# Bit-Mapped
## *(Raster) Graphics*

**A bit-mapped image is a digital painting** made of pixels.*

Pixels are the electronic equivalent of paint. Like a canvas painting, **bitmaps have an invisible weave** (or matrix). **Digital pigment is mapped\** (or painted) **to this canvas, pixel by pixel.**

**The bits** of information **in each pixel determine its color and shade.**

**The number of pixels per inch determines the resolution** (image detail). The more pixels per inch, he greater the resolution.

**The pixelized nature of a bitmap** is most visble when there are few pixels per inch (low resolution), since the pixels are relatively large. "Aliasing" along edges **is sometimes called "the jaggies"** because edges comprised of large pixels have a jagged appearance.

*Painting, scanning, retouching and image processing typically employ bitmapped images.*

Pixels

Bits per pixel

-
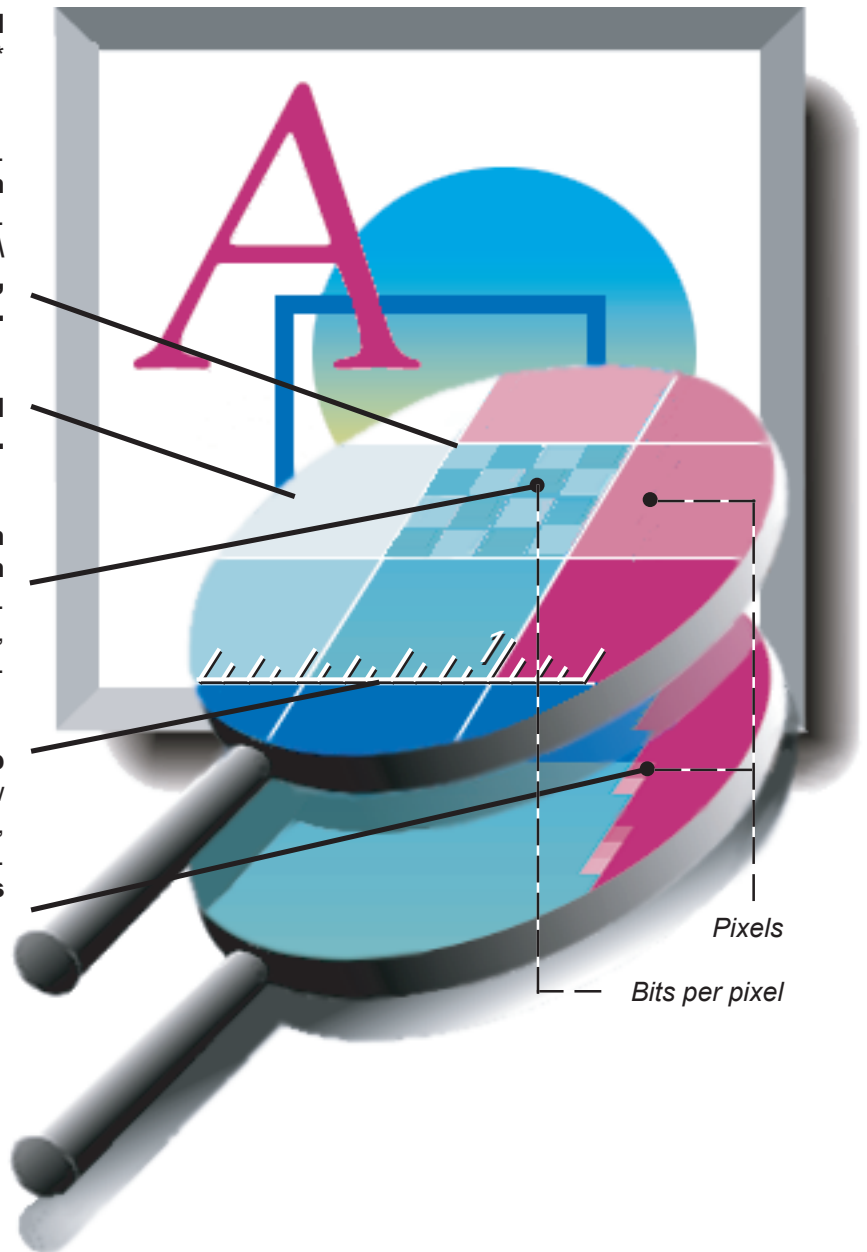
RICK BARRY

# Object-Oriented
## (Vector) Graphics

**An object-oriented image is a collage of objects** on a transparent surface*

Unlike bitmaps comprised of pixels painted to a digital canvas, **vector objects ar separate, self-contained elements with distinct properties.**

**A digital object is defined by its path, fill and stroke** (shape, color and outline). It may overlap or sit beneath other objects, and may be individually moved or modified at anytime.

**Vector objects are not fixed to any resolution** (image detail) since they are abstract descriptions.

Resolution independence means that **object-oriented images will be rendered at the resolution of each imaging system** (printer, monitor, etc.)

*Digital documents are generally vector-based. Bitmaps are the exception.*

Object Fill (color)

Object Path (shape)

Object Stroke (outline)

Separate self-contained objects

May overlap or sit beneath other objects
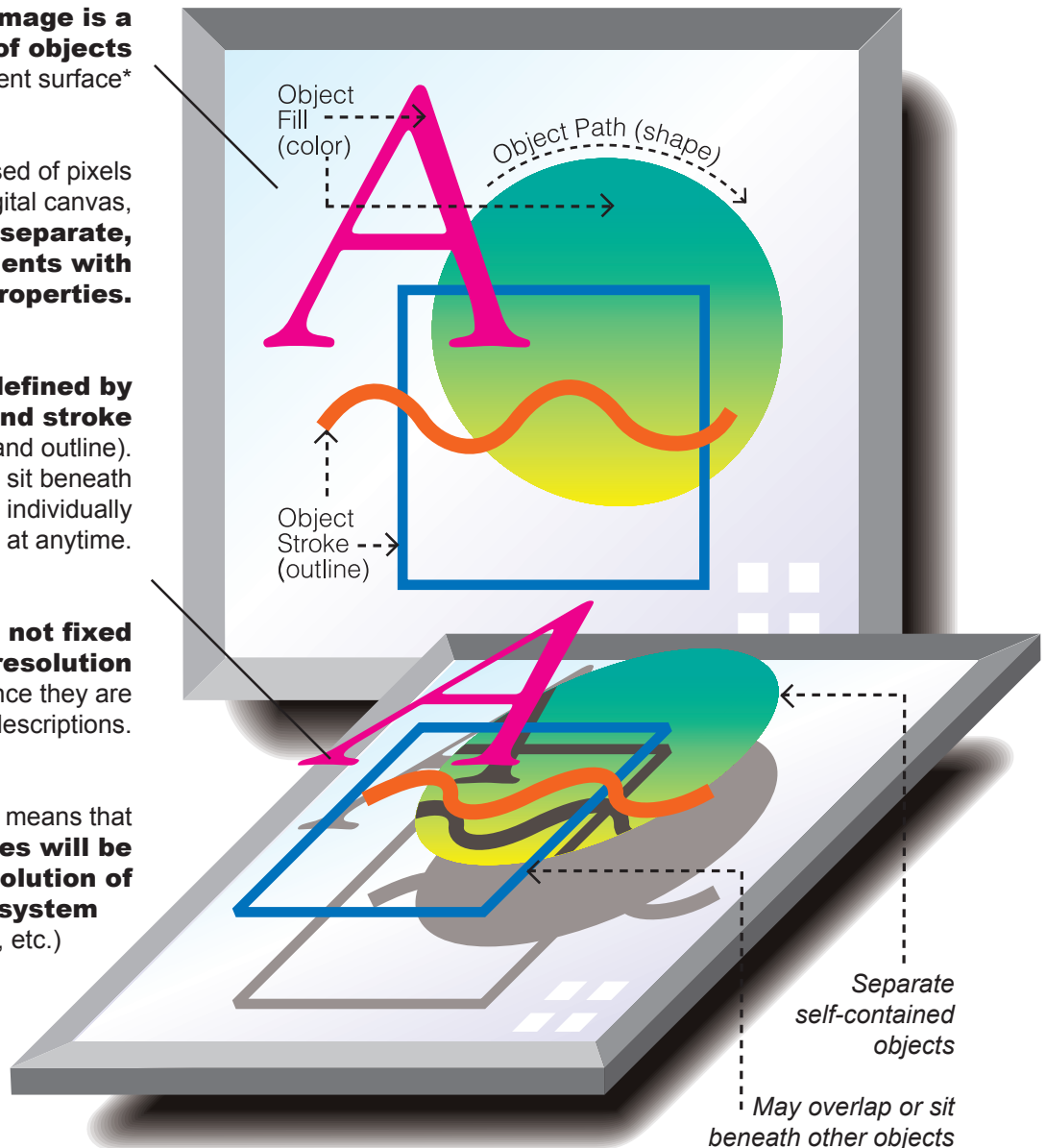
# Generic 2D File Formats

*(Standard Two-Dimensional Graphics Filetypes)*

(Pixel-based images only)

## Bit-Mapped *(Raster) Graphics*

(May contain both objects & bitmaps)

## Object-Oriented *(Vector) Graphics*

**TIFF** *(Tagged Image FIle Format)*
*Also TIF.*
USES: High quaility print. Digital photography, scanning, painting, image manipulation. When high image quality is critical.

**PNG** *(Portable Network Graphics)*
USES: When file size must be moderate, but image quality must be good.

**JPEG** *(Joint Photographic Experts Group)*
*Also JPG.*
USES: When file size must be minimized, but color gamut must be satisfactory.

**PICT** *(Picture Format)*
Older Macintosh graphics format.
USES: Combined raster and vector images (non-PostScript).
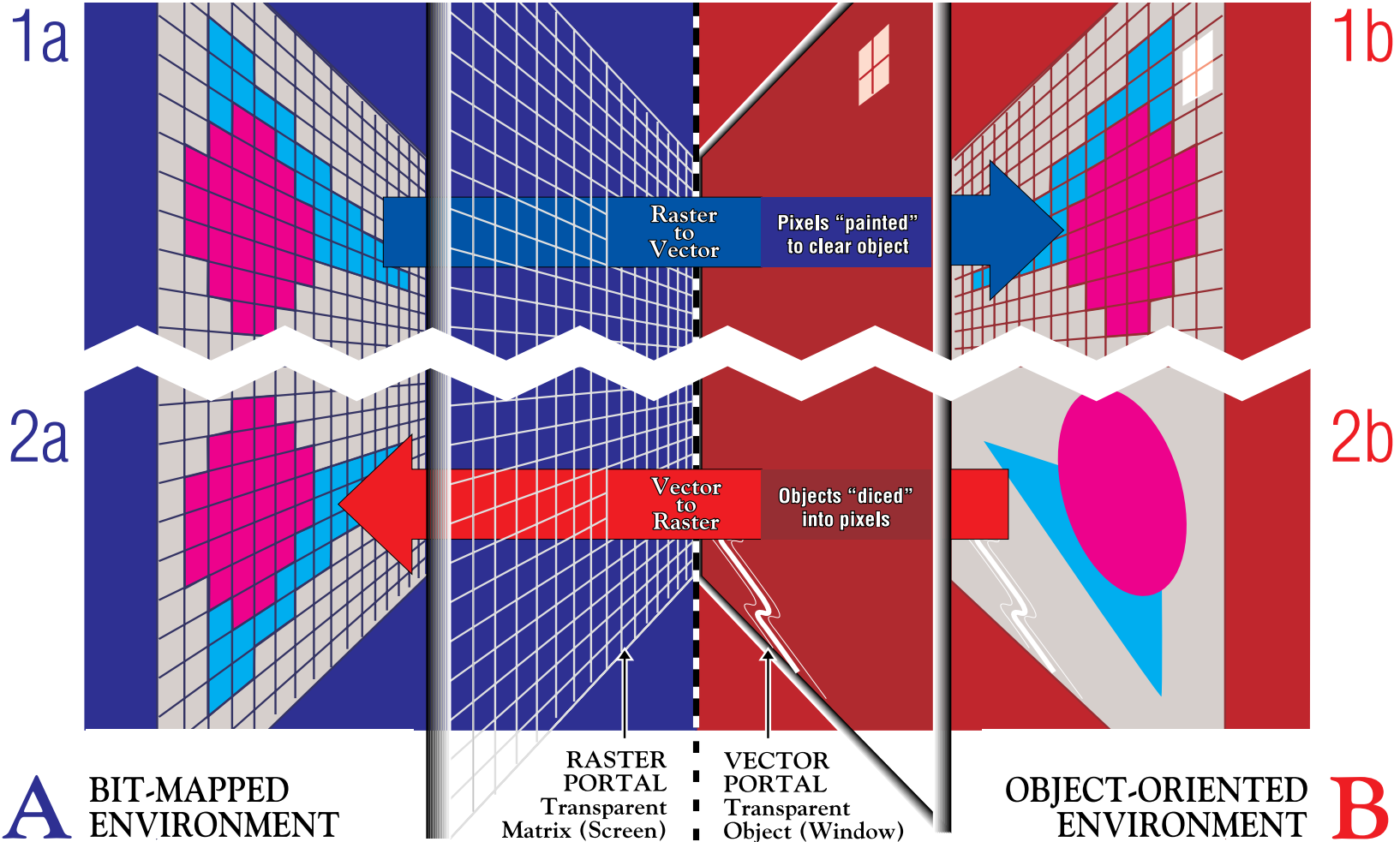
**PDF** *(Portable Document Format)*
USES: Combined raster and vector images (including PostScript).

**EPS** *(Encapsulated PostScript)*
Same as PDF, but PostScript elements are editable.
USES: Editing images containing PostScript elements using applications like Adobe Illustrator.

# Raster ← INTERACTION → Vector

**1a**

Raster to Vector — Pixels "painted" to clear object

**1b**

**2a**

Vector to Raster — Objects "diced" into pixels

**2b**

**A** BIT-MAPPED ENVIRONMENT

RASTER PORTAL Transparent Matrix (Screen)

VECTOR PORTAL Transparent Object (Window)

OBJECT-ORIENTED ENVIRONMENT **B**

1a   The portal to the bitmapped environment may be imagined as a screen with pixel-size holes. Anything entering or leaving must pass through the screen.
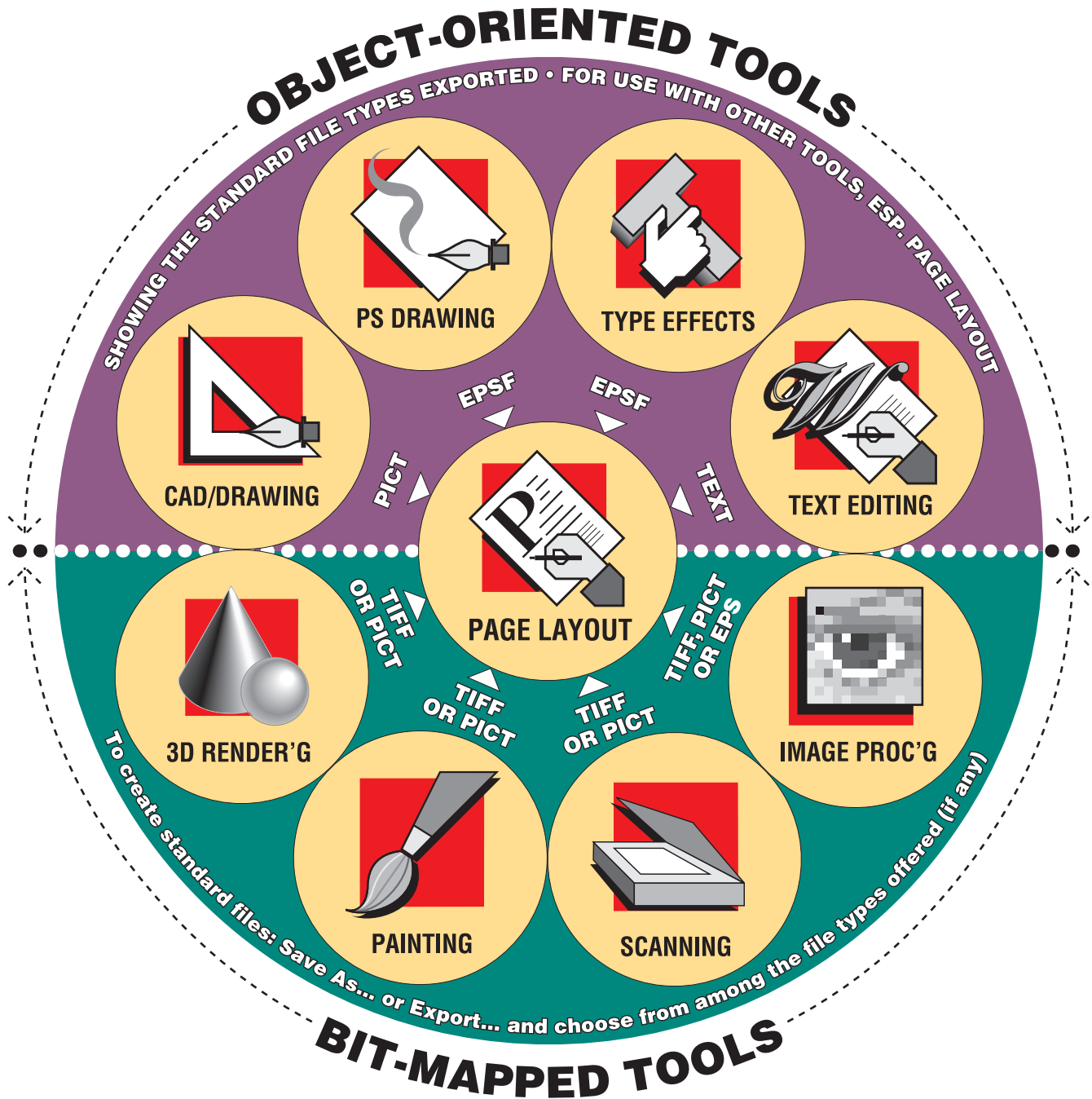
2a   Vector objects entering the raster environment become "diced" into pixels by the invisible screen. So any objects that enter become bitmaps, permanently losing all the properties of objects in the process.
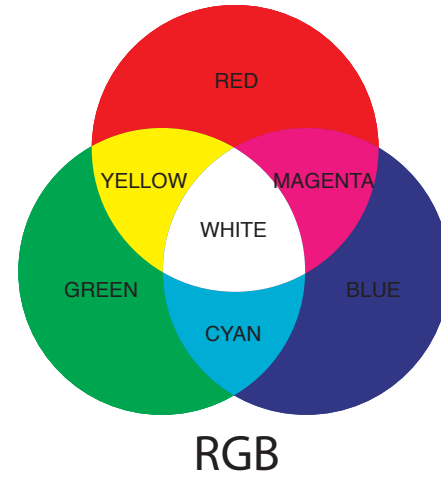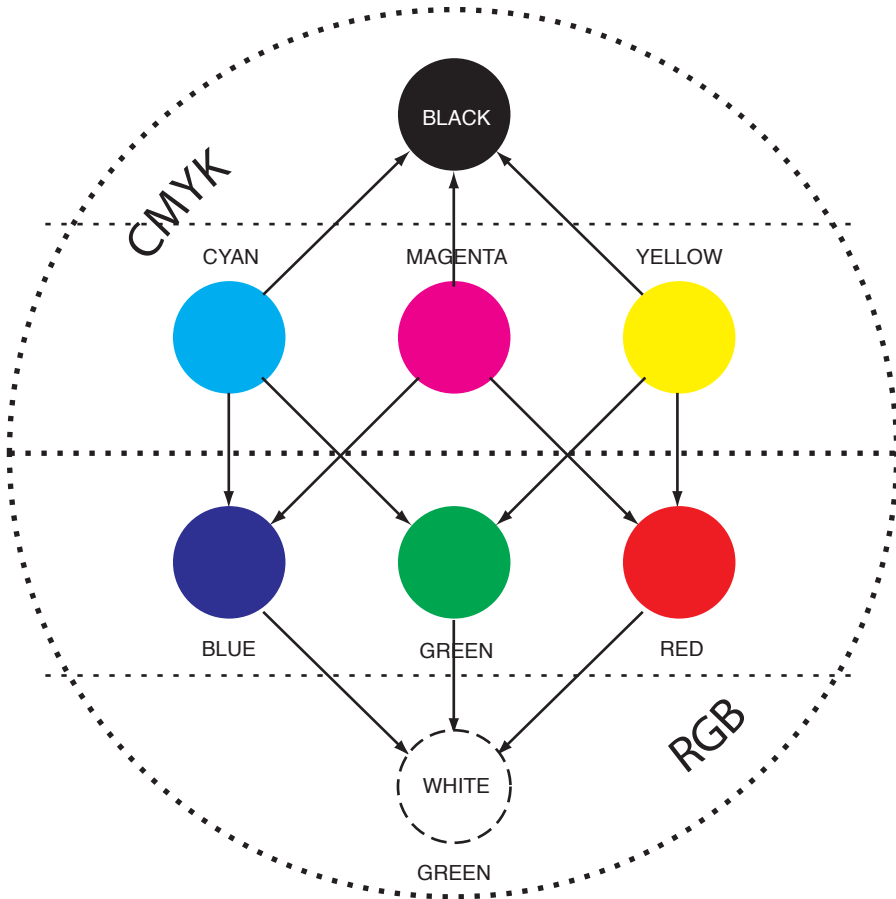
1b   The object-oriented portal may be imagined as a window pane. Bitmaps are "painted" to the window, becoming a rectangular object. While pixel painting is no longer possible, this is the best way to combine raster and vector graphics.

# The Electronic Design Process
## (For Print-Based Design)

OBJECT-ORIENTED TOOLS

SHOWING THE STANDARD FILE TYPES EXPORTED • FOR USE WITH OTHER TOOLS, ESP. PAGE LAYOUT

PS DRAWING

TYPE EFFECTS

CAD/DRAWING

TEXT EDITING

EPSF

EPSF

PICT

TEXT

PAGE LAYOUT

3D RENDER'G

TIFF OR PICT

TIFF OR PICT

TIFF OR PICT

TIFF, PICT OR EPS

IMAGE PROC'G

PAINTING

SCANNING

To create standard files: Save As... or Export... and choose from among the file types offered (if any)

BIT-MAPPED TOOLS

## RGB

Primary (additive) transparent colors (red, green and blue) are the components of white light and secondary colors (cyan, amagenta and yellow)

## CMY(K)
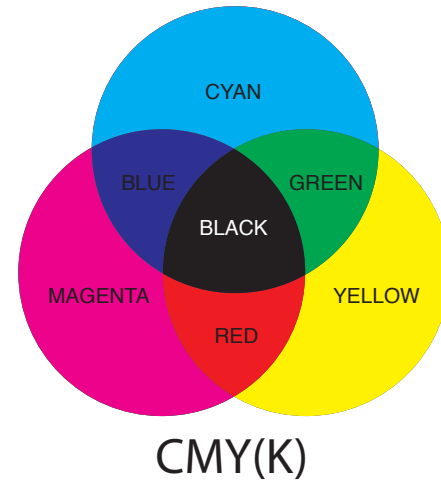
Secondary (subtractive) translucent colors (cyan, amagenta and yellow) are the components of black pigment and prim ary colors (red, green and blue)

CMYK

BLACK

CYAN    MAGENTA    YELLOW

BLUE    GREEN    RED

WHITE

GREEN

RGB