not as well-known and seems so different from traditional architectural approaches. A related disadvantage is that middle-out is based on more-sophisticated concepts than traditional EA. This requires that the business be sophisticated enough to understand the approach.

Sometimes, middle-out is mistaken for a "least common denominator" or commodity approach: always preferring the most general-purpose or commodity product or service. Such an approach can sacrifice differentiation that is truly a competitive advantage. However, when middle-out is fully understood, such valuable differentiation is accommodated via the appropriate use of extensible designs.

Situation Where It Is Advised

The middle-out approach is most suited to globally complex organizations whose primary business challenges involve myriad dependencies among its major elements. It is also well-suited to extended-enterprise or industry architectures, where the participants are peers in some sort of value network — hence the obvious need to architect the lines, because the boxes (peers) are not under any central control.

Situation Where It Is Unadvisable

Middle-out is not appropriate in environments where any substantial lack of structure is detrimental. For example, in some highly regulated environments (for example, pharmaceutical manufacturing), every component of an architecture must be accounted for. It is also not advised for IT organizations with only minimal architectural skills and experience.

Relationship to Business Strategy

Given its emphasis on open-ended uses, middle-out should be used when the business wants the ability to pursue a more-open-ended range of possible strategies. For example, Amazon business leaders embraced a middle-out business-to-consumer (B2C) architecture that enables Amazon to offer an open-ended set of products. Barnes & Noble's B2C architecture, on the other hand, is limited to selling the kinds of products one would see in a bookstore — for example, books, CDs and DVDs.

Key Stakeholder/Driver

The key driver for middle-out is enterprise or ecosystem information-sharing environments. When information or activities need to be integrated across diverse business functions or ecosystem/industry partners, middle-out enables such flows via the interfaces that are its focus.

Key Deliverables

Since IFaPs are the primary aspects that middle-out architects, its key deliverables are standards for identifiers, formats and protocols. It is also concerned with delivering decentralized processes for unifying, extending and applying such IFaPs.

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