Università di Genova

Integration of Web Accessibility Courses in ICT programmes

Marina Ribaudo
DIBRIS, Università di Genova
April 27th, 2022

iwac
integration of web accessibility courses

Co-funded by the Erasmus+ Programme of the European Union

https://erasmus-plus.ec.europa.eu/projects/eplus-project-details#project/2019-1-SE01-KA203-060529

Funka

We offer | Education | Design for all | Research and Innovation | About Funka

- Research and innovation projects
- Position of trust and investigations
- Standardisation
- Webinars
- Employees

Accessibility - a natural part of training for web professionals

Funka is collaborating with universities across Europe and IAAP to make pilot courses in web accessibility that can be adapted to educational programmes in for example IT, design, and communication.

Across the EU, there is an increasing demand for web accessibility skills. Anyone who works with digital interfaces - whether as a developer, an editor, a designer, or a procurer – will soon require such skills. The effect of current and upcoming European legislation, such as the Web Accessibility Directive and the

IAAP International Association of Accessibility Professionals
A division of G3ict

Mittuniversitetet
MID SWEDEN UNIVERSITY

HOCHSCHULE DER MEDIEN

Università di Genova

> Many universities are interested in providing web accessibility courses but don’t know where to start. In this project, we can give all higher education institutions a foundation to build on, regardless of their educational focus, says Professor Katarina Gidlund at Mid Sweden University.

In this project we will, under the leadership of Mid Sweden University, develop and test a starter-kit for courses in web accessibility. The kit will include both online courses and case study material, as well as guidance and recommendations for how the universities can develop and adapt their own courses.

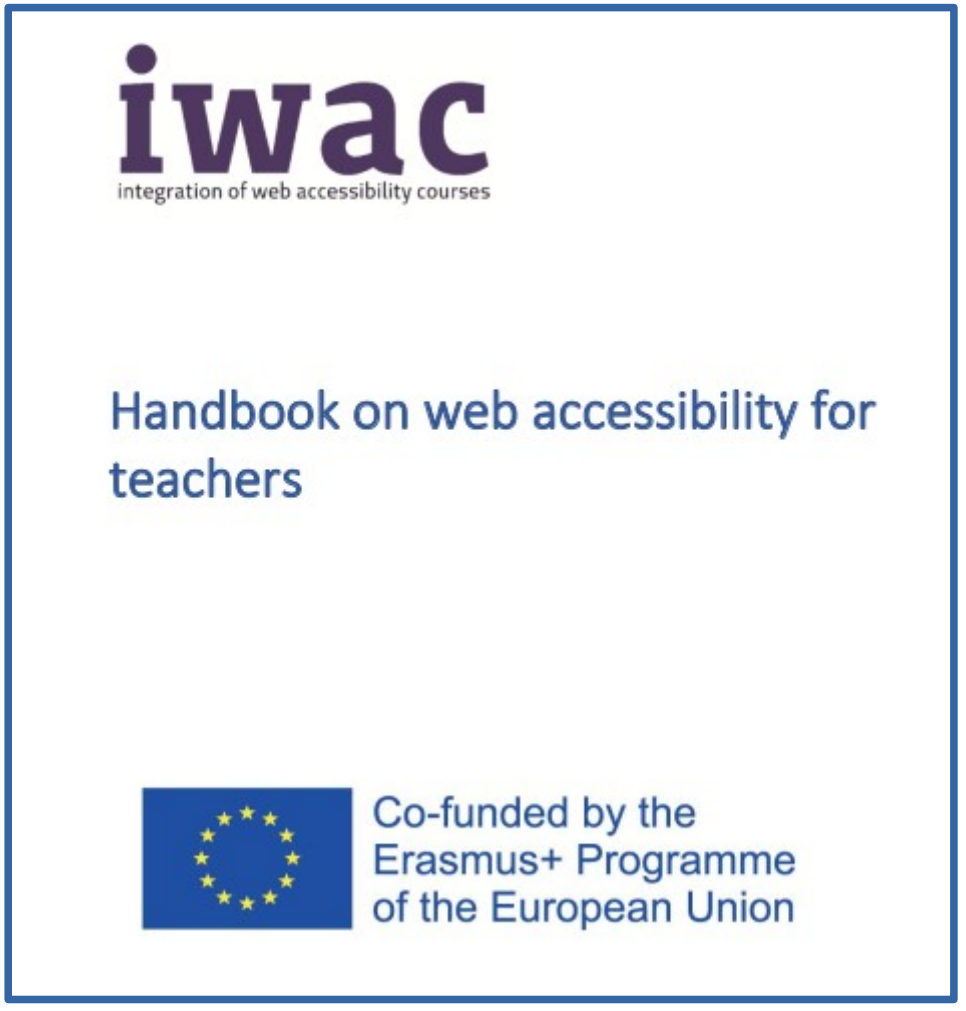
> Many universities are interested in providing web accessibility courses but don't know where to start. In this project, we can give all higher education institutions a foundation to build on, regardless of their educational focus, says Professor Katarina Gidlund at Mid Sweden University.

In this project we will, under the leadership of Mid Sweden University, develop and test a starter-kit for courses in web accessibility. The kit will include both online courses and case study material, as well as guidance and recommendations for how the universities can develop and adapt their own courses.

http://www.iaapnordic.org/projekt/iwac/project-outputs/

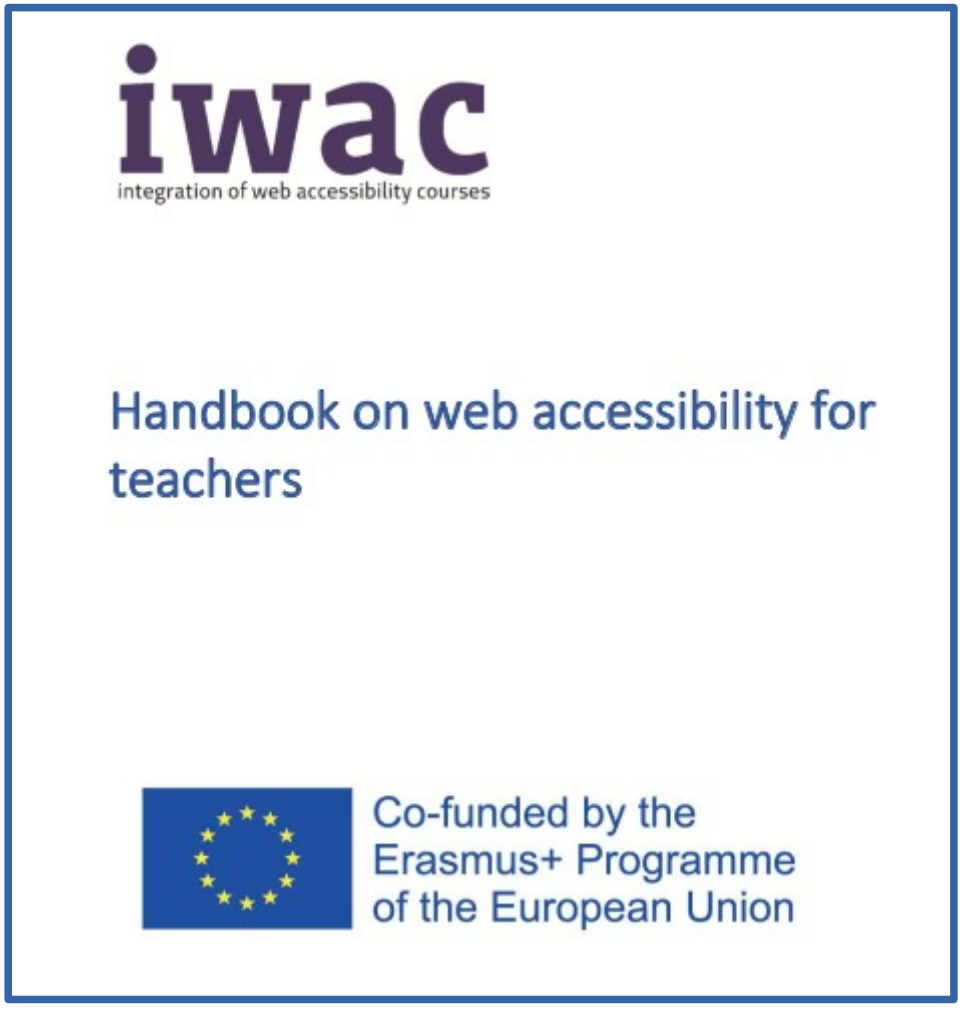
IWAC handbook

- **Targeting university professors** who want to **stimulate their students** to deepen their understanding of **inclusion issues**



IWAC handbook

- Provides an **overview of different aspects of web accessibility** and its context
- Each chapter has **links to resources** for further reading



IWAC handbook

IWAC handbook

[…] web accessibility should be practiced as an **on-going program**, not just as ad-hoc activities

IWAC handbook

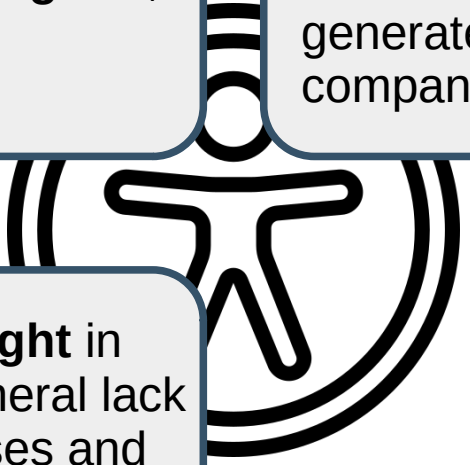
[…] web accessibility should be practiced as an **on-going program**, not just as ad-hoc activities

Since it is **not generally taught** in ICT education, there is a general lack of expertise among businesses and public organisations [...]

IWAC handbook

[…] web accessibility should be practiced as an **on-going program**, not just as ad-hoc activities

[…] inclusive and accessible design will attract more customers and generate a **positive image** of the company

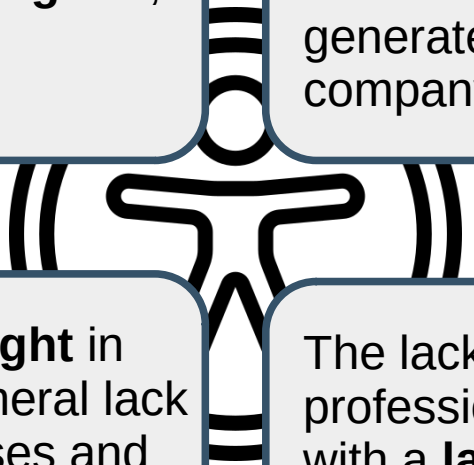


Since it is **not generally taught** in ICT education, there is a general lack of expertise among businesses and public organisations [...]

IWAC handbook

[…] web accessibility should be practiced as an **on-going program**, not just as ad-hoc activities

[…] inclusive and accessible design will attract more customers and generate a **positive image** of the company



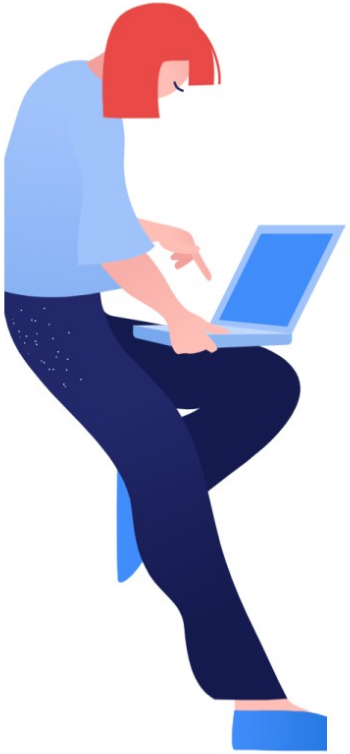
Since it is **not generally taught** in ICT education, there is a general lack of expertise among businesses and public organisations [...]

The lack of knowledge among ICT professionals should **not** be confused with a **lack of advacement** in the field

IWAC handbook

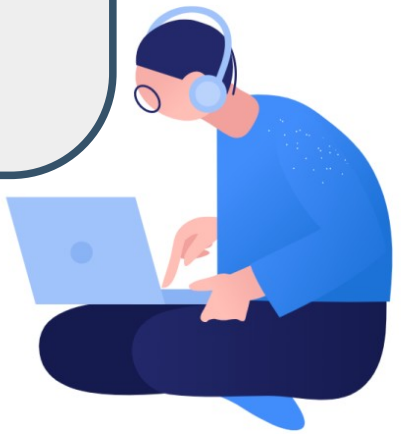
- Examples of how accessibility can be applied in teaching and learning

IWAC handbook

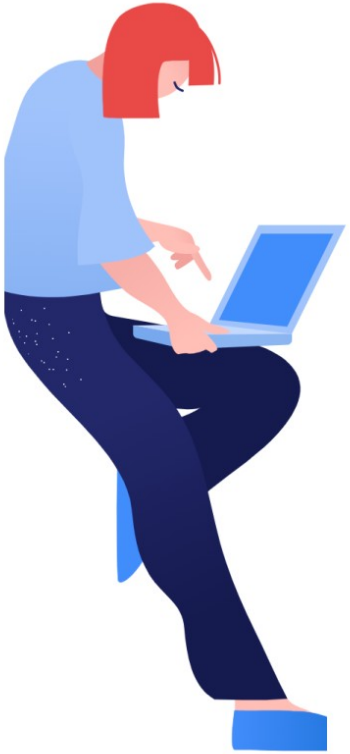


Norm-creative design
Students are given an assignment to analyse advanced apps for everyday tasks.

The challenge is to explore how the apps align with inclusive design, and whether they support the needs of persons with specific user needs.

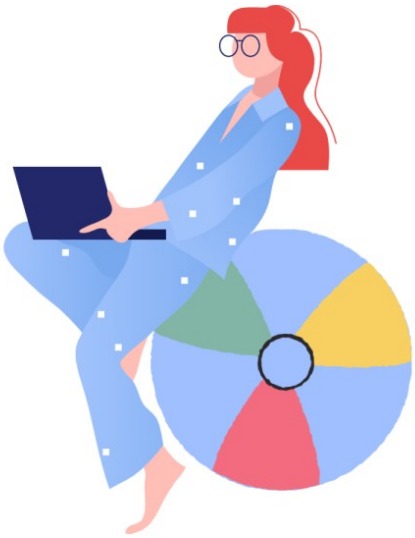


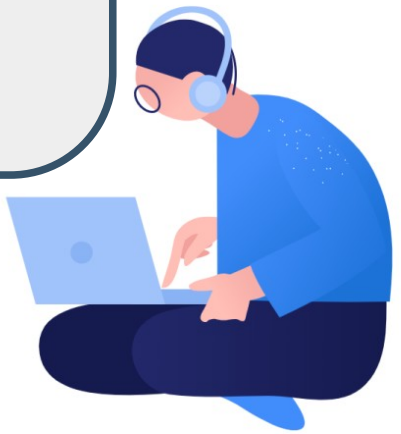
IWAC handbook



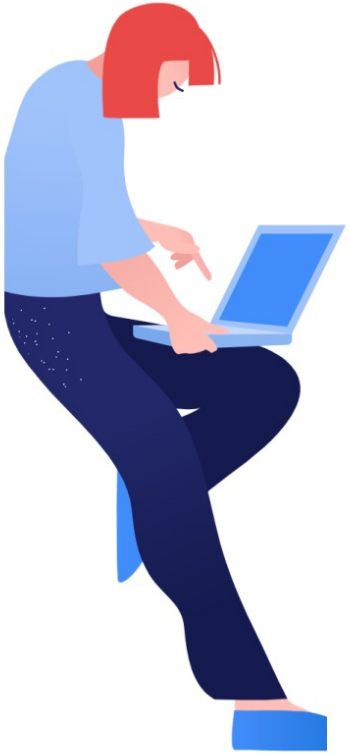
Emphatic modelling
The method involves simulating disabilities to give the students an opportunity to personally experience day-to-day situations from the perspective of a person that is blind or visually impaired.

As an example, using the web with the help of a screen reader

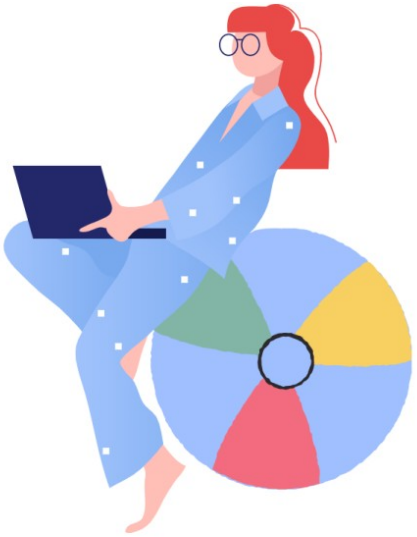


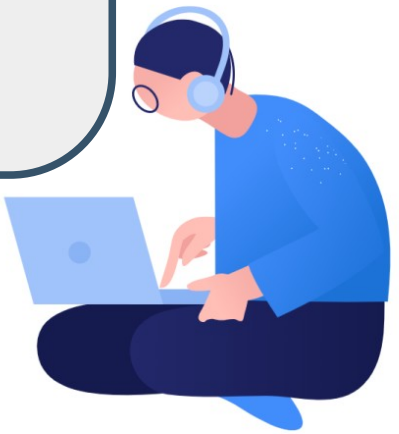


IWAC handbook



Hackathons
Organize hackathons where students acting as designers and developers work together with persons with disabilities, elderly, children, to co-design apps and services based on personalized solutions that can improve people's lives.





IWAC MOOCs

- Course 1 – Introduction to web accessibility from a user perspective
  - Unit 1: Vision
  - Unit 2: Hearing
  - Unit 3: Cognition
  - Unit 4: Motor

14 Enrolled Students

Apr 7 2022

Not Set

Issued by: University of Genova

Introduzione all'accessibilità web

General

Benvenuti

Annunci e news di carattere generale

Community del corso

Forum per l'interazione tra i partecipanti del corso

Questionario di inizio corso

Questionario di fine corso

1.

Unità 1: Mobilità

2.

Unità 2: Cognizione

3.

Unità 3: Visione

IWAC MOOCs - Feedback

- *I liked the overall objective to **increase awareness** about the different ways web can be used, facing the difficulties and providing solutions*
- *It was **eye-opening** and the practical exercises were the most interesting part, it was fun to put myself under similar conditions to the ones who actually have these kind of disabilities and it helped me to better understand how they feel when browsing the web.*
- *I **understand the difficulties** that some people have in using devices and I am pleased, in my small way, to be able to do something for them by making the websites I make accessible.*

IWAC MOOCs

- Course 2 – Accessible Teaching
  - Unit 1: Understanding inclusive teaching practices
  - Unit 2: Creating inclusive teaching practices

9 Enrolled Students | Jan 1 2022 | Not Set

Issued by: University of Genova

Apprendimento e insegnamento accessibili

General

Benvenuti a tutte e tutti nel corso Apprendimento e insegnamento accessibili

Facciamo la tua conoscenza

Per le prossime due settimane, imparerai alcune buone pratiche sull'accessibilità insieme ad altri professori e docenti. Prima di iniziare l'analisi delle procedure di insegnamento accessibili e inclusive, perché non ti prendi un po' di tempo per presentarti agli altri?

Puoi usare il forum per dirci di più su di te, perché hai scelto di unirti a questo corso o perché dovremmo interessarci delle pratiche di insegnamento inclusivo.

Annunci

Community del corso

Forum per l'interazione tra i partecipanti del corso

Questionario di inizio corso

Questionario di fine corso

IWAC Recommendations

- Make students aware of employment opportunities
  - For most ICT products and services sold in the European Union, **accessibility will no longer be optional but required**
    Web Accessibility Directive, adopted in 2016
    European Accessibility Act, adopted in 2019
  - According to LinkedIn, the number of vacancies with “accessibility” in the title increased by 78% between August 2020 and July 2021

Students activities

- Mid Sweden University
  - Accessible customer journey: learning how to design services and products that meet the needs of users with different abilities
- Stuttgart Media University
  - Set up a computer with assistive technologies for two users with different disabilities

University of Genoa

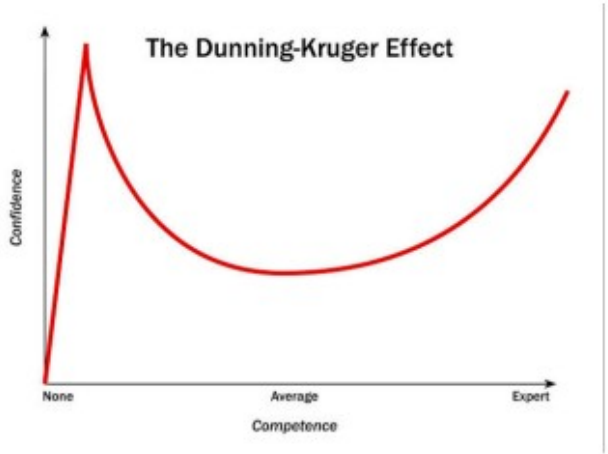
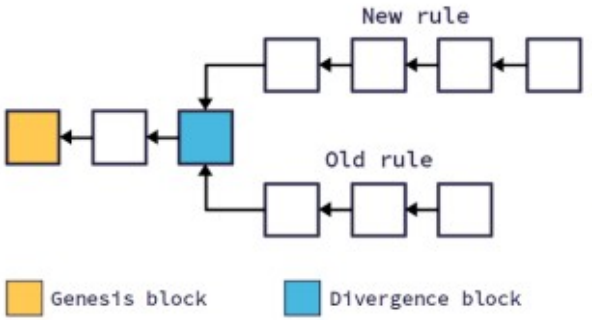
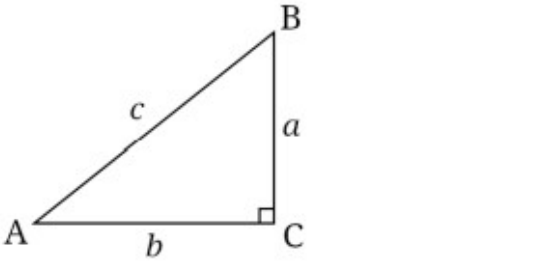
- **Accessibility issues for complex images**
  - Starting from a basic knowledge of web accessibility for the images, students will learn how to write descriptions for STEM images to make them accessible.
  - Proposed to **3rd year students** attending the Web Development course

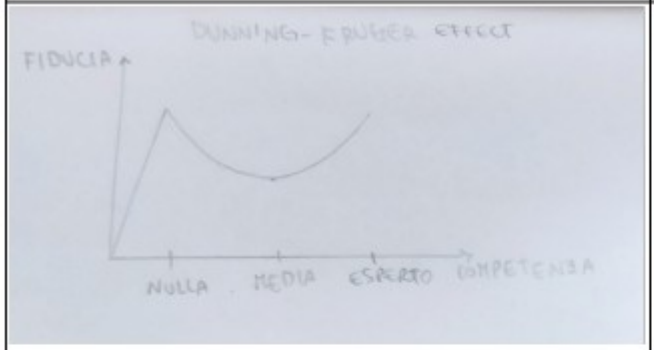
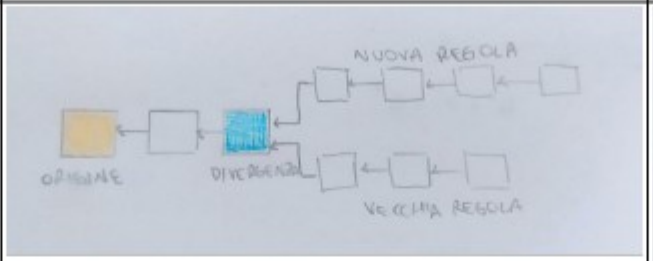
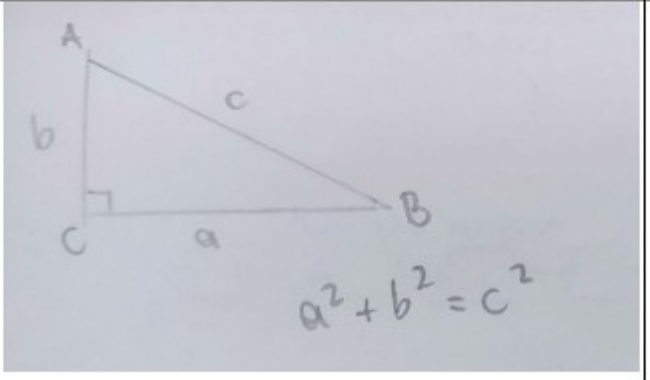
Accessibility issues for complex images

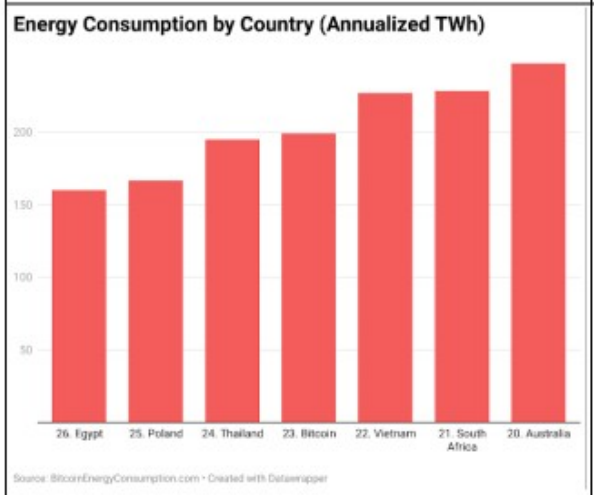
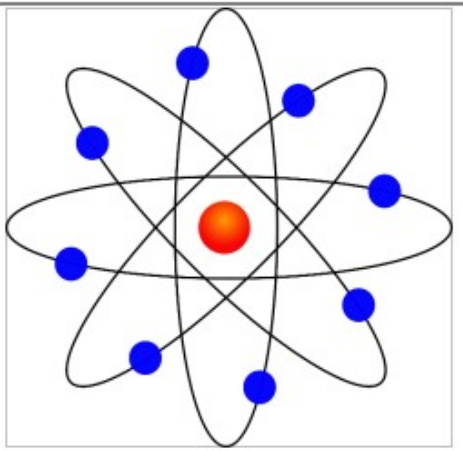
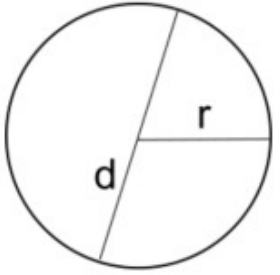
- **Part 1.** For each image, provide:
  1. the alt-text of the image (max 140 chars)
  2. the long description (max 840 chars)
  3. the time required to describe the image

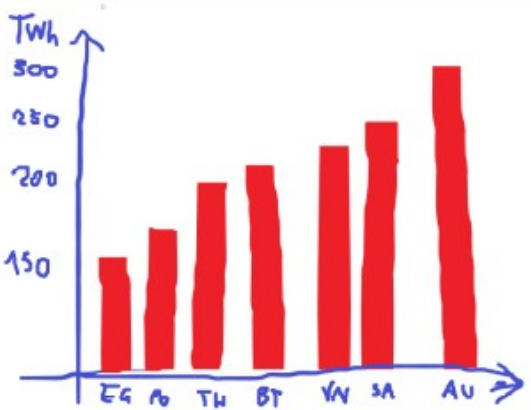
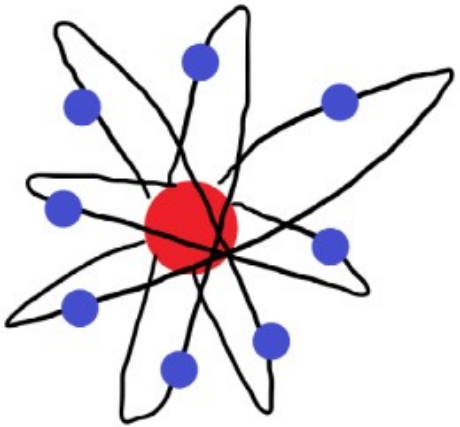
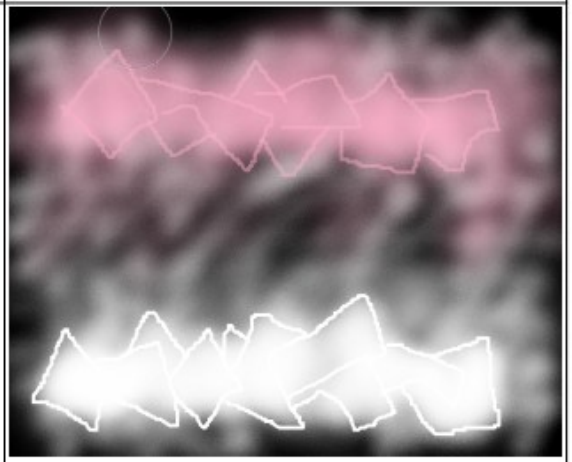
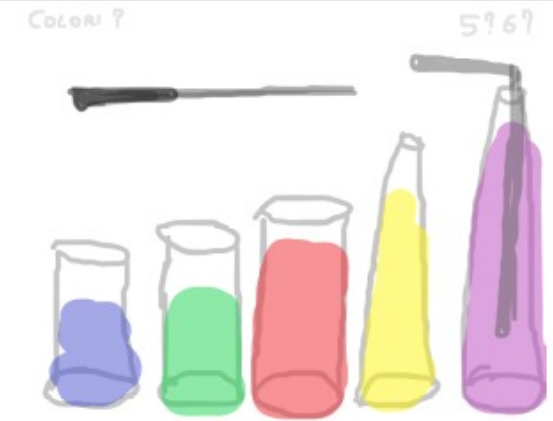
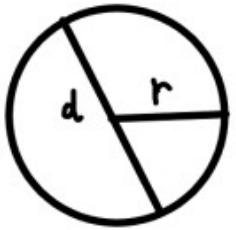
Accessibility issues for complex images

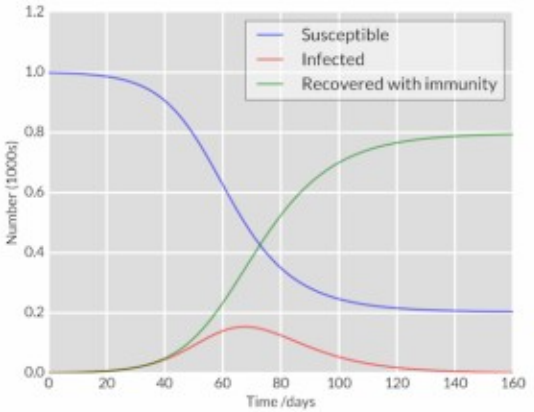
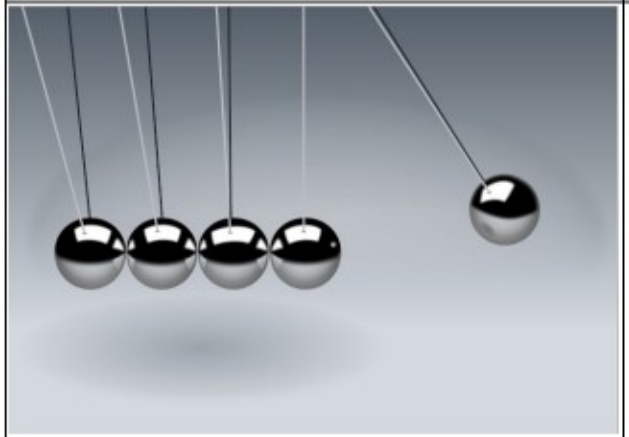
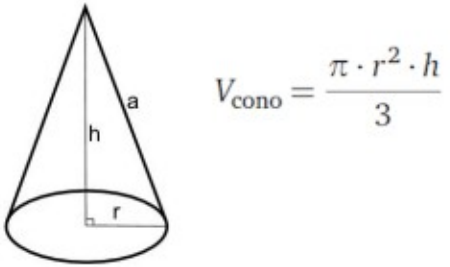
- **Part 2.** Given the descriptions of other images, draw them without seeing them
- The images were in **different categories** to experiment with different ways in their descriptions and in the following reconstructions

Category 1: Curves and histograms	Category 2: Diagrams	Category 3: Nature
		
Category 4: Objects	**Category 5: Geometry**	
	 $a^2 + b^2 = c^2$	

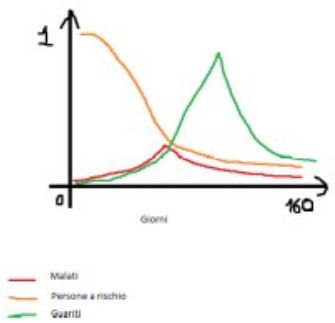
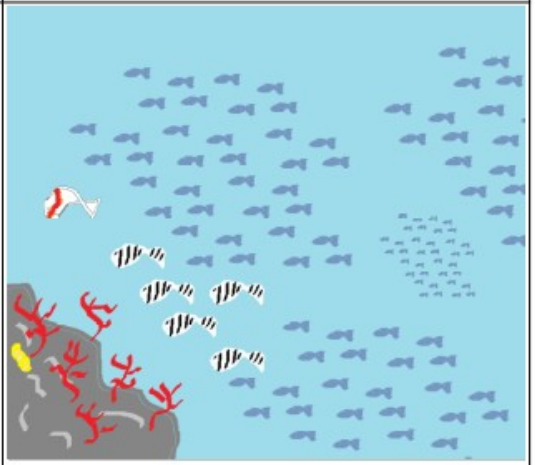
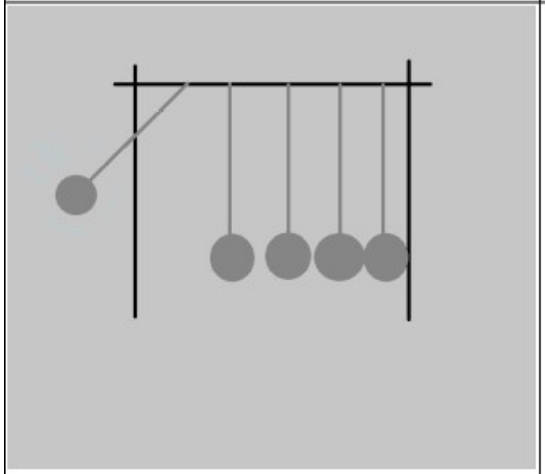
Category 1: Curves and histograms	Category 2: Diagrams	Category 3: Nature
		
Category 4: Objects	**Category 5: Geometry**	
		

Category 1: Curves and histograms	Category 2: Diagrams	Category 3: Nature
		
Category 4: Objects	**Category 5: Geometry**	
	 $A = \pi r^2$	

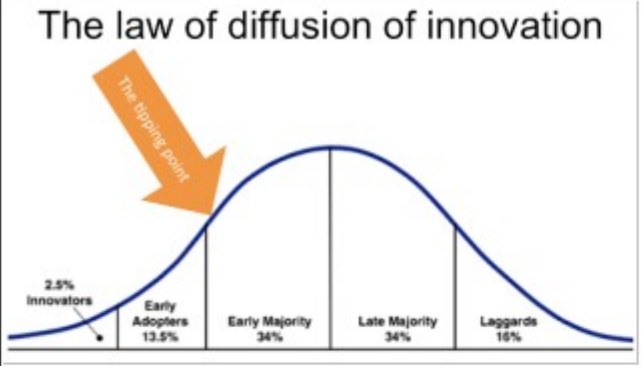
Category 1: Curves and histograms	Category 2: Diagrams	Category 3: Nature
		
Category 4: Objects	**Category 5: Geometry**	
	 $A = \pi * r^2$	

Category 1: Curves and histograms	Category 2: Diagrams	Category 3: Nature
		
Category 4: Objects	**Category 5: Geometry**	
		

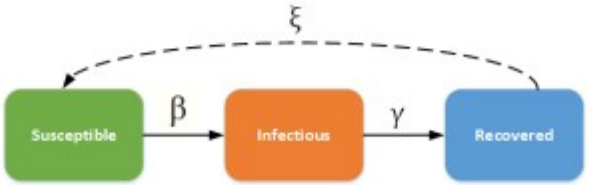
$$V_{\text{cono}} = \frac{\pi \cdot r^2 \cdot h}{3}$$

Category 1: Curves and histograms	Category 2: Diagrams	Category 3: Nature
		
Category 4: Objects	**Category 5: Geometry**	
		

Category 1: Curves and histograms



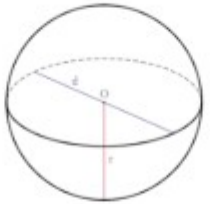
Category 2: Diagrams



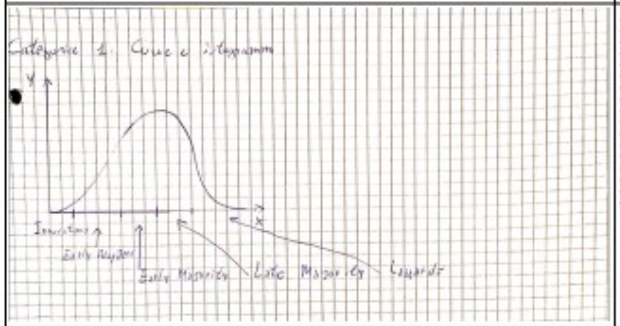
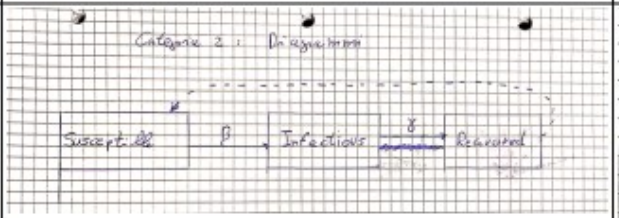
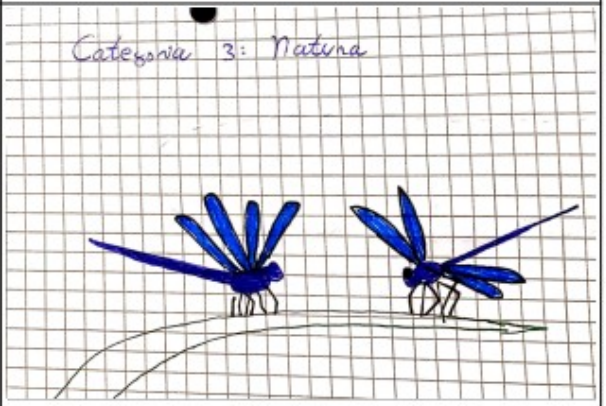
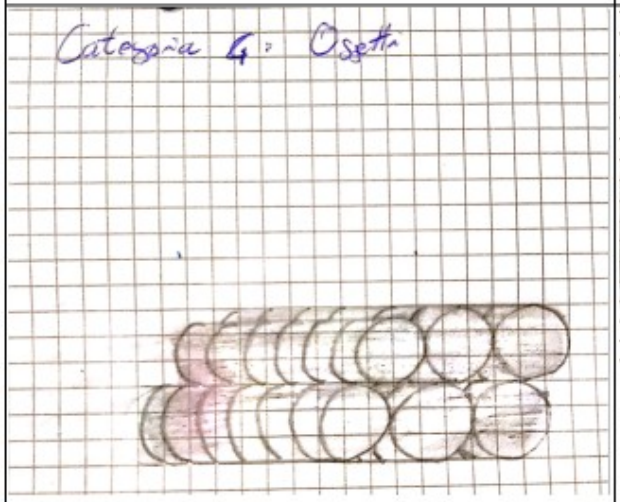
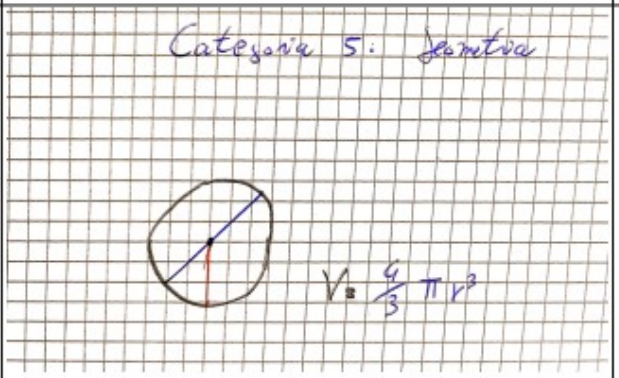
Category 3: Nature

Category 4: Objects

Category 5: Geometry



$$Volume = \frac{4}{3}\pi r^3$$

Category 1: Curves and histograms	Category 2: Diagrams	Category 3: Nature
		
Category 4: Objects	**Category 5: Geometry**	
		

Feedback

- With this exercise I think I have increased my awareness on the accessibility issues related to the images on the web.

	Responses
Strongly Agree	12 (48.00 %)
Agree	12 (48.00 %)
Undecided	0
Disagree	1 (4.00 %)
Strongly Disagree	0

Feedback

- *L'esperimento/esercizio proposto è stato molto interessante e permetteva di vivere in prima persona le difficoltà di accessibilità per utenti con disabilità di vario genere.*
- *Since I like drawing I pretty much enjoyed this activity*
- *Thank you for this interesting activity, I enjoyed it a lot!*
- *It was a useful exercise to put yourself in the shoes of a blind person*

Università degli Studi di Genova

Dipartimento di Informatica, Bioingegneria,
Robotica e Ingegneria dei Sistemi (DIBRIS)

BSc Computer Science

Evaluating the Effectiveness of Automated Tools for the Generation of Web Images Descriptions

by

Advisors: Maurizio Leotta, Marina Ribaudo

January, 2021

logo" or something similar. Using a description like `alt="blue bird"` is a bad choice because it does not provide the information that the image would like to convey: this is the logo of Twitter not a generic blue bird.

Figure 1.2: Twitter logo, `<img alt="Twitter logo" ... />`

Web pages contain many images but sometime it might be annoying for the developers to label all them properly since it is time-consuming. As a consequence, the web is full of content that does not satisfy this simple accessibility requirement.

Fortunately, in recent years, tools have been developed to automatically create image descriptions, and this is the subject of my final project: I selected some of these tools and analysed the quality or their results. These tools were not developed for the specific task of alternative text's creation, but for general image descriptions, and I used them, adopting a *black box* approach, for labelling several images taken from Wikipedia[8]. Then, I evaluated the quality of their results thanks to a survey proposed to some university students, and tried to understand whether the automatic generated descriptions can be compared with those written by humans.

[8] https://www.wikipedia.org/

Automatic vs human captioning

- Thanks to the advent of advanced machine learning techniques, scientific research has made significant steps forward in this field by proposing different approaches to automatic image captioning
- However, to the best of our knowledge, these tools were never evaluated to understand if their outputs could be used as a substitute for manual defined alt-texts in the web context

Automatic vs human captioning

- Comparison among different vision engines
  - Azure Computer Vision Engine
  - Amazon Rekognition
  - Cloudsight
  - Auto Alt-Text for Google Chrome

  - Human authored: Wikipedia

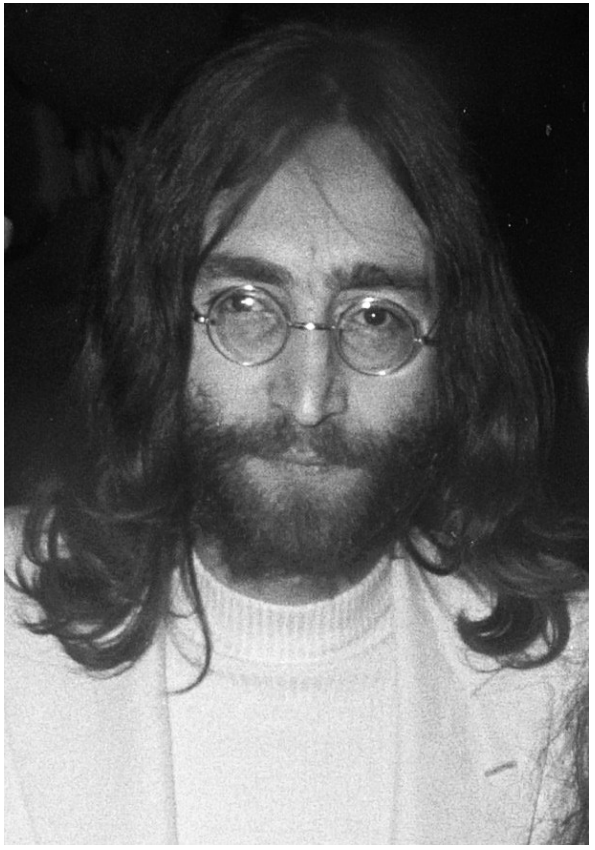
Automatic vs human captioning

- Descriptions of **60 images** selected from Wikipedia covering the categories **General, Human**, and **Landmark**

Automatic vs human captioning

Wikipedia	`complete brown sugar rapadura`
Azure CVE	`a close up of a teddy bear`
Amazon Rek	`sugar, food`
Cloudsight	`brown powder on white ceramic plate`
Auto Alt-Text	`a close up of a cake on a plate`

Automatic vs human captioning



Wikipedia	John Lennon 1969
Azure CVE	John Lennon in glasses looking at the camera
Amazon Rek	face, person, accessories, glasses, beard
Cloudsight	man in black framed eyeglasses
Auto Alt-Text	a man with a tie

Automatic vs human captioning

Wikipedia	youth soccer indiana
Azure CVE	a group of young men playing a game of football
Amazon Rek	person, people, team, soccer, ball, sport, team sport, soccer ball, football
Cloudsight	three boys playing soccer on green grass field during daytime
Auto Alt-Text	a group of young children playing a game of soccer

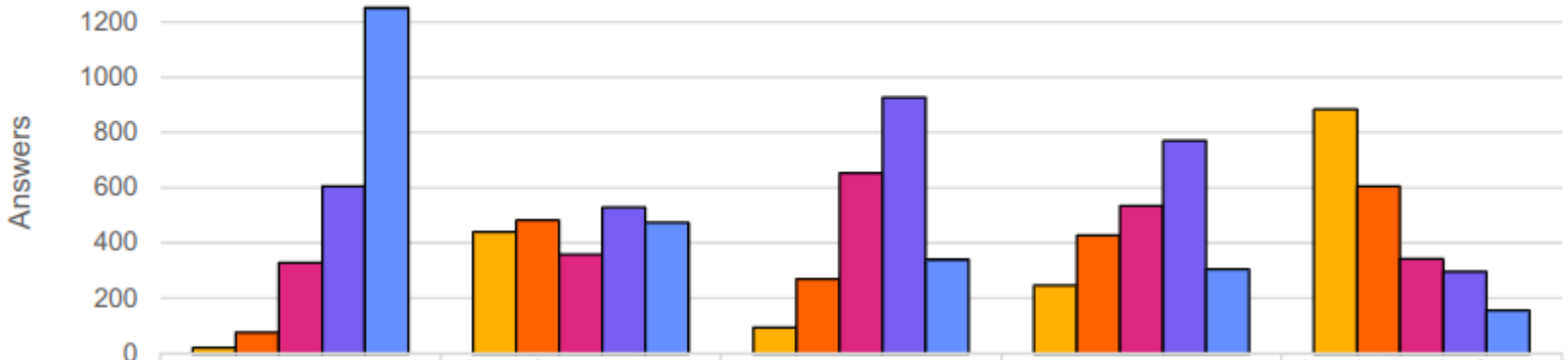
Automatic vs human captioning

- Q1: Is there any difference in the perceived correctness among the descriptions generated by the considered tools?

- RQ2: Is there any difference in the perceived correctness between the ground truth descriptions provided by humans and those provided by the tools?

Automatic vs human captioning

- Evaluate each of the following 5 descriptions for the picture above.
  In your opinion, are they good descriptions for the picture? (evaluate aspects like the correctness and the precision of the description)



	Wikipedia (manual)	Azure Computer Vision Engine	Amazon Rekognition	Cloudsight	Auto Alt-Text for Google Chrome
Strongly disagree	20	440	93	245	882
Disagree	77	481	269	427	605
Neither agree nor disagree	328	358	653	533	342
Agree	604	528	926	770	296
Strongly agree	1251	473	339	305	155

Automatic vs human captioning

	Wikipedia	Azure CVE	Amazon Rek	Cloudsight	Auto Alt-Text
Human	1	**2**	3	4	5
Landmark	1	4	3	**2**	5
General	1	4	**2**	3	5
Overall	1	4	2	3	5

Table 21: Summary of the comparison: ranking of Wikipedia (always the best) and the four tools

- With the current technology, the correctness (and thus the perceived quality) of the human-authored descriptions is simply **not yet reachable** by automated tools

Conclusions

I have presented the issue of accessibility which is still an unsolved problem.

I have also presented an exercise for students because I think that us, as future developers, are responsible of the design and development of digital services without barriers.

Università di Genova

Grazie per l’attenzione

iwac
integration of web accessibility courses

Co-funded by the Erasmus+ Programme of the European Union