Pertemuan 4

Usability of Interactive Systems

Disiplin ilmu yang terlibat dalam sistem interaksi

Disiplin Ilmu yang diperlukan adalah :

1. Teknik Informatika :Bidang ini merupakan bidang dasar dalam pembahasan interaksi manusia dengan komputer karena komputer sendiri merupakan subjek dalam interaksi tersebut.
2. Psikologi :Bidang ini memperhatikan sifat, kebiasaan, persepsi, pengolahan kognitif, dan ketrampilan motorik pengguna.
3. Desain Grafis :Sebuah gambar atau ikon dapat secara cepat memberikan informasi atau makna bagi user tanpa harus bayak berkata-kata. Bidang ini memperhatikan bagaimana representasi grafis (gambar) yang mewakili berbagai macam ragam kalimat.

4. Ergonomic :Bidang ini berkaitan dengan aspek fisik untuk mendapatkan lingkungan kerja yang nyaman.

5. Antropologi :ilmu pengetahuan yang mempelajari tentang manusia, dan memberi suatu pandangan tentang cara kerja berkelompok yang masing – masing anggotanya dapat memberikan konstribusi sesuai dengan bidangnya.

6. simbol dan suara diintepretasikan sebagai Lingustik : Bahasa sebagai sarana komunikasi mendasar diperlukan dalam pembuatan desain interaksi antara manusia dengan komputer. Melalui bahasa, berbagai macam perintah yang akan dikerjakan oleh komputer.

Usability

Dalam mendesain antarmuka komputer, perlu diperhatikan faktor tingkat kebergunaan/ usability.

Menurut Nielsen ada lima hal yang menentukan usability yaitu:

1. *Learnability*: User dapat segera memulai pekerjaanya semenjak dimulainya penggunaan sistem.

2. *Efficiency*: User dapat meningkatkan produktifitasnya setelah pertama kali belajar.

3. *Memorability*: User dapat menggunakan sistem kembali dengan cepat setelah lama tidak menggunakan aplikasi tersebut tanpa perlu belajar dari awal kembali

4. *Errors*: User harus mampu diarahkan untuk sekecil mungkin berbuat kesalahan. Apabila user melakukan kesalahan harus ada langkah penanganan yang dapat memulihkan kesalahan tersebut dengan segera.

5. *Satisfaction*: User harus harus merasa nayaman dengan sistem aplikasi yang digunakannya

Usability requirements

- Kata lain untuk “user-friendly” di Microsoft Word 2002 yang mudah untuk digunakan, dapat diakses, mudah untuk dimengerti, memiliki keuntungan dan siap untuk digunakan
- Tapi “user-friendly” juga mencari bantuan dan diberi nilai. “user- friendly tidak hanya dapat dipahami tetapi penuh pengertian, user- friendly dapat dipercaya dan tidak menyusahkan, user- friendly adalah kepercayaan untuk bersama
- Pengukuran ini yang masih bersifat subyektif dan samar oleh karena itu proses symatic diperlukan untuk merancang sistem yang mudah untuk digunakan untuk pengguna spesifik di konteks yang spesifik

- Sebagai contoh dari kegunaan kebutuhan adalah

  U.S. Standar militer untuk Ukuran-ukuran Disain Rekayasa Manusia (1999) nyatakan penggunaan adalah :

1. Pencapaian kinerja yang diperlukan sebagai operator, kontrol, dan personal pemeliharaan
2. Perkecil keterampilan dan kebutuhan personalia dan waktu pelatihan
3. Capai keandalan diperlukan dari alat-alat perlengkapan personalia / kombinasi perangkat lunak

   membantu perkembangan standardisasi desain diantara sistem

Harus meningkatkan kualitas hidup pengguna dan juga kualitas komunitas secara obyektif

Usability memerlukan manajemen proyek dan perhatian saksama pada fase analisa keperluan dan pengujian untuk mencapai tujuan yang obyektif

Goals for requirements analysis

- Ascertain the user's needs

a. Tentukan tugas dan subtugas yang harus dibutuhkan
b. Tugas-tugas yang adakalanya yang hanya dilaksanakan, secara umum sangat mudah untuk dikenali
c. Fungsi – fungsi harus sesuai dengan kebutuhan penguna

- **Ensure reliability** /pastikan keandalan
  - Actions must function as specified
  - Database data displayed must reflect the actual database
  - Appease the user's sense of mistrust
  - The system should be available as often as possible
  - The system must not introduce errors
  - Ensure the user's privacy and data security by protecting against unwarranted access, destruction of data, and malicious tampering

- **Promote standardization, integration, consistency, and portability**
  - *Standardization*: use pre-existing industry standards where they exist to aid learning and avoid errors (e.g. the W3C and ISO standards)
  - *Integration*: the product should be able to run across different software tools and packages (e.g. Unix)
  - *Consistency*:
    - compatibility across different product versions
    - compatibility with related paper and other non-computer based systems
    - use common action sequences, terms, units, colors, etc. within the program
  - *Portability*: allow for the user to convert data across multiple software and hardware environments

- *Complete projects on time and within budget* (Lengkapi proyek – proyek pada waktunya dan dengan pembiayaan)

  Late or over budget products can create serious pressure within a company and potentially mean dissatisfied customers and loss of business to competitors

Usability measures

- Define the target user community and class of tasks associated with the interface
- Communities evolve and change (e.g. the interface to information services for the U.S. Library of Congress)
- 5 human factors central to community evaluation:
  - *Time to learn*
    How long does it take for typical members of the community to learn relevant task?
  - *Speed of performance*
    How long does it take to perform relevant benchmarks?
  - *Rate of errors by users*
    How many and what kinds of errors are made during benchmark tasks?
  - *Retention over time*
    Frequency of use and ease of learning help make for better user retention
  - *Subjective satisfaction*
    Allow for user feedback via interviews, free-form comments and satisfaction scales

- Trade-offs in design options frequently occur. Changes to the interface in a new version may create consistency problems with the previous version, but the changes may improve the interface in other ways or introduce new needed functionality.
- Design alternatives can be evaluated by designers and users via mockups or high-fidelity prototypes. The basic tradeoff is getting feedback early and perhaps less expensively in the development process versus having a more authentic interface evaluated.

Usability motivations

Many interfaces are poorly designed and this is true across domains:

- Life-critical systems
  - Air traffic control, nuclear reactors, power utilities, police & fire dispatch systems
  - High costs, reliability and effectiveness are expected
  - Length training periods are acceptable despite the financial cost to provide error-free performance and avoid the low frequency but high cost errors
  - Subject satisfaction is less an issue due to well motivated users

- Industrial and commercial uses
  - Banking, insurance, order entry, inventory management, reservation, billing, and point-of-sales systems
  - Ease of learning is important to reduce training costs
  - Speed and error rates are relative to cost
  - Speed of performance is important because of the number of transactions
  - Subjective satisfaction is fairly important to limit operator burnout

- Office, home, and entertainment applications
  - Word processing, electronic mail, computer conferencing, and video game systems, educational packages, search engines, mobile device, etc.
  - Ease of learning, low error rates, and subjective satisfaction are paramount due to use is often discretionary and competition fierce
  - Infrequent use of some applications means interfaces must be intuitive and easy to use online help is important
  - Choosing functionality is difficult because the population has a wide range of both novice and expert users
  - Competition cause the need for low cost

- Exploratory, creative, and cooperative systems
  - Web browsing, search engines, artist toolkits, architectural design, software development, music composition, and scientific modeling systems
  - Collaborative work
  - Benchmarks are hard to describe for exploratory tasks and device users
  - With these applications, the computer should "vanish" so that the user can be absorbed in their task domain

- Social-technical systems
  - Complex systems that involve many people over long time periods
  - Voting, health support, identity verification, crime reporting
  - Trust, privacy, responsibility, and security are issues
  - Verifiable sources and status feedback are important
  - Ease of learning for novices and feedback to build trust
  - Administrators need tools to detect unusual patterns of usage

Universal Usability

- **Physical abilities and physical workplaces**
  - Basic data about human dimensions comes from research in *anthropometry*
  - There is no average user, either compromises must be made or multiple versions of a system must be created
  - Physical measurement of human dimensions are not enough, take into account dynamic measures such as reach, strength or speed

- Screen-brightness preferences vary substantially, designers customarily provide a knob to enable user control
- Account for variances of the user population's sense perception
- Vision: depth, contrast, color blindness, and motion sensitivity
- Touch: keyboard and touchscreen sensitivity
- Hearing: audio clues must be distinct
- Workplace design can both help and hinder work performance

- The draft standard *Human Factors Engineering of Computer Workstations* (2002) lists these concerns:
  - Work-surface and display-support height
  - Clearance under work surface for legs
  - Work-surface width and depth
  - Adjustability of heights and angles for chairs and work surfaces
  - Posture—seating depth and angle; back-rest height and lumbar support
  - Availability of armrests, footrests, and palmrests

- Cognitive and perceptual abilities
  - The human ability to interpret sensory input rapidly and to initiate complex actions makes modern computer systems possible
  - The journal *Ergonomics Abstracts* offers this classification of human cognitive processes:
    - Long-term and semantic memory
    - Short-term and working memory
    - Problem solving and reasoning
    - Decision making and risk assessment
    - Language communication and comprehension
    - Search, imagery, and sensory memory
    - Learning, skill development, knowledge acquisition and concept attainment

- They also suggest this set of factors affecting perceptual and motor performance:
  - Arousal and vigilance
  - Fatigue and sleep deprivation
  - Perceptual (mental) load
  - Knowledge of results and feedback
  - Monotony and boredom
  - Sensory deprivation
  - Nutrition and diet
  - Fear, anxiety, mood, and emotion
  - Drugs, smoking, and alcohol
  - Physiological rhythms
- But note, in any application, background experience and knowledge in the task domain and the interface domain play key roles in learning and performance

- **Personality differences**
  - There is no set taxonomy for identifying user personality types
  - Designers must be aware that populations are subdivided and that these subdivisions have various responses to different stimuli
  - Myers-Briggs Type Indicator (MBTI)
    - extroversion versus introversion
    - sensing versus intuition
    - perceptive versus judging
    - feeling versus thinking

- **Cultural and international diversity**
  - **Characters, numerals, special characters, and diacriticals**
  - **Left-to-right versus right-to-left versus vertical input and reading**
  - **Date and time formats**
  - **Numeric and currency formats**
  - **Weights and measures**
  - **Telephone numbers and addresses**
  - **Names and titles (Mr., Ms., Mme.)**
  - **Social-security, national identification, and passport numbers**
  - **Capitalization and punctuation**
  - **Sorting sequences**
  - **Icons, buttons, colors**
  - **Pluralization, grammar, spelling**
  - **Etiquette, policies, tone, formality, metaphors**

- **Users with disabilities**
  - **Designers must plan early to accommodate users with disabilities**
  - **Early planning is more cost efficient than adding on later**
  - **Businesses must comply with the "Americans With Disabilities" Act for some applications**
- **Elderly Users**
  - **Including the elderly is fairly ease, designers should allow for variability within their applications via settings for sound, color, brightness, font sizes, etc.**

- **Potential research topics**
  - **Reducing anxiety and fear of computer usage**
  - **Graceful Evolution**
  - **Specification and implementation of interaction**
  - **Direct manipulation**
  - **Input devices**
  - **Online assistance**
  - **Information exploration**

Goals for our profession

- **Potential research topics**
  - **Reducing anxiety and fear of computer usage**
  - **Graceful Evolution**
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Goals for our profession (cont.)

- **Providing tools, techniques, and knowledge for system implementers**
  - **Rapid prototyping is easy when using contemporary tools**
  - **Use general or self-determined guideline documents written for specific audiences**
  - **To refine systems, use feedback from individual or groups of users**
- **Raising the computer consciousness of the general public**
  - **Many novice users are fearful due to experience with poor product design,**
  - **Good designs help novices through these fears by being clear, competent, and nonthreatening**