



**Accomplishments -  
Data Standardization  
& Management  
Task Team**

1 December 2011

**Federal Working Group on Industrial Digital Radiography (FWGIDR)** - The FWGIDR is a self-chartered organization consisting of federal and government contract employees and endorsed by the Defense Working Group on Nondestructive Testing (DWGNDT). This working group provides a platform for identifying common concerns and critical issues facing the federal industrial radiographic community as it transitions from film to digital radiography (DR). The FWGIDR, utilizing expertise from within the community, organizes and coordinates technical committees that formulate positions, guidance, and/or solutions for the community's common concerns and issues.

**Background** – Recognizing significant difficulties in addressing technical advances in the digital radiographic field, several engineers from the Department of Energy (DOE) and Department of Defense (DoD) organized the FWGIDR in 2007 to address the problems and concerns faced by the industrial radiographic community in transitioning to DR. Digital X-ray systems are revolutionizing medical radiology, as digital cameras revolutionized the photographic community, and similarly has an ever-increasing role in radiographic nondestructive testing. Medical radiology, backed by significant development and funding, and digital photography, with rapid public acceptance, have demonstrated the advantages that digital systems offer in image intensive applications. The FWGIDR is focused on a vision for the future radiographic inspection facility, and that vision is digital radiography.

The rapid growth in DR has created transitional issues difficult for the industrial community to assimilate while transitioning from film to digital techniques. These issues include personnel training; data formatting, storage and retrieval; technique development and qualification; equipment qualification and monitoring; process control; and development and acquisition of equipment suitable for industrial applications.

Participants in the FWGIDR are organizations that employ nondestructive testing in support of government contracts. DOE, DoD, prime government contractors, along with other government and contractor personnel are actively contributing to and supporting the efforts of this working group.

**Introduction** – The Federal Working Group on Industrial Digital Radiography (FWGIDR) established a number of focused task teams to address transitional issues the industrial community encounters while transitioning from film to digital radiography. This team, the Data Standardization and Management task team, focused on the standardization and management of digital nondestructive testing (NDT) data. Since December 2007, this team has endeavored to identify, enhance, and promote the adoption of a universally recognized standard for the collection, review, transmission, and long term archival of digital NDT data. To that end, the FWGIDR issued a white paper entitled “Guide for the Standardization and Management of Digital NDT Data” on September 25, 2009. Since that time, the team has continued to work for the enhancement of the standards and the universal adoption of the standards.

**Purpose** – This paper describes the activities and accomplishments of the FWGIDR’s Data Standardization and Management task team. The purpose is to ensure the membership of the FWGIDR is aware of the accomplishments, therefore being knowledgeable of the accomplishments and the resulting documents they may implement the standardization and data management solutions as necessary in their activities.

**Activities and Accomplishments** – The FWGIDR identified data standardization and management as a critical issue for a robust DR infrastructure at the first meeting of the FWGIDR in July 2007. At the December 2007 meeting the Data Standardization and Management task team was established with the purpose to:

- identify a universally accepted standard that can be used or adopted for use by the industrial DR community for collection, review, transmission, and long term archival of digital NDE data,
- encourage active member participation on standards committees to ensure the applicability and robustness of the selected standards,
- promote the acceptance, implementation, and adoption of the selected standards, and
- provide a guide to aid the membership in the proper implementation of the standard to ensure data is archived in a retrievable manner for effective and efficient inspections, reviews, and operations.

The FWGIDR issued a white paper entitled “Guide for the Standardization and Management of Digital NDT Data” on September 25, 2009. There was an identified need by the FWGIDR members to establish a common data exchange and file format for sharing and long term archiving of digital image data. In response to this need, the FWGIDR endorsed the adoption of the ASTM DICONDE

standard. The leadership of the FWGIDR and the Data Standardization and Management task team understood that the DICONDE standard needed additional work to permit full implementation of the standard for the most widely-used DR modalities. The task team members and other members took active roles on the DICONDE standard committee to help drive the standard to completion, establish related standards, and then promote adoption by DoD and others in the industry.

**Standards Committee Activities:** ASTM E2339-10 – Standard Practice for Digital Imaging and Communications in Nondestructive Evaluation (DICONDE) is the DICONDE standard. The standard “facilitates the interoperability of NDE imaging and data acquisition equipment” for “image data acquisition, review, storage and archival.”<sup>1</sup> Although E2339 was established, implementing standards for imaging methods such as Computed Radiography (CR), Direct Detection Arrays (DDA), and Computed Tomography (CT) either were not issued or did not exist. FWGIDR members accepted leadership roles on the ASTM E07.11 committee and worked closely with others on the committee to ensure the timely issuance of the necessary standard practices.

**Computed Radiography:** Initial ASTM efforts resulted in the balloting and issuance of ASTM E2738 – 10 Standard Practice for Digital Imaging and Communications in Nondestructive Evaluation (DICONDE) for Computed Radiography (CR) Test Methods. This practice defines a set of information modules that along with the Practice [E2339](#) and the DICOM standard provides a standardized means to organize CR inspection data. The CR inspection data may be displayed and analyzed on any device that conforms to the standard.<sup>2</sup>

**Direct Digital Arrays:** A standard practice for implementation of DICONDE for direct digital arrays was proposed, balloted, and issued. ASTM E2699 – 10 Standard Practice for Digital Imaging and Communications in Nondestructive Evaluation (DICONDE) for Digital Radiography (DR) Test Methods defines a set of information modules that along with Practice [E2339](#) and the DICOM standard provide a standardized means to organize digital X-ray test parameters and results. The digital X-ray test results may be displayed and analyzed on any device that conforms to this standard.<sup>3</sup>

**Computed Tomography:** Likewise, ASTM E2767 – 10 Standard Practice for Digital Imaging and Communications in Nondestructive Evaluation (DICONDE) for X-ray Computed Tomography (CT) Test Methods was proposed, balloted, and issued. This practice defines a set of information modules that along with Practice [E2339](#) and the DICOM standard provide a standardized means to organize X-ray tomography test parameters and results. The X-ray CT test results may be displayed and analyzed on any device that conforms to this standard.<sup>4</sup>

Following issuance of these standards the FWGIDR task team worked closely with the Defense Logistics Agency (DLA) to obtain DoD Adoption of the DICONDE standard. ASTM E2339, the DICONDE standard, was adopted for use by the Department of Defense on February 1, 2010. Subsequently, on September 8, 2011 the related DICONDE standard practices for CR (ASTM E2738), DR (ASTM E2699), and CT (ASTM E2767) were also adopted for use by the DoD. On a related note, ASTM E2663 – 08 Standard Practice for Digital Imaging and Communications in Nondestructive Evaluation (DICONDE) for Ultrasonic Test Methods was adopted as well much to the credit of the FWGIDR effort.

**Procurement Template:** The task team, with the support of government procurement personnel, has developed a contractual Statement of Work for inclusion in procurement documents for activities that intend to procure DICONDE compliant systems. The document, available to FWGIDR members and others, is a template that may be modified as necessary to fit each individual procurement and it is an excellent starting point for defining the base requirements of a DICONDE system for a given procurement.

**Educational Activities:** The establishment, acceptance, and implementation of a standard for data management requires a concerted commitment by the industry to require standardized data protocols for critical data that must be archived and retrievable for decades. Therefore, from the beginning the task team and the FWGIDR leadership initiated a campaign to educate the industry of the importance of data standardization, the proper management of that data, and critical vulnerabilities associated with improper management. Numerous presentations at NDT and other technical conferences were given to educate on and encourage the use of these standards. A number of articles were written and printed in professional journals espousing the importance of standardization.

**Summary** – The FWGIDR has worked to meet the industry’s needs concerning data standardization and management, including the establishment of a universally accepted and implemented standard for collection, review, transmission, and archival of NDT data. With the publication of ASTM standards for DICONDE, CR, DR, and CT, the Adoption by DoD of these standards, and the issuing of procurement guidance for DICONDE compliant systems, the FWGIDR has met a critical need of the industrial DR community.

**References –**

1. ASTM E2339 – 10 Standard Practice for Digital Imaging and Communications in Nondestructive Evaluation (DICONDE) is the DICONDE standard.
2. ASTM E2738 – 10 Standard Practice for Digital Imaging and Communications in Nondestructive Evaluation (DICONDE) for Computed Radiography (CR) Test Methods.
3. ASTM E2699 – 10 Standard Practice for Digital Imaging and Communications in Nondestructive Evaluation (DICONDE) for Digital Radiography (DR) Test Methods.
4. ASTM E2767 – 10 Standard Practice for Digital Imaging and Communications in Nondestructive Evaluation (DICONDE) for X-ray Computed Tomography (CT) Test Methods.

***Additional References:***

FWGIDR Website: <http://dwgndt.org/fwgidr.htm>

ASTM Website: <http://www.astm.org>