

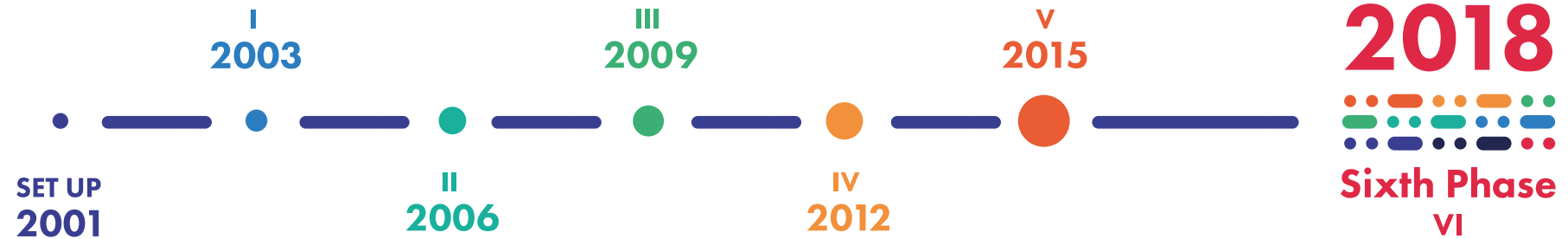


# An IT R&D Collaboration Framework

*Quantum Computing for HEP Workshop*

Alberto Di Meglio – CERN openlab Head

# DRIVING INNOVATION SINCE 2001



CERN openlab Collaboration Board 2017

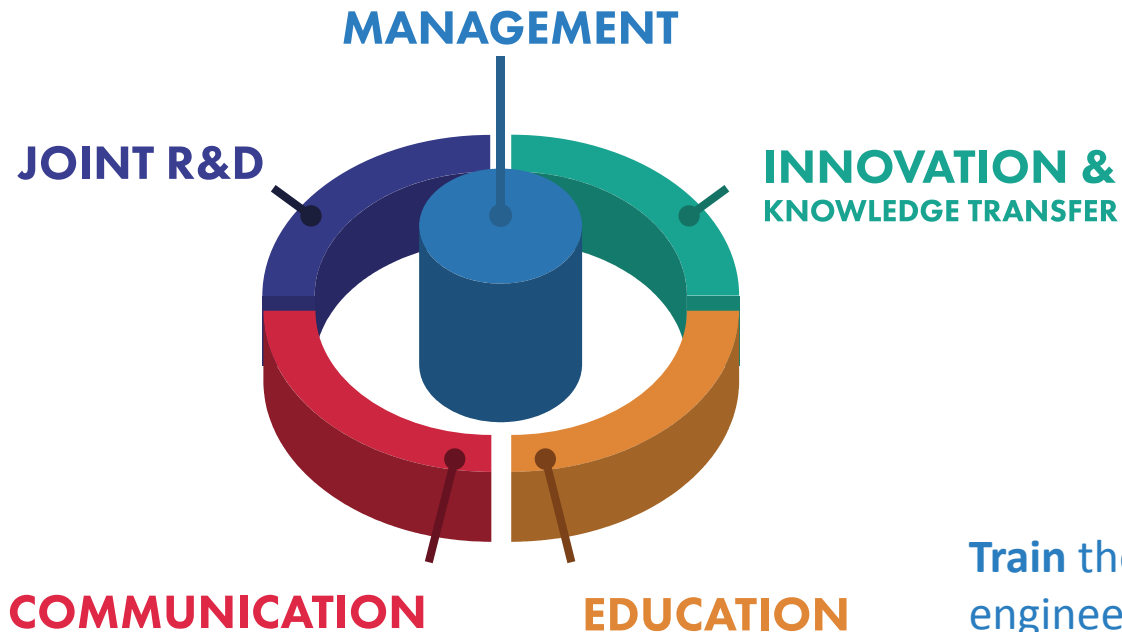


# CERN OPENLAB'S MISSION

*Our recipe for success*

**Evaluate and test** state-of-the-art technologies in a challenging environment and improve them in collaboration with industry.

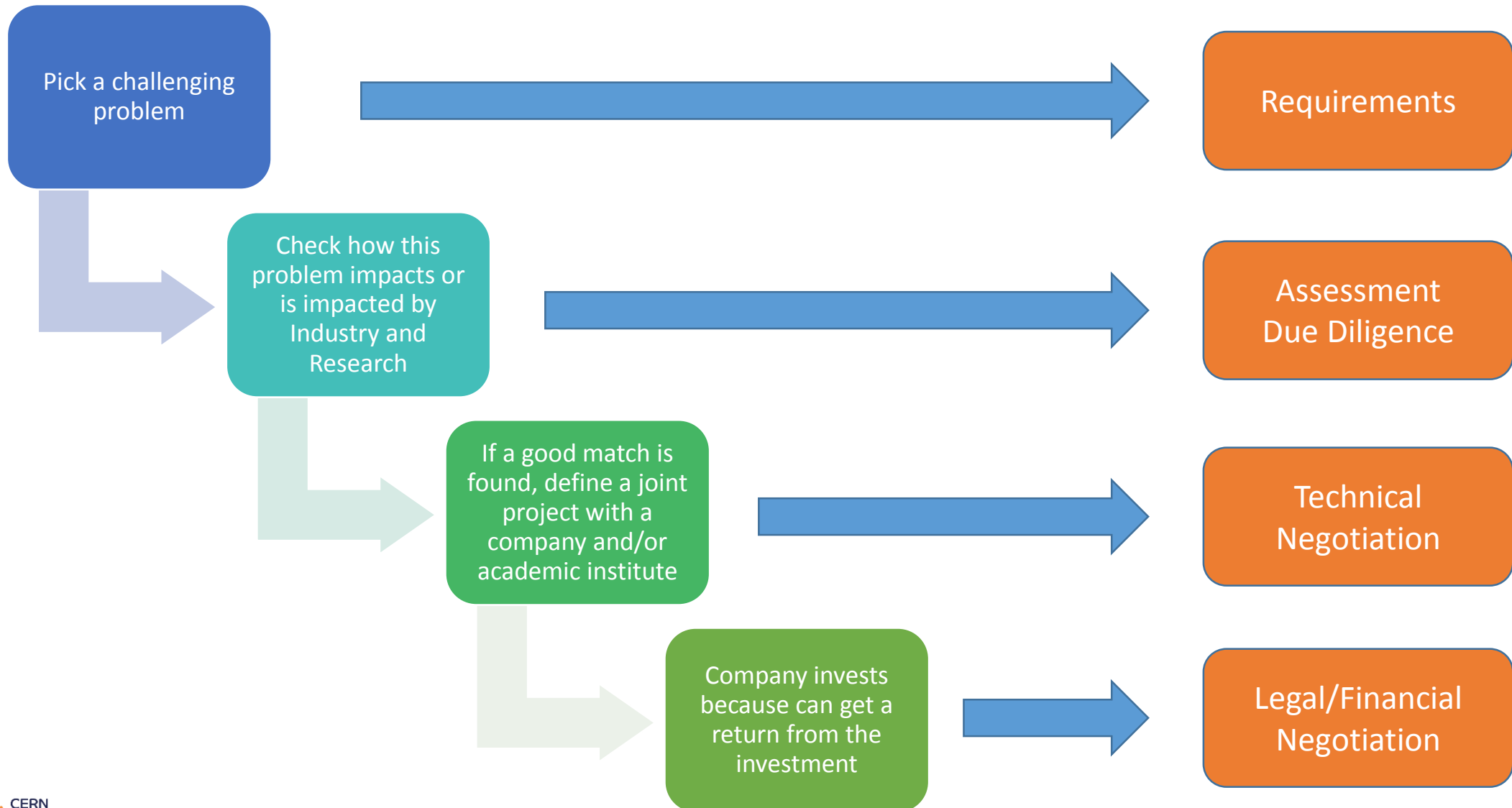
**Communicate** results, demonstrate impact, and reach new audiences.



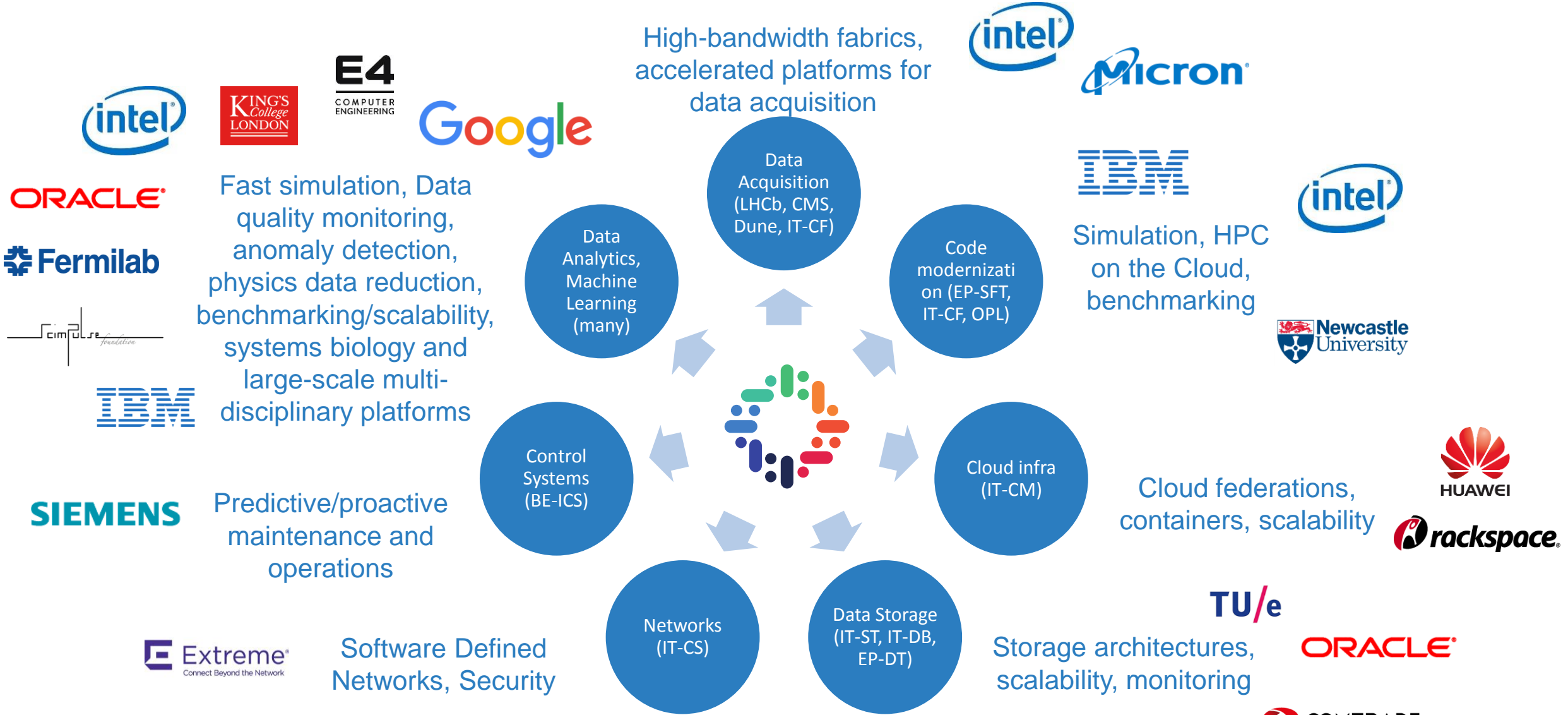
**Collaborate** and exchange ideas with other communities to create knowledge and innovation.

**Train** the next generation of engineers/researchers, **promote** education and cultural exchanges.

# Collaboration Model



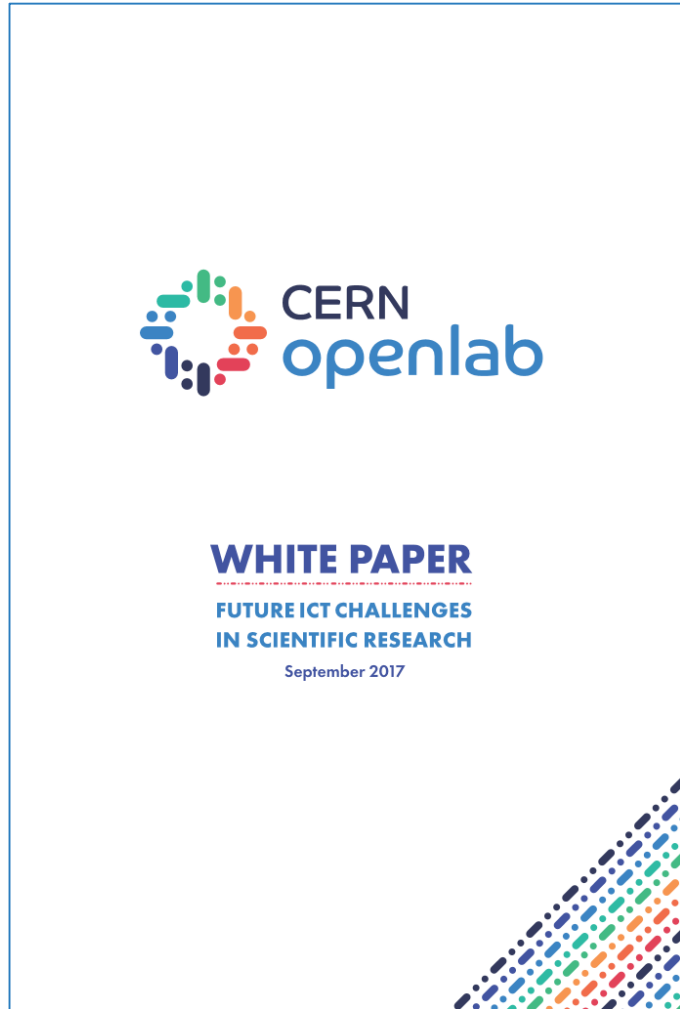
# JOINT R&D PROJECTS



CERN openlab @ QC4HEP



# ICT WHITE PAPER 2017



Published on 21 September 2017

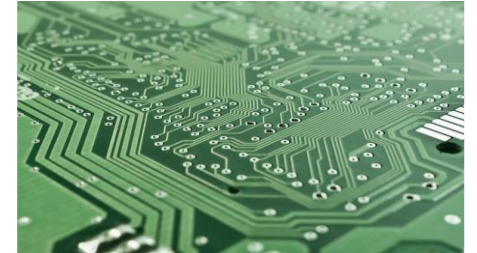
Summarises the results of extensive consultations with CERN experts, LHC Experiments representatives, ICT companies and international research labs and academic institutes

Based on 4 major research topics and 16 challenge areas

A solid starting point for a very challenging and constructive Phase VI

# Three Main Areas of R&D

Increase **data centre performance** with hardware accelerators (FPGAs, GPUs, ..) optimized software



**Scale out capacity** with public clouds, HPC, new architectures

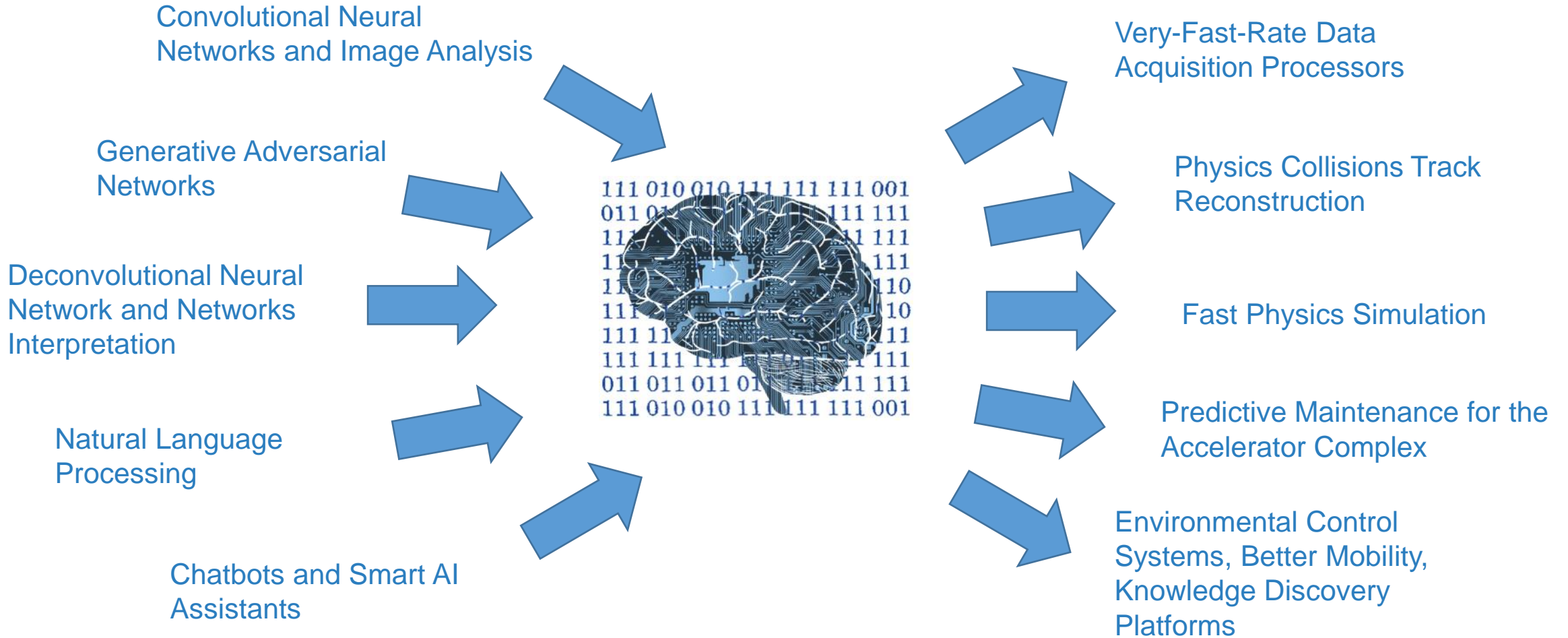


**Change the computing paradigms** with new technologies like **Machine Learning, Deep Learning, Advanced Data Analytics, Quantum Computing**



COMPUTING CHALLENGES

# Artificial Intelligence (ML/DL)

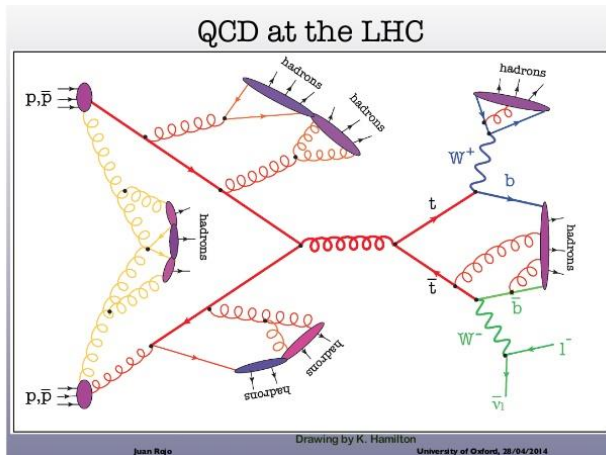


# Disruptive Architectures: Neuromorphism and Quantum Devices



Always look with keen interests at new architectures as a way of disrupting (for the better) how we do things

Actively following developments in **Neuromorphic Computing and Quantum Computing**



Which use cases from HEP workflows would benefit? Real-time DAQ filtering, Track reconstruction, radiation simulation, basic particle interactions, QCD. And non-HEP workflows as well: brain simulation

# KNOWLEDGE SHARING

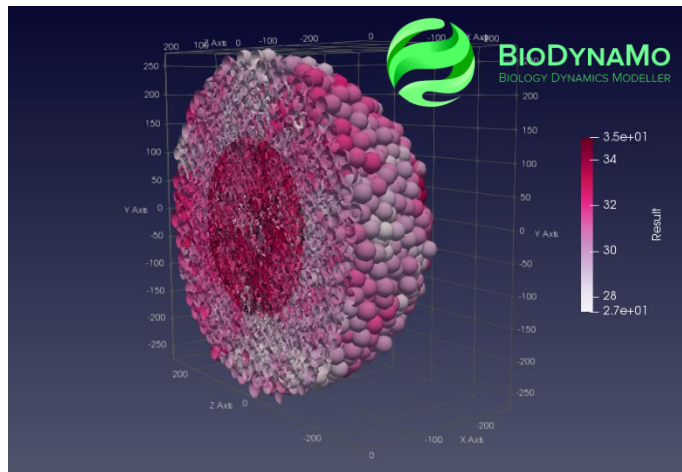
*Working with communities beyond high-energy physics*



Working closely with CERN KT on initiatives aimed at transferring tools, skills, and knowledge from the high-energy physics community to other research fields.



Aligned with the recently approved knowledge transfer strategy for the benefit of medical applications



# IP Management, Open\*

- The basic principle of any CERN openlab collaboration is openness
- We assume shared IP of results among project members
  - More specific IP agreements can be discussed with the CERN KT Office
- Within the respect of limited confidentiality agreements and short embargo periods, we expect the results of the projects to be released to the scientific communities following open policies



# MEASURING IMPACT

## Communication and Outreach



Our website: <http://openlab.cern/>  
~150k unique visitors/year (+100%)



Articles in other **CERN and external channels**  
~900 press cuts (+300%)



**Facebook:** <http://cern.ch/go/p7pF>  
3.5k people reached / 100k single posts



**Facebook group:** <http://cern.ch/go/n6xD>



**Twitter:** <http://cern.ch/go/7vvk>



**Workplace:** <http://cern.ch/go/6MTQ>

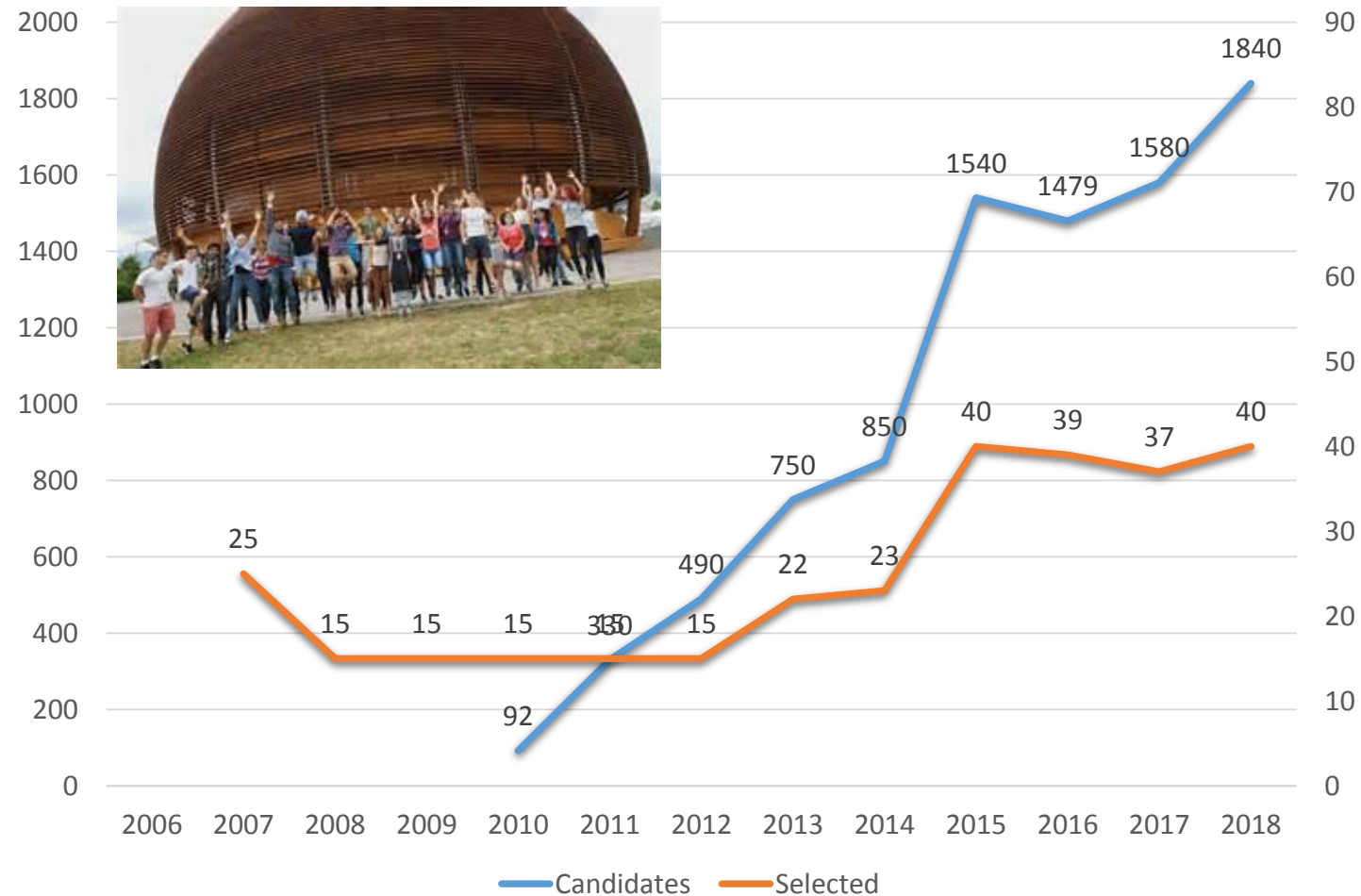


**LinkedIn:** <http://cern.ch/go/NK9k>



Join the **alumni:** <https://alumni.cern/>

# SUMMER STUDENT PROGRAMME



## In 2018

- 1840 applicants
- 40 selected students
- 14 lectures
- Visits to external labs and companies
- Lightning talks session
- 40 Technical reports

# CONTACTS

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**[www.cern.ch/openlab](http://www.cern.ch/openlab)**



# Enjoy the Workshop!

# Thanks!

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