1. INTRODUCTION

From an enthusiastic start in 1974, work on standards for computer graphics has developed into a growth industry in its own right. Throughout the world, groups have been meeting to discuss and agree on the specification of standards. More than 200 people are currently involved. The standards cover several areas:

- programming interfaces;
- metafiles;
- device-level interfaces;
- both 2D and 3D.

This paper looks at these activities and traces the development of the various standards from the past, through the present and into the future.

Like any activity that involves communication between people, a few terms are used so regularly that they become an extension to the vocabulary - a jargon. While it is an attractive idea to avoid using such terms, the various stages that a document goes through within ISO (the international standards organization) before becoming an international standard recur so often that some definitions will make the article clearer.

**Workitem**

An official project with agreed scope and goals. Workitem start with one or more base documents which are reworked into a single document until they are submitted for voting as a
Draft Proposal (DP)
The first official stage towards becoming a standard. All ISO member nations concerned with the project comment and vote on the DP until is overwhelmingly agreed that no further technical changes are required, when it is submitted as a

Draft International Standard (DIS)
The DIS is then edited and amended until it is acceptably in ISO format and all known ambiguities in the document have been resolved, at which stage it can be voted as an

International Standard (IS)
At this stage, the document is published by ISO and it is generally left unaltered for about five years, at which time a review process may decide to endorse, revise or abandon it.

Within the national standards bodies, such as the American body ANSI, a similar process takes place, although the names of the stages are different.

2. PROGRAMMING INTERFACES (2D)

There are two ways in which users have tackled the problem of transporting programs that referenced graphics systems or devices. The first was to make one package emulate another. The second was to allow a program to produce a file of graphics orders and to interpret them with a separate program. The first approach leads to the idea of a standard programming interface /1/ and is dealt with in this section and the next; the second is the starting point for a standard metafile and is dealt with later.

Both of the original developments for a graphics standard aimed at a programming interface. One was from ACM/SIGGRAPH - the GSPC "Core" system /2/ - and the other from DIN (the German standards body) - GKS /3/. There were technical differences between these documents, but under the ISO umbrella there evolved a version of GKS that covered much of the same area as Core, with the exception of 3D. ISO has been processing GKS for what may seem to an outsider as a long time. By October 1981, a document called GKS 6.8, which became GKS 7.0 after substantial editorial work, was submitted as a Draft Proposal.

This document was widely circulated. A number of substantial objections concerning omissions were raised. The next ISO meeting (June 1982) resolved these by including facilities for text alignment, for STROKE input and for "individual" as well as "bundled" attributes. The document that incorporated these - GKS 7.2 - was completed by the end of 1982 and circulated for voting as a Draft International Standard /4/. The result was general acceptance; two nations voted against the acceptance as a DIS unless some aspects of the document were clarified. These comments have been dealt with. Other points had been noted as a result of the widespread availability of the GKS 7.2 document and the