MANO A MANO ONLINE INFORMATION SYSTEM:
A TECHNICAL REPORT

by
K. Denise Crowder

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From Morse Code, to the rotary telephone, to the Internet, communication among individuals has been and still is the champion for human growth and development. Moreover, human communication is key for educational, professional, and personal development. *Mano a Mano* (Spanish for "Hand to Hand"), an online system designed for UNC-CH students, staff, faculty, and organizations to meet, greet, and achieve serves a vital role in the educational, professional, and personal development of such campus affiliates. In addition, it strives to weaken the campus population barrier to communication by providing a means in which campus affiliates can make contacts among a diverse body of individuals.

Designed in accordance with the conceptual framework of the iterative method proposed by Mulhem and Nigay (1996), *Mano a Mano* and its underlying objectives intend to set UNC-CH apart from other UNC system colleges and universities by introducing a novel, technological platform of campus communication.

Headings:

      Human-computer interaction – Design

      Electronic Communication

      Online Information Systems – Development

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INTRODUCTION

      From Morse Code, to the rotary telephone, to the Internet, communication among individuals has been and still is the champion for human growth and development. Moreover, human communication is key for educational, professional, and personal development. In fact, TAP (Technology Assistance Program) acknowledges that "while we know that learning takes place individually, an important part of forming ideas and understanding of the world occurs through interaction with other individuals" (Adams 6).

      Yet, in settings of vast populations this type of learning or development becomes quite inhibited as the larger the population, the smaller the likelihood of interacting with a *variety* of people becomes. For instance, consider a group of 50 faculty members who together, make up the entire faculty membership of a small college. In the event that a faculty member develops an information need to contact all faculty members who hold membership in the hypothetical organization, National Faculty Association (NFA), he would need only manually inquire from the small group of 50 faculty members by phone, email, or in person.

However, had the college's faculty membership consisted of 500 or more individuals, the faculty member's task of contacting its members would have been most laborious. In addition, his task may have even been unsuccessful as well as time inefficient.   Yet, with the emergence of the Internet and Internet features such as e-mail and instant messaging, the population barrier to communication has been debilitated.

More specifically, the Internet has brought about a major paradigm shift in the mechanisms used for communication among affiliates of highly populated college campuses such as the University of North Carolina at Chapel-Hill (UNC-CH). In fact, a recent study of Internet use on college campuses revealed that 86% of college students use the Internet regularly (2002 American City Business Journals). What's more is that in comparison to the overall U.S. population usage of the Internet, college students use the Internet 27% more often (2002 American City Business Journals). Aside from its reputation of being a revolutionary advancement in the worlds of communication and computers (Cerf, et al. 1997), the Internet fosters relationships, bridges gaps in communities, and raises social capital around the world. In regards to this idea, Uslaner insists,

> The Internet connects people from all over the world – and may be, as Michael Hauben and Ronda Hauben described it, "a grand intellectual and social commune in the spirit of the collective nature present at the origins of human society" (pg. 62).

In addition, Ellis and Bruckman offer,

> As a more diverse population of users move online, understanding how to help those groups work together and leverage their diverse skills poses a significant challenge for human-computer interaction (pg. 474).

This concept of using the Internet as a tool for learning and achievement and the challenge for the field of human-computer interaction to facilitate a means of doing so is the motive for the development of *Mano a Mano*, an online system designed for UNC-CH students, staff, faculty, and organizations to meet, greet, and achieve. Moreover, manual methods of contact such as those exploited by the faculty member in the aforementioned scenario can be replaced by *Mano a Mano* as an alternative conducive to the goal of locating and contacting individuals of an immense population by effective and efficient means.

ABOUT MANO A MANO

THE BASICS

Mano a Mano (MAM) is a virtual liaison among UNC-CH campus students, faculty, staff, and organizations as well as an alternative solution to the population barrier to campus communication. It serves as an electronic information repository and retrieval system designed to bring such campus affiliates together in one meeting place. *Mano a Mano*, Spanish for "Hand to Hand" is an online system backed by a Postgres database. The system or website provides the interface and framework needed for user interaction while the database hosts the user profiles for querying and submittal purposes. *Mano a Mano*'s underlying motto is "Meet, Greet, Achieve."

HOW DOES *MANO A MANO* WORK?

UNC-CH students, staff, faculty, and organizations log onto *Mano a Mano* using their MAM Profile ID's and Passwords. If the user has not created a MAM Profile ID and Password, he or she must do so via the MAM Personal Profile Form or Organizational Profile Form before logging into the system. Once the user is logged in, he or she may select any of five task options: Look for Individual Profiles, Look for Organizations, Modify Your Profile, Delete Your Profile, or Access Your Notes.   An additional function of the system allows users to submit comments about their experiences with *Mano a Mano* as well as their opinion of the system.

Essentially, the system's chief function is to allow users to query the profiles of other users in search for profiles of educational, professional, and/or personal interest. Profiles are submitted to the system voluntarily by users who complete MAM profile forms via the MAM Personal Profile Form or the Organizational Profile Form. Because organizations are inanimate, the primary contact for the campus organization will be responsible for creating the organization's MAM profile.

Users who query *Mano a Mano* for user profiles may query on several of twenty profile attributes. Together, these attributes form the basis for an individual's personal, educational, and professional characteristics and will be discussed in detail later in this manuscript. The Scenario of Use shown in the figure below illustrates a typical user's information need for the system.
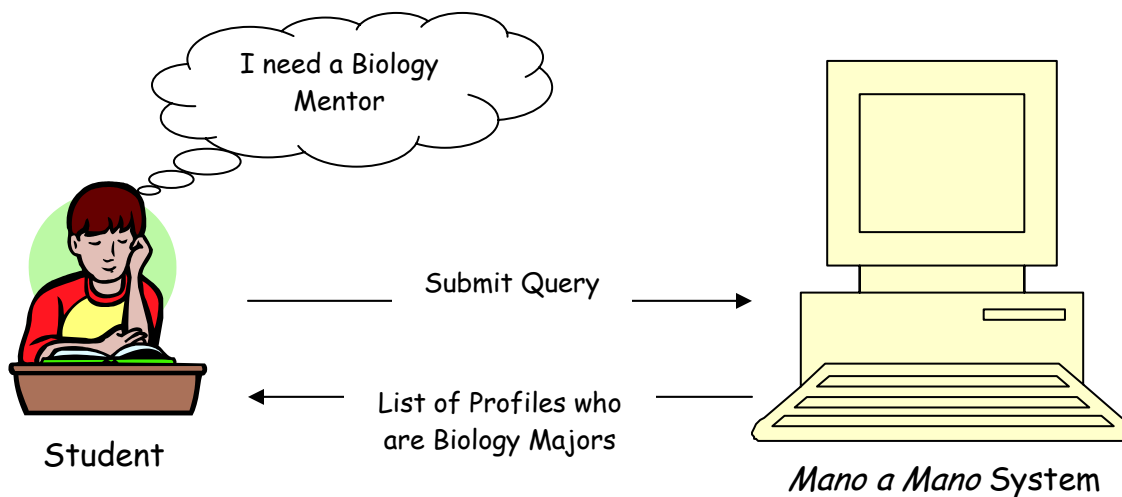
Fig. 1. Student's information need for Mano a Mano

BENEFITS OF *MANO A MANO*

Users of *Mano a Mano* may access the system for a myriad of reasons. However, the single benefit that users receive from using *Mano a Mano* is the ability to locate and contact a campus affiliate based upon specific query criterion. As an alternative to accomplishing an identical goal, the campus affiliate may indeed opt to walk the campus and introduce himself or herself to others in an effort to meet and contact a specific type of person or organization. However, doing so is extremely time consuming, does not guarantee that the individual is an UNC-CH affiliate, and may even produce irrelevant results. *Mano a Mano* assures the user that the profiles in the system are those of UNC-CH affiliates. It allows the user to look for individuals based upon certain criteria and transmits the relevant results of such queries in a timely fashion.

LIMITATIONS OF *MANO A MANO*

Although the benefits of *Mano a Mano* are solutions to some of the population barriers to communication on the campus of UNC-CH, certain limitations of the system exist as well. One such limitation is its inability to capture the profiles of all UNC-CH affiliates. Because the profiles stored by *Mano a Mano* are submitted on a voluntary basis by its users, it is expected that not all campus affiliates will volunteer their personal information to the system. Because it is understood that possible relevant results include all UNC-CH students, faculty, staff, and organizations, the limited number of profiles within the system minimizes the number of possible relevant results that a user may retrieve from a query.

One other constraint of MAM is that it does not bear the ability to detect inaccurate or false input among its users. Therefore, users who submit a query may indeed retrieve a profile which may contain false or inaccurate information about that particular user. In other words, profiles hosted by MAM may portray partially inaccurate or counterfeit data. In reference to the human inclination to mask one's identity, Wahlstrom and Roddick consent that,

> The data quality issue is difficult to resolve. The inaccurate data are undetected by the individual until he or she experiences some associated repercussion…It is also usually undetected by the organization holding the data as it lacks the contextual knowledge necessary for the exposure of inaccuracies (pg. 24).

Nonetheless, this concern of data inadequacy for MAM does not inhibit the system's overall functionality and accomplishment of objectives.

USING MANO A MANO—A STEP-BY-STEP PROCESS

ACCESSING THE SITE

Because the use of *Mano a Mano* is restricted to UNC-CH students, faculty, staff, and organizations, access to the site has been restricted to those affiliates. Once the user enters the MAM website address, he or she will be prompted to enter his or her UNC-CH ONYEN and Password. Because organizations are inanimate and hence are not issued an ONYEN and Password, an individual who serves as the primary contact for the organization will be responsible for using his or her ONYEN and Password to access the site for the organization.

LOGGING INTO THE SITE

Once access to the site has been granted by way of the user's ONYEN and Password, the user may then log into the site using his or her MAM Profile ID and Password. The MAM Profile ID and Password are created by the user. The user may create a MAM Profile by clicking on the "Create a *Mano a Mano* Profile" link from the homepage shown below.
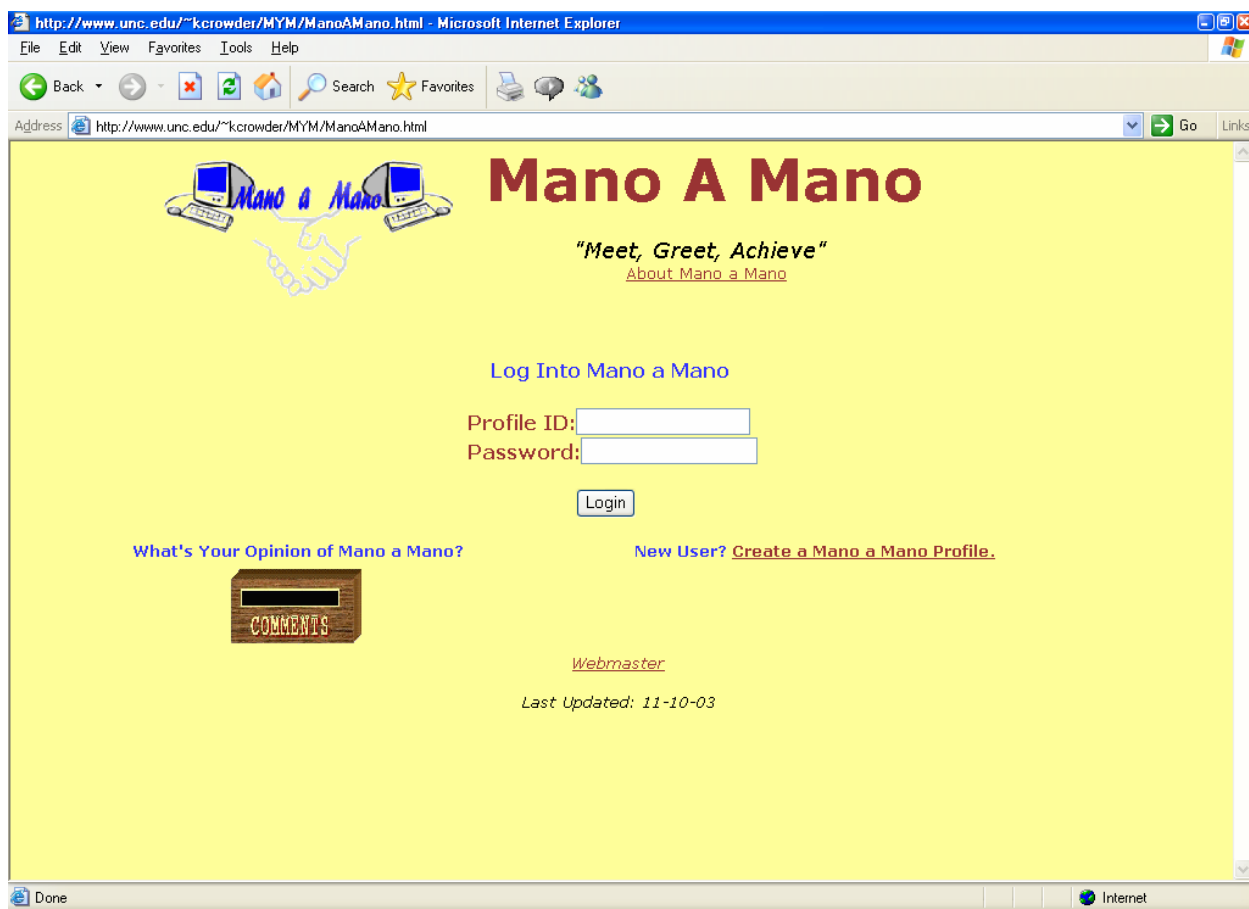
Fig. 2. Mano a Mano Homepage

CREATING A *MANO A MANO* PROFILE

Any UNC-CH affiliate may create a MAM Profile by clicking on the "Create a *Mano a Mano* Profile" link from the homepage. Individuals who wish to create a MAM profile need only to complete the form and submit it. A depiction of the top and bottom halves of the Personal Profile Form is below.

Fig. 3. Mano a Mano Personal Profile Form (Top Half)

Fig. 4. Mano a Mano Personal Profile Form (Bottom Half)

Primary contacts of UNC-CH Organizations wishing to create a MAM profile should click on the "Click Here" link next to "To Create a Profile for a UNC Organization" from the Personal Profile Form. Subsequent to doing so, the primary contact need only complete the form and submit it. The Organization Profile Form is shown below.

Fig. 5. Mano a Mano Organization Profile Form

CHOOSING A TASK

As mentioned before, once logged in, the user may choose one of five task options from the task options screen. The Task Options page renders as the figure below represents.

Fig. 6. Mano a Mano Task Options Page

Should the user choose to look for individual profiles, the resulting screen is as follows:

Fig. 7. Mano a Mano Individual Profile Search Page

From this screen, the user may search for individual profiles by Category, Profile ID, or Last Name. If searching by category, the user may select from as many categories as desired and submit the query. Otherwise, the user may enter the Profile ID or Last Name by which he or she plans to search and submit the query.

Should the user choose to look for organizations, the resulting screen is as follows:

Fig. 8. Mano a Mano Organization Profile Search

The user may search for Organizations by Category, Profile ID, or by the name of the organization.

VIEWING QUERY RESULTS

Upon execution of a query, a user will be directed to a Search Results screen. The Search Results screen will display the Profile ID, Last Name, and First Name of all relevant profiles. The screen will also entail an Email link, View Profile link, and an Add to Notes link. Should the user select the option to email, a MS Outlook interface will appear with the "To" and "From" name boxes pre-populated with the user's email address and the selected profile email address, respectively. If the user chooses to View the Profile, a screen will appear defining the selected profile in all 20 categories. If the user clicks Add to Notes, the Profile ID, Last Name, and date on which the query was ran will be automatically sent to the User's "Notes" file.

ADDITIONAL TASK OPTIONS

If the users choose to modify their profiles, their profiles will be presented in the form in which they were originally entered. The user may then make any desired changes and re-submit the profile. If a user chooses to delete his or her profile, a warning will appear asking the user if he or she is requesting that the profile be deleted. If the user verifies the request to delete the profile, it will be deleted from the database and a confirmation screen stating the profile has been deleted will appear. Should the user opt not to delete the profile, the Task Options screen will subsist.

In the event that the user chooses to access his or her notes, the user will be forwarded to the Notes file which will display the Profile ID, Last Name, and Query Date of all profiles added to the notes from query results in the past 30 days. The Notes file contains no hypertext, but it may be printed.

A user may submit comments about *Mano a Mano* by clicking the "Comments" box from the Homepage or by clicking "feedback" in the About *Mano a Mano* page. Comments are sent directly to the site creator and administrator. A user may submit comments anonymously or specify his or her name within the Comments Form.

SYSTEM DESIGN ANALYSIS

OVERALL SYSTEM DESCRIPTION

The entire *Mano a Mano* system was novel in idea and hence was created in absence of a prior design platform or framework. The system itself is twofold in design. One part consists of the interface. The other component is the Postgres Database, which stores all user profiles for querying purposes. Postgres is a relational database management system. It is esteemed in the technological realm for its rule processing capability and reputation for performance consistency.

The method used to determine *Mano a Mano*'s interface design was the iterative method (Mulhen and Nigay, 1996). Contrary to the conceptual method, the iterative method supports an experimental design that warrants the development of

the interface without the collection and study of user information needs beforehand.

The iterative method employs end-user evaluation subsequent to interface design.

This method, unlike that of the conceptual method, allows for greater flexibility in

design where rapid development is needed. In other words, the iterative method

supports prototyping.

The interface is coded primary in HTML and is hosted on the UNC-CH ISIS

server. Additional languages employed throughout the system include Javascript™

and PHP (open source software project of *The Apache Software Foundation*).

Javascript is used to perform many site functions. These functions include:

- Verifying MAM Profile ID and Password

- Allowing users to log out of the system

- Permitting execution of the following Task Options:

    o Modifying User Profiles

    o Deleting User Profiles

    o Accessing user Profiles

The scripting language used to facilitate communication between the website

and the Postgres database is PHP. Although Perl's popularity as a scripting language

and the fact that PHP was first prototyped using Perl was considered before the

decision to utilize PHP became effective, the speed that PHP allows in execution of

queries became the deciding factor in determining which scripting language to

employ.

An integral step taken towards procedures of the database design was the

development of an ER diagram. ER diagrams, in general, aid in the organization and

design of database content. In a discussion concerning content design methods,

Merialdo et al., explain,

> The first step of our method is the definition of the site content, which in turn
> corresponds to content of the underlying database; as it is standard this is
> done by means of a conceptual database design phase which produce an ER
> scheme (pg. 52).

The following ER diagram represents the entities and the relationship between the

entities that support the contents of the *Mano a Mano* database.
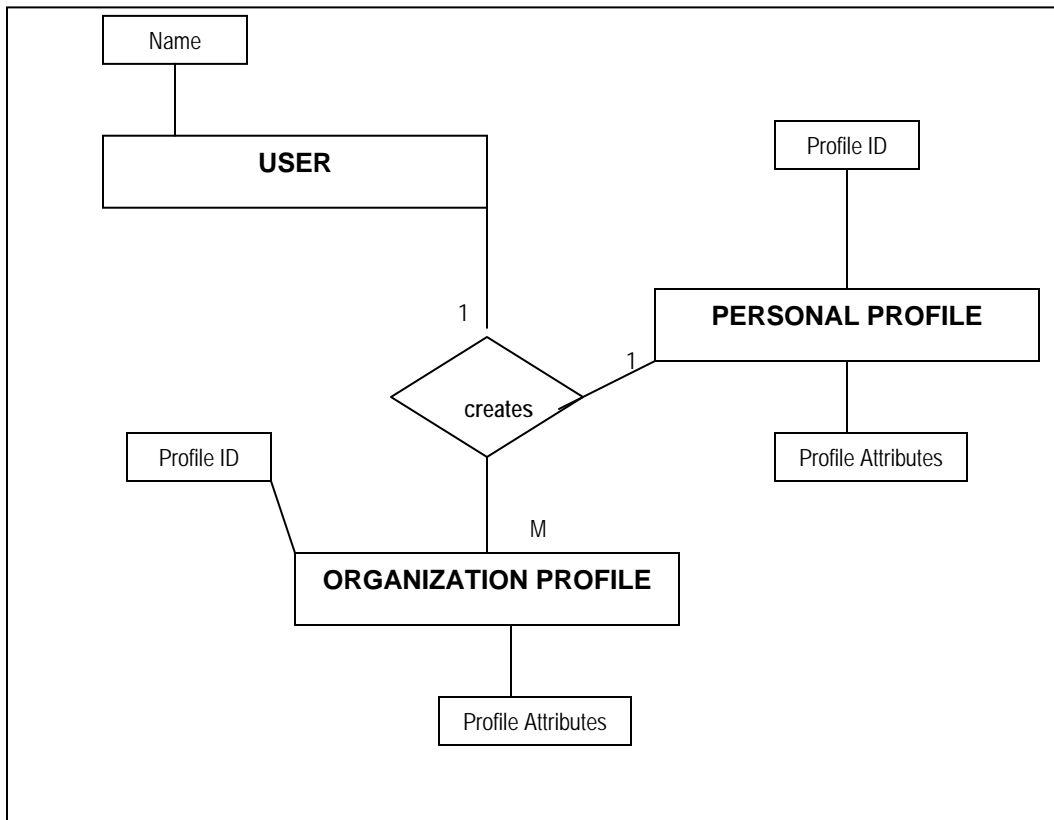
Fig. 9.   Mano a Mano database: ER diagram.

Three components describe the systems complete operation: The user, the website, and the database. Figure 10, below, illustrates the interaction between all three components and thus describes the system's function in its entirety.
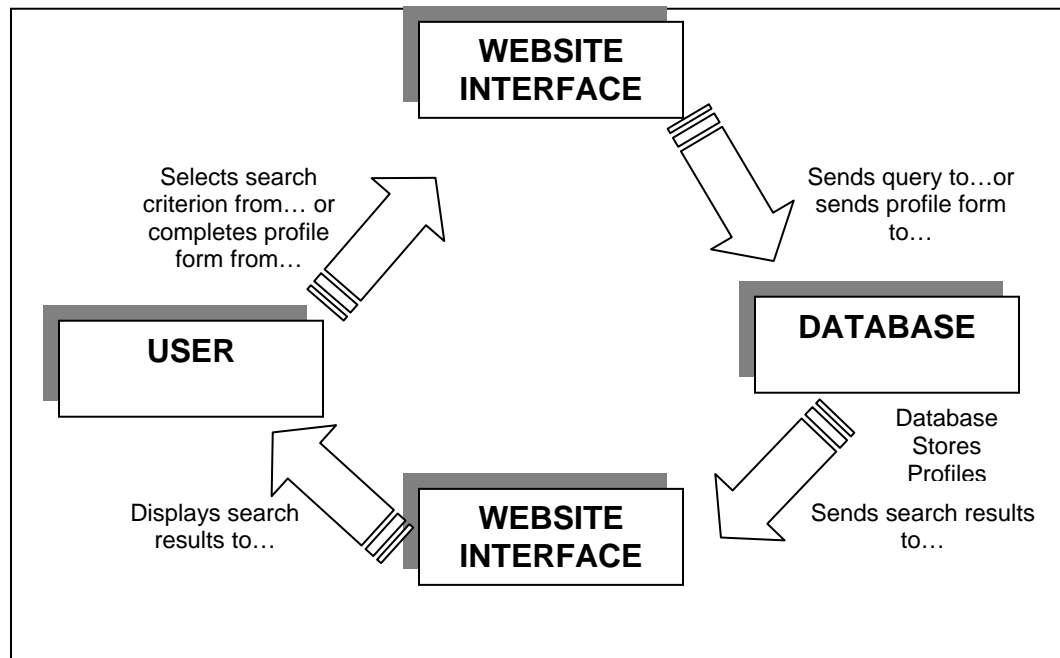
Fig. 10. Mano a Mano user, website, and database interaction.

In terms of system functionality, B.L. Allen's idea of how a user satisfies an information need was modeled throughout the *Mano a Mano* front-end design. This methodology is responsible for the logical development of the site's front-end design because it emphasizes the cognitive process that a user experiences when attempting to satisfy an information need. Allen's model for the user-centered approach to information systems is depicted in Figure 11 below.

```
                    ┌─────────────┐
                    │    SEEK     │
                    │ INFORMATION │
                    └─────────────┘

┌─────────────┐  ┌─────────────┐      ┌──────────────────┐
│Seek information│ │{Express information│  │{Examine Results}│
│    need      │  │    need}     │      └──────────────────┘
└─────────────┘  └─────────────┘

        ┌───────────┐ ┌─────────┐  ┌─────────┐ ┌──────────┐ ┌──────────┐
        │Find/Identify│ │ State  │  │  Scan   │ │(Learn from│ │{(Plan next│
        │ an expert/ │ │problem: │  │/evaluate│ │ results) │ │ moves)}  │
        │  source    │ │ label,  │  │ resutls │ └──────────┘ └──────────┘
        └───────────┘ │definition│  └─────────┘
                      └─────────┘
LEGEND
()=optional
{}=may be repeated
```
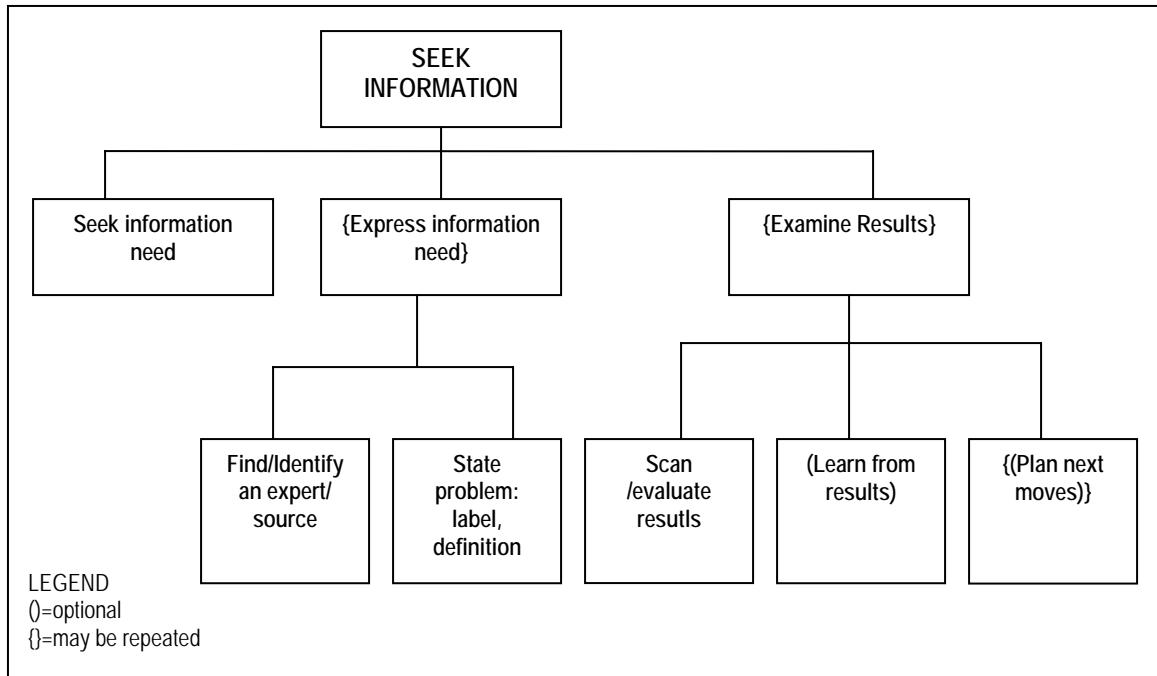
Fig. 11. B.L. Allen's Information Seeking Model: *Information Tasks: Toward a User-Centered Approach to Information Systems.*

FORMS

     Mano a Mano supports the use of three forms: the Personal Profile Form, the Organization Profile Form, and the Comments Form. The graphical interfaces of each of these forms were designed from a human-computer interaction perspective. Forms are an efficient means of communicating user input via the Web. In reference to this idea, Niedherst mentions that,

> Forms provide a method for interaction between users and the publisher of a website, with an immediacy that could never be achieved in print. With forms, you can solicit input from a user in order to provide a customized response on-the-fly or just collect data for later use (pg. 253).

In addition, the use of forms allows for a visually effective graphical interface.

Information Visualization: A special aspect of user interfaces, the means for communicating structures and processes, which may be shown in abstract or representational forms. Classically, these may be described as tables, forms, charts, maps, and diagrams (Marcus 11).

Mano a Mano's three web forms apply Jakob Nielson's heuristic of aesthetic design in that each form is designed to be logical in order and to allow ample white space. The use of ample white space throughout the form avoids interruption of the user's cognitive flow and hence allows for a greater level of usability. The elements that make up each of the forms are left aligned so as to communicate a clear order of the form.

A page with lots of form elements can get ugly in a hurry. The best favor you can do for a form is to align elements in some orderly fashion (Niedherst 273).

MANO A MANO ICON

The idea behind the *Mano a Mano* icon incorporates the English meaning of the system's name, *Mano a Mano*. This interpretation ("Hand to Hand") is represented by the handshake emerging from the two computers in the graphic. The "Handshake" metaphor attempts to soften the website environment and enforce the system's motto, "Meet, Greet, Achieve." This icon also serves as a means for branding the site as well.

COLOR SELECTION

The overall aesthetic presentation of the site was designed to be warm in nature. The shade of yellow in the background and shades of burgundy and blue as

font color intend to invite the user into a socially pleasing atmosphere as well as to

enforce readability of the site. On that note, Ambler points out that,

> If you are going to use color in your application, you need to ensure that your
> screens are still readable. The best way to do this is to follow the contrast
> rule: use dark text on light backgrounds... (pg. 2).

POP-UP WINDOWS

Mano a Mano uses pop-up windows in two instances of the website. One of

which is the "About *Mano a Mano*" window revealed below.
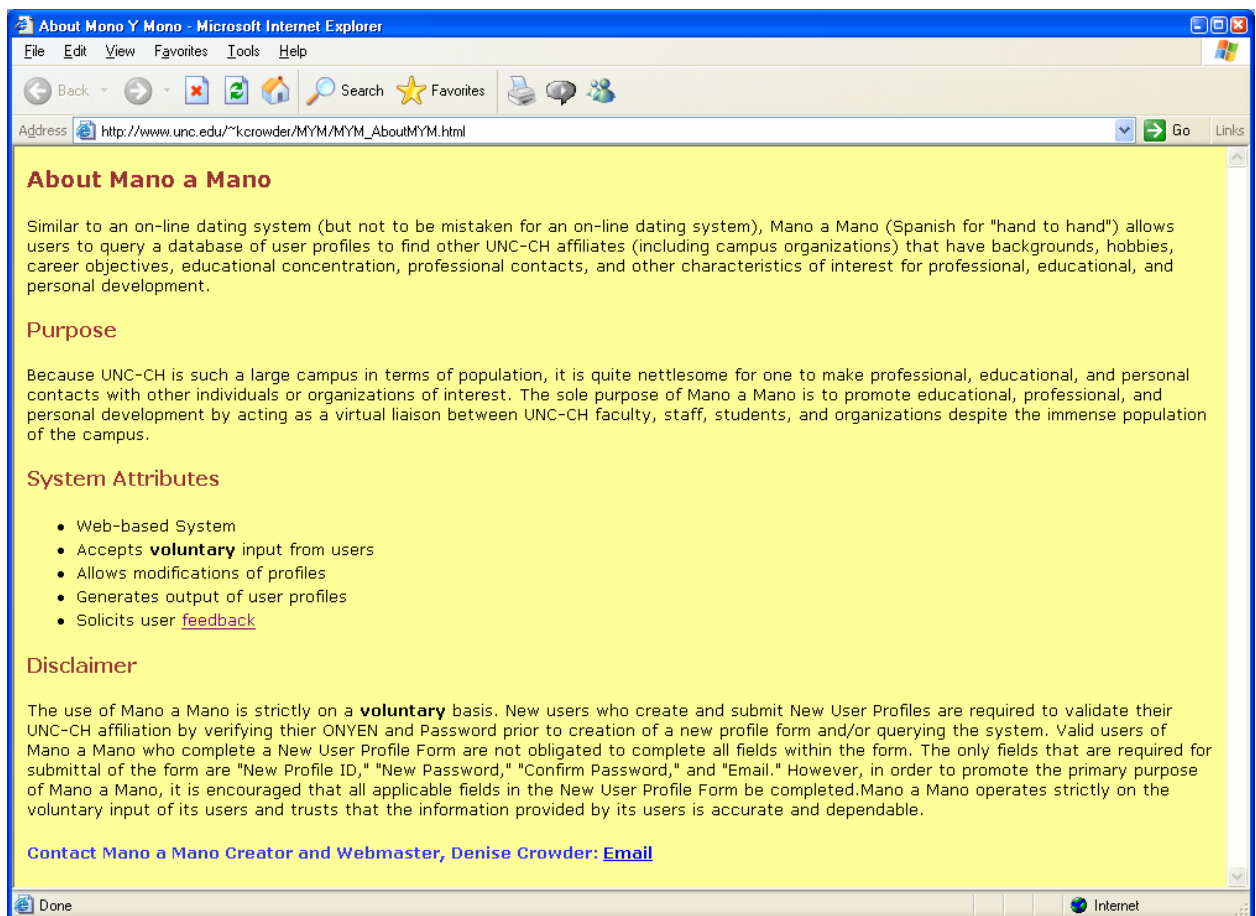

Fig. 12. "About Mano a Mano" pop-up window

The contents of this window describe the system, provide a hyperlink for users to submit comments about the system, and provide an e-mail link which allows users to contact the creator and webmaster.

The other pop-up window found within the site is the MAM disclaimer shown below.
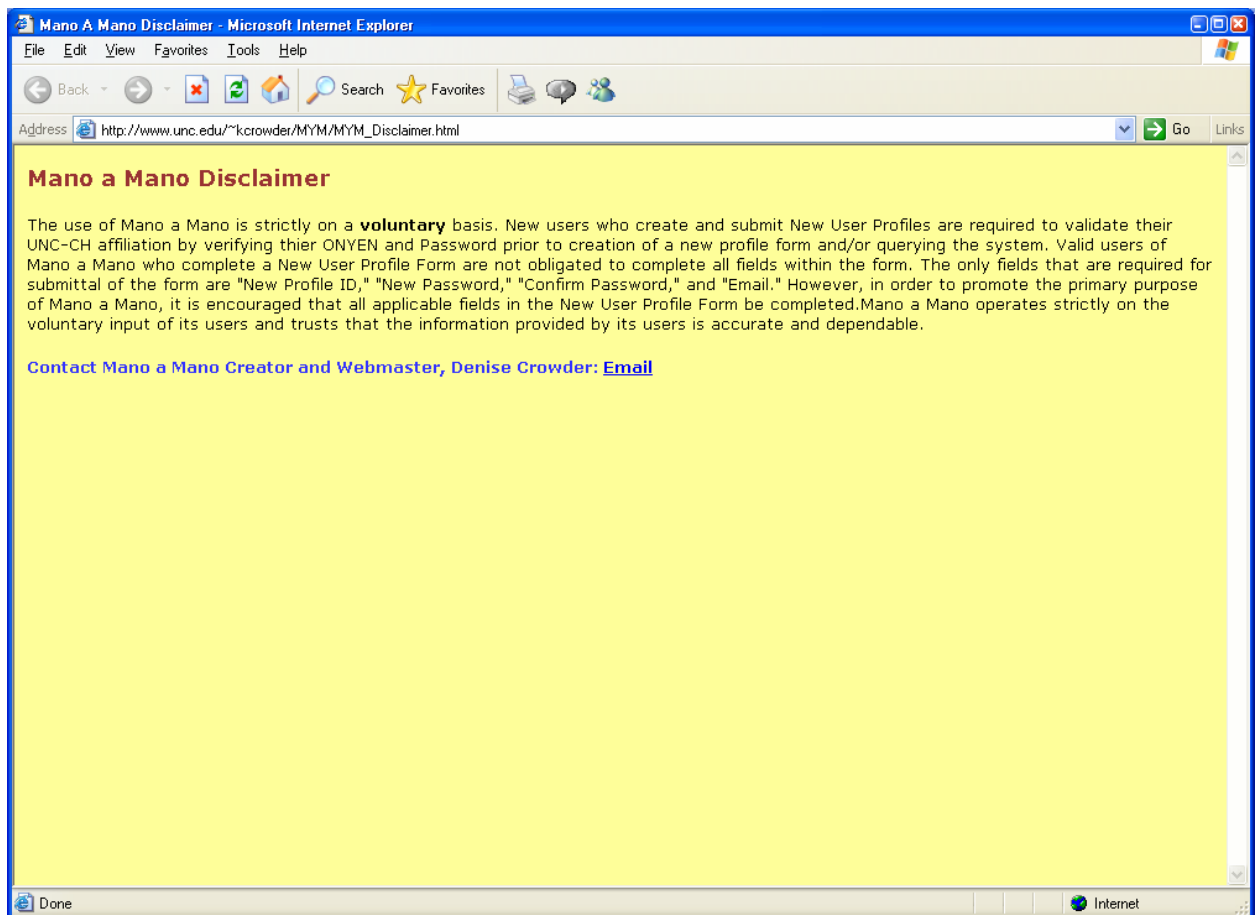
Fig. 13. Mano a Mano Disclaimer pop-up window

The usefulness of this disclaimer is referenced later in this manuscript in the Design Decisions section.

The use of pop-up windows for relaying the aforementioned information versus the use of links that would not depart from the flow of the site encourages the user's navigation. Since viewing the Disclaimer or the About *Mano a Mano* piece is irrelevant to the user's central purpose for using the system, pop-up windows were incorporated to display this data. Nielson's rule of navigational ease became the deciding support for this decision.

SELECTION OF ATTRIBUTES

The following table presents the attributes that make up the individual profile.

Educational Attributes	Professional Attributes	Personal Attributes
Campus Affiliation (student, faculty, staff)	Previous Work Experience	Last Name
Educational Degrees Received	Current Work Experience	First Name
Educational Degrees Pending		Age
Student Classification		Race
UNC Memberships		Marital Status
Honors and Awards Received		Number of Children
Honors and Awards Sponsored		Sex
Academic Concentration		Language
		Religion
		Native State/Providence
		Disabilities
		Overall Personality
		Hobbies

Table 1. List of Individual Profile Attributes

As shown in the table, the attributes of the individual profile are intended to represent a balanced educational, professional, and personal description of all users.

The educational and professional attributes epitomize the core objectives of the University, which include initiatives to educate and promote professionalism for all. The personal attributes intend to represent holistically an affiliate's personal characteristics and may become the basis for which an affiliate develops an information need to contact another affiliate for reasons other than educational and professional.

The personal need to socialize and develop connections with other affiliates is the primary rationale for such MAM personal attributes as religion, disabilities, and number of children. Additionally, patrons of *Mano a Mano* are not required to complete the religion, disabilities, or number of children field within the Personal Profile Form to use the system. Should a user feel a threat to his or her privacy from completion of any of these three fields, he or she may exercise the option to omit these fields in the Personal Profile Form. The figure below further iterates the reasoning for such MAM personal attributes.
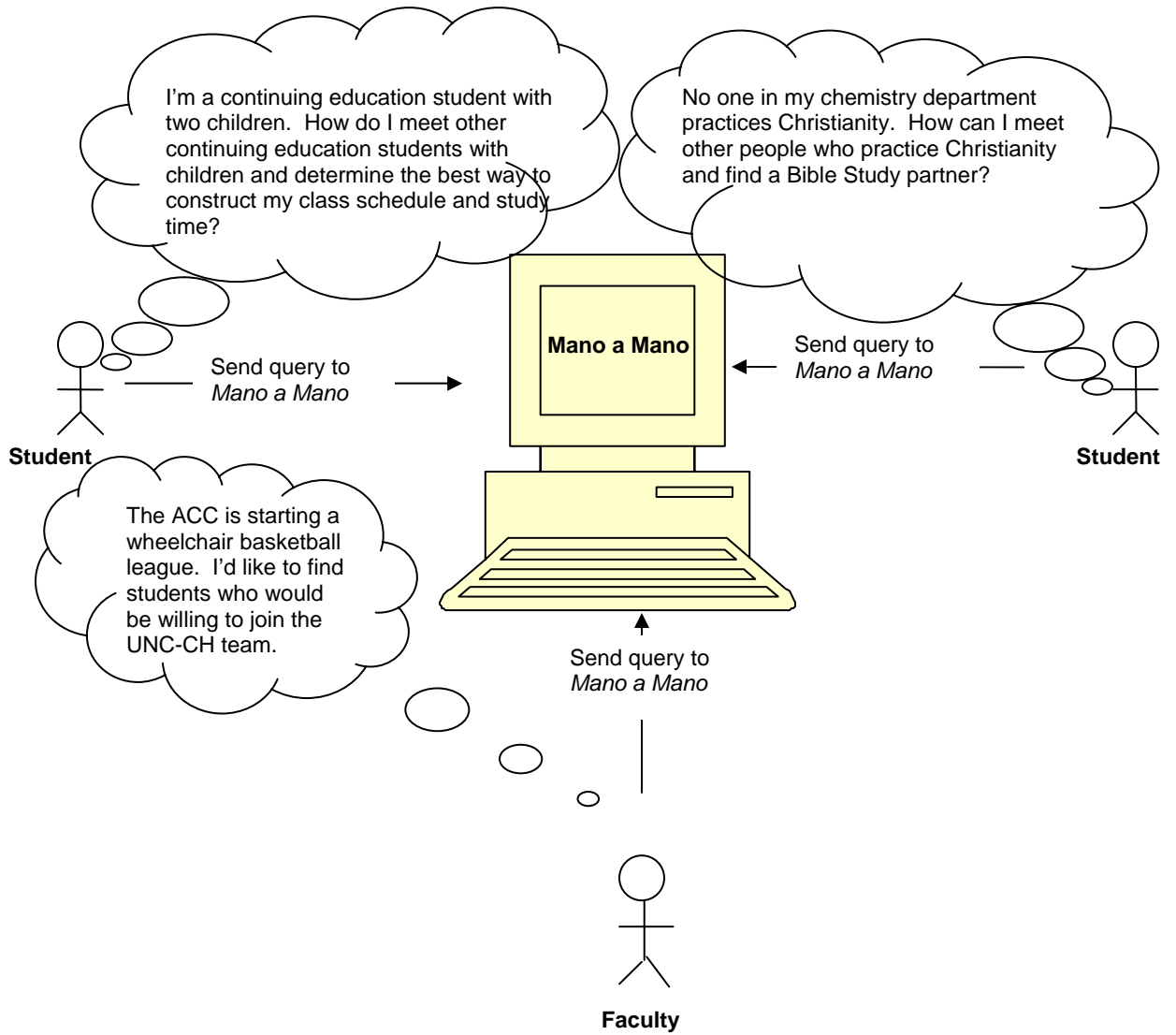
Fig. 14. Rationale for Mano a Mano Personal Attributes

The table below depicts the attributes that constitute the organizational profile.

All Organizational Attributes
Organization Name
Organization Email Address
Faculty Advisor
Primary Contact Name
Primary Contact Number
Primary Contact Email
Organizational Category
Description of Organization

Table 2. List of Organizational Attributes

This table outlines the attributes that are intended to describe an UNC-CH organization in its entirety. The Organizational Category attributes were derived from the current UNC-CH standard used to classify campus organizations. Currently, the standard lists 12 categories in which all campus organizations fall.

DESIGN DECISIONS

DROP-DOWN MENUS

Users who query the system will look for individuals, look for campus organizations, or both. The method by which the users select their search criteria is a drop-down box. Although using a drop-down box in web forms is used most often on many sites, alternatives to this segment of the graphical interface were considered. Such alternatives included the Checkbox input type and the Radio Button input type. The resulting decision to use the drop-down box for user queries as well as within the web form was premised on the usability factor of efficient screen space usage. While

checkboxes and radio buttons tend to consume large amounts of space when several

form elements are in use, drop-down boxes occupy less space within the graphical

interface. Advocating drop-down box usage in web forms, Fitcher notes that,

> Drop-down boxes are excellent for picking one item from lists such as names
> of cities, branches of companies, etc. (pg. 3).

MANO A MANO DISCLAIMER

An acute concern about preserving user privacy arose during the system

design. Users who complete profile forms may feel pressured to complete fields

which some may consider too personal. Such pressure translates into loss of user

interest or the scare tactic effect. In a discussion of employees who submit personal

information via web forms, Fitcher acknowledges,

> One way that you can tell that privacy issues might be at play is if many of your
> forms are submitted bearing bogus employee names...those users are
> uncomfortable with some of the questions (pg. 2).

In an effort to counter this issue of privacy, the following ideas were formed:

- Prompt a quick tutorial of use once the user clicks "Create a *Mano a*

  Mano Profile"

- Attach the word "required" to the 4 fields which are required (Email,

  Profile ID, Password, and Confirm Password)

- Develop a disclaimer to be embedded as a link within the form

The option to develop the disclaimer and embed it in the form proved to be the most optimal solution in that prompting a tutorial would interrupt the user's cognitive flow in satisfying his or her information needs and labeling the four required fields may encourage users to ignore the rest of the form elements altogether. It is expected that this decision will be further evaluated in usability testing.

COMMENT BOX ICON

The MAM homepage currently displays the MAM comment box icon with an "alt" html tag that reads "comments" as a description. Users click this icon to send comments on their opinions of MAM. However, an additional means of accomplishing this goal was contemplated beforehand. The alternative was to use a simple hyperlink that read "Submit Comments." Yet, the decision to use the comment box icon prevailed as Rosenfeld and Morville point out that,

> ...it is interesting to note that even the site's design acknowledges that iconic labels don't stand well on their own and hence need textual explanations. Iconic labels like these add aesthetic quality to a site...(pg. 130).

CONCLUSIONS AND FUTURE WORK

Mano a Mano can be accessed at:

http://www.unc.edu/~kcrowder/MYM/ManoAMano.html. Its current functions allow users to look for individuals, look for organizations, modify profiles, delete profiles, and access notes. Although the site is functional, the design of the site is still in its adolescent stage of development and has yet to undergo usability and security testing. However, the system's ultimate goal to connect UNC-CH students, faculty, staff, and organizations has been achieved and intends to foster the educational, professional, and personal development of all affiliates.

Future work on *Mano a Mano* includes the implementation of a full-scale usability and security testing strategy. The results of the testing should indicate the system's level of usability and degree of security from a user's perspective. The survey intended to capture these results can be found in the Appendix of this manuscript. In addition, the functionality and interface design of similar systems such as PRWeb, WebCT, European School Net, and iEarn will be evaluated and considered in *Mano a Mano*'s future development.

APPENDIX

Mano a Mano
-A Usability Survey-

Use the following scale to complete the survey.

| 1 | Strongly Agree |

| 2 | Agree |

| 3 | Neither Agree or Disagree |

| 4 | Disagree |

| 5 | Strongly Disagree |

<u>Circle One</u>

1. The overall experience of using *Mano a Mano* was satisfactory. 1 2 3 4 5

2. The color scheme of the *Mano a Mano* graphical interface
was satisfactory. 1 2 3 4 5

3. I felt a true sense of privacy when using the system. 1 2 3 4 5

4. I felt a true sense of security when using the system. 1 2 3 4 5

5. The overall graphical interface of the system was satisfactory. 1 2 3 4 5

6. The arrangement of form elements on the Profile Forms was
logical. 1 2 3 4 5

7. The "About *Mano a Mano*" link was helpful in my understanding
of the system purpose. 1 2 3 4 5

8. The *Mano a Mano* icon conveys the site's motto,
"Meet, Greet, Achieve." 1 2 3 4 5

9. The use of drop-down boxes in the forms was effective. 1 2 3 4 5

10. The *Mano a Mano* Disclaimer was conducive to my understanding
of form input requirements. 1 2 3 4 5

11. The Search Results interface was helpful. 1 2 3 4 5

12. I would use *Mano a Mano* for satisfying my information needs. 1 2 3 4 5

13. I would encourage others to use *Mano a Mano* for satisfying
their information needs. 1 2 3 4 5

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