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ISO/IEC 12087-1:1995

AS ISO/IEC 12087.1:2015

Australian STANDARD

Information technology—Computer graphics and image processing—Image Processing and Interchange (IPI)—Functional specification

Part 1: Common architecture for imaging

STANDARDS Australia

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Australian Standard®

Information technology—Computer graphics and image processing—Image Processing and Interchange (IPI)—Functional specification

Part 1: Common architecture for imaging

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PREFACE

This Standard was prepared by the Standards Australia Committee IT-031, Computer Modelling and Simulation.

The objective of this Standard is to provide an architectural model for the representation and manipulation of images in a digital form. Based on this model, it defines an application program interface and an image interchange format. It is applicable to all areas that involve the processing, manipulation, or transfer of image data.

This Standard is identical with, and has been reproduced from ISO/IEC 12087-1:1995, *Information technology—Computer graphics and image processing—Image Processing and Interchange (IPI)—Functional specification*, Part 1: *Common architecture for imaging*.

As this Standard is reproduced from an International Standard, the following applies:

(a) In the source text 'this part of ISO/IEC 12087' should read 'this Australian Standard'.

(b) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

Reference to International Standard		*Australian Standard*	
ISO/IEC		AS ISO/IEC	
9973	Information technology—Computer graphics, image processing and environmental data representation—Procedures for registration of items	9973	Information technology—Computer graphics, image processing and environmental data representation—Procedures for registration of items

Only normative references that have been adopted as Australian or Australian/New Zealand Standards have been listed.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the annexes to which they apply. A 'normative' annex is an integral part of a Standard, whereas an 'informative' annex is only for information and guidance.

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INTRODUCTION

The processing of images is a requirement of many application areas of information processing. Early work in these areas led to the development of many application program interfaces and a large number of image representations for interchange. The purpose of ISO/IEC 12087 is to provide an application program interface and an image interchange representation in order to increase the portability of application software.

ISO/IEC 12087 provides an architectural model for the representation and manipulation of images in a digital form. Based on this model, it defines an application program interface and an image interchange format. It is applicable to all application areas that involve the processing, manipulation, or transfer of image data.

ISO/IEC 12087 includes notes and exemplary material. Such material is non-normative: it is included solely to aid understanding and does not form part of ISO/IEC 12087.

ISO/IEC 12087 initially comprises three parts:

1 *Common architecture for imaging*, which describes the common architectural material on which the entire Standard is based;

2 *Programmer's imaging kernel system application program interface*, which defines processing operations to be carried out on image data;

3 *Image Interchange Facility (IIF)*, which defines how images may be interchanged between application programs.

Information may be interchanged between the application program, Programmer's Imaging Kernel System (IPI-PIKS), and Image Interchange Facility (IPI-IIF) (see figure). Data paths between all three components are standardized in ISO/IEC 12087, as indicated by the solid lines; however, it is also permitted that implementations may use private, implementation-dependent data paths, shown by dashed lines; such data paths are outside the scope of ISO/IEC 12087.

There are a great many types of application that involve the use of images. The Computer Graphics Reference Model [ISO 11072] identifies six main function classes (see figure 0.1):

image analysis — transformation of digital images to image and non-image data; this encompasses basic functions such as histogram generation, mean value determination, image classification, *etc.*, but does not include image understanding using artificial intelligence techniques.

image interpretation — the process of inferring symbolic scene descriptions from image data.

image presentation — transformation of image data to a form suitable for an observer; *e.g.,* via video monitors, printers, film recorders, *etc.*

image processing — transformation of digital images to digital images; *e.g.,* grey value contrast enhancement, edge detection, *etc.*

image sensing — transformation of real-world information to digital images; *e.g.,* via cameras, optical scanners, *etc.*

image synthesis — transformation of non-image data to image data; this encompasses functions such as the rendering of lines, creation of test images, simulation of sensor functions, letters of graphical text and symbols, *etc.*

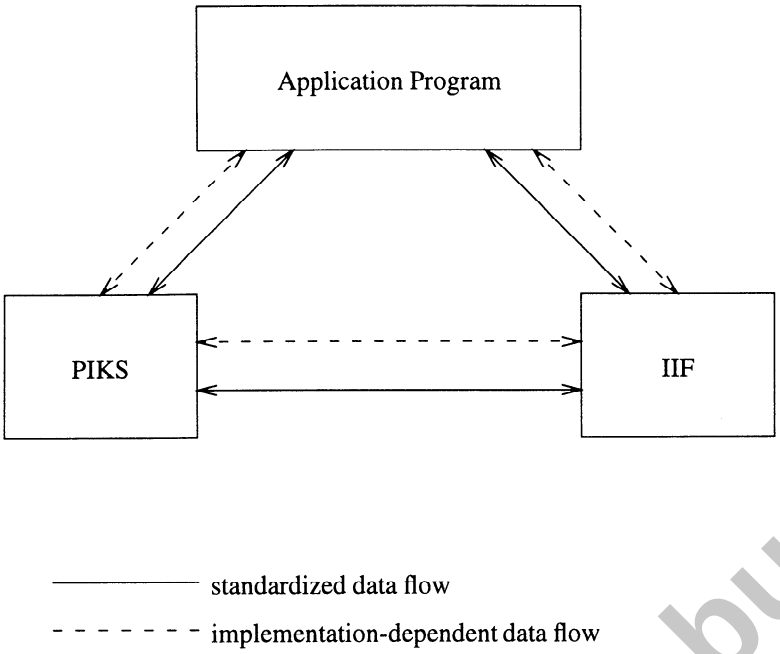

Figure 0.1 — Data flow between the application program, PIKS, and IPI-IIF

As figure indicates, all these function classes involve the manipulation of a digital image; some function classes also require information that is related to the data contained in the digital image but is itself non-image in nature. This *image-related* information is essential to many of the common operations performed on digital images and is therefore also described by ISO/IEC 12087.

ISO/IEC 12087 is also concerned with *image interchange*, the interchange of digital images among imaging applications; this serves for the communication of image data and related non-image data among imaging applications.

The term 'digital image' used in [ISO 12087-2] is synonymous with the term 'image' as used in ISO/IEC 12087. It is important to realize the distinction between 'image' (or 'digital image') as used in ISO/IEC 12087 and the term 'image' as it may be used colloquially: in ISO/IEC 12087, 'image' (or 'digital image') refers to a particular representation of image data within a computer system. An image may not be viewed directly. To view an image, an explicit presentation step is involved, as figure indicates. Image data that are in a form suitable for viewing by an observer are termed 'presentable' image data in ISO/IEC 12087.

NOTE 1 Some application areas, which might loosely be termed "image understanding," utilize data derived from an image by means of some analysis; such applications are therefore omitted from this ISO/IEC 12087. However, ISO/IEC 12087 may be used by such applications.

This part of ISO/IEC 12087 fulfills the following purposes:

a) It provides an overview of ISO/IEC 12087;

b) It defines a Common Architecture for Imaging, an abstract architectural model for the representation

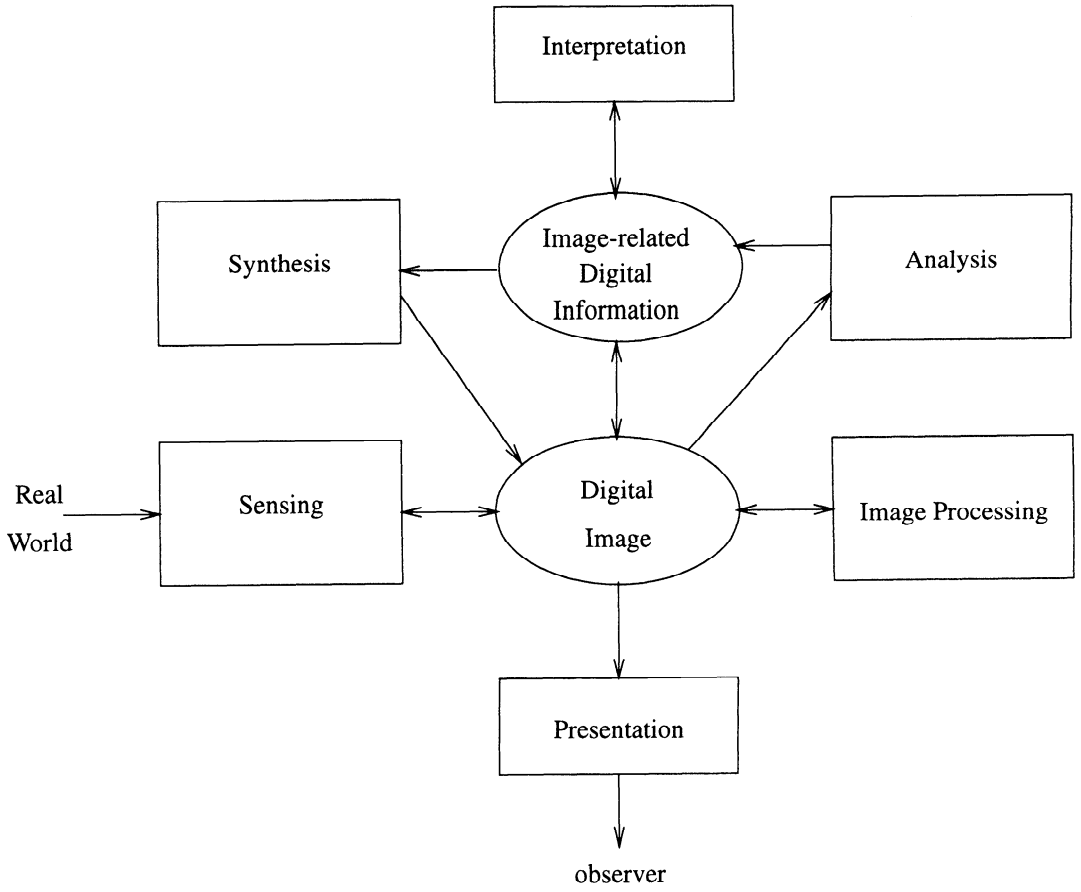

Figure 0.2 — Classes of operations on images

and processing of image data. The purpose of this model is to define a common set of data types and a common image representation for use with all other parts of ISO/IEC 12087 and to provide a standardized framework upon which future imaging standards may be built, allowing simplified conversion of existing applications to the new standard.

c) It defines rules to which conforming implementations shall adhere and the mechanism by which conformance is achieved.

AUSTRALIAN STANDARD

Information technology—Computer graphics and image processing—Image Processing and Interchange (IPI)—Functional specification

Part 1: Common architecture for imaging

1 Scope

ISO/IEC 12087 is concerned with the manipulation, processing, and interchange of all types of digital images. The main purpose of this part is to define a generic, unifying imaging architecture to which other parts of ISO/IEC 12087 conform. This part of ISO/IEC 12087 also defines those "specializations" or "delineations" of the generic imaging architecture that are required to support IPI-PIKS and IPI-IIF.

The relationship of the different parts of ISO/IEC 12087 is shown in figure 1. This part of ISO/IEC 12087 describes material that applies throughout ISO/IEC 12087, including topics such as data types available for use in image data and image-related data, and a model for the processing of digital images by operators. These topics are presented in a general form, since it is intended that subsequent imaging standards will conform to the same architectural model.

Derived from this general description are more constrained descriptions of the same topics. The principal reason for this process of delineation is to restrict the range of data representations for IPI-PIKS and IPI-IIF, while simultaneously ensuring that IPI-IIF is capable of interchanging both IPI-PIKS data objects and objects that cannot be represented or manipulated within IPI-PIKS.

ISO/IEC 12087 permits multiple Application Program Interface (API)s to be developed, each of which must be