TECHNICAL REPORT – TYPE 3

IEC 61852

First edition
1998-04

Medical electrical equipment – Digital imaging and communications in medicine (DICOM) – Radiotherapy objects

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International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE XC

For price, see current catalogue

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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MEDICAL ELECTRICAL EQUIPMENT – DIGITAL IMAGING AND COMMUNICATIONS IN MEDICINE (DICOM) – RADIOTHERAPY OBJECTS

FOREWORD

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- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but no immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

Technical reports of types 1 and 2 are subject to review within three years of publication to decide whether they can be transformed into International Standards. Technical reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

IEC 61852, which is a technical report of type 3, has been prepared by subcommittee 62C: Equipment for radiotherapy, nuclear medicine and radiation dosimetry, of IEC technical committee 62: Electrical equipment in medical practice.

The text of this technical report is based on the following documents:

Committee draft	Report on voting
62C/183/CDV	62C/201A/RVC

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This report has been developed in conjunction with IEC subcommittee 62C, CEN TC251 and the AAPM.

ACR (the American College of Radiology) and NEMA (the National Electrical Manufacturers' Association) formed a joint committee to develop a standard for digital imaging and communications in medicine. This DICOM standard was developed according to the NEMA Procedures.

This report is supplement 11 to the DICOM standard. It is an extension to Part 3, 4 and 6 of the published DICOM standard which consists of the following parts:

Part 1 — Introduction and Overview
Part 2 — Conformance
Part 3 — Information Object Definitions
Part 4 — Service Class Specifications
Part 5 — Data Structures and Encoding
Part 6 — Data Dictionary
Part 7 — Message Exchange
Part 8 — Network Communication Support for Message Exchange
Part 9 — Point-to-Point Communication Support for Message Exchange
Part 10 — Media Storage and File Format
Part 11 — Media Storage Application Profiles
Part 12 — Media Formats and Physical Media
Part 13 — Print Management Point-to-Point Communication Support

These parts are independent but related documents. Their development level and approval status may differ. Additional parts may be added to this multi-part standard. PS3.1 should be used as the base reference for the current parts of this standard.

A bilingual version of this technical report may be issued at a later date.

INTRODUCTION

This supplement to the DICOM Standard defines a number of information objects applicable to the domain of radiation oncology. The intent of these objects is to support the transfer of radiotherapy-related data between devices found within and outside a radiotherapy department. They are not, however, intended to support the *management* of the transferred data, a function which may be addressed in future revisions of the DICOM Standard.

This task of process management has not been addressed in the current draft due to the absence of a consistent process model for a radiotherapy department, especially in an international context. As a result, the radiotherapy information objects contain a large number of conditional and optional data elements. Essentially the objects are intended to be used as “containers” for related radiotherapy data, with data being added as the object flows through the department.

MEDICAL ELECTRICAL EQUIPMENT – DIGITAL IMAGING AND COMMUNICATIONS IN MEDICINE (DICOM) – RADIOTHERAPY OBJECTS

The following text extends and/or amends Part 3 of DICOM.

Part 3: Addendum radiotherapy information object definitions

1 Scope

This report specifies the following information objects:

1) A DICOM *Image* Information Object for Radiotherapy. It specifies the semantic content of RT Images. It is commonly abbreviated to the RT Image IOD. It also includes the corresponding Storage SOP Class so that this IOD can be used in Network and Media Storage exchanges. The scope of the RT Image IOD is radiotherapy images which have been obtained on a conic imaging geometry, such as that found on conventional simulators and portal imaging devices. It can also be used for calculated images using the same geometry, such as digitally reconstructed radiographs (DRRs).
2) A DICOM *Dose* Information Object for Radiotherapy. It specifies the semantic content of RT Doses. It is commonly abbreviated to the RT Dose IOD. It also includes the corresponding Storage SOP Class so that this IOD can be used in Network and Media Storage exchanges. The scope of the RT Dose IOD is radiotherapy dose distributions which have been calculated on a radiotherapy treatment planning system, represented as two- or three-dimensional dose grids, groups of named or unnamed dose points, isodose curves, and dose-volume histograms (DVHs).
3) A DICOM *Structure Set* Information Object for Radiotherapy. It specifies the semantic content of RT Structure Sets. It is commonly abbreviated to the RT Structure Set IOD. It also includes the corresponding Storage SOP Class so that this IOD can be used in Network and Media Storage exchanges. The scope of the RT Structure Set IOD is radiotherapy patient-related structures which have been identified on devices such as CT scanners, virtual simulation workstations, or treatment planning systems.
4) A DICOM *Plan* Information Object for Radiotherapy. It specifies the semantic content of RT (Treatment) Plans. It is commonly abbreviated to the RT Plan IOD. It also includes the corresponding Storage SOP Class so that this IOD can be used in Network and Media Storage exchanges. The scope of the RT Plan IOD is geometric and dosimetric data specifying a course of external beam and/or brachytherapy treatment.

This report includes a number of addenda to existing Parts of DICOM; therefore the reader should have a working understanding of the Standard.

1. Part 3 Addenda (Extension to the body, Annex A, B, C and D)
2. Part 4 Addenda (Extension to Annex B)
3. Part 6 Addenda (Extension to Section 6 and Annex A)

Add to Section 2

2 Normative references

IEC 61217:1996, *Radiotherapy equipment – Coordinates, movements and scales*

ICRU Report 50, *Prescribing, Recording, and Reporting Photon Beam Therapy*, International Commission on Radiation Units and Measurements, 1993