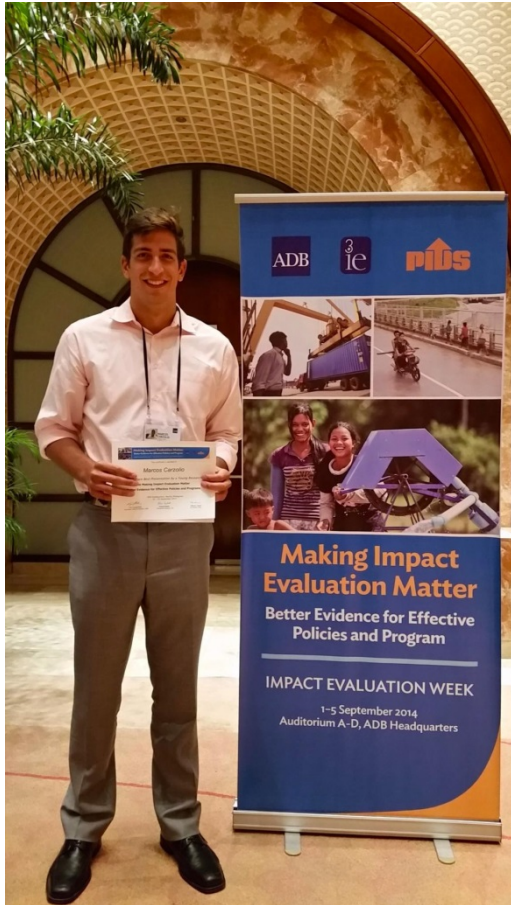# LISA (Virginia Tech's Laboratory for Interdisciplinary Statistical Analysis)

2013-14 Annual Report

January 14, 2015

Executive Summary

The 2013-14 academic year was very successful for LISA, Virginia Tech's Laboratory for Interdisciplinary Statistical Analysis. LISA statistical collaborators helped 1332 researchers around Virginia Tech via our three main services of Collaboration Meetings, Walk-in Consulting, and educational Short Courses (Figure 1).

Highlights of 2013-14:

➢ Vigorous emphasis on collaborations and co-authorships resulted in 20 peer-reviewed publications; 40 conference posters and presentations; and 17 manuscript submissions.

➢ LISA moved in to the Old Security Building for Walk-in Consulting, weekly meetings, Video Coaching and Feedback Sessions, and many collaboration meetings with clients.

➢ Tonya Pruitt, the LISA Admin. Specialist, won the 2014 President's Award for Excellence.

➢ Three LISA Fellows were trained in the growing LISA 2020 program to create a network of 20 statistical collaboration laboratories in developing countries by 2020.

➢ For the fourth year in a row, LISA was featured in an invited session at the American Statistical Association's (ASA) Joint Statistical Meetings (JSM). This year's invited session was, "The Impact of Statistical Consulting Centers: Past, Present, and Future."

➢ Emanuel Msemo, a LISA Fellow and Department of Statistics MS student, won the "Best Contributed Paper Award" from the ASA Section on Statistical Consulting for, "Impacting Agricultural Productivity in Tanzania Through the Wheels of Statistics."

Annual LISA Clients AYs 2005-14:
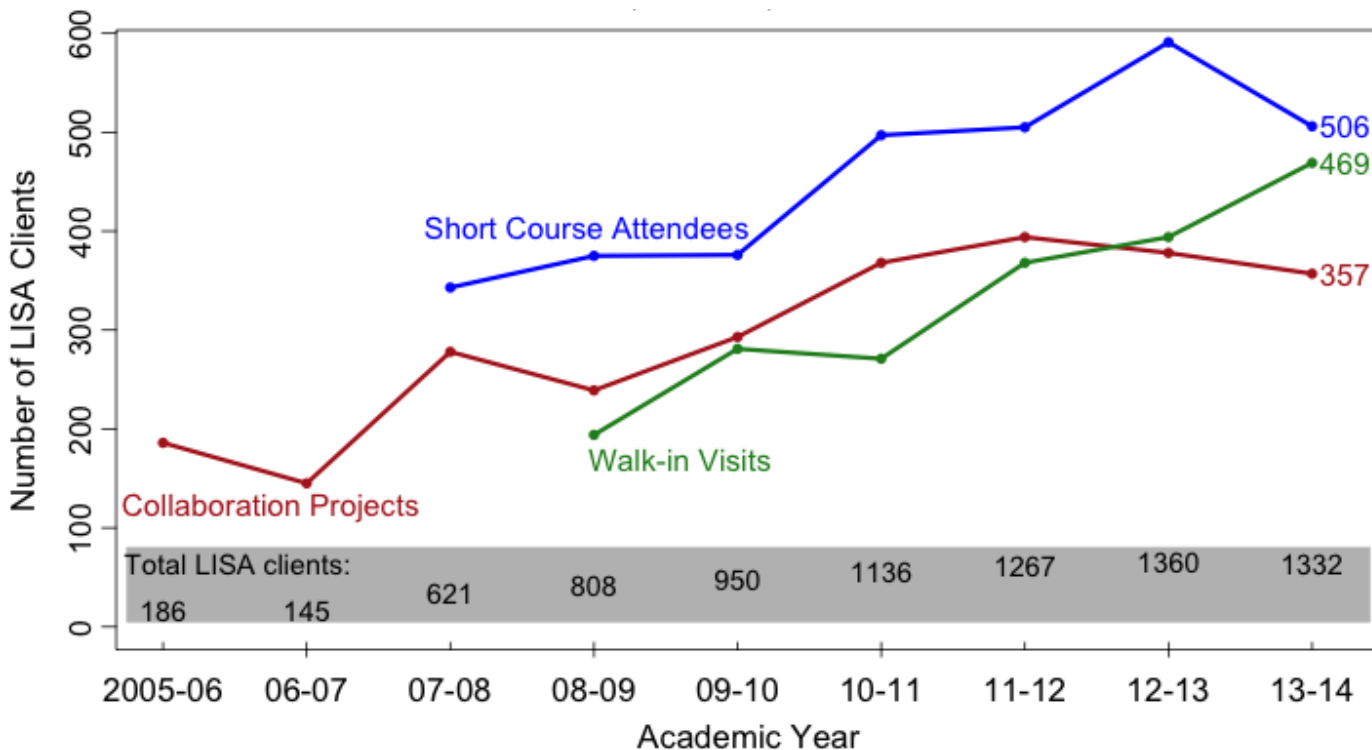**Collaboration, Walk-In, and Short Courses**

Figure 1. Total number of clients for Collaboration, Walk-In Consulting, and Short Courses

Table of Contents

Collaborators

Dr. Eric Vance, Director
Dr. Christopher Franck, Assistant Director
Tonya Pruitt, Administrative Specialist

Lead Collaborators

Jon Atwood	Shuyu Chu	Yiming Peng
Khaled Bedair	Ian Crandell	Liang (Sally) Shan
William Tyler Bradley	Xinran Hu	Ning Wang
Chen Chen	Hamdy Mahmoud	Angang Zhang

Associate Collaborators

Jonathan Ammirati	Jian Huang	Xiaoyue Shu
James Anderson	Steven Hurwitt	Matt Slifko
Zhe Bao	Huiquan Jiang	Jinhui Sun
Marcos Carzolio	Matthew Keefe	Yizhi Sun
Tianlei Chen	Caleb King	Katie Thornton
Yajuan Chen	Qing Li	Alice Toms
Jennifer Cheng	Xiao Li	Hong Tran
Lulu Cheng	Yi Liu	Yimeng Xie
Ho Cho	Wei Ma	Yangyi Xu
Amanda Coughlin	John Mulheren	Zhibing (Alex) Xu
Rebecca Dickinson	Jing Niu	Hui Yi
Jack DiTrapani	Ana Maria Ortega Villa	Miao Yuan
Mohamed Elkhouly	Diana Pragel	Lin Zhang
J.T. Fry	Raj Shrivastava	
Roberto Guzman-Franco	Yuhyun Song	

LISA 2020 Fellows

Olawale Awe	Dr. Benedicto Kazuzuru	Emanuel Msemo

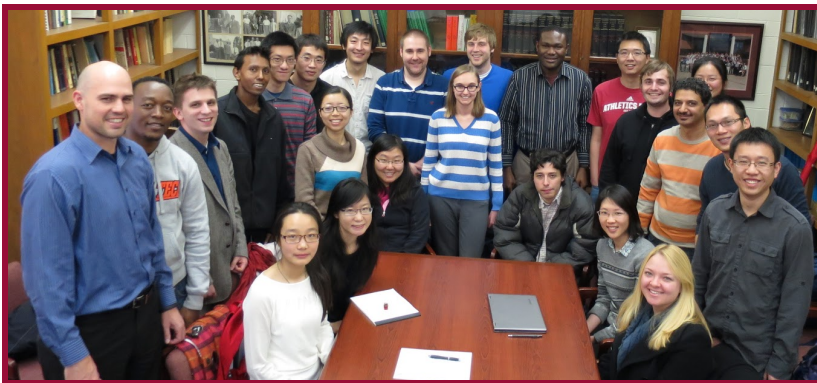## Statistics Faculty Collaborators

Dr. Jeff Birch

Dr. Pang Du

Dr. Ina Hoeschele

Dr. Leanna House

Dr. Inyoung Kim

Dr. Jie Li

Dr. J.P. Morgan

Dr. Jane Robertson

Dr. Anne Ryan-Driscoll

Dr. Eric Smith

Dr. Runlong Tang

Dr. George Terrell

Dr. Xiaowei Wu

Dr. Hongxiao Zhu

Fall 2013 Collaborators

Spring 2014 Collaborators

Summer 2014 Collaborators

Introduction and Mission

LISA is the Laboratory for Interdisciplinary Statistical Analysis at Virginia Tech. It was originally founded in 1948 as the Statistical Laboratory, reorganized and renamed in 1973 as the Statistical Consulting Center, and then again reorganized and renamed as LISA in 2008. **LISA's mission is to train statisticians to become interdisciplinary collaborators and promote the value of statistical thinking in all phases of scientific research** by helping researchers design experiments; collect, analyze, and visualize data; run statistical software; interpret results; and communicate statistical concepts to non-statisticians. LISA provides statistical advice, analysis, and education to Virginia Tech researchers by offering individual collaboration meetings, walk-in consulting, educational short courses, and support for interdisciplinary research projects. In the 2013-14 academic year, 60 statistical collaborators from LISA collaborated with researchers on 357 projects from 66 departments, provided statistical advice for 469 visitors to LISA Walk-in Consulting, and taught 506 short course attendees how to apply statistics in their research.

The LISA collaborators are faculty and students in the Department of Statistics. LISA's full-time director and assistant director (partially supported by funded projects) meet with clients and—together with the LISA Administrative Specialist—oversee a team of graduate and undergraduate student collaborators. In addition, the entire statistics faculty may be available for collaboration on a case-by-case basis.

Statistical assistance is free for Virginia Tech faculty, staff, and students. LISA is funded jointly by the Office of the Vice President of Research, the College of Science, the Graduate School, the Office of the Provost, and now all seven other colleges (Agriculture and Life Sciences, Architecture and Urban Studies, Engineering, Liberal Arts and Human Sciences, Natural Resources and Environment, the Pamplin College of Business, and the Virginia-Maryland Regional College of Veterinary Medicine). The Department of Statistics also provides funding for many of the LISA statistical collaborators and provides other support for LISA's activities.

Users of LISA engaging in sponsored research can benefit from in-depth help and are encouraged to include statistical collaboration in grant proposals. This can take the form of a full or partial graduate research assistantship, partial funding of a faculty member's salary, or a direct-cost line item. LISA occasionally provides statistical consultation and collaboration on projects outside of Virginia Tech for a fee. Through StatCom (Statistics in the Community), students in the Department of Statistics also provide pro-bono statistical consultation and collaboration for researchers studying topics of local interest and for local community nonprofits, schools, and governmental organizations.

This report summarizes LISA's main activities for the 2013-14 academic year, highlights the activities and progress achieved over the past year, and outlines six goals for 2014-15. In addition, this report presents the numbers of clients served and reported hours worked for the past nine years to help place the past year's activities into context.

LISA 2020

A July 2014 editorial in the New York Times stated, "Africa needs science, not aid." For many scientists at Virginia Tech and around the world (especially in developing countries), the bottleneck in research is lack of capacity to statistically analyze data. Scientists need statistical collaborators who can help them design studies, collect and analyze data, interpret the results, and make better and more impactful decisions.

LISA 2020 is a program started by LISA (Virginia Tech's Laboratory for Interdisciplinary Statistical Analysis) to educate and train statisticians and data scientists from developing countries to communicate and collaborate with non-statisticians and become collaborative statisticians. Our program includes supporting these newly trained collaborative statisticians to create and run a statistical collaboration laboratory at their home university or institution **to build a network of 20 statistical collaboration laboratories in developing countries by 2020**.

Each of the newly created laboratories in the LISA 2020 network will foster education in statistics and will promote the proper application of statistics to solve real-world problems. With a strong support network, just one statistician trained to communicate and collaborate with non-statisticians can enable and accelerate 50 or more research projects per year. **Each research project can impact hundreds or thousands of people.**

In 2013-14 LISA 2020 received funding from a Google Faculty Research Award and the USAID-sponsored Innovative Agricultural Research Initiative (iAGRI) program to train three LISA Fellows (Olawale Awe, Dr. Benedicto Kazuzuru, and Emanuel Msemo) to become collaborative statisticians.

Olawale Awe	**Dr. Benedicto Kazuzuru**	**Emanuel Msemo**
Nigeria	**Tanzania**	**Tanzania**
Fall 2013-Fall 2014	**Summer 2013-Fall 2014**	**Fall 2012 - Summer 2014**

Activities and Progress in 2013-14

Demand for LISA statistical collaboration and expertise continues to grow. From all over Virginia Tech, **1332 faculty, staff, and students met with LISA statistical collaborators** for assistance in designing experiments and studies; collecting, cleaning, plotting, and analyzing data; interpreting results of statistical analyses; developing new theories from these results; writing grant proposals and scholarly papers; answering quick questions about statistics; and for learning new statistical methods.

During the 2013-14 academic year, the 60 statistical collaborators of LISA met with researchers from 66 Virginia Tech departments for individual statistical collaboration meetings on **357 projects**. During daily Walk-in Consulting hours, LISA met with 469 faculty, staff, and students to answer quick statistical questions on projects requiring less than 30 minutes of assistance. 24 LISA Short Courses were offered to teach 506 graduate students and other university members how to apply statistics in their research. Overall, LISA provided at least **7666.5 hours of statistical assistance and education** to members of the Virginia Tech community. Figure 2 shows a summary of the clients and reported hours for LISA's three main services. **This year LISA assisted 1332 total clients.**
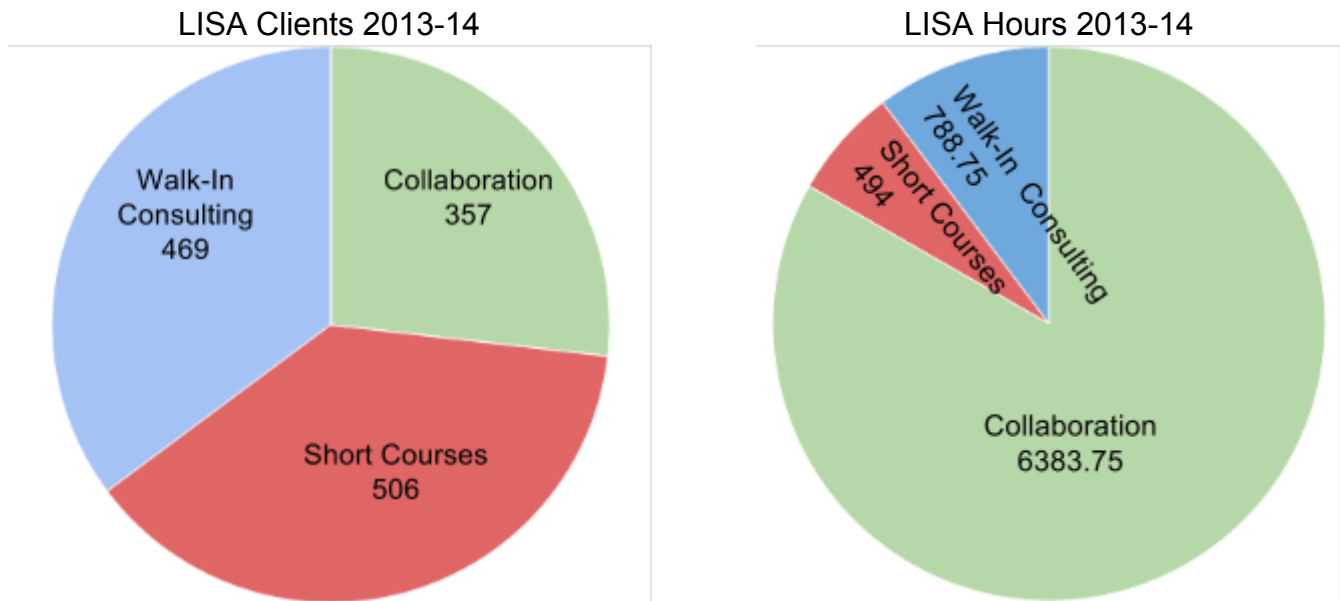

Figure 2. Number of clients and reported hours for LISA's three main services

In past years, **LISA's primary goal was to become the premier academic statistical collaboration laboratory.** We feel we have accomplished this! In last year's annual report we highlighted six goals we thought would help us **become an even better and stronger model stat lab for others to emulate**. We met or exceeded four of our six goals and came close on one. Our progress is described briefly below and expanded upon in subsequent sections of this report. In addition, since most of our goals have longer than a one-year horizon for achievement, we report on the progress made on the six goals for 2012-13 (from the 2011-12 LISA annual report), for 2011-12 (from the 2010-11 LISA annual report), and for 2010-11 (from the 2009-10 LISA annual report). See page 36 for our six goals for 2014-15.

2013-14 Goals

1. *Securing crucial additional—and permanent—funding for LISA.*

   ➢ To keep pace with *current* demand, LISA needs funding for 6 lead collaborators; a director, assistant director, and administrative specialist; and for supplies, etc. A new faculty member partially supported from soft money could alleviate some of the challenges faced by the growth in demand for statistical collaboration. Permanent funding from Virginia Tech is important for planning and may be a prerequisite for winning large grants for LISA 2020.

Unfortunately, little progress was made toward securing permanent or additional funding for LISA in 2013-14. Permanent funding for LISA from Virginia Tech would be an important demonstration of support for our educational and research commitments to meet the needs and challenges of a data-driven society. Also, permanent funding for LISA will signal to large foundations (Carnegie, Ford, MacArthur, Rockefeller, Gates) that the LISA 2020 program has support from Virginia Tech and a solid base (LISA) from which to operate.

2. *Continuing the momentum for LISA 2020.*

   ➢ Begin training at least 3 LISA Fellows at Virginia Tech. Submit at least 4 grant proposals for LISA 2020 totaling more than $100,000. Publicize the LISA 2020 program by giving at least 10 talks or posters at conferences and universities.

The LISA 2020 program showed tremendous growth and momentum during 2013-14. We began training 3 LISA Fellows at Virginia Tech. We submitted 3 grant proposals for LISA 2020 totaling more than $150,000. We publicized the LISA 2020 program by presenting 26 talks, posters, workshops, and papers at conferences and universities around the world, including Brazil (twice), Tanzania, Mozambique, the Google headquarters in Mountain View, CA, and a keynote address at the Virginia Academy of Science in Richmond, VA. Details are provided on page 7.

3. *Continuing faculty support and encouragement for statistical collaborations resulting in co-authored publications.*

   ➢ Publish at least 10 papers from LISA collaboration projects co-authored by LISA students. Submit at least 15 manuscripts co-authored by LISA students.

LISA students continued their amazing record of being recognized as collaborative statisticians who substantially contribute to research projects by co-authoring 10 papers from LISA collaboration projects and submitting at least 7 manuscripts. Details of the publications and submissions can be found starting on page 24.

4. *Recruiting high quality students to the statistics graduate program because they want to gain experience in LISA applying statistics to help people solve real world problems.*

> ➢ At least 4 incoming students admit that LISA was a major deciding factor in choosing to attend Virginia Tech over somewhere else, and at least 2 say that if not for LISA they never would have applied to Virginia Tech.

In 2013-14, LISA again sent recruiting flyers to over 400 department heads and undergraduate coordinators of math, statistics, and computer science departments all over the country to convey the message, "Earn a Ph.D. in Statistics at Virginia Tech and help people, solve real world problems, and travel around the world." See the recruiting flyer on page 35. Despite not collecting complete data from students regarding the impact of LISA on their decision to attend Virginia Tech, LISA achieved its recruiting goals with 4 incoming students saying that LISA was a major deciding factor in choosing to attend Virginia Tech over somewhere else, and 2 saying that if not for LISA they never would have applied to Virginia Tech.

5. *Maintaining the high quality of our collaboration meetings and Walk-in Consulting and continuing to improve the quality of our short courses.*

> ➢ Maintain 95% or higher positive feedback from our collaboration clients. Video review every collaborator who regularly meets with clients at least once per semester. Begin collecting feedback from Walk-in Consulting visitors. Achieve an 80% or higher positive feedback rating from short course attendees.

Our collaboration meetings with clients continue to be the signature offering of LISA, providing high-quality statistical advice to help researchers answer their research questions and impact their fields. LISA continued biweekly Video Coaching and Feedback Sessions as 39 collaborators who regularly met with clients in the Fall and Spring semesters were videoed reviewed at least once per semester. Perhaps because this strong emphasis on training its statistical collaborators, we received 95% positive feedback from our collaboration clients. We successfully implemented a systematic feedback survey for Walk-in Consulting visitors during the Fall and Spring semesters, with 92% positive feedback. Short course attendees continue to rave about LISA, with 91% positive feedback. An overview of the feedback LISA received on its collaboration meetings can be found on pages 19-20.

6. *Promoting statisticians as collaborators within Virginia Tech.*

> ➢ Collaborate with researchers from at least 60 departments at Virginia Tech. Give talks in at least 3 departments about the benefits of collaborating with statisticians.

As evidenced by the 19 publications co-authored by LISA personnel, LISA statisticians are perceived as collaborators by a growing number of Virginia Tech researchers. Last year LISA collaborated with

researchers from 66 departments at Virginia Tech. We gave talks about LISA and the benefits of collaborating with statisticians to at least 5 university-wide audiences (Africa Coalition, INFORMS, NLI new faculty orientation, the Deans' Forum on Global Engagement, and Graduate Education Week at the GLC).

2012-13 Goals

1. *Continuing faculty support and encouragement for deep collaborations/student co-authorships[1]*

   ➢ Achieve at least 5 student co-authored publications resulting from a LISA collaboration.

2. *Improving the quality of our services*

   ➢ Maintain 95% or higher positive feedback from our collaboration clients. Video review every collaborator who regularly meets with clients at least once per semester.

3. *Recruiting students to the department*

   ➢ Have at least 3 incoming students admit that LISA was a major deciding factor in choosing to attend Virginia Tech over somewhere else.

4. *Securing additional—and permanent—funding for LISA*

   ➢ By the end of 2013, LISA must have permanent and sufficient funding for at least 6 lead collaborators; the director, assistant director, and administrative specialist; and for software, supplies, and travel.

See the update above on 2013-14 Goals #3, 5, 4, and 1, respectively.

5. *Forming new connections and strengthening the old with VTC, VCOM, and other VT departments*

   ➢ Increase the number of collaborations with VTC and VCOM from 2011-12 and collaborate with researchers from at least 50 departments at Virginia Tech.

In 2013-14, LISA hosted four special Walk-in Consulting sessions at Virginia Tech-Carilion School of Medicine and the Virginia Tech-Carilion Research Institute (VTC), meeting with 18 researchers to answer statistics questions necessary to advance their research. In addition, LISA collaborated on 35 projects with researchers from VTC and 0 projects from VCOM. This was a large increase from the 26 projects with researchers from VTC and 2 projects from VCOM in 2012-13 and the 22 VTC projects and 2 VCOM projects in 2011-12. Overall, LISA collaborated with researchers from 66 departments at Virginia Tech in 2013-14.

6. *Celebrating the International Year of Statistics by making progress on "LISA 2020"*

   ➢ Continue to build awareness of LISA 2020 by promoting the vision in at least 3 conference talks or posters. Submit at least 2 grant proposals to fund LISA 2020.

See Goal #2 for 2013-14 and page 9 for more details.

Progress and Updates on 2011-12 Goals

1. *Promote and emphasize interdisciplinary collaborations leading to student co-authorships.*

See the update on Goal #3 for 2013-14. LISA students were co-authors on a total of 9 papers in 2013-14 compared to 1 paper in 2011-12.

2. *Secure new **permanent** and increased funding to bolster LISA's efforts to be the premier academic statistical consulting and collaboration laboratory.*

See the update on Goal #1 for 2013-14.

3. *Increase the number of collaborations and connections with the Virginia Tech Carilion School of Medicine and Research Institute (VTC), the Institute for Critical Technology and Applied Science (ICTAS), and other departments within Virginia Tech.*

See the update on Goal #6 for 2013-14.

4. *Improve the integration between LISA and the graduate statistics course, "Introduction to Statistical Program Packages," and between LISA Short Courses and the graduate service courses, "Statistics in Research, parts I and II."*

LISA assistant director Dr. Chris Franck and Dr. Anne Ryan continue to integrate statistical collaboration experiences into their teaching and encourage their students to collaborate with LISA on research projects.

5. *Improve the training of LISA statistical collaborators by regularly providing feedback on their performance.*

In 2013-14, the director of LISA did not meet individually with LISA students to review feedback received by clients. Instead, LISA pod leaders provided the majority of coaching and feedback of associate collaborators. Providing feedback to LISA collaborators is an important part of LISA's training and its frequency needs to be increased. See page 28 for an update on LISA's innovative Video Coaching and Feedback Sessions.

6. *Encourage other universities to emulate LISA by writing papers and giving talks at national conferences about LISA.*

Papers about LISA's methods for training statisticians to become interdisciplinary collaborators are still being developed. These methods were featured in 29 talks, posters, or workshops at national conferences, guest lectures, or invited colloquia, in addition to 9 of these at Virginia Tech. Dr. Eric Vance led training workshops or guest lectures on statistical collaboration at the University of Georgia, Penn State, Federal University of Rio Grande do Norte (Brazil), the ASA Conference on Statistical Practice in Tampa, University of Minnesota-Twin Cities, and the JSM in Boston.

Progress and Updates on 2010-11 Goals

1. *Increase collaborations with the Virginia Tech Carilion School of Medicine and Research Institute (VTC) and the Institute for Critical Technology and Applied Science (ICTAS).*

See 2013-14 Goal #6 above.

2. *Use LISA to recruit to Virginia Tech statistics graduate students who are eager to apply their statistical knowledge to solve real-world problems and help researchers make discoveries in diverse fields.*

See 2013-14 Goal #4 above.

3. *Create opportunities for LISA statistical collaborators to become involved "on the ground" in research projects around the world.*

"On-the-ground statisticians" and LISA collaborators Mark Seiss, Marcos Carzolio, and Dr. Eric Vance were co-authors of a report in 2013-14 summarizing the impact of the MCC-funded Mozambique rural water supply activity to install handpumps in villages without access to clean water.

4. *Present talks at national conferences so that LISA becomes recognized across the country as a model for academic statistical consulting and collaboration.*

See Goal #6 from 2011-2012 above. LISA considers "collaboration" to be helping the researcher answer her *research* questions and "consulting" to be helping the researcher answer her *statistical* questions. Since August 2008, LISA's focus has been on collaboration over consulting.

5. *Improve the integration between LISA and the two graduate statistics courses "Introduction to Statistical Program Packages" and "Communication in Statistical Collaborations." The latter course is designed to teach second-semester statistics graduate students what they need to know to be effective statistical collaborators that they don't learn in their other, more technically focused statistics courses.*

In Spring 2014, "Communication in Statistical Collaborations" was split into two sections of undergraduates and graduate students. Dr. Jane Robertson taught the undergraduate statistics majors. Dr. Eric Vance taught the graduate students and, due to the split, was able to intensify, accelerate, and improve the training of the graduate students to become effective statistical collaborators.

6. *Use weekly meetings and Video Coaching and Feedback Sessions to improve LISA collaborators' overall statistical collaboration skills, including communication skills and technical statistical skills.*

Weekly meetings and Video Coaching and Feedback Sessions have become a regular part of LISA's education and training program. See page 28 for more details.

Services

Collaboration Projects

As a *laboratory* for interdisciplinary statistical analysis, LISA creates new knowledge in at least four ways:

1. We help researchers answer questions they could not have answered without expert statistical advice.

2. Based on our understanding of the researchers' goals and their data, we may suggest novel questions their data can answer.

3. When we encounter new types of data for which standard statistical methods do not apply, we create new knowledge by developing novel statistical methods that enable researchers to extract useful information from their data.

4. We are researching the process of statistical collaboration itself, advancing knowledge in best practices for statistical collaboration and how to improve one's statistical collaboration skills.

In collaboration meetings, we focus on points 1-3 above, contributing statistical expertise to research projects in many disciplines. Collaboration meetings typically last for one hour, with multiple follow-up meetings as necessary. LISA statistical collaborators meet with researchers to discuss their research goals, the nature of the data collected or to be collected, how the data can be analyzed to answer the researcher's specific questions, what the statistical results mean in terms of the research goals, and how the researcher can explain the results to his or her intended audiences. After and between meetings, LISA collaborators typically analyze the clients' data or conduct background research to determine the most appropriate statistical analysis for the client.

LISA met with researchers during the fall 2013 semester on 117 projects for a total of 2948.5 hours. In spring 2014, LISA met with researchers on 156 projects for 2524.75 hours. In the summer semester LISA met with researchers on 84 projects for 710.5 hours. In total, LISA worked on 357 collaborative projects with researchers from 66 departments. Table 1 below summarizes these numbers.

Table 1. Collaboration clients and hours for the 2013-14 academic year

Collaboration	Fall 2013	Spring 2014	Summer 2014	Total
Clients	117	156	84	357
Hours	2948.5	2524.75	910.5	6383.75

Short Courses

LISA teaches a series of evening short courses each semester to help graduate students apply statistics in their research. The focus of these two-hour courses is on learning practical statistical techniques for analyzing or collecting data. Taught by graduate students and faculty from LISA and the Department of Statistics, these short courses proved to be very popular, with 506 students, faculty, and staff attending. The tables below describe the course titles, instructors, dates, and attendance for the 24 short courses. Seven of these courses were taught twice due to limited classroom size. In 2013-14, **LISA taught a total of 30 short course sessions.**

Table 2. Short Course titles, instructors, and attendance for 2013-14

Fall 2013

Date	Title	Attendance
September 23 & 24, 2013	"Basics of R" by Ana Maria Ortega Villa[2]	40
September 30 & October 1, 2013	"Statistical Analysis in R" by Ning Wang[2]	33
October 7 & 8, 2013	"Graphing with R" by Ian Crandell[2]	31
October 17, 2013	"Survey Design and Analysis" by Marcos Carzolio	16
October 24, 2013	"Design of Experiments" by Jennifer Cheng	20
October 31, 2013	"T-tests and ANOVA" by William Tyler Bradley	27
November 4 & 5, 2013	"Introduction to JMP" by Yiming Peng[2]	20
November 12, 2013	"Nonparametric methods featuring the bootstrap" by Jon Atwood	20
November 21, 2013	"Regression Methods" by Olawale Awe	22
	Total	**229**

Spring 2014

Date	Title	Attendance
February 11, 2014	"Basics of R" by Ana Maria Ortega Villa	20
February 18 & 20, 2014	"Statistical Analysis in R" by Shuyu Chu[2]	26
February 25 & 27, 2014	"Graphics in R" by Xinran Hu[2]	16
March 4 & 5, 2014	"Introduction to JMP" by Yiming Peng[2]	16

March 18, 2014	"Advanced Topics in R: parallel processing, structural equation modeling, and the bootstrap" by Ian Crandell	9
April 1, 2014	"Survey Design and Analysis" by Olawale Awe	7
April 10, 2014	"Accelerating statistical calculations using inexpensive graphics cards" by Anders Eklund	23
April 15, 2014	"Multiple Imputation and Missing Data" by Jon Atwood	11
	Total	**128**

Summer 2014

Date	Title	Attendance
June 18, 2014	"Basics of R" by Olawale Awe	25
June 25, 2014	"Statistical Analysis in R" by Ian Crandell	36
July 2, 2014	"Graphics in R" by Dr. Chris Franck	27
July 9, 2014	"T-tests, ANOVA, and Rank-Based Tests" by Dr. Benedicto Kazuzuru	13
July 16, 2014	"SQL in R" by Xinran Hu	22
July 23, 2014	"Parametric Versus Semi/nonparametric Regression Models	18
July 30, 2014	"Factorial Experiments: Blocking, Confounding, and Fractional Factorial Designs" by Emanuel Msemo	8
	Total	**149**

[2] Two sessions of these courses were taught because of limited classroom size.

Walk-In Consulting

To offer assistance to Virginia Tech researchers who might not require the intense, personalized efforts of the collaboration meetings, **LISA provides walk-in consulting for answering quick questions and giving statistical advice** on smaller, simpler projects. Assistance is limited to less than 30 minutes when others are waiting.

In 2013-14, LISA **Walk-in consultants were available for 788.75 hours**, which is an increase of 180 hours from last year. Our standard time and location for Walk-in Consulting was Monday-Friday from 1-3PM in the GLC Video Conference Room. Additional times and locations were added to keep up with the heavy demand.

LISA Walk-in consultants met with 161 visitors during fall 2013, 203 during spring 2014, and 105 during the summer sessions. During the 2013-14 academic year, **LISA Walk-in consultants met with a total of 469 clients from 60 departments.**

Table 3. Walk-In Consulting times and locations during 2014-15.

Semester	Day and Time	Location
Fall	Monday-Friday 1-3 pm (standard)	GLC Video Conference Room
Fall	Monday/Friday 3-5 pm (additional)	312 Sandy Hall
Fall	Tuesday/Wednesday 11 am - 1 pm (additional)	Port (Torgersen/Newman Library Bridge)
Fall	Thursday 9:30-11:30 am (additional)	ICTAS Café X
Spring	Monday-Friday 1-3 pm (standard)	GLC Video Conference Room
Spring	Monday 3-5 pm (additional)	312 Sandy Hall
Spring	Monday-Friday 1-3 pm (standard)	Port (Torgersen/Newman Library Bridge)
Spring	Wednesday 11 am - 1 pm (additional)	OSB (Old Security Building)
Summer	Monday-Friday 1-3 pm (standard)	GLC Video Conference Room
Summer	Monday-Friday 11 am - 1 pm (additional)	OSB (Old Security Building)

Table 4. Walk-In Consulting clients and hours for the 2013-14 academic year

Walk-In	Fall 2013	Spring 2014	Summer 2014	Total
Clients	161	203	105	469
Hours	274.75	240	274	788.75

Total Clients and Hours

The two plots below (Figures 3 and 4) show the total number of LISA clients and reported hours for our three main services of Collaboration, Walk-in Consulting, and Short Courses for the past eight academic years. LISA was created in spring 2008 to succeed the Statistical Consulting Center, which was created in 1973 (with roots going back to 1948). In summer 2008, LISA began offering short courses. In fall 2008, LISA began offering Walk-in Consulting.
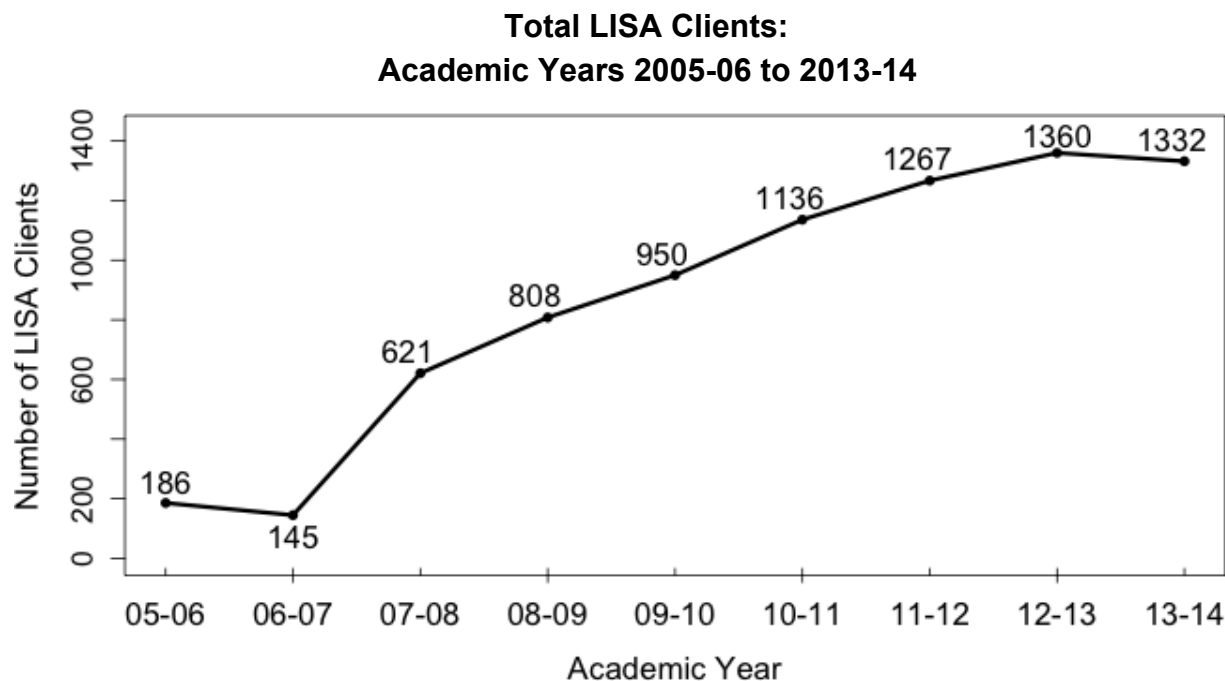
Total LISA Clients:
Academic Years 2005-06 to 2013-14

Figure 3. Total number of LISA clients (including collaboration clients, walk-in visitors, and short course attendees) in academic years 2005-06 to 2013-14
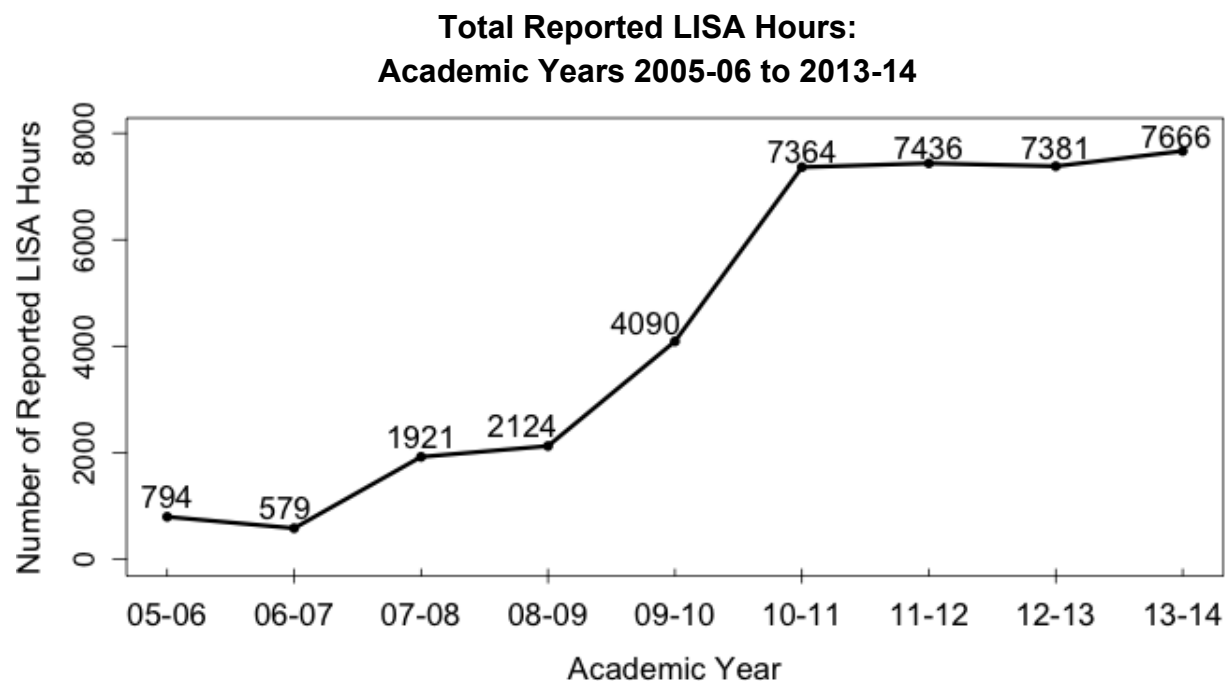
Total Reported LISA Hours:
Academic Years 2005-06 to 2013-14

Figure 4. Total number of reported hours for Collaboration, Walk-In Consulting, and Short Courses

Feedback from Clients

At the conclusion of each academic term, clients who requested statistical collaboration meetings are asked to fill out a feedback survey evaluating their experience with LISA. Below are the summaries of two of the survey questions (Figure 5) and a selection of comments (next page) from clients in each of the eight colleges at Virginia Tech and VTC. By counting "Other" responses as half "Yes" and half "No", **95% of LISA clients considered LISA's services "helpful", and 94% were satisfied with their overall LISA experience.**
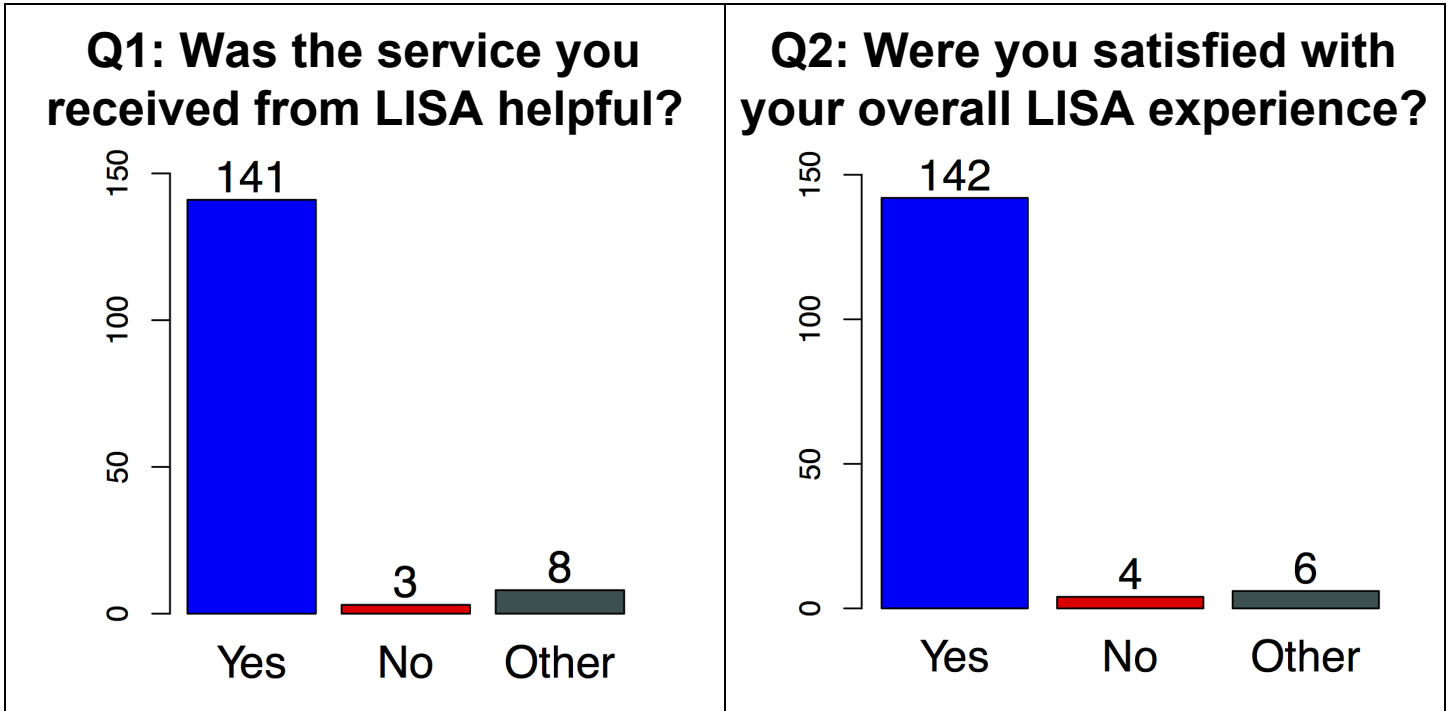
Figure 5. Summary of quantitative feedback on collaboration meetings

Selected Client Quotes

Lorien MacAuley, Graduate Student, Agricultural and Extension Education, CALS
LISA is like having a team of expert statisticians on your project, which makes Virginia Tech into a quality research institution and helps Virginia Tech fulfill its land grant mission for excellence in research. The LISA office is a vital component of the university to ensure that Virginia Tech takes its place as a top tier research institution.

Eric Negangard, Graduate Student, Accounting and Information Systems, PCOB
Jennifer was really easy and fun to work with! She provided expert guidance.

Emily Mikkelson, Graduate Student, Mechanical Engineering, COE
Both Xinran Hu and Olawale Awe were very helpful and quickly provided clear assistance in the analysis I wanted to complete - they gave great guidance and were very thorough in making sure that we were suggesting the appropriate statistical approach.

Sarah Casey, Graduate Student, Biomedical Sciences and Pathobiology, CVM
The folks who helped me were very helpful and informative. They had good insight into what I was asking/talking about. Both were very knowledgeable of statistics and were able to explain how to go about doing the stats and what the data meant.

Kristopher Brown, *Graduate Student, Forest Resources and Environmental Conservation, CNRE*
Ana and Ian worked hard to understand our study objectives. I was confident that they understood how we collected the data and how this impacted what model effects we should include in the analysis. I always walked away from meeting feeling like I wanted to get back to the office and start working on what we discussed at our meetings. I had direction.

Alex Sumadijaya, Graduate Student, Biology, COS
Ian & James are just a perfect combination. They creatively collaborated to solve my problem. They really understood my pain and quickly performed a beautiful orchestra of a solution above my expectations.

Anamaria Bukvic, Faculty, Urban Affairs and Planning, CAUS
Anganag Zhang - great experience, very responsible, responsive, answered all the questions, provided clarification - immediately picked up on problem and was able to discuss and deliver everything in a timely manner

Ted Fuller, Faculty, Sociology, CLAHS
They did a good job of "checking in" with me and with each other frequently to make sure we were all "on the same page", i.e., had the same understanding of the problem.

Chris Reed, Medical Student, Virginia Tech Carilion School of Medicine
Both Yiming and Alice were professional and friendly, and were able to rapidly identify my scientific needs and concerns as well as elaborate their own questions or clarifications in a way that was easy for me to understand. They also should both be commended for how hard they have worked on this project, as well as their timeliness-- in addition to the formal meetings, they replied and responded rapidly to emails asking for additional explanation or reformulations of the figures that we have worked out. Our experience has been 100% positive due largely to their motivation and ability.
It has been a pleasure working with Yiming and Alice, as well as learning from Dr. Franck last year-- I hope that the medical school and its affiliates can continue to utilize this resource and hope that this relationship continues to develop in general.

Grants and Grant Proposals Involving LISA

LISA provides statistical support for sponsored projects and collaborates with researchers across disciplines on grant proposals. In 2013-14, LISA was funded on 18 grants. LISA collaborators were co-PIs or key personnel on at least 8 grant proposals.

Funded projects

1. PI Warren Bickel (09/2008–06/2014)
   Statistician: **Chris Franck**
   NIH/NIDA
   "Executive Function Therapy for Stimulant Addiction"
   $5,818, Effort = 5% (0.6 calendar months)
2. PI Warren Bickel and Read Montague (07/2013–06/2015)
   Statistician: **Chris Franck**
   NIH/NIDA
   "Inter-Temporal Trade-offs in the Risky Decisions of Cocaine Addicts"
   $17,454.54, Effort = 15% (1.80 calendar months)
3. PI Hatsukami and Shields (09/2012–08/2017)
   Statistician: **Chris Franck**
   NIH/NCI
   "Models for Tobacco Product Evaluation"
   $5,818, Effort = 5% (0.6 calendar months)
4. PI Sheffer (07/2012–06/2017)
   Co-Investigator/Statistician (subcontract): **Chris Franck**
   NIH/NIMHD
   Reducing Socioeconomic Disparities in Tobacco Dependence Treatment Outcomes
   $5,818, Effort = 5% (0.6 calendar months)
5. PI Warren Bickel (07/2013–06/2018)
   Statistician: **Chris Franck**
   NIH/NIDA
   "Self-Control Improvement Intervention (SCII): Improving Abstinence in Smokers"
   $11,636, Effort = 10% (1.2 calendar months)
6. PI Warren Bickel and LaConte (09/2013–05/2018)
   Statistician: **Chris Franck**
   NIH/NIAAA
   "The Repair of Self-Control in Alcohol Dependence: Working Memory and Real Time fMRI"
   $17,454.54, Effort = 15% (1.80 calendar months)
7. PI Andrew McCoy (08/2013–07/2015)
   Statistician: **Chris Franck**
   Hanley Wood
   "Improving the Value of the Reporting and Intelligence of the Nation's Door, Window and Skylight Manufacturers"
   $50,000 total, $12,500 personal
8. PI Andrew McCoy (11/2013–10/2014)
   Statistician: **Chris Franck**
   Housing Virginia
   "The Impact of Energy Efficiency Construction for LIHTC Housing in Virginia"
   $51,559 total, $12,889 personal
9. PI **Chris Franck** (07/2013–06/2015)
   NIH
   "Enhancing Relapse Prevention for Smoking Cessation with rTMS"
   $19,778 total, $19,778 personal

10. PI Warren Bickel (09/2008–09/2014)
    Statistician: **Chris Franck**
    NIH/NIAAA
    "Executive Function Therapy for Stimulant Addiction (ARRA Supplement)"
    $5,818, Effort = 5% (0.6 calendar months)
11. PI Andrew McCoy (01/2012–01/2014)
    Statistician: **Chris Franck**
    HUD
    "Impact of Market Behavior on the Adoption and Diffusion of Innovative Green Building Technologies"
    $5,818, Effort = 5% (0.6 calendar months)
12. PI **Eric Vance** (05/2013–12/2014)
    Google Faculty Research Awards
    "Building Statistics Capacity in Developing Countries by Educating and Training Statisticians to Communicate and Collaborate with Non-statisticians."
    $40,000 (100% credit)
13. PI Mary Marchant (10/2013–09/2014)
    Co-PI: **Eric Vance** and **Eric Smith**
    USDA/NIFA
    "Improvement and Marketing of the Food and Agricultural Education Information System (FAIES)."
    $220,000 (10% credit)
14. PI **Eric Vance** (11/2013–09/2015)
    Innovative Agricultural Research Initiative, USAID
    "Growing Research Capacity at SUA by Creating a Statistical Collaboration Laboratory."
    This grant supports Eric Vance, Benedicto Kazuzuru, and a future statistics graduate student related to the LISA 2020 program. $72,094 (100% credit)
15. PI Kathy Alexander (05/2014–04/2016)
    Co-PI: **Eric Vance**
    Morris Animal Foundation
    "The Epidemiology of Mycobacterium Mungi—how can we control this emerging disease?"
    $68,036 (20% credit)
16. PI Dan Kauffman (07/2013–06/2014)
    Key Personnel: **Eric Vance**
    USDA
    "A Grocery Store Test Market for Farmer Grown Shrimp that Utilizes Consumer Education"
    This grant provided LISA with $2,000 for statistical collaboration.
17. PI Jennifer Davis (09/2010-05/2014)
    Co-PI: **Eric Vance**, Ralph Hall, and Emily Van Houweling
    Millennium Challenge Corporation
    "Impact Evaluation for the Millennium Challenge Corporation-supported Rural Water Investment in Nampula, Mozambique"
    $814,235 (12.4% credit)
18. Co-PI **Eric Vance** (04/2013-03/2014)
    ASA Member Initiative grant awarded to the Committee on Applied Statisticians
    "ASA Pilot Mentoring Program for Applied Statisticians"
    $9,500

Proposals submitted

1. PI **Chris Franck** (02/2015–02/2018)
   NSF
   "2005-2013 Foreclosures: A study using spatio-temporal analysis, causal modeling and statistical monitoring"
   $498,751 total, $249,375 personal
2. PI **Eric Vance** (08/2014–9/2015)
   USAID

"Innovative Agricultural Research Initiative"

This grant supports travel for Eric Vance and education and training for Richard Ngaya related to the LISA 2020 program.

$60,390 (100% credit)

3. PI **Eric Vance** (09/2014–12/2015)

   Google Faculty Research Awards

   "LISA 2020 Year 2: Building Statistics Capacity in Developing Countries to Solve Real-World Problems"

   $20,000 (100% credit)

4. PI Mary Marchant (10/2014–09/2015)

   Co-PI: **Eric Vance** and **Eric Smith**

   USDA/NIFA

   "Improvement and Marketing of the Food and Agricultural Education Information System (FAIES)"

   $220,000 (10% credit)

5. Co-PI **Eric Vance**

   National Science Foundation: Emerging Infectious Diseases

   "Can group living and the influence of Allee Effects explain infectious disease vulnerability in social species?"

6. Co-PI **Eric Vance**

   National Science Foundation: Coupled Human and Natural Systems

   "The coupled dynamics of human -- dryland river systems: linkages and feedbacks between anthropogenic and environmental drivers of water quality"

7. Key Personnel **Eric Vance**

   National Science Foundation: Discovery Research K-12 Program

   "Studio STEM: Strengthening STEM Workforce Development Through Sustainable Learning Environments"

Publications and Selected Presentations

One of LISA's missions is to **contribute statistical thinking to interdisciplinary research projects**. The natural result of such collaborative projects is a co-authored publication or a series of publications. In 2013-14, LISA collaborators were co-authors on 20 peer-reviewed publications and submitted at least 17 others. **LISA students were co-authors on 10 of these publications.**

Co-authored publications

1. **Franck, C.T.**, Nielsen, D.M., and Osborne J.A., (2013). A method for detecting hidden additivity in two-factor unreplicated experiments. *Computational Statistics and Data Analysis*, 67: 95-104. *Impact factor: 1.151.*

2. Anderson, D.E., **Franck, C.T.**, and Madigan M.L., (2014). Age differences in the required coefficient of friction during level walking do not exist when experimentally-controlling speed and step length. Accepted, *Journal of Applied Biomechanics. Impact factor: 1.26.*

3. Brunson, J.C., Fassino, S., McInnes, A., Narayan, M., Richardson, B., **Franck, C.T.**, Ion, P., and Laubenbacher, R., (2013). Evolutionary Events in a Mathematical Sciences Research Collaboration Network. *Scientometrics*, doi: 10.1007/s11192-013-1209-z. *Impact factor: 2.133.*

4. Bickel, W.K., Wilson, A.G., **Franck, C.T.**, Mueller, E.T., Jarmolowicz, D.P., Koffarnus, M.N., and Fede, S.J., (2014). Using crowdsourcing to compare temporal, social temporal, and probability discounting among obese and non-obese individuals. *Appetite*, 75:82-89. *Impact factor: 3.144.*

5. Boone, J.H., Archbald-Pannone, L.R., Wickham, K.N., Carman, R.J., Guerrant, R.L., **Franck, C.T.**, and Lyerly, D.M., (2014). Ribotype 027 Clostridium difficile infections with measurable stool Toxin have increased lactoferrin and are associated with a higher mortality. Accepted, *European Journal of Clinical Microbiology & Infectious Diseases*. doi: 10.1007/s10096-013-2043-1. *Impact factor: 2.544.*

6. Ball, D.A., Adames, N.R., Reischmann, N., Barik, D., **Franck, C.T.**, Tyson, J.J., and Peccoud, J., (2013). Measurement and modeling of transcriptional noise in the cell cycle regulatory network. *Cell Cycle*,12(19):3203-18. doi: 10.4161/cc.26257. *Impact factor: 5.4.*

7. Levine, M., Moore, A., Kuehl, D., **Franck, C.T.**, and Li, J., (2013), Variation in Use of All Types of Computed Tomography by Emergency Physicians. *The American Journal of Emergency Medicine*,31(10):1437-42. doi: 10.1016/j.ajem.2013.07.003. *Impact factor: 1.152.*

8. Price, J.E., Zipper, C.E., Jones, J.W., and **Franck, C.T.**, (2014). Water and Sediment Quality in the Clinch River, Virginia and Tennessee USA, over Nearly Five Decades. Accepted, *Journal of the American Water Resources Association. Impact factor: 2.074.*

9. Sharma, A., Marchant, M.A, **Vance, E.A**., **Smith, E.P.**, Richardson, W.W., and Hightower, L.S., (2014). National Survey of Study Abroad Programs Conducted in Asia Using the Food and Agriculture Education Information System (FAEIS) Database. *NACTA Journal*, 58(2): 140-147.

10. Monaco, T.A., Taylor, J.A., Langenbach, A., and **Vance, E.A.**, (2014). Intra- and inter-observer reliability of combined segmental measurement techniques for predicting immediate post-deployment intraluminal tracheal stent length in dogs. *Canadian Veterinary Journal*, 55(5): 435-441.

11. Misra, S., **Cheng, L.**, Genevie, J., and **Yuan, M.**, (2014). The iPhone Effect: The Quality of In-Person Social Interactions in the Presence of Mobile Devices. *Environment and Behavior*. DOI: 10.1177/0013916514539755. *Impact Factor*: 2.013.

12. McAvoy, T.J., Salom, S.M., Yu, B., Ji, H.L., Du, Y.Z., **Johnson, N.G.**, Reardon, R., and Kok, L.T., (2014). Occurrence and development of *Eucryptorrhynchus brandti* and *E. chinensis* (Coleoptera: Curculionidae) on *Ailanthus altissima* trees subjected to different levels of mechanical damage. *Biocontrol Science and Technology*, 24:1 (65-79). doi: 10.1080/09583157.2013.847902.

13. Parkunan, V., Johnson, C.S., **Xu, L.**, **Peng, Y.**, Tolin, S.A., and Eisenback, J.D., (2013). Induction and maintenance of systemic acquired resistance by acibenzolar-S-methyl in three cultivated tobacco types. *Plant Disease*, 97:1221-1226.

14. Smith-McKenna, E.K., Resler, L.M., Tomback, D.F., **Zhang, H.**, and Malanson, G.P., (2013). Topographic Influences on the Distribution of White Pine Blister Rust in Pinus albicaulis Treeline Communities. *Écoscience*, 20 (3): 1-15.

15. Prussin, II, A.J., **Li, Q.**, **Malla, R.**, Ross, S.D., and Schmale, III, D.G., (2014). Monitoring the Long-Distance Transport of Fusarium graminearum from Field-Scale Sources of Inoculum. *Plant Disease*, 98(4):497-503.

16. Contreras, R.N., Ruter, J.M., Owen Jr., J.S., and **Hoegh, A.**, (2013). Chlorophyll, Carotenoid, and Visual Color Rating of Japanese-cedar Grown in the Southeastern United States. *HortScience*, 48(12):1452-1456.

17. Giese, G., **Velasco-Cruz, C.**, **Roberts, L.**, Heitman, J., and Wolf, T.K., (2014). Complete Vineyard Floor Cover Crops Favorably limit grapevine vegetative growth. *Scientia Horticulturae*, 170:256-266.

18. Granata, L.A., Bourne, D.W., Flick Jr., G.J., Peirson, M., Riley, T., Croonenberghs, R.E., and **Kensler, J.**, (2014). Effect of Cooling Rates and Temperatures on Quality and Safety of Quahog Clams (Mercenaria mercenaria). *Journal of Food Protection*, 77(5):843–848. doi:10.4315/0362-028X.JFP-13-413.

19. Cartwright, T.J. and **Atwood, J.**, (2014). Elementary Pre-Service Teachers' Response-Shift Bias: Self-efficacy and attitudes toward science. *International Journal of Science Education*, 36(14). DOI: 10.1080/09500693.2014.925152

20. Dart, N.L., Hong, C., and **Bradley, W.T.**, (2014). An improved leaf disc bioassay for detecting *Calonectria pseudonaviculata* in soil and potting media. *Plant Disease*, accepted for publication - First Look posted online July 2, 2014. http://dx.doi.org/10.1094/PDIS-03-14-0233-RE

Publications submitted

1. **Franck, C.T.**, Koffarnus, M.N., House, L.L., and Bickel, W.K., Accurate characterization of delay discounting: a multiple model approach using approximate Bayesian model selection and a unified discounting measure. Under revision, *Journal of Experimental Analysis of Behavior*.

2. Garman, C., **Franck, C.T.**, Nussbaum, M.A., and Madigan, M.L. A bootstrapping method to assess the influence of age, obesity, and gender on probability of tripping as a function of obstacle height. Submitted, *Journal of Biomechanics*.

3. Moody, L., **Franck, C.T.**, Hatz, L., and Bickel, W.K., Impulsivity and polysubstance use: A systematic comparison of delay discounting in mono, dual, and tri-substance use. Submitted, Psychopharmacology.

4. Moore, A., Levine, M., Kuehl, D., **Franck, C.T.**, and Li, J., Computed tomography use and hospital admission rates of emergency medicine physicians. Submitted, *Academic Emergency Medicine*.

5. Rossi, C.G., Arena, S.L., **Franck, C.T.**, Nussbaum, M.A., and Madigan, M.L., Minimum foot clearance during overground walking is lower among females but not affected by obesity. Submitted, *Gait and Posture*.

6. Hall, R.P., Van Houweling, E.A., and **Vance, E.A.**, (2014). The Productive Use of Rural Piped Water in Senegal. *Water Alternatives* (to appear).

7. Seiss, M., **Vance, E.A.**, and Hall, R.P., (2014). The Importance of Cleaning Data During Fieldwork: Evidence from Mozambique. *Survey Practice*, (7)4. Available at: http://surveypractice.org/index.php/SurveyPractice/article/view/243.

8. Gazel, E., Hayes, J., Hoernle, K., **Vance, E.A.**, **Chu, S.**, Kelemen, P., Everson, E., Holbrook, W.S., Hauff, F., van den Bogaard, P., Carr, M.J., and Yogodzinski, G.M. "The Youngest Continents." (Under review in *Nature Geoscience*.)

9. Seiss, M. and **Vance, E.A.** "Improved Matrix Sampling Designs Using A Bayesian Variable Selection Approach." (Under review in *Survey Methodology*.)

10. Simmons, D.R., Young, G., Adams, A., Martin, J.P., **Cheng, J.**, and **Vance, E.A.** "Non-curricular Involvement Promotes Development of Engineer of 2020 Traits for African American Engineers." (Under review in *Journal of Women and Minorities in Science and Engineering*.)

11. Rallos, L.E.E., **Johnson, N.G.**, Schmale, III, D.G., Prussin, II, A.J., and Baudoin, A.B., Fitness of G143A based Resistance to QoIs in *Erysiphe necator* Populations.

12. Rallos, L.E.E., **Johnson, N.G.**, Prussin II, A.J., Schmale III, D.G., and Baudoin, A., (2014). Fitness of Erysiphe necator with G143A-based Resistance to Quinone Outside Inhibitors. *Plant Disease*, accepted for publication - First Look posted online on April 29, 2014.

13. Jong, E., **Peng, Y.**, **Bradley, W.**, Brashear, K., Luxbacher, K., and McNair, H.M., (2014). Development of a PMCH permeation plug release vessel for tracer gas studies in underground mines. *Process Safety and Environmental Protection*. Submitted.

14. Bukvic, A., Smith, A., **Peng, Y.**, and Jones, R., (2014). Psychometric Validation of Measures of Relocation Potential in Disaster-affected Coastal Areas. *Disaster Prev. Manage*. Submitted.

15. **Hoegh, A.** and **Leman, S.**, (2014). A spatio-temporal model for assessing winter damage risk to east coast vineyards. *Journal of Applied Statistics*, accepted for publication posted online December 15, 2014. www.tandfonline.com/doi/abs/10.1080/02664763.2014.987652#.VKwxqns1YZw

16. Hightower, L.S., **Lu, H.,** Marchant, M.A., **Vance, E.A., Smith, E.P.,** Richardson, W.W. (2013) Exploring Baccalaureate Enrollment for Minority Students in Agriculture and Life Sciences Programs. *NACTA Journal*. Submitted.
17. **Vance, E.A.** and Magayane, F., (2014). Strengthening the capacity of agricultural researchers through a network of statistical collaboration laboratories. Submitted to *Proceedings of The 4th RUFORUM Biennial Conference.*

Selected other publications

1. **Awe, O.O.** and **Vance, E.A.**, (2014). Statistics education, collaborative research, and LISA 2020: a view from Nigeria, *Proceedings of the Ninth International Conference on Teaching Statistics (ICOTS9, July, 2014), Flagstaff, Arizona, USA*, 4 pages.
2. **Vance, E.A.** (2014). A conference on statistical practice! *The Statistical Consultant*, 30(2), 4-5.
3. Hall, R.P., Davis, J., van Houweling, E., **Vance, E.A.**, Carzolio, M., Seiss, M., Russel, K. (2014). Impact evaluation of the Mozambique rural water supply activity under a cooperative agreement between MCC and Stanford University. Submitted to the Millennium Challenge Corporation, April 15, 2014, 111 pages.
4. Hall, R.P., van Houweling, E., **Vance, E.**, Carzolio, M., and Davis, J. (2014). Evaluation of eight small-scale solar systems in Cabo Delgado, Mozambique. Submitted to the Millennium Challenge Corporation, April 15, 2014, 51 pages.
5. **Vance, E.A.** (2014). An interview with Doug Zahn. *The Statistical Consultant*, 30(1), 4-7.
6. **Vance, E.A.** (2013). Conference on statistical practice mentoring program to help promote statistics. *Amstat News*, Issue 437. (Cover story)

Selected posters and presentations

1. **Franck, C.T.** "An approach for large scale statistical collaboration in the university setting." Department of Statistics, North Carolina State University, November 2013.
2. Moore, A.B., Levine, M.B., Kuehl, D., **Franck, C.T.**, and Lie, J., "Emergency Department Physician Computed Tomography Utilization and Admission Rates." ACEP annual research forum in Seattle in October 2013.
3. Levine, M., Moore, A., Kuehl, D., **Franck, C.T.**, and Li, J., "Emergency Physician Variation in Admissions for Common Chief Complaints." ACEP annual research forum in Seattle in October 2013.
4. **Pruitt, T.R.** "Introduction to LISA." Virginia Tech Library Staff Association's event for library partners, Blacksburg, VA, March 5, 2014.
5. **Pruitt, T.R.** "Introduction to LISA." Virginia Tech Data Management Bootcamp, Blacksburg, VA, January 10, 2014.
6. **Vance, E.A.** "LISA 2020: How Stat Labs Can Make an Impact Now and in the Future." Joint Statistical Meetings (JSM), Boston, MA, 2014.
7. **Vance, E.A.** "LISA 2020: Creating a Network of Statistical Collaboration Laboratories." Keynote address at the Virginia Academy of Sciences Statistics Meeting, Richmond, VA, 2014.
8. **Awe, O.O.** and **Vance, E.A.** "Statistics Education, Collaborative Research, and LISA 2020: A View From Nigeria." Invited presentation at ICOTS9, Flagstaff, AZ, 2014.
9. **Vance, E.A.** "LISA 2020: Building Statistics Capacity for In-Country Impact Evaluations." Making Impact Evaluation Matter, Manila, Philippines, 2014.
10. **Vance, E.A.** and Magayane, F. "Strengthening the capacity of agricultural researchers through a network of statistical collaboration laboratories." The 4th RUFORUM Biennial Conference, Maputo, Mozambique, 2014.
11. **Vance, E.A.** and **Pruitt, T.R.** "LISA 2020: Creating a network of statistical collaboration laboratories in developing countries." Virginia Tech Deans' Forum on Global Engagement, Blacksburg, VA, 2014.
12. Hall, R. and **Vance, E.A.** "Impact Evaluation of the MCC's Rural Water Supply Project in Mozambique: Enhancing Local Partner Capacity through Collaboration." Deans' Forum on Global Engagement, Blacksburg, VA, 2014.
13. **Vance, E.A.** and Hall, R. "Designing Impact Evaluations in Developing Countries: Leveraging Technology to Collect High-quality Data." 27th Annual Conference of the American Evaluation Association, Washington, D.C., 2013.
14. **Msemo, E.*** and **Vance, E.** "Impacting Agricultural Productivity in Tanzania Through the Wheels of Statistics." JSM, Boston, MA, 2014. ** Winner, Best Contributed Paper Award from the Section on Statistical Consulting*
15. **Awe, O.O.*** and **Vance, E.A.** "LISA 2020: A Vision Towards Research Development in Nigeria." JSM, Boston, MA, 2014. ** Honorable Mention, Best Contributed Paper Award from the Section on Statistical Consulting*

16. **Msemo, E.** and **Vance, E.** "LISA 2020: A Spark for Global Development." Virginia Academy of Sciences Statistics Meeting, Richmond, VA, 2014.

17. **Msemo, E.**, **Awe, O.**, and **Vance, E.** "LISA 2020: A Spark for Global Research Development." Virginia Tech Deans' Forum on Global Engagement, Blacksburg, VA, 2014.

18. **Awe, O.O.** and **Vance, E.A.** "Comparing Statistical Consulting and Collaboration Practices between Nigeria and the United States." ASA Conference on Statistical Practice, Tampa, FL, 2014.

19. **Vance, E.** (host) "Building the LISA 2020 Mentoring Network to Support Newly Created Stat Labs in Developing Countries." Roundtable discussion at JSM, Boston, MA, 2014.

20. Gauvin, J. (chair), **Vance, E.**, Morganstein, D., Chowdhury, D., **Awe, O.**, Lin, L. and Hardnett, F. "Program Reflections and a Panel Discussion on Mentoring" ASA Conference on Statistical Practice, Tampa, FL, 2014.

21. **Vance, E.A.** "LISA 2020: Creating a Network of Statistical Collaboration Laboratories." Google, Mountain View, CA, 2014.

22. **Vance, E.A.**, Awe, O. and Msemo, E. "LISA 2020: Creating a Network of Statistical Collaboration Laboratories in Africa and Beyond." Africa Coalition Brownbag Series, Virginia Tech, Blacksburg, VA, 2014.

23. Hall, R.P. and **Vance, E.A.** "Impact Evaluation of the RWSA in Mozambique." Webinar presented at the invitation of the Millennium Challenge Corporation for more than 30 interested parties around the world, 2014.

24. **Vance, E.A.** "LISA 2020: Building Research Capacity in Developing Countries." Graduate Education Week, Virginia Tech, Blacksburg, VA, 2014.

25. **Vance, E.A.** "LISA 2020: Creating a Network of Statistical Collaboration Laboratories." Department of Biostatistics and School of Statistics, University of Minnesota, Twin Cities, Minneapolis, MN, 2014.

26. **Vance, E.A.** "Using Video and the POWER Process to Improve Statistical Collaboration." School of Statistics Consulting Course, University of Minnesota, Twin Cities, Minneapolis, MN, 2014.

27. Hall, R., Davis, J., **Vance, E.A.** and Van Houweling, E. "Impact Evaluation of the MCC-Funded Rural Water Supply Activity (RWSA) in Nampula, Mozambique." Millennium Challenge Corporation's 2014 Monitoring and Evaluation (M&E) and Economic Analysis (EA) College, Millennium Challenge Corporation, Washington, D.C., 2014.

28. **Vance, E.A.** "LISA 2020: Creating a Network of Statistical Collaboration Laboratories." Department of Statistics, Colorado State University, Fort Collins, CO, 2014.

29. **Vance, E.A.** "LISA 2020: Creating a network of statistical collaboration laboratories." International Year of Statistics Colloquium presented at Sokoine University of Agriculture (SUA), Morogoro, Tanzania, 2013.

30. **Vance, E.A.** "LISA 2020: Criando uma Rede de Laboratorios de Colaboracao Estatistica." International Year of Statistics Colloquium presented at Department of Statistics, Federal University of Rio Grande do Norte (UFRN), Natal, Brazil, 2013.

31. **Vance, E.A.** "LISA 2020: Training statisticians and data scientists to communicate and collaborate with non-statisticians." INFORMS, Virginia Tech, Blacksburg, VA, 2013.

32. **Vance, E.A.** "The Importance of effective communication, LISA, and LISA 2020." Department of Statistics First Year Experience Course, Virginia Tech, Blacksburg, VA, 2013.

33. **Vance, E.A.** "LISA 2020: Creating a network of statistical collaboration laboratories." International Year of Statistics Colloquium presented at Department of Statistics, The Pennsylvania State University, State College, PA, 2013.

34. **Vance, E.A.** "Using Video and the POWER Process to Improve Statistical Collaboration." Department of Statistics Consulting Course, The Pennsylvania State University, State College, PA, 2013.

35. **Vance, E.A.** "Using Video and the POWER Process to Improve Statistical Collaboration." Department of Statistics Consulting Course, University of Georgia, Athens, GA, 2013.

36. **Vance, E.A.** "LISA 2020: Creating a network of statistical collaboration laboratories." International Year of Statistics Colloquium presented at Department of Statistics, University of Georgia, Athens, GA, 2013.

37. **Vance, E.A.**, Smith, H. and Zahn, D. "Learning and Improving Skills to Become a More Effective Collaborator." Continuing Education Personal Skills Development Workshop, JSM, Boston, MA, 2014.

38. **Vance, E.A.** "Learning and improving skills to become an effective statistical collaborator." Tutorial, ASA Conference on Statistical Practice, Tampa, FL, 2014.

39. **Vance, E.** "Oficina (Workshop) Statistical Collaboration." University of Rio Grande do Norte (UFRN), Natal, Brazil, 2014.

40. Panelists: Furlong, C. (Statistics Without Borders), Cochran, J.A. (The University of Alabama), Gunaratna, N.S. (Harvard School of Public Health), Pierson, S. (ASA), and **Crandell, I.** (Virginia Tech). "The Glocal Impact of Statistics Without Borders and StatCom: Can We Make It Enduring?" Joint Statistical Meetings, Boston, MA, 2014.

Video Coaching and Feedback Sessions

LISA's main activity is interacting with clients during collaboration meetings to help them advance their research through the collection, modeling, analysis, and interpretation of data. In fall 2010, **LISA began collecting and analyzing data on itself to improve collaboration meetings by video recording meetings, watching the videos, and then analyzing them** in a small group setting of typically 5-7 participants, including 1 faculty member, 1 note taker, 1-2 "stars" of the video, and 1 or more additional students.

Of the 60 LISA statistical collaborators, 39 who regularly met with clients in 2013-14 had at least one collaboration meeting videoed and reviewed. Coaching and feedback in **these review sessions focused on how to improve collaboration skills.** Participants focused on three aspects of the meeting:

1. Interpersonal relationships between the client and collaborators

2. Intrapersonal attitudes and emotions

3. Technical aspects of the meeting, including whether the client understood the statistical advice.

After reviewing 38 collaboration meetings in 2013-14, we were pleased to discover that these **video coaching and feedback sessions still yield immediate benefits for the participants**, who learn what to stop doing (e.g., speaking before thinking, excess fidgeting, being disengaged) and what to start doing (e.g., ask the client what she wants from the meeting, paraphrase the overall research goals). Repeated video sessions offer **opportunities for LISA statistical collaborators to practice new techniques** and to verify if they actually work in practice **to improve statistical collaboration.**

Table 6. Video Coaching and Feedback Session Totals for 2013-14

	Fall 2013	Spring 2014	Total
Videos Watched	16	22	38
Collaborators Reviewed	24	29	53 (38 unique)
Video Coaching and Feedback Sessions	17	23	40

2013 Outstanding LISA Collaborator of the Year

LISA, Virginia Tech's Laboratory for Interdisciplinary Statistical Analysis, is pleased to announce that the 2013 Outstanding LISA Collaborator of the Year is Yiming Peng, a fifth year statistics Ph.D. student from Chuzhou City, China.

LISA provides research infrastructure for Virginia Tech faculty, staff, and students to use statistics and data science in their research. LISA's statistical collaborators are trained to help researchers design experiments; collect, analyze, and plot data; run statistical software; interpret results; and communicate statistical concepts to non-statisticians.
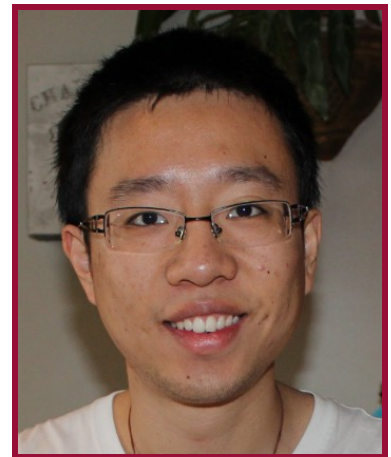
At the end of a collaboration project, clients are asked to complete a feedback survey about the quality of service they received and if they were satisfied. This survey provides clients the opportunity to nominate a statistical collaborator for the award as well as to provide feedback for the improvement of the collaboration service as a whole and for individual collaborators.

During 2013, LISA received 57 nominations for the Outstanding LISA Collaborator of the Year award.

Since joining LISA in summer 2010, Yiming has worked on 89 collaboration projects. Clients find Yiming respectful and considerate, often complimenting his meeting organization skills. He takes the time to thoroughly understand their research and make sure that the statistical methodology he chooses is the most appropriate for answering their research questions. In addition to his work on collaboration projects, he has also presented four short courses for the LISA Short Course series and has hosted Walk-In Consulting for seven semesters.

As well as being an excellent leader, clients often note how well Yiming works with his partner collaborators. He often builds his teammates' confidence and develops them into much stronger collaborators. Tina Bhandari was especially impressed with the assistance she received. "Yiming and Wei were exceptional. They were truly exemplary and I would recommend that others learn from them. My problem may have been simple for them, but their professionalism and understanding of the client was also exemplary. If there is a way I can get them more recognition for the work they do please let me know."

Jason Perry, a distance graduate student in the School of Education, wrote in his nomination, "Yiming quickly had a vision for my research. He asked very good questions which caused me to think." This insight would develop into a collaborative co-authorship with Jason later adding, "Yiming Peng was tremendously helpful with all aspects of this project," and, "Yiming Peng is a great communicator and statistician." Due to the care he takes with projects, Yiming is currently working on five co-authored publications with his clients.

"Yiming is a fantastic statistical collaborator," says Eric Vance, director of LISA. "He takes the time to fully understand the clients' research and then he comes up with a plan for how to use statistics to

answer the research questions. This makes him very popular with clients as a co-author and collaborator in their research."

There were three other finalists for the Outstanding LISA Collaborator of the Year award: Jon Atwood, Ian Crandell, and Jonathan Stallings. Below are a few quotes received from clients for each of these honorees.

Clients were impressed with the care Jon Atwood gave to explaining any statistical methodologies suggested in meetings. Carla Tyler, a graduate student in population health sciences, wrote, "Jon was very patient with me, and when I asked questions he did his best to answer them. He really took the time to make sure that I didn't leave the meeting without understanding what was going on. Jon also thought of different ways in which to test the data that I hadn't even considered." Jonathan Manz, graduate student in education leadership and policy studies, echoed this sentiment: "I had a plan of analysis going into the project. Being a bit of a novice researcher I wanted to make sure that plan was solid. Jon helped further define my plan and help me understand what I was doing. Jon Atwood is very good at explaining statistics. He would make an excellent statistics professor."

Ian Crandell is always willing to try something new and go the extra mile. After working to improve the "Graphics in R" short course he developed the ambitious "Advanced Topics in R: parallel processing, structural equation modeling, and the bootstrap". His ambitious nature and technical prowess are very appreciated by clients. Harold Trease, a faculty member in electrical and computer engineering, included Ian in a major proposal and wrote, "I found the support from LISA to be timely, responsive, and very helpful. This support filled a technical gap in statistical analysis and information theory for a major VT proposal that was submitted to the IARPA JANUS project on Dec. 23rd. I was impressed enough about the LISA program that I recommended it as a model to the Statistical and Information Analysis Group at the Pacific Northwest National Laboratory (which is where I worked before coming to VT last July)." After working with Ian, Kristopher Brown, a forest resources and environmental conservation graduate student, wrote that he "...felt great. I was satisfied with the statistical analyses that we decided upon. We discussed the model results and performed model diagnostics. I felt like we had closed the book on the statistical analyses that needed to be done for my manuscript, and we had done just that."

Jonathan Stallings was the 2012 Outstanding Collaborator of the Year. In 2013 he continued to impress clients with his efficiency and overall great disposition. Bradford Wiles, human development graduate student, wishes more statisticians were like Jonathan, writing, "...if the statistical consulting world were made up of individuals like this, nobody would be afraid of quantitative analysis." Linda Taylor, a horticulture graduate student, added, "Jonathan was very knowledgeable and helpful. He

thought of several things that I did not - and he had just been introduced to the research! I was very impressed by him." In addition to working with LISA, Jonathan is the currently the President of both the Mu Sigma Rho Virginia Alpha Chapter and the Statistics Graduate Student Assembly. He also serves as the Assistant Director of the Department of Statistics Student Outreach Seminar. He has also the first recipient of the John Bartko '62 Prize in Statistics for excellence in statistical collaboration, communication, and consulting in 2013.

Honorable mentions in alphabetical order include William Tyler Bradley, Marcos Carzolio, Jennifer Cheng, Lulu Cheng, Shuyu Chu, Michelle Collura, Jack DiTrapani, Andy Hoegh, Xinran Hu, Jian Huang, Wei Ma, Emanuel Msemo, Ana Maria Ortega Villa, Xiaoyue Shu, Ning Wang, and Miao Yuan.

StatCom

Statistics in the Community—StatCom for short—was first established by graduate students from the Department of Statistics at Purdue University in 2001 to provide professional statistical consulting services to non-profit and governmental organizations in the community free of charge. With the support of the American Statistical Association, StatCom now exists over an international network of colleges and universities, each with its own interpretation of how StatCom can serve their community. The graduate students in the Department of Statistics at Virginia Tech began a StatCom program in 2008 and promptly joined the growing StatCom Network.

➢ During the last year, StatCom has begun collaboration with medical researchers at Lewis Gale Memorial Clinic in Blacksburg, VA. Drs. Fagg, Ford, and Minnae wanted to replicate a study on the detection of bacterial infections. StatCom was able to direct the doctors to the appropriate statistical methods to both collect and analyze their data.

➢ StatCom performed outreach and networking at the 2014 JSM in Boston by giving a topic contributed talk in the survey research methods section.

Virginia Tech StatCom Director Ian Crandell presents at JSM 2014.

President's Award for Excellence

Virginia Tech News Article by Rosaire Bushey on 2014-04-25.

Tonya Pruitt, administrative specialist for the Laboratory for Interdisciplinary Statistical Analysis in the College of Science at Virginia Tech, has received the university's 2014 President's Award for Excellence.

The President's Award for Excellence is presented annually to up to five Virginia Tech staff employees who have made extraordinary contributions by consistent excellence in the performance of their job or a single incident, contribution, or heroic act. Each recipient is awarded a $2,000 cash prize.

In 2009, Pruitt began providing part-time administrative support for Virginia Tech's Laboratory for Interdisciplinary Statistical Analysis which was created the year before to provide research infrastructure in statistics for the university.

"As Tonya has grown professionally and gained more skills, the laboratory has also grown," wrote Eric Vance, research assistant professor in the Department of Statistics and director of the Laboratory for Interdisciplinary Statistical Analysis, in his letter of nomination.

In 2013, the laboratory helped 1,453 researchers across Virginia Tech in its three main services of statistical collaboration meetings, walk-in consulting, and educational short courses. Pruitt organized and administered all these services.

"Now in 2014, Tonya is enabling us to build a network of 20 statistical collaboration laboratories in developing countries by 2020 so that more people around the world will benefit from statistical thinking," added Vance. "Her combination of organizational skills and sense of personal responsibility exemplify the qualities we all aspire to. She is able to anticipate challenges and frequently has solutions for problems before they even arise. Her contributions have made the Department of Statistics a better place for all faculty, staff, and students, and her service is an indispensable part of the laboratory's success."

"I appreciate many things about Tonya — her cheerful nature, that she always arrives and departs on time, that she supports the activities of the department, and that she willingly participates in staff activities," wrote Eric P. Smith, professor and head of the Department of Statistics, in his letter of support. "However, what I am most impressed with is her willingness to help, in a careful and timely manner with many of the tasks that are not part of her job description.

"I feel I can trust her to get a task done on time and I am always pleased with the care she takes in completing the task," he added. "Tonya is the type of employee we wish for."

JSM

LISA's methods for training statisticians to become interdisciplinary collaborators were featured during an 8-hour workshop in the Personal Skills Development program of the Joint Statistical Meetings (JSM) in Boston in August 2014. The workshop was lead by LISA Director Eric Vance, Doug Zahn from Florida State University, and Heather Smith from Cal Poly San Luis Obispo. Participants learned and practiced how to effectively collaborate with other professionals to solve real-world problems and implement solutions. How well was the workshop received? Participant Forrest Williamson said, "This workshop should be mandatory for all statisticians!"

For the fourth year in a row, LISA was featured in an invited session at JSM. The session, chaired by James Rosenberger of Penn State, was titled, "The Impact of Statistical Consulting Laboratories: Past, Present, and Future," and featured four talks from directors or former directors of stat labs at land grant universities. Kim Love-Myers from the University of Georgia spoke on, "Measuring the Impact of an Academic Statistical Consulting Center." Chris Holloman from Ohio State talked about, "Being Impactful from a Business Perspective: The OSU Statistical Consulting Service." George McCabe from Purdue added his perspective on, "The Impact of Computing on the Transition from

Consulting to Collaboration: A Historical Perspective." Eric Vance concluded the well-attended session with a talk on, "LISA 2020: How Stat Labs Can Make an Impact Now and in the Future."

Emanuel Msemo, a LISA Fellow from the Sokoine University of Agriculture in Tanzania, won the Best Contributed Paper Award from the ASA Section on Statistical Consulting at JSM for his paper, "Impacting Agricultural Productivity in Tanzania Through the Wheels of Statistics." He was awarded a certificate and a cash prize by the Chair of the Section on Statistical Consulting, Walter Ambrosius from Wake Forest. Olawale Awe, a LISA Fellow from Obafemi Awolowo University in Nigeria, was runner-up for the award for his paper, "LISA 2020: A Vision Toward Research Development in Nigeria." Congratulations to both of our outstanding LISA Fellows!

Chris Franck, the LISA Assistant Director, was a panelist in the inspiring and informative JSM session, "Collaborative Statisticians Advancing Their Careers in an Academic Setting."

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to solve real-world problems

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LISA

Virginia Tech's Laboratory for Interdisciplinary Statistical Analysis (LISA) educates statistics students to become interdisciplinary collaborators.

Travel around the world as an *on-the-ground statistician*. Help build the **LISA 2020** network of stat labs in developing countries.

Turn consulting projects into collaborations and co-authored publications that **solve real-world problems**.

Use statistics to **help people**. Collaborate on projects that make positive impacts on people around the world.

PhD student Marcos Carzolio (left) working as an *on-the-ground statistician* with a survey team leader in Mozambique

Visit **www.lisa.stat.vt.edu** for more info about LISA

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Future Plans

Statistical collaboration is a very powerful, effective, and impactful approach to solving research problems big and small. We believe we have created a model statistical collaboration laboratory at Virginia Tech that is both extraordinary and unique. Our efforts toward continuous improvement in 2014-15 will focus on six points that will make LISA even *more* extraordinary and *less* unique. LISA will continue its efforts to provide high quality training for its students and faculty and high quality research, service, and education for clients at Virginia Tech and will help statistical collaboration laboratories at other universities to do the same through the LISA 2020 program. Measurable goals are listed below for each point of focus.

2014-15 Goals

1. *Stabilize LISA and ensure its continued success as research infrastructure for Virginia Tech by securing permanent and increased funding from Virginia Tech.*
   - ➢ Engage in at least one meeting between LISA, the newly appointed Head of the Department of Statistics, and the relevant Virginia Tech administrators about the next steps to secure permanent and increased funding for LISA.

2. *Fund LISA's research and discovery efforts to better understand how to train statisticians to become effective interdisciplinary collaborators.*
   - ➢ Submit at least one NSF proposal related to the training of statistics graduate students.

3. *Grow the LISA 2020 network of statistical collaboration laboratories.*
   - ➢ Help establish at least two LISA 2020 stat labs in developing countries. Partner with at least three domestic universities or institutions to grow and strengthen the LISA 2020 domestic network.

4. *Recruit high quality students to the statistics graduate program because they want to gain experience in LISA applying statistics to help people solve real world problems.*
   - ➢ Interview all incoming students to see if LISA was a major deciding factor in choosing to attend Virginia Tech and whether they would have applied to Virginia Tech if not for LISA. Produce and disseminate a short recruiting video highlighting LISA's role in the graduate student experience at Virginia Tech.

5. *Quantify and qualitatively document LISA's impacts on student statistical collaborators, on LISA clients, and on LISA clients' research.*
   - ➢ Collect data on the impacts of involvement in LISA on statistical collaborators' technical and non-technical skills and their on-the-job performance. Continue to compile and present the numbers of LISA clients in the LISA Annual Report. Collect and disseminate at least 10 stories of LISA's impact on research at Virginia Tech and around the world.

6. *Build on our connections with VTC to increase the opportunities for statistical collaboration.*
   - ➢ Institute regular LISA Walk-in Consulting hours for visitors from VTC. Seek funding for LISA collaboration, walk-in, and short course services from VTC.

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