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ML4 MICROBIOME

COST Action CA18131 ML4Microbiome

Statistical and Machine Learning techniques in human microbiome studies

Action Chair
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EuroScience

Fondazione Internazionale Trieste

What is the Microbiome?

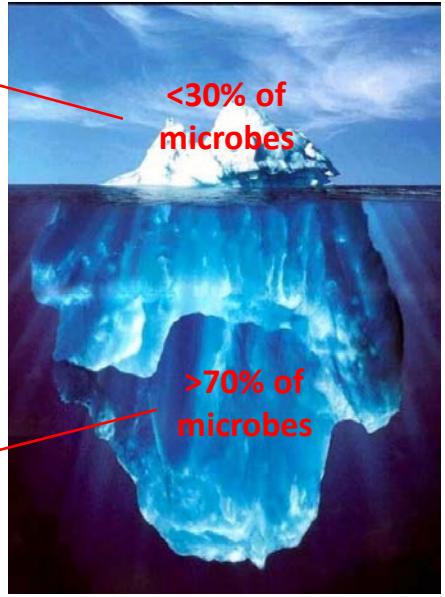
Microbiome definition:
The complete set of microbial genes & genomes in a given environment

Bacteriome, virome/phageome, mycobiome etc.

60-90% of Earth's biomass microbial

New technologies allows high-throughput analysis of microbial DNA from samples without culturing

Traditional culturing:
one species at a time



Metagenomics &
Next Generation Sequencing:
DNA from 1000s species in parallel

Why is the Human Microbiome important?

The human microbiome

38 trillion bacterial cells (2-3kg) in a 70kg man

1.3 : 1 bacterial and human cells in/on body

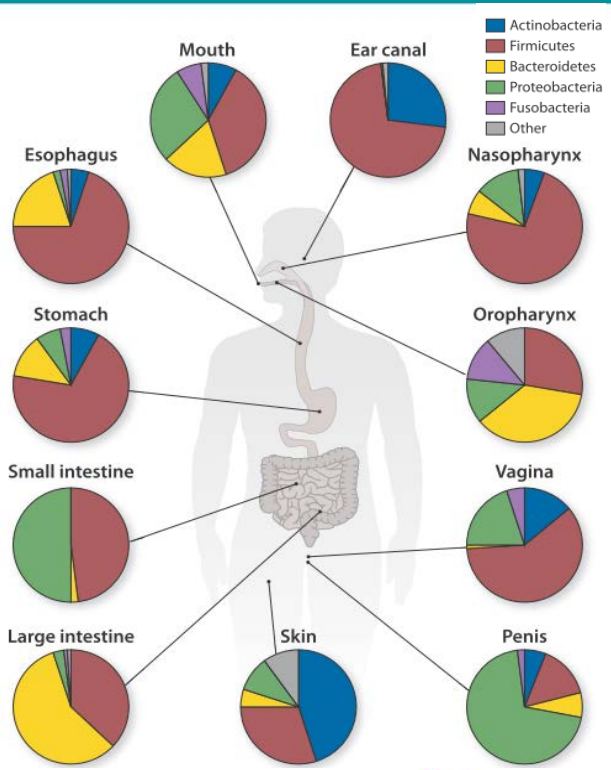
Digests food, synthesizes vitamins, prevents pathogens & trains the immune system

Microbiome importance for improving health

Dysregulation increasingly associated with health & disease
=> new treatments & diagnostics/prognostics

Optimise nutritional composition & uptake of food

Optimise action, stability & safety of drugs



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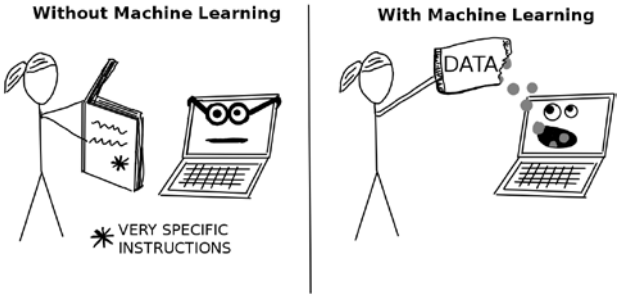
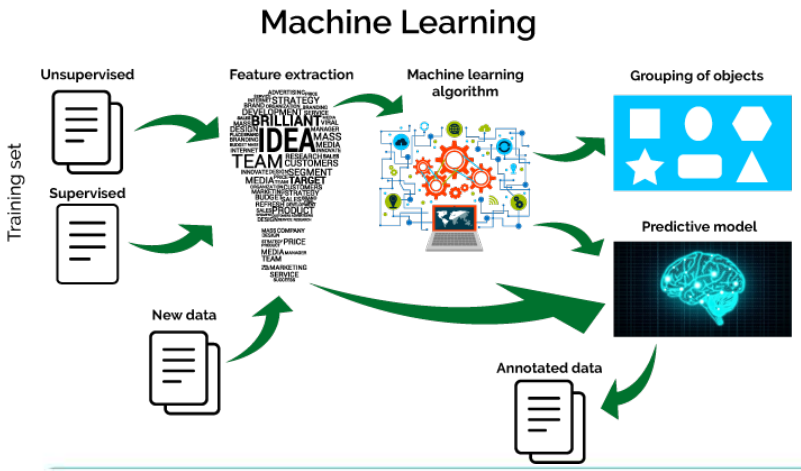
How can Machine Learning help?





Microbiome datasets are huge, BUT so is their potential of improving human health!

<u>Many challenges with these data, e.g.</u>

- Different data types
- Lots of noise & inter-individual variation
- # of microbiome samples << # of microbes
- ML models hard to generalise across studies

ML4 MICROBIOME **<u>Aim</u>**

To first optimize and then standardize best practice of ML techniques for human microbiome research

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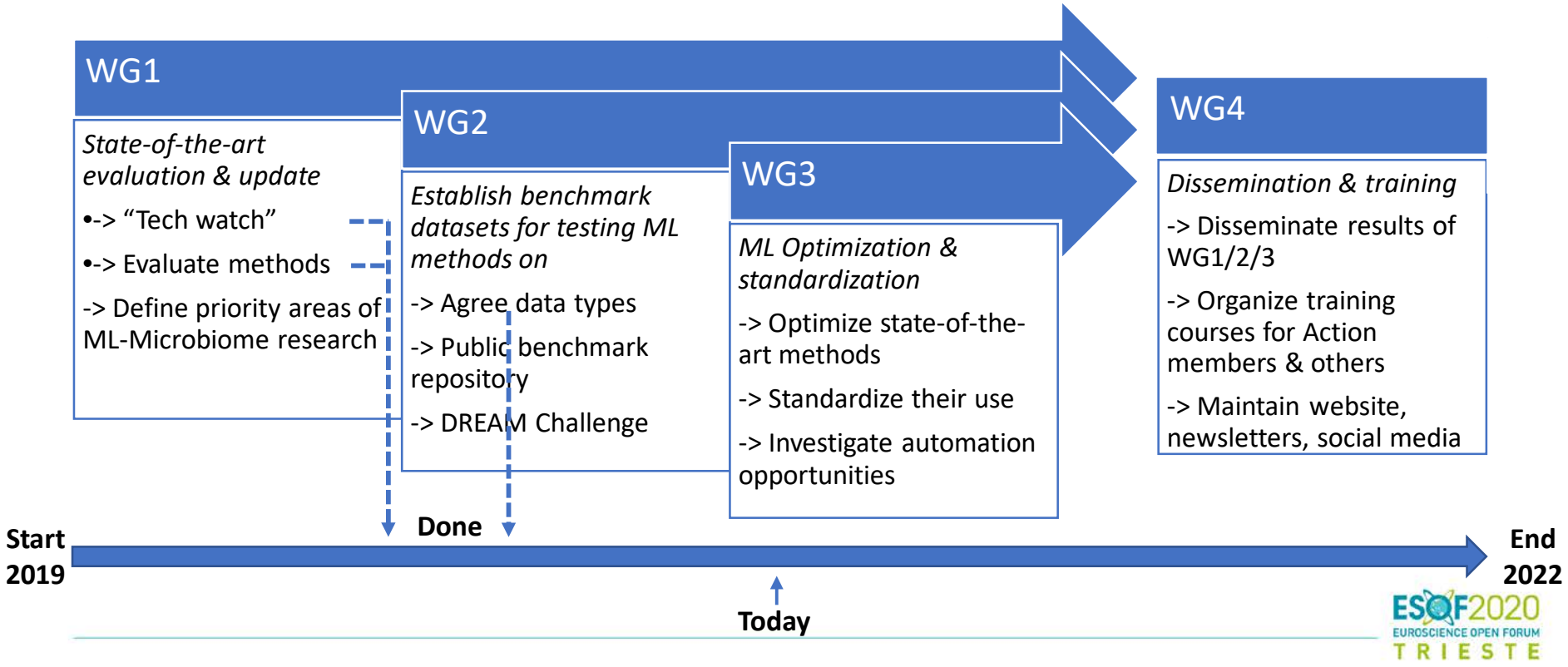
How do we achieve this?



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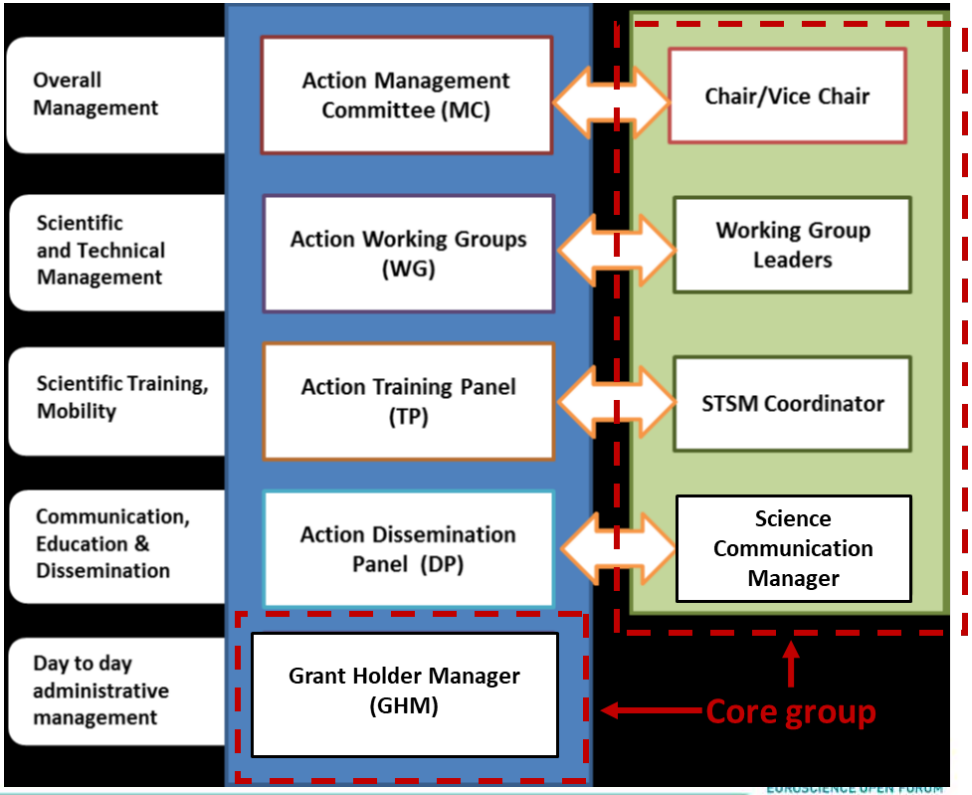
Action size & structure

	Start	Now
Countries	24	**34**
Participants	57	**113**
ITC	54%	**55%**
Female	36%	**39%**
ECI	?	**23%**

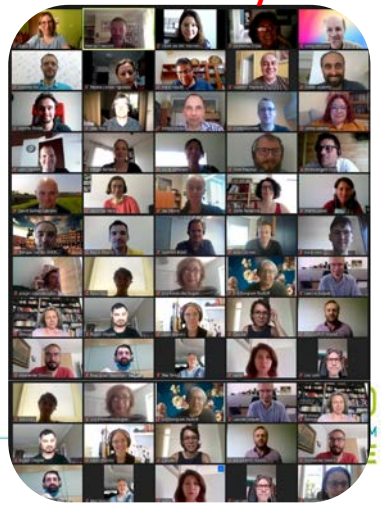


Meetings, training schools & STSMs

MC: Brussels - Feb 2019

TS: Sarajevo - May 2019

WG: Zoom - July 2020



MC: Heraklion - Oct 2019

WG: Riga - May 2019

+ 7 Short-Term Specific Missions

Hopefully: MC: Sofia Dec 2020 & TS: Uppsala Jan 2021

A huge thanks to

Grant Holder Manager Chloe Huseyin

Vice Chairs David Cabrero Lopez & Randi Betelsen

The Core Group

All MC Members & Substitutes

Karina Marcus & Olga Gorczyca

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