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Health informatics — Digital imaging and communication in medicine (DICOM) including workflow and data management

Informatique de santé — Imagerie numérique et communication en médecine (DICOM) incluant le déroulement des opérations et la gestion des données

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 215, *Health informatics*.

This second edition cancels and replaces the first edition (ISO 12052:2006), of which it constitutes a minor revision.

The changes made are as follows:

— Clause 1, 6.18, 6.19, 6.20 and Clause 7 have been revised;

— informative material has been added to the Introduction.

0 Introduction

Digital Imaging and Communications in Medicine (DICOM) is the standard for the communication and management of medical imaging information and related data.

0.1 History

With the introduction of computed tomography (CT) followed by other digital diagnostic imaging modalities in the 1970s, and the increasing use of computers in clinical applications, the American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA) recognized the emerging need for a standard method for transferring images and associated information between devices manufactured by various vendors. These devices produce a variety of digital image formats.

The American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA) formed a joint committee in 1983 to develop a standard to:

— promote communication of digital image information, regardless of device manufacturer;

— facilitate the development and expansion of picture archiving and communication systems (PACS) that can also interface with other systems of hospital information;

— allow the creation of diagnostic information databases that can be interrogated by a wide variety of devices distributed geographically.

ACR-NEMA standards Publication No. 300-1985, published in 1985, was designated version 1.0. The standard was followed by two revisions: No. 1, dated October 1986 and No. 2, dated January 1988. These standards publications specified a hardware interface, a minimum set of software commands, and a consistent set of data formats.

ACR-NEMA standards Publication No. 300-1988, published in 1988, was designated version 2.0. It included version 1.0, the published revisions and additional revisions. It also included new material to provide command support for display devices, to introduce a new hierarchy scheme to identify an image, and to add data elements for increased specificity when describing an image.

In 1993, ACR-NEMA/Standard 300 was substantially revised and replaced by this document, designated Digital Imaging and Communications in Medicine (DICOM). It embodies a number of major enhancements to previous versions of the ACR-NEMA standard, as listed below.

— It is applicable to a networked environment. The ACR-NEMA standard was applicable in a point-to-point environment only; for operation in a networked environment, a Network Interface Unit (NIU) was required. DICOM supports operation in a networked environment using the industry standard networking protocol TCP/IP.

— It is applicable to offline media exchange. The ACR-NEMA standard did not specify a file format or choice of physical media or logical filesystem. DICOM supports operation in an offline media environment using industry standard media such as CD-R, DVD-R and USB and common file systems.

— It is a service-oriented protocol, specifying the semantics of commands and associated data, and how devices claiming conformance to the DICOM standard react to commands and data being exchanged. Specified services include support for management of the workflow of an imaging department. The ACR-NEMA standard was confined to the transfer of data with only implicit service requirements.

— It specifies levels of conformance. The ACR-NEMA standard specified a minimum level of conformance. DICOM explicitly describes how an implementor must structure a Conformance Statement to select specific options.

In 1995, with the addition of DICOM capabilities for cardiology imaging supported by the American College of Cardiology, the ACR-NEMA Joint Committee was reorganized as the DICOM Standards Committee, a broad collaboration of stakeholders across all medical imaging specialities.

0.2 Principles

0.2.1 Global applicability and localization

DICOM is a world-wide standard that can be used in every locale. It provides mechanisms to handle data that support cultural requirements, such as different writing systems, character sets, languages, and structures for addresses and person names. It supports the variety of workflows, processes and policies used for biomedical imaging in different geographic regions, medical specialities and local practices.

Localization to meet the requirements of national or local health and workflow policies can be done without deviating from the DICOM standard. Such localization may include specifying code sets (e.g. procedure codes) or profiling data element usage (both specifying locally-allowed values, and making elements that are optional in the DICOM standard mandatory for local use).

Localization and profiling can be specified in a number of mechanisms outside the purview of the DICOM standard. One such mechanism is Integration Profiles from the Integrating the Healthcare Enterprise (IHE) organization. It is important that Profiling adhere to the concept of non-contradiction. A Profile can add requirements but should not contradict DICOM requirements, as that would make it impossible to comply with both DICOM and the Profile.

0.2.2 Continuous maintenance

The DICOM standard is an evolving standard and it is maintained in accordance with the Procedures of the DICOM Standards Committee. Proposals for enhancements are welcome from all users of the DICOM standard and may be submitted to the Secretariat. Supplements and corrections to the DICOM standard are balloted and approved several times a year. When approved as Final Text, each change becomes official, is published separately, and goes into effect immediately. At intervals, all of the approved Final Text changes are consolidated and published in an updated edition of the DICOM standard. Once changes are consolidated into an updated edition of the DICOM standard, the individual change documents are not maintained; readers are directed to use the consolidated edition of the DICOM standard.

A requirement in updating the DICOM standard is to maintain effective compatibility with previous editions.

The maintenance process may involve retirement of sections of the DICOM standard.

Retirement does not imply that these features cannot be used. However, the DICOM Standards Committee will not maintain the documentation of retired features. The reader is referred to earlier editions of the DICOM standard.

The use of the retired features is discouraged for new implementations, in favour of those alternatives remaining in the DICOM standard.

0.2.3 Information objects and unique object identification

Many DICOM services involve the exchange of persistent information objects, such as images. An instance of such an information object may be exchanged across many systems and many organizational contexts, and over time. While minor changes may be made to the attributes of an instance to facilitate its handling within a particular organization (e.g. by coercing a Patient ID to the value used in a local context), the semantic content of an instance does not change.

Each instance is identified by a globally unique object identifier, which persists with the instance across all exchanges. Changes to the semantic content of an instance are defined to create a new instance, which is assigned a new globally unique object identifier.

0.2.4 Conformance

Conformance to the DICOM standard is stated in terms of Service-Object Pair (SOP) Classes, which represent Services (such as Storage using network, media, or web) operating on types of Information Objects (such as CT or MR images).

SOP Class specifications in the DICOM standard are only changed in a manner that is intended to be forward and backward compatible for all editions of the DICOM standard. Conformance requirements

and conformance claims are therefore referenced to the identifier of the SOP Class, and never referenced to an edition of the DICOM standard.

Each implementation is required to provide a Conformance Statement, in accordance with a consistent pro forma structure, facilitating comparison of products for interoperability.

0.2.5 Consistency of information model

A large number of information objects defined in the DICOM standard follow a common composite information model with information entities representing Patient, Study, Series, Equipment, Frame of Reference, and the specific instance data type. This information model is a simplification of the real world concepts and activities of medical imaging; for acquisition modalities, a Study is approximately equivalent to an ordered procedure, and a Series is approximately equivalent to a performed data acquisition protocol element. In other domains, such as Radiotherapy, the Study and Series are less clearly related to real world entities or activities, but are still required for consistency. This simplified model is sufficient for the pragmatic needs of managing imaging and related data collected in routine practice.

New information objects defined in DICOM will typically conform to this existing common information model, allowing reuse of implementations with minimal changes to support the new objects.

Health informatics — Digital imaging and communication in medicine (DICOM) including workflow and data management

1 Scope

This document, within the field of health informatics, addresses the exchange of digital images and information related to the production and management of those images, between both medical imaging equipment and systems concerned with the management and communication of that information.

This document facilitates interoperability of medical imaging equipment by specifying:

— for network communications, a set of protocols to be followed by devices claiming conformance to this document;

— the syntax and semantics of Commands and associated information which can be exchanged using these protocols;

— for media communication, a set of media storage services to be followed by devices claiming conformance to this document, as well as a File Format and a medical directory structure to facilitate access to the images and related information stored on interchange media;

— information that is to be supplied with an implementation for which conformance to this document is claimed.

This document does not specify:

— the implementation details of any features of the DICOM standard on a device claiming conformance;

— the overall set of features and functions to be expected from a system implemented by integrating a group of devices each claiming conformance to this document;

— a testing/validation procedure to assess an implementation's conformance to this document.

This document pertains to the field of medical informatics. Within that field, it addresses the exchange of digital information between medical imaging equipment and other systems. Because such equipment may interoperate with other medical devices and information systems, the scope of this document needs to overlap with other areas of medical informatics. However, this document does not address the full breadth of this field.

This document has been developed with an emphasis on diagnostic medical imaging as practiced in radiology, cardiology, pathology, dentistry, ophthalmology and related disciplines, and image-based therapies such as interventional radiology, radiotherapy and surgery. However, it is also applicable to a wide range of image and non-image related information exchanged in clinical, research, veterinary, and other medical environments.

This document facilitates interoperability of systems claiming conformance in a multi-vendor environment, but does not, by itself, guarantee interoperability.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
attribute
property of an *information object* (3.10)

Note 1 to entry: An Attribute has a name and a value which are independent of any encoding scheme.

3.2
command
request to operate on information across a network

3.3
command element
encoding of a parameter of a *command* (3.2) which conveys this parameter's value

3.4
command stream
result of encoding a set of DICOM *Command Elements* (3.3) using the DICOM encoding scheme

3.5
conformance statement
formal statement that describes a specific product implementation that uses the DICOM standard

Note 1 to entry: It specifies the *Service Classes* (3.14), *Information Objects* (3.10), and communication protocols supported by the implementation.

3.6
data dictionary
registry of DICOM Data Elements which assigns a unique tag, a name, value characteristics, and semantics to each *Data Element* (3.7)

3.7
data element
unit of information as defined by a single entry in the *data dictionary* (3.6)

3.8
data set
exchanged information consisting of a structured set of *Attributes* (3.1)

Note 1 to entry: The value of each Attribute in a data set is expressed as a *Data Element* (3.7).

3.9
data stream
result of encoding a *Data Set* (3.8) using the DICOM encoding scheme (Data Element Numbers and representations as specified by the *Data Dictionary* (3.6))

3.10
information object
abstraction of a real information entity (e.g. CT Image, Structured Report, etc.) which is acted upon by one or more DICOM Commands

Note 1 to entry: Information object is also referred to in the DICOM standard as an Information Object Definition.

Note 2 to entry: This term is primarily used in DICOM PS3.1, with a few references in DICOM PS3.3. It is an informal term corresponding to a formal term that is introduced in DICOM PS3.3. In all other parts of the DICOM standard, this formal term is known as an Information Object Definition.

3.11
information object class
formal description of an *Information Object* (3.10) which includes a description of its purpose and the *Attributes* (3.1) it possess

Note 1 to entry: It does not include values for these attributes. Also referred to in the DICOM standard as a SOP Class or Service-Object Pair Class.

Note 2 to entry: This term is only used in DICOM PS3.1. It is an informal term corresponding to a formal term that is introduced in DICOM PS3.4. This formal term is known as a Service-Object Pair Class or more commonly as a SOP Class.

3.12
information object instance
representation of an occurrence of a real world entity, which includes values for the *Attributes* (3.1) of the *Information Object Class* (3.11) to which the entity belongs

Note 1 to entry: Information object instance is also referred to in the DICOM standard as a SOP Instance.

Note 2 to entry: This term is only used in DICOM PS3.1. It is an informal term corresponding to a formal term that is introduced in DICOM PS3.4. This formal term is known as a Service-Object Pair Instance or more commonly as a SOP Instance.

3.13
message
data unit of the Message Exchange Protocol exchanged between two cooperating DICOM Applications

Note 1 to entry: A Message is composed of a *Command Stream* (3.4) followed by an optional *Data Stream* (3.9).

3.14
service class
structured description of a service which is supported by cooperating DICOM Applications using specific DICOM Commands acting on a specific class of *Information Object* (3.10)

4 Abbreviated terms

ACSE	Association Control Service Element
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
HIS	Hospital Information System
IOD	Information Object Definition
JIRA	Japan Medical Imaging and Radiological Systems Industries Association
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication Systems
REST	Representational State Transfer
RESTful	A RESTful Web service is a Web service implemented using REST architecture and HTTP (see http://www.ics.uci.edu/~fielding/pubs/dissertation/fielding_dissertation.pdf)

RIS	Radiology Information System
SOP	Service-Object Pair
STOW-RS	STore Over the Web by RESTful Services
TCP/IP	Transmission Control Protocol/Internet Protocol
WADO-RS	Web Access to DICOM Objects by RESTful Services
WADO-URI	Web Access to DICOM Objects by URI
WADO-WS	Web Access to DICOM Objects by Web Services (WS*)

5 Requirements

5.1 Provisions

This document references, normatively and in its entirety, the publicly available specification known as the "Digital Imaging and Communications in Medicine (DICOM) standard, PS 3".

5.2 Conformance

A claim of conformance to this document, with regard to a given product, shall only be valid when supported by a DICOM Conformance Statement written in accordance with the provisions of the DICOM standard, PS 3.2 (Part 2) which includes, but is not limited to, a list of all data IOD items communicated by the product and confirmation that their content conforms to the specifications of DICOM PS 3.

6 Overview of the content of the DICOM standard

6.1 Document structure

DICOM consists of the following parts:

— PS3.1: Introduction and Overview (equivalent to this document);

— PS3.2: Conformance;

— PS3.3: Information object definitions;

— PS3.4: Service class specifications;

— PS3.5: Data structures and encoding;

— PS3.6: Data dictionary;

— PS3.7: Message exchange;

— PS3.8: Network communication support for message exchange;

— PS3.9: Retired;

— PS3.10: Media storage and file format for media interchange;

— PS3.11: Media storage application profiles;

— PS3.12: Formats and physical media;

— PS3.13: Retired;

— PS3.14: Grayscale standard display function;

— PS3.15: Security and system management profiles;

— PS3.16: Content mapping resource;

— PS3.17: Explanatory information;

— PS3.18: Web services;

— PS3.19: Application hosting;

— PS3.20: Imaging reports using HL7 clinical document architecture.

These parts of the DICOM standard are related but independent documents. A brief description of each part is provided in this clause.

6.2 PS3.2: Conformance

PS3.2 of the DICOM standard defines principles listed below that implementations claiming conformance to the DICOM standard shall follow.

— Conformance requirements. PS3.2 specifies the general requirements that shall be met by any implementation claiming conformance. It references the conformance sections of other parts of the DICOM standard.

— Conformance Statement. PS3.2 defines the structure of a Conformance Statement. It specifies the information that shall be present in a Conformance Statement. It references the Conformance Statement sections of other parts of the DICOM standard.

PS3.2 does not specify a testing/validation procedure to assess an implementation's conformance to the DICOM standard.

Figure 1 and Figure 2 depict the construction process for a Conformance Statement for both network communication and media exchange. A Conformance Statement consists of the following parts:

— set of Information Objects that is recognized by this implementation;

— set of Service Classes that this implementation supports;

— set of communications protocols or physical media that this implementation supports;

— set of security measures that this implementation supports.

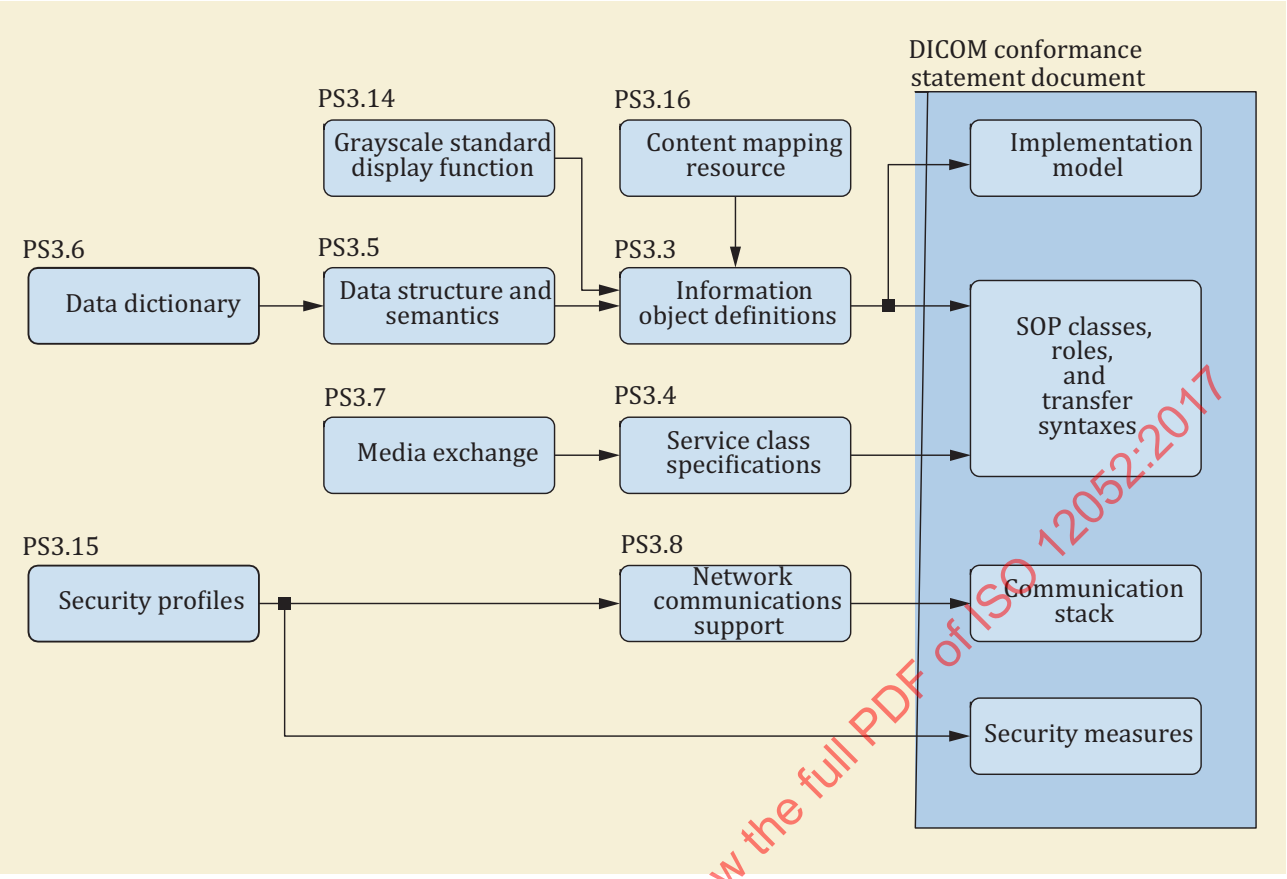

Figure 1 — Construction process for a network conformance claim

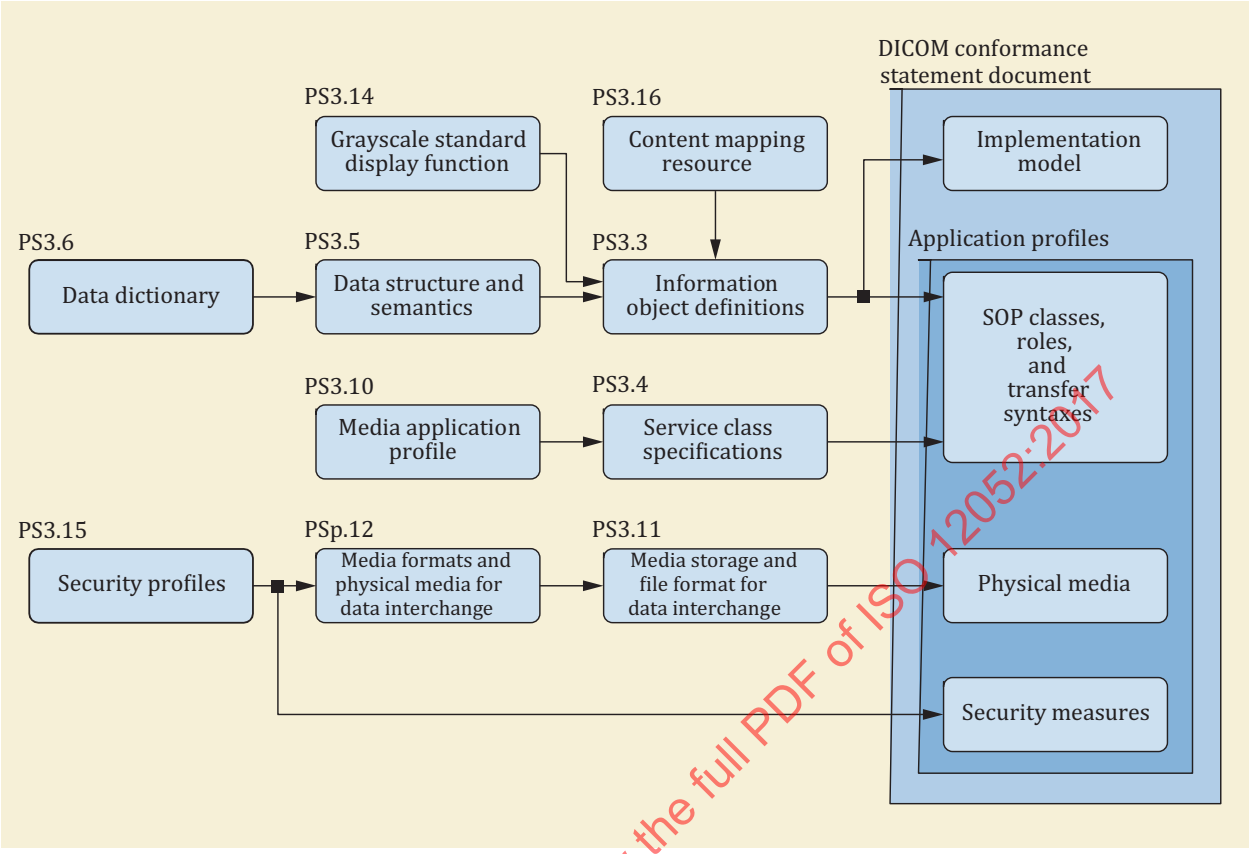

Figure 2 — Construction process for a media conformance claim

6.3 PS3.3: Information object definitions

PS3.3 of the DICOM standard specifies a number of Information Object Classes that provide an abstract definition of real-world entities applicable to communication of digital medical images and related information (e.g. waveforms, structured reports, radiation therapy dose, etc.). Each Information Object Class definition consists of a description of its purpose and the Attributes that define it. An Information Object Class does not include the values for the Attributes that comprise its definition.

Two types of Information Object Classes are defined: normalized and composite.

Normalized Information Object Classes include only those Attributes inherent in the real-world entity represented. For example, the study Information Object Class, which is defined as normalized, contains study date and study time Attributes because they are inherent in an actual study. Patient name, however, is not an Attribute of the study Information Object Class because it is inherent in the patient on which the study was performed and not the study itself.

Composite Information Object Classes may additionally include Attributes that are related to but not inherent in the real-world entity. For example, the Computed Tomography Image Information Object Class, which is defined as composite, contains both Attributes that are inherent in the image (e.g. image date) and Attributes that are related to but not inherent in the image (e.g. patient name). Composite Information Object Classes provide a structured framework for expressing the communication requirements of images where image data and related data needs to be closely associated.

To simplify the Information Object Class definitions, the Attributes of each Information Object Class are partitioned with similar Attributes being grouped together. These groupings of Attributes are specified as independent modules and may be reused by other Composite Information Object Classes.

PS3.3 defines a model of the Real World along with the corresponding Information Model that is reflected in the Information Object Definitions. Future editions of this standard may extend this set of Information Objects to support new functionality.

To represent an occurrence of a real-world entity, an Information Object Instance is created, which includes values for the Attributes of the Information Object Class. The Attribute values of this Information Object Instance may change over time to accurately reflect the changing state of the entity that it represents. This is accomplished by performing different basic operations upon the Information Object Instance to render a specific set of services defined as a Service Class. These Service Classes are defined in PS3.4.

6.4 PS3.4: Service class specifications

PS3.4 of the DICOM standard defines a number of Service Classes. A Service Class associates one or more Information Objects with one or more Commands to be performed upon these objects. Service Class Specifications state requirements for Command Elements and how resulting Commands are applied to Information Objects. Service Class Specifications state requirements for both providers and users of communications services.

PS3.4 of the DICOM standard defines the characteristics shared by all Service Classes and how a Conformance Statement to an individual Service Class is structured. It contains a number of normative annexes that describe individual Service Classes in detail.

Examples of Service Classes include the following:

— Storage Service Class;

— Query/Retrieve Service Class;

— Basic Worklist Management Service Class;

— Print Management Service Class.

PS3.4 defines the operations performed upon the Information Objects defined in PS3.3. PS3.7 defines the Commands and protocols for using the Commands to accomplish the operations and notifications described in PS3.4.

6.5 PS3.5: Data structure and semantics

PS3.5 of the DICOM standard specifies how DICOM applications construct and encode the Data Set information resulting from the use of the Information Objects and Services Classes defined in PS3.3 and PS3.4 of the DICOM standard. The support of a number of standard image compression techniques (e.g. JPEG lossless and lossy) is specified.

PS3.5 addresses the encoding rules necessary to construct a Data Stream to be conveyed in a Message as specified in PS3.7 of the DICOM standard. This Data Stream is produced from the collection of Data Elements making up the Data Set.

PS3.5 also defines the semantics of a number of generic functions that are common to many Information Objects. PS3.5 defines the encoding rules for international character sets used within DICOM.

6.6 PS3.6: Data dictionary

PS3.6 of the DICOM standard is the centralized registry that defines the collection of all DICOM Data Elements available to represent information, along with elements utilized for interchangeable media encoding and a list of uniquely identified items that are assigned by DICOM.

For each element, PS3.6 specifies:

— its unique tag, which consists of a group and element number,

— its name,

— its value representation (character string, integer, etc.),

— its value multiplicity (how many values per attribute), and

— whether it is retired.

For each uniquely identified item, PS3.6 specifies:

— its unique value, which is numeric with multiple components separated by decimal points and limited to 64 characters;

— its name;

— its type, either Information Object Class, definition of encoding for data transfer, or certain well-known Information Object Instances;

— in which part of the DICOM standard it is defined.

6.7 PS3.7: Message exchange

PS3.7 of the DICOM standard specifies both the service and protocol used by an application in a medical imaging environment to exchange Messages over the communications support services defined in PS3.8. A Message is composed of a Command Stream defined in PS3.7 followed by an optional Data Stream as defined in PS3.5.

PS3.7 specifies:

— the operations and notifications (DIMSE Services) made available to Service Classes defined in PS3.4;

— rules to establish and terminate associations provided by the communications support specified in PS3.8 and the impact on outstanding transactions;

— rules that govern the exchange of Command requests and responses;

— encoding rules necessary to construct Command Streams and Messages.

6.8 PS3.8: Network communication support for message exchange

PS3.8 of the DICOM standard specifies the communication services and the upper layer protocols necessary to support, in a networked environment, communication between DICOM applications as specified in PS3.3, PS3.4, PS3.5, PS3.6, and PS3.7. These communication services and protocols ensure that communication between DICOM applications is performed in an efficient and coordinated manner across the network.

The communication services specified in PS3.8 are a proper subset of the services offered by the OSI Presentation Service (ISO/IEC 8822) and of the OSI Association Control Service Element (ACSE) (ISO/IEC 15953). They are referred to as the Upper Layer Service, which allows peer applications to establish associations, transfer messages and terminate associations.

This definition of the Upper Layer Service specifies the use of the DICOM Upper Layer Protocol in conjunction with TCP/IP transport protocols.

The TCP/IP communication protocol specified by PS3.8 is a general purpose communication protocol not specific to the DICOM standard.

6.9 PS3.9: Retired (formerly point-to-point communication support for message exchange)

PS3.9 of the DICOM standard previously specified the services and protocols used for point-to-point communications in a manner compatible with ACR-NEMA 2.0. It has been retired.

6.10 PS3.10: Media storage and file format

PS3.10 of the DICOM standard specifies a general model for the storage of medical imaging information on removable media (see Figure 3). The purpose of this Part is to provide a framework allowing the interchange of various types of medical images and related information on a broad range of physical storage media.

PS3.10 specifies:

— a layered model for the storage of medical images and related information on storage media. This model introduces the concept of media storage application profiles, which specify application specific subsets of the DICOM standard to which a media storage implementation may claim conformance. Such a conformance applies only to the writing, reading and updating of the content of storage media;

— a DICOM file format supporting the encapsulation of any Information Object;

— a secure DICOM file format supporting the encapsulation of a DICOM file format in a cryptographic envelope;

— a DICOM file service providing independence from the underlying media format and physical media.

PS3.10 defines various media storage concepts:

— the method to identify a set of files on a single medium;

— the method for naming a DICOM file within a specific file system.

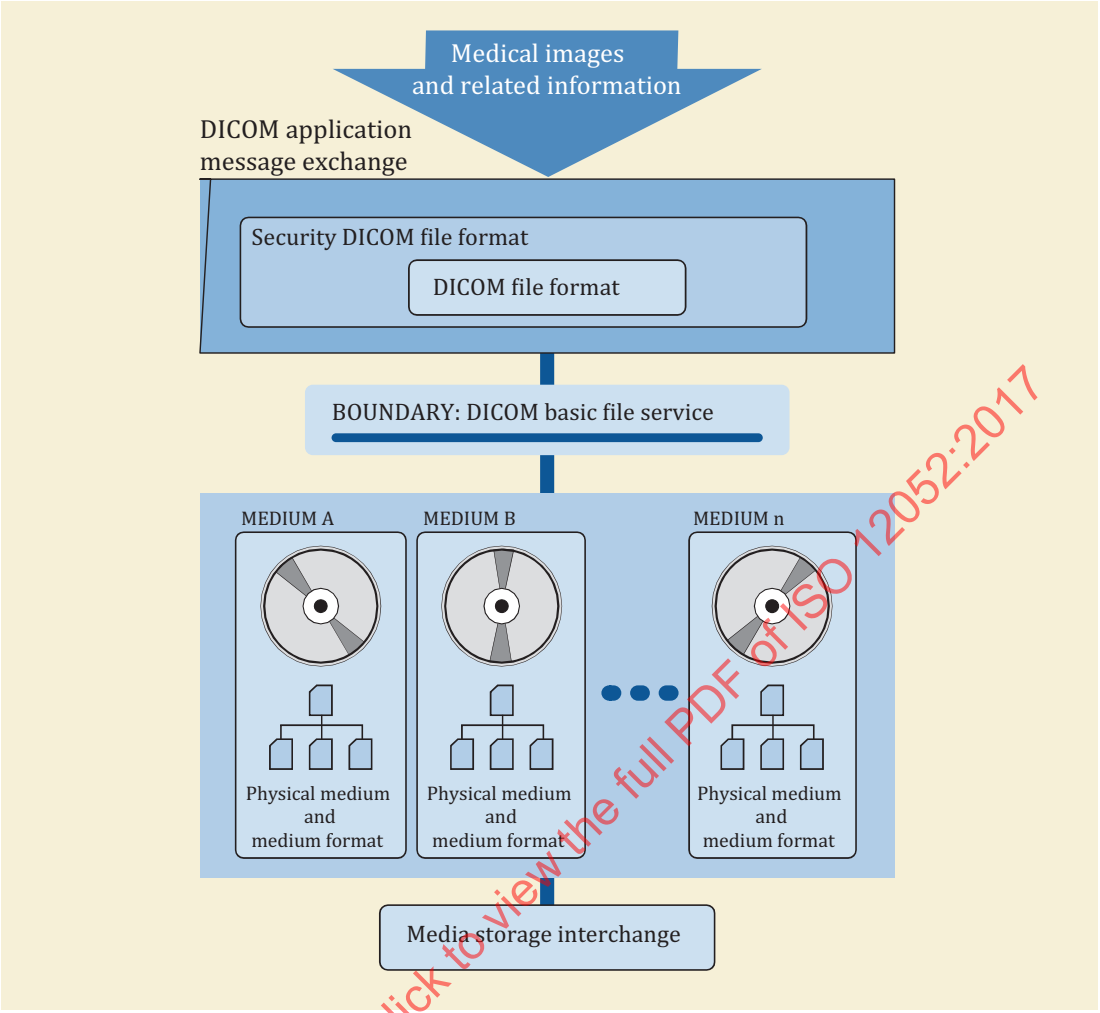

Figure 3 — DICOM Media Communication Model

6.11 PS3.11: Media storage application profiles

PS3.11 of the DICOM standard specifies application-specific subsets of the DICOM standard to which an implementation may claim conformance. These application specific subsets will be referred to as Application Profiles in this section. Such a conformance statement applies to the interoperable interchange of medical images and related information on storage media for specific clinical uses. It follows the framework, defined in PS3.10, for the interchange of various types of information on storage media.

An Application Profile annex is organized into the following major parts:

— the name of the Application Profile or the list of Application Profiles grouped in a related class;

— a description of the clinical context of the Application Profile;

— the definition of the media storage Service Class with the device roles for the Application Profile and associated options;

— informative section describing the operational requirements of the Application Profile;

— specification of the Information Object Classes and associated Information Objects supported and the encoding to be used for the data transfer;

— the selection of media formats and physical media to be used;

— other parameters that need to be specified to ensure interoperable media interchange;

— security parameters that select the cryptographic techniques to be used with secure media storage Application Profiles.

The structure of DICOM and the design of the Application Profile mechanism is such that extension to additional Information Object Classes and the new exchange media is straightforward.

NOTE Figure 4 shows how individual aspects of an Application profile map to the various parts of the DICOM standard.

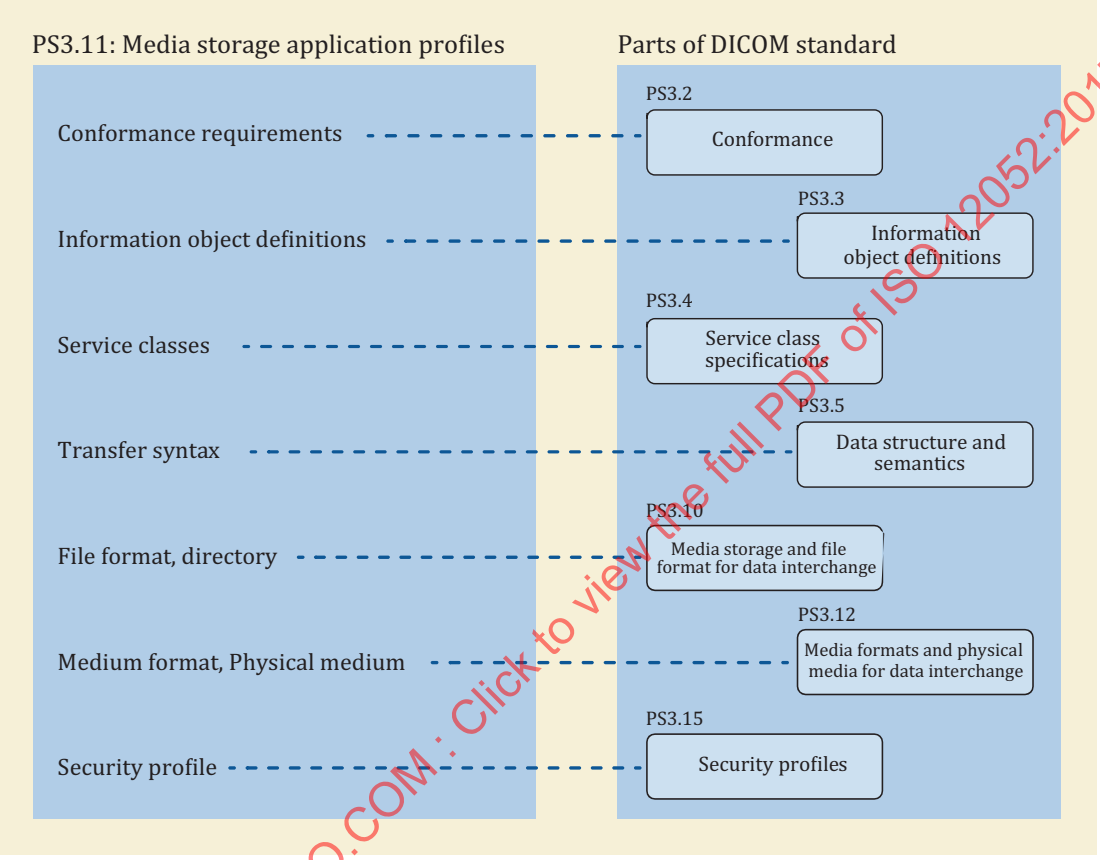

Figure 4 — Relationship between an Application Profile and parts of DICOM

6.12 PS3.12: Storage functions and media formats for data interchange

PS3.12 of the DICOM Standard facilitates the interchange of information between applications in medical environments by specifying:

— a structure for describing the relationship between the media storage model and a specific physical media and media format;

— specific physical media characteristics and associated media formats.

6.13 PS3.13: Retired (formerly print management point-to-point communication support)

PS3.13 previously specified the services and protocols used for point-to-point communication of print management services. It has been retired.