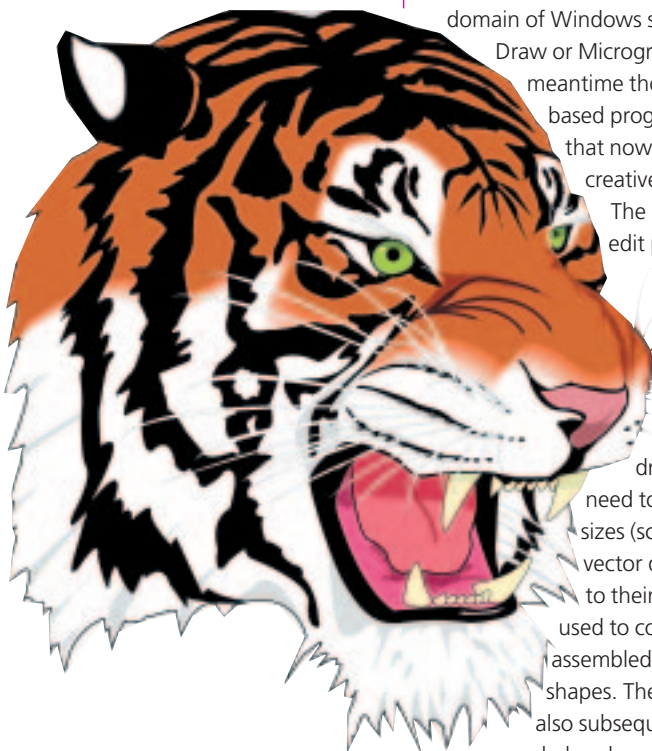## Vector Drawing Programs

POINT, STRAIGHT, CURVE

FRANC WIEDUWILT

The drawing of diagrams, flow charts and freely scalable illustrations was, for a long time, the domain of Windows software such as Corel Draw or Micrografx Designer. In the meantime though, a number of Linux based programs have been created that now compete for favour in the creative fraternity.

The program normally used to edit photos or to produce pictures with photo-realistic appearance is Gimp. This program is however not suitable for the production of accurate drawings or diagrams that need to be worked on in different sizes (scalability). This is where vector drawing programs come in to their own. These programs are used to construct diagrams, assembled from simple geometrical shapes. These shapes or objects can also subsequently be combined, expanded, reduced, rotated, stretched or transformed in a variety of other ways, without suffering any decrease in quality.

Figure 1: XFig

We present six current programs in this article, all with one thing in common: they are all available free of charge. You will find that the differences otherwise outweigh the similarities.

Test Criteria

The test candidates were put through the following course: We first checked the installation from Sources and Binary Packages.

In the drawing test, the programs had to show how graphic objects were constructed, how these objects could be transformed and filled, whether it

Pixel Graphics and Vector Graphics

The difference between how a vector drawing program presents an element, and how a photo (pixel) editing program presents an element, lies in how they save their created picture data. Vector graphics programs save their objects as mathematical descriptions of shapes, which require a small amount of disk and work space. Take for example a circle, the program only has to make a note of the middle point and the radius. Because of this accurate mathematical description, vector diagrams can be scaled at will or deformed geometrically, without any loss

of quality. Photo editing programs use a pixel based file format, in which each individual pixel, with all its characteristics, must be stored. Enlargements and reductions are in most cases only possible with pixel-based pictures, with an associated degradation in quality.

Therefore, vector drawing programs are particularly suitable for clear structures and technical illustrations. None of the programs presented here have the picture effects capability of a photo editing program like for example Gimp.
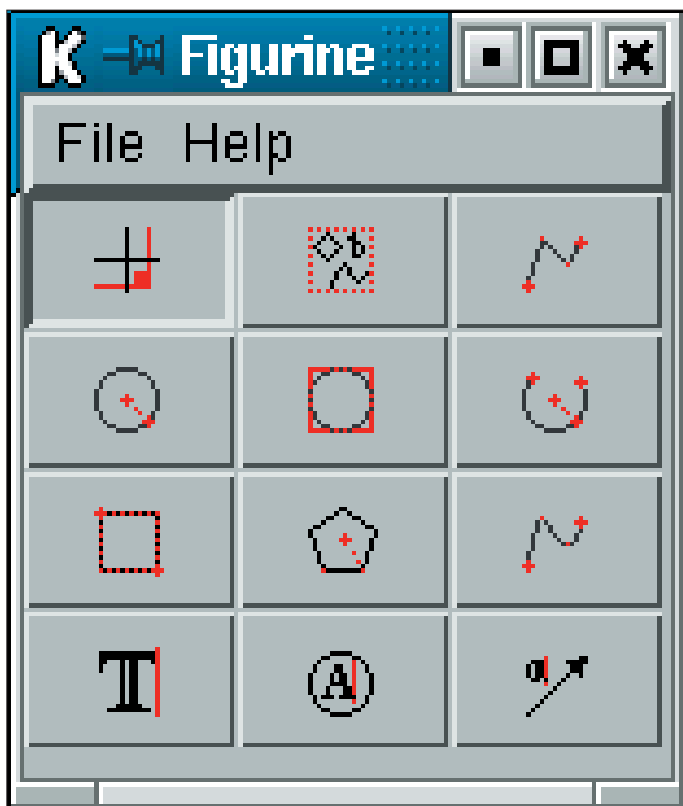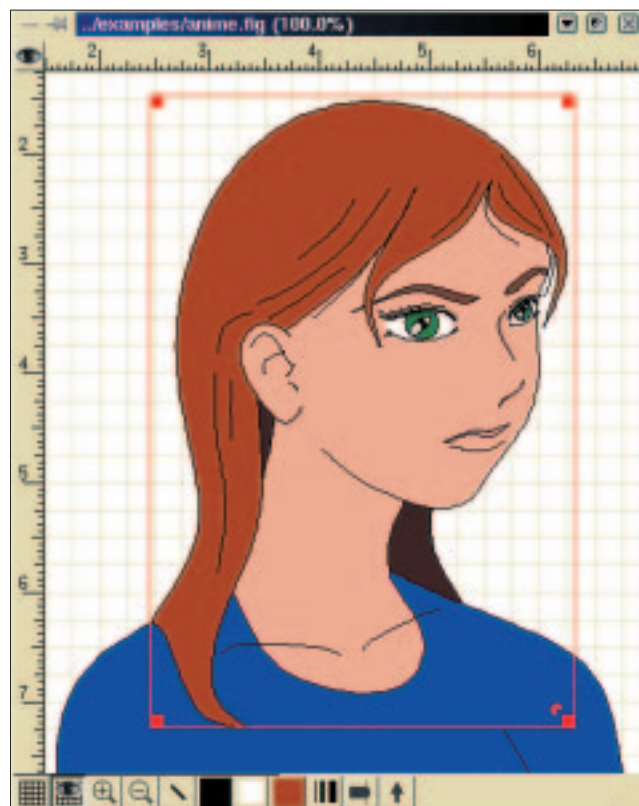
Figure 2: Figurine's tool bar

Figure 3: Figurine work surface

was possible to combine objects into groups and work on them together, and whether it was simple (or possible) to change the sequence of objects. We also tried to find out the level of accuracy with which one can draw in these programs.

Those of you who would like to create illustrations or posters must also be able to work with text. We therefore examined how (and whether) the programs edit and transform text. In doing this, we paid special attention to the possibility of being able to transfer drawings to, and read drawings from, other programs (compatibility). Three of the presented programs support the SVG format, which should facilitate the simple export and import of drawings over and above the boundaries of operating system.

We then had a look at the user support offered by the programs in the form of on-line help and manuals. At the end of this article, you find a table, which lists and summarizes the most important program functions.

Xfig

Xfig is considered the Methuselah of vector drawing programs for X. The program has been around since 1985 and is thereby substantially older than Linux. It is included in almost all Linux distributions.

The Xfig user interface seems somewhat antiquated, but is however very functional. All commands can be accessed by the large tool bar at the left side of the program window, whereby it is

not clear at first glance which functions the tool bar icons correspond to. You can draw all the important basic geometrical shapes and also input and format text. Objects can be enlarged and reduced at will and then be subsequently shape-transformed. Xfig allows you to arrange objects on different layers. Different line types and object fills are possible. One thing a bit irksome about the program, is that it is not possible to preset your preferential ruler and drawing units.

The Xfig file format is very common in the Linux world. Additionally, created drawings can be exported into different pixel formats, so that subsequent alteration work is possible in a whole range of picture editing programs.
The program has an outstanding online helpdesk in the HTML format. To display this however, you must have Netscape installed. A manual in the PDF format is in addition provided.

Xfig is particularly suitable for the production of pictograms, flow charts, mind maps, overviews or schematic diagrams. Xfig drawings can be comfortably modified in texts using LaTeX.

Figurine

Figurine enables you to draw diagrams in the Xfig format with a more modern user interface.

You find the program on the Figurine homepage in source text as well as rpm, the installation can be carried out without any problems.

Operation is similar to Gimp: There is a small window with drawing tools (refer to figure 2) and at

Pixel: A point on the screen or paper.
Binary Package: A binary package is a combination of all the pre-compiled files that a program needs for its execution. This includes other data as well as the actual program, for example assistance files.
SVG: " Scalable Vector Graphics ", a relatively new, non-platform-dependent format for the storage of vector drawing data.
HTML: " *H*yper*T*ext *M*arkup *L*anguage ", is a scripting language that specifies how web pages are formatted and displayed on the internet.
PDF: " *P*ortable *D*ocument *F*ormat ", a file format for the transfer of formatted text.
Sources, Source Text: The text that the programmer enters to write a program. The program must be converted, with the help of a compiler, into a machine-readable form so that it can be run by the operating system.
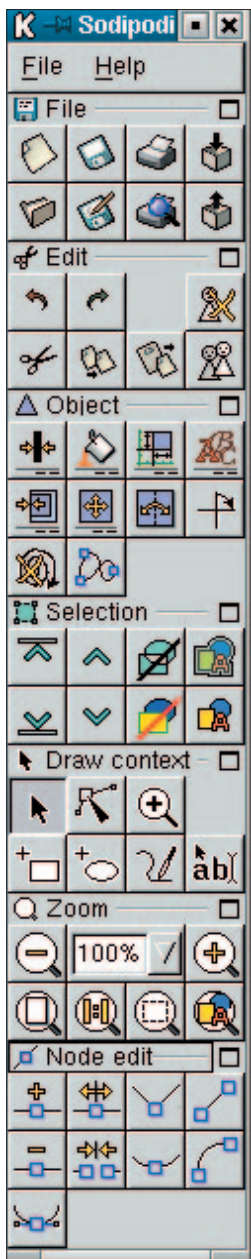
Figure 4: Impress

Figure 5: Sodipodi's tool bar

Netscape is installed. If you do not call up the help via the menu, you can use any browser.

Like Xfig, Figurine is particularly suitable for creating drawings that do not have to be produced with exact accuracy. We found it rather difficult to draw objects of a precisely defined size.

The program supports the export of files to the same formats as Xfig. Documents created in Figurine can therefore be further modified in other programs or be inserted into LaTeX documents.

Impress

Impress is an illustration program for folios and other screen presentations. It is downloadable as *rpm* and source text from the Impress homepage. Like Figurine, this program has a tool bar independent of the document window (refer to figure 4). It however only permits one drawing to be open at any one time.

Operating this program requires some patience, as it is very slow – particularly with gradients and enlargements. There are even times when one gets the impression that the program has crashed. All the usual basic geometrical shapes are available, there are different line types and fill patterns as well as many different gradient functions. Text entry is not as simple as it could be, it must be entered into a separate window. It is possible to enter several lines of text at once, but this can only be formatted in one style.

The program has neither an on-line help service nor a manual. A special feature is the presentation mode, in which several drawings can be displayed one after another. Caution is recommended when quitting out of Impress: The program does not ask you if you want to save before quitting.

least one window with a work space for each opened document.

Figurine offers all the important drawing tools: Rectangles, ellipses, lines and a text tool. The text tool does not allow the input of umlauts. These are however correctly displayed by figurine if they are contained in a file. Figurine offers a selection of different line shapes and allows drawing objects to be filled with colours and patterns. Objects can be combined into groups and worked on together. Like Xfig, Figurine unfortunately does not allow for the presetting of ruler and drawing units. If you, for example, want to have centimetres as your ruler units, this must be reset each time. Inches are the default unit for drawing and this cannot be changed.

Figurine has a detailed on-line help, This however can only be displayed from within the program if
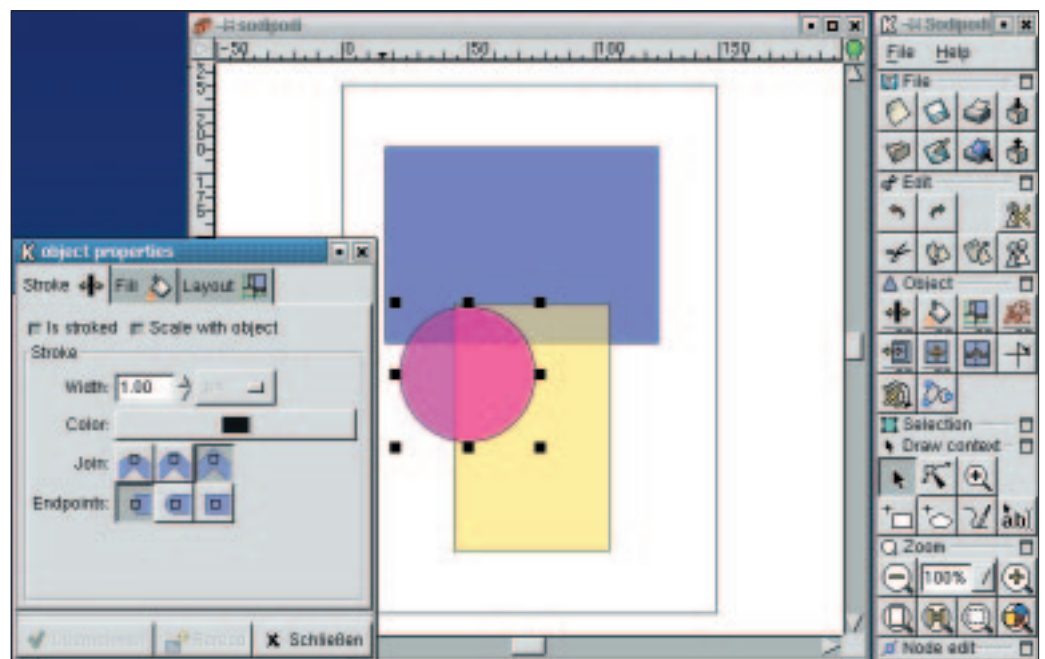

Figure 6: Sodipodi in action

Sodipodi

Sodipodi is the youngest program in this comparison and it is taking big steps forward in its development. On the Sodipodi homepage, you will find the program sources and rpms. The rpms however, are not as up to date as the source text packages. Sodipodi uses the most current GNOME libraries, which one must have installed (procurable from *http://www.gnome.org/*).

The software is very similar to Gimp in both appearance and operation. There is a very extensive tool bar (refer to figure 5) and each drawing has its own window. As is the case of Gimp, the tools are accessible either by means of the tool bar or the context menu in the document window, called up by right mouse clicking the drawing.

It should be noted here that the program is not fully complete yet. The basic functions for drawing objects and for processing text however work without problem. Objects can have different line types, filling patterns have not yet been included. Sodipodi is the only program in the test which can create transparent objects (refer to figure 6), a capability that otherwise only pixel-based programs have. It is also possible to define your required paper format.

There is no on-line help yet, but it is relatively simple to get along with out it – the user interface is very self-explanatory. All in all Sodipodi is an interesting software development which, when it is finished, promises to be a universal graphics solution beside Gimp.

Kontour

Known earlier under the name Killustrator, Kontour is part of the KOffice project (*http://www.koffice. org/*). It was renamed to get around a trademark dispute with Adobe (see also K-splitter in this magazine). We will limit ourselves here to the new
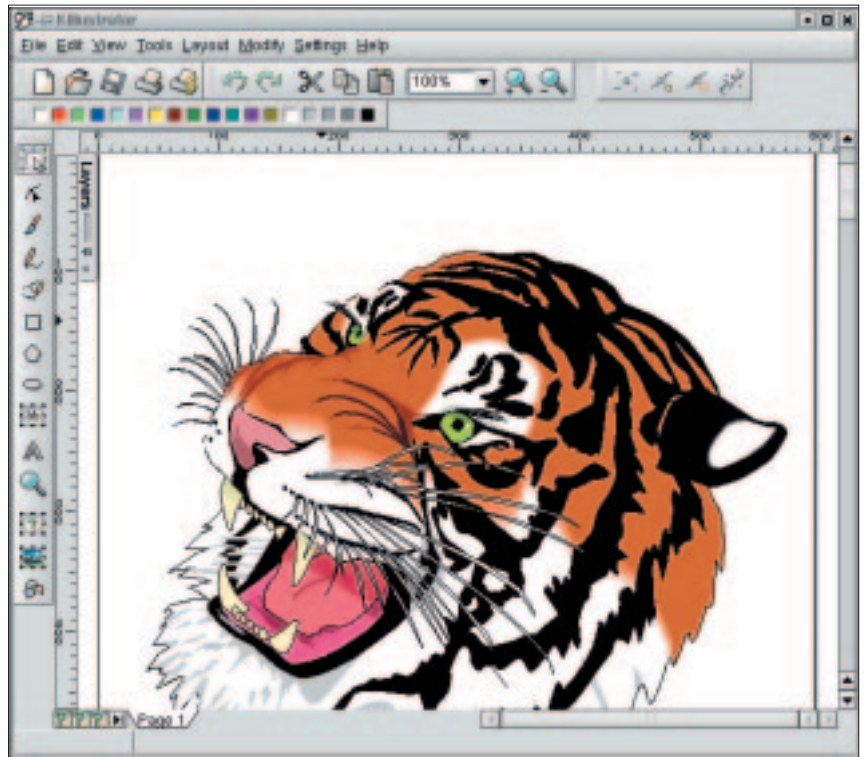

Figure 7: Kontour

features and innovations. You will find all Koffice source texts and binary packages for different Linux distributions on the KOffice homepage.

Kontour includes all the important drawing objects. Elements can be given different line types and fillings (patterns and gradients) and manipulated in a whole variety of ways. Kontour can blend two objects into each other (refer to figure 8), and this function can produce really cool effects. Grids and guides help to draw objects precisely.

The software is seamlessly integrated in KOffice, and it is therefore possible to embed drawings in KWord and even work on them within this program (refer to figure 9). The whole process also

rpm: " The *R*ed Hat *P*acket *M*anager " is a program for the installation and removal of programs that takes into account dependencies between different software.

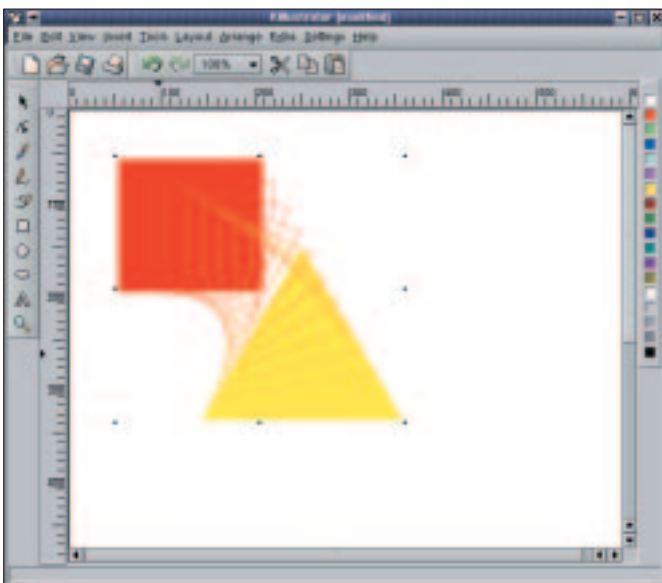**WMF:** "*W*indows *M*eta *F*ile ", a file format for vector drawings.
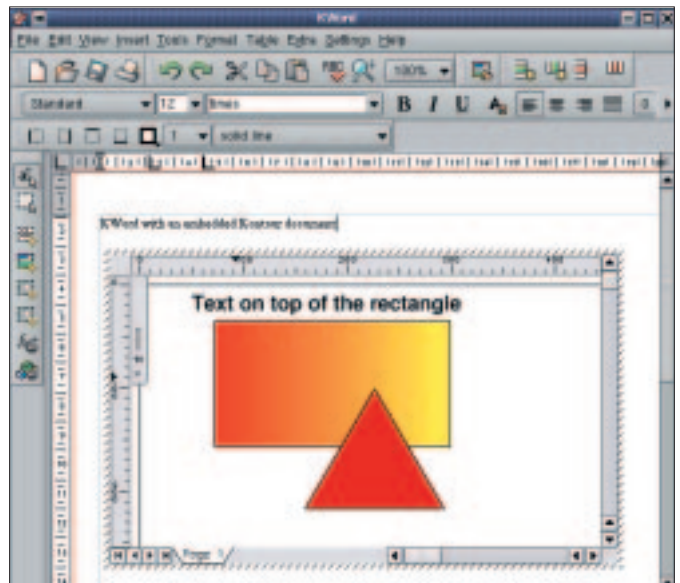

Figure 8: Dissolving

Figure 9: A Kontour drawing embedded in KWord

Figure 10: Sketch

offers different gradients for filled objects. Grids and guides help with the construction of drawing elements. Objects can be arranged on different layers. The text function is at present limited to single lined text elements, which can only be formatted in one style. Unfortunately there is no displayed indication of the size of the selected object in the status bar, so that some mental arithmetic is needed in the creation of exact-sized objects. Sketch only allows single page drawings at present.

Sketch was, together with Xfig and Figurine, the most stable program in the test – it didn't crash once. It lacks an on-line help, but has however a manual in HTML format. Those who have already operated a vector drawing program will have no problems getting acquainted with the application.

Sketch reads and writes the Adobe Illustrator format, so that drawings can be imported and exported through operating system boundaries. Furthermore, drawings can be imported from the Xfig format and exported into different formats (also including SVG). Sketch is suitable not only for presentation folios or maps, but also for accurate drawings, for example structural drawings.

Result

As always, selection of the "correct" program for you depends on what you want to draw: Figurine and Xfig create charts, sketches and folios that do not need extras such as colour gradients or special accuracy. Impress, Sodipodi, Kontour and Sketch are trying to advance to the class of programs such as Corel Draw, but are however still a way off. Sodipodi could become the perfect supplement for Gimp, as it uses the exact same operating concept and interface. Kontour is particularly user friendly and its integration in the KOffice package is another plus. Sketch has the goal of becoming a universal drawing program for Linux, and we are therefore awaiting its further development with anticipation.

It is unfortunately difficult to exchange drawings between the tested programs. Sketch, Sodipodi and Kontour say that they support the SVG data format. The down side is that this is a very complex standard, which is for the most part only partly implemented by the individual programs. As consequence of this, these programs can not read SVG files that were produced by other programs. Sketch and Kontour enable the import of Xfig files and WMF drawings, which are very common in Windows, so that at least the import of existing drawings is possible.

works in reverse, so that all text processing functions available in KWord can be used in Kontour drawings.

New to Kontour is above all the possibility of creating multi-page documents, the capability to drag guides out of the rulers and faster mouse movement when working in big enlargements.

The on-line help in HTML format describes the most important functions of the program. It is possible to read drawings in the Xfig -, WMF -, and SVG formats as well as write drawings in the SVG and various bit-map formats.

The program still has some small bugs at present. XML code is occasionally inserted into the drawing when pasting drawing objects. Also, the gradient path is often not saved. Nevertheless, Kontour runs really well – you should just remember to save your drawing frequently.

Sketch

Sketch is, similar to Kontour, a Linux based program developed to offer a level of functionality matching Corel Draw. With its latest version 0.6.10, Sketch seems to be well on the way to reaching its mark. The program runs very fast, even on older hardware. You can download Sketch from the Sketch homepage as source or rpm packages for different distributions. The installation is somewhat laborious. As well as Sketch, the following packages must also be installed: *python*, *python-devel*, *python-imaging*, *python-tk*, *python-tkinter*, *tkdev* and *blt*. You can find all these libraries on the Sketch homepage.

The program includes the blend function and

The author:
Franc Wieduwilt studied history and lives in Berlin with his wife Sabine and daughter Johanna.

Table 1: Vector Drawing Programs – Overview

	Xfig	Figurine	Impress	Sodipodi	Kontour	Sketch
Developers	Supoj Sutanthavibul, Brian V. Smith, Paul King	John Levon	Christopher Jay	CoxLauris Kaplinski	Kay-Uwe Sattler	Bernhard Herzog
License	Own Open-Source-License	GPL	GPL	GPL	GPL	GPL
http://	www.xfig.org	figurine.sourceforge.net	www.ntlug.org/~ccox/impress/	sodipodi.sourceforge.net	www.koffice.org	sketch.sourceforge.net
Installation						
rpm	-	x	x	x	x	x
Source-tgz	x	x	x	x	x	x
Additionally required						
libraries	-	libXpm	tcl, tk	gnomelibs, gnomeprint	kdesupport, kdelibs	python, python-devel, python-imaging, python-tk, python-tkinter, tkdev and blt
Drawing tools:						
Poly-line	x	x	x	x	x	x
Bezier line	x	x	-	-	x	x
Freehand line	-	-	-	x	x	x
Rectangle	x	x	x	x	x	x
Ellipse	x	x	x	x	x	x
Text tool	x	x	x	x	x	x
Extra functions:						
Colour gradients	-	-	x	-(1)	x	x
Transparency	-	-	-	x	-	-
Effects	-	-	-	-(1)	gradient	gradient
Object grouping	x	x	x	x	x	x
Layers	x	-	-	-(1)	x	x
Document formatting:						
Freely adjustable sheet size	-	-	x	x	x	x
Multi-page documents	-	-	x	-	x	-
Units	cm, inch	cm and inch for the ruler, otherwise inch	mm, cm, inch, pt	mm	cm, mm, pt, inch,	cm, mm, pt, inch pica, diderot, cicero
Drawing assistance:						
Grid	x	x	x	x	x	x
Snap to Grid	x	x	x	x	x	x
Guides	-	-	-	- (1)	x	x
"Cross-Hair" cursor	-	x	-	-	-	x
Data exchange:						
Import	-	-	Tcl (3)	- (2)	Applixgraphics, XFig, WMF, SVG, MS-Office-Drawing	Adobe Illustrator, Corel Draw, WMF, XFig, SVG
Export	gif, hgl, jpeg, latex, pxc, pic, pdf, png, ppm, tiff, tk, xbm, xpm, Tcl (3)	gif, hgl, jpeg, latex, pxc, pic, png, ppm, tiff, xbm, xpm	Tcl (3)	- (2)	SVG, ps, gif, png, jpeg	SVG, pdf, Adobe Illustrator
User support:						
On-line help	HTML	HTML	-	-	HTML	-
Manual	pdf	-	-	-	-	HTML

Therefore, vector drawing programs are particularly suitable for clear structures and technical illustrations. None of the programs presented here have the picture effects capability of a photo editing program like for example Gimp.

LEGEND

(1): Planned
(2): Sodipodi uses the SVG format for saving drawings
(3): This program saves diagrams as Tcl script.