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Update at the IPP AGM

June 13, 2016

Compute Canada (CC) - Quick Intro

CC is a not-for-profit corporation. The membership includes 35 of Canada's major research institutions and hospitals.

Compute Canada, working through a federated partnership with regional organizations ACENET, Calcul Québec, Compute Ontario and WestGrid, leads the acceleration of research and innovation by deploying advanced research computing (ARC) systems, storage and software solutions.

ARC includes HPC, HTC, Cloud, etc.

Funding is through a federal grant with matching funds from provincial and institutional partners (40% federal / 60% provinces and institutions), which is the basis of the federated Canadian model.

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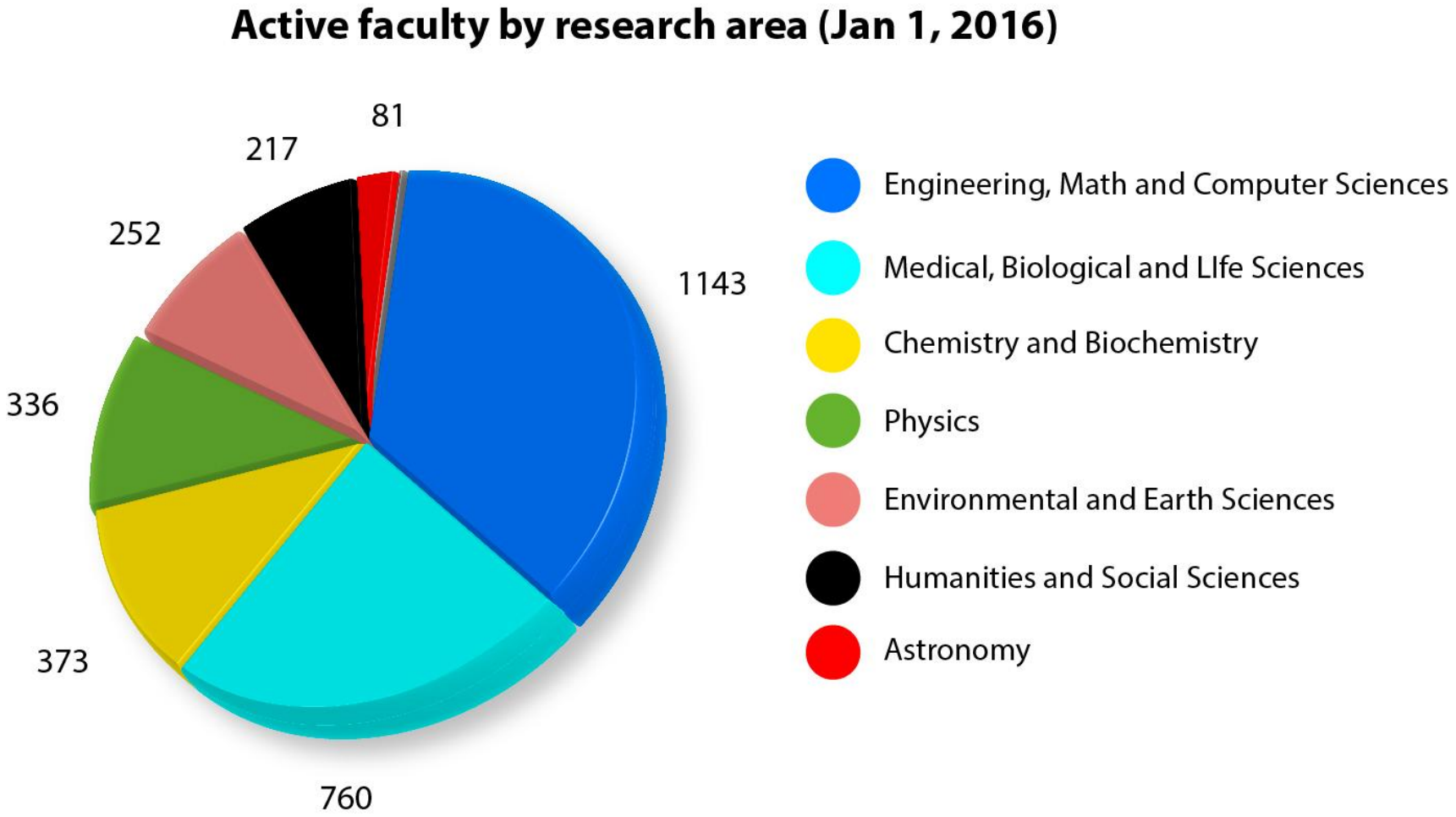
Serving Researchers in all Disciplines



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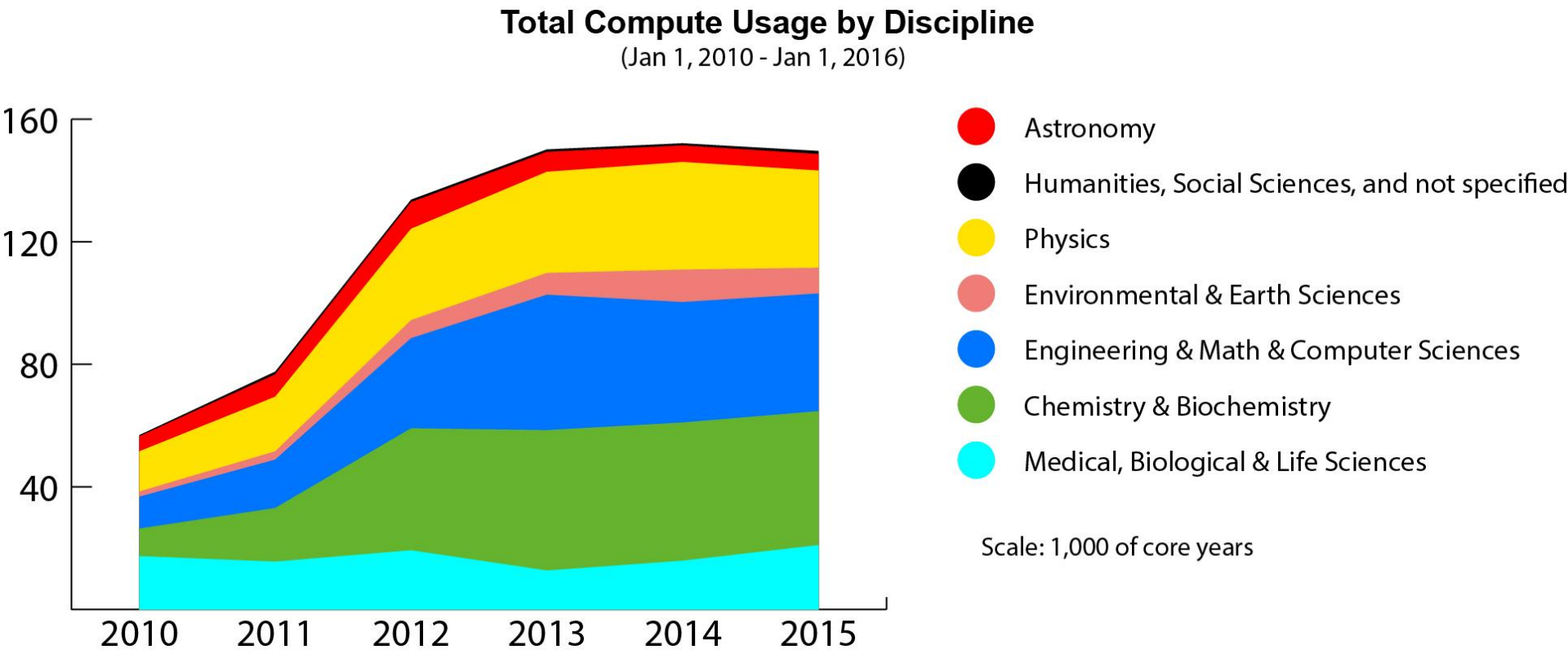

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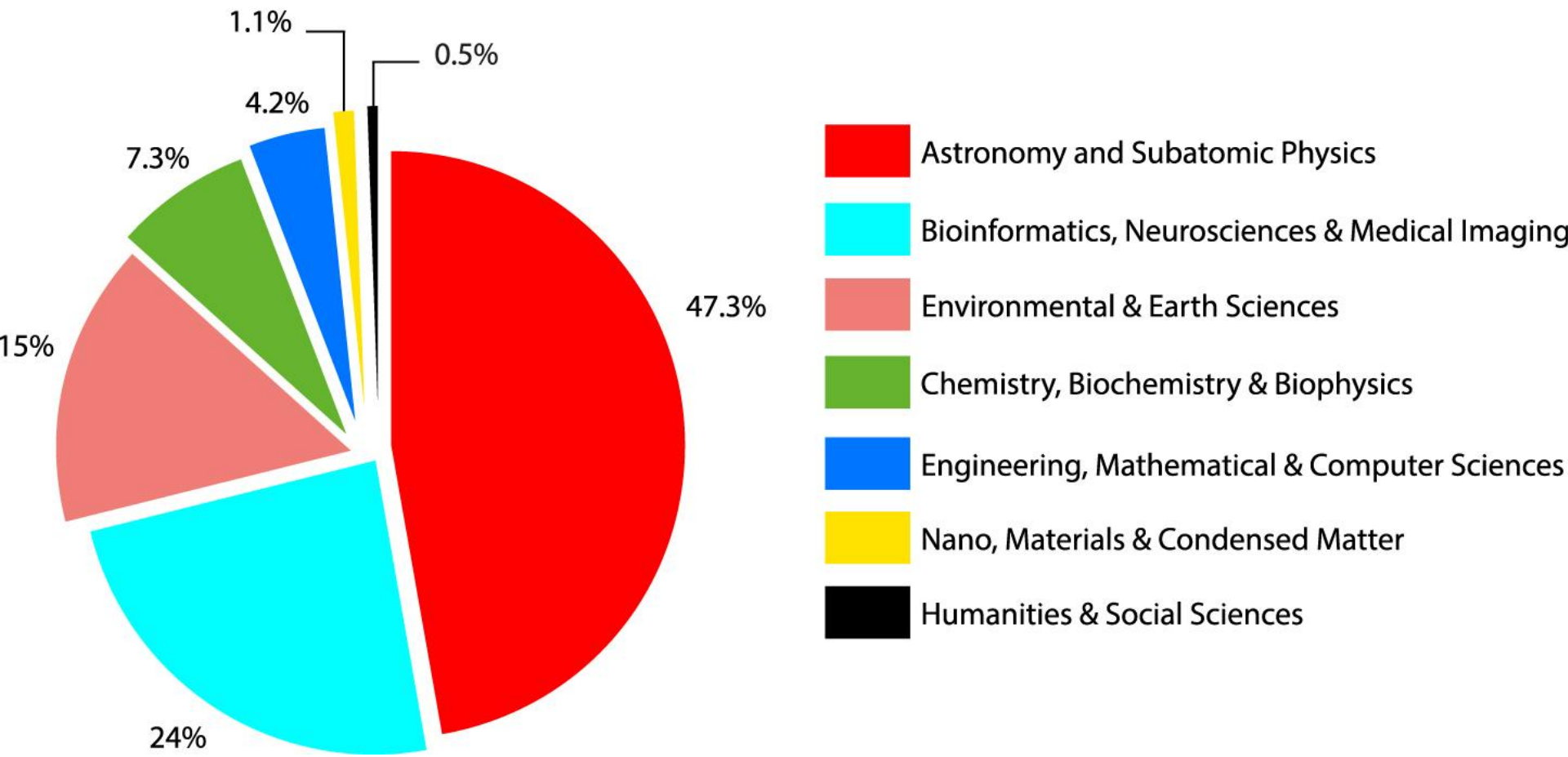
Storage allocated in 2015 organized by discipline



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Capital Planning Timeline

- CFI Challenge-2 Stage-1 (**announced**)
  - $30M CFI investment announced, July 2015
  - 2015: National Data Infrastructure RFP launched; deployment in 2016
  - 2016: 3 new systems to be deployed
  - 2017: 1 new system to be deployed, potentially 2 systems upgraded
  - April 1, 2018 - spending complete

- CFI Challenge-2 Stage-2
  - **Decision September 2016**
  - $20M available from CFI.
  - 2017: first purchases
  - April 1, 2020 - spending complete

- CFI Challenge-2, Stage-3 (**assumed for planning purposes**)
  - Competition in 2018, potentially $50M available from CFI
  - First spend in 2019/2020
  - Opportunity to build a larger single system?

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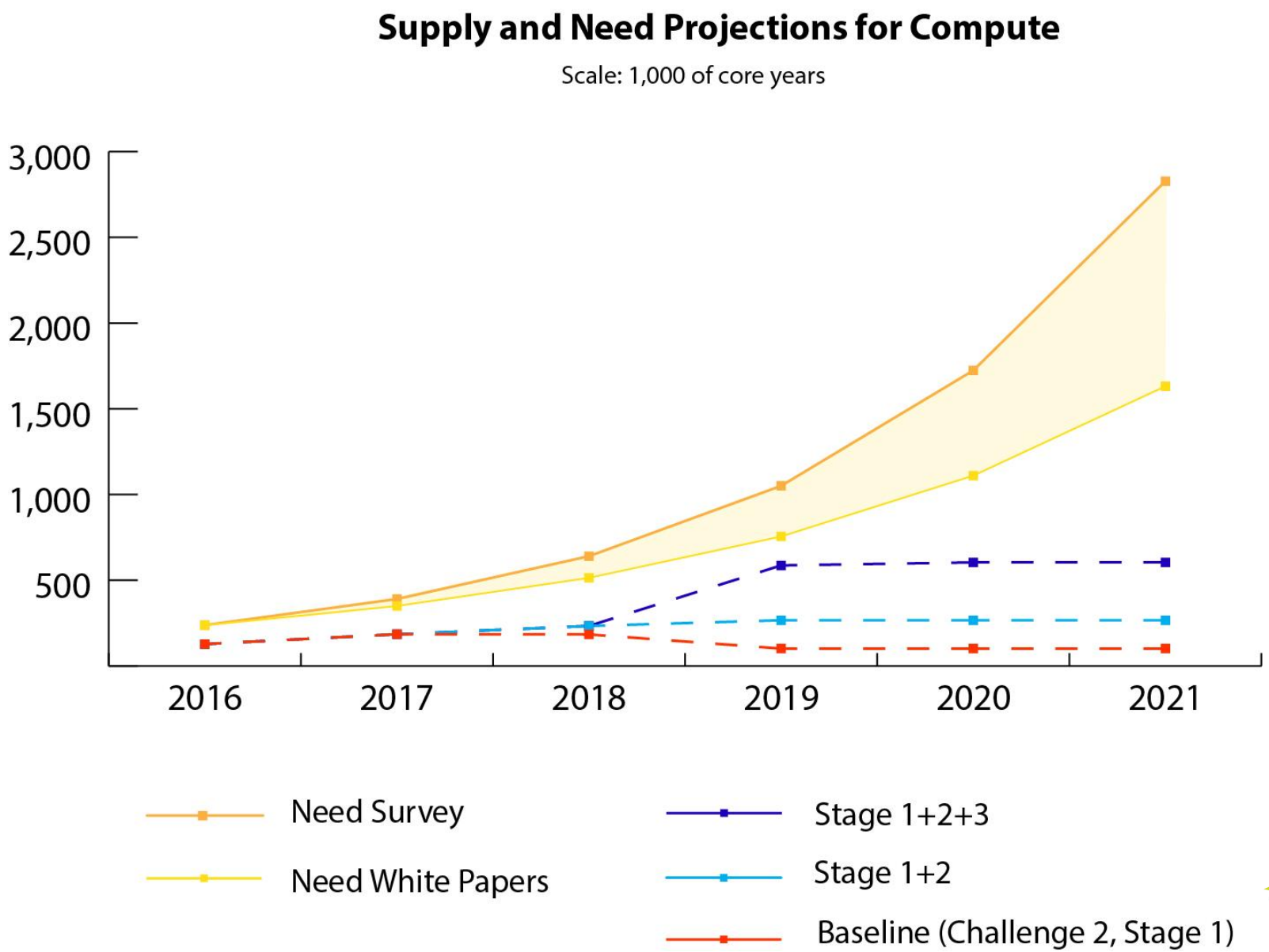
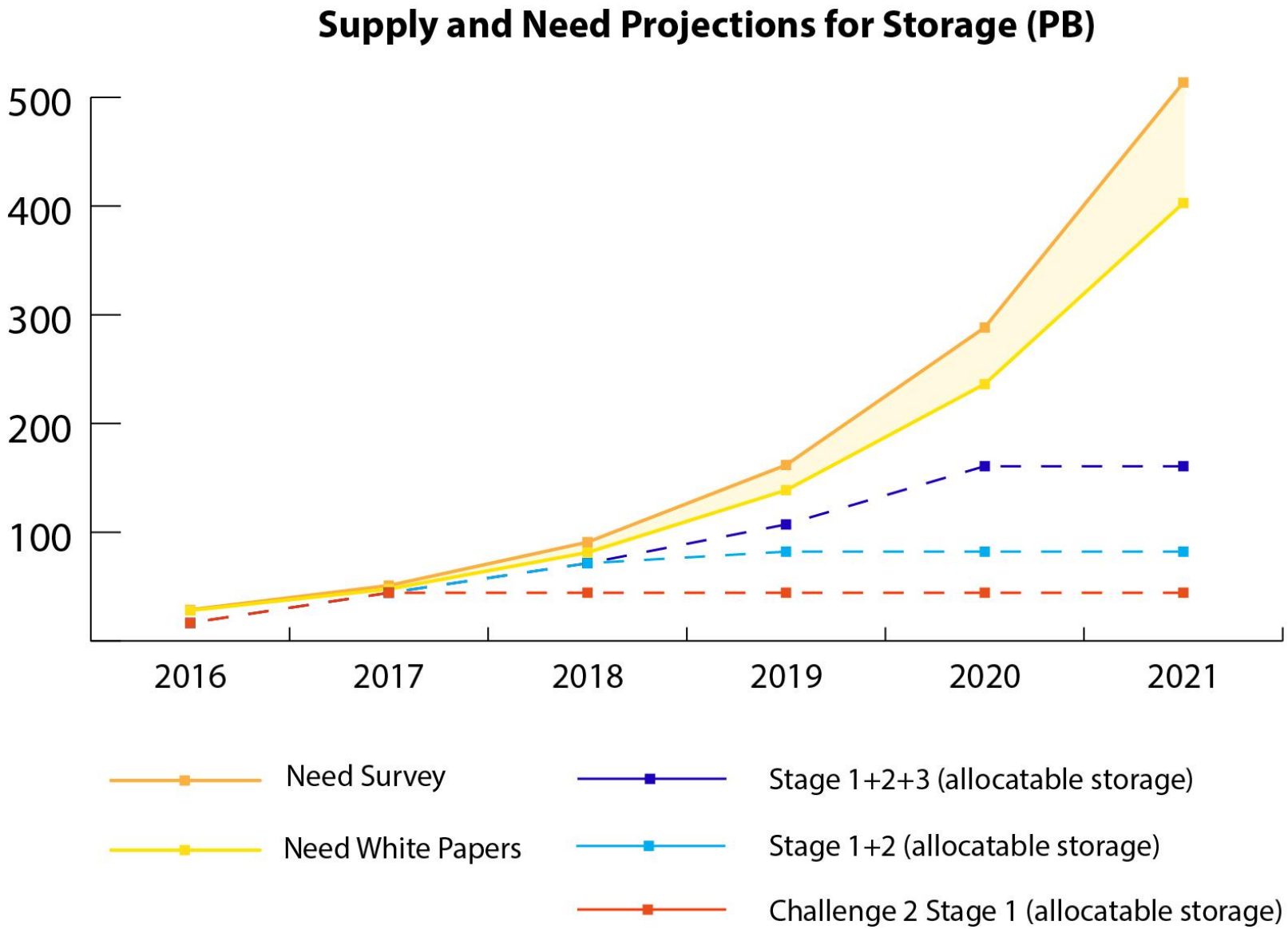
Compute Projections (SPARC 2)



Storage Projections (SPARC 2)



Consolidated Hardware, Distributed People - Stage 1

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Member locations and new national hosting sites

● Future Consolidated Infrastructure Site

● Member Site*

*member sites include sites served by Compute Canada, sites with infrastructure and support teams and sites with support teams only

Technology Deployment Plan

https://www.computecanada.ca/featured/compute-canada-technology-briefing/

- New National Data Infrastructure - **RFP Complete!**

- Four new national systems:
  - **GP1** (General Purpose) - Openstack cloud - **RFP Complete!**
  - **GP2,GP3** - Twinned hybrid systems (HTC, HPC, Cloud, GPU) of 20-25k cores each. Deep storage sites.
    - **GP2 RFP coming soon!** System available in autumn.
    - GP3 to follow by end of year. System available early in 2017.
  - **LP** (Large Parallel) - HPC (deployed in 2017)

- At the same time, major decommissioning of existing systems.

- Interesting for particle physics in 2016:
  - GP1 brings major expansion of cloud
  - GP2 brings major site for high throughput computing and major GPU deployment
- Interesting for particle physics in 2017:
  - GP3

Capital Deployment Plan 2016-17

www.computecanada.ca/wp-content/uploads/2015/11/Compute-Canada-Technology-Briefing-2015.pdf

	New allocatable resources
Primary disk storage (usable, excluding scratch space)[4]	62 petabytes
CPU cores	126,500
Nodes	Approximately 4,000
Petaflops	Approximately 12.5
Electricity for power & cooling	Approximately 2,400 kW

Note: over the same time period we will be decommissioning an existing 82,000 CPU cores and a large fraction of existing disk storage.

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Subatomic Physics National Team

- Many particle physics projects supported by CC personnel across the country - ATLAS, SNO+, T2K, IceCube, and more.

- Often supported by same personnel using same/similar tools (eg. WLCG tools). However, no national strategy.

- CC formed subatomic physics national team this spring:
    - Includes existing CC subatomic physics support staff, TRIUMF T1 staff. Others welcome.
    - Ensure new systems designed to support subatomic physics
    - Ensure common services between experiments with similar needs

- Very active team. Meeting weekly. Team lead is Leslie Groer.

RAC Improvements

- 2016 was a very tough year for RAC. Not nearly enough resources to meet the need.

- A system under stress shows its weaknesses - many suggestions received from researchers on how to improve (besides just deploying more resources).

- RAC committee chairs (researchers) convened over the last 3 months to discuss. Also an active discussion by ACOR (Advisory Committee on Research)

- **Major recommendations:**
  - **Adjust competition schedule**
  - **Create multiple RAC/RPP streams**
  - **Enable multi-year awards (deferred to 2018)**

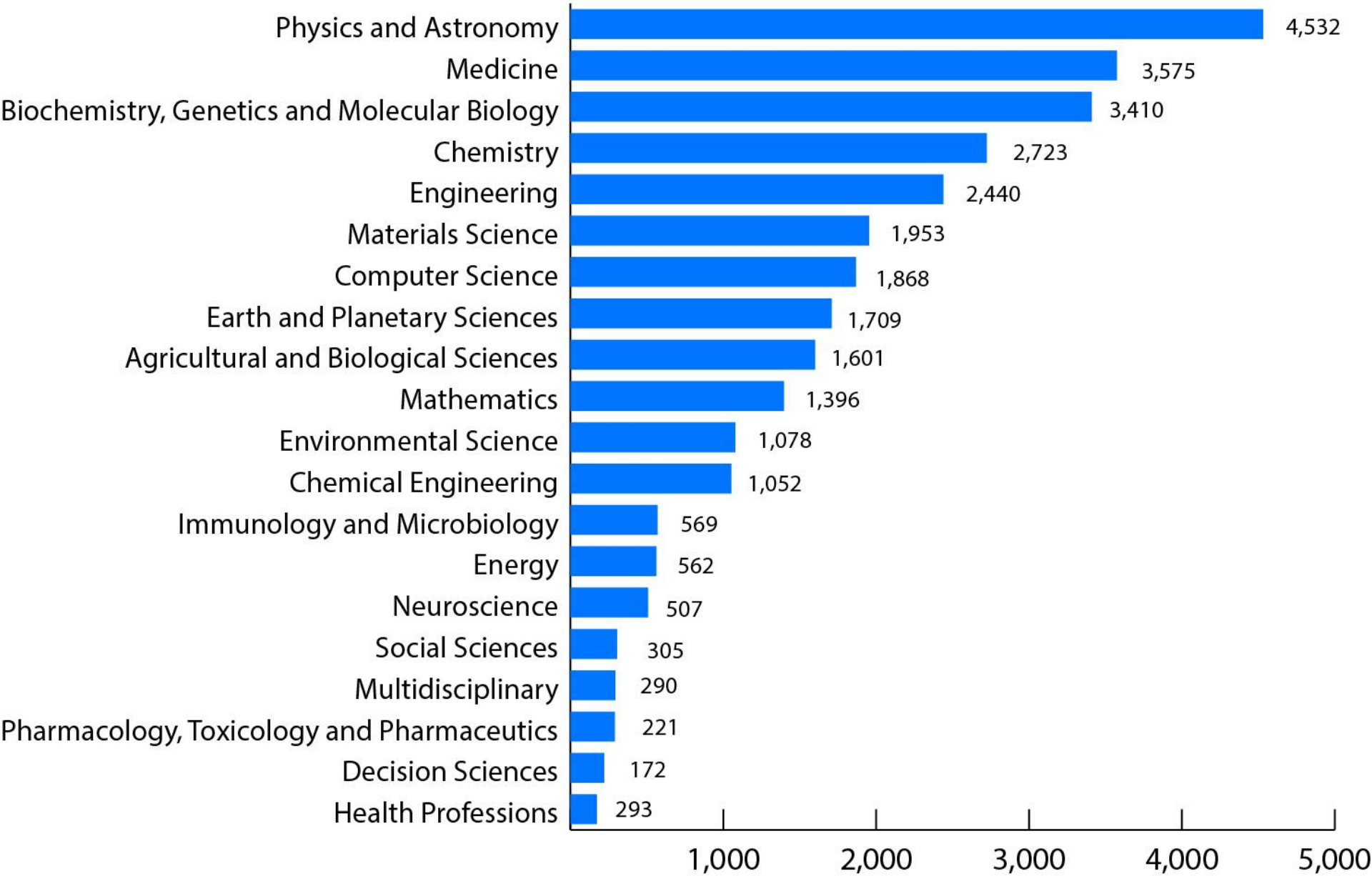
Summary/Conclusions

- Need for ARC is growing, along with diversity of community.
- Continued strong usage from particle physics (especially storage).
- Compute Canada at the beginning of a major technology refresh. Several RFPs either complete or in progress.
- Major transition underway, expect to start seeing benefits later this year. GP2 and GP3 will be well-suited to particle physics workloads.
- Only see full effect of technology refresh in 2018.

Extra Slides

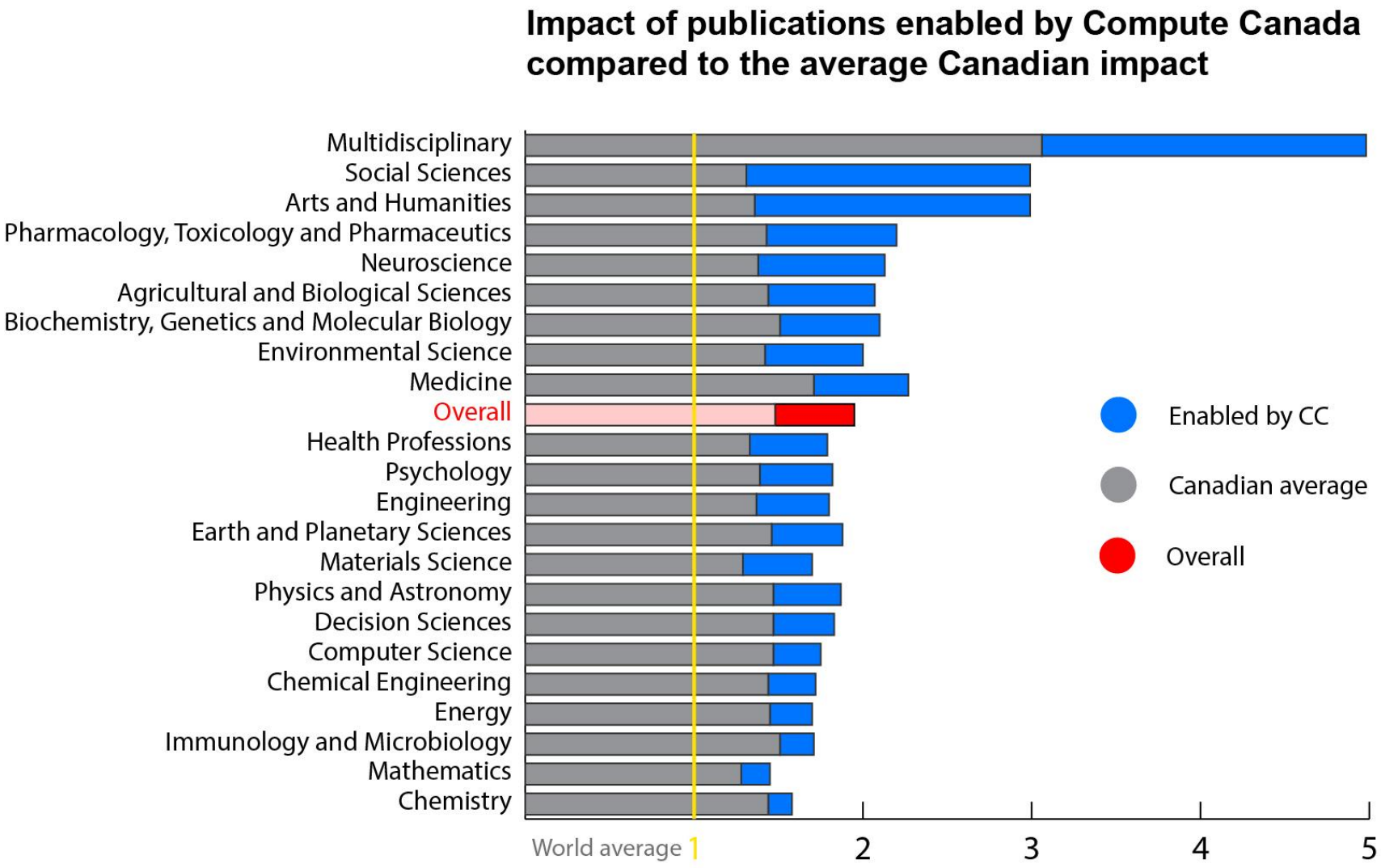
Publications enabled by Compute Canada 2010-2016 binned by Discipline

Cutoff date: March 21, 2016



Impact of CC-Enabled Papers

Field-Weighted Citation Impact (FWCI) of CC-enabled papers minus Canadian Average.



Research Data Management

- Research data is growing at a tremendous rate.
- New policies coming from granting councils (data management planning)
- A complete solution would require a lot of functionality:
  - ingestion
  - curation
  - discovery
  - preservation
  - movement to/from computing resources
- Important features for the Canadian context:
  - scaleability (national)
  - security/privacy (granular)
  - federated storage model (ownership)
  - buy-in from institutions, government
  -
- We are working closely with CARL on tools to meet these needs.

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Compute Canada Services - Middleware

- The CC user base is broadening, bringing a broader set of needs.
- We have seen tremendous interest in services enabling RDM
- We have identified an additional list of middleware services CC will implement in common across our sites:
  - Authentication and ID Management
  - Data Transfer
  - Software Distribution
  - Monitoring (system status)
  - Resource publishing (capacity available)
- Important to cooperate with international community. Our researchers do!

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RAC Improvements

- Schedule:
  - More time between notification and implementation of award
  - Get away from notification of award on Christmas Eve
  - Align timing better with decommissioning/commissioning schedules

- Streaming:
  - Currently, all researchers provide the same RAC info whether they need 100 cores or 10,000 cores, 10TB or 10PB.
  - Recommendation to redefine RAC with 3 streams:
    - Default - just click a button. Always available. No scientific review.
    - Regular- Up to a certain scale. Modeled on what we do now, but simplify form as much as possible. Same review as today.
    - Large - Full set of information we ask for today. Add external review.

- Default is currently not implemented in the same way everywhere. Needs fixing.