Systematic Approach—
User/Design Research Projects

IA Design & Usability

Topic: Expertise and Professional Qualifications

For Doing User-Centered Design and User/Design Research

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TABLE OF CONTENTS

Page

WHITE PAPER

FIGURES

Introduction: Need for Information Architects/ User Experience Designers

According to the authors, Morville & Rosenfeld (2006) of *Information Architecture for the World Wide Web,* a new field of work emerged back in 1994 with the advent of Internet industry entitled Information Architecture and commonly abbreviated as "IA." While Information Architecture is a relatively *young profession*, the professional practice of Information Architecture is continually developing and emerging.

That means thinking about user-centered design: designing navigational systems and search functions to help end users effectively use Websites. Organizing information to support wayfinding and usability in the digital landscape defines what the Information Architect practitioner does in his practice. This white paper does not include a complete discussion or description of every job task the Information Architect practitioner might do in his practice, but it is a brief discussion about this *new* and *emerging*.

Many corporations realize that they have a need to make usability assessments for Websites, Intranets, interaction designs, and do research prior to implementation of any digital design products. That means performing a needs assessment (commonly referred to as a competitive analysis). Doing Information Architecture research and implementing user-centered design into every design product should provide meaningful online experiences for end users who use distance educational programs online or Websites.

Because end users should be able to use design products with ease, following an Information Architecture model is a way of ensuring that user-centered design is incorporated into design plans—in digital design products prior to final implementation. Another good reason to follow a model: it helps to know where one is at in his project. Documentation enables team members to effectively communicate about projects, keeping track of milestones and deliverables.

What is Information Architecture?

Since Information Architecture is such a *young* profession, it is difficult to know exactly how to define what Information Architecture *is* or *is not*. The other problem with defining the professional practice of Information Architecture is that many universities or colleges do not offer any specialized degrees in Information Architecture, though. During the last decade, because Information Architecture is an *emerging* profession, a few universities currently offer Information Architecture or interaction design in graduate-level programs.

Wikipedia (http://en.wikipedia.org/wiki/Information_architecture) gives this definition for Information Architecture.

> The Information Architecture Institute (http://iainstitute.org/en) gives this definition for **Information Architecture** as:
>
> 1. The structural design of shared information environments.
> 2. The art and science of organizing and labeling Websites, Intranets, online communities and software—to support usability and findability.
> 3. An emerging community of practice focused on bringing principles of design and architecture to the digital landscape.
>
> The term **Information Architecture** describes a specialized skill set, which relates to the interpretation of information and expression of distinctions between signs and systems of signs. It has some degree of origin in the library sciences. Many library schools [and graphic design schools] teach **Information Architecture**.

Per Dick & Carey, et al., *The Systematic Design of Instruction* (2005), regarding ISD Models, Information Architects or clients may *not* follow a model (similar to what instructional designers use, referring to The ADDIE Model or other ISD Models). Critics may inquire, ponder, or remark: Why should an Information Architect follow The IA model?

The answer to that question is—if Information Architecture is not implemented into all design products prior to building Websites or other design products—design products may be seriously defective because end users cannot effectively use them. These design products may lack in structure, overall consistency, or search functionality. If usability testing is *not* done prior to final implementation of a Website, sites may lack in user-centered design or navigational systems and may *not* be fully integrated and unusable.

Relevance of Information Architecture—The IA Model

Information Architects *must* educate, *teach*, and i*nform* clients about what a good model is for using a standardized system to develop high-quality Websites. While instructional designers use The ADDIE Model or other ISD Models, Information Architects use The Creative Information Architecture Model. The IA Model one might imagine and speak about, should be used, is cited from Wikipedia. The manual and guidelines on usability standards from the U.S. Government Printing Office (2006), *Research-Based Web Design & Usability Guidelines* insinuate that The IA Model should be used in the Information Architecture profession. Since it helps to regulate the industry, it incorporates user-centered design into digital design products.

Following a standardized systematic approach, this provides Information Architects and instructional designers with a better way to document their researched findings in detailed reports. A systematic approach is an iterative process and incorporates high-quality designs or well thought out conceptual ideas into design products. Another good reason for using an Information Architecture model is that it gives one a way to more readily and easily communicate with stakeholders as well as with team members.

The IA Model provides a systematic approach for doing specific Information Architecture design research, and it helps in an iterative design process to communicate to others and do high-quality work. If a good model and systematic approach is followed, it provides a solid framework for every person on the team. In addition, using a model is an excellent way to communicate and document conceptual ideas. It enables researchers to do brainstorming and create good designs. Let us talk about The IA Model.

The IA Model is comprised of eight steps: 1. Design Research, 2. Concept Generation, 3 User Scenarios, 4. Wire Frame Mockups, 5. Prototyping, 6. Usability Testing, 7. Implementation, and 8. System Testing (see Figure 1). This white paper explains the step-by-step process for successfully using The IA Model. Thus, The IA Model provides a systematic approach for every person to use on projects. While it is true processes and procedures have to be followed, The IA Model provides a solid framework and excellent model that any person can use on projects, including a systematic approach for building Websites or other digital design products (Online IA Tutorial—http://www.stevenheitman-ia.com/html/MAEd.html; Online NS Tutorial—http://www.stevenheitman-ia.com/html/MAIA.html).

The IA Model

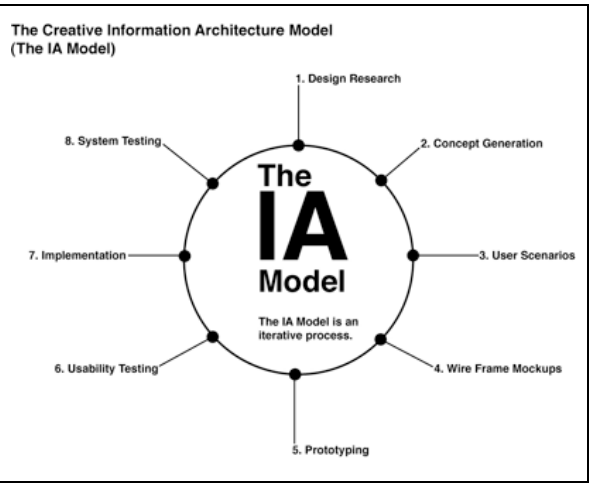
1. Design Research 2. Concept Generation 3. User Scenarios 4. Wire Frame Mockups 5. Prototyping 6. Usability Testing 7. Implementation 8. System Testing	

Figure 1: The IA Model

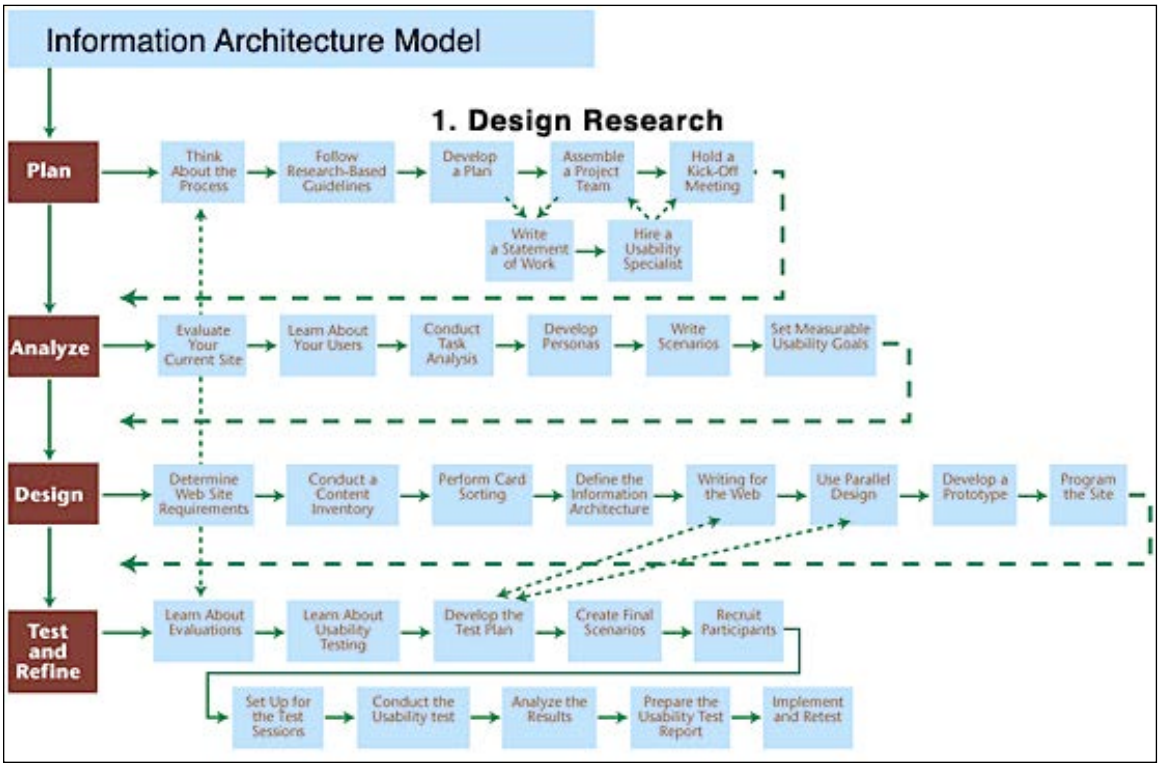


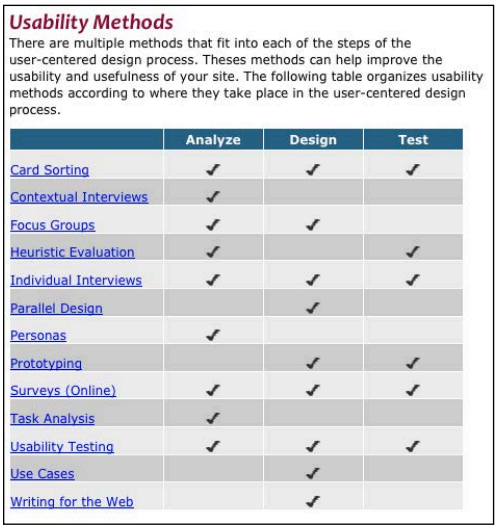
Figure 2: A Typical Information Architecture Model to Follow—The IA Model

1. Design Research

Information Architects do research, writing specific case studies, interviewing stakeholders, end users, and doing a competitive analysis (see Figure 3). Research also includes interviewing and observing end users to determine how they intend to use a Website before it is designed. Doing card sorting with participates or setting up focus groups to gather research for design plan is another way to collect data from end users (may be accomplished in 3. User Scenarios and/or 4. Wire Frame Mockups). The rationale for doing research prior to designing and building a Website—it may save corporations money in the long run. In 1. Design Research, these procedures are followed.

1. Think about the process (see Figures 1-2):
    - Learn about users.
    - Researchers outside the agency.
    - Researchers inside the agency.
    - Other staff in the division.
    - Non-research staff elsewhere in the agency.

2. Conduct a task analysis—to understand end users and their:
    - Needs for information on the Internet (Websites).
    - Ways of thinking about, grouping, and organizing information.
    - Expectations about your site.
    - Levels of knowledge about the subject matter.
    - Levels of experience with the Web and similar types of sites.
3. Follow research-based guidelines (see Figure 2):
    - The IA Model.
    - http://www.stevenheitman-ia.com/html/MAEd.html.
    - Who should use the guidelines?
        - Information Architects and Project Managers.
    - Can an Information Architect customize the guidelines?
        - Any person can customize guidelines to meet their specific needs on projects.
    - Do the guidelines have limitations?
        - Guidelines serve as a model—any system has limitations. Website design is highly specialized and a limited medium with different parameters than print-based projects.
4. Develop and write a Design Plan Report (see Figure 2):
    - Create an Information Architecture Design Plan Report (see http://www.stevenheitman-ia.com/html/MAEd).
    - Determine project scope.
    - Identify user audiences.
    - Set objectives.



Usability Methods

There are multiple methods that fit into each of the steps of the user-centered design process. Theses methods can help improve the usability and usefulness of your site. The following table organizes usability methods according to where they take place in the user-centered design process.

	Analyze	Design	Test
Card Sorting	✓	✓	✓
Contextual Interviews	✓		
Focus Groups	✓	✓	
Heuristic Evaluation	✓		✓
Individual Interviews	✓	✓	✓
Parallel Design		✓	
Personas	✓		
Prototyping		✓	✓
Surveys (Online)	✓	✓	✓
Task Analysis	✓		
Usability Testing	✓	✓	✓
Use Cases		✓	
Writing for the Web		✓	

Figure 3: Design Research

2. Concept Generation

After research has been completed, Information Architects and their team members all come together to participate in brainstorming activities, numerous discussions, deciding on the best way to move forward with their intended design products (see Figure 4). One thinks about design concepts with regard to flow charts and various schematic—how to show the structure of a Website, including developing draft concepts of wire frame mockups (may be accomplished in 3.User Scenarios and/or 4. Wire Frame Mockups—in rapid prototyping these items could be done sooner). This is a way to brainstorm and think on paper by drawing out conceptual ideas, completing other pieces of relevant design research. In 2. Concept Generation, these procedures are followed.

5. Assemble a project team:
    - Who should be included on the team?
        - Project Managers,
        - Usability Specialists,
        - Testers,
        - Content Writers,
        - Technical Writers,
        - Editors,
        - Subject Matter Experts,
        - Information Architects,
        - Corporate Trainers,

- Graphic Designers,
- Interface Designers, and
- Computer Programmers.

- What skills are needed?
  - Include research and pertinent details in Information Architecture Design Plan Report or Statement of Work (SOW) Design Plan.

6. Hold a kick-off meeting with:
   - Team visions and perceptions.
   - Project realities.
7. Write a Statement of Work (SOW) in Design Plan Report:
   - What is a Statement of Work (SOW)?
     - A detailed Information Architecture Design Plan Report, regarding requirements for Websites.
   - What should it include?
     - Work to be performed.
     - Location of the work.
     - Period of performances and timeline.
     - Deliverable schedule.
     - Any special requirements such as security clearances, travel required, special skills or knowledge.
   - Examples and templates—
     - Sample of the SOW covers a range of user-centered design activities, including:
       - Evaluation of current Websites.
       - User research and analysis.
       - User and task analysis.
       - Information architecture and content organization.
       - Iterative usability testing.
       - Templates and forms at online Statement of Work (SOW).

8. Hire a usability specialist:
    - What to ask?
        - Information about qualifications, degrees, references, and work experience.
    - Where to look for consultants—
        - Word of mouth and recommendations from clients, human resources, hiring managers, online at http://www.stevenheitman-ia.com/index.html, agencies, or recruiters.
9. Evaluate current Website:
    - Does the Website meet your organization's objectives and your usability goals?
    - Is the Website meeting the needs of your end users?
        - Review users' emails and phone calls.
        - Evaluate your Web logs and search logs.
        - Conduct an online survey.
        - Conduct a usability test.
    - Does the Website comply with basic Websites guidelines?
        - Evaluations have to be made and Website inspected. If a Website complies, that means user-centered design was incorporated into Website prior to implementation.

Figure 4: Concept Generation

3. User Scenarios

User scenarios help Information Architects and stakeholders to understand who intended audiences will be, as well as how an intended audience could use a Website, including how end users might use current computing technology devices and navigational systems (see Figure 5). This helps everyone involved to make determinations if computer programmers can actually do required computer programming for a proposed Website. Great conceptual ideas may be well thought out. Can they realistically be designed and implemented in the digital landscape?

Another consideration that must be taken into account is what computing devices or what software programs an end user might use or not use. End users may not have a high-speed Internet connection or large computer screens to view a Website. Understanding who the end users will be gives us insights about how to design a Website for its intended audiences. Other design issues concerning usability have to be taken into account: compliance with Section 508 of the Disabilities Act (requirements for specific Websites and intended audiences in online communities). In 3. User Scenarios, these procedures are followed.

10. Learn about your end users (IA Techniques and Characteristics of End users—see matrix below):
    - What I need to know about end users.
    - How can I learn about end users?

IA Techniques	Characteristics of End Users
Usability Testing	• It can be done remotely; tester and user need not be at same location. • You usually develop the scenarios. • One or two users at a time. • Total numbers: 5 to 12 users. • You observe and listen to actual behaviors. • May be formal or informal, quantitative and/or qualitative results. • Users usually come to you.

Contextual Interviews	• You go to the user's home or work site. • Users do their own work (different scenarios with different users). • One or two users at a time. • With individual sessions, typical total numbers: eight to 16 users per user group. • With remote testing, typical total numbers: 30 users per user group • You observe and listen to actual behaviors. • You see users' environments and the technology users have. • Usually informal dialogue with user, qualitative results. • Interviewer and user are physically at same location.
Online Survey	• May have large number of responses. • Get users' self-report. • Good for wish lists, attitudes, experiences; not for actual behaviors. • Usually mostly closed questions (yes/no, multiple choice, short answer). • May include open-ended questions, but they require more analysis. • Users may be located anywhere. • May be single-survey or iterative series.
Individual Interviews	• Face to face, by telephone, through instant messaging or other computer-aided technologies. • One user at a time. • Total numbers: usually five to 15 users. • Rich data—you can follow up on questions. • Can include both closed and open-ended questions. • Self-report; good for attitudes, experiences, wish lists. • Not good for actual behaviors.
Focus Groups	• Small group discussion, usually eight to 12 people per group. • Moderated by trained facilitator. • Usually everyone is in the same location. • Self-report; good for attitudes, experiences, and wish lists. • Not usually good for actual behaviors, but it can be combined with some aspects of behavioral usability testing. • Discussion is influenced by group dynamics (for good or bad).

Card Sorting	• Usually used after gathering information with one or more of the other techniques. • Each card represents a possible topic on the site. • Need a start on content topics—so have some cards to sort. • Can be done remotely with one of several Web-based tools; that allows for large numbers of responses but little understanding of why each person chose that response. • Can be done as individual sessions; one or two users at a time. • With individual sessions, typical total numbers: eight to 16 users per user group. • With individual sessions, you can observe and take notes as users talk about what they are doing. • With Web-based tools, typical total numbers: 30 users per user group. • With Web-based tools, you can gather a great deal of data and can call users after the card sort to learn about how users sorted the cards into categories.

- Users' research techniques including surveys, interviews, contextual interviews, card sorting, and usability testing.

11. Conduct task analysis:

- What is task analysis?
- What does task analysis focus on?
- What does task analysis involve?

Task Analysis

A task analysis complements user analysis. Task analysis means learning about your users' goals—what they want to do at your Web site-and your users' ways of working. Task analysis can also mean figuring out what more specific tasks users must do to meet those goals and what steps they must take to accomplish those tasks. Along with user and task analysis, we often do a third analysis: understanding users' environments (physical, social, cultural, and technological environments). Segmenting your target audiences by their main goals focuses your site's development on those users' tasks.

- What are the benefits of task analysis?

> **Benefits of Task Analysis**
>
> According to JoAnn Hackos and Janice (Ginny) Redish, authors of *User and Task Analysis for Interface Design*, user and task analysis focuses on understanding:
>
> - What users' goals are and trying to achieve;
> - What users actually do to achieve those goals;
> - What personal, social, and cultural characteristics the users bring to the tasks;
> - How users are influenced by their physical environment, including previous experiences; and
> - How users' previous knowledge and experience influence how they think about their work and the workflow they follow to perform their tasks.

12. Develop personas:
    - What is a persona?
        - A persona is a fictional person who represents a major user group for your Website (see Figure 5).
    - How do you get information for a persona?
        - Contextual interviews.
        - Individual interviews.
        - Surveys (online).
        - Focus groups.
        - Usability testing.
    - What does a persona format look like?
        - See Figure 5.

- What characteristics are included in a persona?
    - A name and picture.
    - Demographics (age, education, ethnicity, family status).
    - Job title and major responsibilities.
    - Goals and tasks in relation to your Website.
    - Environment (physical, social, technological).
    - A quote that sums up what matters most to the persona with relevance for your Website.
- What are the benefits of personas?
    - End users' goals and needs become a common point of focus for the team.
    - The team can concentrate on designing for a manageable set of personas, knowing that they represent the needs of many users.
    - Design for what end users' need.
    - Design Plan is based on needs of end users.
    - Disagreements over design decisions sorted out by referring back to personas.
    - Designs evaluated against personas, which results in better user-centered designs for Websites.

13. Write user scenarios:

- What is your scenario?
    - A short story about a specific end user and their goal(s) for using your Website; scenarios are questions, tasks, and stories that end users bring to your Website and that it must satisfy.
- When should you use scenarios?
    - Scenarios critical for Websites and usability testing.
    - Write down 10 to 30 most common scenarios.
    - While doing usability testing, an Information Architect can ask end users for their own scenarios.
- How detailed should a scenario be (simple to complex)?
    - Goal- or task-based scenarios.
    - Can be elaborate scenarios.

Brief (No Story or Motivation):
In which government building can you find Bertrand Adams' 1937 painting Early Settlers of Dubuque?

Elaborated (with Story and Motivation):
Your grandfather told you that he posed for Bertrand Adams when he was painting his large 1937 masterpiece, *Early Settlers of Dubuque*. You heard that the painting is displayed in a Federal building. In which building can this artwork be found?

- How do you gather scenarios?
    - Questions from contact links.
    - Questions people ask and stories they tell clerks who answer phones.
    - Surveys (online).
    - Contextual interviews.
    - Individual interviews.

14. Set measurable usability goals:
    - What is a measurable usability goal?
        - A measurable usability goal is the definition of successful usability on your Website for a specific set of end users doing a specific task.
    - What types of measureable usability goals should be set (referring to affordances built into interaction design components and part of information architecture)?
        - Complete transactions in five or ten minutes.
        - Submit the right amount from the right bank and bank account.
        - Make no more than one error while using the application.
        - Recover from any error in one minute or less (built-in affordances for end users).
        - Rate the experience a four or five on a one to five scale where five is the best.

- Which types of measures should you rely on most?
    - Time, accuracy, overall success, satisfaction.
- How do you set measurable usability goals?
    - Test Website against your measurable usability goals and consider: time, accuracy, and success—more important than satisfaction.

Figure 5: User Scenarios

4. Wire Frame Mockups

These mockups help Information Architects to clearly design and draw out what a Website might look like prior to developing it via code (see Figure 7). By drawing up wire frame mockups, it saves a company spending a lot of money to develop a Website because it costs a lot of money to pay a computer programmer to actually write code. Wire frame mockups can also be used to communicate Information Architecture design conceptual ideas to clients as well as to computer programmers.

By doing annotated wire frame mockups, enable other team members to view and read any wire frame mockup. Wire frame mockups include written technical specifications about functionality and rationale for a design. These drawings provide detailed technical specifications for everyone on a team. Wire frame mockups help Information Architects to communicate their conceptual ideas to computer programmers, and it prevents developing unrealistic design concepts that may never be able to

be implemented. Also, card sorting sessions with end users are performed to do research and collect data about how end users use Website—prior to implementation and production (see Figure 6). In 4. Wire Frame Mockups, these procedures are followed.

15. Determine Website's requirements:
    - What are requirements?
        - Fully integrated navigational systems—
            - Navigational systems (main and local).
            - Search features and functions (Web indexing, et al).
        - Meets business requirements for stakeholders.
        - Links to related Websites (ad hoc).
        - Pertinent reports or documents (PDFs).
    - How do you develop requirements?
        - Website reflects end users' needs.
    - How detailed should requirements be?
        - One sentence description to define purpose of Website and what end user does on it.
    - How do you use requirements?
        - Gather information on what end users' need.
16. Conduct a content inventory:
    - What is a content inventory?
        - List of all the content on your Website.
    - Why conduct a content inventory?
        - Information Architects and researchers need to know what is already on the Website.
    - What goes into a content inventory?
        - Overall topic area for Web page(s).
        - Web page title.
        - URL.
        - Short description of information on Web page(s).
        - Creation date of Web page(s).
        - Date of last revision(s).

- Author of Web page(s).
- Who is responsible for Web page and his contact information?
- When Web page(s) must be reviewed next.
- Expiration date of Web page(s).
- Links on Web page(s).
- Web pages' status.

- How do you get a content inventory?
  - Audit Website.
- How do you organize a content inventory?
  - Use spreadsheet or database.
  - May sort by date of last revision.
- What do you do with a content inventory?
  - Use it to work with managers, content developers, and all team members.

17. Perform card sorting:

- What is card sorting?
  - Card sorting is a way to involve users in grouping information for a Website (see Figure 6).
- What are the benefits of card sorting?
- It helps Information Architects to learn how end users' think about content and how they would organize a Website.

What are the different types of card sorting?

- **Open Card Sort**—
  - An open card sort is typically done when you want to learn how users group content and understand the terms or labels users call each category.
- **Closed Card Sort**—
  - A closed card sort typically works best when you are working with a pre-defined set of categories and you want to learn how users sort content items into each category.

- A closed sort works well after an open sort. By conducting an open card sort first, you can begin to identify categories of content. You can then use a closed card sort to see how well the category labels work.

- How do you conduct a card sorting session?
  - List content topics or types of information on Website.
  - Write each topic on a separate index card.
  - Limit yourself to 50 to 100 index cards; use blank cards; number index cards in bottom corner or on back and process—
    1. Select participants that represent broad range of end users.
    2. Plan for about an hour for each session.
    3. Have enough space for participants to work in with cards.
    4. Plan to have a note taker present to take notes.
    5. Pay participants and treat them.
  - Conducting card sorting session with participants—
    1. Show participants cards; home page and categories; explain you want them to group cards in ways that make sense to them.
    2. Ask participants to talk out loud because you want their thoughts.
    3. Let participants work to organize cards in a way that makes sense to them and for additional hyperlinks or other documents.
    4. At end, if too many home pages, ask if or how they could be combined.
    5. Provide additional colored cards and ask to name each group. What words would they use to name or label items?
    6. At end, pay participants and thank them.

7. Analyze data at end by recording number down quickly; make a detailed site map or other Information Architecture flow charts or diagrams; less detailed analysis use notes; more complex analysis use computing software for a spreadsheet.

18. Define the Information Architecture for Website:

- How do you define the Information Architecture for your Website?
    - Do research to learn about end users' and business requirements (see Figures 1-2).
- How do you determine what should go on the home page?
    - Reflects reasons why end users use Website.
- How can you use **card sorting** to help you define your categories and labels?
    - Card sorting is a way to involve users in grouping information for a Website; see how they group cards together and organize cards to gain insights into how end users' use Website (see Figure 6).
- What is a **wire frame mockup**—how do you create one?
    - A visual representation (drawing) of one Web page; it defines graphic design, navigational systems, functionality, consistence interface designs, and defines key features on a Web page; prioritizes the features so that the most important features are prominently positioned on a Web page; and visually communicates this information to the entire design team and stakeholders with a diagram of each and every Web page (see Figure 7).
    - Wire frame mock ups or illustrations are usually produced using Visio, and Illustrator, and are oftentimes annotated.
        - While no Figure is included to show an annotated wire frame mockup, it is just a wire frame mockup with additional notes included in diagram for additional details.

- How do you create a **site map** or **flow chart**?
    - A site map is a visual representation of the Information Architecture of your Website.
    - A flow chart depicts organization of main navigational system, et al., with links and other aspects of technology or computer programming or requirements for layer codes (AJAX, CSS, et al., in an Information Architecture Design Plan Report)—if required for Websites (see Figure 8).

19. Writing for Web pages and/or the Internet:
    - How do you select what your audience needs?
        - Audience needs defined from research.
            - Use relevant information.
            - Use information to serve end users' needs.
    - How should you organize your content?
        - Break text into manageable chunks.
        - Put in headers and footers.
        - Write useful and meaningful headers.
        - Make headings into a table of contents (remote navigational system).
        - If information is in sequential order, keep it in order.
        - Non-sequential information organized by what end users' need first.
    - How do you write clearly?
        - Main message first.
        - Cut out words.
        - Keep paragraphs shorts.
        - Keep sentences short.
        - Use fragments.
        - Use end users' language or words.
        - Give examples.

- How do you write visually or communicate visually?
    - Use photographs or illustrations or meaningful diagrams.

20. Use parallel design:
    - What is parallel design?
        - Using design solutions created by other people as though they were templates—a way to save time and money, using improved Websites and/or digital design products.
    - What are the benefits of parallel design?
        - Seeing and trying others' designs improved in final solutions—can use their designs for templates.
        - Creating many designs that produce better results.
        - Combining design elements that resulted in better user interfaces.
    - How have others conducted parallel design?

> McGrew (2001) published an article confirming the value of parallel design. McGrew's case study was the user interface for an invoice reconciliation program. He scheduled a one-day session with several participants, including the project manager, a designer, two subject matter experts, and a technical writer who was scheduled to do the training, three users, and a human factors engineer. They began by having each person independently sketch a proposed user interface on a large sheet of paper using colored felt-tip markers. The sketches then were posted on the wall for all to see and evaluate. After viewing the design solutions proposed by others, each participant sketched two new designs. McGrew required that each new design include at least one idea from another person's design and an idea that no one had yet proposed. They began to agree on an optimal design fairly early in the process and were able to reach consensus on the final user interface before the end of the day.

- How does parallel design work?

> What is most striking about parallel design is how many ideas can be considered in a very short time. Most linear processes would only have considered a few iterations of a single design in the time that parallel design can consider many ideas. McGrew's design team considered at least 40 design alternatives in a single day. McGrew found that most participants responded immediately to good ideas. This was true even when good ideas were contained in otherwise poor design solutions. Good user interface design requires designers first to "saturate the design space." This means that user interface designers should consider as many alternative design ideas as possible before selecting the best to take forward.

Figure 6: Card Sorting

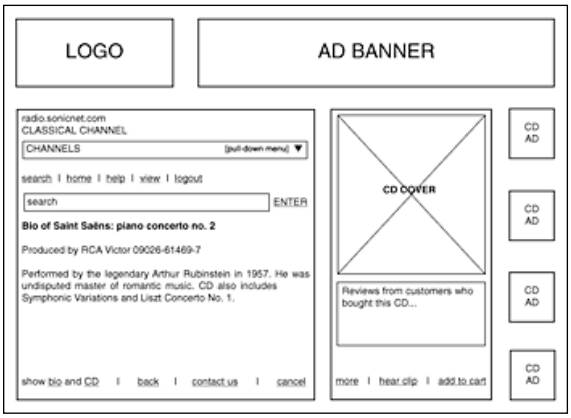


Figure 7: Wire Frame Mockups

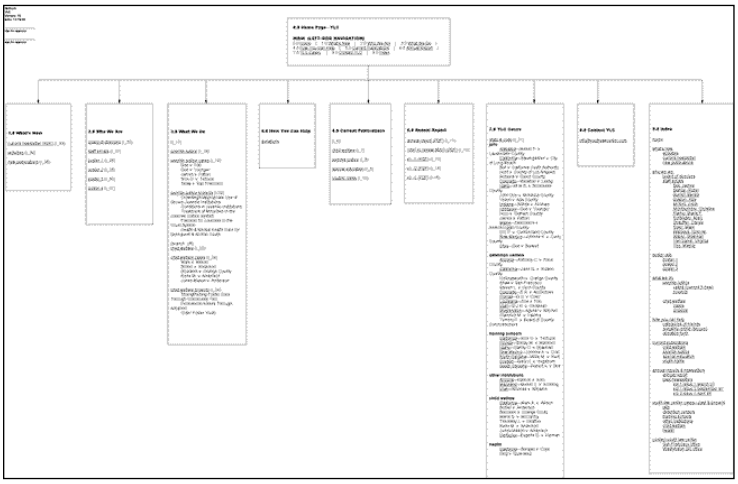


Figure 8: Flow Chart (IA, PM project for Youth Law Center)
http://stevenheitman-ia.com/html/youth_law_center_project.html

5. Prototyping

Information Architects work with other team members to create "experience prototypes" (see Figure 9). Working prototypes are developed quickly. End users can also be tested to see if they can easily use a prototype. Another inexpensive way to do prototyping is to use wire frame mockups to test end users. One might consider doing a focus group and recording or videotaping the sessions to provide Information Architects and clients with additional research documentation. In 5. Prototyping, these procedures are followed.

21. Develop a prototype:
    - What is a prototype?
        - A draft version of your Website—
            - HTML (see Figure 9).
            - Image based (see Figure 9).
            - Paper based (see Figure 9).
    - When should you build a prototype?
        - Can be built at any time; best time is early on in the process.
    - Why build a prototype?
        - Since it is much cheaper and a good way to get feedback from end users (per Nielsen, 2003, he says—"it saves a 100 times the actual cost and 10 times the impact. If you discover you need a change early on in your project."
    - Why use low-fidelity prototypes?
        - Because it is less expensive, fast—the quickest way to get feedback on your preliminary Website's Information Architecture, design, and content.
        - Can use paper and scissors.
        - Sticky notes.
    - Does fidelity make a difference?
        - Research indicates it makes no difference.

22. Programming (computer programming) the Website:

- When should you begin programming?
  - Consider paper prototyping or HTML or use of images to prototype.
  - After research and focusing on end users' needs, test working prototypes or consider parallel design.
  - When final solutions have been decided upon, programming may begin.
- When should you test the Website?
  - Consider testing HTML prototypes early on in the design process.
- What about accessibility for end users?
  - Accessibility (Section 508 of the Rehabilitation Act, 29 U.S.C. 794d) requires all Federal Agencies to make their electronic and information technology accessible to people with disabilities.

Figure 9: Prototyping

6. Usability Testing

Information Architects write and develop usability test plans, since it provides a structured way in which to test end users. Most likely, an Information Architect requires two other team members to assist with usability testing. The Information Architect leads end user in the taking the usability test; a note taker jots down notes (see Figure 10). The other team members observe end users. End users may be video taped for future references. In 6. Usability Testing, these procedures are followed.

23. Learn about evaluations (see MAIA Thesis Report; MAEd Thesis Report and Appendix C):
    - How can you tell if your Website is usable?
        - Usability evaluations, which typically do not include users working with the product. Usability tests, which focus on users working with the digital design products.
    - What types of usability evaluations are there?
        - Surveys and questionnaires.
        - Observational evaluations.
        - Guideline based reviews.
        - Cognitive walkthroughs.
        - Expert reviews.
        - Heuristic evaluations (see matrix below).

What is a heuristic evaluation?

The goal of **heuristic evaluation** is to find usability problems early in the design of a Website so that improvements can be made as part of the iterative design process.

Heuristic evaluations usually are conducted by a small set (one to three) of evaluators. The evaluators independently **examine** a user interface and judge its compliance with a set of usability principles.

The result of this analysis is **a list** of potential usability issues or problems. The usability principles, also referred to as usability heuristics, are taken from published lists. Ideally, each potential usability problem is assigned to one or more heuristics to help facilitate fixing the problem. As more evaluators are involved, more true problems are found.

Some evaluators try to **estimate** the degree to which each usability issue potentially could impede user performance or acceptance.

This is done to help **set priorities** for making revisions to the system. However, judging the severity of proposed usability issues has been shown to be very difficult to do.

Nielsen (1994), after evaluating several **sets of heuristics**, concluded that a better set of heuristics may be:

1. Ensure good visibility of system status.
2. Have a good match between the system and the real world.
3. Ensure user control and freedom.
4. Use consistency and standards.
5. Design to prevent user errors.
6. Design to facilitate recognition rather than recall memory.
7. Provide for flexibility and efficiency of use.
8. Use aesthetic and minimalist design concepts.
9. Help users recognize, diagnose, and recover from errors.

- When should you do usability evaluations?
  - When you have a prototype for end users to review.
- Which should you rely on more: usability evaluations or usability tests?
  - Examine the results of both; a usability test with representative users tells you whether your predictions are valid.

- What is a heuristic evaluation?
    - A method for finding usability issues in a user interfaces is by having a small number of evaluators (1 to 5) evaluates Websites. It can be conducted on paper prototypes, PowerPoint wireframes, Visio wireframes, and any other type of prototype for fully functioning Websites or applications.
- How do usability tests differ from usability evaluations?
    - Tests include participants and evaluations do not.

24. Learning about usability testing:

- What is usability testing?
    - Tests end users to see if they complete typical tasks with digital design products.
- What are you looking for in a usability test?
    - To identify usability issues problems.
- How does usability testing fit into user-centered design?
    - Usability testing is part of user-centered design. A user-centered design process should include a series of tests developed specifically to evaluate both performance and preference.
- What can you learn through usability testing?
    - Can end users successfully complete tasks?
        - How fast?
        - How many clicks does it take to get to the information?
            - 1-3 clicks are usually considered excellent IA design.
        - Websites perform well enough to meet usability objectives?
- What should you keep in mind when usability testing?
    - You are testing the Website, not end users.
    - Do testing and rely on what you learn from it.

- Do I need a lab to do usability testing?
  - If required, yes. If not, then see options below.
    - Fixed laboratory.
    - Conference room.
    - End user's room.
    - End user's workspace or office.
- How many participants are needed for a usability test?
  - 8-16 end users.
  - Plan several rounds of testing.
  - Homogenous user population.
- How much does it cost to do usability testing?
  - Depends on how many rounds and how many hours may be required. A usability specialist charges competitive rates, congruent with education and complexity of vocation.

25. Develop the test plan:

- The usability specialist and design team meet and the usability specialist writes a test; team reviews and a final plan is developed (see matrix below).

Information Architecture & Usability Testing Scope	What and who are you testing?
Purpose	What concerns, questions, and goals is the test focusing on?
Schedule and Location	When and where will the test take place?
Participants	How many users of what types will you recruit?
Scenarios	What will participants do with the product in this round of testing?
Questions	What will you ask at the beginning and end of the session?

Collected Data	What will you count?
Set Up	What system will you use for testing? Will you be videotaping and/or audiotaping? Will you be using a specific technology to capture data?
Roles	Who will do what in the usability test?

- Includes information on numbers of participants, scenarios to be tested, pre- and post-test questions and data to be collected.

26. Create final scenarios:
    - What is a scenario?
        - Tasks end users' perform on a Website.
    - What makes a good scenario for usability testing?
        - Goals or tasks.
        - Data, if needed, that a real user would have when going to a Website.
    - What does *not* go in a scenario for usability testing?
        - The scenarios *do not* include any information on how to accomplish the task; that is what usability testing is for and to show you how the participant goes about accomplishing task.
    - Should you write down how to accomplish the task?
        - Note taker takes notes and establishes pathways to accomplish task; end user does not see this during testing.
    - What if you give participants choices for answers?
        - Sometimes you can use multiple-choice tests if necessary.
    - What if users have difficulty in understanding scenarios?
        - Test out on a pilot test and make corrections if necessary.

27. Recruit participants:
    - Who should participate in a usability test?
        - End users that use Website(s).
    - Who should recruit participants?
        - Information Architects, commercial recruiting, companies, or human resources.
    - What should you ask in a screening questionnaire?
        - Review online templates.
    - Does recruiting cost money?
        - Yes.
28. Set up for the test sessions:
    - Make sure you have everything you need—
        - Prototype you are testing.
        - Computer set up with appropriate equipment and set up right.
        - Note-taking forms or set up on a computer.
        - Consent forms.
        - Questionnaires, if you are using any.
        - Participant's copy of scenarios.
        - Cameras, microphones, or other recording equipment if you are using any.
        - Folders to keep each person's paperwork in if you are using paper.
    - Do a dry-run and a pilot test:
        - See if your questions and scenarios make sense to participants.
        - Do time estimates for how long each participant will spend on each scenario(s).
        - If computing technology is working, then great. If problems become apparent, then glitches have to be fixed.

29. Conduct the usability test:
    - What happens in a typical usability test session?
        - Introductions, questions by participants, facilitator guides everyone for each task.
        - Debriefing and a thank you to participants.
        - What makes for good test facilitation?
            - Treating participants with care.
            - Staying neutral.
            - Deciding when and how much to help.
            - Taking good notes.

30. Analyze the results:
    - What data will you have?
        - Success rate.
        - Time to complete tasks.
        - Pages visited.
        - Error rates.
        - Ratings on a satisfaction questionnaire.
    - Qualitative data, might include—
        - Notes of your observations about the pathways participants took.
        - Notes about problems.
        - Notes about what they said while working.
        - Questions to open-ended answers.
    - What do you do with qualitative data?
        - Look for patterns.
    - Prepare the usability test report and write it—
        - Keeping each section short.
        - Using lots of tables.
        - Being very brief about the background information.
        - Focusing on findings and recommendations.
        - Including visual examples.

- What should you include?
  - Introduction and summary of the background on logistics.
  - Information from test plan—
    - What and whom you tested.
    - When and where the test was held.
    - The system that you used for testing (resolution, monitor size, etc.).
    - What you did during the testing (names of the facilitator and note-takers).
    - Tables of information about end users, keeping it anonymous, including demographic features and pertinent details.
  - Summary of quantitative data.
  - Findings and recommendations.

Section 2.0 **Instructional Design Website:** http://www.ited.org/index.htm **Matrix for Information Architecture Research Questions:**	**3 Excellent**	**2 Good**	**1 Poor**
Ease of Use			
• Unity of Web page design			1
• Predictable and clear navigation			1
• 1-3 clicks to get to information		2	
• Aesthetically pleasing design	3		
Remarks: Overall, this Website is quite easy to use. The only problem is that no consistent navigational systems are used. The navigation is not clear or very predictable because an end user lands on different pages with no way out. Affordances for end users are not incorporated into design. Many links are very redundant and serve no purpose. There is no consistent Web page design; no consistent main navigational systems used—navigating for end user is unproductive—since this type of design lends itself to assisting end users to get lost while using this design product.			
User Experience			
• Legibility and reading speed			1
• Good use of the screen in all resolutions	3		
• Printer-friendliness		2	
• Browser compatibility		2	
• Respect interface standards			1
• Icons work or do not work			1
• Use of colors	3		
Remarks: Overall, the user experience is quite poor. While the Web page, design is somewhat pleasing; one does not really know what the icons represent without prior knowledge of subject matter. The gray squares boxes at the top on the right side serve no purpose. The type size on most Web pages is too small and difficult to read.			
Practical Value			
• Informative homepage			1
• Contact information	3		
• Search and search results	3		
• Up to date and correct information	3		
• Language and copywriting appropriate/not appropriate	3		
Remarks: Overall, the homepage is not very informative because the purpose of the Website is not clearly defined. In terms of practical value, (without really having prior knowledge) it is hard to understand the practical value of this Website. Since this is supposed to be a Website about instructional design, the end user should be able to access relevant information about instructional easily. Unfortunately, it is hard to get the information since it is so buried in the Website.			

Figure 10: Usability Testing

7. Implementation

The final design product or Website is produced and implemented (see Figure 11). Additional changes may have to be made. *It is an iterative process*, leading up to the final development of an intended design product. In 7. Implementation, these procedures are followed.

31. Implement and retest:
    - Implementing recommendations and making revisions.

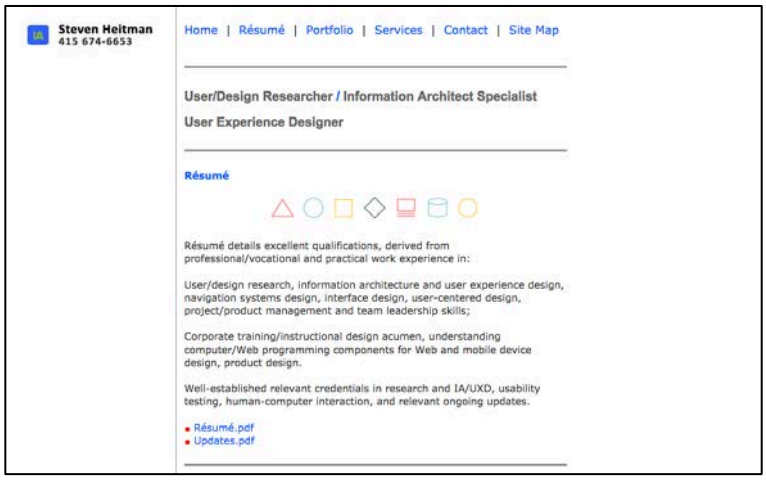


Figure 11: Implementation

8. System Testing

The final stage of development is where tests are run on a Website to see if it works, and catch any bugs or code errors prior to launching a design product or Website (see Figure 12). Load tests are performed on a Website to see if it works. When numerous end users use it, tests are performed to see if the Website works. As required, further usability testing is done to make sure the final product is good and works for end users. In 8. System Testing, these procedures are followed.

32. Implement final version of digital design product and retest—if required and necessary:
    - Retest, making revisions if necessary.

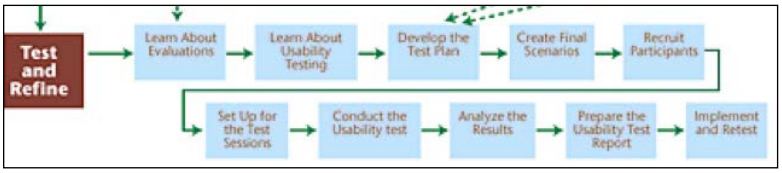


Figure 12: System Testing

Information Architecture Curriculum in Education at Universities

Information Architects are professional practitioners in their field and increasingly sought after to collaborate on designing meaningful online learning experiences. While Instructional Designers design curriculum plans, Information Architects design plans that enable Websites to work for end users. Distance educational experiences and virtual classrooms that better incorporate user-centered design into overall designs for Websites tend to work better for end users. To date, many accredited universities and colleges are offering specialized Information Architecture and interaction design programs. These programs are usually offered in Library Science and Information or Graphic Design Departments.

Jakob Nielsen, usability expert, recounts that critics may not understand the value of Information Architecture. Nielsen said (cited from Morville & Rosenfeld, 2006): "I am a great believer in having professional Information Architects design the structure of professional information projects such as corporate web sites and intranets." He thinks eventually Information Architecture will be taught at the elementary level in schools. I believe Information Architecture will eventually be taught at all the major universities.

Since the professional practice of Information Architecture gives the Information Architect a means to an end, it is a process and a way to structure information, incorporating user-centered design principles or "best practices" into every digital design product. Why shouldn't Information Architecture be taught at the lower levels in schools! When it is taught at the elementary school level and in high school, it will help prepare future Information Architects for college programs and advanced-level graduate programs.

The main issue is that end users are confronted with vast amounts of information on the Internet. Since no Information Architect or usability specialist can completely predict what an end user will do or will not do online, this is why research is done prior to designing and implementing Websites. Information Architects do research, as though they were an end user, surfing on a Website to gather research and collect meaningful data used *to design a usable Website*.

In practicing Information Architecture professionally, we can only do so much research. We make "informed decisions" about how to best serve end users, meeting business requirements for clients. Information Architecture is a way of structuring information to make it more manageable for end users. To this end, this includes incorporating findability options into Websites, since this helps end users to find what they need to find online while surfing. On the other hand, a Website that works right for end users helps a corporation to enjoy and achieve higher profit margins.

This includes developing fully integrated navigational systems for Websites. It also means designing for consistency in documents and Websites. That includes navigational systems and search functions help to guide an end user through a Website. These conditions make for increased findability, sense-making, and wayfinding on Websites for end users.

Per Nielsen, et al., (1994), end users often remark they cannot find what they are looking for online or design products lack in user-centered design. Information Architects and Usability Experts ask: Can an end user get at information and find it while surfing online? During usability testing sessions, intelligent end users demonstrate they cannot use a particular design product. Usability testers have to explain to end users, simply because a design product does not work, it does not mean end users lack in intelligence or computing technology skills. Many times end users really cannot use a Website. Every Website has different specific requirements. Websites are unique design products, requiring Information Architecture and Navigational Systems pertinent to the true goals and objectives for its intended audiences.

Unique Products Require Information Architecture Design

As one may imagine, Information Architecture and incorporating user-centered design into products enable end users to use them. Because we have to be able to use these online products and to keep environments safe, the practice of Information Architecture and implementation of user-centered design help protect end users.

According to the authors of *Cool Stuff 2.0 and How It Works* (2007), many design products are unique. End users cannot always successfully use these products and products must pass governmental standards for usability to comply with safety regulations, for example:

- High-tech toilets,
- User interface screen designs that super markets want end users to use,
- Watches to alarm clocks,
- E-voting,
- A petcam device,
- Aircraft HUD,
- Robotical navigational systems used in robotics to navigate,
- Second Life,
- A hawk-eye device,
- A sandstorm navigational device,
- Navigational systems for a Mars rover,
- SpaceShipOne,
- A space station in outer space,
- A neutrino tank,
- A reactor vessel,
- A Falkirk wheel,
- A computerized monitoring device—a mass damper,
- Airport security devices,
- X-ray machines,
- Stealth military technology,
- Simulators,
- Silent flight technologies,
- Tsunami alert systems,
- Many computerized design products used in the military,
- Many computerized devices used in health care, and
- Other computerized devices used to protect and keep the public safe.

Navigational Systems and User-Centered Design

Per Fleming (1998), Information Architects can design integrated Navigational Systems specific to the need of any distance learning online training program for their Website. If Information Architecture is practiced professionally, when excellent conceptual designs (in all aspects of Information Architecture) are incorporated into the overall structures of Websites or other design products, it makes for more meaningful online experiences for end users.

That means incorporating user-centered design practices into the structure of a Website before having a coder build out a Website. Websites used to deliver learning materials to end users do work better as well as provide relevant structure, helping end users to get information quickly. Wayfinding and sense-making on Websites are then significantly increased for end users or learners.

A few years ago, the author did extensive, specific research on Navigational Systems and how, when, or why Navigational Systems are designed for specific Websites. Navigational Systems should be included in wire frame mockups for a Website. Per Heitman (2000), http://www.stevenheitman-ia.com/html/MAIA.html, the researcher and author found these basic Navigational Systems comprise most integrated Navigational Systems:

> Seven Navigational Systems, in myriad combinations, are used in Websites for navigating by end users. Navigational Systems are naturally integrated together in Information Architecture design concepts.
>
> For effective navigation within a Website, Navigational Systems are integrated together—research revealed that these seven commonly used Navigational Systems are:
>
> 1. Hierarchical Navigational Systems,
> 2. Global Navigational Systems,
> 3. Local Navigational Systems,
> 4. Integrated Navigational Systems,
> 5. Remote Navigational Systems,
> 6. Ad Hoc Navigational Systems, and
> 7. Search Engines in Websites.

Research and Development of Information Architecture for Websites

Information Architects do research, usually accomplished by first doing a needs assessment or competitive analysis, using methods-of-design research and procedures. These documents should include: specific research and a design plan, a competitive analysis, wire frame mockups, flow chart, schematics, and supporting documentation.

Information Architects consult closely with a client or corporation to determine what their needs will be prior to designing and implementing a Website. Who has to use all of these online products? The answer to that question is clear that human beings use Websites. Information Architects meet with clients or stakeholders and interviews subject matter experts—to get at what the real need is for a client's business requirements and for end users. This means developing a viable design plan report and solution prior to implementation of digital design products.

Understanding requirements for design plans are helpful to instructional designers that desire to produce high-quality Websites. In the long run, end users do benefit from user-centered design. Since information is then appropriately structured and Navigational Systems developed, end users can more effectively use a Website and then concentrate on learning. Information Architects use a variety of software programs to produce required documentation.

Information Architects create flow charts or schematics using Visio, OmniGraffle, and Inspiration. Then drafts and draws wire frame mockups, using Adobe Creative Suite or other computer program softwares. One might develop a few working prototypes using Photoshop, Illustrator, ImageReady, Dreamweaver (paper or online working prototypes). Then experienced computer programmers make code refinements. Information Architects are primarily concerned with the conceptual design part-of-the-project, incorporating user-centered design into every digital design product.

The Adobe Creative Suite, (http://en.wikipedia.org/wiki/Adobe_Creative_Suite), Visio, OmniGraffle, Inspiration, are software programs used by Information Architects to develop and produce Information Architecture documentation and documentation for reports. It is an individual's choice and decision to use software programs that best serve their particular professional goals.

Conclusion: Implementation of Information Architecture Increases Productivity

In conclusion, developing distance educational online training programs can benefit from having Information Architecture done prior to designing a Website or other design products. That also means doing usability testing and continuously making evaluations to see if Websites really work—or do not work. In the long run, doing Information Architecture prior to implementing a final version of a Website may save a corporation a lot of money and time. If the Website is designed to work right and more usable, end users will desire to use the Website. If end users get frustrated when online, they may not be able to quickly find information they want to get at and say: "forget it." Information Architects figure out objectives—their goal is to create meaningful experiences for end users—this makes using online products easier. That means incorporating user-centered design and "best practices" in all design products!

Since Information Architecture is a complicated subject matter, it cannot be fully elucidated in a brief white paper. Many Information Architects have completed in-depth graduate-level programs to specialize in Information Architecture and Usability Testing. This enables them to specialize in Information Architecture, designing Navigational Systems—fully integrated Navigational Systems and search functions for design products. Other aspects include: interaction design, developing and performing usability tests after production—prior to implementation. Because Information Architecture is such a specialized arena, now universities are beginning to develop and offer advanced degree programs.

The value of doing Information Architecture, in the long run, reduces usability issues—lack of user-centered design. It can save corporations money. It increases productivity for their work force and raises a return on their investment because end users and employees are better able to use Websites or other design products. While a few critics may interject they feel it is not worth spending extra money for an Information Architect, viable research demonstrates one's money is well spent on Information Architects and usability experts—*for increased profit margins and higher productivity for end users.*

According to Jakob Nielsen, usability expert, (cited from Morville & Rosenfeld, 2006): "I estimate that low intranet usability costs the world economy $100 billion per year in lost employee productivity. This may not be the most important problem facing the planet, but it's not a trifling issue either."

Per Horton (1994), Nielsen, et al., (1994), substantial documented research speaks directly to these issues. Statistical data shows empirical evidence that Information Architects provide meaningful and relevant services to clients—adds value and integrity to Websites. Spending additional funding to make use of Information Architects to achieve user-centered design is worth it! Because in the long run, consulting with qualified Information Architects, this saves corporations a lot of money, time, and *significantly increases productivity for end users*.

Bio for Steven Heitman, MAIA / MAEd—
Sr. Information Architect (IA) Specialist,
User/Design Researcher, User Experience Designer,
Project/Product Manager, Usability Tester, Director

My experiences and credentials—major/emphasis—are in:

- User/design research
- Information architecture
- User experience design
- Interaction design
- Interface design
- Graphic design
- Typography
- Project/product management
- Directing
- Usability testing

My expertise and knowledge base are in information architecture—coupled with experiences in technical writing, editing, corporate training, instructional design, and The ADDIE Model.

In addition, the author and inventor of The NS Model (copyright), The IA Model (copyright)—all about navigational systems, information architecture, user-centered design, usability testing, including why and how information architecture may be professionally practiced, accomplishing high-quality products.

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