FOREST PATHOLOGY COMPUTER SYSTEM

User requirement analysis & Design, with prototyping

Author: Dr F H Yung, Michael

Date: 10-11-1992

1. The existing manual system

It consists of a form (form no 1) of about one-and-a half page long containing data items, which is to be ticked and blanks, which is to be filled by the field staff. This form has evolved over the past years, but during the recent four years it has become very stable and satisfactory. This form is included in appendix 1 below. The information in it is self-explanatory and is not repeated here.

Further, the Users also want part of the information of another form (form no 2, NUTRITIONAL AND PHYSIOLOGICAL PROBLEMS) to be included in this computerized database system. This required information is in appendix 2 below.

The fields are listed in appendix 3 below.

The Users expressed that they would like to have a system for entering and querying data with screen layout as similar to the manual system as possible.

Agreement was also reached about field types, field lengths, valid values and their abbreviations if applicable.

2. Data analysis

2.1 A Special field type used extensively

Many fields are of the type "tick as many as you like", eg. the field Sample has seven possibilities, which are not mutually exclusive, but can all be ticked. This feature renders complete normalization impractical. Thus, I chose to use just a single database table to contain all the fields sequentially.

Discussions were carried out with the Data Base Administrator, Mr Paul Gioia, Mr Alex Chapman and Mr Richard Siemon. It was decided to use the following technique to handle this type of data, the "tick as many as you like" type.

Take the field Sample as an example. We adopted the abbreviation convention for its values as follows:

abbreviation	value
ROO	ROOT
ROC	ROOT COLLAR
TWG	TWIG
STE	STEM
BRA	BRANCH

Only the abbreviated values will be entered.

Then we use a single field to store its values as follows :

ROO,ROC,TWG. (a total of 12 characters)

where the abbreviated values are separated by commas and a period marks the end of the list of values chosen to be included by the User, as shown above.

Note that these field values are all highly standardized.

2.2 The simple fields

Most other fields are of the simplest type such that their allowable values are mutually exclusive. These field values are also highly standardized and can only take up a value from a list of valid values.

2.3 The Species Fields

Mr Alex Chapman suggested to the users that it is most desirable to record the Species Name by using four fields namely: Genus, Species, Rank & Infra_species.

This has definite advantages in querying the database and was adopted by the users, but only for this field and not for the fields Insects & Fungi.

2.4 Descriptive fields:

For fields, which cannot be standardized, eg. Fertilizers applied, Other conditions, we simply use one or more character fields to store the description of the situation. Admittedly, it will be harder to query these fields.

3. System Design - The Prototype

To facilitate the system design and communications with the users, a prototype was constructed using Oracles's SQL*FORMS Version 3. It was made as simple as possible and yet shows most of the features required so that the users can have a feel of the final system.

The VDU screen was divided into two halves the upper and lower halves, each being a "Pop-up Page", in Oracle terms. The data itself spans over only two Pages which always occupy the upper half of the screen. The lower half of the screen is reserved solely for displaying promptings to the User.

When the cursor is in the field Sample, if the user pressed the [List Value] key, the valid values for the field Sample will be displayed in the Pop-up Page occupying the lower half of the screen, where the cursor is also moved to. Here you can move the cursor up and down to view the valid values.

When the cursor is in the lower half of the screen, hitting the

[Prvblk] key will bring the cursor back to the field Sample into which the user can now enter the valid values while the lower screen is still displaying them. After the cursor is returned to the field Sample pressing the [next field] key will make the lower Pop-up Page disappear.

Extensive validation is carried out using the user specified conditions inbuilt into the system by PL/SQL programming techniques. When an invalid value is entered, the user will hear a beep and a message is displayed prompting him what to do.

4. Demonstration to the users

After demonstrating to the users about 5-10-1992, they were satisfied with the features and functions of the system.

On the 22-11-1992, they further provided a list of field labels and prompting messages which they like to see on the screen, to be incorporated in the final version. they also provide a list of abbrevations.

It is clear now that users know exactly what they want and I can construct the system in an orderly manner.

Appendix 1

FOREST PATHOLOGY RECORDS

CONTACT PERSON :_____ DATE:_____
ADDRESS:_____PHONE:_____

PLANT SPECIES AFFECTED:_____
BLOCK:_____ PLANT./COMPT. :_____
LAT/LONG:_____A/MAP GRID:_____OTHER:_____
HEIGHT(m):_____ DBH (cm):_____
AGE (yrs):_____ DOMINANCE: dom, co-dom, sub-dom, suppressed
SAMPLE :leaves__; twigs__, branches__, stem__, root collar__, roots__, soil__

SYMPTOMS (circle if present)

CROWN: LEAF COLOUR: green, yellow, white, silver, red, blue, brown, dead
LEAF SYMPTOMS: mildew, rust, smut, leaf spot, wilt, microphylly, necrosis, insect damage, sooty mould, twisting, none
POSITION OF SYMPTOMS ON LEAVES: tip, base, margin, between veins, along veins, bands, scattered, all over
AGE OF SYMPTOMATIC LEAVES: young, old, all ages
TWIGS: shoot death, canker, bud death twisting
POSITION OF SYMPTOMS IN CROWN: top, middle, bottom, scattered

BRANCHES: twisting, twig death, canker, kino/resin, bluestained wood, discoloured sapwood, discoloured heartwood, brown rot, straw rot, white pocket rot, insect damage, none

STEM: canker, kino/resin, bluestained wood, discoloured sapwood, discoloured heartwood, brown rot, straw rot, white pocket rot, insect damage, none

ROOT COLLAR: canker, kino/resin, bluestained wood, discoloured sapwood, discoloured heartwood, brown rot, straw rot, white pocket rot, insect damage, none

ROOTS: canker, root death, kino/resin, bluestained wood, discoloured sapwood, discoloured heartwood, brown rot, straw rot, white pocket rot, insect damage, none

OTHER SYMPTOMS:_____
FUNGI PRESENT:_____
INSECTS PRESENT:_____
FIRST OBSERVED:_____OTHER AFFECTED TREES _____

SITE

SOIL TEXTURE: sand, loam, clay GRAVEL CONTENT: none, low, high
DEPTH TO IMPEDING LAYER OR ROCK (cm):_____ ROCK OUTCROPS: Y/N
TOPOGRAPHICAL POSITION: crest, upper slope, mid-slope, lower slope, valley bottom
DRAINAGE: good, moderate, poor ASPECT: N, E, S, W

PAST SITE HISTORY

TIME SINCE CLEARING:_____
FERTILIZER APPLICATION_____
_____
HERBICIDE APPLICATION_____
_____

WEATHER

ANNUAL RAINFALL_____
RECENT ABNORMAL CONDITIONS: frost, hail, storm, flooding, exceptional heat.
other_____

LAB USE ONLY

REFERENCE NUMBER:_____ DATE:_____PAYMENT:_____
ENQUIRY: Forest, Plantation, Nursery, Utilization, Conservation,CALM, Commercial, Private

Appendix 2

NUTRITIONAL AND PHYSIOLOGICAL PROBLEMS

CONTACT PERSON :_____ DATE:_____
ADDRESS:_____PHONE:_____

PLANT SPECIES AFFECTED:_____
BLOCK:_____ PLANT./COMPT. :_____
LAT/LONG:_____A/MAP GRID:_____OTHER:_____
HEIGHT(m):_____ DBH (cm):_____
AGE (yrs):_____ DOMINANCE: dom, co-dom, sub-dom, suppressed
SAMPLE :leaves__; twigs__, bark __, wood __, root __, soil__, depth of soil sample___

SYMPTOMS (circle if present)

CROWN: LEAF COLOUR: green, yellow, white, silver, red, blue, brown, dead
LEAF SYMPTOMS: mildew, rust, smut, leaf spot, wilt, microphylly, necrosis, insect damage, sooty mould, twisting, none
POSITION OF SYMPTOMS ON LEAVES: tip, base, margin, between veins, along veins, bands, scattered, all over
AGE OF SYMPTOMATIC LEAVES: young, old, all ages
TWIGS: shoot death, canker, bud death twisting
POSITION OF SYMPTOMS IN CROWN: top, middle, bottom, scattered

BRANCHES: twisting, twig death, canker, kino/resin, bluestained wood, discoloured sapwood, discoloured heartwood, brown rot, straw rot, white pocket rot, insect damage, none

OTHER SYMPTOMS:_____
FUNGI PRESENT:_____
INSECTS PRESENT:_____
FIRST OBSERVED:_____OTHER AFFECTED TREES _____

SITE

SOIL TEXTURE: sand, loam, clay GRAVEL CONTENT: none, low, high
DEPTH TO IMPEDING LAYER OR ROCK (cm):_____ ROCK OUTCROPS: Y/N
TOPOGRAPHICAL POSITION: crest, upper slope, mid-slope, lower slope, valley bottom
DRAINAGE: good, moderate, poor ASPECT: N, E, S, W

PAST SITE HISTORY

TIME SINCE CLEARING:_____
FERTILIZER APPLICATION_____
_____
HERBICIDE APPLICATION_____
_____

WEATHER

ANNUAL RAINFALL_____
RECENT ABNORMAL CONDITIONS: frost, hail, storm, flooding, exceptional heat.
other_____

Only this information is required in this form

.....

LAB USE ONLY

REFERENCE NUMBER:_____ DATE:_____ PAYMENT:_____
ENQUIRY: Forest, Plantation, Nursery, Utilization, Conservation,CALM, Commercial, Private

```
CREATE TABLE  FPT_MASTER
   (REFNO          CHAR(10)          NOT NULL,
    SAMPLE_DATE     DATE             NOT NULL,
    CLIENT_GIVNAM  CHAR(30)          NOT NULL,
    CLIENT_SURNAM  CHAR(30)          NOT NULL,
    CLIENT_PHONE    CHAR(7),
    CLIENT_ADDR     CHAR(60)         NOT NULL,
    ENQ_TYPE       CHAR(15)          NOT NULL,
    USER_STATUS    CHAR(15)          NOT NULL,
/*      species                                          */
    GENUS          CHAR(30)          NOT NULL,
    SPECIES        CHAR(37),
    RANK           CHAR(9),
    INFRA_SPECIES  CHAR(37),
/*                                                       */
    BLOCK          CHAR(25),
    PLANTN         CHAR(25),
    LAT_DEG        NUMBER(2)         NOT NULL,
    LAT_MIN        NUMBER(2)         NOT NULL,
    LAT_S          NUMBER(2),
    LONG_DEG       NUMBER(3)         NOT NULL,
    LONG_MIN       NUMBER(2)         NOT NULL,
    LONG_S         NUMBER(2),
/*             A/MAP                                 */
    ZONE           NUMBER(2),
    EASTING        NUMBER(6),
    NORTHING       NUMBER(8),
/*                                                    */
    LOC_OTHER       CHAR(40),
    HEIGHT         NUMBER(4),
    DBH            NUMBER(4),
    AGE            NUMBER(5),
    SAMPLE         CHAR(45),
/*     --------------- SYMTOMS  --------      */
    C_L_COLOUR   CHAR(20),
    C_L_SYMP     CHAR(20),
    C_L_SYMP_POSN    CHAR(32),
    C_SYMP_L_AGE     CHAR(10),
    C_TWG_SYMP       CHAR(16),
    C_SYMP_POSN      CHAR(24),
    BCH_SYMP         CHAR(36),
    STM_SYMP         CHAR(36),
    RT_COL_SYMP      CHAR(36),
    RT_SYMP          CHAR(36),
    OTHER_SYMP       CHAR(40),
    FUNGI            CHAR(100),
    INSECTS          CHAR(100),
    FIRST_OBS_DATE   DATE,
    OTHER_TREES      CHAR(4),
/*     ---------------------- SITE ------------------  */
    SOIL_TEXT        CHAR(20),
    GRAVEL_AMT       CHAR(6),
    DPTH_IMPED_LAYER    NUMBER(4),
    ROCK_OUTCRP         CHAR(1),
    TOPO_POSN           CHAR(20),
    DRAINAGE            CHAR(20),
    ASPECT              CHAR(6),
/*     ---------------------SITE HISTORY ---------------  */
    YRS_CLEARED         NUMBER(10),
    FERT_APPD           CHAR(80),
    HERBI_APPD          CHAR(80),
/*     -------------------- WEATHER  ---------------------- */
    RAIN_MMPA           NUMBER(5),
    RECENT_ABCOND       CHAR(30),
    OTHER_COND          CHAR(80),
/*     --------------------LAB REPORT  --------------  */
    TISSUE_SAMPLED      CHAR(100),
    TISSUE_NUTRI        CHAR(1),
    AGAR                CHAR(40),
```

```
FUNGI_ISO           CHAR(100),
PLANT_ANAL          CHAR(100),
SOIL_ANAL           CHAR(100),
CONCLUSION1         CHAR(255)     NOT NULL,
CONCLUSION2         CHAR(145),
RESPONSE            CHAR(40),
WAHERB_NO           CHAR(10),
CULTURE_NO          CHAR(10)   ) ;
```

{end of document}