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

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https://github.com/WestGrid/trainingMaterials

This Presentation:
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- https://github.com/WestGrid and search/click through.
- https://westgrid.github.io/trainingMaterials/

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Contents

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

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.

Researcher Consultation

2016-2017: Leadership Council on Digital Research Infrastructure (LCDRI)	2017-2018: WestGrid Incorporation and planning
● **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.	● **Spring 2018:** new WestGrid board of directors. ● **Summer 2018**: intensive internal strategic planning

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

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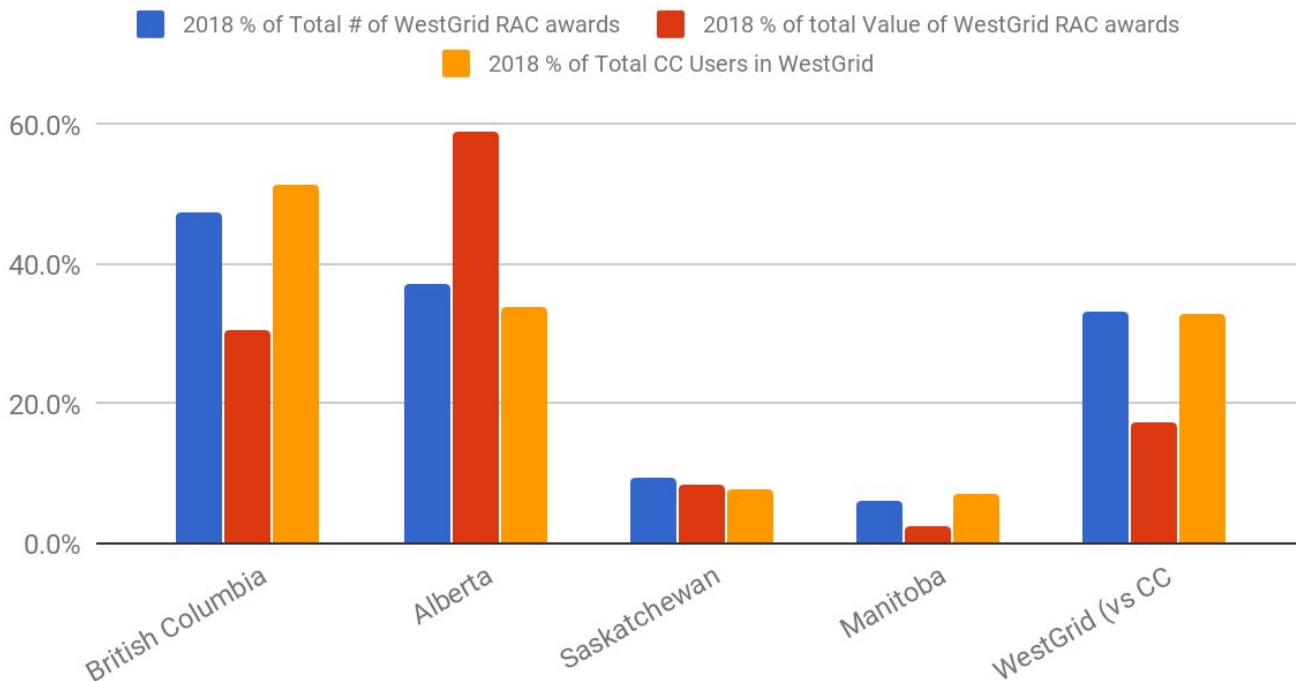- Must be eligible to hold a grant from a Canadian granting agency.

UVic RAC 2018 Results

|	2018	Comments
Applications received	16	10% of WG total
Number of successful applications	15	94% success rate!
CPU allocations (CY)	3,647	7% of WG total
Average science score out of 5	3.3	WG average: 3.33
Average CPU scaling	41%	WG average: 43%
GPU asks	1	(WG: 29). Any plans for more GPU asks at UVic?

RAC 2018: Value & Total Awards by Province

Comparison of Value and Number of RAC Awards Received in WestGrid

- 2018 % of Total # of WestGrid RAC awards
- 2018 % of total Value of WestGrid RAC awards
- 2018 % of Total CC Users in WestGrid

Allocations by Research Area

2018 WestGrid Accounts & RAC Awards by Research Area
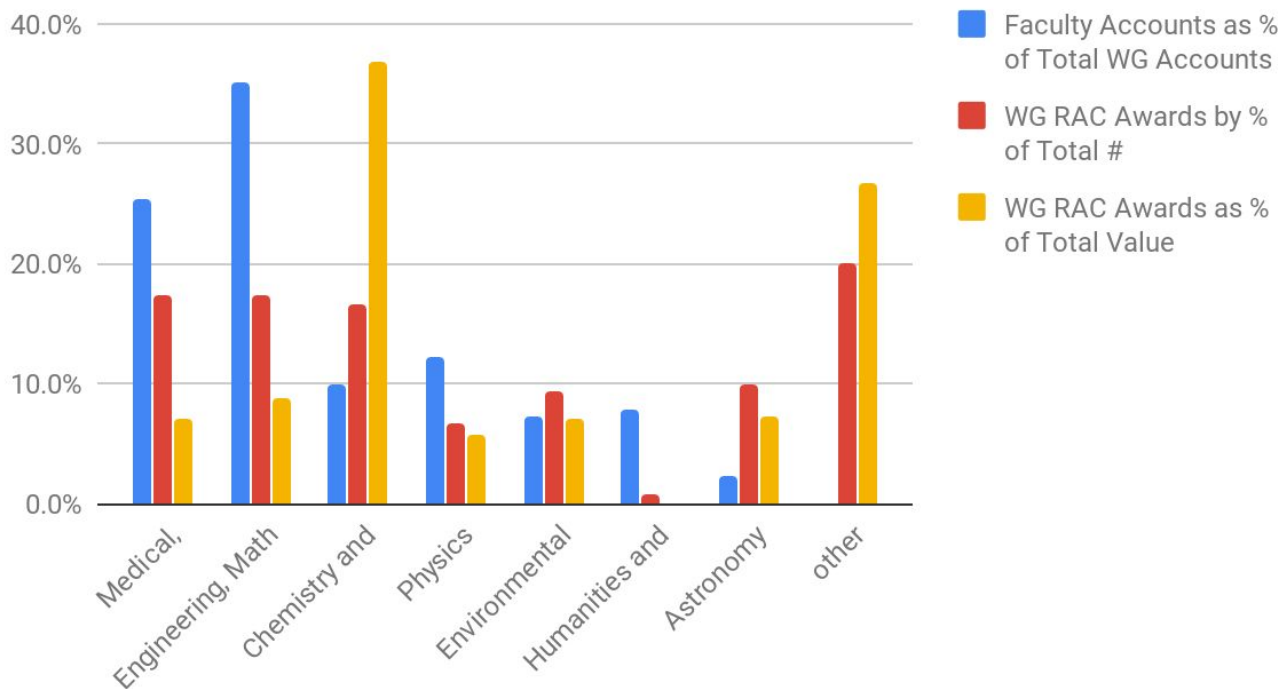
RAS vs RAC - What do you need?

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

Start

Is RAS Enough?

Start using RAS: Apply for a CC account

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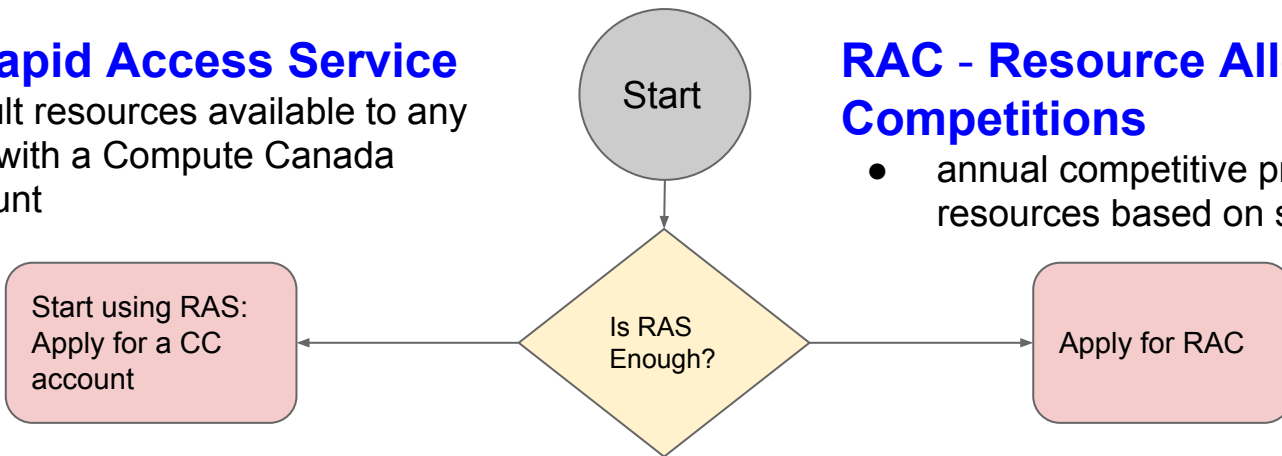
Service	Max RAS
Compute	50 Core Years
Storage	10 TB
GPU	10 GPU years
Cloud Compute	80 vCPUs
Cloud Persistent	10 vCPUs
Cloud (block) storage	1 TB

Two competitions for RAC 2019:

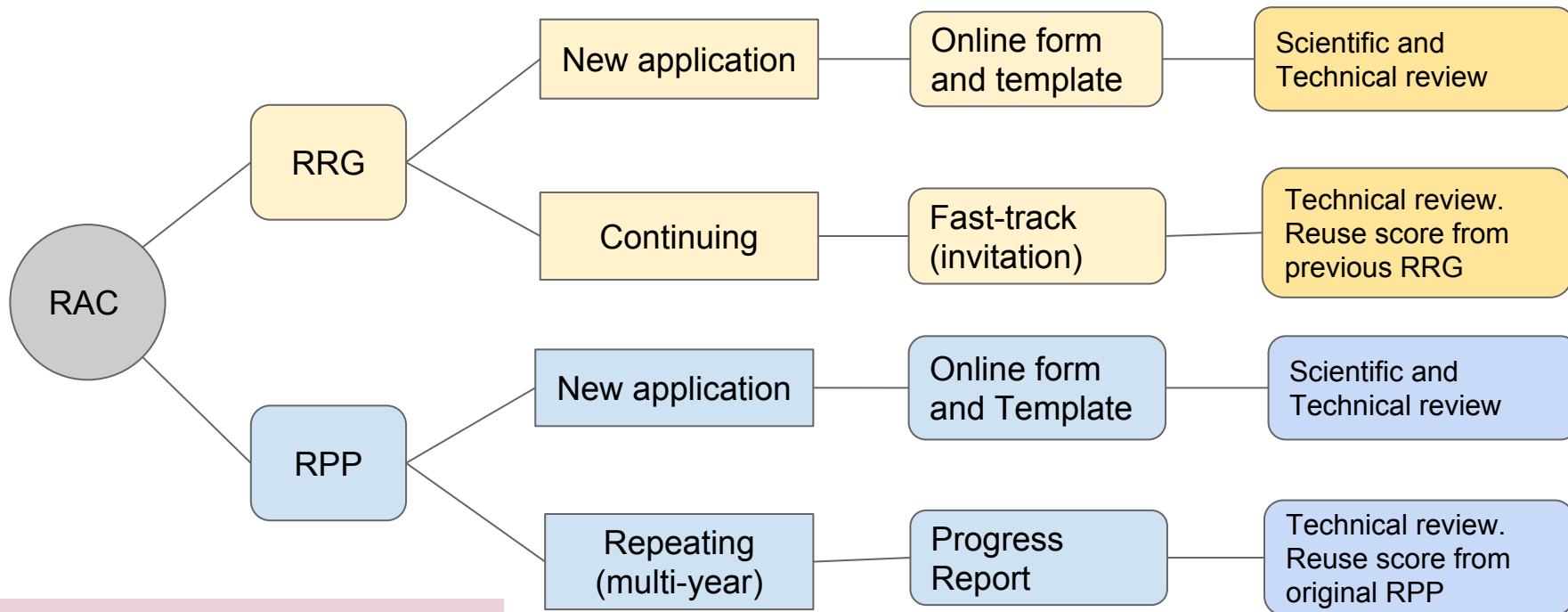| Research Platforms and Portals Competition	RPP	Scientific gateways ● Provide service to a community of users ● Datasets and Toolsets ● Generally in the cloud (may include compute) ● Multi-year
Resources for Research Groups Competition	RRG	Classic HPC with jobs submitted to the big clusters. ● Jobs submitted through a scheduler. May also ask for cloud resources Fast-track for year-to-year continuity.

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.
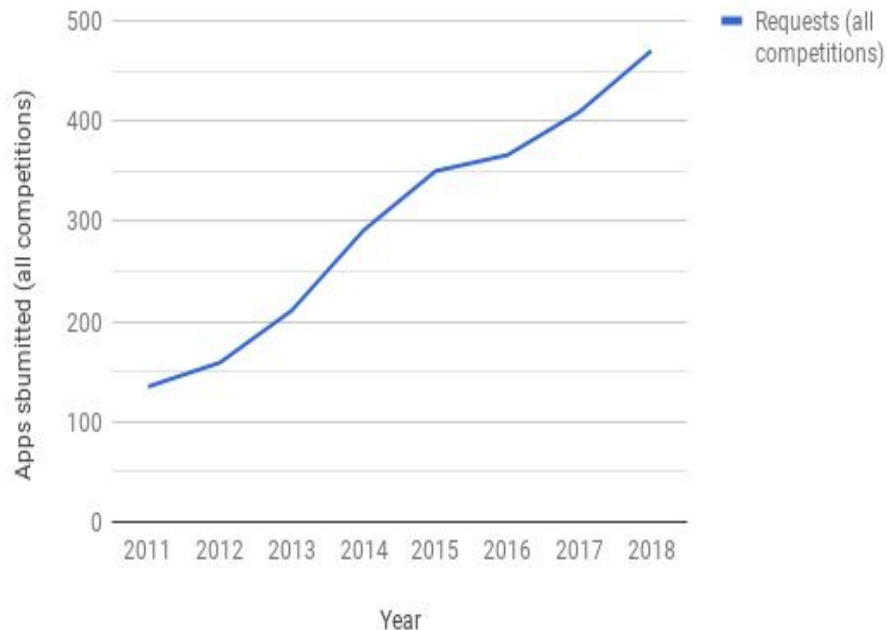RPP: Research Platforms and Portals.

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!

WESTGRID

RAC Requests per year

Requests (all competitions)

Apps sbumitted (all competitions) / Year

CPU Allocation Trends 2011-2018

- Supply: Allocatable CPU CY
- Need: Total CY Requested
- Provided: Total CY allocated

Year

RAC -2018 Results
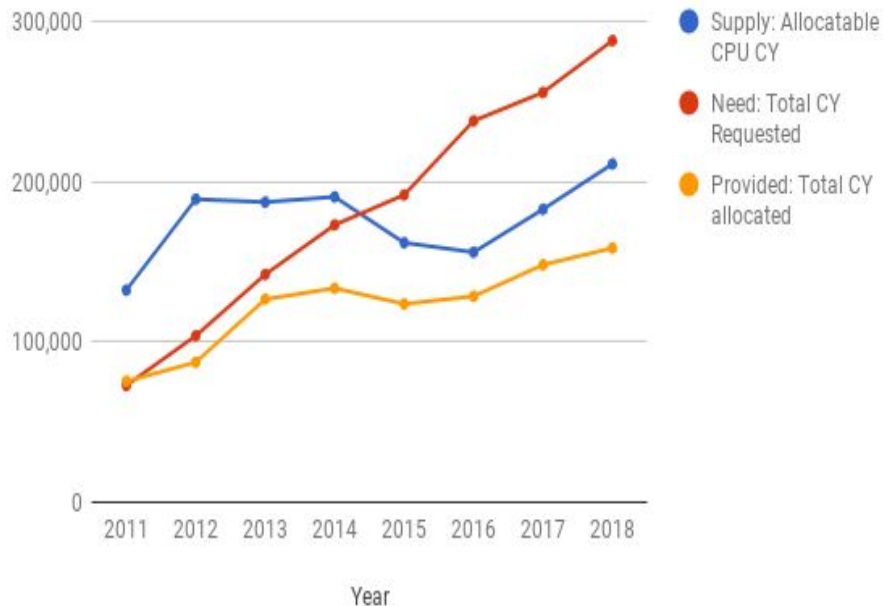
GPU's Really Bad

GPU Allocation Trends 2011-2018

Legend:
- Supply: Allocatable GPUs
- Need: GPUs requested
- Provided: Total GPUs allocated
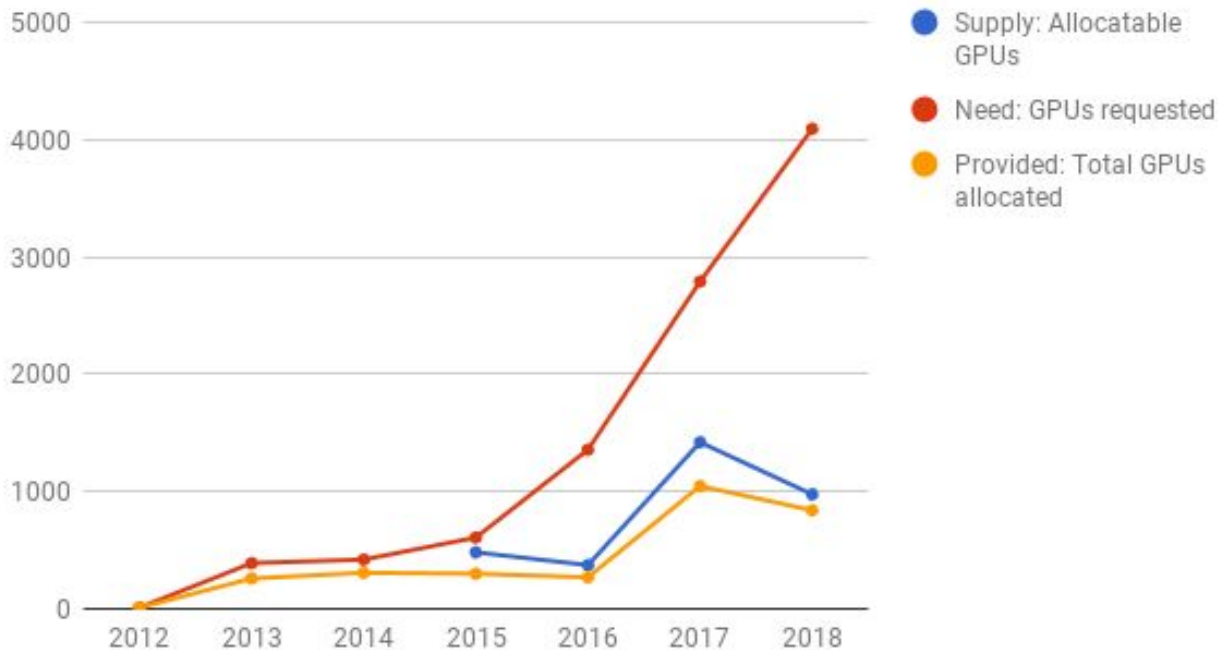
RAC 2018: 21% of asks allocated!

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!**

CPU Scaling

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

CPU Scaling for RAC 2018
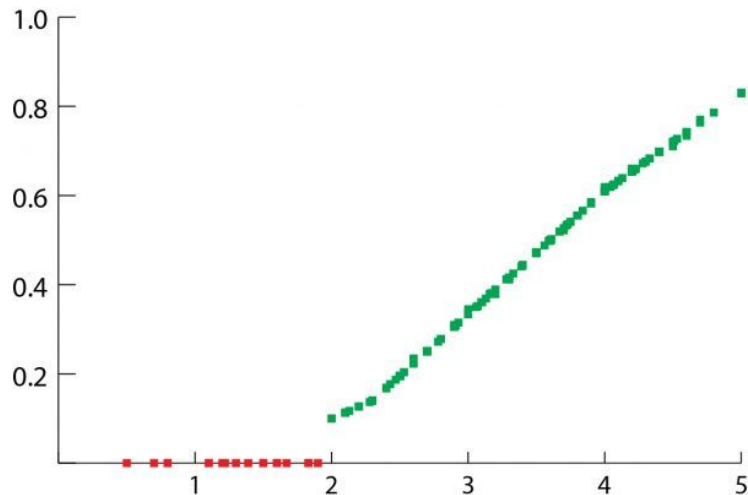
Scaling is required due to insufficient resources, which makes the **RAC a very competitive process.**

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.

288 Fast-tracks sent out this year! (297 last year)

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."

Out-of-Round & Early-Stage

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

- Send request to rac@computecanada.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**.

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 <u>not received</u> 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

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.

- 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."

Be Concise

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."

# Updated CCV & Past Year Progress

Keep your CCV up to date!

- Reference citations in the proposal ("Progress over the Past Year" section) which were or will continue to be supported by the resources requested.

"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!

Science Impact → Solution techniques and challenges → The technologies to be used → The resource ask
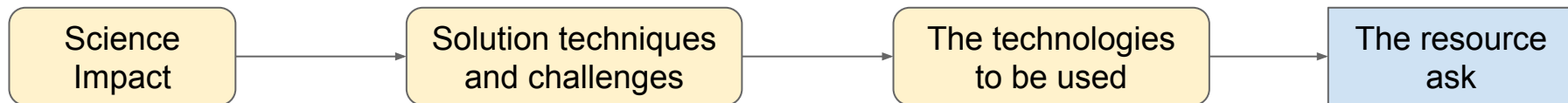
- Team (HQP, RPP management, ..) supports the science and the technologies/ask.

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%	- 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%	- 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. *The applicant has already included a CCV so this is an opportunity to highlight any particular contributions, and also to add anything new.*

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

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.

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%)	

Research Problem and Justification	● 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	● 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	● 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	● 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	● The **team assembled** to develop and operate the platform have the right combination of skills ○ 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	● The **team assembled** to manage the platform have the right combination of skills ○ 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.

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.

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
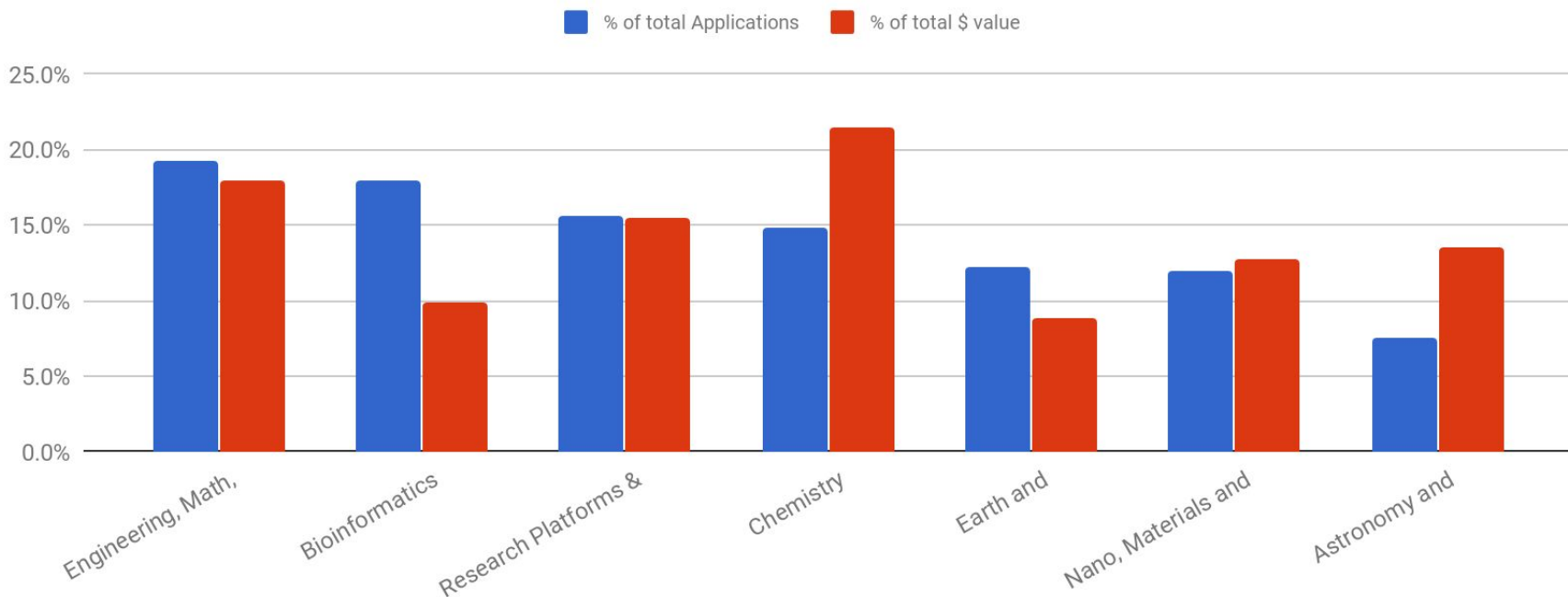www.westgrid.ca
docs.computecanada.ca
www.computecanada.ca
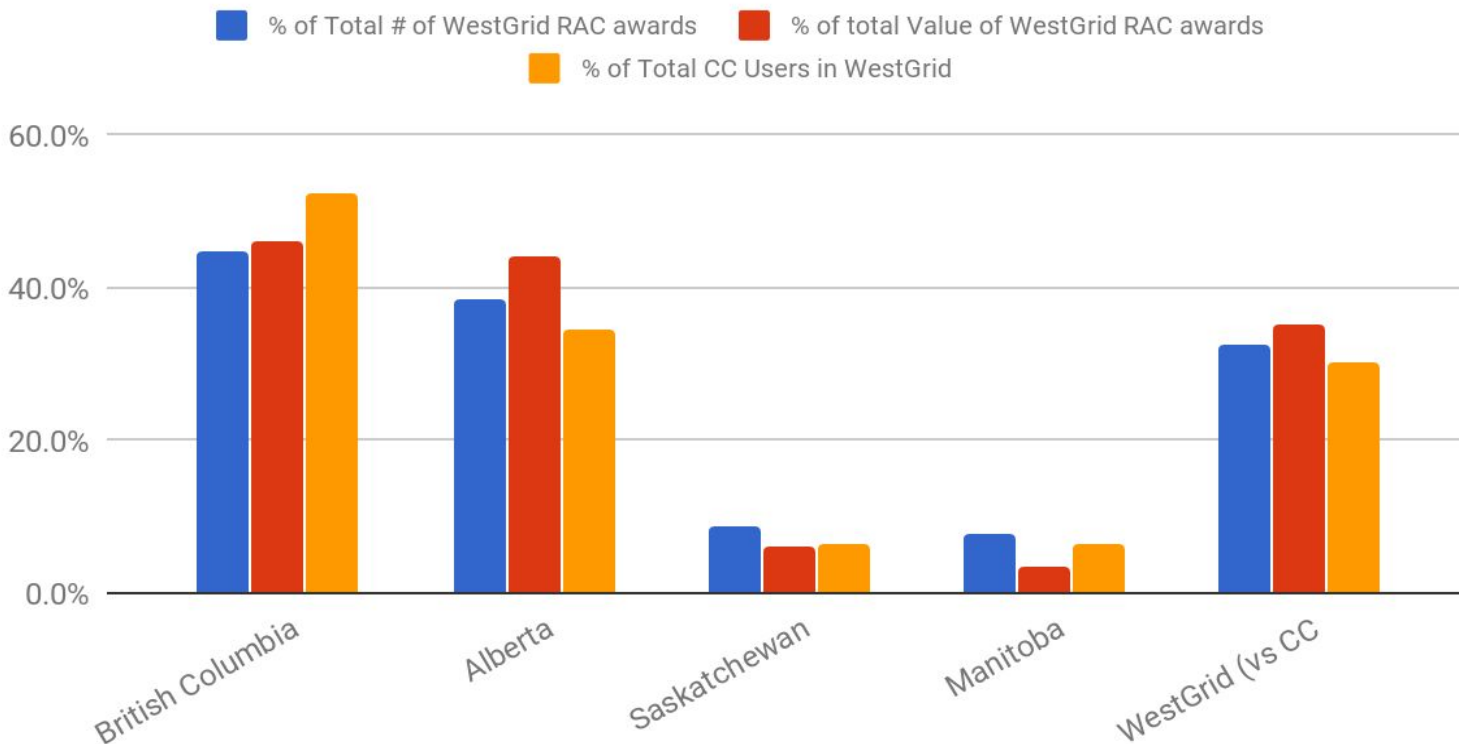
Questions?

GOOD LUCK!

Allocations by Research Area

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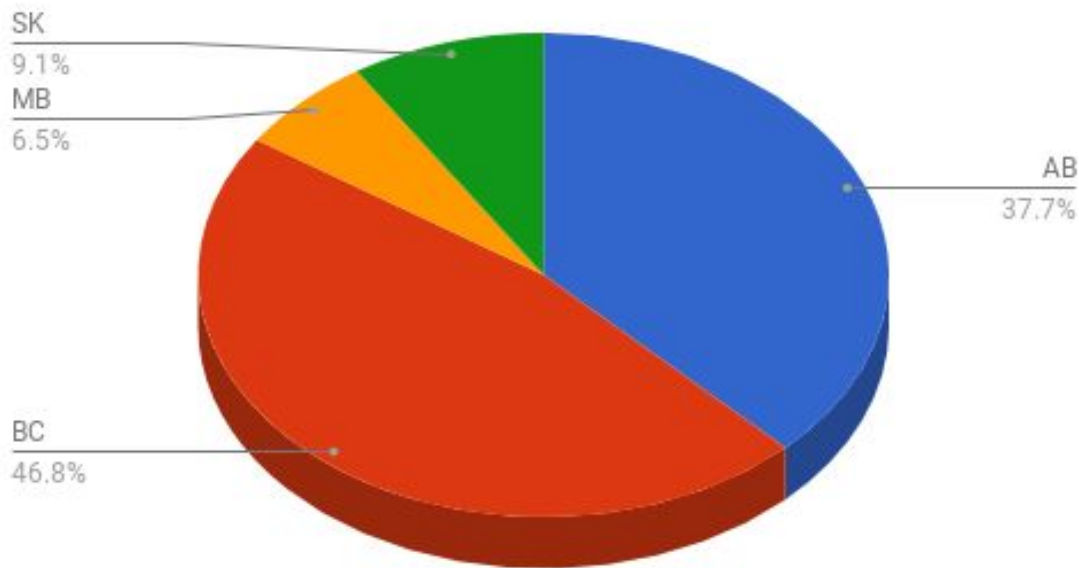
Value & Total Awards

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**

Pie chart values:
- SK 9.1%
- MB 6.5%
- AB 37.7%
- BC 46.8%

RAC 2018 By Discipline

2018 WestGrid RAC Awards by Discipline

Blue is by number
Red is by value