Micro-Based Fact Collection Tool User's Manual

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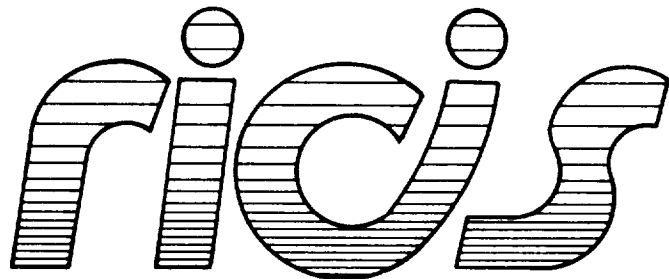
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Preface

This research was conducted under the auspices of the Research Institute for Computing and Information Systems by Richard Mayer, Director, Knowledge Based Systems Lab, Department of Industrial Engineering, Texas A & M University. Peter Bishop, Director of the Space Business Research Center at the University of Houston-Clear Lake, served as the technical representative for RICIS.

The views and conclusions contained in this report are those of the author and should not be interpreted as representative of the official policies, either express or implied, of NASA or the United States Government.

Chapter 1

Micro-Based Fact Collection Tool Users Manual

1.1 Introduction

The Fact Collection tool is designed for use by an analyst to assist in the collection and organization of data gathered during the interview processes associated with a system analysis and modeling task. The basic concept behind the development of this tool is that during the interview process an analyst is presented with assertions of facts by the domain expert. The analyst also makes observations of the domain (which again take the form of facts observed). These facts need to be collected and preserved in such a way as to allow them to serve as the basis for a number of decision making processes throughout the system development process. Thus, this tool can be thought of as a computerization of the analyst's notebook. As such, the primary mode of entry of information into the FCT is through the entry of data in the form of "sentences" (capture of "Dialog"). The analyst user of the FCT can enter these assertions and then classify portions of the text as references to instances of ten general concept types. This allows the user to capture both named and descriptive references to the concepts in the domain. Once a reference has been captured the tool supports the acquisition of additional information about that concept. This support is provided through a set of standard data collection forms associated with each concept type. For example if a named or descriptive reference is categorized as a reference

to a "physical object" the standard form will prompt for such information as the "has parts" and "part of" relations to other physical objects. These back-up data collection forms were composed after a detailed analysis of the practice of expert systems analysts and the interview procedures of a number of system analysis methods. However these collection forms are known to be incomplete. Therefore the FCT allows the capture of additional dialogue (via the dialogue capture mode) during the filling out of a standard data collection form. This support eliminates the need for a general "comments" section on the data collection form, allowing all input to be available for subsequent processing and analysis.

The following user's manual describes the general usage procedures and commands for the prototype FCT developed under this effort. This tool was constructed primarily to investigate the feasibility of providing such collection support on a micro-processor based delivery platform. Therefore, it should not be considered as a production utility. No warranties or guarantees are claimed for its performance or robustness.

1.2 Getting Started

After the FCT has been installed and booted the user will be presented with a top level screen. The system should be run from the computer's hard drive, if one is available. The following sections describe in general the allowable operations at this screen and all subsequent screens.

1.2.1 Initial Screen

The initial screen is displayed while the system is being initialized. Appropriate messages will be displayed indicating the status of the database. Press the ESC (escape) key to exit to the operating system or press any other key to continue to the main menu.

1.2.2 Main Collection Screen

The purpose of the Fact Collection Tool (FCT) is to assemble data during an interview as would be done by an analyst. Key sequences are used to move from screen to screen. Mouse sensitive type menus were not used to

increase the speed of the tool. The tool was specifically designed to be used on a portable MS-DOS based machine with a hard drive. Operating the tool from a floppy disk drive severely slows the system down and is not recommended.

The data collected can be broken down into three categories: the stage of the interview, general statements, and directly classified items.

1.2.3 Setting the Stage

The stage form is displayed by pressing "Ctrl-S" at the Collection Screen. Headings followed by spaces for data entry will apppear to gather information concerning the interview setting. This information includes who the interview is with, where and when it will take place, etc. A segment of one line will be in reversed video (it will have a light background with dark letters). This is the entry prompt and shows you how much space has been allocated to hold the information for the label next to that space. At this time you may move the entry prompt to enter information elsewhere in the form or type in a response for that label.

To move the entry prompt, you must use the cursor keys. These are the group of keys with the arrows on them or the words "Home," "PgUp," "End," and "PgDn." The arrows will move the prompt in the direction specified, scrolling the form up and down if needed. The "Home" and "End" keys will move the prompt to the first and last labels on the form. The "PgUp" (pronounced page up) key will position the form so that the screen displays the labels and entries that were above those currently on the screen. The "PgDn" key displays the screen of labels below the current screen.

To enter information, type it in from the keyboard. Originally, all of the information will be blank, and the first time you type in a piece of information, the blanks will be replaced by your entry. All of the cursor keys perform various functions. The "Home" key will position the cursor at the beginning of the entry space. The "End" key will place the cursor at the end of that space. The "Ins" key will toggle the entry mode between inserting text and overwriting it. And the left and right arrow keys will move the cursor in the appropriate direction. To have the system accept what you have typed, press the "Enter" key. Or, to disregard what has been typed, press the "Esc" key. This will return that entry to the state that it was in before you started modifying it.

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If you find that you have made a mistake, and wish to correct an incorrect entry, move the reverse video prompt to that entry and begin typing to enter the edit mode. This is exactly the same as if you are entering the information for the first time, except that the current information is kept and you are allowed to change it. All of the cursor movement keys will work the same way.

1.2.4 Entering Dialogue Statements

Statements can be entered from the collection screen after pressing "Ctrl-G." The collection screen has this key sequence listed to remind the user. This will open up a window in which a general statement can be entered.

While you are typing the statement, you may classify various parts of the statement into the previously listed classifications. Each part that is classified must be less than thirty-six characters long. To classify a string of text, merely press the function key associated with that classification. The text that will be classified will be shown in reverse video. Press the function key again to complete the classification. This text will be stored and will appear on the list of those items as described previously. If you press the control key with the function key then a blank form associated with that key will appear, ready for more information to be entered about that item. When you are through with that form, the statement window will return with the statement just as you were typing it.

1.2.5 Entering Detailed Descriptions

The Collection screen shows a list of classifications in a column. These serve to categorize certain phrases or strings of text. A function key has been assigned to each of the ten different classifications. The classifications are:

- **F1** Activity

- **F2** Physical object

- **F3** Artifact

- **F4** Organization

- **F5** System

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- **F6** Process/scenario

- **F7** Event

- **F9** Descriptor

- **F10** Statement

To obtain a form for entering information about an item, press the control key with the associated function key. Each form is different and has labels similar in structure to the stage form. These are provided to help you obtain all of the needed information. The operation of these forms is identical to that of the stage form.

At the collection screen, if you press the function key by itself, a list of items with that classification will appear. You may then select one of those items to view its associated form or enter in more data.

1.2.6　List/Modify Entries

Pressing the function keys allows the user to list the entries currently in the database for each category. Once listed, an entry is selected by using the arrow keys to move the selection bar to the desired entry and pressing return. Selecting an entry will zoom the user into the form for that entry. Any data previously entered will be recalled from the database and available to edit or append. The user may also delete an entry by simple pressing the DEL key after selecting it. Help can be obtained by pressing Ctrl-H at any time.

1.2.7　Category Descriptions

Although the categories for classifying the data entities are fairly generic, a base consensus has evolved concerning how they are generally defined:

- **F1** Activity - An activity happens over time and implies action by the subject. An example would be tightening a bolt.

- **F2** Physical object - A physical object is a touchable object. An example would be a machine.

- **F3** Artifact - An artifact is something that contains information and has many descriptors. An example would be a disk, a book, or a filing cabinet.

- **F4** Organization - An organization is a grouping of several items. An example would be a company, or a group like engineering.

- **F5** System - A system is a way of doing things or the hardware to perform a process. An example would be a LIFO system.

- **F6** Process/scenario - A process/scenario is a series or actions or activities. It can also be an ordering of the same items. An example would be a list of the steps needed to run a machine.

- **F7** Event - An event is an affair that happens "at" a time. An example would be a switch being activated when the temperature reaches a specific level.

- **F9** Descriptor - A descriptor is a piece of information. An example would be the information that a machine has four electric motors each operating at 110 volts.

- **F10** Statement - A statement is one or more sentences that can contain one or more instances of activities, physical objects, artifacts, organizations, systems, processes and scenarios, events and descriptors as components. Statements allow the collection of a free form data entity that can be decomposed as entered or at a later time into it's classifiable components. An example would be as follows: "Full system philosophy is used to determine die out demand".

1.3 Summary of Commands

1.3.1 Keyboard Functions

It may be helpful to remember that the control sequence with the function keys will cause an associated form to appear immediately. For example, at the Collection screen, "F1" will place a list of activities on the screen while "Ctrl-F1" will place a blank activity form on the screen. During data entry,

pressing "F1" will cause the addition of the specified activity to be place in the database, while "Ctrl-F1" will place that activity in the database and bring up its form on the screen immediately.

Each function key has a classification associated with it. In order from F1 to F10 (excluding F8), these are, activity, physical object, artifact, organization, system, process/scenario, event, descriptor, and statement.

The "Esc" key is used to exit a form or screen. In all cases except during entry of text in a form, its meaning is just "exit". During entry of text in a form, its meaning is disregard this text modification and exit the text entry. You will remain in the current form and be allowed to attempt modification to that text again or any other normal form operation.

1.3.2   Collection Screen Commands

- Ctrl-S - Go to the Stage Description Form.

- Ctrl-G - Open a dialogue window to accept a general statement.

- F1 - Display a list of activities and select one activity to browse or modify its form.

- F2 - Display a list of physical objects and select one to browse or modify its form.

- F3 - Display a list of artifacts and select one to browse or modify its form.

- F4 - Display a list of organizations and select one to browse or modify its form.

- F5 - Display a list of systems and select one to browse or modify its form.

- F6 - Display a list of processes/scenarios and select one to browse or modify its form.

- F7 - Display a list of events and select one to browse or modify its form.

- F9 - Display a list of descriptors and select one to browse or modify its form.

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- F10 - Display a list of statements.

- Ctrl-F1 - Display a blank form to enter an activity.

- Ctrl-F2 - Display a blank form to enter a physical object.

- Ctrl-F3 - Display a blank form to enter an artifact.

- Ctrl-F4 - Display a blank form to enter an organization.

- Ctrl-F5 - Display a blank form to enter a system.

- Ctrl-F6 - Display a blank form to enter a process/scenario.

- Ctrl-F7 - Display a blank form to enter an event.

- Ctrl-F9 - Display a blank form to enter a descriptor.

- ESC - Backup to main menu.

1.3.3 Dialogue Window Commands

Once in a Dialogue window the user is provided with support for the entry and classification of text.

Text entry

- Alphanumeric keys - place their associated character at the cursor location. The current FCT supports word wrap. Note that the concept of a dialogue entry is for the capture of simple declarative sentences.

- Esc - Accept the statement as is and return to the previous screen.

Cursor Movement Commands

- Home - Move cursor to beginning of current line.

- End - Move cursor to end of current line.

- Left - Move cursor one character to left.

- Right - Move cursor one character to right.

- Up - Move cursor to previous line.

- Down - Move cursor to next line.

- Ctrl-Left - Move cursor one word to left.

- Ctrl-Right - Move cursor one word to right.

- PgUp - Move cursor to top line.

- PgDn - Move cursor to bottom line.

- Ctrl-PgUp - Move cursor to beginning of statement.

- Ctrl-PgDn - Move cursor to end of statement.

- Ins - Toggle edit mode between insert and overwrite.

- Del - Delete character above cursor.

- Backspace - Delete character to left of cursor.

Text Marking Commands

- Alt-B - Mark the beginning of a block of text.

- Alt-E - Mark the end of a block of text.

- Ctrl-C - Copy marked block to current cursor location.

- Ctrl-D - Delete marked block.

- Ctrl-E - Move marked block to current cursor location.

- Alt-H - Unmark (i.e. hide) the currently marked block.

- Ctrl-U - Erase all of the text in the current window.

Text Reference Classification Commands

- F1 - Place the cursor on the first letter of the first word in the block to marked. A single word, several words, or a part of a word or words may be marked. Press the Alt-B key sequence to mark the beginning of this block. Now place the cursor on the last character to be included in the block. Press the Alt-E key sequence to mark the end of the block. The block will appear in reverse video if the block was successfully marked. Press F1 to classify the entity as an activity.

- F2 - Same as F1 except the block will be classified as a physical object.

- F3 - Same as F1 except the block will be classified as an artifact.

- F4 - Same as F1 except the block will be classified as an organization.

- F5 - Same as F1 except the block will be classified as a system.

- F6 - Same as F1 except the block will be classified as a process/scenario.

- F7 - Same as F1 except the block will be classified as an event.

- F9 - Same as F1 except the block will be classified as a descriptor.

The following commands support the classification of a text block and immediate description of that reference. Upon completion of the associated description capture form the user will be returned to the point in the dialogue text capture form at which the command was executed.

- Ctrl-F1 - Place the cursor on the first letter of the first word in the block to marked. A single word, several words, or a part of a word or words may be marked. Press the Alt-B key sequence to mark the beginning of this block. Now place the cursor on the last character to be included in the block. Press the Alt-E key sequence to mark the end of the block. The block will appear in reverse video if the block was successfully marked. Press Ctrl-F1 to classify the entity as an activity and go directly to its associated form for additional data entry.

- Ctrl-F2 - Same as Ctrl-F1 except the block will be classified as a physical object.

- Ctrl-F3 - Same as Ctrl-F1 except the block will be classified as an artifact.

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- Ctrl-F4 - Same as Ctrl-F1 except the block will be classified as an organization.

- Ctrl-F5 - Same as Ctrl-F1 except the block will be classified as a system.

- Ctrl-F6 - Same as Ctrl-F1 except the block will be classified as a process/scenario.

- Ctrl-F7 - Same as Ctrl-F1 except the block will be classified as an event.

- Ctrl-F9 - Same as Ctrl-F1 except the block will be classified as a descriptor.

1.3.4 Item Description Form Commands

An Item Form is any of nine different forms used by this tool to acquire more detailed information about a specific item or area. These include the activity, physical object, artifact, organization, system, process/scenario, event, descriptor forms and statements. With the exception of statements, there are two modes for each form: (1) the data entry mode where the user is typing in characters, and (2) the entry prompt movement mode in which different areas may be highlighted (selected for editing).

Form Data Entry Mode Commands

- alphanumeric keys - place their associated character at the cursor location.

- Home - Move cursor to beginning of the entry text.

- End - Move cursor to end of the entry text.

- Left - Move cursor one character to left. Upon the second consecutive left arrow key depression with the cursor at the end of the allocated length of the entry, the entry will be accepted as is and the entry prompt will be moved to the next entry.

- Right - Move cursor one character to right. Upon the second consecutive right arrow key depression with the cursor at the beginning of the entry, the entry will be accepted as is and the entry prompt will be moved to the previous entry.

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- Ins - Toggle the edit mode between insert and overwrite.

- Del - Delete the character under the cursor.

- Backspace - Delete the character to the left of the cursor.

- Enter - Accept the entry as is.

- Esc - Do not accept entry. Leave entry as it was before editing was begun.

Entry Prompt Movement in Data Entry Forms

- Home - Move entry prompt to beginning of the form.

- End - Move entry prompt to end of the form.

- Left - Move entry prompt one entry to left.

- Tab - Move entry prompt one entry to left.

- Right - Move entry prompt one entry to right.

- Sft-Tab - Move entry prompt one entry to right.

- Up - Move entry prompt to entry on previous line.

- Down - Move entry prompt to entry on next line.

- PgUp - Move entry prompt to entry one page (twenty-five lines) before the current entry.

- PgDn - Move entry prompt to entry one page (twenty-five lines) after the current entry.

Item classification within Data Entry Forms

- F1 - Mark the current entry as an activity with a link back to the current form.

- F2 - Same as F1 except the block will be classified as a physical object.

- F3 - Same as F1 except the block will be classified as an artifact.

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- F4 - Same as F1 except the block will be classified as an organization.

- F5 - Same as F1 except the block will be classified as a system.

- F6 - Same as F1 except the block will be classified as a process/scenario.

- F7 - Same as F1 except the block will be classified as an event.

- F9 - Same as F1 except the block will be classified as a discriptor.

- Ctrl-F1 - Classify the entry as an activity and display that activity's form for data entry. Upon completion of data entry for this activity, return to this form.

- Ctrl-F2 - Same as Ctrl-F1 except the block will be classified as a physical object.

- Ctrl-F3 - Same as Ctrl-F1 except the block will be classified as an artifact.

- Ctrl-F4 - Same as Ctrl-F1 except the block will be classified as an organization.

- Ctrl-F5 - Same as Ctrl-F1 except the block will be classified as a system.

- Ctrl-F6 - Same as Ctrl-F1 except the block will be classified as a process/scenario.

- Ctrl-F7 - Same as Ctrl-F1 except the block will be classified as an event.

- Ctrl-F9 - Same as Ctrl-F1 except the block will be classified as a descriptor.

Exiting Data Entry Forms

- Enter - No meaning.

- Esc - Accept the form as is and return to previous screen.

1.4   Installation

Due to the heavy disk usage by this tool, it is recommended that a hard disk be used to maintain a suitable speed of operation. It is also recommended that a new directory be made in which to place all of the necessary files.

1.4.1   Two Floppy Drives

The following steps are required to install the FCT on a new diskette for use in systems without hard drive(s) and two floppy disk drives.

1. Insert a double density blank formatted disk into drive B.

2. Insert the FCT disk into drive A.

3. At the DOS prompt type "copy a:fct.exe b:".

1.4.2   One Floppy Drive

The following steps are required to install the FCT on a new diskette for use in systems without hard drive(s) and one floppy disk drive.

1. At the DOS prompt type "diskcopy a: b:".

2. A prompt will appear asking the user to insert the source diskette.

3. Insert the FCT disk into drive A and press the ENTER (i.e. RETURN) key.

4. The computer will make a copy of the FCT disk and prompt the user for the target diskette.

5. Insert a double density blank formatted disk into drive A and the press ENTER key.

6. When the diskcopy is completed the user will see the prompt: Copy another disk?". Type n (or N) to exit the diskcopy program.

7. Remove the disk from the disk drive and label it (i.e. write FCT on a label with adhesive backing and attach it to the disk for identification purposes) and the appropriate version number. It is also a good idea to put the date the copy was made on the label. The above information often helps future user's of the disk determine which version of the program is on the disk and how old the copy

The first time that the FCT is run, it will create all of the necessary database files. It is always a good idea to periodically make backups of the system and the database files on diskettes.

To run the FCT program make the drive with the disk containing the FCT the current drive. At this time the FCT disk is in drive B.

1. Type "b:".

2. Type "fct".

1.4.3 Hard disk installation

It is assumed that the hard disk is drive C. If this is not so, replace all occurrences of c: with the drive letter of the drive being used followed by a colon.

To create a directory, use the DOS make directory command. Choose a name that is meaningful and less than eight characters long. The name of the directory in this example is "FCT". First make drive C the current drive. Then create the directory. And then make that directory the current directory.

1. Type "c:\".

2. Type "md \fct".

3. Type "cd \fct".

Now place the FCT disk in drive A and copy the FCT file to drive C.

1. Insert the FCT disk into drive A.

2. Type "copy a:fct.exe".

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The first time that the FCT is run, it will create all of the necessary database files. To run the FCT program:

1. Type "fct".

1.4.4   Hardware and Software Requirements

Technical Information

The C language was chosen for this tool because of its power, speed, and widespread use in industry. Development was performed using Microsoft's C 5.0 Compiler and supports all of the standard C functions. BTree V2.5 by Softfocus was used for the database management.

The tool has been written in a modular form to allow modifications to one area and not affect the entire program. For example, the function calls that affect the databases may be modified to use any database package other that the one currently in use. After properly modifying and compiling this one module, the entire tool may be linked again without fear of disturbing the the rest of the program.

The commented source code for all of the routines except the database package is available and included with the executable program.