ESTABLISHING A HUMAN FACTORS CAREER IN THE NEW MILLENNIUM: ANSWERS TO FREQUENTLY ASKED QUESTIONS

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Welcome to the seventh annual Human Factors and Ergonomics Society career panel. This year, each panelist was asked to answer six questions related to careers now and in the future. Topics selected include: working environment, becoming a professional, skills and experiences.

QUESTIONS AND ANSWERS

What are the differences, advantages and disadvantages of working in industry, academia, and government, as well as working as a consultant?

Tony. Academic and government jobs are typically slower paced and support longer term projects. This is a nice advantage, but it comes at a cost in that you won't get to do as much design work and the "red tape" can be devastating. Industry and consulting jobs work at a much faster pace and allow one to operate at the cutting edge of the field and to really exercise skills and creativity. However, the hours are long and the pressure is high. In the end, they all represent somewhat different kinds of work, and different mixes of people. So, it's best to decide up front what you want to do, how you want to do it, and who you want to do it with--and then find the job sector that's most compatible!

Arnie. In industry, the problems on which one works are often defined by others, and the resources and time available are constrained by the project itself. One advantage, however, is that the results have a direct impact on users. Another is that the work is often diverse, and the design problems frequently represent the state-of-the-art in available technologies. Furthermore, despite the constraints, the best industrial jobs provide considerable latitude in how the problems can be approached and offer ample opportunity for creativity.

Jean. Government jobs typically involve "contract monitoring," where you monitor the work done by private companies. Although you can be involved in major research initiatives, you often don't get to do the work yourself. However, at a few agencies, you do get to perform human factors work. At the Bureau of Labor Statistics, we get to do both basic research and interface design, which is a balance I enjoy. Also, although some government agencies work on a tight deadline, the ones that I have been involved with have more realistic schedules. This is a definite advantage when balancing work and life activities.

As a consultant, you probably will have more control over what projects you work on, because you decide if you want to take on a client. However, as you build your practice, you may not have many clients to choose from. Consulting can be stressful, as you must find your own clients and work within their budget and schedule. You may have to do tasks yourself (e.g., prototyping) which might be delegated to an experienced programmer in a larger organization. However, once you have established yourself, you may have many opportunities to be involved in a wide variety of activities that can be fun and rewarding.

Jen. One interesting difference between industry, academia, government, and consulting can be the structure of professional vs. personal time. Government and some industries set constraints on the number of hours and locations in which work is done. These constraints can be stifling at times, but can also provide opportunities to create well-defined boundaries between work time and private time, and can help employees structure a comfortable balance between work and personal lives. Academia, consulting, and some industries (such as computer software) allow for a much freer work structure than government and other industries. Requirements for the location and time period in which people work can be very relaxed. This structure may seem more appealing, but it can also lead to a blurring between work and personal time. Therefore, people must create a comfortable balance between the temptation to pursue personal interests, and the requirement to spend the time necessary to meet professional goals.

Steve. In industry, people often expect you to be application-oriented. You have to apply knowledge of research, design, and test results in order to make rapid, effective decisions. However, you'll rarely feel that you have the data necessary to do so. In addition, others expect that your recommendations can be implemented, so you need to

consider market requirements, resource constraints, and company objectives, in addition to traditional human factors issues like usability and system impact.

There is little time to conduct extensive research and literature reviews, as people want feedback NOW. After feedback is given, there is the risk that others may carry it too far, sometimes returning with a "finished product" that they claim was based on the feedback you provided. You need to maintain clear and constant communication with all parties throughout the complete development cycle.

In academia and often in government, people expect you to be truth-oriented. You need to produce quality data based on iterative research and experimentation. Multiple studies address deficiencies in the experimental design, and numerous participants are used to boost statistical power. In industry, you're lucky if you can run a test with a small handful of people.

Ron. In an academic setting, evaluations, promotion and tenure are often based upon the quality and quantity of your research publications. Frequently teaching evaluations and community service are also important. In industry and consulting success is often measured by the contributions you have made to the company's product set and profitability. Patents are also helpful. Other "less tangible" factors such as teamwork, negotiation effectiveness, understanding the business environment, attitude, communications, and success in "working through others" play a very significant role in measuring success. Publications and presentations in journals and at professional conferences are a nice addition to one's portfolio, but are nowhere near as important as the other factors mentioned.

How should I prepare myself to transition from student to professional?

Tony. Practice makes perfect, so the best advice is to start practicing on your own and/or to get an internship or two. When you have the time, try to evaluate and redesign a product and think about how you might present your findings and ideas to another person. Be prepared to answer an employer who says "Do you have any examples of your work/skills to show me?" It's also becoming more and more important to enter the job market with some education or skills in the area of web programming, visual graphics, and communications.

Arnie. The most important preparation is often to gain experience through internships. This allows you to understand whether there is a fit between your interests and the job, and gives you insight into areas where you might want to grow skills before taking your first job. Closely related to internships is getting experience on projects that have many of the properties of the professional job you are targeting. For industry, this might include working on a team to solve a realistic design problem.

Jean. You will probably experience a shift in the nature of your work. You will have more responsibility and authority in directing your work than you did in school, and you will also have more resources available to you. It is important to take advantage of them. In addition, as a graduate student, you typically work on one research project that you select. As a professional, you must often work on multiple projects, and the scope may range from large, long-term projects to short, one- or two-day projects. The projects are often directed by your supervisor, but you may report to multiple project leaders. You also must learn to balance all your projects with other professional activities and (sometimes) other office duties (for example, one person in my office maintains the travel budget for the whole office).

Jen. Begin now to build professional relationships and connections with people who have similar interests. These connections can last many years, and can provide you with mentors, resources, sounding boards, and potential job prospects. Also, work on developing your assertiveness and time management skills. Seek experience and advice for successfully juggling multiple projects and working in large, multidisciplinary teams. These skills will be invaluable as you face these requirements in your new job. Finally, get as much work experience as possible. Try working for different kinds of places – apply for internships in large corporations and small startup companies to learn what you want or don't want in a future employer. Teaching experience is also valuable. It can help you determine whether you want to teach later, and it helps build skills like leadership and communication.

Steve. Learn to think and act on your feet, but don't lose the big picture. People will be less patient than they were in school, and they will expect you to have quick access to the latest information, standards, and design ideas. Resist the temptation to answer without the necessary facts and information, but recognize that you'll sometimes need to make decisions without all the facts, and without conducting research. Eventually, you'll be called into a situation to act on the spot as an expert, and you need to be prepared to make a quick decision. A risk of being too conservative and comprehensive is that the people asking for input will stop coming to you.

What skills should the ideal job candidate have?

Tony. Besides the obvious HF/Ergo skills, I think that communication skills are most important. It's not what you know, it's what you communicate. You must develop the skills to write and speak effectively and to be persuasive about your conclusions and suggested actions. Experimental design skills will be invaluable for anyone who plans on being involved in usability testing or basic research.

Arnie. The foundation, of course, is a broad understanding of cognitive, perceptual, emotional, motor, and social properties of human beings and their implications for design; training and experience in designing and running studies; and strong statistical skills. In addition, however, strong teaming and communications skills, and the ability to identify the key issues in a problem area and to define a strategy to approach them, are important. Increasingly, strong design skills (and an even stronger sense of good design) and a comfort with emerging technologies are important.

Jean. I think the primary qualities that are important to find a good job are (1) understanding usability principles, theories, and methods, and (2) demonstrating that you can apply them to a project. You can get experience in a job or internship, but you can also acquire it by taking appropriate classes or independent studies. Completed design projects are excellent indicators of how well you know your material. Specific skills that are important include the ability to communicate well, the ability to work on teams, an understanding of experimental design and statistics, and the ability to do minor programming in a language such as Visual Basic. When I was looking for a job, several of the interviewers commented on the lack of experience in most candidates. The interviewers said they were looking for people who could start working independently fairly quickly; they were concerned that the inexperienced candidates would require too much training.

Jen. The ideal job candidate has practical work experience that can be used to provide context for future work, is able to connect with and work with diverse groups of people, has an inquisitive and open mind, and is interested in continuing to learn and expand his or her skills and experiences. Ideal job candidates also have practical experience and skills that match the requirements of their future positions. If you decide you want to be a web designer, develop the skills and experience that demonstrate that you do this.

Steve. I recently participated in a university-industry roundtable, to help identify the skills that "technology recruiters" looked for when reviewing candidates. We identified four general types of skills/qualities that we believed were underrepresented in our candidate pools: rigor, understanding, experience, and follow-through. "Rigor" was defined as those analytical problem solving skills often associated with advanced mathematics and experimentation, such as quantitative statistics, calculus, logic, and testing. "Understanding" includes knowledge of computer programming, design, technology infrastructure, and a systems approach to development. "Experience" is the hand's-on exposure one gets from internships, co-ops, or doing their own consulting. "Follow-through" is the ability to initiate and stick with a project from conception to development to validation.

Ron. In addition to the Human Factors Technical Skills and the communications skills mentioned by my colleagues, know the business in which you want to work. If you want to work with computer software, be a good programmer. If you want to work in aviation, know all about flying (and maybe even get a pilot's license). A good understanding of business concepts is also really useful.

Which experiences in graduate education are most helpful in preparing for a job (and/or the job interview process)?

Tony. The personal interactions with my advisor during graduate school were most important. Class is one thing; real conversations with your advisor, or other professors, is where knowledge transfer really takes place. Equally important are the relationships I formed and knowledge I gained from

attending conferences. Finally, I think teaching helped me a lot. Not just to prepare for teaching in the future, but because it forces one to organize their thoughts and to practice the important skills of verbal presentation, persuasion, group management, and so on.

Arnie. The experience of a thesis or dissertation is important to prepare for dealing with unstructured problems. Teaching and presentations, and publications, are important for developing communications skills. Team-based research (especially multidisciplinary research) is important for preparing you to be effective on teams. The best preparation for interviewing for jobs is to interview for jobs, at a time when the job is less critical and you have the luxury of making changes in your style, questions, and answers.

Jean. It is important to gain experience with projects (either design or research projects). The goal is to show you can complete work successfully. Ideally, this would be done through an internship or job experience. You can also get project experience in classes and through your own graduate research. Working on projects (not just literature reviews or short class papers), you learn to:

1. Plan and execute appropriate work
2. Communicate with others (either team members or your committee)
3. Apply theory to a specific situation.

Jen. Internships, teaching, and conference presentations are great graduate education experiences that can help you prepare for a job and the interviewing process. Internships can help you learn what you want and do not want in your future job, and they help you develop confidence in your work. As you are interviewing for jobs, you can draw from your internship experiences to demonstrate that you will be able to do well in a potential job. Teaching helps develop presentation skills, and interactions with students in a mentoring role can teach you how to connect with and communicate with diverse groups of people. Conferences provide the opportunity to present and defend concepts and ideas, and they allow the possibility of building lasting professional relationships.

Steve. Internships and exposure to the work environment help show that you're familiar with how things operate, and imply that you'll have a better transition into the workplace than someone who has never had such experience. When we interview people, we try to hone in on their real world skills. If they don't have any experiences outside of school, we look into their academic life and part time jobs to see if they've done any work that has required them to interact as part of a team, as well as to communicate, negotiate, and compromise with other teams (marketing, development, support). Although certain technical skills are often necessary for certain positions, experiences with working on a team, communicating with other teams, and having an understanding of how systems work can often outweigh those technical skills.

What can I do now to better my position for the job market 2 years from now?

Tony. Get on the Web. Learn who hires HF people and what these people do. Also, use the Web to learn about emerging technologies and products. If you can talk the talk two years from now, you'll be in the best position to get the job you want. Practice the art of observation. If, two years from now, you have been observing the nature of human-product interaction, then you will have something meaningful to say about it during your job interviews. Otherwise, you will be listening way more than talking!

Arnie. Gain experience in the areas you would like to work. If these areas are outside of your current area of expertise, become professionally active in these areas in order to gain a deeper understanding of trends and the specific skills these trends will exercise.

Jean. I would recommend that you continue to network and to learn. National conferences or local chapter meetings are both good places to meet people. You can keep up with current Human Factors issues not only in classes, but also by reading the current literature, attending conferences, and by being an intern. You should especially focus on topics that are of particular interest to you but are not taught in school.

Jen. Get as much varied practical experience as possible, and work together with as many people as possible. This experience can be gained in internships and/or real-world projects conducted for research or classes. Varying your experiences will help you learn more about what you want to do with your career, and working with diverse sets of people will help you learn and demonstrate that you can work well with others.

Steve. Never stop learning. Read journals, magazines, and textbooks for a glimpse of where things are going in your field. Observe how competitors or others in related fields are designing their products and interfaces. Pay attention to trends and think how they could influence you and your career down the road. Continue to read the journals, magazines, and textbooks for a glimpse of where things are going in your field. Pay attention to trends and think through how they could affect you down the road.

Communication is also critical. Network like crazy, both inside and outside your organization. Generate buy-in for Human Factors. Take time to explain what it is that we do, and how our efforts can help other groups meet their goals. If they believe you, they'll advocate for human factors input, and will help you organization progress with creating user-centered products, systems, and services.

What skills, knowledge or experience will be vital in order to prepare for work in the next century?

Tony. A good understanding of the influence of the Internet and other communication technologies on all facets of our lives. As more and more of us are hired into startup companies, it will become vital that you understand the business side of things as well.

Arnie. First, become familiar with emerging technologies, and anticipate the knowledge that will be required to design for new environments. Second, increasingly we are finding it important to understand the context of use and the ethnography of the users, and to incorporate this knowledge into the design process. This is comparable to more formal task analysis in earlier human factors work in offices and factories. Developing skills in this area will be more and more important. Successful products are partly a function of ease of use and usefulness, but they are also a function of aesthetics and the aesthetics need to support product usability. Strong design skills, therefore, are important to have in the practitioners portfolio of skills.

Jean. On top of the necessary human factors skills and experience, communication skills are probably the most important. Human Factors professionals serve as translators between users and developers, so we have to speak the languages of both groups. Sometimes we have to be extremely diplomatic and tactful; we may have to present our case in just the right light to persuade others. As systems and technology become more complex, we will have to communicate with developers in varied areas of expertise and with more user groups (including users from different cultures). We also have to communicate with managers, who often focus on "the bottom line." Therefore, we should be able to discuss the advantages of Human Factors work in terms that are important and meaningful to them (i.e., how Human Factors will save them money and time, or help them sell more products and solutions).

Jen. As technology advances, instant global connections will become more prominent and important. Therefore, it will be important to develop skills necessary for working with diverse, scattered, global teams. Instant connections and data transfer will increase the need for the skill of filtering data and tuning in to relevant information. Also, advances in telecommuting will create the need for people to learn to develop comfortable work-life balances as they work with people in different time zones, and as the delineation between work and personal life becomes blurred.

Steve. A colleague of mine believes that "in the future, and probably now, the best workers will be those who can prepare for and re-define their jobs every two years". It's not important that you have a specific programming skill, or exposure to a specific design or analysis tool, as the tools will change as the technology changes. However, it is important that you have an understanding of the system you're becoming a part of. For example, if you're entering the software development world, you should probably get programming experience to develop (and be able to demonstrate) an understanding of that world.

You will never be fully prepared for your career, but with careful anticipation, you will transition more smoothly.

Ron. Develop true expertise in human factors, understand the business in which you work, work well as a member and leader of technical teams, stay current with the newest technologies and build a meaningful list of accomplishments.