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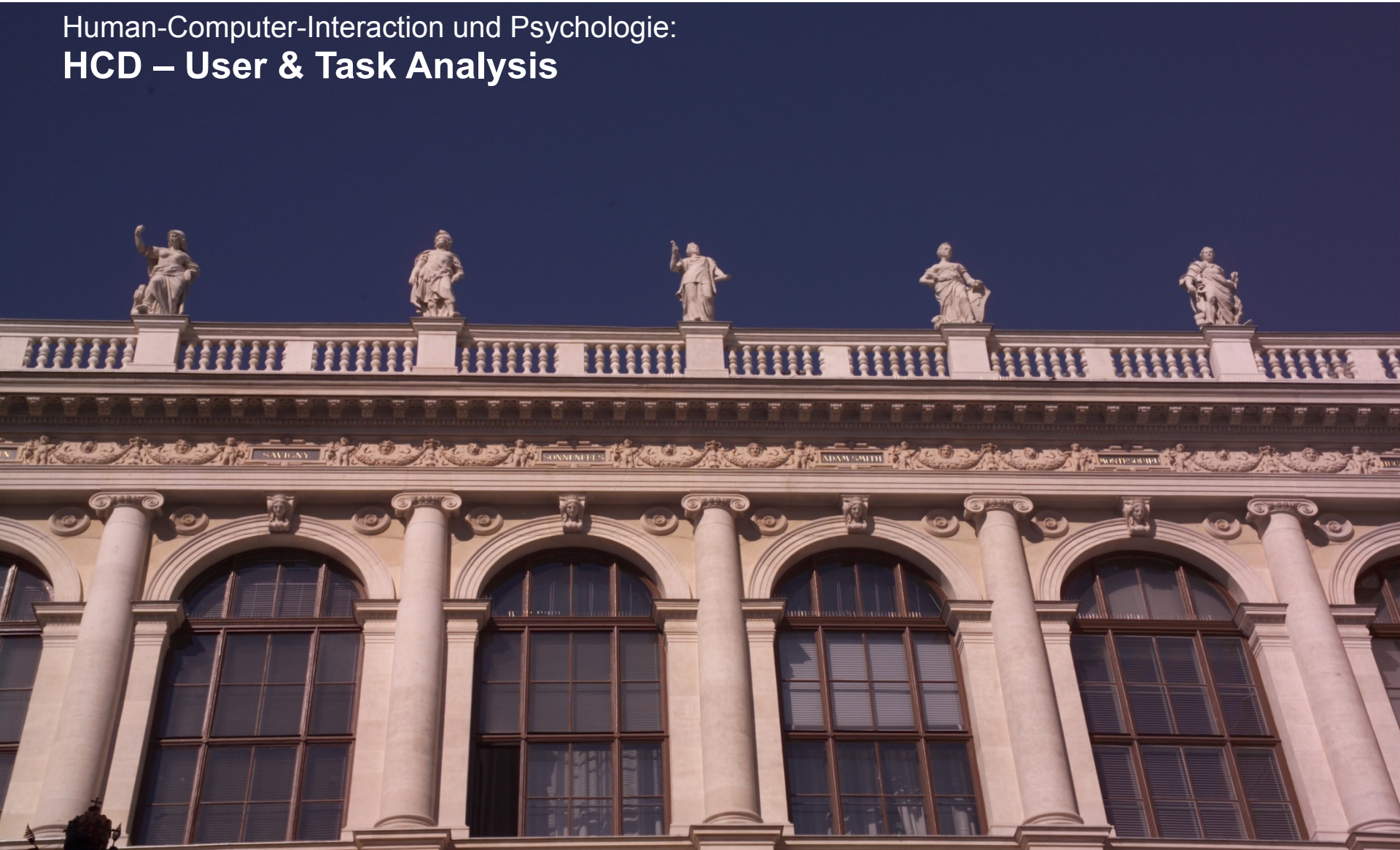
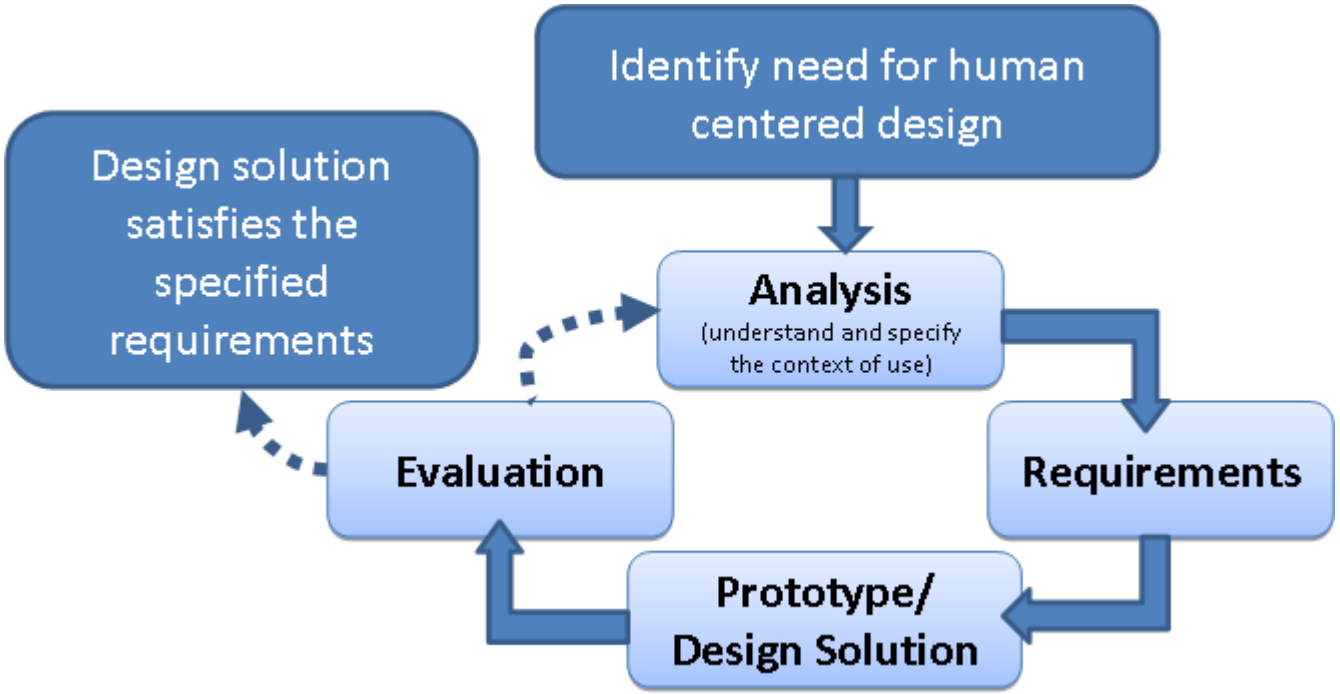
Human-Computer-Interaction und Psychologie:

HCD – User & Task Analysis



Human-Centered Design Process



Functional & non-functional

Human centered design process (based on ISO 13407:1999).

Image from Krigl stein 2011 (Dissertation)

Requirements analysis

- **User analysis**
- **Context analysis**
- **Tasks analysis**
- Analysis of competitors / competing tools

- Requirements: What should the system do for each user under which conditions?
- Needs prioritization!

- Typical methods used in user/context/task analysis:
  - Interviews of different users
  - User observations (e.g. at work)
  - Surveys and questionnaires
  - Designing and evaluating prototypes

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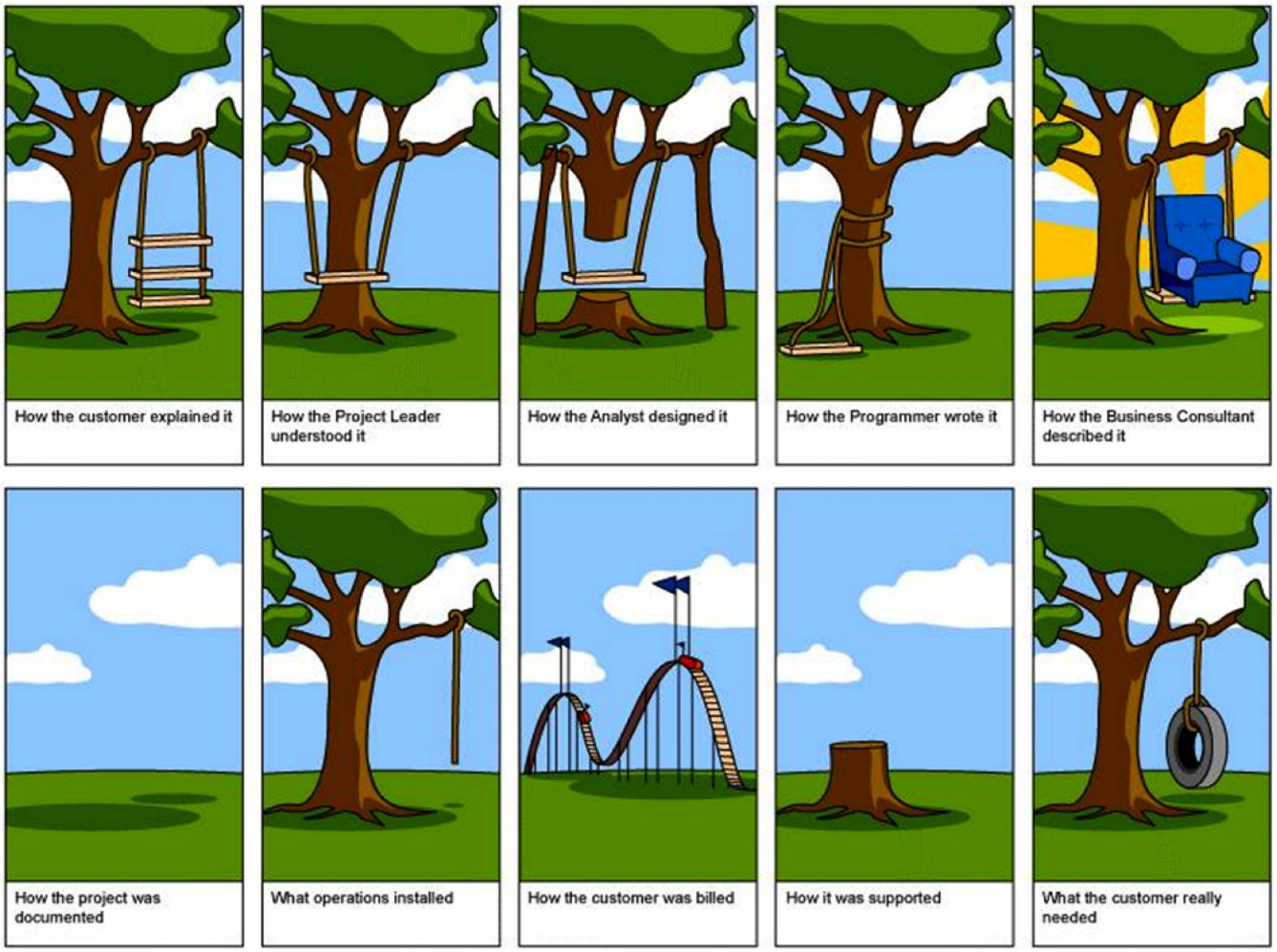
Who are your users?

You ???

Elastic User?


How the customer explained it
How the Project Leader understood it
How the Analyst designed it
How the Programmer wrote it
How the Business Consultant described it
How the project was documented
What operations installed
How the customer was billed
How it was supported
What the customer really needed

User analysis

User Analysis in Human-Centered Design:

- Success of the system is closely tied to the **expectations** and **needs** of the user
  - **Problem:** Necessary definitions and a clear understanding of target users is often missing
  - **Solution:** Create and share a common understanding of target users
- Crucial for driving design decisions:
  - Who are my users?
  - What tasks do/will they conduct?
  - What other criteria will influence the system?
  - What similar systems are out there?
  - …

User analysis

- Different people have different requirements for (computer) interfaces
- Analyze differences of potential **user groups**
  - Identify user groups
    - Primary
    - Secondary
    - Border cases
  - Prioritize important user groups!

  - **Example: Online travel booking system**

User analysis

- Example: online travel booking system
  - Employee at a travel agency that books multiple flights per day
  - Business woman that wants to change flights during a business trip
  - Teacher that needs to organize a class outing/trip

User analysis

- Define background information of target users:
  - Goals and motivation
  - Education, cultural background, specific training/know-how
  - Age, gender
  - Physical capabilities
  - Experience
    - E.g. uses similar systems?

Personas

- Who are our users?

Personas

- Introduced by Alan Cooper 1999
- A fictive person that represents a larger number of users with similar **characteristics, expectations,** and **motivations**
- Personas surrogate real users in the design process
- Persona descriptions need to be clear, concise and short

Personas Examples

Quelle: http://www.informatik.uni-bremen.de/frautec/lehre/PSE2007/PSE-Folien7+8.pdf

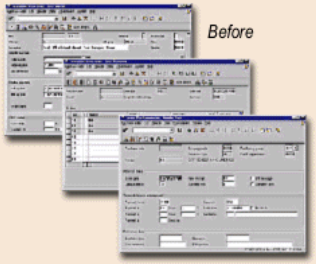
Personas Examples

- SAP

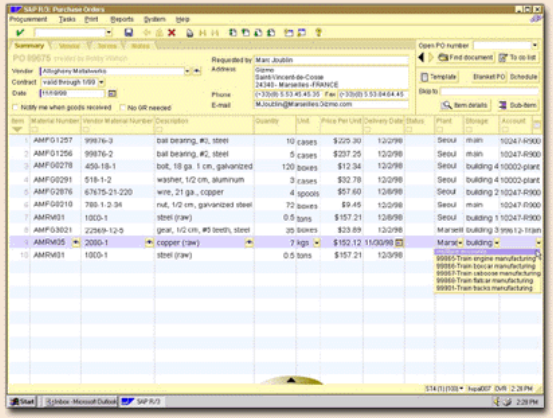
Case Study: SAP Materials Management

Bobby Watson
Purchasing Assistant
Gizmo Toys

Bobby's Goals:
- Get his job done by 5:00.
- Feel competent.
- Make the process run smoothly.



Before



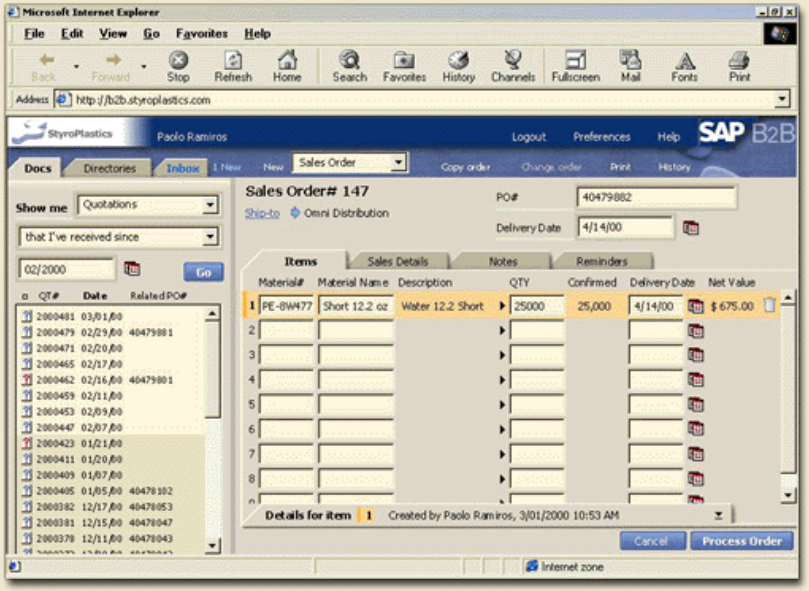
Cooper Design

Cooper's Materials Management (MM) design took functionality that was spread across several screens and brought it into a one-screen interface. Bobby Watson, the primary persona for the MM tool, can do his job without ever losing his context: all his important information is visible and easily accessible.

Case Study: SAP Business-to-Business

Paolo Ramiros
Buyer
Omni Distribution

Paolo's Goals:
- Clear his desk by the end of the day.
- Make the day run smoothly.
- Don't reinvent the wheel.



The Business to Business design gives Paolo access to the forms and information necessary to do his job. A powerful attribute-based retreival system lets him quickly find the right form, vendor, customer, item, or any other object in his business database.

Quelle http://www.sapdesignguild.org/editions/philosophy_articles/cooper.asp

Personas Examples

- Microsoft

Carl - The New Guy

General Characteristics and Responsibilities:
Carl finished his degree in computer science last year, and has been working as a Software Design Engineer in Test (SDET) at Microsoft for just over six months. Carl has learned a lot in his half year with the company; he is getting more comfortable with his job and more confident in his abilities every day. He likes writing code and spends a good chunk of his time writing automated tests and tools to help with his work and to help the rest of his team. Carl also loves analyzing problems and coming up with solutions. He is currently working on integrating a popular Microsoft internal fault injection tool into his tests. With that, he can exercise more of the error handling code in the application he is testing. Carl uses customer data to influence the design of his test cases. He has relatives who are often frustrated when using the computer; he is proud that he can have so much influence on the design of the software and hopes he can ease his relatives' frustration.

Goals and motivations:
Carl has been programming since high school and was initially a bit apprehensive over taking a testing job at Microsoft. Now, however, he finds the work both challenging and exciting. Carl is a great coder, but he has found that his passion for problem solving and analysis make him a great tester. He loves the variety of the job and appreciates the growth paths for testers at Microsoft.

Alecha - Product Line Customer Advocate

General Characteristics and Responsibilities:
Alecha is skilled at knowing the needs and attributes of her customers. She has a knack for seeing things from the customer point of view, but also works closely with program management and marketing to verify her assumptions and clear up ambiguity. She analyzes data from various tools that track customer data and makes sure that the testing effort focuses primarily on customer scenarios and customer pain points. She is also one of the key drivers in determining how these tools are used for her product. Alecha writes some automation, but is most effective when working with the rest of the test team to make sure that their automated tests focus on customer scenarios. She is an excellent exploratory tester, and typically spends an hour or so each day testing end to end scenarios in various areas of the product. While most of her teammates focus on specific technologies within the product, Alecha is valued for always having the big-picture view of the product and for her understanding of how all of the pieces fit together.

She designs end to end customer scenarios for entire team, and also is extremely knowledgeable in customer scenarios. She consolidates customer data and works with the test team to design test cases that reflect customer scenarios, and with program management and development teams to ensure that designs and implementations match customer usage patterns. The influence of her work spans all disciplines in her division.

Alecha contributes to product design reviews where she provides valuable input on how the customer will see and interact with the proposed feature set. She is well versed in customer focused design techniques and works with the appropriate cross discipline owners to apply these techniques across the product. She is concerned with all aspects of the customer experience including usability, reliability, security, performance and general product effectiveness. Alecha spends a lot of time working with other team members to ensure everyone maintains that customer connection that enables her team to create a quality product that the customer wants and needs.

Primary responsibilities include:

- Analyzes customer data from a variety of sources
- Represents the customer in design and usability reviews
- Mentors and educates the test team in customer based testing approaches and the needs of the customer
- Is Active in customer discussions such as newsgroups, conferences, or special interest groups
- Provides immediate and accurate feedback on customer impact of bugs
- Designs end to end testing scenarios based on customer usage data.

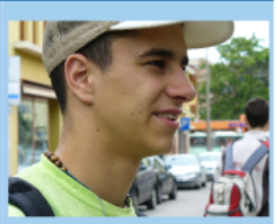
Goals and motivations:
Alecha enjoys coming to work every day knowing that she directly shapes the product in a way that ensures the customer's needs will be met. She enjoys being a product expert and feels valued and respected by her team members as someone that is completely knowledgeable about their product and industry. She loves her product and the difference she directly makes in customer's lives by the work she does for them.

Quelle: http://msdn2.microsoft.com/en-us/testing/bb414765.aspx

Personas Examples

- Kivio

Kivio Users

	The researcher	The Sysadmin	The OSS developer	The CS student
				
Name	Alexander Weiß	Donald M. Berry	Kristian Larsson	Eric Neville
Age	30	30	26	24
Location	Germany	US	Sweden	France
Social Life	Alexander lives with his girl-friend in a flat in Hamburg.	Donald lives with his wife and 1-year old daughter in a house in Portland.	Kristian shares an apartment with two friends in Stockholm. His girl-friend lives in Uppsala. They see each other every weekend.	Eric lives with his parents in a small city close to Lyon. He visits the university there. Often, he stays at his friend's apartment for playing PC games and programming.
Work Life	He works at centre for environmental systems research and designs plans for replacable energies in a EU-funded project.	He is a lead system administrator in a huge network solutions company in Portland.	A software developer with a dayjob in a medium-sized software company. Works on KDE in his spare time.	He is a student of computer science. Besides university, he performs small programming jobs for people in his neighbourhood.

Quelle: http://msdn2.microsoft.com/en-us/testing/bb414765.aspx

Personas Examples

Timothy Powell

P. Eng, Civil Engineer
GeoLine Engineering
Age: 52

"Speed trumps security when it comes to exchanging documents. It's not worth jumping through hoops to protect a document that nobody's interested in but me and the client."

Sends 12 documents/week at nearly 100 MB each **via FTP**

Sends 8 documents/week under 5 MB each **via email**

Receives 15 documents/week under 5 MB each **via email**

Receives 15 hand-edited CAD drawings/week **via fax**

Exchanges primarily PDF and Microsoft Word files

Employs couriers only for shipping physical goods

Internet use is mostly limited to a website that hosts discussion groups for civil engineers. Purchases flights, hotels, and conference registrations twice per year.

Goal: Get everything done before heading home. Timothy has a lot of work to stay on top of and firm deadlines that cannot be missed. Speed is a competitive advantage for GeoLine, so it's essential that delays do not occur. Timothy hates working at night, too, so he makes the most of his hours at the office.

Goal: Cover his back and avoid blame. In Timothy's industry, projects usually go far over budget and are completed late, at which point all the subcontractors involved begin pointing fingers at each other. Timothy needs detailed records that prove he completed exactly what was expected of him and his company.

Timothy Powell is famous among his coworkers for once visiting a construction site and remarking to the client, "Look, you may build bridges, but I design them. And that's the most critical part!" He may not have made a friend that day, but Timothy was unconcerned. He doesn't suffer fools, just as he won't put up with anything that stands in the way of getting his job done. Timothy's work is extremely deadline-driven. His clients demand aggressive schedules and expect him to stick to them, as timing is crucial when coordinating subcontractors and suppliers on a large construction project.

"On a great day, I'm able to get everything out the door and into our client's hands. Never, ever let anything come between you and that door!" Timothy struggles with this all the time. With at least three major projects underway, it takes an enormous effort to produce his CAD drawings on schedule. As a result, he ships most of his documents at the end of the day, just before leaving the office around 5:30 pm.

CLICKDOX

Quelle: http://chopsticker.com/2007/06/08/download-an-example-persona-used-in-the-design-of-a-web-application/

Personas

- Allow to **share** target user understanding across entire design team
- Number of personas needs to be **manageable**
  - Only specify personas that are actually needed
- Personas should **not** be too **complex,** so they can be internalized by designers
- Usually 1 page is enough
- Persons should describe **typical** usage scenarios
- Personas must **not** be an **average** user!

Quelle: http://www.mprove.de/events/roundtablehh/_media/OLS04_Personas.pdf

Personas

- Benefits
  - Helps defining a system
    - What does the system need to support/do?
    - How should it “act”?
  - Helps evaluating designs
  - Avoids developing for “own” goals
  - Avoids developing for the „elastic user“
  - Gives a “face” to the user (powerful!)
  - Costs are comparably low

Personas

- **Potential problems?**

Quelle: http://www.informatik.uni-bremen.de/frautec/lehre/PSE2007/PSE-Folien7+8.pdf

Personas

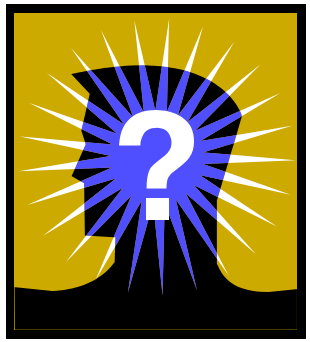
- Potential problems:
  - How to find/select the right personas?
  - Plausibility and trustworthiness?
  - Need to be communicated well, otherwise not useful
  - Tendency towards “re-using” personas for multiple projects

Quelle: http://www.informatik.uni-bremen.de/frautec/lehre/PSE2007/PSE-Folien7+8.pdf

Quelle: https://www.slideshare.net/cwodtke/interaction-design-and-goal-driven-design-using-personas/132

Personas: structure

- Description of “Body”:
  - Photo
  - Age
  - Gender
  - …
- Description of “Background“:
  - Education
  - Experiences
  - …



Quelle:http://www.hceye.org/HCInsight-Nielsen.htm

Personas: structure

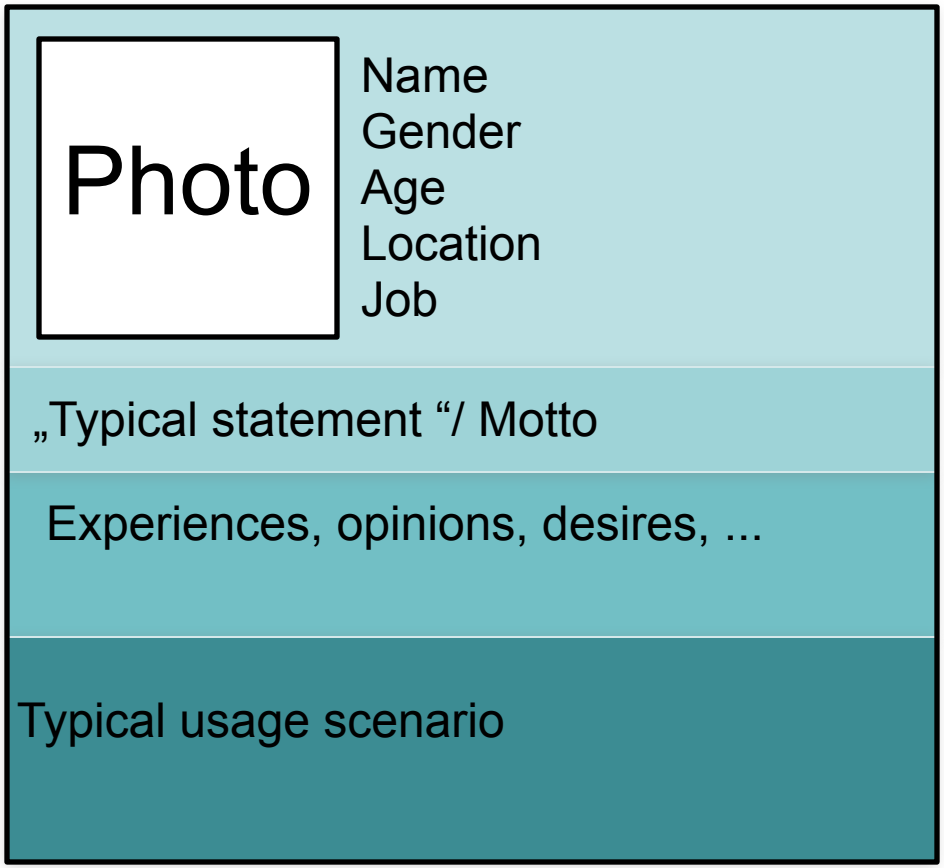
- Description of opinions and desires
- Typical statement / motto
- Typical scenario
- …

- Structure not set in stone, can vary between different projects and systems

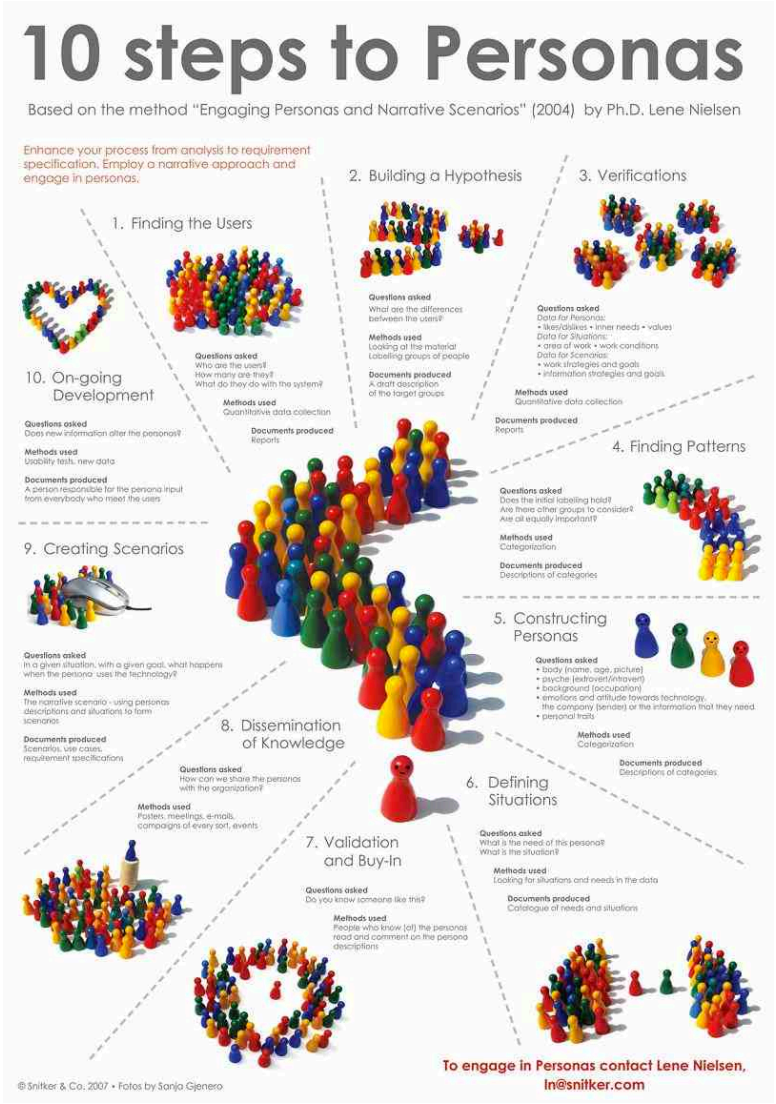
Quelle:http://www.hceye.org/HCInsight-Nielsen.htm

Personas: structure

- Example



Where do Personas come from?



- Imagination of Designers (?)
- Epistemic distance?

- User interviews
- ...
- Field studies
- Full-blown ethnographic study

https://www.interaction-design.org/encyclopedia/personas.html

Aufgabe

Diskussion: Typische Profile der Studierenden in der LV

Ihre Aufgabe:

- Sie wurden engagiert um moodle zu re-designen
- Erstellen Sie in kleinen Teams eine entsprechende Persona zu einem Profil.

15 Minuten

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Foto

Name
Geschlecht
Alter
Wohnort
Beruf

„Typisches Zitat“/Motto

Erfahrungen, Einstellungen, Wünsche …

Beschreibung eines typischen Nutzungsszenarios

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Context analysis (short)

Context analysis

- Analyze the context a system will get used in:
  - Environment: weather, light conditions, noise
  - Usage of the system
    - While seated, standing …
    - At work, at home, on the go, …
    - Frequently / rarely
    - Hectic / calm

- Typically studied in the field

Context analysis

http://one.laptop.org

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Task analysis

Task analysis

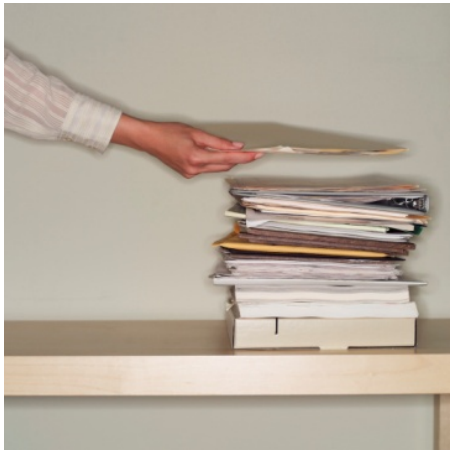
- *Important note:* Only a system a user can use will be sold
- → What are the user group's **tasks** to be solved with the system?

- A **task** is a meaningful unit during a user's activity; they lead to a meaningful (partial) results

- Quasi-Synonyms:
  Task, Scenario, Use-Case

Task analysis

- Various ways of documenting tasks:
  - Table: **User groups** X **tasks**
    for each note down **frequency** of the task
  - Table: Objects X tasks
  - For complex tasks, e.g., sequence diagrams (UML)
  - Describe a task according to a given schema (not mandatory)



Task profile – Example 1

Table with user groups and tasks, as well as the relative frequency of each task

User / **Task**	Typist	Secretary	Administrator	…
Create letter	often	often	occasionally	
Create report	never	occasionally	often	
Insert figure	never	occasionally	often	
print	often	often	often	
…				

Task profile – Example 2

Table with objects assigned to tasks

	Bill	Letter	Article	…
Create	+	+	+	
Print	+	+	+	
Insert table	-	-	+	
Insert figure	-	-	+	
Spellcheck	-	+	+	
Reminder	+	-	-	
…				

Additional Information for task analyses - overview

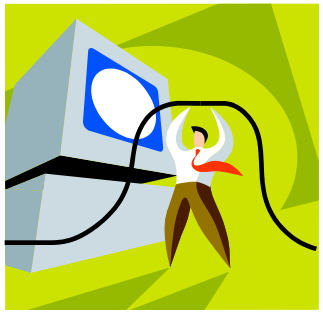
- Types of tasks
- Derive task profiles from user needs and goals
- Tasks vs. functions
- Examples for task frequencies

Types of tasks

- Specific types of tasks
  - Collaborative tasks
    - in sequential order
    - In parallel (cooperative)
    - Can be described with flow diagrams
  - Unstructured and explorative tasks:
    - Do not restrict the range of operations too much! Allow user to “experiment”!
  - Content-driven tasks
    - Multimedia, games, etc.

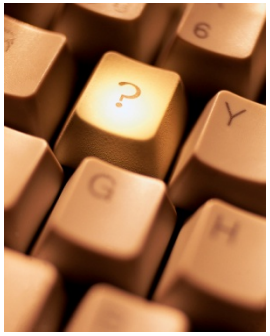
Derive task profiles from user needs and goals

- Aim: Find out what the user wants to do!
  - User needs, goals, and resulting tasks
- Users think in ‘tasks’, not in ‘functions’!
- Example
  - Task: I want to change my address
  - Function:
    - First, I need to log in,
    - then I need to navigate to settings,
    - select the item “change address”,
    - change address,
    - and then click on “save”



Task profiles – guidelines

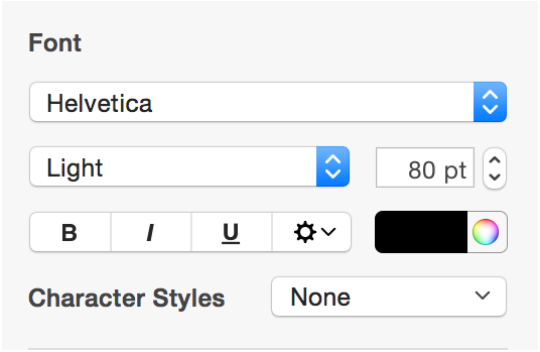
- Tasks that need to be supported should be determined first
- (Unnecessary) tasks should not be added just because they are easy to implement
- Task frequency (according to the user profiles) should result in design decisions
- The more frequent a function is used, the easier it should be to access.



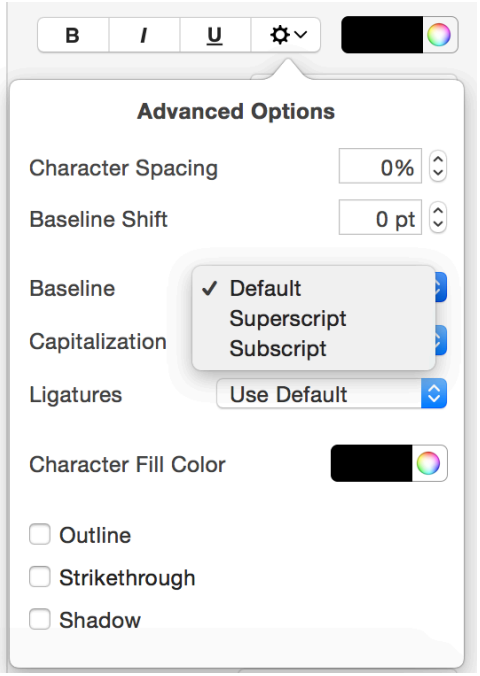
Quelle: http://mitschau.edu.lmu.de/video_online/vorlesungen/wise2006_2007/mensch_maschine/index.php

On task frequency

- **Bold** can be found directly in the sidebar
- **Subscript** needs extra clicks
- The assumption is that users need more often **bold** than **subscript**
- (Customization and/or shortcuts can be used for users with specific demands)

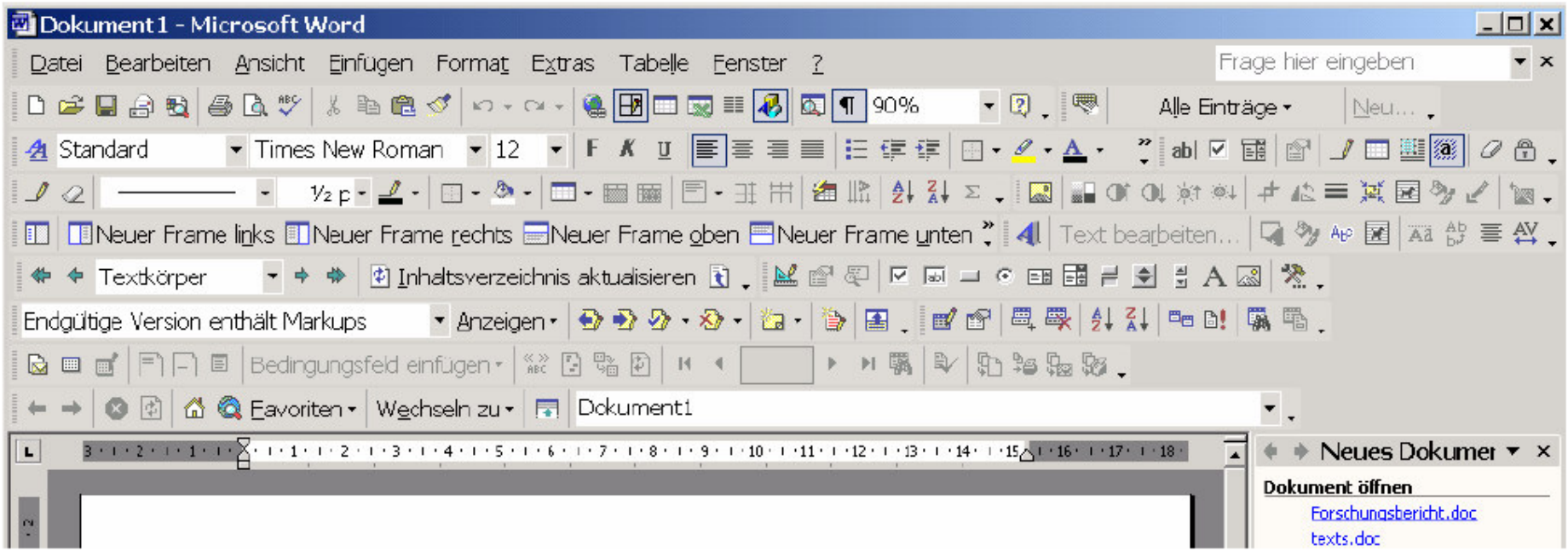


Apple Keynote



Task frequency – discussion!

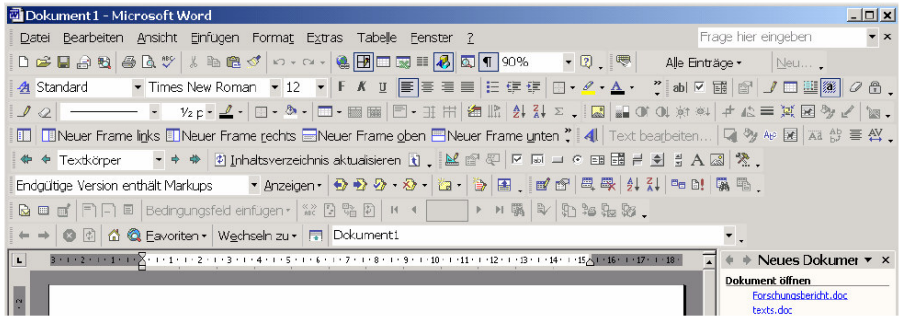
- Tradeoff between fast access and cluttered/crammed design
- Example toolbar:



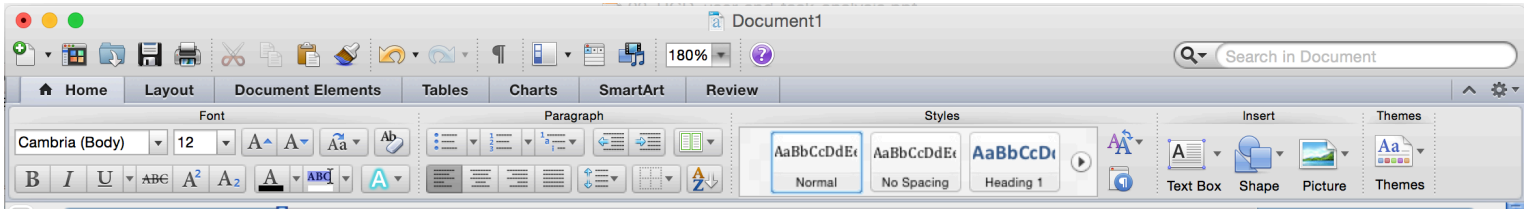
Quelle: http://mitschau.edu.lmu.de/video_online/vorlesungen/wise2006_2007/mensch_maschine/index.php

Task frequency

- Tradeoff between fast access and cluttered/crammed design
- Example toolbar:
  - The more functions are directly visible, the faster the access
  - However, the time to find them gets longer (at least initially)
  - More screen space is used up
    (trend: larger displays AND smaller displays)



Word 2000 (or so)



Word 2011 for Mac

Quelle: http://mitschau.edu.lmu.de/video_online/vorlesungen/wise2006_2007/mensch_maschine/index.php

How to gather information?

- Interviews
- Surveys
- Discussions
- Observations

➡ With these informations, **Personas** and **Tasks** can be described.

Task description (1)
Schema for task specification

- Pre-conditions for the task
  - *Example:* state of objects: to revise a document it must already exist
- Goals of the task
  - Can be expressed via status of objects
  - *Example:* generate a letter with the content that was just dictated to the secretary
- „Breakdowns“ in current workflows
  - What are problematic steps in the current system
  - Room for improvement in the new system
- Post-condition of the task
  - States of objects that were involved in the task
  - *Example:* after generating a letter, the author becomes the file owner

Task description (2)
Schema for task specification

- Definition of actors/agents
  - Classes of people that are involved in the task
  - Agents describe roles of users
  - *Example:* typist, manager
- Definition of objects
  - In the current and envisioned system
- Steps in task execution
  - Task decomposition in its elementary components
- Critical characteristics of the task
  - Important steps, even though if they might get automated in the new system