

Compute Canada's Resource Allocation Competition 2019 (RAC 2019): **BEST PRACTICES**



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(University of Alberta)

<https://github.com/WestGrid/trainingMaterials>

This Presentation:

<https://github.com/WestGrid/trainingMaterials>

- <https://github.com/WestGrid> and search/click through.
- <https://westgrid.github.io/trainingMaterials/>
 - (GettingStarted section)
- <https://westgrid.github.io/trainingMaterials/materials/rac2019changesAndBestPractices.pdf>
 - Detailed RAC 2019 Best Practices guide
 - (with everything from this presentation and more!)

Contact us anytime:

support@westgrid.ca

www.westgrid.ca

docs.computecanada.ca

www.computecanada.ca

1. Intro to WestGrid and Compute Canada
2. What is the RAC?
3. Stats, including UVIC-specific
4. Overall and Admin Details
5. Updates and changes
6. Tips and Best Practices
 - a. Reviewers
 - b. Basic Best Practices
 - c. RRG specifics
 - d. RPP specifics
7. Questions and Discussion

Researcher Consultation

2016-2017: Leadership Council on Digital Research Infrastructure (LCDRI)

- **August 2017:** Report sent to cabinet.
- **March 2018:** Cabinet announced \$572M over 5 years for DRI (ARC, RDM, Research Network)
- **Summer 2018:** ISED planning and consultation process.

2017-2018: WestGrid Incorporation and planning

- **Spring 2018:** new WestGrid board of directors.
- **Summer 2018:** intensive internal strategic planning
 - Business Development
 - Platforms and portals support
 - Training



After presentation: informal meeting with researchers and anyone interested.

- RAC 2018: issues, revisions, etc.
- New systems: what did we get right? Wrong?
- Surveys: what should we be asking about?
- Future: what should WG be focussing on? Compute Canada?
- What should we be emphasizing to gov't?
- Anything Else?

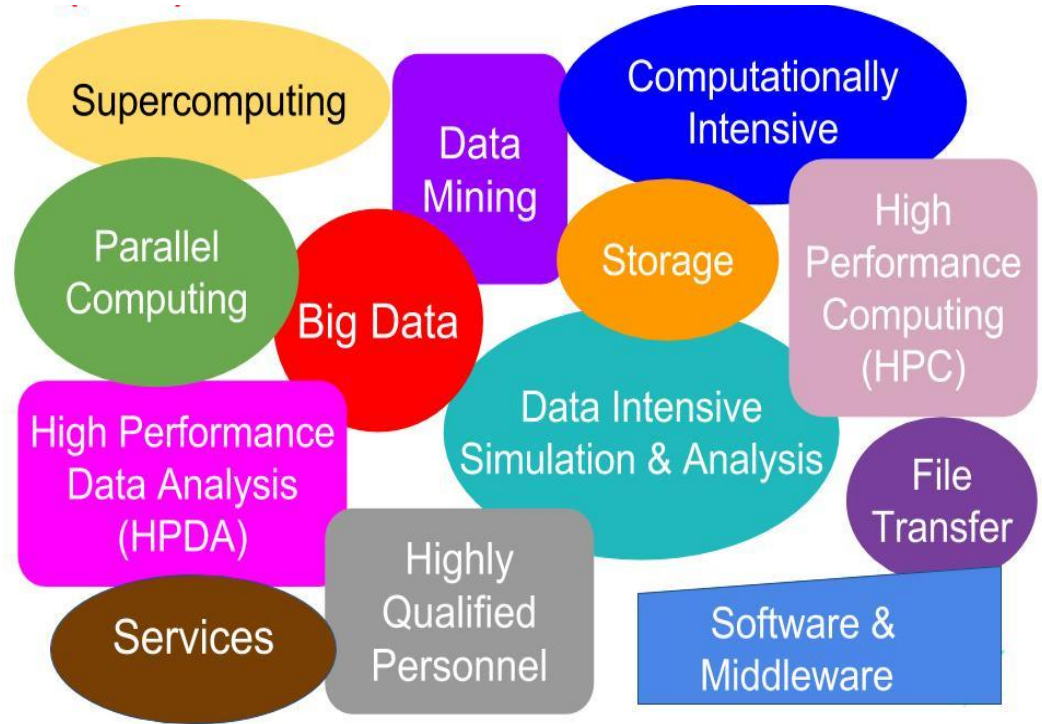
About an hour depending on interest and questions

Intro to WG and CC

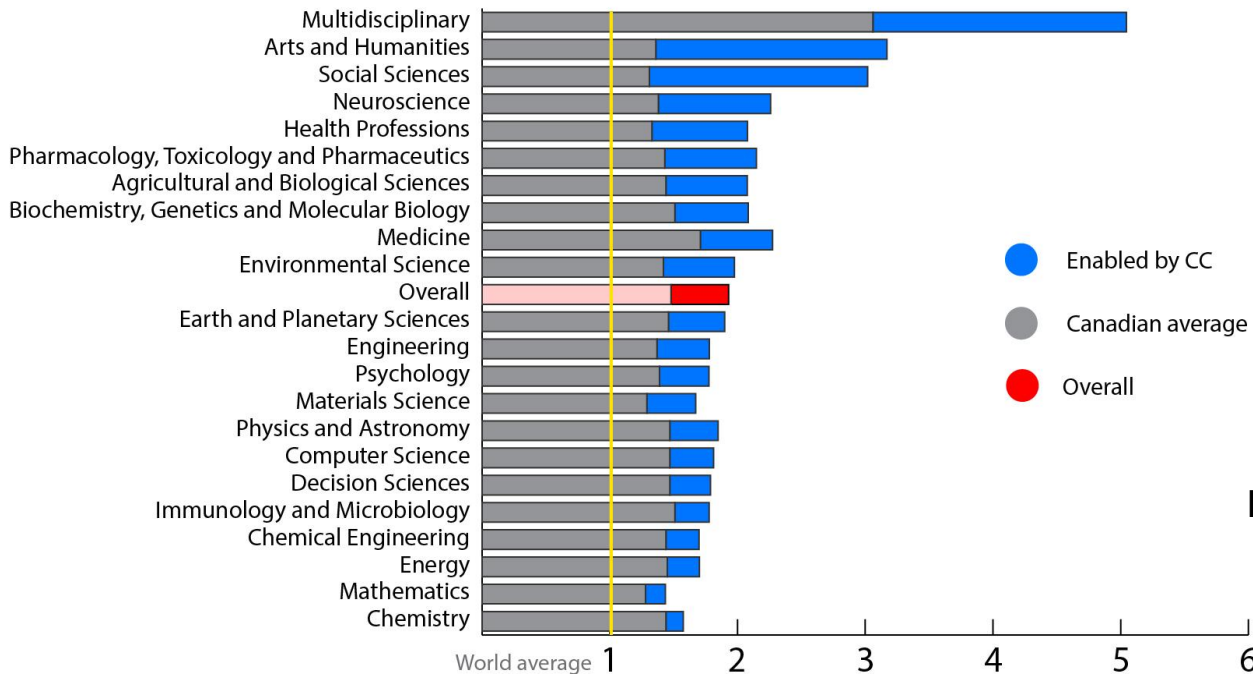
First an intro to WG and CC

Advanced Research Computing?

Advanced Research Computing (ARC) is **everything beyond a standard desktop workstation.**



Impact of publications enabled by Compute Canada compared to the average Canadian impact



Field-Weighted Citation Impact (FWCI) of CC-enabled papers



Compute Canada Federation (CCF)

Canada's National Provider of Shared Essential Digital Research Infrastructure (DRI)

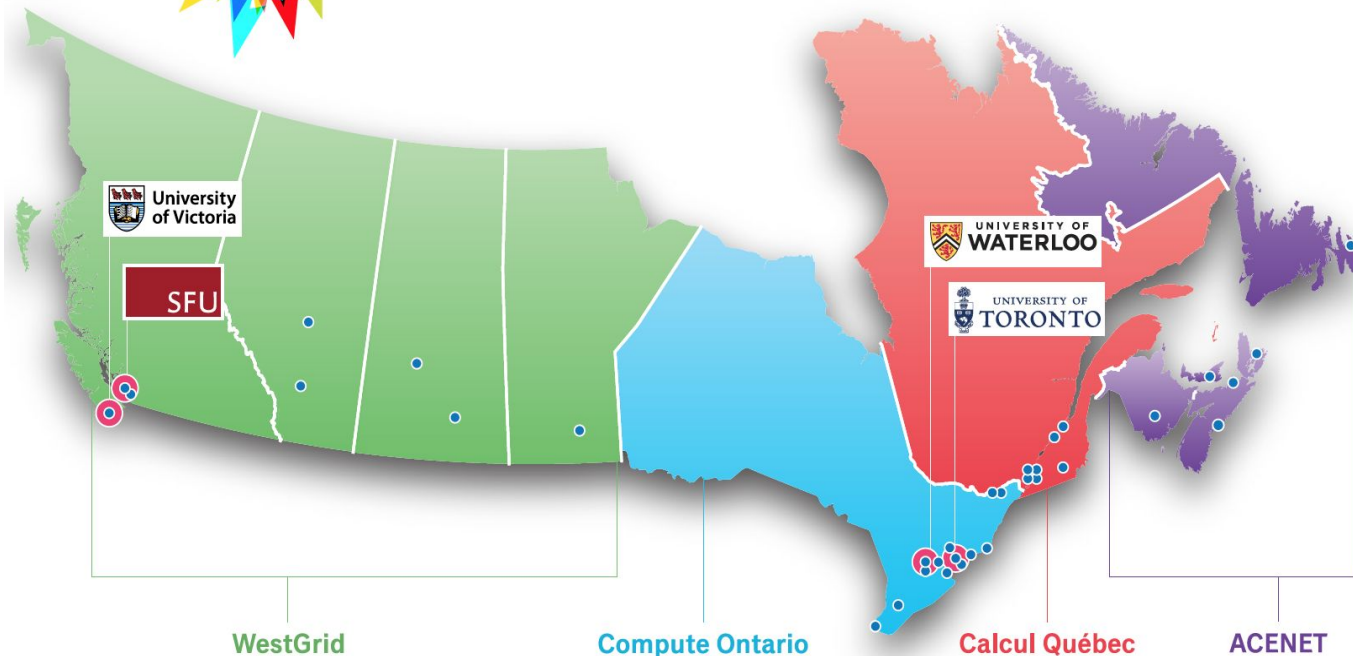
- CC is a not-for-profit corporation. The membership includes 35 of Canada's major research institutions and hospitals.
- Funding is through a federal grant with matching funds from provincial and institutional partners (40% federal / 60% provinces and institutions), which is the basis of the federated Canadian model.
- Provide shared services to over 12,000 researchers across Canada. No fees. Large requests based on a merit-based access system.





computecanada

Member locations and new national hosting sites



* Member Site*

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

compute | **calcul**
canada | canada





Regional Consortia

Compute Canada:

Leadership role and national scale initiatives:
Resource Allocation Competition (RAC),
procurement, coordinating research data
management and other national services,
securing funding, advocacy,
national/international partnerships

Regions:

Provide and Coordinate local activities
Training, Support, Staff management
Ensure needs of the member institutions and
provinces are being met.



WestGrid Members & Partners

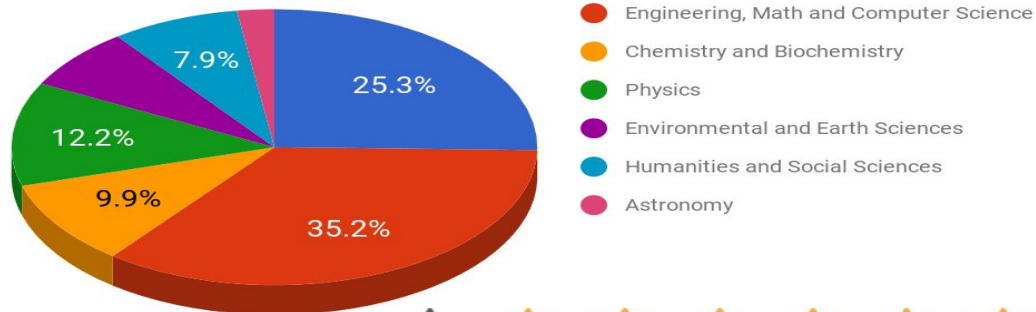


Members pay a membership fee to WestGrid and receives funding through the Canada Foundation for Innovation (CFI) Major Science Initiatives (MSI) program. WestGrid Members also provide matching funds for all CFI grants.

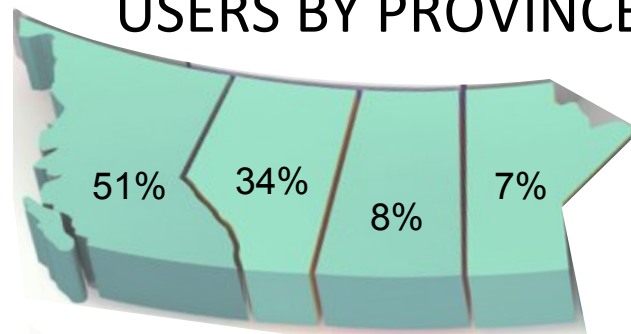


Institutional Partners are the home institutions of any WestGrid user or any research organization that collaborates with WestGrid to lead the acceleration of research and innovation.

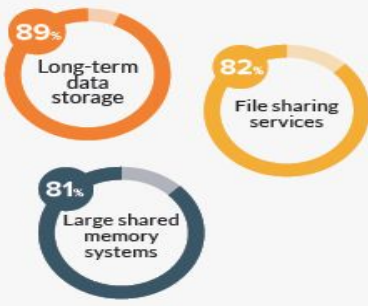
As of January 2018



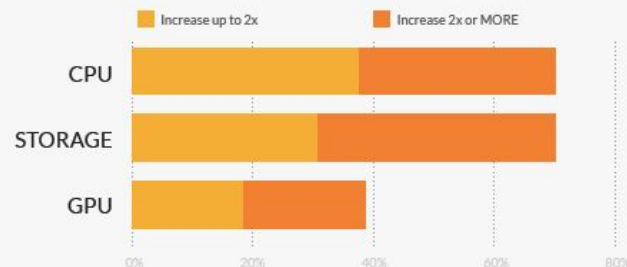
USERS BY PROVINCE



**MOST IMPORTANT
SERVICES & RESOURCES:**
(rated somewhat/very important)



HOW WILL YOUR NEEDS FOR COMPUTE AND STORAGE RESOURCES CHANGE FROM 2018-2022:



What we do: National Host Sites

Arbutus (**University of Victoria**)

- OpenStack cloud computing
- 9,000 CPU cores
- 3.5 PB Ceph storage
- 87% vCPU usage



Cedar (**Simon Fraser University**)

- General purpose computing, multiple node types
- Over 58,000 CPU cores
- 3.6 petaflops peak performance
- 584 GPU NVIDIA P100's
- 10 PB /project storage



What we do: Training & Support

In **2017-18** we delivered:

- **287 hrs** of training at **42** events
- **800+** RSVPs, **42%** new users
- **2** regional summer schools
- National *Visualize This!* challenge
- **24** Software Carpentry events
- **11** Community Town Halls
- Answered **34%** of national support tickets

This document is a WestGrid-provided best practices guide for the Compute Canada Resource Allocation Competition (RAC). It does not replace the official RAC documents and PI's should carefully review the Compute Canada official documentation. In cases of conflict between this Best Practices Guide and the official RAC documents, the official documents take precedence.

What is the RAC?

Resource Allocation Competition: compute, storage and cloud allocations on Compute Canada national services

~20% reserved for opportunistic use.

- Available to all CC users - [Rapid Access Service](#) (RAS).
- Any researcher/student at a Canadian institution can become a user.
 - No application required beyond request for an account

~80% allocated through a competitive process.

- Must be eligible to hold a grant from a Canadian granting agency.

UofA RAC 2018 Results

| | 2018 | Comments |
|-----------------------------------|-----------|--------------------------------------|
| Applications received | 40 | 25.5% of WG total (UBC had 41!) |
| Number of successful applications | 38 | 95% success rate! |
| CPU allocations | 16,500 CY | 32% of WG total |
| Average science score out of 5 | 3.27 | WG average: 3.33 |
| Average CPU scaling | 41% | WG average: 43% |
| GPU applications | 8 | WG: 29. Any plans for more GPU asks? |
| GPU allocation | 83 GY | |

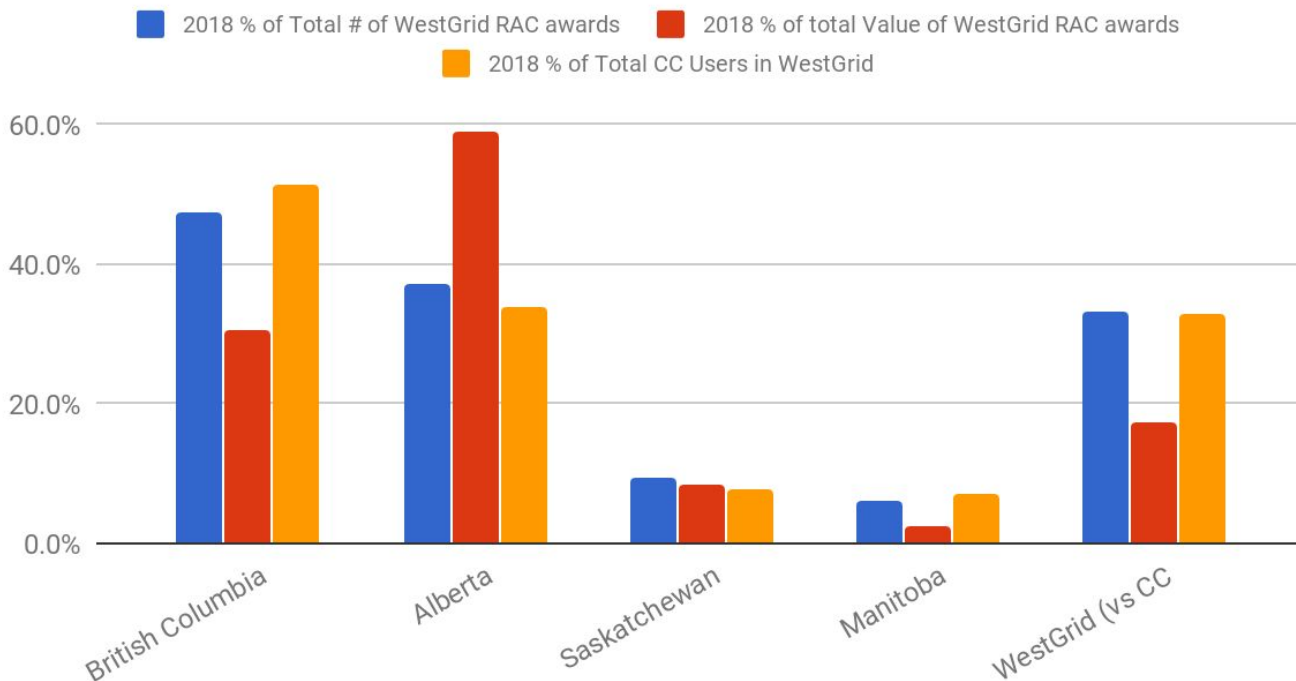


WEST

GRID

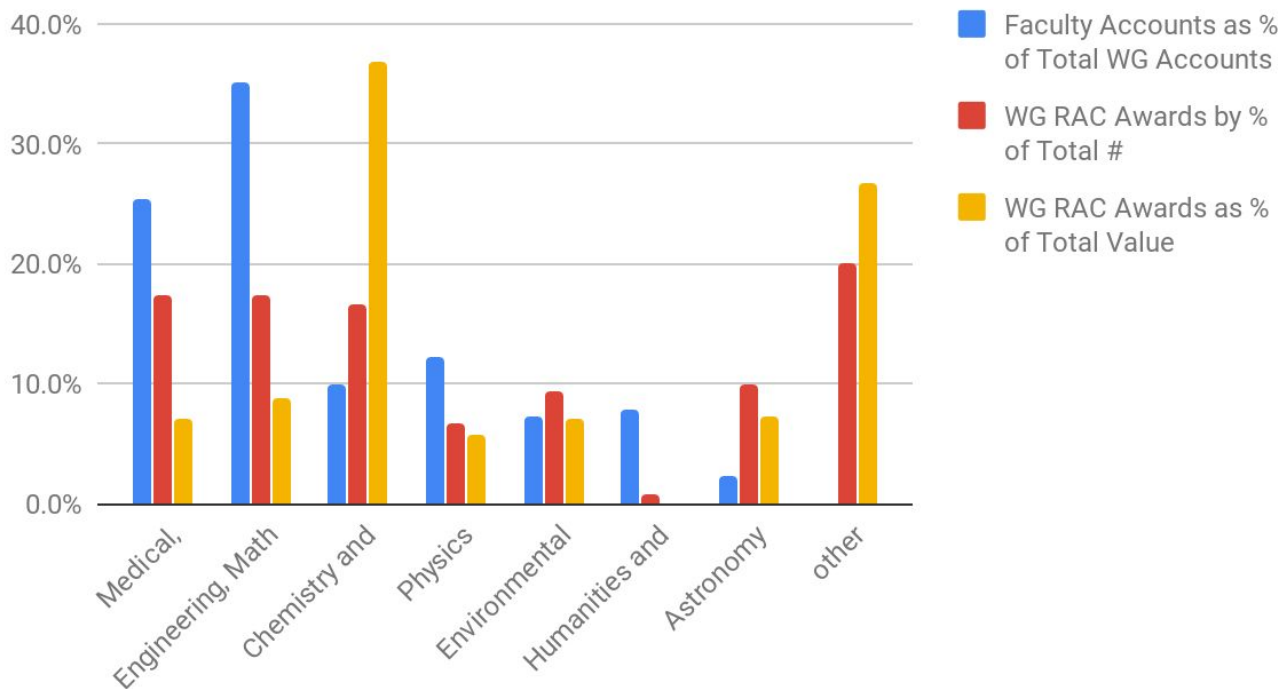
RAC 2018: Value & Total Awards by Province

Comparison of Value and Number of RAC Awards Received in WestGrid



Allocations by Research Area

2018 WestGrid Accounts & RAC Awards by Research Area



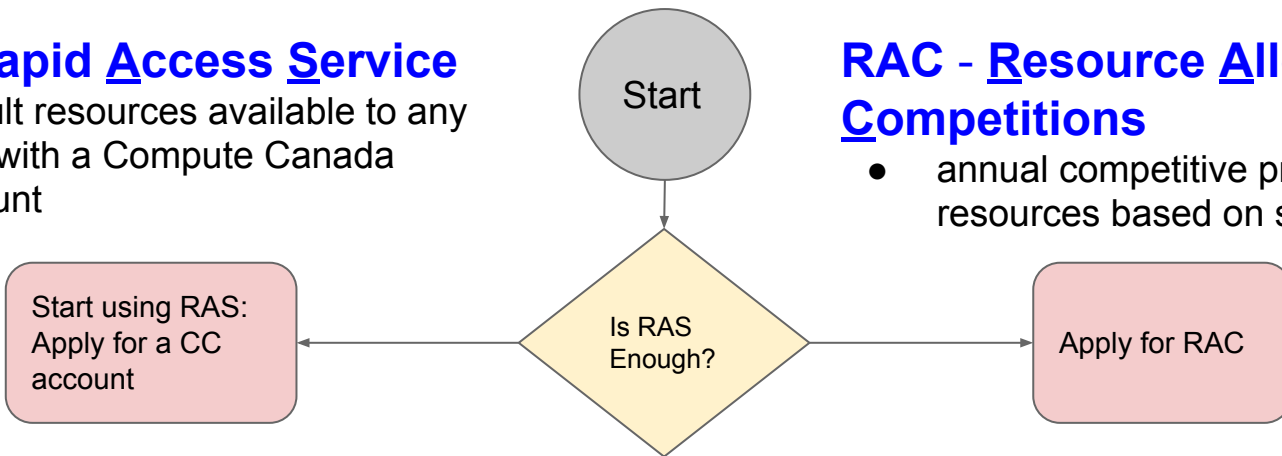
RAS vs RAC - What do you need?

RAS - Rapid Access Service

- default resources available to any user with a Compute Canada account

RAC - Resource Allocation Competitions

- annual competitive process to allocate resources based on scientific excellence



| Service | Max RAS |
|-----------------------|---------------|
| Compute | 50 Core Years |
| Storage | 10 TB |
| GPU | 10 GPU years |
| Cloud Compute | 80 vCPUs |
| Cloud Persistent | 10 vCPUs |
| Cloud (block) storage | 1 TB |

Two competitions for RAC 2019:

| | | |
|---|-----|--|
| <u>Research Platforms and Portals Competition</u> | RPP | <p>Scientific gateways</p> <ul style="list-style-type: none">• Provide service to a community of users• Datasets and Toolsets• Generally in the cloud (may include compute)• Multi-year |
| <u>Resources for Research Groups Competition</u> | RRG | <p>Classic HPC with jobs submitted to the big clusters.</p> <ul style="list-style-type: none">• Jobs submitted through a scheduler. <p>May also ask for cloud resources</p> <p>Fast-track for year-to-year continuity.</p> |

Priorities and Allocations

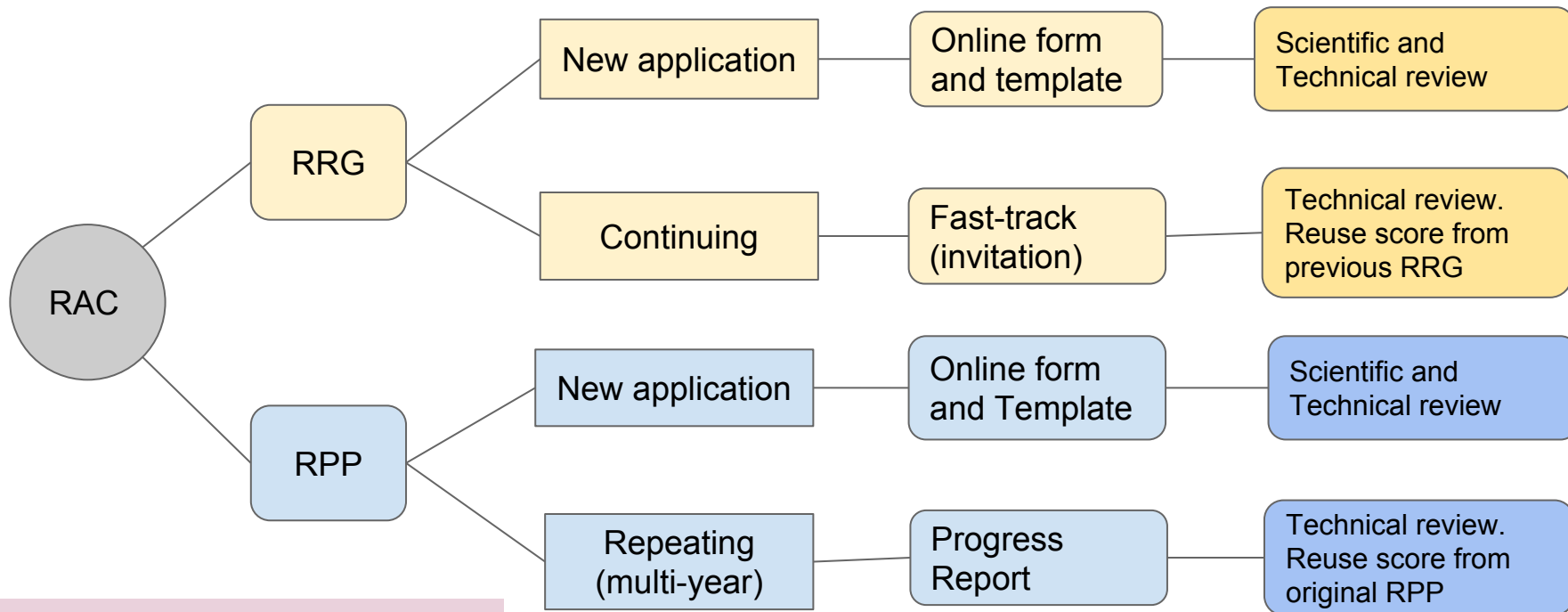
Our usual warning: we translate a compute allocation into a **scheduling priority**. This priority is defined such that on average with continuous job submission a user will be able to use their allocation over the year.

- Intermittent use will result in approximately pro-rated total usage.
- Allocations do not accumulate. Priority stays the same.

RAS (default) compute is **not an allocation**. Priorities are evenly distributed across the resources remaining after RAC, so use is opportunistic. Currently lots of RAS users so it can be hard to get jobs to run.

- Jobs will run in the “holes”.
- Small, short jobs!
- There are few holes for long or large jobs.

RAC 2019 Structure



RRG: Resources for Research Groups.
RPP: Research Platforms and Portals.

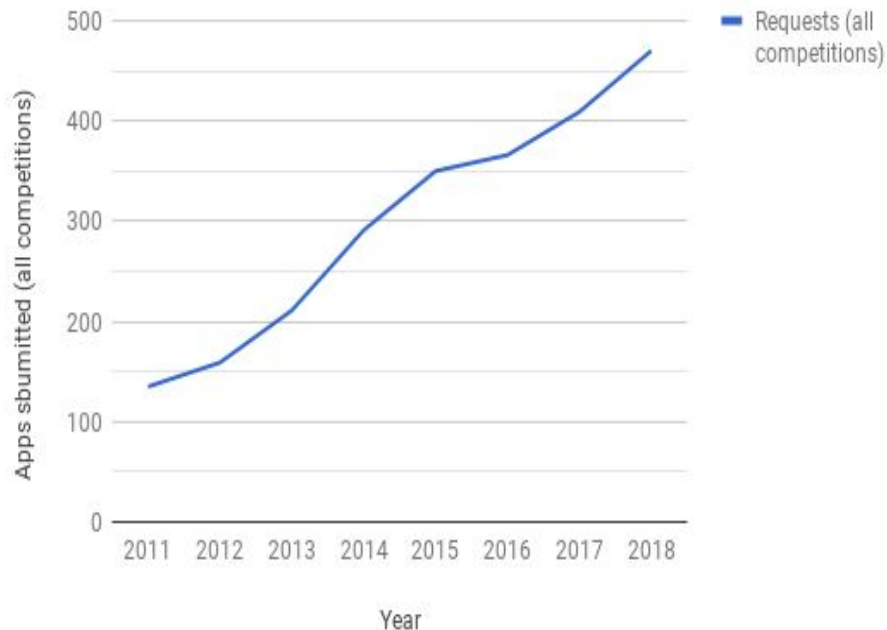
2019 RAC Key Dates

| RAC 2019 | Start | Finish |
|--|-----------------|------------------------------------|
| Fast Track submission (Invitations sent Sept. 12) | Sep 27, 2018 | Nov 2, 2017 |
| RRG & RPP full application submission | Sep 27, 2018 | Nov 8, 2018 11:59 PM EST |
| RPP Progress Report submission* | November , 2018 | Jan 30, 2019 |
| Award letters sent* | Mid Mar, 2019 | Late Mar, 2019 |
| RAC 2018 Allocations implemented* | Mid Apr, 2019 | Early May, 2019 |

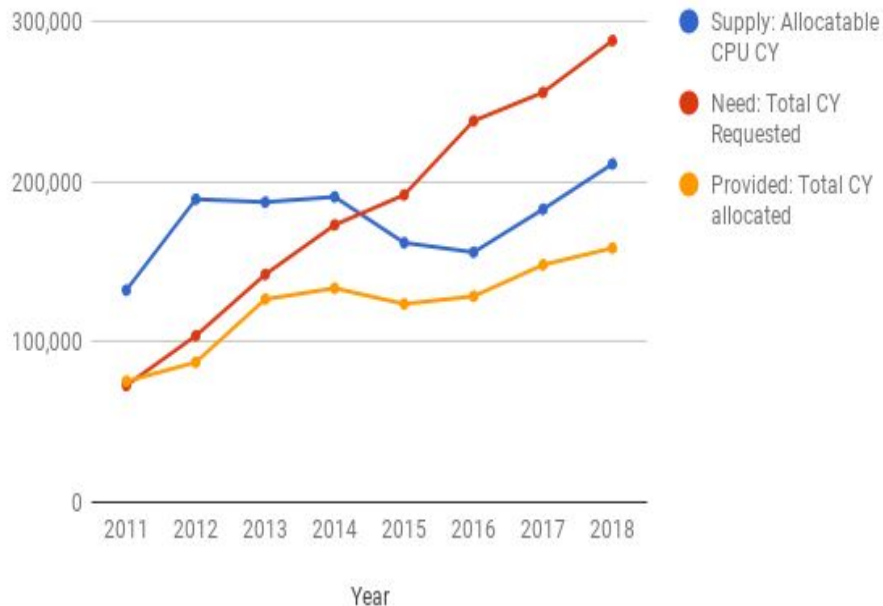
** Final dates to be confirmed.*

Under Pressure!

RAC Requests per year

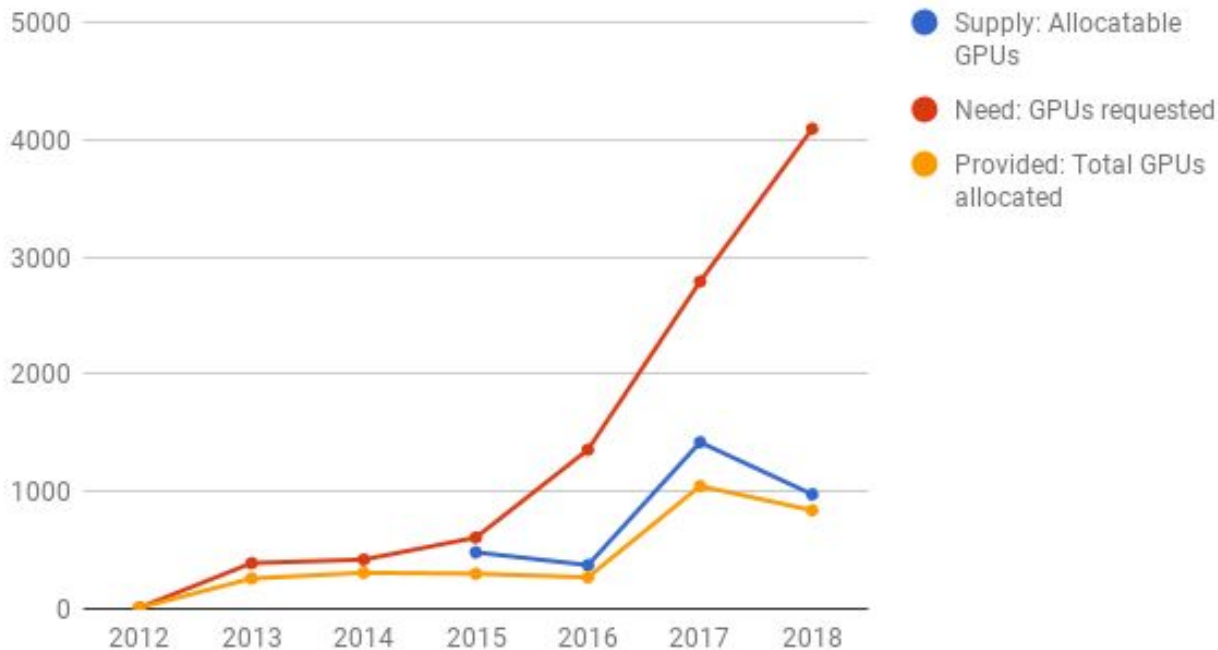


CPU Allocation Trends 2011-2018



GPU's Really Bad

GPU Allocation Trends 2011-2018



RAC 2018: 21% of asks allocated!

GPUs and Machine Learning

- Major increase in GPU asks!
 - Machine Learning is the major use
 - Increasing demand for production training
 - So expect demand to increase, possibly drastically.
- Both Cedar and Graham have GPUs (P100's)
 - And Béluga will have lots of them!
 - But nothing like enough!
 - Current estimate on linear extrapolation: **<30% of asks can be satisfied!**
- Future Compute Canada planning
 - Opportune time as CC is working with ISED and Federal Gov't for DRI.
 - Send comments to me: patrick.mann@westgrid.ca

GPU requests will require very strong justifications.

RAC 2019 Resources

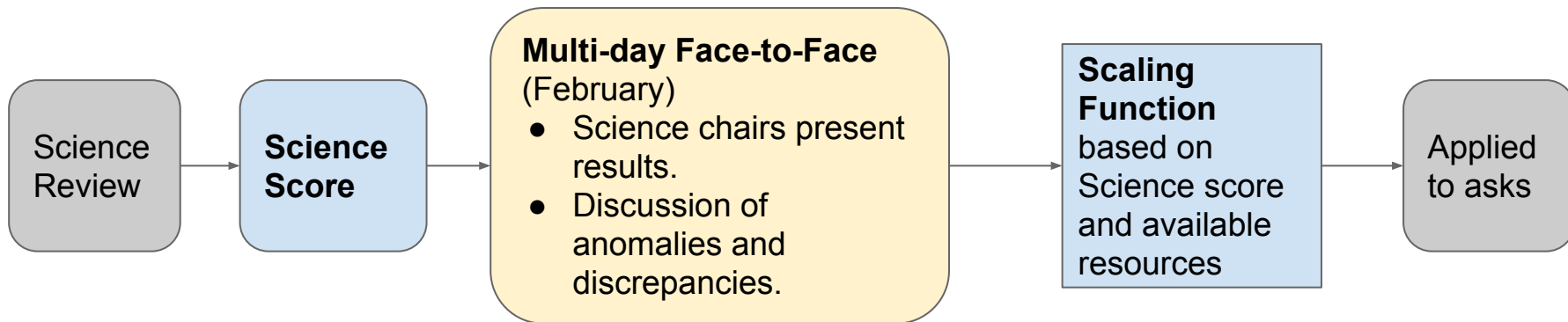
| System | Cores | GPUs | Storage | |
|------------------------|-------------------|-------------------|---------|--|
| Cedar | 58,416 | 584 (NVidia P100) | 11.5 PB | In operation. Storage expansion in progress. |
| Graham | 33,472 | 320 (NVidia P100) | 12 PB | In operation |
| Béluga (GP4) | ~30,000? | ~600? | TBD | Purchase orders in. Delivery 2018/2019. Production for RAC 2019! |
| Niagara | 60,000 | 0 | 2 PB | In operation |
| Arbutus (cloud) | ~9,000 (7,640) | 0 | ~3.5 PB | After expansion (Details in next slides) |
| Legacy | TBD | TBD | | Some systems may continue for RAC 2019. |

Prediction: we'll have <50% of CPU ask and <30% of GPU asks! **Very competitive!**

Scaling Overview

Scaling is applied to CPU and GPU requests.

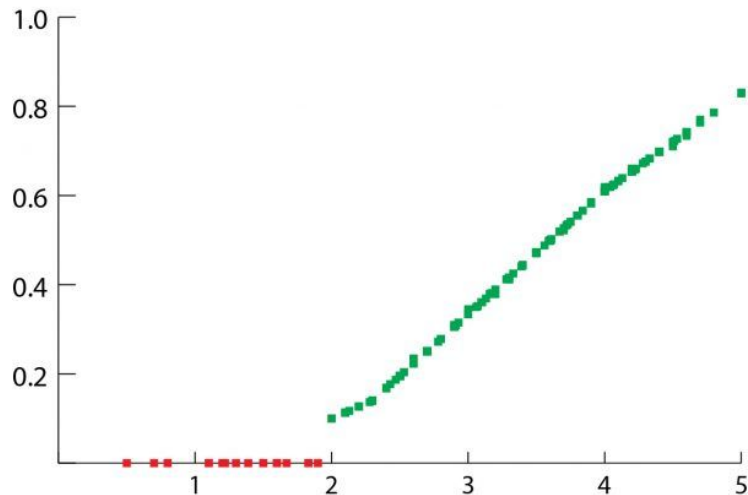
- Not applied to persistent Cloud requests (web servers, database servers, ...)
- Not applied to storage



CPU Scaling

- CFI mandates allocations based on excellence
- Peer-review process to determine SCIENCE SCORE
- High Score = Less Scaling

CPU Scaling for RAC 2018



Scaling is required due to insufficient resources, which makes the **RAC** a **very competitive process**.

Scaling Parameters

| Scaling Parameters | 2018 | 2017 | |
|--|------|-------|----------------------------|
| Minimum Science Score for an allocation | 2.0 | 2.2 | Score < 2 received nothing |
| % of CPU request allocated at minimum Science Score | 10% | 16% | |
| % of CPU request allocated to 4.0 Science Score | 61% | 72% | |
| % of CPU request allocated to 5.0 Science Score | 83% | 87.5% | 4-5 got 83% of resources!! |
| Number of applications below minimum allocatable score | 18 | 55 | |

| Descriptor | Score | Patrick's Comments |
|---------------|-------|---|
| Exceptional | 5 | This is almost never given, and is only for the highest quality research and proposal. |
| Outstanding | 4 | Excellent science, excellent technical approaches with high quality proposals. |
| Very strong | 3 | Small impressions can make a difference between "Strong" and "Very Strong" |
| Strong | 2 | RAC 2018 cutoff was 2.0, so "Strong" proposals are insufficient for an allocation! |
| Moderate | 1 | A passable proposal with no significant issues. |
| Insufficient | 0 | Significant issues either scientific or technical. Very few proposals receive scores <1. |

Expanded top end.
(under discussion)

If you are reasonably happy with your 2018 allocation then fast-track is very straightforward and requires no further work on your part.

- Invitations have been sent (Sep.11)
- **Fast Track applications cannot be delegated:** PIs must complete the application themselves.
- Proposals with **score<2.5** from previous year have not been invited.
 - That was really too low to get anything reasonable so we recommend a proposal re-write.

Fast-track Process: score from previous year is inserted into this year's scaling and allocation process.

- **No guarantee that the allocation will remain the same.**
- But generally it's pretty similar.

Out-of-Round & Early-Stage

New faculty can apply for an **Out-of-Round** And support for major breakthroughs

- Send request to rac@compute canada.ca
- This is a full RAC process, including science reviewers. So response can be a few weeks.

Use the RAS for tests and prototypes

1. Early-stage or new users get an account and learn about the systems.
2. Run prototypes or test jobs, and if possible production jobs
3. Acquire performance statistics
4. Predict future requirements
5. Use the above information to create a well-justified RAC application.
(out-of-round or regular)

Most resources are already allocated, so generally we can only respond to smaller asks.

Large asks must be well-justified.

Changes from RAC 2018

RPP Focus on Gateways

The Research Platforms and Portals (RPP) Competition enables communities to develop research projects that improve access to shared datasets, enhance existing online research tools and facilities, or advance national or international research collaborations.

Note that the emphasis is on **creating scientific gateways which provide services to a community** of users. Compute Canada will no longer entertain RPP requests for pure compute or storage.

Pure compute and storage requests must now be in the RRG competition. Continuing **multi-year asks should make use of the fast-track process.**

RPP Annual Report I

The requirements have been tightened.

Process

1. Notices sent in November, with reports due in January.
2. Progress report is reviewed by Compute Canada staff.
3. Science score of the original RPP application is inserted into the normal allocation process, together with any requested updates to the original resource request.
4. **All new and continuing platforms and portals are then allocated through the normal process.**
 - a. The current year's scaling is applied!
 - b. So no guarantee of an allocation identical to the previous year.**

CC strives to keep the allocations consistent from year-to-year,

IMPORTANT: If the RPP annual report is not received by the deadline, *then the allocation for the current year will be left to expire and not renewed.*

Not supposed to be particularly lengthy

- Compute Canada would really like to see evidence of uptake by the community of users.

New Development Projects

1. Creation of the development team.
2. Development effort with prototypes in operation.
3. Identification of issues and challenges that have been encountered, and plans for mitigation including revisions to the project plan and schedule.
4. Evidence of uptake: (number of hits, number of users, number of downloads/uploads, etc.)

Continuing Projects

1. Evidence of continuing usage: (Number of hits, number of users, total downloads/uploads, storage utilization, etc.)
2. Evidence of marketing effort.
3. User breakdown between Canadian and international users.
4. Research outcomes associated with the platform (for example, number of papers acknowledging or citing the gateway).
5. Usage (compute, storage, and cloud) within 50% of the predicted estimates. Usage below this limit may result in a prorated cut to the next year's allocation.
6. Expected changes in support levels from CC. In particular requests for significant increases in CC support need to be justified.

RRG/RPP Streams Removed

There were streams for RRG regular and large.
And for RPP Platforms (large) and Portals (smaller).

In practice this was not successful as it was difficult for applicants to understand the difference and for reviewers to take into account shorter proposals.

So no streams: just one form for each program.

No Generic Resources

There are no “generic” resource categories. Applicants must choose a specific system.

- There were many legacy systems so applicants could choose from among a few “generic” categories.
 - With the consolidation to a small number of national systems the “generic” classes have been removed.
- Please choose an actual system from the [Compute Canada list of available resources](#).
- We generally assume that new users have at least tried various sites under a **RAS account**, so should already have some idea of the right system.
- Please contact support@westgrid.ca for further consultation.

Page Limits, PDF, Secondary Contact

Page limits are enforced

(we got some extremely short and extremely long applications last year)

PDF only

(last year we accepted Word files for the technical justification).

Secondary Contact Person

PI's are encouraged to appoint a secondary contact person so that important communications don't go astray.

- PI's on some major projects did not monitor their email, or were not available.
- So this year a secondary contact can be nominated.

Tips & Best Practices

No Appeal Process

There is no appeal process.

If the reviewers misunderstand a proposal (which does happen) there is no way of correcting or amplifying the proposal.

- **Need to get it right the first time.**

The Reviewers

- Science reviewers are experts in their discipline
 - For details see list of committees and chairs on [CC RAC pages](#)
- But - not necessarily experts in the specific sub-discipline or area of any particular project.
- Very wide range of RAC proposals do not allow for area experts, so you **cannot assume that your proposal is going to be read by someone who works directly in the area or field of the project.**

Don't have lots of detailed jargon. That's very hard for someone outside the specific area. Write for a discipline expert, but not for the specific area.

Use the Templates

We strongly recommend that PIs **use the templates.**

- [RRG Application Template](#) (Reminder: no streams this year)
- [RPP Application Template](#)

Summaries and details are in the following sections.

Justify your Request

- Address the **evaluation criteria** (details to follow)
- Provide details on ***significance*** and ***impact of research***.
- Citation rates of recent work help justify science.
- Justify why/how the resources requested will be used to accomplish/support the science.
- Poor proposals generally do not provide sufficient information, or have mixed technical requirements into the research justification.
 - Very difficult to decipher for both science and technical reviewers, and results in poor scores.

“Please improve motivation of why the proposed calculations are important, and what is to be learned and/or what other science depends on the results.”

Provide Adequate Details

Clearly explain **WHAT** the science is, using specific details.

- **Use tables** to provide resource details by project
- If it is difficult to predict usage then emphasize the areas of uncertainty.

| Project | Team Members | Estimated Core-Years | /project Storage | Memory/ core | Comments |
|-----------|---------------|----------------------|------------------|--------------|----------|
| Project 1 | Student X | 10,000 | 100TB | 4 GB | ... |
| Project 2 | Students Y, Z | 5,000 | 50TB | 32 GB | ... |
| Totals: | | 15,000 | 150TB | | |

“The technical justification did not show a calculation of the computing and storage needs. Providing a table with this information, as suggested in the guidelines, would have made this section stronger.”

Provide ALL the information asked for, but ONLY what is asked for.

- Use the templates!
- Answer the specific questions and provide only those details requested.
- Do not re-use submissions from other proposals or competitions.
 - Students and post-docs can write sections (they are the experts) but the overall proposal needs an experienced, guiding hand.
- Be clear, avoid jargon - reviewers are not experts in all sub-domains.
- Take time to edit and review the application before submitting it.

“The proposal is very long. The very detailed scientific justification is more reminiscent of a NSERC proposal. For next year, I recommend to shorten the science part, and to work out more clearly the purpose of the CC usage, and the results that will be enabled by the CC Allocation.”

- Ideally provide a **table** showing the expected HQP at each level (undergraduate, masters, doctorate, etc).
- Highlight the contribution of any excellent graduate students.
- Mention any training opportunities beyond that of normal academic teaching.

“For future allocation requests... describe in detail the involvement of HQP in past projects that utilized Compute Canada resources. The current proposal states that one PDF will be involved and reviewers were wondering if there were plans for this PDF to mentor junior graduate or undergraduate students. If so, mention this in the proposal.”

“This proposal was very clearly articulated with an integrated HQP training plan. The number of HQPs is impressive.”

Keep your CCV up to date!

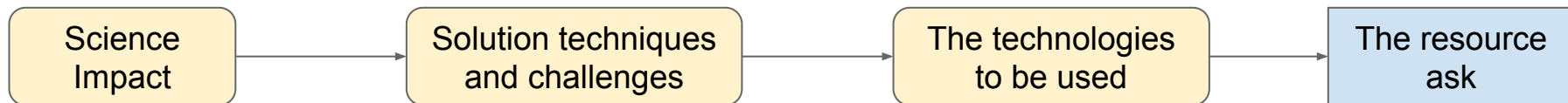
1. CCV is used by the review committees - quality of the PI and his/her research.
Keep your bibliography up-to-date to ensure that reviewers are aware of the latest (and greatest!) work.
 2. CC relies on the CCV for bibliographic analyses used both for annual reporting, and for funding proposals.
The Field Weighted Citation Index (FWCI) is a key component of the metrics presented by CC.
- Required for RRG and RPP full applications (update not required for Fast-Tracks or progress reports).
 - Note: Applicants with a CCV on CCDB - need to delete and resubmit. Carefully read the instructions in the [CCV Submission Guide](#) (section 6)

“For future allocation requests, please consider adding references to published work in the proposal, progress made in the previous year, and clear description of how HQP will be involved in achieving the milestones.”

“Progress over the past year is missing. Based on the CCV, most of the group's publications were enabled through Compute Canada resources, so that information should have been accessible and would have been relevant to include.”

There should be a thread or narrative used to present a well-connected and justified story.

This was emphasized by reviewers!



- Team (HQP, RPP management, ..) supports the science and the technologies/ask.

Discrepancies in the Asks

Very important: Ensure there are NO discrepancies between the resources requested in your technical justification document and the online application.

The application form takes precedence.

- Seems to happen a number of times every year.
- Requests on the form are not consistent with the technical justification.
- The form values are inserted automatically in the master spreadsheet.
 - The master spreadsheet is the basis for the rest of the process!
- Please be careful - we have missed or mistaken the resource requests in the past.

Resources for Research Groups

- Aimed at Job-based use of the big clusters.
- Simple cloud asks are also available.

Emphasis

1. **Quality of Science** - including impact and technical justification
2. **Quality of Applicant(s)** - reputation, publishing record,
..

RRG Evaluation Criteria

| | | |
|------------------------------------|-----|--|
| Quality of Science | 60% | <ul style="list-style-type: none">• originality and innovation• significance and expected contributions to research• clarity and scope of objectives• clarity and appropriateness of methodology• Feasibility• discussion of relevant issues• impact of the research• Unique opportunities for HQP training |
| Quality of the Applicant(s) | 40% | <ul style="list-style-type: none">• knowledge, expertise, and experience• quality of contributions to, and impact on, the proposed and other research areas• importance of contributions |

RRG Template - Outline

| | Section | Page Limit | Description |
|---|---|------------|---|
| 1 | Research Problem and Justification | 1.5 | Outline the research problem for which Compute Canada resources are being requested. Its importance/relevance as well as your general objectives. |
| 2 | Research Justification | 3 | In-depth discussion of the problem(s), specific projects, methodology, timelines, and specific goals. |
| 3 | Training and Support of HQP | 1.5 | Describe how this allocation will support the training of Highly Qualified Personnel (HQP) that are reported on the online form. |
| 4 | Technical Justification (See below for details!) | 4 | This section addresses the technical details of computational and/or storage needs. Compute Canada needs enough information to ensure that compute cycles and storage are used as efficiently as possible, that resource requirements are estimated reasonably, and that the appropriate systems are being used. Typically the entire section 4 will be 1-2 pages long but projects involving several sub-projects or phases may need more. |
| 5 | Progress over last year | 2 | Highlight any notable RAC-enabled research. Should be directly linked to publications in the CCV, or may be a work in progress. <i>The applicant has already included a CCV so this is an opportunity to highlight any particular contributions, and also to add anything new.</i> |

Research Justification

- Description of the science, methodology and solution techniques.
- Not much to say beyond the general comments made previously.
- Template asks for
 - Introduction and description
 - Detailed justification

Technical Justification I

Provide performance estimates.

- RAS - default resources available for testing and prototyping.
- Performance tables really help the reviewers, and make the proposal look good!

Explain the projects being worked on and the proposed research plan.

- Tabulate the number and size of the needed runs/jobs/virtual machines
- Again **tables** and breakdowns really add to the proposal.
 - Sub-tasks or sub-projects, phases, team members, ..
- If it is difficult to predict usage then emphasize the areas of uncertainty.
 - early research issues where details are still to be worked out
 - administrative issues like onboarding graduate students or postdocs who have not yet worked out a detailed research plan.

Technical Justification II

Provide details of the numerical and computational techniques used.

- Describe the **numerical and computational techniques**. Expect reviewers to be computationally literate, but not experts in your particular field.
- Explain the way these techniques will **address the science and the challenges**.
- Explain any development of **new or revised approaches**.
- Provide details of any **software packages** required.
- Show that the users are **experienced and familiar** with the performance characteristics of such packages.
 - If the packages are new to the research team then describe the approach for **familiarization**. If possible describe any tests that the team may undertake.

Carefully justify the resource ask.

Both science and technical reviewers are very aware of inflated, unjustified asks and have unilaterally decreased asks in the past.

- A critical section!
- Tables showing your performance/requirements.
- Tables showing a project breakdown.
- Tie the previous techniques, science, HQP sections together into the final ask (the thread!).

We really appreciate an upfront, clear presentation of the impact of scaling on the project. What would you as a researcher do if you were given some percentage of your ask?

- Impact on hiring graduate students.
- Impact on hiring post-docs.
- Issues with collaborative projects for the other co-PI's or co-workers.
- Critical or short-term projects that are necessary for further activities.
- Identification of lower-priority projects or activities that could be postponed.
- Projects which are critical to, for instance, an early-stage researcher who is applying for tenure.

The Research Platforms and Portals (RPP) Competition enables **communities** to develop research projects that improve access to **shared datasets**, enhance existing online **research tools** and facilities, or advance national or international **research collaborations**.

There have been quite enthusiastic ideas with big asks, but in practice the user community is quite specialized and uptake is dependent on the user interfaces and the services offered. Such asks are critically reviewed and the allocation may be decreased.

In addition to being a useful gateway with a user community the project team must have the skills and ability to **develop, operate and manage the gateway**.

Pure compute and storage requests must now be in the RRG competition.
Continuing multi-year asks should make use of the fast-track process.

RPP Review Overview

1. Research community provided with datasets and toolsets.

- a. what is the user community?
- b. what is being provided?

2. Development and Management

- a. Is the team capable of developing and managing a major platform/portal system in the cloud?
- b. Are the requested resources reasonable for the predicted user community?

The criteria and templates are more detailed compared to RRG.

The current cloud resources are **IaaS** (“**Infrastructure as a Service**”) resources.
So it is completely up to the project team to design and implement a suitable architecture.

RPP Template

The [RPP Application Template \(Word\)](#) is quite comprehensive. Have a look!

| | |
|------------------------------------|--|
| 1 Strategic Plan (40%) | 1.2 Research problem and justification 1.2 Goal, Alignment and Impact 1.3 User of the Platform/Portal 1.4 Expected Outcomes |
| 2 Management Plan (50%) | 2.1 Development and operation of the Platform/Portal 2.2 Management of the Platform/Portal |
| 3 HQP (10%) | |

Strategic Plan (40%)

| | |
|---|--|
| Research Problem and Justification | <ul style="list-style-type: none">• The research problem or need that the platform/portal will address is clearly presented.• The importance/relevance of the platform/portal for Canada is well justified.• The general objectives of the platform/portal are clear. |
| Goal, Alignment and Impact | <ul style="list-style-type: none">• The project goal is clearly stated and aligns with the goals of Compute Canada.• The research area of focus is of importance and will generate benefits to Canada.• The expected impacts have been clearly explained. |
| Use of the Platform/Portal | <ul style="list-style-type: none">• The applicant has clearly explained the added value from the creation of the proposed platform or portal for the identified communities.• Creation of the research platform/portal is being driven by the research community targeted.• If applicable – The application details the level of interaction between Canadian and international research groups. |
| Expected Outcomes | <ul style="list-style-type: none">• The application presents a clear timeline for the delivery of the anticipated outcomes over the entire duration of the requested allocation and has indicated the means by which they will be measured.• The outcomes presented are of relevance and importance, and will benefit the users of the platform/portal |

Management Plan (50%)

| | |
|--|---|
| Development and operations of the Platform/Portal | <ul style="list-style-type: none">• The team assembled to develop and operate the platform have the right combination of skills<ul style="list-style-type: none">○ where positions are not yet filled, a description of the position has been included.• The proposed methods and technologies are suitable and scientifically justified.• The approach to sharing data sets across the platform/portal is well detailed and the application addresses any potential accessibility issues. |
| Management of the Platform/Portal | <ul style="list-style-type: none">• The team assembled to manage the platform have the right combination of skills<ul style="list-style-type: none">○ where positions are not yet filled, a description of the position has been included.• Management of the resources is well defined and will provide broad access to the research communities.• Process for resource access is well defined and the application identifies a credible plan to maintain or increase the population accessing resources.• If applicable, the scientific evaluation of selecting projects will result in supporting excellent research with the resources available.• The reporting framework presented will ensure information collected on the users of the portal will provide the ability to track impacts (scientific, HQP, social, etc.) and the participants are maximizing the benefits of the resources to meet the expected outcomes of the application. |

RPP Phased Plans

We encourage phased plans, with for instance performance indicators showing a well-justified and strong understanding of the issues involved with not only technical development, but also marketing and communications.

If possible define performance and success metrics. It's always useful to have a nice table defining your Key Performance Indicators (KPIs)

Especially startups - lots of large, enthusiastic but unjustified estimates.

- Start small.
- Briefly address marketing and communications.

Development plan

- Assembling the team, Development practices, Gantt chart, ...
- Architecture, including monitoring and reporting.

RPP Impact Best Practices

1. Identify the **audience/community**.
 - a. Who would be interested in using the proposed platform or portal?
 - b. Why are they interested?
 - c. Is the community national in scope? International?
2. What is the **size of the community**?
 - a. justify any such estimates.
3. What kinds of research would you expect the community to carry out?
 - a. examples of exciting projects that would make use of the portal/platform.
4. Are there any **agreements** in place that would put conditions on the request?
 - a. For instance the Atlas High-Energy physics project is part of the Large Hadron Collider collaboration, and must satisfy international agreements.

RPP Dev & Management

1. Carefully describe the server architecture.
 - a. Feeds into the resources ask.
2. Describe any security/privacy concerns or requirements
 - a. steps that will be taken to satisfy such requirements.
3. Is the architecture scalable?
 - a. Refer to the size of the community to justify any scalability issues or plans.
4. Demonstrate the expertise and capability of your staff.
 - a. A portal or platform requires system management so identify the staff resources necessary to both develop and operationally manage your proposed system.
5. Special requirements?
 - a. Cloud or tape based backups
 - b. Particularly large memory requirements
 - c. Performance or response requirements
 - d. Redundancy and Reliability requirements. For instance multi-site architectures.
 - e. ...

Resource Links

- **Ask a question:**
 - About RAC: rac@computecanada.ca
 - About CCV: ccv@computecanada.ca
- **Find an answer:**
 - [General Competition Information](#)
 - [RPP Guide](#)
 - [RRG Guide](#)
 - [Technical Glossary](#)
 - [Frequently Asked Questions](#)
 - [CCV Guide](#)
- **Guides:**
 - The [Full WestGrid Best Practices Guide](#)
- **Compute Canada Q&A:**
 - Oct.4, 2018 (English): [Register](#)
 - Oct.5, 2018 (French): [Register](#)
- **This Presentation:** <https://github.com/WestGrid/trainingMaterials>
 - Just go to <https://github.com/WestGrid> and search/click through.
 - <https://westgrid.github.io/trainingMaterials/>

Contact us anytime:
support@westgrid.ca
www.westgrid.ca
docs.computecanada.ca
www.computecanada.ca

Questions?

GOOD LUCK!

Reminder: Open Discussion after
this



Open Consultation

Researcher Consultation

2016-2017: Leadership Council on Digital Research Infrastructure (LCDRI)

- **August 2017:** Report sent to cabinet.
- **March 2018:** Cabinet announced \$572M over 5 years for DRI (ARC, RDM, Research Network)
- **Summer 2018:** ISED planning and consultation process.

2017-2018: WestGrid Incorporation and planning

- **Spring 2018:** new WestGrid board of directors.
- **Summer 2018:** intensive internal strategic planning



After presentation: informal meeting with researchers and anyone interested.

- RAC: issues, revisions, etc.
- New systems: what did we get right? Wrong?
- Surveys: what should we be asking about?
- Future: what should WG be focussing on? Compute Canada?
- What should we be emphasizing to gov't?
- Anything Else?

ISED DRI Discussion Paper

Innovation, Science and Economic Development Canada (ISED)

“Canada’s DIGITAL RESEARCH INFRASTRUCTURE STRATEGY Discussion Paper July 2018”

In the 2018 federal budget, the Government of Canada committed to greatly strengthen support for Canadian scientists and researchers in conducting world-leading research. As part of this vision, the 2018 budget announced an investment of \$572.5 million over five years, with \$52 million ongoing, to implement a Digital Research Infrastructure (DRI) Strategy for Canada.

1. Digital network for Research: CANARIE
2. Advanced Research Computing (ARC): Compute Canada
3. Data Management: research libraries, CARL, Research Data Canada
4. Research Software

Lack of Resources

The major issue is lack of resources.

*The overwhelming impression from a detailed re-reading of the RAC 2018 WestGrid proposals is that of **well-written, well-justified asks from competent and generally experienced teams**. The prevalent complaint from the survey, RAC proposals and informal discussion is that of very long queue times and inability to acquire sufficient resources to carry out a research program.*

So a strong recommendation is that WestGrid should consider acquiring additional resources.

- Should WestGrid consider buying hardware?
- Where would we find funds? Who should we approach?
- Can we obtain provincial funds? Currently AB, SK and MN do not have sites/systems.
- Where? How do we decide?
- What should we aim for?
 - GPUs and machine learning?
 - ARM-based clusters?
 - ???

WestGrid is proposing to hire a Business Development specialist

- Limited term
- Generally understand that the use of HPC is growing fast in industry, but no understanding of local Western Canada requirements and opportunities.
- So recommend hiring a business development officer.
- Initial task is to analyze the Western Canada business and industrial community with a focus on HPC and cloud use, plus academic and research connections.

Comments? Suggestions?

- Any opportunities in Manitoba, and particularly the University of Manitoba?

Platforms and Portals

Growing:

- 3 years ago had about a dozen in all of CC
- RAC 2018 had 25 from WestGrid alone.

WestGrid is planning to invest in RPP support

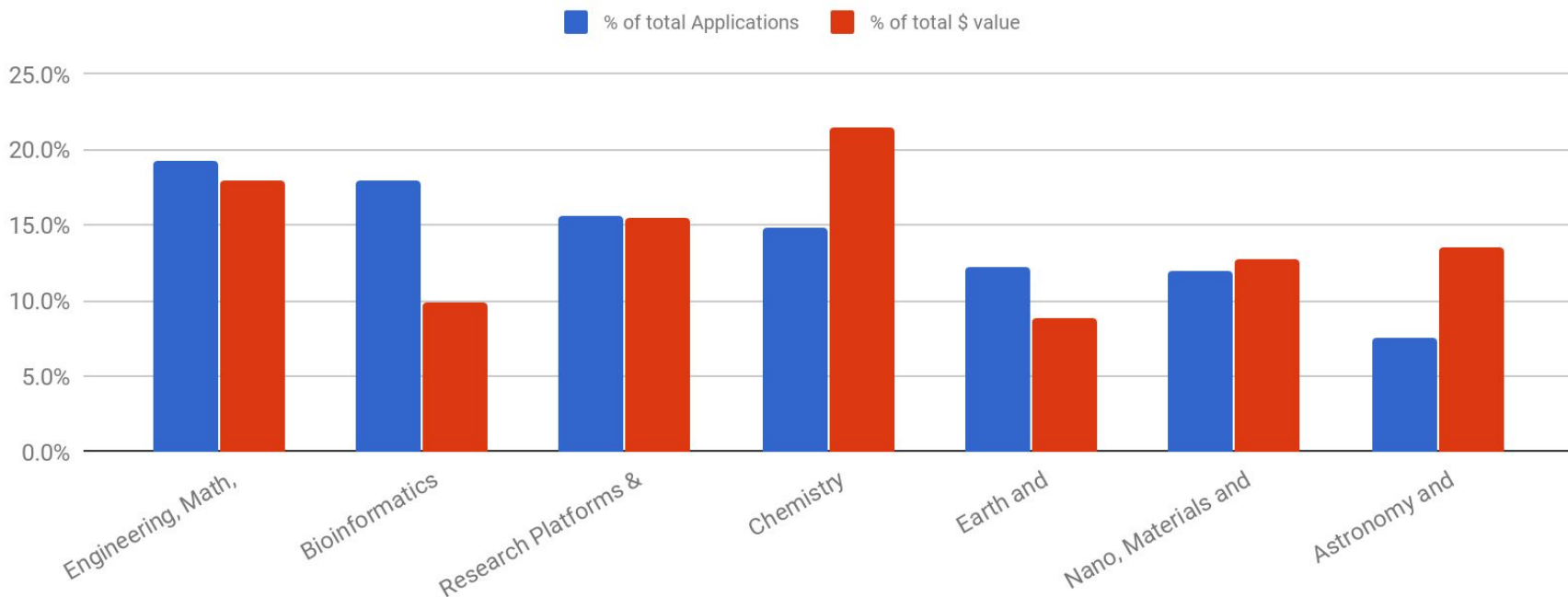
Comments/Suggestions?

- Competitive scoring process
 - Scaling function: From 10% to about 90%
 - Is this the right way to go? Maybe ranking is preferred.
- Storage requests can't be scaled.
 - How do we handle these?
- What happens when a continuing project terminates
 - PI moves to another job/country?
 - Project completes or is no longer making progress?
 - What do we do with the data?
- Discrepancies between disciplinary review committees
 - Should we move everyone to the average?
 - Digital humanities is still relatively small, so statistics are unreliable.
 - Some fields really have some outstanding PIs (Noble prize winners) which skew results.
- Can we dump out-of-round? Very time-consuming.
- Annual full proposals are very time-consuming for PIs
 - Current approach (RAC 2019: 3 year RPP's, and fast-track RRG's for almost everyone.
 - Is this reasonable?

Extra Slides

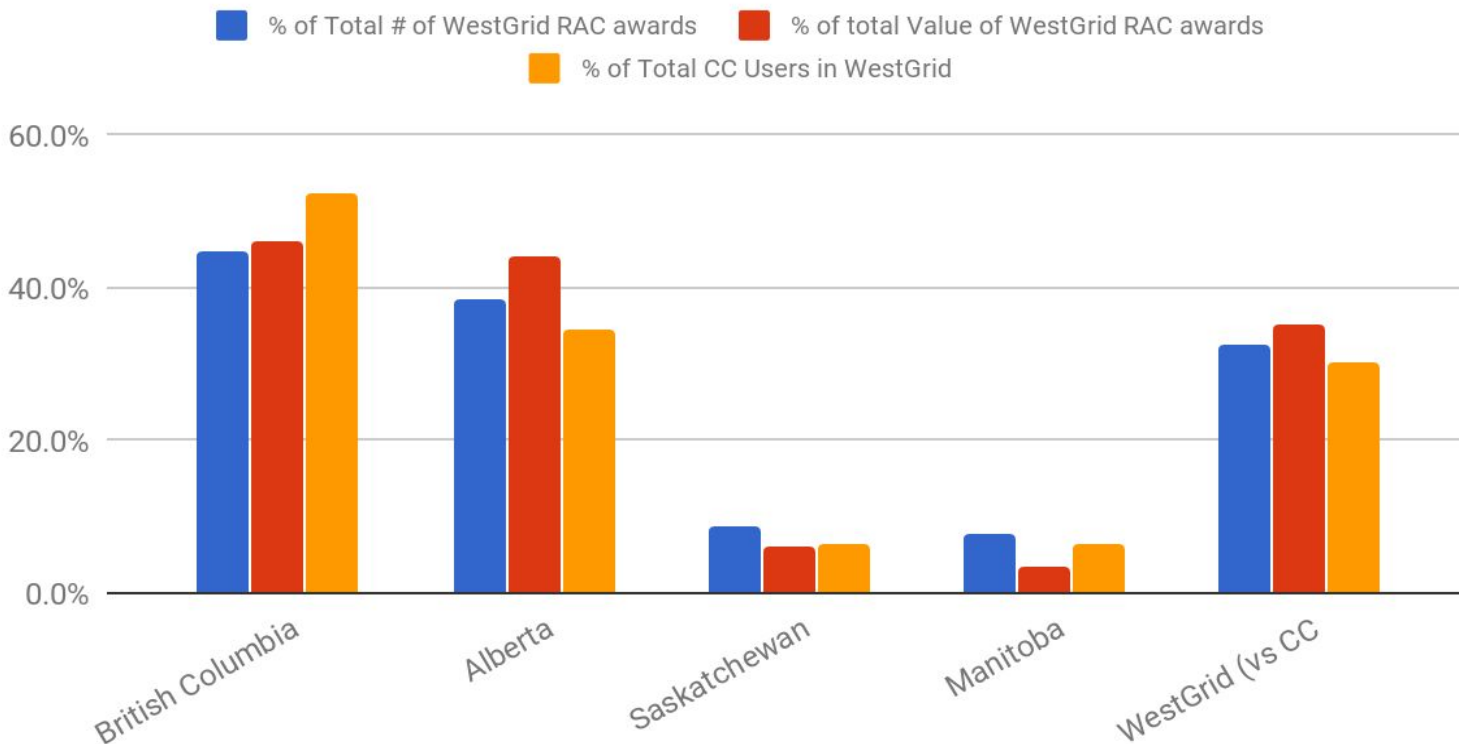
Allocations by Research Area

2017 RAC Applications Received and Total Value of Resources Awarded by Research Area



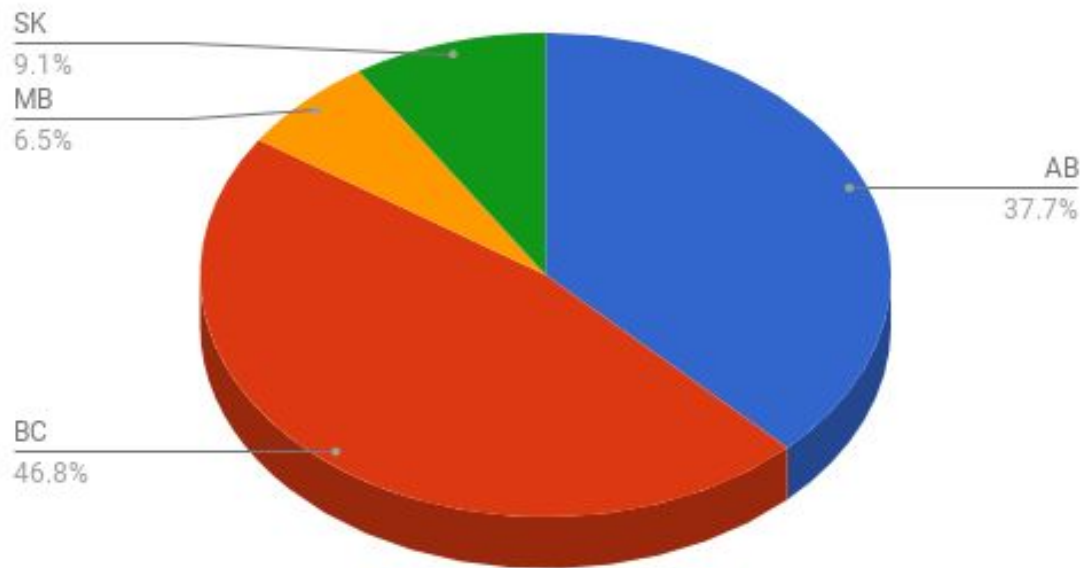
Value & Total Awards

Comparison of Value and Number of RAC Awards Received in WestGrid



RAC 2018 By Province

Number of WestGrid 2018 RAC Awards by Province



| Province | Allocated |
|-----------------|------------|
| AB | 56 |
| BC | 72 |
| MB | 9 |
| SK | 14 |
| WG Total | 151 |

RAC 2018 By Discipline

2018 WestGrid RAC Awards by Discipline

