



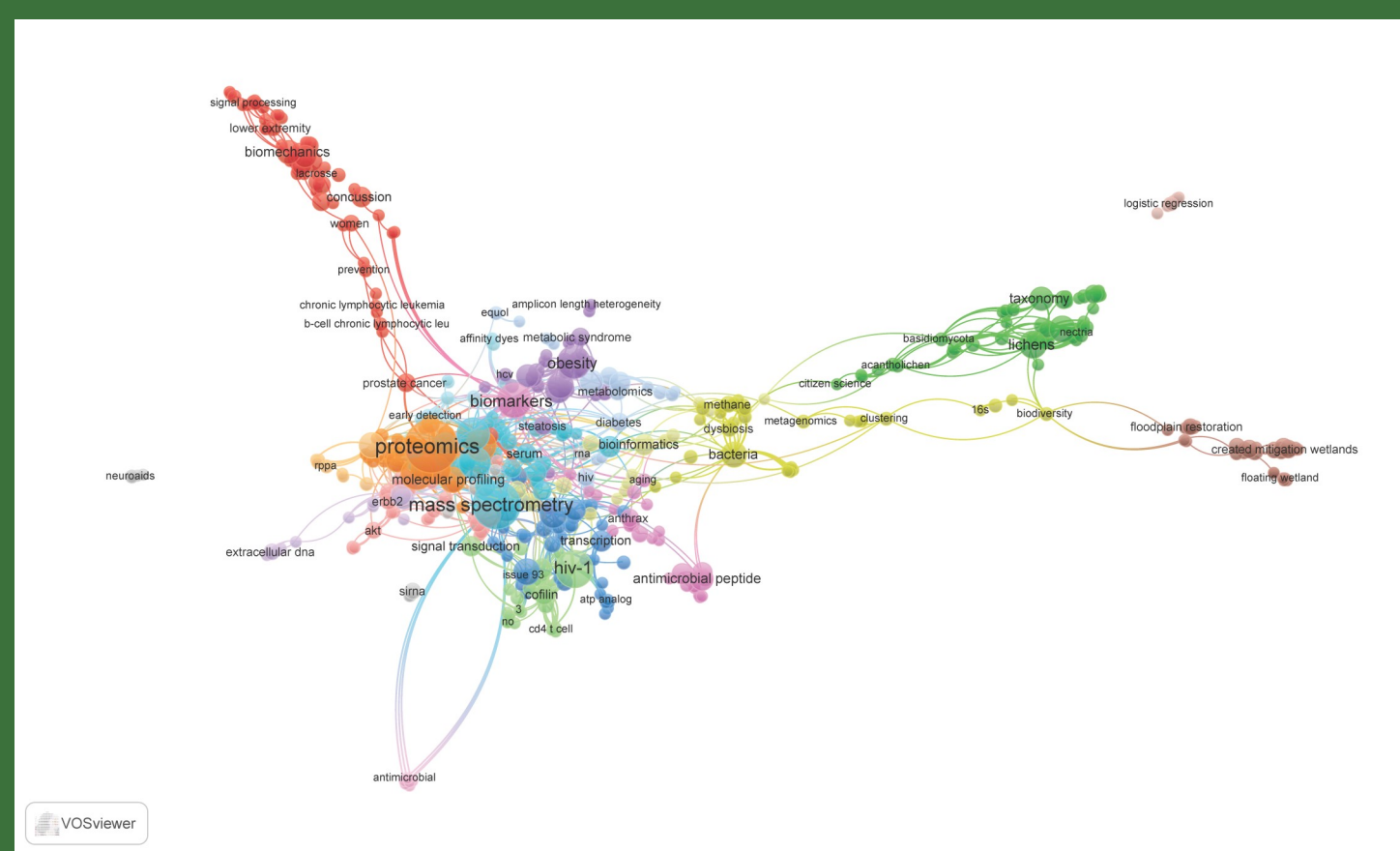
# Beyond Bibliometrics: Understanding Library Services in Multidisciplinary Research



By Pattiya Mahapasuthanon and Kimberly Hoffman

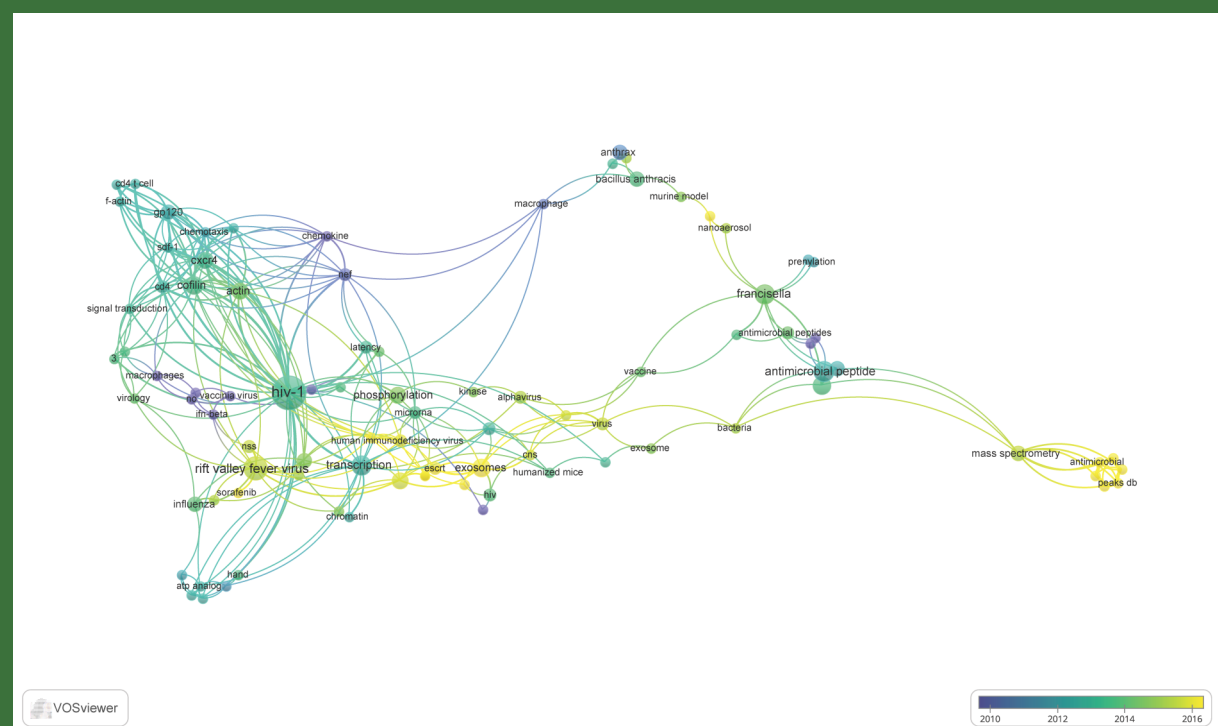
## Abstract

With a strategic initiative from George Mason University (GMU) to become excellent in multidisciplinary research, Mason Libraries fully supports multidisciplinary research activities. Bibliometrics are used across academia to measure research impacts. These measures and resulting visualizations can be used to indicate trends and multidisciplinary connections across university departments and campuses.

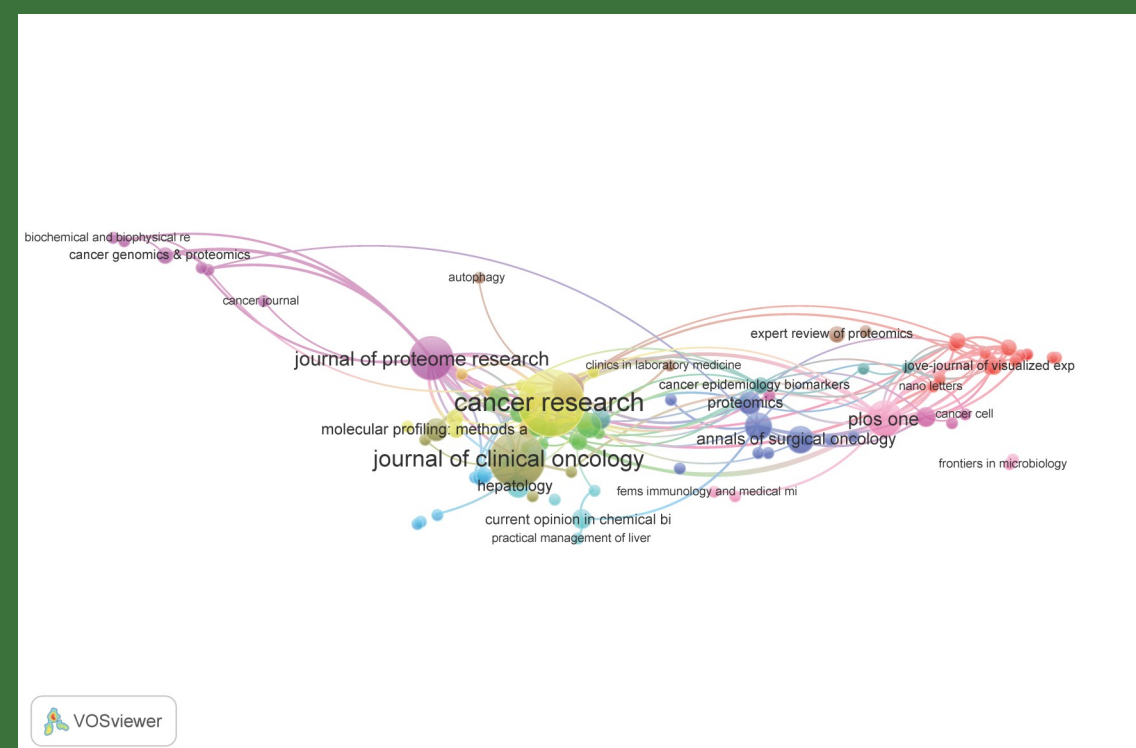


Keyword Co-occurrence across five Centers on the Science & Technology Campus of George Mason University 2006-2017

Mason Libraries began this project in 2017 as an analysis of bibliometrics and funding across the Science and Technology Campus (SciTech) at George Mason University. The results of this analysis demonstrated understanding of research activities and interactions across the five centers at the SciTech Campus. A sixth center, the Virginia Serious Games Institute (VSGI) also resides on the SciTech Campus, but research products from VSGI cannot be visualized by bibliometrics. This project became a survey of the use of analysis and visualizations, beyond bibliometrics, for library services and resources.



National Center for Biodefense and Infectious Diseases (NCBID)  
Keyword Co-occurrence over time 2006-2017



Dr. L. Liotta, Center for Applied Proteomics and Molecular Medicine (CAPMM) publications

The research trends at the SciTech Campus have shifted towards applied health and biological medicine according to the keyword analysis. Bibliometrics can inform by campus, center (or institute,) or by individual researcher.

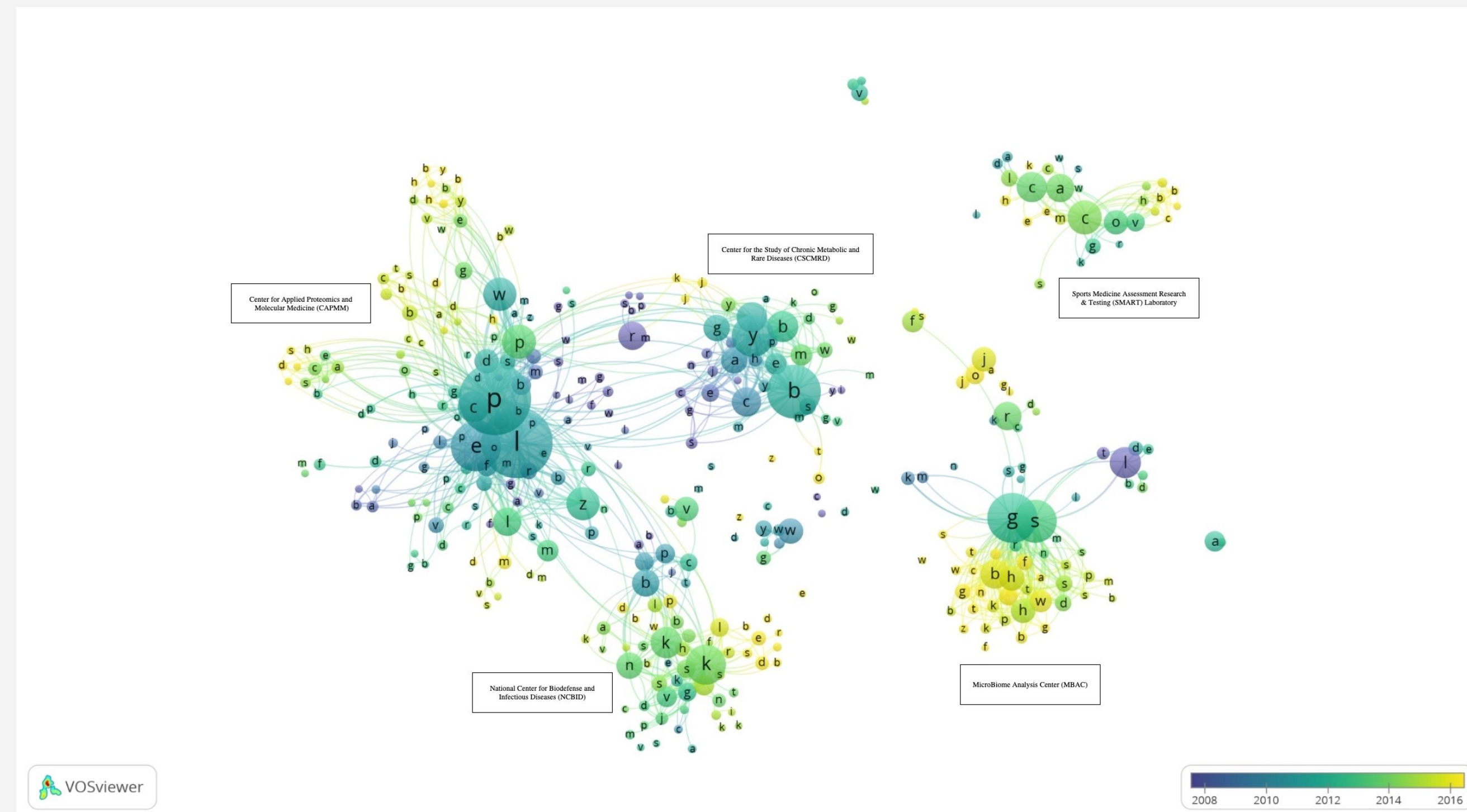
## Research Questions

In order to understand specific research programs at the SciTech Campus, and further these analysis techniques to research support for multidisciplinary institutes, we define following research questions:

RQ1: What has been the research focus at the SciTech Campus over the years (2006-2016)?

RQ2: What can funding analysis and bibliometrics analysis tell us about research activities on the SciTech campus?

RQ3: How can Mason Libraries provide tailored services to researchers in multidisciplinary institutes?



George Mason University, SciTech Campus Centers  
Co-authorship 2006-2017

## Results

### 1. Bibliometric Analysis

The co-occurrence and co-authorship network graphs (above) generated using VOSviewer indicate that researchers from Center for Applied Proteomics and Molecular Medicine (CAPMM) and Center for the Study of Chronic Metabolic and Rare Diseases (CSCMRD) have collaborated in various research projects prior to 2010. The collaboration between the two institutes has expanded to National Center for Biodefense and Infectious Diseases (NCBID). Researchers from Microbiome Analysis Center (MBAC) and Sports Medicine Assessment Research and Testing (SMART lab) have instead expanded their networks with researchers from different universities since 2012.

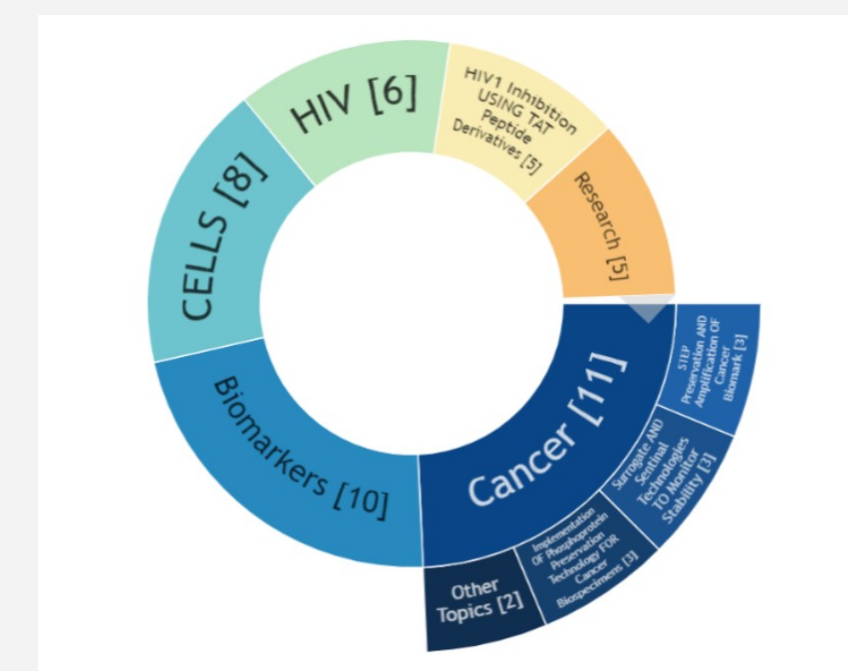
### 2. Funding Analysis

According to the funding analysis, the number of funded research projects associated with the SciTech Campus Centers have been increasing over the years since 2006. Between 2008 and 2017, 2013 is the year with the highest number of funded projects. The top three funding agencies are the National Institutes of Health (NIH), the National Science Foundation (NSF), and the Congressionally Directed Medical Research Programs (CDMRP) respectively. Research activities on the SciTech Campus have grown from biomedicine to applied health over the years.

#### Funding Proportion in Table Format

GMU Funding Agencies	GMU	SciTech	Funding Percentage	Funding Percent...
NATIONAL SCIENCE FOUNDATION	1,704	55	3.23%	
NASA	762	6	0.79%	
NIH	445	149	33.48%	
US DEPARTMENT OF ENERGY	258	34	12.69%	
NOAA	230	1	0.43%	
OFFICE OF NAVAL RESEARCH	221	4	1.81%	
SCIENCE AND TECHNOLOGY FACILITIES COUNCIL	218	4	1.83%	
GEORGE MASON UNIVERSITY	145	45	31.03%	
NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA	185	4	2.16%	
ICREA	181	6	3.31%	
Grand Total	4,359	308		

George Mason University and GMU SciTech Campus  
Data from Web of Science funding analysis 1997-2019



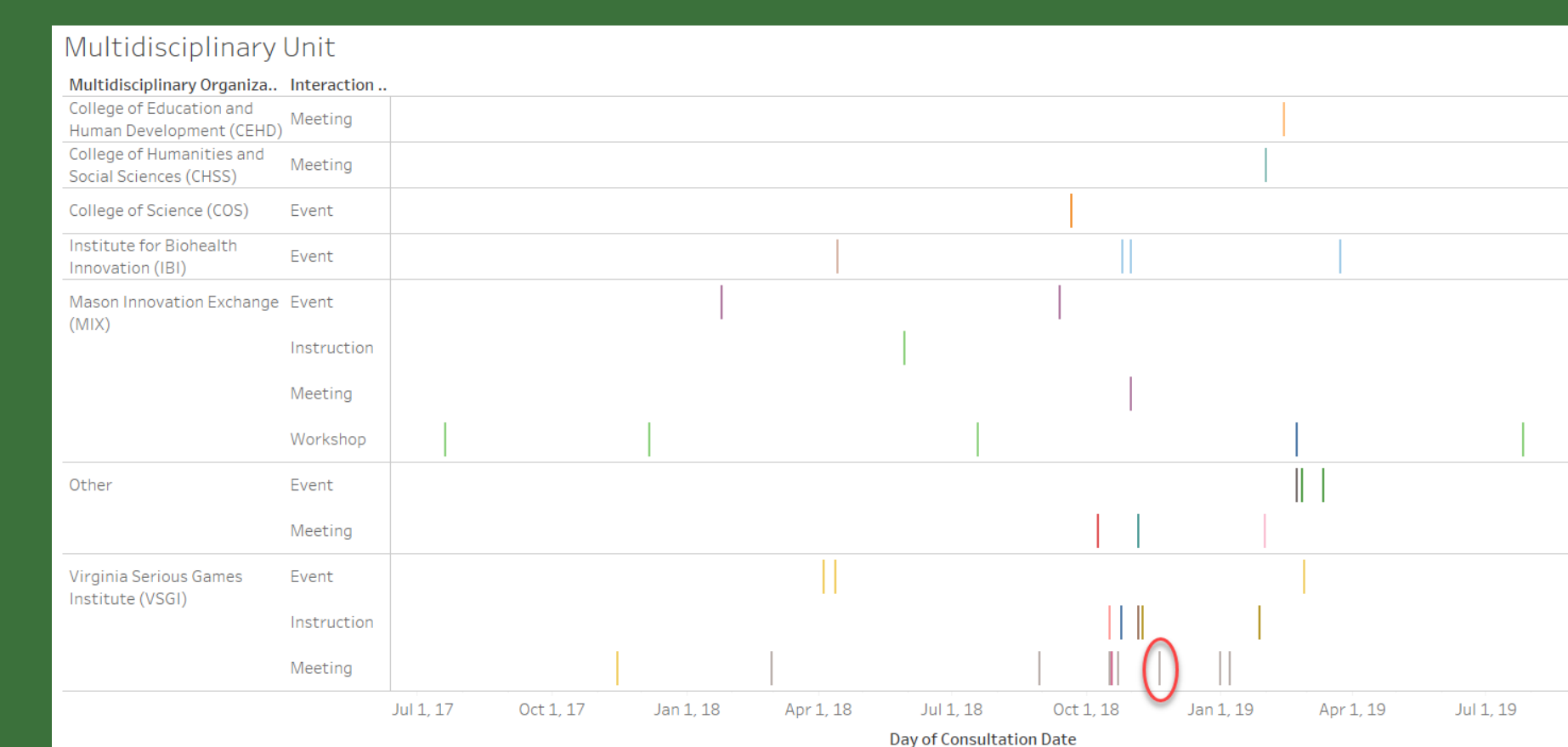
GMU SciTech Campus Research  
Federal RePORTER  
Topic Funding from agencies  
1997-2019

### 3. Experience Mapping

Research and the products of research are changing and are more nuanced. The Virginia Serious Games Institute (VSGI) was established on the SciTech Campus in 2014. Currently, it works on three fronts. These are 1) as an entrepreneurial incubator for start-up companies; 2) as a part of the Computer Game Design program; and 3) as an educational outreach machine which includes the K-12 component the Mason Game and Technology Academy (MGTA.) VSGI was the first multidisciplinary entity studied for this project. Consultation data were collected via a Qualtrics survey. This work can provide a roadmap for subsequent multidisciplinary institutes that have been formed at GMU for how libraries can visualize entrepreneurship, events, and research connections to build library services and research connections.

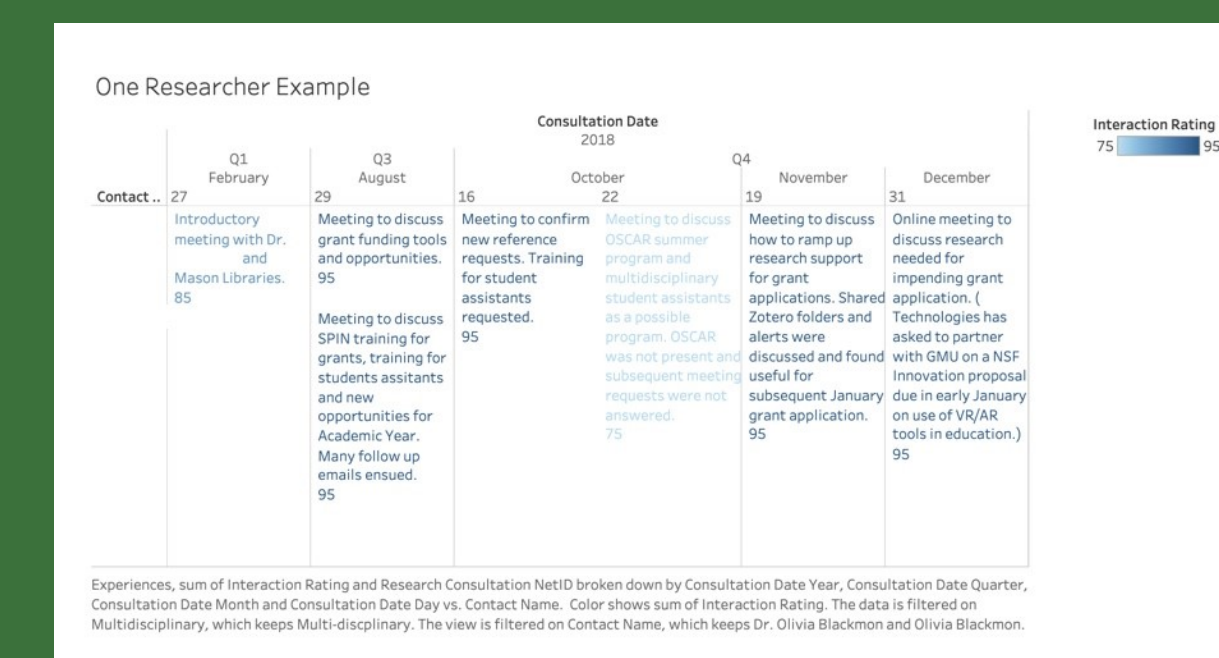
## Methodology

Visualizations were created in VOSviewer based on citations using data from the five research centers mined from Web of Science (WoS.) The publications citations files were created by dividing GMU publications into two timespans: before 1997 and after 1997 [1997 being the founding date of the SciTech Campus.] The search results were filtered from 'after 1997 dataset' in WoS to researchers who are associated with the SciTech campus. Citations from the Federal RePORTER and the Web of Science tools were used to generate various visualizations on funding both based on researchers who are associated with centers at the SciTech campus. Tableau was used to visualize funding sources that propel research on the SciTech campus. Experience Mapping visualizations were created in Tableau from librarian consultation data collected in a pilot project. All data is archived in the Open Science Framework (OSF.)

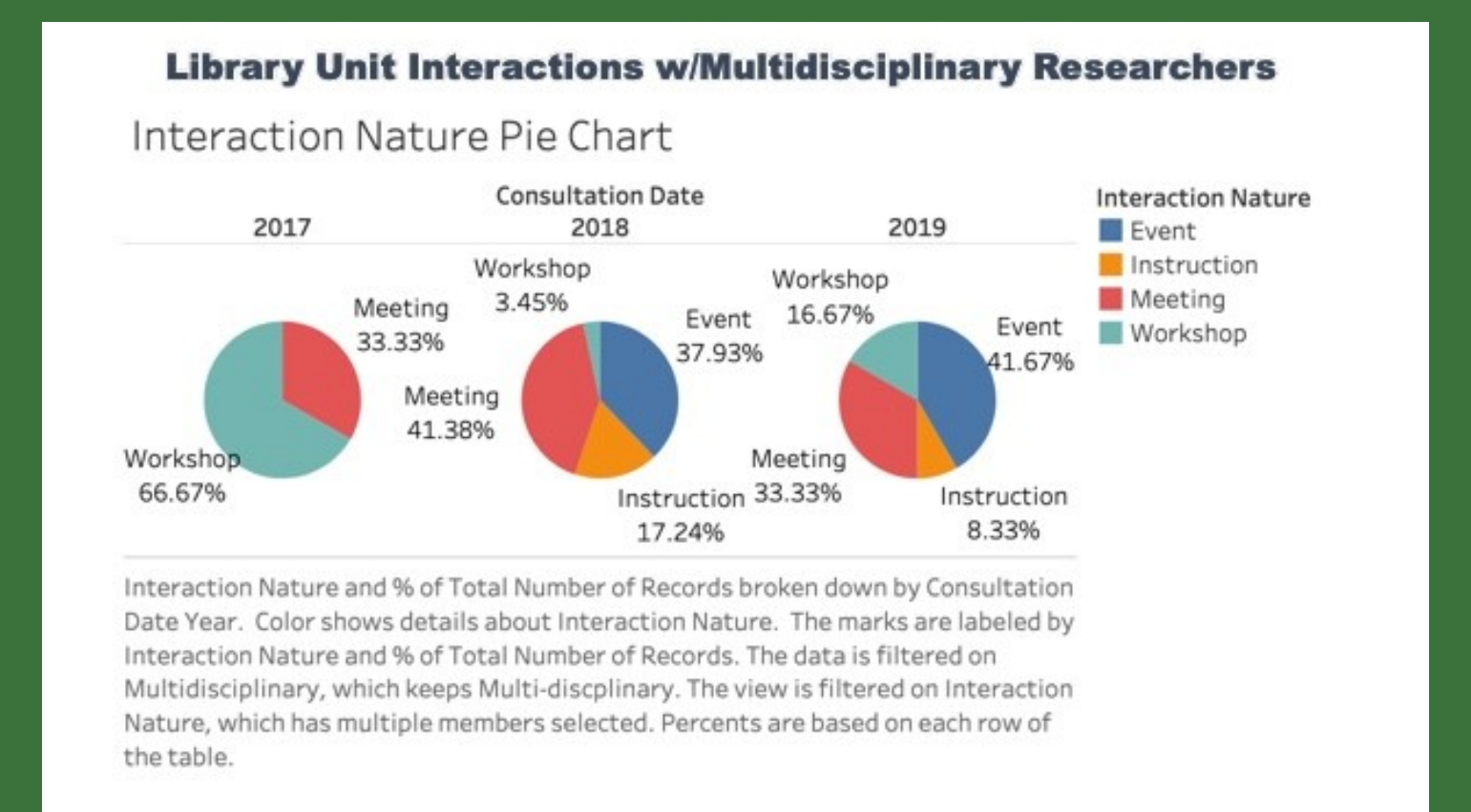


Consultation data were collected over a pilot period to capture and begin to visualize the nature of the library interactions with multidisciplinary entities. A satisfaction scale was implemented for future research context.

Contact Name: Meeting  
Interaction Nature: Multidisciplinary Organizational Unit 1: Virginia Serious Games Institute (VSGI)  
Day of Consultation Date: November 15, 2018  
Experiences: Meeting to discuss how to ramp up research support for grant applications. Shared concerns folders and alerts were discussed and found useful for subsequent January grant application.  
Research Consultation Ref ID: 95  
Contact Interaction Rating: 95



Both library interaction history and the types of library interactions can be visualized using these types of analysis.



## Discussion

Academic libraries are complex organizations, with many touchpoints (interactions at specific times and contexts to meet user needs) and channels of interaction that define the library experience. Research activity outcomes have expanded beyond traditional products captured by citations. Outcomes may include guidelines, apps, performances, games, health enhancing devices, and more. Knowing the research environment and communicating with the researcher includes new customer service emphasis. Mason Libraries is practicing LEAN Customer methods, as well as, utilizing tools to analyze and communicate the research environment. New tools for visualizing research and customer relationships should be researched and developed to highlight libraries unique position in understanding research trends. This work can provide a roadmap for subsequent multidisciplinary institutes that have been formed at GMU.

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