



Advanced Distributed Learning (ADL) Registry Support Final Report

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Executive Summary

Advanced Distributed Learning (ADL) engaged the consulting firm Booz Allen Hamilton, which was assisted by Eduworks, to recommend an appropriate Host within the Department of Defense (DoD) for hosting the Advanced Distributed Learning Registry (ADL-R) and to recommend an appropriate Registrar.

The Booz Allen and Eduworks team followed a three-phased methodology of Planning (Phase 1), Data Gathering and Analysis (Phase 2), and Report Writing (Phase 3) to develop the recommendations. The team reviewed the ADL-R requirements and multiple other ADL-R documents available to determine the decision criteria for the evaluation. Using the decision criteria, the team created interview questions. Working with ADL, the team identified nine potential Hosts and then interviewed representatives from these agencies to collect the data.

The team analyzed the data to come up with recommendations for the Host and Registrar.

What became clear was that to choose a Host, the appropriate model of hosting needed to first be chosen. ADL's measures of success and strategic long-term vision for the ADL-R would best determine the option chosen for the hosting model.

Recommendation for ADL-R Host

Option 1: Pure ADL-R Hosting

Candidate Agencies: Defense Information Systems Agency (DISA) and Defense Technical Information Center (DTIC)

Recommendation: DISA and DTIC appear equally capable of performing this function.

DISA has mature information assurance (IA) and requirements-gathering steps in place, which need to be completed before the ADL-R can become operational at DISA. DTIC, on the other hand, has prior experience hosting the Registry. Although DTIC expressed interest in becoming the Host, DTIC was cautious of entering a situation in which it would face the same problems it had experienced in the past while attempting to host the ADL-R.

A few interviewees indicated that hosting the ADL-R at the Service level could have an adverse impact on the acceptance and use of the ADL-R. Hosting the ADL-R with DISA or DTIC could give ADL-R the perception of being hosted at the DoD level. If a Service is selected to host the ADL-R, then steps should be taken to counter the view that the ADL-R belongs only to the Service where it is hosted and not the entire DoD.

Option 2: Partnership Model

Candidate Agencies: Army Training Support Center (ATSC), Naval Education and Training Professional Development and Technology Center (NETPDTC), Joint Knowledge Development and Distribution Capability (JKDDC), Defense Acquisition University (DAU)

Recommendation: ATSC is the candidate with the greatest capability to perform ADL-R Host functions. ATSC ranked the highest in all evaluation categories (functional, technical, security, business, and personnel).

NETPDTC is the next highest ranking candidate with strong technical ability, help desk support, and user management. After NETPDTC, JKDDC and DAU followed and ranked closely to each other in terms of their final scores. JKDDC had a high level of willingness and enthusiasm to host the ADL-R. DAU is looking for further evidence of the effectiveness of the ADL-R in promoting reuse and alignment of ADL-R with DAU's business objectives.

Our interview results indicate that hosting the ADL-R using Option 2 could provide immediate benefit in terms of providing access to a large number of users and facilitating user engagement with the system in the learning community.

Option 3: Partnership Model With a Distinct Hosting Service Provider

Candidate Agencies: Air Education and Training Command (AETC) with hosting provided by DISA

Recommendation: If ADL chooses this option for the hosting model, the only choice is AETC/DISA.

Recommendation for ADL Registrar

Recommendation: Place Registrar at the same location as the chosen ADL-R Host.

Other Recommendations and Common Issues

During the multiple interviews, attendees shared information with certain common themes. We believe ADL will find this information valuable and particularly useful in the near term in selecting an appropriate Host and Registrar, as well as in long-term strategic planning for the ADL-R.

In Section 5 of this document, the team identifies specific recommendations that are independent of the specific hosting candidate ADL may choose. We believe this additional information will help ADL make the final decision in selecting an appropriate Host and Registrar for the ADL-R.

Through the interview process, common considerations emerged as potential significant challenges that any DoD organization undertaking ADL-R Host responsibilities would have to face. We describe these in detail in Section 6.

1. Background

Although the Advanced Distributed Learning (ADL) Initiative has made major advances in promoting and enabling the development of interoperable digital objects across the Department of Defense (DoD) and beyond, the discovery and reuse of those objects has not been as successful. ADL's Sharable Content Object Reference Model (SCORM) has become the de-facto standard in many learning communities for the development of reusable learning objects and is fully supported by DoD policy (DoDI 1322.26). However, SCORM does not address locating and reusing learning objects after they have been created.

ADL has been working on a solution to close this gap since 2003. Partnering with the Corporation for National Research Initiatives[®] (CNRI), ADL developed the Content Object Discovery and Registration/Resolution Architecture (CORDRA) as a new approach to the discovery and reuse of digital learning objects. In 2005, ADL launched the first publically available CORDRA implementation—the ADL-R.

The ADL-R was initially hosted by the Defense Technical Information Center (DTIC), but evolving requirements necessitated a move back to the ADL-R's developer, CNRI. At this time, ADL wishes to identify a new Host for the Registry and has engaged consulting firm Booz Allen Hamilton, assisted by Eduworks, to assist them in the identification of a new Host and an appropriate Registrar for the ADL-R.

2. Methodology

We followed a three-phased methodology (see Exhibit 1) to develop recommendations for a new ADL-R Host and an appropriate Registrar.

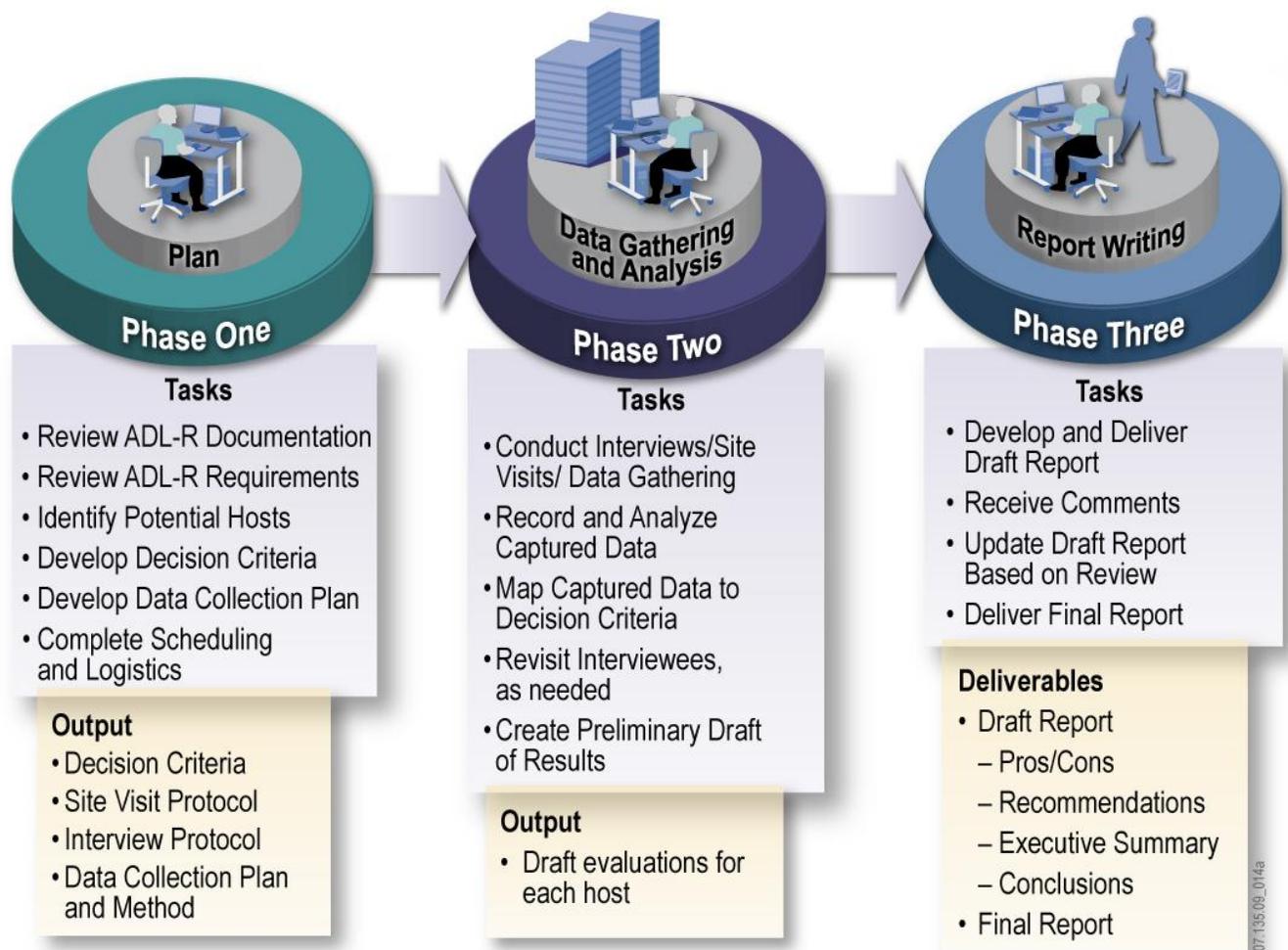
Phase 1 of our methodology was the planning phase. We based this phase on our review of multiple ADL-R documents referenced in Appendix C of this document, including the ADL-R Requirements Document. We developed a comprehensive set of decision criteria for selecting a potential Host and a Registrar and prepared a data collection plan. The decision criteria included functional factors, technical factors, and cost factors that would best address the requirements of an operational ADL-R. We developed a list of nine potential Hosts with whom we scheduled interviews to perform a detailed data gathering and analysis phase. Based on the decision criteria, we developed the Interview Protocol Document to collect data during interviews with agencies.

During Phase 2, we conducted interviews with the nine potential Hosts, recorded the data collected using the Interview Protocol Document, and correlated the data to the decision criteria. Further, we performed preliminary analysis of the data collected and developed an interim draft report. We reviewed the summary of our findings with ADL.

In Phase 3, we performed a thorough analysis of the data collected and developed a draft report. The report included the pros and cons of each agency and our recommendations for an appropriate ADL-R Host and Registrar.

Through the interview process, a common thread of considerations emerged as potential significant challenges that any DoD organization undertaking ADL-R Host responsibilities would face. Although the task did not require us to present the considerations we gathered from the agencies, the information in Section 6 of this document should be of interest to ADL leadership.

Exhibit 1. Phased Approach to Develop Recommendations for ADL-R Host and Registrar



2.1 Criteria

We developed a comprehensive set of decision criteria for selecting a potential Host and a Registrar and prepared a data collection plan. The decision criteria included functional factors, technical factors and cost factors that will best address the requirements of an operational ADL-R.

The decision criteria used to evaluate potential ADL-R Hosts and Registrars is available in the appendices of this report:

- Appendix A: ADL-R Host Decision Criteria
- Appendix B: ADL-R Registrar Decision Criteria.

3. Findings

This section summarizes the findings of interviews with potential Hosts for the ADL-R. Interviews were conducted with the following organizations:

- DTIC
- Joint Knowledge Development and Distribution Capability (JKDDC)
- Defense Manpower Data Center (DMDC)
- Army Training Support Center (ATSC)
- Marine Corps Distance Learning Program (MCDLP)
- Naval Education and Training Professional Development and Technology Center (NETPDTC)
- Defense Acquisition University (DAU)
- Air Education and Training Command (AETC)
- Defense Information Systems Agency (DISA).

Exhibit 2 provides a summary of evaluation criterion responses for each organization that completed the interview. Although DISA declined to participate in the interview, it provided sufficient information during evaluation team questioning for us to complete the entries in Exhibit 2.

Exhibit 2. Comparison Summary Table

	JKDDC	DTIC	ATSC	MCLDP	NETPDTC	DAU	AETC	DISA
Willingness	Yes	Yes, pending further review	Yes	N/A	Yes, will require program approval to commit	Do not see benefit to DAU at this point	Yes, pending further review	Yes, pending review of ADL requirements in the Service Request Form (SRF)
Ability	Yes	Yes, and have prior experience with ADL-R product	Yes	MCLDP hosts at NAVAIR; cannot make a unilateral decision	Yes	Yes	Yes, with DISA hosting support	Yes, for hosting; maybe, for application support
Help Desk	Yes, have a functioning Help Desk	Yes, have a functioning Help Desk	Yes, have a functioning Help Desk	Yes, have a functioning Help Desk	Yes, have a functioning Help Desk	Yes, have a functioning Help Desk	Yes, have a functioning Help Desk	Yes, have a functioning Help Desk
Hardware/Software Requirements	Yes, would need to acquire resources	Yes, would need to acquire resources	Yes, using existing resources	Yes, would need to acquire resources	Yes, would need to acquire resources	Yes, would need to acquire resources	Hardware and software do not meet requirements; will need DoD IRB approval to acquire hardware	Yes, would use existing or acquire new resources
Security and User Access	Able to obtain IA certifications to operate; have access to large existing AKO user pool	Able to obtain IA certifications to operate; have an existing user base, not as large as AKO	Able to obtain Certificate of Networthiness, which can expedite IA process; have access to large existing AKO user pool	N/A	Able to obtain IA certifications to operate; have access to a large existing NKO user pool; must also satisfy NMCI requirements	Able to obtain IA certifications to operate; have access to a large existing user pool	Able to obtain IA certifications to operate; have access to a large existing user pool	ADL must first obtain an ATO with DAA approval for open source software; able to obtain IA certifications to operate; do not have access to an existing pool of users
Registrar Function	Yes, and has a feasible approach to automate based on JIDB system	Yes	Yes, based on further understanding of the Registrar role	N/A	Yes, have suggestions to improve efficiency and effectiveness	Yes, is capable, but willingness is uncertain	Yes, given funding for personnel	Maybe, given funding for personnel; not in their typical service agreement
Personnel	Yes, would require new personnel	Yes, would require new personnel	Yes, expect to perform functions using existing personnel	Resources are very stretched	Yes, may be able to use existing personnel or hire just one person	Yes, would require new personnel	Yes, would require new personnel at AETC and at DISA	Yes, would use existing vendor contracts to obtain personnel
Cost¹	Estimated startup cost of \$600K; sustainment cost of \$350K/year for out-years	Hard to predict; estimate for hosting is \$30K–\$460K/year based on ADL-R stability and labor needed; Help Desk and Registrar at \$160K–\$180K per year	Expects to subsume most of the costs, but subject to change; might need a .25 FTE, about \$25K	N/A	Must discuss costs internally; a person year is typically \$85K–\$110K	Did not provide a cost estimate; must discuss opportunity and cost internally	Did not provide a cost estimate; requested detailed requirements to prepare an estimate	Did not provide a cost estimate; requested ADL complete the SRF to prepare an estimate
Evaluation Score (equal weighting)	96	90	117	Not Scored	105	95	97	Not Scored

Note 1: All agencies that provided us the cost information indicated that is an initial estimate that is subject to change pending detailed analysis of requirements

3.1 DTIC

Although DTIC interviewees expressed interest in becoming the Host, they also indicated that they were cautious of entering a situation in which they would face the same problems they experienced in the past. The DTIC interviewees described the following problems encountered during their prior experience:

- DTIC lacked Registry documentation to help obtain DoD Information Assurance Certification and Accreditation Process (DIACAP) approval and run DISA Security Technical Implementation Guides (STIGs). Specifically, DTIC identified the need for better documentation on the ports and protocols to satisfy DISA requirements.
- DISA requires the tracking of individual users, but the Handle System does not have the capability to track individual users. Also, although the Registry uses Public Key Infrastructure (PKI), it is not the same as DoD PKI. DTIC expected a simpler user identification and access management approach for ADL-R that could be easily integrated with the DTIC Lightweight Directory Access Protocol (LDAP). This would have enabled DTIC to maximize user access to the Registry in a controlled manner using role-based access control using user groups.
- The production system was unstable. DTIC indicated it had difficulty getting DIACAP approval and integrating the system because of frequent changes to the production system. DTIC is not set up to support frequent updates to a production system. In DTIC's prior experience, integration costs and support requirements were higher than expected because the Registry had frequent updates.
- The Practice and Operational Registry environments were not clearly separated (e.g., accounts management).

DTIC indicated there were too many unknowns to give a firm estimate of costs. It provided an estimate of approximately \$30K–\$460K per year. DTIC mentioned that the rough estimates for hosting could vary substantially based on system stability and therefore the labor needed. Estimates from the Help Desk and Registrar were \$160K–\$180K per year. DTIC noted that hardware costs have come down significantly over the last few years, and the cost to purchase a server was estimated at \$7K.

3.1.1 Advantages

- DTIC's prior experience provides it with ADL-R knowledge and experience, as well as lessons learned about Registry weaknesses and potential issues. It has a greater awareness of potential problems and a greater propensity to address these up front.
- Hosting the Registry at DTIC would place it at the DoD level and present it as a DoD resource. This is a perceived plus for accessibility and acceptance among DoD agencies, as voiced during the Marine Corps interview.
- DTIC has a centralized user LDAP-based repository with support for single sign-on (SSO) and Common Access Card (CAC) authentication.
- DTIC offers customers a wide variety of backup and replication services and has processes in place to provide these services. Customers have the option to decide what level of service they want and are capable of obtaining funding for their system.
- DTIC uses a combination of commercial tools, custom scripts, and established processes to monitor system health.

3.1.2 Disadvantages

- Although DTIC has a portal, it does not have a global infrastructure in place or portal similar to Army Knowledge Online (AKO)/Defense Knowledge Online (DKO). It cannot model after DKO.
- DTIC will require new personnel resources to support this task. Resources would be obtained through contracts, which could take as long as 6 months to put in place.
- DTIC was somewhat noncommittal about becoming the Host, indicating it would need to discuss this opportunity with management to see if there was interest in pursuing it a second time.

3.2 JKDDC

JKDDC would host the Registry on JKO in the “.mil” domain. It is confident it can perform all Host responsibilities but would need hardware and personnel resources to perform the job. It has a hardware procurement cycle that can take up to 1 year. Once it has the hardware, it can install the software, and then the system can go through accreditation. JKDDC has an existing System Security Authorization Agreement (SSSA), and all new systems are added to the existing SSSA. It must have SSSA approval before the ADL-R can go live. The entire process could take 1.5 years from initial plan to add a new system with no hardware. If ADL could procure the hardware for them, the process would be accelerated.

ADL-R access must comply with AKO/DKO SSO. JKDDC would need to map AKO SSO to the Handle Server’s way of doing things. This would mean integration with AKO SSO, which is based on CA SiteMinder, to enable permissions. JKDDC has no experience with Handle Systems but has experience with other authentication systems.

JKDDC has a Help Desk, ticket tracking software tool, and processes to manage problems. It also performs regular backups but currently does not have off-site duplication for restoration or a Continuity of Operations Plan (COOP). System monitoring is mainly a manual process in which the first level of notification is typically through a call to the Help Desk.

Estimated startup cost is approximately \$600K, and sustainment for out-years is \$350K/year.

3.2.1 Advantages

- Having JKDDC as the Registrar would make it easier to integrate its systems with the Registry and would make access easier for the joint enterprise. JKDDC also proposed a viable approach to perform Registrar functions using the Joint Investment Database (JIDB).
- Hosting at JKDDC would preserve portrayal of ADL-R as a DoD-wide resource.
- JKDDC already has experience managing accesses for a DoD-wide user base using integration with AKO/DKO. Therefore, JKDDC may easily be able to provide the DoD community access to ADL-R.
- JKDDC has relevant experience hosting enterprise training systems and content.
- JKDDC expressed serious interest in serving as the Host and has traditionally had a close relationship with the ADL and OSD(P&R) organizations.

3.2.2 Disadvantages

- Systems monitoring falls short of industry best practices for systems of similar size, complexity, and importance. The absence of a COOP and off-site backups introduces some risk of data loss.

- JKDDC does not have hardware or human resources that can be immediately applied to the hosting tasks. It would take appreciable time to acquire these resources because of purchasing and administrative requirements.

3.3 MCDLP

MCDLP does not have a hosting capability. Its system is hosted by NAVAIR at Webster Field, located in Patuxent River, Maryland. The Marine Corps College of Continuing Education (CCE) has a .mil environment, but it runs on Defense Research and Engineering Network (DREN), which is not owned by the Marine Corps. Because the Marine Corps does not own these systems, it cannot commit to offering them as host sites for the ADL-R. Pursuing either site as an option would require obtaining the approval of the Hosts. Because the Marine Corps does not have these capabilities or systems, it received no rating for most categories in the decision criteria matrix.

Marine Corps interviewees made several noteworthy recommendations regarding the ADL-R Host and Registrar:

1. Keep management of Registrar and Registry together. Pull functions together as a package. This recommendation was repeated by other organizations as well.
2. Maintain the DoD posture of the Registry by placing it at the DoD level rather than at the Service level. Registry users should perceive the Registry as being managed and operated at the DoD level, and the Registry should not reflect a Service flavor. The Registry will lose effectiveness if it looks like it belongs to a Service.
3. Marine Corps recommended DISA as the ideal home. At that level, it could shape the issues to address access and to support people in other countries. ADL should be in compliance about what can and cannot be shared with other countries, and DISA knows the policy better than anybody else.

3.3.1 Advantages

- MCDLP operates a Help Desk conforming to industry standards.
- MCDLP has experience with training systems and content and has developed a method for effectively using external hosts (the DREN network) to run its operations.

3.3.2 Disadvantages

- MCDLP does not have a place of its own where it can offer to host the ADL-R.
- Personnel, facility, and hardware resources are stretched. MCDLP has had to scale these back because of funding. New resources would be needed to host and support the ADL-R.
- Interviewees indicated that the ADL-R should be hosted elsewhere (not at an agency) and expressed little enthusiasm for acting as the Host.

3.4 DMDC

DMDC had many questions regarding the ADL-R Host functions, which were answered at the beginning of the interview. DMDC indicated at the start that its interest in the ADL-R Host may decline if the Host did not involve personnel data. DMDC responded to the first four interview questions and then stated that at this point it did not feel the ADL-R Host role was in strategic alignment with DMDC. DMDC indicated that hosting at its site was technically feasible, but it was not sure it would add value to DMDC.

Interviewees said they would discuss the ADL-R Host role with their leadership to determine if it was necessary to pursue this opportunity. Because DMDC chose not to complete the interview, it is not included in Exhibit 2.

3.5 ATSC

ATSC stated that the current state of ADL-R is outdated and that it would need to bring the hardware and operating system up to date to make it meet “networthiness” standards. It could not meet DIACAP requirements for networthiness if it were to implement the old technology described in the ADL-R requirements specification. ATSC’s approach would be to apply for a Certificate of Networthiness (CoN) for the application. Once the application has a CoN, ATSC can install the application on a system that has DIACAP approval. It has passed DIACAP reviews for new systems before by demonstrating networthiness.

ATSC would provide user identification and access management through AKO. Because there is no unifying user ID method throughout DoD, every user would need to have an AKO account. ATSC would consider making the Registry part of the Reimer Digital Library (RDL). ATSC would then integrate the ADL-R information rather than taking users to another ADL-R website.

ATSC has an operational Help Desk supporting approximately 700,000 users. ATSC uses commercial tools to monitor system health and perform automated backups. It has a backup and recovery system for COOP, but this system currently is on-site. However, ATSC has started discussions with Fort Leavenworth to store backups off-site.

ATSC would subsume most of the costs of Host and Registrar operation based on its current level of understanding of task and storage requirements. From what it knows of requirements, it is not anticipating a cost at the present time. That is not to say there may not be additional costs in the future. ATSC assumes there would be a Memorandum of Agreement (MOA) that would formalize arrangements and address costs. For maintaining Registry records, it might ask for .25 FTE (which would be roughly \$25K per year).

3.5.1 Advantages

- ATSC’s initial cost estimate for hosting and operating ADL-R was that it would require minimal funding because of availability of resources and capacity.
- ATSC performs a technology refresh on systems on 3-year rotations. It is currently replacing servers with virtual storage and virtual servers and expanding its storage capability. Therefore, it has the capacity, storage, and bandwidth for the future.
- ATSC believes it could put ADL-R to use by registering content from RDL as well as commandant-approved products from the Training Development Capability (TDC). It also feels the content from Blackboard could be registered with the ADL-R. Therefore, ATSC has content that could be made available readily for submission to the ADL-R and content that other users of the ADL-R may search and reuse.
- ATSC can leverage TDC application user accounts to quickly set up Registry contributor accounts. TDC is a web-based application used by Army Training Developers to develop Army training products. The training products are deposited in a centralized database for use by RDL and other Army training information systems.
- ATSC expressed a high level of interest in serving as the Host.

- ATSC has well-established processes and tools in place for help desk support.
- ATSC has strong software tools and processes in place to enable system monitoring, system backups, and system recovery.
- ATSC has personnel currently on staff with the requisite knowledge and experience to stand up and support the ADL-R.
- ATSC has prior experience managing user accounts using AKO and integrating systems, such as RDL and TDC, with approaches for delegated account management. This experience could help ATSC manage user roles and access to the Registry across the DoD.

3.5.2 Disadvantages

- Hosting the Registry at the Service level may affect the level of acceptance within DoD.
- There could be associated costs with updating the ADL-R to the levels required for DIACAP networthiness. Note: This situation may apply to all potential Hosts.

3.6 NETPDTC

Two entities would be involved in setting hosting up in the Navy eLearning environment: PMW 240 and NETPDTC N6. NETPDTC cannot independently commit to hosting the ADL-R. NETPDTC is a mission-funded organization. Hosting the ADL-R fits within its core mission, but it is not funded. Because NETPDTC's work is prioritized by its sponsors, it must submit a new project request into the program request process for approval. Funding from ADL would help with obtaining approval.

NETPDTC conveyed interest in hosting the ADL-R and stated that the organizational benefits of hosting the ADL-R would be helping NETPDTC obtain sponsors to search content for reuse and developing a culture of reuse.

The interviewees emphasized the importance of conducting IA approval for the ADL-R, as well as the need for good documentation on the Registry. Good documentation describing the ADL-R's architecture, services, ports, and protocols, as well as functional requirement documents, would be required for receiving security approval to deploy the Registry.

NETPDTC made the following suggestions to improve the effectiveness and efficiency of the ADL-R Host and Registrar functions:

1. NETPDTC highly encouraged ADL to continue to be the driver for policies and CONOPS from the OSD level. If ADL wants all Services to play an active part in this program, then OSD needs to drive the program. NETPDTC indicated that it would be very hard at its level to execute a policy. ADL, on the other hand, is in the perfect position to do so. If delegated too far down the chain, the ADL-R set up would not work. If hosted at the Service level, OSD would need to sign a SECNAV instruction assigning a Service this function. If the NETPDTC were identified as the Host, it could then perform the assigned role.
2. NETPDTC suggested having a representative from each Service validate their own repositories. The Navy would seek the approval of the representative, and if the representative approved the repository, Navy would then, as an ADL-R host, accept them. There needs to be a policy directive on who can approve repositories and register content.

3. It is a challenge to register massive amounts of content. NETPDTC would need tools to automatically populate the Registry, or the metadata would not be added. As an example, the Navy and Marines both use the Rustici SCORM Engine. A tool could be developed to extract metadata from Rustici and automate registration.
4. When testing software updates in NETPDTC's test environment, the product owner tests and signs off on the application. In this case, NETPDTC would want ADL involved in validating that the application is working as appropriate in the test environment. Upon ADL approval, NETPDTC would push the application into the production environment. One reason for this approach is that ADL may have an in-depth understanding of a new capability that NETPDTC lacks. NETPDTC also suggests giving end users from other agencies a voice in the sign off.

NETPDTC requested an opportunity to discuss this project internally before providing an estimate. It offered a rough initial estimate of first-year non-recurring costs of \$248,400 and recurring costs of \$103,400 in subsequent years. It based this estimate on the assumption that one person-year is typically between \$85K and \$110K and a server runs between \$8K and \$30K depending on the size and build out. NETPDTC indicated that a closer look at requirements was needed to determine the final cost and to determine whether labor resources were available for leveraging on this project; otherwise, it would need to hire one person. Its staffing strategy would be to roll up multiple functions (e.g., Registrar, configuration management of documentation, training of new repository managers) under one person.

3.6.1 Advantages

- NETPDTC has experience running Navy Knowledge Online (NKO) and significant experience in the learning technologies domain supporting a large user base.
- NETPDTC has a customer resource center with a Help Desk. It has experience providing support to a large number of users. Its current user base exceeds 1 million users.
- NETPDTC offered to take a closer look at the level of effort involved to determine whether existing personnel resources could meet ADL-R needs. It foresees a need to hire additional resources to support the Registry; however, NETPDTC has resources skilled in learning technologies, system administration, XML technologies, and Java, which would help it support the ADL-R.
- NETPDTC has a COOP site and established processes for backups and system recovery.
- NETPDTC has a robust tool set and processes in place for 24/7 system monitoring and notification.
- NETPDTC has developed a custom application called Electronic Learning Integrated Authentication and Authorization System (ELIAAS), which integrates with the Defense Eligibility Enrollment Reporting System (DEERS) and provides user authorization and SSO. NETPDTC can set up rules in ELIAAS to streamline rule-based user access control to the Registry.

3.6.2 Disadvantages

- Hosting ADL-R in the Navy eLearning environment would require approval and coordination with two entities: NETPDTC N6 and PMW 240.
- Hosting the Registry at the Service level may affect the level of acceptance within DoD.
- Hardware may take longer to obtain and set up because hardware procurement would need to go through an internal planning process for approval and installation would depend on availability of

public works. In addition, NETPDTC would need to obtain waivers from NMCI for the new hardware.

3.7 DAU

DAU stated that taking on the role of ADL-R Host was much more a business and organizational issue than a technical issue. Of primary concern was the issue of whether taking on such a role would serve any benefit to DAU's business objectives. Within DAU, the business logic is anything it does must connect to doing something better for its external customers. Its focus is on finding a way to help external customers get faster, better content. DAU is not culturally adverse to sharing content, and it has done this with other agencies; however, its experience is that the payoff from evaluating content for potential reuse is value neutral. DAU described the typical scenario as one in which it spends resources to look for and evaluate content, only to determine it cannot use the content and is now several weeks behind schedule. DAU would like to see improved accessibility to the ADL-R where a junior ISD is able to easily search or submit to the Registry.

The most important element is the value proposition to DAU. DAU is not convinced it should take on this responsibility. The following questions asked by DAU provide some insight into what could create value for DAU: "Does ADL intend to give the Host the 'first among peers' position when the next generation of the Registry is developed?" "Will the Host play a role in requirements definitions?"

DAU has the expertise and processes in place to perform Host functions. It would, however, have to obtain hardware and personnel resources to provide support for the ADL-R. Interviewees will make a recommendation to leadership on whether this project is worth pursuing. The value proposition of the ADL-R to DAU must be made clear to DAU leadership.

In terms of improving the efficiency and effectiveness of the ADL-R, DAU suggested testing the assumptions for the ADL-R. These assumptions were articulated as follows: reuse is good, the barrier to reuse is discovery, and the barrier to discovery is how the system is architected. DAU expressed interest in working with ADL to test these assumptions. Currently, DAU routinely "shares" courses with partners as part of its normal operations.

3.7.1 Advantages

- DAU has the technical skills and ability to conduct all functions needed to host and operate the ADL-R based on its experience hosting other large enterprise systems in support of its training functions.
- DAU has a well-established customer support system and processes, including a Help Desk and ticket tracking system.
- DAU has a robust set of tools for network and systems monitoring, as well as a notification system to alert system administrators of impending or active problems.
- DAU can host in both .gov and .mil environments.

3.7.2 Disadvantages

- DAU does not see a clear benefit in hosting the ADL-R. It must see a connection between hosting the ADL-R and DAU's business objectives to generate interest.
- Meeting external customer needs is of utmost importance to DAU. It would place ADL interests behind external customer needs. For example, if DAU suffered a serious failure, repairing systems

that support external customers would come first. The ADL-R might have to wait several days before DAU could reach it.

- DAU does not have significant experience with Handle Systems, repositories, or registries.
- DAU does not have personnel resources available to install, operate, or manage the ADL-R. It would need to hire personnel to support the system.

3.8 AETC

AETC's learning management system and learning content management system are hosted by DISA in Montgomery, Alabama. AETC contracts with DISA to provide hosting services. The parameters are determined by a service-level agreement (SLA). The arrangement can be described as a "managed hosted service" where AETC manages LMS and LCMS user accounts and content and can access the servers using Virtual Private Network (VPN) if required, and DISA handles server maintenance, patches, backups, etc. AETC does not have administrative roles on the servers. AETC would host the ADL-R at DISA by adding the system to its current contract. AETC interview responses were presented from the standpoint of capabilities provided by AETC with support from its contract and SLA with DISA.

AETC systems run on Windows servers. If AETC were to procure new hardware, it would need procurement approval from the DoD Investment Review Board (IRB). This is a lengthy process and can take up to 2 years. If DoD already owns the hardware or if the hardware added for the Registry could be considered a "tech refresh," then IRB approval may not be necessary.

AETC operates its LMS in a .mil environment. The LMS is also accessible via .com using CAC. AETC operates a Help Desk for the LMS, supporting more than 700,000 users. It uses a ticket tracking system developed in-house and has established tracking and notification processes in place. DISA performs system monitoring. AETC also has a COOP in which DISA provides data backup and recovery.

AETC stated that it had the same capability to host the ADL-R as any other service provided its funding, personnel, and security requirements could be met. AETC will require funding for internal personnel resources, as well as personnel at DISA. AETC did not provide number of personnel or cost estimates but explained its hesitancy to provide estimates or commit to taking on Host functions came from needing to have a better understanding of the requirements. It is willing to look into the Host function further and provide estimates given more detailed requirements. AETC generally feels it would take a lot of work and time to stand up an effective ADL-R for the services. It described itself as a "whatever it takes" organization when describing its capability to host the ADL-R.

AETC made the following suggestions to improve ADL-R effectiveness and increase use:

1. ADL-R should appear transparent to the users, regardless of the service that hosts it.
2. Common practices across the Services should be established to make content more useable. AETC stated that ADL should provide guidance to the Services concerning content practices (e.g., SCO level) and ADL-R processes (e.g., what gets submitted and how it is reused).
3. Access should be increased, including access to content developers. ADL should not overdo security at the expense of access.
4. The effectiveness of a DoD-wide Registry should be proven. AETC pointed out that ADL had plans to develop use cases for who would use ADL-R and how, the benefits of ADL-R, and the cost savings from reuse and ADL-R. From AETC's viewpoint, these questions have not been answered.

5. If ADL-R takes a federated approach, it should be aware of restrictions in the operational environment. The idea of CORDRA is a problem in a security-restricted environment. ADL needs to keep in mind the security and framework the services must work in now.

3.8.1 Advantages

- AETC has significant experience managing LMS and LCMS systems, managing user accounts, and working with DISA to host systems. Therefore, it has personnel in its organization with the relevant skill set and capabilities. However, it would need to hire additional resources to operate the ADL-R.
- AETC sees the advantages of having a single ADL-R for all services.
- AETC has access to complete hosting and maintenance services through its contract and SLA with DISA. This is a model that other agencies suggested might work.
- AETC operates a Help Desk and has tracking tools and processes in place to support a large number of users.

3.8.2 Disadvantages

- If servers are needed, the AETC estimate is 2 years to stand up because of approvals needed from the DoD IRB and security certification and accreditation (C&A). The time needed may be reduced if ADL were to provide servers or if DISA capacity services were used.
- AETC has limited experience supporting, maintaining, and integrating non-commercial or government-owned applications. The LMS and LCMS hosted at DISA are COTS products that have vendor-supported software maintenance.
- Hosting the Registry at the Service level (e.g., Air Force, Army, Navy, Marines) may affect the degree of acceptance within DoD.
- AETC does not have significant experience with Handle Systems, repositories, or registries.
- AETC would require new personnel resources (internal and at DISA) to support this task. Resources would be obtained through contracts, which would take at least 6 months and possibly longer than 1 year to put in place.
- AETC appears more comfortable in a Windows-based environment. This may not be an important factor if the ADL-R can be run in a Windows-based environment.

3.9 DISA

DISA declined to respond to the interview questions but agreed to discuss ADL requirements with respect to the hosting services it provides. DISA can give a cost estimate once the requirements are defined. DISA does not feel the ADL requirements are defined enough yet for it to provide a cost estimate. DISA process requires that ADL further define the hardware and software requirements and then select services using DISA's catalog of services. The requirements and the services must be documented in DISA's Service Request Form (SRF). Once ADL requirements are finalized, DISA engineers will likely have further questions that would need to be clarified before DISA can provide a cost estimate.

Discussions with DISA and agencies that use DISA services indicate that DISA has the capability to serve as a Host and could potentially provide the other underlying services needed for the ADL-R. Unlike other agencies interviewed, DISA is primarily a managed hosting service and not an application service

provider. DISA typically provides hosting services, and customers manage their application(s). Customers receive the access needed to do this, but they do not receive super user access with all administrative privileges to the servers (root access). This was the arrangement DTIC and AETC described with DISA during their interviews. Some functions of the ADL-R and (especially) Registrar are outside the normal scope of DISA's services. During our discussion, DISA indicated it would consider providing these services if appropriately funded.

DISA emphasized that ADL must obtain an Authorization to Operate (ATO) in the DISA environment before installing any software at DISA. DISA repeatedly stated that the lack of an ATO is a problem. DISA stated that open source software must be supported via a support contract (e.g., as in Red Hat Linux). Certification of open source software was initially identified as a problem. It was later stated that open source software approval could be obtained from the Designated Accrediting Authority (DAA). DISA pointed out that it offers a Rapid Access Computer Environment (RACE) that can be used to test and help prepare for C&A. The ADL may wish to consider obtaining certification preparation and testing support even if ADL does not choose DISA as the ADL-R Host.

DISA can host in both .mil and .smil domains. ADL funding would be required for all hardware and services. DISA would use existing capability or purchase new capabilities through vendor contracts. DISA or the ADL could buy the hardware; DISA seemed to prefer the former.

3.9.1 Advantages

- DISA indicated a willingness to provide ADL-R Registry and Registrar functions pending a more detailed analysis of ADL requirements documented in the SRF.
- DISA provides a full range of hosting and maintenance services through its vendor contracts. DISA is the provider of hosting services for other agencies with a high volume of users.
- DISA has a well-established customer support system and processes, including a Help Desk and ticket tracking system.
- Hosting the Registry at DISA would place it at the DoD level and present it as a DoD resource.
- DISA can host in both .mil and .smil environments.

3.9.2 Disadvantages

- DISA is not an application service provider. Hosting at DISA provides only a partial solution for the ADL-R unless DISA is willing to take on functions outside its normal service model. However, in DISA's normal operating model, it expects ADL to handle more complex tasks related to supporting the ADL-R.
- DISA does not have a centralized user repository approach in place or portal that is similar to AKO/DKO. Having such a DoD-wide approach is expected to improve accessibility to the ADL-R.
- DISA's software testing and certification process appears to be more stringent and arduous than that of other agencies.

4. Evaluation Results

This section presents evaluation results based on criteria contained in Appendix A. Candidate capabilities were scored using evaluation criteria, interview responses, and to a lesser degree the evaluation team's knowledge and past experience with the potential host's technical capability.

Evaluation scores for candidates completing the interview are provided in Exhibit 2. While we have used a default weight of “1” for each criterion, ADL may choose to weight the criteria differently if they feel certain criteria are more important than others. Model preference and relative weighting of criteria are factors which may lead to different evaluation outcomes. Further, the evaluation score should be considered as just one of the factors in the overall evaluation for an appropriate host. The overall evaluation should take into consideration the subjective information/findings collected during the evaluation process.

Because DISA chose not to answer the interview questions it could not be evaluated using the same evaluation protocol.

MCDLP received no score in several key areas based on interview responses indicating that it has no capability on its own to host the ADL-R. A low score for MCDLP merely reflects that MCDLP model of operation is not well aligned with the one needed for hosting ADL Registry.

4.1 ADL Registry Host Results

Following the analysis of data collected, three different options for the hosting model emerged. These models and the roles and relationships between ADL and the prospective host are described below.

Option 1: Pure ADL-R Hosting. In this model, ADL will continue to lead efforts to achieve ADL-R measures of success while relying on the services of a DoD hosting service provider to perform the backend functions required to operate and maintain the ADL-R. ADL’s role will include contractual management and technical oversight of the hosting service provider, customer development, implementation support from an operational standpoint, and defining and developing the future state of the ADL-R. The service provider will perform ADL-R technical and maintenance functions such as infrastructure setup, maintenance, ADL-R installation and monitoring. The Help Desk function can be performed either by the host or ADL. In this model, the most common approach is for the host to provide infrastructure related help desk support and for ADL to provide ADL Registry specific Help Desk support to ADL-R end users. However, ADL would have the option to delegate additional ADL-R specific Help Desk support also to the host. The host would provide ADL-R specific support to end users normally by hiring additional staff with appropriate skills.

Candidate Agencies: DISA and DTIC

Recommendations: Both DISA and DTIC have successfully implemented this model with other agencies and offer examples of how this hosting arrangement might be used to meet the ADL-R requirements.

Option 2: Partnership model. An agency or service will host and partner with ADL in achieving ADL-R measures of success. The partnership model occurs when the agency’s business objectives are aligned with the capabilities of ADL-R. Besides hosting and operating the Registry, the agency or service partner will help develop future requirements for the registry, may perform registrar functions, facilitate use of the registry, contribute content to the registry, advocate use of the registry and generally demonstrate the value proposition of the registry.

Candidate Agencies: ATSC, NETPDTC, JKDDC, and DAU

Recommendations: Our first recommendation is ATSC, followed by NETPDTC and then JKDDC.

The evaluation results indicate that ATSC is the candidate with the greatest capability to perform ADL-R host functions. ATSC ranked highest in all evaluation categories (functional, technical, security, business and personnel) compared to the other candidates. In the functional and technical categories, ATSC stood

above the other candidates in its capability to integrate with other systems, facilitate user access, and provide a technical architecture to support continuous improvement. ATSC proposed to shorten the IA approval process by handling ADL-R as an application and installing it on an existing server. Further, ATSC's approach of making ADL-R available via the AKO/DKO portal and streamlining the user access management should improve accessibility to the Registry. ATSC indicated a strong willingness to host the ADL-R and offered to utilize existing personnel to stand up and sustain the ADL-R with minimal cost to the ADL. ATSC was the candidate with the shortest timeframe to stand up the ADL-R. Other potential hosts stated six months to more than 2 years to stand up the ADL-R at their site, but ATSC indicated stand up could occur within 3 months using current staff and hardware resources. There is one concern with ATSC as the Host that should be researched further. ATSC along with other potential Hosts pointed out that the hardware and software requirements for the ADL-R are outdated (i.e., they call for hardware that is obsolete). The ADL-R must be able to operate on newer hardware systems to be hosted on servers at ATSC. This issue is not unique to ATSC and was also pointed out in the ADL-R architecture study conducted by ICF International.

The next highest ranking candidate was NETPDTC. NETPDTC's strengths were technical ability, ease of registering a large number of users supported by the custom application ELIAAS, and capability to provide help desk support using existing tools and processes. NETPDTC indicated there may be a possibility of using existing staff to support the ADL-R. One potential drawback to hosting the ADL-R at NETPDTC is that it would need to partner with another Navy organization (PMW 240) to setup the ADL-R. ADL might be required to negotiate and maintain agreements with two organizations to host the ADL-R with NETPDTC.

JKDCC and DAU, ranked very closely in terms of their total scores. Both organizations were strong in several areas but weaker than ATSC and NETPDTC in more than one area. For example, JKDCC had a high level of willingness and enthusiasm to host the ADL-R but did not convey the same level of help desk and technical infrastructure support as the two top candidates. JKDCC's approach also stands to benefit from the accessibility advantages that integration with AKO/DKO provides. Although DAU had a strong showing in the technical infrastructure and operational availability areas, it expressed uncertainty in regards to its willingness to take on the ADL-R host functions.

Option 3: Partnership model with a distinct hosting services provider. This model is a combination of options 1 and 2. An agency or service which utilizes a DoD hosting service provider partners with the ADL to achieve ADL-R measures of success. This option differs from option 1 because the partner agency or service provides contractual and management oversight of the hosting service provider rather than the ADL. Another difference is that the partner agency has an existing business relationship with the service provider through a Service Level Agreement (SLA). AETC is a potential partner for this model.

Candidate Agencies: The only option in this model is AETC with hosting provided by DISA

Recommendations: If ADL chooses this hosting model, the only choice is AETC/DISA.

AETC ranked much lower than the other candidates for some very specific reasons. AETC scored lower in technical abilities because it has no experience with the hardware or software needed to operate the ADL-R and has no prior experience maintaining a non-commercial system. Also, AETC uses DISA to host its systems. Therefore DISA performs several technical functions for managing the systems for AETC. If ADL chooses this option, AETC would extend its existing agreements with DISA to include the ADL Registry system. DISA would host the ADL-R, and AETC would take on additional ADL-R functions such as Help Desk, managing ADL-R, administering user accounts, etc.

4.2 ADL Registrar Results

Evaluation results for the Registrar paralleled the results for ADL-R Host. ATSC ranked the highest, followed by NETPDTC, and then the remaining candidates. The availability of experienced in-house personnel and the willingness to use these personnel to perform Registrar functions with little or no cost to the ADL were factors that made ATSC stand out from the other candidates. JKDDC also proposed a viable approach to performing Registrar functions using the Joint Investment Database (JIDB) system to submit, track, and process stakeholder requests for the Registrar. JIDB is an auditable automated management system with configuration control.

Recommendations: We recommend that the ADL Registrar function be performed by the agency that ADL would select as the eventual host for the ADL Registry. Most agencies we interviewed did not anticipate the Registrar role to be a full-time role but one that may be subsumed by the personnel supporting the ADL Registry. Additionally, the Registrar role requires a good understanding of the Registry itself. Therefore we recommend keeping the ADL Registrar role with the ADL-R host.

5. Recommendations Independent of a Specific Hosting Candidate

The following recommendations are related to setup and implementation of the ADL-R Host and Registrar functions in general. They are independent of a specific hosting candidate.

5.1 ADL-R Host Recommendations

1. Place ADL-R with a Host whose mission is closely aligned with ADL-R goals.

Several candidates spoke of their need to consider whether the ADL-R would fit within their organizations mission before committing to undertake the role of ADL-R Host. When they did not view the ADL-R as supporting their core mission, candidates indicated their organization would either decline the role of ADL-R Host or assume the role but assign support for the role to a lower priority. For example, DAU was very clear that meeting ADL-R hosting needs would be secondary to meeting the needs of its core mission.

2. Be aware of possible drawbacks of hosting the ADL-R with a Service, but do not eliminate Services as an option.

A few interviewees indicated that hosting the ADL-R at the Service level could have an adverse impact on the acceptance and use of the ADL-R. Our interview results indicate that hosting the ADL-R with a Service organization could produce immediate benefits in terms of providing access to a large number of users and facilitating user engagement with the system. If a Service hosts the ADL-R, steps should be taken to counter the view that the ADL-R belongs only to the Service where it is hosted and not the entire DoD. A suggestion offered by NETPDTC is to form an ADL-R steering committee with representatives from each Service to help create CONOPS for OSD to manage the ADL-R.

3. Identify the technical architecture for the ADL-R production environment and migrate the current prototype architecture to a stable production target environment.

DTIC indicated that instability of the ADL-R architecture was a significant maintenance problem and prevented it from obtaining an ATO. Interviewees indicated the existence of technical, security, and maintenance issues regarding obtaining and operating the ADL-R with legacy hardware and software. Migration to a technically stable and scalable architecture is critical for obtaining certifications to operate at any DoD Service or agency.

4. Identify and document ADL-R non-functional and functional requirements.

Interviewees requested more information on ADL-R functional requirements as well as non-functional requirements, such as operational availability, accessibility, and supportability requirements. Documenting ADL-R requirements in a system-level requirements specification would help the potential Host develop a better understanding of the full range of ADL-R Host expectations and enable the Host to conduct planning to meet ADL-R needs.

5. Select a Host in the context of ADL-R future plans and measures of success.

This report provides ADL with information on hosting models, hosting candidates, and evaluation of candidates based on the current state of the ADL-R. ADL-R Host selection should be conducted in the context of the hosting candidate's ability to help the ADL achieve future plans and measures of success. Once future plans have been decided, ADL may apply weighting to the evaluation criteria to determine if evaluation of candidates based on future plans leads to a different outcome.

5.2 ADL-R Registrar Recommendations

1. Place Registrar at same location as the ADL-R Host.

Candidates who were willing to assume the role of ADL-R Host were also willing to assume the role of ADL Registrar. There are no functional or technical reasons to preclude having the Registrar at the same location as the ADL-R Host. There are operational and business benefits to keeping both functions at the same location. For example, placing both at a single site would make it easier for users to obtain help with registration questions and prevent potential duplication with managing separate help systems.

2. Documentation of ADL Registrar functions.

Some candidates expressed that they would like to get more information on the role of Registrar than was available so they could understand the functions a Registrar would need to perform better.

6. Common Issues

Through the interview process, common considerations emerged as potential significant challenges that any DoD organization undertaking ADL-R Host responsibilities would have to face. These considerations include the following:

- *The technology is dated.* Both DTIC and ATSC commented that the ADL-R technology was dated. ATSC indicated it could not support the Registry if it had to operate on legacy systems that ATSC no longer had. The underlying system would need to be updated to operate on newer hardware and software operating systems.
- *All candidates have challenges in managing and controlling access.* A problem faced by all is that there is no universal method for user authentication across DoD. CAC cards are becoming the standard, but each Service has its own limitations on authentication. A majority of agencies saw the need to integrate ADL-R with the existing identity and access management processes and tools in that agency. A few agencies indicated that they may be able to obtain exceptions, but the longer term goal should be to integrate ADL-R with the existing infrastructure.
- *The Handle System is problematic and unnecessary.* Several interviewees commented that the Handle System was problematic in the .mil environment because it is incompatible with DoD CAC and PKI. Their IT and/or engineering team opinions were that the Handle System is unnecessary and that simpler and more compatible methods exist to accomplish the same ends.

- *Appropriate ADL-R documentation is needed for information assurance approval.* All interviewees emphasized the need to go through a DoD C&A process or an equivalent process to obtain IA approval to operate the Registry. It was clear from the various organizations interviewed that IA security and local policies were more rigorous at some sites than others. Interviewees indicated that having good documentation was critical to moving through the approval process. DTIC indicated that the documentation package it reviewed for the ADL-R did not have sufficient information on architecture and ports and protocols to obtain approval. Further, DTIC observed that IA processes are significantly more stringent across DoD today than they were a few years ago. It should also be noted that the ADL has stated that the Registry software is DIACAP approved, but information from DTIC indicates that approval was never obtained because of inadequate documentation and frequent changes to the production software baseline.
- *Appropriate ADL-R documentation is needed to set up and operate the Registry.* Several interviewees expressed the need for documentation, such as a Functional Requirements Document or Architecture Document, to be able to set up and operate the Registry.
- *Mission alignment.* In general, the level of enthusiasm with assuming the ADL-R Host role was relative to the interviewees' perception of how closely the ADL-R Host role aligned with their organization's core mission. DAU and DTIC articulated the need to identify a connection between hosting the ADL-R and organization mission and business objectives. Both indicated that their ability to draw this connection would be a strong consideration in order for their respective management teams to commit to becoming the Host.
- *Effectiveness of the Registry:* In tangential comments, interviewees expressed a high level of buy-in with the notion of reuse and the purpose of the Registry (with the exception of DAU, which pointed out the need to test the assumptions underlying the Registry). However, a common observation was that the Registry has not been used much. Many organizations offered suggestions, which are documented in the individual interview summaries.

7. Conclusions

Candidates for ADL-R Host and Registrar were interviewed and evaluated using criteria contained in Appendix A. Candidates were representative of three different hosting options the ADL might consider. Evaluation results placed ATSC at the top of the list of prospective ADL-R Hosts and Registrars. ATSC ranked higher than the other candidates in all evaluation categories (functional, technical, security, business, and personnel). There are several advantages with hosting the ADL-R with ATSC, including access to technical resources, user databases, skilled personnel, and robust support systems. As discussed earlier, a disadvantage of hosting the ADL-R with any Service is the risk that potential users may view the Registry as belonging to the Service rather than the entire DoD. Discussions with interviewees indicate that this risk may be mitigated by involving the Services in the development, implementation, and maintenance of ADL-R CONOPS.

Independent of Host selection, a few problems must be overcome to set up the ADL-R with a new Host. These problems are identified and discussed in Section 6.

In terms of next steps in the Host selection process, we recommend ADL take the following steps toward moving the ADL-R to a new Host:

1. Determine ADL-R future path and measures of success and select a hosting model option (Section 4. Evaluation Results) that is best aligned with ADL's strategic vision for the ADL-R. Selection of the Host can then follow from the hosting model selected.

2. Draft a requirements document describing specific performance requirements for the ADL-R Host and Registrar.
3. Develop a strategy with parallel efforts to resolve ADL-R Host and Registrar implementation issues identified in Section 6.
4. Arrange and facilitate discussions with the ADL-R Development Team and the new Host to determine scope and effort of transitioning ADL-R to current technology.

Appendix A: ADL-R Host Decision Criteria

Specific criteria were used to evaluate organizations considered for the new ADL-R Host. These criteria addressed functional, technical, security, business, personnel, and performance criteria that the ADL-R Host must meet to support DoD ADL-R objectives described in the ADL-R Requirements Document, the ADL-R and CORDRA Volumes, and other documents available on the ADL website.

Where applicable, background information is presented to provide rationale for specific decision criterion and demonstrate traceability between criterion and information resources. Associated with each criterion are interview questions asked of candidate agencies.

Functional Criteria

2.2.1 Willingness to operate and maintain the Registry.	
Background information	<p>Host could be different from the entity operating the Registry. SOO requirement is to recommend an appropriate ADL-R Host and Registrar.</p> <p>Operation and maintenance includes performing help desk functions, supporting installation of Registry code updates, conducting system backups, and maintaining hardware.</p>
Questions for agency	<p>Based on what you know so far, would you be willing to operate and maintain the Registry?</p> <p>What do you see as the benefits of being the Host?</p> <p>Based on what you know so far, do you feel your organization is capable of hosting the Registry?</p> <p>Do you have an existing portal or system into which you would envision integrating the Registry?</p> <p>Are there other persons within your organization whom we should also speak with? (If the answer to d) is a specific system, interviewer should ask questions to learn more about the proposed system.)</p>
2.2.2 Ability to register users and manage user accounts. (Help Desk)	
Background information	<p>SOO asks to identify pros and cons of potential Hosts to administer a Help Desk.</p> <p>ADL-R help desk calls are currently handled through the ADL Help Desk.</p> <p>The main tools the Help Desk currently uses are the URT and e-mails to manage issues. In addition, the Help Desk has certain documents it uses to support help desk operations.</p> <p>The ADL-R Requirements Document indicates the Help Desk shall:</p> <ul style="list-style-type: none"> Assist end users with accessing, searching, and contributing to the Registry Validate end user credentials before approving access to the Registry. Support repository registration and management Support repository manager registration and management (via URT) Support contributor/group registration and management (via URT) Support and promote contributors access from the Practice Registry to the Operational Registry Support creation and management of RIM Lite CAKs Support RIM Lite connectivity and development issues
Questions for agency	<p>Does your agency currently operate and manage a Help Desk?</p> <p>If yes, who are the help desk customers and how many customers do you support?</p> <p>Does your agency validate end user credentials and create and manage end user</p>

	<p>accounts for hosted systems? If yes, please provide some examples of these systems.</p> <p>Does your agency have the capability (e.g., personnel, processes) to perform ADL-R help desk functions, such as repository manager and contributor registration and management of ADL-R accounts?</p> <p>(Please give concrete example of existing systems whenever possible—Interviewer should repeat this.)</p>
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2.2.3 Ability to provide support to repository contributors and managers. (Help Desk)

Background information	<p>Contributor support requirements described in ADL-R and CORDRA Volume 2.</p> <p>Provide training to new individual account holders (ADL's current outreach activities include training).</p> <p>Assist ADL-R repositories with registering content objects.</p> <p>Practice Registry shall be used to provide support for new contributors.</p> <p>ADL-R Requirements Document indicates the Help Desk shall:</p> <p>Assist end users with contributing to the Registry</p> <p>Answer inquiries about the Registry and its capabilities</p> <p>Provide a direct phone line and a remote e-mail-based submission process for taking and handling problem tickets</p> <p>Support web portal issues</p> <p>Support digital object submission issues</p> <p>Support resolution of content issues</p> <p>ADL is hosting webinars on the Registry once a month available through the adlnet.gov website as part of outreach activities. Webinars cover the current way to contribute to the Registry and can be used as part of training efforts.</p>
Questions for agency	<p>Would your agency be able to provide user access to help desk support via e-mail and a direct phone line?</p> <p>If your agency runs a Help Desk, what is the typical initial response time for a new problem ticket?</p> <p>Does your agency have the capability (e.g., personnel, ticket tracking system, processes) to:</p> <p>Support new contributors and address issues they may face using the Practice Registry?</p> <p>Assist contributors with submission issues?</p> <p>Support the operation and maintenance of the ADL-R Portal and address any issues?</p> <p>(Please give concrete example of existing systems and names of possible personnel whenever possible—Interviewer should repeat this. If a specific system will be the umbrella for the Registry, ask how things are done in that system.)</p>

2.2.4 Ability to maintain and update documentation.

Background information	SOO asks to identify ability of potential Hosts to maintain and update documentation.
Questions for agency	Does your agency have the capability (e.g., personnel, processes) to: Make changes to ADL-R user documentation for unique aspects of the .mil Registry? Modify ADL-R portal user documentation if needed for the .mil Registry or create new documentation if you develop a new portal? Develop and document policies unique to the .mil Registry?

Technical Criteria

2.3.1 Ability to meet hardware requirements.

Background information	ADL-R has been tested on several 64-bit architectures, including Sun SPARC, Intel Xeon, and AMD Opteron architectures, with a minimum recommendation of 4 GB RAM and 500 GB storage, which is expandable. Detailed information is available in the Installation Document available at http://www.doregistry.org/documentation.html and in the ADL-R Requirements Document.
Questions for agency	Do you currently have hardware resources that meet hardware technical requirements? The Installation Document is available at http://www.doregistry.org/documentation.html . If answer to the question above is no, how long would it take you to obtain hardware resources that meet the technical requirements? Who is expected to procure hardware for your environment—ADL or you?

2.3.2 Ability to meet software requirements.

Background information	The ADL-R runs on the Java platform on SunOS, Red Hat, Fedora Core, and Ubuntu Linux flavors. Detailed information is available in the Installation Document available at http://www.doregistry.org/documentation.html and in the ADL-R Requirements Document.
Questions for agency	Are there other large enterprise Java systems that you currently host and operate? If yes, please name some and an approximate number of total and concurrent users accessing these systems. Do you run and operate the platforms on which ADL-R runs in your environment? Do you currently have personnel or will you be able to staff personnel with skills needed to administer systems and install and configure the Registry? If answer to the question above is no, how do you plan to complete the software installation and set up the ADL-R?

2.3.3 Network requirements.

Background information	The ADL-R and its components use some non-standard ports and protocols. Non-HTTP and non-SSH ports and protocols are used for Registry internal communication. The URT (CTC/CNRI)—desktop tool—needs HTTP connectivity and connectivity to the Handle Server. Connectivity to the Handle Server by HTTP is not recommended. Prefer native ports/protocols for Handle.
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	Handle Web Proxy: It is a way for browsers to resolve Handles. Fronts HTTP for Handle Server. Needed in the .mil environment.
Questions for agency	<p>Note: A Handle Web Proxy will be needed to enable browsers to resolve Handles in the .mil environment. A Local Root Handle Server will also be needed besides the Handle Server needed for Registry operations.</p> <p>Will you be able to grant the help desk staff direct connectivity to the Handle Server to use the URT desktop tool?</p> <p>The ADL-R and its components (including a Local Root Handle Server) use some non-standard ports and protocols. Do you foresee any potential issues due to this? If yes, what are those issues and what steps can be taken to address those?</p>

2.3.4 Availability requirements.

Background information	<p>The criteria for evaluating candidate's ability to have the Registry up and running in a timely manner.</p> <p>Although the ADL-R is not a mission-critical system, full and differential backups are still needed. (Follow-on question e-mail response from Angelo Panar)</p>
Questions for agency	<p>What are the levels of availability you provide for the systems running in your environment?</p> <p>What are the technologies and processes you currently use to ensure system availability?</p> <p>Do you have disaster recovery plan for the systems? If yes, please explain what the plan is.</p> <p>Are you able to meet the availability requirements of ADL-R?</p> <p>Are you able to provide emergency maintenance support to keep the Registry in operation 24/7 except for planned downtime?</p>

2.3.5 Ability to perform Registry technical management functions.

Background information	<p>Technical management functions involve installing anti-virus upgrades and minor software patches, performing system backups, and overseeing system monitoring. Third-party monitors are used to monitor the Registry at CNRI. CNRI uses the Siteseer Service (hosted by HP)—support for HTTP GETS/Pings/ftp/tcp/ssh.</p>
Questions for agency	<p>How do you currently monitor the systems running in your environment? Do you use any monitoring technologies or services to ensure systems are running and performing normally?</p> <p>If the system health status changes and it stops performing normally, is there a notification mechanism to inform administrators?</p> <p>Are you able to perform the following Registry technical management functions?</p> <ul style="list-style-type: none"> Install anti-virus updates Install minor software patches Oversee system monitoring Manage database Upgrade hardware/software

2.3.6 Ability of Host or Operator to apply code updates (patches) to the Registry.

Background information	<p>ADL-R development and maintenance is currently performed by CNRI.</p> <p>ADL-R website development and maintenance is performed by CTC for ADL.</p> <p>ADL-R Registry code is maintained by CNRI under ADL's stewardship. There is approximately 1 year between code releases. ADL will provide training to the Host and support the transition.</p> <p>CTS, an ADL contractor maintains the ADL-R Website. Website changes occur at a rate of once every 2 months. (Meeting with CNRI, Larry Lannom, and Giridhar Manepalli)</p>
Questions for agency	<p>Do you currently have procedures in place to update in production the systems that you run whenever new patches or updates to these systems are released? Please provide some examples and explain.</p> <p>The Registry is under active development and maintenance and new production releases are made under ADL stewardship. Will you be able to apply such updates to the Registry?</p>

2.3.7 Ability of Host to perform backup functions on the Registry.

Background information	<p>ADL-R Requirements Document states functional requirements include management of valid submissions and management of data.</p> <p>Operational Registry will be actively managed and backed up.</p> <p>Currently, the Handle Server and DO repository are replicated to another machine.</p> <p>The weekly (or every two weeks) backup is for indexes, logs, and databases.</p>
Questions for agency	<p>Do you currently back-up systems that you run to prevent data loss? If yes, where is the data backed up to?</p> <p>What processes and technologies do you have in place to perform such backups?</p> <p>Do you have processes in place to correctly restore system data if needed? If yes, please explain.</p> <p>Will you be able to back up the Registry submissions, Handles, and other related data?</p>

2.3.8 Ability to provide application testing support to contributors using the Practice Registry.

Background information	<p>ADL-R Requirements Document states: "the Practice Registry shall provide support for new contributors and direct application testing support..."</p>
Questions for agency	<p>Are there enterprise systems in your environment for which you have provided support to enable integration with other external systems? Please provide examples and explain.</p> <p>Other external applications may choose to test integrations with the Practice Registry. Are you able to provide necessary support to external teams for testing with the Practice Registry?</p> <p>The Practice Registry will be used by contributors to try out Registry submissions using the website (besides external applications). Will you be able to support the contributors who would be testing submissions to the Practice Registry using the website?</p>

2.3.9 Ability of Host or Operator to execute the ADL-R Test Suite.

Background information	The ADL-R Test Suite is an application that automates the submission of test case instances to an ADL-R instance.
Questions for agency	The ADL-R has a Test Suite to test a Registry instance for proper operation. Will you be able to run the Test Suite, analyze the results, fix errors or escalate complex errors to ADL, and work with ADL to fix the errors? Do you currently perform similar activities for other systems in your environment? If yes, please explain with some examples.

Security Criteria

2.4.1 Ability to host the Registry in a .mil environment.

Background information	Ability to host ADL-R in a .mil environment. Optionally, determine ability to host in a .gov and .smil environment. (Meeting with Angelo Panar)
Questions for agency	Are you able to host the Registry in the .mil environment? The following are not immediate requirements; however, we would like to understand these capabilities: Do you currently host systems in .smil environment and will you be able to host the Registry in the .smil environment if needed? Do you currently host systems in .gov environment and will you be able to host the Registry in the .gov environment if needed? While this is not an absolute requirement, ADL is interested in knowing if it is possible to propagate registrations from the less restrictive .gov Registry to the .mil Registry. Do you think this is possible, and if not, what difficulties do you foresee and what steps can be taken to address those?

2.4.2 Ability to manage and control access to potential users of the Registry.

Background information	User accounts are managed using the URT tool. There are three access levels for users (Volume 2): Search access Submit access Delete, withdraw, and move access ADL/CNRI recommendation: Authenticate against Handle Server. LDAP authentication was developed for DTIC environment and can be supported (was specific to DTIC). CNRI recommendation is to leave authentication as is (Handle Server based) and try not to make any changes.
Questions for agency	Can you give examples of existing systems that you host for which you manage user accounts and grant privileges to access the systems? Do you have a centralized user repository across systems? Do you have any identity and access management processes and technologies that you currently use which ADL-R must comply with or integrate? While submission requires contributors to be granted access, searching the Registry is currently unrestricted. Can you allow unrestricted search? Based on the background information and the requirements, would you be able to manage and control access to the Registry?

2.4.3 Ability to maximize and streamline user access to the Registry.

Background information	<p>Consider options that can maximize user access in a potential host environment; e.g., do several potential Registry users already have identities in the host environment that can be granted access to the Registry?</p> <p>Consider options to streamline identity management and access to the users; e.g., minimize manual processes, SSO possibilities.</p>
Questions for agency	<p>How would potential users obtain access to the Registry?</p> <p>Any access through portals?</p> <p>Any SSO?</p> <p>Integrated via RIM-LITE?</p> <p>Are there users with accounts for other systems in your environment who may be easily granted access to the Registry?</p> <p>How will you grant these users access to the Registry?</p> <p>Once the Registry is hosted at your location, will you be able to enable remote systems access to the Registry by creating and managing RIM Lite Client Access Key (CAK)?</p> <p>(If a specific system is envisioned, ask about that system)</p>

2.4.4 Ability to obtain IT approval to operate the Registry at the agency's site.

Background information	Ability to obtain IT approval to operate the Registry at the potential host site.
Questions for agency	Registry software is DIACAP-certified in DTIC environment. Are there any other security requirements for operation in your environment? If yes, what are those and would you be able to obtain the necessary certifications to operate the Registry in your environment?

Business Criteria

2.5.1 Ability to complete initial setup of the Registry and Help Desk with minimal cost to the ADL.

Background information	ADL recognizes there will be a cost for initial setup and ongoing operation of the Registry and Help Desk. Each potential Host should provide a cost estimate. (Meeting with Angelo Panar)
Questions for agency	What resources would you be able to repurpose and contribute to the initial setup of the Registry without funding from ADL, and what additional funding would you need from ADL for the initial setup?

2.5.2 Ability to operate and maintain the Registry and Help Desk with minimal cost to the ADL.

Background information	ADL recognizes there will be a cost for initial setup and ongoing operation of the Registry and Help Desk. Each potential Host should provide a cost estimate. (Meeting with Angelo Panar)
Questions for agency	<p>What human resources, processes, and systems can you reuse and repurpose to the ongoing operation of the Registry, including supporting operations, such as Help Desk, without additional funding from ADL?</p> <p>What is your estimate of funding you would need each year from ADL to operate and maintain the Registry?</p>

2.5.3 Cumulative cost estimates criterion.

Background information	<p>Broad tasks to be performed by the potential Host:</p> <p>Initial system install and test of Practice and Operational Registry</p> <p>ADL-R system (including Handle System), web portal operation, and maintenance</p> <p>Registrar operation and help desk support to repository managers and contributors</p> <p>Documentation maintenance and update</p> <p>Hardware cost</p> <p>Any security certification processes needed</p>
Questions for agency	<p>Please provide an overall cost estimate for hosting and operating the .mil ADL-R based on the tasks outlined above.</p> <p>Please provide a similar cost estimate if you were co-host the .mil and .gov ADL Registries with the expectation that an additional Registry will result in an incremental cost.</p> <p>Please provide a cost estimate for the combined operation of the Help Desk and Registrar:.</p> <p>For the .mil Registry</p> <p>For both the .mil and .gov Registries</p> <p>Is the estimate of funding you would need each year from ADL for the above tasks different from your estimated costs? If yes, please provide details.</p>

2.5.4 Ability to meet ADL timeline for Registry operation.

Background information	No specific timeline has been identified; however, the amount of time needed to complete the transition is important. (Meeting with Angelo Panar)
Questions for agency	If you were to operate the Registry, when would you be able to begin setup and operation of the Registry and Help Desk?

Personnel Criteria

2.6.1 Does the Host have skilled personnel already on staff or can the Host obtain skilled personnel within a reasonable period of time to operate and maintain the Registry?

Background information	Availability of skilled personnel
Questions for agency	<p>Do you have personnel on staff who have knowledge of and experience with distributed learning technologies and learning resource management?</p> <p>Do you have personnel on staff with system administrator, network administrator, and web master skills to operate and maintain the Registry?</p> <p>Would you use existing personnel or obtain new personnel to operate and maintain the Registry?</p> <p>If you were to need additional personnel, would you be able to acquire personnel with the knowledge and skills needed to operate and maintain the Registry in a timely manner?</p> <p>(Interviewer should ask for names or examples.)</p>

Appendix B: ADL-R Registrar Decision Criteria

The following paragraphs identify specific criteria used to evaluate the potential Host's ability to provide ADL-R Registrar functions in the .mil environment.

Functional Criteria

3.2.1 Willingness to serve as the ADL-R Registrar.	
Background information	<p>Host could be different from the entity operating the Registry. SOO requirement is to recommend an appropriate ADL-R Host and Registrar.</p> <p>Registrar could be an office or a person. The benefit of having an Office of the Registrar is that anyone in the office could cover the Registrar duties. (Meeting with G.A. Redding)</p>
Questions for agency	<p>Based on what you know, are you willing to accept the ADL-R Registrar role and fulfill associated responsibilities?</p> <p>What do you see as the benefits of being the Registrar?</p> <p>How do you plan to carry out the Registrar role and responsibilities?</p>

3.2.2 Ability to perform Registrar functions.	
Background information	<p>ADL Initiative Content Object Registration and Discovery Volume 2: ADL-R indicates the Registrar functions are:</p> <p>Register content repositories</p> <p>Authenticate and register ADL repositories. Oversee the registration of learning content repositories for Practice and Operational Registry accounts. This function involves reviewing repository registration forms submitted by repository managers, contacting the repository DoD component proponent for approval of the request, and notifying the Support Office (Help Desk) and repository sponsor when a repository is approved, along with the Handle prefix.</p> <p>Once the repository registration form has been validated and the content repository approved, the ADL Registrar will assign the content repository a unique Handle prefix.</p> <p>Handle prefix assignment and management:</p> <p>Registrar assigns Handle prefixes to an approved repository and the Help Desk sets up individual accounts for repository contributors and managers. The Registrar uses an Excel spreadsheet with a breakout of Handle prefixes for DoD agencies. Maintenance of the Handle spreadsheet is a Registrar function.</p> <p>DoD repositories are given Handle assignments for practice and operational accounts. Initially only the practice account is activated. Once the Help Desk is satisfied the repository is ready to start using the Operational Registry, then access to the Operational account is enabled. The Help Desk determines the criteria for allowing access to the Operational Registry.</p> <p>Serving as the ADL point of contact for Registry activities.</p>
Questions for agency	<p>When you get a call to register a repository, how will you determine whether the caller is authorized to make the call and whether the repository is an authorized DoD repository?</p> <p>Do you have any experience with Handle systems?</p> <p>Do you have experience cataloguing and tracking documents or courseware?</p>

Business Criteria

3.3.1 Ability to perform Registrar functions with minimal cost to the ADL.	
Background information	<p>ADL recognizes there will be a cost for initial setup and ongoing operation of the Registry and Help Desk. Each potential Host should provide a cost estimate. (Meeting with Angelo Panar)</p>

Questions for agency	<p>What support are you able to contribute to the ongoing operation of the Registrar without funding from the ADL?</p> <p>How much funding do you estimate you will need from the ADL to operate the Registrar?</p>
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3.3.2 Ability to meet ADL timeline for Registrar operation.

Background information	No specific timeline has been identified; however, the amount of time needed to complete the transition is important. (Meeting with Angelo Panar)
Questions for agency	Would you be able to set up the Registrar function in a timely manner for the Operational Registry?

Personnel Criteria

3.4.1 Does the candidate have skilled personnel already on staff or can the Host obtain skilled personnel within a reasonable period of time to perform Registrar functions?

Background information	Training for the Registrar function could be done with a half-hour office visit or via an online session. (Meeting with G.A. Redding)
Questions for agency	<p>Do you have personnel on staff who have knowledge of and experience working with registries and repositories?</p> <p>Do you have personnel on staff with knowledge and experience in the Library Sciences?</p> <p>Would you use existing personnel or obtain new personnel to perform Registrar functions?</p> <p>If obtaining new personnel, how long would it take you to acquire personnel with the desired knowledge and experience?</p>

Appendix C: References

“ADL-Registry (ADL-R) Support Statement of Objectives (SOO),” ADL, June 2009

“ADL Registry Requirements,” ADL, August 2009

“ADL Registry Deployment Operational Architecture,” ADL/CNRI, October 2009

“Developing a Refined Operational ADL Registry—Task 1: Strategy for Demonstrating the Value of the ADL Registry in an Operational Environment” developed by Booz Allen Hamilton for the ADL Initiative, November 2007

“DoDI 1322.26 Development, Management, and Delivery of Distributed Learning,” USD(P&R), June 2006

“The ADL Registry and CORDRA Volume 1: General Overview,” ADL, August 2008

“The ADL Registry and CORDRA Volume 2: Registry Overview and User’s Guide (DRAFT),” ADL, August 2009

Multiple ADL Registry Documents available on ADL-R website
(<http://www.adlnet.gov/Technologies/adlr/default.aspx>)