

# White Paper

## Authoritative Data Source (ADS) Framework

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### ***Executive Summary***

Throughout the Federal Government, including DoD, there is a pervasive need to have current, reliable, and trusted data from what are termed Authoritative Data Sources (ADSs).

To date, ADSs could be considered a “cottage industry,” where a multitude of ADSs are providing a multitude of products using a multitude of methods with multiple risks regarding the data they are providing.

This white paper proposes that an Authoritative Data Source (ADS) Framework be adopted for reasons that are similar to the reasons that the concept of developing to architectures (for example, Federal Enterprise Architecture and DoD Architecture Framework) was adopted. The white paper also proposes that an ADS maturity model be adopted. It would be used to assess the **quality** and **risks** associated with a specific ADS product. This would be adopted for reasons similar to those that led to the maturity model concept’s adoption in the software development area.

Adopting these two models is a transformational, scalable solution for the ADS community. For ADS providers, it is a transition plan to achieve the high grade of data that is needed by all communities. For ADS product users, this solution offers a means to assess the risks associated with the ADS product they are using. They thereby become better-informed users.

This white paper, in addition to proposing the ADS Framework and ADS maturity model, also presents some considerations, challenges, an example, and conclusions that are associated with this initiative.

### ***Background***

Many Communities of Interest (COIs), within and outside of the Federal Government, rely on ADSs for certain types of data<sup>1</sup>. An ADS’s product can range from simple lists of codes and associated names to complex work products like architectures. Within DoD, for example, the areas of architecture, Command and Control (C2) and Situational/Battlefield Awareness (SA/BFA), all need reliable, trusted data from ADSs for mission success. This need is heightened by the shift to net-centric operations within DoD.

The users of data from ADS products face risks when using this data. The following types of questions should be asked to help mitigate some risks:

- Am I using the same version of this data that everyone that I need to interoperate with is using?
- Should we all be using a later version? Does a later version exist?

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<sup>1</sup> ADS data is also called reference data or domain values in certain areas.

- Have I/we properly taken into account changes between versions of the ADS's data?
- Is one ADS's data consistent with the same data from other ADS?

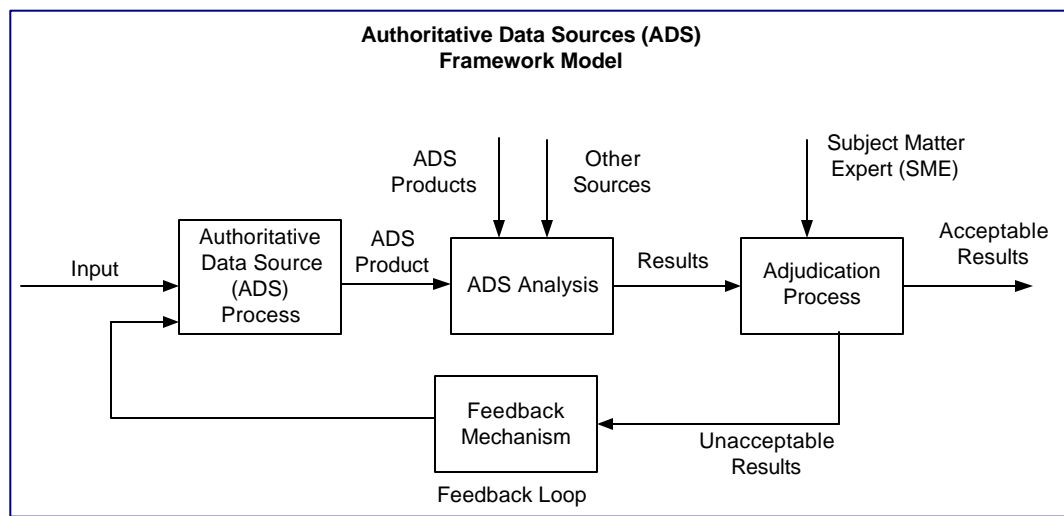
The problem facing most organizations is what, how, and when to address the risks. In a best-case scenario, everyone is taking the necessary actions to address these risks. However, this results in significant duplication of activities across organizations, probably with varying results. In a worst-case scenario, none of the risks are being addressed and wrong information is being used for system tests. Unfortunately, everything "looks good" until ADS issues surface in integration tests, exercises, or when the data is required in a production environment.

### **ADS Framework Model**

The proposed ADS Framework Model is presented in Figure 1. The ADS process receives input that an addition, modification, or deletion is required in an ADS product. This change could be as simple as a change to a code list or as complex as a change to a multi-node network architecture that is used by others in their development plans.

The updated ADS product is then submitted and subjected to an ADS analysis, the intent of which is to improve and validate the quality of the ADS product and to reduce the risks identified above for users of the ADS product. The ADS analysis could use prior versions of the ADS product and, if available, data from other sources for the ADS analysis. The ADS analysis would include a comparison and contrast analysis using the prior version and a uniformity and consistency analysis using data from other sources.

The results of the ADS analysis are then submitted to an adjudication process. The adjudication process would be performed using the developers of the ADS product and Subject Matter Experts (SMEs), possibly in the form of an ADS Review Board, to scrub the results. Adjudication would ascertain if, based on the input that was provided to the ADS process, the ADS results are acceptable or unacceptable. The unacceptable results would be used as feedback to the ADS process. This feedback loop process would continue until only acceptable results are achieved.



**Figure 1**

At this point, the ADS product and the ADS analysis results would be published, and appropriate alerts distributed to users.

The use of the ADS Framework Model is transformational for both the ADS provider and user. For the ADS provider, the ADS analysis negates the resource burden of developing and publishing an analysis. The adjudication process adds additional expertise to the process and expands the sphere of knowledge associated with the ADS product. For the user, who relies on the ADS product, this is the equivalent of an Underwriters Lab (UL) approval of the results with full transparency and disclosure of the ADS product and ADS analysis.

Another part of the ADS Framework is to have each ADS provide an ADS analysis with each version of the product that contains the following information:

- The details of the additions, changes, and deletions between this version and the prior version.
- The types of internal quality assurance validations that have been performed on the product. This would include duplication, consistency, uniformity, etc., types of checks.
- The location of other sources of which they are aware, who provide the same or similar information. Users could decide if, when, and how to use this information as part of their risk mitigation plans.

This information is captured in tag information associated with each ADS product. This disclosure to potential users would be used as part of the ADS risk assessment.

*Notes: It is important to understand that publication of ADS data is only a snapshot in time. In all likelihood, the updated additions, changes, and deletions were in effect before the publication was issued.*

*This supports the asynchronous form of data availability versus the synchronous form of data availability.*

### **ADS Maturity Model (AMM)**

The use of a maturity model is beneficial for everyone—ADS providers and users. It provides an implied transition plan for each ADS to strive to improve its products. It provides users with the knowledge of what level of maturity is associated with the ADS product. In situations where there are multiple sources for the same or equivalent ADS product, users could use the maturity model level designation of the source to determine which source to use and/or in which source they have the most trust.

The maturity model has levels that would indicate the risk management steps that were addressed by the ADS provider. For example, if there is a five-level model, the maturity levels might be determined as follows:

Maturity Level	Risk Management Steps Taken	Information Source
0	No ADS analysis is provided.	
1	The adds, changes, and deletion between successive versions are provided and approved by the provider.	Provided in the ADS analysis
2	Duplication, consistency, and uniformity checks were performed.	Provided in the ADS analysis
3	The ADS results have been scrubbed by at least one SME.	Provided in the adjudication process
4	Multiple SMEs and multiple users have accepted the ADS analysis results	Provided in the adjudication process

The AMM level also captures tag information to be used by users as part of the ADS risk assessment.

### **Example**

Because of the broad and in depth interest in the use of architectures within the Federal Government, an architecture example is used below as an example to assist readers in determining the applicability of adopting this ADS Framework to their data sources.

The organization producing a data-based architecture would be considered an ADS to the organization using that architecture to build a product. An architecture may consist of multiple components that typically present various “views” of the architecture. For example, in the DoD Architecture Framework (DoDAF) there are multiple operational, system, and technical views of the architecture.

Within the Army, DoDAF-compliant architectures are used to design battlefield networks, which span from the command center (for example, CENTCOM in Kuwait during Operation Iraqi Freedom) down through the various echelon levels to the warfighter, where vehicles are equipped with digitized systems. A change to an architecture can affect the network structure, which impacts battlefield communications. Therefore, adjudication of any changes by all stakeholders is essential to ensure that all affected parties have had input and are aware of the impact. In addition, a framework is also essential to ensure that a change in any one view is reflected in all other published views.

For example, if an existing radio were replaced with a radio that uses a new technology and provides additional capabilities, this could have broad impact on the architecture. The group creating the architecture would develop a new architecture version reflecting the new radio and the necessary connectivity changes in the various views. The ADS analysis would detect all of the changes made in all of the views, comparing it to the prior version of the architecture and other authoritative sources. The stakeholders, to ensure that all changes required for the new radio have been reflected in the new architecture version, would submit these ADS results for adjudication. In addition, they would ensure that the desired communication functionality will be achieved by the warfighter. If there were multiple subject matter experts and users involved in the adjudication process, the

organization that developed the new architecture (the ADS) would be at a maturity level 4.

## **Challenges**

The challenges that need to be addressed to accomplish this proposed ADS transformation are:

- Championing of this initiative by a single or multiple organizations.
- The promulgation of the ADS Framework and the associated AMM to the various communities, for example, Architecture, C2, and Software Blocking.
- The “deployment” of the ADS Framework to the ADS community.
- The oversight and monitoring of adherence to the ADS Framework.
- Securing funding for this initiative.

## **Conclusion**

The introduction of the ADS Framework concepts and the maturity model for ADS is transformational for following reasons:

- It recognizes that the current situations are not going to be able to support net-centric operations and that improvement is necessary.
- It provides a framework for transition.
- It provides measurable maturity goals to accomplish the transition and therefore achieve the transformation.

It is also scalable, in that the model is as relevant for an ADS product that provides code lists as for an ADS product that provides a complex architecture.

It is transformational in that it expands on the concept of metadata tags by adding data quality information to the current administrative information. At the same time, for this additional effort, it provides ADS providers with the incentive to provide high quality data and ADS users with needed risk assessment information about the data on which they must rely.

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