



CENTER FOR ADVANCED RESEARCH COMPUTING

**Internal Advisory Board Meeting
June 20, 2019**

MINUTES

Present: **Susan Atlas** - Research Professor, Physics and Astronomy; **Patrick Bridges** - Director of CARC; **Jeremy Edwards** - Professor, Chemistry; **Hua Guo**- Distinguished Professor, Department of Chemistry and Chemical Biology, and Department of Physics and Astronomy; **Patricia Henning, Ph.D.** - Associate Vice President of Research; **Keith Lidke**- Associate Professor, Physics & Astronomy; **Monika Nitsche** - Professor, Mathematics and Statistics; **Marek Osinski** - Professor, Electrical & Computer Engineering; Center for High Technology Materials; **Brian Pietrewicz** - Interim Deputy CIO, Information Technologies; **Edl Schamiloglu** - Distinguished Professor, Electrical and Computer Engineering; Associate Dean for Research, School of Engineering **Gregory Taylor** - Director, Long Wavelength Array; Director, Center for Astrophysical Research and Technology; Professor, Department of Physics and Astronomy; **Lee Taylor**- Associate Professor, Biology; **Tom Turner** - Professor, Biology; Associate Dean for Research, Arts & Sciences; **Tracy Wenzl** - CARC Business Manager

1. CARC downtime and upgrade report
 - Slides were presented (see attached)
2. CARC Annual Report 2018
 - Following slides, there was a discussion about how papers were counted and it was noted that the number seems low. Currently papers are counted via Google Scholar alerts and email requests to PIs.
 - It was suggested that patents and conference presentations be included as a metric for measuring CARC success year over year
3. CARC Strategic Plan
 - Slides presented and progress reviewed
4. Discussion: collaboration opportunities
 - UNM IT, other UNM research computing units
 - Data management discussion, CARC partners with Libraries to work on this.

Interesting models at Utah State, San Diego State. Doing DM is expensive, but there is also a high cost for doing it wrong. Discussion of options like discipline-specific repositories

- Discussion of database of software licenses on campus for research computing. A recent survey tried to determine if any savings could be realized by purchasing site licenses, but didn't find any.
 - CARC is looking for opportunities to support research networking and infrastructure in partnership with IT, other campus units. Efforts to unify campus research computing community to eliminate redundancy and share best practices
- External users (other academic institutions, private industry)
 - Discussion was favorable to including other NM academic institutions when they partner with UNM researchers. UNM researchers may be willing to enter partnerships to extend research impact, find new collaborators. It was suggested the Center seek state funding for academic partners across NM.
 - Discussion of opening up CARC systems to external, industry partners at cost. CARC cost model would need to develop external user rates and would need to work with Unrestricted Accounting to determine appropriate pricing.
5. Potential NSF Major Research Instrumentation (MRI) opportunity - \$2-3 million, requires 30% cost share.
- Bridges and Guo are considering an application in the fall and will meet soon to discuss. Discussion included suggestion that some building upgrades may be used as cost share, though facilities commitment needed to be separate from this.
6. New business – Osinski suggested CARC apply to NSF Advanced Computing Systems & Services: Adapting to the Rapid Evolution of Science and Engineering Research opportunity (NSF 19-587). Discussion on whether this would bring value to UNM researchers, and how it would impact the Center and UNM research community.

Internal Advisory Board Update

Prof. Patrick G. Bridges
Director, UNM CARC

Outline

- **CARC Publicity**
- **Staffing Changes**
- **System/Downtime Update**
- **Annual Report Discussion**
- **Strategic Plan Progress**
 - Significant Systems Updates
 - CSE Program Refresh Update
 - Multiple Grant Proposals Submitted
- **Outstanding Issues for Discussion**
 - Broader Research Computing Collaborations
 - How to handle external users (NM institutions, Corporate)?
- **Informational: MRI Submission planned for 2019-2020**

CARC and CARC Researcher Publicity

UNM Newsroom

About Us

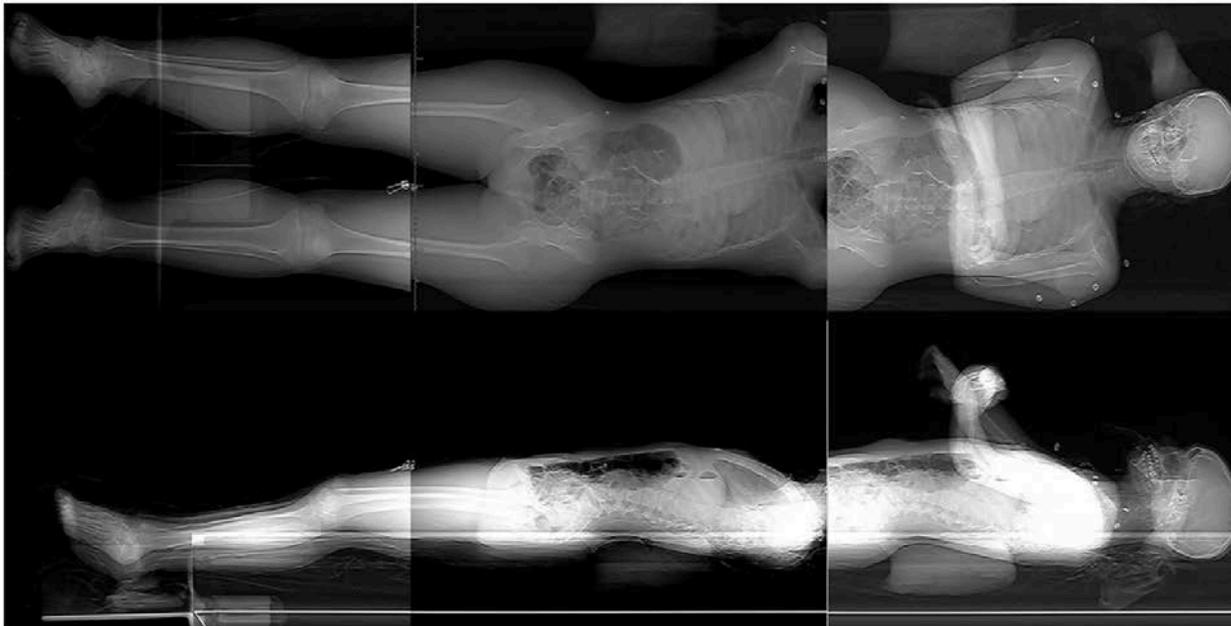
News Topics

Schools and Colleges

For The Media



UNM Newsroom / News / UNM database of deceased people a national first



UNM database of deceased people a national first

Media Contact
Katie Williams

CARC and CARC Researcher Publicity

UNM Newsroom

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UNM Newsroom / News / International partnership focuses on drone rotor simulations



International partnership focuses on drone rotor simulations

Related News

 UNM researchers partner with

CARC and CARC Researcher Publicity



UNM student developing technology to save lives of firefighters



by: Sara Yingling

Posted: Feb 7, 2019 / 05:11 AM MST / Updated: Feb 7, 2019 / 02:41 PM MST

CARC and CARC Researcher Publicity

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University of New Mexico Upgrades Its Computational Resources

June 13, 2019

June 13 — Following a week of downtime in late May, the Center for Advanced Research Computing (CARC) at The University of New Mexico is back online with a number of improvements to its systems. The changes included upgrades to CARC's datacenter power facilities, storage systems, network infrastructure, and software services.

First, the center completed critical maintenance on one of the uninterruptible power supply (UPS) units that protects the machine room, including Wheeler, Xena, Taos, and Gibbs, in addition to the Chama and RSC storage systems. The UPS assures that CARC systems stay online without service interruption during a power outage. If the power outage lasts longer than the UPS can handle, CARC systems will also automatically shut down safely.



Leading Solution Providers

Off The Wire
Industry Headlines
✕

June 20, 2019

- [▶ AMAX Unveils New Series of Servers for Artificial Intelligence and Machine Learning](#)
- [▶ SDSC Receives New Funding for West Big Data Innovation Hub](#)

Staffing Changes

- **Ryan Johnson, Mary Beth King moved to other positions at UNM (ECE research faculty, UNM Newsroom)**
- **Technical Support**
 - User Support: Prof. Matthew Fricke (UNM CS) taken over user support lead with help from OGS-funded student interns
 - Systems Support: Hired Troy Redfearn (NMSU) as HPC System Engineer I to provide additional HPC system administration expertise
- **Administration**
 - Admin Leadership: Tracy Wenzl reclassified as CARC Business Manager, won 2018 Gerald May Outstanding Staff award
 - Front Desk: Hired Political Science student Sarah Carpenter to write stories on CARC-supported research projects, handle reception afternoons 2pm-5pm

2018-19 System Updates

- **Serrano storage upgraded to NetApp filer adding full quotas, storage snapshots, continuous cross-campus DR**
- **Mitsubishi UPS system maintenance finished**
- **Head nodes and storage uniformly moved 10Gb Ethernet**
- **Galles Retired, Wheeler expanded to 300 compute nodes**
- **Multiple Software Systems upgrades**
 - Ganglia/Nagios System Monitoring
 - AIRS Ticket System replaced with Vivantio helpdesk system
 - Parallel/Distributed Matlab fully deployed to Xena
 - Debug queue added to Wheeler
 - JupyterLab preparing for deployment to Wheeler
 - Documentation moved to GitHub to ease development/publication

System Monitoring



Current Network Status

Last Updated: Thu Jun 20 09:44:03 MDT 2019
 Updated every 90 seconds
 Nagios® Core™ 4.3.2 - www.nagios.org
 Logged in as ?

[View Service Status Detail For All Host Groups](#)
[View Host Status Detail For All Host Groups](#)
[View Status Summary For All Host Groups](#)
[View Status Grid For All Host Groups](#)

Host Status Totals

Up	Down	Unreachable	Pending
11	0	0	0
<i>All Problems</i>		<i>All Types</i>	
0		11	

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
46	0	0	0	0
<i>All Problems</i>		<i>All Types</i>		
0		46		

General

- [Home](#)
- [Documentation](#)

Current Status

Tactical Overview

[Map \(Legacy\)](#)

[Hosts](#)

[Services](#)

[Host Groups](#)

[Summary](#)

[Grid](#)

[Service Groups](#)

[Summary](#)

[Grid](#)

[Problems](#)

[Services \(Unhandled\)](#)

[Hosts \(Unhandled\)](#)

[Network Outages](#)

Quick Search:

Reports

[Availability](#)

[Trends \(Legacy\)](#)

[Alerts](#)

[History](#)

[Summary](#)

[Histogram \(Legacy\)](#)

[Notifications](#)

[Event Log](#)

Service Overview For All Host Groups

Alliance Clusters (Alliance)

Host	Status	Services	Actions
gibbs	UP	4 OK	
taos	UP	4 OK	
wheeler	UP	4 OK	
xena	UP	4 OK	

Uninterruptible Power Supply (UPS)

Host	Status	Services	Actions
liebert	UP	6 OK	
mitsubishi	UP	3 OK	

Nagios Web Server (linux-servers)

Host	Status	Services	Actions
localhost	UP	6 OK	

MMR Infrastructure Monitor (monitoring)

Host	Status	Services	Actions
ims4000	UP	9 OK	

Storage Clusters (storage)

Host	Status	Services	Actions
chama_cntrl1	UP	1 OK	
chama_cntrl2	UP	1 OK	
serrano	UP	2 OK	

Overall System Usage

- Main
- Search
- Views
- Aggregate Graphs
- Compare Hosts
- Events
- Reports
- Automatic Rotation
- Live Dashboard
- Cubism
- Mobile

CARC Grid Report at Thu, 20 Jun 2019 15:40:23 +0000

Last or from to

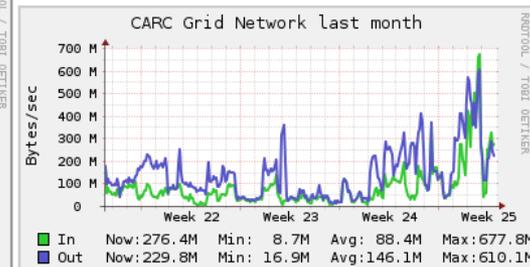
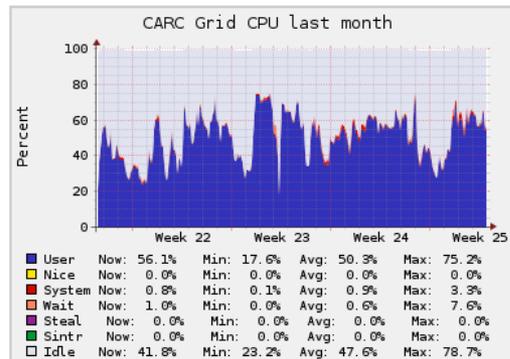
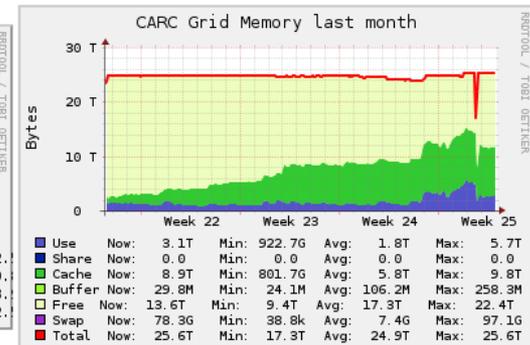
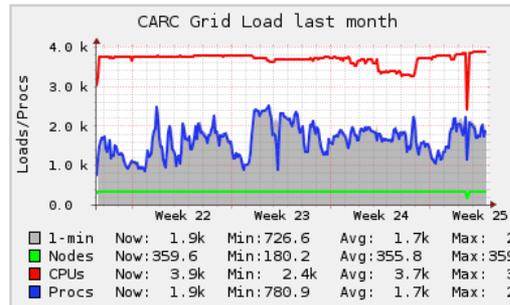
Sorted

CARC Grid >

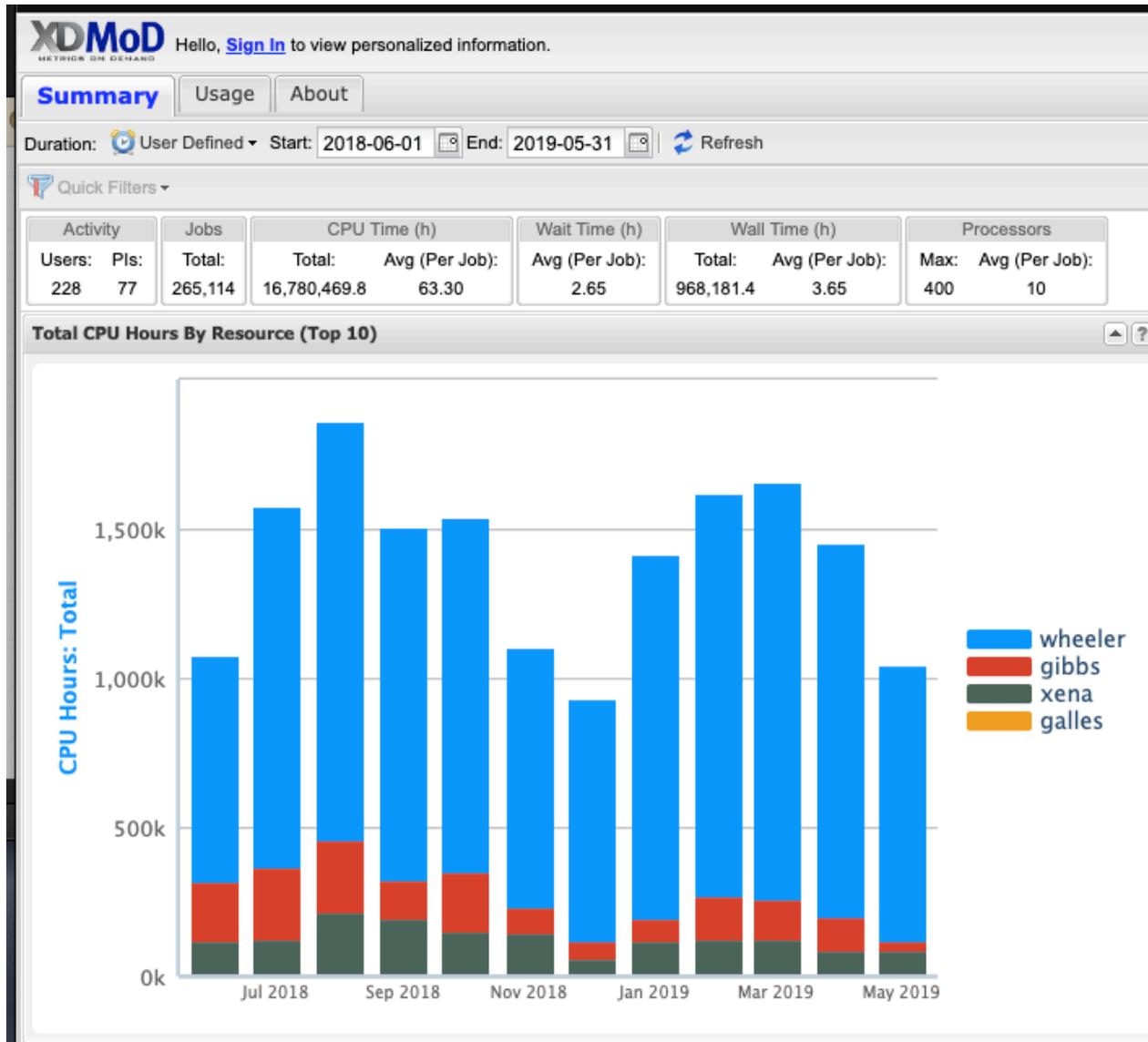
CARC Grid (4 sources) (tree view)

CPU's Total: **3952**
 Hosts up: **373**
 Hosts down: **0**

Current Load Avg (15, 5, 1m):
33%, 32%, 33%
 Avg Utilization (last month):
45%
 Localtime:
 2019-06-20 15:40



Accounting Statistics



Better Helpdesk System



Go To Item:



Switch to FLEX

Dashboards

Home

CARC Support Request + New

- Pending Emails
- Open 22
- On Hold 3
- Ping
- Re-Ping 1
- Escalated to Di...
- Closed 62
- All Tickets 87
- Quick Search
- Saved Searches

Research Support Requests

IT Support Requests

All All Tickets Software & Applications - 43 Accounts & Projects - 12								
Add New CARC Support Request Add Note Reassign Update Priority Close Accept Update Status More... ▾								
<input type="checkbox"/>	Record ID	Contact Name	Summary	Assigned To	Opened	Last Modified	Status	
<input type="checkbox"/>	CARC000011	Louis Tkach	Velodyne	CARC Software: Matthew Fricke	4/24/2019 3:29 PM	6/17/2019 5:00 AM	Re-Ping	
<input type="checkbox"/>	CARC000012	David Phillips	Integer Programming	CARC Software: Schuyler Liphardt	4/24/2019 3:39 PM	6/18/2019 11:10 AM	Open	
<input type="checkbox"/>	CARC000014	Dominic David Lewinski	Parallel R	CARC Software: Schuyler Liphardt	4/24/2019 5:00 PM	6/18/2019 11:12 AM	Open	
<input type="checkbox"/>	CARC000015	Julie Allison Spencer	RaxML	CARC Software: Schuyler Liphardt	4/24/2019 5:05 PM	5/10/2019 7:25 PM	Closed	
<input type="checkbox"/>	CARC000019	Stavroula Foteinopoulou	Lumerical FlexNet and	CARC Software: Matthew Fricke	5/2/2019 2:59 PM	6/7/2019 3:29 PM	Closed	
<input type="checkbox"/>	CARC000020	Ben Datko	Files deleted when job	CARC Software: Schuyler Liphardt	5/2/2019 3:02 PM	5/15/2019 10:55 AM	Closed	
<input type="checkbox"/>	CARC000021	Stephen Lau	Job Problems	CARC Software: Matthew Fricke	5/3/2019 12:09 PM	5/21/2019 9:30 PM	Closed	
<input type="checkbox"/>	CARC000022	Ivana Gonzales	Killing Jobs	CARC Software: Matthew Fricke	5/3/2019 12:19 PM	5/17/2019 12:32 PM	Closed	
<input type="checkbox"/>	CARC000023	Rubel Chandra Das	Requesting help on Mf	CARC Software: Matthew Fricke	5/3/2019 3:50 PM	5/21/2019 6:50 PM	Closed	
<input type="checkbox"/>	CARC000025	Kel Cook	Recovering data durin	CARC Software: James Prewett	5/8/2019 9:48 AM	5/9/2019 2:28 PM	Closed	
<input type="checkbox"/>	CARC000026	Vanessa Surjadidjaja	Bad_Alloc At Runtime	CARC Software: James Prewett	5/8/2019 9:51 AM	5/17/2019 12:18 PM	Closed	
<input type="checkbox"/>	CARC000029	Satomi Sugaya	Tensorflow 2	CARC Software: Matthew Fricke	5/8/2019 9:56 AM	5/20/2019 4:20 PM	Closed	
<input type="checkbox"/>	CARC000031	Davood Tofighi	R package install failer	CARC Software: Schuyler Liphardt	5/8/2019 10:16 AM	5/15/2019 7:29 PM	Closed	

Software Documentation

113 lines (67 sloc) | 5.7 KB
Raw Blame History

Parallel MATLAB Server

MATLAB supports parallelization on desktop computers which can be used to increase the speed of analysis drastically. MATLAB also provides the MATLAB Parallel Server (previously the MATLAB Distributed Computing Server) which allows you to write MATLAB code on your local desktop or laptop computer and perform the computation using the CARC high-performance clusters. This QuickByte leads you through the steps needed to set this up. If you run into problems please send an email to help@carc.unm.edu and we will be happy to help.

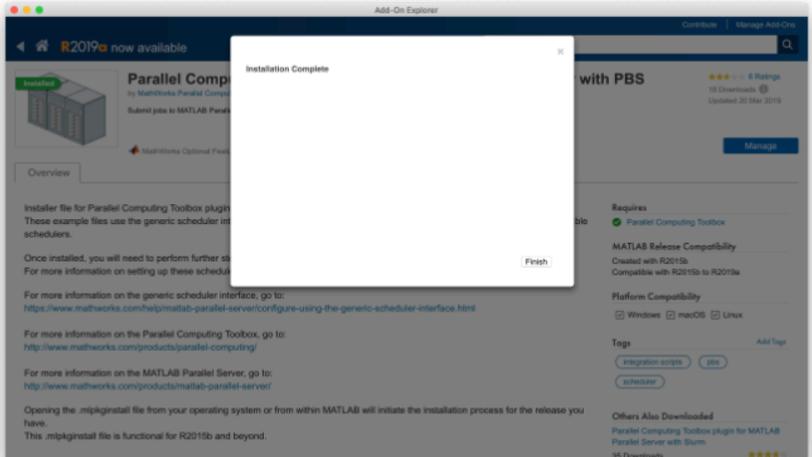
Please ensure you have the MATLAB Parallel Toolbox installed on your local computer.

MATLAB Parallel Server Client Configuration

Once MATLAB is installed on your local machine (the MATLAB version on your local machine must match the version on the CARC cluster) click "add-ons" to open Add-on explorer. Search for PBS.

Click on the link "Parallel Computing Toolbox plugin for MATLAB Parallel Server with PBS" (there is a plugin for slurm as well).

Click the "install" button and the plugin will install and a wizard is started.



Annual Report Highlights

- **Cost Model Deployed and Simple Grant Calculator Developed, Currently Soliciting Purchases**
- **Multiple Grants Funded (\$1.2M in new awards from NSF)**
- **CSE Program Revisions Submitted/Approved**
- **Graduate Internship Program Instituted with funding from OGS**
- **Prof. Bridges moved from Interim Director to Director**
- **CARC supported 203 users and 75 PIs, with 217,427 jobs finished**
- **33 publications in journals such as Nature Methods, Journal of Applied Physics, Financial Review, Chemical Physics, Computational Materials Science, and Optica.**

Cost Model Calculator

	A	B	C	D	E	G	I	K	M	N
1						Subject to F&A		No Overhead		
2		# units needed	Resource	Node Type	Term (Year)	Infrastructure total (3150)	CARC Service total (6920)	Capital Hardware total (9000)	Item total	Amount subject to F&A
3	node	4	Compute Nodes	Standard Cluster Node	5	\$2,445.88	\$2,432.52	\$35,112.76	\$39,991.16	\$4,878.40
4	node	0		384GB RAM Cluster Node	5	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
5	node	0		1.5TB RAM Cluster Node	5	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
6	node	0		Regular GPU Cluster Node	5	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
7	node	0		High-End GPU Cluster Node	5	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
8	node	0		100TB Storage Cluster Node	5	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
9		0		Virtual Machine Host	5	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
10	TB	25	Enterprise Storage	-	5	\$1,109.50	\$2,475.50	\$20,000.00	\$23,585.00	\$3,585.00
11	TB	0	Working Storage	-	5	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
12	U	0	Server Co-location	-	1	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
13	VM	0	VM Hosting	-	5	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
14		0	System Administration	-	1	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
15		4	5% FTE Custom Application Support		1	\$0.00	\$19,950.00	\$0.00	\$19,950.00	\$19,950.00
16		0	User Support (North Campus/Non-UNM users only)		1	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
17						\$3,555.38	\$24,858.02	\$55,112.76	\$83,526.16	\$28,413.40

Directions: enter the number of units needed in the first column. The sheet will calculate the infrastructure, service and capital hardware totals for you, and advise how much is subject to F&A. A more detailed description of each item can be accessed by clicking on the name of the item. For questions, please contact Tracy Wenzl at unitadmin@carc.unm.edu.

Strategic Plan Updates

Objective 1 measures	2017	2018	% change
Measure 1: Numbers of PIs whom have used CARC systems	90	75	-17%
Measure 2: Number of grant proposals submitted or collaborated on by CARC	15	19	27%
Measure 3: Number of peer-reviewed publications by active CARC PIs	32	33	3%

Objective 2 measures	2017	2018	% change
Measure 1: Number of users whom have actively used CARC systems	206	203	-1%
Measure 2: Number of new CARC research projects created per year	24	26	8%
Measure 3: Number of users who attend CARC workshops and symposia	47	14	-70%
Measure 4: Number of students enrolled in CSE program	1	0*	-100%
		*2 admitted & enrolled for Spring 2019	

Immediate Action Items

Strategy	Action Item	Timeframe
Strategy 1.1: Ease of system use	1. Survey users (students and PIs) to find what they use, what they want to use and what other needs and wants they have about CARC systems, facilities, and training materials	Immediate
Strategy 1.2: Ease of system use	2. Increase outreach to users via workshops, tutorials, and classes	Immediate
Strategy 2.1: User support	1. Develop online Intro to CARC workshop for use in UNM courses and for our new users	Immediate
Strategy 3.1: Grow systems	1. Work with PIs and other units and departments on sharing resources to grow capacity, for example shared storage systems with University Libraries	Immediate
Strategy 3.2: Grow systems	2. Develop and advertise cost center models for above baseline CARC systems and services	Immediate
Strategy 3.3: Grow systems	3. Pursue cyber-infrastructure grant and contract research opportunities to enhance system capabilities	Immediate
Strategy 4.1: Collaborative user community	1. Lead regular (weekly/quarterly/etc.) rotating events to encourage collaboration, such as research presentations, research socials/poster presentations, and symposia; conducting these jointly with different UNM units may increase outreach	Immediate
Strategy 4.2: Collaborative user community	2. Survey techniques other interdisciplinary research groups and centers use to foster collaboration	Immediate

Immediate Action Items Largely Completed (2.1, 4.1 in progress)

Short Term Action Items

Strategy	Action Item	Timeframe
Strategy 1.3: Ease of system use	3. Prototype and deploy new user environments that support a broader range of applications and disciplines (e.g. JupyterLab, RStudio, and Spark)	Short
Strategy 2.2: User support	2. Create mechanisms and collaborations to help CARC staff effectively collaborate with users on main campus	Short
Strategy 2.3: User support	3. Pursue CARC grants to grow CARC user support staff	Short
Strategy 2.4: User support	4. Deploy shared collaboration and coordination tools with other research support staff on campus	Short
Strategy 2.5: User support	5. Actively collaborate and coordinate with designated campus/department/unit IT staff (“CARC Champions”) to support users	Short
Strategy 3.4: Grow systems	4. Identify instrumentation and center proposal opportunities for acquiring and hosting specialized computing systems	Short
Strategy 3.5: Grow systems	5. Deploy virtualization technology for providing robust, modern local infrastructure services	Short
Strategy 4.3: Collaborative user community	3. Develop better research collaboration, workshop, and tutorial facilities in partnership with existing UNM departments and current and emerging research collaborators	Short
Strategy 4.4: Collaborative user community	4. Publicize CARC systems and services to the UNM community, CARC users, and UNM leadership	Short
Strategy 5.1: Industry collaboration	1. Overhaul the CSE certificate program, to include the creation of course groupings offering specializations in particular areas	Short
Strategy 5.2: Industry collaboration	2. Create pathways for students to computing industry positions in collaboration with other UNM units	Short
Strategy 5.3: Industry collaboration	3. Work with UNM Foundation to identify potential industry partners	Short

All in progress except 2.5, 4.3, 5.2, 5.3

CSE Program Details

- **Changes to program approved through to UNM catalog**
 - Add CS567 Big Data to core classes
 - Add MATH471 or CS567 as prerequisites to CS542
 - Require only 2 of MATH471/CS567/CS542 for MS/Postgrad students
 - Cleaned up admission requirements
- **CSE Program Applications being moved to UNM ApplyMe graduate application system**
- **Starting work on formal specializations now that catalog changes approved**

Finalized Grant Submission

- **Funded: EPSCoR RII Track-1: Towards a SMART Grid Center: Sustainable, Modular, Adaptive, Resilient, Transactive**
- **Funded: NSF CDS&E: Optimization of Advanced Cyberinfrastructure through Data-driven Computational Modeling (\$523,664)**
- **Funded: NSF CICI: RDP: SAMPRA: Scalable Analysis, Management, and Protection of Research Artifacts (\$598,594)**
- **Declined: NSF CyberTraining: Medium Implementation: Research Computing and Data Curation Ambassadors for Science and Engineering (\$999,055)**

Pending Grant Submissions

- **NSF SPX: Scheduling High-Performance Computing Systems via Intelligent Resource Sharing (\$600,000)**
- **NSF HDR DSC: Collaborative Research: New Mexico Data Science Corps (\$322,468)**
- **NNSA MSIPP New Mexico Enterprise-Wide Cybersecurity Consortium (\$641,717)**
- **NSF CUE Ethics: NMIX+CS: Developing the diverse computationally-enhanced interdisciplinary workforce of New Mexico (\$150,000)**
- **NNSA PSAAP-III (FIC): Center for Understandable, Performant Exascale Communication Systems (CUPS-ECS) (\$4,411,355)**
- **Letters of collaboration and cost model funding requested on multiple outstanding contract/grants (e.g. NSF NRT, NSF DMREF)**

Discussion Issues

- **CARC (and many other UNM research computing units) are overstretched to meet the needs of UNM researchers**
 - Collaborations with UNM libraries have increased robustness and efficiency of CARC systems/resources
 - Recent work with UNM IT Platforms and Libraries (as part of NSF CiCi award) also very promising for sharing infrastructure and expertise
 - Idea: a systematic collaboration/coalition of units providing research computing units to share systems or expertise
- **We get occasional requests for support from external users, both academic (e.g. Mesalands CC, CNM, AHS) and industrial**
 - Should we define a separate free baseline for other state users?
 - How should we price/support external corporate users?