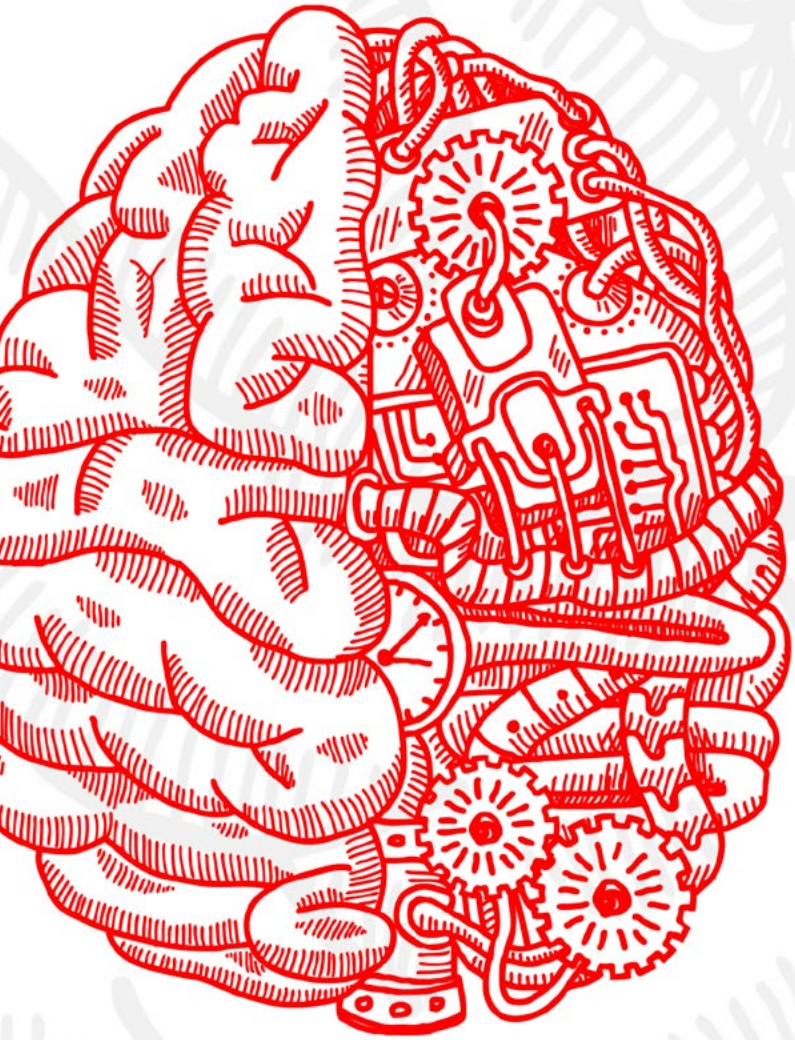


#27co-session

ARTIFICIAL INTELLIGENCE FOR BUSINESS

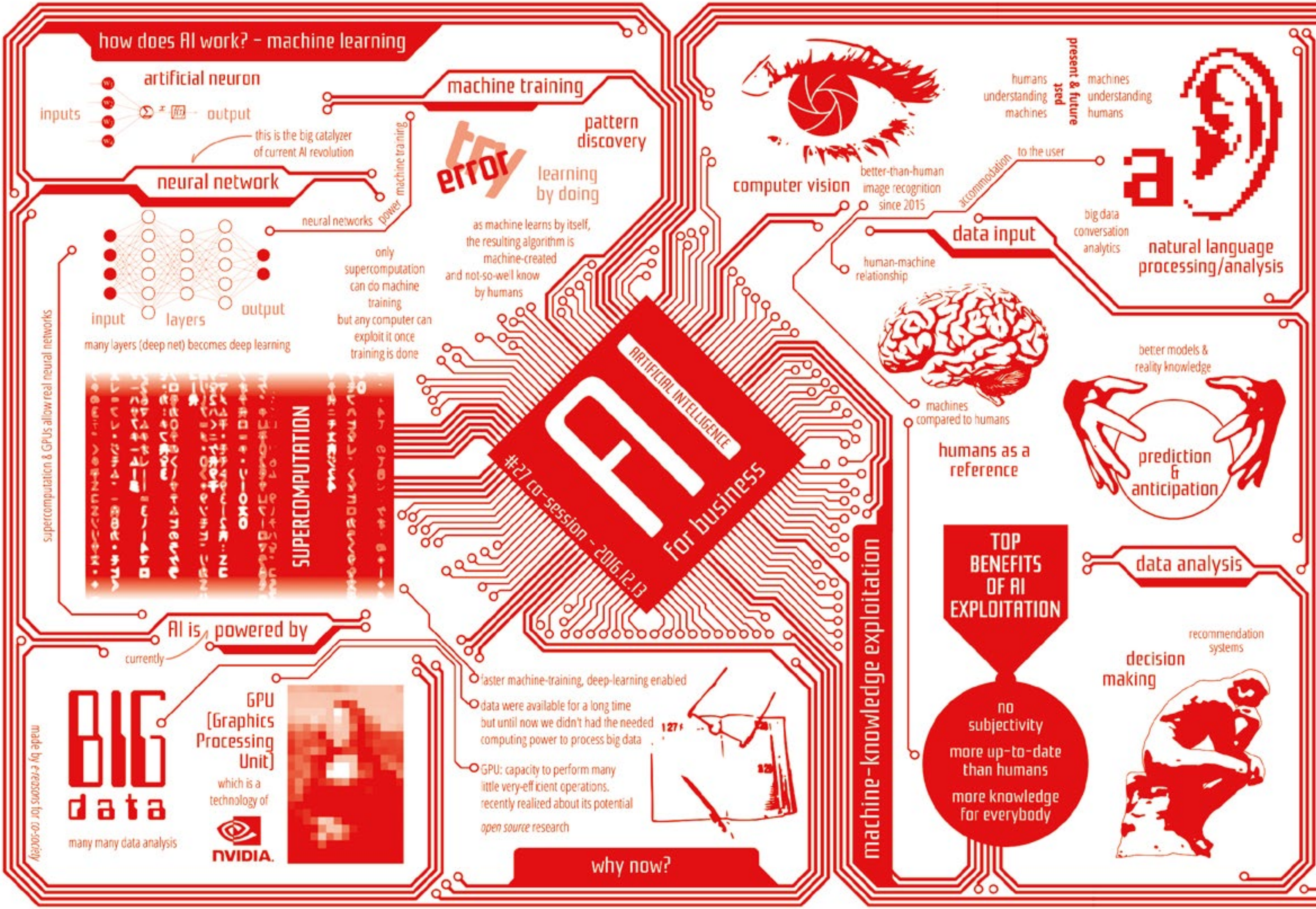
MARTES 13 DE DICIEMBRE 2016
CAMPUS NORD, UPC BARCELONA

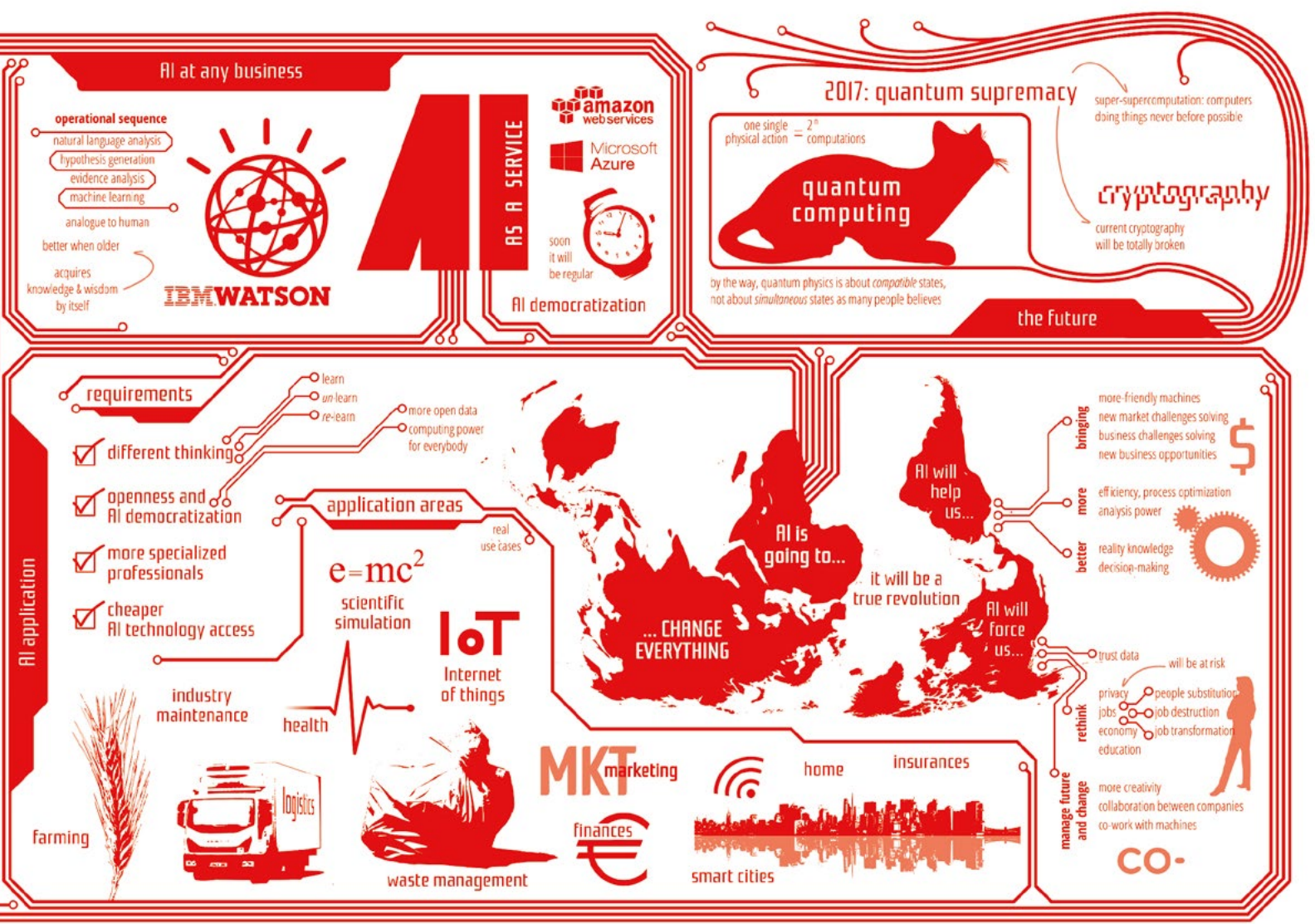
Organised by:

co-society®

In collaboration with:

BSC Barcelona Supercomputing Center
Centro Nacional de Supercomputación


how does AI work? - machine learning
artificial neuron
inputs
output
this is the big catalyzer of current AI revolution
neural network
machine training
power
neural networks
input
layers
output
many layers (deep net) becomes deep learning
supercomputation & GPUs allow real neural networks
SUPERCOMPUTATION
machine training
pattern discovery
try
error
learning by doing
as machine learns by itself, the resulting algorithm is machine-created and not-so-well know by humans
only supercomputation can do machine training but any computer can exploit it once training is done
ARTIFICIAL INTELLIGENCE
AI
for business
#27 co-session - 2016.12.13
AI is powered by
currently
BIG data
many many data analysis
made by e-reasons for co-society
GPU [Graphics Processing Unit] which is a technology of
NVIDIA.
faster machine-training, deep-learning enabled
data were available for a long time but until now we didn't had the needed computing power to process big data
GPU: capacity to perform many little very-efficient operations. recently realized about its potential
open source research
why now?
computer vision
better-than-human image recognition since 2015
humans understanding machines
past
present & future
machines understanding humans
accommodation
to the user
a
data input
big data conversation analytics
natural language processing/analysis
human-machine relationship
machines compared to humans
humans as a reference
better models & reality knowledge
prediction & anticipation
machine-knowledge exploitation
TOP BENEFITS OF AI EXPLOITATION
no subjectivity
more up-to-date than humans
more knowledge for everybody
data analysis
recommendation systems
decision making


AI at any business
operational sequence
natural language analysis
hypothesis generation
evidence analysis
machine learning
analogue to human
better when older
acquires knowledge & wisdom by itself
IBM WATSON
AI AS A SERVICE
amazon web services
Microsoft Azure
soon it will be regular
AI democratization
2017: quantum supremacy
one single physical action = 2^n computations
quantum computing
super-supercomputation: computers doing things never before possible
cryptography
current cryptography will be totally broken
by the way, quantum physics is about compatible states, not about simultaneous states as many people believes
the future
AI application
requirements
learn
un-learn
re-learn
more open data
computing power for everybody
different thinking
openness and AI democratization
more specialized professionals
cheaper AI technology access
application areas
real use cases
e=mc²
scientific simulation
IoT
Internet of things
industry maintenance
health
farming
logistics
waste management
MKT marketing
finances
home
insurances
smart cities
AI is going to...
... CHANGE EVERYTHING
it will be a true revolution
AI will help us...
bringing
more-friendly machines
new market challenges solving
business challenges solving
new business opportunities
more
efficiency, process optimization
analysis power
better
reality knowledge
decision-making
AI will force us...
trust data
will be at risk
rethink
privacy
people substitution
jobs
job destruction
economy
job transformation
education
manage future and change
more creativity
collaboration between companies
co-work with machines
CO-

THE STATE OF THE ART

Barely two decades have passed since Artificial Intelligence was no more than an eminently theoretical concept, the only practical applications for which seemed to be those offered by science fiction. AI is now among us and the question is not whether companies will use it in their operations or as the basis for new business models, but *when* they are going to do it and in what way. This Co-Session sought to explore the answer to these questions and show at first hand cases in which Artificial Intelligence is applied to the world of business. And for this there could have been no better host than the **Barcelona Supercomputing Center (BSC)**.

OF ARTIFICIAL INTELLIGENCE

AI is now among us and the question is not whether companies will use it, but when they are going to do it and in what way.

BSC is a research center that is home to the **MareNostrum** supercomputer. Josep María Martorell, the center's Associate Director, and Jordi Torres, one of its researchers, kicked off this Co-Session with an introduction to the current status of the raft of technologies collectively known as Artificial Intelligence. We learnt that its incipient market, in which multimillion dollar investments are already being made in the world's biggest tech companies, is set to change everything, from the food we eat to our healthcare systems, as well as the current concept of work.

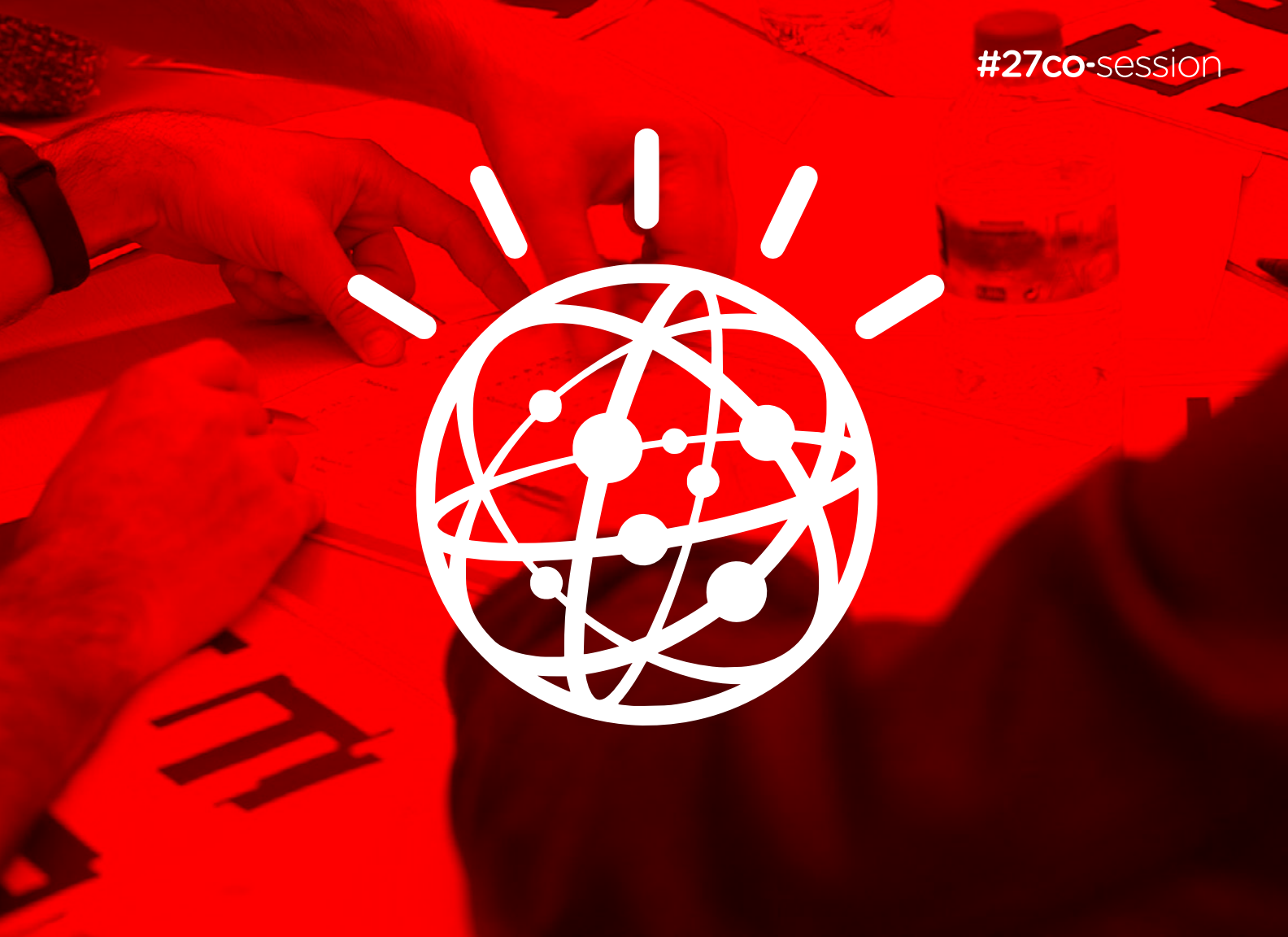
IBM'S WATSON

Watson is opening up a new era for computing by including elements of human perception and reasoning

This introduction also helped us understand that we are entering a new era of the democratization of computing power, and that companies that delay in incorporating AI into their strategies can suffer the same consequences as those who took their time getting onto the Internet. One of the most advanced and paradigmatic examples of Artificial Intelligence and computing superpower available for companies is undoubtedly the services linked to IBM's **Watson** system. Alfred Escala, Vice President of IBM's SPGI Financial Services, was on hand at this Co-Session to explain how Watson is already being used by companies from different sectors.

Certainly the best-known Artificial Intelligence system after beating the top contestants on the TV game show *Jeopardy!*, Watson is opening up a new era for computing by including elements of human perception and reasoning. Its natural language interaction capabilities make it especially in demand for the automation of Call Center systems or to operate robots that can analyze the context of each interaction with humans and learn from them. Watson's first banking project in Europe has been an advisory system for Caixabank's Foreign Trade consultants.

#27co-session



AI BUSINESS CASES

The increased democratization of computing power and Artificial Intelligence is perhaps best reflected in the appearance of a growing number of startups offering new products and services associated with these new technologies. Some of these new companies were invited to this Co-Session to share their experience.

THETHINGS.IO was one of them. For its founder, Marc Pous, the Internet of Things will not make sense without Artificial Intelligence. TheThings is already being used in a wide range of sectors, for instance logistics to manage fleets of trucks more efficiently and maintain the cold chain needed to transport certain types of goods. AI linked to the Internet of Things has also found its first industrial applications in fields like asset management and predictive maintenance. For its part, IMATH SERVICES has specialized in Big Data services that use AI technologies to better understand customer needs and behavior. Iñigo Zubizarreta, co-founder and CEO of this startup, explained how the company applies predictive models for one of its customers, a telecommunications company, which help predict customer attrition and offer the products and services that are most likely to be contracted by each of its more than one million users.

Large companies should feel more threatened than ever by small startups, as with access to AI they are going to be able to do great things with much less.

"Large companies should feel more threatened than ever by small startups, as with access to AI technologies they are going to be able to do great things with much less." These were the words of Javier de la Rosa, co-founder of SADAKO TECHNOLOGIES, for whom Artificial Intelligence is a truly disruptive innovation in the robotics field. Sadako Technologies uses this combination of robotics and Artificial Intelligence to provide a low-cost solid waste separation system using multilayer neural network algorithms (Deep Learning) that

If up to now humans have had to understand machines in order to use them, now it is the machines that are going to start to be able to understand humans

allow waste materials to be recognized from images taken by a simple camera. Instead of programming detection rules, this system uses Machine Learning techniques that allow it to learn from its experience separating waste.

If up to now humans have had to understand machines in order to use them, now it is the machines that are going to start to be able to understand humans. AI is also responsible for this paradigm shift. The Swedish company ARTIFICIAL SOLUTIONS has spent 15 years teaching machines to understand natural language. Joaquim Bargalló, Professional Services Director Europe, described several practical applications for these technologies. Meanwhile, Caterina Font, co-founder of COUNTEREST, a startup dedicated to analyzing customer behavior in physical spaces, stressed the important point that to make efficient use of AI technologies, we first and foremost need to know how to ask the right questions that are to be answered by these new systems.


AI:
WHAT'S
IN IT
FOR
ME?

Metric4Match is a new matching tool that can connect participants at an event based on the terms used to describe them in their LinkedIn profiles

As is usually the case at each Co-Session, there was time to work in groups. On this occasion things were done a little differently as the work groups were organized for the first time using **Metric4Match**, a new matching tool that can connect participants at an event based on the terms used to describe them in their LinkedIn profiles. For this, Co-Society used a specially-developed algorithm which allows us to see the "distance" or "closeness" between the professional and personal backgrounds of the different profiles analyzed. Metric4Match therefore makes it possible to put together groups based on the potential opinions and perspectives of its members.

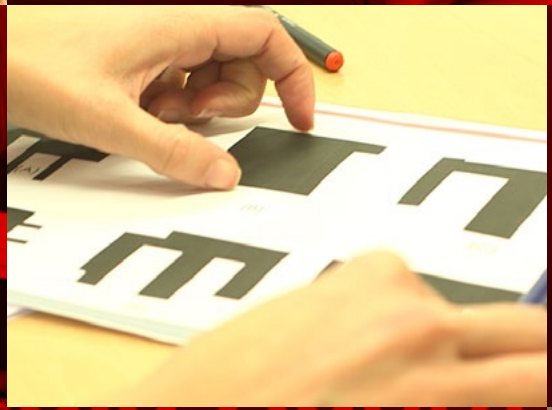
The groups formed debated the business opportunities offered to their respective sectors by Artificial Intelligence. Among the many potential advantages were those related to cost reduction and greater efficiency based on anticipation. They also discussed the prior needs of organizations to be able to make reality the promises of AI. The answers to this question included the need for more specialized professionals, more accessible tools, strategic management and focus in the longer term, and innovative business models capable of levering the new paradigms that Artificial Intelligence can create in new markets.

THE COMING ERA OF QUANTUM COMPUTING

The most scientific part of this Co-Session came from José Ignacio Latorre, theoretical physicist and partner of **Entanglement Partners**, "The Quantum Information Company", who tackled the unenviable task of helping the uninitiated understand the principles and potential of quantum computing. From his presentation, we learned, for example, that the quantum computing revolution will leave today's AI revolution standing, as it will exponentially multiply the current limits of traditional computing.

This will allow us, among other disruption innovations, to break modern encryption systems, devise simulations of quantum physics, easily train neural networks, and multiply our current capabilities in drug design or the optimization of solutions to an infinite number of problems to an unheard-of degree. For Latorre, the main question here is not going to be so much *when* quantum computing will be available but into whose hands this type of technology is going to fall. This is a valid question if, as he himself states, being the first to have the know-how to run a quantum supercomputer brings about a situation similar to that of being the first to possess the atomic bomb.

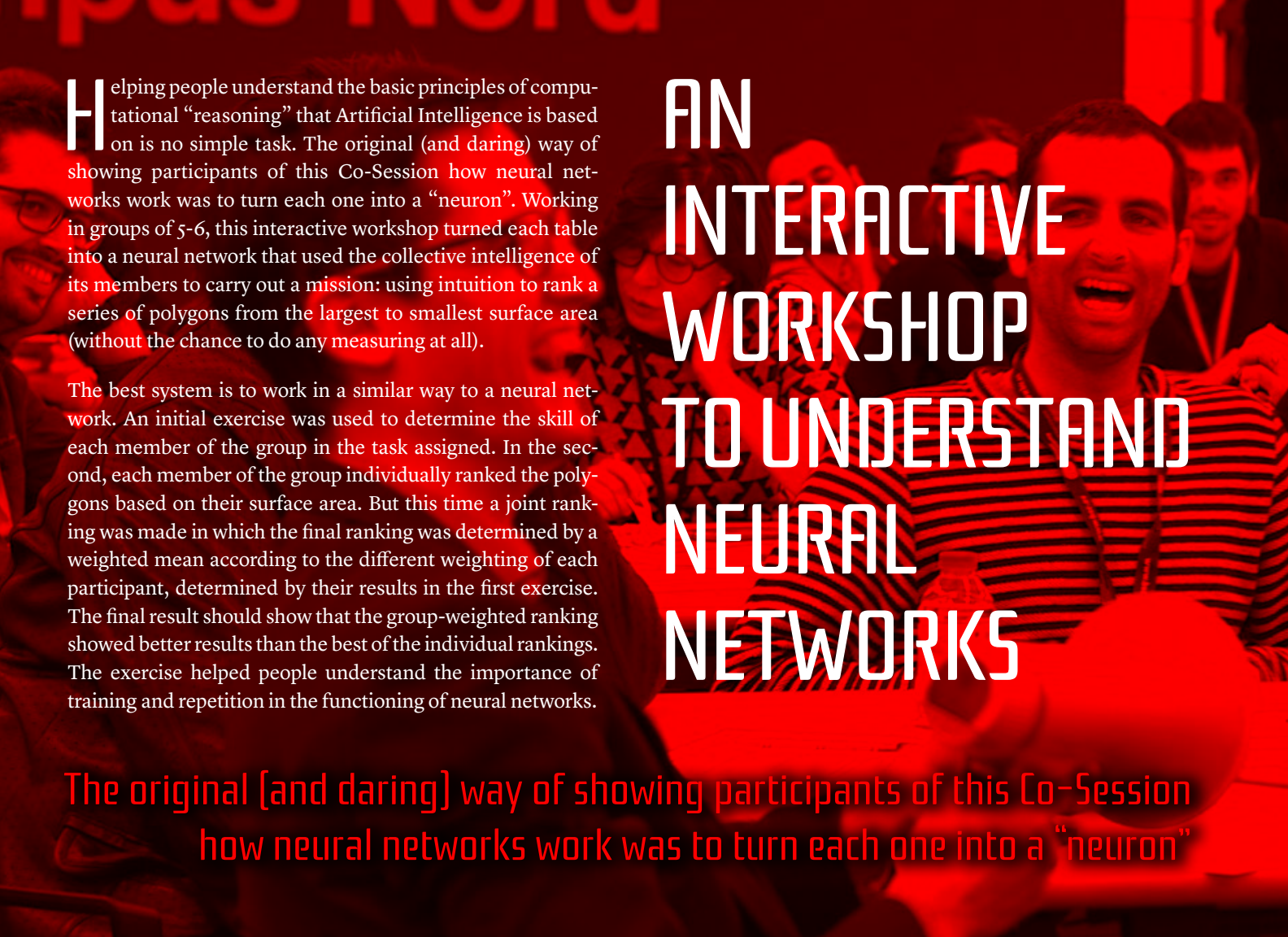




Quantum computing revolution will leave today's AI revolution standing, as it will exponentially multiply the current limits of traditional computing

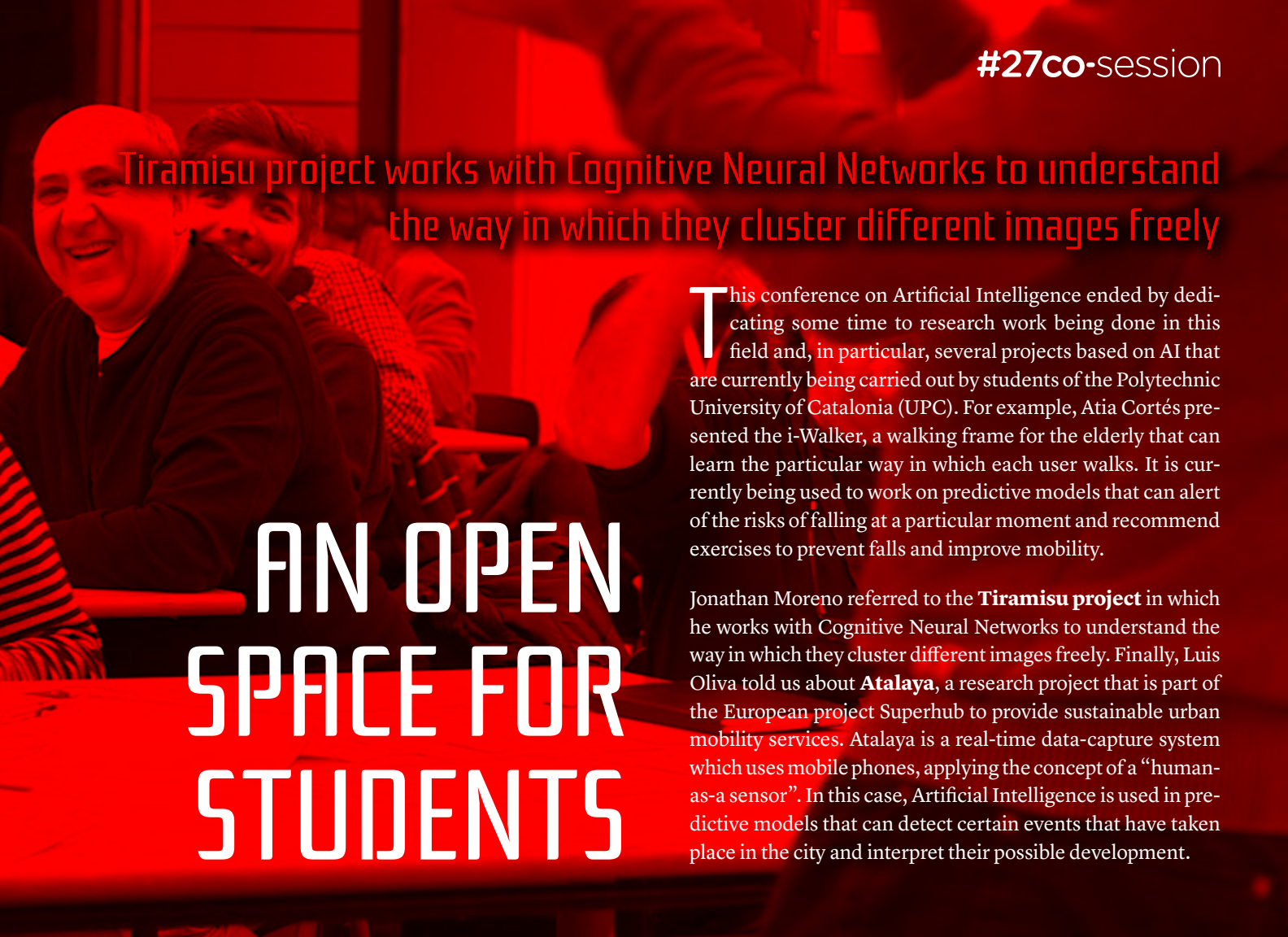
AN INTERACTIVE WORKSHOP TO UNDERSTAND NEURAL NETWORKS

Helping people understand the basic principles of computational "reasoning" that Artificial Intelligence is based on is no simple task. The original (and daring) way of showing participants of this Co-Session how neural networks work was to turn each one into a "neuron". Working in groups of 5-6, this interactive workshop turned each table into a neural network that used the collective intelligence of its members to carry out a mission: using intuition to rank a series of polygons from the largest to smallest surface area (without the chance to do any measuring at all).

The best system is to work in a similar way to a neural network. An initial exercise was used to determine the skill of each member of the group in the task assigned. In the second, each member of the group individually ranked the polygons based on their surface area. But this time a joint ranking was made in which the final ranking was determined by a weighted mean according to the different weighting of each participant, determined by their results in the first exercise. The final result should show that the group-weighted ranking showed better results than the best of the individual rankings. The exercise helped people understand the importance of training and repetition in the functioning of neural networks.



The original (and daring) way of showing participants of this Co-Session how neural networks work was to turn each one into a "neuron"



Tiramisu project works with Cognitive Neural Networks to understand the way in which they cluster different images freely

AN OPEN SPACE FOR STUDENTS

This conference on Artificial Intelligence ended by dedicating some time to research work being done in this field and, in particular, several projects based on AI that are currently being carried out by students of the Polytechnic University of Catalonia (UPC). For example, Atia Cortés presented the i-Walker, a walking frame for the elderly that can learn the particular way in which each user walks. It is currently being used to work on predictive models that can alert of the risks of falling at a particular moment and recommend exercises to prevent falls and improve mobility.

Jonathan Moreno referred to the **Tiramisu project** in which he works with Cognitive Neural Networks to understand the way in which they cluster different images freely. Finally, Luis Oliva told us about **Atalaya**, a research project that is part of the European project Superhub to provide sustainable urban mobility services. Atalaya is a real-time data-capture system which uses mobile phones, applying the concept of a "human-as-a sensor". In this case, Artificial Intelligence is used in predictive models that can detect certain events that have taken place in the city and interpret their possible development.

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