



HARVARD UNIVERSITY
Information Technology

Enterprise Architecture **Workgroup Kickoff**

December 11, 2014 | Thursday | 3:00-4:00 p.m. | 8 Story Street #6016

Agenda

- The EA Vision
- Milestones for EA at Harvard
- Governance
- EA Program Approach
- Definition of Terms
- Architecture Maturity
- EA Focus Areas

The EA Vision

Our Vision for Enterprise Architecture

Provide a technology framework and a set of standards to enable acquisition, development, and deployment of IT services that maximize interoperation, minimize duplication, and simplify the IT environment across all of Harvard.

Strategic Objectives

- Deliver an enterprise architecture framework that drives technology and development standards across Harvard
- Provide common approaches for integration across enterprise applications, processes, and data
- Align and rationalize technology decisions and investments
- Identify redundant or conflicting processes and data across organizations

Guiding Principles

- Ensure that EA provides active direction and delivers value to the organization
- Counter complexity with common solutions
- Enable sharing of data across organizations
- Preference for open-source, COTS, and programmatic interfaces — both in what we obtain and what is produced
- Encourage, define, and ultimately provide best-practice solutions
- Evolve framework and solutions with advances in technology

Key Performance Indicators

- Decrease in project delivery timeframes to production
- Increase in the number of integrated applications using programmatic interfaces
- Increase in the number of funded projects that conform to an EA Checklist
- Decrease in ad-hoc data sharing
- Increase in automated data exchange
- Increase in the number of known authoritative data sources
- Decrease in the number of copies of data

Milestones for EA at Harvard

HUIT Top 40 Goal	EA Milestones
<p>20. Establish an IT enterprise architecture</p>	<p><i>Oct 2014:</i> Launch EA strategic initiative, including vision and strategic plan</p>
	<p><i>Dec 2014:</i> Define a Harvard EA framework to incorporate key elements in principles, data, integration, and technology architecture</p>
	<p><i>March 2015:</i> Conduct a current state analysis on integration to identify data passed between enterprise applications and the means of exchange</p>
<p>21. Implement an architecture review process</p>	<p><i>Sept 2014:</i> Identify a set of technical architects who can undertake architectural reviews</p>
	<p><i>Oct 2014:</i> Review and refresh PRC technical review process</p>
	<p><i>Dec 2014:</i> Review and refresh ITCRB technical review process</p>

Governance

Enterprise Architecture Executive Committee

IT executives who ensure that the vision and plan are addressed by the working group. Also provides consistent direction and problem-solving approaches for the working group and the EA program at large.

Meets monthly.

Co-Chairs: Anne Margulies and Stephen Gallagher

Members: Scott Bradner, Ben Gaucherin, Stephen Ervin, Gabriele Fariello, Praneeth Machettira, Pratike Patel, Jason Shaffner, Jason Snyder, Jim Waldo, Bob Wittstein

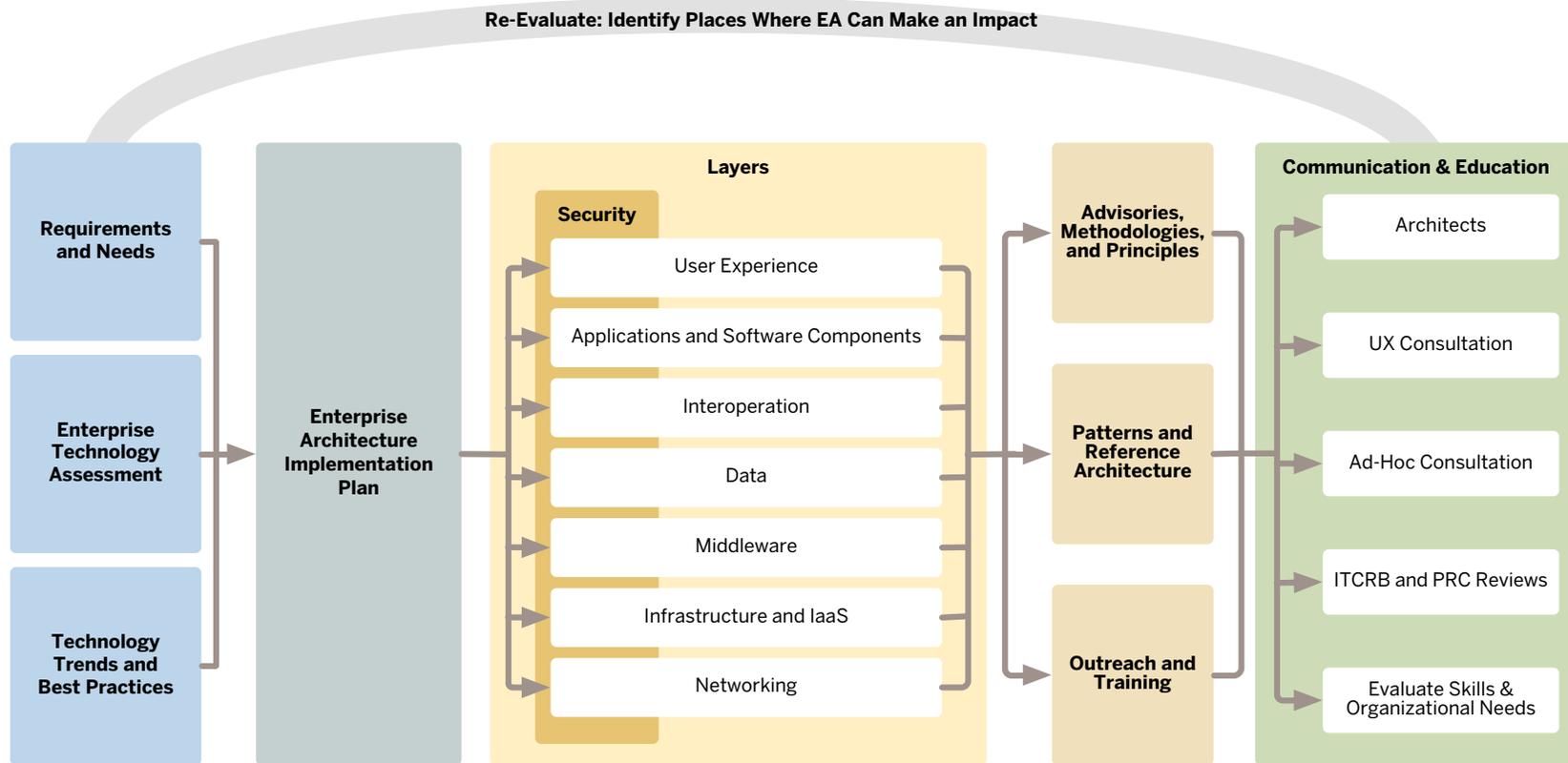
Enterprise Architecture Working Group

- Technical members of HUIT, Harvard Schools, and other IT departments that meet on a regular basis
- Defines the Enterprise Architecture framework for review by Steering Committee
- Defines sub-groups to detail layers
- Builds and reviews other EA components as per vision
- Publishes a monthly report on enterprise architecture progress, issues, and direction for the organization

Chair: Jason Snyder

Members: Scott Bradner, Bill Brickman, Dan Kaplan, Arnold Paul, Robert Piscitello, Jon Saperia, Raoul Sevier, Michael Thomas

EA Program Approach



Definition of Terms: EA Layers

Layers	Definition	Examples
User eXperience	End-user look-and-feel and navigation style of an application or service	The appearance of the Harvard brand, color schemes, use of breadcrumbs, position and appearance of navigation bars.
Applications, services, SaaS	Algorithms and code that provide technical or business value	Large-scale applications such as the Student Information System (SIS), small applications such as Electronic Submission Tracking and Reporting (ESTR), services such as Informatica for data transfers, and Software-as-a-Service solutions such as Office365.
Interoperation	Exchanges of information and provisioning of business transactions between different applications and services	Examples of information exchanges include transfers of student registration from SIS systems to central directories and transfer of account balance values from financial systems to CRM systems. An example of a remote service is the Identity and Access Management service for Authentication.
Data	Information represented in formats that are managed by applications and services	Data includes structured information such as student records and general ledger financial data. Examples of unstructured data include electronic books, the content of wikis, and most of the information available from the Internet.
Middleware	Common business or technical services that are implemented separately from applications and services	Database technologies are the most common example of middleware, but this layer can also include reporting 'engines', rules 'engines', application servers, data transfer applications, and other common shared services.
Infrastructure	Hardware and virtualized platforms that operate applications, services, and their components	Servers, associated storage components, operating systems, and other computing devices are the common examples of infrastructure, more recently joined by cloud-based infrastructures of Platform-as-a-Service and Infrastructure-as-a-Service.
Networks	Communications technologies that join infrastructures in disparate locations	Technologies that allow computing devices to communicate with each other include wired and wireless communications supported by devices such as routers, switches, and naming services.
Security	Use of resources by authorized individuals and computing services to information, business functions, and computing services	Examples of security mechanisms include door locks, user IDs and passwords, and intrusion detection/prevention tools. These mechanisms are supported by applications and services that manage user and systemic authentication, authorization, access to functionality, and access to data.

Definition of Terms: EA Deliverables

Deliverables	Definition	Examples
Principles	Foundational elements to drive decision-making and alignment	Principles can be applied at many levels, from guiding principles that characterize strategic, enterprise-wide systemic behavior to principles that help explain detailed technical behaviors of applications and services.
Methodologies	Methodologies divide IT work into phases containing activities with the intent of better planning and management; they help determine which methods or “best practices” should be applied to specific cases, and may include specific deliverables and artifacts	Examples of IT methodologies include waterfall, prototyping, iterative and incremental development, spiral development, rapid application development, extreme programming, and Agile.
Advisories	Recommendations offered as a guide to specific actions or practices	Common examples of advisories include security notifications of newly discovered vulnerabilities with recommendations for patching systems or changing passwords, and announcements of changes to the features, forms, or functions of applications.
Patterns	Generic models or descriptions from which specific implementations can be based or derived	In the IT context, patterns include reusable approaches for connecting applications to databases, establishing user security within an application, and implementing user experience in a solution.
Reference Architectures	A template solution, using multiple patterns and a vocabulary that promotes commonality, defining an architecture for a particular domain	Examples of business reference architectures include Insurance Application Architecture for the insurance domain, and 'HL7 V2.5' for the electronic health record domain. An example of a technical reference architecture is the Java Enterprise Edition for IT systems construction.
Outreach	Elevating awareness of programs and initiatives to affected populations	Examples of broadly-focused outreach include ABCD meetings on many IT topics, while more narrowly focused outreach include Big Group meetings regarding IT skills upgrades.
Training	The acquisition of knowledge and skills as a result of teaching that relates to specific competencies, with the goals of improving an individual’s productivity and performance	IT training of techniques could include database design, software coding in node.js, and process modeling with BPMN. Examples of vendor tool training include Oracle Financials, PeopleSoft, and Informatica ETL.

Architecture Maturity

Focus on Architecture as a Process

Establish EA outcomes on a maturity scale in order to deliver value at all stages of the program.

EA Maturity	Solution Architecture Reference Models	User Experience	Apps, Services, SaaS	Interoperation	Data	Middleware & PaaS	Infrastructure & IaaS	Networking	Security
<p>Continuously-improved EA Program EA widely adopted; legacy portfolio reduced to agreed minimum.</p> <ul style="list-style-type: none"> Metrics are used to measure progress and effectiveness against EA plans Architecture contracts in place Requirements impact assessments identify need for updates Risk assessments drive EA practice and evolution Monitoring tools watch for new technology and business trends 		<ul style="list-style-type: none"> UX standards are in place UX is seamless across composite and discrete solutions Implementations use external definitions for easy and consistent evolution 	<ul style="list-style-type: none"> Solutions focus on business-value-adding capabilities Significant reuse through leverage of common services Composite applications are the norm Services designed for enterprise reuse Solutions designed for cloud implementation 	<ul style="list-style-type: none"> Data exchange process standardized Catalog of interchange data sets published and managed "Pub/sub" model provides wide enterprise access Web services widely deployed Composite and workflow-managed solutions routine 	<ul style="list-style-type: none"> Data elements conform to enterprise dictionary Application and service data accessible via interoperation tools Solution data and interoperation data sets identified in enterprise data catalog Pub/sub and warehousing widely used 	<ul style="list-style-type: none"> Rationalized middleware portfolio Clear implementation standards Integrated management and monitoring Routine use of PaaS 	<ul style="list-style-type: none"> On-premise infrastructure only by agreement Infrastructure resources span the enterprise Clear operational standards and practices Skills-managed workforce SLO/SLA contracts consistently deployed across enterprise 	<ul style="list-style-type: none"> Unified on-premise and cloud network management Clear operational standards and practices 	<ul style="list-style-type: none"> Single identity management authentication process and mechanism Integrated security monitoring, notification, and reporting Clear organizational and operational standards and practices Clear and rapid responses to attacks and breaches
<p>Well Defined EA Program Enterprise-wide scope of EA agreed, but adoption and implementation is limited.</p> <ul style="list-style-type: none"> Governance committees become formal Architecture board reviews work Architecture skills framework in place Organizations use templates to capture information Cross-organization reference library in place Standards information base in place Architecture patterns, based on past effective solutions, in place EA compliance process is followed consistently, with exception and change processes Interoperability requirements considered in strategic planning and budgeting processes 		<ul style="list-style-type: none"> UX standards are well defined Shared and common services conform to standards Adoption across portfolio in process Implementation style refactored as part of solution evolution 	<ul style="list-style-type: none"> Rationalized solution portfolio agreed Application and service process standards and patterns agreed Application and service technical standards and patterns agreed IT skills framework adopted SaaS and cloud solutions considered for all new work 	<ul style="list-style-type: none"> 'Key' applications integrated via common bus 'Key' interchange data formatted to standards 'Key' interchange data set definitions published and available on request 'Key' services published and available 	<ul style="list-style-type: none"> 'Key' element meanings and formats defined Systems of record identified for key data sets Emerging catalogs of data at rest and in motion Data quality initiatives are underway 	<ul style="list-style-type: none"> Product standards for middleware tools declared Emerging implementation standards Multiple implementations and operational segmentation Inconsistent implementation across platforms and organizations 	<ul style="list-style-type: none"> Rationalized infrastructure portfolio IaaS becoming routine Skills and practices transformations underway Contract-based service levels for key applications 	<ul style="list-style-type: none"> Cross-organization management of network resources Uniform allocation of network address resources VLAN segmentation consistent across enterprise Network operations increasingly aligned to standards and practices 	<ul style="list-style-type: none"> Cross-organization management of lower-level security resources Integrated identity repositories Segmented application and service security operations Emerging operational standards and practices
<p>Informal EA Program EA agreed in principle, but impact is limited.</p> <ul style="list-style-type: none"> Architecture activities and processes are informal and unstructured Architecture depends on individual contributors Architecture vision inconsistent and fragmented across organizations Lack of consistent business, application, and technology architectures across organizations Little communication or sharing across organizations 		<ul style="list-style-type: none"> UX at the discretion of developer or procured solution Standards marginally in place but not enforced UX in services "first implementation" Implementation embedded and difficult to evolve 	<ul style="list-style-type: none"> Redundant applications across organizations Low consistency in solution process implementation Technical implementations vary widely Adoption of reusable services low Limited use of SaaS solutions 	<ul style="list-style-type: none"> Point-to-point integration Implementation via scripts and standalone applications Interchange data formats embedded and opaque Some shared services, but with inconsistent techniques 	<ul style="list-style-type: none"> Data definitions and formats private to applications Incomplete cross-application or cross-organization data inventories Few 'systems of record' for data Access to data is limited and "hand-crafted" Data transformation opaque during interoperation 	<ul style="list-style-type: none"> Redundant middleware tools 'Stovepipe' implementations Lack of implementation standards Inconsistent integration across tools Limited use of platforms-as-a-service 	<ul style="list-style-type: none"> Redundant infrastructure services across organizations Inconsistent operational standards and practices SLO/SLA contracts rare Occasional use of infrastructure-as-a-service 	<ul style="list-style-type: none"> Network address resources segmented across enterprise Network resource management by committee VLAN implementations inconsistent Gateways closely managed 	<ul style="list-style-type: none"> Security services deployed in "islands" Multiple identity management solutions No cross-domain correlation Multiple security teams and organizations

EA Focus Areas

Enterprise Architecture: Interoperability

Deliver a plan outlining how we will deliver the following for interoperability:

Current State	Requirements & Frameworks	Future Action
<ul style="list-style-type: none">• Current-state integration analysis• Identify data passed between enterprise applications• Identify the means of exchange	<ul style="list-style-type: none">• Principles, methodologies, and advisories• Patterns, reference architectures, and standards• Resource requirements, including software and services• Identification of a repository and process for keeping the information gathered up to date	<ul style="list-style-type: none">• Building a place to publish the outcomes• Next steps• Deliverables• Timings

Questions or comments?

Thank you!



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