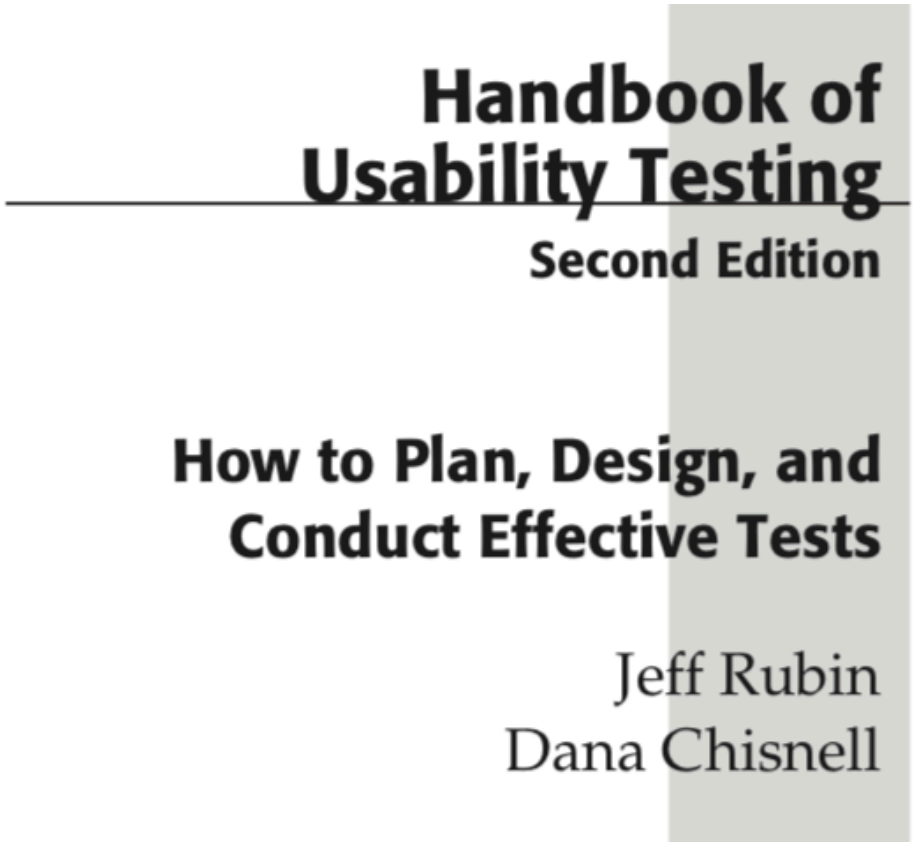
FEUP
Departamento de Engenharia Electrotécnica e de Computadores

Multimedia Systems - M.EEC057

- Principles and process towards the design of multimedia applications
- Princípios e processo para o projecto de aplicações multimédia

Additional reading

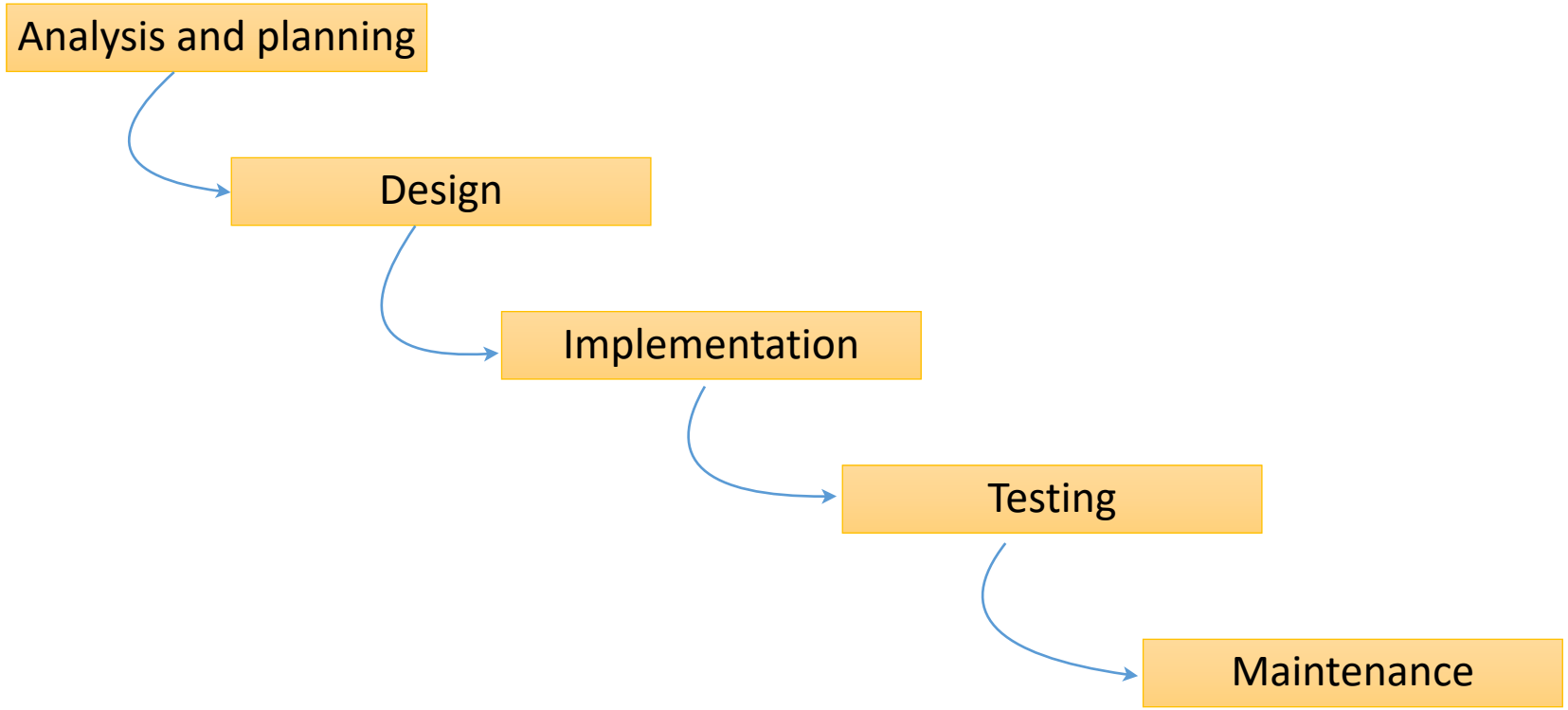


Approach to design interactive multimedia systems

- Iterative process
- User-centricity

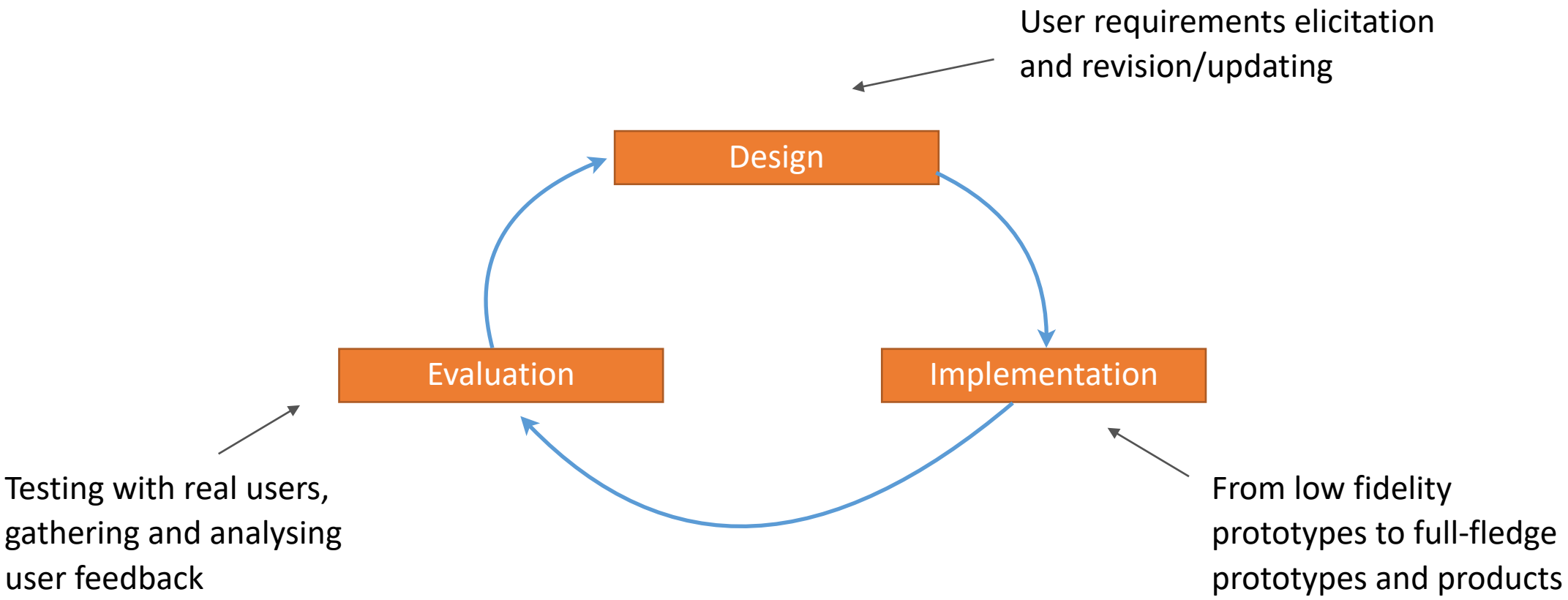
Iterative process

- In contrast to the "waterfall model"



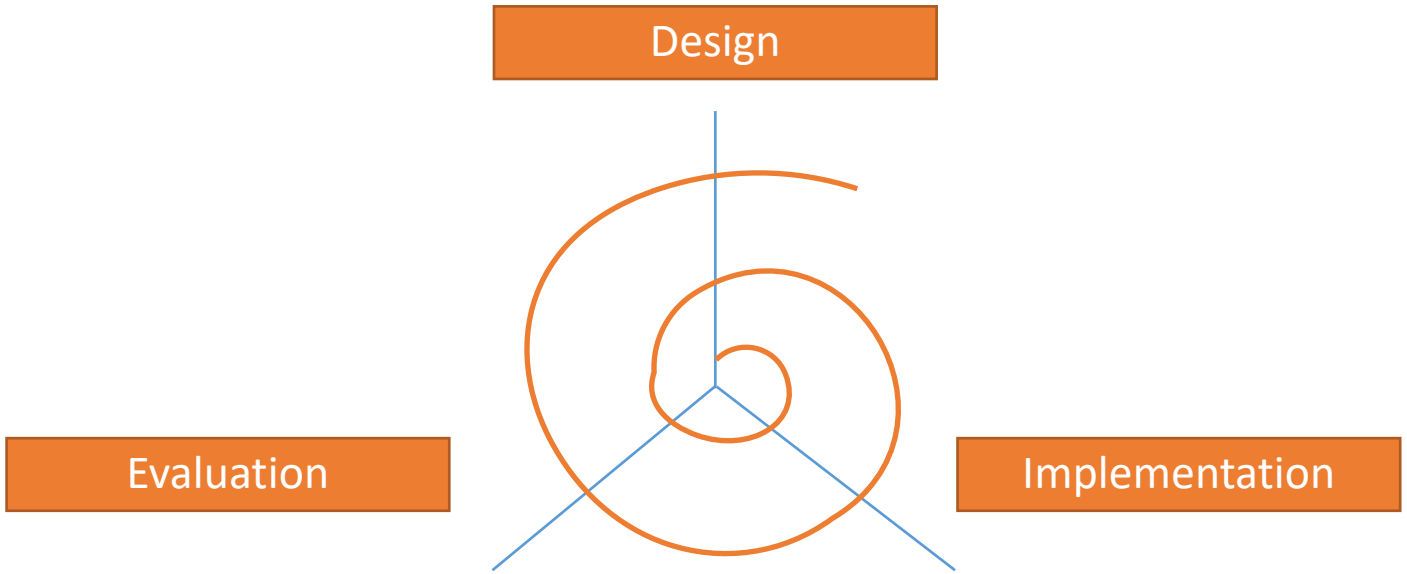
Iterative process (2)

- A circular model
  - crucial to this model: user involvement!



Iterative process (2)

- Spiral model with increase detail



Iterative process (3)

- Several iterations
  - accuracy/details and correctness increase in each iteration
- First iteration may be a sketch in paper
  - low fidelity (prototype) not necessarily looking as the application will look at the end
- Initial iterations may involve the use of multiple low fidelity prototypes
  - Ideating and testing multiple alternatives in parallel
  - Eventually, only one will survive and go onto more advanced iterations
- Higher number of iterations have better chances of delivering apps meeting users' expectations

User-centricity

- It is in today's realm of good design and development practices
  - from
    - *Science finds, Industry applies, Man conforms*
  - to
    - *People propose, Science studies, Technology conforms*

slogan of the World Fair Chicago in 1933, whose focus was on technological innovations

slogan of Donald Norman, one of the world's most influential designers

User-centred design

- The design of the application is based on the user
  - needs, abilities, context/situation, preferences, expectations
  - tasks will be conducted by the users
- Good principles for user-centred design
  - Use common knowledge and your own ideas
  - Simplify the structure of tasks
  - Make things visible (transparency)
  - Look for constraints
  - Identify potential barriers
  - Identify potential errors (troubleshooting)

Steps of a User-centred design

- User analysis
  - Know the users
    - problems, requirements and needs
    - Preferences and expectations
    - Limitations or constraints
- Task analysis
  - Clarify what the user will need to do with the application
    - the tasks

Steps of a User-centred design - user analysis

- Characteristics of the target user/population:
  - age, gender, ethnicity
  - Education
  - Physical abilities & limitations
  - General computer experience / IT skills
  - Domain experience
  - Application experience
  - Work environment and social context
  - Communication patterns

Steps of a User-centred design - user analysis (2)

- How to gather data?
  - using questionnaires
  - interviews
  - through observation
- Barriers
  - Availability of users
  - Time constraints
  - Different languages

Steps of a User-centred design - user analysis - gathering data

- Observation
  - Real environment versus controlled environment
    - Real life vs laboratory experiments (experiments!)
  - Passive versus active
    - "watch and hear" (and record) versus asking
  - Encourage the user to think aloud
  - Capture what the users say and do
  - Describe the observation to someone who has never witnessed the task

Steps of a User-centred design - user analysis - gathering data (2)

- Interviews
  - Structured
    - Follow an interview plan
      - specific
      - Efficient
      - Needs preparation
  - Non structured
    - Opentalk
      - Inefficient
  - Semi-structured
    - Start with a plan of questions and end up in an open talk
      - Balanced
      - Often appropriate
  - Record interviews

Steps of a User-centred design - user analysis - gathering data (3)

- Questionnaires
  - list of questions in the form of multiple-choice or ratings, to which participants reply individually
  - useful to obtain information about the viewpoints, values, behaviour and intentions of participants
  - In a quantitative approach, such questions are said to be closed-ended, so that no subjectivity is introduced whilst ensuring that all replies can be directly compared and used to arrive to results and asserting conclusions
  - In a qualitative approach, questions can be open-ended

Steps of a User-centred design - task analysis considerations

- Two situations may occur
  - the most probable one is that the new application will substitute existing application(s) overcoming identified problems/limitations
    - in this case, it is possible to observe how users currently operate or perform the actions towards the goal
  - or the new application is totally disruptive, addressing goals not yet covered by any existing application
    - no chance of watching how users perform

Steps of a User-centred design - task analysis

- What users do?
- Why they do it?
- How they do it?
- When they do it?
- What tools they use?

- The new application is likely to change the current procedure ("How?")
  - Many times the problem is precisely in the "how"
- Understanding "how" and "why" allows for a deeper knowledge about the tasks
  - knowing why the users do what they do can help in identifying alternatives "how's" that may solve the problem

Steps of a User-centred design - task analysis (2)

- Identify the individual tasks the system should perform
  - each task represents a goal (the "what")
- Top-down approach
  - start with the overall goal of the system and decompose it hierarchically into successively finer objectives
- Example:
  - Overall goal: self-service checkout
    - Tasks:
      - Register products
      - Pack
      - Pay

Steps of a User-centred design - task analysis (3)

- Start with defining the goal
  - overall, what is to be done?
- Then, identify whether there are (pre) conditionings
  - Is it necessary to do something before?
    - tasks on which the goal depends?
    - information the user needs to have?
- Finally, list the steps to be performed to accomplish the goal:
  - Tasks can be decomposed recursively in simpler, finer-grain detailed sub-tasks

Steps of a User-centred design - task analysis (4)

- Techniques for collecting information
  - direct observation of users performing tasks
  - interviews with users
  - contextual inquiry
  - participatory design
  - logging
- The first two are also used for user analysis

Steps of a User-centred design - task analysis (5)

- Contextual Inquiry
  - Combines interviewing and observation in the user's actual work environment, discussing actual work products
  - strong collaboration between the designers and the user
  - necessary to be concrete when asking questions and requesting some action from the user
  - sort of master-apprentice relationship
    - the User shows how and explains
    - the Interviewer watches, ask questions and registers

Steps of a User-centred design - task analysis (6)

- Participatory Design
  - when deciding how to present the tasks and how required steps should be performed, users are involved in the process
  - "the user is always right"
    - this holds true if the user has any kind of problem with the interface
      - even if for the developer is clear how steps are performed, if the user has problems then there must be something that is not that clear
    - however, it is not a good practice to simply ask the users what they want
      - alternatives must already be presented to the user
  - it is good practice to refresh the pool of involved users
    - users become less representative as they understand the proposed system structure

How to idealise a multimedia application? Practical steps …

An application is supposed to solve a problem/limitation, and to provide added-value to the current status

1. Start by identifying and clearly formulating the problem to solve
   - and the cause(s) of the problem
   - many time it goes by talking to users, making questionnaires, etc.
   - knowing the cause will provide useful guidelines for the next step!
2. Come up with ideas that could help solving the problem
   - even the more unrealistic ones, without trying to find out whether they are viable or not
     - give space to your imagination (think in the shower!)
   - write down your ideas
   - analyse them and pick-up THE idea
     - the more inspiring one, the one that looks more suitable

How to idealise a multimedia application? (2)

3. Talk to potential users
   - identify/analyse types of users (slide 11)
   - create *Personas*
     - *Personas* are fictitious users and may be created based on the performed user analysis
     - that represent and describe the target audience
4. Analyse the users' actions, i.e., how users operate and perform tasks (slides 17 and 18)

How to idealise a multimedia application? (3)

5. make a list of formal requirements

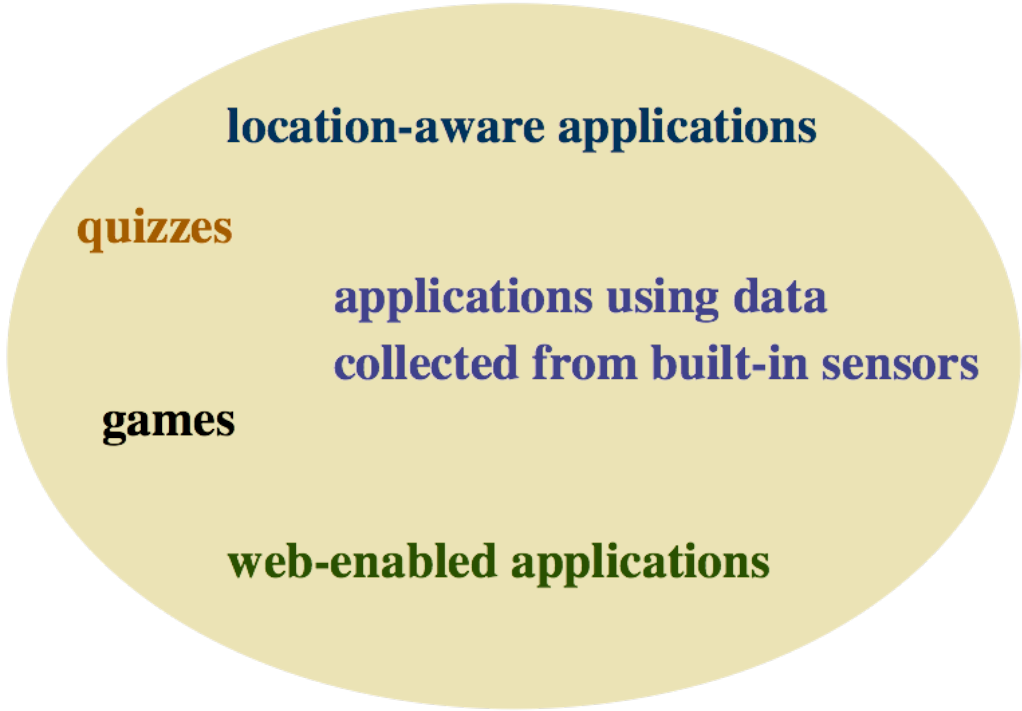
- What should the app offer to the user? What can the user do with the app? What results/outcomes should be provided?
  - e.g., user must be able to register and modify personal data
  - many times the list can be a set of statements from the user perspective:
    - "as a user I want to be able to be recognised by the system"
    - "as a user I want to be able to visualise and modify personal data"

How to idealise a multimedia application? (3)

6. sketch the interface of the app
   - Identifying functionality that will satisfy user requirements
     - e.g., a screen showing a button "register" and a following screen showing boxes to insert the user's credentials
     - another screen presenting a button "view and modify personal data"
     - …
7. Sketch a functional block diagram of the app
   - each block implements/offer some functionality
   - blocks interact with each other
     - pass information between them and/or to the user interface

Some reflections on functionality and modality in mobile environments

- using different types of media
  - text
  - images
  - graphics
  - sound
  - video
- Cloud storage
  - e.g., tables with data shared by users
- using built-in sensors
  - localisation
  - temperature
  - movement
- etc.



Some reflections on functionality and modality in mobile environments

- To be continued …

References

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