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Document Interchange Standards: Description and Status of Major Document and Graphics Standards

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National Bureau of Standards became the National Institute of Standards and Technology on August 23, 1988, when the Omnibus Trade and Competitiveness Act was signed. NIST retains all NBS functions. Its new programs will encourage improved use of technology by U.S. industry.

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
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DOCUMENT INTERCHANGE STANDARDS:
Description and Status of Major Document and Graphics Standards

ABSTRACT

Document interchange standards have emerged in response to two distinct needs. First, there is the need to interchange documents among workstations and tools in the office environment. Second, there is the need to exchange versions of a document between an author and a publisher. This document describes standards which attempt to satisfy those needs. Each relevant standard is presented in summary form and includes the following information: name of standard, number of standard, status, scope, description, use, and references.

KEY WORDS:

CGI, CGM, DFR, DIF, document interchange, DSSSL, EDI, FAX, GGCA, GKS, IGES, ODA, ODIF, ODL, PHIGS, Raster, SDIF, SGML, SPDL, standards, TRIF.

1. Introduction

Paper documents as we know them today are complex with their rich variety of contents: assorted modes of emphases, photographs, diagrams, tables, maps, etc. Electronic documents have the potential of all the parts we have today plus many new ones: animated sequences, aural components, dynamic charts, tables, and graphs, etc. Paper documents are easily interchanged but not easily updated and revised. Electronic documents have the potential for easy updating and revision. Further, they can be easily interchanged among machines if appropriate steps are taken. However, if this potential is to be realized, standards must be used so that the document can be readily transferred from machine to machine thus allowing updating and revision independent of the originating machine.

Although the standards process is not new, with the current transition to electronic offices, standards are being developed rapidly. It is difficult to keep up to date unless one is in the center of the activity. However, more and more of us need a general understanding of what is available as we work to determine the offices and the systems of today and the future.

It is to fulfill this perceived need that this document originated. It will not answer all the detailed questions about the standards. It will, however, provide a general introduction to the current document and graphics standards.

1.1 Document Overview

The following information is provided for each standard: name of standard, reference number, status, scope, description, use, and references.

1.2 Acknowledgments

I would like to thank Lawrence A. Welsch and David K. Jefferson for encouraging me to publish these materials which have been very helpful for me and others who have used them.

2. Document Standards Summaries

The standards covered include the following:

Abbreviation	Name of Standard	Doc. No.
CGI	Computer Graphics Interfacing Techniques for Dialogues with Graphical Devices	ISO DP 9636:1988
CGM	Computer Graphics Metafile for the Storage and Transfer of Picture Description Information	ISO 8632:1986 ANSI X3.122-1986 FIPS PUB 128
DFR	Document Filing and Retrieval	ISO/IEC JTC1/SC 18/WG 4 N1264 ISO/IEC JTC1/SC 18/WG 4 N1265
DIF	Document Interchange Format	NBSIR 84-2836
DSSSL	Document Style Semantics and Specification Language	ISO/IEC JTC1/SC 18/WG 8 N606
EDI	Electronic Data Interchange (series of Electronic Business Data Interchange (EBDI) Standards)	
	Data Element Dictionary	ANSI X12.3:1986
	Application Control Structure	ANSI X12.6:1986
	Functional Acknowledgment	ANSI X12.20:1986
	Data Segment Dictionary	ANSI X12.22:1986
FAX	CCITT Group 4 Facsimile	Recommendations T.5 and T.6
GGCA	Geometric Graphics Content Architecture	ISO 8613-8:1988
GKS	Graphical Kernel System	ISO 7942:1985 ANSI X3.124-1985 FIPS PUB 120
IGES	Initial Graphics Exchange Specification	NBSIR 86-3359 (IGES 3.0)
	Digital Representation for Communication of Product Definition Data (Based on IGES 3.0.)	ASME/ANSI Y14.26M-1987
	Initial Graphics Exchange Specification	NBSIR 88-3813 (IGES 4.0)
ODA	Office Document Architecture	ISO 8613:1988
ODIF	Office Document Interchange Format	ISO 8613-5:1988
ODL	Office Document Language	ISO 8613-5:1988
PHIGS	Programmer's Hierarchical Interactive Graphics System	ISO DIS 9592:1988 ANSI X3.144-1988
Raster	Raster Graphics Content Architecture	ISO 8613-7:1988
SDIF	SGML Document Interchange Format	ISO DIS 9069:1987
SGML	Standard Generalized Markup Language	ISO 8879:1986 FIPS PUB 152
SPDL	Standard Page Description Language	ISO/IEC JTC1/SC 18/WG 8 N561
TRIF	Tiling Raster Interchange Format	Proposed Extension to ISO 8613-7:1988

Other acronyms found in the document include:

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
DIS	Draft International Standard
DP	Draft Proposal
FIPS PUB	Federal Information Processing Standards Publication
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
JTC	Joint Technical Committee 1 of ISO and IEC
NBS	National Bureau of Standards (now NIST)
NBSIR	National Bureau of Standards Internal Report
NIST	National Institute of Standards and Technology
SC	Subcommittee
TTG	Tiling Task Group
WG	Working Group

NAME OF STANDARD: Information Processing Systems - Computer Graphics - Interfacing Techniques for Dialogues with Graphical Devices (CGI)

NUMBER OF STANDARD: ISO DP 9636:1988

STATUS: International Draft Proposal (1988)

SCOPE: "This standard establishes the conceptual model, functionality, minimum conformance requirements, and encodings of the Computer Graphics Interface (CGI). This standard defines a usable set of CGI functions that is expected to satisfy the following needs of a majority of the computer graphics community:

1. Provide an interface standard for computer graphics software package implementors.
2. Provide an interface standard for computer graphics device manufacturers and suppliers.
3. Provide an inquiry and response mechanism for graphics device capabilities, characteristics, and states.
4. Provide a standard graphics escape mechanism to access non-standard graphics device capabilities.
5. Provide for future functional extension of the CGI.

"In addition to the CGI functionality, device classes and constituency profiles are defined. The device classes included in the CGI are output (OUT), input (IN), and input/output (OUTIN). Constituency profiles allow subsets of the CGI functions and features to be defined to suit particular constituencies of users. There is also provision for constituency profiles to be registered after the standard is published." (ISO/DP9636 "1.1 Scope")

DESCRIPTION: "The Computer Graphics Interface (CGI) is a standard functional and syntactical specification of the control and data exchange between device-independent graphics software and one or more Virtual Devices.

"The syntax of the CGI is presented in this standard in a binding-independent and encoding-independent specification. Any similarity of the examples or function specifications to a particular language or encoding technique is purely accidental, unless explicitly stated otherwise.

"The functions specified provide for the representation of a wide range of two-dimensional pictures and control over their display on a wide range of graphical devices. The functions are split into groups that perform device and CGI session control, which specify the data representations used, control the display of the pictures, perform basic drawing actions, control the attributes of the basic drawing actions, and provide access to non-standard device capabilities.

"Part 1 of this standard gives an overview of this multipart standard, explains the relationship between the parts and the relations to other standards, describes the graphics standards reference model used, and defines certain constituency policies. Parts 2 to 6 specify the CGI functions for different functional areas using an abstract syntax.

"Additional separate standards will define standard data-stream encodings, procedural library bindings, and single-entry-point procedural bindings of the CGI." (ISO/DP9636 "1.2 Field of Application")

USE: "The CGI standard describes graphical services provided by a Virtual Graphics Device. The model for description of these services is expressed in terms of graphical capabilities of a single instance of a hypothetical graphics device. In all but the simplest of computing environments, CGI functions alone will not be sufficient to provide complete control over a device. Additional functions, not included in this standard will likely be needed. Examples of such functions include:

— means to configure (sets of) physical devices to be accessed as CGI Virtual Devices.

— means to control a device capable of offering CGI-defined services as well as other, non-CGI-defined services, such as those implied by ISO 2022 and ISO 6429.

— means to differentiate among separate instances of CGI Virtual Devices in the same computing environment; and

— means of defining or determining communication paths from CGI clients to CGI Virtual Devices.

"In some cases, other standards exist that describe the functions required. For example, various communications standards address the needs of the last point above. In other cases no standards may exist, but the tasks indicated are outside the scope of a Computer Graphics Standard. The second point mentioned above is such an example." (ISO/DP9636 "1.2 Relationship of CGI to a Computing Environment")

REFERENCES:

Arnold, D.B. and P.R. Bono. *CGM and CGI: Metafile and Interface Standards for Computer Graphics*. Berlin: Springer-Verlag, 1988.

ISO/DP9636 (CGI) - Interim Draft *Information Processing Systems - Computer Graphics - Interfacing Techniques for Dialogues with Graphical Devices - Functional Specification* April 15, 1988.

Powers, Thomas, Andrea Frankel, and David Arnold. "The Computer Graphics Virtual Device Interface." *IEEE Computer Graphics and Applications* (August 1986) 6:8, 33-41.

NAME OF STANDARD: Computer Graphics Metafile for the Storage and Transfer of Picture Description Information (CGM)

NUMBER OF STANDARD: ISO 8632:1986 and ANSI X3.122-1986

STATUS: International Standard (1986) and American National Standard (1986)

SCOPE: "The Computer Graphics Metafile provides a file format suitable for the storage and retrieval of picture description information. The file format consists of an ordered set of elements that can be used to describe pictures in a way that is compatible between systems of different architectures and devices of differing capabilities and design.

"The elements specified provide for the representation of a wide range of pictures on a wide range of graphical devices. The elements are split into groups that delimit major structures (metafiles and pictures), that specify the representations used within the metafile, that control the display of the picture, that perform basic drawing actions, that control the attributes of the basic drawing actions and that provide access to non-standard device capabilities.

"The Metafile is defined in such a way that, in addition to sequential access to the whole metafile, random access to individual pictures is well-defined; whether this is available in any system that uses this Standard depends on the medium, the encoding and the implementation.

"In addition to a Functional Specification, three standard encodings of the metafile syntax are specified. These encodings address the needs of applications that require minimum metafile size, minimum effort to generate and interpret, and maximum flexibility for a human reader or editor of the metafile." (ISO 8632-1:1986 1 "Scope and Field of Application")

DESCRIPTION: "The Computer Graphics Metafile provides a file format suitable for the storage and retrieval of picture information. The file format consists of a set of elements that can be used to describe pictures in a way that is compatible between systems of different architectures and devices of differing capabilities and design." (ISO 8632)1:1986 0.1 Purpose)

"The main reasons for producing a standard computer graphics metafile are:
a) to allow picture information to be stored in an organized way on a graphical software system;
b) to facilitate transfer of picture information between different graphical software systems;
c) to enable picture information to be transferred between graphical devices;
d) to enable picture information to be transferred between different computer graphics installations."

The parts of the international standard are as follows:

1. Functional Specifications
2. Character and Coding
3. Binding and Coding
4. Clear Text Encoding

USE: "The use of this standard is strongly recommended when one or more of the following situations exist:

— A graphics metafile is maintained at a central facility for a decentralized system that employs graphics devices of different makes and models that must utilize the data.

— A graphics metafile is required to preserve picture data when conversion or migration from one graphics system to another is necessary and the two systems are not necessarily compatible.

— A graphics metafile is intended for information interchange between a source system and a target system that are not necessarily compatible."
(FIPS PUB 128 - Computer Graphics Metafile "9. Applicability")

REFERENCES:

ANSI X3.122-1986 *American National Standard for Information Systems - Computer Graphics - Metafile for the Storage and Transfer of Picture Description Information.*

Arnold, D.B. and P.R. Bono. *CGM and CGI: Metafile and Interface Standards for Computer Graphics.* Berlin: Springer-Verlag, 1988.

Henderson, Lofton, Margaret Journey, and Chris Osland. "The Computer Graphics Metafile." *IEEE Computer Graphics and Applications.* (August 1986) 6:8, 24-32.

ISO 8632-1986 *Information Processing Systems - Computer Graphics Metafile for the Storage and Transfer of Picture Description Information.*

FIPS PUB 128 *Computer Graphics Metafile (CGM)* 1987 March 16 adopts ANSI X3.122-1986.

NAME OF STANDARD: Information Processing - Document Filing and Retrieval (DFR)

NUMBER OF STANDARD: None

STATUS: Proposed DP (1988)

SCOPE: "This Standard is for a Distributed Application located in the Application Layer of the Reference Model for Open Systems Interconnection (see ISO 7498).

"It should be noted that a DFR will provide storage for an open-ended set of document types; the content of the documents is transparent to the DFR.

"This Standard serves the following important fields of application:

— capability for large capacity document storage for use by multiple users in a distributed system;

— ordered filing and multi-key retrieval of documents;

— structured organization of groups of documents;

— storage of an open-ended number of different document types (i.e. the content of a document is transparent to the DFR);

— filing and referencing documents outside of the document storage (i.e. a non-electronic hard copy document);

— adjoining attributes to a document independent from the document's content;

— capabilities to store, retrieve and delete documents of the document store whatever their content;

— capabilities to search for, order, retrieve, and delete single documents or groups of documents using document attributes;

— protection against unauthorized storage and retrieval of documents;

— capabilities to control concurrent access to the documents."
(ISO/IEC JTC1/SC 18/WG 4 N1264 "1. Scope and Field of Application")

DESCRIPTION: "The Document Filing and Retrieval Application forms part of a series of standards defining the application needed in the area of office automation, as it is described in the Distributed Office Application Model. This standard provides the functionality which directly supports the user in an office environment. Thus, Document Filing and Retrieval is not aiming to a general standardization of all types of filestores, as they may exist in computing systems. Rather, it concentrates on the filing and retrieval of documents, as it is a task of office work. Document Filing and Retrieval only aims to standardize the model of such documentstores and the services and protocols defining the principles, how clients can access such documentstore servers, whereas clients and servers reside on different nodes of a distributed office system." (ISO/IEC JTC1/SC 18/WG 4 N1264 "0. Introduction")

USE: "The Document Filing and Retrieval Application provides the capability for large capacity non-volatile document storage to multiple users in a distributed office system. This facility is particularly useful in an environment where a large population of desktop workstations that have limited storage capacity require access to large expensive storage devices." (ISO/IEC JTC1/SC 18/WG 4 N1264 "0. Introduction")

"This standard will deal with individual document filing and retrieval servers. The Standard governs the interactions of a document filing and retrieval client and a single document filing and retrieval server. Future standardization will consider the facilities of a distributed filing and retrieval server system and the need for inter-server protocols. It is intended that the results of the initial standardization work be extensible and support this latter work." (ISO/IEC JTC1/SC 18i/WG 4 N1264 "Note".)

REFERENCES:

ISO/IEC JTC1/SC 18/WG 4 N1264 *Information Processing - Document Filing and Retrieval (DFR) - Part 1: Abstract Service Definition and Procedures*

ISO/IEC JTC1/SC 18/WG 4 N1265 *Information Processing - Document Filing and Retrieval (DFR) - Part 2: Protocol Specification*

NAME OF STANDARD: (Navy) Document Interchange Format (DIF)

NUMBER OF STANDARD: NBSIR 84-2836

STATUS: Navy Standard (1984)

SCOPE: At the time that DIF was developed (before 1984), there was no standard which addressed "even a majority of the control information required by text processing systems."

"Based on ANSI standards X3.98, X3.64, and ISO 6429, 13 functions were found to be already standardized. It was decided to use the framework provided by ANSI standard X3.64 to encode the remaining 29 functions." (NBSIR 84-2836 pages 2 and 3.)

DESCRIPTION: "The forty-four control functions defined by DIF have been divided into six classes according to their primary purpose. The six classes are Break functions, Document Format functions, Page Format functions, Line Format functions, Rendition functions, and Miscellaneous functions." (NBSIR 84-2836 page 5.)

USE: DIF provides transfer of basic text and formatting instructions.

REFERENCES:

NBSIR 84-2836 *Document Interchange Format* April 1984.

NAME OF STANDARD: Information Processing - Text and Office Systems - Document Style Semantics and Specification Language (DSSSL)

NUMBER OF STANDARD: None

STATUS: Proposed DP (1988)

SCOPE: "Document Style Semantics and Specification Language (DSSSL) primarily provides the means of specifying the desired appearance of a composed SGML document, independent of any formatting process and any specific type of formatter. As such it:

a. is used to specify the relationships between the SGML logical elements as expressed in the source DTD and the intended result;

b. defines formatting and style semantics and a corresponding machine-processable syntax to describe the typographic style and layout of a document; and

c. allows the typographic semantics to be extended as required by specific applications.

"This International Standard is intended to be extensible in order to accommodate future developments in formatting and other document processing technologies." (ISO/IEC JTC1/SC18/WG 8 N606 "1.1 Scope")

DESCRIPTION: "The DSSSL semantics are designed to be interpretable by a wide variety of page layout, formatting, and other document processing systems, including printing, display, and data base loading and extraction. The specification language portion of DSSSL has two purposes:

a. To connect DSSSL constructs to SGML constructs.

b. To express relationships among DSSSL constructs.

"The specification language is, therefore, designed to accommodate two categories of language component, namely datatypes and operators." (ISO/IEC JTC1/SC18/WG 8 N606 "4.1 Introduction")

USE: "This International Standard is intended for use in a wide variety of SGML application environments, including:

a. Electronic publishing (e.g., production publishing, workgroup publishing, desktop publishing, database publishing, etc.)

b. Electronic galley creation, pagination, and imposition

c. Printing specifications (offset lithography, letterpress, gravure, demand printing)

d. Display and/or on-line information

"This International Standard provides a means to specify document processing characteristics of a formatted document which may be represented in SPDL (Standard Page Description Language) or in some other format.

"Documents that exist solely in final formatted form are not within the field of application of this International Standard." (ISO/IEC JTC1/SC18/WG 8 N606 "1.2 Field of Application")
REFERENCES:

ISO/IEC JTC1/SC18/WG 8 N606 *Information Processing - Text and Office Systems - Document Style Semantics and Specification Language (DSSSL)* July 1988

NAME OF STANDARD: Electronic Data Interchange (EDI) series of Electronic Business Data Interchange (EBDI) Standards

NUMBER OF STANDARD: ANSI X12.3:1986 Data Element Dictionary
ANSI X12.6:1986 Application Control Structure
ANSI X12.20:1986 Functional Acknowledgment
ANSI X12.22:1986 Data Segment Directory

STATUS: American National Standards (1986)

SCOPE: "The ANSI X12 Data Interchange Standards consist of transaction set standards, a data dictionary, a segment directory, and transmission control standards." (ANSI *An Introduction to Electronic Data Interchange* July 1987, p. 2.)

ANSI X12.3:1986 - "This standard provides the specifications of the data elements that comprise the transaction sets described in the X12 series." (ANSI X12.3:1986 "1. Purpose and Scope")

ANSI X12.6:1986 - "This American National Standard is used in the definition of the structure and content of business transaction for computer-to-computer interchange. This standard describes the control segments used to envelop loops of data segments, to envelop transaction sets, and to envelop groups of related transaction sets. This standard does not define any specific transaction or group of transactions to be standardized. The actual data segments of this standard are diagrammed in American National Standard for Electronic Business Data Interchange - Data Segment Directory, ANSI X12.22-1986; the description of those control segments is contained in this standard." (ANSI X12.3:1986 "1. Purpose and Scope")

ANSI X12.20:1986 - "The purpose of this standard is to define the control structures for a set of acknowledgments to indicate the results of the syntactical analysis of the electronically encoded documents. The encoded documents are the transaction sets, which are grouped in functional groups, used in defining transactions for business data interchange. This standard does not cover the semantic meaning of the information encoded in the transaction sets." (ANSI X12.3:1986 "1. Purpose and Scope")

ANSI X12.22:1986 - "This standard provides the definitions and formats of the data segments used in the construction of the X12 series." (ANSI X12.22:1986 "1. Purpose and Scope")

DESCRIPTION: "Transaction set standards define the procedural format and data content requirements for specified business transactions, such as purchase orders.

"The data dictionary defines the precise content for data elements used in building transaction sets.

"The segment directory provides the definitions and formats of the data segments used in building transaction sets.

"The transmission control standards define the formats for the information required to interchange data. These controls are already in use by some industry groups." (ANSI *An Introduction to Electronic Data Interchange* July 1987, p. 2.)

USE: EDI is used to standardize the format and content of data to be interchanged between two computers. Subsets of the total EDI Standards package will be selected based on the needs of the potential interchange partners.

REFERENCES:

ANSI *An Introduction to Electronic Data Interchange* July 1987.

ANSI X12.3:1986 *American National Standard for Electronic Business Data Interchange - Data Element Dictionary.*

ANSI X12.6:1986 *American National Standard for Electronic Business Data Interchange - Application Control Structure.*

ANSI X12.20:1986 *American National Standard for Electronic Business Data Interchange - Functional Acknowledgment.*

ANSI X12.22:1986 *American National Standard for Electronic Business Data Interchange - Data Segment Directory.*

NAME OF STANDARD: CCITT Group 4 Facsimile

NUMBER OF STANDARD: CCITT Recommendations T.5 and T.6

STATUS: International Standard (1984)

SCOPE: The Group 4 Facsimile Standard has two parts. Recommendation T.5 "defines the general aspects of Group 4 facsimile apparatus. The Group 4 facsimile coding scheme and facsimile control functions are defined in Recommendation T.6." (CCITT *Red Book* "Recommendation T.5 2 Scope")

DESCRIPTION: "The Group 4 apparatus provides the means for direct document transmission from any subscriber to any other subscriber.

"All apparatus participating in the international Group 4 facsimile service has to be compatible with each other at the basic level defined in this Recommendation. Additional operational functions may be invoked.

"The range of data rates is described in Section 6. Detailed arrangements on a national level are left to the Administrations concerned, as it is recognized that national implementation of the Group 4 facsimile service on various types of networks may involve national operation at different data throughput rates.

"The page is the basis for facsimile message formatting and transmission. Both A4 and North American paper formats are taken into account.

"Facsimile coding schemes are applied in order to reduce the redundant information in facsimile signals prior to transmission.

"The apparatus must have the ability to reproduce facsimile messages. The content, layout and format of facsimile messages must be identical at the transmitting and receiving apparatus.

"The reproducible area is defined within which facsimile messages are assured to be reproduced.

"The Group 4 facsimile apparatus should provide means for automatic reception. In addition Class II/III apparatus should provide means for automatic reception of Teletex and mixed mode documents.

"All Classes of Group 4 facsimile apparatus shall incorporate the functions defined as basic for the Group 4 facsimile service in Section 3.2 below. In addition, optional functions can be incorporated. In this Recommendation, the optional functions are divided into CCITT standardized options and nationally and/or privately specified options." (CCITT *Red Book* "Recommendation T.5 3.1 Basic Characteristics")

"Facsimile coding schemes consist of the basic facsimile coding scheme and optional facsimile coding schemes.

"Facsimile coding schemes are specified assuming that transmission errors are corrected by control procedures at a lower level.

"The basic facsimile coding scheme is the two-dimensional coding scheme which is in principle the same as the two-dimensional coding scheme of Group 3 facsimile specified in Recommendation T.4.

"Optional facsimile coding schemes are specified not only for black and white images but also for grey scale images and colour images.

"Facsimile coding control functions are used in facsimile user information in order to change facsimile parameters or to invoke the end of facsimile block." (CCITT *Red Book*, "Recommendation T.6 1.2.1 Facsimile coding schemes and coding control functions")

USE: "Group 4 facsimile is used mainly on public data networks (PDN) including circuit-

switched, packet-switched, and the integrated services digital network (ISDN). The apparatus may also be used on the public switched telephone network (PSTN) where an appropriate modulation process will be utilized.

"The procedures used with Group 4 facsimile apparatus enable it to transmit and reproduce image coded information essentially without transmission errors.

"Group 4 facsimile apparatus has the means for reducing the redundant information in facsimile signals prior to transmission.

"The basic image type of the Group 4 facsimile apparatus is black and white. Other image types, e.g. grey scale image or colour image, are for further study.

"There are three classes of Group 4 facsimile terminals:
- Class I - Minimum requirement is a terminal able to send and receive documents containing facsimile encoded information.
- Class II - Minimum requirement is a terminal able to transmit documents which are facsimile encoded. In addition, the terminal must be capable of receiving documents which are facsimile coded, Teletex coded, and also mixed-mode documents.
- Class III - Minimum requirement is a terminal which is capable of generating, transmitting and receiving facsimile coded documents, Teletex coded documents, and mixed-mode documents." (CCITT *Red Book* "Recommendation T.5 1 General")

"Group 4 facsimile apparatus shall be capable of handling:
a. the basic end-to-end control procedures as defined in Recommendation T.62;
b. document interchange protocol as defined in Recommendation T.73;
c. the basic facsimile coding scheme as defined in Recommendation T.6;
d. the control functions associated with the basic facsimile coding scheme as defined in Recommendation T.6.

"All classes of Group 4 apparatus shall have the following provisions for facsimile messages:
a. provision for scanning the documents to be transmitted;
b. provision for receiving and presenting hard or soft copies of the documents.

"In addition Group 4 Class II apparatus shall have provision for receiving and displaying basic Teletex and mixed mode documents.

"In addition to the requirements for Group 4 Class II apparatus, Class III apparatus shall have provisions for generating and transmitting basic Teletex and mixed mode documents.

"Basic page formatting functions are as follows:
a. vertical page orientation;
b. paper size of ISO A4;
c. reproducible area/printable area is defined taking into account ISO A4 and North American paper formats and ISO standard 3535." (CCITT *Red Book* "Recommendation T.5 3.2 Basic Functions")

REFERENCES:

CCITT *Red Book Vol VII fascicle VII.3 Terminal Equipment and Protocols for Telematic Services.* "Recommendation T.5 General Aspects of Group 4 Facsimile Apparatus." Geneva 1985.

CCITT *Red Book Vol VII fascicle VII.3 Terminal Equipment and Protocols for Telematic Services.* "Recommendation T.6 Facsimile Coding Schemes and Coding Control Functions for Group 4 Facsimile Apparatus." Geneva 1985.

NAME OF STANDARD: Geometric Graphics Content Architectures (GGCA)

NUMBER OF STANDARD: ISO 8613-8:1988

STATUS: International Standard (1988)

SCOPE: "The purpose of this International Standard is to facilitate the interchange of documents.

"In the context of ISO 8613, documents are considered to be items such as memoranda, letters, invoices, forms and reports, which may include pictures and tabular material. The content elements used within the documents may include graphic characters, geometric graphics elements and raster graphics elements, all potentially within one document.

"ISO 8613 applies to the interchange of documents by means of data communication or the exchange of storage media." (ISO 8613-8 "1 Scope")

DESCRIPTION: "This part of ISO 8613:

— defines a geometric graphics content architecture that can be used in conjunction with the document architecture defined in ISO 8613-2;

— defines an interface which allows the use of content structured [sic] according to ISO 8632 within documents structured according to ISO 8613-2;

— defines those aspects of positioning and imaging applicable to the presentation of this geometric graphics content architecture in a basic layout object;

— defines the presentation attributes applicable to this geometric graphics content architecture;

— describes a content layout process, which together with the document layout process described in ISO 8613-2, describes the layout of geometric graphics content in basic layout objects and determines the dimensions of these basic layout objects."
(ISO 8613-8 "1.3")

USE: "ISO 8613-8 applies to documents that are structured according to the architecture defined in ISO 8613-2 that include geometric graphics content, consisting of a descriptive representation of picture description information as an ordered set of elements such as lines, arcs, polygons, attributes for these drawing elements, elements that structure the content portion, etc. using the Computer Graphics Metafile (CGM) and its binary encoding defined in ISO 8632-1 and ISO 8632-3, respectively." (ISO 8613-1 "6.7 Part 8 Geometric graphics content architectures")

REFERENCES:

ISO 8613-1:1988 *Information Processing - Text and Office Systems - Office Document Architecture (ODA) and Interchange Format - Part 1 - Introduction and General Principles.*

ISO 8613-8:1988 *Information Processing - Text and Office Systems - Office Document Architecture (ODA) and Interchange Format - Part 8 - Geometric Graphics Content Architectures (GGCA).*

NAME OF STANDARD: Computer Graphics - Graphical Kernel System (GKS) Functional Description

NUMBER OF STANDARD: ISO 7942:1985 and ANSI X3.124-1985

STATUS: International Standard (1985) and American National Standard (1985)

SCOPE: "This American National Standard specifies a set of functions for computer graphics programming, the Graphical Kernel System (GKS). GKS is a basic graphics system for applications that produce computer generated two dimensional pictures on line graphics or raster graphics output devices. It supports operator input and interaction by supplying basic functions for graphical input and picture segmentation. It allows storage and dynamic modification of pictures. A fundamental concept in GKS is the workstation, consisting potentially of a number of input devices and a single output device. Several workstations can be used simultaneously. The application program is allowed to adapt its behavior at a workstation to make best use of workstation capabilities. This standard includes functions for storage on and retrieval from an external graphics file. Last, but not least, the functions are organized in upward compatible levels with increasing capabilities.

"For certain parameters of the functions, GKS defines value ranges as being reserved for registration or future standardization. The meanings of these values will be defined using the procedures established in an International Standard under development (Procedures for registration of graphical items)." (ANSI X3.124:1985 "1 Scope and Field of Application")

DESCRIPTION: "The Graphical Kernel System (GKS) provides a functional interface between an application program and a configuration of graphical input and output devices. The functional interface contains all basic functions for interactive and non-interactive graphics on a wide variety of graphics equipment.

"The interface is at such a level of abstraction that hardware peculiarities are shielded from the application program. As a result a simplified interface presenting uniform output primitives, and uniform input classes is obtained.

"A central concept both for structuring GKS and for realizing device independence is introduced, called the workstation.

"The facilities for picture manipulation and change are introduced via the segment facilities, the dynamic attributes and the transformations.

"The concept of multiple workstations allows simultaneous output to and input from various display systems. Facilities for internal and external storage are provided by special workstations together with the possibility of transferring graphical entities directly from the special workstation for internal storage to other workstations.

"Not every GKS implementation needs to support the full set of functions. Twelve levels are defined to meet the different requirements of graphics systems. Each GKS implementation provides at least the functions of one level. The levels are upward compatible." (ANSI X3.124:1985 GKS "4.2 Introduction")

USE: "The Graphical Kernel System (GKS) is a set of basic functions for computer graphics programming usable by many graphics producing applications." Use of "this standard

1. allows graphics application programs to be easily transported between installations,

2. aids graphics applications programmers in understanding and using graphics methods, and

3. guides device manufacturers on useful graphics capabilities."

(ANSI X3.124-195 GKS "Abstract")

REFERENCES:

ANSI X3.124-1985 *American National Standard for Information Systems - Computer Graphics - Graphical Kernel System (GKS) Functional Description*

Bono, Peter R., Jose L. Encarnacao, F. Robert A. Hopgood, and Paul J.W. ten Hagen. "GKS - The First Graphics Standard." *IEEE Computer Graphics and Applications.* (July 1982) 2:5, 9-23.

FIPS PUB 120 Graphical Kernel System adopts ANSI X3.124-1985.

NAME OF STANDARD: Initial Graphics Exchange Specification (IGES)

NUMBER OF STANDARD: ASME/ANSI Y14.26M-1987 Digital Representation for Communication of Product Definition Data (Based on Version 3.0 of the Initial Graphics Exchange Specification published as NBSIR 86-3359.)

STATUS: American National Standard (1987)

SCOPE: "This document establishes information structures to be used for the digital representation and communication of product definition data. Use of the specification established herein permits the compatible exchange of product definition data used by various (CAD/CAM) Computer Aided Design and Computer Aided Manufacturing) systems." (ASME/ANSI Y14.26M-1987 "1.1 Purpose")

DESCRIPTION: "This specification defines a file structure format, a language format, and the representation of geometric, topological, and non-geometric product definition data in these formats. Product definition data represented in these formats will be exchanged through a variety of physical media. The specific features and protocols for the communications media are the subject of other standards. The methodology for representing product definition data in this specification is extensible and independent of the modeling methods used.

Chapter 1 is general in nature and defines the overall purpose and objectives of this specification. "Chapter 2 defines the communications file structure and format. It explains the function of each of the sections of a file. The geometry data representation in Chapter 3 deals with two- and three-dimensional edge-vertex models and with simple surface representations. Chapter 4 specifies non-geometric representations, including common drafting practices, data organization methods, and data definition methods.

"In Chapters 3 and 4, the product is described in terms of geometric and non-geometric information, with non-geometric information being divided into annotation, definition, and organization. The geometry category consists of elements such as points, curves, and surfaces that model the product. The annotation category consists of those elements which are used to clarify or enhance the geometry, including dimensions, drafting notation, and text. The definition category provides the ability to define specific properties or characteristics of individual or collections of data entities. The organization category identifies groupings of elements from geometric, annotation, or property data which are to be evaluated and manipulated as single items." (ASME/ANSI Y14.26M-1987 "1.2 Field of Application")

USE: IGES is used "to describe and communicate the essential engineering characteristics of physical objects as manufactured products. Such products are described in terms of their physical shape, dimensions, and information which further describes or explains the product. The processes which generate or utilize the product definition data typically include design, engineering analysis, production planning, fabrication, material handling, assembly, inspection, marketing, and field service." (ASME/ANSI Y14.26M-1987 "1.4 Concepts of Product Definition")

REFERENCE

ASME/ANSI Y14.26M-1987 *Digital Representation for Communication of Product Definition Data.*

H. Grabowski and R. Glatz, "IGES Model Comparison System: A Tool for Testing and Validating IGES Processors," *IEEE Computer Graphics and Applications,* (November 1987) 47-57.

IGES *Technical Illustrations Application Guide,* April 1987.

IGES *Recommended Practices Guide,* November 1987.

IGES *Electrical Application Guide,* March 1987.

MIL-D-28000 *Digital Representation for Communication of Product Data: IGES Application Subsets,* 22 December 1987.

MIL-STD-1840A *Automated Interchange of Technical Information,* 22 December 1987.

NBSIR 86-3359 *Initial Graphics Exchange Specification, Version 3.0.*

NBSIR 88-3813 *Initial Graphics Exchange Specification, Version 4.0.*

NAME OF STANDARD: Office Document Architecture (ODA) and Interchange Format (ODIF)

NUMBER OF STANDARD: ISO 8613:1988

STATUS: International Standard (1988)

SCOPE: "The purpose of this international standard is to facilitate the interchange of documents.

"In the context of ISO 8613, documents are considered to be items such as memoranda, letters, invoices, forms and reports, which may include pictures and tabular material. The content elements used in the documents may include graphic characters, geometric graphics elements, and raster graphics elements, all potentially within one document.

"NOTE : ISO 8613 is designed to allow for extensions, including typographical features, colour, spreadsheets and additional types of content such as sound." (ISO 8613-1:1988 (E) "1.1)

DESCRIPTION: ODA was developed to allow the interchange of documents from one word processor to another. Page layout is handled according to some precise semantics which strive to be content independent. The page or sets of pages are specified denoting margins, columns, character path, line progression, etc., which detail the placement of rectangular "blocks," with content, specifically characters, image, and graphics to be poured in to occupy various areas on the page. (Adler)

The parts of the standard are as follows:

1. General Introduction
2. Document Structures
4. Document Profile
5. Office Document Interchange Format (ODIF) (see ODIF, ODL, and SDIF)
6. Character Graphics Content Architectures
7. Raster Graphics Content Architectures (see Raster and TRIF)
8. Geometric Graphics Content Architectures (see GGCA)

USE: ODA/ODIF is specifically designed for the interchange and replication of office documents in exact format. The design strives to be content-independent in order to allow for future content architectures such as audio information or possible mathematical and scientific equations.

REFERENCES:

Adler, Sharon C. "SGML and ODA: Two Standards for the Interchange of Documents," *<TAG> The SGML Newsletter,* Volume 1, Issue 4, 1-3.

Horak, Wolfgang. "Office Document Architecture and Office Document Interchange Formats: Current Status of International Standardization" *Computer* (October 1985), 50-60.

ISO 8613:1988 (E) *Information Processing - Text and Office Systems - Office Document Architecture (ODA) and Interchange Format.*

NAME OF STANDARD: Office Document Interchange Format (ODIF)

NUMBER OF STANDARD: ISO 8613-5:1988

STATUS: International Standard (1988)

SCOPE: "The purpose of this International Standard is to facilitate the interchange of documents.

"In the context of ISO 8613, documents are considered to be items such as memoranda, letters, invoices, forms and reports, which may include pictures and tabular material. The content elements used within the documents may include graphic characters, geometric graphics elements and raster graphics elements, all potentially within one document.

"ISO 8613 applies to the interchange of documents by means of data communication or the exchange of storage media." (ISO 8613-5 "1 Scope")

DESCRIPTION: "This part of ISO 8613:

— defines the format of the data stream used to interchange documents structured in accordance with ISO 8613-2;

— defines the representation of the constituents which may appear in an interchanged document."

(ISO 8613-5 "1.3")

"ODIF is an abstract data syntax in which the constituents and attributes of the document are represented by a hierarchy of data structures and data items, specified using the abstract syntax notation ASN.1 defined in ISO 8824.

"The coded representation of each data structure or data item is obtained by applying a set of encoding rules." (ISO 8613-5 "4.1 ODIF")

"The ODIF data stream is described in terms of a set of data structures, called 'interchange data element', which represent the constituents (document profile, object descriptions, object class descriptions, presentation styles, layout styles and content portion descriptions) of a document. The formats of the interchanged data element according to ODIF are defined using the Abstract Syntax Notation One (ASN.1) specified in ISO 8824." (ISO 8613-1 "6.4 Part 5 Office document interchange format (ODIF))"

USE: A document structured in accordance with ISO 8613 may be represented for interchange by the Office Document Interchange Format (ODIF). Since ODIF is a data structure specified using ASN.1, it is intended for use in an OSI environment. (ISO 8613-5 "4 Document representations")

REFERENCES:

ISO 8613-1:1988 *Information Processing - Text and Office Systems - Office Document Architecture (ODA) and Interchange Format*

ISO 8613-5:1988 *Information Processing - Text and Office Systems - Office Document Interchange Format (ODIF)*

NAME OF STANDARD: Office Document Language (ODL)

NUMBER OF STANDARD: ISO 8613-5:1988

STATUS: International Standard (1988)

SCOPE: "The purpose of this International Standard is to facilitate the interchange of documents.

"In the context of ISO 8613, documents are considered to be items such as memoranda, letters, invoices, forms and reports, which may include pictures and tabular material. The content elements used within the documents may include graphic characters, geometric graphics elements and raster graphics elements, B all potentially within one document.

"ISO 8613 applies to the interchange of documents by means of data communication or the exchange of storage media." (ISO 8613-5 "1 Scope")

DESCRIPTION: "This part of ISO 8613:

— defines the format of the data stream used to interchange documents structured in accordance with ISO 8613-2;

— defines the representation of the constituents which may appear in an interchanged document."

(ISO 8613-5 "1.3")

"ODL uses the Standard Generalized Markup Language (SGML) specified in ISO 8879. It consists of a standard set of SGML names and markup conventions for representing the constituents and attributes of a document." (ISO 8613-1 "6.4 Part 5 Office document interchange format (ODIF)")

USE: A document structured in accordance with ISO 8613 may be represented for interchange by the Office Document Language (ODL) in conjunction with the SGML Document Interchange Format (SDIF). "ODL is particularly appropriate for systems that share information through marked-up text files, especially where human users can access the markup directly." (ISO 8613-5 "4 Document representations")

REFERENCES:

ISO 8613-1:1988 *Information Processing - Text and Office Systems - Office Document Architecture (ODA) and Interchange Format*

ISO 8613-5:1988 *Information Processing - Text and Office Systems - Office Document Interchange Format (ODIF)*

NAME OF STANDARD: Computer Graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS)

NUMBER OF STANDARD: ISO DIS 9592:1988 and ANSI X3.144:1988

STATUS: Draft International Standard (1988) and American National Standard (1988)

SCOPE: "This American National Standard specifies a set of functions for computer graphics programming, the Programmer's Hierarchical Interactive Graphics System (PHIGS). PHIGS is a graphics system for applications that produce computer generated pictures on line graphics or raster graphics output devices. It supports operator input and interactions by supplying basic functions for graphical input and hierarchical picture definition. It allows for storage, and dynamic modification of pictures.

"A fundamental concept in PHIGS is the *workstation,* consisting of a number of input devices and a single output device. Several workstations can be used simultaneously. The application program is allowed to adapt its behavior at a workstation to make best use of workstation capabilities. A second fundamental concept is the *centralized structure store,* where graphical information is stored and edited.

"This American National Standard includes functions for storage on and retrieval from an external graphics file." (ANSI X3.144:1988 "1 Scope and Field of Application")

DESCRIPTION: "The Programmer's Hierarchical Interactive Graphics System (PHIGS) provides a functional interface between an application program and a configuration of graphical input and output devices. The functional interface contains basic functions for dynamic interactive hierarchical graphics on a wide variety of graphics equipment.

"The interface is at such a level of abstraction that hardware peculiarities are shielded from the application program.

"PHIGS defines only a language independent nucleus of a graphics system. For integration into a language, PHIGS is embedded in a language dependent layer containing the language conventions, for example, parameter and name assignment." (ANSI X3.144:1988 "4.2 Overview")

USE: "This Standard:

— allows graphics application programs to be easily transported between installations.

— aids graphics applications programmers in understanding and using graphics methods.

— guides device manufacturers on useful graphics capabilities.

— performs many functions currently performed by graphics applications; thus, offloading the graphics application development effort.

"This Standard defines an application level programming interface to a hierarchical interactive and dynamic graphics system. Hence it contains functions for:

— outputting graphical primitives.

— controlling the appearance of graphical primitives with attributes.

— controlling graphical workstations.

— controlling 2D & 3D transformations and coordinate systems.

— generating, modifying, and controlling groups of primitives called structures.

  — modifying the hierarchical relationship of structures.

  — obtaining graphical input.

— archiving and retrieving structures and structure hierarchies.

— inquiring the capabilities and states of the graphics system.

— handling errors."
(ANSI X3.144:1988 "Abstract")

REFERENCES:

ANSI X3.144:1988 *American National Standard for Information Systems - Computer Graphics - Programmer's Hierarchical Interactive Graphics System (PHIGS) Functional Description*

ISO DIS 9592:1988 *Programmer's Hierarchical Interactive Graphics System.*

Shuey, David, David Bailey, and Thomas P. Morrissey. "PHIGS: A Standard, Dynamic, Interactive Graphics Interface." *IEEE Computer Graphics and Applications* (August 1986) 6:8, 50-57.

NAME OF STANDARD: Raster Graphics Content Architecture

NUMBER OF STANDARD: ISO 8613-7:1988

STATUS: International Standard (1988)

SCOPE: "The purpose of this International Standard is to facilitate the interchange of documents.

"In the context of ISO 8613, documents are considered to be items such as memoranda, letters, invoices, forms and reports, which may include pictures and tabular material. The content elements used within the documents may include graphic characters, geometric graphics elements and raster graphics elements, all potentially within one document.

"ISO 8613 applies to the interchange of documents by means of data communications or the exchange of storage media." (ISO 8613-7 "1 Scope")

DESCRIPTION: "This part of ISO 8613 defines:

— the raster graphics content architectures that can be used in conjunction with the document architecture defined in ISO 8613-2;

— the internal structure of content portions that are structured according to a raster graphics content architecture;

— those aspects of positioning and imaging applicable to the presentation of raster graphics contents in a basic layout object;

— a content layout process which, together with the document layout process defined in ISO 8613-2, specifies the method for determining the dimensions of basic layout objects for raster graphics content portions;

— the presentation and content portion attributes applicable to raster graphics content architectures."
(ISO 8613-7 "1.3")

USE: "ISO 8613-7 applies to documents that are structured according to the architecture defined in ISO 8613-2 that include raster graphics content, consisting of a descriptive representation of pictorial information provided by an array of picture elements (pels), encoded according to facsimile or bitmap encoding." (ISO 8613-1 "6.6 Part 7 Raster graphics content architectures")

REFERENCES:

ISO 8613-1:1988 *Information Processing - Text and Office Systems - Office Document Architecture (ODA) and Interchange Format - Part 1 - Introduction and General Principles.*

ISO 8613-7:1988 *Information Processing - Text and Office Systems - Office Document Architecture (ODA) and Interchange Format - Part 7 - Raster Graphics Content Architectures.*

NAME OF STANDARD: Information Processing - SGML Support Facilities - SGML Document Interchange Format (SDIF)

NUMBER OF STANDARD: ISO DIS 9069:1987

STATUS: Draft International Standard (1987)

SCOPE: "This International Standard specifies a data structure known as the SGML Document Interchange Format (SDIF). SDIF enables a document conforming to ISO 8879, which might be stored in several entities, to be packed into a data stream for interchange in a manner that will permit the recipient to reconstitute the separate entities.

"SDIF also allows related documents to be included in the data stream, such as covering letters, transmittal forms, catalog cards, formatting procedures, font resources, or the 'document profile' required by a document architecture." (ISO DIS 9069 "1 Scope")

DESCRIPTION: "The SDIF data stream represents one or more SGML document entities, and zero or more SGML subdocument, SGML text, and data entities, as defined in ISO 8879." (ISO DIS 9069 "5 Description of the Data Stream")

USE: "The SGML Document Interchange Format shall be used solely for the interchange of SGML documents, as defined in ISO 8879, among SGML systems.

"Interchange can be by means of data communications in Open Systems Interconnection or other environments, or by the exchange of storage media." (ISO DIS 9069 "2 Field of Application")

REFERENCES:

ISO 8613-1:1988 *Information Processing - Text and Office Systems - Office Document Architecture (ODA) and Interchange Format*

ISO 8613-5:1988 *Information Processing - Text and Office Systems - Office Document Interchange Format (ODIF)*

ISO DIS 9069:1987 *Information Processing - SGML Support Facilities - SGML Document Interchange Format (SDIF)*

NAME OF STANDARD: Standard Generalized Markup Language (SGML)

NUMBER OF STANDARD: ISO 8879:1986

STATUS: International Standard (1986)

SCOPE: "This International Standard specifies an abstract syntax known as the Standard Generalized Markup Language (SGML). The language expresses the description of a document's structure and other attributes, as well as other information that makes the markup interpretable.

"This International Standard specifies a reference concrete syntax that binds the abstract syntax to specific characters and numeric values, and criteria for defining variant concrete syntaxes.

"This International Standard defines conforming documents in terms of their use of components of the language.

"This International Standard defines conforming systems in terms of their ability to process conforming documents and to recognize markup errors in them.

"Specifies how data not defined by this International Standard (such as images, graphics, or formatted text) can be included in a conforming document." (ISO 8879 "1 Scope")

DESCRIPTION: SGML was designed to interchange documents without regard to how the information is formatted. This allows for the use of the information in many different formats. SGML was designed to be application independent, and as such can be used in conjunction with a database application. The user is allowed to interact with and to modify the logical structures which are a primary part of his application. An SGML document may be processed by any formatter (for a formatting application) which has been suitably enabled with an SGML parser and other entity-management software. The SGML notation may be used to describe both logical and layout structures, if the format of the document is also to be interchanged. A set of standardized formatting semantics are to be provided by DSSSL. (Adler 2-3)

USE: SGML is specifically designed for the world of publishing and the management and control of the information which may take form in many types of documents.

"SGML can be used for publishing in its broadest definition, ranging from single medium conventional publishing to multi-media data base publishing. SGML can also be used in office document processing when the benefits of human readability and interchange with publishing systems are required." (ISO 8879 "0 Introduction")

REFERENCES:

Adler, Sharon C. "SGML and ODA: Two Standards for the Interchange of Documents," *<TAG> The SGML Newsletter,* Volume 1, Issue 4, 1-3.

ISO 8879:1986 *Information Processing - Text and Office Systems - Standard Generalized Markup Language (SGML),* First Edition - 1986-10-15.

ISO 8879:1986(E) *Technical Errata* as of April 30, 1987.

Smith, Joan M. *The Standard Generalized Markup Language(SGML): Guidelines for Authors.* British National Bibliography Research Fund Report 27. Great Britain: The British Library, 1987.

NAME OF STANDARD: Standard Page Description Language (SPDL)

NUMBER OF STANDARD: None

STATUS: Proposed DP (1988)

SCOPE: "The scope of this International Standard is the specification of a device-independent and process-independent description of images of documents in fully composed, non-revisable form. Such documents may utilize the full capabilities of imaging devices which may include high-resolution printing machinery and softcopy output devices.

"This International Standard is intended to be extensible in order to accommodate future developments in imaging technology.

"This International Standard is intended to be used in a variety of configurations meeting a variety of connectivity needs. It is specifically compatible with use over OSI networks.

"In addition to specifying how document images are represented, this International Standard specifies how additional information called *printing instructions* affects the document image. Printing instructions may be supplied with the request to print the document by means of a *print access protocol.*" (ISO 3rd Working Draft "1.1 Scope")

DESCRIPTION: "The Standard Page Description Language is capable of representing all content types for fully composed, non-revisable documents. Any combination of the following types of content can be represented; any content may in [sic] black-and-white, gray-scale, or full colour; and content types may be intermixed in any way in the same document.

— character

— raster graphics

— geometric graphics."
(ISO 3rd Working Draft "1.1 Scope")

USE: "This International Standard is intended for use in a wide variety of application environments, including:

— electronic publishing (including production publishing, workgroup publishing, desktop publishing, database publishing, electronic prepress, etc.)

— office systems

— information networks

— demand printing

"This International Standard provides a straightforward and efficient method of representing documents which are generated by ODA systems to presentation devices. It also provides a capability for similarly representing documents generated by SGML systems whose formatting is described by DSSSL.

"This International Standard allows for document presentation to be disjoint in both time and place from the document creation and formatting processes. It is specifically intended that SPDL document descriptions will be:

— sent directly to presentation systems which are accessed via a local connection

— sent to proximate or remote presentation systems via OSI or non-OSI networks, and

— stored or interchanged for the purpose of presentation at other times or at other locations."
(ISO 3rd Working Draft "1.2 Field of Application")

REFERENCES:

ISO/IEC JTC1/SC 18/WG 8 N561 *Information Processing - Text and Office Systems - Standard Page Description Language (SPDL)*, 3rd Working Draft - 1988-02-19.

NAME OF STANDARD: Tiled Raster Interchange Format (TRIF)

NUMBER OF STANDARD: Proposed Extension to 8613-7:1988

STATUS: Proposed to ANSI X3V1 (1988)

SCOPE: "The purpose of this International Standard is to facilitate the interchange of documents.

"In the context of ISO 8613, documents are considered to be items such as memoranda, letters, invoices, forms and reports, which may include pictures and tabular material. The content elements used within the documents may include graphic characters, geometric graphics elements and raster graphics elements, all potentially within one document.

"ISO 8613 applies to the interchange of documents by means of data communications or the exchange of storage media." (ISO 8613-7 "1 Scope")

DESCRIPTION: "This part of ISO 8613 defines:

a. the tiled raster graphics content architectures that can be used in conjunction with the document architecture defined in ISO 8613-2;

b. the internal structure of content portions that are structured according to a tiled raster graphics contents in a basic layout object;

c. those aspects of positioning and imaging applicable to the presentation of tiled raster graphics contents in a basic layout object;

d. a content layout process which together with the document layout process defined in ISO 8613-2, specifies the method for determining the dimensions of basic layout objects for tiled raster graphics content portions;

e. the presentation and content portion attributes applicable to tiled raster graphics content architectures."

(TTG/88-14 TRIF 2.0 Tiled Raster Graphics Content Architecture"1.3")

USE: "The tiling scheme developed provides a format that supports operation on a subset of an image without requiring other portions of the image to be accessed. For large format documents this provides a way to interchange images between systems of various capabilities."

Further, the "tile format was developed for interchange that could also reasonably be used for storage and retrieval without necessarily requiring translation."

The following restrictions for use were made to ease user implementation:

— "This interchange format deals only with bi-tonal (black and white) data. Pixels are assumed to be square.

— "A tile is a rectangular region in a page in which all regions have the same dimensions (are regular) and no part of any region overlaps any other region. They are positioned in a fixed grid, determined by partitioning the page into tile-sized areas.

— "For the purposes of this interchange format, the application profile restricts all tiles to being square. Square tiles have the desirable attribute of being easily rotated. Tiles are allowed to be absent...

— "A single tile size is desirable to limit the burden on implementors of the interchange standard. The tile size is specifically 512 by 512 pels...

— "Only one page (one single raster image) is allowed per document.

— "Any given tile is to be encoded as T.6 compressed data, as bitmap data, or is specified as all foreground or all background..."

(TTG/88-20 Preliminary User Requirements for Tiled Raster Graphics TRIF 2.0)

REFERENCES:

TTG/88-14 *TRIF 2.0 Tiled Raster Graphics Content Architecture,* proposed to ANSI X3V1 by the Tiling Task Group, February 1988.

TTG/88-20 *Preliminary User Requirements for Tiled Raster Graphics TRIF 2.0,* 11 March 1988.

NBS-114A (REV. 2-8C)

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5. AUTHOR(S)

Judi Moline

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10. SUPPLEMENTARY NOTES

☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

11. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here)*

Document interchange standards have emerged in response to two distinct needs. First, there is the need to interchange documents among workstations and tools in the office environment. Second, there is the need to exchange versions of a document between an author and a publisher. This document describes standards which attempt to satisfy those needs. Each relevant standard is presented in summary form and includes the following information: standard name, standard number, status, scope, description, use, and references.

12. KEY WORDS *(Six to twelve entries; alphabetical order; capitalize only proper names; and separate key words by semicolons)*

CGI/CGM, DFR, DIF, document interchange, EDI, FAX, GGCA, GKS, IGES, ODA/ODIF/ODL/ Raster/TRIF, PHIGS, SGML/SDIF/DSSSL, SPDL, standards

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