

Current and future trends in Enterprise Integration

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Purpose

The purpose of this paper is to discuss current and future trends in integration and how we can plan for future direction of this practice in Unisys.

Enterprise Integration patterns and dominant Tool suites comparison

Enterprise Integration pattern	WebMethods (Supports patterns if not Inbuilt)	Informatica (Supports patterns if not Inbuilt)	Oracle (Supports patterns if not Inbuilt)	Tibco (Supports patterns if not Inbuilt)	Microsoft (Supports patterns if not Inbuilt)
Category: Integration Styles					
File Transfer	☑	☑	☑	☑	☑
Shared Database	Not using	Not Using	Not using	Not using	Not using
Remote procedure Invocation	☑	☑	☑	☑	☑
Messaging	☑	☑	☑	☑	☑
Enterprise Integration pattern	WebMethods (Supports patterns if not Inbuilt)	Informatica (Supports patterns if not Inbuilt)	Oracle (Supports patterns if not Inbuilt)	Tibco (Supports patterns if not Inbuilt)	Microsoft (Supports patterns if not Inbuilt)
Category: Messaging Systems					
Message Channel	☑	☑	☑	☑	☑
Message	☑	☑	☑	☑	☑
Pipes and Filters	☑	☑	☑	☑	☑
Message Router	☑	☑	☑	☑	☑
Message Translator	☑	☑	☑	☑	☑
Message Endpoint	☑	☑	☑	☑	☑
Enterprise Integration pattern	WebMethods (Supports patterns if not Inbuilt)	Informatica (Supports patterns if not Inbuilt)	Oracle (Supports patterns if not Inbuilt)	Tibco (Supports patterns if not Inbuilt)	Microsoft (Supports patterns if not Inbuilt)
Category :Message Channels					
Point to Point channel	☑	☑	☑	☑	☑
Publish Subscribe	☑	☑	☑	☑	☑

channel					
Data Type Channel	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Invalid Message Channel	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Dead Letter Channel	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Guaranteed Delivery	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Channel Adapter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Messaging bridge	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Message Bus	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Enterprise Integration pattern	WebMethods (Supports patterns if not Inbuilt)	Informatica (Supports patterns if not Inbuilt)	Oracle (Supports patterns if not Inbuilt)	Tibco (Supports patterns if not Inbuilt)	Microsoft (Supports patterns if not Inbuilt)
Category: Message Construction					
Command Message	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Document Message	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Event Message	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Request-Reply	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Return Address	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Correlation Identifier	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Message Sequence	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Message Expiration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Format Indicator	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Enterprise Integration pattern	WebMethods (Supports patterns if not Inbuilt)	Informatica (Supports patterns if not Inbuilt)	Oracle (Supports patterns if not Inbuilt)	Tibco (Supports patterns if not Inbuilt)	Microsoft (Supports patterns if not Inbuilt)
Category: Message Routing					
Content-based Router	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Message Filter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Dynamic Router	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Recipient List	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Splitter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Aggregator	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

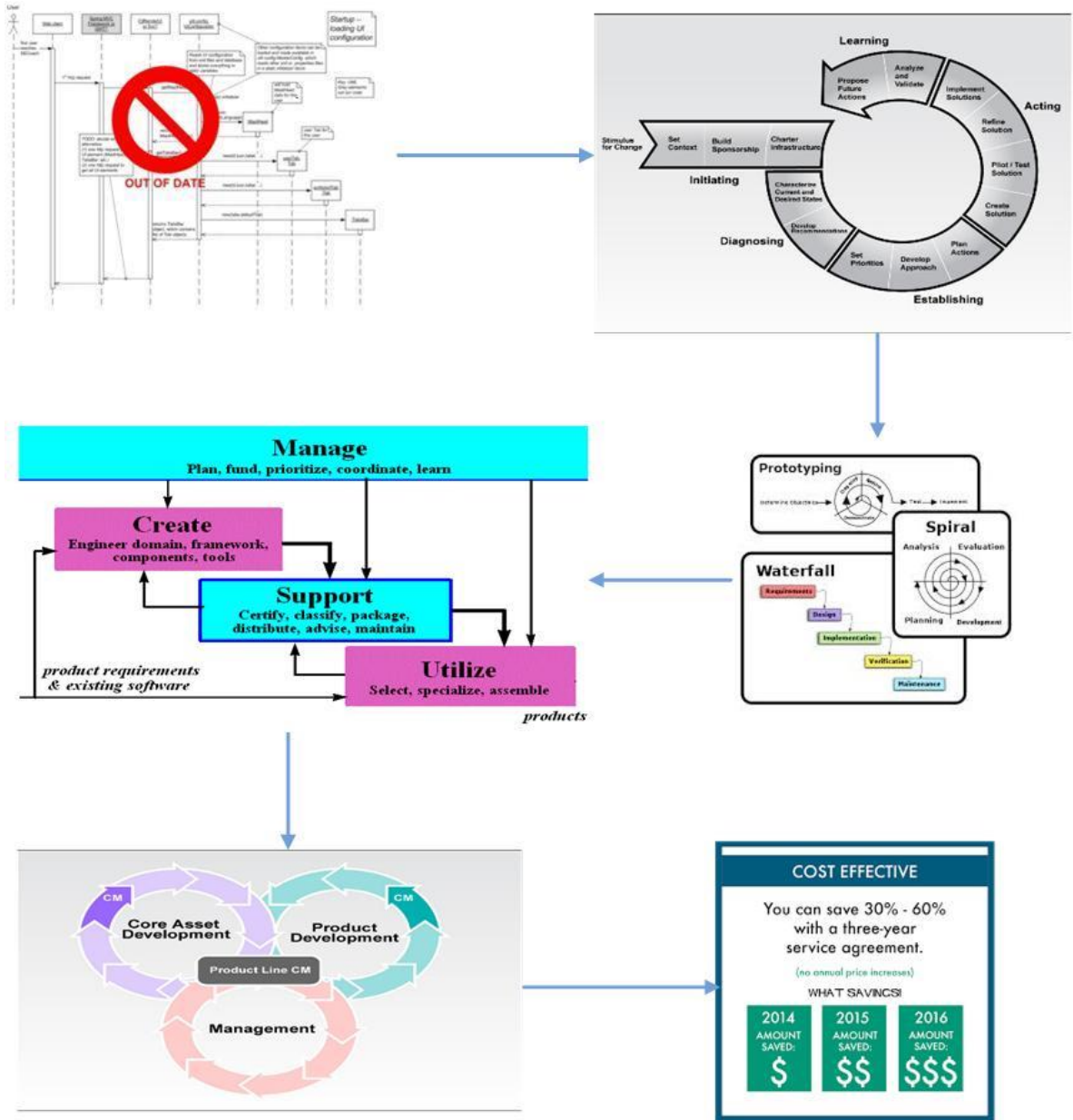
Resequencer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Composed Message processor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Scatter -Gather	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Routing Slip	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Process Manager	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Message Broker	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Enterprise Integration pattern	WebMethods (Supports patterns if not Inbuilt)	Informatica (Supports patterns if not Inbuilt)	Oracle (Supports patterns if not Inbuilt)	Tibco (Supports patterns if not Inbuilt)	Microsoft (Supports patterns if not Inbuilt)
Category: Message Transformation					
Envelope wrapper	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Content Enricher	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Content Filter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Claim Check	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Normalizer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Canonical Data Model	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Enterprise Integration pattern	WebMethods (Supports patterns if not Inbuilt)	Informatica (Supports patterns if not Inbuilt)	Oracle (Supports patterns if not Inbuilt)	Tibco (Supports patterns if not Inbuilt)	Microsoft (Supports patterns if not Inbuilt)
Category: Messaging Endpoints					
Messaging Gateway	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Messaging Mapper	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Transactional Client	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Polling Consumer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Event Driven Consumer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Competing consumers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Message Dispatcher	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Selective Consumer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Durable Subscriber	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Idempotent	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Receiver					
Service Activator	☑	☑	☑	☑	☑
Enterprise Integration pattern	WebMethods (Supports patterns if not Inbuilt)	Informatica (Supports patterns if not Inbuilt)	Oracle (Supports patterns if not Inbuilt)	Tibco (Supports patterns if not Inbuilt)	Microsoft (Supports patterns if not Inbuilt)
Category: System Management					
Control Bus	☑	☑	☑	☑	☑
Detour	☑	☑	☑	☑	☑
Wire Tap	☑	☑	☑	☑	☑
Message History	☑	☑	☑	☑	☑
Message Store	☑	☑	☑	☑	☑
Smart Proxy	☑	☑	☑	☑	☑
Test Message	☑	☑	☑	☑	☑
Channel Purger	☑	☑	☑	☑	☑

Current Domains

From **managed services** business perspective Unisys offers lot of enterprise scale integrations

- **Field services integrations.**
- Integration of **ITIL compliant** CRM and ticketing systems in service desk deals for managed services.
- Integration of **non-ITIL compliant** home grown ticketing systems with ITIL compliant ticketing systems for custom IT services deals.
- **Asset data integrations** between data discovery tools across various companies that allows tracking of various devices and software licenses in use for Global IT services.
- **ETL services** across various business databases and warehouses to enable reporting and analytics.
- Projects using **End Point systems integration suites themselves** where applicable (BAO from BMC, ServiceNow integration Libraries etc.)
- **Custom Products building and monetization** -A la Carte integration services on need basis for any verticals that involve data integration / Enterprise Application Integration / Cloud Integration / Hybrid IT or any kind of vertical or horizontal integrations using home grown enterprise service bus as well. **(On Demand basis)**



From technical capabilities perspective, we are offering enterprise integration capabilities in

1. Application to Application integrations within the enterprise (**A2A**)
2. Business to Business integrations with trade partners(**B2B**)
3. Customer to Business integrations as in workflows supporting business websites within the enterprise (**C2B/ B2C**)
4. On premise to cloud hosted partner app integrations (**Cloud integrations**)
5. On premise to enterprise hosted cloud COTS applications instances(**Cloud integrations**)

The scope of the work involves services doing inline translation and semantic transformation services, defining ontologies for multi enterprise data transformation using canonical forms , protocol mapping (for example between AS2 and FTP), intelligent routing, IaaS service provider interconnects, Web services choreography, process model-driven choreography of B2B services, SOA governance and data validation.

To elaborate further, we also have an in house developed enterprise service bus with an internal framework sewed on top of two commercial ESBs which are Web methods and Informatica. This provides both functionalities of **Mediation** within enterprise and **Federation** for outside enterprise.

Our existing functionality also allows us to cater to multiple integration methodologies with different access patterns like synchronous and asynchronous (fire and forget) communications, with capability to deal with distributed transactions if required and also helps in implementing different topologies like hub and spoke as well as working across conceptual or logical tiers like integration services across DMZ zone (Tier-1), application zone (Tier-2) and data zone (Tier-3).

A quick look on industry standard tool suites used in Unisys

Gartner is known for providing premium research reports on information technology industry trends year after year. Their reports are known for their quadrants based analysis. The below picture shows Gartner's quadrant reporting methodology. In this quadrant, leaders are considered successful and mature vendors for a given application domain.

Gartner's Magic Quadrant



Given the fact that application integrations procedural convergence is happening across domains, we are listing 3 individual areas which are currently involved in integration work. They are

- On Premise enterprise integration
- Enterprise integration platform as a service
- Structured data integration in an enterprise

On Premise Enterprise Integration Providers

This **Gartner quadrant** gives a quick overview of leaders, visionaries, challengers for **on premise enterprise integration providers**.



Among these below toolsets, Unisys officially uses best components of many of these tool sets. They are

- Webmethods Integration server and various adapters from SoftwareAG
- Oracle Fusion middleware components like Oracle AQ subsystem, Oracle databases, Oracle Web caches, Oracle App servers, Oracle Internet Directory suite tools etc.
- Microsoft Queuing and SQL server service brokers and databases, SSIS etc.

So Unisys integration team has experience in **using almost 3 technical leaders** suite of components from the Gartner's leaders quadrant for enterprise integration tools.

Also the teams have basic working knowledge in few more tool sets like Mulesoft and Talends products.

Majority of Unisys integrations in Field services, ITIL and non ITIL ticketing systems integrations are catered to by these vendor products.

Among these, most of the visionaries' products are also competitively priced. Our teams can quickly scale up on

- WSO2
- Talend
- Redhat

These tool suites can support multitudes of protocols and exchange formats and we have integration experience in majority of these protocols

- HTTP / HTTPS
- FTP/SFTP/ FTP over SSH
- EDI
- ROSETTANET
- EMAIL (SMTP /POP /IMAP)
- SOAP /REST
- JSON
- Custom API formats as applicable using respective adapters

We also have a library of best practices and reusable components for each one of the dominantly used tool suites within Unisys.

Enterprise Integration Platform as a service

As far as the integration platform services being offered as a service i.e. in **IPaaS segment**, the below picture depicts the leaders, visionaries and challengers in Gartner's magic quadrant.



Unisys integration team officially uses **Informatica** suite of components from leaders quadrant here in its homegrown Message Bus solution and has basic working knowledge of **Mulesoft** suite functionalities.

Structured Data integration Tools

This Gartner magic quadrant lists Leaders, challengers, visionaries and niche players for structured **data integration tool suites** (relational, File and other traditional repository based data sources)



Among these, our Unisys integration team has active work experience in Informatica power exchange and Microsoft SSIS tool suites and basic experience in Oracle and Talend products.

Pricing models

- Multi-tenanted and Pay per use (Subscription Models)
- Open source / in house custom development
- Dedicated infrastructure

Future Industry Trends

Enterprise and data integrations space is headed for huge growth in future with explosion of technologies in consumer and enterprise segments. The growth of mobile usage, cloud usage, social media usage, enterprise content management tools, advances in processing power of traditionally standalone electronic devices and establishment of new standards for communication have resulted in crystallizing some trends into potential opportunities.

Below is a brief description of segments where integrations are required.

- 1) **Mobile Integration** (Geo location, Camera, contacts, photos, others, Custom app communication) sync services to cloud hosted applications and also contextual real-time access to enterprise integration platforms back ends, making mobiles an extension of existing integration capabilities with same standards of security.
- 2) **Internet of Things.** Pretty much open space. All kinds of device talk. Sensors data from any kind of electronic and electrical equipment to the command center that makes **predictive or reactive decisions**. These will be micro messages with evolving communication standards. This will be the transport layer over which big data analytics can be built as well. Complex Event processing capabilities of existing integration players will start becoming mainstream business opportunities.
- 3) **Pure play Cloud Integrations and Master Data management.** Basically transfer of data from cloud hosted Peta byte scale data warehouses hosted in clouds to target destinations as well as Cloud to Cloud and on premise to cloud communications.
- 4) Integration of **interactive Virtual Reality /Augmented reality systems with database back ends** to access information from digital archives etc.
- 5) **Enterprise Content management and Social computing verticals** growth within enterprises will require unique integration needs. We can include enterprise needs like Email migrations and any other integration between enterprise applications and infrastructures.

- 6) **Digitization projects.** Any kinds of digital projects ultimately require integrations from all kinds of sources / front ends to target data stores which can be databases or clustered file systems and the data can be of any nature (images, XMLs and all sorts of files).
- 7) **Visual Integrations.** A methodology where we provide a single pane of glass or dashboard type of landing pages in the front end and then have a mashable set of integrations based on user choice. Works more like syndication and can catch up in market place model for a vendor aggregator.