

MULTIMEDIA COMMUNICATION

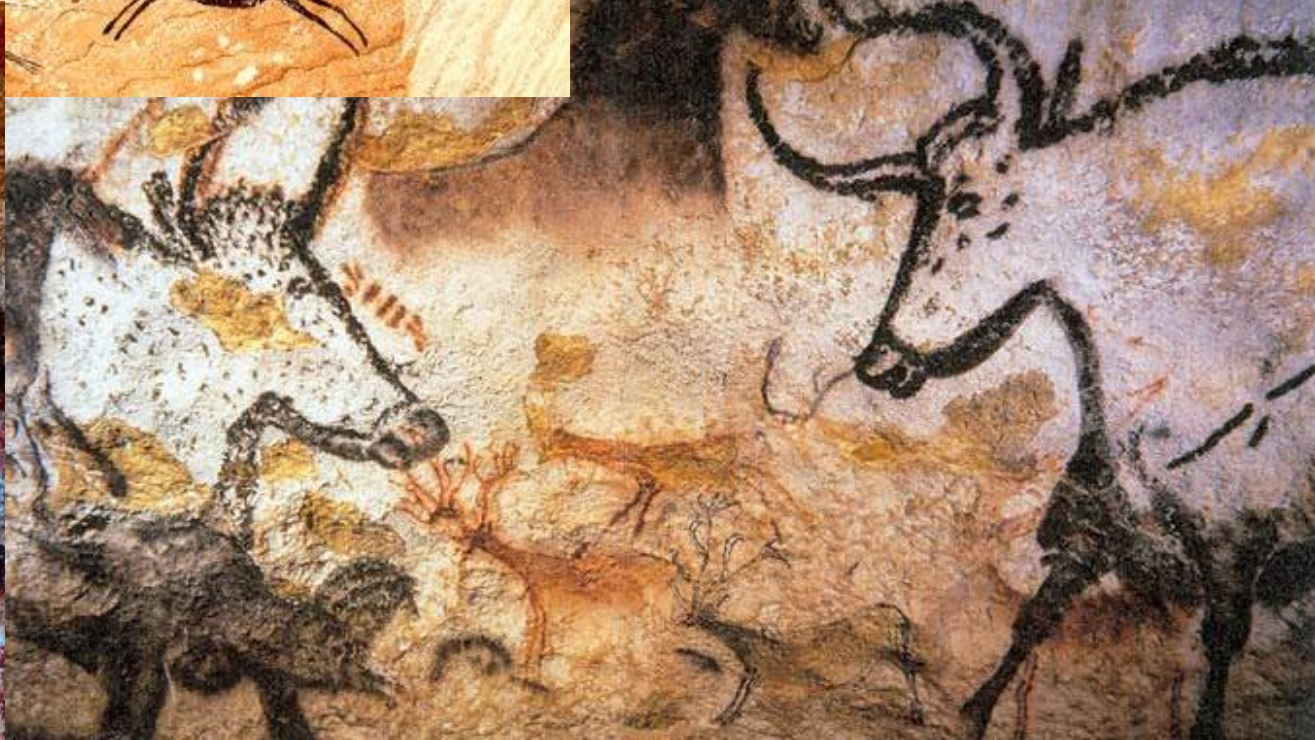
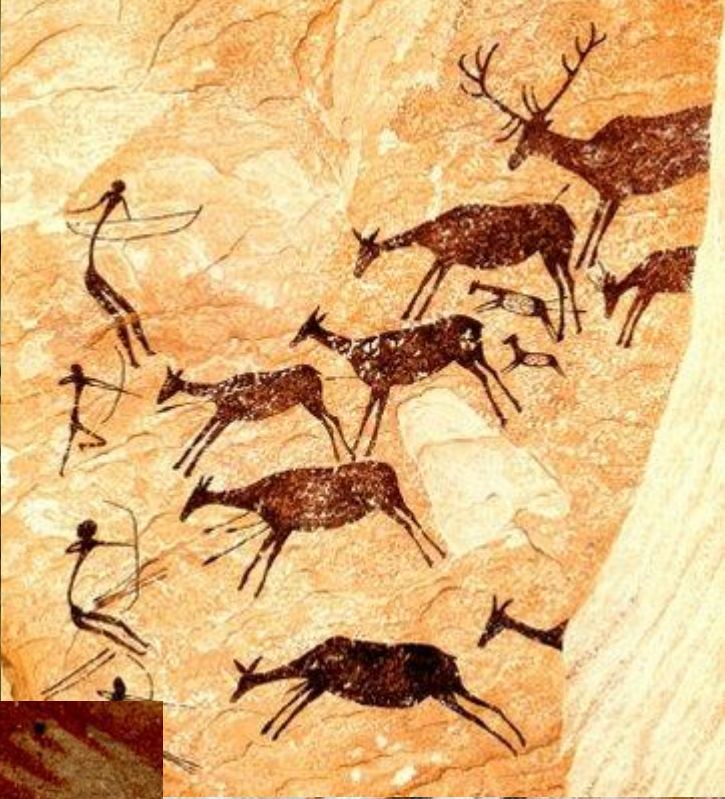
Fernando Pereira

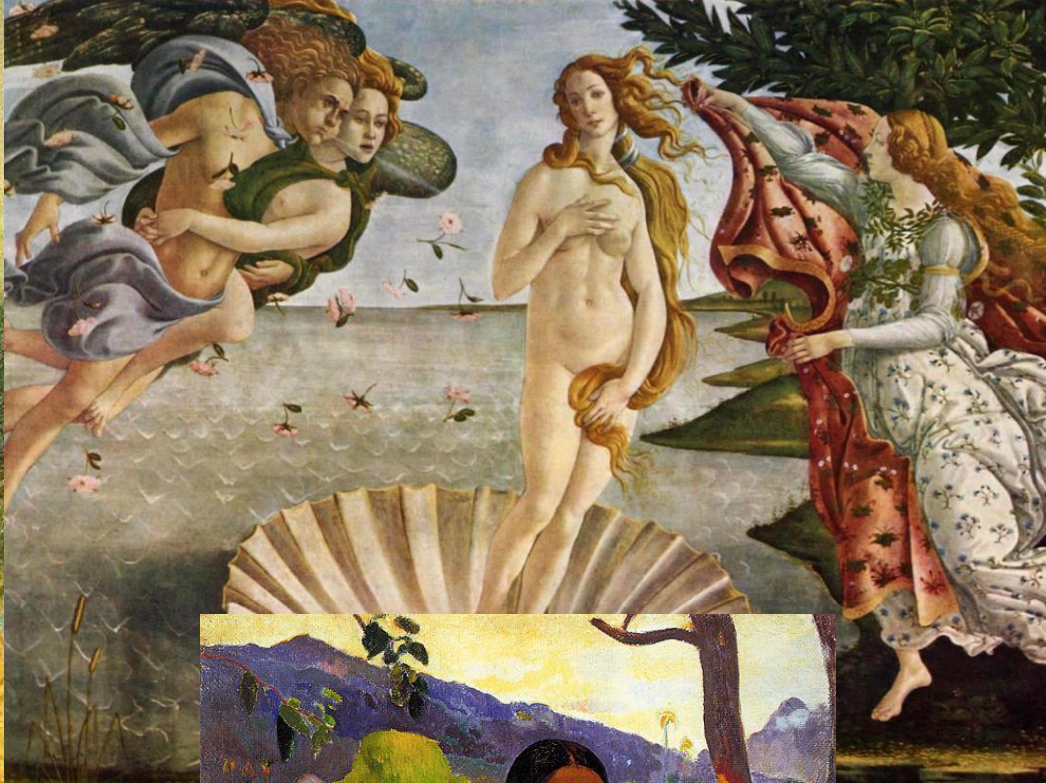
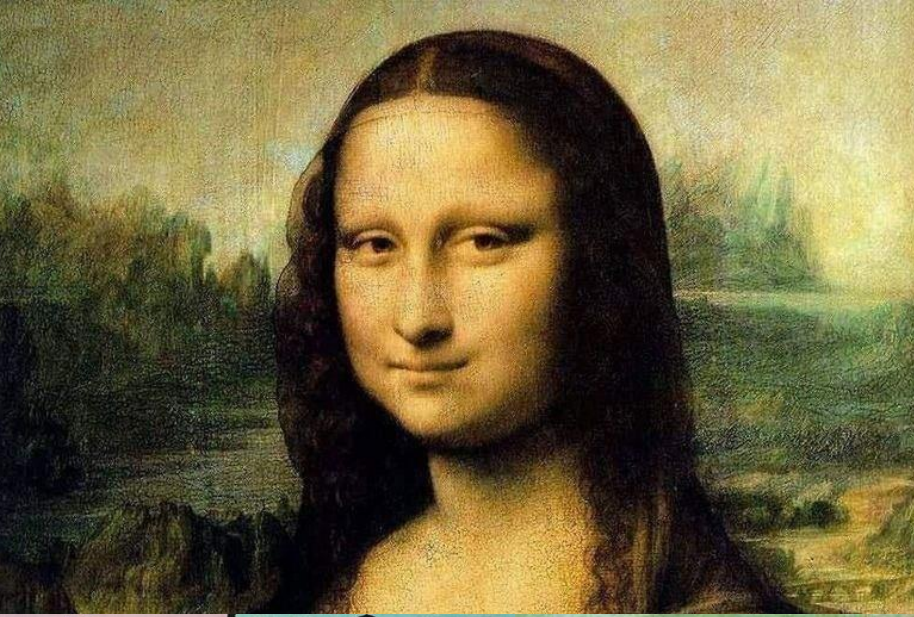




HUMANS

*This is a Long
Story ...*



















*And
Surprisingly ...*



**REALITY
CHECK
AHEAD**

—
**according
to science**

How to Survive a Pandemic



17,000+

**HEALTH WORKERS
HAVE DIED FROM
COVID-19 IN THE
PAST YEAR**









WhatsApp
CALLING







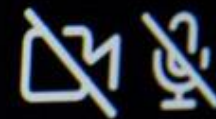
Main-ZR-Flr0



End Meeting

/2022









ABOUT US







Multimedia Communication: The Course

Relation and Logistics

Nothing great was ever achieved without enthusiasm.



Ralph Waldo Emerson

US essayist & poet (1803 - 1882)

Web Page and Mailing List

[http://www.img.lx.it.pt/~fp/comunicacao_multimedia/
Welcome_CMul_Alameda.htm](http://www.img.lx.it.pt/~fp/comunicacao_multimedia/Welcome_CMul_Alameda.htm)

To subscribe the course mailing list
send a message to fp@lx.it.pt

Mailing list address:
cmul_ist_alameda@lx.it.pt



CMul Lectures Schedule

Theoretical Lectures

- ★ 2 lectures of 120 minutes per week – **Monday, 11am, QA.02.1,** and **Tuesday, 5pm, QA.02.1**

Practical Lectures (in weeks with no lab)

- ★ 1 lecture of 120 min per week – **Tuesday, 1pm, EA2,** and **Friday, 11am, EA1**

Laboratory Sessions (in weeks 3, 4 and 5)

- ★ 1 lecture of 120/180 min per week – **Monday, 4pm, LT5,** and **Friday, 2pm, LT5**

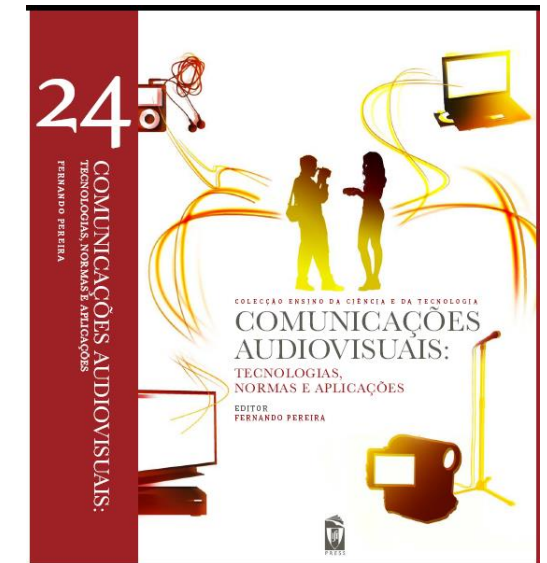
The weeks with practical lectures or lab sessions will be also announced in the CMul mailing list where you should be subscribed.

	<	>	today	Nov 29 - Dec 5 2021				
	Seg 11/29	Ter 11/30	Qua 12/1	Qui 12/2	Sex 12/3			
07:00								
08:00								
09:00								
10:00								
11:00	11:00 - 13:00 T QA02.1				11:00 - 13:00 PB EA1			
12:00								
13:00		13:00 - 15:00 PB EA2						
14:00								
15:00								
16:00								
17:00		17:00 - 19:00 T QA02.1						
18:00								
19:00								

Studying Material

Studying material made available consists in:

- ★ **Book “Comunicações Audiovisuais: Tecnologias, Normas e Aplicações”, IST Press, 2009 (details at the CMul Web Page)**
- ★ **Slides from theoretical lectures (available at CMul Web Page)**
- ★ **Additional supporting texts for each topic (available at the CMul Web Page)**
- ★ **Collection of exercises with many corresponding solutions (available at CMul Web Page)**
- ★ **Laboratory guides (available at CMul Web Page)**



Evaluation Method



The evaluation method includes three components:

1. **EXAM**

- After the end of the lecturing period (weight 50%) – 12th February 2022, 6pm and 24th February 2022, 6pm;

2. **PROJECT** (in groups of 3)

- About a selected topic; to be finished by 21st January 2022 (weight 35%) with a preliminary Table of Contents by 17th December 2021

3. **MAP QUIZZES AT THEORETICAL LECTURES**

- 2 MAP Quizzes per week (starting in week 2), only the best per week counts
- $\text{Quizzes_Score} = 20 \times (\text{Number of questions rightly answered in the best 6 MAP sessions, 1 per week}) / (\text{Total number of questions asked at the corresponding 6 MAP sessions})$

4. **FINAL SCORE:**

- **$\text{Final_Score} = \text{round} (0.5 \times \text{Exam_Score} + 0.35 \times \text{Project_Score} + 0.15 \times \text{Quizzes_Score})$**

Evaluation Method: The Rules ...

★ Exam

- The minimum score for the exam is **9.5**.

★ Project

- The minimum score for the project is **9.5**.
- The project should be made in groups of **3 students**.
- The project score is **individual** even if the project is a group work.
- The evaluation of the project may include a **self-assessment component**; it may also include a presentation and/or discussion, if found necessary.

★ Final score

- The minimum final score is **9.5**.
- The students with a final score higher than 17 may have to make an oral exam to confirm the score; not making this oral exam, if requested, **implies getting a score of 17**.

Practical Lectures: Bring Your Videos



- ★ For each practical lecture (1 per week), students will be asked to suggest short videos, around 3 minutes long, related to a specific topic previously announced, e.g. VR/AR/MR, Multimedia in Social Networks, IPR, Streaming.
- ★ At the second part of each practical lecture, at most 2-3 selected videos will be presented and debated. These videos are selected by the professor in charge from those suggested by the students for the corresponding week.
- ★ The proposing student for a selected video will be asked to introduce it and manage the following debate.
- ★ At the end of lecture, the students will vote the most interesting movie from those presented if more than 1 video was selected for presentation from those proposed by the students.
- ★ The student who suggests the ‘winning video’ for a specific lecture will get a bonus for his/her CMul final score (before final rounding) of 0.5 points.
- ★ Each student cannot accumulate more than 1 final score point on video-related bonus.

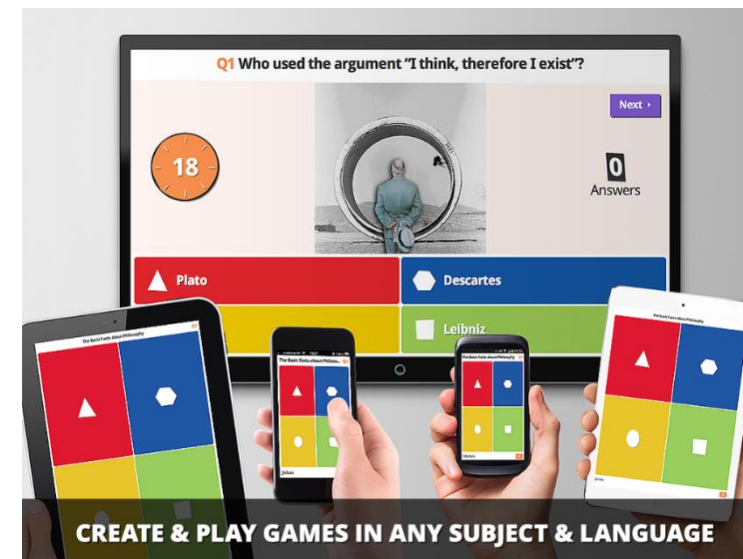
Evaluation Method: Project Self-Assessment

- ★ By the project deadline date, each student (not each project) will provide to a previously identified student representative, his/her 'estimate' of the score for his/her project. The professor will have NO access to these 'score estimates'.
- ★ The professor will score the projects in a 0-20 scale.
- ★ The students which estimated score is **the same** as the professor's score will get a **bonus of 1 point** in the project score.
- ★ The students which estimated score is **± 1 point** regarding the professor's score will get a **bonus of 0.5 point** in the final project score.



Testing Kahoot Application

1. Pick your mobile phone or laptop
2. Enter in kahoot.it
3. Insert the Game PIN
4. Use your student number as your ID
5. Choose an answer before the time is over
6. Check the result



About the Project

- ★ The project has the key objective to offer the students the opportunity to review a multimedia related topic that they like, thus asking for bibliographic review, company visits and contacts, product review, etc.
- ★ The project will be produced in two **versions**:
 1. **Paper version** which shall not have more than **8 PAGES** using the template made available at the CMul Web Page.
 2. **Web version** with a similar content of the paper version but exploiting HTML capabilities typical of Web content, e.g. including video and audio material, and interactivity. *Must include a 3 minutes video where the group summarizes the topic by just speaking (using no slides at all).*
- ★ **Deadlines**
 - ★ **December 17, 2021** – 1-2 pages (pdf file by email) with the paper table of contents (the topic should have been selected before)
 - ★ **January 21, 2022** – Paper (pdf) and Web versions

Explaining the Project ...



**Tuesday, 1pm, EA2, and
Friday, 11am, EA1**



Students (in groups of 3) should register the project topic by sending an email to fp@lx.it.pt with the topic and the names and numbers of the students.

Groups for the laboratory sessions may be different.

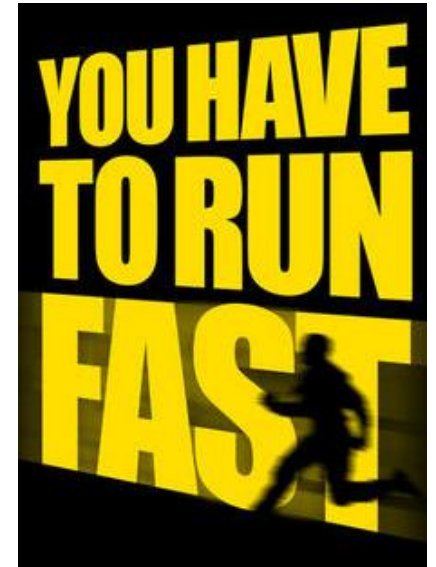
Lab Registration

Monday, 4pm, LT5, and
Friday, 2pm, LT5

Students (in groups of 2) should register for one of the lab sessions by sending an email to [**fp@lx.it.pt**](mailto:fp@lx.it.pt).

FIFO processing for the 2 lab sessions (in weeks 3, 4 and 5) ...

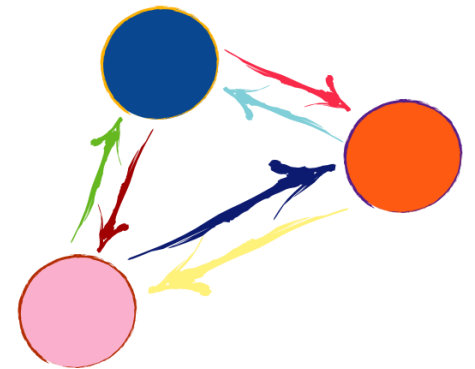
Groups for the project may be different.



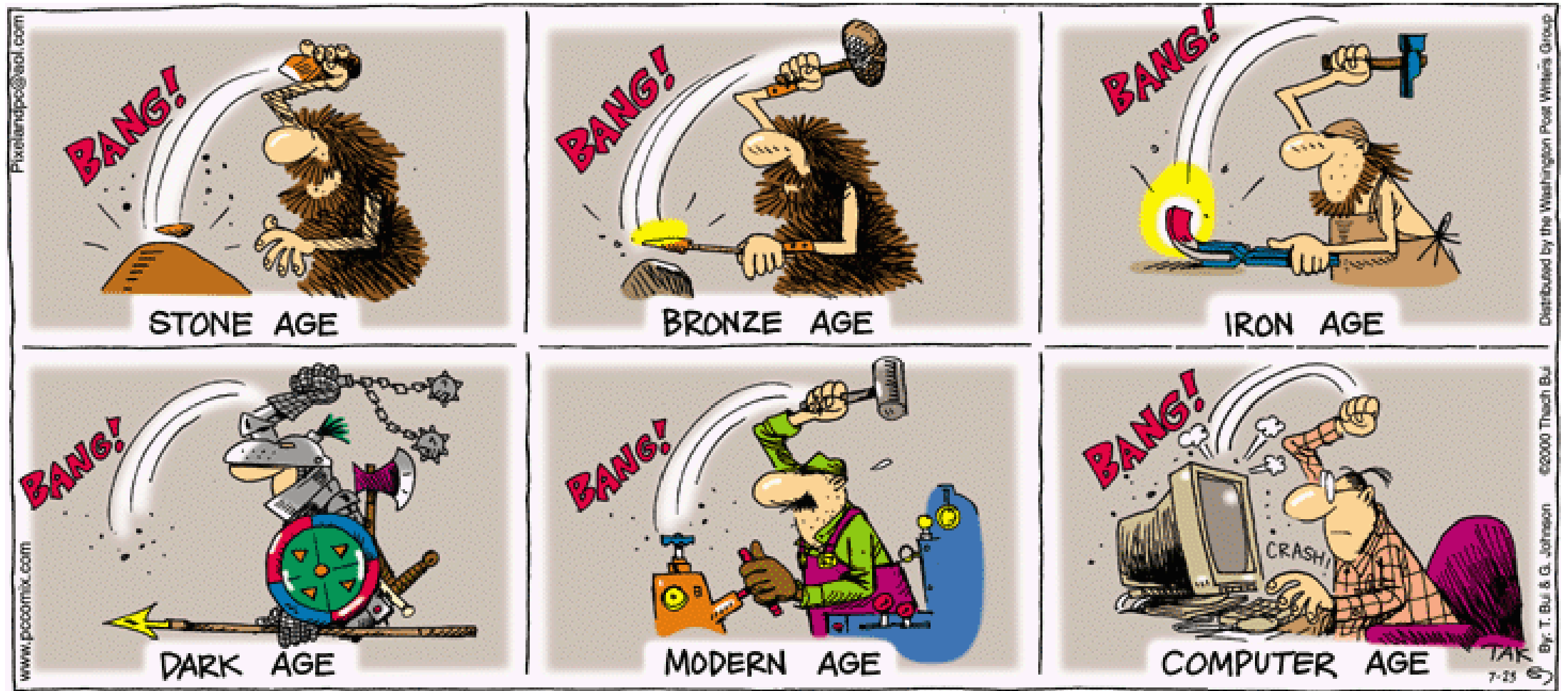
The Course Content: a Quick Trip Around

Course Objectives

- ★ To understand the main concepts and tools in video and audio representation, especially targeting compression
- ★ To understand how the concepts and tools build complete solutions to address the needs and requirements of relevant applications
- ★ To study some relevant coding solutions, both standard and non-standard based
- ★ To discuss future trends in multimedia coding technology and services



Program: an Evolutive Perspective

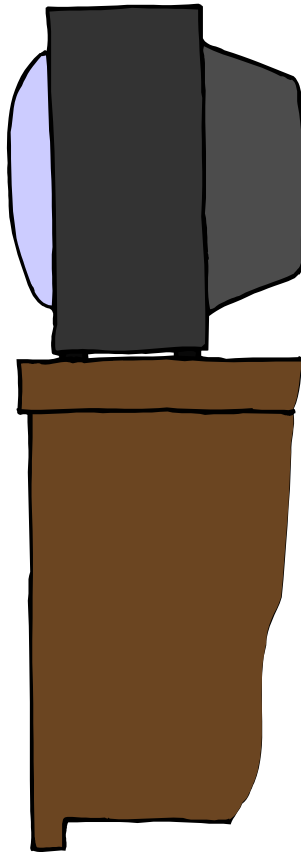


Program: a Summary

- 1. Multimedia Representation Basics**
- 2. Digital Imaging: Applications, Tools and Codecs**
- 3. Digital Audio: Applications, Tools and Codecs**
- 4. Digital Video: Applications, Tools and Codecs**
- 5. Multiplexing and Synchronization**
- 6. Immersive Video: Applications, Tools and Codecs**
- 7. Coming Trends**



The Importance of the (Human) User ...

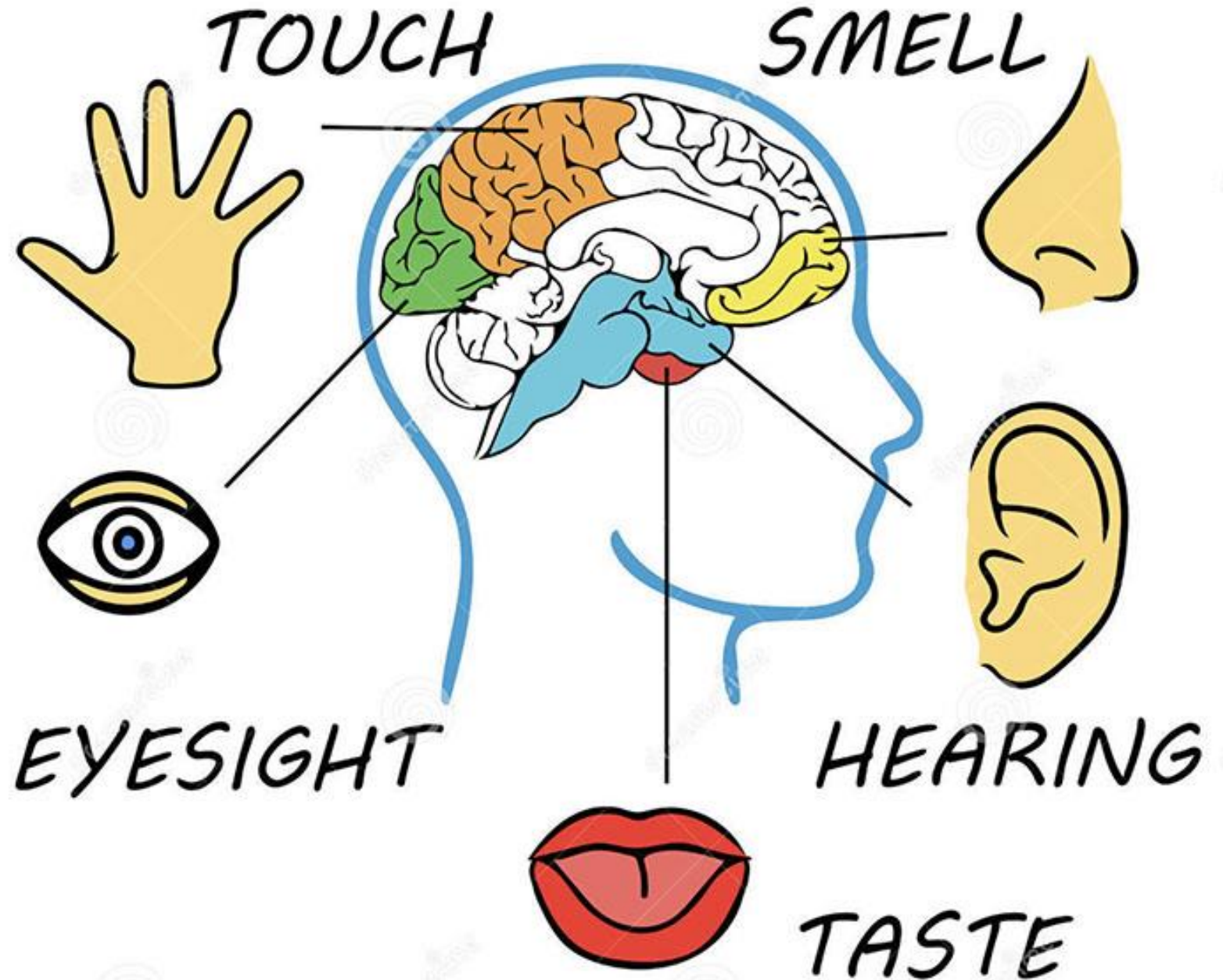
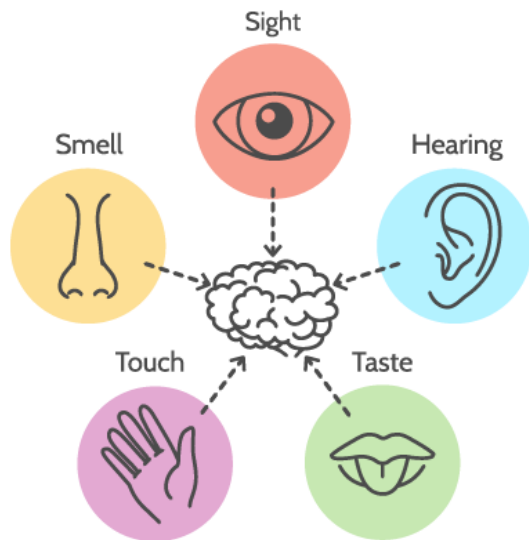


Multimedia Communication

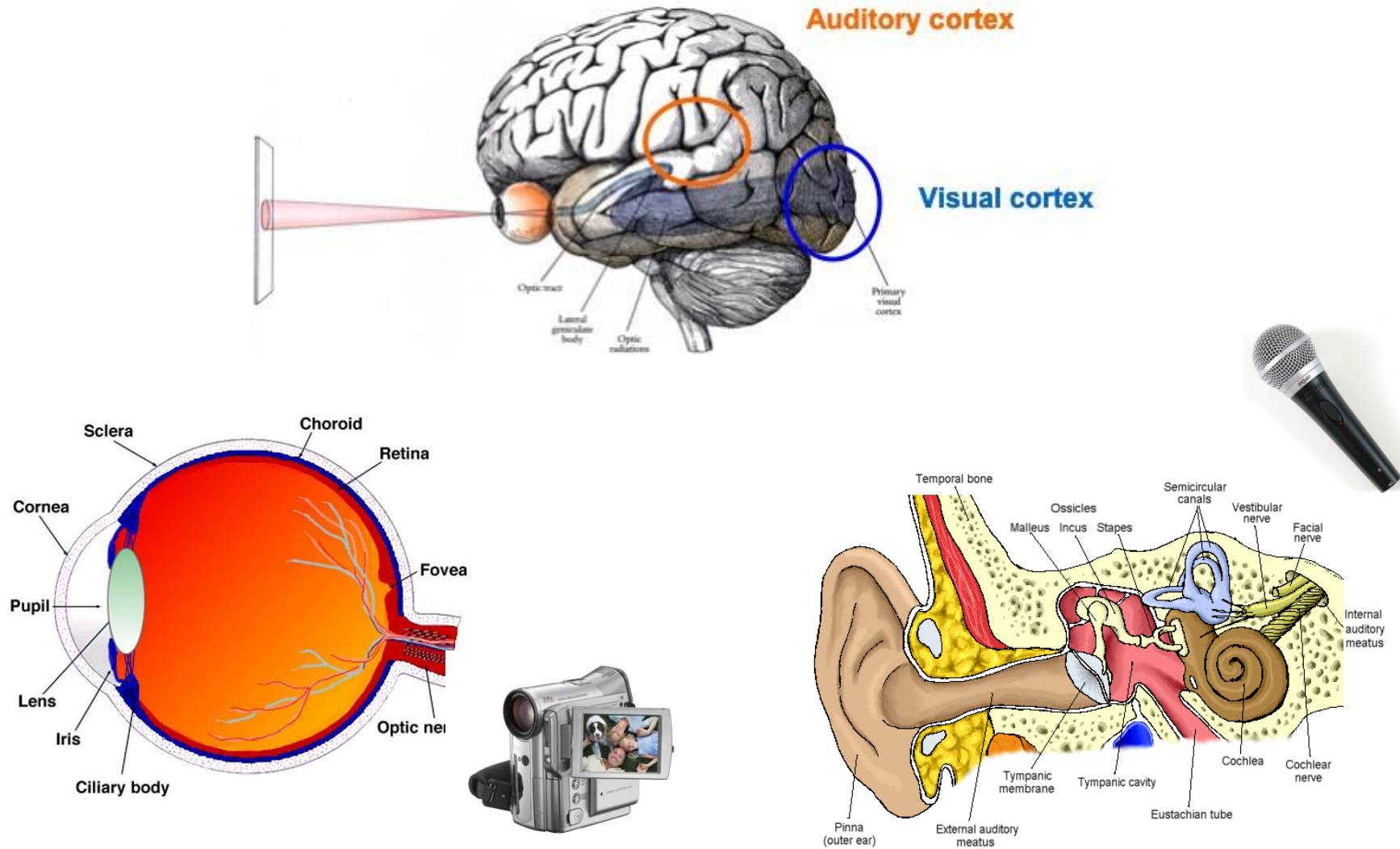
**Transference of image, audio, video, graphics, haptics, etc.
information through space, time, or space and time
simultaneously.**



The 5 Human Senses



Sensations, Perceptions and Emotions ...



**Light is Life ...
Vision is Life ...
Light is Vision !**





TÉC
LIS

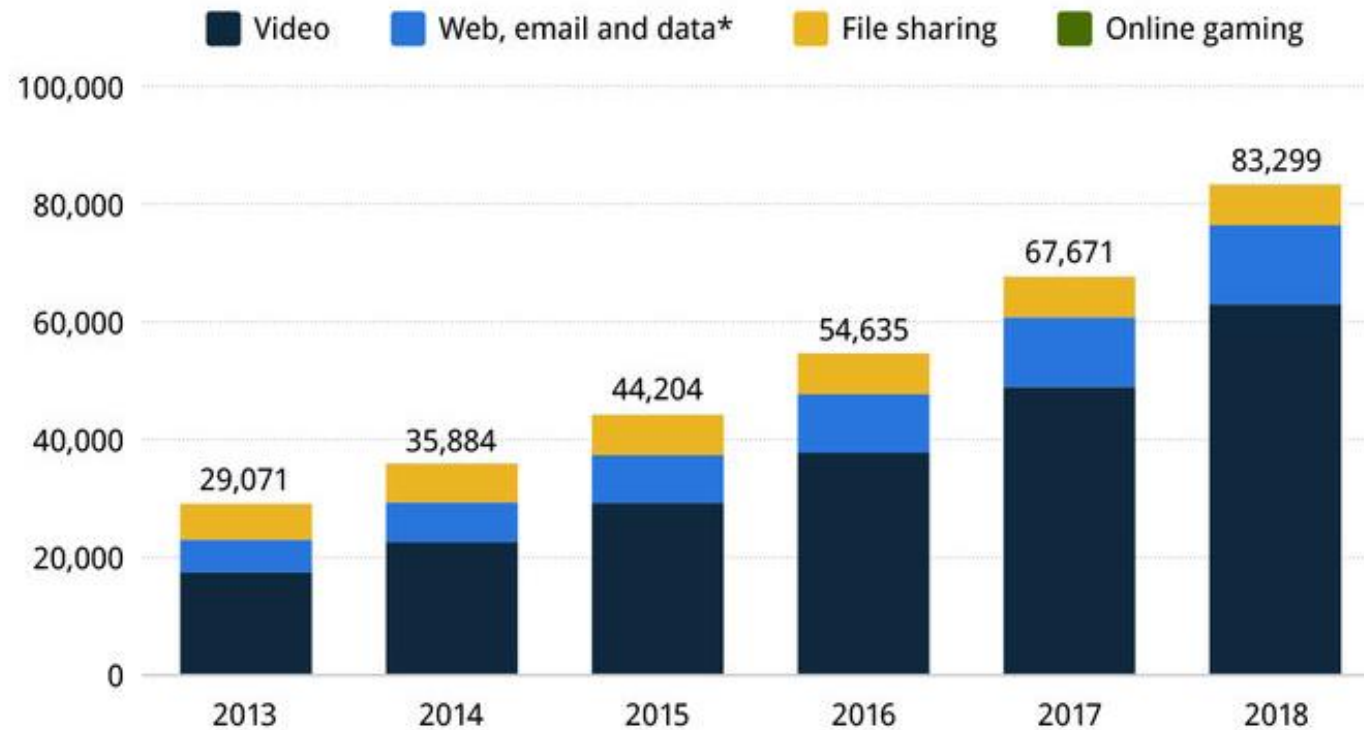
Let's replicate the world !



Video Traffic in Expansion ...

Online Video To Account For 3/4 of Consumer Internet Traffic by 2018

Estimated monthly consumer internet traffic broken down by type of usage (in petabyte)



Evolution of the Mobile Phone

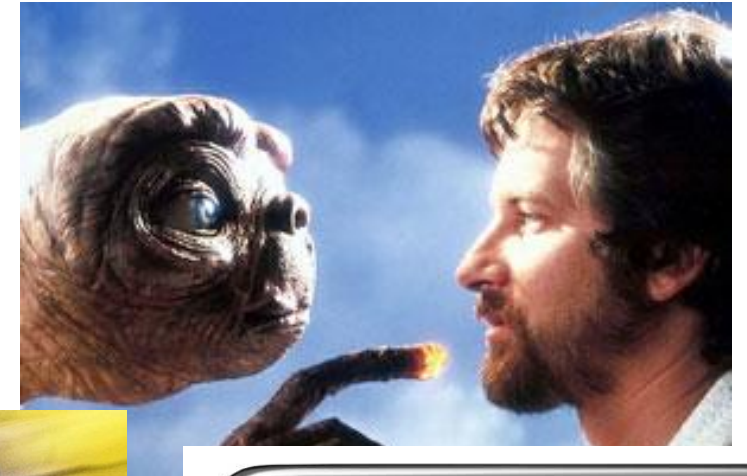


**Any doubts on the real importance
of image and video ?**

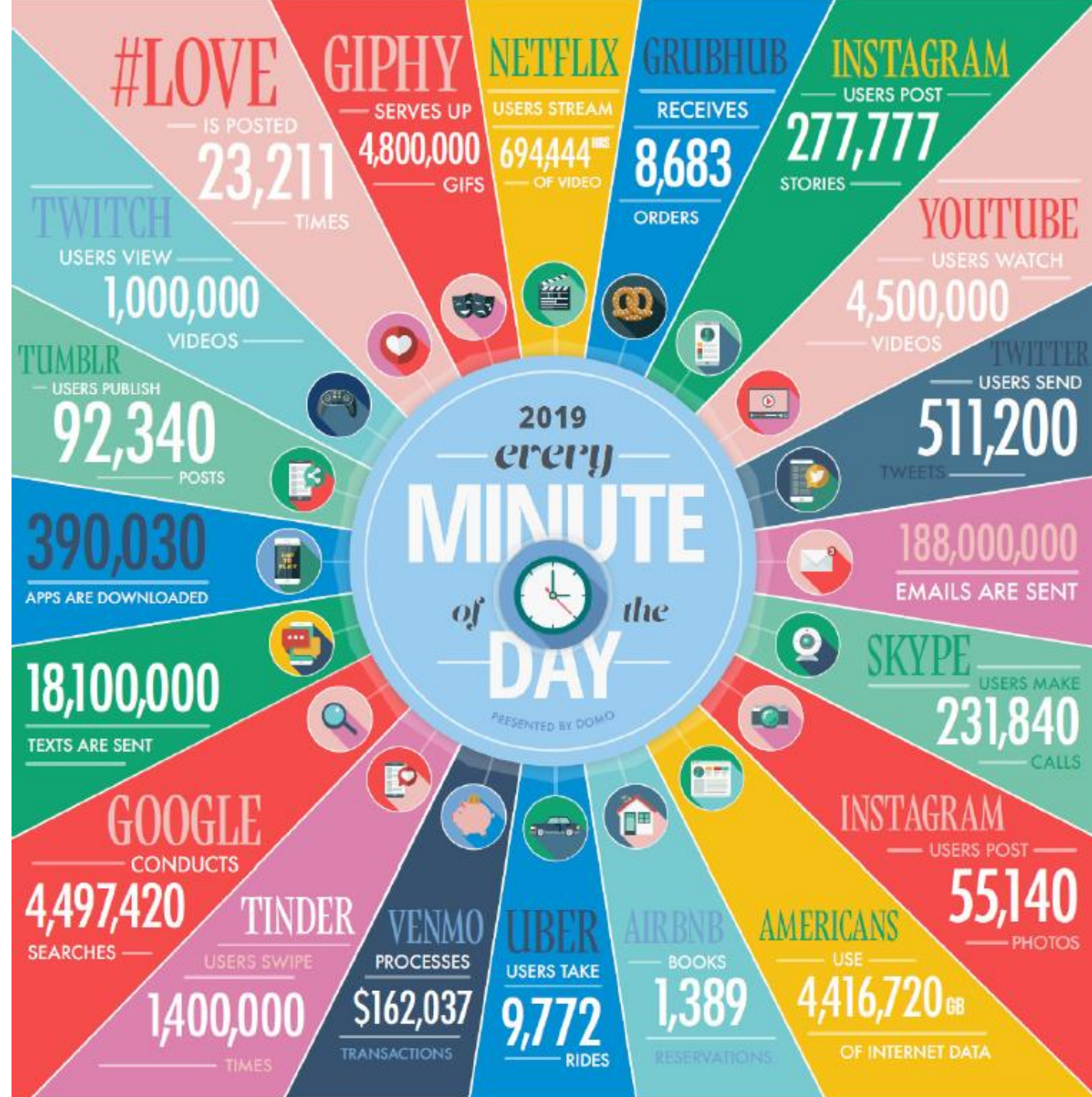


What do the Users Want ?

- ★ Entertainment
- ★ Personal communication
- ★ Information
- ★ Games
- ★ Surveillance
- ★ Education
- ★ Shopping
- ★ ...



Multimedia- based Applications and Data are Exploding !



LARGEST GLOBAL COMPANIES IN 2018 VS 2008:

SEVEN OUT OF TEN ARE NOW BASED ON PLATFORM BUSINESS MODELS

2018

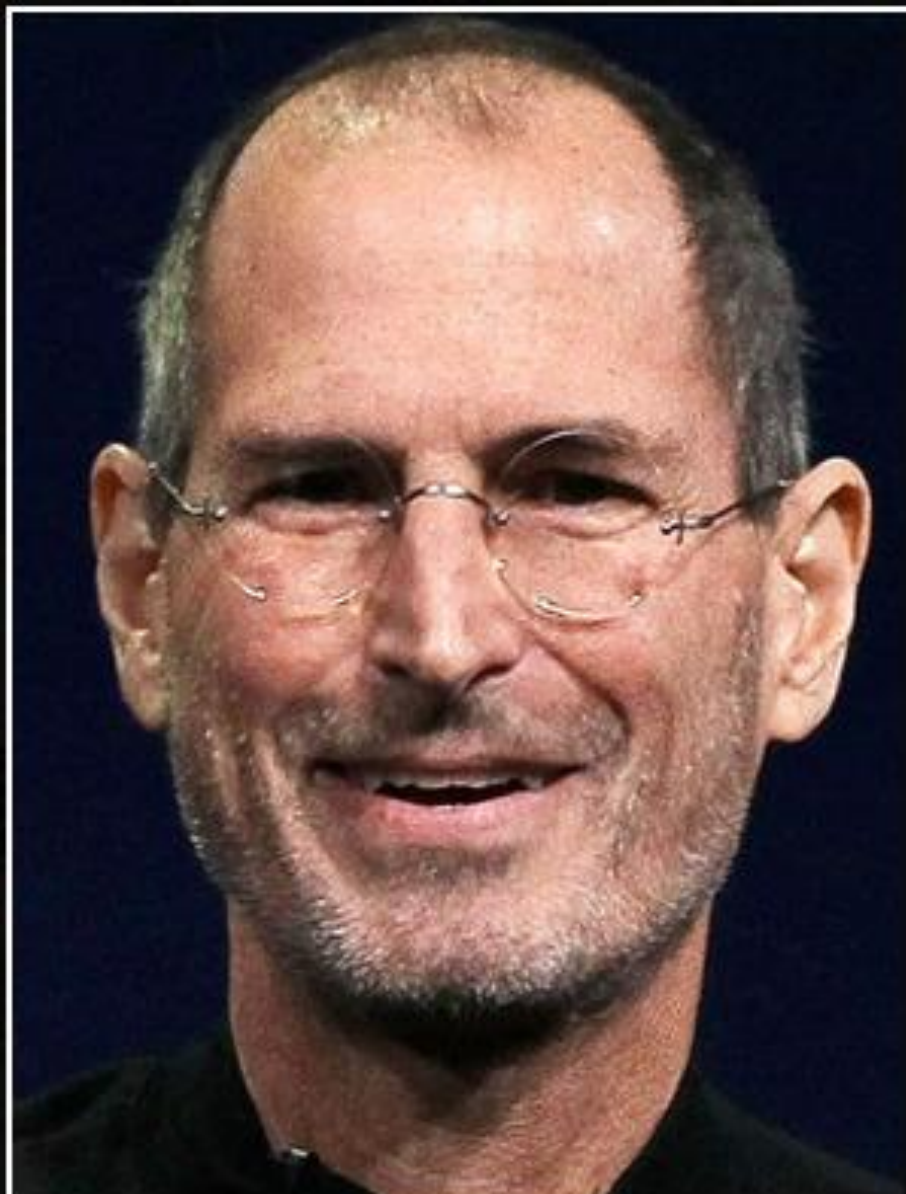
RANK	COMPANY	FOUNDED	US\$bn
1.	 *	1976	890
2.	 *	1998	768
3.	 *	1975	680
4.	 *	1994	592
5.	 *	2004	545
6.	 腾讯 *	1998	526
7.	BERKSHIRE HATHAWAY	1955	496
8.	 *	1999	488
9.		1886	380
10.	J.P.Morgan	1871	375

2008

RANK	COMPANY	FOUNDED	US\$bn
1.	 PetroChina	1999	728
2.		1870	492
3.		1892	358
4.	 中国移动 China Mobile	1997	344
5.	 	1984	336
6.	 GAZPROM	1989	332
7.	 Microsoft	1975	313
8.		1907	266
9.	 ARAMCO	2000	257
10.	 AT&T	1885	238

* Companies based on the platform model

Technology is NOT Enough !



Technology alone is not enough.

— *Steve Jobs* —

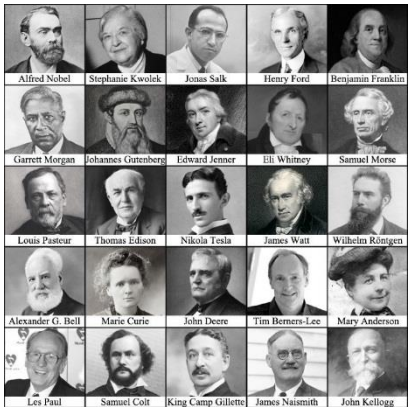


Every Model 2007–2021



Intellectual Property: Patents and Copyright ...

Intellectual property (IP) enjoys legal protection and stems from the exercise of the mind. IP regards patents, trademarks, copyright, design protection and some minor rights.



About Inventors

- ★ A patent for an invention is granted to the applicant, and gives him the right for a limited period to stop others from making, using or selling the invention without permission.



About Creators, Artists

- ★ Copyright is a legal right (usually of the author or composer or publisher of a work) to exclusive publication production, sale, distribution of some work.

Digital is Copy-Friendly: The Piracy Effect and Consequences



Business Model: The Key to Success ...

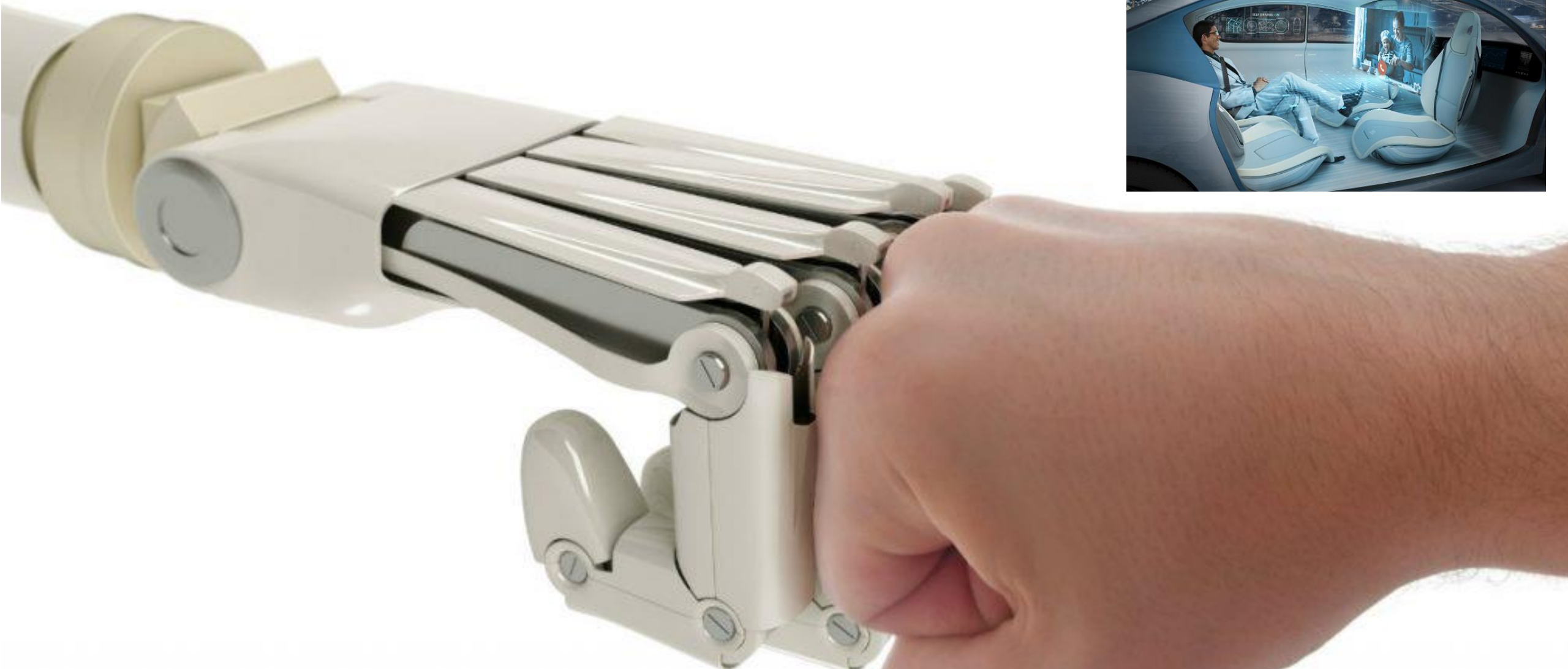
A business model is the method of doing business by which a product/service can sustain itself - that is, generate revenue.



Some business models are quite simple. Other models can be more complex such as free television. The broadcaster is part of a complex network of distributors, content creators, advertisers, and listeners or viewers. Who makes money and how much is not always clear at the outset.

- ★ Digital representations and networks give rise to new kinds of business models, since acquiring, transmitting, and storing information (now just bits) became much easier.
- ★ But it is also likely to reinvent ‘old’ models such as auctions. New and interesting variations of old models should be expected in the future.

Technology and Humans: *Need to Team Up* !





- ★ It is today much easier than before to create and sell multimedia related products and services (mainly software based).
- ★ Internet helps the success of small, innovative companies created without much investment.
- ★ Competition between companies may stimulate also the operators to more easily embrace more innovative challenges.
- ★ Users are increasingly open to new services and applications.
- ★ International contact is changing old habits and prejudices ...

In summary, multimedia technology is an interesting field for Portuguese young engineers with initiative to launch their own companies !