



Accessibility Assessment Simulation Environment for New Applications Design and Development



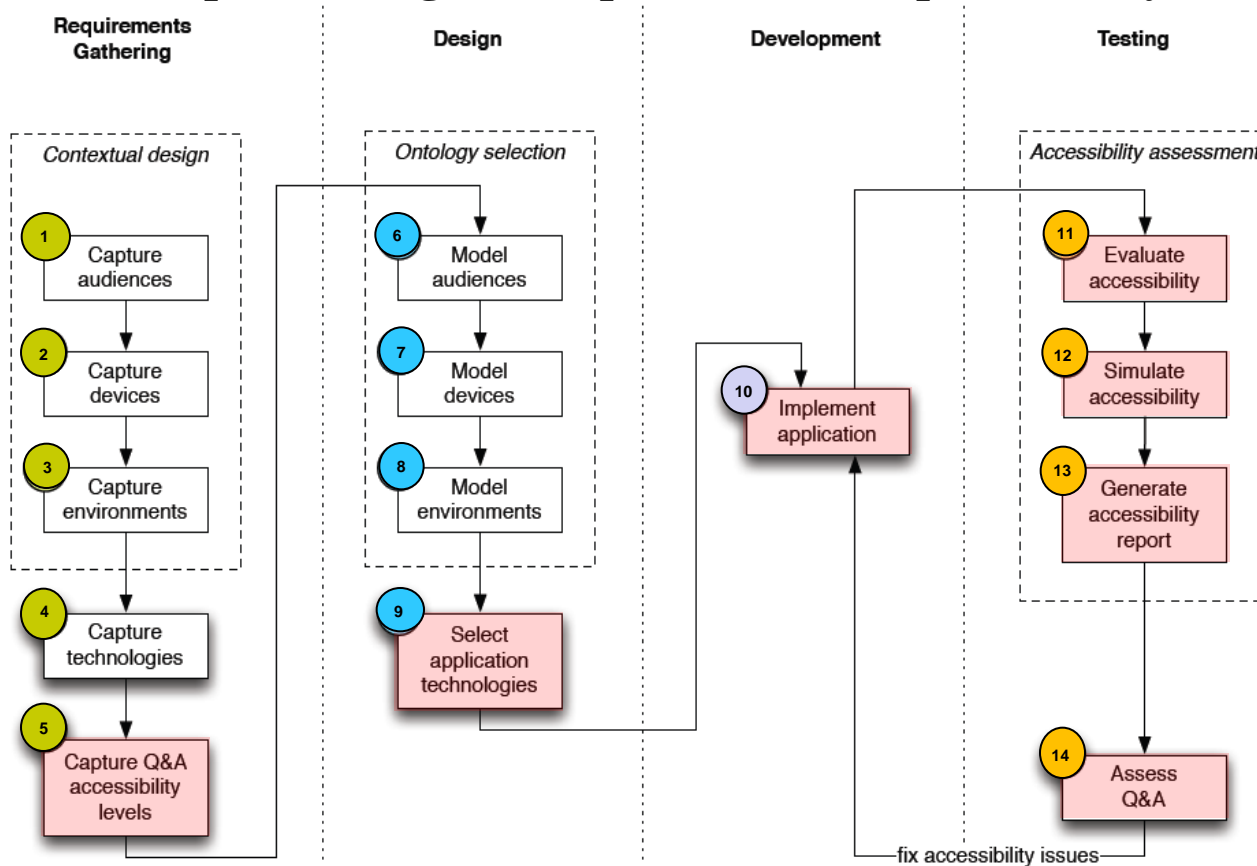
# ACCESSIBLE harmonized methodology

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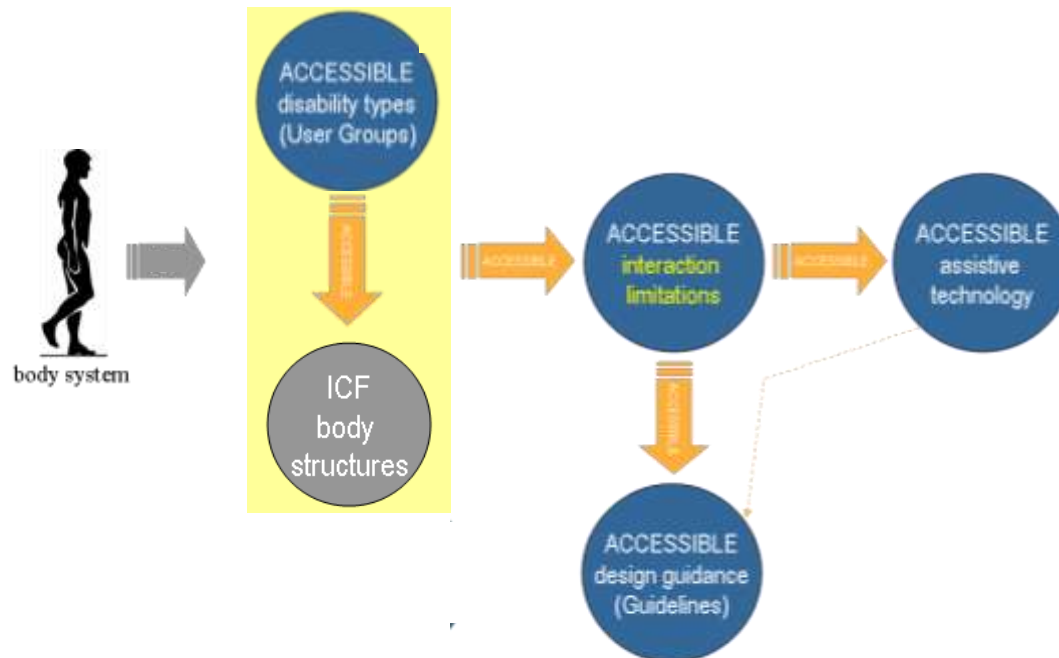
□ Objective:

- Implementation of a harmonized accessibility methodological approach applied to software development and design of accessible new applications and services. Assist developers through all steps of the development lifecycle.



### ❑ HAM components

- ❑ Disability and user groups.
- ❑ ICF Classification.
- ❑ Interaction limitations.
- ❑ Assistive technologies.
- ❑ Accessibility standards & guidelines.



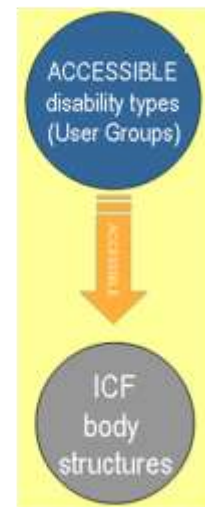
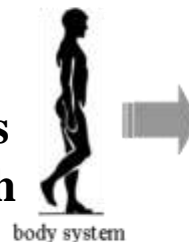
## ❑ Disability and user groups

- ❑ There are as yet **no universally accepted categorizations of disability, despite efforts towards that goal.**
- ❑ **HAM is based on the user groups that have been realised in at the duration of the project.**

Disability / Main type	Disability / Sub type
Cognitive impairment	Dementia
	Dysarthria
	Down syndrome
	Learning disability (LD)
	Learning disability (LD) - Speech and language disorders
	Learning disability (LD) - Academic skills disorders
	Learning disability (LD) - Nonverbal Learning Disorder
	Attention Deficit Hyperactivity Disorder (ADHD)
Traumatic Brain Injury	
Alzheimer disease	

## ❑ ICF classification mapping

- ❑ **ICF provides a concrete classification of impairments of the body structures, which ensures no overlapping.**



e.g.

Disability Type		Short Description in ICF terms	ICF classification
Main Type	Subtype		
Cognitive impairment	Dementia	Dementia is a non-specific illness syndrome in which affected areas of cognition may be memory, attention, language, and problem solving.	b117 Intellectual functions (incl. Estimation, dementia) b144 Memory functions b1401 Short-term memory b1401 Long-term memory b1402 Retrieval of memory b1403 Memory functions, other specified b1409 Memory functions, unspecified
	Dysarthria	Dysarthria is a motor speech disorder resulting from neurological injury, dysfunction by poor articulation.	s228 Articulation functions s230 Fluency and rhythm of speech functions s2300 Fluency of speech s2301 Fluency of speech s2302 Speed of speech s2303 Quality of speech s2304 Fluency and rhythm of speech functions, other specified s2309 Fluency and rhythm of speech functions, unspecified s268 Control of voluntary movement functions s2680 Control of single voluntary movements s2681 Control of complex voluntary movements s2682 Coordination of voluntary movements s2683 Supportive functions of arm or leg s2688 Control of voluntary movement functions, other specified s2689 Control of voluntary movement functions, unspecified

### ❑ Interaction limitations mapping

- ❑ **Based upon an adaptation of the “Barrier Walkthrough” methodology.**
- ❑ **Focus on the barriers instead of the accessibility principles.**
  - ❑ A barrier is any condition that hinders the user's progress towards achievement of a goal, when the user is a disabled person.
  - ❑ Identification of all possible barriers.

Number n.

Barrier:

Cause:

Failure Mode:

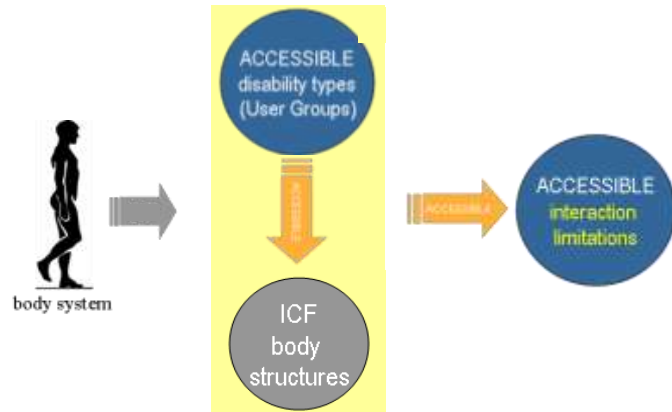
Effect:

Fix

- ❑ **Explanation of the functional limitations that derive from each disability type and sub-type.**
- ❑ **Presentation of the points that should be checked in order to cover all possible dysfunction of a disability type.**

### Correlation of the interaction limitations and disability types

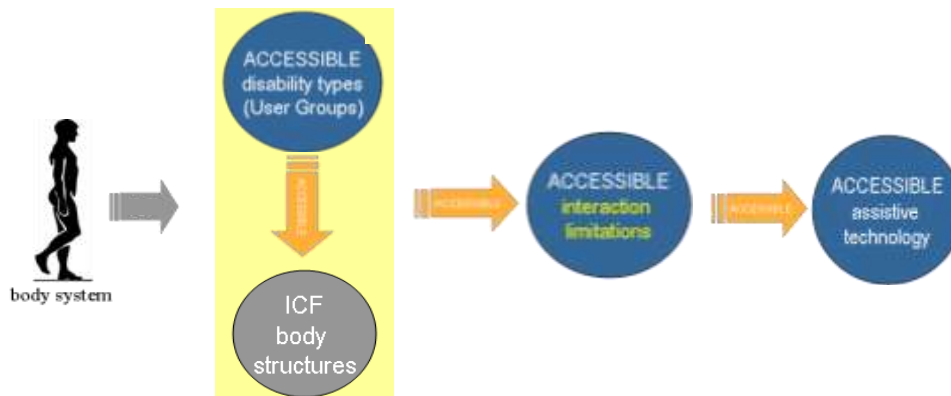
- We mapped the disability types with the interaction limitations.



Disability Type		Interaction limitation	
Main Type	Subtype	Function	Checkpoints
<b>Hearing impairments</b>	Mixed Hearing Loss	Combined hearing loss is caused by both conductive and sensorineural causes. A mixed hearing loss simply means that the hearing problem occurs in the outer or middle ear and in the inner ear (cochlea) or auditory nerve.	<ul style="list-style-type: none"> <li>No caption for audio</li> <li>Video with no captions</li> <li>Missing synchronisation</li> </ul>

### Assistive technologies mapping

- Description of the correlation between specific disability type and existing ICT user technologies, including assistive technologies.



AT Category	Description	Disability (ies)
Assistive Listening Devices	Hearing Aid Telephone Interconnect System used with in the ear and behind the ear hearing aids.	Hearing impairments

- ❑ **Accessibility guidelines**
  - ❑ **AREA A: Web Content**
    - ❑ WCAG 2.0 (W3C)
    - ❑ Section 508
  - ❑ **AREA B: Mobile-Web applications**
    - ❑ MAG (ACCESSIBLE)
  - ❑ **AREA C: Web Services**
    - ❑ Web services guidelines (ACCESSIBLE)
  - ❑ **AREA D: Description languages**
    - ❑ Description languages guidelines (ACCESSIBLE)

### ❑ AREA A: *Web content*

#### ❑ WCAG 2.0

- ❑ 12 guidelines organized under 4 principles.

- ❑ *Perceivable*
- ❑ *Operable*
- ❑ *Understandable*
- ❑ *Robust*

❑ *Priority 1 (Level A)*     $\longrightarrow$  *Absolute barriers*     $\longrightarrow$  *Must be satisfied*

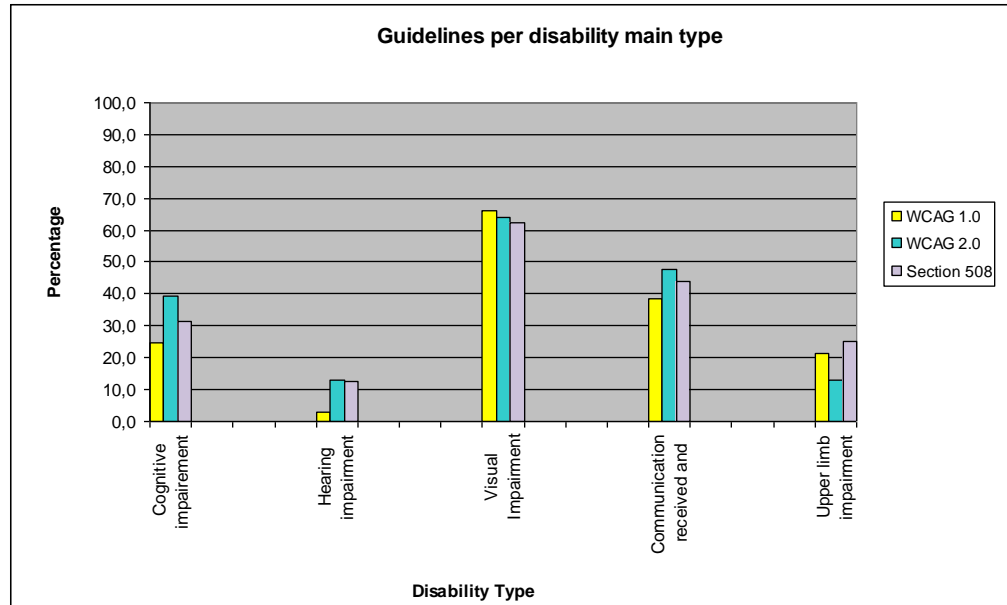
❑ *Priority 2 (Level AA)*     $\longrightarrow$  *Significant barriers*     $\longrightarrow$  *Should be satisfied*

❑ *Priority 3 (Level AAA)*     $\longrightarrow$  *Provide additional accessibility support*     $\longrightarrow$  *Improve access to Web documents if satisfied*

#### ❑ Section 508

- ❑ Mapping Web content guidelines to Disabilities
  - ❑ Based on the Barrier Walkthrough Methodology
  - ❑ W3C unofficial documents

Disability Type Main Type	Guideline		
	WCAG 1.0	WCAG 2.0	Section 508
Cognitive impairment	1.1, 1.4	1.1	1194.22(a)
	3.5	1.1.1	1194.22(b)
	4.2	1.2	1194.22(d)
	6.2	1.2.1, 1.2.2, 1.2.3	1194.22(k)
	7.1, 7.2, 7.3, 7.4	1.2.4, 1.2.5, 1.2.7	1194.22(p)
	7.5	1.2.8, 1.2.9	
	10.1	1.3.1	
	11.4	2.2	
	13.1, 13.3	2.2.1, 2.2.2, 2.2.4	
	14.1, 14.2	2.3	
		2.3.1, 2.3.2	
		2.4	
		2.4.4, 2.4.5, 2.4.9, 2.4.10	



Generic guidelines	WCAG 1.0	WCAG 2.0	Section 508
	1.2, 1.3, 1.5	1.2	1194.22 (e)
	3.6, 3.7	1.2.6	1194.22 (f)
	9.1, 9.2	1.3	
	10.4	1.3.3	
	11.1, 11.3	1.4	
	13.4, 13.5, 13.7	1.4.2, 1.4.7, 1.4.8	
	13.9	2.2	
	14.3	2.2.5	
		2.4	
		2.4.6, 2.4.8	
		3.1	
		3.1.6	
		3.2	
		3.2.2, 3.2.3, 3.2.4	
		3.3	
		3.3.5	
		4.1	
		4.1.1	

## ❑ AREA B: *Mobile-Web Applications*

- ❑ **Accessible mobile applications: accessible applications and mobile applications.**
- ❑ **General-purpose usability guidelines applied to the mobile applications domain.**
- ❑ **Mobile Web applications guidelines.**
  - ❑ W3C Mobile Web Best Practices (MWBP)
    - ❑ *The two level structure narrows MWBP into a subset of checkpoints that are machine verifiable, called MobileOK Basic Tests.*
    - ❑ *The checkpoints are aligned into 5 Best Practice Headings akin to WCAG 2.0 POUR.*

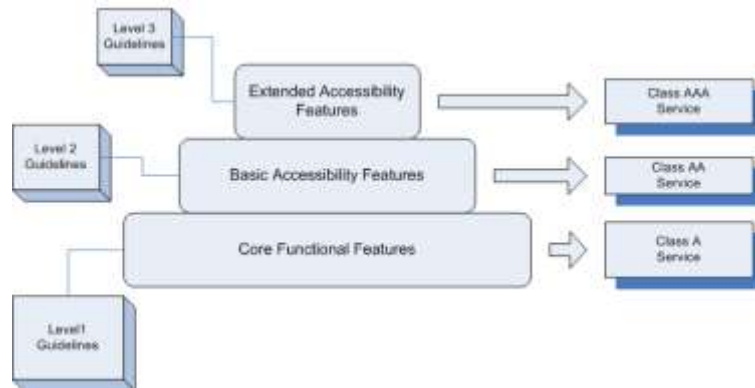
## ❑ Mapping Mobile-Web Application Guidelines to Disabilities

- ❑ **Define Mobile Accessibility Guidelines (MAG) with a three-step methodology.**
  - ❑ 1<sup>st</sup> STEP → mapping between MWBP and WCAG (either v1.0 or v2.0).
  - ❑ 2<sup>nd</sup> STEP → leverage this mapping to associate MWBP to disabilities.
  - ❑ 3<sup>rd</sup> STEP → define a subset of MWBP checkpoints that can be applied to non-Web scenarios.

Disability Type		Guidelines
Main Type	Subtype	MWBP
Hearing impairments	Conductive Hearing Loss	NON-TEXT_ALTERNATIVES
	Sensorineural Hearing Loss	NON-TEXT_ALTERNATIVES
	Mixed Hearing Loss	NON-TEXT_ALTERNATIVES
	Deaf Blindness	NON-TEXT_ALTERNATIVES
	Deafness	NON-TEXT_ALTERNATIVES

## ❑ AREA C: Web Services

- ❑ Three accessibility layers form the basis for the Accessible Web Service accessibility evaluation.



- ❑ “in-Level” categorization.

- ❑ **Mandatory guidelines (e.g. L1m).**
- ❑ **Not Mandatory guidelines (e.g. L2).**

## ❑ Mapping Web services to Disabilities

- ❑ Follow the instructions of the web applications disability mapping and the interaction limitations.
- ❑ In complement with the WCAG mapping the superset of checkpoints that have to be checked in the context of web Accessibility is settled.

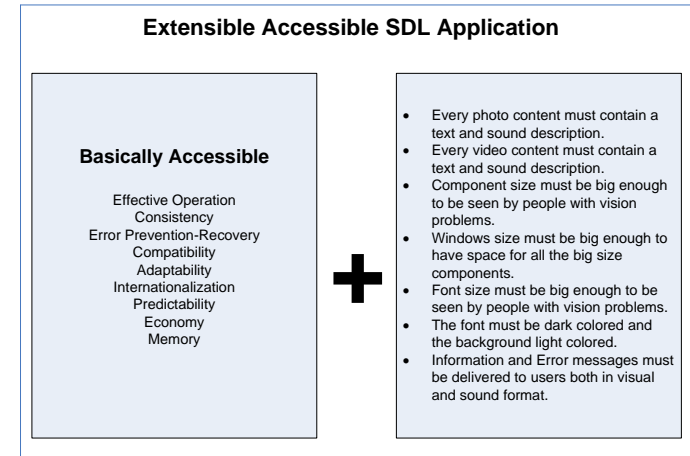
Disability Type		Guideline
Main Type	Subtype	Web services
Vision impairments	Low vision	12
	• Generalised haze	15
	Low vision	17
	• Extreme light sensitivity	15
	Low vision	15
	• Night blindness	16
Blindness	15	
	16	
	Colour-blindness	

## ❑ AREA D: *Description languages*

- ❑ The application must be able to process the user inputs and providing them with appropriate output content.
- ❑ 2 layers form the basis for the Accessible SDL application evaluation.

- ❑ Basic accessibility layer.
- ❑ Extended accessibility layer.

- ❑ A set of techniques that can be used to check whether an already developed SDL application belongs to a specific class were defined.



## ❑ Mapping Description languages to Disabilities

- ❑ According to the web applications disability mapping and the interaction limitations.

Disability Type		Guideline
Main Type	Subtype	SDL
<b>Hearing impairments</b>	Conductive Hearing Loss	10, 18, 19
	Sensorineural Hearing Loss	10, 18, 19
	Mixed Hearing Loss	10, 18, 19
	Deaf-blindness	10, 18, 19
	Deafness	10, 18, 19

- ❑ **HAM outcome → Best Practices Catalogue**
  - ❑ **Defines universal objective accessibility assessment metrics.**

- ❑ **Two sections.**

- ❑ **Correlation of the ACCESSIBLE components.**

- ❑ *Disability type.*
    - ❑ *ICF classification.*
    - ❑ *Functional limitations.*
    - ❑ *Assistive technologies.*
    - ❑ *Accessibility guidelines.*



***Best practices catalogue***

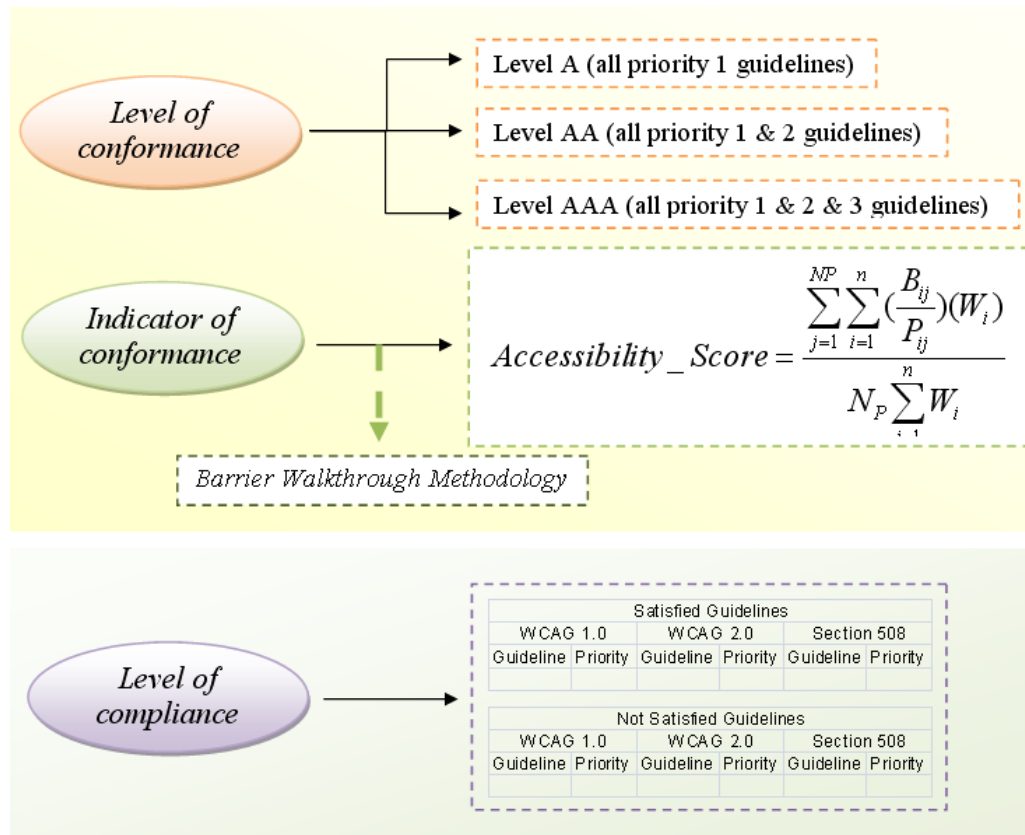
- ❑ **Methodological framework for the ACCESSIBLE optimum qualitative metric for measuring accessibility.**

- ❑ *Literature review.*
    - ❑ *SoA methodologies.*
    - ❑ *Adaptation of the optimum metric to ACCESSIBLE needs.*



***Accessibility score***

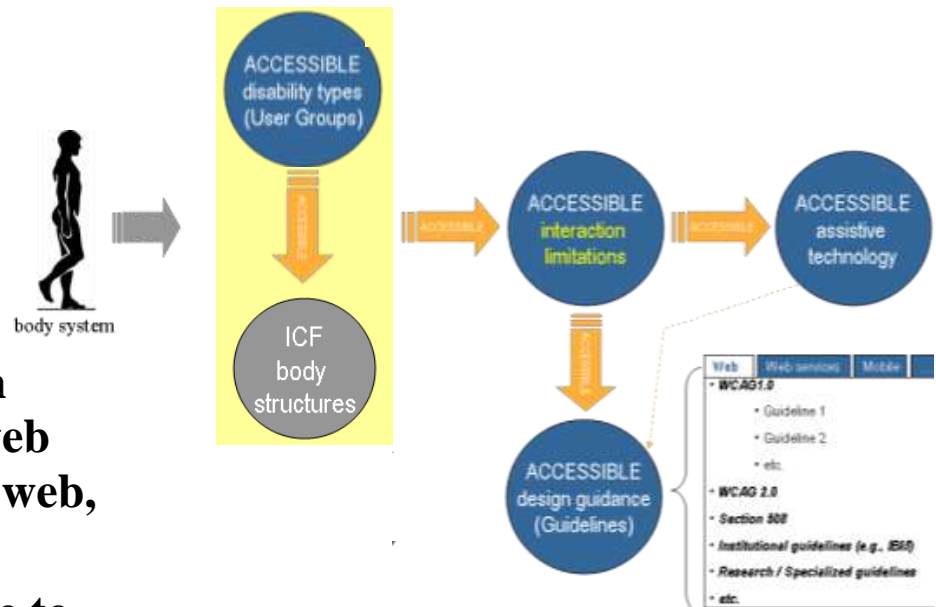
### ACCESSIBLE accessibility metric



- ❑ Level of conformance and Indicator of conformance will be available to the developers and the users too.
- ❑ Level of compliance and list of guidelines will be available to the developers only.

### ❑ Innovation

- ❑ Major step in software development products accessibility.
  - ❑ New concise and integral methodology for assessing different software application types and their level of accessibility, with established or under development guidelines.
- ❑ Correlation of all the components that are related to accessibility for people with disabilities and linking with the core of the ACCESSIBLE HAM, the disability type and the ICF classification.



### ❑ Foreseen added value

- ❑ Ability of extension of the HAM in wide range of application areas (web applications, web services, mobile web, SDL).
- ❑ Generic oriented methodology able to be adapted in other areas and include new guidelines.

# ACCESSIBLE

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