

# Engineering Research Culture Retreat - 2016

**“We are what we repeatedly do. Excellence,  
then, is not an act, but a habit.”**

Will Durant, American philosopher, writer, and historian

**“Culture beats scheme”**

Chip Kelly, ex-Eagles coach

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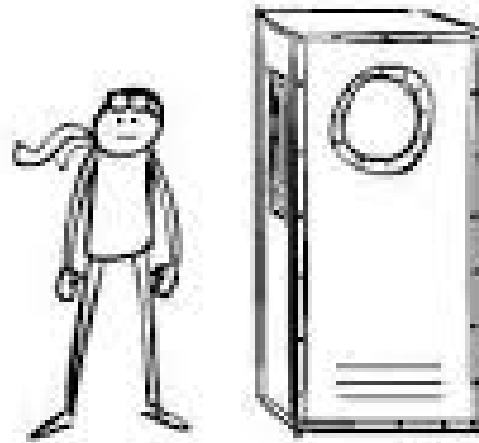
# Stated Goals

- To elevate our scholarly performance across the College we must constantly improve and enhance our research climate.
- We need to create *a culture of research*.
  - Culture indicates habits, customs, and beliefs that inform our actions and behaviors.
  - An established culture is picked up by new members of an organization so that they too will blend into a collective set of rules and attitudes.
  - If a research culture is established, members of a community think, decide, and act on research in an almost unconscious way.
- We have to chart a course towards a new set of habits and customs which will drive processes and policies (if necessary), and which will in turn guide our behavior, until research permeates what we do and how we opt and act.
- This will not happen from one day to the next, nor will it be a process that will be driven top-down.
  - It will take engagement and acceptance of most, and it will be a continuous process; culture changes, evolves, and adapts constantly.

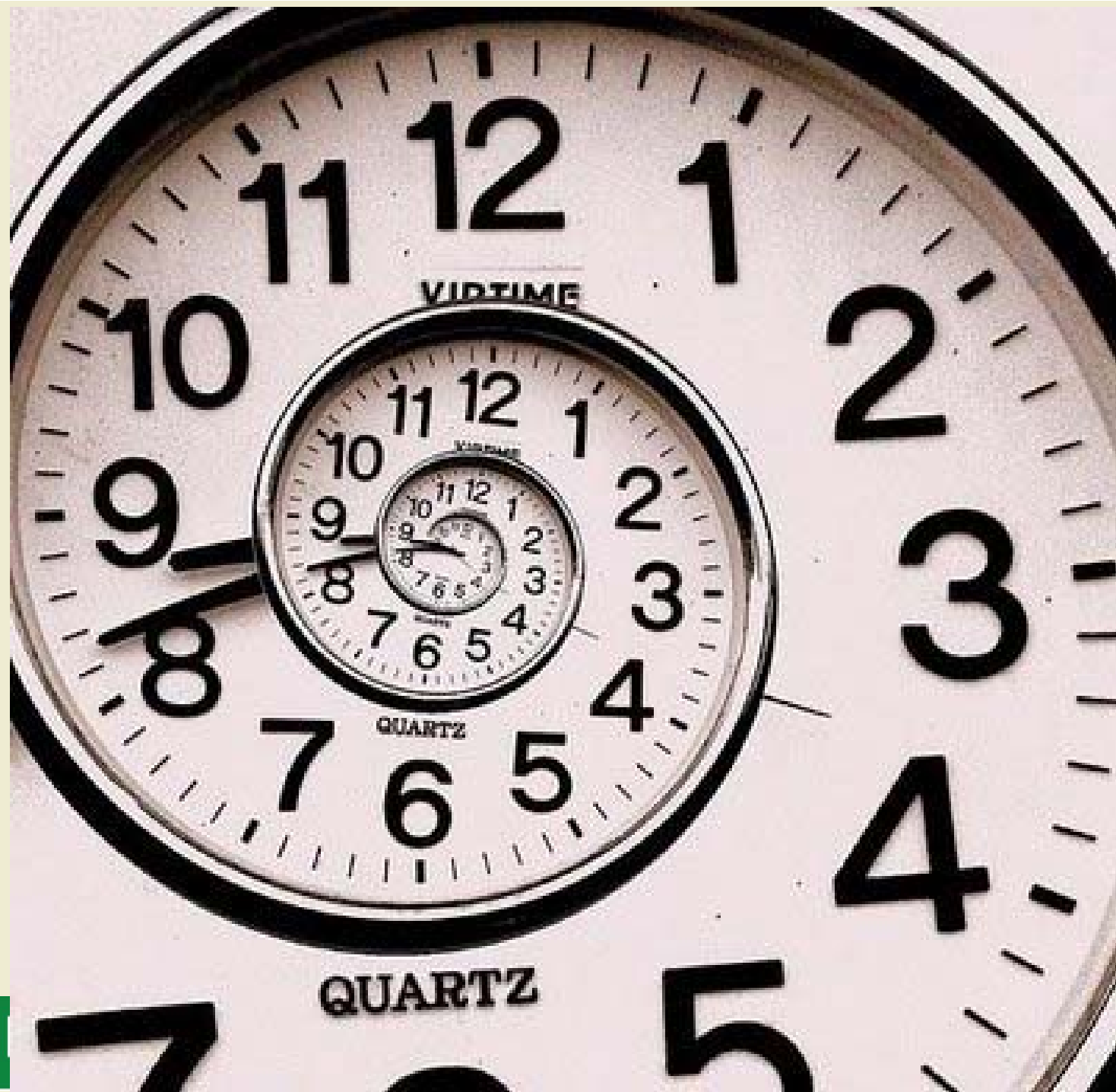
# Why a retreat with so many individuals?

- There is a wide range of evidence that combining the independent opinions of many people can lead to better judgments
- “If you can assemble a diverse group of people who possess varying degrees of knowledge and insight, you're better off entrusting it with major decisions rather than leaving them in the hands of one or two people, no matter how smart those people are.” (B. Martin, “Research Productivity: some paths less travelled,” 2009)

# A trip back in time



ATTENTION: TONIGHT I WILL ATTEMPT TO TRAVEL BACK IN TIME AND CHANGE HISTORY. YOU'LL KNOW I'VE SUCCEEDED IF GERMANY LOSES WORLD WAR II AND WEDNESDAY COMES *AFTER* TUESDAY.



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# 2008

## College of Engineering: Goals

- By 2015:
  - Top-100 (50%) in the US 158/195 (20%)
  - \$16M in annual research expenditures \$9.7M (61%)
  - 0.3 PhD graduates per faculty per year 0.31 ✓
  - 100 companies attend our Career Fairs 120 ✓
  - 2 chaired professorships 2 ✓
- Journals: Three per faculty per year 3.5 ✓
- Growth of the faculty from around 50 to around 85, with related staffing increases 89 ✓
- Research: \$200,000 expenditures per faculty per year \$131,000
  - Implies: \$445,000 awarded per faculty per year \$97,000

# Totals - Enrollment Goals

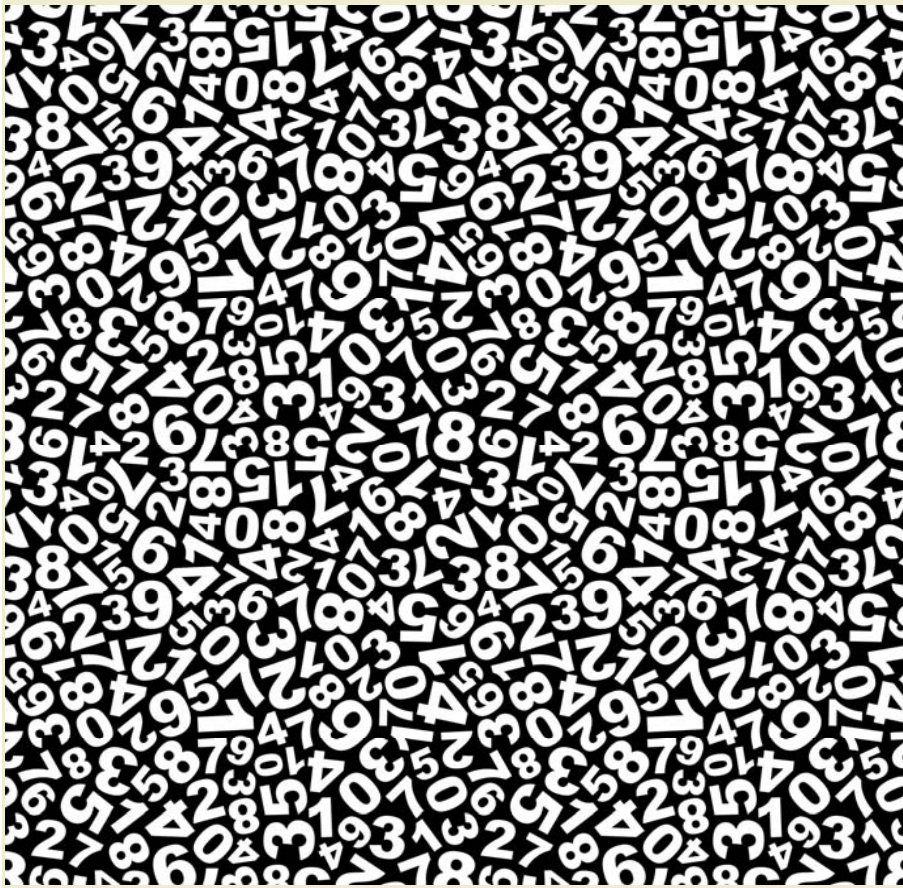
	2008	2009	2010	2011	2012	2013	2014	2015
<b>BS</b>	1300	1320	1350	1400	1450			
	1430	1562	1487	1588	1778	2159	2351	2712
<b>MS</b>	220	200	190	180	170			
	242	290	271	310	306	321	376	453
<b>PhD</b>	60	70	90	120	150			
	58	80	86	98	126	136	156	171

# Research Awards - Goals

	2009	2010	2011	2012	2013	2014	2015
Awards per faculty	82,000	97,000	107,000	125,000	150,000		
	59,391	75,035	117,859	139,782	92,446	106,640	97,207
CENG Total Awards	4,200,000	6,000,000	7,500,000	9,750,000	12,750,000		
	3,385,259	4,802,212	7,778,701	9,246,597	6,854,870	7,907,356	7,334,290



# Numbers, numbers, numbers...



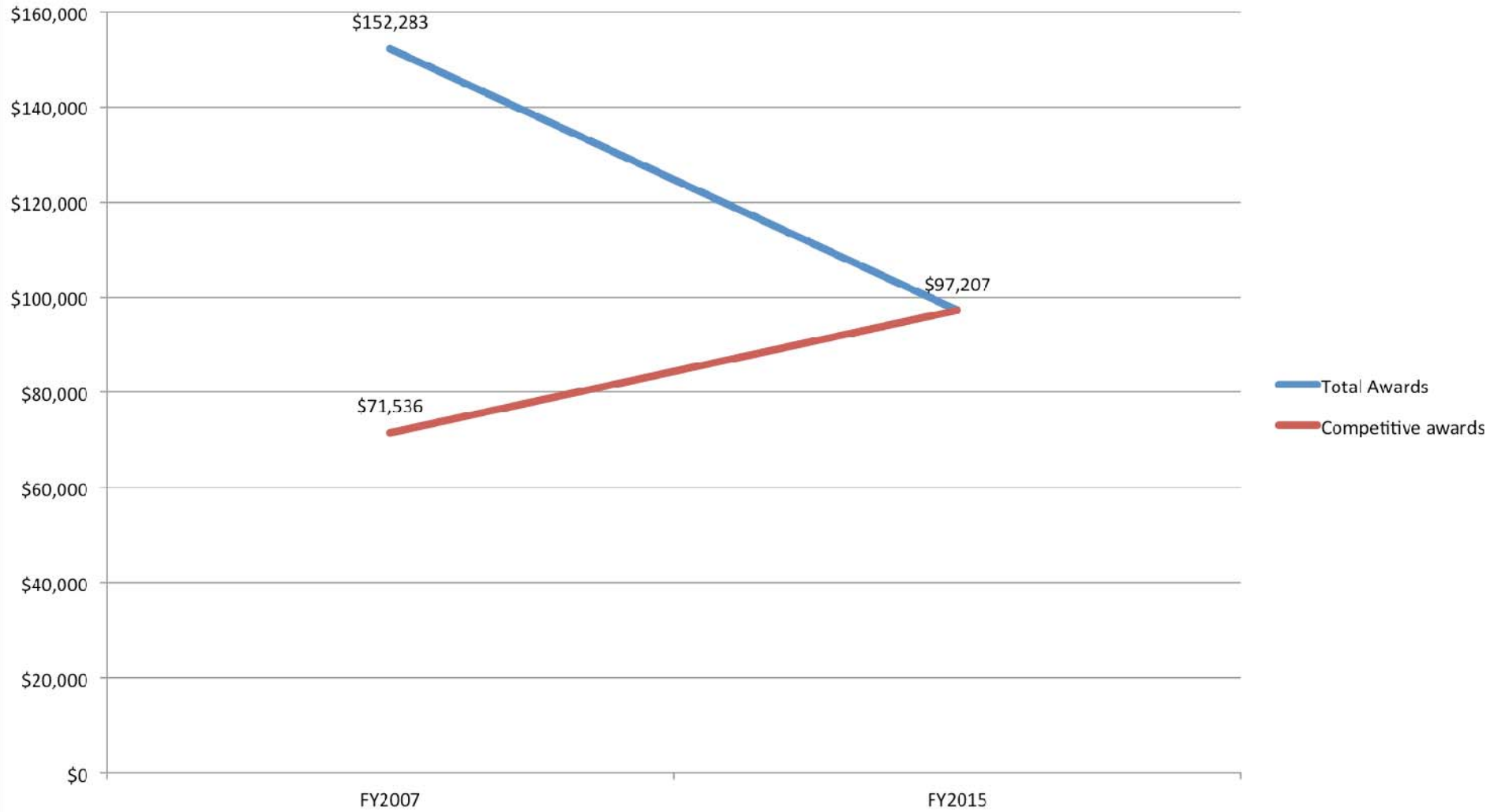
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# So, how are we doing in funded research? ( $\Delta$ 2002-14)

Indiana University Purdue University Indianapolis	1856.5%
Prairie View A&M University	1538.2%
The University of Texas at San Antonio	1325.2%
Kettering University	820.3%
South Dakota State University	639.8%
Lawrence Technological University	566.5%
The University of Texas at Dallas	551.2%
The University of Texas at Tyler	430.2%
University of North Texas	409.6%
Colorado School of Mines	392.9%
New Jersey Institute of Technology	363.7%
University of Notre Dame	334.9%
The University of Texas at Arlington	334.8%
University of Nebraska-Lincoln	321.0%
Texas A&M University - Kingsville	315.6%
Auburn University	309.6%
University of Hartford	302.9%
University of Missouri	298.9%
University of Michigan-Dearborn	285.7%

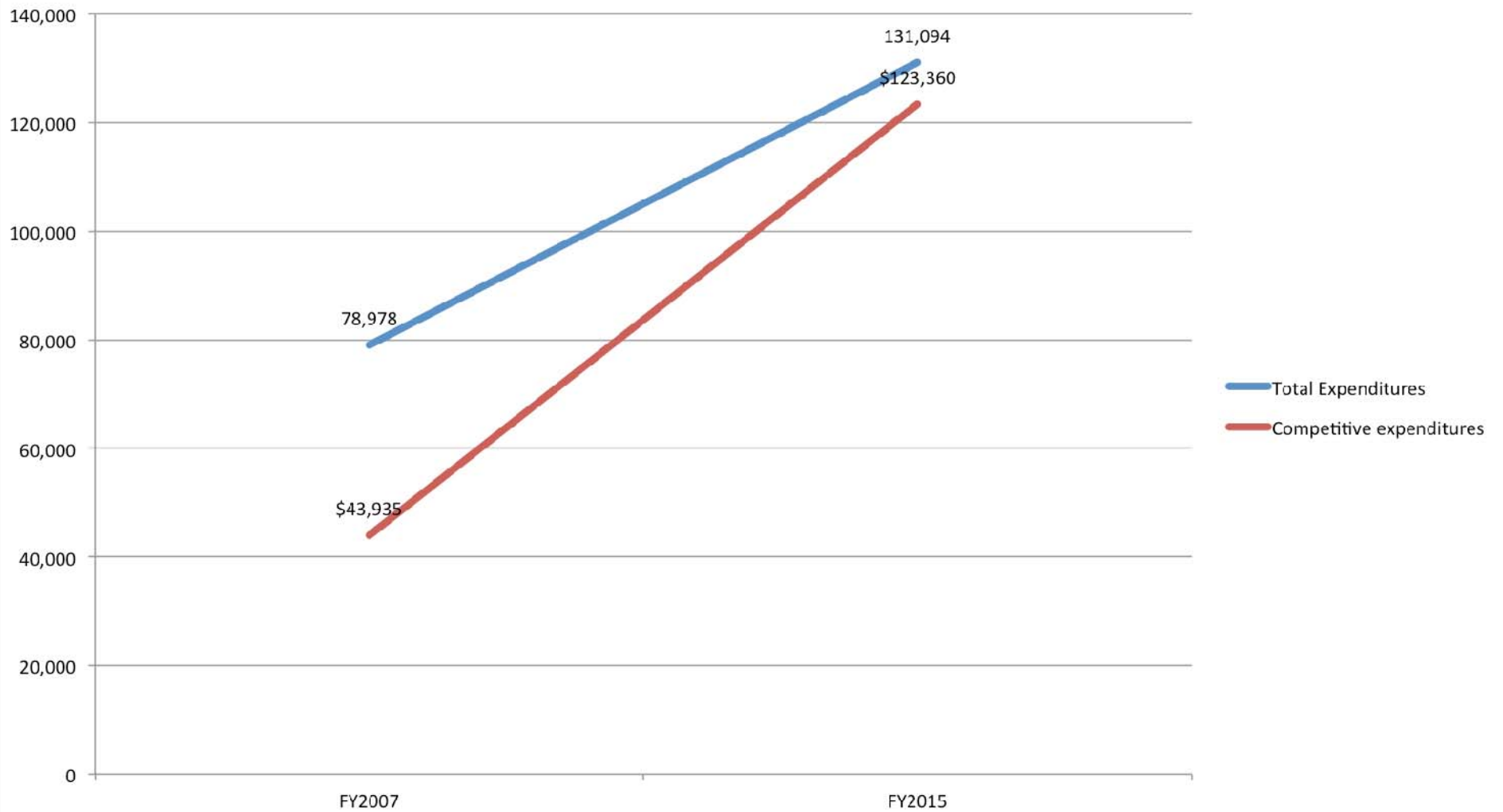
## Per Capita Reseach Awards



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## Per Capita Reseach Expenditures



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# 2012- 157<sup>th</sup> (205; 23%)

Tennessee State University	152,222	University of North Texas	115,246
Texas Tech University	149,323	Grand Valley State University	115,000
Boise State University	147,780	Temple University	110,314
Clemson University	141,270	South Dakota State University	106,582
University of Massachusetts Lowell	141,132	University of Wisconsin-Milwaukee	105,264
New Mexico Institute of Mining & Technology	135,956	University of Denver	101,051
University of Louisville	133,370	Rowan University	97,286
Old Dominion University	132,691	The University of Texas at Tyler	96,269
The University of Texas at San Antonio	131,600	Tennessee Technological University	96,087
Southern Methodist University	128,090	University of Miami	95,134
Brigham Young University	127,995	Worcester Polytechnic Institute	94,765
University of Vermont	127,403	University of Rhode Island	85,876
Clarkson University	126,764	University of North Carolina at Charlotte	84,183
New Mexico State University	125,263	Cleveland State University	83,295
North Carolina A&T State University	123,692	Lamar University	83,154
University of New Hampshire	122,304	Purdue University-Calumet	74,389
Marquette University	121,980	Virginia Commonwealth University	73,604
Portland State University	121,300	University of Nevada-Las Vegas	71,799
Florida Atlantic University	119,310	The University of Texas-Pan American	66,455
South Dakota School of Mines and Technology	115,518	Oakland University	64,445
University of North Texas	115,246	University of Michigan-Dearborn	62,048

# 2013- 139<sup>th</sup> (200; 30%)

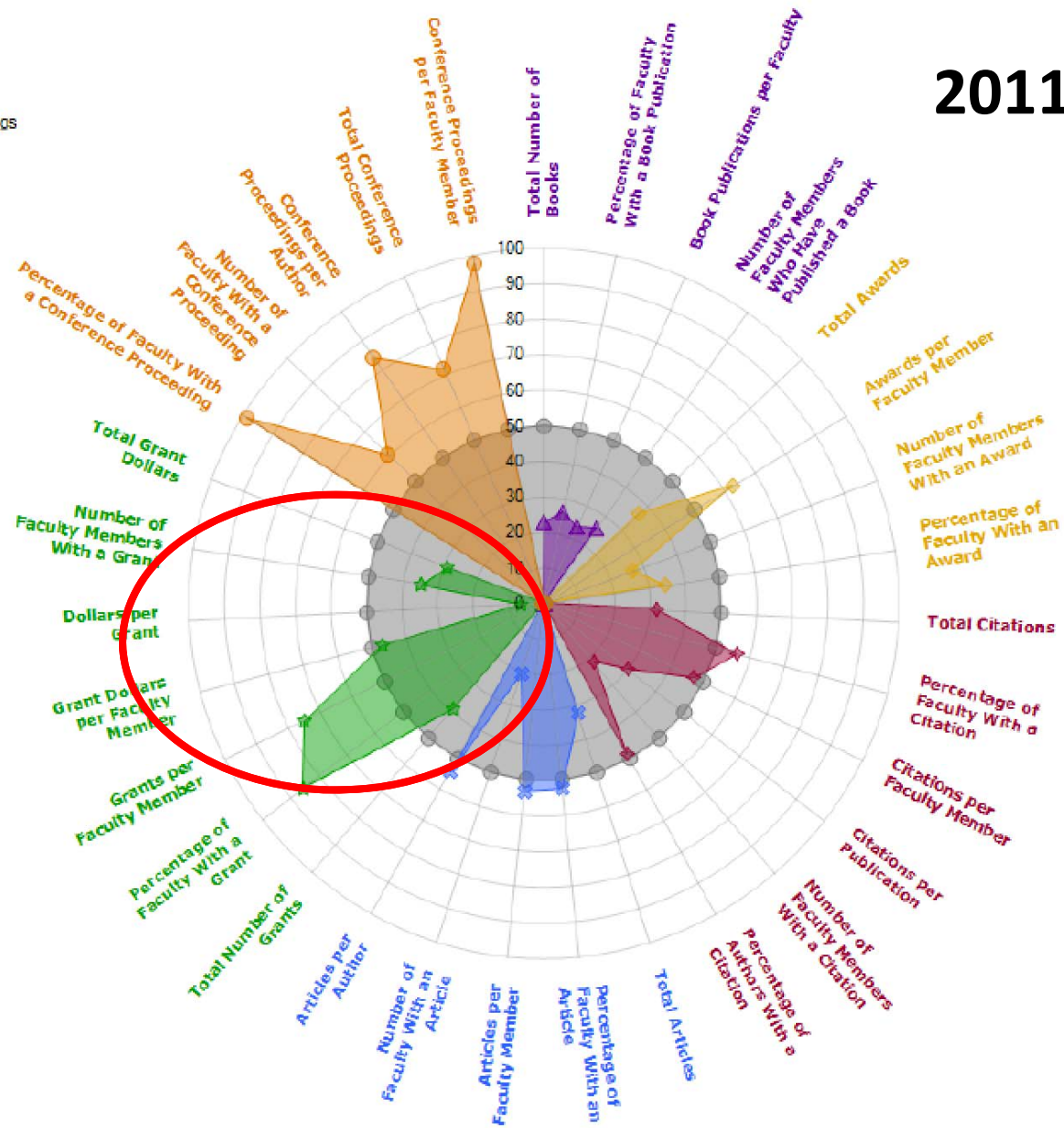
University of Kansas	173,104	University of North Texas	136,581
University of Louisiana at Lafayette	172,160	University of Denver	135,668
The University of Alabama	171,198	Embry Riddle Aeronautical University-Daytona Beach	130,802
FAMU-FSU College of Engineering	170,705	University of Colorado Denver	129,073
Missouri University of Science and Technology	167,277	University of Massachusetts Lowell	124,872
Wayne State University	162,933	Texas Tech University	121,768
Wright State University	157,959	University of Miami	119,165
Kansas State University	154,629	Southern Methodist University	111,782
University of Arkansas at Little Rock	154,071	University of Wisconsin-Milwaukee	111,651
The University of Memphis	153,718	University of Rhode Island	106,591
University of Vermont	153,006	University of New Hampshire	100,475
Air Force Institute of Technology	152,930	Temple University	93,982
University of Louisville	149,546	Marquette University	92,156
The University of Mississippi	149,172	South Dakota State University	92,115
The State University of New York at Binghamton	143,721	University of Georgia	91,361
Purdue University-Calumet	140,778	Boise State University	87,883
Clemson University	140,660	Florida Atlantic University	82,303
Worcester Polytechnic Institute	140,229	University of Nevada-Las Vegas	79,422
Brigham Young University	138,718	The University of Texas at Tyler	75,123
Clarkson University	137,541	South Dakota School of Mines and Technology	73,692
University of North Texas	136,581	Virginia Commonwealth University	73,262

# 2014- 133<sup>rd</sup> (197; 32%)

The University of Toledo	180,016	University of North Texas	142,376
		North Carolina A&T State University	138,120
Stony Brook University	178,843	Texas Tech University	136,688
Drexel University	177,043	Air Force Institute of Technology	135,935
Syracuse University	176,379	University of Vermont	133,259
University of Nebraska-Lincoln	172,717		
Lehigh University	169,505	University of Arkansas	127,595
New Mexico State University	166,950	University of Miami	121,091
Worcester Polytechnic Institute	166,658	University of Denver	120,730
		The State University of New York at Binghamton	118,508
Kansas State University	166,422	Clarkson University	116,865
FAMU-FSU College of Engineering	165,550	The University of Mississippi	109,055
Wayne State University	165,291	Marquette University	106,607
University of Hawaii at Manoa	164,121		
		University of Louisville	104,859
The University of Alabama	161,236	University of Massachusetts Lowell	103,966
Missouri University of Science and Technology	161,119		
		University of Nevada-Las Vegas	103,840
University of Louisiana at Lafayette	160,935	University of Wisconsin-Milwaukee	100,485
Wright State University	150,627	University of New Hampshire	97,568
University of Kansas	150,202	Purdue University-Calumet	97,000
Brigham Young University	149,782		
		Southern Methodist University	96,969
George Mason University	149,598		
		Temple University	91,600
Clemson University	143,264	Virginia Commonwealth University	89,443
University of North Texas	142,376		

# 2011

- National Median
- Articles
- Awards
- Books
- Citations
- Grants
- Conference Proceedings



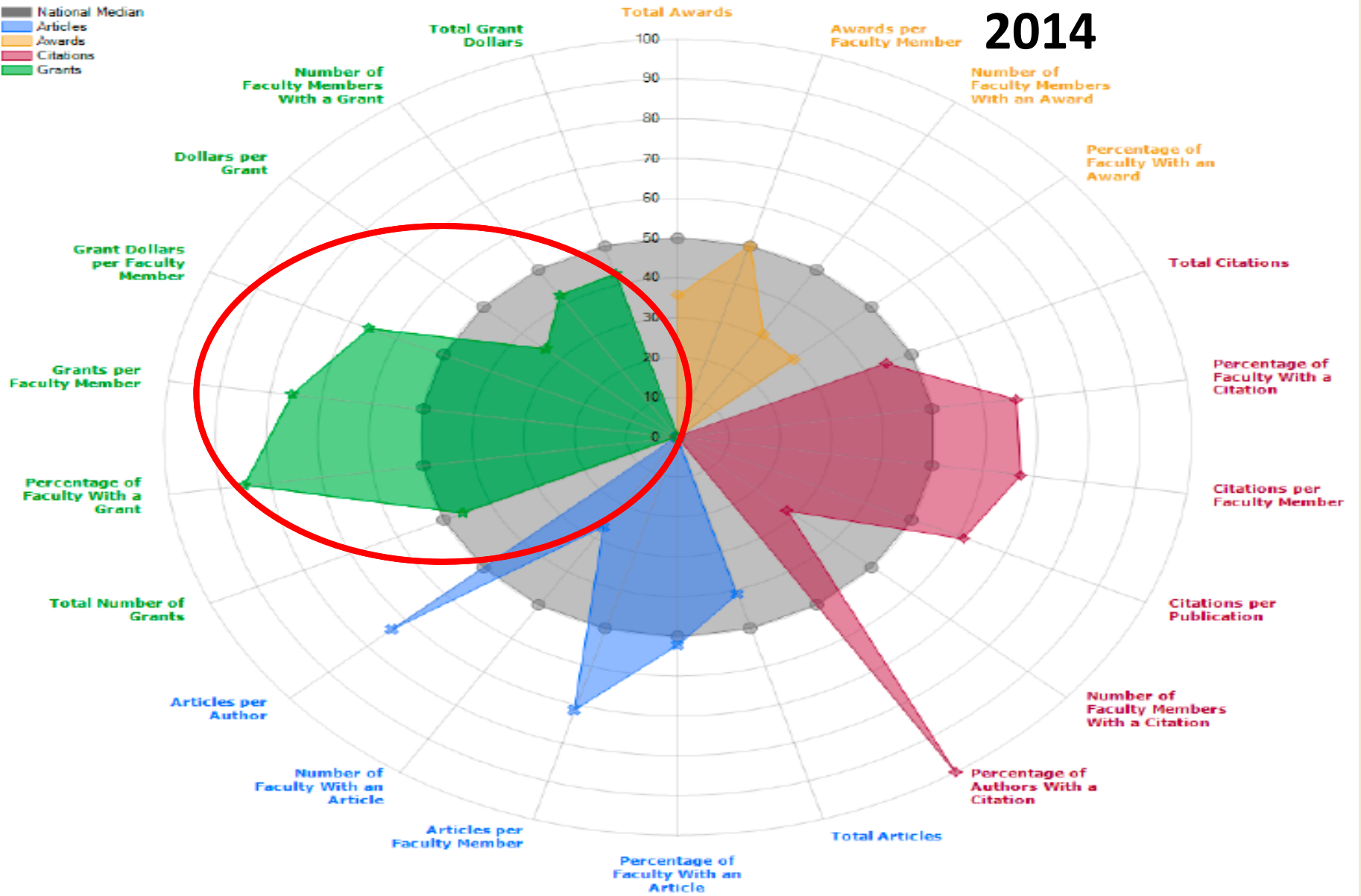
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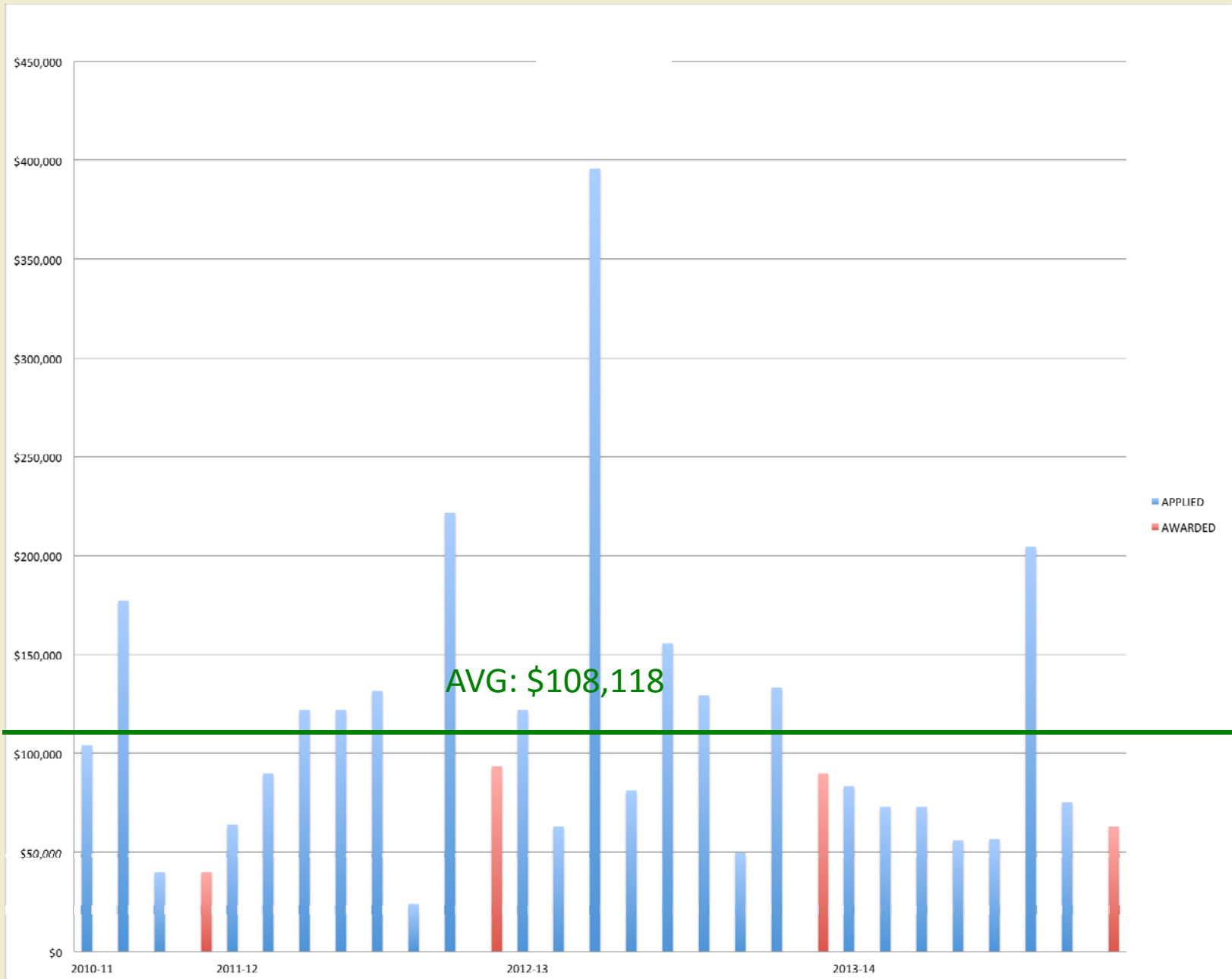
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2014

- National Median
- Articles
- Awards
- Citations
- Grants





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**We are good**

**We want to be great**

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# 2014- 98<sup>th</sup> (197; 50%)

95	University of Central Florida	208,262
96	University of Cincinnati	206,621
97	University of Alabama at Birmingham	204,637
98	West Virginia University	201,225
99	University of South Carolina	199,974
100	Oregon State University	198,180
101	University of Maryland-Baltimore County	197,843

# 2014- 49<sup>th</sup> (197; 25%)

The University of Iowa	430,120
Auburn University	428,657
The Ohio State University	421,117
University of Delaware	414,151
University of North Carolina at Chapel Hill	414,044
New Jersey Institute of Technology	413,441
University of California-Santa Cruz	411,195

We are on the right trajectory!



How do we speed up and also avoid a crash??



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# Our current research culture in your words:

- **Medium; Fragmented**- lack of cohesion – **insulation/isolation** – **disinterest** in what everyone else is doing
- Expect UNT's help
  - Recruiting and funding of grad students; UNT to form teams of PIs (“provide incentives, e.g. lunch”; “it’s the job of Assoc. Dean and VPR”); we need incentives; reward system for faculty writing large grants; local funding for research to produce initial results
- **Negative attitude**
  - We need better matching funds; we need lower IDC; no credibility of our research with Fed and State funding agencies; must compete better with UTD and UTA
- **(Too) Positive (but locally focused) attitude**
  - We already contribute 35% of UNT's research; Department X (MTSE, BIOL, CHEM, CSE, PSYCH, ...) is not good compared to us
- **Policies**
  - Workload to assist active researchers; merit evaluation should tilt towards research; only active researchers should evaluate other researchers



# Building/Rebuilding/Improving our Research Culture

- It will be a long-term, *continuous* process
  - We'll bite off three year chunks
    - Focus on major issues in year 1
    - More major issues year 2 and refine issues from year 1
    - Wrap up in year 3 and establish future agenda
  - We'll define actions and success measures
    - We'll keep track and share these measures quarterly
    - Movement may be slow, but we want movement
  - Everything will be determined by you
    - You will tell us
      - where to go
      - how we'll get there
      - how to determine we've reached our goal
    - You will also be responsible for helping achieve our goals – **your** goals

# Immediate Agenda

- These three have been identified almost by everyone as the most important strategic goals that will have a positive impact on our research culture:
  - **Collaborative/inter-disciplinary/intra-disciplinary research:** break the silos, learn what others are doing, build partnerships that outlast proposal submissions
  - **Plan, write, and succeed in large grant proposals:** projects and agencies to target, processes to adopt, create timeline, establish milestones
  - **Focus on graduate students:** recruit, attract and support the best, engage them in research early, make them publication-driven, “cultivate a research focus at both the undergraduate and graduate levels”

# Let's go to work!

- Address each issue
  - Collaborative research
  - Graduate students
  - Facilities
- Tweak the issue if necessary; define clearly *why* we want to achieve it
- Next, identify *tactics*, i.e. ways to achieve our goals
- Finally, identify success metrics