

Mobile Field Notebook

System Specifications

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1. Big Idea

The mobile field notebook will facilitate remote data collection and calculations. It will be designed to allow connection to instrumentation devices and be modular enough to be customized for future instruments and data collection mechanisms.

This document describes the initial idea of the Field Notebook.

2. Application Flow

In this section we describe how the user interacts with the Field Notebook. It describes step by step the procedures required and their sequence.

1.1. Pre-Launch Assumptions

- The field notebook is updated and installed through the syncing utility that comes with the Pocket PC
- The field notebook is installed properly in the mobile device and in the desktop.
- The mobile device can operate steadily without interruption.
- All calibration variables set to initiation state.

1.2. Launch/Start

The Login Screen will be the entrance door to the Field Notebook. The following are the options available:

- **New user:** Need to register in order to start using the system.
- **Normal user:** Already registered in the system.
- **Guest account:** Provides with a tutorial of the system and limited functionality. Still needs to be determined what is the level of access for this type of user.

For the remote registration, the following fields are required:

- **First Name:**
- **Middle Initial:**
- **Last Name:**
- **Username:** to log into the system.
- **Password:** more than five characters
- **UserType:** can be faculty, student, and developer.
- **Group:** group the user belongs in the system. We will have a list of classes and a undefined group in case the person is not related to any group. These groups could be either classes or interest groups. [Needs a better definition]

The return user will be presented with the normal login screen and it will have the option to try three times before the system locks.

After the login is successful, the system will present a title page with the name of the product, version, and copyright information. We'll have a link to a pop-up window that contains all the information about the Mobile Field Notebook program (version number, release date, fixes, etc.).

1.3. Project Setup

The overall planning for the project starts here. The objective is to help the user select the number of tools that are going to be needed. Here the user will be able to combine the existing tools or create their own packages of tools.

Here the user will be able to select the following:

- **New Project:** a completely new project that can combine existing templates or brand new set of tools.
- **Existing Projects:** a list of the current projects that the user is working on.
- **Templates:** a list of pre-defined projects with different components already selected.
- **Logout:** option to login as a different user. Takes the user back to the login screen.

A **Project** will encompass every single function of the Field Notebook. For example, one project may have different parts that deal with instrumentation, environmental sensors, GIS mapping, and any other add-ons like GPS or additional software packages. By selecting a template the user can accommodate their different needs.

For each project selected they will be able to modify the syncing setup. To this end the user will be able to select which process is synchronized. For example, just being able to sync the calculations rather than the whole set of objects is one of the options in mind.

Another part of the project options is the ability to select which device the data is going to be synchronized. For example, being able to select a desktop, laptop, or central database for connection purposes.

1.1.1. Example

There could be an existing project template that will combine the GIS mapping with the GPS information system. In this case the GPS will provide with the exact positioning and this will be used for the GIS software (in this case ArcPad) to generate the map and the relevant information. The GPS application that will communicate with ArcPad will save the data in the Field Notebook database and will be capable to handle different data formats (for input/output purposes). It will also permit the data to be saved in different database locations (desktop vs. central database).

1.4. Third Screen: Control Options

This is where the data input options and sub applications come into play. It is the way the project is managed and how the activities of the project are centralized. By far this is the most complicated and most commonly used screen.

1.1.2. File Actions Supported

There will be a File menu for: opening, closing, saving, editing, importing, exporting, and sending projects. There is a need to discuss in more detail how frequent the auto-save function is going to work and what are the capabilities for import/export of the project.

For now the main functions will be:

1. The **Close** option will take the user to the Project Setup page.
2. The **Open** option will allow selections of project files.

1.1.3. Data Transfer Options

Download options are specified here. Note that this is similar to Project Setup where at the time of creating a project the user is able to select syncing options.

Some of the options include:

- **Transfer to the desktop:**
- **Transfer to the central database:**
- **Transfer to another mobile device:**

The selection of what type of data is transferred is also of concern. The different parts of the project will be available to be chosen. Thus enabling to just download the computations.

We need to declare the limit of the data that is going to be stored.

Other type of functionality expected of the transfer options include:

- Status of your disk space on your device.
- Progress bar of how the download is going.
- It will give you the active sync option.

1.1.4. Instrument Status

List the status on demand for each instrument that is currently being used.

1.1.5. New Session Info

Provides with all the necessary customization to identify the project. This screen will appear automatically the first time the project is loaded requesting information:

- **Location** where you are
- **Current Session** name
- **Measurement Types** that are going to take place.

1.1.6. Input Types

Describes the different types of input of the system.

A provisional list will look like:

- Nutrients (choose this type or add new),
- Velocity,
- Data from different sensors (what type of operations, start / stop/ store, calibration)...

1.1.7. Output Types

There are three different types of outputs. The first will display information such as who took the data, name of the project, location, and parameter value. We envision having a table format and the output keeps adding to it.

Example:

Display the nutrients where a measurement is taken every hour.

The second type of output deals with maps. Spatial data collected out of GPS data that is drawn in a map and displays certain properties. In this case, the color will represent a specific parameter depending on time. ArcPad will be customized to provide with this functionality. We just need to give the data in a right format and the scripts in ArcPad will take on.

The third output type will deal with graphics of the data collected by the instrumentation devices. Once the sensor is connected and starts transmitting, the data is graphically displayed in some chart to certify that is being recorded properly. This type of output is especially created for the instrument in question.

1.1.8. Computations

Depends on the place: mobile or desktop. On the mobile side you have a couple plus the option to add a new one. When you add a new one it is just a series of stored formulas or little programs that we have included. [Need some examples here]

Some possible list of computations include:

Discharged and Geochemical Flux: this computation depends on several inputs. Those need to be verified and completed in order to complete this computation. For example, the procedure will check in another screen the validity of the manual input forms. It will then take the stored input and it will output to the database and to the screen the result of the computation. The output is numeric. We envision that this can be displayed in a tabular form. The desktop application will mirror this format.

1.1.9. Logout

The user will be able to logout also from the control screen. [To where?]

3. Input Screen

There are currently two different ways to input data: Manual or Automatic. They have different subsets that will allow easy selection.

After this screen the user will go back to the control screen.

1.1.10. Manual Input Forms

There are many ways that we envision data is going to be manually inserted. This adds flexibility to the Mobile Field Notebook application. It represents the real world situation where there may be needed to record or use the output of a new instrumentation devices but there is no time or space to attach it to the mobile device.

This manual input module needs to be flexible enough to add new types of input forms and at the same time indicate how it is computed.

Some examples of manual input include:

Velocity Input Screen: Here a figure of a sample river section will be presented dividing the river into let's say ten different sections. In this figure, there is a left and right bank. If they click with a pen on section 1; for example, a little window will open requesting parameter values for that section. Some of them could be depth, distances, etc. After data is inputted, the point is flagged to know which points have no data.

Chemistry Measurements: The input will be image based as was the case with the velocity input screen. They will take one sample representative of the whole cross section. It will not vary that much. The format for the chemistry will be a little bit different. A river up /down. The sections for the chemistry input will depend on the measurements that you are taking and some things will be on/off.

Units are important to determine before hand. Most of them are going to be standard.

1.1.11. Automatic Input Forms

This part deals with the instrumentation mechanisms.

Some general ideas are:

- Status bar for downloading info and other issues
- Calibration buttons, data
- Status Ping
- Start/Stop
- Progress bar

- Error Checking

Some basic functionality:

- You'll be able to see the point over time on a chart.
- You'll be able to see prior results.
- Option to delete a previous record.

4. Scenarios

1.5. Scenario #1:

Mario logs and selects the project template that includes:

- GPS
- GIS
- Manual

Then in the next screen he goes to the control options. Then he inserts new data for the project name, river, location, and what he is doing. Then he connects the In-situ rod and GPS into the Pocket pc. And he wants to read the GPS data, thus ArcPad takes control enabling the GPS/GIS system of input/output screens and instrument calibration. Then we have a subset of options. And the information for the point is stored. And he goes back to the control screen.

And then he tries the in-situ option, input form, automatic, in-situ probe, then it automatically check if the instrument is there. If the instrument fails, an error is generated. Mario then calibrates the instrument. And selects a new record, then data is being transferred. And he sets a time for the record. For the next fifteen minutes, data is being read and stored.

Does he want to see the output on the screen or not? He takes the record and stores the values. He saves and exit.

Then he records velocity from a manual input screen, he goes into the different input series. Then he goes back to the control screen.

Computations and select discharge. Based on his calculations.

And then he downloads to the desktop all the information. Or whatever he wants.

Then he wants to view the maps. The discharge as he goes downstream the river. And we have a script in arcPAD that already does this and makes sure also that all the data is there before arcPad is already.