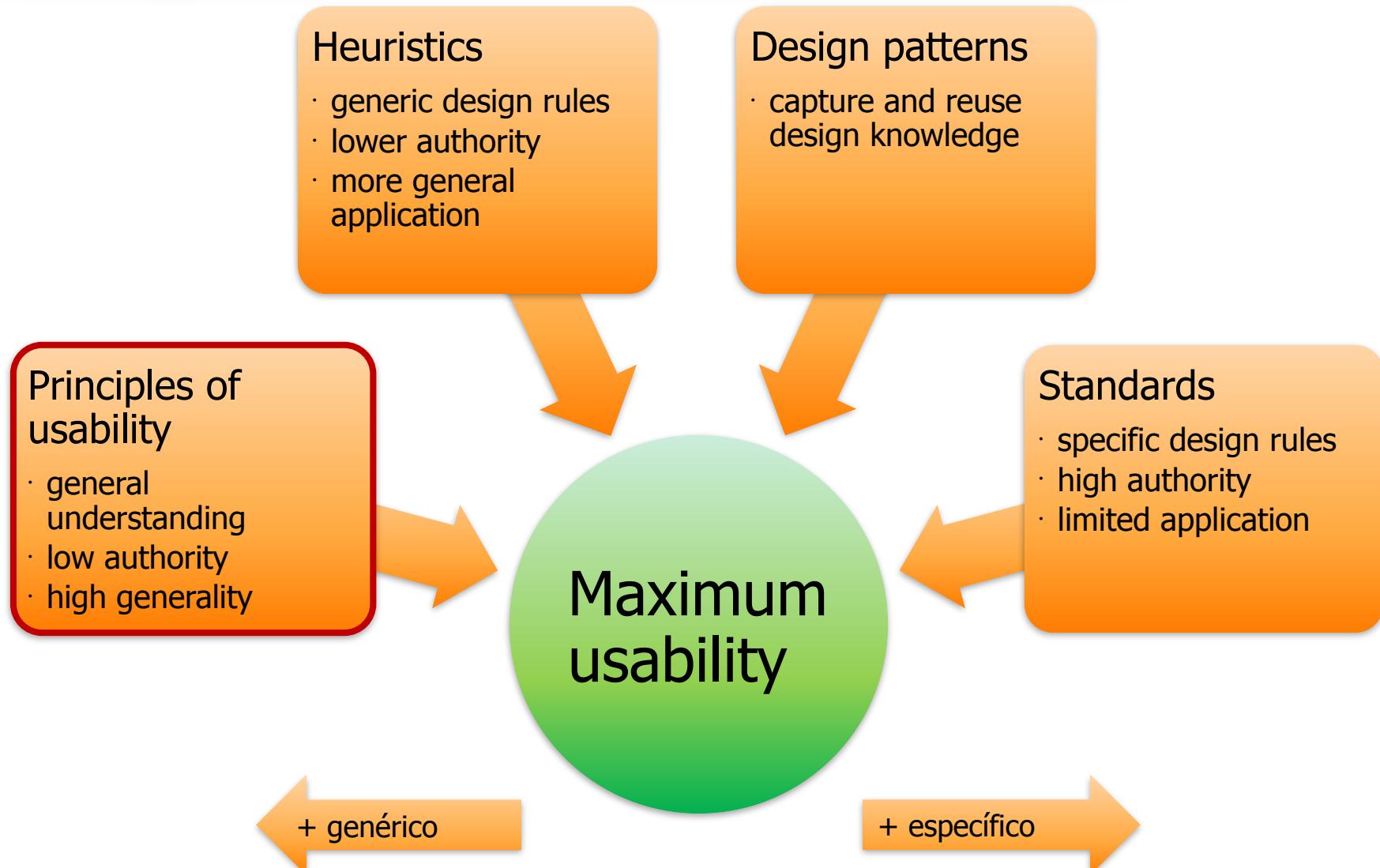


Módulo 5

DESENHAR PARA A USABILIDADE

Designing for maximum usability



Principles for usability

Learnability

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

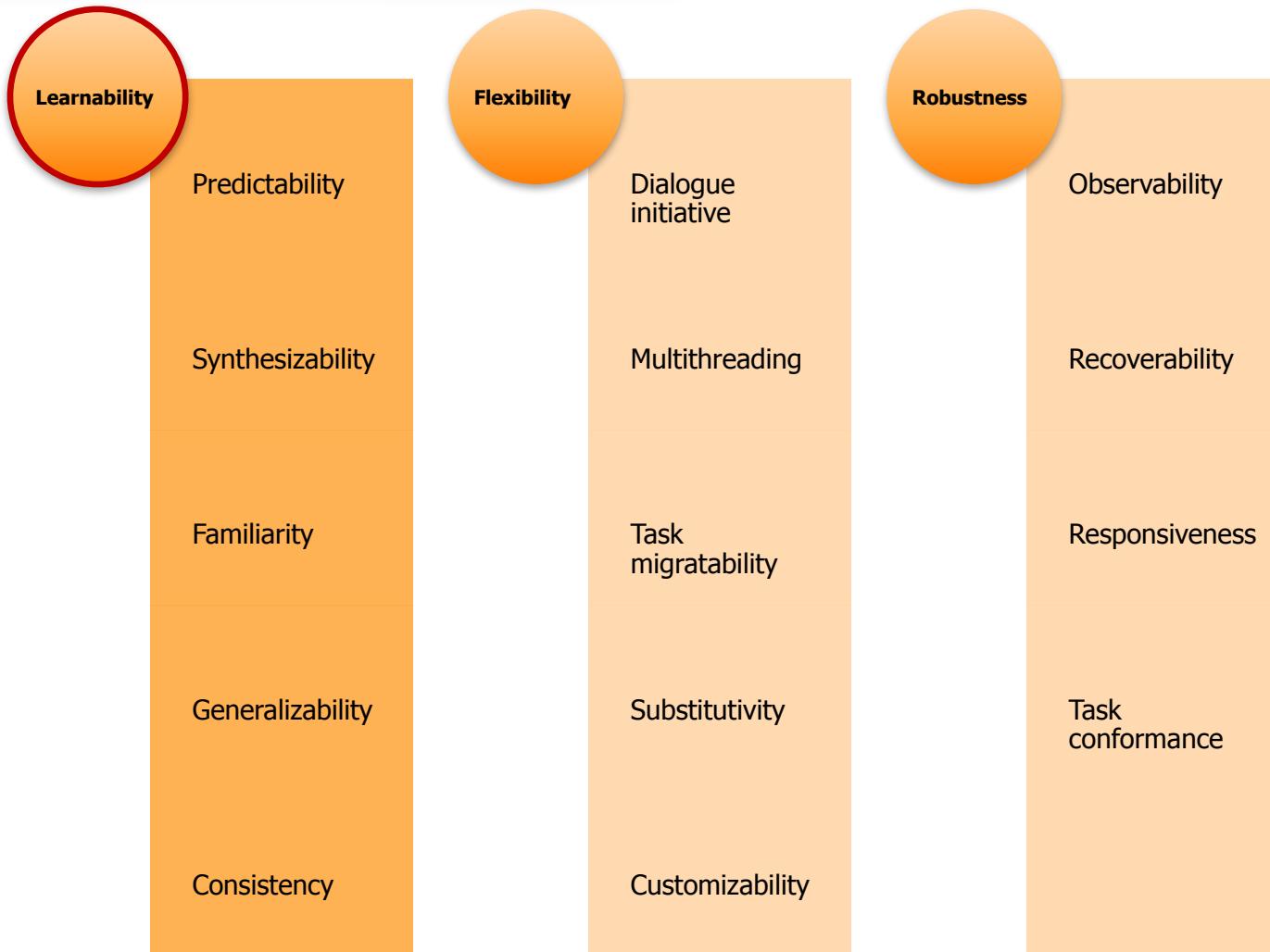
Flexibility

- the multiplicity of ways the user and system exchange information

Robustness

- 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

- 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:

- System provides feedback

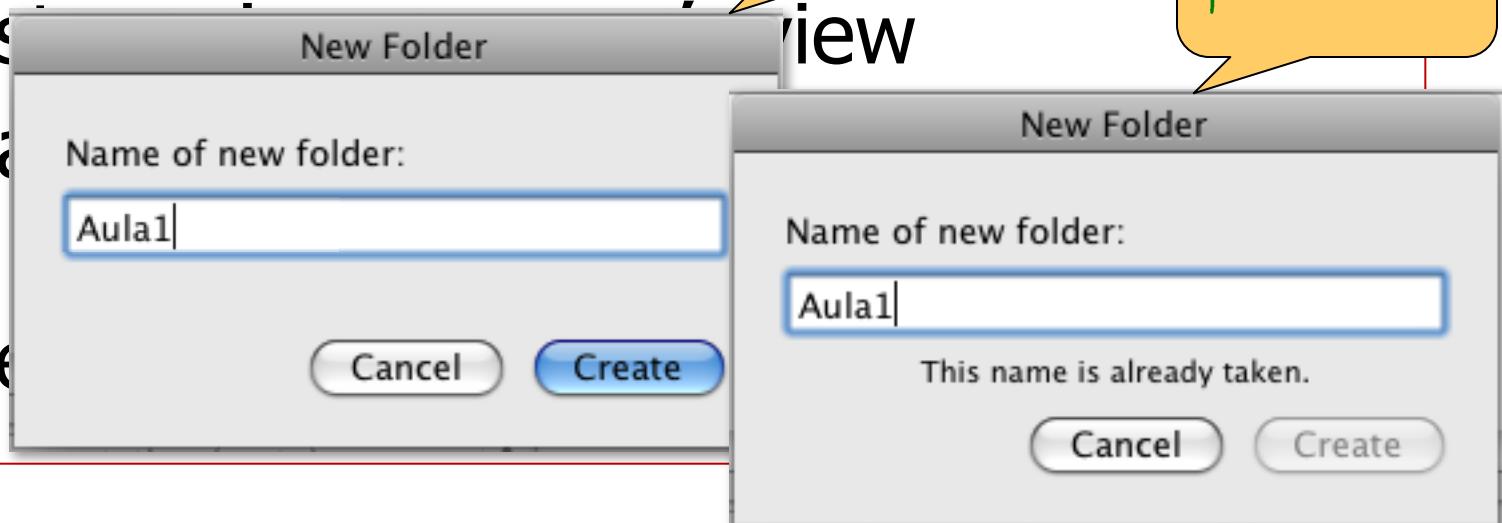
- Available options

- Ex.:

'Save'

less
predictable

more
predictable



Principles of learnability 2/5

Synthesizability (of mental model)

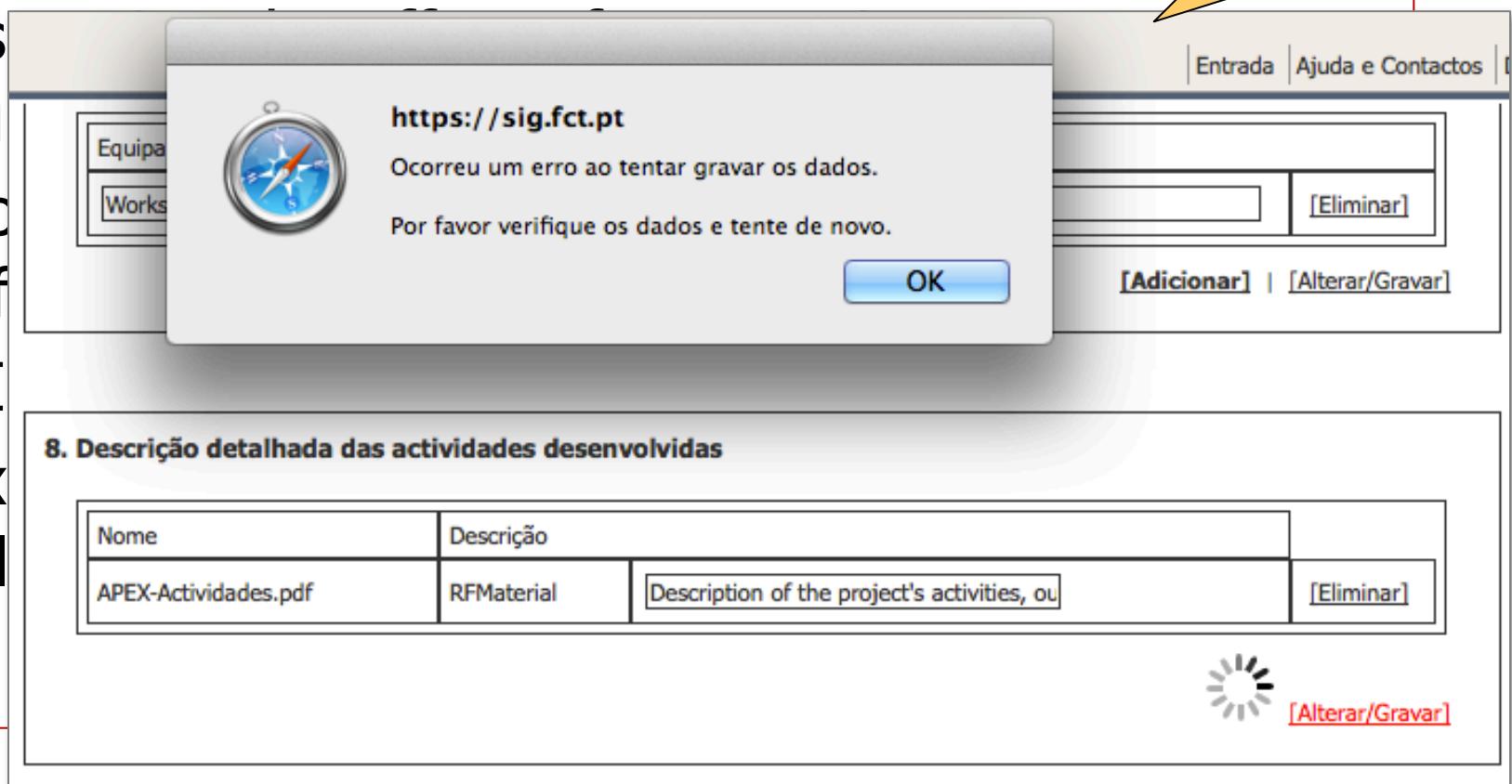
- Assessing the effect of past actions on current state
- Honesty: ability of user interface to provide information about state changes
 - Immediate vs. Eventual honesty
- Ex.: Notificação de envio de SMS num telemóvel.

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
- Inference
- Example of telic

The screenshot shows a software interface with two main sections:

Top Section: A table for equipment registration. It has four columns: 'Equipamento' (Equipment), 'Nº Recibo' (Receipt No.), 'Data' (Date), and 'Observações' (Observations). The first row contains the data: 'Workstation Base Valor € 250.00 €', 'ID-005/2011', '09-06-2011', and an empty observations field. To the right of the table are buttons for '[Adicionar]' (Add) and '[Alterar/Gravar]' (Edit/Save).

Bottom Section: A table for detailed activity descriptions. It has three columns: 'Nome' (Name), 'Descrição' (Description), and an empty column for notes. The first row contains the data: 'APEX-Actividades.pdf', 'RFMaterial', and 'Description of the activities, outputs and'. To the right of the table is a button for '[Eliminar]' (Delete). Below this table is a success message: 'Dados Gravados com sucesso!' (Data saved successfully!) followed by '[Alterar/Gravar]'.

Principles of learnability 3/5

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?

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					
Docente : José Francisco Creissac F. Campos					
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

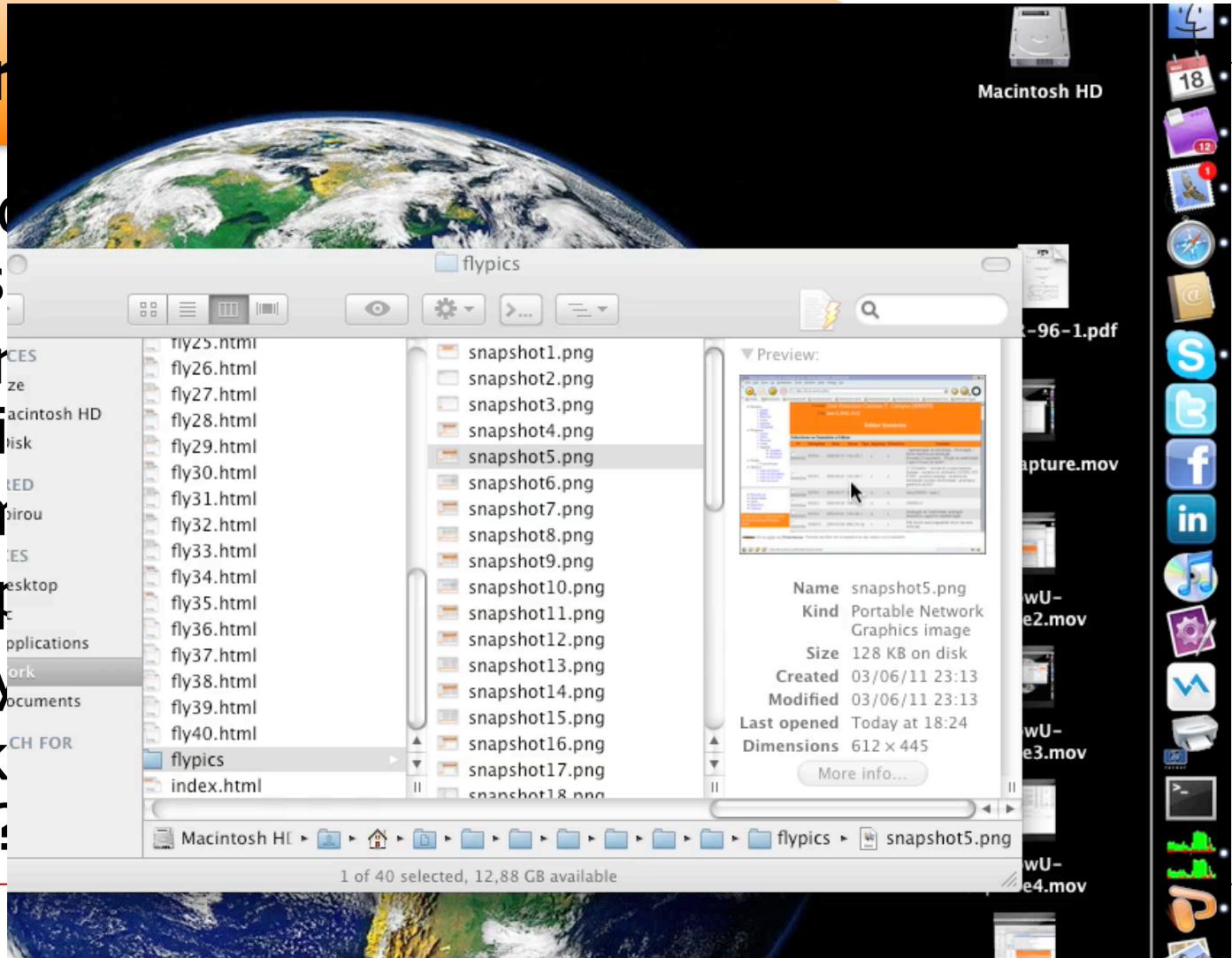
Generalizability

- 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 some apps in early macOS versions

Principles of learnability 4/5

General

- Extended support for new situations
- Exploration of situations
- A form of trial and error
- Examples
 - Copy and paste
 - Lack of support for OSs?



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
 - Example: Mac apps menu

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.

High Grade

High Grade

Medium Grade

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

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

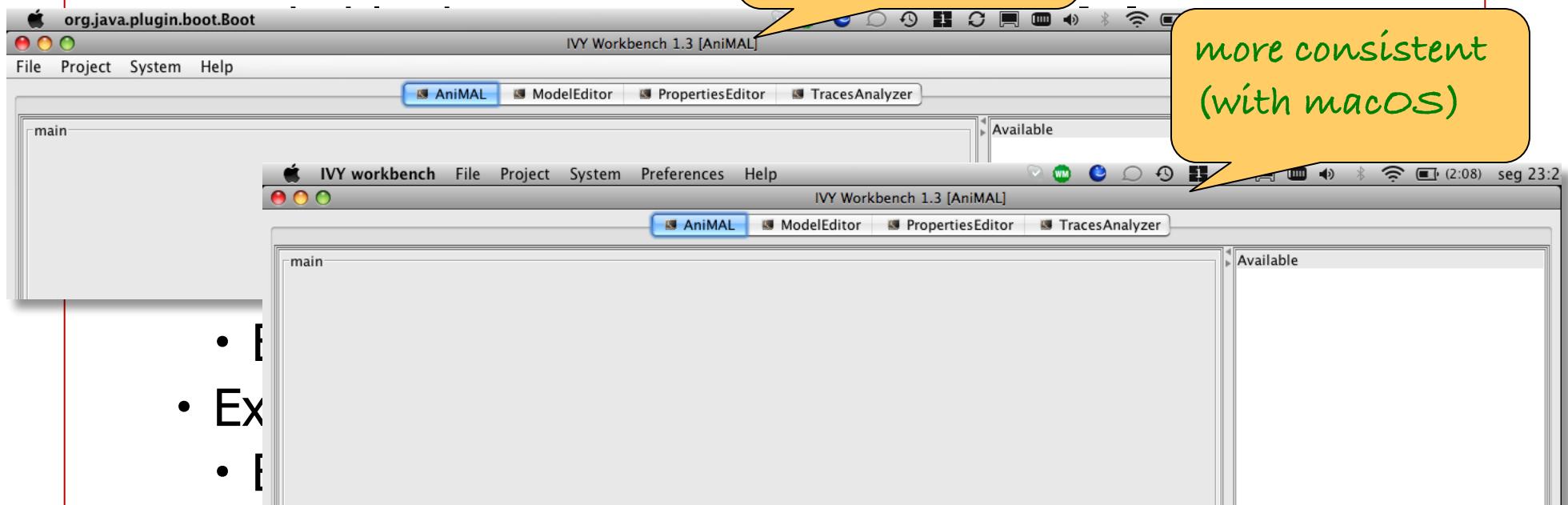


Principles of learnability 5/5

Consistency

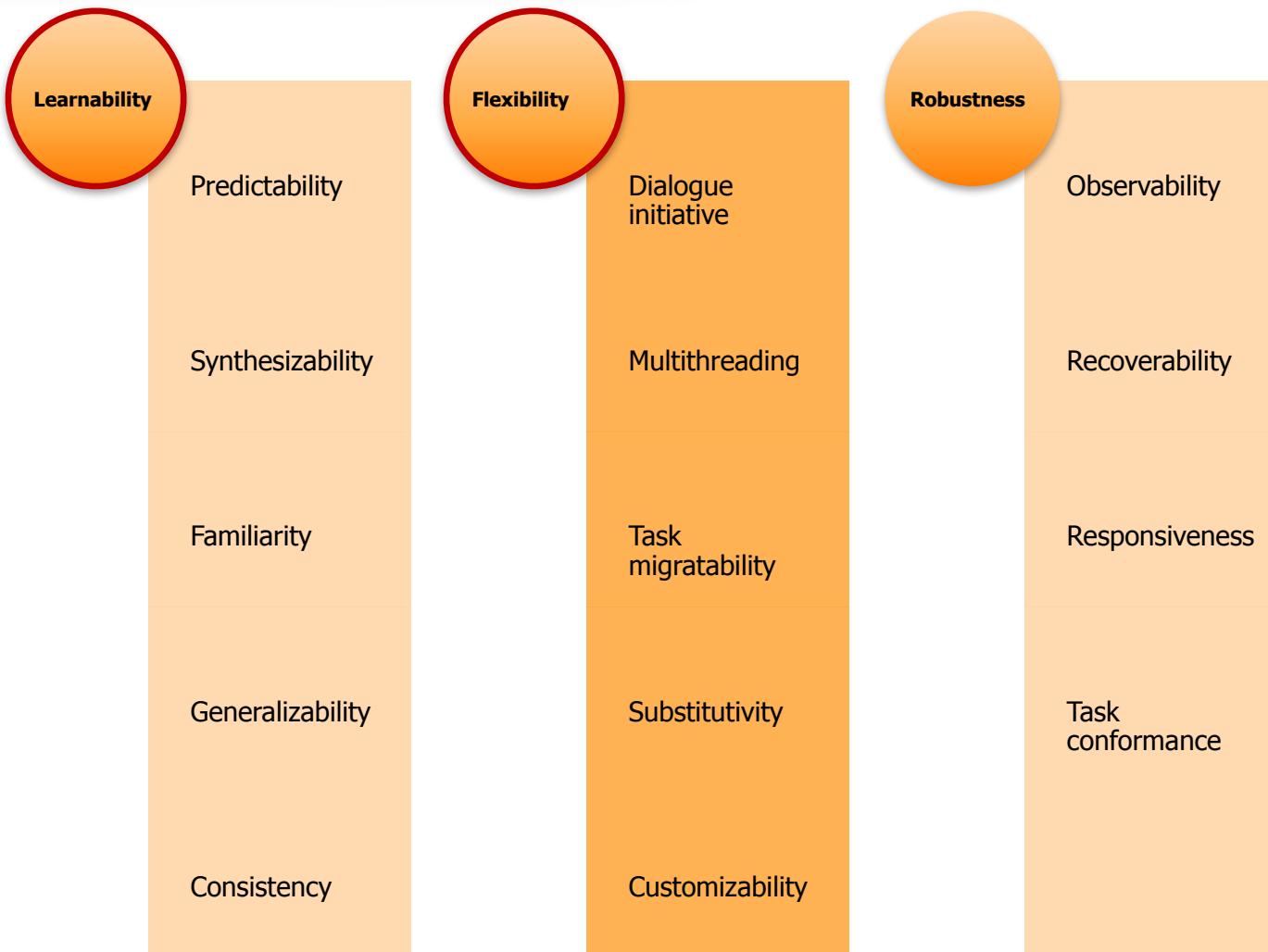
less consistent
(with macOS)

more consistent
(with macOS)



- [
- 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

Principles of flexibility 1/5

Dialogue initiative

- more system control
(too much for most people!)

- User control (more flexibility)

Ex.: navigating

managing

goal is

Some

want/need

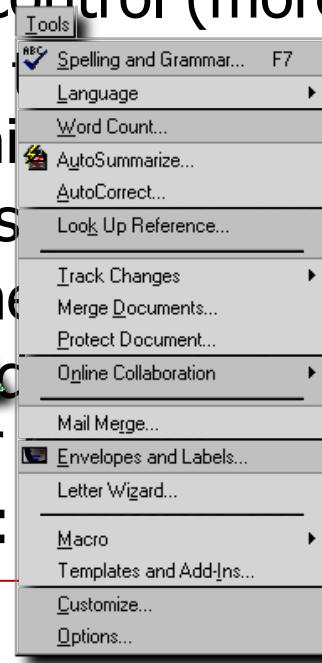
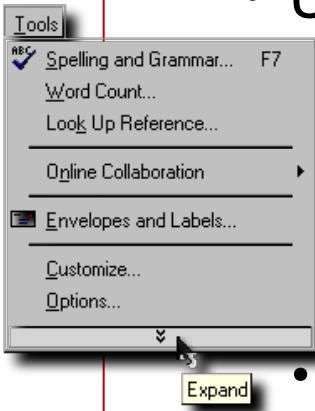
of tasks

• Go

user

• Ex. :

search available in input fields



more user control
(too much for some people?)

```
jfc@flyingmorcego.di.uminho.pt: /home/jfc
jfc@GSVLittleRascal ~
$ 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/                           log
bin/                               mobilept2v1.pdf
cartalD.jpg                         mozilla.ps
ceiareis.jpg                        Pessoal@
config.xml                          PoseidonCE_3_0_0_Installer.bin*
Desktop/                            print.ps
Desktop1/                           progesi.html
Documents/                          Programming/
ds@                                public_htm_20040917.tgz
Ensino/                             ruigomes-escala.ps
ESI_3.pdf                           ruigomes.ps
flier.pdf                           sub4k/
Fun/                                teste*
Gestao/                             texof/
Investigacao/                       thunderbird-1.0.tar.gz
Invitation.pdf                      tap/
[jfc@flyingmorcego jfc]$
```

Principles of flexibility 2/5

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)

P

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

Google

Braga

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

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

500 mi
500 km

Map Traffic

The screenshot shows a Google Maps interface. In the search bar, the word 'Braga' is typed. Below the search bar, a list of search results appears: 'Bragança Paulista - São Paulo, Brazil', 'Braga, Portugal', 'Bragaw Street, Anchorage, AK, United States', 'Bragadiru, Ilfov, Romania', and 'Bragança - Para, Brazil'. On the left side, there's a sidebar with options like 'Get directions' and 'My place', and a note about the location being 'United States' and 'Not your current location'. Below the sidebar, there's a link to 'Put your business on Google Maps' and a button for 'Experience MapsGL'. At the bottom of the sidebar, there are links for 'Maps Labs - Help' and 'Google Maps - ©2013 Google - Terms of Use - Privacy'. The main area of the screen displays a satellite map of the United States. A zoom control is visible on the left side of the map. The map shows state boundaries and major cities. The 'Map' and 'Traffic' buttons are located in the top right corner of the map area.

Principles of flexibility 3/5

Task migrability

- 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 4/5

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

high substitutivity
(in due date)

The image shows five separate windows of a software application, likely a task manager or calendar, demonstrating the concept of high substitutivity (flexibility) in due dates. Each window displays a form with fields for Project, Context, Estimated Time, Start, Due, Completed, Added, and Change dates. A 'Repeat Every' section is also present.

- Window 1:** Due date is 2009/05/15 17:00.
- Window 2:** Due date is next friday.
- Window 3:** Due date is 1 week.
- Window 4:** Due date is 1w.
- Window 5:** Due date is weeks.

Common Fields:

- Project: Aulas : POO
- Context: Mac
- Estimated Time: 1 hour
- Start: None
- Completed: None
- Added: 2009/05/06 12:00
- Changed: 2009/05/13 11:00
- Repeat Every: 1 week
- Repeat from: Assigned date
- Next Start: None
- Next Due: 2009/05/22 17:00

Due Date Selection:

- Window 1: Due date is 2009/05/15 17:00.
- Window 2: Due date is next friday.
- Window 3: Due date is 1 week.
- Window 4: Due date is 1w.
- Window 5: Due date is weeks.

Notes:

- ~~Ex.: input de datas; conver~~
- Ex.: input de datas; conver

Principles of flexibility 4/5

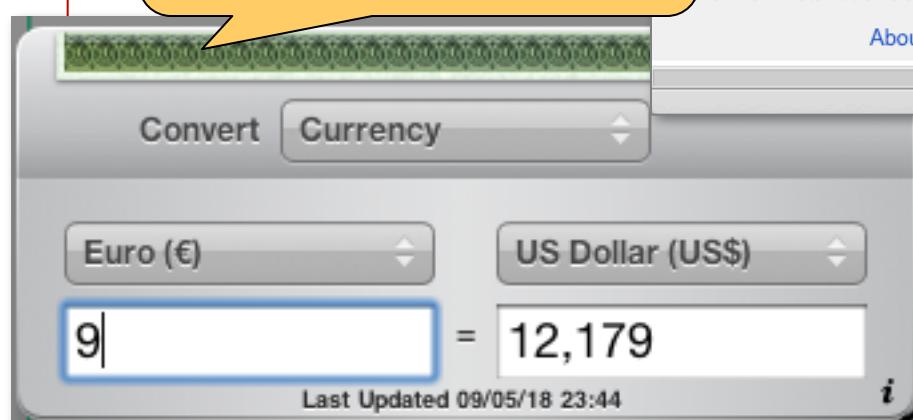
less substitutivity
(no equal opportunity;
alternative implemented)

Substitutivity

- Allowing equivalent each other (typical)
- Good alternative

Can minimize

more substitutivity
(equal opportunity)



between input and output
conversões

Principles of flexibility 5/5

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

Principles of flexibility 5/5

Adaptability
(user changes the system)

Customizability

- Modifiability of the system
 - Adaptability (Adaptation)

A screenshot of the Microsoft Word ribbon. The 'Review' tab is highlighted in blue, indicating it is the active tab. A dropdown menu is open from the 'Review' tab, showing options: Language, Word Count..., AutoSummarize..., AutoCorrect..., and Look Up Reference....

A context menu is displayed over a document titled "Adaptive Automation Based". The menu items are: Track Changes, Merge Documents..., Protect Document..., and Online Collaboration.

- Based

Adaptivity
(system changes
itself)



*adaptivity
(to the device)*

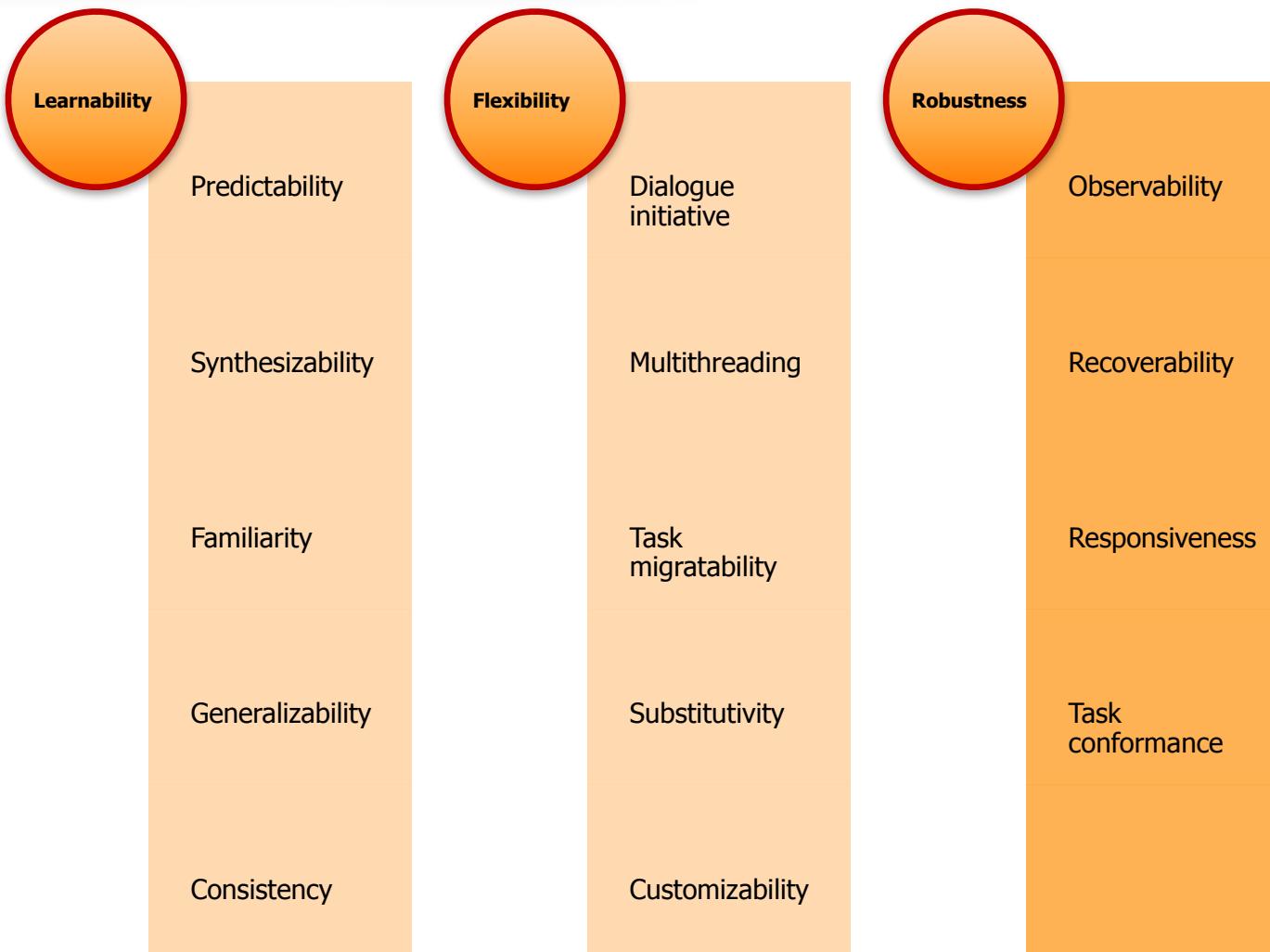
interface
(e)

ipting

- Basic
- Example
- Basic
- Example.: Responsive Web

Licenciatura em Engenharia Informática – Universidade do Minho

Principles of usability



Principles of robustness 1/4

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 state
 - operation visibility – what can be observed about the system's operation
- 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 from
- Five
- bro (lin
- def
- rea
- sta
- per
- op
- Ex.: S

The screenshot shows a web interface 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 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".

A table lists student marks:

Número	Aluno	Reg	Classificaç
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 with red text contains the text: "how to save marks? Lack of operation visibility". A large red arrow points downwards towards the bottom right corner of the table.

Principles of robustness 1/4

Obs

- Ability to handle missing values from the database
- Five ways to handle missing values (list)
- deal with missing values
- read data from different sources
- perform statistical analysis
- open files
- 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

— escolha uma opção —

PREENCHER

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

O ficheiro foi importado com sucesso

ficheiro

Choose File

no file selected

EXPORTAR

IMPORTAR

LEGENDA

10 a 20 valores

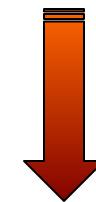
D Desistiu

F Faltou

NA Não Admitido

R Reprovado

SF Sem Frequência



Principles of robustness 1/4

Observability

- Ability to observe what's happening from the outside
- Five levels of observability
- broad (line of sight)
- defined
- real-time status
- performance
- operational
- Example: Software

The screenshot shows a software application window with several panels:

- PREENCHIMENTO AUTOMÁTICO:** A dropdown menu labeled "classificação" with the placeholder "escolha uma opção" and a "PREENCHER" button.
- EXPORTAÇÃO E IMPORTAÇÃO:** A section with a "ficheiro" input field containing "Choose File no file selected", and "EXPORTAR" and "IMPORTAR" buttons. A green message box says "O ficheiro foi importado com sucesso".
- LEGENDA:** A light blue panel listing codes and their meanings:
 - 10 a 20 valores
 - D Desistiu
 - F Faltou
 - NA Não Admitido
 - R Reprovado
 - SF Sem Frequência
- GRAVAR:** A small button in the bottom right corner.

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

At the bottom of the window, there are logos for COMPETE, QREN, and the Fundo Europeu de Desenvolvimento Regional, along with the text "COPRIGHT 2013 UNIVERSIDADE DO MINHO".

Principles of robustness 2/4

Recoverability

- The ability of users to take corrective action
- Backward recovery
 - **undo** to return to previous state
- Forward recovery (e.g. when error cannot be undone)
 - accepting error state and working from there
 - Ex.: input validation
 - 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

Principles of robustness 2/4

Recoverability

- The ability of users to take corrective action

- Back

- un

- Forw

- ac

- Ex

- Com

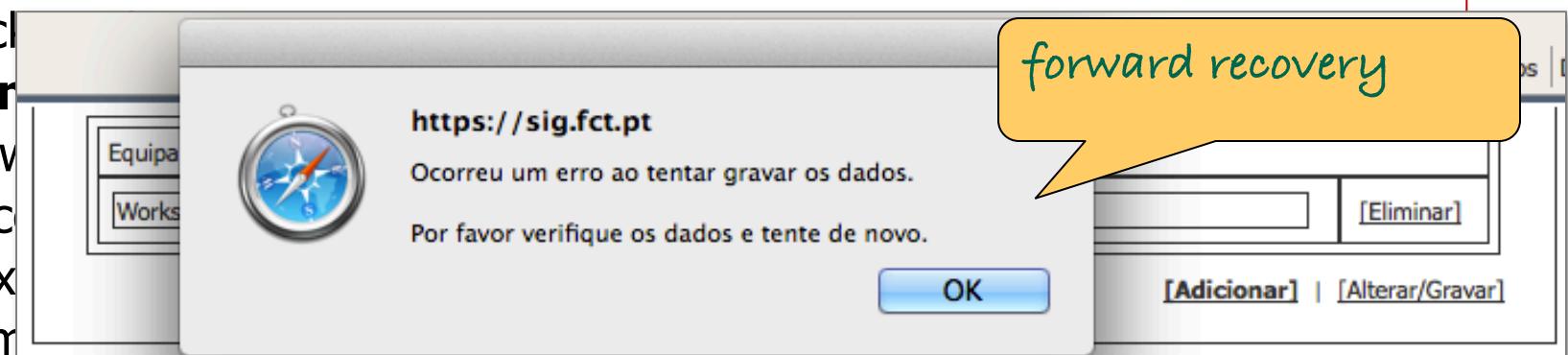
- Ha

- Ea

- Ex

-

-



A screenshot of a web application interface. A modal dialog box is centered, displaying a compass icon and the URL <https://sig.fct.pt>. The message in the dialog reads: "Ocorreu um erro ao tentar gravar os dados. Por favor verifique os dados e tente de novo." Below the dialog are two buttons: "OK" and "[Adicionar] | [Alterar/Gravar]". Below the dialog, a table titled "8. Descrição detalhada das actividades desenvolvidas" is visible. A yellow speech bubble points to the table, containing the text "backward recovery". At the bottom of the screen, there is a navigation bar with buttons for "Date updated", "UNDO", "HIDE", and "[Alterar/Gravar]".

Principles of robustness 3/4

Responsiveness

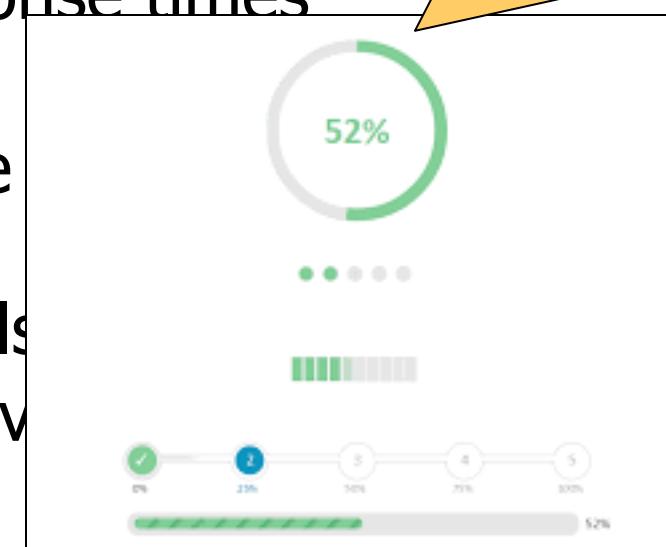
- How users perceive rate of communication with the system
- Short or instantaneous response times
 - From the user perspective
 - When not possible, provide indication of activity
- Stability of response times also relevant
 - Ex. Menus response times vs motor skills

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

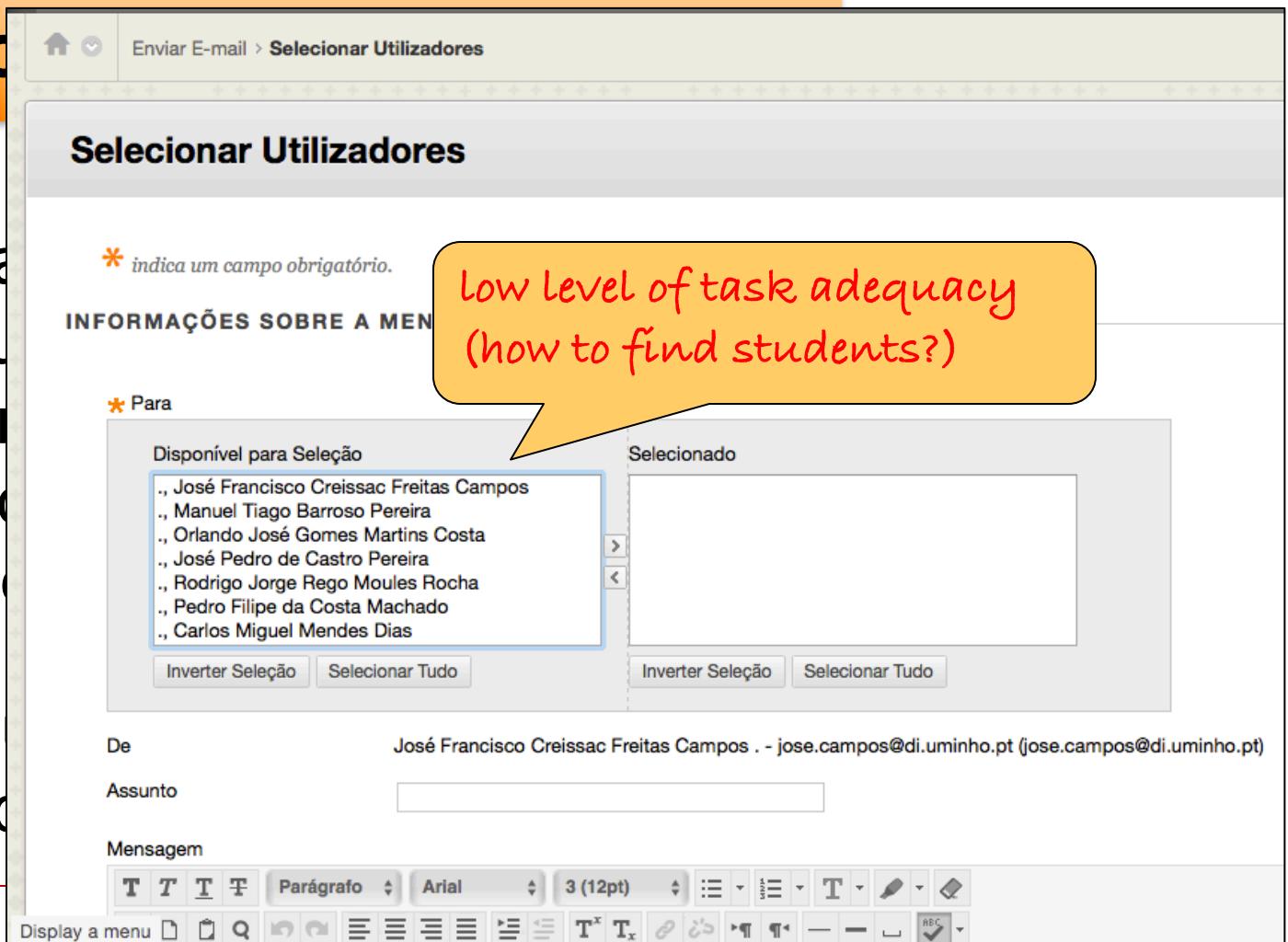
- Degree to which system services support the users' tasks
 - C.f. Gulf of Execution
- Task completeness
 - Level of support for users tasks
- Task adequacy
 - Match between system support for task and users understanding of task
- Exemplo: Adicionar autores a uma publicação?

Principles of robustness 4/4

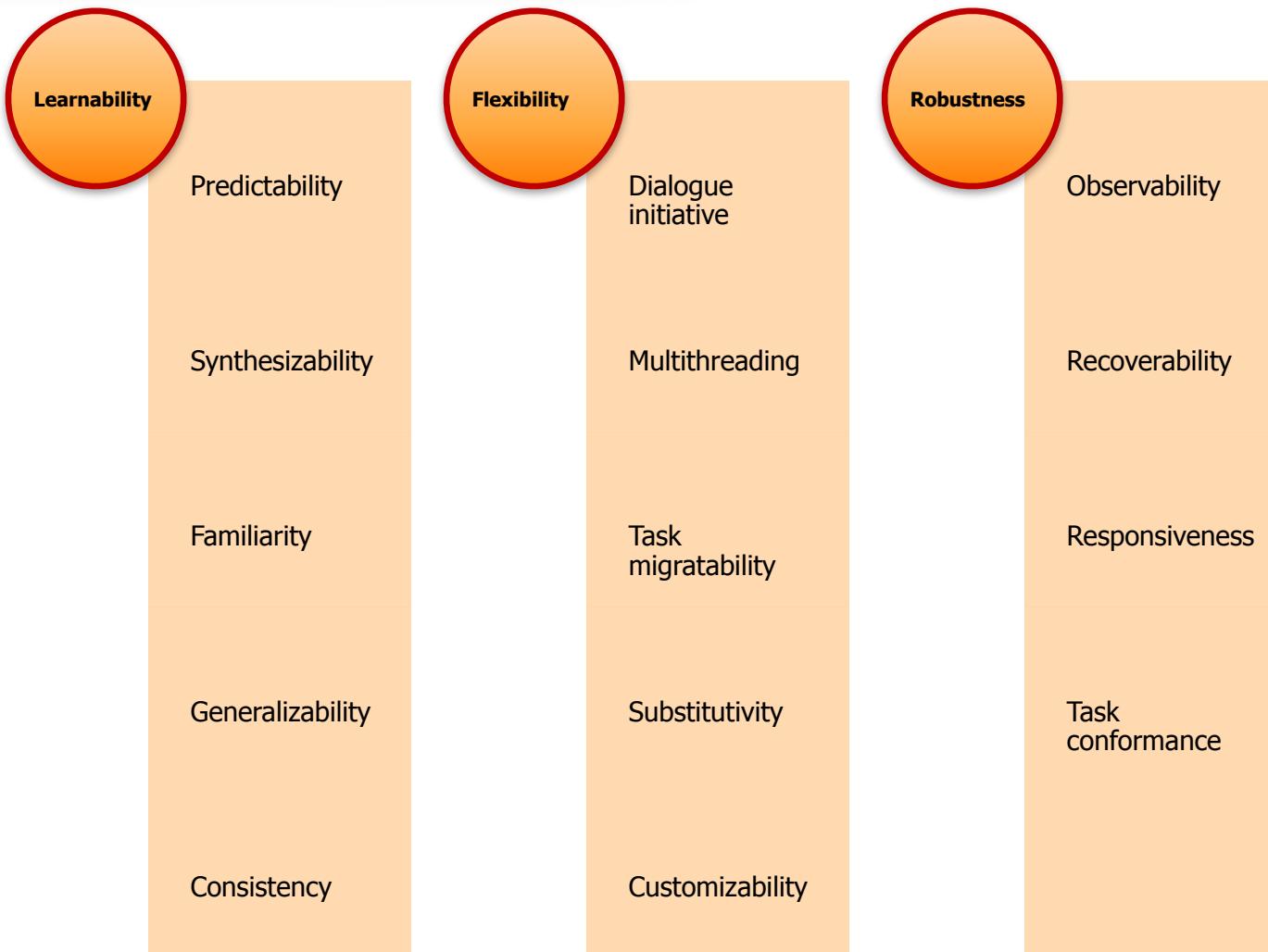
Also, lacking in flexibility/
costumizability (sort order?)

Task cd

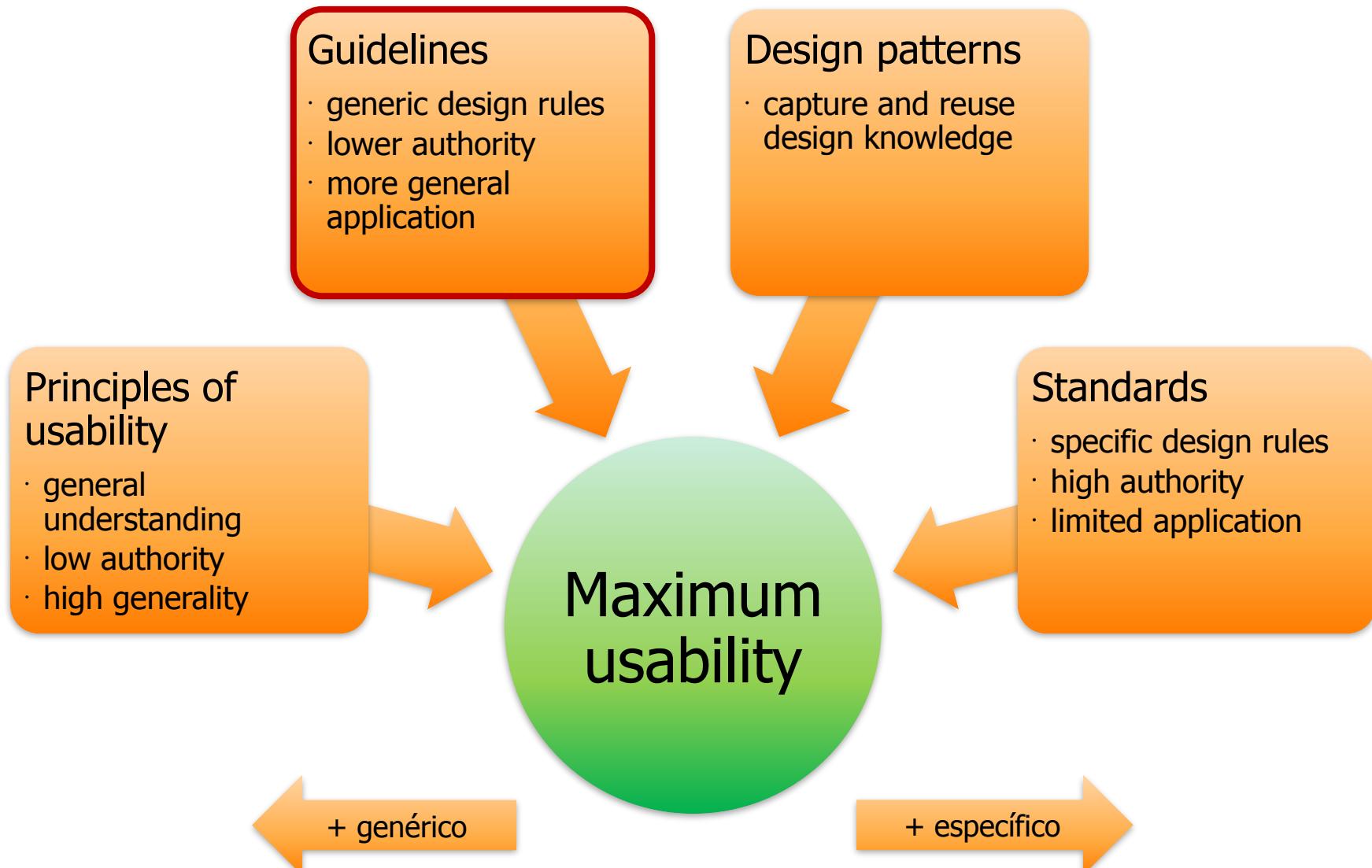
- Degree users' tasks
 - C.f. Guidelines
 - Task complexity
 - Level of difficulty
 - Task adaptation
 - Matching users
 - Examples



Principles of usability



Designing for maximum usability



Guidelines

- More operational (than principles)
 - Derived from them
- Suggest how to achieve good usability
- Many textbooks and reports full of guidelines
- Sometimes not easy to select what is appropriate in each situation
- Many times guidelines will conflict
- Understanding justification for guidelines (the principles) aids in selecting them and in resolving conflicts

Golden rules and heuristics

- “Broad brush” design rules
- Useful check list for good design
- Better design using these than using nothing!
- Different collections e.g.
 - Shneiderman’s 8 Golden Rules
 - Nielsen’s 9 Heuristics

Shneiderman's 8 Golden Rules

1. Strive for consistency
2. Enable frequent users to use shortcuts
3. Offer informative feedback
4. Design dialogs to yield closure
5. Offer error prevention and simple error handling
6. Permit easy reversal of actions
7. Support internal locus of control
8. Reduce short-term memory load

Heurísticas de Nielsen

1. Visibilidade do estado do sistema

Manter os utilizadores informados sobre o que se passa, através de feedback apropriado.

2. Correspondência entre o sistema e o mundo real

Falar a língua dos utilizadores (palavras, frases e conceitos familiares, em vez de jargão interno). Apresentar a informação numa ordem natural e lógica.

3. Controlo e liberdade do utilizador

Os utilizadores executam frequentemente acções por engano. Fornecer "saídas de emergência" claramente marcadas.

4. Consistência e normas

Palavras, situações, ou acções diferentes devem ter significados diferentes. Seguir as convenções da plataforma e da indústria.

5. Prevenção de erros

Boas mensagens de erro são importantes, mas ainda mais é evitar a ocorrência de problemas.

6. Reconhecer em vez de recordar

Minimizar a carga de memória do utilizador. A informação necessária deve ser visível ou facilmente recuperável.

7. Flexibilidade e eficiência de utilização

Os atalhos (ocultos dos utilizadores principiantes) podem acelerar a interacção para o utilizador experiente.

8. Desenho estético e minimalista

As interfaces não devem conter informação que seja irrelevante ou raramente necessária.

9. Ajudar os utilizadores a reconhecer, diagnosticar e recuperar de erros

Expressar mensagens de erro em linguagem simples (sem códigos de erro), indicando o problema e possível solução.

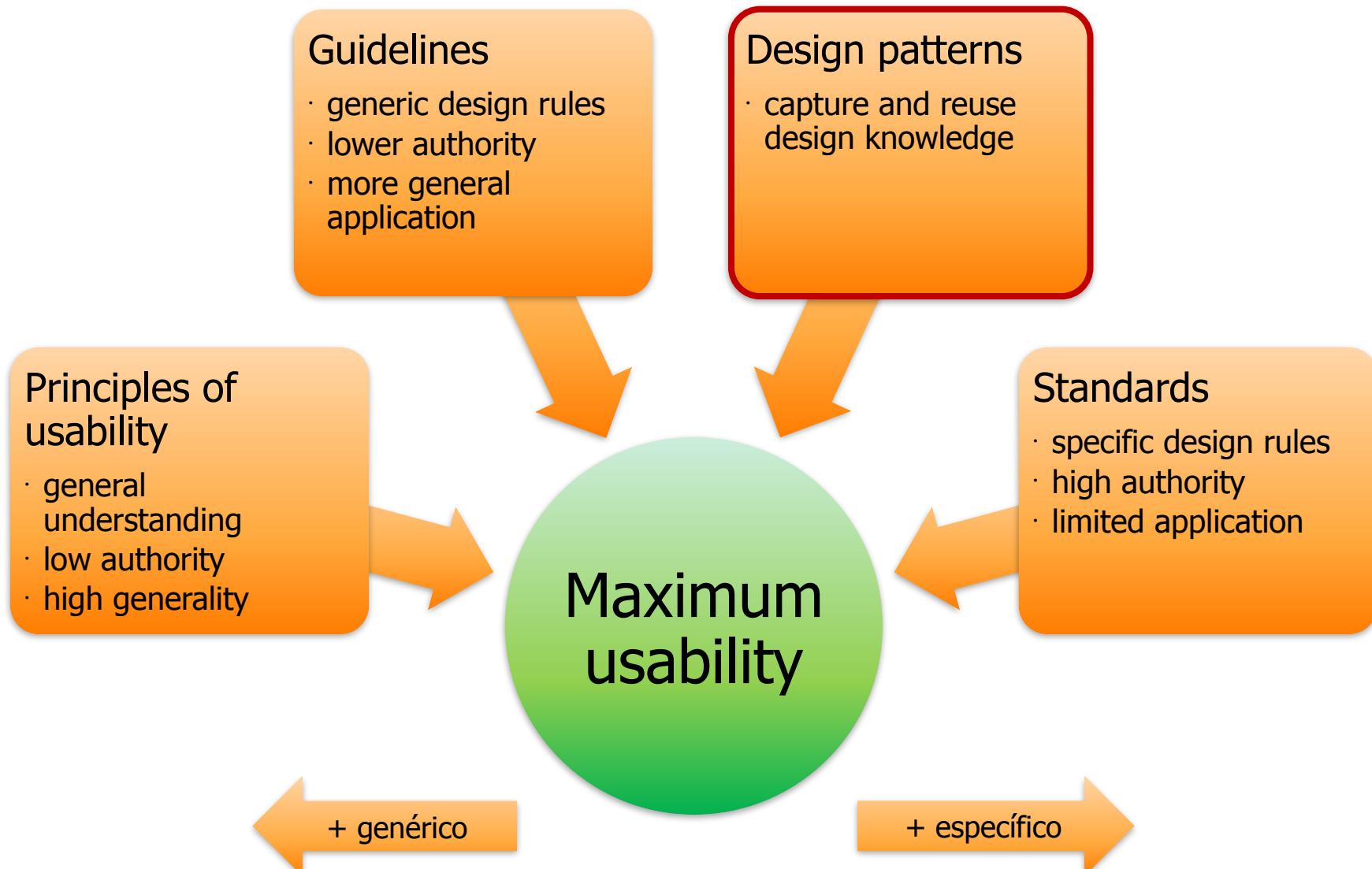
10. Ajuda e documentação

É melhor se o sistema não precisar de qualquer explicação adicional, mas pode ser necessário fornecer informação.

<https://www.nngroup.com/articles/ten-usability-heuristics/>



Designing for maximum usability



Design patterns

- An approach to reusing knowledge about successful design solutions
- Originated in architecture: Alexander
- A pattern is an invariant solution to a recurrent problem within a specific context.
- Examples
 - Light on Two Sides of Every Room (architecture)
 - Decorator (software architecture)
 - Go back to a safe place (HCI)
- Patterns do not exist in isolation but are linked to other patterns in languages which enable complete designs to be generated

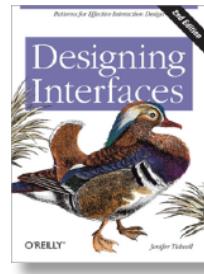
Design patterns (cont.)

- Characteristics of (good) patterns
 - capture **design practice** not theory
 - capture the essential common properties of **good examples of design** – useful as **learning tool**
 - represent **design knowledge**
 - can be **used for communication** between all stakeholders
 - a pattern language should be generative and assist in the development of complete designs.
- HCI patterns collections
 - Designing Interfaces collection – <http://designinginterfaces.com/>
 - Patterns in Interaction Design – <http://www.welie.com/>
 - The Design of Sites

Designing Interfaces (J. Tidwell)

1st Edition (45 patterns)

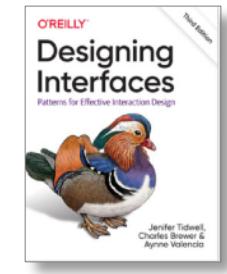
1. Organizing the Content (5)
2. Getting Around (4)
3. Organizing the Page (10)
4. Commands and Actions (5)
5. Showing Complex Data (6)
6. Getting Input From Users (7)
7. Builders and Editors (5)
8. Making It Look Good (3)



<http://designinginterfaces.com/firstedition/>

3rd Edition (106 patterns)

1. Designing for People (13)
2. Organizing the Content (12)
3. Getting Around (13)
4. Layout of Screen Elements (8)
5. Visual Style and Aesthetics (5)
6. Mobile Interfaces (9)
7. Lists of Things (10)
8. Doing Things (11)
9. Showing Complex Data (7)
10. Getting Input from Users (11)
11. Making It Look Good (7)



Patterns in Interaction Design

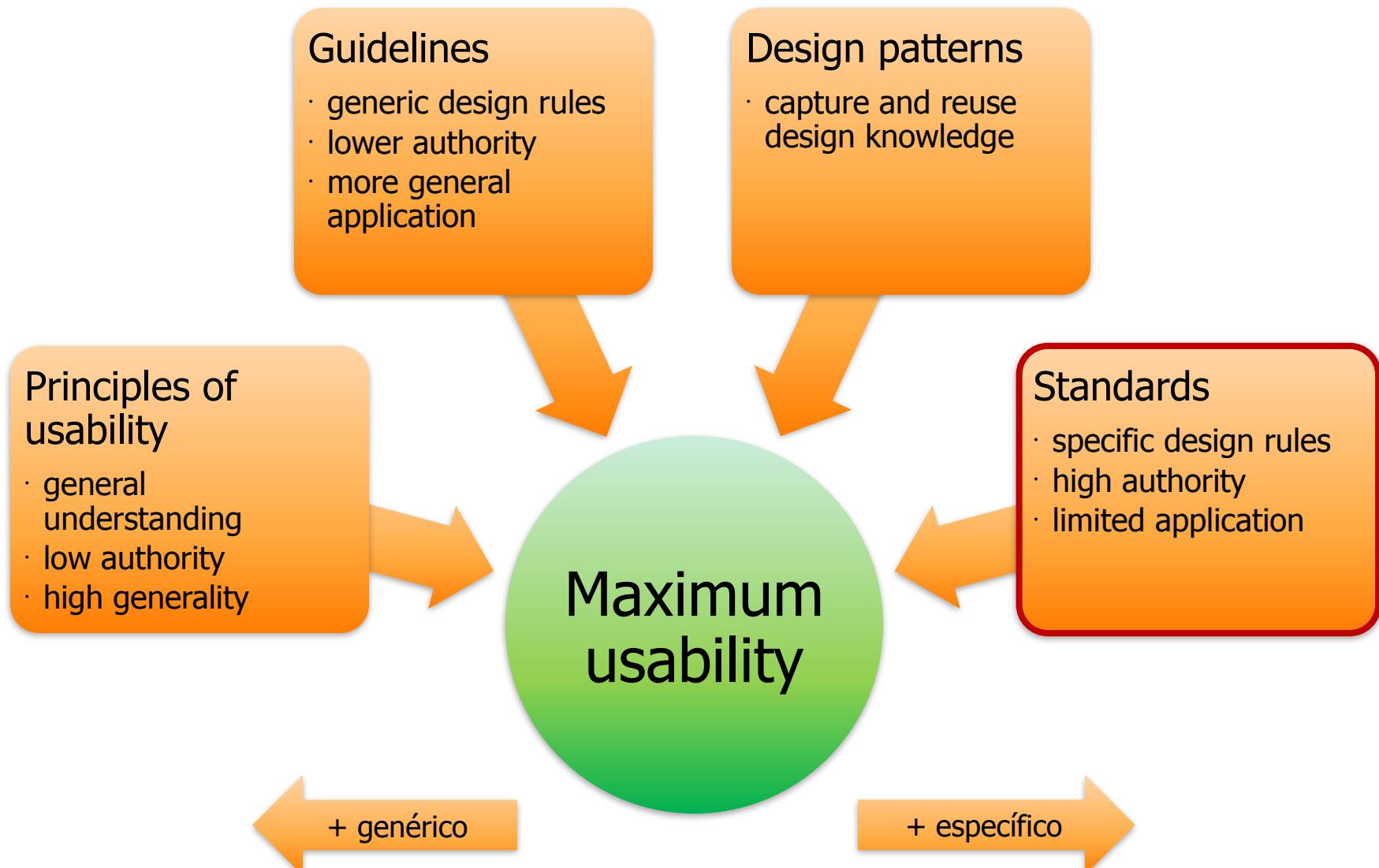
1. Navigating around (25)
2. Basic interactions (7)
3. Searching (13)
4. Dealing with data (14)
5. Personalizing (3)
6. Shopping (9)
7. Making choices (5)
8. Giving input (3)
9. Miscellaneous (5)

<http://www.welie.com/patterns/>
(84 patterns)

UIPatterns

<https://ui-patterns.com/patterns>

Designing for maximum usability



Standards

Official standards

- set by national or international bodies to ensure compliance by a large community
 - require sound underlying theory and slowly changing technology
- hardware standards more common than software
- E.g. ARINC 653 - Avionics Application Software Standard Interface

Corporate standards

- Tend to be design standards
- Each company will define their own

Benefits of standards

- Users – less training required
- Developers – reuse of prior knowledge; automation
- Maintenance – changes easier when there is consistency

Designing for maximum usability

