UPR Mayagüez

Overview of the College of Engineering

Dr. Agustín Rullán
Dean of Engineering

Dr. Oscar Perales-Perez
Associate Dean for Research & Innovation

The UPR System

UPR Mayagüez

- Established in 1911
- Currently 12,130 students enrolled
  - 11,133 undergraduate, 997 graduate
- Four Colleges
  - Agricultural Sciences
  - Arts & Sciences
  - Business Administration
  - Engineering
- Only UPR Campus that offers engineering degrees
- Currently 4,476 engineering students
  - 4,120 undergraduate, 356 graduate

UPRM Open House Oct. 24, 2014 (4,646 HS students)

Strategic Planning & Assessment

COE Strategic Plan

Strategic Objectives (link to complete document)

1. Maintain a culture of ***Strategic Planning and Assessment***
2. Stay ahead and strengthen our ***Leadership in Engineering Education***
3. Increase and diversify our ***Funding Sources***
4. Implement ***Agile and Efficient Administrative Processes***
5. Strengthen Competitive ***Research and Creative Efforts***
6. ***Benefit Puerto Rican Society***
7. Form the ***Institutional Identity and Pride at the College of Engineering***
8. Achieve the institutional presence and visibility of the College of Engineering

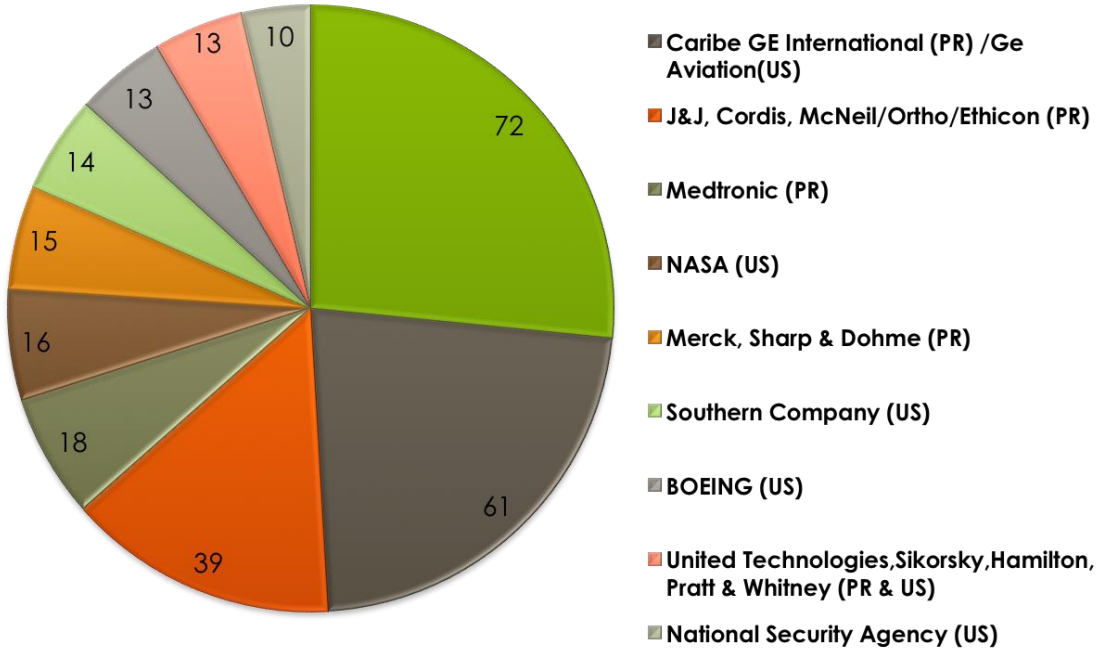
The Experience
Engineering Student Associations

Alpha Pi Mu - Industrial Engineering Honor Society
American Institute of Aeronautics and Astronautics
American Institute of Chemical Engineers
American Society for Quality
American Society of Civil Engineers
American Society of Mechanical Engineering
Asoc. de Estudiantes Graduados de Ing. Civil
Asoc. de Estudiantes Graduados de Ing. Química
Asoc. de Ingeniería Civil y Agrimensura
Asoci. de Estudiantes Graduados de Ing. Eléctricas y Comput.
Associated General Contractors of America
Association for Computing Machinery
Biomedical Engineering Society
Capítulo Estudiantil del Instituto de Agrimensores
Capítulo Estudiantil del Instituto de Ing. Civíles de la CIAPR
Construction Engineering Management Association
Earthquake Engineering Research Institute
Engineering Student Council
Golden Key International Honor Society
Human Factors and Ergonomics Society
IEEE Circuits and Systems Society
IEEE Computer Society
IEEE Comunications Society
IEEE Control Systems Society
IEEE Electromagnetic Compatibility Society
IEEE Engineering in Medicine and Biology Society
IEEE Eta Kappa Nu Honor Society - Lambda Chapter
IEEE Power Engineering Society
IEEE Robotics and Automation Society
IEEE Vehicular Technology Society
IEEE Women in Engineering
Institute of Electrical and Electronics Engineers
Institute of Indutrial Engineers
Institute of Transportation Engineers
Instituto de Ingenieros Mecánicos de P.R.
Instituto de Ingenieros Químicos de Puerto Rico
International Society for Pharmaceutical Engineering
Mexican American in Engineering and Science
National Society of Professional Engineers
Puerto Rico Water and Environment Association
Reto Colegial
Society of Automotive Engineers
Society of Electrical Engineers of Puerto Rico
Society of Hispanic Professional Engineers
Society of Women Engineers
SPIE Student Chapter
Tau Beta Pi - PR Alpha Chapter
United States Green Building Council

The Experience
Eng. Coop Program & Internships


Jesús Sánchez de Ingeniería Mecánica laboró en la compañía aeronáutica *Boeing* como parte del Programa COOP.

- 1976-2014 (37.5 years!)
- 2002 QEM Exemplary Program Award-Washington D.C.
- 8000+ students attended
- Up to 9 credits (free/technical electives)
- Seven Faculty COOP Advisors
- Resume, Interviews, English communication and soft skills



HackPR 2014 - Hackathon (~300 participants)

Institutional Identity and Pride at the COE

Out-of-Campus Student Achievements

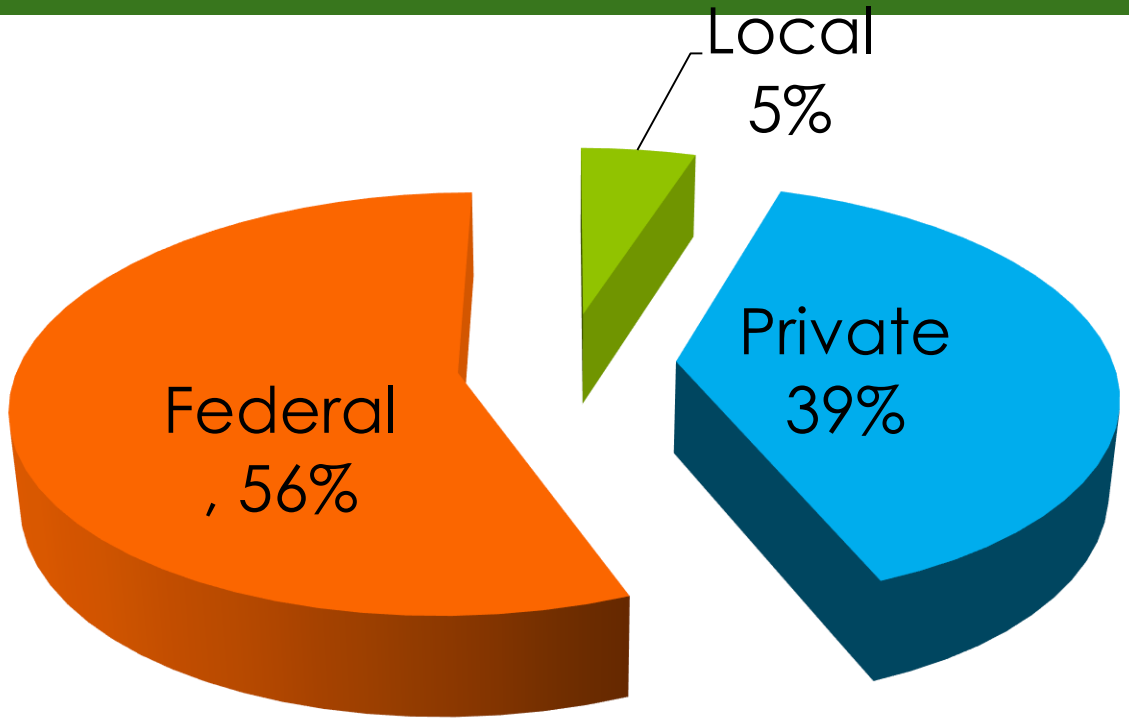
Some Research Facts

How are we doing?

Research Facts

- **UPRM** total research funds amount to $21-$26M annually making a total of **$115.7M** in the last five academic years.
- The College of Engineering accounts for the **44.4%** of this grand total, without considering the technical and budgetary contribution from CoE researchers to inter-Colleges projects across UPRM ($10M+)
- UPRM-CoE researchers are leaders in their fields inside and outside PR and serve as expert panelists for the NSF, USDA, NIH and other Federal Agencies as well as reviewers for high-impact factor publications.
- Peer-reviewed publications authored by CoE-faculty: 102 in 2012 and 366 in the 2007-12 period. Conference presentations 550+ in the 2007-12 period

Overall Research Funding at the CoE-UPRM (as March 2012)



Funding Sources

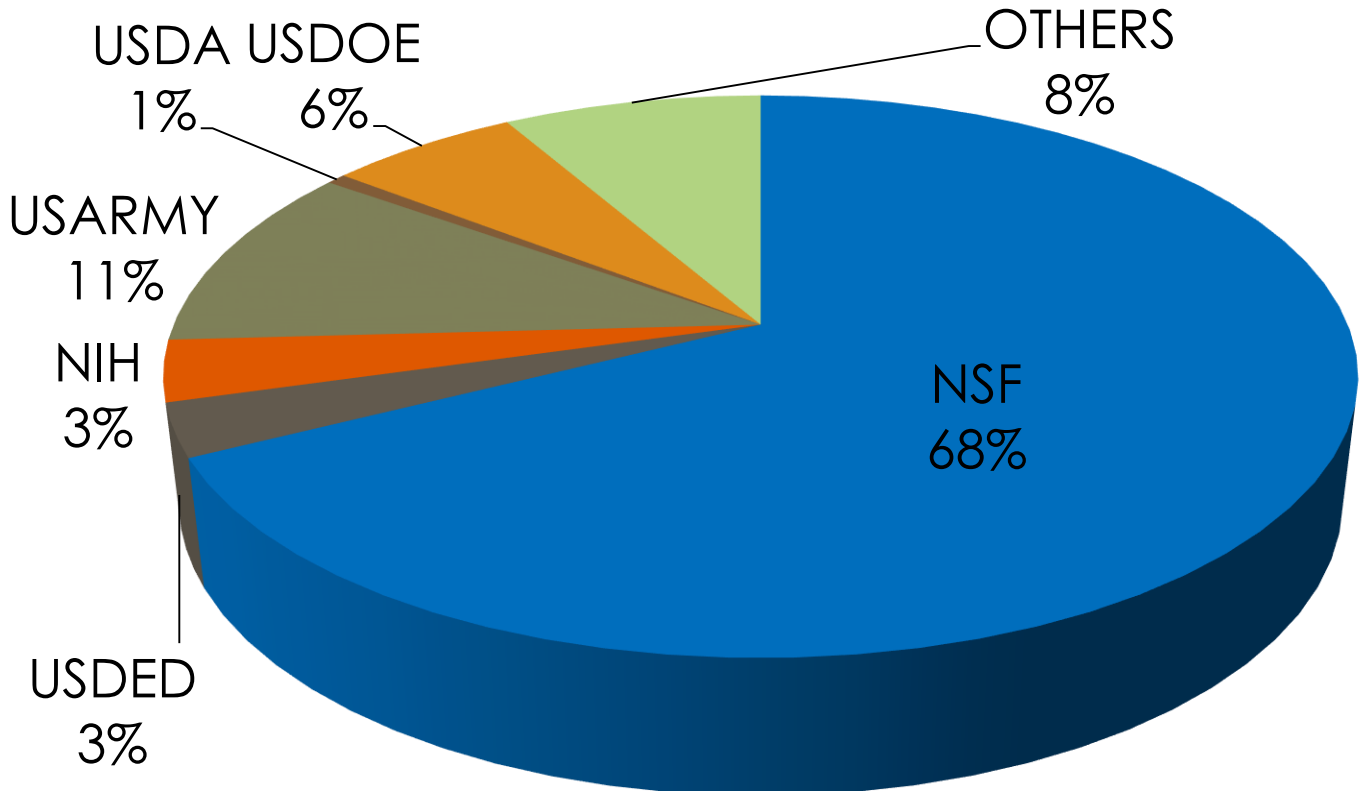
Cash Donations

- $300K-$400K per year
- Mostly for student projects and student associations
- Fellowships
- Laboratories
- Facilities

Total Cash Donations	**$745,700.00**
Texas Instruments	195,000.00
GM Foundation	110,000.00
Boeing	60,000.00
Air Products	57,000.00
Maximo Solar Industries	21,756.00
Abbot Laboratories	20,000.00
Verizon	16,000.00
Lockheed Martin	15,000.00
Exxon/Mobil	10,000.00
PACE Partnership	10,000.00
Procter & Gamble	10,000.00
Georgia Power	10,000.00
Other (<$10,000)	210,944.00


abarca health
Cigna
EXELIS
ExxonMobil
freescale
INGELLI.COM
Your needs our goal.
INROADS
MIT Lincoln Laboratory
MITRE
nielsen
Transportation Security Administration
TRAVELERS
abbvie
CIGA
accenture
CITRIX
DEPARTMENT OF DEFENSE
intermex
International Money Express
Mondelēz International
PHARMA-BIO SERV INC.
OWENS CORNING
Truenorth
Actavis
AIR PRODUCTS
DCPAS
Defense Civilian Personnel Advisory Service
JCA
since 1997
nagnoi
anticipate.optimize.achieve
pjm
MARINES
THE FEW. THE PROUD.
General Mills
INVID
NASA
PMA Consultants
PPG Architectural Coatings
AEP AMERICAN ELECTRIC POWER
Dewberry
AMGEN
DRAPER LABORATORY
GM
APL
JOHNS HOPKINS
APPLIED PHYSICS LABORATORY
NATIONAL SECURITY AGENCY
UNITED STATES OF AMERICA
P&G
AMERICA'S NAVY
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
AXON
DEA
GFR MEDIA
Johnson & Johnson
Lilly
Raytheon
Rock Solid technologies
A Pratt & Whitney Joint Venture
POPULAR
DU PONT
Goldman Sachs
NAVAL AIR SYSTEMS COMMAND
SILGAN CONTAINERS
BASF
The Chemical Company
EATON
ECOLAB
HARRIS
LOCKHEED MARTIN
SOUTHERN COMPANY
Ultimate Solutions Corp.
BECHTEL
EMC²
hp
TPi
PR
stryker
BOEING
Honeywell
IBM
Medtronic
Megger
TATA
TATA CONSULTANCY SERVICES
Boston Scientific
Advancing science for life™
EY
Building a better working world
verizon
everis
Huntington Ingalls Industries
Hard Stuff Done Right™
MICHELIN
NAVSEA
NAVAL SEA SYSTEMS COMMAND
TEXAS INSTRUMENTS
CardinalHealth
an NTT DATA Company
xerox

Contribution of Federal Agencies (as March 2012)



Engineering
Representative Research Niches

- Information Science and Technology
- Cloud & Virtualization Comp.
- Cybersecurity
- High Performance Comp.
- Image Processing
- Geographic Info. Systems
- Fault Tolerant Embedded Syst.
- Materials Science and Engineering & Nanotechnology
- Pharmaceutical Engineering

- *Aerospace*
- Cyber Infrastructure
- *Photonics*
- *Ocean Engineering*
- Renewable Energy
- Power Electronics
- *Bioengineering*
- Transportation
- Environmental Engineering

Engineering Research Centers

UPRM-NSF-Center for Research and Excellence in Science and Technology (CREST): **Nanotechnology** Center for **Biomedical and Energy-Driven** Systems and Applications

Research in Computing and **Information Sciences** and Engineering (PRECISE)

Center for Subsurface **Sensing and Imaging** Systems (CenSSIS)

Center for Structured **Organic Composites** (CSOC)

The Puerto Rico Water Resources and **Environmental** Research Institute (PRWRERI)

The **Civil Infrastructure** Research Center (CIRC)

The Center for Collaborative **Adaptive Sensing** of the Atmosphere (CASA)

The Partnership for Research and Education on **Materials** (PREM)

The Mid America **Earthquake** Center (MAEC)

The Wireless Integrated **Microsystems** Center (WIMS)

Transportation Technology Transfer Center.

Puerto Rico **Strong Motion** Program

NOAA-UPRM Center of **Ocean Engineering**

Center for **Aerospace and Unmanned Systems** Engineering **(CAUSE)**

http://engineering.uprm.edu/research/major-research-centers-and-facilities/

The Center in the Me

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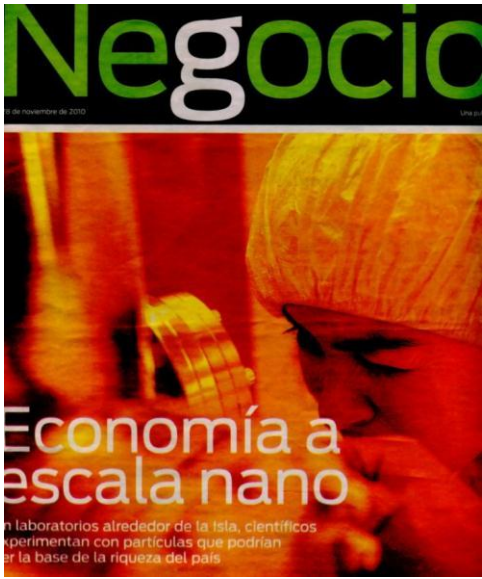


JOM is published monthly by TMS and distributed throughout the world in more than 3,000 libraries + TMS members

O.M. Suárez, *JOM*, 61 [10], (2009): pp. 22-25.

M. Custodio Collazo, END, 14692, Nov. 28, 2010: *Business Section:* pp. 8-11.

Funding Sources

Design/Fab/Commercialization of LED Lamps

- Pilot Project 530 lamps Stefani Building
- UL Certification
- All lamps in UPRM will be replaced with our LED lamps.
- First sale/installation to UPR-RP
- Order from UPRC
- $325K loan from Chancellor
- Will start mass production 5K units/month
- I-Corps training
- Patent being sought

Inter-College Translational Research

Establishment and consolidation of synergistic research and education efforts in fundamental and applied science and technology

A couple of examples

- **NIH-RISE 2 Best Program ($5M, 5 years)**: Hosted by Chemistry department includes faculty from *Electrical Engineering and Chemical Engineering*. It is focused on the advance in biomedical science and engineering.
- **USDA-Center for Education ad Training in Agriculture and Related Sciences (CETARS, $3.6M, 4 years):** Led by Chemistry department with Co-Directors from *Engineering Science and Materials.* Training through research in environmental nanotechnology, nanotechnology-enabled food packaging materials and water remediation issues.

Strategic RESEARCH & INNOVATION

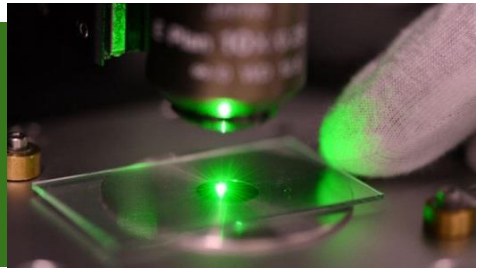
Or, How to Change the Culture to Strength Research and Competitive Creative Endeavors?

Keep and Enhance a Healthy External Research Funding

- ***Status*:** Although CoE Faculty is successful in obtaining funds from competitive grants, the total amount of funding from external sources needs to keep growing.

- ***Opportunity:*** The amount of funding from external sources (federal, non-federal, local) with emphasis in nation-wide competitive research grants (Centers-like). can be increased.

Keep the CoE-Research and Innovation at the Edge



- ***Status:*** UPRM-CoE has become successful in attracting research funding in traditional and top-notch areas. However, emerging areas and niches need to be identified and supported.

  The performance and achievements of our Human Resources needs to be properly acknowledged.

- ***Opportunity:*** Research strengths and possibilities need to be assessed on a periodical basis to identify emerging niches.

  Functional protocols to recognize and appreciate the performance of our Research Human Resources can be implemented.

Faculty encouragement

- Uncommitted Voluntary Cost-Sharing (Release Time)
- SEED (BioSEI?)
- Summer Salary (3/9)
- Incentives “Compra de Tiempo”
- Additional Compensations (Incidentals, Non-Federal funds)
- Diferencial Salario Basico Docente (DSBD)
- Tax exemption (Law 101)
- Early Promotion

Establish a Culture on Generation and Protection of the Know-How

- ***Status:*** Breakthroughs achieved by CoE faculty are disseminated in journals or Conferences. The know-how is not always protected and the commercialization potential is, sometimes, lost. Intellectual property (IP) issues can occur in all phases of the research.
- ***Opportunity:*** CoE Faculty can be educated and motivated to protect the know-how and guided to explore the commercialization potential of their findings and discoveries. A working understanding of IP is needed to make informed decisions, from starting and running programs to deciding how best to handle the resulting inventions.

All-PhD CoE

- ***Status:*** At present, Civil Engineering, Computer and Information Sciences and Engineering, and Chemical Engineering offer graduate studies conducive to PhD degrees. PhD students in new graduate programs will strength our research capability while widening our capability to assure funds in those novel research niches impacted by the new programs.

- ***Opportunity*****:** Our current PhD programs can be up-dated on a continuous basis while consolidating new graduate programs and designing future inter-disciplinary PhD programs focused on strategic and/or emerging areas.

Engineering Programs

Program	BS	MS/ME	Ph.D.
Bioengineering		✓	✓
Chemical Engineering	✓	✓	✓
Civil Engineering	✓	✓	✓
Computer Engineering	✓	✓	
Computer & Information Science & Engineering			✓
Electrical Engineering	✓	✓	✓
Industrial Engineering	✓	✓	
Materials Science & Engineering		✓	
Mechanical Engineering	✓	✓	✓
Computer Science & Engineering	✓		
Surveying & Topography	✓		

Robust Body of Graduate Students, Post-doctoral Associates and Visiting Scholars

- ***Status:*** A drop in the number of qualified candidates to pursue graduate studies has affected the progress of the research activities at the CoE. Besides, the hiring of PDF associates and visiting scholars is not a common practice within the CoE.

- ***Opportunity:*** The number of highly-qualified candidates to pursue graduate studies at the CoE while broadening the representativeness of the Americas and beyond need to be increased. Rise in the hiring of PDF associates and visiting scholars can be encouraged.

Growth in Research = Growth in Space

- ***Status:*** Many successful research areas continue growing by receiving funding, student fellowships, and state-of-the-art equipment; however, the space available for research does not grow at the same rate.

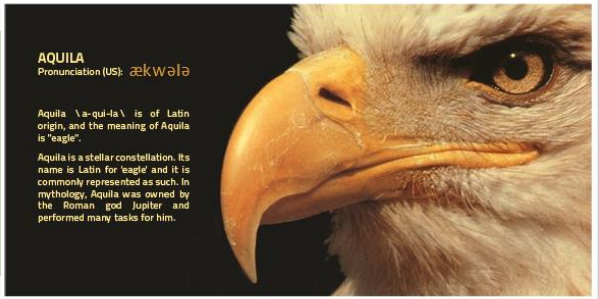
- ***Opportunity:*** The optimum use and increase of currently available space for productive research, (protecting and supporting emerging or incipient research activities), need to be assessed.

Boosting of the CoE Leadership in Science and Technology

- ***Status:*** There is still room to improve our publication rate and productivity. Besides, a more active and influential presence of CoE faculty in national and international forums and professional societies needs further encouragement.

- ***Opportunity:*** Young and established researchers need to be motivated and supported by adequate policies and logistics to improve their peer-reviewed publications rate in parallel to their more active involvement in national and international forums and related activities.

Reinforcement of the CoE-Research Corporative Image



- ***Status:*** UPRM-CoE faculty and students play a key role on the technological development of PR and the Nation. The broad impact of UPRM-CoE achievements is not effectively disseminated inside and outside UPR.

- ***Opportunity:*** The CoE should become more effective in disseminating its research and innovation achievements and contributions to the well-being of PR and the Mainland.

Continuous Assessment of Safe Research Practice

- ***Status:*** Not all laboratories and research-related facilities at UPRM-CoE are aware of up-dated safe practice protocols or have identified safety concerns in the working place.
- ***Opportunity:*** Get all research-related facilities at UPRM-CoE to evidence safe research practice protocols and guidelines. Periodical in-house and formal safety inspections can be scheduled.

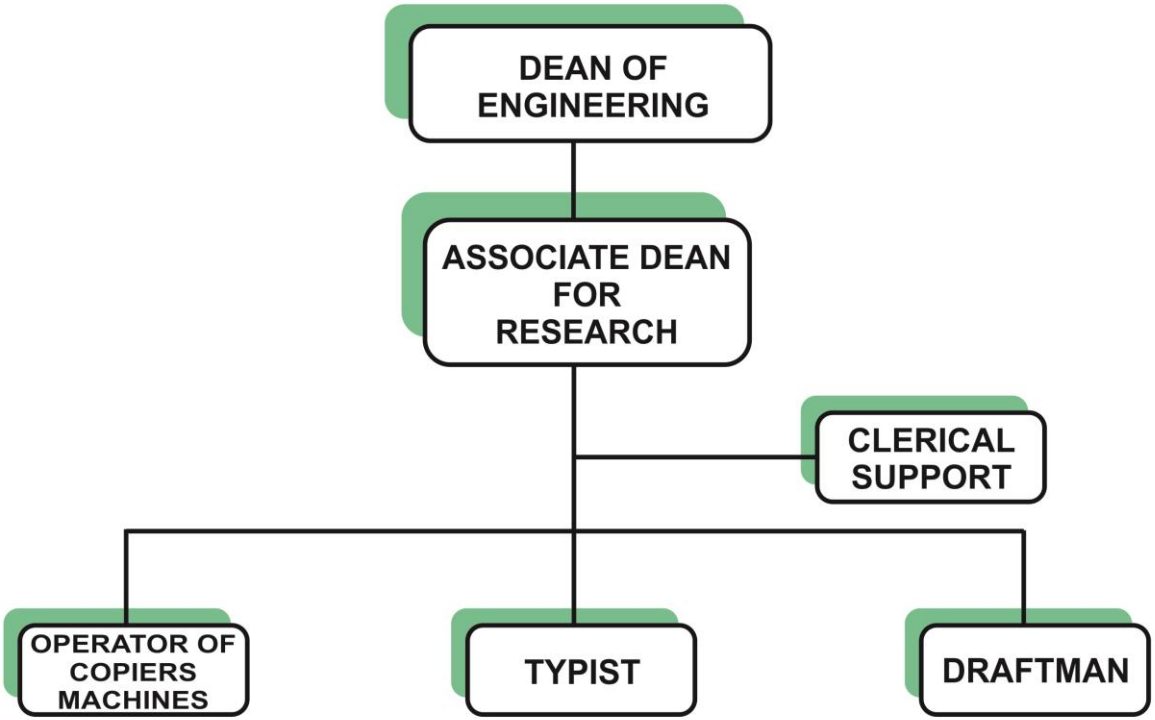
Agile and Efficient Research Management Practice

- ***Status:*** The traditional duties and specific tasks assigned to the Dean of Research office have became obsolete and limiting under current conditions of research growth and complexity at the College of Engineering (CoE).

- ***Opportunity:*** Re-engineering of the Office of the Dean for Research Affairs became indispensable.

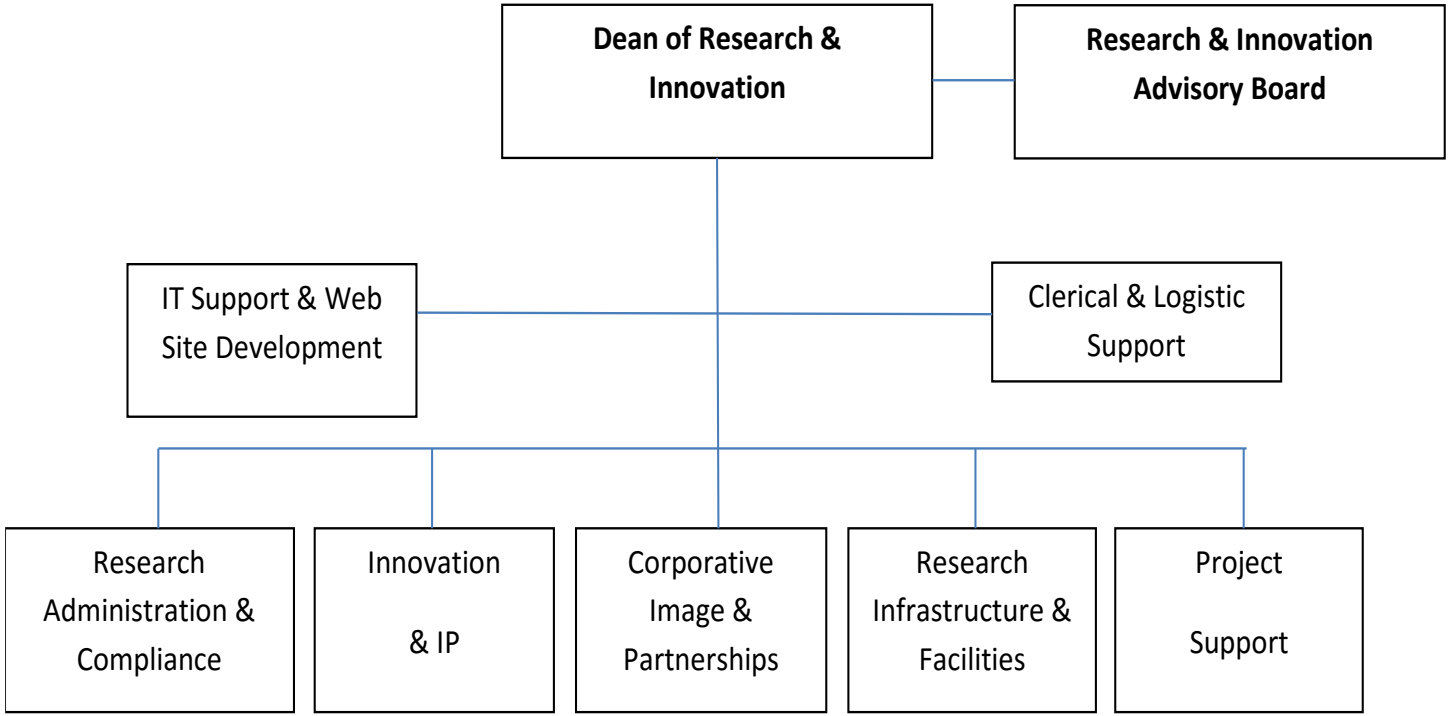
UNIVERSITY OF PUERTO RICO
MAYAGUEZ CAMPUS
COLLEGE OF ENGINEERING
RESEARCH CENTER

As 2012

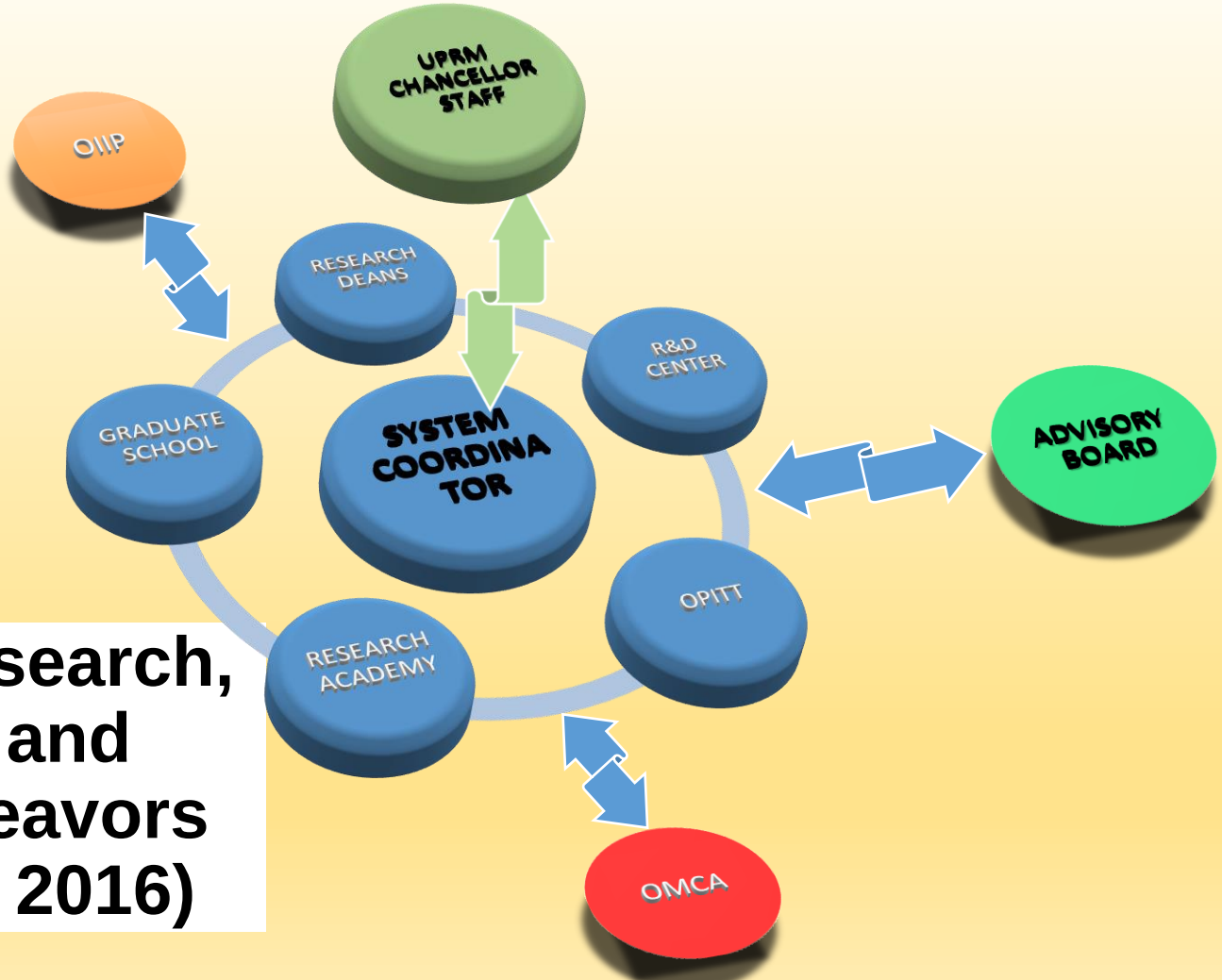


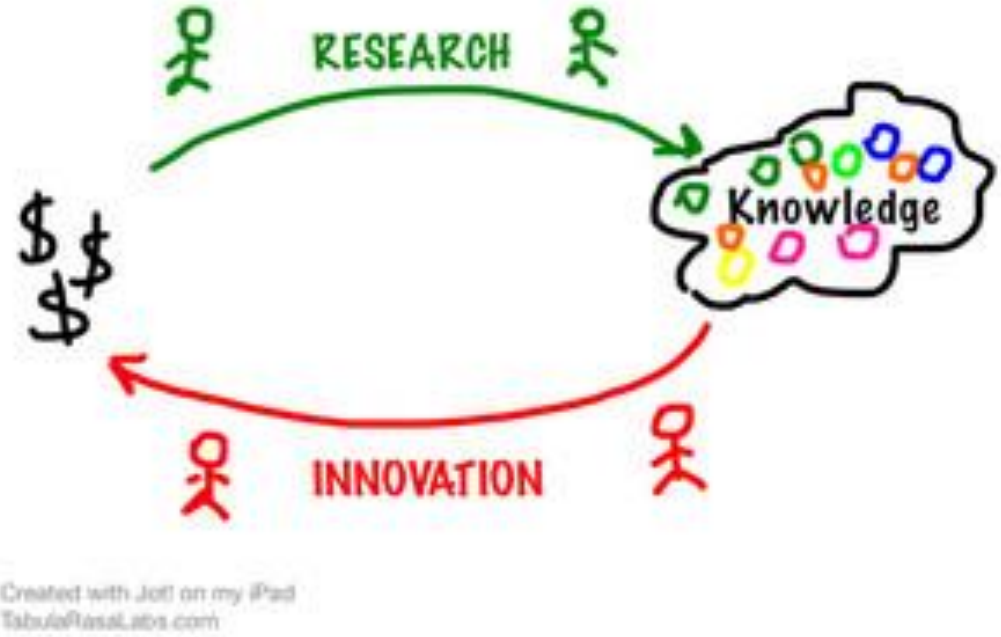
The Re-Engineered DRI Office

1. **Proposed Structure**



The UPRM Research, Innovation and Creative Endeavors System (May 2016)





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http://engineering.uprm.edu/research-2/