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City of Austin Enterprise Architecture Training Plan

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Date: 09/08/2015

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Enterprise Architecture Purpose and Value

No one would think twice about creating blueprints to construct even the simplest building or structure. Blueprints communicate the design to builders by identifying plumbing, electrical, structure and materials. We create blueprints to deal with complexity and integrate the final assembly to ensure pipes, wires, etc. don't cross doorways or windows and engineered elements provide proper support. Code compliance professionals use blueprints to ensure proper standards, occupant safety and even aesthetics of the design. We frequently use blueprints as a historical record to manage structural change such as expansions or modifications necessary to refine or redefine the structure's purpose. Not unlike buildings, today's information technology (IT) enterprises are very complex yet we traditionally create and sustain them without standardized blueprints.

No Blueprint = Disjointed Understanding

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Blueprint = Mutual Understanding

The building blueprinting process has evolved over the last 200 years and matured to design standards readable by the trained builder - effectively communicating design requirements in an integrated way. Information technology, on the other hand, has only been around sense the mid-80s with the advent of the Internet Protocol and the evolution of IT design standards have begun to emerge. Early computer languages such as FORTRAN and Pascal used a structured analysis approach for code design and early blueprinting methods such as Integrated Definition (IDEF) immerged. In the mid-90s, object-oriented computer languages gained popularity such as ADA, C, and Java. Practitioners of these languages synthesized the notations of the Booch Method, the Object-Modeling Technique (OMT) and Object-Oriented Software Engineering (OOSE) by fusing them into a single, common and widely used modeling language called the Unified Modeling Language (UML). In the mid-2000s, the Department of Defense commissioned the Object Management Group to issue a Request for Proposal to expand the UML to include infrastructure, systems and enterprise organizational elements. This led to the Unified Profile for Department of Defense Architecture Framework (DoDAF) and the UK Ministry of Defence Architecture Framework (MODAF) referred to as the Unified Profile for DoDAF and MODAF (UPDM). To date, UML/UPDM is solely the global open standard to blueprint IT architecture and is widely adopted by many commercially available UML tools. IBM recognized the commercial value of the UPDM, created an Extension for Integrated Architecture for their Rational Software Architect UML tool, and called it UML Profile-Based Integrated Architecture (UPIA). UPIA provides a robust, highly configurable and loosely coupled standard language to blueprint complex IT enterprises. One of the shortfalls of IDEF is that it only employs a method (i.e., lacks a language) and doesn't employ the concept of an interface. UML is highly interface focused and has both a method and a language making its utility more useful to blueprint enterprise needs.

Using the standardized UML, there now exists an IT method and language to blueprint our enterprise by improving communications between the business stakeholder community and IT solution providers. Enterprise Architecture is essentially our enterprise IT requirements collection tool. The EA approach delivers a method to increase and improve system integration while providing a change management framework to evolve our enterprise over time. To be successful, however, we must tool and train our staff to apply the UML method and language. With this added enterprise-wide skill, we'll create a blueprint to a best-managed city.

Student Preparation and Resource Needs

Learning to employ enterprise architecture (EA) is a complex and challenging endeavor. This challenge requires commitment by the student and support of their leadership to exercise the curriculum to become proficient. When the student learns a particular method or technique, the student must apply what they've learned or the knowledge is lost. In other words, architecture education is perishable and quickly too! Therefore, prior to training the student must have a fully functioning computer running either a fixed or a floating license of IBM™ Rational Software Architect with the Extension for Integrated Architecture (UPIA). For details on the software requirements, see Addendum.

For Candidate Architects, recommend procuring a fixed license. In addition to licensing, architects require a laptop computer running at least Windows 7 or better. Microsoft's Remote Desktop can be an

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alternative; however, this requires reliable network connectivity in all collaborative spaces. Architecture is a collaborative venue requiring mobility - i.e., the ability to transport the tool to various city conference rooms equipped with projectors or SmartBoards. Recommend use of the floating license for non-architects who only view the architecture - a floating license may be a good option in the beginning while we evaluate the student's performance. In addition to equipping the Candidate Architect, we require a well-equipped training environment.

Classroom training requires a facility equipped with the necessary EA software and network connectivity for the students to complete instructor led exercises. The following table outlines the Training Room requirements.

Training Room Requirements
- Student laptop computer configured with Rational Software Architect licenses   - PCs require access to City of Austin network domain to gain access to the CTM Subversion server   - Projection system to hookup instructor laptop computer   - Instructor work position to function keyboard and mouse to demonstrate tool usage   - Large white board to facilitate discussions

Identification of Candidate Architects

In order to provide each student quality hands-on opportunity along with regular instructor attention, we limit training to eight or less students per curriculum series. Identification of viable candidate architects is crucial because the future architect must perform the following duties, functions and responsibilities:

- Develops and maintains architectural language models
- Analyzes and proposes business process reengineering improvements
- Creates logical data models defining information element dependencies and associations
- Assists in the facilitation of common language
- Collaborates and vets architecture information with customers
- Writes specifications
- Develops reports, presentations, schedules, and other related materials
- Maintains configuration management
- Manages relationships with vendors as required for research and validation

The IT Enterprise Architect must also have the following knowledge, skills and abilities:

- Knowledge of architecture language and models
- Knowledge in software engineering and systems development
- Skill in business system analysis and model-driven architecture
- Skill in facilitation and technical writing
- Ability to comprehend complex architectural problems
- Ability to lead team collaboration and working-group efforts

To ensure a good investment in time and materials, an initial prescreening process evaluates candidate acceptance into the EA training program. The screening identifies the candidate's propensity for object-oriented modeling technology and their commitment to the program. The objective evaluation includes a measure of the candidates experience with the knowledge, skills and abilities listed above. The program recognizes not all candidate architects fully meet all the knowledge, skills and abilities; however, the program selects top candidates from these skill elements.

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To select viable Candidate Architects, the Chief Enterprise Architect informs Department Leadership on the forthcoming Enterprise Architecture training program and requests nomination of Candidate Architects. Department Leadership must commit to procuring the necessary tooling for each Candidate Architect and provide the candidate time for study and mentoring. Mentoring occurs based on department architecture needs - see Mentoring Apprentice Architects.

Enterprise Architecture Curriculum

Enterprise Architecture employs three curriculums. The first provides executive leadership understanding of enterprise architecture and a more detailed curriculum trains future enterprise architects to include advanced strategic development. The curriculum is in order of required knowledge - i.e., information from previous blocks are required to understand future curriculum sessions. Therefore, it's critical for students to commit to the entire curriculum. Once selected, the Candidate Architect must commit to attend the entire curriculum - failure to attend any portion of the curriculum may result in program elimination. Based on instructor recommendation and extenuating circumstances beyond the student's control, the Chief Enterprise Architect determines absentee action.

Executive Enterprise Architecture Curriculum

City of Austin staff curriculum designed to instruct on the basic purpose and principles of Enterprise Architecture. The curriculum provides an executive summary of EA products and their purpose and use.

Class Size: 20 or less

Duration	Course Name	Description
30 Min	Introduction to Enterprise Architecture	Provides the definition, purpose, value, challenges and roles of Enterprise Architecture
30 Min	Introduction to the Unified Model Language	Introduces the modeling language history, collaboration techniques, tools, structure, terms, modeling concepts and configuration management
30 Min	Overview of Enterprise Architecture Artifacts	The pupil learns the purpose and value of various EA artifacts.
30 Min	Introduction to Strategic Viewpoints	The pupil learns the importance of strategic capabilities and the evolution of a Capability Area Architecture (CAA). They also learn how capability elements help determine dependencies and priorities of business needs.

Note: Curriculum durations may differ as the training program matures.

Enterprise Architect Curriculum

Class Size: 10 or less

Week	Topic
1	Class norms, expectations, attendance policy, introduction to Eclipse, naming conventions, symbol use, package names, UPIA vs UML, anatomy of the RSA file structure and XML
2	How to search the model. Logical Data Models
3	Intro To UML Diagrams, Capability Usage, and Realization
4	Creating a Use Case - Defining Scope
5	Use Case Part 2
6	Sequence Diagram part 1

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Week	Topic
7	Sequence Diagram part 2
8	The Parts of a Sequence Diagram
9	Introduction to Activity Models
10	Create an Activity Diagram
11	Activity Model Part 2 Forks and Joins
12	Activity Model Part 3 Interaction Diagrams
13	Activity Diagram, Extend and Include Revisited
14	Activity Model, Extend and Include, Intro to System Context Diagrams
15	Interaction Overview Part 1
16	Interaction Overview Part 2
17	Create a simple System Context Diagram - More with System Context Diagrams. Exposing Levels of a diagram. Embedding Images.
18	Using Layers and use of Free Form Diagrams
19	Vision, Mission and Goals, Capability Area Architectures
20	Logical Data Models, Use Cases, Activity Diagrams, Interaction Overviews, Sequence Diagrams, System Context Diagrams
21	Capability Area Architectures - Vision, Mission and Capability Statements
22	Goals and Objectives
23	Facilitation Role play # 1
24	Facilitation Role play # 2
25	Facilitation Role play # 3
26	Facilitation Role play # 4
27	Facilitation Role play # 5
28	Facilitation Role play # 6
29	Facilitation Role play # 7
30	Facilitation Role play # 8
31	Interacting with CVS/Subclipse, small intro to Business Intelligence Reporting Tool (BIRT)
32	BIRT
33	Class Wrap up, Apprenticeship

Note: Curriculum order may differ as the training program progresses.

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Advanced EA Curriculum

Once the Apprentice Architect demonstrates competency in the basic modeling techniques, they advance to a higher-level understanding of the EA practice called Capability Area Architecture.

Class Size: 3 to 5

Duration	Course Name	Description
8 Hours	Capability Area Architecture	During this session, the student gains in-depth knowledge to develop enterprise architecture strategic views and learns to develop architecture-based work breakdown structures. The curriculum demonstrates the importance of outcome-oriented thinking. In addition, students learn about capability and goal associations, dependencies and relationship to vision and mission.

Candidate Architect Performance

According to Peter A. Luongo in his book *10 Truths about Leadership*, we can make someone more than they are, but we cannot make someone something they're not. This is the situation when developing enterprise architects - some people don't have the conceptual ability or experience to understand the interface perspective essential to employ object-oriented concepts. Traditionally, most business analysts learn to exercise structured-analysis methods, which places emphasis on process. The Integrated Definition (IDEF) is the most common structured-analysis method and works from a functional decomposition principle. The object-oriented approach using the Unified Modeling Language (UML) requires a concept shift placing emphasis on the information element rather than the process.

During training, it becomes clear to the instructor who is catching on to object-oriented concepts and who is not. The Candidate Architect's ability to perform instructor assigned architecture tasks provides objective evaluation. The candidate is either capable of performing the assigned tasks or not. In the beginning, the instructor does not expect the Candidate Architect to understand object-oriented concepts; however, within the first few weeks of training the instructor begins to recognize candidate understanding. The instructor provides additional assistance when needed; however, overcoming this paradigm can be difficult for some candidates. In fact, some candidates may not be able to shift to the object-oriented perspective. The prescreening process attempts to identify Candidate Architect limitations; however, there's an art to architecture and the candidate's ability to think in terms of abstraction cannot always be determined until they attempt to apply the object-oriented method. Upon successful completion of EA training, the Candidate Architect becomes an Apprentice Architect and is eligible for mentorship by an experienced Enterprise Architect.

Mentoring Apprentice Architects

Mentorship is a personal developmental relationship in which a more experienced or more knowledgeable person helps to guide a less experienced or less knowledgeable person. However, true mentoring is more than just answering occasional questions or providing ad hoc help. It is about an ongoing relationship of learning, dialog, and challenge. Enterprise Architecture is actually not much different from architectural works, in the material form of buildings, which are often cultural symbols and works of art. To become a building architect takes many years to include a substantial mentorship from a certified architect in both the process and product of planning, designing and construction. The art form of architecture surfaces through experience and the mentor shares experience to enhance the apprentice's knowledge by guiding them through time-consuming pitfalls and other technical challenges.

Once the student successfully completes the EA curriculum, he or she mentors with a more experienced architect to refine their method skills, tool usage and facilitation abilities for tangible city EA projects. The more experienced architect acts as the group facilitator and the Candidate Architect

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drives the RSA tool under senior architect guidance. Over time (typically six to twelve months), the apprentice gains valuable competency and confidence to progress to facilitator. At this stage, the Candidate Architect begins to apply the facilitator role and the more senior architect drives the architecture tool and provides the apprentice feedback after each session. Eventually, the apprentice obtains the knowledge, skills and abilities; and therefore, eligible for the official position of IT Enterprise Architect. The Chief Enterprise Architect provides Department Leadership with regular updates on the Apprentice Architect's performance recognizing the timing of the position change is dependent department budgets. Through observation, the senior architect makes a recommendation to the Chief Enterprise Architect when the apprentice is proficient enough to have full read/write access to the City's EA [Subversion](#) repository.

Enterprise Architect Reclassification

Apprenticeship periods vary depending on candidate experience and the number of workable projects to practice the trade. Typically, apprentices mentor for six to twelve months - sometimes longer. Once an Apprentice Architect achieves the knowledge, skills and abilities of an IT Enterprise Architect, they are eligible for position reclassification. Per recommendation by the Chief Enterprise Architect, Department leadership reclassify the apprentice using Human Resources Department approved reclassification process.

Note: There's a plan to work with Human Resources Department to create two new positions to include IT Enterprise Architect and IT Enterprise Architect Senior. The salary range for these new positions is likely higher than the current position. Therefore, departments should budget in anticipation of their Apprentice Architects achieving the knowledge, skills and abilities of IT Enterprise Architect. We should recognize that EA talent is a highly sought industry commodity, we can't afford to lose our talent after a great deal of time, and effort went into their development. If we manage this correctly, EA provides a new career opportunity as we move into Cloud or other outsourced IT environments.

EA Training Program Performance Metrics

The following metrics evaluate EA's training performance; however, there are factors outside of EA's control that could lead to less performance than anticipated. For example, EA can't control department acquisition priorities, training facility configuration and Candidate Architect or executive leadership participation.

Reporting period: One year from training start

Performance Item	Successful	Above	Exemplary
Executive Level Trained	5	6 - 10	11 - 20
Number of Candidates Trained	5	6 - 10	11 - 20
Mentored Apprentice Architects	1	2 - 3	4 - 5

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Addendum: Rational Software Architect License Requirements

The following table describes the software components of both the fixed node and floating license requiring procurement prior to training. If needed, the EA Group can assist in determination of RSA licensing needs.

Rational Software Architect License Requirements

Part #	Description	~Cost	Annual
Option 1: Fixed license			
D0DA2LL	IBM Rational Software Architect authorized user license + SW subscription & support 12 months	$791.01	$182.75
D0DAGLL	IBM Rational Software Architect Extension for Integrated Architecture Frameworks authorized user license + SW subscription & support 12 months	$1,031.18	$154.28
	Total:	$1,822.19	
Option 2: Floating license (used by multiple users - one at a time) Note: Requires IBM license server			
D0D9YLL	IBM Rational Software Architect floating User single install license + SW subscription & support 12 months	$1,582.02	$196.35
D0DACLL	IBM Rational Software Architect Extension for Integrated Architecture Frameworks floating user single install license + SW subscription & support 12 months	$2,581.24	$127.92
	Total:	$4,163.26	

Note: Costs estimates based on 2011 procurements.