



Human Brain Project

Building a European ICT Infrastructure for Brain Research

HBP Status Update for the BoF

Brussels, 17 March 2016

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Co-funded by
the European Union

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Human Brain Project

Re-centered Aim

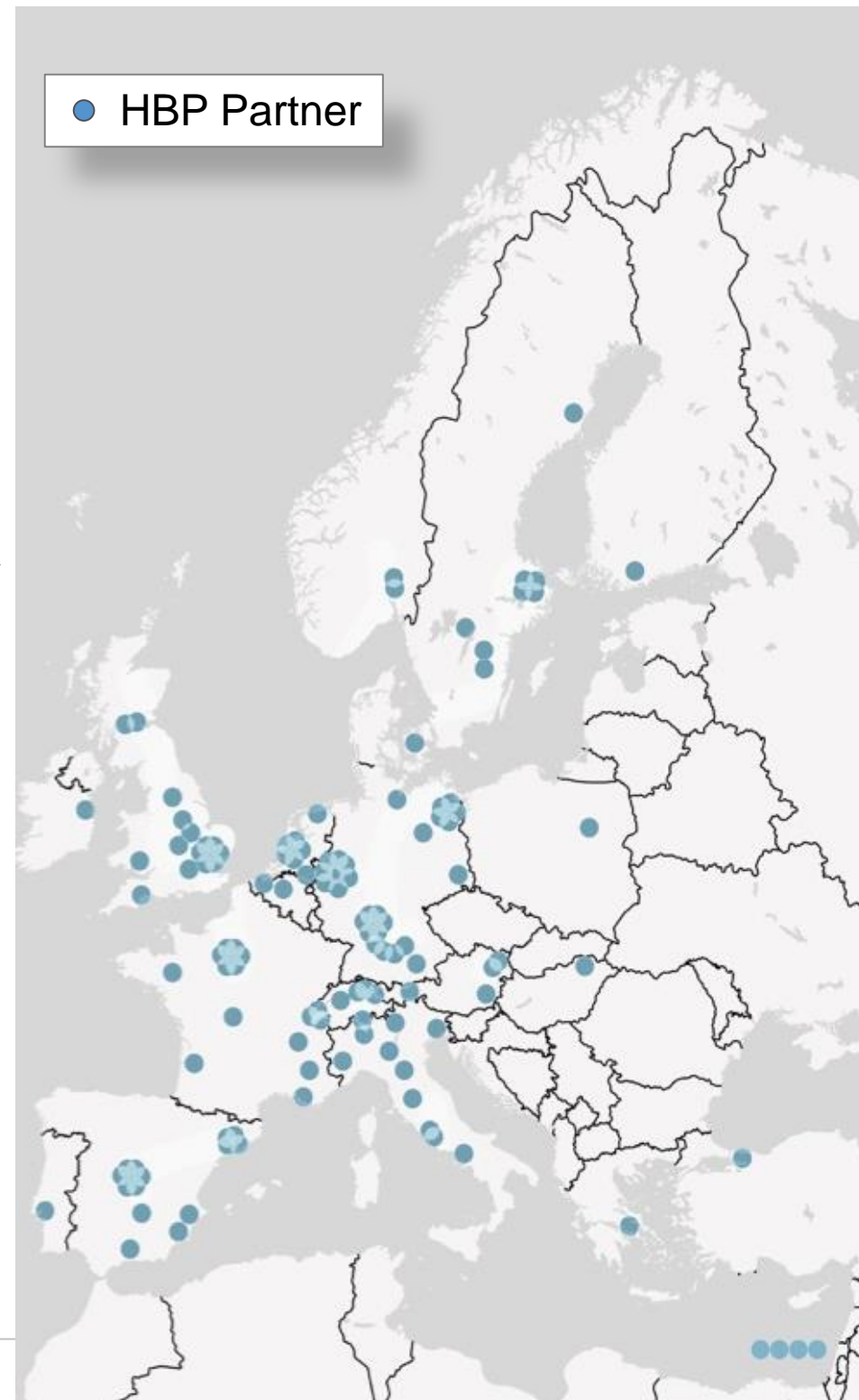
The HBP is a European Flagship project to create and operate a federated, collaborative ICT Infrastructure for brain research, neuroscience, and brain-inspired technologies.

HBP Flagship Objectives

- FO1:** Develop & operate a European scientific research infrastructure for advancing brain knowledge and medicine, plus brain-inspired computing & robotics.
- FO2:** Gather, organise & disseminate data describing the brain & its diseases
- FO3:** Simulate the brain using high-fidelity digital reconstructions
- FO4:** Build multi-scale scaffold theory and models for the brain
- FO5:** Develop brain-inspired computing, data analytics & robotics
- FO6:** Ensure that HBP's work is undertaken responsibly & that it benefits society







HBP at a glance

- 10-year, EUR 1 billion Research Roadmap (50% Core Project, 50% Partnering Projects)
- Core Project: mainly Europe + Americas & Asia; 400+ scientists, 113 institutions, 24 countries
- 12 Scientific Subprojects, Education + Outreach
- 5 Co-Design Projects exemplify cross-disciplinary approach
- Foci: Informatics, Medicine, Neuroscience
- Biggest EU ICT project (HBP uses ICT funding)
- Builds on pre-existing EU & MS Projects: Blue Brain, BrainScaleS, JSC, SpiNNaker, etc.
- Interfaces with other EU & international efforts: PRACE, US BRAIN initiative, etc.
- 2½ year, EUR 54 million Ramp-Up Phase: 6 prototype ICT-based research platforms



HBP in Europe and the World

Existing National Projects




















	Blue Brain Project	
	Jülich Supercomputing Centre	
	SpiNNaker	

HBP Core Project Partners

FLAG-ERA

Partnering Projects (JTC 2014)

CANON				
CHAMPMouse				
FIIND				
FUSIMICE				
MULTI-LATERAL				
Slow-DYN				

Other Brain Initiatives

Australia	
China	
Israel	
Japan	
US BRAIN	



Human Brain Project

HBP Open Calls

2013-14 / 2015 / etc.

International Projects

Foundations & Industry

	
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European Commission

		
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Resilience – Crisis is over

- Project was presented with significant, existential challenges in 2014 and the first half of 2015
- “Open Letter” – Mediation Process – Call for Expressions of Interest
- Open, transparent process
- Self-improving system: Lessons learned integrated in next phase
- HBP and commission worked together and succeeded

Achievements: the foundation is there

- Scientific Achievements
- Technology and Infrastructure Achievements
- Significant publications, notably in Neuron, Cell
- Initial versions of the HBP platforms ready and released March 30, 2015
- Integrative Project methodology (Product Breakdown Structure)
- Set focused Roadmap (described in Framework Partnership Agreement)

Ramp-Up Phase: Science Achievements

3D segmentation algorithm development for timely whole brain reconstruction of vasculature

SP1

SP7

Classification of GABAergic interneurons with Bayesian networks

SP1

SP5

Identification of half of the brain territories across subjects

SP2

Neurotransmitter receptor fingerprints

SP2

SP5

Generation of datasets recording brain activity across spatial scales

SP3

Detailed architecture maps of coherent functional networks in human visual cortex

SP3

First models of orchestrated synaptic plasticity

SP4

SP9

Foresight Report on Future Medicine

SP12

Report on how far Brain Simulation can explain the Mechanisms of the Mind

SP12

Ramp-Up Phase: Technology & Infrastructure Achievements

HBP Knowledge Graph and Ontologies



Collaboratory: gateway to the platforms



Network Simulator making full use of the largest supercomputers available today



Reconstruction and simulation of neocortical microcircuitry



Exascale data management tools for visualisation



MoU with PRACE to access its high-bandwidth net



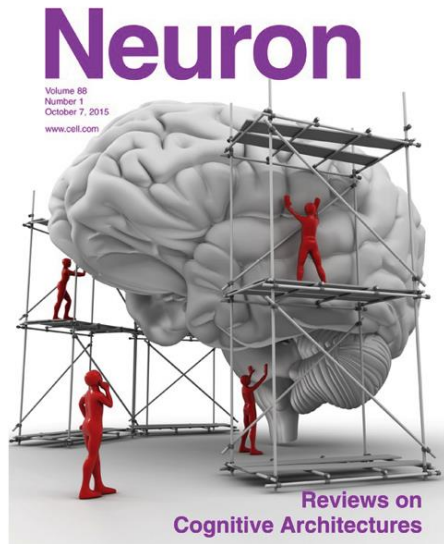
Next generation neuromorphic chips and smaller scale neuromorphic systems



Neural control of musculoskeletal robots and brain-body integration of completely virtual robot mouse



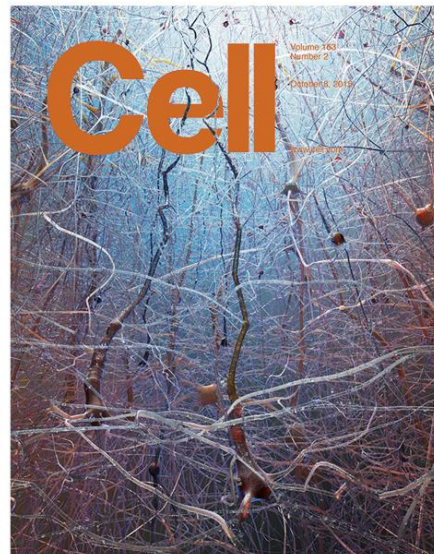
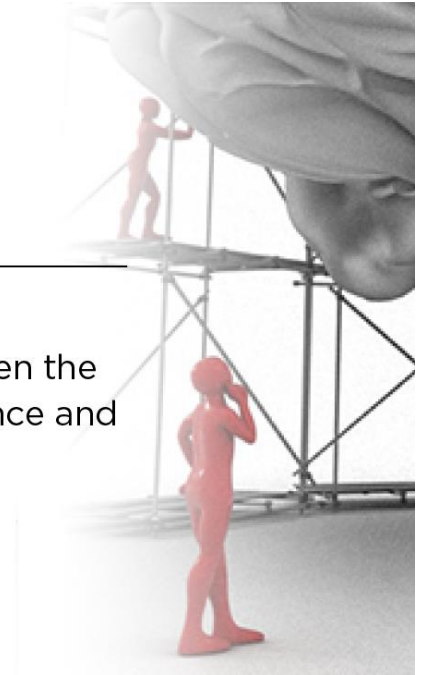
Some recent high-impact publications



SP3 Reviews on Cognitive Architectures

NEURON SPECIAL ISSUE

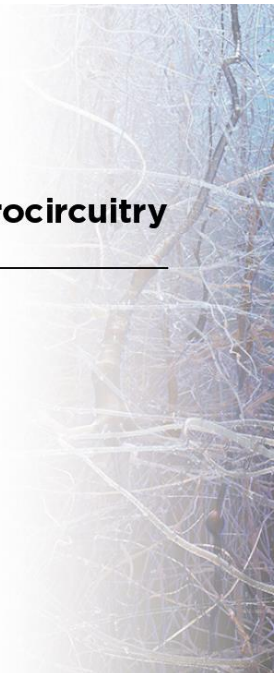
Published on the 7th October 2015. It is a collaboration between the Neuron editorial team and Stanislas Dehaene-Collège de France and Yadin Dudai-Weizmann Institute Israel



SP1 SP5 SP6 SP7 Reconstruction and simulation of neocortical microcircuitry

CELL PUBLICATION

Published on 8th October 2015. The Blue Brain Project, the simulation core of the Human Brain Project, completed a first draft computer reconstruction of a piece of the neocortex.



Platform release



On **30 March** HBP is hosting a Platform Release event to launch the first prototype versions of its six ICT platforms to the scientific community

The entire event will be web-streamed live and accessible via AdobeConnect Webcast.

For further information and **to join us on 30 March.**

<https://www.humanbrainproject.eu/platform-release>

Current Status

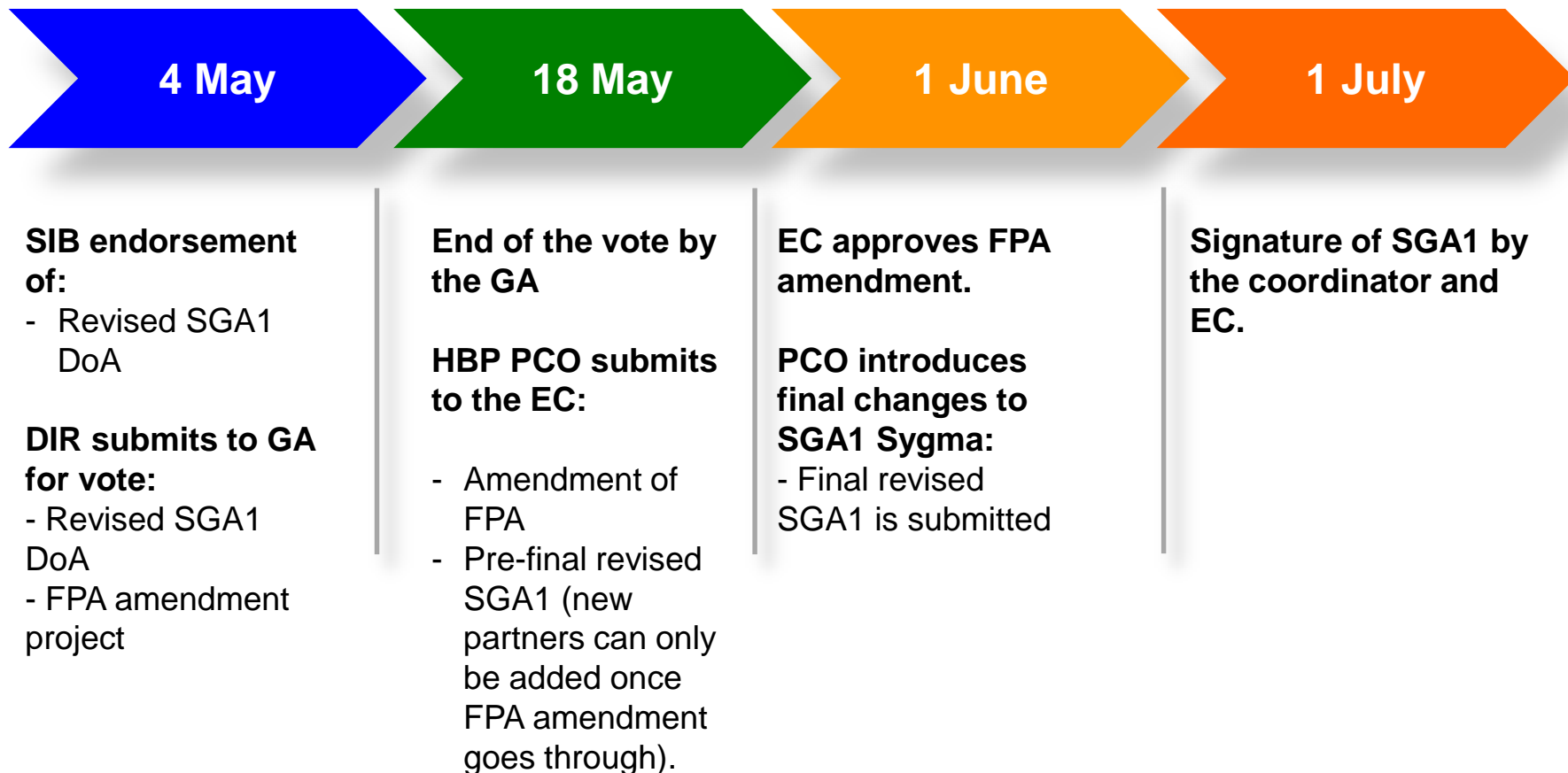
- Ramp-up phase ends March 2016
- First Specific Grant Agreement will be signed in June, some revisions underway
- Work on the next phase to begin April 1, 2016
- Platform release to Review (June 2016): Integrated Pilots
- Cloud / Compute discussion
- Integrative Project Methodology in use (PBS)
- Focus on user engagement, next generation researchers underway
- New Governance is currently set up

Road ahead (next 6 months)

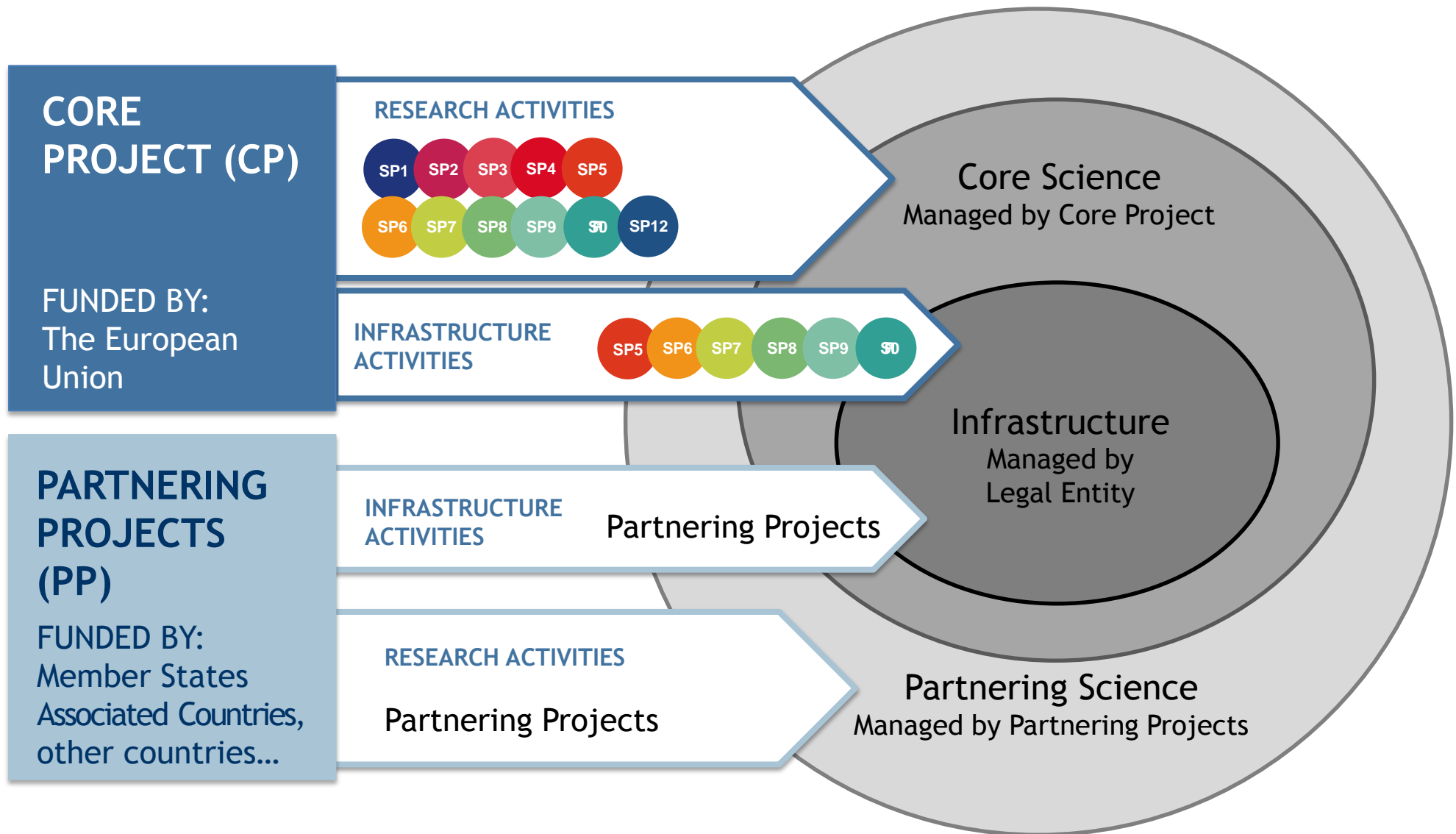
- Implement new Governance (elections underway, governance bodies are being set up)
- New Coordinating Legal Entity is being set up in cooperation with the stakeholders
- Describe entire project as task dependencies, PBS
- Demand side approach vs Supply Side approach
- Adapt and update HBP Data Strategy* (*what is produced in house, what do we get from elsewhere, how is that made available to the models/simulation, how do we treat it).
- User engagement

Key dates for the next phase

Adjustments are being made to the SGA 1 proposal based on reviewer comments



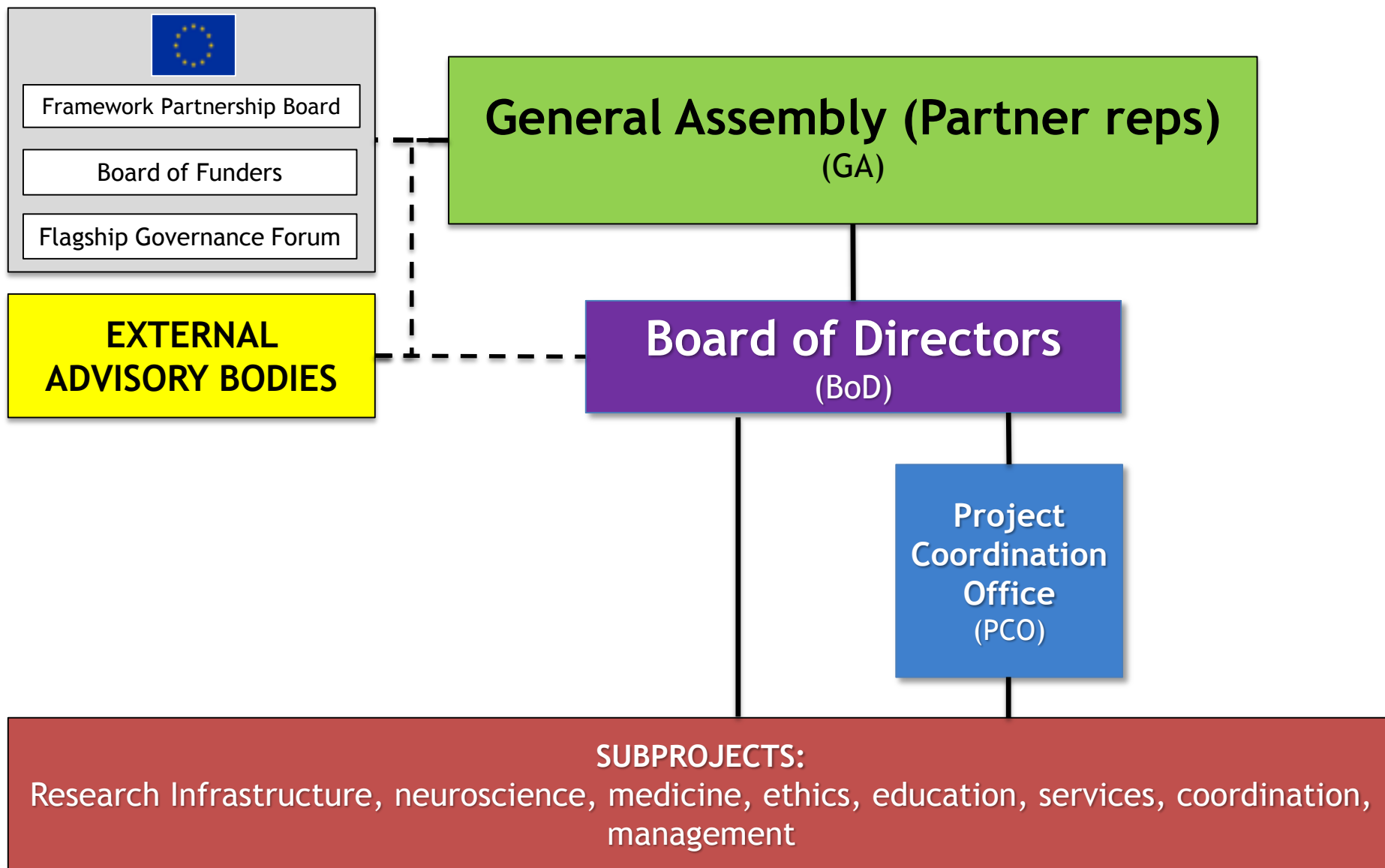
Research & Infrastructure, Core & Partnering Projects



New governance

- Separation of powers between the scientific (SIB), management (DIR), and ultimate decision-making bodies (GA).
- Then Replacement of General Assembly (GA), composed of partner representatives, by Stakeholder Board (SB), composed of country representatives.
- EPFL replaced as coordinator by new HBP Legal Entity (LE).

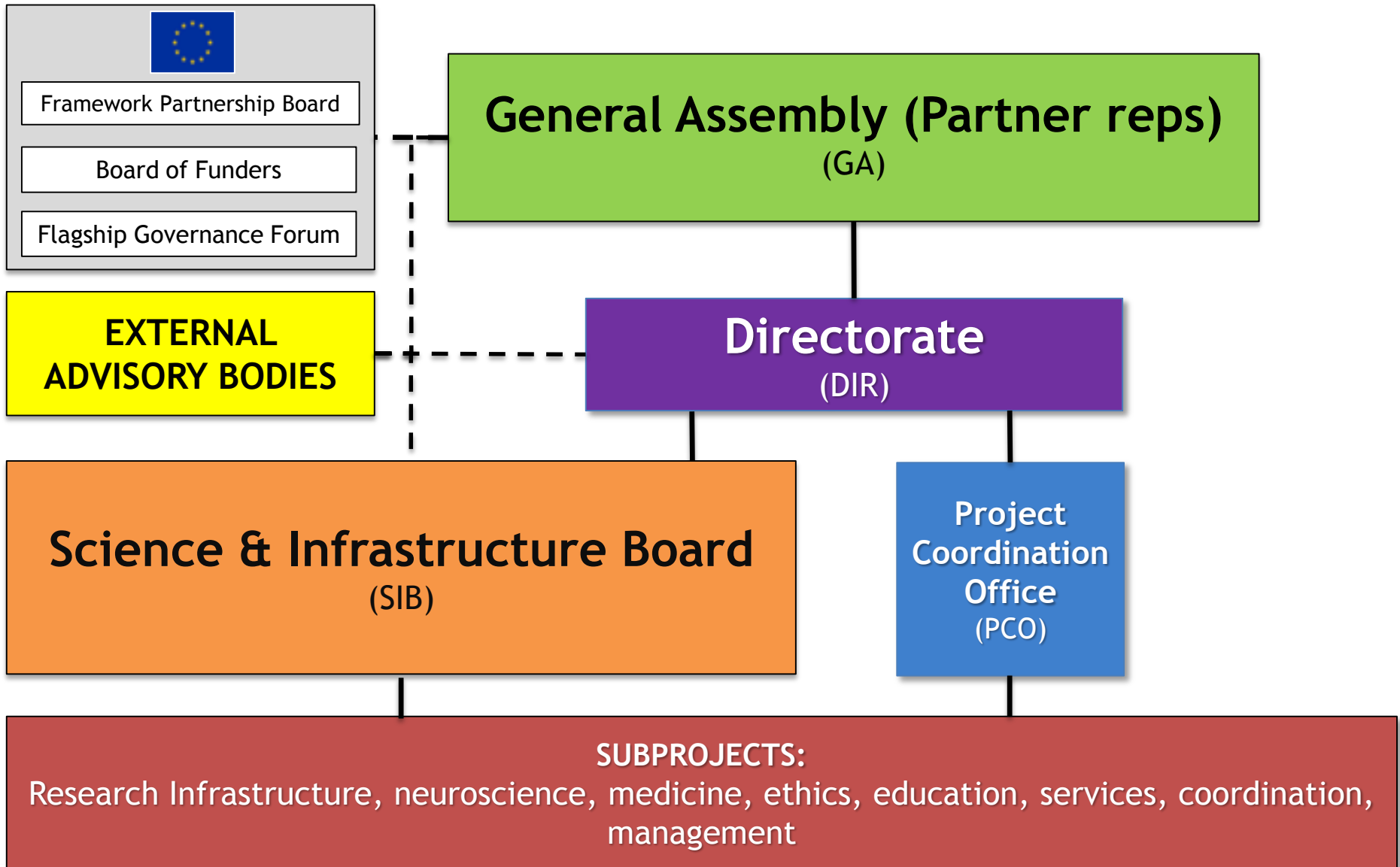
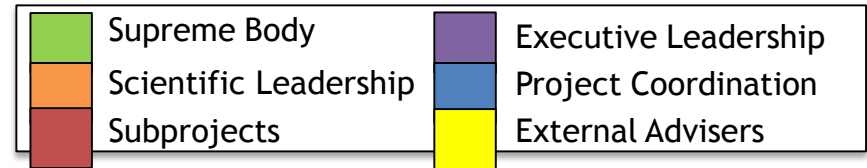
CP Governance: Ramp-up Phase (FP7)



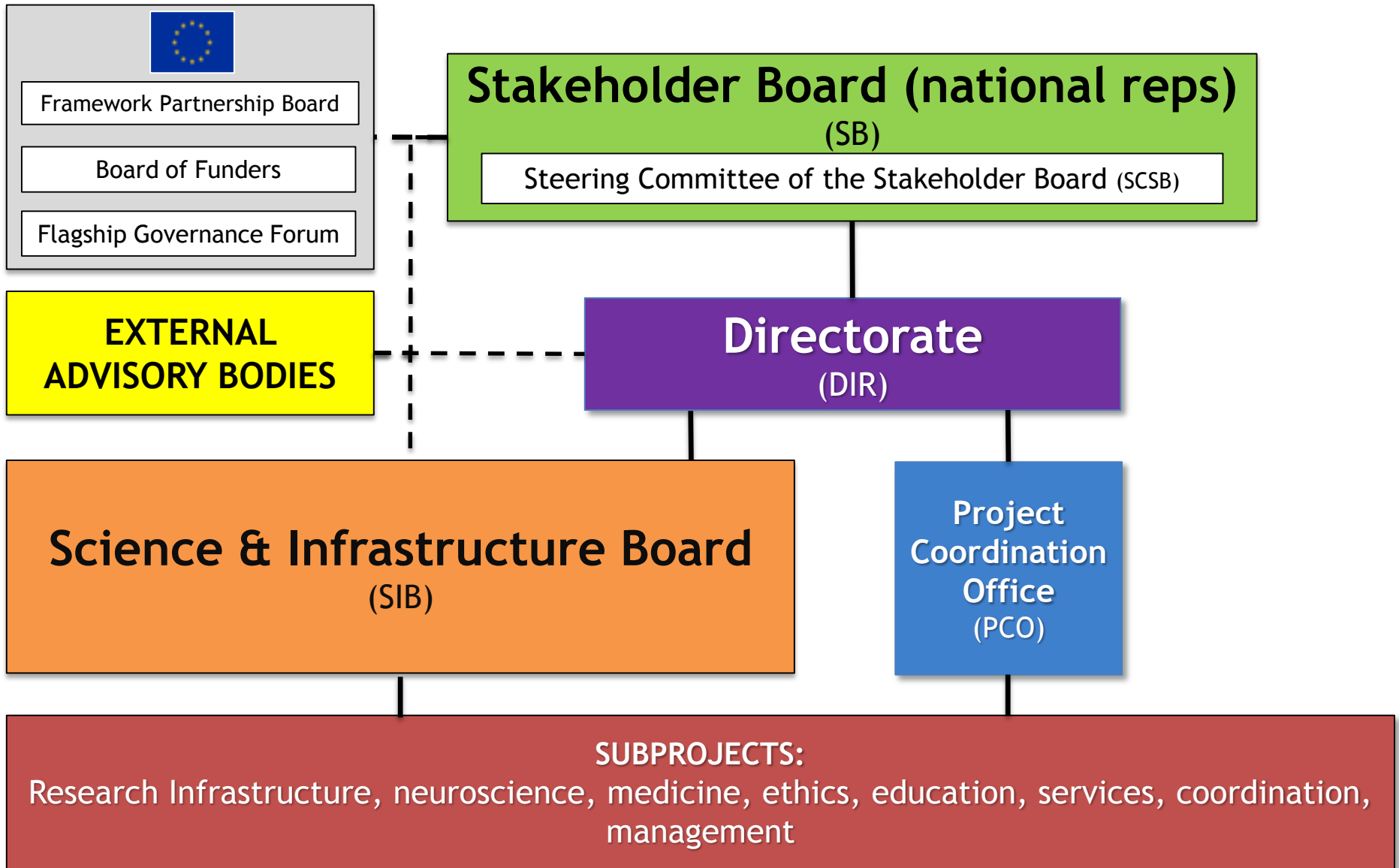
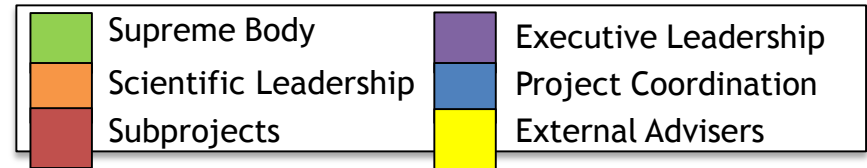
Simplified governance transition plan

- Separate governances for the CP and the Legal Entity (LE).
- Core Project:
 - The CP will have an SB with country representatives who have mandates to represent the partners of the country.
 - The SB will take over the GA's responsibilities as soon as all the countries have selected representatives.
- Legal Entity:
 - The funders of the LE will form the Board of the LE. Legal form to be decided upon by Stakeholders and Funders.
 - The LE will become the coordinator of the CP once it is funded and operational.

CP Governance: Start of SGA1 (H2020)



CP Governance: SB replaces GA (H2020)



Legal Entity creation

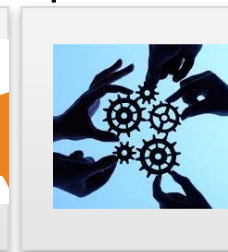
- Coordinator has hired a law firm specializing in NGOs to investigate the most adequate legal forms and create the LE.
- Work of the law firm has started in January 2016.
- Results presented for approval by stakeholders
- It will take some time for the LE to be fully operational and take over the coordination of the Core Project.

Partnering projects

The HBP views the partnering projects as a highly beneficial mechanism for building community and for engaging future users of the HBP Platforms

JTC 2015

The first 6 partnering projects are joining HBP in 2016



Association mechanisms

They will be finalized by the end of march

CSA on Partnering Project Environment

A CSA proposal was submitted in March with GRAPHENE

Flagera kick off
13 April Flagera is hosting a kick off meeting to welcome all new partnering projects

2017 JTC call
HBP is working with Flagera to finalize the text for the call

Young Researchers Event, Budapest

Date: 12 April 2016
Title: Simulations on different scales of space and time
Audience: Young neuroscience researchers using simulation tools

One day interactive training on using and collaborating with cutting edge simulation tools. Several of the tools are integrated into the HBP Platforms.

The event is open to all young scientists of the HBP community and to external participants.

Registration is open now

<https://education.humanbrainproject.eu/web/young-researchers-budapest/home>



International Cooperation

- HBP exists within a global brain research effort
- HBP aim complementary to other initiatives (notably US BRAIN) – therefore excellent collaboration potential
- Level of maturity now reached for substantive discussions and larger scale cooperation
- Ongoing cooperations (Allen, and others)
- Coherent need-driven strategy (data acquisition, co-design, complementarity)
- Priority on cooperation with US, but others not neglected



Human Brain Project

Thank you.