

Módulo 7

# **DESENHAR PARA A USABILIDADE**



# Exemplo...

The screenshot shows a web-based voting system interface. At the top, there's a navigation bar with links for 'OS MEUS PROCESSOS ELEITORAIS', 'DADOS PESSOAIS', 'MENSAGENS (8)', and 'HISTÓRICO'. The main content area is titled 'CONSULTA DAS REFERÊNCIAS DE VOTO' (Vote Reference Inquiry). It contains a text input field with the placeholder 'Insira a sua referência de voto e valide se o seu voto foi contabilizado.' (Insert your vote reference and validate if your vote was counted.) and a blue 'VALIDAR' (Validate) button with a magnifying glass icon. Below this, a section titled 'Lista de referências de voto' (List of vote references) displays a list of 16-digit alphanumeric strings, each preceded by a small blue square icon containing a white question mark. The strings are: 13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e76, 13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e<sup>23</sup>, 13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e<sup>67</sup>, and 13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e<sup>67</sup>.

# Exemplo...

The screenshot shows a web-based voting system interface. At the top, there's a navigation bar with links for 'OS MEUS PROCESSOS ELEITORAIS', 'DADOS PESSOAIS', 'MENSAGENS (8)', and 'HISTÓRICO'. The main content area is titled 'CONSULTA DAS REFERÊNCIAS DE VOTO' (Vote Reference Inquiry). It includes a note: 'Insira a sua referência de voto e valide se o seu voto foi contabilizado.' Below this is a search input field containing the reference code '13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e76' and a blue 'VALIDAR' (Validate) button with a magnifying glass icon. Below the search area, a section titled 'Lista de referências de voto' (List of vote references) displays four rows of reference codes, each ending with a superscripted character: '23', 'e7', and 'e7'. The reference codes are: '13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e76', '13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e<sup>23</sup>', '13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e<sup>e7</sup>', and '13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e<sup>e7</sup>'.

# Exemplo...

The image shows two screenshots of the e-votUM voting system interface. Both screenshots are identical, displaying the 'Consulta das referências de voto' (Vote Reference Inquiry) page.

The top navigation bar includes links for 'OS MEUS PROCESSOS ELEITORAIS', 'DADOS PESSOAIS', 'MENSAGENS (8)', and 'HISTÓRICO'. The user's name, 'José Francisco Grela da Freitas Campos', is displayed at the top right.

The main content area has a heading 'CONSULTA DAS REFERÊNCIAS DE VOTO' and a note: 'Insira a sua referência de voto e valide se o seu voto foi contabilizado.' Below this is an input field containing the reference code: '13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e76'. To the right of the input field is a blue button labeled 'VALIDAR' with a magnifying glass icon.

A large blue arrow points from the input field in the first screenshot to the same input field in the second screenshot, highlighting the comparison between the two instances.

The bottom section displays a table titled 'Lista de referências de voto' (List of vote references) with one row:

13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e <sup>23</sup>
--

The second screenshot shows the same interface and data, with the blue arrow pointing from the input field to the input field.

# Exemplo...

The image shows two screenshots of a web-based voting application. Both screenshots have a dark header bar with the University of Minho logo, the title 'e-votUM', and a user profile picture. The top header also includes tabs for 'OS MEUS PROCESSOS ELEITORAIS', 'DADOS PESSOAIS', 'MENSAGENS (8)', and 'HISTÓRICO'. The user's name 'JOSE Francisco Grescão Freitas Campos' is visible in the top right.

**Screenshot 1 (Left): Consulta das referências de voto**

This screenshot shows the 'CONSULTA DAS REFERÊNCIAS DE VOTO' section. It contains a text input field with the value '13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e76' and a blue 'VALIDAR' button with a magnifying glass icon. Below the input field, there is a message: 'Insira a sua referência de voto e valide se o seu voto foi contabilizado.' A large blue arrow points from the 'VALIDAR' button down to the validation result in the next screenshot.

**Screenshot 2 (Right): Resultado da validação**

This screenshot shows the validation result. It displays the same 'CONSULTA DAS REFERÊNCIAS DE VOTO' section with the same input field and 'VALIDAR' button. The validation message 'O seu voto foi contabilizado com sucesso!' (Your vote was successfully counted!) is prominently displayed in blue text. Below this message, the same vote reference '13d4d4b87661c8e7f2f83d74aced3f93a8ee63e4fb3236b6b96f4021e48a4e76' is listed.

# Designing for maximum usability

Diretrizes=> regras de design

## Guidelines

- generic design rules
- lower authority
- more general application

Padrões de design=> cap

## Design patterns

- capture and reuse design knowledge

## Principles of usability

- general understanding
- low authority
- high generality

## Maximum usability

Princípios de usabilidade=> geral co

+ genérico

## Standards

- specific design rules
- high authority
- limited application

Padrões/normas=> regras de de

+ específico

# Principles for usability

## Learnability

Existem três grandes grupos de principios genericos que tem a ver com facilidade de uso:

- the ease with which new users can begin effective interaction and achieve maximal performance

## Flexibility

Flexibilidade da interface, fazer coisas de multiplas formas é possivel adaptar ao utilizador.

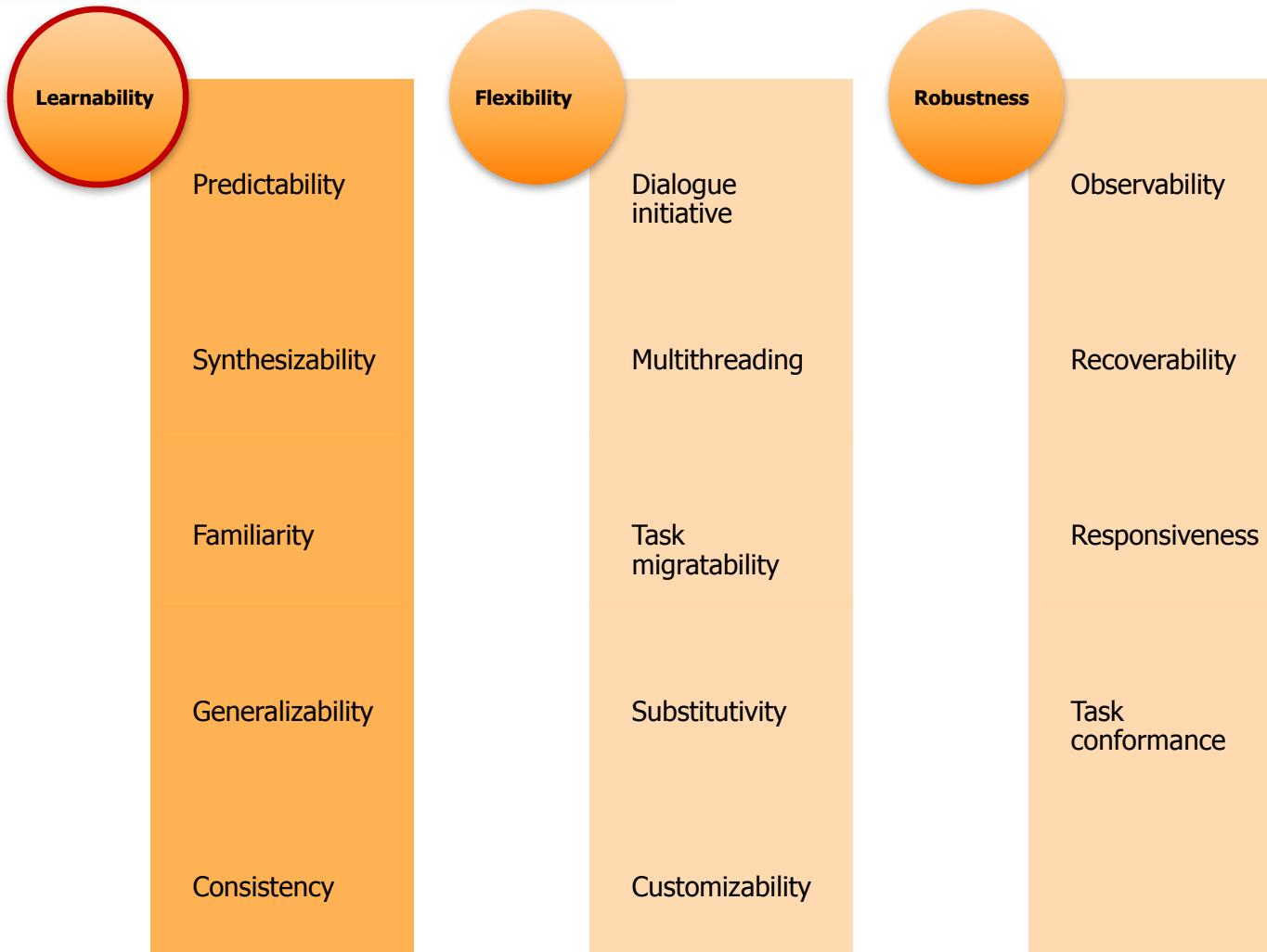
- the multiplicity of ways the user and system exchange information

## Robustness

Robustez significa que as pessoas conseguem fazer as coisas que pretendem.

- the level of support provided to the user in determining successful achievement and assessment of goal-directed behaviour

# Principles of usability



# Principles of learnability 1/5

## Predictability

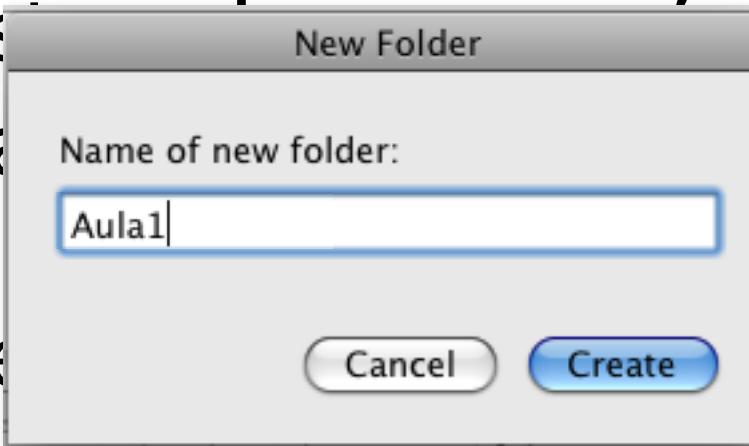
Ser previsível é mais fácil de aprender, é ser capaz de prever qual o

- Ability to determine the effect of actions on the system
- Non-determinism:
  - System view vs. user's view
  - Available information enough?
  - Ex.: Criar uma nova pasta no diálogo 'Save As...' (Mac)

# Principles of learnability 1/5

## Predictability

- Ability to determine the effect of actions on the system
- Non-determinism:

- Systematic approach
  - Available options
  - Examples
- 'Save' dialog box example:
- 
- view  
ough?  
no diálogo

# Principles of learnability 1/5

## Predictability

- Ability to determine the effect of actions on the system
- Non-determinism:

- System provides feedback
  - Available options
  - Examples
- 'Save' button
- 
- New Folder
- Name of new folder:  
Aula1
- Cancel Create
- New Folder
- Name of new folder:  
Aula1
- This name is already taken.
- Cancel Create

# Principles of learnability 1/5

## Predictability

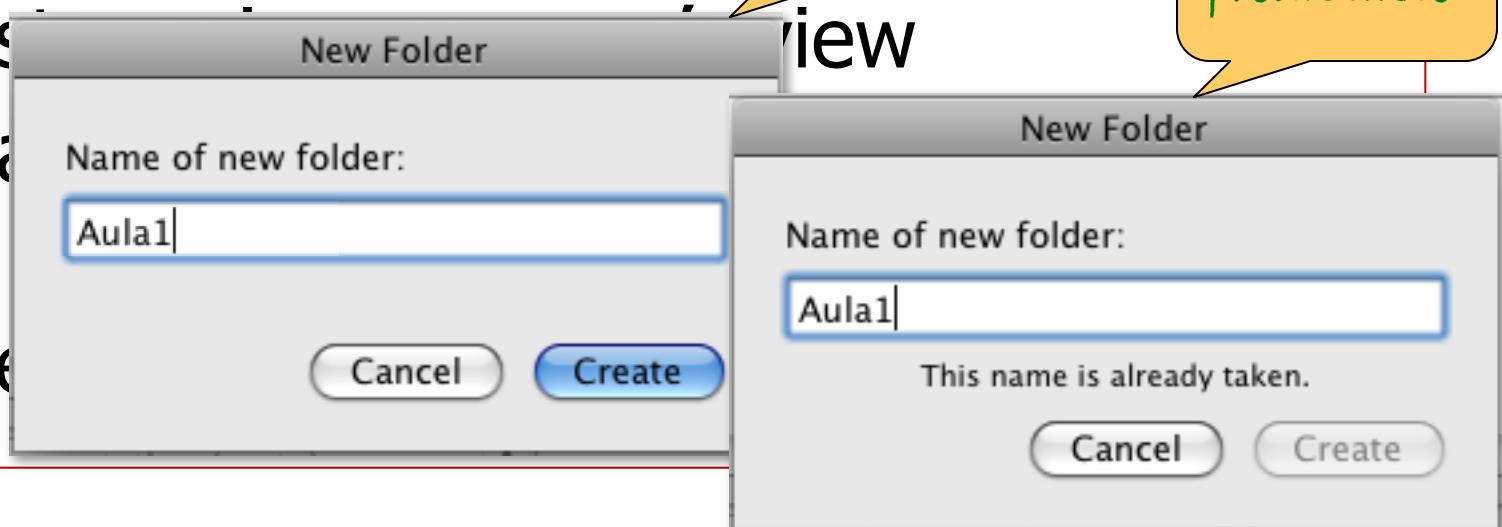
- Ability to determine the effect of actions on the system
- Non-determinism:

- System provides feedback

- Available options

- Ex.: 'Save' dialog

- 'Save' dialog



# Principles of learnability 2/5

## Synthesizability (of mental model)

- Assessing the effect of past actions on current state
- Honesty: ability of user interface to provide information about state changes
  - Immediate vs. Eventual honesty
- Ex.: Notificação de envio de SMS num telemóvel.

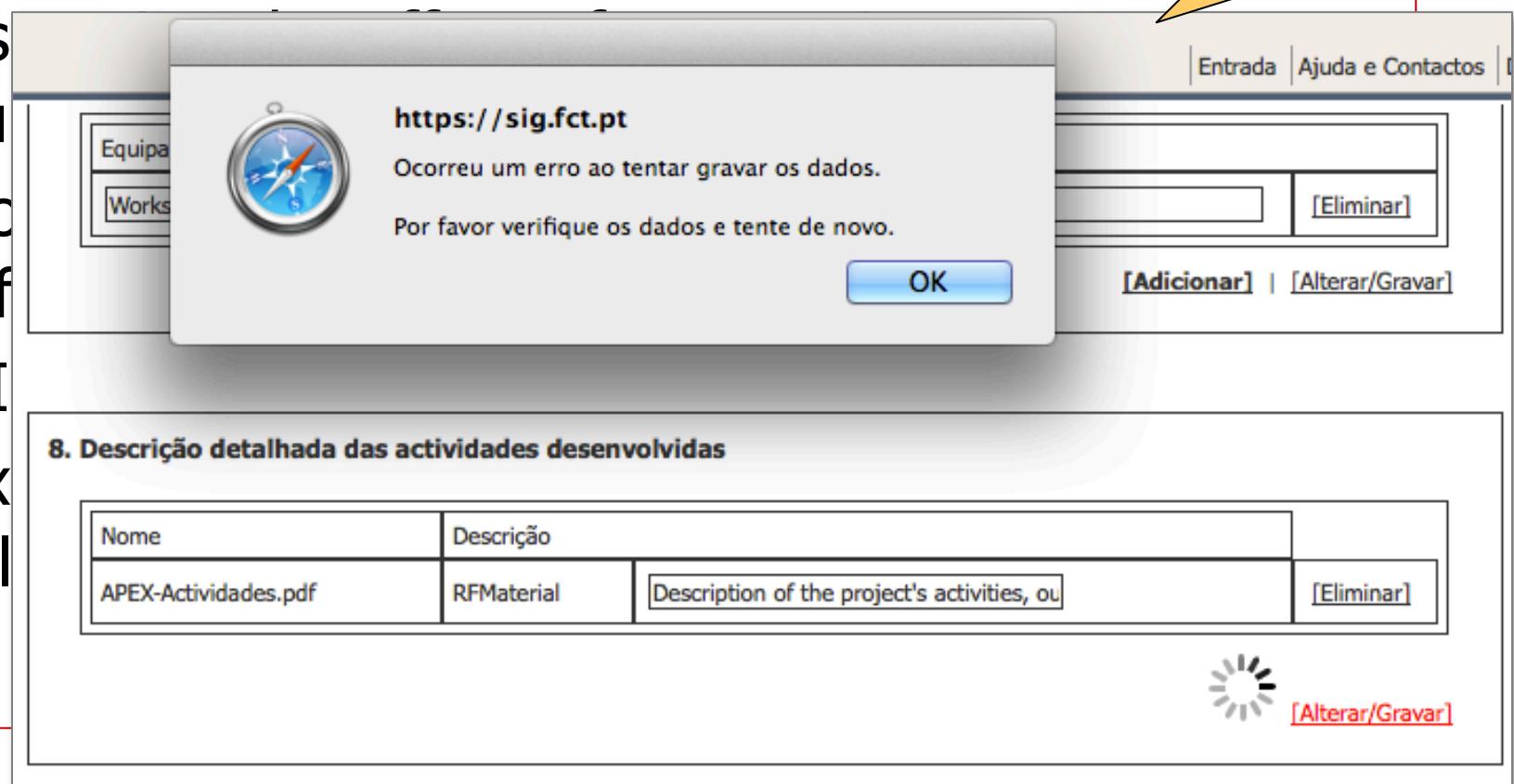
Ser possível sintetizar um modelo mental da interface, o que a aplicação faz; É p

# Principles of learnability 2/5

## Synthesizability (of mental mode)

negative example!

- Asks questions that can be answered by the user
- Has clear feedback information
- Is consistent with the user's mental model
- Extends the user's knowledge



# Principles of learnability 2/5

## Synthesizability (of mental mode)

negative example!

- Assessing the effect of past actions on current state
- How to infer information
- Implementation
- Example: telephone system

The screenshot shows a software interface with two main sections. The top section is a table for equipment management:

Equipamento	Nº Recibo	Data	Observações
Workstation Base Valor € 250.00 €	ID-005/2011	09-06-2011	[Empty]

Buttons at the bottom right of this section are [Adicionar] and [Alterar/Gravar].

The bottom section is a table for detailed activity descriptions:

Nome	Descrição
APEX-Actividades.pdf	RFMaterial Description of the activities, outputs and

At the bottom right of this section is a message in red: **Dados Gravados com sucesso!** [Alterar/Gravar].

# Principles of

Apresentar as coisas de uma maneira que as pessoas conheçam; Conseguir

## Familiarity

- How prior knowledge applies to a new system
  - about the world
  - about other systems
- Use of **metaphors** can help
- Examples:
  - Timetables
  - Lack of adoption of Open Source software?

Como o conhecimento prévio se apli

# Principles of learnability 3/5

## Familiarity

imprimir

Nome: José Francisco Creissac Freitas Campos 1076

30/03/2015 - 02/04/2015

	segunda-feira	terça-feira
14:00	Programação Orientada aos Objetos [EEUM_G - DI-1.04]	Sistemas Interactivos [EEUM_G - DI-0.05]
15:00	PL2	Sistemas Interactivos [EEUM_G - DI-0.05]
16:00		TP1
17:00		
18:00	Programação Orientada aos Objetos [EEUM_G - DI-0.11]	Programação Orientada aos Objetos [EEUM_G - DI-0.11]
19:00	PL6	PL5

more familiar

new system

less familiar

O meu Horário					
Disciplina	Dia da Semana	Ano Lectivo	Horas	Tipo aula	
530807 - Desenvolvimento de Sistemas Informação	ter	02/03	11h-13h	teórica	
530807 - Desenvolvimento de Sistemas Informação	ter	02/03	18h-20h	teórica-prática	
7008N8 - Desenvolvimento de Sistemas Informação	ter	02/03	11h-13h	teórica	
530405 - Paradigmas da Programação IV	qua	02/03	09h-11h	teórica-prática	
530405 - Paradigmas da Programação IV	qui	02/03	09h-11h	teórica-prática	
530405 - Paradigmas da Programação IV	qui	02/03	15h-17h	teórica-prática	
001011 - Interacção Humano-Computador	sab	02/03	11h-13h	teórica	

[Imprimir](#)

# Principles of learnability 4/5

## Generalizability

Uma coisa que se possa fazer num

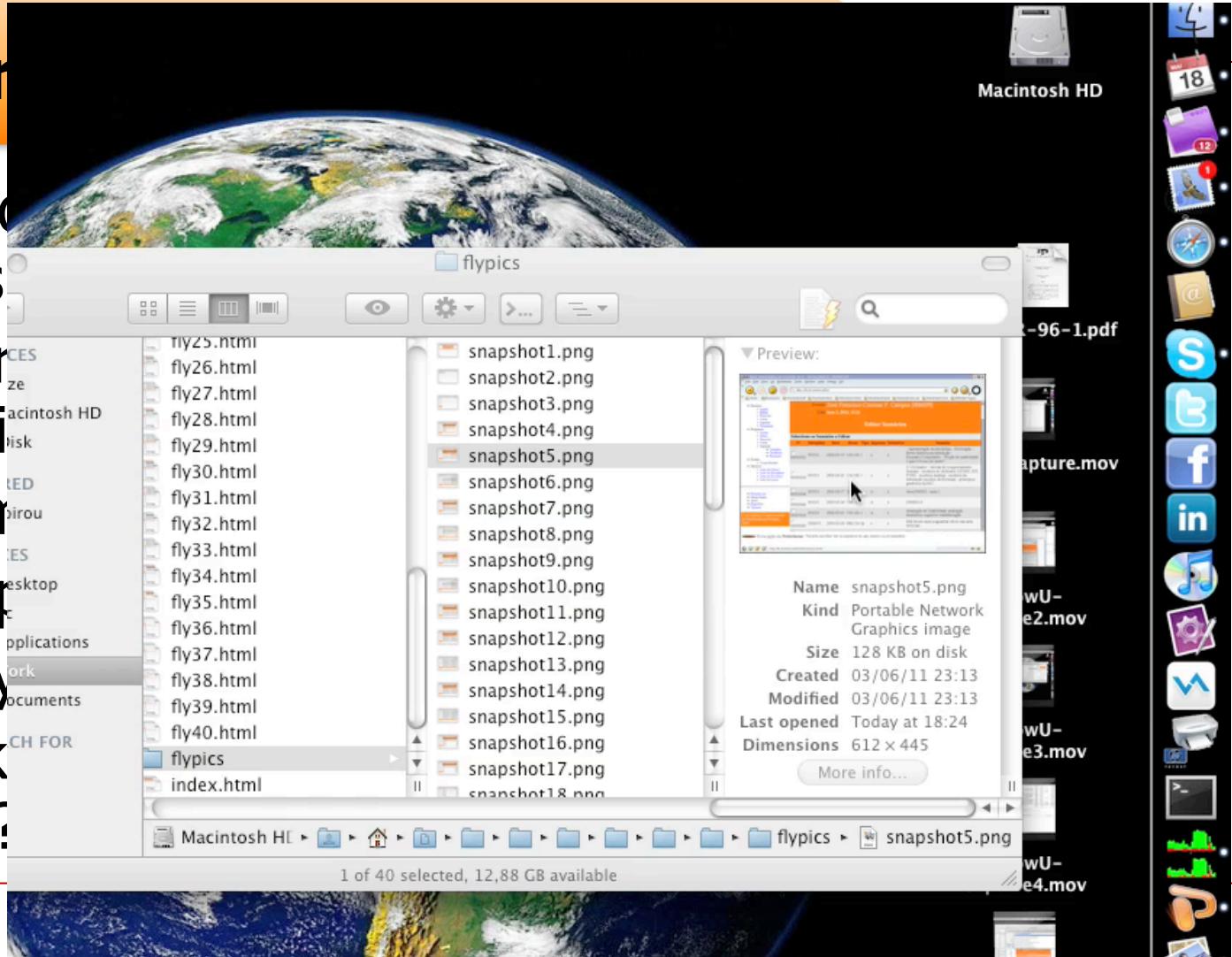
- Extending specific interaction knowledge to new situations
- Explores users' ability to compare similar situations
- A form of **consistency**
- Examples:
  - Copy&Paste services
  - Lack of Drag&Drop to Apps on some Mac OSs?

Estendendo conhecimento de interação específico

# Principles of learnability 4/5

## General

- Extended knowledge through new situations
- Exploration of situations
- A form of trial and error
- Examples:
  - Copying
  - Lack of OS support for OSs?



# Principles of learnability 5/5

## Consistency

O principio mais importante e mencionada; O comportamento

- Probably the **most mentioned principle!**
- Likeness in input/output behaviour in similar situations or task objectives
- Internal consistency
  - Inside the application
  - Example: Toyota AC
- External consistency
  - Between one application and the rest of the system
  - Example: Mac apps menu

Provavelmente o princípio mais mencionado! Se

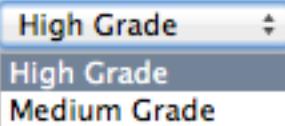
# Principles of learnability 5/5

## Consistency

- Probably the **most mentioned principle!**
- Likeness in input/output behaviour in similar situations or task objectives
- Internal consistency

*Lack of  
internal consistency!*

A seguinte caixa permite selecionar a força criptográfica da sua chave. Aconselhamos que selecione 1024 por ser a mais segura e, simultaneamente, não comprometer a compatibilidade com sistemas de correio dos destinatários com quem se vai corresponder.



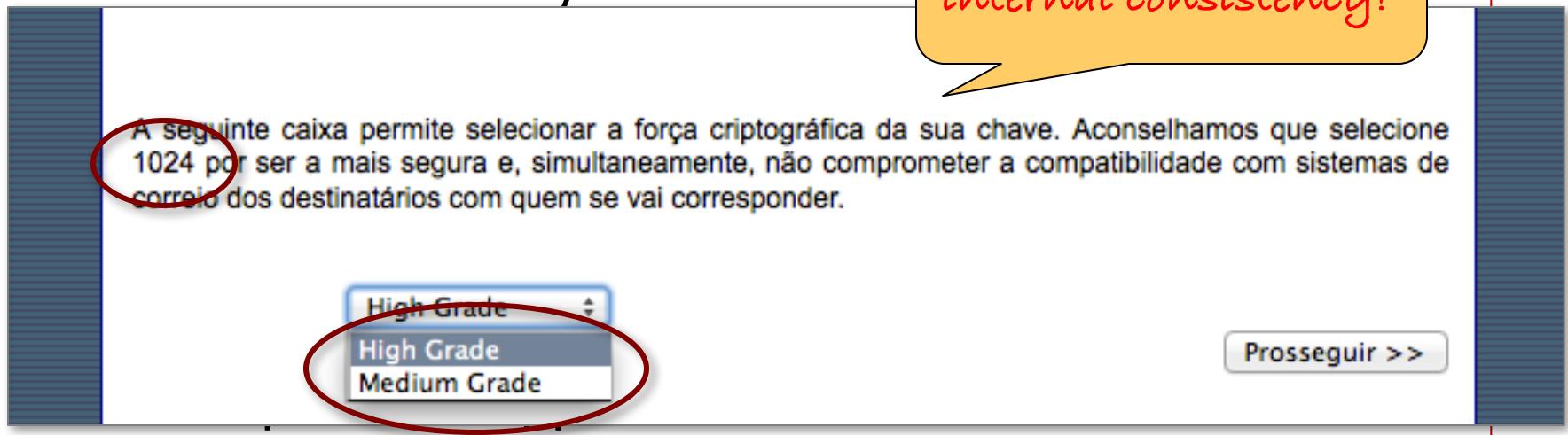
[Prosseguir >>](#)

# Principles of learnability 5/5

## Consistency

- Probably the **most mentioned principle!**
- Likeness in input/output behaviour in similar situations or task objectives
- Internal consistency

*Lack of  
internal consistency!*



# Principles of learnability 5/5

## Consistency

- Probably the **most mentioned principle!**
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  - Inside the application
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  - Example: Mac apps menu

Lack of  
internal consistency!  
(five identical buttons, five  
different behaviours)



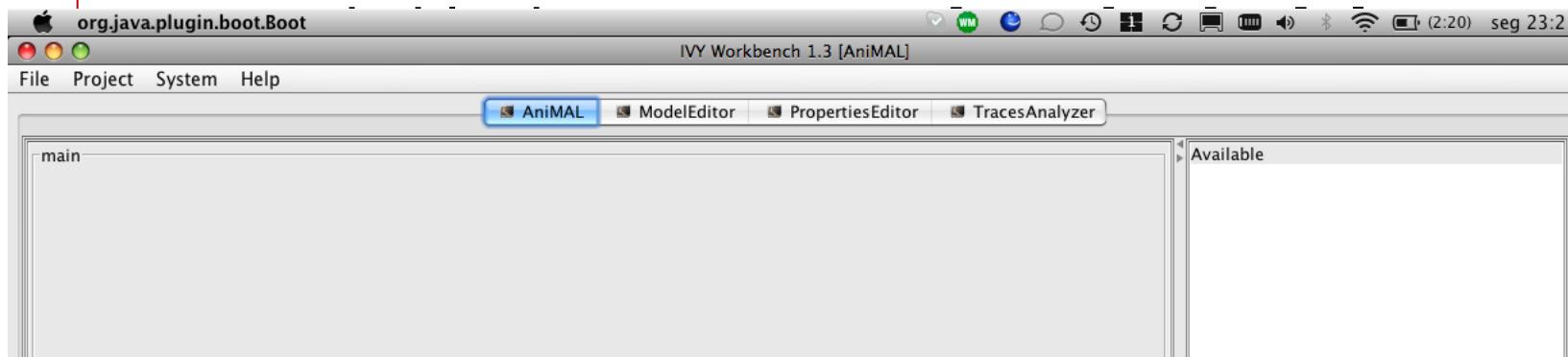
# Principles of learnability 5/5

## Consistency

- Probably the **most mentioned principle!**
- Likeness in input/output behaviour in similar situations or task objectives
- Internal consistency
  - Inside the application
  - Example: Toyota AC
- External consistency
  - Between one application and the rest of the system
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# Principles of learnability 5/5

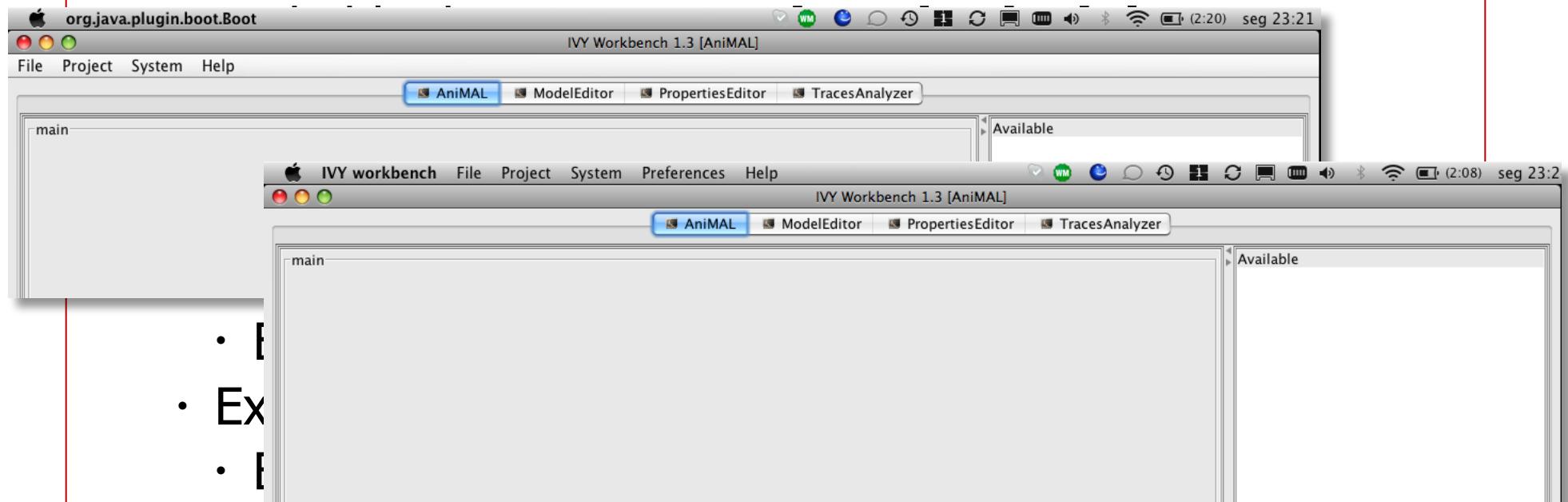
## Consistency



- Example: Toyota AC
- External consistency
  - Between one application and the rest of the system
  - Example: Mac apps menu

# Principles of learnability 5/5

## Consistency



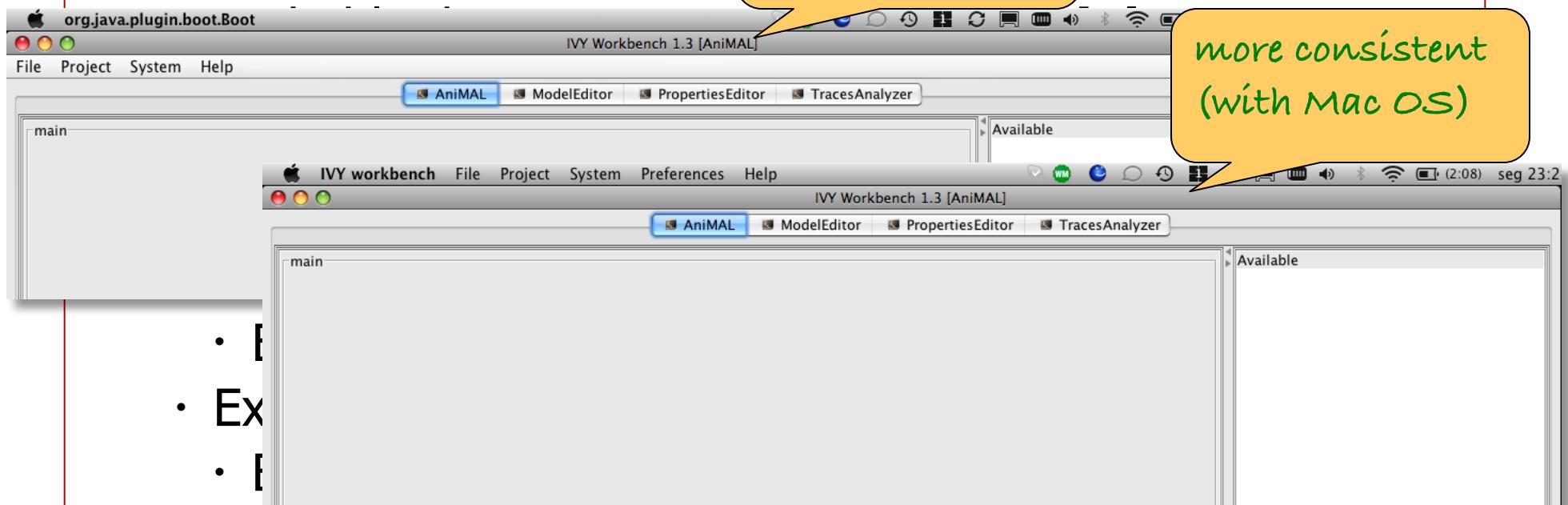
- Example
- Example
- Example
- Example: Mac apps menu

# Principles of learnability 5/5

## Consistency

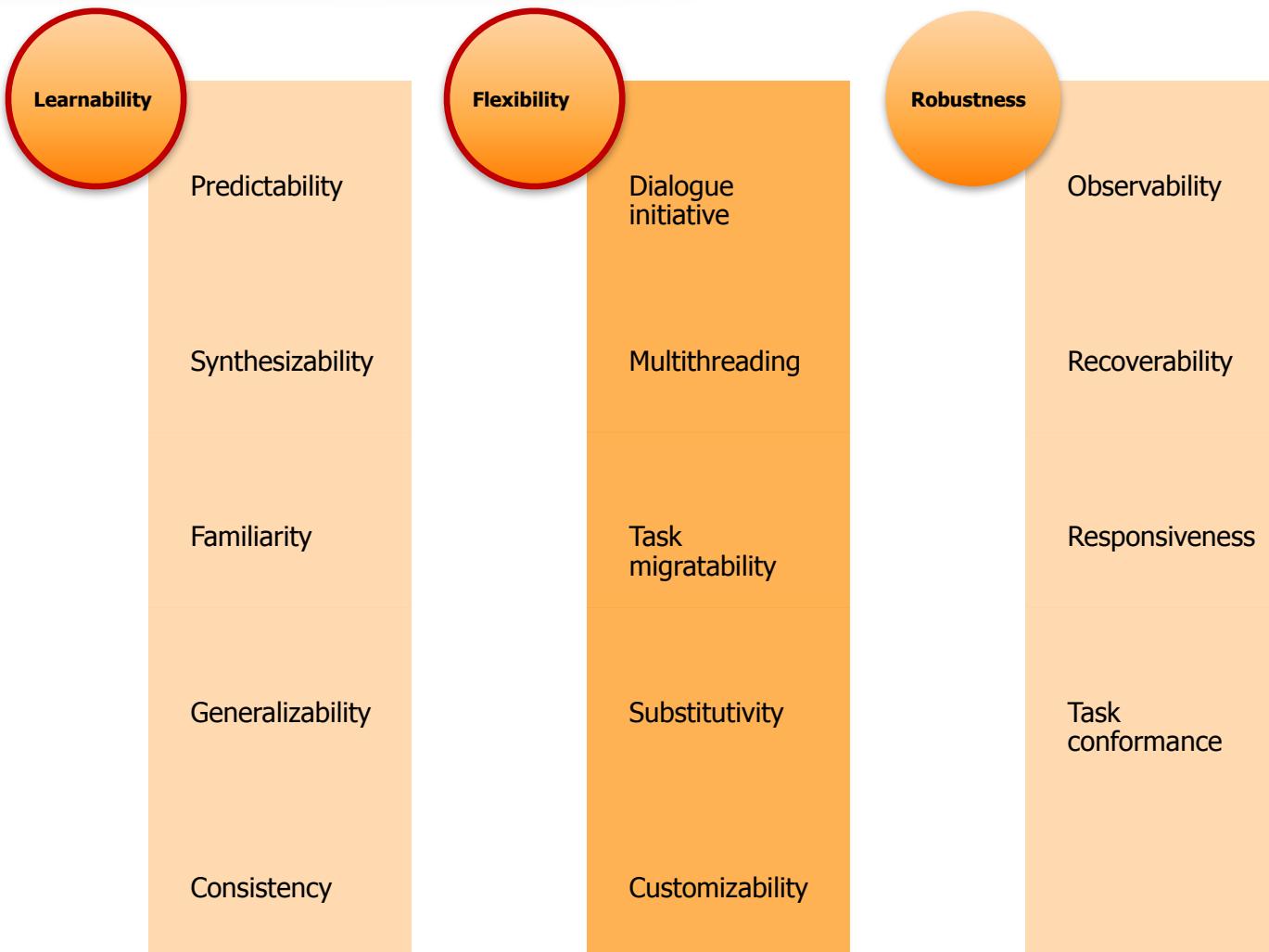
less consistent  
(with Mac OS)

more consistent  
(with Mac OS)



- [ ]
- Example
- [ ]
- system
- Example: Mac apps menu

# Principles of usability



# Principles of flexibility 1/5

## Dialogue initiative

- System control (less flexibility)
  - Ex.: modal dialogue; wizard; deep menu structures
- User control (more flexibility)
  - Ex.: toolboxes; navigating the web; direct manipulation
- Goal is to maximize user control(?!)
  - Sometimes we want/need to guide users...
  - Good knowledge of tasks will help create feeling of user control
- Ex. : making search available in input fields

Quem toma a iniciativa do dialogo, quem

# Principles of flexibility 1/5

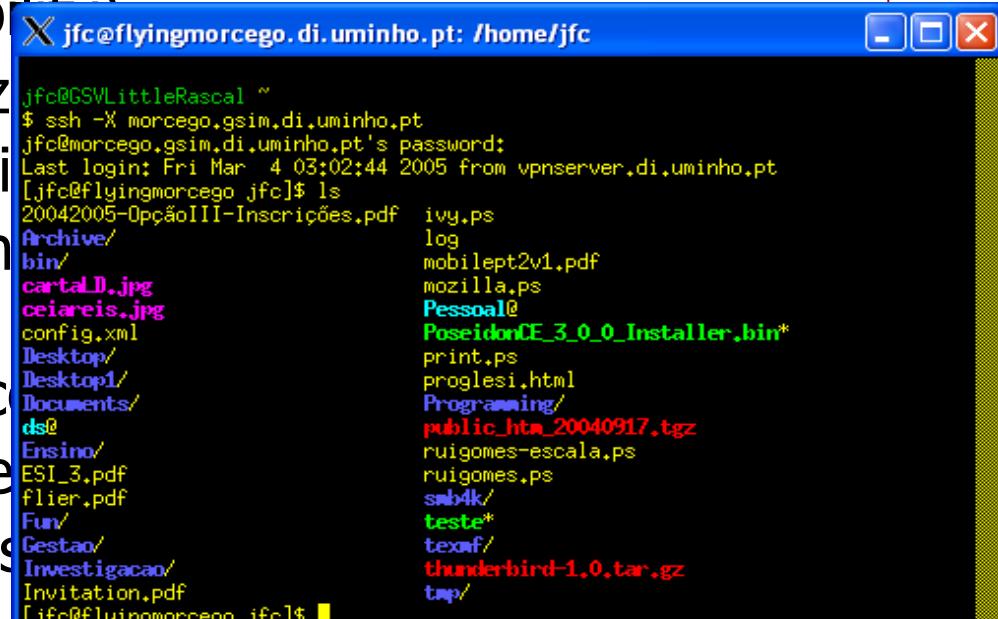
D

more system control  
(too much for most people!)

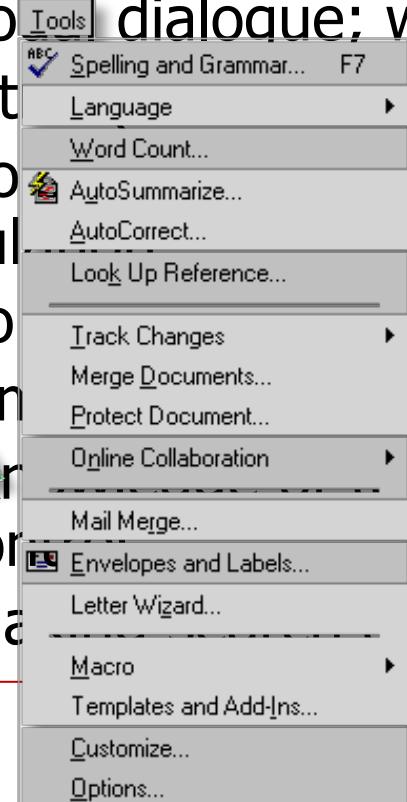
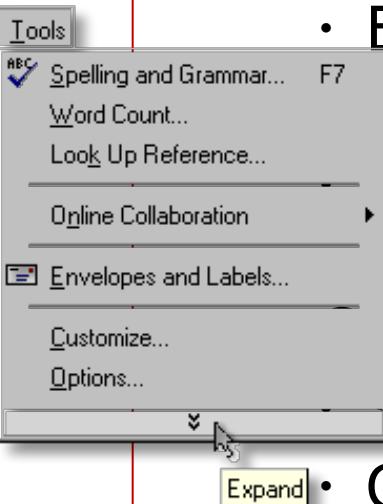
- Ex.: modal dialogue; wizard
- Ex.: too many controls
- Ex.: too much manipulation
- Ex.: modal dialogues; wizard is too much control
- Ex.: modal dialogues; wizard is too much control
- Good for user control
- Ex. : modal dialogues; wizard is too much control

more user control

(too much for some people?)



```
jfc@flyingmorcego.di.uminho.pt: /home/jfc
jfc@flyingmorcego ~
$ ssh -X morcego.gsim.di.uminho.pt
jfc@morcego.gsim.di.uminho.pt's password:
Last login: Fri Mar  4 03:02:44 2005 from vpnserver.di.uminho.pt
[jfc@flyingmorcego jfc]$ ls
20042005-OpcãoIII-Inscrições.pdf  ivy.ps
Archive/
bin/
cartalD.jpg
ceiareis.jpg
config.xml
Desktop/
Desktop1/
Documents/
ds@
Ensino/
ESI_3.pdf
flier.pdf
Fun/
Gestao/
Investigacao/
Invitation.pdf
[jfc@flyingmorcego jfc]$
```



available in input fields

# Principles of flexibility 2/5

Capacidade de fazer várias coisas ao

## Multithreading

- The ability of system to support user interaction for more than one task at a time
- Interleaved multithreading
  - Ex.: windowing system (input)
- Concurrent multithreading
  - Ex. 1: multimodality with fusion ("copy that to there")
  - Ex. 2: windowing system (output)

A capacidade do sistema de supor

Pr

Google Maps

https://maps.google.com

Work Read Later Import to Mendeley Cool Text: L...cs Generator Author Reviewer Apple YepShot Sapo Google Maps YouTube

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Sign in

Get directions My place

United States  
Not your current location

Put your business on Google Maps

Experience MapsGL

Maps Labs - Help

Google Maps - ©2013 Google - Terms of Use - Privacy

Imagery ©2013 TerraMetrics, Map data ©2013 Google, INEGI

Braga

Bragança Paulista - São Paulo, Brazil  
Braga, Portugal  
Bragaw Street, Anchorage, AK, United States  
Bragadiru, Ilfov, Romania  
Bragança - Para, Brazil

Map Traffic

A screenshot of a web browser displaying Google Maps. The search bar at the top contains the text 'Braga'. Below the search bar, a dropdown menu lists several locations: 'Bragança Paulista - São Paulo, Brazil', 'Braga, Portugal', 'Bragaw Street, Anchorage, AK, United States', 'Bragadiru, Ilfov, Romania', and 'Bragança - Para, Brazil'. To the left of the search bar, there's a sidebar for 'United States' with the message 'Not your current location' and a link to 'Put your business on Google Maps'. At the bottom left, there's a button for 'Experience MapsGL'. On the right side of the screen, a map of the United States and parts of Canada and Mexico is shown. A zoom control with '+' and '-' buttons is located on the left side of the map. The bottom of the map features labels for various states and countries, along with labels for the 'Gulf of California' and 'Gulf of Mexico'. A scale bar at the bottom indicates '500 mi' and '500 km'. The bottom of the page includes links for 'Maps Labs - Help' and 'Google Maps - ©2013 Google - Terms of Use - Privacy'. A red box highlights the sidebar area on the left.

Alocação de funções, responsabilidades

# Principles of flexibility 3/5

## Task migrability

Passando a responsabilidade do con

- Passing responsibility for task control between user and system
- A task can be internal to user, internal to system, or shared
  - Ex. 1: Spell checking of a text document
  - Ex. 2: Cruise control
  - Mudança de “modo” cria complicações

# Principles of flexibility 4

Permitindo que valores equivalentes sejam substituídos

## Substitutivity

- Allowing equivalent values to be substituted for each other (typically input)
  - Good alternative to error messages
  - Can minimize user errors and cognitive effort
- Representation multiplicity
  - Substitutivity also at the output
  - Ex.: Different views in a word processor
- Equal opportunity
  - Eliminating distinction between input and output
  - Ex.: input de datas; conversões

# Principles of flexibility 4/5

## Substitutivity

- Allowing equivalent values to be substituted for each other (typically input)
  - Good alternative to error messages
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  - Eliminating distinction between input and output
  - Ex.: input de datas; conversões

# Principles of flexibility 4/5

high substitutivity  
(in due date)

The image shows five instances of a software dialog box titled 'Action' for a task named 'Aulas : POO' in 'Mac' context. Each instance has different settings:

- Window 1 (Left):** Due: 2009/05/15 17:00
- Window 2:** Due: next friday
- Window 3:** Due: 1 week
- Window 4 (Bottom Left):** Shows a repeating schedule from May 18 to May 22, 2009, with a due date of 17:00. It includes a red box around the 'Repeat Every' section.
- Window 5 (Bottom Right):** Due: 1w

A yellow callout bubble in the top right corner contains the text "high substitutivity (in due date)".

- Ex.: input de datas; conver

# Principles of flexibility 4/5

## Substitutivity

- Allowing equivalent values to be substituted for each other (typically input)
  - Good alternative to error messages
  - Can minimize user errors and cognitive effort
- Representation multiplicity
  - Substitutivity also at the output
  - Ex.: Different views in a word processor
- Equal opportunity
  - Eliminating distinction between input and output
  - Ex.: input de datas; conversões

# Principles of flexibility 4/5

## Substitutivity

- Allowing equivalent values to be substituted for each other (typically input)
  - Good alternative to error messages
  - Can minimize user errors and cognitive effort
- Representation multiplicity
  - Substitutivity also at the output



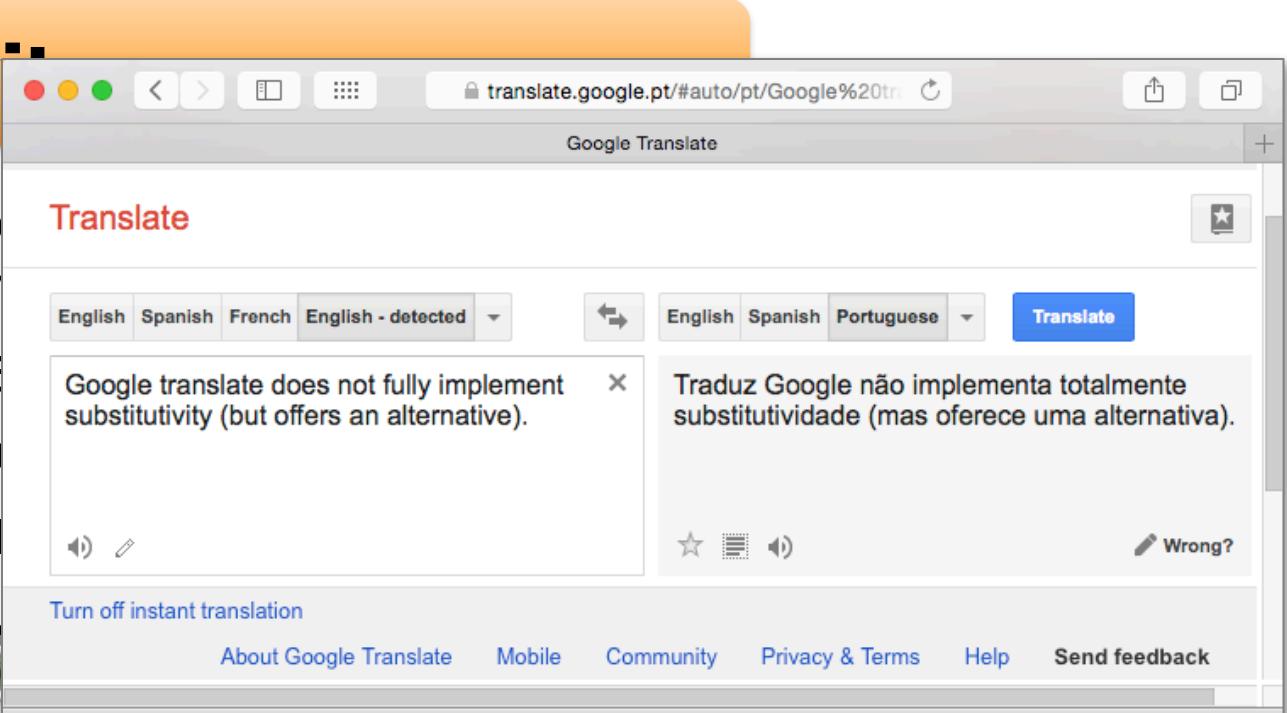
a word processor

between input and output  
conversões

# Principles of flexibility 4/5

## Substitutivity

- Allowing equivalent representations to each other (typical of AI)
- Good alternative to equivalence
- Can minimize search space
- Representation independence
- Substitutivity



between input and output  
representations

# Principles of flexibility 4/5

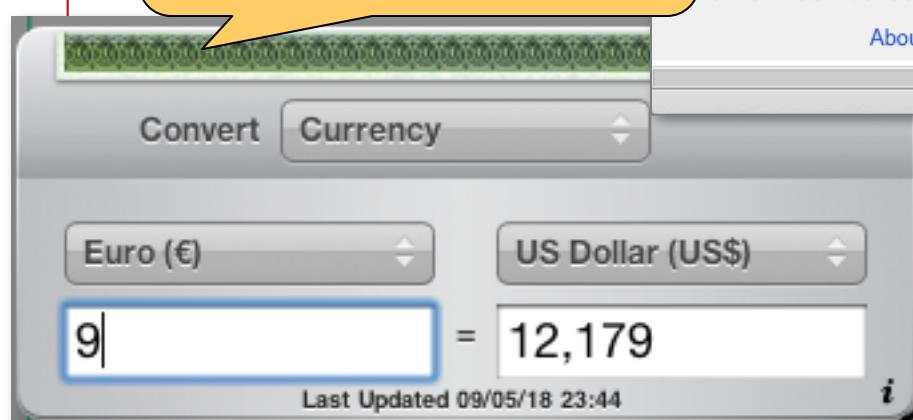
less substitutivity  
(no equal opportunity;  
alternative implemented)

## Substitutivity

- Allowing equivalent each other (typical)
- Good alternative

Can minimize

more substitutivity  
(equal opportunity)



between input and output  
conversões

# Principles of flexibility 5/

Possibilidade de mudar a interface, permitir q

## Customizability

- Modifiability of the user interface
- Adaptability (Adaptabilidade)
  - Modified by the user
  - Ex.: toolbars; user interface scripting
- Adaptivity (Adaptação)
  - Automatically modified by the system
  - Based on knowledge about the user – tricky!
    - Ex.: MS Windows™ adaptive menus
  - Based on knowledge about the device
    - Ex.: Responsive Web Design

Modificação da interface do utilizador

# Principles of flexibility 5/5

Adaptability  
(user changes the system)

# Customizability

- Modifiability of the system
  - Adaptability (Adaptation)

**Modifi** Language Word Count...

Ex.: to  
adaptiv

The screenshot shows the Microsoft Word ribbon with the 'Review' tab selected. A green arrow points to the 'Track Changes' option in the dropdown menu that appears when the 'Review' tab is clicked.

Based  
Mail Merge...  
Envelopes and Labels...  
Letter Wizard...  
Merge

A screenshot of the Microsoft Word ribbon. The 'View' tab is selected, showing its options. The 'Macro' option is highlighted with a blue selection bar.

Adaptivity  
(system changes  
itself)



The screenshot shows the homepage of the Portuguese news website Público.pt. At the top, there's a navigation bar with links like 'EDIÇÃO IMPRESSA', 'LOJA', 'IMOBILIÁRIO', 'SERVIÇOS', 'CLASSIFICADOS', 'Iniciar sessão', and 'Registar'. A search bar is also present. Below the header, there's a main news article titled 'Julgamento de activistas angolanos chega ao fim com nova acusação' with a photo of people holding portraits. To the right, there's an advertisement for 'COMBOS DE PORTUGAL' with a green background, featuring the text 'LISBOA - PORTO IC 2ª classe por apenas 9,50€' and 'COMPRA ANTECIPADA'.

adaptivity  
(to the device)

interface  
(e)

Modified by the user

- Ex.: toolbars; user interface scripting
- Adaptivity (Adaptação)
  - Automatically modified by the system
  - Based on knowledge about the user – tricky!
    - Ex.: MS Windows™ adaptive menus
  - Based on knowledge about the device
    - Ex.: Responsive Web Design

The screenshot shows the desktop version of the Público.pt website. At the top, there's a navigation bar with links like 'EDIÇÃO IMPRESSA', 'LOJA', 'IMOBILIÁRIO', 'SERVIÇOS', 'CLASSIFICADOS', 'Facebook' (973,968 likes), 'Iniciar sessão', and 'Registar'. Below the navigation is a main menu with categories: PORTUGAL, ECONOMIA, MUNDO, CULTURA-ÍPSILON, DESPORTO, CIÉNCIA, TECNOLOGIA, OPINIÃO, MULTIMÉDIA, and MAIS. The main content area features a large headline: 'Julgamento de activistas angolanos chega ao fim com nova acusação'. To the right of the headline is a green sidebar with the CP logo and the text 'COMBOS DE PORTUGAL'.

adaptivity  
(to the device)

This screenshot shows the mobile version of the Público.pt website. The layout is more compact, with the main article content appearing below the header. The headline 'Julgamento de activistas angolanos chega ao fim com nova acusação' is present, along with a small image of people holding up portraits and some text from the author.

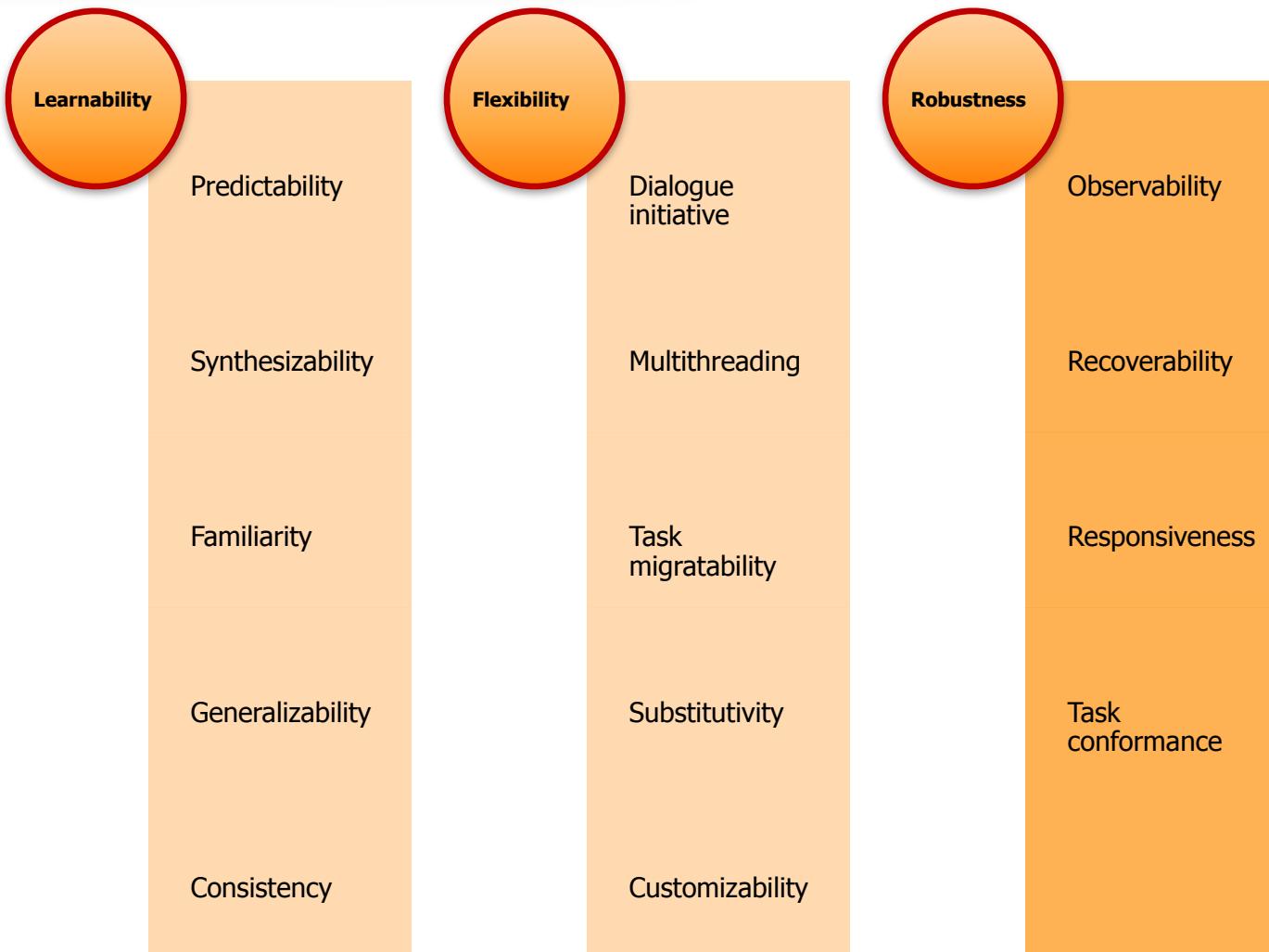
- Basic
- Examples
- Basic
- Ex.: Responsive Web

This screenshot shows the tablet version of the Público.pt website. The layout is larger than the mobile version but smaller than the desktop version, providing a better experience for devices in between.

This screenshot shows a different article on the Público.pt website. The headline is 'Particulares fogem do risco dos fundos e apostam em certificados e depósitos'. It includes a small icon of a money bag with a euro symbol.

This screenshot shows the mobile version of the Público.pt website displaying the same article about individuals avoiding risks in funds. The layout is adapted to fit the screen size.

# Principles of usability



# Principles of robustness

O sistema ser observável, o utilizador deve:

Capacidade do utilizador avaliar o estado interno do sistema de sua representação

## Observability

- Ability of user to evaluate the internal state of the system from its perceivable representation – c.f. Predictability
- Five aspects
  - browsability – possibility of user to explore current state (limited screen real-estate)
  - defaults – static vs. dynamic; passive recall
  - reachability – possibility of user to navigate observable states
  - persistence – sound vs. icon for notifications
  - operation visibility – what can be done is clear
- Ex.: Showing available slots on a Timetabling system

# Principles of robustness 1/4

## Observability

- Ability of user to evaluate the information from its perceivable representation
- Five aspects
  - browsability – possibility of users navigating through the system (limited screen real-estate)
  - defaults – static vs. dynamic;
  - reachability – possibility of users interacting with the system states
  - persistence – sound vs. icon for notifications
  - operation visibility – what can be done is clear
- Ex.: Showing available slots on a Timetabling system



# Principles of robustness 1/4

## Observability

- Ability of users to understand what is happening from its perspective
- Five aspects of observability:
  - browsability – how easy it is to find information (limited screen space)
  - defaults – what is the system's state when it starts up
  - reachability – what states can be reached from what states
  - persistence – sound vs. icon for each item
  - operation visibility – what can be done to each item
- Ex.: Showing available slots on a timetabling system

	Prototipagem	Soares Dias .		2016
Trabalho	Aula 4 - Análise de Tarefas	Ana Luisa da Cruz Pinheiro Coutinho .	15 de Março de 2016 17:04:01 ATRASADO	11 de Março de 2016
Trabalho	Aula 5 - Prototipagem	João Paulo Rodrigues Mano da Silva .	15 de Março de 2016 17:05:56	15 de Março de 2016
Trabalho	Aula 5 - Prototipagem	Jose Luis enes Ribeiro .	15 de Março de 2016 20:48:33 ATRASADO	
Trabalho	Aula 5 - Prototipagem	Sérgio Manuel Pereira Simões .	15 de Março de 2016 21:23:30 ATRASADO	2016

browsability

observability

flexibility/  
customizability

# Principles of robustness 1/4

Obs:

- Ability to recover from errors
- Five levels of robustness
- breaking (links)
- defining
- reading state
- persistency
- operation
- Example: ...

The screenshot shows a web-based application for managing student marks. At the top, there's a navigation bar with links for Pesquisar Contactos, Braga, weather forecasts for Hoje (8-16), Amanhã (10-14), and Sábado (12-13), and menu items for ÁREA PESSOAL, ÁREA DE TRABALHO, QUALIDADE, RELATÓRIOS, and SAIR.

The main content area has a header 'INTRANET - UMINHO' with a logo. Below it, there are tabs for ENSINO & ID, INFORMAÇÃO PROFISSIONAL, VIDA NOS CAMPUS, COMUNICAÇÃO, and SUGESTÕES & RECLAMAÇÕES.

A green banner at the top of the main content area says 'O ficheiro foi importado com sucesso' (The file was imported successfully) and 'Para gravar as classificações importadas, por favor, clique no botão "gravar pauta"' (To save the imported grades, please click the "save grade sheet" button).

The main table displays student information and their marks. The columns include Número (Number), Aluno (Student), Reg (Grade), Classificação (Classification), and a column for individual marks. The table shows the following data:

Número	Aluno	Reg	Classificação	
60988	Agostinho Abilio Cardoso Fernandes	ORD	R	
38620	Alexandre Filipe Vilaça Fernandes	ORD	F	
64307	André David Gomes Monteiro oliveira	ORD	13	
64322	André Diogo Ribeiro Assunção Pereira	ORD	12	
57758	André Fafe Fernandes Ferreira de Melo	ORD	F	
61018	André Sá Silva	ORD	13	
42949	António Carlos de Almeida Brandão Capelo	T-E	18	
19671	António César Monteiro da Silva	ORD	F	

A yellow callout bubble on the right side of the table contains the text 'how to save marks? lack of operation visibility'.

# Principles of robustness 1/4

Obs:

- Ability to recover from errors
- Five levels of robustness
- breaking (links)
- defining
- reading state
- persistency
- operation
- Example: ...

The screenshot shows a web interface for managing student grades. At the top, there's a navigation bar with links for Pesquisar Contactos, Braga, weather forecasts for Hoje (8-16), Amanhã (10-14), and Sábado (12-13), and menu items like ÁREA PESSOAL, ÁREA DE TRABALHO, QUALIDADE, RELATÓRIOS, and SAIR. Below the navigation is the INTRANET - UMINHO logo and a menu with ENSINO & ID, INFORMAÇÃO PROFISSIONAL, VIDA NOS CAMPUS, COMUNICAÇÃO, and SUGESTÕES & RECLAMAÇÕES.

The main content area is titled "AS MINHAS PAUTAS". It shows a message: "O ficheiro foi importado com sucesso. Para gravar as classificações importadas, por favor, clique no botão "gravar pauta".

The table lists student grades for the 2013/2014 academic year, January/February period, under Normal Grade. The columns are: Número (Number), Aluno (Student), Reg (Grade), Classificação (Classification), and a column for individual marks. A yellow callout bubble with red text points to the right side of the table, containing the text: "how to save marks? lack of operation visibility".

Número	Aluno	Reg	Classificação	
60988	Agostinho Abilio Cardoso Fernandes	ORD	R	
38620	Alexandre Filipe Vilaça Fernandes	ORD	F	
64307	André David Gomes Monteiro oliveira	ORD	13	
64322	André Diogo Ribeiro Assunção Pereira	ORD	12	
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# Principles of robustness 1/4

## Obs

- Ability to handle missing values from the database
- Five ways to handle missing values
- breaking ties (linear order)
- dealing with outliers
- readability of results
- stability of results
- performance
- options
- Examples

57779	Sérgio Manuel Rodrigues Caldas	T-E	11
57799	Tarcísio Júnio Lima Malheiro	ORD	10
60030	Tiago Alexandre Rocha Gomes Miranda da Silva	MEL	14
64352	Tiago Fernando dos Santos Braga Fernandes	ORD	13
54713	Tiago Filipe Alves Fonseca da Silva Augusto	T-E	R
55171	Tiago João Ferreira da Conceição	ORD	15
64346	Tiago Luís Santos Loureiro	ORD	14
64381	Tiago Manuel da Silva Santos	ORD	12
61083	Tiago Manuel Monteiro Ferreira de oliveira	ORD	R

how to save marks?

PREENCHIMENTO AUTOMÁTICO  
PREENCHER AS CLASSIFICAÇÕES RESTANTES COM O VALOR SELECIONADO

classificação

EXPORTAÇÃO E IMPORTAÇÃO  
PARA A IMPORTAÇÃO DO FICHEIRO, TERÁ QUE MANTER A EXTENSÃO .CSV

O ficheiro foi importado com sucesso

ficheiro  no file selected

LEGENDA

10 a 20 valores

D Desistiu

F Faltou

NA Não Admitido

R Reprovado

SF Sem Frequência

# Principles of robustness 1/4

## Obs

- Ability to handle errors from user input
- Five principles of robustness
- breaking down (linear)
- detection
- readability
- state
- persistence
- openness
- Example:

57779	Sérgio Manuel Rodrigues Caldas	T-E	11
57799	Tarcísio Júnio Lima Malheiro	ORD	10
60030	Tiago Alexandre Rocha Gomes Miranda da Silva	MEL	14
64352	Tiago Fernando dos Santos Braga Fernandes	ORD	13
54713	Tiago Filipe Alves Fonseca da Silva Augusto	T-E	R
55171	Tiago João Ferreira da Conceição	ORD	15
64346	Tiago Luís Santos Loureiro	ORD	14
64381	Tiago Manuel da Silva Santos	ORD	12
61083	Tiago Manuel Monteiro Ferreira de oliveira	ORD	R

how to save marks?

PREENCHIMENTO AUTOMÁTICO  
PREENCHER AS CLASSIFICAÇÕES RESTANTES COM O VALOR SELECIONADO

classificação

EXPORTAÇÃO E IMPORTAÇÃO  
PARA A IMPORTAÇÃO DO FICHEIRO, TERÁ QUE MANTER A EXTENSÃO .CSV

O ficheiro foi importado com sucesso

ficheiro  no file selected

LEGENDA

10 a 20 valores

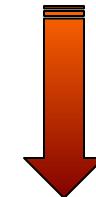
D Desistiu

F Faltou

NA Não Admitido

R Reprovado

SF Sem Frequência



# Principles of robustness 1/4

## Observability

- Ability to observe what's happening from outside the system
- Five types of observability:
  - breaking down (line by line)
  - defining what's important
  - reading state
  - reading status
  - performance
  - operations
- Ex.: System status

The screenshot shows a software application window with several functional areas:

- PREENCHIMENTO AUTOMÁTICO:** A section for automatically filling remaining fields based on selected values. It includes a dropdown menu labeled "classificação" with the placeholder "escolha uma opção" and a "PREENCHER" button.
- EXPORTAÇÃO E IMPORTAÇÃO:** A section for exporting and importing data. It shows a green success message "O ficheiro foi importado com sucesso", a "ficheiro" input field with "Choose File" and "no file selected", and "EXPORTAR" and "IMPORTAR" buttons.
- LEGENDA:** A legend table mapping codes to descriptions:

Código	Descrição
10 a 20 valores	
D Desistiu	
F Faltou	
NA Não Admitido	
R Reprovado	
SF Sem Frequência	
- GRAVAR:** A "GRAVAR" button located at the bottom right of the main area.

A large orange speech bubble on the right side contains the text: "Lack of observability (operation visibility)".

At the bottom of the screen, there are logos for COMPETE, QREN, and the European Union, along with the text "COPRIGHT 2013 UNIVERSIDADE DO MINHO".

# Principles of robustness

Ser possível ou tomar ações corretivas, o mais comu

## Recoverability

- The ability of users to take corrective action
- Forward recovery (e.g. when error cannot be undone)
  - accepting error state and working from there
- Ex.: input validation
- Backward recovery
  - **undo** to return to previous state
- Commensurate effort
  - Hard to undo effects should be hard to do
  - Easy to undo effect should be easy to do
- Ex.: Trash can
  - easier to undo delete means no delete confirmation needed
  - emptying the trash can cannot be undone so confirmation should be requested

A capacidade dos utilizadores de toma

# Principles of robustness 2/4

## Recoverability

- The ability of users to take corrective action
- Forward recovery
- actions
- Example
- Backward recovery
- user interface
- Command-line interface
- Help system
- Error messages
- Examples

The screenshot shows a web application interface with a modal dialog and a table.

**Forward recovery:** A modal dialog box displays an error message: "https://sig.fct.pt" followed by "Ocorreu um erro ao tentar gravar os dados. Por favor verifique os dados e tente de novo." with "OK" and "[Adicionar] | [Alterar/Gravar]" buttons. A yellow speech bubble points to the "OK" button with the text "forward recovery".

**Backward recovery:** Below the modal, a table titled "8. Descrição detalhada das actividades desenvolvidas" contains two rows. The first row has columns "Nome" and "Descrição". The second row has columns "Nome", "Descrição", and "[Eliminar]". A yellow speech bubble points to the second row with the text "backward recovery".

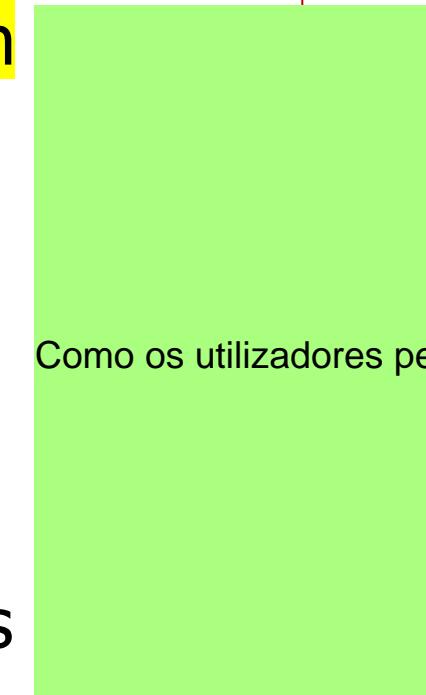
At the bottom left, there are buttons: "Date updated", "UNDO", and "HIDE". At the bottom right, there is a circular progress icon and "[Alterar/Gravar]".

# Principles of robustness

Velocidade a que o sistema consegue responder, é a

## Responsiveness

- How users perceive rate of communication with the system
- Short or instantaneous response times
  - From the user perspective
  - When not possible, provide indication of activity
- Stability of response times also relevant
  - Ex. Menus response times vs motor skills

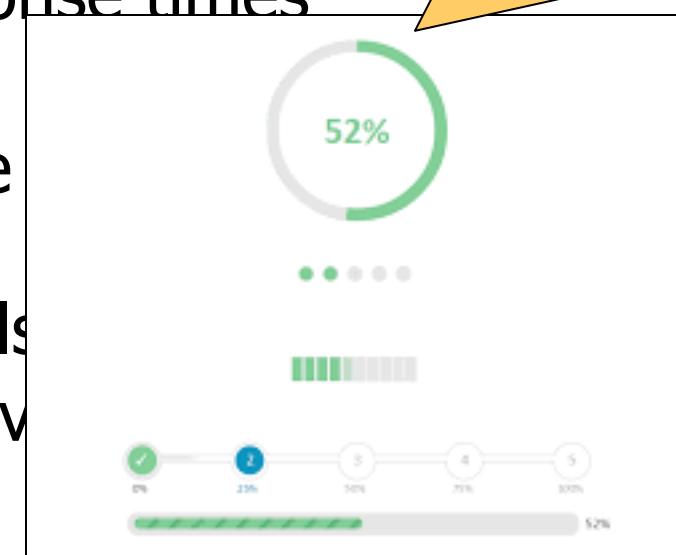


# Principles of robustness 3/4

## Responsiveness

- How users perceive rate of communication with the system
- Short or instantaneous response times
  - From the user perspective
  - When not possible, provide activity
- Stability of response times also
  - Ex. Menus response times vs

compensating for poor responsiveness



# Principles of robustness 4/4

## Task conformance

- Degree to which system services support the users' tasks
  - C.f. Gulf of Execution
- Task completeness
  - Level of support for users tasks
- Task adequacy
  - Match between system support for task and users understanding of task
- Exemplo: Adicionar autores a uma publicação?

O sistema ser ajustável às tarefas que pretende fazer, de

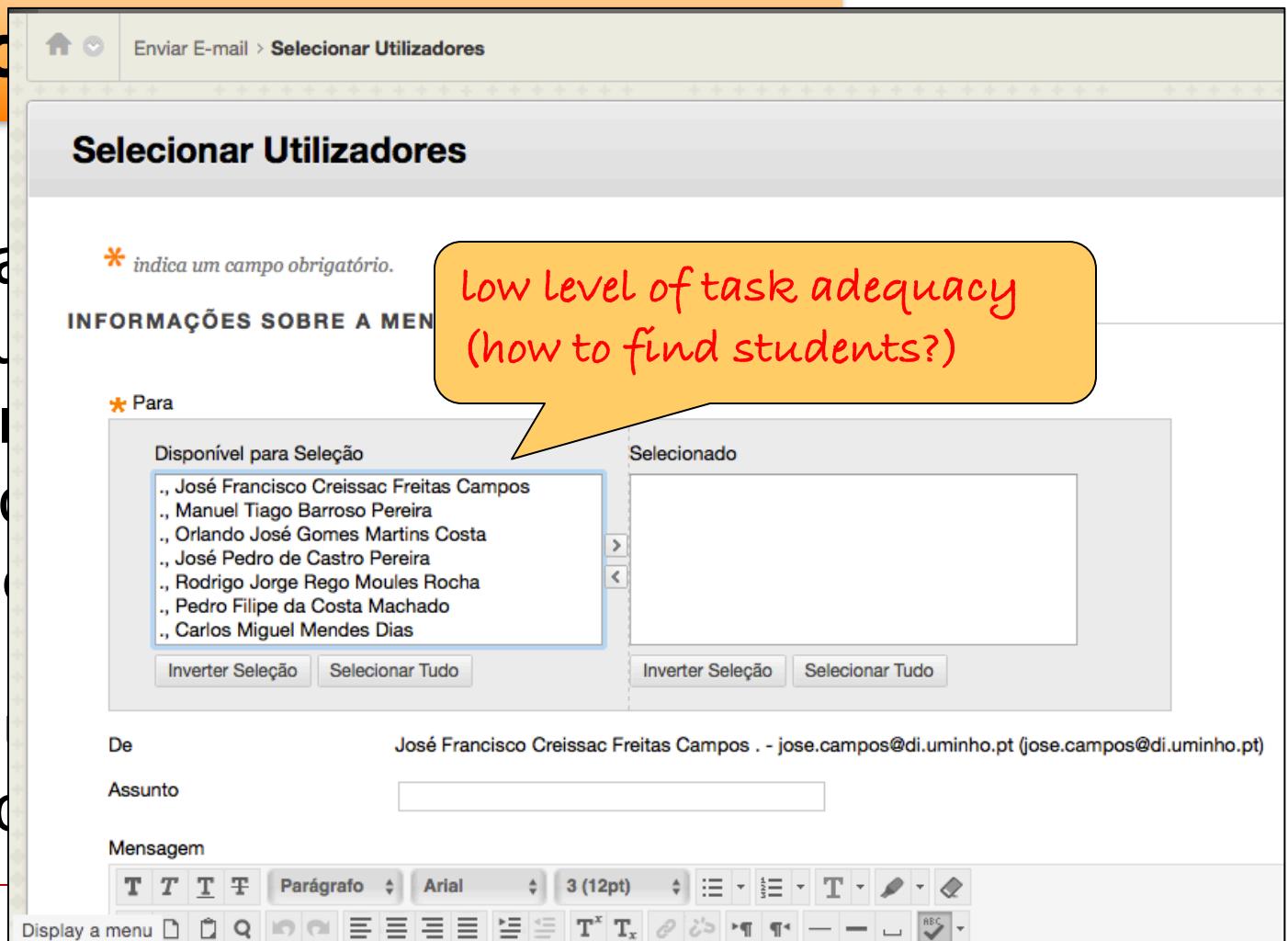
Grau em que os serviços do sistema sup

# Principles of robustness 4/4

Also, lackin in flexibility/  
costumizability (sort order?)

## Task co...

- Degree of users' tasks
- C.f. Guidelines
- Task consistency
- Level of difficulty
- Task adequacy
- Matching users
- Examples



# Principles of usability

