

Master ICT for Internet and multimedia engineering



Presentation May 2018

Dicono di noi

...la nuova Laurea magistrale in "ITC"



ITC P. F. Calvi, Padova

Istituto tecnico commerciale

indirizzi: marketing, informatica aziendale

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ITC Einaudi-Gramsci, Padova

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sito web: <http://www.einaudigramsci.gov.it>



Dicono di noi

...la Laurea magistrale in "CT"



Dicono di noi

...la Laurea in "TLC for Internet meme"



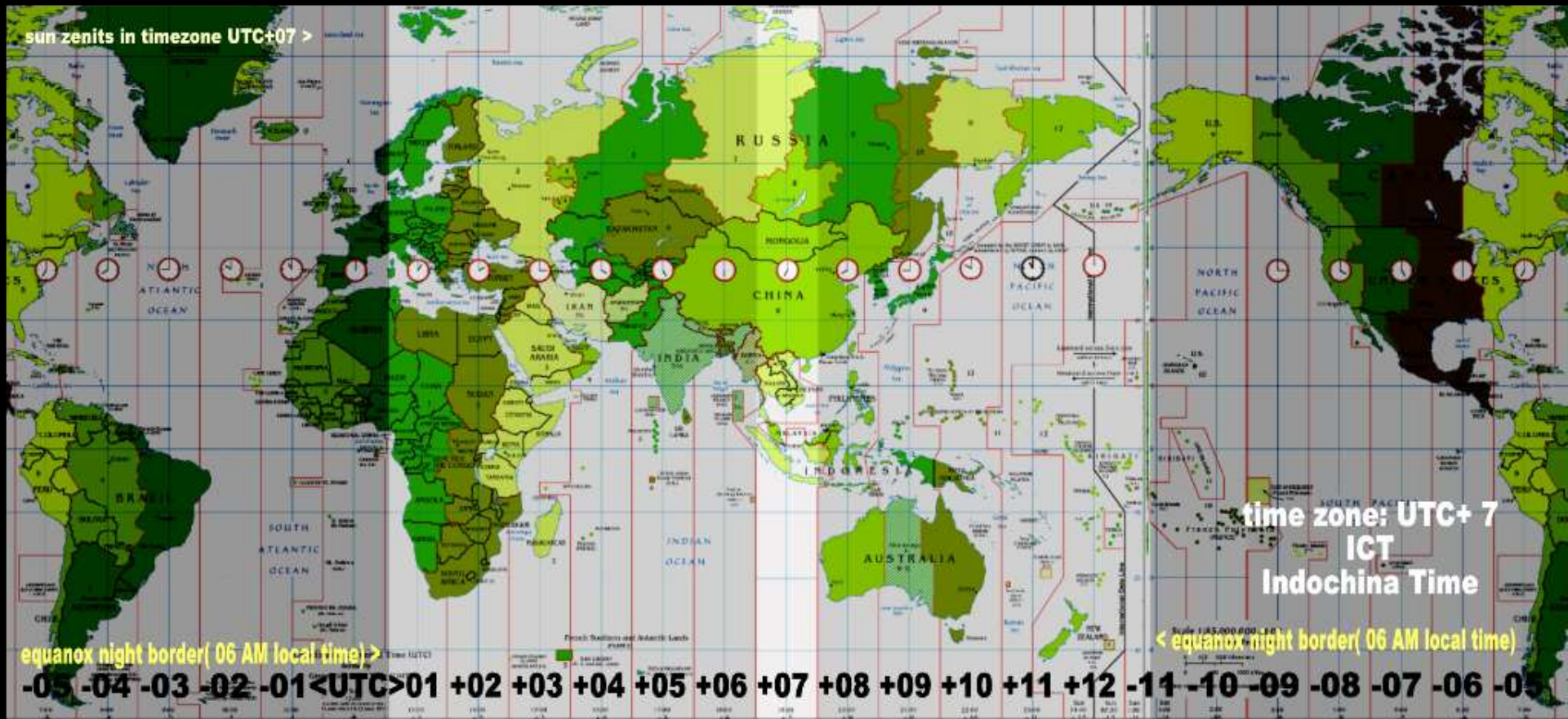
Cosa significa ICT?

Codice ATA dell'aeroporto di Wichita (Kansas)



Cosa significa ICT?

IndoChina Time (fuso orario GMT +7)



Cosa significa ICT?

Inverness Caledonian Thistle (serie A scozzese)



Cosa significa ICT?

Acronimo inglese per Ice Cream Truck



Cosa significa ICT?



- Acronimo di Information and Communication Technologies = tecnologie dell'**informazione** e della **comunicazione**
- Insieme delle metodologie che realizzano i sistemi di trasmissione, condivisione ed elaborazione di informazioni, a tutti i livelli (hardware/software)

Perché Internet e multimedia?



La rete Internet

è il sistema per le telecomunicazioni più ampio e usato al mondo

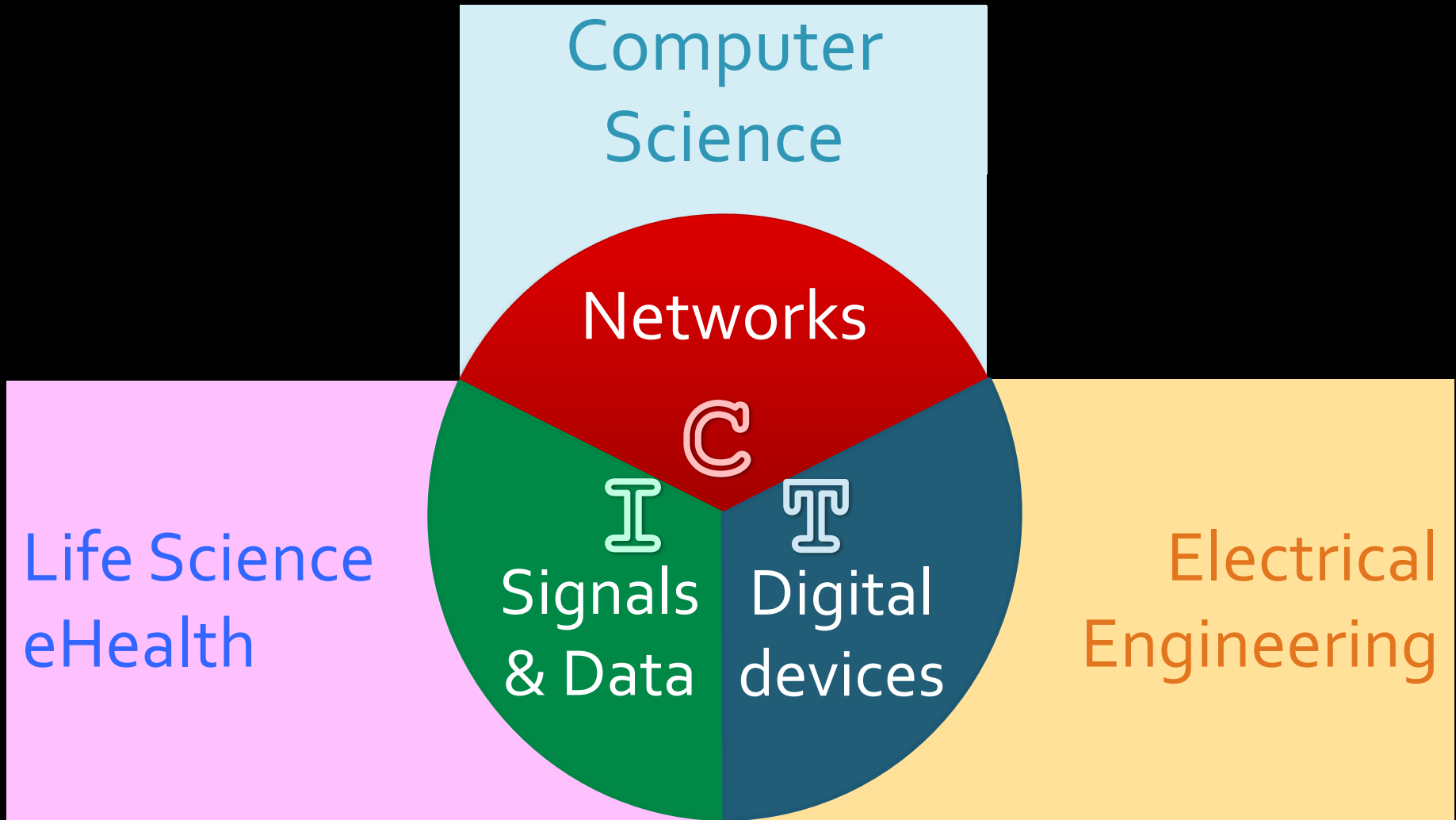
Ma solo nel 2017 penetration rate > 50%
= ancora grandi margini di crescita

Perché Internet e multimedia?

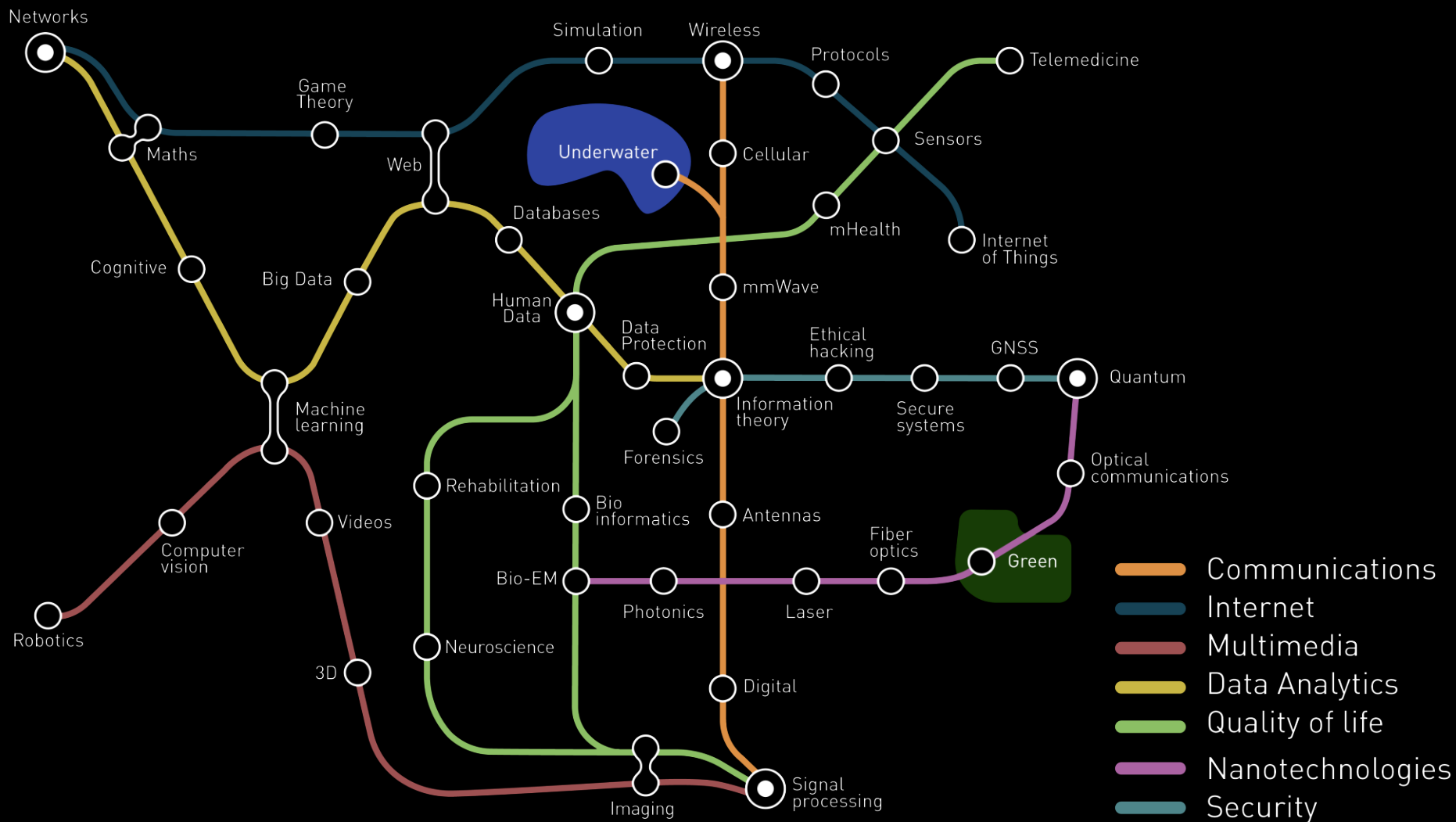


- Multimedia = molte sorgenti di informazione
- Molteplici modi di comunicare (Testo, Video, Audio, Realtà aumentata...)
- Dal 2014 >50% traffico Internet

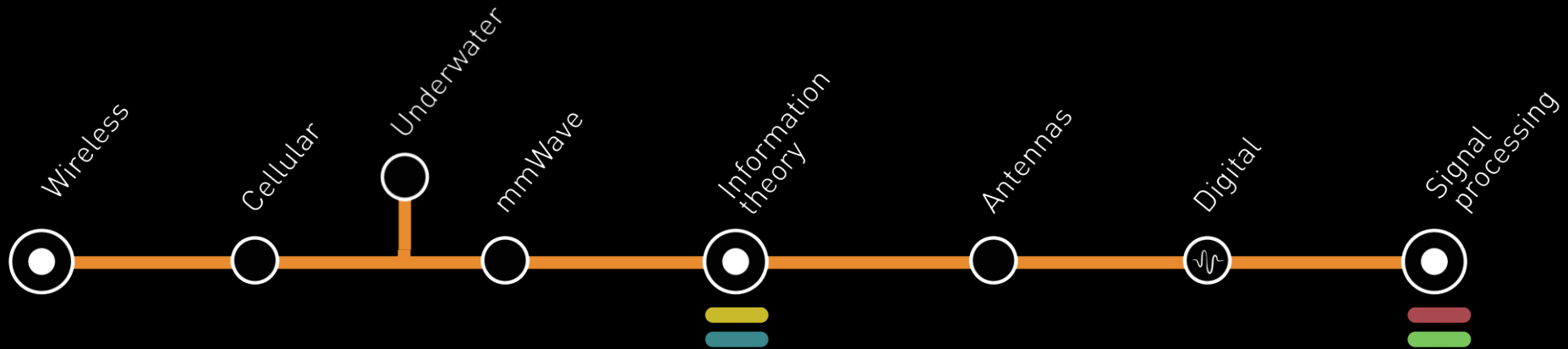
ICT: al centro dell'era digitale



MIME: transit map



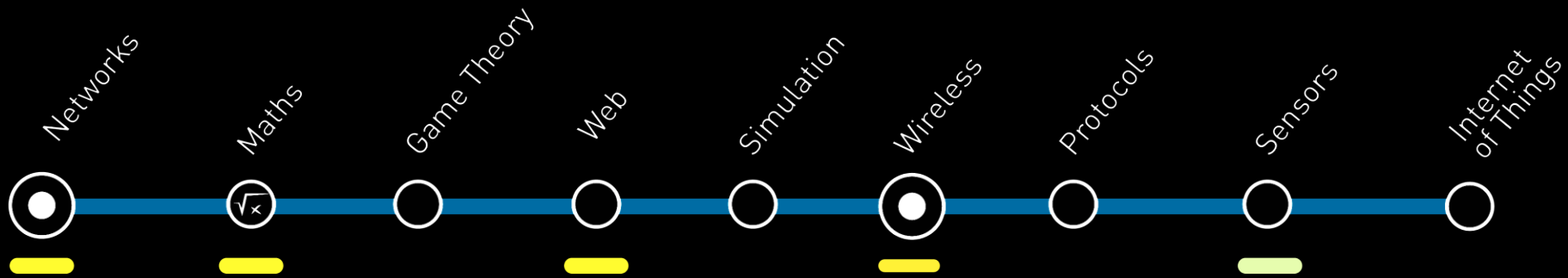
Communications route



Classical and revolutionary transmission techniques



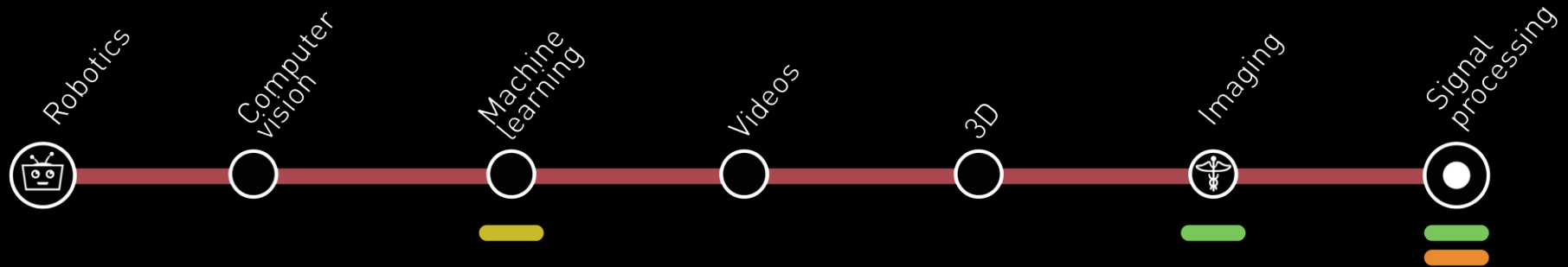
Internet route



Software applications through the entire protocol stack



Multimedia route



Multidimensional contents for data-hungry systems

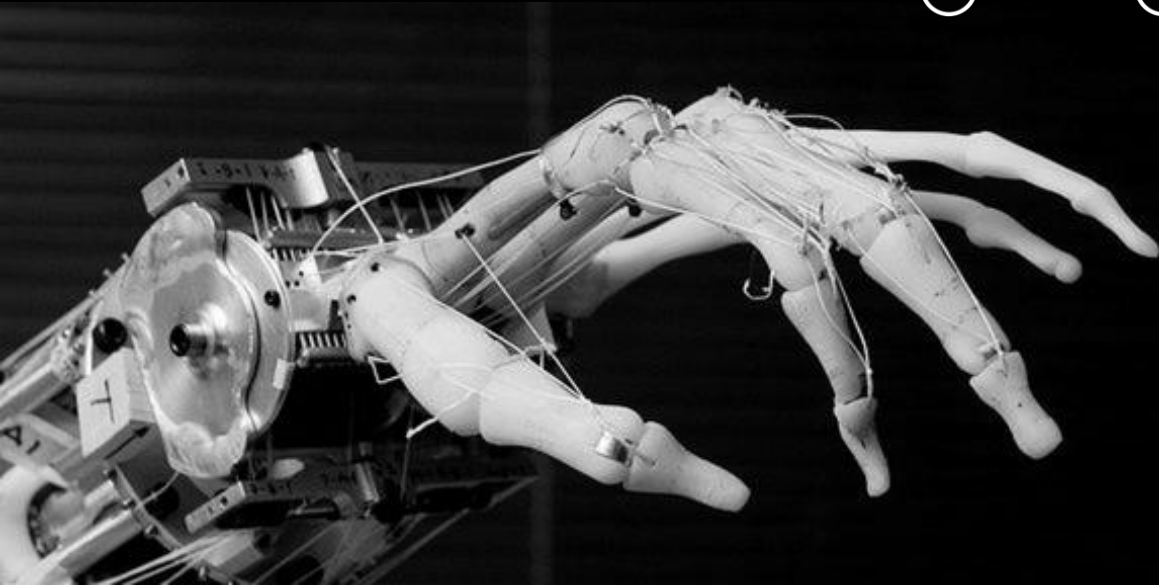
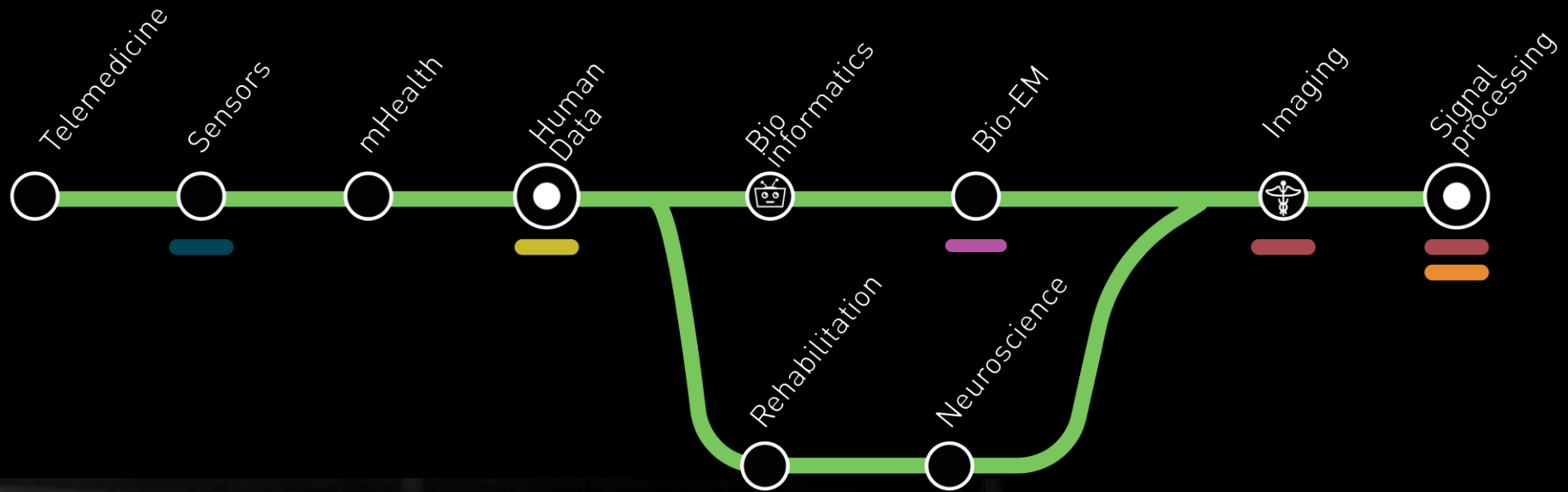


Data analytics route



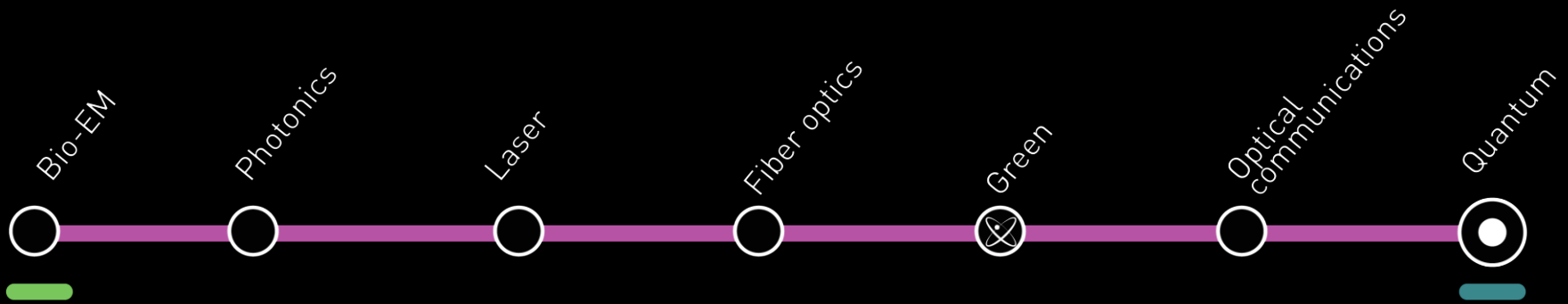
Systematic ways to
extract knowledge
from data

Quality of life route



IT expertise for
medical care and
mHealth scenarios

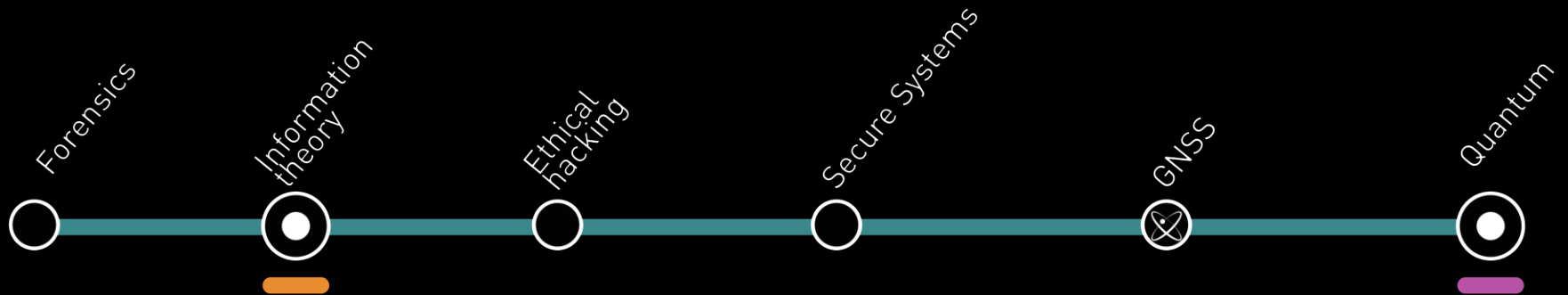
Nanotechnologies route



Reach nanoscale to communicate at the speed of light



Security route



Ensure privacy and data protection for cybersecure systems



Le lauree magistrali del DEI

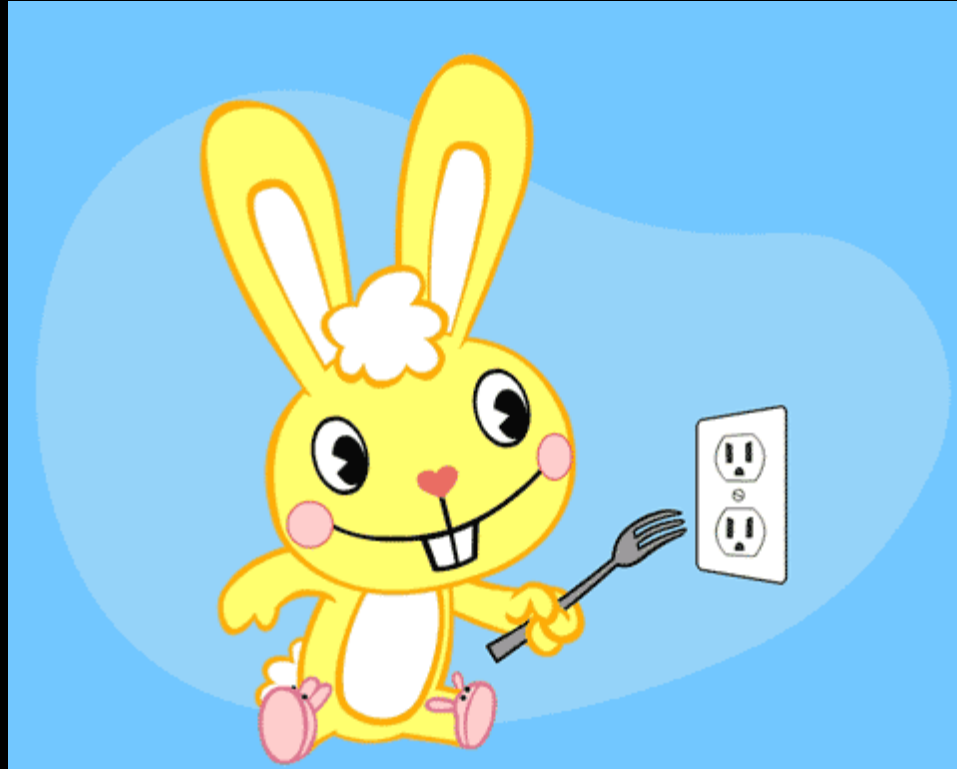
Guest starring



Ingegneria informatica



Ingegneria elettronica



Ingegneria dell'automazione



Bioingegneria



ICT for Internet and multimedia



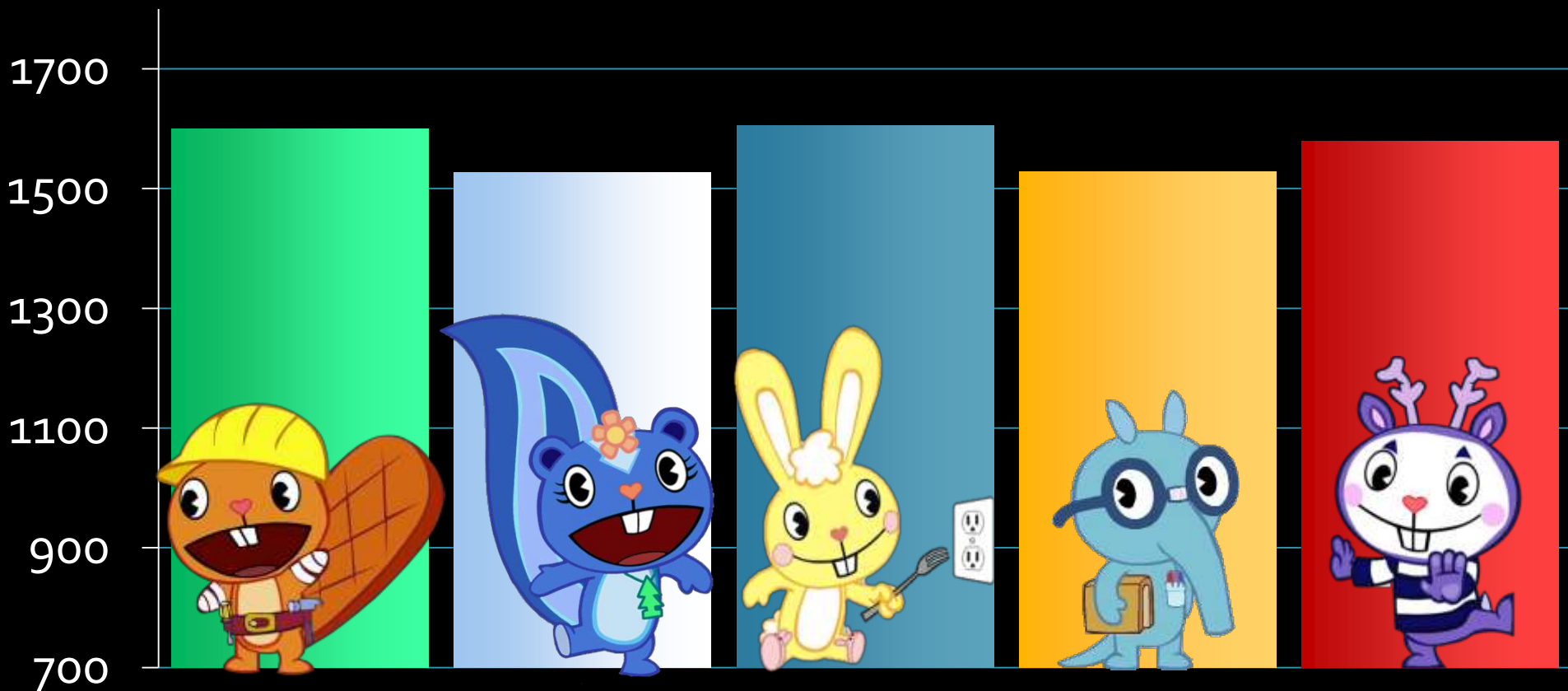
MIME

Master's degree ICT Internet Multimedia Engineering

Monthly salary after 1 year

UniPD graduates of 2016

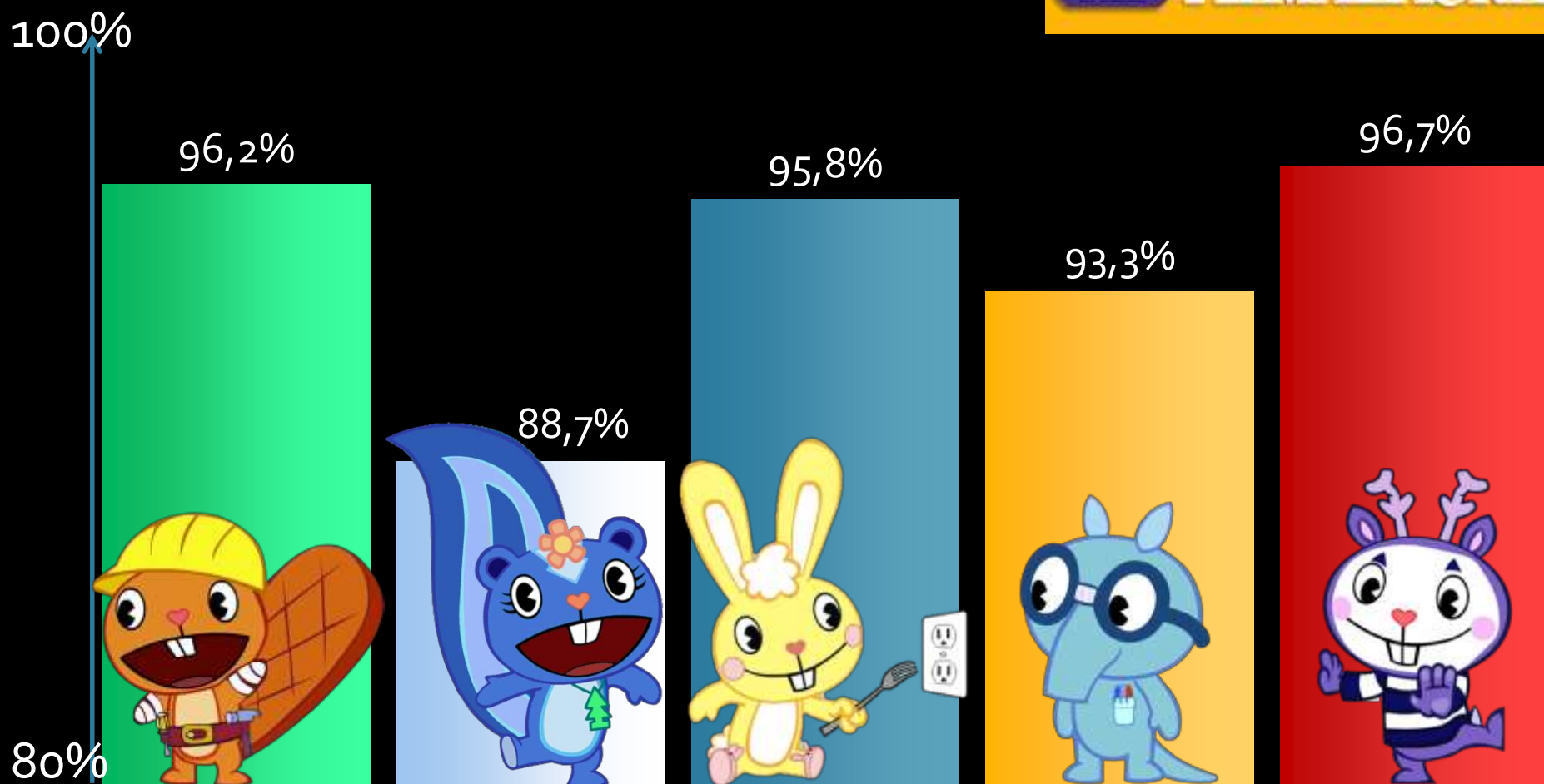
source: XIX survey



Employment rate after 1 year

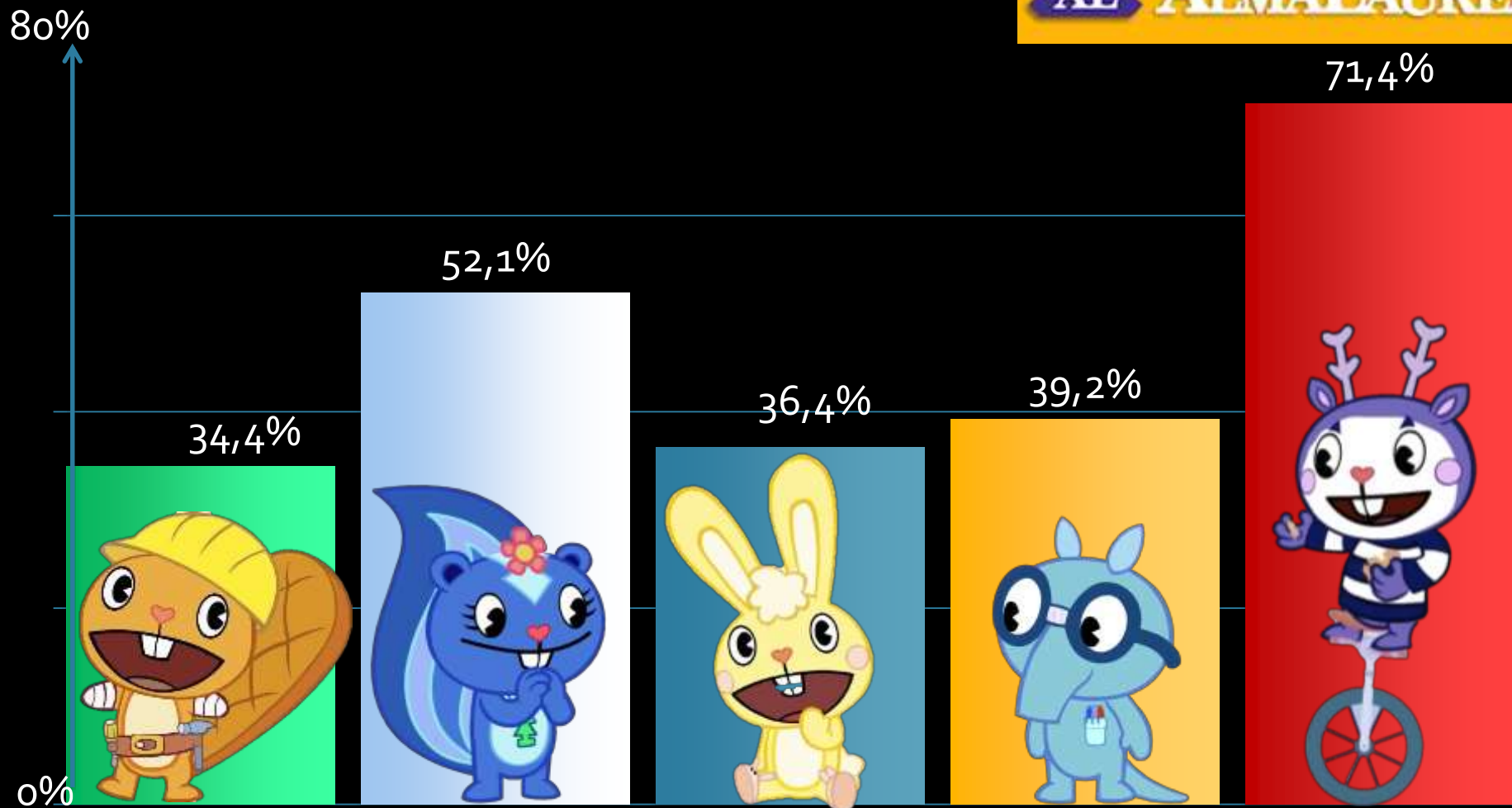
UniPD graduates of 2016

source: XIX survey



Satisfaction rate (overall) = pienamente soddisfatto del corso UniPD graduates of 2017

source: XIX survey

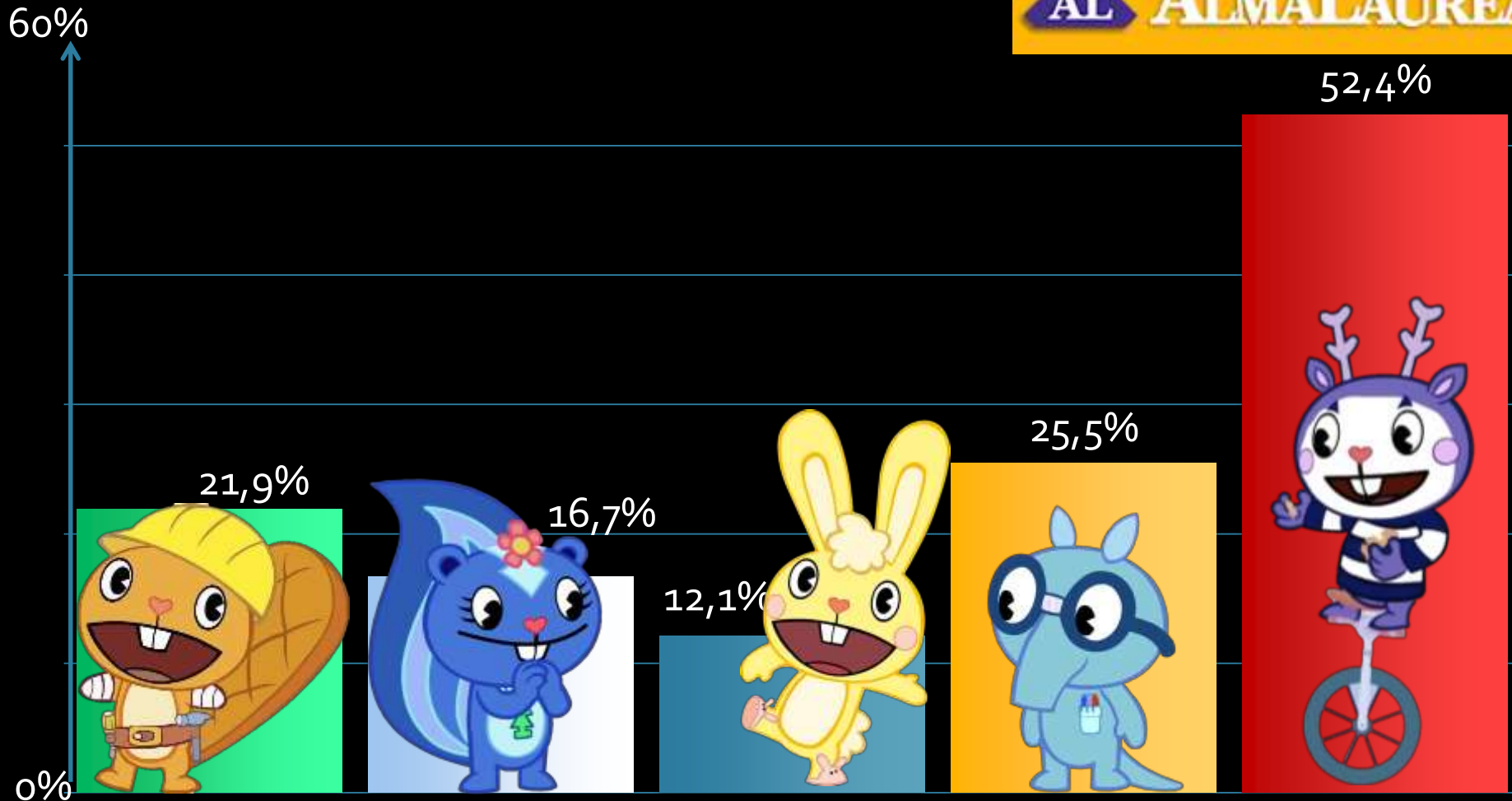


Satisfaction rate (lecturers)

=pienamente soddisfatto del rapporto coi docenti

UniPD graduates of 2017

source: XIX survey

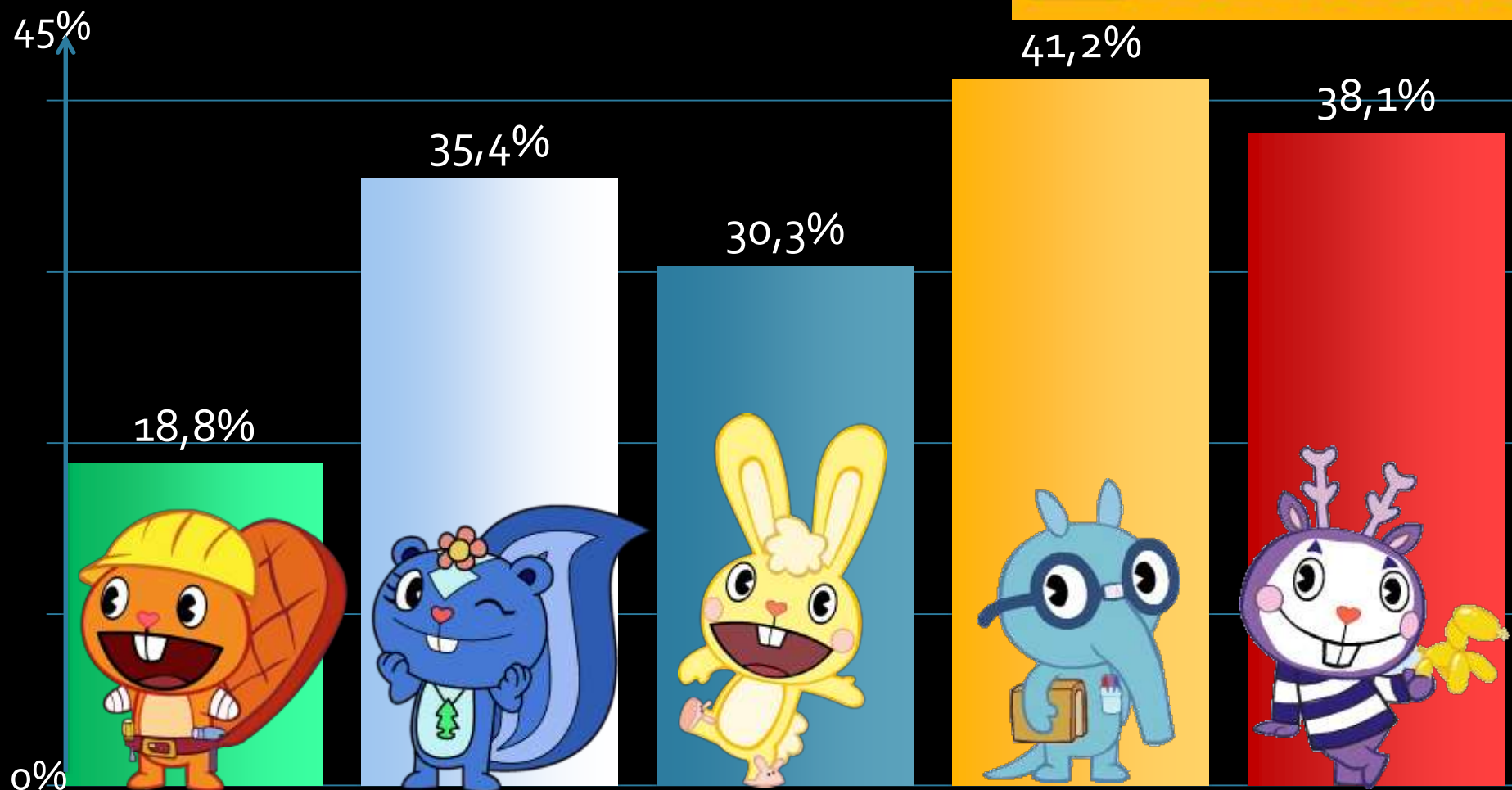


Too heavy?

=il carico didattico è pienamente adeguato

UniPD graduates of 2017

source: XIX survey

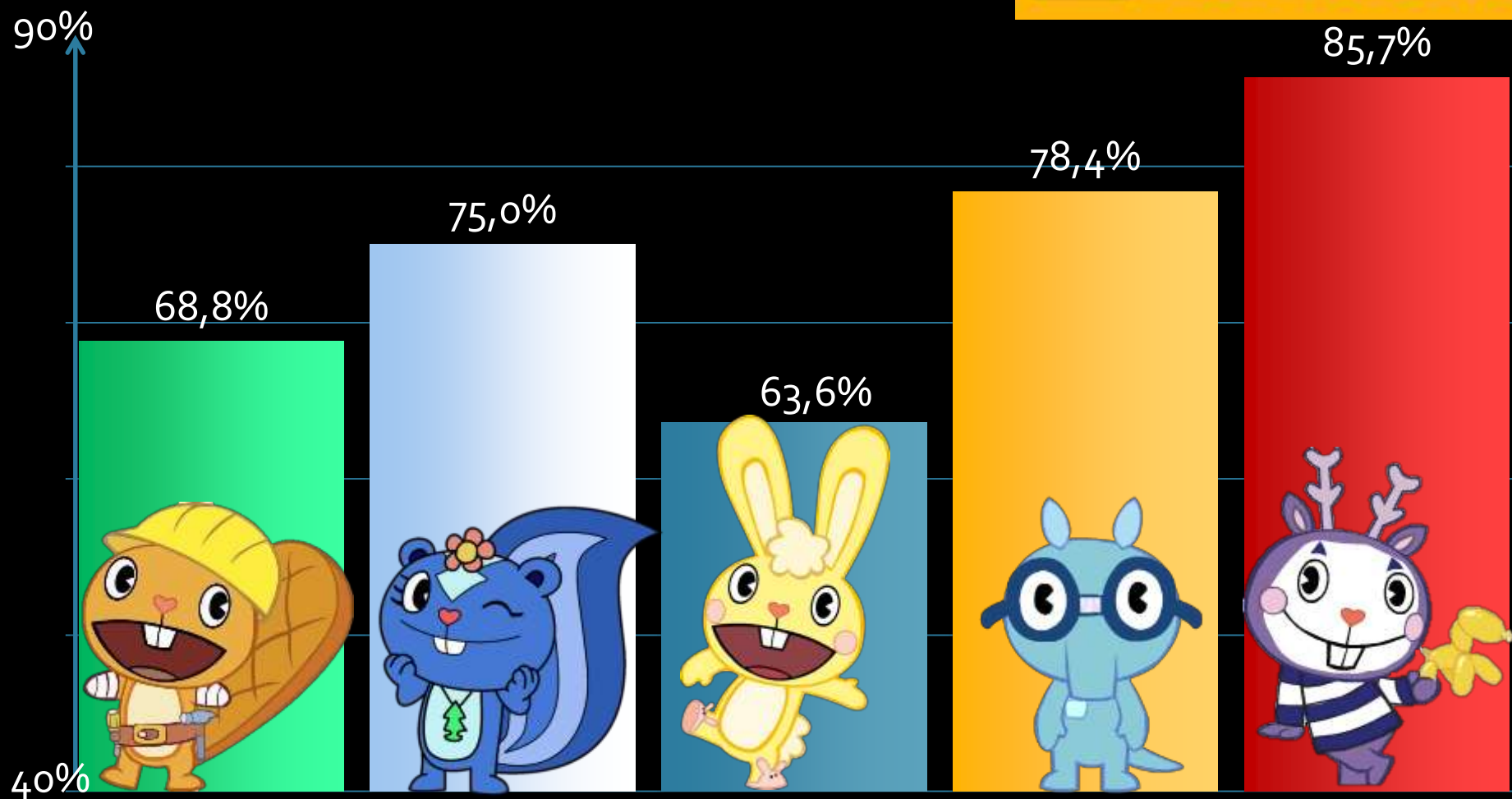


Turn back time

=mi iscriverei ancora a questo corso

UniPD graduates of 2017

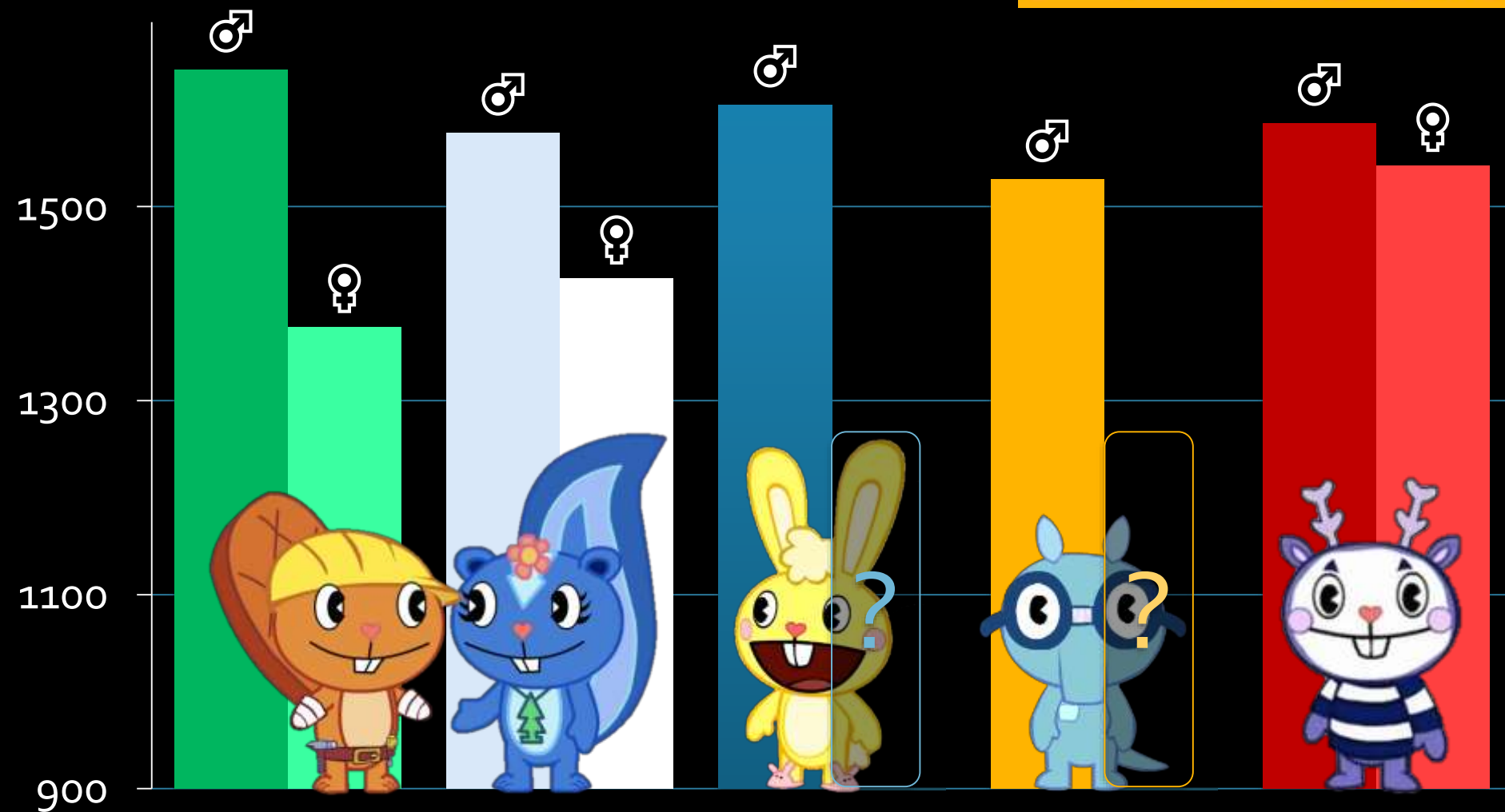
source: XIX survey



Gender equality (salary after 1 year)

UniPD graduates of 2016

source: XIX survey



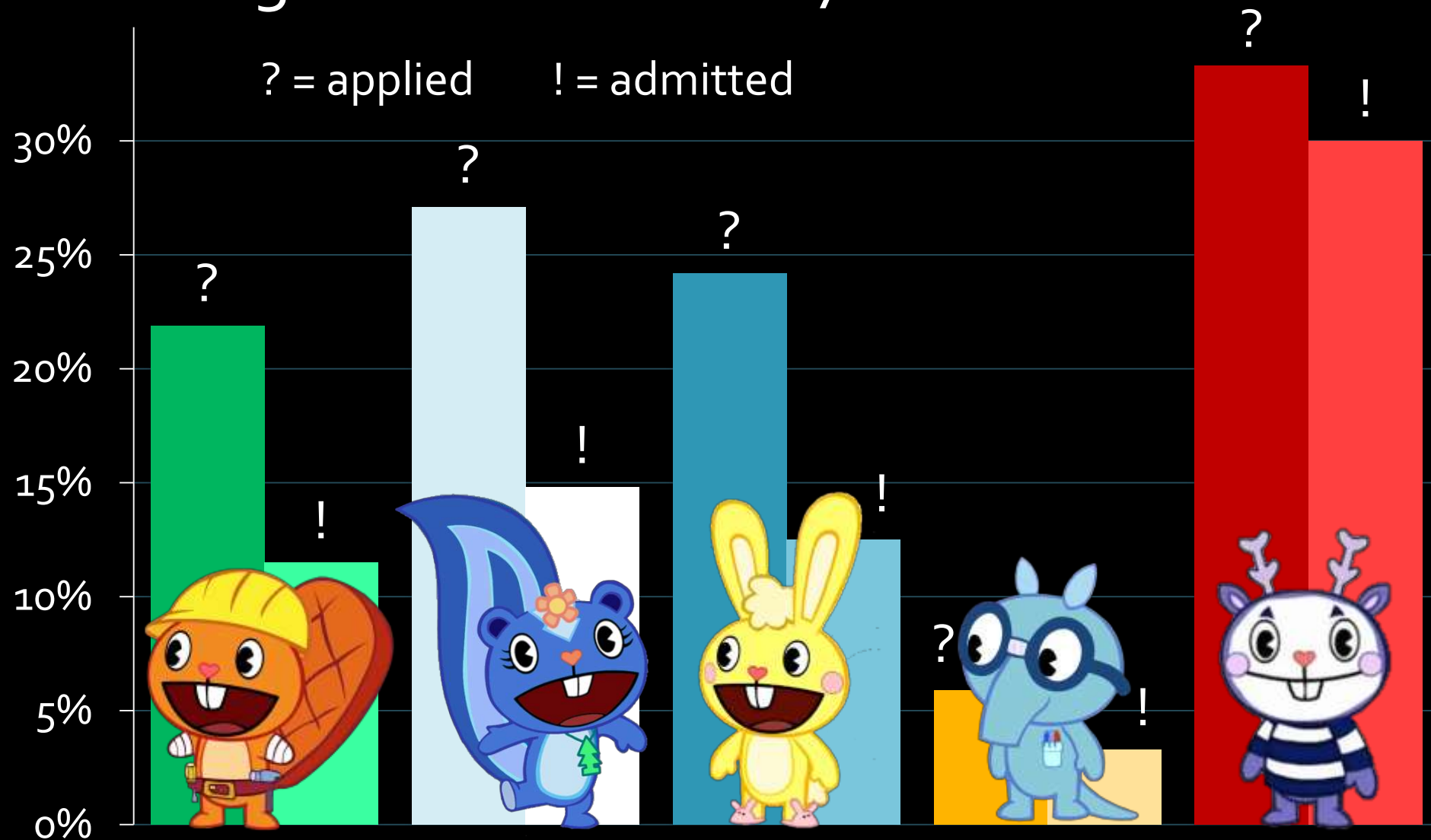
Pursuing a PhD

UniPD graduates of 2016-7

source: XIX survey



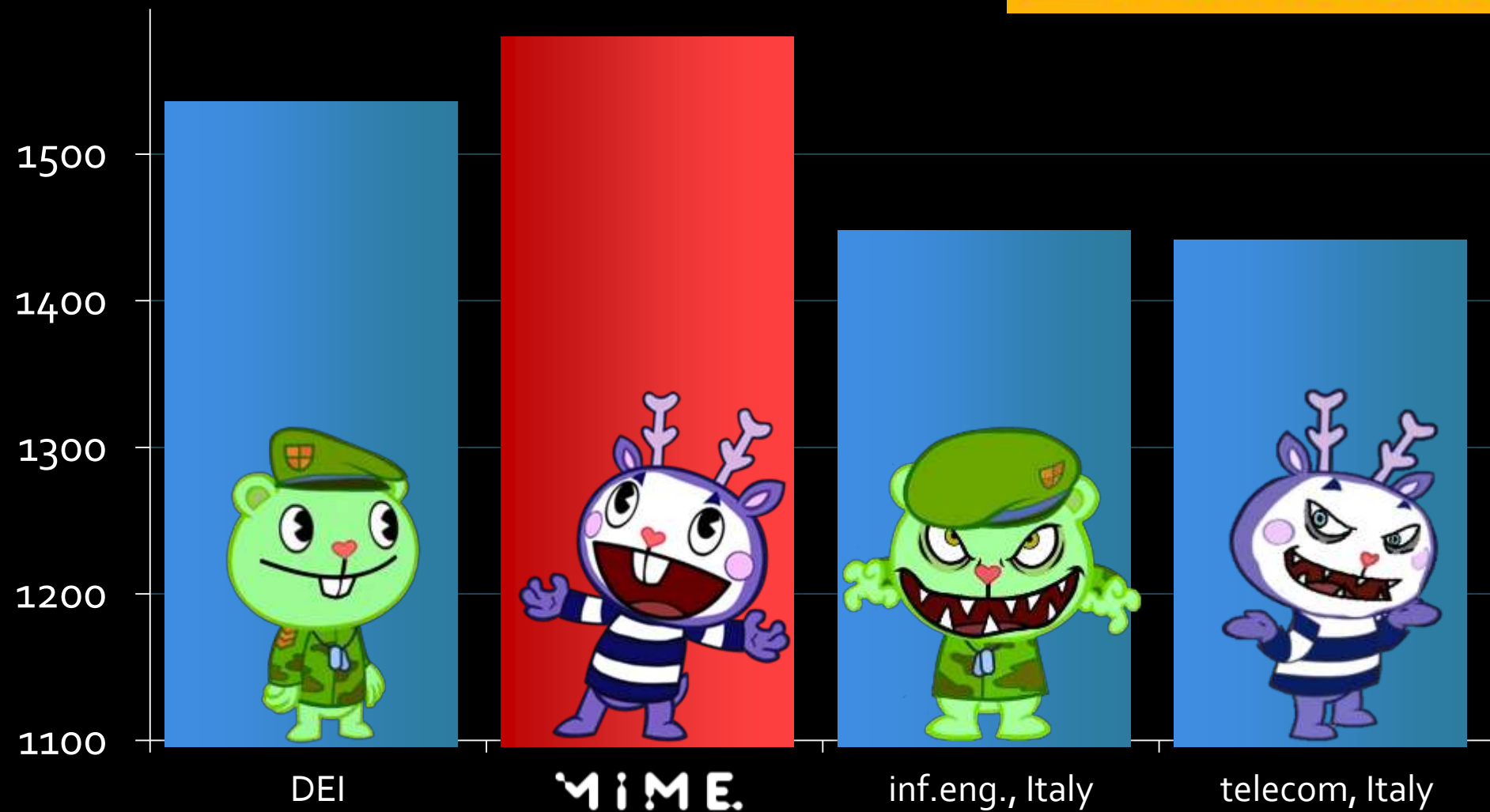
? = applied ! = admitted



UniPD vs. rest of Italy, 1yr salary

Graduates of 2016

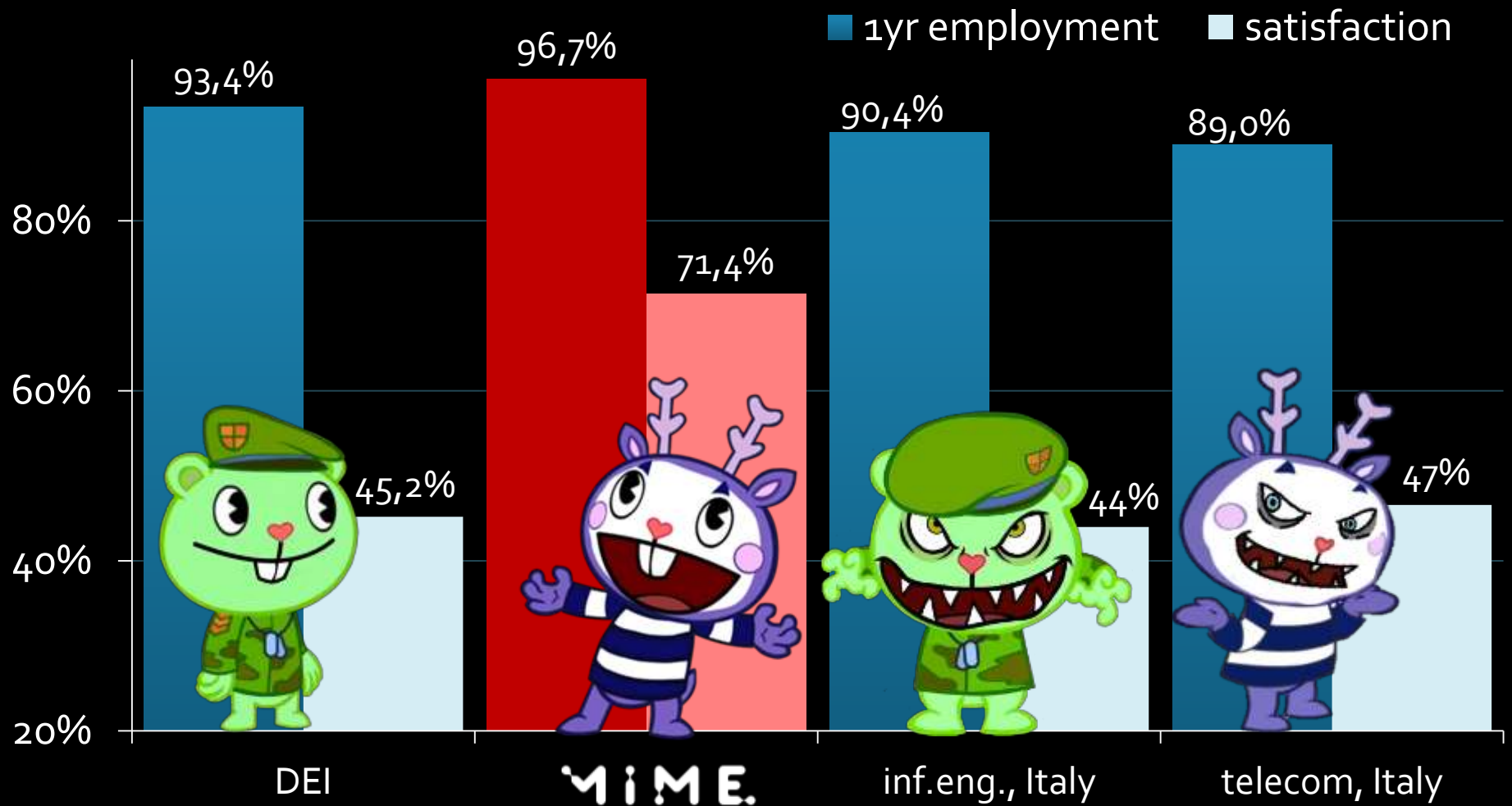
source: XIX survey



UniPD vs. rest of Italy

Graduates of 2016-7

source: XIX survey

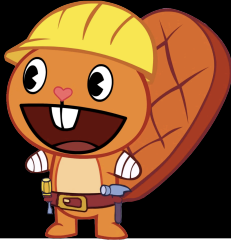

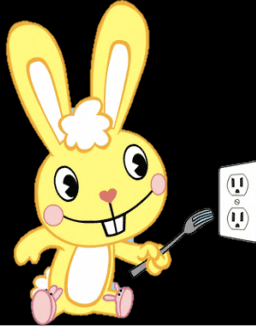











Other data

Graduates of 2016-7

source: XIX survey

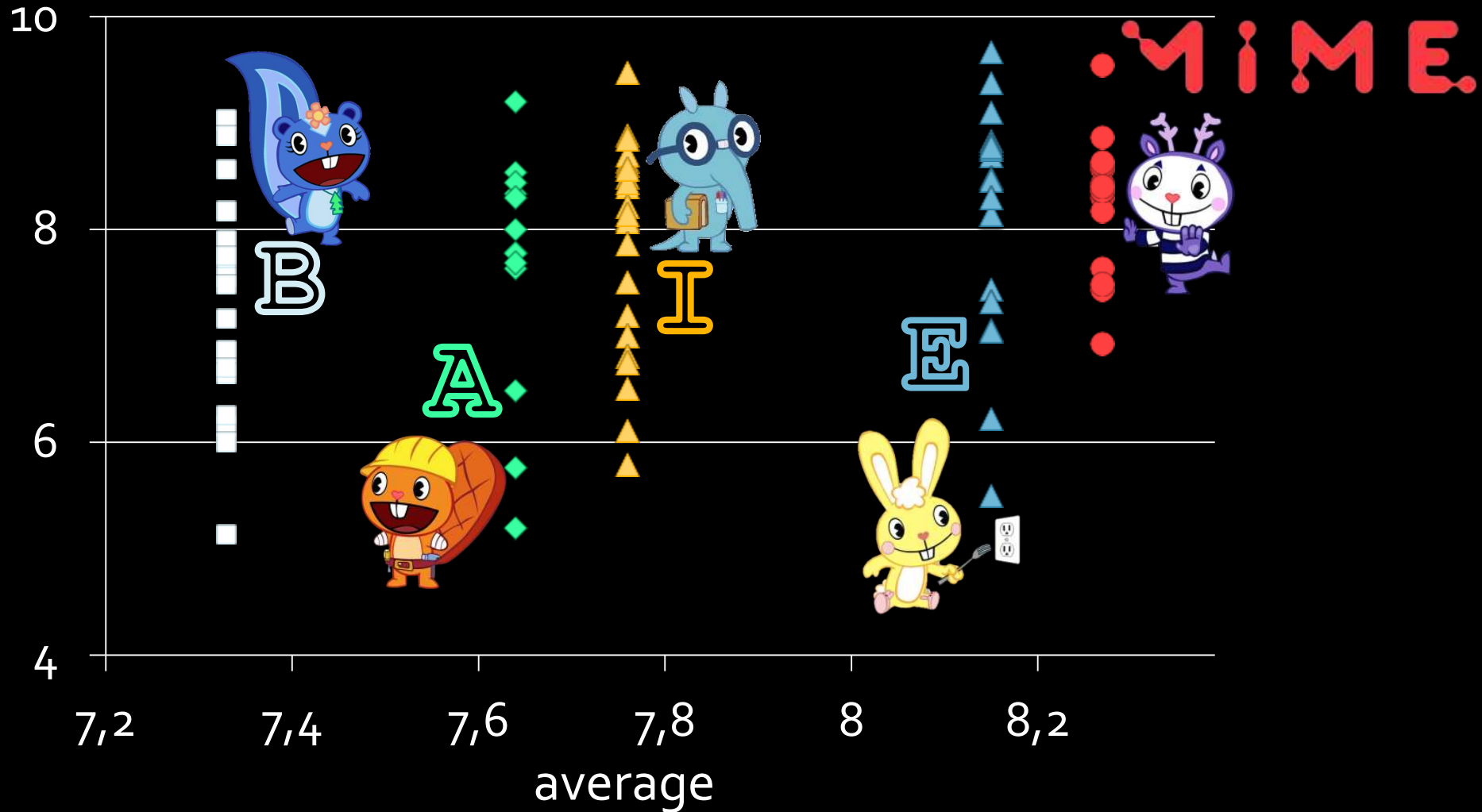


					
 → 	2.5 y	2.4 y	2.8 y	3.0 y	2.2 y
	64%	82%	44%	61%	96%
 	105.9	103.1	105.3	105.8	106.1
 → 	2.8 m	3.4 m	2.4 m	2.0 m	2.1 m

Evaluation by students

Academic year '16-'17

source:
uniPD public evaluations



Job market

Enterprises working **within** ICT

from hardware to software,
from access to application...



Enterprises working **with** ICT

networking, data processing,
analytics, energy...



Job market

Local enterprises



Abroad for education or work



R&D at universities or research centers

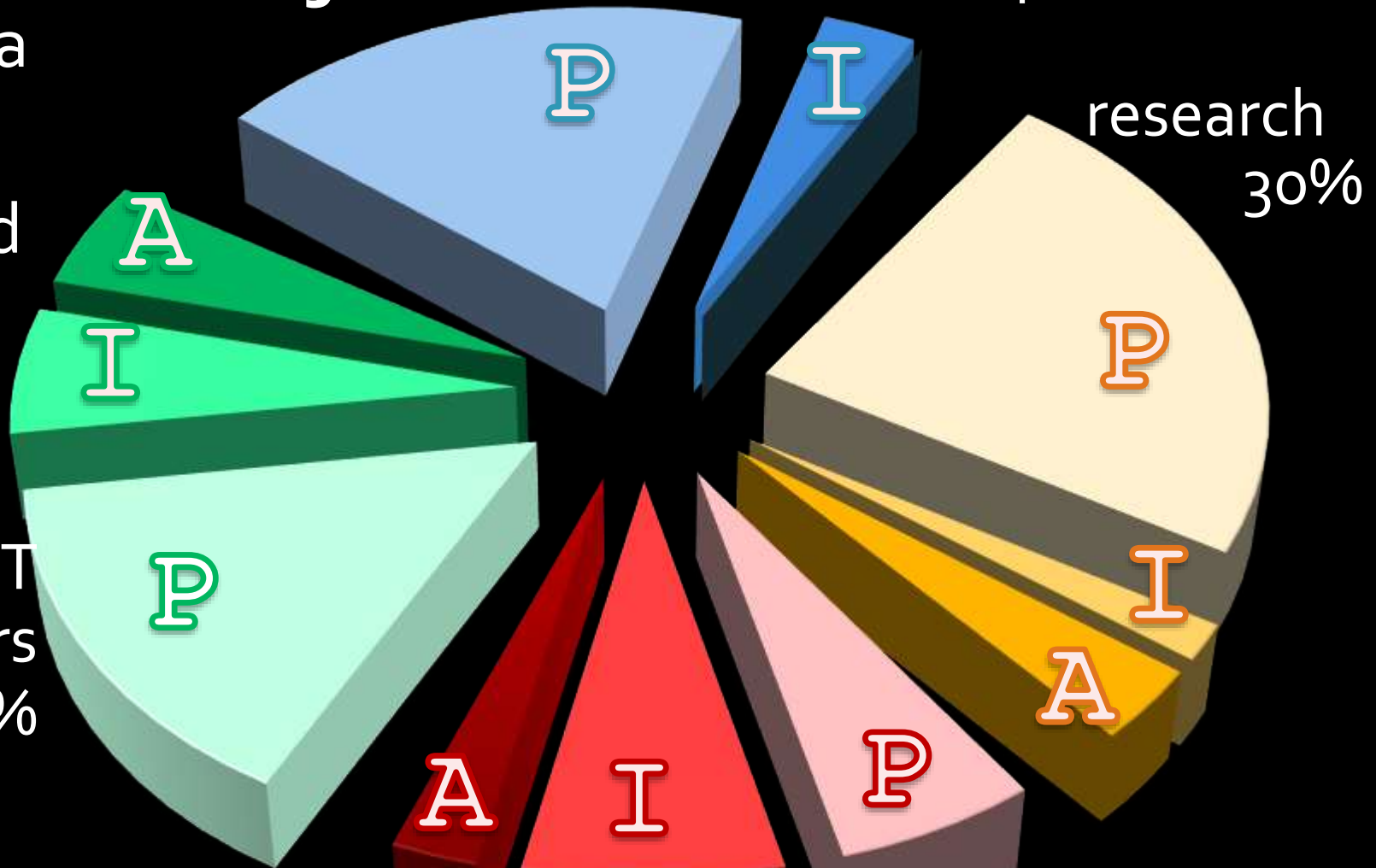


Many internships possibilities



Which jobs?

Padova
Italy
Abroad



source:
Google, linkedIn
graduates 2012-15

MIME

Master's degree ICT Internet Multimedia Engineering



Master's degree ICT

Internet Multimedia Engineering

Frequently Asked Questions

- is it an engineering degree?
- is it a *Laurea Magistrale*?
- why do you call it a Master?



Admission



Holders of Italian degree $\geq 84/110$

with at least 50 ECTS credits in:

- maths (MAT/02, MAT/03, MAT/05, MAT/06)
- physics (FIS/01)
- computer science (INF/01, ING-INF/05)
- telecommunications (ING-INF/02, ING-INF/03)

No English requirements (but lectures are in English!)

Passerelle?



Accesso **diretto** da

- classe L8 di Ingegneria dell'informazione a Padova
incluse Ing.Informatica, Elettronica, Biomedica L8
- ogni laurea italiana che soddisfa i requisiti;
p.es.: Matematica, Fisica, Informatica a Padova

È **consigliato** avere competenze di

- probabilità / statistica (Analisi dei dati)
- teoria dei segnali (Segnali e sistemi)
- telecomunicazioni (Fondamenti di comunicazioni)

Ministry inspection

November 2018:
the Italian ministry of Education
is inspecting 15 degree courses at UniPD

MIME was selected as
DEI's standard-bearer



Four areas of specialty = 4 curricula



Fluid study plan

No mandatory subjects

Curricula:



Telecommunications



Cybersystems



Photonics



Life&Health

general

ECTS

4 basic ICT subjects

36

4 advanced ICT subjects

24

2 other subjects

15

2 “free” elective subjects

15

internship + thesis

30

cross-disciplinary

ECTS

3 basic ICT subjects

27

3 advanced ICT subjects

18

specialty

33

2 “free” elective subjects

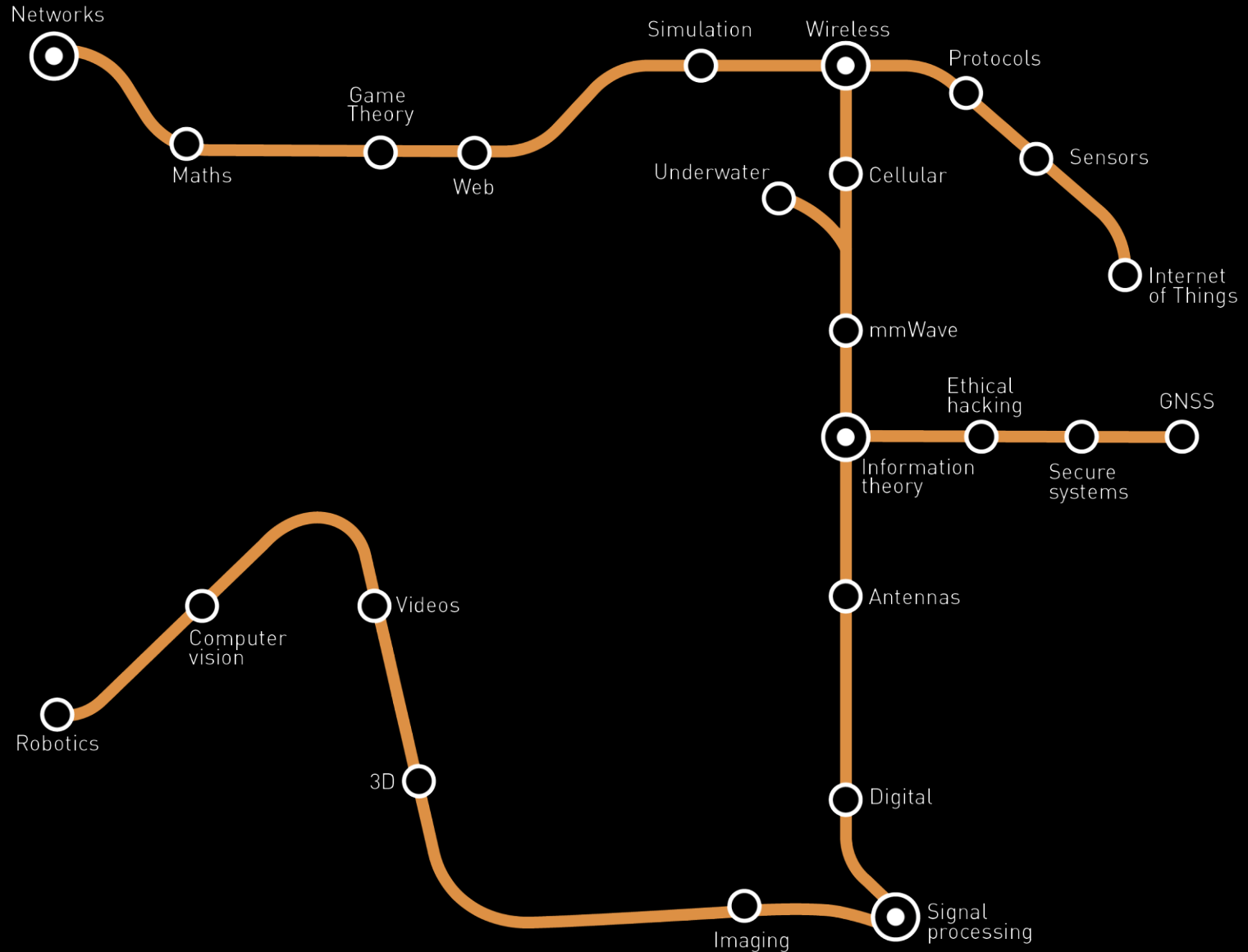
12

internship + thesis

30



Telecommunications





Telecommunications

Motivation

- This curriculum explores every layer from physical to application; Industry 4.0 is synonymous with ICT

What does it cover?

- Telecom systems, network management, sensors, security, multimedia, antenna design, scientific R&D





Telecommunications

ICT subjects

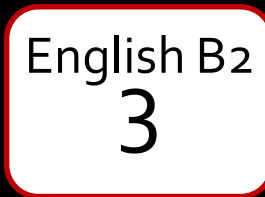
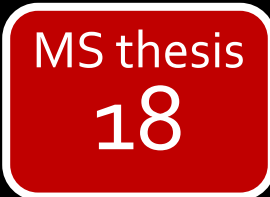
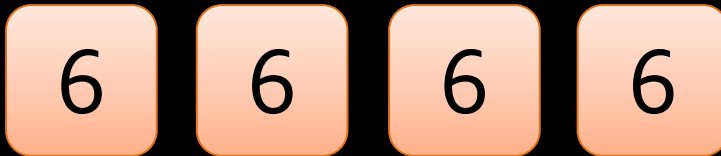
others

free electives

basic



advanced





ICT Subjects

TRANSMISSION AND SIGNALS, ELECTROMAGNETISM, NETWORKS



Antennas and wireless propagation
Computer vision
Digital signal processing
Fiber optics and waveguides
Network modeling
Network science
Telecommunication networks
Wireless communications

3D augmented reality
5G systems
Biophotonics
Digital forensics
Game theory
Human data analytics
Information security
Internet of things and smart cities
Network analysis and simulation
Optical network devices
Optical and quantum communications
Source coding

BASIC - 9 CFU

ADVANCED - 6 CFU



Other Subjects

COMPUTER SCIENCE, AUTOMATION, ELECTRONICS,
MATHS, PHYSICS, SOFT SKILLS



Database management systems

Integrated circuits for signal processing

Mathematical methods

Robotics vision and control

Innovation and entrepreneurship

High level programming

Machine learning

Non verbal communications

Optimization

Statistical mechanics of complex
systems



Internships at ...

ARRI
MUNCHEN (DE)

Elaborazione
segnali per il
cinema digitale



Fiat Chrysler
Automobiles
TORINO / USA

Comunicazione
5G in ambito
veicolare



Huawei
MILANO / CINA

R&D per
telefonia
cellulare



Wind Tre
VENEZIA

Operatore
nazionale di
telefonia



World Sensing
BARCELONA (ES)

Sensoristica
monitoraggio
wireless



RFI
MESTRE (VE)

Rete
ferroviaria
italiana



Telenor
OSLO (NO)

Operatore
nazionale di
telefonia



CAME SpA
DOSSON DI
CASIER (TV)

Controllo
sicuro accessi



Gavia systems
ROVIGO

Servizi WiFi in
ambiente
pubblico



Bft Spa
SCHIO (VI)

Domotica e
automazione
cancelli



Is it a good choice for me?

Strong **mathematical** background is needed

- especially in probability and signal theory

Many courses are **project**-oriented

- not difficult per se but surely demanding

Mostly focuses on **telecommunications**

- did you like your “fundamentals” course?





Compared to ...



MIME
TELECOMMUNICATIONS

Automation Engineering



Control

Dynamic systems
Actuators
Estimation
Industrial



Design

Performance
Optimization
Networks
Security
Web

Mathematical Engineering

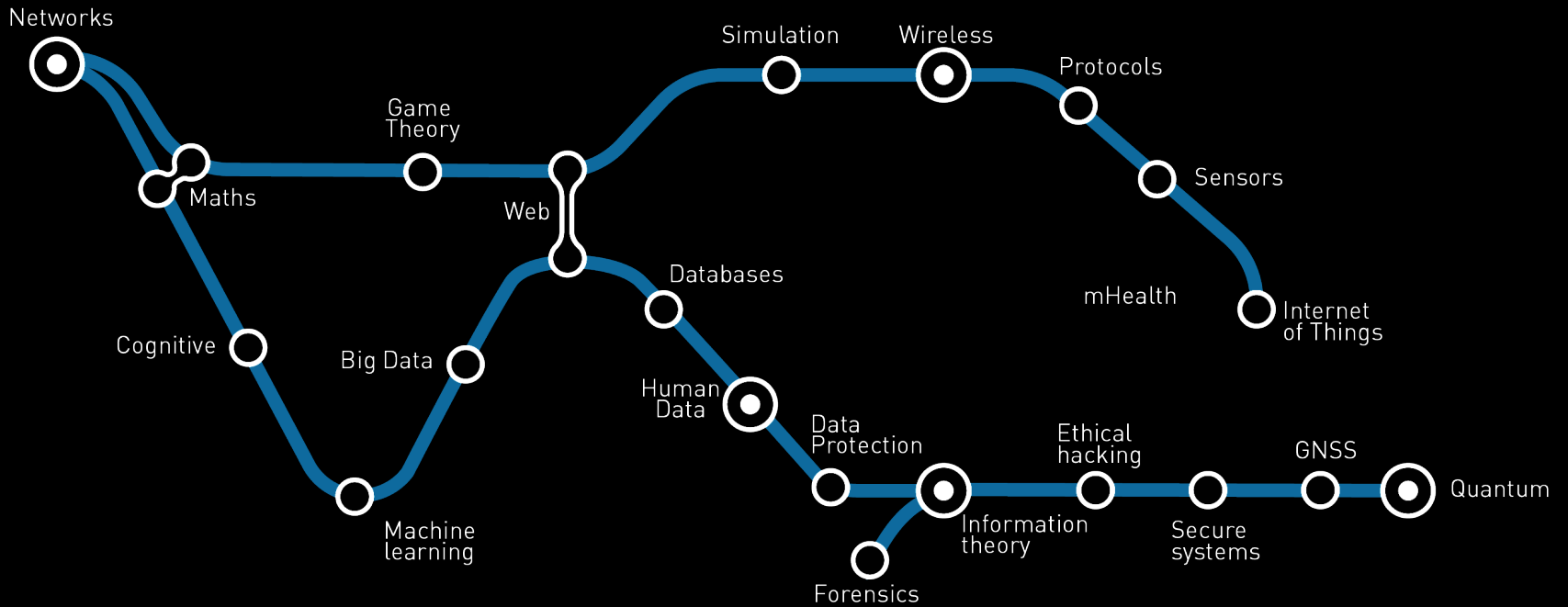
Mechanics

Differential equations
Stochastic
Numerical methods





Cybersystems



Motivation

System interconnection opens up new horizons ,
inspiring challenges... and amazing job opportunities

What does it cover?

Internet of Things

Data analysis

Social networks

Smart cities

Self driving cars

Web applications





Cybersystems

ICT subjects

specialty

free electives

basic

9

9

9

9 6

6 6 6

12

advanced

6

6

6

MS thesis
18

internship
9

English B2
3



Specialty

NETWORKS, COMPUTER SCIENCE,
SIGNALS, MATHS, SOFT SKILLS



MANDATORY

Network science
Web applications

Big data
Cryptography
Digital Forensics
Graph theory
High level programming
Machine learning
Non verbal communications
Optimization

ONE MORE BASIC ICT SUBJECT

Database management systems

6 CFU



Internships at ...

Sanmarco
Informatica
GRISIGNANO DI
ZOCCO (VI)

Soluzioni per IT



Teypra SRL
ROVIGO

Dispositivi
connessi per IoT



Sony Eutec
STUTTGART (DE)

Ricerca e
sviluppo per
multimedialità

Mida Solutions
PADOVA

Virtualizzazione
di applicazioni
voce e dati



Uqido
PADOVA

Software
engineering per
IoT / Blockchain



Aquifi
PALO ALTO (US)

Visione
tridimensionale

solidThinking
VICENZA / USA

Software per
rendering 3D

Nokia Bell Labs
DUBLIN (IR)

Visione
tridimensionale

Altran Italia
ROMA

Consulting su
5G, video 3D,
cybersecurity

Athonet
BOLZANO
VICENTINO (VI)

Software
defined
networking



Is it a good choice for me?

A mixture of **math, computer science, telecom**

- you certainly need good programming skills

A **system-wide** perspective, with an eye on **cross-disciplinary** topics, and an **open mindset**

- data analysis, machine learning, web engineering, middleware, cybersecurity, computing systems





Compared to ...

Computer Science

Computer Engineering

Software



Computer

Languages
Programming
Algorithms
Web

Computing
Data structures
Data retrieval
Algorithms
OS



Systems

Networks
Analytics
Security
Performance
IoT



Data Science

Statistics

Stochastic
Analytics
Data retrieval

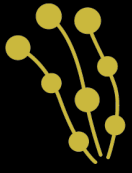


Physics of Data

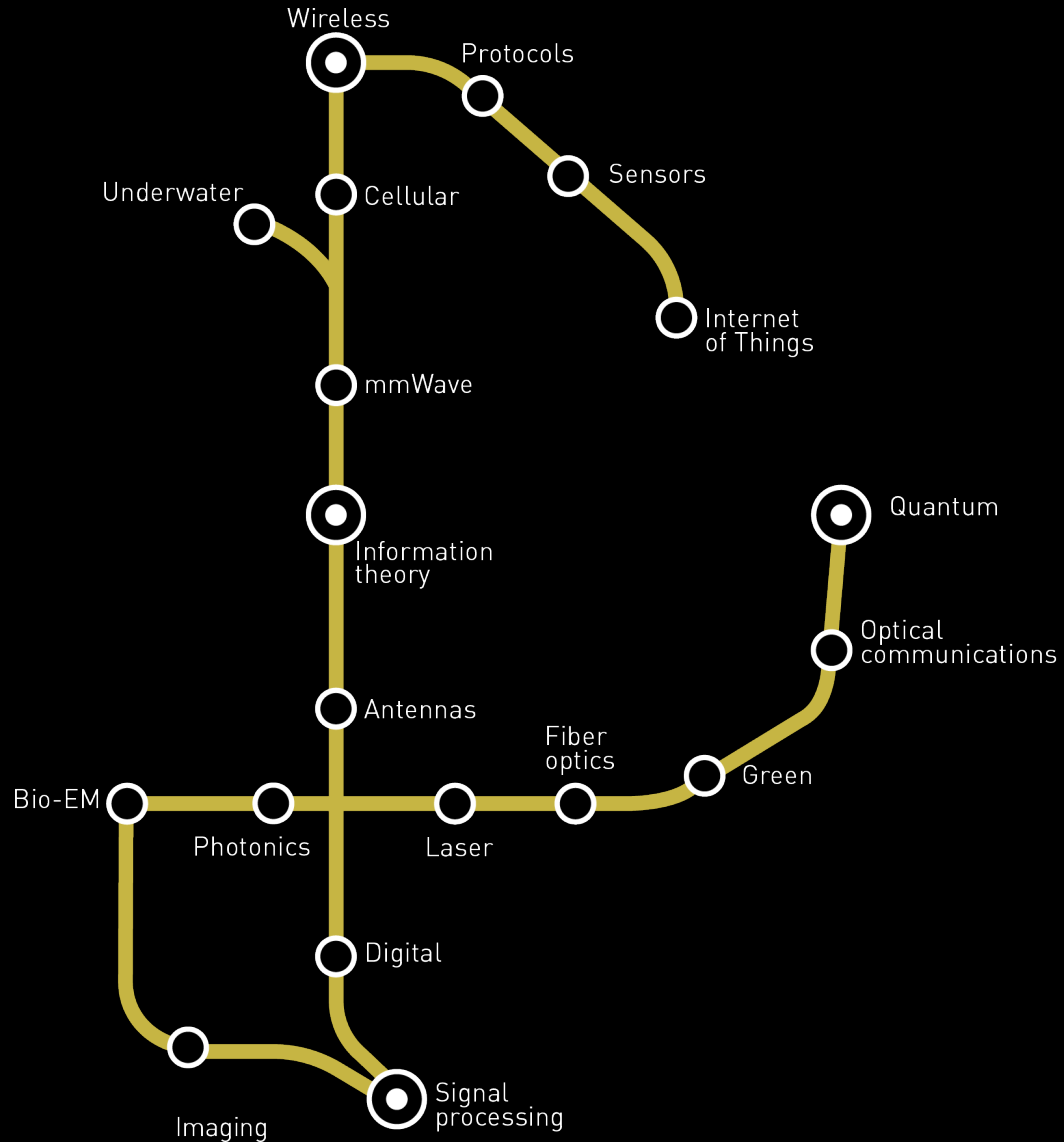


Physics

Physics of matter
Statistical mechanics
Computing



Photonics





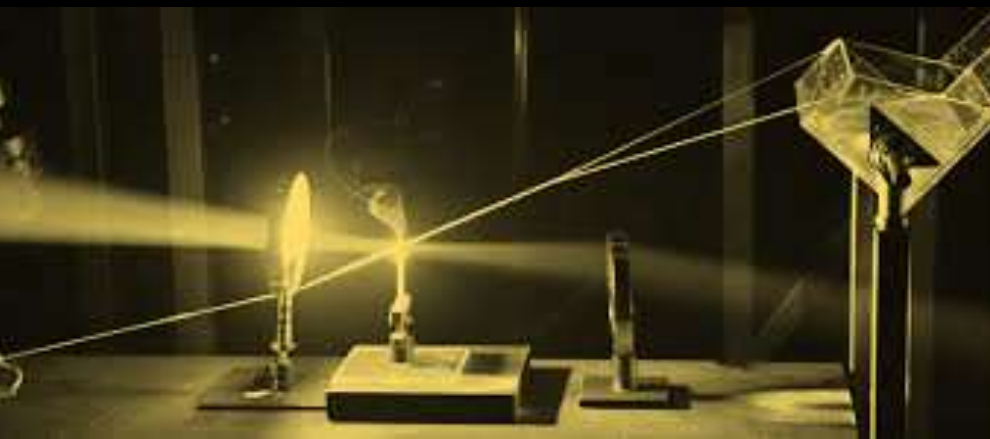
Photonics

Motivation

- Photonics and light-based technologies are the main drivers of this century's industry (source: UN, 2015)

What does it cover?

- Fiber optics, laser, photovoltaic, nanoscale technology, optical networking, bio-electromagnetism, quantum





Photonics

ICT subjects

specialty

free electives

basic

9

9

9

9 6

6 6 6

12

advanced

6

6

6

MS thesis
18

internship
9

English B2
3



Specialty

ELECTROMAGNETICS, PHYSICS,
ELECTRONICS, SOFT SKILLS



MANDATORY

Fiber optics and waveguides
Nanophotonics

ONE MORE BASIC ICT SUBJECT

Optoelectronics for green technologies

Molecular photonics
Nanostructured materials
Non verbal communications
Quantum information and computing
Quantum optics and lasers
Photovoltaic science and technology



Internships at ...

Leonardo
CARSOLI (AO)

Film sottili
per applicazioni
ottiche spaziali



Qascom
BASSANO DEL
GRAPPA (VI)

Comunicazioni
satellitari
sicure



DeltaOhm
PADOVA

Sensori
fotometrici e
radiometrici



CEIT
MONSELICE (PD) /
SVIZZERA

Progettazione
reti in fibra
ottica



NTSG
ROMA

Sensoristica in
fibra ottica e
monitoraggio



Calero Antenne
ISOLA VICENTINA (VI)

Antenne per 5G
e automotive



Infineon
PADOVA / AUSTRIA

Semiconduttori
e IoT



Adant
PADOVA

Antenne
riconfigurabili



SIT
PADOVA

Sistemi di
misura per la
sicurezza



SM Optics
MILANO

Optical
networking



Is it a good choice for me?

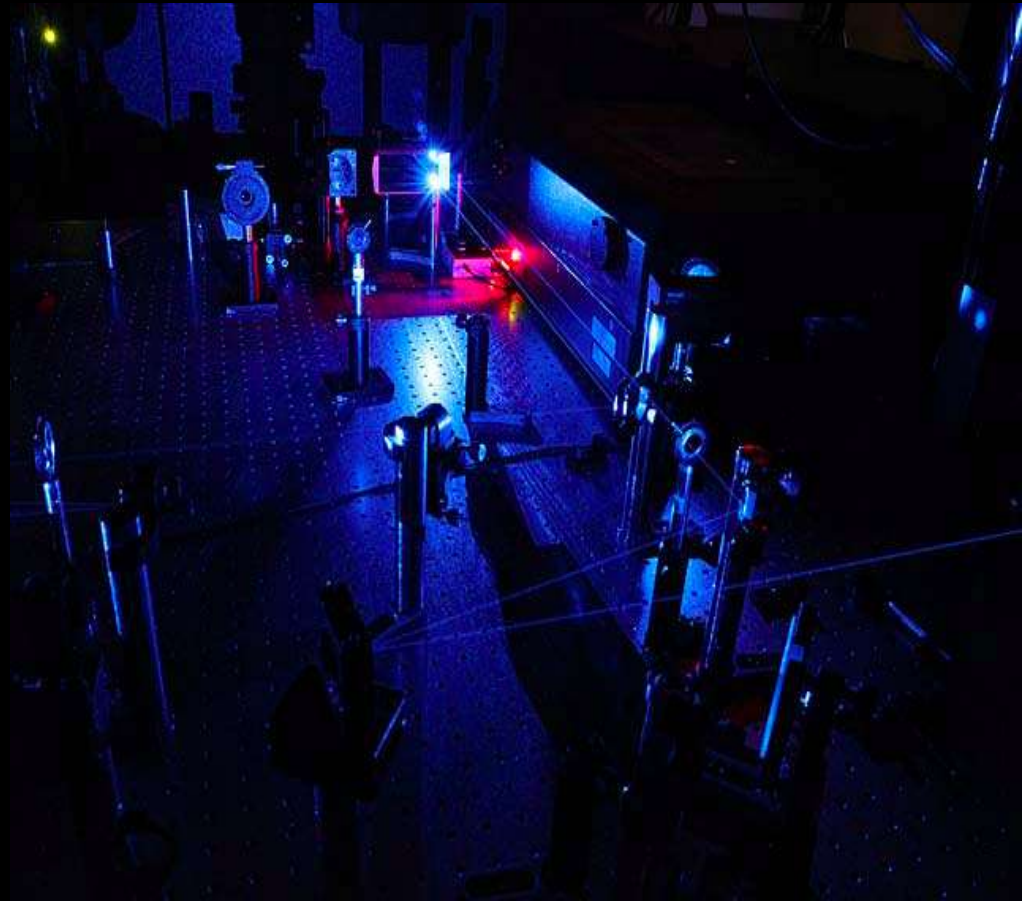
Your proficiency in **physics** will be put to the test

- electromagnetism, quantum, physics of matter

But you need a very **engineering** attitude

- laboratory activity is really important here

(yes, this is our **real lab** and not a stock picture)





Compared to ...

Electrical
Engineering



Electronics

- Integrated Circuits
- Microelectronics
- Power Electronics
- Transducers

 **MIME.**
PHOTONICS



Photonics

- Fiber optics
- Optical networks
- Nano-scale tech
- Bio-electromagnetism
- Quantum computing



Physics

Physics

- Nanophysics
- Semiconductors
- Quantum physics
- Physics of matter



Life & Health



Life & Health

Motivation

- ICT can improve the well-being of individuals by disease prevention/cure, pervasive monitoring, rehabilitation, healthy ageing, in everyday life

What does it cover?

- Application of ICT to: medical systems, diagnostics, imaging, neuroscience, life data analytics, genomics





Life & Health

ICT subjects

specialty

free electives

basic

9

9

9

9	6	6
6	6	6

12

advanced

6

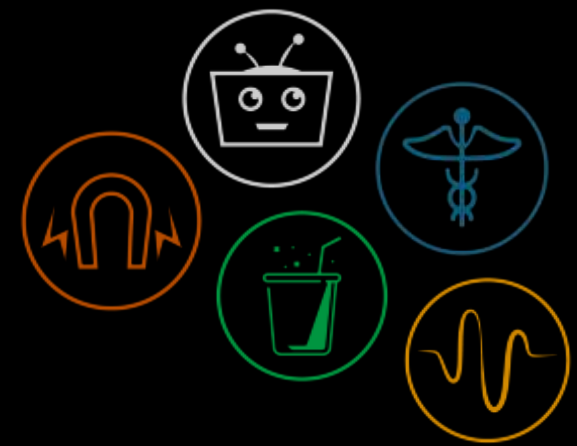
6

MS thesis
18

internship
9

English B2
3

Specialty



**SIGNALS, COMPUTER SCIENCE,
BIOMEDICAL, SOFT SKILLS**

MANDATORY

Digital signal processing
Telemedicine

ONE MORE BASIC ICT SUBJECT

Database management systems

Clinical engineering and health
Computational genomics
Computational neuroscience
Digital forensics
Imaging for neuroscience
Life data epidemiology
Machine learning
Neurorehabilitation and BCI
Sports engineering
Structural bioinformatics

6 CFU



Internships at ...

Malvestio

VILLANOVA DI

CAMPOSAMPIERO (PD)

Monitoraggio di
segnali vitali per
letti ospedalieri



Khymeia

NOVENTA

PADOVANA (PD)

Virtual reality for
neurological
rehabilitation



Policlinico

Sant'Orsola

BOLOGNA

Reparto
malattie
infettive



BrainTrends

ROMA

Sensori per
biosegnali
cerebrali



Phoenix RTO

PADOVA

Spettroscopia
iperspettrale
agrifood



AMPED

TRIESTE

Multimedialità
per indagini
forensi



Nidek Medical

ALBIGNASEGO

(PD) / GIAPPONE

Oftalmologia
e diagnostica
oculare



Inst. Behavioral

Neurobiology

TUBINGEN (D)

BCI per paralisi e
stroke



WYSS Center

GENEVA (CH)

Analisi FMRI-BCI,
Neuroprostetica



Inst. Tecnológico

de Canarias

CANARY ISLANDS (E)

Ricostruzione
ossea CAD



Is it a good choice for me?

Requires interest in both **ICT** & **medical** subjects

- you must acquire solid skills in both areas; thus, also math, computer science, telecommunications
- this is a rigorous **engineering** program

Note that you **will not** find:

- general courses in chemistry or physiology
- courses of biology, biomechanics, biomaterials





Compared to ...

Bio engineering



Biomedical

- Imaging
- Models (diabetes)
- Materials
- Mechanics



ICT for medical

- Signal processing
- Analytics
- Digital forensics
- IT for neuroscience
- Photonics




Clinical

Medical
Biotechnologies

- Pathology
- Pharmacology
- Chemistry
- Molecular biology

International priority



Travel is fatal to prejudice,
bigotry, and narrow-mindedness,
and many of our people need
it sorely on these accounts



Mark Twain

TIME

completely in English

with many international
opportunities

Incoming students

- ICT for Internet and Multimedia is one of 20 UniPD's International Masters
- For extra-EU: 167 applicants (top of UniPD) 33 positions, so far 20 students admitted

mg	al	in	tn	pk	ir	ps	lk	vn	et
									
1	1	2	3	4	2	4	1	1	1

- application for EU students is still ongoing

Erasmus destinations

destinations



2



1



1



2



1



2

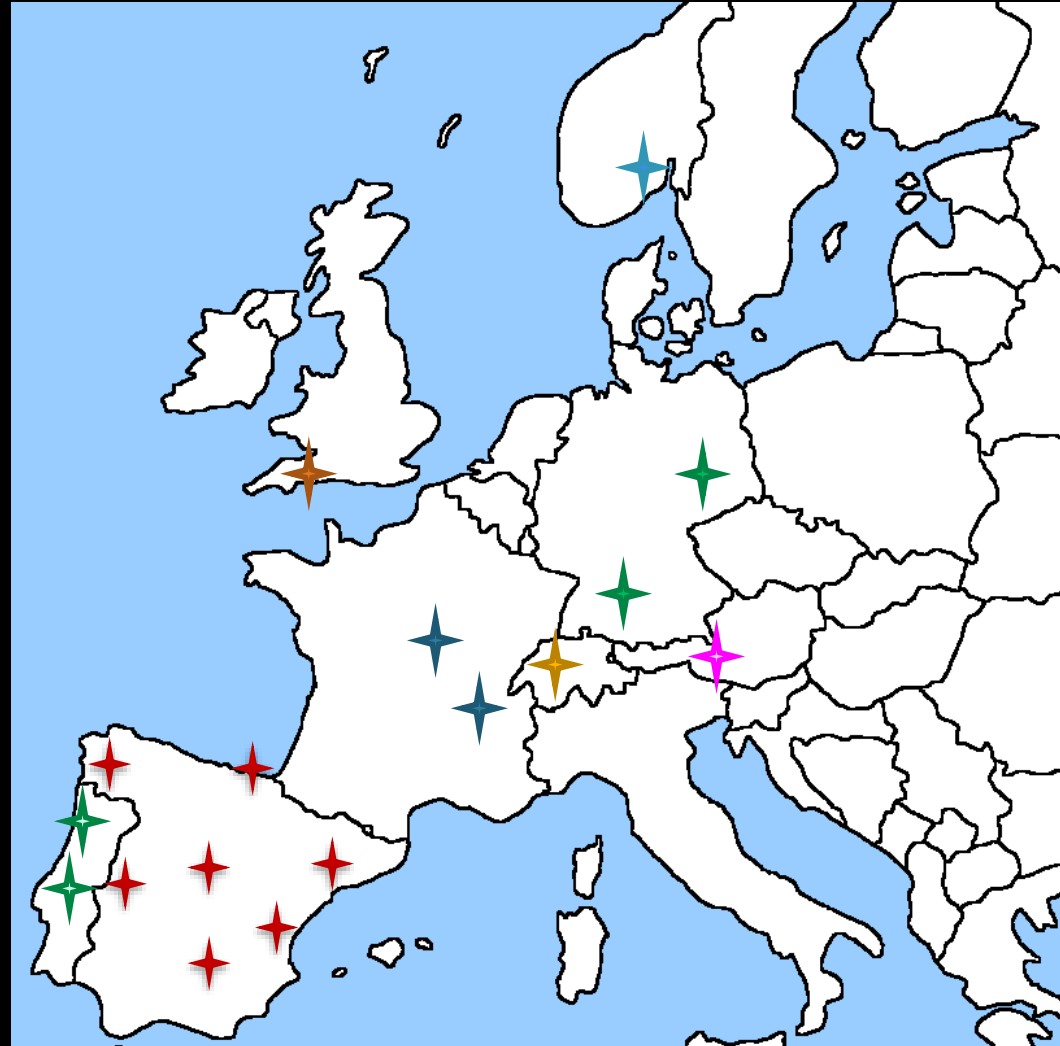


1 (SEMP)



9 (incl.
Canary)

and counting...



Double degrees



International agreements of Double Degree with top-ranked universities worldwide:

- National Taiwan University (2 positions)
- Universidad Politecnica de Madrid (2 positions)

Compared to similar programs (e.g TIME) you still get 2 degrees but in just 2 years, not 3

DD: how does it work?



- Apply halfway through 1st year → must earn 60 ECTS in Padova by September
- If selected, spend the 2nd year abroad
- Final thesis done and discussed abroad before a joint committee, also valid for Italian degree
- When abroad, scholarship at least 2×Erasmus for a period = $\min(\text{graduation}, 24 \text{ months})$

MIME

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Slides available at:

 /mime.unipd