

A Survey of User-Experience Development at Enterprise Software Companies

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Abstract. Developers worldwide wish to understand what major companies are doing in user-experience development (UXD). UXD comprises activities in user-centered design of user experience, specifically user-interface development (metaphors, mental models, navigation, interaction, and appearance) that is useful for planning, research, analysis, design, implementation, evaluation, and documentation of products/services across a wide number of platforms. This paper reports the results of a survey conducted with six enterprise software companies.

Keywords: Design, development, management, user interface, user experience.

1 Introduction

User-experience development (UXD), especially user-experience design, within major computer technology firms throughout the world is undergoing significant change in corporate product/service development. These firms themselves are attempting to determine answers to questions such as these: How does one define UXD? What is required for the UX organization? Which kind of professionals is required? What tools are useful? What methods are/should be employed?

This initial survey seeks to inquire about what is occurring among major centers of computer technology development. For this survey, Aaron Marcus contacted the other authors and a representative of Fujitsu, who agreed to participate. This survey attempts a difficult and delicate task, inquiring about UXD from busy senior management at major corporations who may not wish to divulge proprietary information or may be reluctant to divulge information that is viewed as providing their companies with strategic or tactical advantage, bordering on revealing trade secrets and other intellectual property protection.

2 Some Comments

In the survey responses, which are presented in the Appendix, comments appear throughout the survey replies to help the reader interpret those replies. Based on this survey as well as other research the first author and his firm have undertaken over the past 25 years, the following interpretations or initial conclusions may be drawn:

- Information is of interest not only to those at the contributing corporations, but among the AIGA, CHI, HCI, HFES, STC, UX, and other user-interface design communities.
- Companies vary significantly in make-up of staff and backgrounds
- Information design and information-oriented, systems-oriented visual design seem under-represented, perhaps misunderstood/undervalued in team make-up and disciplines.
- Only a few of the companies attempt to define “user experience” and other key terms. It may also be the case that only a few of the companies have a rigorous process definition and diagrammatic representation of that process.
- It seems possible that there may be “culture clashes within UX development groups due to varying backgrounds, understanding of key terms, differences of method, career goals, value placed on research and publishing vs. product/service deliverables, etc.
- Variations in the UX development process, methods, and objectives may be found based on local cultural preferences and habits despite an international company’s preferences for uniform characteristics.

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Appendix: Survey Questions and Replies

Note: The following questions and replies from a Survey Monkey response are edited to correct errors in spelling, grammar, ambiguity of reference, or other aspects of style.

1. What is the approximate number of full-time equivalent UX "designers" on staff (may include people whose primary job is planning, analysis, evaluation, etc.)?

Fujitsu: About 40-50. All answers are based on Fujitsu Design Limited.

IBM: Approximately 500 User Experience and Design practitioners in IBM world-wide.

Microsoft: 12.

Oracle: 150.

SAP: 180.

Siemens: 12 for the US, 30 in Germany and 10 in China in a central function to work as internal consultants. Approximately another 50 worldwide in operating companies.

2. What is the approximate number of full-time equivalent contracted UX designers?

Fujitsu: About 10-15.

IBM: Less than 10 world-wide.

Microsoft: Varies (from 1 to 6).

Oracle: 15.

SAP: 10.

Siemens: 0 in the US, 10 in Germany. The number of consultants in operating companies is not more than 12 worldwide.

3. What kinds of prototyping tools are being used?

Fujitsu: Paper prototyping, PowerPoint, Flash, HTML. Depends on the project.

IBM: PowerPoint, Visio, Visual Basic, PhotoShop, and IBM products not yet available (still in closed beta).

Microsoft: Paper prototyping, PowerPoint, HTML, Flash, WPF/Silverlight, etc.

[WPF refers to Windows Presentation Foundation. Microsoft's Website: <http://www.microsoft.com/net/wp.aspx> states: "Windows Presentation Foundation (WPF) is Microsoft's strategic presentation technology for Windows smart client user experiences. Customers can use WPF to deliver innovative user interfaces through support for multimedia and document services, hardware acceleration of vector graphics, resolution independence for different form factors, and enhanced content readability. WPF tools improve developer-designer collaboration through Microsoft Visual Studio®, Microsoft Expression® Interactive Designer, and XAML. WPF enables the developer to write user interface code once and deploy it as a stand-alone client or in a browser. Developers can incrementally take advantage of WPF through interoperability with Win32® and Windows Forms. And they can also use existing knowledge in .NET Framework, CLR languages, and Visual Studio IDE."].

Oracle: Dreamweaver, Visio, Photoshop, JDeveloper, and "homebrew."

SAP: Visio, Flex, and custom internal tools.

Siemens: Flash, WPF, Visio, Photoshop.

4. Do you plan to use some new kind of tool or technique?

Fujitsu: Not specifically.

IBM: Adoption of Agile and Lean development practices are driving forces in investigating multiple tools, techniques, methods, and assets for user research, design, and evaluation.

Microsoft: WPF/Silverlight, and we are building our own prototyping tool; plus, I like to use video simulations.

Oracle: Typically we homebrew beyond the commercial tools available.

SAP: No.

Siemens: WPF/Silverlight.

5. What is the approximate UX-development investment-ratio per one product? That is, what is the total amount of dollars spent on UX vs. total development cost dollars?

Fujitsu: Do not know.

IBM: It depends on the definition of "investment" and of "total development cost." The best figure we can provide is that the number of user-experience and design practitioners in IBM is about 2 - 3% of the total number of developers (not including technical support).

Microsoft: 5%.

Oracle: The best we can do here is that we have 150 people working on core UC supporting approximately 5000 developers. One could also include the 200 more developers who are supporting the core UX toolbox and related technologies.

SAP: Approximately 1%.

Siemens: 5%.

6. For new product development and existing product revision, what is the breakdown of development-process time for planning, research, pre-design testing, evaluation or post-design testing, and evaluation?

Fujitsu: Do not know.

IBM: There is too much variability to provide a meaningful answer. Release life cycles range from weeks to over a year, and there are wide differences across hardware, software, and service projects.

Microsoft: Varies considerably...Say 5% planning, 15% pre-design research, 10% evaluation, and the rest is the design and usability process itself from low fidelity to high.

Oracle: Depends on product. On a high value new product the design time is six months, and dev and QA 12 to 14 months.

SAP: This question does not make sense. New product development is totally different than for a revision of an existing one. I don't understand what "pre-design testing" means. You don't test something that does not exist.

Siemens: Planning 10%, research 20%, evaluation 10%; missing from your list is concept, interaction, and visual design which is 60%.

7. Do you prepare "design pattern documents"? Why?

Fujitsu: We do not prepare our original "pattern document". We will refer to the books or other available public sources.

IBM: Yes, we have been developing UI design patterns to address common design solutions across products. The value of these design patterns is to improve efficiency/reuse, promote consistency, and deliver a compelling user experience.

Microsoft: Yes, to bring consistency across systems, and to enable reusable code; we also create style guides within the specifications.

Oracle: We are very pattern oriented. So much so that we have had the design patterns integrated into the development environment so developers do not have to code each pattern from scratch each time. This increases productivity, consistency, by lowering the design time and number of bugs filed.

SAP: Yes, for both UI standards and product line specific specifications.

Siemens: Yes, to maintain consistency and foster re-use. This is part of our branding efforts.

8. Do you make use of moderated or un-moderated remote testing (via the Web)?

Fujitsu: No.

IBM: Yes.

Microsoft: We have used moderated remote testing, and are building an infrastructure for un-moderated remote testing.

Oracle: We do both. We do a lot of moderated remote testing, but we also run surveys etc.

SAP: Yes, but not that often.

Siemens: Yes, we do. Development is usually validated in all regions of the world, and our 3 local offices use the web to do that.

9. For how long have you had a UX group or department?

Fujitsu: About 15 years.

IBM: IBM has had UX practitioners for over 40 years.

Microsoft: 20 years across companies, 5 years here at Microsoft, 1 year in my current job within Microsoft.

Oracle: 13 years.

SAP: I have managed this one for 3 years, but it has existed as a corporate function for at least 13 years.

Siemens: 10 years.

10. Do you have posted a standard definition of UX? Can you please provide it?

Fujitsu: We do not have a clear definition of UX.

IBM: Unclear whether you are referring to practitioners or to the product user experience. The product total user experience encompasses all aspects of product interactions by all stakeholders and users throughout the life cycle of the product (e.g., marketing, purchase, acquisition, installation and deployment, operation and administration, troubleshooting and technical support, etc.).

Microsoft: Not really... we argue it is not identical to UI; but it is the UI as experienced in the rich context of users attempting to achieve their goals.

Oracle: <http://usableapps.oracle.com/about/index.html>.

[The Website first page states the following (see next question, also): "Welcome to the Applications User Experience Web site. We created this site to share with you some of the outstanding work Oracle has been doing to define the current and future user experiences across our product lines. Through blogs and articles, we intend to enhance your understanding of our methods and processes and give you an opportunity to participate through your feedback.

SAP: Yes, refer to the SAP Design Guild site.

[The User Experience Glossary is located at the following URL: http://www.sapdesignguild.org/resources/ux_glossary.asp. Unfortunately, there is no entry for "user experience"! The following related terms are cited, however: *User*: Anyone who works directly with SAP software or applications as a regular part of his/her job – in contrast to a customer, who is typically involved in purchasing and/or supporting such software or applications – synonymous with "end user". *User-centered design (UCD)*: A research and design methodology that is both a philosophy and set of methods that focuses on designing for and involving end-users in the development process. UCD is based on based on four principles: 1) focus on "real" end-users, 2) validate UI requirements and designs, 3) design and prototype iteratively, and 4) understand and design for holistic user experiences. The SAP UCD consists of 3 Phases, Understand Users, Define Interaction, and Design UI. *User interface designer (UID)*: Person who consults developers with respect to the design of the user interface and interaction of an application. The UID may also design and create the user interface him- or herself. At SAP, user interface designers are organized 1) in a central group, the User Experience (Ux) group, and 2) decentralized in development groups. The Ux coordinates the information flow for the UIDs in the company and among the UIDs

and the Ux group. User profile – A part of the deliverables from Phase 1 of UCD, Understand Users, that describes users' distinguishing characteristics and aspects of their work environment that inform what the user interface should include.]

Siemens: Our mission statement says, "We enhance the value of our partner's technology by advocating human capabilities and user needs." We point to humans to capture the physical strengths and limitations of the human being and, and to users which puts our efforts into the context of Siemens products and their use at the workspace. Almost all Siemens products are capital goods, which means the customer has bought them to improve business processes. Human capabilities, even though these are often also formed by professional and cultural experience, are more general in that the phenomena are closer linked to the sensoric apparatus of the human body as well as its capabilities to move and act. Interaction design and visual design cater to both these aspects (humans, users) but in different ways. The mission also expresses that technology alone isn't enough, but that its value can be enhanced by improved User Experience. User Experience describes the functional system between the users and the system as a whole, while User Interface can be misunderstood as pointing to what 'can be seen on the screens'. We find that this would be too narrow a focus.

11. What is the mission of the UX department or group?

Fujitsu: 1. Promoting user experience of products and services to be attractive enough to contribute to the overall sales of Fujitsu. 2. As an activity of corporate social responsibility (CSR), we try to be contributory to the society. For example, we participate in the external organizations such as International Association of Universal Design (IAUD), or we have developed and provided free download web accessibility check tools for web developers. We have hosted exhibitions to public periodically.

IBM: To deliver a compelling user experience for IBM products and services.

Microsoft: Deliver successful, innovative, compelling and satisfying branded user experiences. Ground design in deep user understanding. Create a user-centered design project structure as a foundation for excellence and continuous improvement.

Oracle: Website: <http://usableapps.oracle.com/about/index.html>.

[The mission seems to be the following: To extend the value of your [the customer's] investment in Oracle applications. The Website first page states the following:

"Welcome to the Applications User Experience Web site. We created this site to share with you some of the outstanding work Oracle has been doing to define the current and future user experiences across our product lines. Through blogs and articles, we intend to enhance your understanding of our methods and processes and give you an opportunity to participate through your feedback.

What we do:

Enhance our customers' investment in Oracle products.

The Applications User Experience group has one goal: to extend the value of your investment in Oracle applications. We believe that the core areas of user experience that will best enhance your bottom line are increased productivity, increased insights, and increased collaboration.

Increased productivity means helping your employees become more effective at the work they already do. At the end of the day, a productive employee is one who can complete their work accurately and efficiently. We streamline task flows, increase personalization of applications, reduce unnecessary navigation, and remove unneeded clicks in order to reach this end goal.

Increased collaboration means lowering the boundaries that keep your employees from connecting. An improved user experience enables your employees to easily leverage the collective knowledge of your organization or department. We work to enhance social networking by examining integration with email and chat clients, determining how Web 2.0 features can be deployed, and considering how users make use of mobile technologies.

Increased insight means supporting rapid, effective judgments. Our design approach provides your employees with the ability to access the right information, at the right time, to make the right decisions. Throughout our product suites, we look for opportunities to make use of best practice business intelligence.

How we do it: Oracle's commitment to User Experience

Oracle has maintained a core competency in user experience for over 12 years, and most recently welcomed the PeopleSoft, JD Edwards, Siebel, and Agile user experience teams into the organization. By adding such talent to our existing expertise, we continue to increase our understanding of your business problems. We maintain usability testing laboratories around the world to monitor and respond to your changing market needs.

Oracle has taken a proactive position on ensuring a quality user experience for enterprise applications. At Oracle, "user experience" (UX) means examining how your users work today, understanding their pain points, and working closely with product management, strategy, and development to target the most effective improvements in product design. UX is an integral part of the development process for enterprise applications.

In the Applications Unlimited space, we leverage the same design techniques and usability methodologies used for all of our other applications. We also adhere to many of the same principles of improving user productivity

and insight. Additionally, we place a great emphasis on ensuring each product line user experience helps reduce overall operating costs through improved usability.

Our main user experience goals for Applications Unlimited are to:

- Continue our UX investment in each product line.
- Implement best design practices by leveraging Oracle user experience guidelines, standards, and patterns.
- Evolve to the next generation of applications by using the latest innovations, such as Web 2.0, mobile experiences, and desktop integration.
- Work closely with customers through our Global Design Partners program to conduct site visits, usability tests, and other activities to ascertain and prioritize customer wants and needs.

We've spent the last three years defining world-class experiences for Fusion based on listening to you. We sent our UX professionals to your offices, branch locations, call centers, and manufacturing facilities. But we didn't stop there. As we designed our Fusion user experiences, we validated our designs with the people who would be using our products—your users. In addition, designing the Fusion user experience involved not only understanding how your end users work today, but also how they will work in the future. We continue to investigate how evolving end-user expectations will shape the future.

Fusion Middleware: The platform for Enterprise Applications user experiences

Oracle Fusion Middleware (FMW) is at the center of our user experience design strategy. FMW serves as the foundation for our next generation user experiences and enables them to be rendered on any supported device (laptop, desktop, mobile phone, PDA, widescreen, and so on). Oracle ADF WebCenter (a component of FMW) provides a framework for managing and maintaining context within our applications, and comprises several key underlying services, including Web 2.0 services for supporting wikis, blogs, and enhanced collaboration. Oracle ADF Design Patterns provide developers and designers with the ability to easily reuse and repurpose common design templates embedded with prebuilt services. These and other middleware innovations are at the forefront of our user experience innovations.

How to get the most from this Web site

Visit our blog regularly for a glimpse into the latest thought leadership on the user experiences of Oracle enterprise applications. We invite you to participate in those experiences by sharing your reactions and comments with us. On this Web site, we will also be revealing some of our best practice user experience methodologies, case studies, and processes in a series of articles. These articles will provide insight into how Oracle approaches user experience design in a global marketplace, on existing products, and across multiple platforms. Work with us! We work with hundreds of customers annually as part of our ongoing requirements gathering, design, and testing. Join our Global Design Partners program today to help shape the future of enterprise applications. My team and I look forward to working with you.”]

SAP: To bring the product user experience up to the level of the retail (and Web) market.

Siemens: We guide our clients in identifying the user experience quality that is needed for the particular business scenario, we advise on how to reach the desired quality, and we help benchmarking against the competition. We also support the operating companies in applying the appropriate product-lifecycle management (PLM) process. And we stand for a common look and feel of Siemens products with maximum reuse and minimized re-development.

12. What is the organizational position of your department or group (i.e., where is it located in the corporate "org chart")? For example, are you attached to engineering, or marketing, or business lines? Where exactly (for example, in relation to the designers, developers, marketers, quality assurance departments, training/educational department, etc.)?

Fujitsu: Official organization name: Product Business Support Group, Fujitsu Design Limited. Independent, but collaborates closely with engineering, marketing, business lines, quality assurance departments, and so on.

IBM: In general, IBM UX departments report to the same development executives as other developers and there are many UX practitioners who report to the same development first-line manager. The corporate UX organization is a virtual community with an indirect reporting structure (i.e., the product UX departments do not report to the corporate UX department).

Microsoft: In an IT engineering/development organization.

Oracle: Report into the SVP of Development. We are a centralized team supporting all of Applications development. My peers are the heads of each applications product area. Oracle has a number of other small UX teams and individuals who are embedded to a particular product or technology.

SAP: Reports to the Chief Technical Officer of the company.

Siemens: We are regionally organized in-house consulting groups. Our colleagues in the operating companies are always part of their PLM or R&D organization and these are also sponsors of our engagement, whether a local UX group exists or not. Sometimes our efforts get funding from marketing departments.

13. What, specifically, is the relationship to the software development department? Is the UX group independent from software development or is it with in the software development group?

Fujitsu: Independent from the software development department.

IBM: For most IBM products, the UX department is a separate dept, but usually reports to the same executive as the development departments. However, UX departments are considered to be part of the larger software (hardware and services, too) development organization.

Microsoft: We are in the middle of it.

Oracle: Report into the SVP of Development. We are a centralized team supporting all of Applications development. My peers are the heads of each applications product area. Oracle has a number of other small UX teams and individuals who are embedded to a particular product or technology.

SAP: Independent, works like in-house design studio.

Siemens: Independent. Our internal process is very different from software engineering processes, and we generate our value from the difference between these two groups of processes. The overall process is often waterfall, internally we iterate a lot. We maintain a closer relationship to users than the SW process overall, and the UX process is typically much more diverse and multidisciplinary in our day-to-day interactions.

14. How is the UX interpreted? That is, how does UX reflect the organization and corporate culture? For example, is "universal design" included in the mission of the UX department or group? Are usability and UX considered as essentially the same thing? Is there a separate marketing group for promoting UX?

Fujitsu: Concept of UX is following; under the concept of human centered design (HCD), we assist in improving UX through various design activities for developers and designers in the group companies. Universal design is a part of HCD, so it is included in the mission.

IBM: There is variability across products and brands. Design for globalization and accessibility are a focus of UX and development organizations, but these are important design considerations which warrant their own corporate departments in IBM. While there are individual exceptions, we believe that the vast majority of developers recognize the value of UX beyond usability evaluations. Our corporate UX leadership team promotes UX within and outside of IBM.

Microsoft: See previous entry on UX definition. Usability is just one attribute of the experience. Universal design is part of how we do our work; not a mission item. Marketing promotes the user experience; but we promote ourselves.

Oracle: Within. Superior User Experience is one of the 10 corporate values.

SAP: UX is generally interpreted as pixel level UI. UX is counter culture in every way. It is the only centralized technical organization. Everything else is line of business. Usability is more thought of as a productivity measurement. There is no internal marketing group for UX. We already have too much work to do.

Siemens: Usability is considered far too narrow to capture UX. Usability is about smart systems compensating for user limitation. UX is about the perfect fit between user profile and software profile. UX makes products attractive, desirable, competitive. Usability in our view is an important yet very limited part of UX.

15. What is the category breakdown and number of, e.g., graphic designers, interaction designers, user-interface designers, ethnographers, analysts, etc.

Fujitsu: There is no distinction among the professions.

IBM: Most UXD practitioners in IBM fill multiple roles (e.g., user researcher, designer, evaluator), but there are some specialists. Rough breakdown: 75 visual designers, 25 user research specialists, 25 usability testing specialists, 100 interaction/UI designers, 25 UX architects, and 250 general UXD practitioners.

Microsoft: Not sure if you mean in the company or across my team. So in my team, there will be something like 1 ethnographer, 1 UX architect, 1 product planner, 3 visual designers, 3 interaction designers, and 3 user researchers.

Oracle: 60 designers, 30 usability engineers, 5 researchers, 4 graphics, 25 user assistance, 3 lab staff, 10 program managers, 10 architects, recruiters, 5 prototypers/developers.

SAP: Graphic designer 5%, interaction 60%, user-interface designers = interaction to us, ethnographers 0%, user research 20%, accessibility 10%, tools and training 5%.

Siemens: Only graphic designers need to be called out (30%); everyone else on the team has to cover ethnography/observation, analysis, interaction design and validation; based on educational background of the talent we hire.

16. What is the role for and resulting impact of UX designers in software development?

Fujitsu: It depends on the product. Some product development has UX designers through out the development term from planning to evaluation. But there are some products where UX designers only participate in testing.

IBM: Our UX practitioners are actively involved in shaping how our software development processes are evolving from a traditional waterfall development model to an agile iterative development model. We are both learning from our early experiences and educating development organizations on the role of UX-led activities (e.g., user research, design, evaluation) in an agile development.

Microsoft: We (design and user research) own the user experience, its definition, design, and delivery (ensuring it is developed appropriately).

Oracle: We help define and are an integral part of the main applications development process, complete with UX deliverables each of the product development teams have to support.

SAP: We are trying to change the development process to allow enough time for a real design cycle upfront.

Siemens: Any profession adds to the quality of the process. When UI elements are determined and designed by SW engineering, or when SW engineers talk about users, they typically do not do so in a professional way. Expertise from UX designers means that business targets can be translated into SW, risks can be managed and results are achieved better, faster and cheaper. We often find that the SW architecture benefits from user research as the way experienced users perceive of their content is much smarter than structures that appear to be logical and complicated. Objects, their attributes and relationships are surprisingly simple and straightforward when strategies of use are considered. When UX and SW developers work together, both reap advantages, as UX design needs to consider true SW constraints from the beginning.

17. What are the definitions of these different professions within the organization: UX designers, user-interface designers, experience designers, interaction designers, product designers, human factor specialists, ethnographers, cognitive/behavioral specialists, and usability analysts?

Fujitsu: There is no clear definition in the department. Each designer has multiple roles. The person can be a graphic designer and/or an interaction designer, but can be, also, an analyst depending on the situation. Portion of the roles varies individually.

IBM: There are no official job titles for these roles in IBM, and virtually all of these titles are used by various professionals in IBM as a matter of personal preference and departmental practice. In general, we distinguish between UX practitioners who tend to focus on user research, interaction design, and usability evaluations; and visual designers, who tend to focus on visual style, branding, and the rendering of visual elements of the UI. However, many of our practitioners are skilled in both areas. We refer to the collective group of UX and Visual Design professionals as User Experience Design (UXD).

Microsoft: The usual ones.

Oracle: There is a separate document I can share with you on these definitions.

SAP: There are no specific definitions in the human-resources system. The company treats everyone as a generalist.

Siemens: We use usability analysts for testing, as these colleagues are best at devising test scenarios and at test execution and evaluation. Human factor specialists fall into the same category. Ethnographers need to be trained in non-intrusive observation and the capability to understand processes from within; so that they avoid carrying pre-conceived notions into situations. And then I would put all ... designers into the same category. In this role, we need to find an appropriate response to the needs and capabilities of users. This is when innovation is happening. Ultimately, these disciplines work together, and most people on the team can assume any of these roles.

18. Do UX designers, experience designers, or interaction designers, etc., also do programming?

Fujitsu: The professionals program when making prototypes. They do not program for actual software products.

IBM: For most designers, some level of programming is required for prototyping. However, the majority of UXD practitioners do not deliver code that is shipped in the product.

Microsoft: No, although the tools we use (WPF/Silverlight) generate deployable code automatically.

Oracle: If they do it is a bonus that we encourage. We hire professional prototypers and developers in the UX team to support this skill set.

SAP: No. They only do programming to create user-interface prototypes and demos. All the code created is throw-away.

Siemens: In rare cases, but this seems to become more and more important. New technology makes this possible, and it gives UX designers more control over the results of their work.

19. Is there a role of UI programmer?

Fujitsu: There are no UI programmers in the UX department or group. There are persons who are in charge of the role depending on the project in the software development group.

IBM: While there is a *de facto* role of UI programmer in IBM, there is currently no official job classification or title.

Microsoft: Yes.

Oracle: Yes.

SAP: Only on a few newer product lines and these people (in India) only build to specifications. They are not involved in the design process.

Siemens: Yes, especially with WPF.

20. What is the typical educational background and previous career of UX designers?

Fujitsu: Graphic design, communication design, cognitive psychology, human factors, architecture, environmental design, psychology, computer science, electrical engineering, information engineering, system engineering, etc.

IBM: Graduate degrees in HCI, human factors, computer science, psychology, and related programs. Almost all have some applied experience either through previous employment or IBM internship programs.

Microsoft: Design school, experience in product design (sometimes HCI programs and experience).

Oracle: Industrial design, interaction design, architecture, cognitive psychology, computer science with specialization in human factors and ergonomics, and media studies.

SAP: Depends on the company. Inside the US and India, most are trained designers. Everywhere else in the world most are volunteers. Some come from computer-science background, some from documentation, and some from marketing.

Siemens: Psychology, linguistics, and/or computer science. It helps if someone has a deep understanding of one or many domains. Capital goods are often difficult to understand but the knowledge of one industry makes it easier to understand the next context of use. I personally appreciate if colleagues have a background in industrial design. Many terrible SW designs would not have happened if it were understood that things on screens have a reality and are not just a bunch of pixels. And I encourage everyone in the team to look into activity theory. Every goal is part of a larger goal. The overall value system of an operation, business conditions, dependencies, etc. are reflected in UX design.

21. Are graphical user-interface and software components developed together?

Fujitsu: Seldom.

IBM: Yes.

Microsoft: Yes.

Oracle: Yes. We design and manage them centrally to maintain consistency, and design efficiently. We have built our own repository and request tools.

SAP: Yes.

Siemens: Yes.

22. How do you manage common components or parts (for example, icons or "widgets")?

Fujitsu: It depends on the product. It varies.

IBM: We have corporate repositories for icons, widgets, and other UI design assets such as design patterns. Development teams may create customized widgets, icons, etc., and are encouraged to contribute them back to the common repository.

Microsoft: In libraries.

Oracle: We design and manage them centrally to maintain consistency, and design efficiently. We have built our own repository and request tools.

SAP: From a central repository with source code control.

Siemens: We use pattern libraries.

23. Are there any style guides (UI guides) or pattern documents for each product/service, or for corporate-wide development? How long are they (approximate number of pages or screens)?

Fujitsu: It depends on the product. Some products have one, but others do not. Length varies from one product to another.

IBM: There is corporate-level design guidance, as well as brand- and product-level extensions of this guidance. Each one ranges from 100 - 200 screens/pages.

Microsoft: Yes; too many to count across all the work surfaces.

Oracle: Yes, we have Applications Style and Pattern guidelines and standards. As it is a web site I will have to get back to you on its size.

SAP: Both. The corporate user-interface standard for applications is 1000 pages in length. Product guidelines based on it are usually about 100 pages.

Siemens: I do not know what you mean by style guide. I believe style guides were a trick of the 80s to keep UX designers away from SW design. Can you write a speech or a novel or an article with a dictionary? To identify the issue and find the right element to respond to user needs takes more than finding the right page in

a style guide. Design is not symmetrical. A pattern library can show exactly how something has to look like, and why it is used in a certain situation. But there is no rule by which it can be predicted which pattern is right. There is no profession that would go about their business otherwise. Whether you design a house or build a business plan, whether you write an e-mail or an article, whether you organize a party or a field trip, you can't just pull a solution from the shelf. Once the plans for the house are ready, once the numbers for the plan are lined up, once the words are written down, the data can easily be put into their target environment. But that wouldn't be called design. There were times when folks were given little books to help them write letters. This was abandoned when everyone had more than 4 years of schooling. Styles guides, in my mind, follow the wrong misunderstanding of what our profession is all about.

24. What means of document management, content management, and user-interface component management do you employ?

Fujitsu: Seeking the best way now....

IBM: There is a wide variability of document/content/code management systems in use in IBM today. In general, each product's UXD team will use the same system as the overall product development team since it is important to collaborate with them.

Microsoft: If you mean for our own documents, we use SharePoint.

Oracle: We have an internal UX design development website, we have the guidelines and standards website, and we use a corporate wide server based document management system (Oracle File Online).

SAP: A content management product for the user-interface specifications called 7 Steps. For user-interface resource files, the regular development build-process.

Siemens: We use the systems our sponsors have in place to manage content. Often these are the same tools that are being used by the SW development teams. Ultimately, it is irrelevant which tools you use, as long as it provides some level of structure and people can access it easily.

25. Are document, content, and UI-component management systems developed internally or do you use commercial products? If commercial products, which do you find most useful?

Fujitsu: Seeking the best way now....

IBM: Most of our management systems are IBM products (e.g., Rational and Lotus products) specifically designed for this purpose.

Microsoft: See above.

Oracle: Developed by the company.

SAP: Both. 7 Steps publishing tool. [URL: <http://www.sevensteps.nl>. SevenSteps is an enterprise-oriented CMS publishing tool. The SevenSteps company Website introduces the product as follows: Dutch-based Sevensteps delivers knowledge products. These products enable companies to publish their knowledge in a variety of publication formats: from PDF to corporate intranet, from website to e-learning solutions. SevenSteps' products prove their value across the globe at companies like: SAP, Google, Microsoft, Rabobank and the Dutch Ministry of Housing.

Siemens: Some are, some are not. This is professionalizing as well, often there are better tools on the market than what groups could build that are not specializing in document management.

26. Are there any original or unique development methods, tools, or documents other than, for example, developing personas (user profiles), pattern documents, or user-designed components?

Fujitsu: Not especially.

IBM: IBM has a strong culture of innovation in the area of UI design. We have 17 Master Inventors among the IBM UX Community, i.e., practitioners with a strong, sustained record of patent activity.

Microsoft: Yes.

Oracle: Yes we have these, but we cannot discuss them yet.

SAP: No.

Siemens: We consider this a trade secret and will not publish.

27. Are there new methods you have heard about that seem worth investigating and trying out?

Fujitsu: Not especially.

IBM: We are constantly searching for new methods to accelerate and improve the quality of our user research, design, and evaluation, especially with the move to Agile development practices.

Microsoft: I think we are trying them somewhere in the company already. We have an effort that harvests experiences and passes them around.

Oracle: Master Usability Scaling (MUS) is showing itself to be useful, as has investment of formal ethnographic studies. Other techniques we cannot discuss until we release Fusion v.1

SAP: No.

Siemens: This cannot be disclosed.