



INSTITUTE FOR DEFENSE ANALYSES

Data Principles for Operational and Live-Fire Testing

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About This Publication

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Executive Summary

The Department of Defense is taking steps to improve its management of data. In 2021, Deputy Secretary of Defense Kathleen Hicks issued the memorandum “Creating Data Advantage,” which coincided with a shift in the department toward viewing data as a strategic asset. Since the publication of the memorandum, the test community has questioned how the five data decrees may be applied to its work. In this presentation¹ we discuss the effort by Institute for Defense Analyses to apply the data decrees to test and evaluation. Data is a critical component of operational evaluations, because any independent and unbiased assessment of system effectiveness and suitability must be based on quality and trustworthy data. While this is already standard operating procedure, the processes DOD employs to obtain, store, clean, and distribute data could, in our view, benefit from modernization.

In this presentation, we review the typical process through which test data contribute to operational evaluations of system performance, which we call the test data

workflow, and provide some examples of substandard data practices. For example, it’s not uncommon to receive a scanned PDF of handwritten test data or to transcribe the data yourself in a notepad. Both of these data collection methods are prone to user error. Such substandard practices could be eliminated or formalized with better planning and procedures.

Our contribution is a set of recommendations that we believe – if implemented and resourced – would result in better test data management and distribution. Most importantly, we advocate that testers include data management and distribution plans in test plans. The following is a complete list of testing data principles:

1. Data should be discoverable and accessible to analysts.
2. Data should come with documentation.
3. Data should be stored in open-source or interoperable formats.

¹ First given at the Joint Statistical Meetings in Toronto, on 7 Aug 2023

4. Operational test agencies and test ranges should develop and use standard, consistent data formats or schemas.
5. A data management and distribution plan should be included as part of a program's test plans.

For each of the proposed data principles, we discuss the specific problem that the principle addresses, our recommended implementation of the principle, and our motivation for including it. We end the presentation by determining which data principles strengthen specific aspects of the test data workflow.



Data Principles for Operational and Live-Fire Testing

Dr. John T. Haman
Dr. Matthew R. Avery

Joint Statistical Meetings
August 2023
Toronto, Canada

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Summary

- In recognition of data as a strategic asset, DOD issues five Data Decrees in 2021.
 - How best to apply the data decrees to test and evaluation remains a work in progress.
- IDA works on guidance to DOD on data standardization and other data issues.

#1: Make data discoverable.

#2: Distribute documentation with the test data.

#3: Store data in open-source or interoperable formats.

#4: Develop standard schema for test data.

#5: Include data management plans in test plans.

Summary of
recommendations

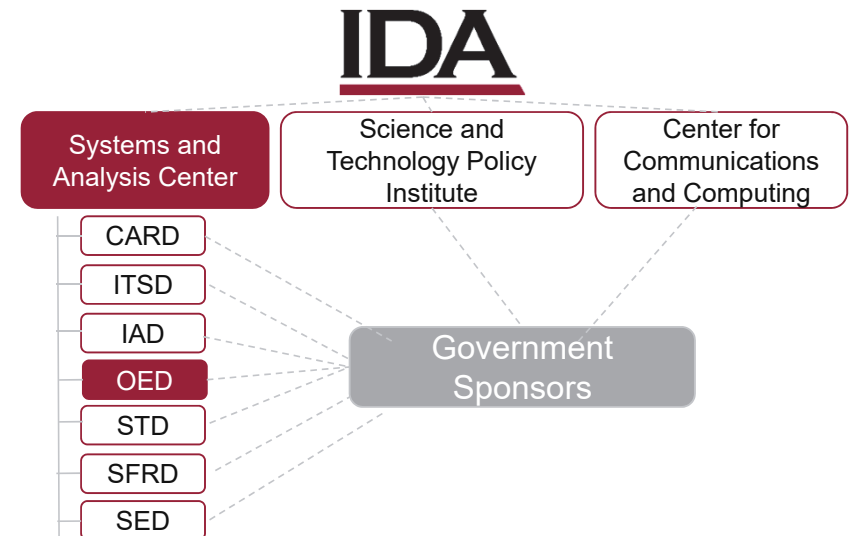
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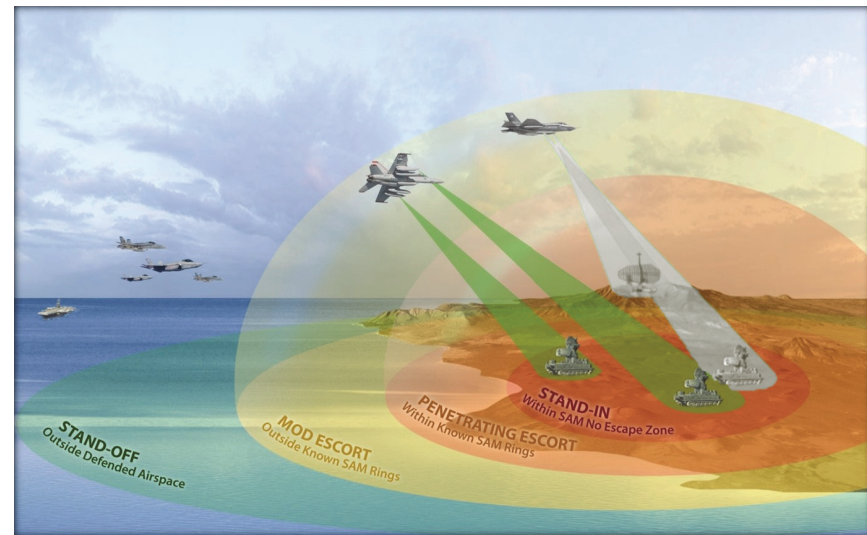
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CARD – Cost Analysis and Research Division; IAD – Intelligence Analyses Division; ITSD – Information Technology and Systems Division; OED – Operational Evaluation Division; SED – System Evaluation Division; SFRD – Strategy, Forces and Resources Division; STD – Science and Technology Division

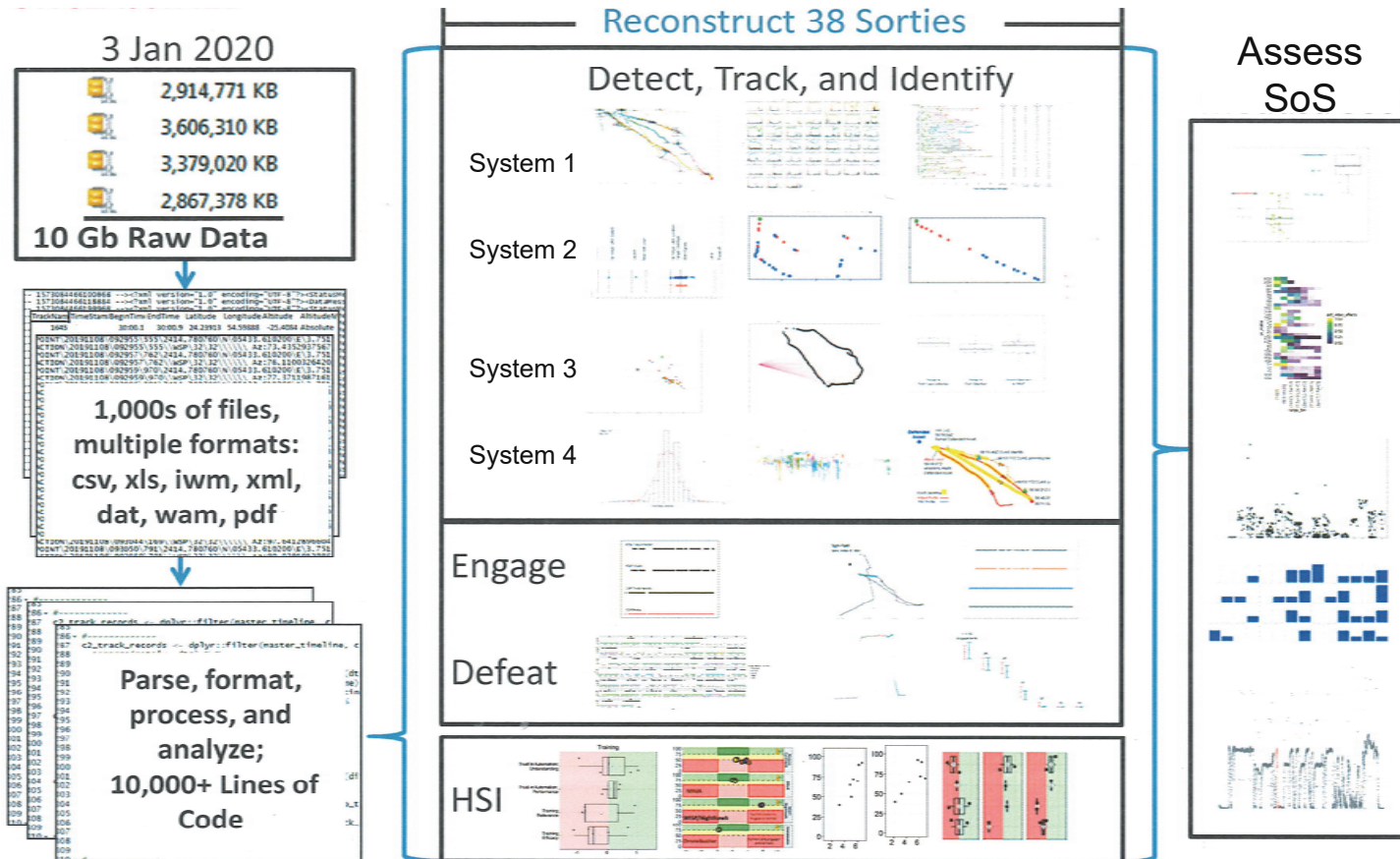
Goal of operational test: Evaluate operational effectiveness and suitability.

- Operational environment
- Representative users
- “Real” threats
- Conduct missions against a red team with intent to win

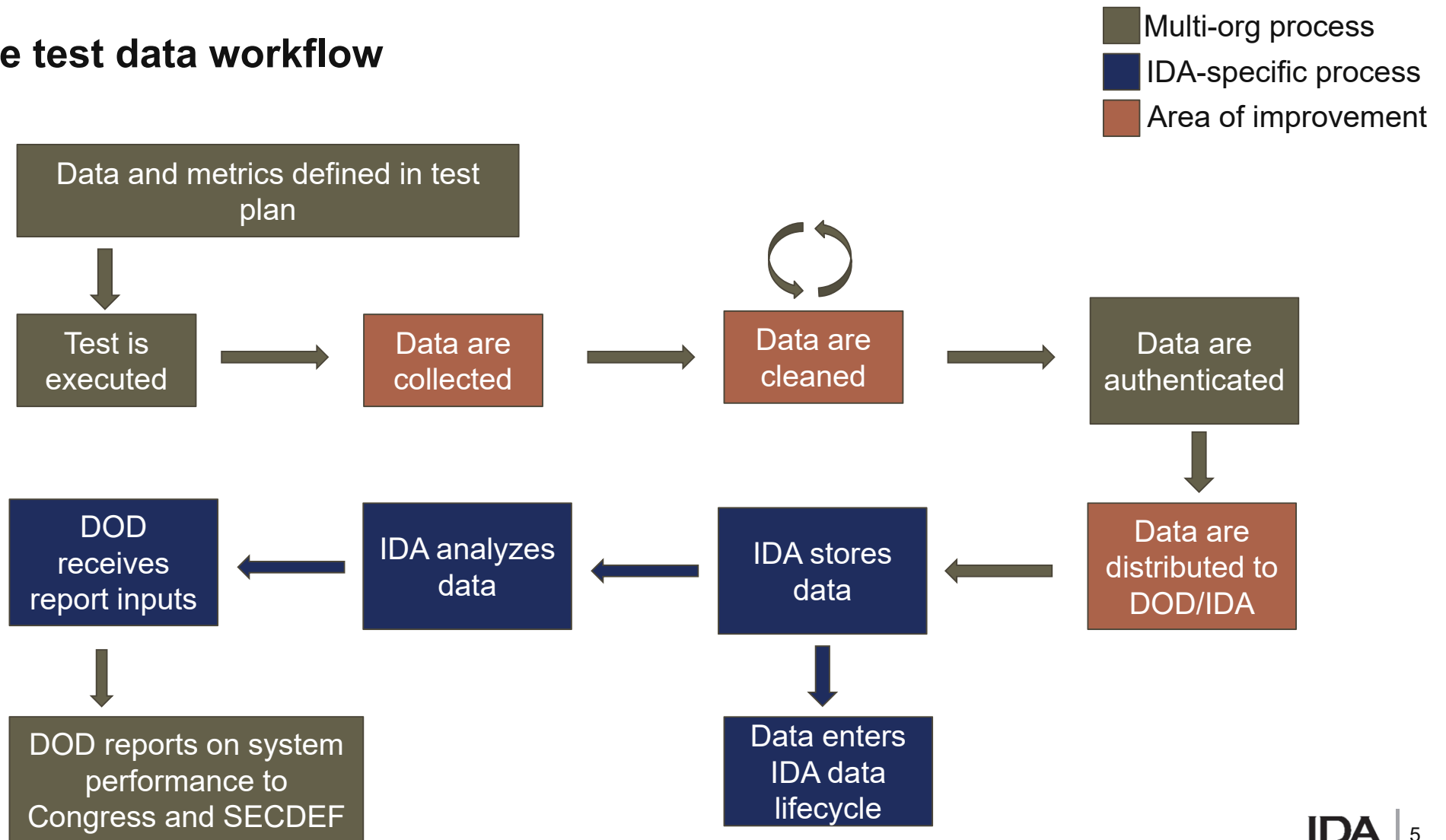


Operational evaluation depends on trustworthy data!

Multimillion-dollar program decisions depend on our data management procedures!



The test data workflow



State of the art of DOD data management and distribution practices

Data are distributed to DOD/IDA



Phone call from observer at range



You get a hard drive in the mail 3 months later

Data are collected



Transcribe the data yourself
(prone to user error!)

Date	Open	High	Low	Close / Last	Volume
01/04/2017	117.55	119.66	117.29	118.69	19,594,560
01/03/2017	116.03	117.84	115.51	116.86	20,635,600
12/30/2016	116.595	116.83	114.7739	115.05	18,668,290
12/29/2016	117	117.531	116.06	116.35	9,925,082
12/28/2016	118.19	118.25	116.65	116.92	11,985,740
12/27/2016	116.96	118.68	116.864	118.01	12,034,590
12/23/2016	117	117.56	116.3	117.27	10,885,030
12/22/2016	118.86	118.99	116.93	117.4	16,226,770
12/21/2016	118.92	119.2	118.48	119.04	10,747,610
12/20/2016	119.5	119.77	118.8	119.09	13,673,570
12/19/2016	119.85	120.36	118.51	119.24	15,871,360
12/16/2016	120.9	121.5	119.27	119.87	25,316,220
12/20/2016	121.1	123.5	119.7	119.87	25,316,220

Scanned PDF

But DOD is trying to do better...

Recent History:

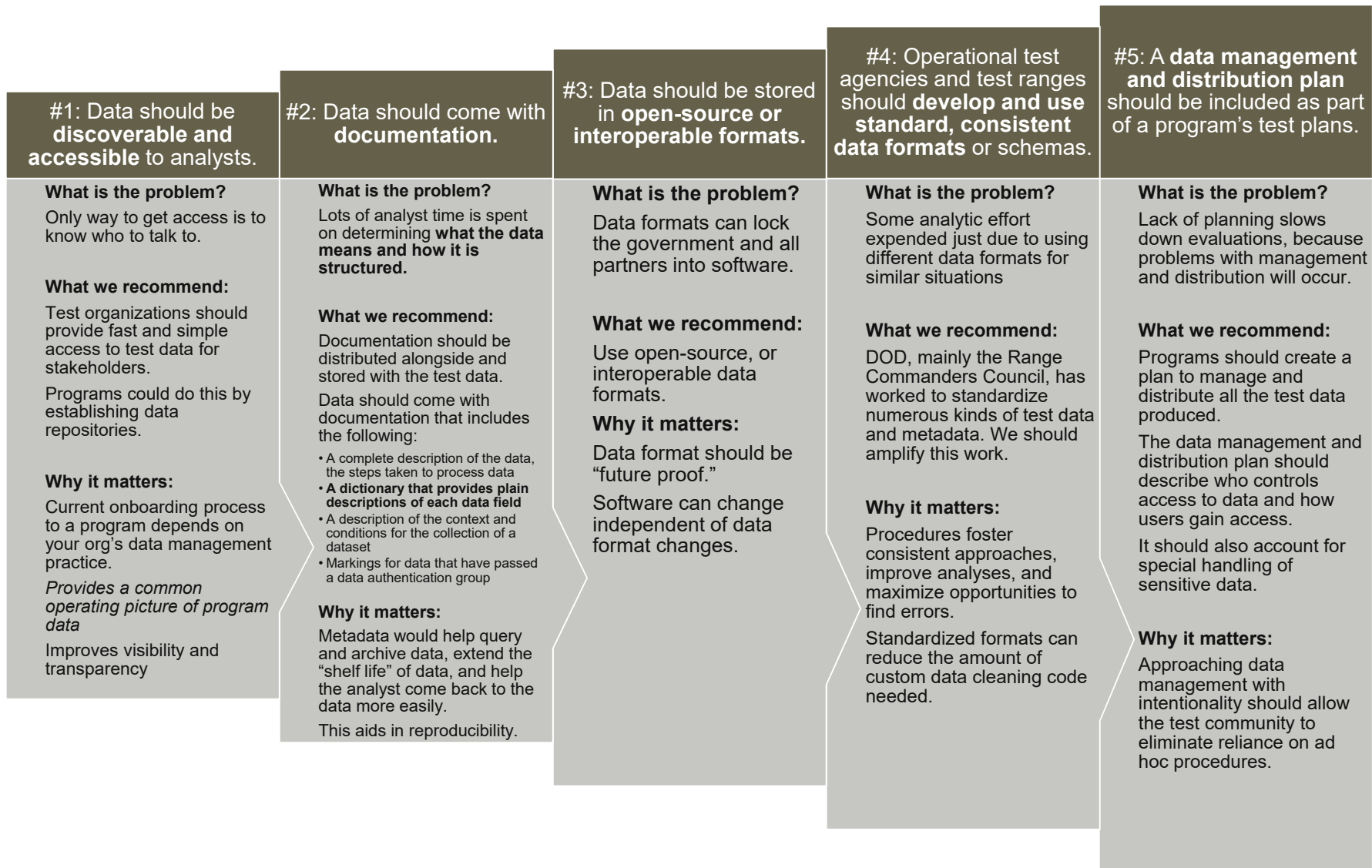
- DOD Data Strategy in 2020
- DSD Kathleen Hicks issued “Creating Data Advantage” memo in 2021.
 - DOD names first Chief Data Officer
 - Five “Data decrees”
 - DOD Data Counsel
- Several DOD offices merge to form CDAO in 2022.
- CDAO issues Guidance on Metadata in 2023.

And why does this matter?

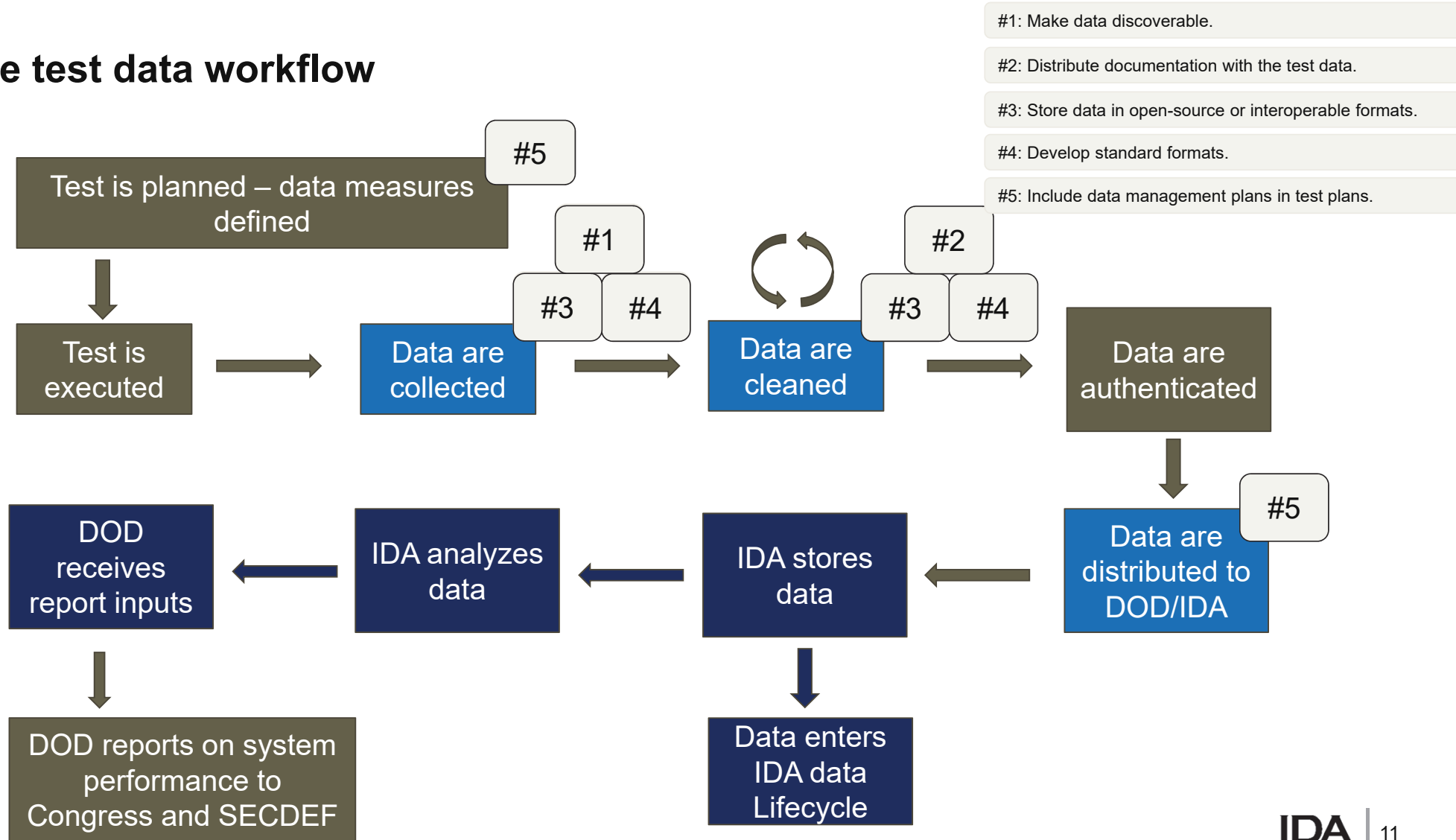
Lack of standards results in inconsistencies across the test and evaluation (T&E) community and, in many cases, within organizations.

IDA has documented several data recommendations to DOD.

- We drafted a memo to DOD: “Data Principles for Operational and Live Fire Test and Evaluation.”
- Key word is “**principles**” – we are making baby steps in the department.



The test data workflow



Where to go from here?

- Guidance is easy compared to implementation.
- Implementation requires studying the problems and getting concurrence from all stakeholders.
- Change needs resourcing.

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