TELIDON INFORMATION MANAGEMENT SYSTEM

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TELIDON INFORMATION MANAGEMENT SYSTEM:

FUNCTIONAL SPECIFICATIONS REPORT

" FINAL "

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PHIPPARD AND ASSOCIATES

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EXECUTIVE SUMMARY

The objective of the TIMS project is to determine whether Telidon graphics can play a significant role in the office of the future.

Phase I of the TIMS project (the User Requirements/Functional Specifications phase) includes:

- identification of user requirements,
- development of a framework for assessment of prototype system utilization, and:
- preparation of functional specifications for the prototype system.

This report is the result of the third of these activities. It provides a detailed description of required capabilities of the TIMS "graphic toolset". It is not a system specification or technical system design. We have tried as much as possible to refrain from selecting implementation approaches or making design or technical decisions, in order to provide for the greatest possible flexibility for those suppliers who may propose to supply the prototype TIMS systems.

The potential users of TIMS span all levels from executive to clerical. Many will use TIMS only occasionally, and must not be required to re-learn the system each time. Others will be very heavy users, and must find the tools to be efficient, powerful and responsive. Therefore, the specifications emphasize those characteristics of the user interface that are important to successfully meet this wide range of user situations.

At the same time, potential uses of TIMS tools are varied. The requirements identified indicate a collection of tools with specific capabilities, more so than a specific relationship between these capabilities. Therefore, these specifications emphasize specific abilities and performance levels, rather than an overall system structure.

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Chapter 1 of this report outlines the scope and methodology of the overall TIMS project, of this project phase, and of the functional specifications activity, and briefly reviews the results of other related activities and reports in this project phase.

Chapter 2 provides an overview of TIMS toolset in general, along with a largely diagramatic description of the overall breakdown of functionality.

Chapter 3 provides detailed specifications as to capabilities, performance, and interfaces, and related considerations, for each tool.

Chapter 4 provides some approximate predictions as to cost and timing for implementation of the TIMS prototypes.

The system described in this document will provide a compatable set of semi-automatic and automatic graphic creation tools, plus hard-copy production and communication capabilities, that can be completely integrated into the automated office environment. They should be of excellent long term utility, independent of changing application-level needs. They cannot be implemented with off-the-shelf products alone, and will require new development of highly flexible and user-friendly software. Therefore, they provide an opportunity for genuinely new tests and applications of Telidon technology.

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1. BACKGROUND

1.1 TIMS Project Objectives

The objective of the TIMS project is to determine whether Telidon graphics technologies can play a significant role in the office of the future, and in the competitive marketing of office automation products in the international marketplace by Canadian companies.

It is unrealistic to expect that the office of the future will have only textual capabilities. Sophisticated office communications systems will offer a common visual workspace, allowing their users to process and communicate with hand-sketched pictures and diagrams as well as words. Office systems will be linked with external information and transaction services, many of which will employ graphics. Traditional financial, inventory, and other corporate information systems will integrate with the office communication system, and in many cases will report results graphically rather than merely through lists of numbers. In many corporations, the office systems will support sales and promotional activities with quality color graphic visual information.

The attributes of Telidon (standardization, efficiency, equipment independence, resolution, quality, ease of use) suggest a strong potential for its use to support these graphic applications. The Telidon Information Management System (TIMS) project explores that potential by assessing the degree to which specific management and communications functions in the automated office can benefit from the integration of Telidon (NAPLPS) graphic capabilities.

Phippard and Associates was contracted to analyze and document user needs and to prepare functional specifications for the prototype system. The project team included participants from OCRA Communications, Inc., Touchstone Policy and Program Evaluation, Inc., and S & S Software Ltd., as subcontractors. These documents were intended to provide the basis for subsequent project phases which involve procurement and implementation of a prototype system, and evaluation of its usage.

1.2 Overall Methodology of the Requirements/Functional Specifications Phase

The overall scope of this first phase includes:

- Familiarization with the target user group (ADMTI Branch of the Department of Communications - DOC);
- Investigation and synthesis of the perceived graphics support needs of the target user group;
- Analysis of these perceived needs against known results of other studies in similar environments; and
- Functional specification of a prototype system to meet these needs.

Our approach to the study involved these activities:

Task		Activities
1. Familiarization	A.	Finalization of project plans with the Scientific Authority.
	B.	Familiarization of the project team with the mandate, structure, objectives, operational environment and relevant history of ADMTI, especially the target users for the project.
2. Requirements Definition	C.	Detailed planning of the interview and data-gathering process.
	D.	Individual interviews and focus groups to determine the nature and extent of graphic support needs as perceived by the target users.
	E.	Analysis, research and brainstorming activities to rationalize these perceived needs with the results of similar studies.
	F.	Additional, more application-specific data-gathering, using feedforward and brainstorming techniques as appropriate.
	G.	Synthesis and presentation of user requirements for Telidon graphics, in interim written report and oral presentation modes.
	H.	Preparation of a final report on user requirements, incorporating feedback on the oral presentation and interim report review, as well as subsequent data-gathering.
3. Functional Specifications	I.	Development and documention of a set of measures to be monitored during operation of the alpha and beta prototypes, to support evaluation of actual versus anticipated usage.
	J.	Preparation of a "systems overview" - level functional specification, to be reviewed informally with the Scientific Authority.
	K.	Preparation of specifications for detailed system functionality, hardware and software component overviews, performance criteria, cost estimates and schedule for Phase 2, resulting in a systems specifications report.
	L.	Identification of any suggested revisions to the Phase 3 time table, scope, or project activities, if appropriate.

This "Functional Specifications" report represents the results of activities J and K above.

1.3 Summary of Existing Systems & Equipment: Alpha & Beta Sites

The current systems environment in the target user sites. and throughout much of the rest of ADMTI, emphasizes IBM-compatible micro-computers, with considerable proliferation particularly in the alpha site, the Telidon Program Directorate (DTL). There are also some other micro-computers, some Telidon equipment, and some word-processing systems.

There is no one major computer system in the target area, except for the DOC Telidon Database system, a DEC-PDP11/44(RSX) minicomputer system operated on a facilities management basis by The Genesys Group, Inc., in Ottawa. There is a central DOC financial computer centre, which is accessible to users in ADMTI on a remote teleprocessing basis.

Micro-computer Inventory (See Appendix B)

The ADMTI micro-computer inventory consists largely of IBM-PC. IBM-PC/XT, and Hyperion (Rev. 5) systems of varied age and config-uration. These systems include various letter-quality and draft-quality printers, different monitors (some graphic compatible, some colour, some high-resolution), and various modems.

There are also a few Apple II's, and several Mitel Kontacs used as executive workstations (primarily for word-processing, telephone and time management, and electronic mail).

Micro-computer software most common in the target groups includes word-processing (Wordstar, Word Wand, and Multi-Mate, with Wordstar being the most prevalent), spreadsheets (mostly Lotus 1-2-3), and Telidon/NAPLPS decoder and page creation software. (The latter is found almost exclusively in the alpha site.) Other software includes telecommunications, project management, database. telephone and time management, idea organizer. and non-Telidon graphics packages.

Word-Processors (See Appendix B)

There are several models of AES word processors in use in the alpha and beta sites. As yet there is no communicating word-processor network in place. A DOC-written conversion program is used to convert between Wordstar and AES documents.

Communications Networks

Most micro-computer workstations in the alpha site are connected to a Develcon data-switch. This switch, installed at DOC, enables file transfer between workstations as well as external connection to outside computers. In the past, some problems were reported with the communication of Telidon graphics using this switch.

Ordinary telephone communication lines are used for the majority

of communications. The telephone system is to be upgraded during January through August 1985, using a new DOC SL1 switch.

Telidon

Telidon equipment consists mainly of some Microtel VT-208 ASCII/NAPLPS terminals, some Norpak and some recently delivered Electrohome EGT series decoders. There is also a considerable inventory of Telidon software for the micro-computers (as supplied by companies such as FBN, Microtaure and Microstar).

Detailed Listing

Appendix B contains extracts from a recent ADMTI equipment inventory, focusing on the alpha and beta sites. It should be treated as a representative rather than an accurate listing, since actual inventory changes on almost a daily basis.

1.4 Overview of Graphic Support Needs

There is a need for a powerful yet simplified graphic creation capability which is specialized to the kinds of graphics required to support office documents, presentations and activities. This capability must function as a highly automated graphics template, enabling the user to quickly prepare effective, quality charts and diagrams using a library of standardized symbols. It must provide for manipulation and colouring of these symbols. plus the addition of lines and text in a selection of fonts, sizes, colours and perhaps orientations.

There is a need for the automatic conversion of numeric results and data, whether provided by spreadsheets or other tools, or from manual form by the user, into quality graphical representations. These representations would include bar charts, pie charts and bi- or tri-axial graphs (two or three dimensions). This should be achievable without a burden of user instructions: the tool should be powerful and automatic. However, the users anticipate the need to experiment and interact with the tool for important graphic displays, varying scales, colours, orientations, and other attributes that would otherwise be assigned automatically as defaults by the tool.

There is a need for a readily accessible, highly automated and simplified production facility where graphic displays created using Telidon (and potentially other electronic technologies) can be converted to other more traditional media for dissemination and presentation. This reflects the fact that Telidon is likely to be accepted and exploited first as a graphic creation medium. Initially, office workers will want to continue using the dissemination or presentation (display) media they are already comfortable with (35mm slides, overhead projector/vugraph, paper, etc.), but will readily accept the superior capabilities of Telidon in the creation of those displays. However, this facility would also support the assembly of independent graphic creations

into integrated, thematic presentations, still in the Telidon format.

Finally, ADMTI user needs include the capability to electronically communicate graphics to and from other sources and destinations, both within the alpha and beta sites and externally to the trial, and to access both Telidon-NAPLPS and regular ASCII alpha-numeric database services.

These four needs represent the chosen focus for the TIMS prototype systems, for the alpha and beta site experiments. There were additional needs identified, both for graphic and for non-graphic systems and capabilities, but these are not within the scope of the TIMS prototype.

Appendix A contains a tabular summary of the specific capabilities required for each of the four "tools" identified above.

1.5 Summary of Utilization Monitoring Requirements

1.5.1 Introduction

A separate report, entitled "Prototype Telidon Information Management System: Utilization Assessment Criteria Report" provides the framework for evaluation of the alpha and beta prototypes during Phase III of the TIMS project.

For the TIMS project, the utilization assessment should address:

- the extent to which the system is being used overall in relation to expectations;
- the extent to which various features are being used and factors impacting on their use: and
- the degree to which users report that the system enhances or has the potential to enhance their work.

A variety of techniques can be drawn upon for measurement, including:

- automatic system monitoring;
- instruments to be completed (potentially under supervision) by the users --e.g., questionnaires, attitude scales, diaries, complaint logs;
- instruments to be completed by the evaluators --e.g., questionnaires used in the context of in-person interviews;
- observation of users: and
- secondary data --e.g., examples of graphic output with and without using the system.

More specific assessment criteria related to each tool can be

found in the Assessment Criteria Report.

Only the first technique is relevant to this Functional Specifications report directly. Measurements which use system monitoring will require special attention in the design and implementation of the TIMS prototypes.

1.5.2 System Monitoring Questions

The following paragraphs summarize those of the suggested assessment criteria that are anticipated to require automatic monitoring by the system, as part or all of their measurement processes:

How frequently and for how long do users access TIMS per day?

How many pages are created per day on average, both:
- automatically, using the business graphics tool; and
- semi-automatically, using the graphics template tool?

How many pages of graphics are kept in personal storage per person on average? And how often are they accessed to be used again?

To what extent have master and common graphics libraries been developed and how often are they used?

How often do the users select default capabilities, especially for the business graphics tool, in order to decide on the details of the graphic to be produced?

To what extent has the business graphics package been used to create charts, graphs, etc. from:
- Lotus 1-2-3?
- other spreadsheets?
- numeric data specifically keyed in?

To what extent has the production facility allowed for and been used to produce hard-copy graphics (black-&-white and colour) whether integrated with text or not?

To what extent has the production facility been used to produce:
- 35mm or vu-graph versions of presentations and briefings?
- complete shows or presentations from component graphic screens?
- complex components produced by the other tools?

To what extent is the communications package being used to communicate with:
- external Telidon-NAPLPS databases? (and for what specific purposes?)
- other TIMS users?

- client companies, contractors, other non-TIMS DOC staff, and non-DOC contacts?
- research and information databases?

How often are the default or automatic options used? For what purposes and at what command level?

What types of errors do users tend to make and how frequently are they made? Does TIMS help them recover satisfactorily from the errors?

1.5.3 Impact on Functional Specifications

Chapter 3 of this report provides specific functional specifications to meet automatic measurement needs, both at the overall TIMS level, for needs that are common to all tools, (Section 3.1), and at the individual tools level, for needs that are unique to each tool.

1.6 Methodology, Scope and Contents of this Report

Many EDP consulting methodologies assume the environment of traditional Management Information System (MIS) applications development (manual or automated). These applications are best described in terms of inputs, processes and outputs, and the intent is usually to develop a rigid, structured, specialized application.

This approach is less than ideal for the objectives and the classes of requirements of the TIMS project. The requirements identified are not for one or more self-contained, specific applications but rather for a family of complementary, compatible, flexible tools which can meet a wide range of application needs, some well documented, others as yet unknown.

There are three dimensions to any system or tool:

1. the required (and desired) functional capabilities;
2. the intended (or anticipated) use of those capabilities; and
3. the required (or suggested) implementation or technical realization of those capabilities.

This documentation is intended to describe only what each required TIMS graphics tool must be able to do. The Requirements Report and the Utilization Assessment Criteria Report outline how these capabilities are anticipated to be used.

The question of how the capabilities should be implemented is left to the prototype procurement activity.

The four key aspects of the functional capabilities specification for the TIMS graphic tools are:

- the mandatory and desirable capabilities of the tools, from the user's perspective;
- the relationship of each TIMS tool with the others and with other, non-TIMS tools (present and potential future) in the user's environment; and
- the level of performance necessary to achieve user satisfaction and acceptance; and
- the monitoring needs of the utilization assessment team that must be met automatically by data collection and activity recording features of the tools.

The first of these features is documented through an overview of the tool "set", presented in Chapter 2, and through detailed functionality description for each tool (derived from Chapter 4 of the Requirements Report), presented in Chapter 3.

The second aspect (inter-relationships) is documented in Chapter 3, through a description of the anticipated interfaces between the individual tools.

The third aspect (performance) is documented primarily through a checklist of performance expectations in general and for each tool, in Chapter 3.

The last aspect (measurements to support utilization assessment) is also documented through checklists in Chapter 3.

Data flow diagrams, function hierarchy diagrams, data dictionaries, and other items often found in functional specifications for traditional MIS systems would be of little information value in this scenario, and are included in this document on an exceptional basis, where they are of real value in communicating one or more of these four aspects. We are reluctant to describe functional hierarchy where no such hierarchy exists in the framework of the user's needs and conceptual expectations. To do so may limit the ability of some suppliers to meet the prototype needs with their available products.

Similarly, we have deliberately avoided the inclusion of system specifications, system design notes, or other technical aspects except where necessary to protect and reflect the user's needs. This is in line with our mandate and terms of reference for this assignment.

2. SYSTEM CONCEPTUAL OVERVIEW

2.1 Introduction

This report focuses on the graphic support needs only. This reflects the scope and mandate of this project, which is to identify those needs that can be met through the application of Telidon technology, as a subset of the systems that would be required to support all office processes.

The study team approached the requirements data gathering and analysis activity for this project without pre-conceived solution biases. Our methodology allowed for the study of needs at two levels:

- functions or tools, and
- applications.

Functions or tools are generic capabilities that may be used for a variety of purposes. Applications are usually complete solutions to specific needs or problems.

The results reflect a strong emphasis on the first category of needs, in all graphic areas. Although this may be surprising to those who expected there to be strong specific application-level needs, we believe that the results are reasonable.

Because of the organizational youth and changing mandates within ADMTI, many potential users are unsure what their specific application needs may be six months into the future, but are quite confident that their activities will be generally of a nature that will almost certainly require the support of certain generic tools.

Current professional thinking, both within ADMTI and in the industry in general, is that to be successful, graphic aspects of the automated office must be completely integrated with all other aspects. While relatively few office applications are exclusively graphic, many are impractical to implement without some (at least primitive) graphic capabilities, and many more would benefit from, but do not absolutely require, graphics.

In several areas within ADMTI, electronic office tools are beginning to be made available to management, project officers, and/or administrative staff. These consist mostly of:

- arithmetic and analytical tools (spreadsheets, for example);
- communication tools, (telephone management, etc.);
- text creation and text management tools; and
- time management tools (calendars, etc.).

The functions specified in this report are a set of automated graphics creation and management tools which can be used independently for exclusively graphic applications, and

integrated with other tools to create more complex, multi-functional applications. It is envisaged that over time, additional needs in the target user areas can be met through the development and implementation of more traditionally "office automation" applications, (forms management, filing, cataloguing, correspondence tracking, teleconferencing, mail and messaging, electronic procedures manuals, etc.), utilizing the graphic tools and other tools to varying degrees according to the characteristics of each application. In fact, we expect that, as they become familiar with the tools available to them, some users may begin to develop their own specific applications, to meet individual needs.

Although this approach of providing basic tools at first, followed by application-level systems, is evolutionary rather than revolutionary, we believe that it will result in a more successful pilot, and better user acceptance of these new tools without unnecessary "cultural trauma" in the changing office environment.

The remaining sections of this chapter will discuss the TIMS graphics capabilities at the tool box level. Section 2.2 will provide a system overview of the functional capabilities while section 2.3 will cover the interfaces of TIMS with other systems both for the pilot project and as anticipated in future use.

In Chapter 3 we will open up the tool box and look at each of the main graphics tools in greater detail.

2.2 TIMS System Functional Overview

A TIMS workstation will provide access to a set of powerful graphics aids. Before discussing each tool in detail it is important to understand the capabilities of TIMS as a whole. This section will cover significant features of TIMS at the tool box or tool set level.

2.2.1 TIMS Major Functions

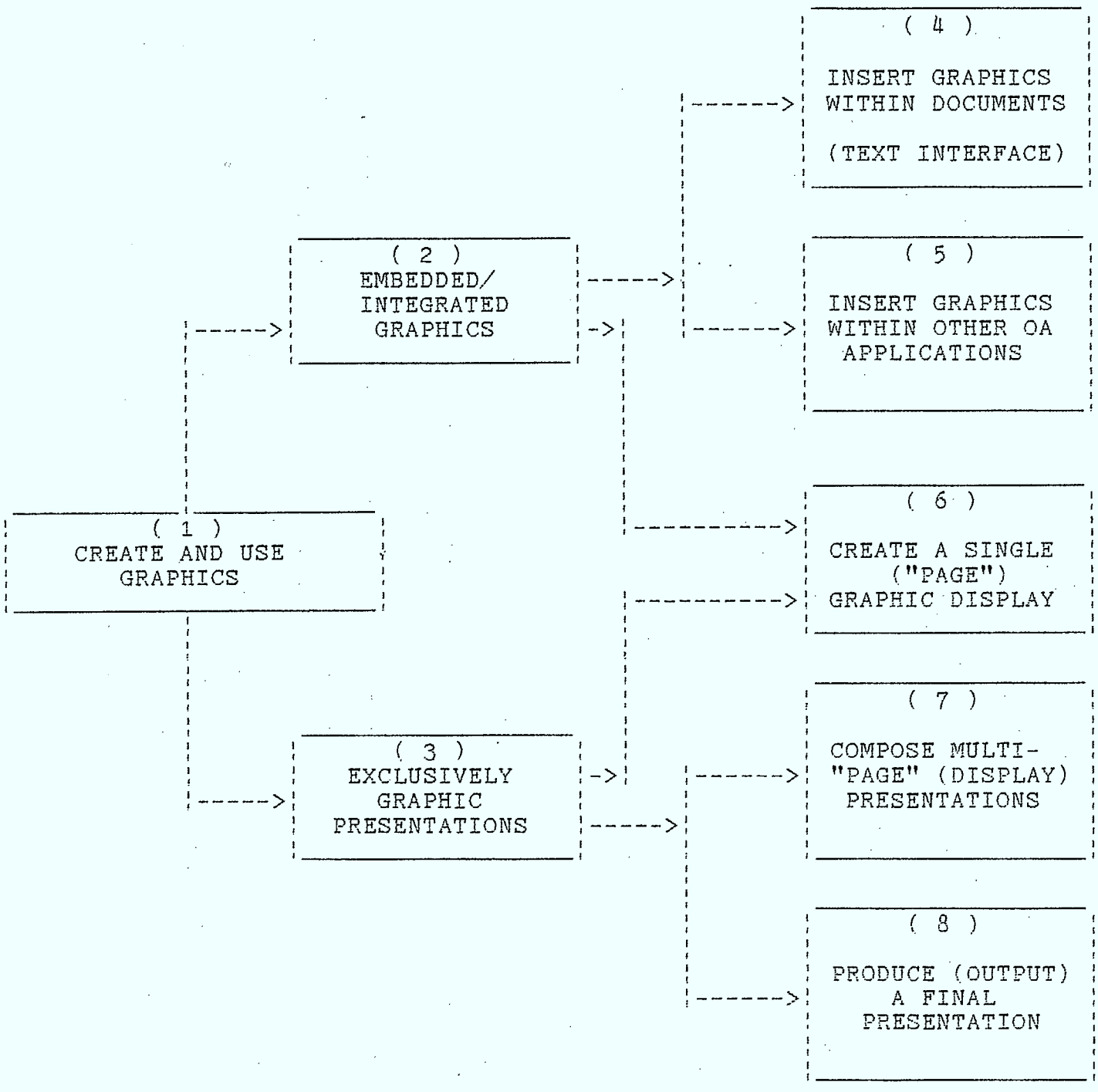
TIMS's sole purpose is the exploitation (creation and use) of graphic images. However, these graphics are part of a larger more fully functional office automation environment. The use of TIMS will fall into one of two major categories:

- situations where the application is exclusively graphic (TIMS can do the whole job), and
- situations where TIMS creates graphics which are to be inserted or embedded in a task that will be completed by some other office system (manual or automated).

Both types of graphic assignments require the ability to create a single page display, but when TIMS is doing the complete task it must also be able to use and output the final product, either electronically or through conversion to another medium.

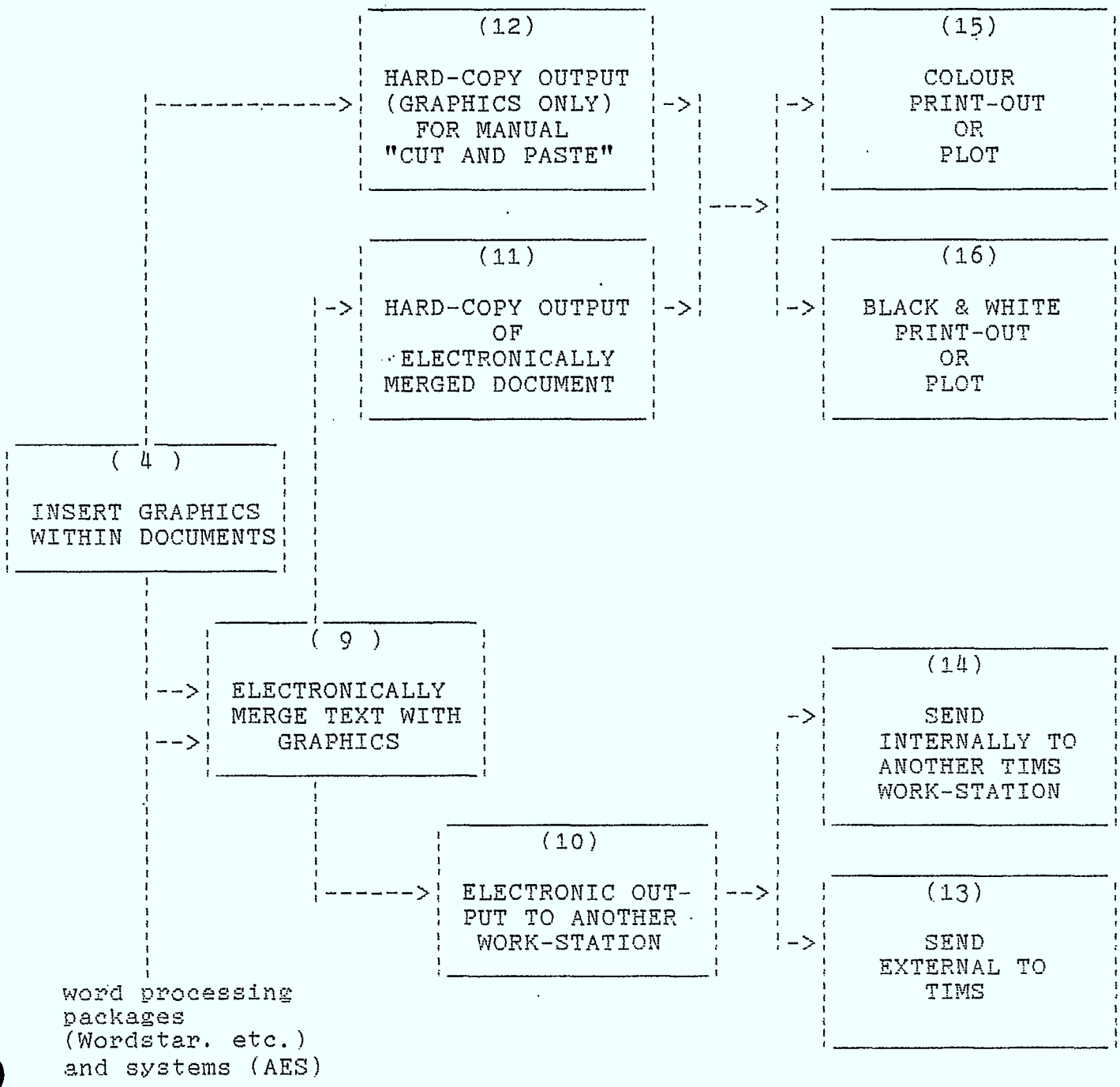
TIMS graphic inserts (the second category above) can be further classified into those to be embedded in a large textual document and those to be passed to another office application. The following diagram shows these high level functions and numbers them for future reference. Each of the low level functions (boxes 4,5,6,7 and 8) will be discussed subsequently.

Please note that in this and all diagrams in this section. the functions or activities become more specific and more elemental as one moves from left to right across the page. Functions to the right are generally components of broader functions to the left.


(1)
CREATE AND USE GRAPHICS
(2)
EMBEDDED/ INTEGRATED GRAPHICS
(3)
EXCLUSIVELY GRAPHIC PRESENTATIONS
(4)
INSERT GRAPHICS WITHIN DOCUMENTS
(TEXT INTERFACE)
(5)
INSERT GRAPHICS WITHIN OTHER OA APPLICATIONS
(6)
CREATE A SINGLE ("PAGE") GRAPHIC DISPLAY
(7)
COMPOSE MULTI-"PAGE" (DISPLAY) PRESENTATIONS
(8)
PRODUCE (OUTPUT) A FINAL PRESENTATION

2.2.2 Insert Graphics Within Documents (4)

In order to create complete documents TIMS users must be able to compose graphics sections and insert them without interfering with the formatting or layout of the non graphics segments. The following diagram illustrates the capabilities that this function requires.



It must be possible, manually and/or electronically, to access the textual portion of a document and merge the TIMS graphics with the text, displaying the result on a TIMS workstation, outputting the final result electronically or producing a hard copy of the document. The textual portion of the document will have been created on a word processing package co-located with TIMS on the user's work-station, or on a stand-alone word processing system (AES) that is outside TIMS. Electronic transfer may be within TIMS for storage and retrieval at other TIMS workstations or to external office/word processing systems. The hard copy may be a complete document or may just be the page with graphics for manual insertion or cut and paste with textual material.

2.2.3 Insert Graphics Within Other Office Applications (5)

Table B (Office Applications) of Appendix A identifies the graphics requirements of several typical office applications. Section 2.3 discusses the TIMS interface requirements to these applications. These sections are quite brief because as previously stated in the requirements report, the main purpose of the TIMS pilot concerns the acceptance and use of these graphics tools in an office environment rather than immediate implementation of complete office applications.

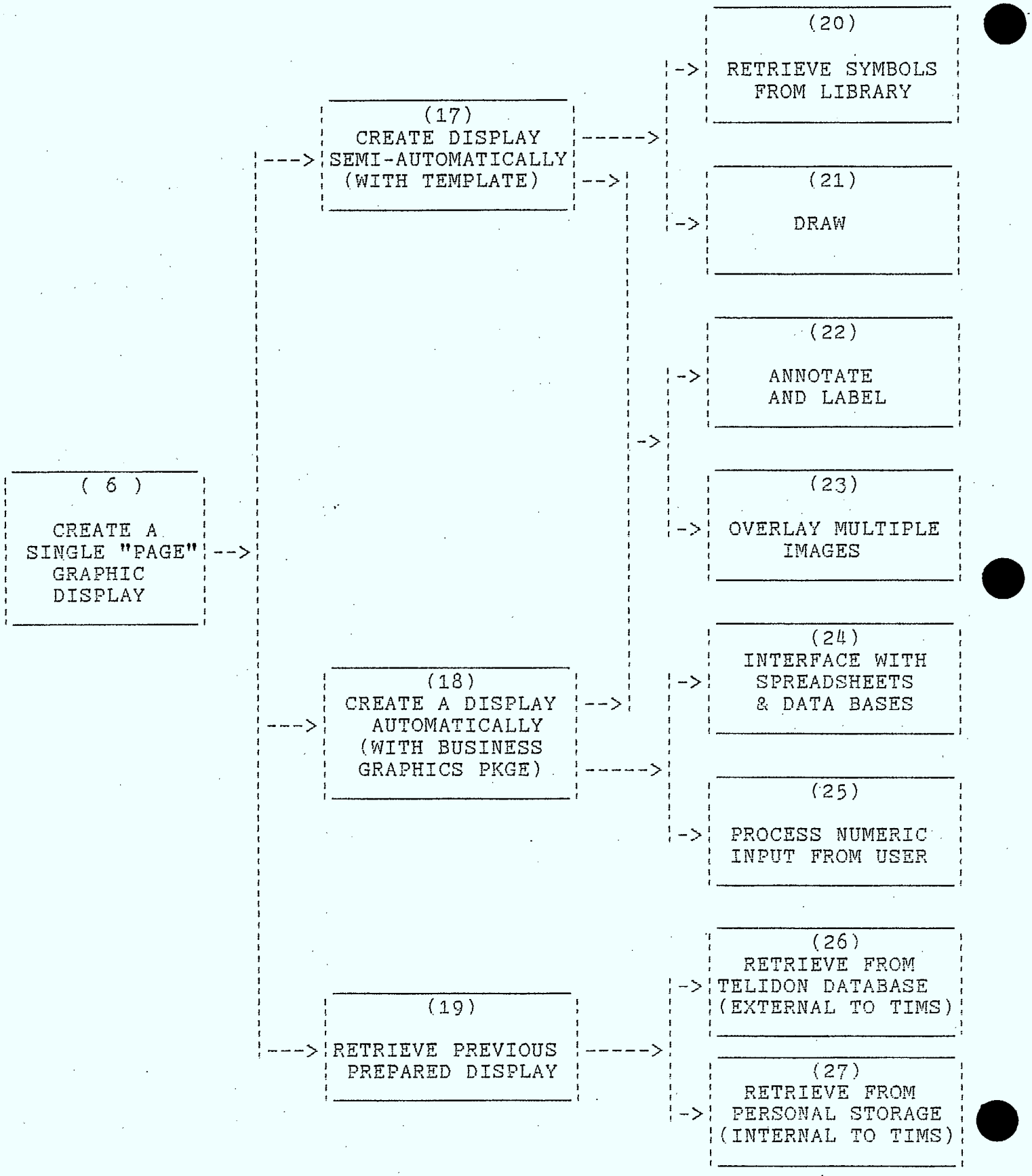
2.2.4 Creation of a Single Page Graphic Display (6)

The diagram on the following page shows the capabilities TIMS must have to be able to create a single page of graphics.

TIMS must be able to assist a user in creating a single display by accessing a library of graphics components (e.g., symbols, backgrounds and layouts), by drawing lines and/or geometric shapes as requested by adding textual annotations and by overlaying all these components on either a blank display or on previously defined displays.

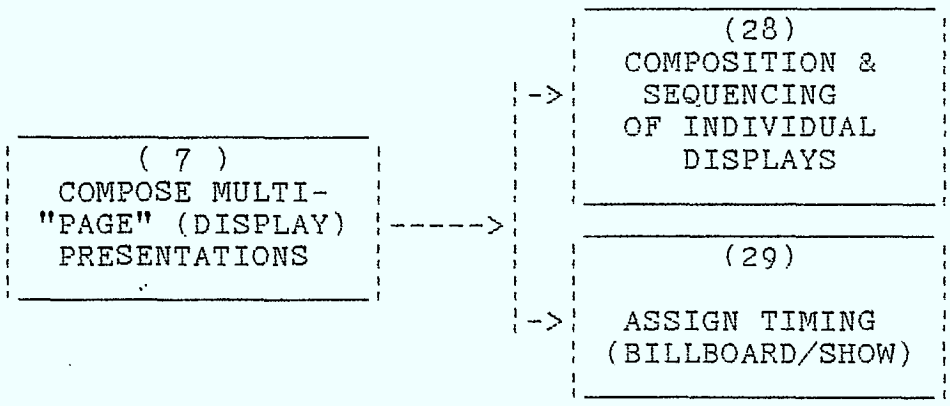
TIMS must also be able to automatically generate some graphics displays. Initially this is intended to be used for the generation of pie charts, bar charts and other simple business graphics. TIMS must be able to accept numeric data from spreadsheets and databases (both internal and external to TIMS) and to generate complete graphics with little or no further information from the TIMS user.

Finally TIMS must support the storage and retrieval of previously created graphics displays both from external Telidon data bases and from within TIMS.


(6)
CREATE A SINGLE "PAGE" GRAPHIC DISPLAY
(17)
CREATE DISPLAY SEMI-AUTOMATICALLY (WITH TEMPLATE)
(18)
CREATE A DISPLAY AUTOMATICALLY (WITH BUSINESS GRAPHICS PKGE)
(19)
RETRIEVE PREVIOUS PREPARED DISPLAY
(20)
RETRIEVE SYMBOLS FROM LIBRARY
(21)
DRAW
(22)
ANNOTATE AND LABEL
(23)
OVERLAY MULTIPLE IMAGES
(24)
INTERFACE WITH SPREADSHEETS & DATA BASES
(25)
PROCESS NUMERIC INPUT FROM USER
(26)
RETRIEVE FROM TELIDON DATABASE (EXTERNAL TO TIMS)
(27)
RETRIEVE FROM PERSONAL STORAGE (INTERNAL TO TIMS)

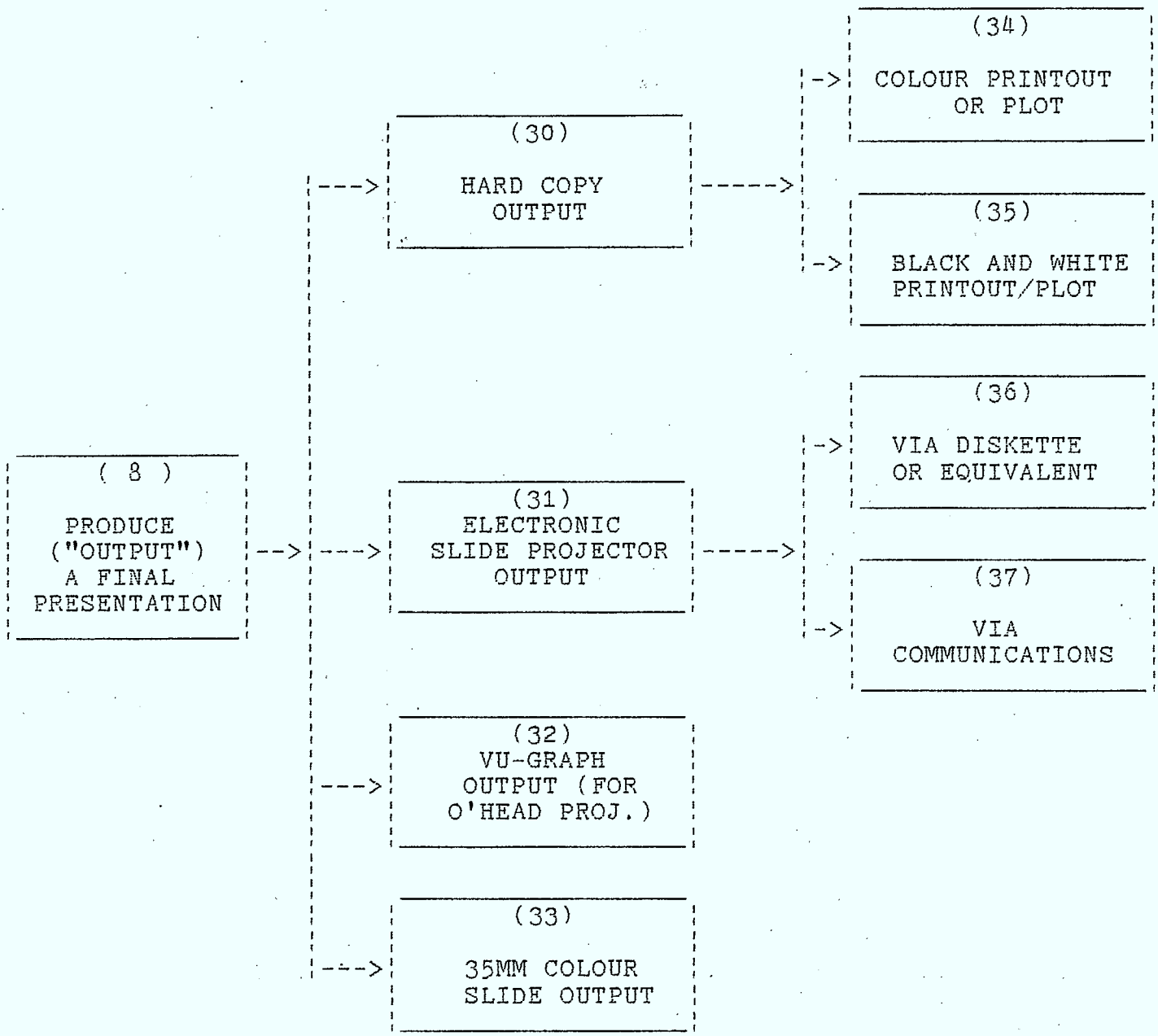
2.2.5 Composition of Multi-page Graphic Presentations (7)

For applications that can be completed by TIMS the capability to create multipage graphics documents is essential. This will require the ability to sequence a series of graphic pages, to optionally specify timing delays within the sequence and to view the resultant presentation on a TIMS workstation. (see the following diagram)



2.2.6 Produce (Output) a Final Presentation (8)

TIMS user must be able to output created graphics documents into various physical or electronic media for distribution. A typical example would be the production slides for a formal presentation. TIMS must be able to produce 35mm slides, vu-graph overhead foils and paper hard copy of graphics documents. These various media must be available in either black and white or colour. Distribution must also be possible via diskette or electronic data communications to other TIMS users as well as to destinations external to TIMS (databases and terminals), where equipment and functional compatibility exists.



2.3 TIMS Interfaces

Initially TIMS will be presented to the alpha and beta pilot study groups as a set of tools that they may use to produce graphics for their office work. There will be no emphasis placed on specific DOC applications. It is anticipated that after the pilot project has been completed the user interface to TIMS will have been thoroughly tested and modified until it has gained the acceptance of the test users. If the pilot has been a success it is expected that specific applications will be identified for implementation during the subsequent phases of the project and at this point the external and internal interface requirements of TIMS will change significantly.

2.3.1 Immediate Needs

For this pilot only the interfaces with word processing packages and spreadsheets will be necessary. Word processing packages available at the pilot test sites now include Wordstar, Multimate and Word Wand. These are running on the IBM-PCs under MS-DOS and Hyperions under MS-DOS. There are also several models of AES stand alone word processors currently in use. Word processing documents from these systems would hopefully be passed to TIMS electronically for insertion of the TIMS graphics displays.

Automatically created pie charts, bar charts and graphs will require the ability to retrieve sets of numbers from spreadsheets and/or databases. Currently only LOTUS 1-2-3 is used in the pilot sites. It is expected that data will be passed from LOTUS 1-2-3 to TIMS and it is hoped that transfers from other packages will be done through a Data Interchage Format (DIF) interface to TIMS.

2.3.2 Future Needs

During the TIMS pilot several office applications that would benefit from the addition of graphics are likely to be identified. Several were raised as possibilities during the interviews and focus groups for this study. Any TIMS pilot system must at least allow for the future interface requirements of these applications which are each briefly discussed below.

1. Tracking System

   There are many different things to keep track of in an office. Examples include correspondence tracking, financial tracking and periodical distribution tracking. In each case some task must be (or should be) completed by a particular due date. The responsible person should be notified automatically when an event has not happened on schedule. Graphics helps tracking systems in three ways. First, simple lines and tabular logs help make the system user friendly. Second, overdue events can be prioritized

and/or highlighted by the use of colour. Third, statistical data from the tracking system can be passed to TIMS to produce bar or pie charts of an organization's performance e.g., average turnaround for an item of correspondence, percentage of tasks completed on time, number of projects completed on budget, etc. A flexible general purpose tracking system is a very powerful office application and one or more specific tracking systems are expected to be identified for graphic enhancement by the end of the TIMS project.

2. Electronic Procedures Manual

Most large organizations have problems controlling the production, maintenence and distribution of procedure and policy manuals. Graphics can assist both by making the manuals visually more colourful and varied (through the use of different font and pitches) and by the inclusion of diagrams to produce a picture of the sequence of events and decision points during a procedure similar to the use of flow charts by a computer programmer. TIMS will need to be able to interface to such a system: and, if possible automatically redraw these procedure diagrams when changes to a procedure are entered in a manual.

3. Bibliographic/Periodical Cataloguing

Automation can assist in the searching or updating of a large bibliographic catalogue and Telidon graphics can provide a much more eye-pleasing colour code format for such a catalogue. TIMS would have to be able to interface with the data base portion of such a catalogue and automatically generate the correct format and colour of each screen and entry. It would be desirable to be able to do this with commercial bibliographic systems such as UTLAS and DOBIS. A Telidon interface has already been developed for the bibliographic system, MINISIS.

4. Electronic Forms System

Most offices are awash in a sea of forms. Any large organization would benefit from the ability to easily create forms while simultaneously warning users of duplicated forms or data fields already in existence. Graphics would clearly assist by allowing the actual forms to be drawn on the screen, but another key ability is to take the data entered on the form, strip out the graphics and pass the data to local and/or remote data bases. TIMS should be able to have a two way transfer of ASCII data from most common database packages to a TIMS forms creation/management application.

5. Telephone and Time Management

Most managers operate under extreme time pressure. A good telephone and time management system frees up some of an executive's valuable time and allows him to schedule his time more effectively. Graphics are useful in producing calendars, (day timers, etc.) in a more natural, pleasing way. Colour can be used to priorize and/or emphasize particular entries in the system. TIMS will have to be able to interface with a local TIMS data base facility and to generate dynamically changing (real time) displays.

6. Common Visual Workspace

A common visual workspace is a type of video conferencing where several users can be looking at an identical display screen while one user (in real time) modifies or adds to what they are currently viewing. The TIMS interface to this application would be restricted to the ability to pass Telidon graphics to the application software. The result would be to add the capabilities of TIMS to the workspace application.

7. Project Management Package

Users, especially in the alpha pilot site are currently using LOTUS 1-2-3 as a project management tool. They would clearly benefit from a specific project management application package running on the TIMS hardware. The TIMS interface would be limited to accessing the application data and to automatically passing back pre-defined graphic images.

8. Computer-Aided Instruction

Although not identified as a strong immediate need, there is a potential future need for one or more computer-aided instruction applications, to train office workers on the use of new office systems and technologies, and/or to give them background education in specific subject areas related to their ongoing policy analysis, evaluation, application development and related mandates and activities. TIMS tools, especially the production/presentation/media conversion capability and the graphic creation capability, could be helpful in making this instruction effective and user-friendly.

9. Automatic Spelling Checker

There was an identified need to enhance current word processing packages by adding an automatic spelling checker. However, this application was not expected to benefit significantly from the addition of graphics. If other requirements result in the development of a capability to extract the text from a TIMS display, it would be possible to apply the spelling checker to the "proofreading" of TIMS graphics, through the use of the text extraction capability.

3. Detailed Functional Description

3.1 Introduction

The system overview in Chapter 2 discussed TIMS at the tool box level. Now it is time to open the toolbox and examine the tools individually. The diagram on the next page depicts the four major tools and how they interact on a very high level.

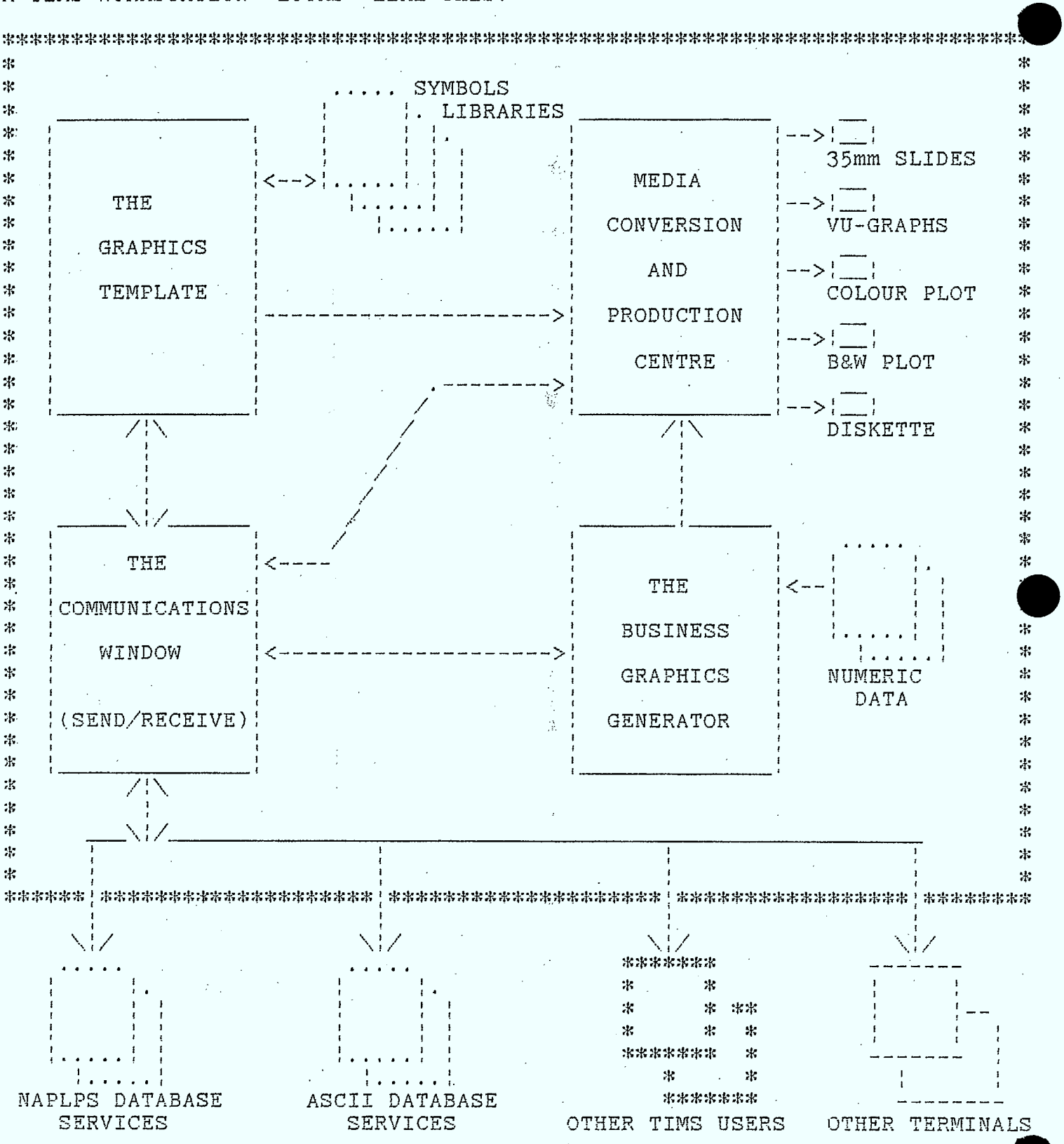
This chapter contains the detailed functional description for each graphics tool.

Each tool is addressed by a separate section. Within each section, subsections describe:

- user profile and anticipated application;
- functions (from Chapter 2) supported;
- mandatory capabilities;
- desirable capabilities;
- interfaces;
- performance needs and guidelines;
- monitoring/measurement capabilities; and
- design/configuration considerations (only where necessary).

In support of the description of "mandatory" and "desirable" capabilities, "interfaces" and "design considerations", Appendix C contains a sample functional implementation, to provide some concept of the user interface requirements.

A TIMS WORKSTATION "LOOKS" LIKE THIS:



Several required features or characteristics were identified as mandatory for all graphic tools, and in fact for any automation or technology to be introduced to ADMTI. These are described here to avoid repetition:

1. Training Support

Formal scheduled training sessions geared to non-technical personnel, must accompany each new tool or system. It is recommended that two different types of training be provided.

The first type of training would be for the end user. It is suggested that one day of training be provided to give an overview of TIMS and that from one half to one and one half additional days of training be provided for each of the four major tools.

In addition two people should be trained for the role of co-ordinator/TIMS System Administrator for the pilot project. This would involve end user support (questions, problems, etc.), doing regular file back ups and providing basic system administration and maintenance (adding new users, assuring security/access controls are in place, contracting hardware and software maintenance people as needed to ensure TIMS is always up and running, etc.). The co-ordinator should recieve 5 to 10 days of extra training for these roles in addition to the regular end user training.

The suppliers of the hardware and software should provide a toll-free telephone hot line to provide any necessary telephone-based technical support to the co-ordinator. On-site support should be provided by personnel equipped with "beepers" or equivalent, to minimize any delay in servicing the users.

2. Documentation

Concise yet thorough documentation must accompany each new tool. This documentation must be geared to non-technical, inexperienced staff at management, professional and clerical levels, and must be free of jargon. Manuals provided must include:

- a training manual which walks users through TIMS and its features in a phased easy to learn way;
- a reference manual which is aimed at providing experienced TIMS users with detailed information on all the features of TIMS: and
- a quick reference card for assisting experienced TIMS users with infrequently used TIMS functions.

It is desirable that an on-line tutorial be provided that would allow users to teach themselves how to use TIMS or to refresh their training on an "as needed" basis. Where appropriate, keyboard templates should be used.

3. On-line Help

User friendly explanations of options/errors and required user actions should be readily available to the user at his work-screen.

4. Ease of Use

TIMS will be used by a wide range of office staff. The most frequent users are expected to be DOC professional staff (project officers and financial officers) who will need to produce presentations or to create graphics for published papers and reports. However, clerical staff will also use TIMS both for regular periodic reports of a fixed format such as the "Level 1 Report" (monthly Branch-wide staff project status reporting) or to assist managers and professionals in the completion of graphic material. Even middle and upper management may be infrequent users if only to view briefings or presentations that have been prepared for them or their superiors. No users will be expected to be familiar with Telidon or with the detailed operation of graphics devices or systems.

This will only be possible if TIMS is extremely easy to use. TIMS will have to take what data and instructions are given to it and make logical decisions to fill in any missing information and produce a final graphic image. It should also be simple to over-ride the system's assumptions and to change colours, backgrounds, layouts, scalings and labelling in order to experiment with the result and produce an acceptable final product.

Where commands must be keyed in rather than selected from a menu, it should be possible to enter the whole command word or a short form comprised of enough of the first letters of the command so as to be unique to the system. If possible, soft-keys and/or on-line menus should be used. Dataset names, and other workstations and computers with which the user communicates regularly, should be selectable from a directory menu or equivalent.

While it is important to minimize the user's typing effort, the commands must be clearly understandable without memorization. For example, the approach taken by Micropro in the design of the "WORDSTAR" command set, would be unacceptable.

Where menus or soft-keys are used, "help" must be a selection on each soft-key line or menu. (It should explain all other items on that menu.)

Each tool must be able to recover from all possible user typographical errors, invalid responses, etc.

5. Bilingual Requirement

Users at any TIMS workstation must be able to easily select and use either an English or French version of TIMS. TIMS must support the entire user dialogue, including all commands, in either language.

6. The Diskette Jungle

There is a growing concern that as offices become automated, workstations that use diskettes for local storage of applications, tools and information, may replace the paper shuffling burden with a diskette shuffling burden. If a microcomputer-based TIMS system is installed which uses diskettes, all TIMS software must be stored on one diskette and one diskette must be capable of storing multiple TIMS data files. Every effort must be made to integrate the TIMS tools in such a way as to minimize the unnecessary proliferation and handling of diskettes.

7. Physical Space Consumption

Many potential TIMS users already have more equipment than room in their offices. The provision of extra furniture (trolleys, tables, desk extensions) to hold this equipment can be a problem, in the ADMTI environment. Therefore, the equipment provided to achieve TIMS functionality should be as compact and unobtrusive as possible, and compatible with professional, executive and clerical office/cubicle space constraints. TIMS should require only one keyboard and one monitor. The monitor should support the range of display requirements of all TIMS tools, and other applications required by the user, including a range of resolutions and monochrome as well as colour.

8. Physical Environment Constraints

For those TIMS components that are generally to be installed in user's offices, the equipment must not have air quality, temperature, humidity, static electricity, power supply, communications or other requirements beyond those that would normally be satisfied by an air-conditioned government office building environment such as that of the Journal Tower complex.

9. Availability For Use

The tool is required to be available for use on an uninterrupted basis (at the user's option) any time during normal office hours (mandatory), and preferably 24 hours per day, 7 days per week, to accommodate overtime working hours.

10. System Reliability

The common industry standard for system reliability/error rates (95% or better error-free operation) should be considered as an absolute minimum. 98% or better would be preferable.

Because of the office oriented, non-technical environment and the need to avoid user inconvenience, very low "Mean Time Between Failures" (MTBF) and "Mean Time To Repair" (MTTR) ratings are important for all hardware and software components for TIMS. Vendor after-sale service is important.

11. System Security

Security protection at two levels is mandatory. The levels are:

- Each user must be able to control access to his/her personal symbols library and other files, by any other persons.

- Each major organizational unit/pilot site must be able to limit access by any users outside of that unit or site, to any of its TIMS files.

An intermediate level of security, on a group-within-organizational-unit basis, is desirable.

12. System Backup Procedures

In anticipation of a possible decentralized, PC-based implementation making substantial use of tape, diskette, and/or hard disk files on individual workstations, a formalized, centralized backup procedure may not be practical. Users should be encouraged (during the training programme and periodically thereafter) to make frequent backups of important libraries and files. Any central files such as the master or common symbols libraries should be backed up by the system automatically whenever updated.

13. Utilization Monitoring/measurement Capabilities

The system should maintain a counter for each tool, and increment it each time the tool is accessed.

The system should record time spent by each user using each tool. Specifically, it should record how many minutes pass while the user is actively using the tool. If more than one minute passes while the system is awaiting input from the user, the system should stop counting time until the user enters a new command. This will prevent "interruption time" (while the user temporarily suspends activity with this tool to respond to telephone or other interruptions) from being accidentally counted as time using the tool.

Many decision points and parameter assignments (such as the selection of colours and textures, etc.) will give the user the option of letting the system select or assign a default decision or parameter for him. In these cases the system should record the number of times (relative to total usage frequency) the user chooses an automatic/default option.

The system should maintain a counter and increment it each time any tool rejects a user input at a menu option level. The actual invalid response need not be recorded. The requirement is for an error counter for each major menu item, so that analysis can be done as to specific training or system streamlining needs.

If the tool has the ability to work in black-&-white or colour creation mode, the system should record the relative frequencies of the selection of each of these modes by the users, at an aggregate level for each of the pilot sites.

These measurements should be transparent to the user. They should be automatic, requiring no action by the user.

Periodically, (perhaps daily or weekly), the system should summarize these measurements to create a record of the time and frequency results by day or week. These results should be reported in a simple hard-copy report, consolidated for each of the alpha and beta sites, on a monthly basis. Ideally, the daily or weekly summarization activity (which also re-sets the counters) would be automatic, but the monthly reporting would be done at the initiative of the system administrator.

3.2 The Graphics Template

User Profile and Anticipated Application:

Users are expected to include professional staff (project officers), clerical staff (working on behalf of management and professional staff), intermediate and occasionally senior management. Uses are expected to include:

- manual creation of pie charts, bar charts, graphs, organizational charts, tables, schedules, and other simple diagrams, as part of the process of creating reports, published papers, memos and other documents including the Level 1 Reports. (This is necessary, for example, in situations where numeric values are not readily available, and hence the business graphics tool (Section 3.3) cannot be used, yet there is a need to graphically portray a concept);

- preparation of exhibits and graphics of a similar nature, for formal presentations and briefings;

- possible use for decentralized creation of simplified content for videotex databases within the sector, directly by professional and administrative staff:

- possible utilization to create the standard forms to implement future electronic forms creation & management applications, correspondence/financial/periodicals tracking logs, and cataloguing applications:

- possible utilization to prepare diagrams to support electronic procedures manuals applications.

Functions (from Chapter 2) Supported:

The Graphics Template's primary role is the semi-automatic creation, manipulation, storage and retrieval of graphics. These may be embedded in textual documents and other non-graphics office automation applications, or may form exclusively graphic presentations. It supports the functions represented by boxes 1, 2, 3, 4, 5, 6, 9, 17, 19, 20, 21, 22, 23, and 27 from the system overview diagrams in Chapter 2.

Mandatory Capabilities:

This tool should not be confused with currently available full-NAPLPS page creation systems. While page creation systems might be considered as a powerful electronic replacement for various coloured pens, pencils, compasses, etc., the tools required here would be the equivalent of a template of pre-defined symbols such as a programmer's template. The emphasis is on the standardization of symbols and on very high levels of user friendliness, specialization and automation. Current page creation systems are too comprehensive and too powerful in a general way, and would require too much user training to be universally accepted and used by office workers at all levels. (This does not mean that current page creation systems could not be simplified, adapted, or "front-ended" to meet the needs identified.)

This "ELECTRONIC GRAPHICS TEMPLATE" must have these features:

- It must have a library of frequently used symbols, such as circles, rectangles, arrows, brackets, pie segments, greek symbols, etc., plus a selection of standard backgrounds, borders, and formats or skeletons for repetitive presentations. The basic symbols should be in a TIMS "master library", while the background and skeletons should be in a common library for the organizational unit.

- It must be possible to add to or modify these libraries, possibly at the worker's station and also at a central "master" station within the organizational unit. The "master" station may have additional NAPLPS

page creation capabilities not available on regular workstations. (There should be some control over the content of the "master and common" libraries, but individual users might have one or more local personal libraries, with additional symbols and skeletons commonly used by that user.) The "master" station concept does not necessarily require a network linking the master station with other workststions. The master library could be replicated (via floppy diskette, for example) on all user workstations.

- The user must be able, through simple commands, to retrieve symbols from the library by name, scale them up or down in size, rotate them, place them anywhere on the screen, add other symbols, connect symbols with lines, and change the texture of symbols and lines (dotted, dashed, etc.). He/she must be able to annotate or label the diagrams with text in one or more of several standard (pre-selected) character size/font combinations, and in a variety of orientations (horizontal, vertical, etc.). He/she must be able to specify one of several (at least 8) standard pre-selected colours for any one or more lines, symbols, labels, etc. (Discussions with users indicated that the diverse colour capabilities of full NAPLPS are not needed in this environment, and in fact may be detrimental in preventing standardization and/or creating more complex colour choices.)

- It must be possible to overlay one symbol, a section of a screen, or an entire screen with another.

- Resultant composite graphic creations must be scalable, movable, and storable at or from the user's workstation for later retrieval by keyword/label.

- The tool must automatically record the date each graphic was created, and optionally (at the user's request) automatically display the date when the graphic is displayed. It must also be possible to display the graphic without the date, on an "over-ride" basis. Ideally, the time and author should be recorded in the same manner.

- It must be possible to print or plot each graphic in a convenient manner, either locally at the user workstation and/or through the media conversion and production facility (Section 3.4). It must be possible to easily send graphics to this facility for conversion to other media, and to send them to other users and destinations through the communications tools (Section 3.5).

Desirable Capabilities:

- It is desirable for users to have the ability to create timing and animation effects by creating graphic compositions which deliberately use pauses and/or overlays for these special effects.

- It would be useful to be able to create single graphic images which are larger (in size/resolution/content) than the user's workscreen can display. This would involve "windowing", allowing the user to see any contiguous segment of the image at one time, and facilitating transfer of the complete image to the media conversion and production facility (Section 4.4), for printing as one complete display on a high-resolution colour or black and white plotter/printer. For example, a user could create an organizational chart that is larger and more complex than would normally be possible with his normal-resolution workscreen, by moving his "window" (his display) from one part of the chart to another. At any one time he would see only a portion of the chart, but could overlap windows to aid in drawing connecting lines, etc. When complete, the chart would be sent to the central production/conversion facility (see Section 3.4) for plotting on a high-resolution (8-1/2 x 11 or larger) colour or black-&-white printer or plotter, with the aid of a "window composition" capability at that facility.

- There is a need to create relatively detailed or complex diagrams that would require a resolution twice that of normal Telidon, (i.e. 512 x 400 pixels rather than 256 x 200). This would allow more detailed diagrams and graphs, finer annotation and labelling, and the display of 80 columns or characters per line of display. (Even higher resolution, such as approx. 1000 x 1000 or 2000 x 2000, is desirable if it does not negatively impact user friendliness, but is not necessary.)

- Integration with word processing systems and packages currently in use or anticipated to be in use within ADMTI, is highly desirable. This includes Wordstar, Multi-mate, Word Wand, and potentially other packages on the same work stations, as well as the stand-alone AES word processors currently in use, if possible. This involves the user being able to switch back and forth between text creation and graphics creation modes during preparation of documents, and to conceptually place the graphics within the text, for distribution of these documents through the graphic communications and conversion/production facilities.

- If possible, the tool should provide the user with an easy ability to work in black-&-white mode during the

actual creation/review activity, to visualize and fine-tune a result that is destined for distribution to black-&-white displays or printer/plotters. This would not need to record colour attributes for later conversion to colour: it would only be used for "black-&-white only" applications.

Interfaces:

The Graphics Template passes completed graphics displays to the Media Conversion and Production Centre where they are incorporated in a completed presentation and/or produced as hard copy output. Graphics images can also be sent to and received from other workstations or data bases via the Communications Package. The Template uses disk storage within TIMS to store or retreive formats, backgrounds, symbols and completed displays. The Graphics Template does not, however, directly access the Business Graphics Package.

Performance Needs and Guidelines:

Response Time Performance:

Instantaneous response is required to any user action at a menu level (or equivalent) that results in another (usually lower-level) menu being displayed.

1/2 second response or better is required in the verification and acceptance/rejection of a menu selection or basic command.

1/2 to 5 seconds response is required, depending upon the complexity of the operation, to perform graphics operations such as scale, rotate, colour, overlay, etc. For example, colouring, scaling, and rotation should be achievable in 1/2 - 1 second, complex sub-graph overlays in 3 - 4 seconds, and "saving" a file (to non-volatile storage such as diskette or hard disk) in 5 seconds.

Any action which takes longer than 1 second should display a "PLEASE WAIT" or equivalent message (blinking if possible), so the user will not worry that something is wrong.

Ease of Use:

In addition to the general comments regarding training, documentation, on-line help, tutorials, diskette use, etc., (Section 3.1) which apply for this tool, this tool should require no more than 10 keystrokes in 3 commands (including the perusal of possible multiple menu levels) to select a parameter value. (such as selecting a colour) and no more than 15 keystrokes in 3 commands to select and execute an operation such as "rotate 45 degrees". This should be considered a target for maximum user effort. These limits may not be achievable for one or two commands, and many other commands should be manageable with fewer keystrokes than these limits allow for.

Volumes and Capacities:

We expect between 50 and 150 pages or graphic images to be created per user with this tool, on average, during an initial 3 to 4 month trial period. However, there are likely to be extremes of zero and nearly 1000. Many of the creations will result from the revision, updating, or enhancement of previously created images. We expect relatively few of these will be deleted, so the storage requirements are likely to grow linearly throughout the trial.

Most pages will be of average complexity, making extensive use of polygon and line mode PDI's, and including a great deal of text. Less than 20% are expected to use high resolution.

Monitoring/measurement Capabilities:

Specifications under this heading in Section 3.1 apply, as do the following additional notes.

The system should maintain a counter and increment it each time a page or completed graphic is successfully created, i.e. is stored and/or sent by the tool (but not when a graphic is abandoned).

This tool should also record the frequency of access by users within each of the alpha and beta sites, to:

- the TIMS master symbols library,
- (any of) the organizational-level common skeleton images library(ies), and
- (any of) the users' own personal libraries of graphic symbols and/or skeleton images.

Design/configuration Considerations:

Any other features or "excess capabilities" may be of longer term value but must be completely transparent to the novice user, to avoid learning curve, confusion, and "culture shock" problems.

It is likely that the set of operations and capabilities available at the user's workstation, as a subset of true NAPLPS page creation capabilities, will require adjustment after initial user experimentation at the alpha site. System design should maximize flexibility of this aspect.

Please refer to Appendix C.

3.3 Business Graphics Package

User Profile and Anticipated Application:

Users are expected to include professional staff (project officers), intermediate level management, and occasionally senior management and clerical staff. Uses are expected to include:

- creation of pie charts, bar charts, graphs, and other diagrams from numeric data as part of the process of creating reports, published papers, memos and other documents such as Level 1 Reports;
- preparation of exhibits and graphics of a similar nature, for formal presentations and briefings;
- possible use for graphic portrayal of project management, budgeting, accounting, and other application data;
- possible use for more decentralized creation of simplified content for videotex databases within the sector, directly by project officers and administrative staff;
- possible utilization to graphically portray statistical performance data collected by future automated correspondence and financial tracking applications.

Functions (from Chapter 2) Supported:

The Business Graphics Package supports the fully automatic creation, manipulation, storage and retrieval of "business graphics". Business graphics refer to pie charts, bar charts and bi-axial or tri-axial graphs. This tool supports the functions shown as boxes 1, 2, 3, 4, 5, 6, 9, 18, 22, 23, 24 and 25 of the system overview diagrams in Chapter 2.

Mandatory Capabilities:

The requirement is for an "BUSINESS GRAPHICS TOOL" with this functionality:

- The tool must perform simple conversion of numeric sequences to pie charts, bar charts, and bi-axial line graphs. It must be able to generate the graphic in an intelligent manner without asking the user a series of questions; (i.e. it must be able to use programmed defaults). However, the user must be able to over-ride these defaults, to change:
  - the type of graphic display selected (i.e. bar instead of pie chart);
  - the orientation of the graphic (axis, bars, etc);
  - the scaling, and relative size of the graph on the

screen:

- the colours and textures of lines, pie segments, bars, etc.;
- the labels, including position, size and colour of text (2-3 standard text sizes may be sufficient).

- Multiple colours are required on one graph. Sixteen colour choices is desirable, and eight choices is mandatory. It is not desirable to have more than sixteen choices. The palette (ie. the actual 8-16 colours offered by TIMS should be modifyable by the system administrator.

- The tool must automatically record the date each graphic was created, and optionally (at the user's request) automatically display the date when the graphic is displayed. It must also be possible to display the graphic without the date, on an "over-ride" basis. Ideally, the time and author should be recorded in the same manner.

- It must be possible, either within this tool or by applying the graphic template tool to the graphs created by this tool, to add additional annotation, labels, legends, etc.

Desirable Capabilities:

- Ability to create tri-axial (X-Y-Z) as well as bi-axial (X-Y) graphs (as above). This implies simulated 3-dimensional graphing.

- The user should be able to record or save for later re-use, a special set of parameters or features selected for a specific type of graph. For example, if the Level 1 Report each month has a pie chart which is most effectively created by over-riding several standard parameter defaults, the tool should be able to remember what these default over-rides were and re-use them at the user's command.

- The tool should be able to accept and automatically plot numeric values produced directly by Lotus 1-2-3, since 1-2-3 is so prevalent in ADMTI.

- The tool should also be able to accept and understand numeric values in a variety of other formats, from different financial and analysis tools. If possible, it should be able to understand any numerics presented in the common "Data Interchange Format" (DIF).

- It should be possible to overlay multiple graphs in an intelligent and presentable manner. This may involve automatic re-scaling of graphs to be compatible with multiple display.

- It should be possible to combine or sum two graphs, to show the result as one line (or set of bars) representing the sum of the two combined graphs. This may also involve automatic re-scaling.

- It should be possible to scale down and combine up to four full-size graphics, displaying them in a 2x2 grid on the resultant display, adjusting the resolution and revising text sizes as necessary.

- There is a need for the ability to create graphics using a resolution twice that of normal Telidon, (i.e. 512 x 400 pixels rather than 256 x 200), allowing more detailed graphs, finer annotation and labelling, and the display of 80 columns or characters per line of display. (Even higher resolution, such as approx. 1000 x 1000 or 2000 x 2000, is desirable if it does not negatively impact user friendliness.)

- If possible, the tool should provide the user with an easy ability to work in black-&-white mode during the actual creation/review activity, to visualize and fine-tune a result that is destined for distribution to black-&-white displays or printer/plotters. This would not need to record colour attributes for later conversion to colour: it would only be used for "black-&-white only" applications.

- Integration with word processing systems and packages currently in use or anticipated to be in use within ADMTI, is important. This may include Wordstar, Multi-mate, Word Wand, and potentially other packages on the same work stations, as well as the stand-alone AES word processors currently in use, if possible. This involves the user being able to switch back and forth between text creation and business graphics modes during preparation of documents, and to conceptually (from the user's perspective) place the graphics within the text, for distribution of these documents through the communications and conversion/production tools.

Interfaces:

Raw numeric data is received from within TIMS or via the Communications Package from external data bases. The completed business graphs can be stored internally within TIMS or sent to the Communications Package for display on other workstations or for storage on external systems. The Business Graphics Package does not interface directly with the Graphics Template but business graphs can be sent to the Media Conversion and Productions Centre for incorporation in complete presentations or for production of hard copy output. The Business Graphics Package should also interface with word processing documents stored both internal and external to TIMS. This interface should allow for

the insertion of the business graphs within the document without disrupting the format or page boundaries of the text. It should be possible to store the completed document within TIMS, to pass it to the Media Conversion Centre for hard copy output, to send it to external systems for storage via the Communications Package and to view it at a TIMS workstation (or other compatible graphics terminal).

Performance Needs and Guidelines:

Response Time Performance:

Instantaneous response is required to any user action at a menu level (or equivalent) that results in another (usually lower-level) menu being displayed.

One second response or better is required in the verification and acceptance/rejection of a menu selection or basic command.

30 seconds to 5 minutes response is required, depending upon the complexity of the operation, to generate the graph.

Any action which takes longer than 1 second should display a "PLEASE WAIT" or equivalent message (blinking if possible), so the user will not worry that something is wrong.

It is desirable that major processing tasks that will require more than five seconds should be done in backgound mode with the TIMS user being notified when the work is finished. If this is not possible (eg. due to a single task operating system such as MS-DOS) then the user must receive notification every few seconds of the progress of the processing.

Ease of Use:

In addition to the general comments regarding training, documentation, on-line help, tutorials, diskette use, etc., (Section 3.1) which apply for this tool, this tool should require no more than 25 keystrokes in 3 commands (including the perusal of possible multiple menu levels) to select a parameter value, (such as selecting colours) and no more than 75 keystrokes in 10 commands to request and generate a complete business graphic, (start to finish). This should be considered a target for maximum user effort.

Volumes and Capacities:

We expect between 50 and 200 pages or graphic images to be created per user with this tool, on average, during an initial 3 to 4 month trial period. However, there may be extremes of zero and 500. We expect relatively few of these will be deleted, so the storage requirements are likely to grow linearly throughout the trial.

Most pages will be of average complexity, making extensive use of polygon PDI's and including some text.

Monitoring/measurement Capabilities:

Specifications under this heading in Section 3.1 apply. Furthermore, the system should maintain a counter and increment it each time a page or graphic is successfully completed (i.e. when stored and/or sent by the tool, but not when abandoned).

Design/configuration Considerations:

The "desirable " features identified should be transparent to users who do not require them (except perhaps the word processing and Lotus 1-2-3 interfaces, which would likely be used by most users and therefore need not be transparent).

Any other features or "excess capabilities" may be of longer term value but must be completely transparent to the novice user. to avoid learning curve, confusion, and "culture shock" problems.

The user interfaces, including default selection. over-ride procedure, and annotation capabilities, are likely to require adjustment after the initial alpha site introduction, and should be designed to be flexible and easily modified.

Please refer to Appendix C.

3.4 Media Conversion and Production Centre

User Profile and Anticipated Application:

Users are expected to include professional staff (project officers), clerical staff (working on behalf of management and professional staff), intermediate and senior management. Uses are expected to include:

- production of hard-copy graphics. whether integrated with text or not, for:
  - management review of draft presentations and briefings,
  - preparation of audience hand-outs for formal presentations and briefings,
  - production of colour and black-&-white hardcopy for reports, papers, memos, and other documents for internal, and especially external, distribution;
- production of 35mm and/or vugraph versions of presentations and briefings, especially for use in remote locations where Telidon "slide projector" equivalents may not be available;

- creation of complete shows or presentations, including timing and sequence aspects, from component graphic screens;

- composition of complex displays from components that themselves were created at the limit of complexity allowed by the other tools described.

Functions (from Chapter 2) Supported:

The Media Conversion and Production Centre is that part of TIMS that "produces" graphics in hard copy and other special formats. It supports the functions shown as boxes: 1, 2, 3, 4, 7, 8, 11, 12, 15, 16, 28, 29, 30, 31, 32, 33, 34, 35, 36, and 37, of the system overview described in Chapter 2.

Mandatory Capabilities:

There is a need for a readily accessible, highly automated and simplified production facility where graphic displays created using Telidon (and potentially other electronic technologies) can be converted to other more traditional media for dissemination and presentation. This facility would also support the assembly of independent graphic creations into integrated, thematic presentations, still in the Telidon format.

This "Graphic Production Centre" is anticipated to be centrally located within each relatively small organizational unit, (not physically remote from the users), in much the same way as a photocopier. It may need to be connected to the TIMS network (electronically accessible from a user's workstation), and/or some of its capabilities may need to be duplicated on each workstation, in order to achieve the capabilities outlined below.

- It must be possible to easily convert from:
  - Telidon to colour 35mm slides,
  - Telidon to colour vugraphs for overhead projectors,
  - Telidon to quality colour plot/print (on paper), possibly including high resolution capabilities,
  - Telidon to quality black-&-white plot or printout, at high speeds (perhaps 15-30 seconds per page).

- It must be possible to select graphic items from multiple sources, arrange them in a sequence for a formal presentation, and create a portable copy of that presentation on a medium (probably floppy diskette) compatible with popularly available Telidon "electronic slide projection" equipment, including that which is now available in ADMTI or DOC boardrooms.

. Many users (especially senior management) are likely to require the capability to retrieve graphics that were sent to the facility by others who were preparing presentations on their behalf. Therefore, some kind of user-friendly directory of images available, and/or a mailbox system, is required.

. It must be possible to send sequences of graphic items to a DOC Telidon database for insertion, storage, and later retrieval by Telidon videotex equipment.

Desirable Capabilities:

. Telidon to 8x10 colour (photographic) glossy prints:

. If possible the user should be able to remotely request (from his workstation) at least the colour and black-&-white print/plot capabilities and preferably all media conversions by sending the image with appropriate instructions, electronically to the production centre. (This implies that the production facility should be able to perform such functions unattended.)

. In the creation of sequences for "electronic slide projectors", it is desirable to be able to assign time delays and produce an output which is compatible with available billboarding or automatic display cycling equipment, for unattended use. This should include the ability to assign the timing and sequences, and review the timed result, at the user workstation if possible.

. It is desirable to be able to overlay multiple graphics, potentially from different sources and created by different tools, to compose combined displays as part of the production process.

. The ability to vary the resolution (low-256x200, medium-512x400, and perhaps high resolution options) of the outputs produced, especially paper outputs, would be helpful.

. There is a need to create intelligible black-&-white versions of colour displays for dissemination on paper, in printed and photocopied reports. This should include the conversion of coloured backgrounds to white, the conversion of labels and text to black, and the ability to substitute texture for colour on lines and symbols (for example, convert red lines to dotted lines, blue lines to solid lines, green lines to dashed lines, etc.) This conversion should utilize automatic default assignments, but allow the user to over-ride defaults.

. It is desirable to be able to compose large/high resolution diagrams for production on a colour or

black-&-white plotter. by composing several "windows" or components, each of which represents a full low-resolution screen. (Note the "windowing" capability listed as desirable in Section 3.2: this is the corresponding "window composition and output" capability.) The resultant printed output may not be any larger than 8-1/2 x 11, just higher resolution and hence more finely detailed.

Interfaces:

The Media Conversion and Production Centre receives graphics produced by the Graphics Template and the Business Graphics Package for insertion in presentations and/or for production of hard copy output. The Media Conversion Centre also electronically receives completed presentations, papers and documents via the Communications Package from external systems and workstations.

Performance Needs and Guidelines:

Response Time Performance:

Instantaneous response is required to any user action at a menu level (or equivalent) that results in another (usually lower-level) menu being displayed.

1/2 second response or better is required in the verification and acceptance/rejection of a menu selection or basic command.

5 to 10 seconds response is required, depending upon the complexity of the operation, to perform operations such as overlay, concatenate, etc.

In the production of 35mm slides, photographic prints. and/or vu-graphs, manual intervention with film, chemicals, equipment adjustments. etc., should be avoided.

Media conversion response times should be:

- to create a quality black & white plot/printout:
  desirable: 15 seconds
  acceptable: 60 seconds maximum
- to create a quality colour plot/printout:
  desirable: 30 seconds
  acceptable: 5 minutes maximum
- to create a 35mm colour slide:
  desirable: 30 seconds
  acceptable: 3-5 minutes maximum
- to create an 8x10 colour print:
  desirable: 30 seconds
  acceptable: 10 minutes maximum
- to create a colour vu-graph:
  desirable: 30 seconds
  acceptable: 3-5 minutes maximum

Any action which takes longer than 1 second should display a "PLEASE WAIT" or equivalent message (blinking if possible), so the user will not worry that something is wrong.

It is desirable that major processing tasks that will require more than five seconds should be done in backgound mode with the TIMS user being notified when the work is finished. If this is not possible (eg. due to a single task operating system such as MS-DOS) then the user must receive notification every few seconds of the progress of the processing.

Ease of Use:

In addition to the general comments regarding training, documentation, on-line help, tutorials, diskette use, etc., (Section 3.1) which apply for this tool, this tool should require no more than 10 keystrokes in 2 commands (including the perusal of possible multiple menu levels) to select a major operation, (such as Telidon to colour plot) and no more than 50 keystrokes in 10 commands to select and assign all parameter values to support that operation. This should be considered a target for maximum user effort. These limits may not be achievable for one or two operations, and other operations should be manageable with fewer keystrokes than these limits allow for.

Volumes and Capacities:

It is difficult to predict volumes of slides, vu-graphs, colour plots, etc., based on the data available.

We expect there to be little need for long-term storage as part of this tool, since it is primarily a facility to compose, overlay, and output (to an external medium) graphics that were created and are stored by other tools.

Most outputs will be of average complexity, making extensive use of polygon and line mode PDI's, and including a great deal of text. Less than 10% are expected to use high resolution. More than 35% are expected to be quality black-and-white printouts, and more than 70% are expected to be on paper, either from the colour or the black-and-white printer/plotter.

Monitoring/measurement Capabilities:

Specifications under this heading in Section 3.1 apply, as do the following additional notes.

The tool should record the frequency of use of the following options or modes:

- 35mm output,
- vu-graph output,
- photographic print output (if implemented),

- diskette output,
- black-&-white printer/plotter for paper output, and
- colour printer/plotter output.

Design/configuration Considerations:

The additional "desirable " features identified should be transparent to users who do not require them.

Any other features or "excess capabilities" may be of longer term value but must be completely transparent to the novice user, to avoid learning curve, confusion, and "culture shock" problems.

Note that the vu-graph creation capability can be realized with a photographic system, or can be emulated by ensuring that the colour printer can print on transparencies (vu-graph), or providing a colour photocopier with the ability to handle transparencies, or by supplying overhead projection equipment that uses reflection techniques, and hence can project an image from an opaque sheet of paper directly to the screen. This last alternative is less desirable, because the users would be inconvenienced when giving presentations at remote locations (such as conferences), where this special overhead projection equipment may not be available.

Please refer to Appendix C.

3.5 Communications Package

User Profile and Anticipated Application:

Users are expected to include professional staff (project officers), clerical staff (working on behalf of management and professional staff), intermediate and occasionally senior management. Uses are expected to include:

- communication with external Telidon-NAPLPS databases, to send and retrieve images for forms management, correspondence tracking & logging, periodicals tracking & cataloguing, electronic procedures manuals, presentation storage and retrieval, and traditional videotex applications,
- communication with other TIMS (prototype) users,
- communication with client companies, contractors, other non-TIMS DOC staff, and non-DOC contacts, in the dissemination and collection of financial, contractual, procurement, research, and other information. This includes external equipment which may or may not be compatible with all capabilities of the TIMS prototype tools and their creations.

- communication with normal ASCII alpha-numeric research and information databases and contacts.

Functions (from Chapter 2) Supported:

The Communications Package handles all data transfer between TIMS workstations and between TIMS and any external systems. This supports the functions shown in the system overview as boxes: 1, 2, 3, 4, 5, 6, 8, 9, 10, 13, 14, 19, 26, 27, 31, and 37.

Mandatory Capabilities:

The requirement is for a "Communications Package" with this functionality:

- It must be possible to send any image created with the TIMS graphic (and other) tools, from one TIMS workstation to another, both in a real-time and in a store-and-retrieve mode. (It should be possible but not necessary that the sender and recipient both be "signed on" while the communication takes place.)

- It must be possible to send any image to non-TIMS destinations, also in both real-time and store-and-retrieve modes. Destinations may include other DOC, government, and private sector contacts. Vehicles may include ENVOY-100 or other electronic mail services, DATAPAC or other networks, or simple point-to-point telephone links; and therfore the tool must be compatible with these.

- It must be possible to receive ASCII alpha-numeric and Telidon graphic messages and documents from these external contacts.

- This tool must include the communications management and decoding capabilities necessary to access any DOC or external Telidon-NAPLPS or ASCII database or information service, both to send and to receive information, including the ability to locate and store information retrieved from these remote sources.

Desirable Capabilities:

- At the (TIMS) users option, graphics should stripped from the images for "text-only" transmission to destinations that do not have Telidon-NAPLPS graphic capabilities.

- The package should allow for FUTURE enhancement with teleconferencing capabilities. This involves the capability for two or more users to share a common

display on their respective workstations, usually in real time (all are "signed on" simultaneously). Any conference participant should be able to change or point to (with the "cursor") any aspect of his display within the limits of the tools available on his workstation), and these actions should be seen immediately by all other conference participants on their own screens.

Interfaces:

The Communications Package has two way interfaces with all the TIMS tools. This permits the sharing of data between the tools but it is primarily intended as a data link to and from TIMS and external systems. The Communications Package must also act as the TIMS network controller and route data between TIMS terminals, TIMS processor and compatible non-TIMS terminals known to the system.

Performance Needs and Guidelines:

Response Time Performance:

Instantaneous response is required to any user action at a menu level (or equivalent) that results in another (usually lower-level) menu being displayed.

One second response or better is required in the verification and acceptance/rejection of a menu selection or basic command.

10 to 30 seconds response is required for the execution of communications operations involving the transfer of a graphic internally to another TIMS tool, or to another TIMS workstation (a user, or the production facility).

10 seconds to 2 minutes response is required to execute a command or function that requires the user to wait. (This includes the above category, plus the logging on to database services, etc.)

5 minutes maximum for communications operations that do not require the user to stand by, such as data transfer in electronic mail mode. (This is subject to the constraints of transfer vehicles such as Envoy 100, or internal data networks, that are beyond the control of TIMS.)

Any action which takes longer than 1 second should display a "PLEASE WAIT" or equivalent message (blinking if possible), so the user will not worry that something is wrong.

It is desirable that major processing tasks that will require more than five seconds should be done in backgound mode with the TIMS user being notified when the work is finished. If this is

not possible (eg. due to a single task operating system such as MS-DOS) then the user must receive notification every few seconds of the progress of the processing.

Note that 300 baud or better is mandatory and 9600 baud is desirable for data transfer external to TIMS, and 1200 baud is mandatory and 9600 baud is desirable for data transfer internal to TIMS. These mandatory levels are absolute minimums and will result in some level of user inconvenience. We recommend that, if practical in terms of cost, 1200 baud and 2400 baud be established as more acceptable minimum speeds for external and intra-TIMS communications respectively.

Ease of Use:

The user effort required should be minimized through the "packaging" of command sequences necessary to set parameters and execute a communication with any commonly accessed database, other workstation, other TIMS tool, etc. It should be easy for the user to cause the tool to remember a new set of commands and parameters, i.e. to "package" his/her own personal sequences.

Comments in Section 3.1 also apply.

We anticipate that the necessary level of user convenience could be obtained through minor enhancements to one of the currently available NAPLPS/ASCII decoder/communications manager packages.

Volumes and Capacities:

Communications volumes cannot be accurately predicted from the data gathering conducted. A rough estimate would be that 2-10 (TIMS-created) pages would be sent from each user's workstation per day, on average, with approximately 50-80% going to other TIMS workstations including the central production facility, 10-30% to external contacts, and 5-15% being loaded into Telidon databases.

Most pages will be of average complexity, making extensive use of polygon and line mode PDI's, and including a great deal of text. Less than 10% are expected to use high resolution.

Monitoring/measurement Capabilities:

Specifications under this heading in Section 3.1 apply, as do the following additional notes.

All measurements for this tool should be broken down by these four sub-functions:

- communications to send/retrieve graphics to/from another TIMS workstation or data file,
- communications to send/retrieve graphics to/from a non-TIMS workstation,

- on-line communication with an ASCII database/videotex service, and
- on-line communication with a NAPLPS database/videotex service.

(The first two are electronic mail-like, store-and-forward or store-and-retrieve modes, while the last two are real-time on-line modes.)

Design/configuration Considerations:

Teleconferencing and any other "excess capabilities" may be of longer term value but must be completely transparent to the novice user, to avoid learning curve, confusion, and "culture shock" problems.

Please refer to Appendix C.

4. NOTES ON COST ESTIMATE, AND SCHEDULE

The purpose of this section is to provide the consultant's "best guess" as to the feasibility, approximate potential cost and achievable implementation/delivery schedule for the TIMS tool set.

Part of the background analysis for this project, as conducted by the study team, included discussions with several potential TIMS hardware and software suppliers to explore these cost, feasibility, and delivery schedule questions. While absolute commitments were neither offered nor requested many of these suppliers were helpful in providing "off the record" comparisons of the capabilities of their products relative to the TIMS requirements.

The following notes, then, represent a synthesis of opinions of the consultants and several potential suppliers.

Feasibility

We expect that the mandatory capabilites as outlined for all four tools, can be achieved by the marketplace, within the TIMS time and cost constraints as we understand them. Indeed, several product enhancements now at the research and development stage by, or on behalf of, some of these suppliers are relevant to TIMS needs.

Some of the desirable TIMS capabilities are also achievable on the same basis. All of the desirable capabilities are anticipated to be feasible but we expect that some of the more complicated capabilites especially involving interfaces, may be proposed by bidding suppliers to be met by enhancements to be delivered subsequent to the initial TIMS system implementation. This is because these capabilites correspond to new products or enhancements already planned by some of the suppliers, but planned for development several months in the future.

Therefore, we expect a scenario where all mandatory and desirable characteristics can be met by the marketplace, but on a phased implementation basis.

However, it may not be possible to achieve all desirable capabilities, even on a phased basis, within what we understand to be the initial budget for the TIMS prototype (approximately $300K).

Implementation/delivery Schedule

To the best of our knowledge even the mandatory TIMS characteristics alone cannot be met with off-the-shelf products from the Canadian Telidon industry. Therefore, time must be budgeted after the completion of the tendering process for the development and testing of the chosen solution. We anticipate that at least two months will be required after contract award

before a product with sufficient TIMS functionality could be ready for installation. This assumes two months of intense, perhaps even frenzied development activity by the successful bidder(s). (We advise the Department that we were warned in November by some potential suppliers that their workloads would preclude such activity before February 1985 at the very earliest.) Two months should be considered as a minimum development period. A total implementation schedule of 3-4 months with implementation of a partial TIMS system half way through that schedule constitutes what we believe to be a reasonable scenario.

The following schedule is probably achievable:

ACTIVITY:	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
Approval to tender	*									
RFP issued		*								
RFP closes			*							
Supplier selection CPT			*							
Development by supplier		--	----	----	----	----				
Eval'n team prepares				--	----	-				
Alpha installation						*				
Alpha prelim. eval'n						----				
Alpha/beta modification						--	----			
Beta installation							*			
Alpha evaluation						-	----	----	----	--
Beta evaluation							-	----	----	--
Final analysis									-	----
TIMS project complete										*

Cost

Cost is difficult to estimate. The budget, scope and mandate for this (Requirement/Functional Specifications) phase of the TIMS project did not provide for the detailed research and system design activites that would be required to support the development of a meaningful and accurate cost estimate. Furthermore, a high proportion of desirable versus mandatory characteristics, combined with the variety of overall implementation approaches that would meet the functional specifications, combine to create a situation of many options or variables in the price equation.

For this estimating activity we have made these assumptions:

- The chosen solution will be a MS-DOS based system compatible and utilizing the significant quantity of IBM-PC and Hyperion systems and related communications and peripherals already present in the alpha and beta sites.

- Half of the TIMS workstations will utilize existing IBM-PC and Hyperion equipment, with minor upgrades at most.

- DOC will pay for all product enhancements and custom development, plus standard or slightly reduced license fees for products purchased. (In practice, we expect that some suppliers may waive license fees and/or absorb part of the product development costs, in return for TIMS product rights, because of the R&D nature of the project.)

- The alpha and beta sites will each have one central Graphics Production/Media Conversion Facility, plus a number of user workstations. The sample costing has been worked up for 10, 20, and 30 workstation scenarios (total, alpha plus beta).

The intended number of TIMS workstations impacts hardware, more so than software, cost.

The greatest proportion of software cost would correspond to custom software or software enhancements to meet TIMS (and in fact generic office automation) needs. Licensing fees for existing software packages are expected to account for a very small proportion of software cost.

Hardware cost depends on the number of workstations provided and on the portion of hardware needs that can be met by existing equipment. The Sector's equipment inventory, especially in the area of IBM-PC's and equivalent, varies almost on a daily basis. We are not confident that our knowledge of that inventory is up to date. Moreover, we have little or no knowledge as to which of the systems already installed in the Sector would be available for TIMS duty and which are already completly utilized for other applications. Finally, the hardware cost is dramatically affected by the hardware configuration required which in turn depends on a number of software options.

We suggest that this cost breakdown may not be unreasonable:

ITEM:	ONE-TIME "CUSTOM" + COST:	PER WORK-STATION COST:
1. Workstation Components:		
1a. Software and Services:		
Graphics Template: (GT)	$25-90K	$500-1000
Business Graphics: (BG) (incremental cost over GT)	20-50K	0-300
Communications: (CM) (incremental cost over GT,BG)	0-50K	0-300
TIMS system manager/main menu: (incremental cost over GT,BG,CM)	5-15K	0-100
1b. Equipment:		
New Workstations, each:		$5-10K
Upgrades to existing workstations, (incl. new monitors, modems, etc.) avge, each:		0-4K
2. Graphics Production / Media Conversion Centre, central system portion:		
Computer hardware, software, peripherals, related photographic equipment, etc.: (One each for alpha & beta sites)	$0-10K	$15-35K
3. Support: (total, both sites)		
Training:	$10-15K	
Documentation:	5-15K	
Miscellaneous support:	0-50K	

TOTALS	RANGE:	BEST GUESS:
10 Workstations total:	$125-450K	$300K
20 Workstations total:	$175-600K	$350K
30 Workstations total:	$200-700K	$400K

Disclaimer

We stress that the estimates provided here are "best guess" predictions only. We may not be aware of all relevant research and development activity in the Telidon industry and we have not attempted, either independently or in co-operation with any supplier(s), to conduct system design/feasibility/implementation alternatives analysis that are absolutely necessary to provide reliable estimates.

TELIDON INFORMATION MANAGEMENT SYSTEM:

FUNCTIONAL SPECIFICATIONS REPORT

APPENDICES

" FINAL "

MARCH 1985

PHIPPARD AND ASSOCIATES

(DSS File # 06ST.36100-4-4185)

APPENDIX A

SUMMARY OF RELEVANT REQUIREMENTS

Note: This appendix contains tabular summaries of:

1. the subset of graphic needs approved for TIMS prototype implementation, (Table A), and:

2. the set of office automation needs identified. some of which may benefit from the exploitation of the TIMS graphics tools at some future time (Table B).

TABLE A: RELEVANT GRAPHIC REQUIREMENTS

EXPLANATION AND NOTES

The graphics support needs identified are at the level of flexible, user friendly "tools" that can be used for a variety of purposes, rather than at the level of specific, dedicated applications. We suspect that the next step in the evolution of ADMTI's automated office, after these and other basic needs have been met, will be characterized by the development of specific frequently used applications that exploit these tools.

In keeping with the mandate and objectives of the study, the intent is to use Telidon to provide these graphics tools.

Various non-graphics issues that came to our attention are addressed in our Requirements Report. However, they are not the primary focus of the study and hence are omitted from this table.

The table represents ADMTI-wide data gathering, and individual needs were not always consistent throughout the Sector.

We have indicated which of the tools and features are tentatively recommended for inclusion in the pilot/prototype. ("IF POSSIBLE" means "desirable, based on identified needs, if technically and economically possible, within the TIMS time and budget constraints". "MAYBE" indicates our concern that the level of need may not warrant the implementation of this feature, in the initial prototype.)

GRAPHIC "TOOL" AND FEATURES DESIRED	INCLUDE IN PILOT?
NOTE: Each "tool" is seen to require:	
. ample user training,	YES
. concise, non-technical documentation,	YES
. an automated "help" feature,	YES
. a minimum of effort and time to use,	YES
. bilingual capabilities,	YES
. minimized use of multiple diskettes, and	YES
. integration and compatibility with the other tools.	YES
1. ELECTRONIC GRAPHICS TEMPLATE:	
. common library of pre-created symbols, backgrounds, text fonts, augmented as needed by an ADMTI resource.	YES
. ability to compose diagrams by selecting, enlarging or reducing, rotating, colouring, and positioning symbols, adding text and lines.	YES
. ability to automatically record the date of creation and automatically display this date whenever a graphic is retrieved.	YES
. ability to get colour and quality black and white hard-copy of the graphic creation.	YES
. ability to use animation and pauses in the "painting" of the graphic, when displayed electronically.	MAYBE
. ability to create displays that are more detailed than would normally be possible on a Telidon screen, by "windowing" on a larger-than-screen graphic creation (i.e. an organizational chart).	IF POSSIBLE
. medium or high resolution capability, including the ability to put 80 characters of text on a line.	IF POSSIBLE
. integration with word-processing packages and systems already in use in the Sector, such as Wordstar, Word Wand, MultiMate, and perhaps even the AES units.	IF POSSIBLE

... cont'd

GRAPHIC "TOOL" AND FEATURES DESIRED	INCLUDE IN PILOT?
2. BUSINESS GRAPHICS TOOL:	
. ability to automatically convert numeric sequences to pie charts, bar charts & graphs.	YES
. optional user control over the following parameters: . type of display (i.e. bar chart), . orientation (horizontal, vertical, etc.) . size of graph on the screen/page, . colours and textures used (chosen from perhaps 8 options), . labels and annotation.	YES
. ability to automatically record the date of creation and automatically display this date whenever a graphic is retrieved.	YES
. ability to understand and process numbers provided in a variety of formats.	IF POSSIBLE
. ability to understand and automatically graph LOTUS 1-2-3 output.	IF POSSIBLE
. ability to overlay multiple graphs, and to combine several sets of numbers to generate one "summation" graph.	IF POSSIBLE
. ability to put up to 4 separate graphs on one page.	MAYBE
. medium or high resolution capability, including the ability to put 80 characters of text on a line.	IF POSSIBLE
. integration with word-processing packages and systems already in use in the Sector, such as Wordstar, Word Wand, MultiMate, and perhaps even the AES units.	IF POSSIBLE
3. GRAPHIC PRODUCTION CENTRE:	
. ability to convert graphic creations to non-electronic media: . Telidon to 35mm colour slide, . Telidon to vu-graph (overhead projector), . Telidon to quality colour hard-copy (plot on paper) . Telidon to high-speed black & white hard-copy.	YES

... cont'd

GRAPHIC "TOOL" AND FEATURES DESIRED	INCLUDE IN PILOT?
. ability to prepare presentations by concatenating multiple graphic creations, and to produce the resultant presentation on a diskette or load it into the DOC database.	YES
. ability to create a timed show for "billboarding" (unattended presentation).	MAYBE
. ability to overlay images from multiple sources to create a composite result.	MAYBE
. ability to switch between high, medium ("80 column"), and regular ("40 column") resolution, especially on paper outputs.	IF POSSIBLE
. ability to convert colour graphic creations to photo-copiable black & white for printout, by converting coloured backgrounds to white, coloured text & lines to black, and substituting texture for colour (i.e. red lines become dotted lines, etc.).	IF POSSIBLE
. ability to compose large exhibits on a plotter, which represent several adjacent Telidon screens (window composition).	MAYBE - IF POSSIBLE
4. GRAPHIC COMMUNICATIONS PACKAGE:	
. ability to send any graphic image or other display from one TIMS workstation to another, in "store and retrieve" mode.	YES
. ability to send any display from a TIMS workstation to any automated external destination, and strip off the graphics (sending only the text), at the TIMS user's option. (for destinations without Telidon capability)	YES
. ability to receive alpha-numeric and Telidon messages, displays and reports from external sources.	YES
. ability to communicate with alpha-numeric and Telidon database/videotex services (internal & external), including decoding capabilities.	YES
. internal (within TIMS) teleconferencing.	NO
. external teleconferencing.	NO

TABLE B: OFFICE APPLICATIONS:

LEGEND:

1. LEVEL OF NEED: N=no need, M=may use, W=would use, S=strong need
2. POSSIBLE GRAPHICS UTILIZATION: (POSS. GRAPH UTIL) reflects the potential for the integration or compatibility with graphic tools defined in Part A. 0=none, 1=should be able to pass graphics, 2=may be implemented as or with the help of a Telidon database, 3=may use graphic template tools for content creation/application set-up, 4=may interface with business graphics tools for display of results.

ITEM AND FEATURES:	LEVEL OF NEED PERCEIVED:							POSS. GRAPH UTIL:
	TARGET USER GROUP			OTHER GROUPS				
	ALPHA	BETA	ADM	DGIE	DGGT	DCS	DMG	
1. Generalized Correspondance, financial, & Periodicals Tracking System (with BF, sort, statistics & keyword retrieval)	S	S	S	M-S	M-S	M	M	2,3,4
2. Electronic Procedures Manuals	W-S	S	M	M-S	M-W	M	S	2,3
3. Bibliographic Periodicals Cataloguing, Filing & Tracking	W-S	W-S	N	M-S	M-W	M-W	N	2,3
4. Electronic Form Filling plus Forms Mgmt.	W-S	M-W	M	M-W	M-W	M-W	M-S	2,3

... CONTINUED

TABLE B: OFFICE APPLICATIONS - continued:

LEGEND:

1. LEVEL OF NEED: N=no need, M=may use, W=would use, S=strong need
2. POSSIBLE GRAPHICS UTILIZATION: (POSS. GRAPH UTIL) reflects the potential for the integration or compatibility with graphic tools defined in Part A. 0=none, 1=should be able to pass graphics, 2=may be implemented as or with the help of a Telidon database, 3=may use graphic template tools for content creation/application set-up, 4=may interface with business graphics tools for display of results.

ITEM AND FEATURES:	LEVEL OF NEED PERCEIVED:							POSS. GRAPH UTIL:
	TARGET USER GROUP			OTHER GROUPS				
	ALPHA	BETA	ADM	DGIE	DGGT	DCS	DMG	
5. Telephone & Time Mgmt (as a replacement for features on Kontact units, if they are to be removed)	N-S	N-M	N-M	N-M	N-M	N-M	M	3
6. Common Visual Wkspce/ Teleconference (universal ASCII only) (see also Sec. A # 4)	M-W	M	M	M	M	M	M	1?
7. Project Management Package (to replace current use of LOTUS 1-2-3 for this)	W	W	N-M	W	M	M	M	0-1
8. Automatic Spelling Checker for WP	M-S	M	M	M	M	M	M	0

APPENDIX B

COMPUTER EQUIPMENT INVENTORY SUMMARY - ALPHA & BETA SITES

COMPUTER EQUIPMENT INVENTORY SUMMARY - ALPHA & BETA SITES

This list is a high-level summary, excluding minor equipment, cables, etc. It was compiled from information supplied primarily by DMG and DTL. The inventory is in a constant state of flux, and this list should not be assumed to be completely accurate and up-to-date. ADMTI and DGAP management units are included as well as the alpha and beta sites, because it is our understanding that they may be included as users in the alpha and/or beta prototype installations.

ADMTI: (20th floor, Journal Tower North)

1 Hyperion

1 AES Super Plus (with synchronous point-to-point software)
1 AES printer

1 Norpak Telidon teletext terminal

1 201 Sync. modem

DGAP: (2nd floor, Journal Tower North)

1 IBM-PC/XT
2 Mitel Kontacts

1 Dot-matrix printer with graphics capability (MX 100 with Graftrax)

1 AES C-20 terminal
1 AES printer

ALPHA SITE: (DTL) (2nd floor, Journal Tower North)

5 IBM-PC's
4 IBM-PC/XT's
4 Hyperions
4 Mitel Kontacts
1 Apple //e

5 Letter quality printers
6 Dot-matrix printers with graphics capability

11 Monochrome monitors, (excludes built-in screens such as Hyperions)
7 Colour monitors
1 IBM colour card
4 Plantronics colour cards

1 Hayes smartmodem
4 212A Modems (Gandalf)
2 212A Modems (General Datacom)
3 1200 baud modems (U.S. Robotics "Password")
2 Acoustic-coupled modems (Anderson-Jacobsen)
3 Add-on "Davong" Hard disk units for IBM-PC's

1 AES Alpha Plus
2 AES Super Plus's
1 AES C-20 Terminal
4 AES printers

1 DEC Writer III (LA120)
1 VT100

2 Microtel VTX-208 ASCII/NAPLPS terminals
1 Electrohome EGT-100 NAPLPS decoder
1 Norpak MK-IV NAPLPS decoder

BETA SITE: (DGTPA) (9th floor, Journal Tower South)

3 IBM-PC's
1 IBM-PC/XT

1 IBM printer
1 Dot-matrix printer with graphics capability
(MX 100 with Graftrax)

3 AES Super Plus's
3 AES printers

APPENDIX C

SAMPLE FUNCTIONAL IMPLEMENTATION

APPENDIX C - SAMPLE FUNCTIONAL IMPLEMENTATION

PURPOSE AND DISCLAIMER:

In the development of functional specifications, it was difficult to clearly describe the level of user-friendly user interface we feel is necessary to the success of TIMS, without creating specifications that would constrain the creativity and flexibility of the opportunity, for potential prototype suppliers.

In order to resolve this dilemma, we have prepared a sample "functional implementation", as documented below.

While the sample below assumes an implementation which exploits the use of "soft" function keys (similar to the approach used in the implementation of MS-DOS and other software for the Hyperion PC), the same functionality could be achieved through the use of screen menus (like a Telidon Database), or typed commands. (We recommend against the latter, because of the greater number of keystrokes required of the user.)

We emphasize that the functional structure implied by this sample is just one alternative implementation, not the only and quite probably not the best one. The important thing to note is that we believe that this implementation (or one like it), suitably refined and detailed in a system specification, would likely meet the needs of the TIMS users.

As well as showing the kind of user interface we believe is necessary, this appendix also helps to show the relationships between various functions described as mandatory and desirable capabilities for the tools, in Sections 3.2 through 3.5. It also implies additional TIMS design considerations.

GENERAL NOTES:

- Every menu or softkey line has a HELP option, (i.e. F10), which describes the meaning and implications of the other 9 keys or options.

- Many menus have a DEFAULT option, (i.e. F9), which, if selected by the user, causes the system to automatically assign a default value for the parameter or decision at hand.

- Where possibey, which causes the system to assign its default values for this and all subsequent parameter options, going immediately to create the graphic. This is of the most value in the business graphics tool, where it is desirable to give the tool the capability to default all options if the user so wishes. This has the same effect as the user hitting the DEFAULT key at this and all subsequent menus. (For readers who are familiar with Wordstar, it

is the same as the ESCAPE key in the user-computer interchange that follows the use of the "Print" command.)

. Ideally, selection of a menu choice could be made in any of three ways:

a) pressing the appropriate function key,
b) typing the first character of the menu item name.
c) pressing the carriage return to select the default choice, which may be highlighted in reverse video.

. Of course, all menus and keys would require french counterparts.

. The cursor is moved around the screen with arrow keys.

THE SAMPLE IMPLEMENTATION:

	REFERENCE MENU #:
1. TIMS MAIN MENU:	
[] DRAW a graphic	(2)
[] GENERATE a graphic	(14)
[] OUTPUT to another media	(20)
[] COMPOSE multiple graphics	(23)
[] SEND graphic(s) electronically	(25)
[] VIDEOTEX terminal mode	(26)
[]	
[]	
[]	
[] HELP	

2. DRAW menu: (The Graphics Template Tool)

[] SELECT a previously drawn graphic to build on (by DSN)	
[] SYMBOL (access a symbols library)	(3)
[] DEFINE SUBSET for a group operation	(4)
[] LINE drawing function	(5)
[] LABEL (annotate with text)	(6)
[] DATE (date stamp)	(7)
[] DONE (save, abandon or send somewhere)	(8)
[]	
[]	
[] HELP	

Notes: SELECT should default to the last dataset/graphic (DSN) accessed.
DEFINE SUBSET lets the user treat a segment of a graphic as one symbol.

3. SYMBOL menu: (select library, select symbol, and modify it)
   [] MASTER TIMS symbol library selection
   [] COMMON skeleton/standards library for organizational unit
   [] PERSONAL (user enters DSN if he has more than one)
   [] DEFAULT to last library accessed
   [] CHANGE COLOUR (defaults to last colour used) (10)
   [] CHANGE TEXTURE (defaults to last texture used) (9)
   [] ROTATE (11)
   [] SCALE (enlarge/reduce) (12)
   [] PLACE/MOVE to cursor position (13)
   [] HELP
   Note: Menu of available symbols is presented for chosen library. User selects by name or menu item number, and then continues with this menu to colour, scale, texture, etc.

4. DEFINE SUBSET menu:
   [] BOUNDED BY symbol/polygon that cursor is touching
   [] FROM CURSOR position (as upper left-hand corner of rectangle)
   [] TO CURSOR position (as lower rt-hand corner of rectangle)
   [] WHOLE GRAPHIC (ie- entire screen defined as a symbol)
   [] SAVE AS (DSN, in personal library)
   [] ROTATE (11)
   [] SCALE (enlarge/reduce) (12)
   [] MOVE TO cursor position (follow-the-cursor) (13)
   [] CANCEL last segment or symbol definition - start again
   [] HELP

5. LINE menu: (Draw a line:)
   [] FROM CURSOR position
   [] TO CURSOR position
   [] TO NEXT CURSOR position (for multiple connected lines)
   [] THROUGH CURSOR position (draws an arc of appropriate radius)
   [] CHANGE COLOUR (defaults to last colour used) (10)
   [] CHANGE TEXTURE (defaults to last texture used) (9)
   []
   []
   [] UNDO last line drawn - start again
   [] HELP
   Note: It should be possible to change start, end or "through" points by re-doing that part of the sequence, without resorting to "undo".

6. LABEL menu: (select font style, size and colour & annotate)
   [] SMALL - FONT 1
   [] SMALL - FONT 2
   [] MEDIUM - FONT 1
   [] MEDIUM - FONT 2
   [] MEDIUM - FONT 3
   [] LARGE - FONT 2
   [] LARGE - FONT 3
   [] CHANGE COLOUR (10)
   [] DEFAULT to last combination used
   [] HELP
   Note: User selects a text font and colour and positions cursor at desired position on screen, then starts typing. It must be easy to erase or undo labels, or blank them out.

7. DATE/TIME/AUTHOR menu: (date/time/author stamping and over-ri
   - [] AUTOMATIC (set tool to apply date/time/author automatically)
   - [] CANCEL AUTO (reverse of above)
   - [] SET DATE (special date other than system date)
   - [] ADD / REMOVE DATE to/from this graphic
   - [] SET TIME (special time other than system time)
   - [] ADD / REMOVE TIME to/from this graphic
   - [] SET AUTHOR NAME (special author other than default)
   - [] ADD / REMOVE AUTHOR NAME to/from this graphic
   - [] RESET TO DEFAULT VALUES
   - [] HELP

8. DONE disposition menu: (save, abondon, or send creation somewhere)
   - [] KEEP (user provides a DSN for local storage)
   - [] ABANDON
   - [] OUTPUT to another media (20)
   - [] COMPOSE multiple graphics (23)
   - [] SEND graphic(s) electronically (25)
   - [] VIDEOTEX terminal mode (to send to a DB) (26)
   - []
   - [] DRAW ANOTHER (2)
   - [] QUIT (1)
   - [] HELP

9. TEXTURE menu: (select/change texture)
   - [] THICKER (line thickness or pel \ These work in steps
   - [] THINNER (as above) /
   - [] SOLID \
   - [] DOTTED > (texture of line or boundary)
   - [] DASHED /
   - [] SELECT FILL PATTERN (cycles through several choices)
   - [] REMOVE FILL
   - [] SELECT COLOUR FOR FILL (10)
   - [] DEFAULT
   - [] HELP

10. COLOUR menu: (select/change colour)
    - [] \ This menu provides
    - [] \ a standard set of colour choices.
    - [] \
    - [] > If more than 8 colours are possible.
    - [] / the F7 key brings up the other 9 choices:
    - [] / otherwise it is the 8th colour of an
    - [] / 8-colour palette.
    - [] ALTERNATE PALETTE
    - [] DEFAULT
    - [] HELP

11. ROTATE menu:
    - [] 5 DEGREES CLOCKWISE \
    - [] 5 DEGREES COUNTER-CLOCKWISE \
    - [] 45 DEGREES CLOCKWISE \ These can be invoked
    - [] 45 DEGREES COUNTER-CLOCKWISE / multiple times for
    - [] 90 DEGREES CLOCKWISE / cummulative rotation

[] 90 DEGREES COUNTER-CLOCKWISE /
[]
[] UNDO
[] DEFAULT to last cumulative rotation
[] HELP

12. SCALE menu: (increase/decrease size)
[] 10% SMALLER \
[] 10% LARGER \
[] 50% SMALLER \ These compound if selected
[] 50% LARGER / multiple times.
[] 100% LARGER /
[] /
[]
[] UNDO
[] DEFAULT to last cumulative rotation
[] HELP

13. MOVE/COPY menu:
[] FROM cursor position
[] TO cursor position (follow the cursor)
[] COPY/OVERLAY OPAQUE
[] COPY/OVERLAY TRANSPARENT
[] MOVE
[] REPLACE WITH
[] SWITCH WITH
[]
[]
[]
[] HELP

14. GENERATE (a graphic) menu: (the Business Graphics Tool)
[] FROM LOTUS 1-2-3 (user supplies DSN)
[] FROM OTHER FILE (user supplies DSN)
[] FROM HERE (user inputs numbers at screen)
[] TO BAR CHART (15)
[] TO PIE CHART (15)
[] TO GRAPH (15)
[] SAME as last attempt (15)
[] DEFAULT selection of graphic type by system (15)
[] AUTO/GO
[] HELP

15. OPTIONS menu: (over-rideable default parameters)
[] ORIENTATION (16)
[] SCALE (17)
[] SIZE (18)
[] COLOUR (19)
[]
[]
[]
[]
[] AUTO/GO
[] HELP

16. ORIENTATION menu: (for bar charts and graphs)
    [] HORIZONTAL AXIS/BASE
    [] VERTICAL AXIS/BASE
    []
    []
    []
    []
    []
    [] DEFAULT
    [] AUTO/GO
    [] HELP

17. SCALE menu: (for bar charts and graphs)
    [] AXIS SELECT - (switches from the vertical to horizontal)
    [] LINEAR SCALING
    [] LOGARITHMIC SCALING
    [] AXIS START VALUE
    [] AXIS MAXIMUM VALUE
    [] LABEL INCREMENTS
    []
    [] DEFAULT
    [] AUTO/GO
    [] HELP

18. SIZE menu: (choose a 1/2 or quarter page size and location)
    [] FULL PAGE
    [] TOP HALF PAGE
    [] BOTTOM HALF PAGE
    [] UPPER LEFT QUARTER PAGE
    [] UPPER RIGHT QUARTER PAGE
    [] LOWER LEFT QUARTER PAGE
    [] LOWER RIGHT QUARTER PAGE
    [] DEFAULT
    [] AUTO/GO
    [] HELP

19. COLOUR menu:
    [] SELECT COLOUR COMBINATION (from several "packaged" options)
    []
    [] SELECT COLOUR (10)
    [] SELECT FILL PATTERN
    [] SELECT POLYGON TO COLOUR (with cursor)
    [] SELECT BORDER/LINE TO COLOUR (with cursor)
    []
    [] DEFAULT
    [] AUTO/GO
    [] HELP

20. OUTPUT (to another medium) menu:
    [] SELECT NEW GRAPHIC (by DSN - optional - see below)
    [] PRINT locally at work station
    [] WRITE DISKETTE locally at work station
    [] WRITE DISKETTE AT PRODUCTION CENTRE
    [] PRINT B/W AT PRODUCTION CENTRE (22,21)
    [] PLOT IN COLOUR AT PRODUCTION CENTRE (23,21)
    [] CREATE 35MM SLIDE
    [] CREATE VUGRAPH
    [] CREATE COLOUR PHOTO PRINT (8x10)
    [] HELP

    Note: SELECT NEW GRAPHIC allows user to start here without prior processing. If this is accessed from other than menu 1. the system defaults automatically to the last graphic worked on or accessed by the user.

21. SELECT PRINT/PLOT SIZE:
    [] 8-1/2 X 11
    []
    [] other options depending on capabilities
    [] of production centre.
    []
    [] SELECT RESOLUTION (especially for high-res colour
    [] plotter output)
    [] DEFAULT
    [] AUTO/GO
    [] HELP

22. COLOUR-TO-B/W CONVERTER
    [] CONVERT TO SHADES OF GREY
    [] CONVERT TO TEXTURE - MANUAL SELECTION
    [] CONVERT TO TEXTURE - DEFAULT SELECTION
    []
    []
    []
    []
    []
    [] AUTO/GO
    [] HELP

23. COMPOSE (MULTIPLE GRAPHICS) menu:
    [] SELECT (DSN)
    [] CONCATENATE AFTER
    [] OVERLAY OPAQUE
    [] OVERLAY TRANSPARENT
    [] CUT & PASTE (24)
    [] WINDOW COMPOSITION (optional)
    [] SPECIFY TIME DELAY (for slide show composition)
    []
    [] DONE (8)
    [] HELP

24. CUT AND PASTE menu:

[] REDUCE TO 1/2
[] REDUCE TO 1/3
[] ENLARGE TO 1.5X
[] ENLARGE TO 2X
[] PASTE UPPER HALF \
[] LOWER HALF \ In combination these keys will
[] RIGHT HALF / allow pasting in any quarter
[] LEFT HALF / page location.
[] DEFAULT
[] HELP

25. SEND (electronically) menu:

[] STRIP GRAPHICS
[] USE ENVOY-100
[]
[]
[]
[]
[]
[]
[] DEFAULT
[] HELP

26. VIDEOTEX MODE:

[] ASCII TERMINAL
[] NAPLPS TERMINAL
[]
[] SET COMMUNICATIONS PARAMETERS
[]
[]
[]
[]
[]
[] HELP

APPENDIX D

PARTIAL LIST OF INTERESTED PROSPECTIVE BIDDERS

APPENDIX D - PARTIAL LIST OF INTERESTED PROSPECTIVE BIDDERS

The following potential suppliers were interviewed and/or sourced for information in support of feasibility, cost, and timing research related to this project, and were found to have (available, under development, or in their plans) software, equipment, and/or capabilities relevant to TIMS. Each expressed an interest in bidding on a project like TIMS, and/or is considered by the consultant team to be a potential supplier of at least part of TIMS.

NOTE:

- This is not intended to be a complete list of potential suppliers. Our inquiries were made on a selective/representative basis only. The scope of our assignment did not require or warrant discussions with all or most potential TIMS system suppliers. We recognize that there are other suppliers that are potentially equally well qualified and equally interested in this project.

- During our discussions with these companies, the client and project names were not disclosed, and required capabilities were discussed in general terms only. The intent was solely to determine the current or potential future capabilities of representative suppliers, to respond to Telidon/office automation system needs of the type characterized by TIMS. Therefore, the companies whose names appear on this list should not be deemed to have made any commitment, to bid, to supply, or to develop solutions relevant to TIMS.

  PDI (Toronto)
  Microtaure (Ottawa)
  United Videotex Systems / UAV (Ottawa)
  Microstar Software Ltd. (Ottawa)
  FBN Software (Ottawa)
  Formic Videotex Systems (Montreal)
  Cableshare (London)
  Limicon (Toronto)
  Lansdowne Consulting (Ottawa)
  Xios Systems (Nepean)

We suggest that the tender for the TIMS prototype be worded in such a way as to encourage suppliers to joint-bid and/or to bid on parts of the required TIMS toolset, if they do not have solutions to the complete TIMS requirement.

TELIDON INFORMATION MANAGEMENT SYSTEM