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# RPPR Final Report

as of 04-Jan-2023

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**Final Report** for Period Beginning 08-Mar-2018 and Ending 09-Mar-2019

**Title:** Conference Support for CompleNet 2018

**Begin Performance Period:** 08-Mar-2018

**End Performance Period:** 09-Mar-2019

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**STEM Degrees:** 0

**STEM Participants:** 132

**Major Goals:** CompleNet is an international conference on complex networks that brings together researchers and practitioners from diverse disciplines who share a passion to better understand interdependencies within and across systems. The purpose of this conference is to create a venue to discuss cutting-edge research about all types networks, from biological, to technological, to informational and social. Northeastern University' Network Science Institute was selected by the CompleNet conference scientific advisory board to host the 2018 meeting.

The main goal of the conference is to act as a bridge between the natural sciences (physics, biology, mathematics, etc.), social sciences (behavior, psychology, sociology, political science, etc) and information sciences (informatics, data science, computer science, etc). CompleNet offers diversity of disciplines not found in most network conferences. Historically, the conference has fueled cross-pollination of ideas across various disciplines, and thus, the primary objective of the conference is to facilitate the development and advancement of transdisciplinary methods and theory.

The main goals for this CompleNet2018 program was to encourage more participation from graduate students and young scholars. With the only Network Science PhD program in U.S., the Network Science Institute at Northeastern University is uniquely positioned to attract a critical mass of young scholars to spearhead several student-focussed initiatives. Specifically, we organized several activities to inspire the participation of young scholars while reducing traditional barriers that exists in science:

- (1) Student pre-conference, "Paper Rewind" event organized by the Society for Young Network Scientist (the third official meeting, after the initial ARO funded inaugural event in 2017).
- (2) Women in Network Science was the inaugural meeting of the Caucus for Women in Network Science (WiNS) which was marketed particularly to young scholars in the field to help open new opportunities.
- (3) Art of Networks III is an installation of network data visualization organized to draw in scholars from diverse fields working with network data incorporating perspectives of communication, human factors, and art, with the purpose of breaking down traditional academic barriers.

**Accomplishments:** CompleNet2018 was held March 5-8, 2018 at Northeastern University hosted by the Network Science Institute. Conference Chairs were Alessandro Vespignani (Northeastern University) and Kate Coronges (Northeastern University). Program Chairs were Bruno Gonzalez (NYU, New York City), Roberta Sinatra (CEU, Budapest), and Sean Cornelius (Northeastern University). Other organizers included Emma Towlson (Scheduling Chair); Joseph Kenny and Alex Gates (Poster Session Chairs); Pim van der Horn and Carolina Mattson (invited speaker coordinators); and Nicole Samay and Isabel Meirelles (Art of Networks Chair).

## RPPR Final Report as of 04-Jan-2023

One of the particular aims of CompleNet 2018 was to increase student engagement. In total, 132 students registered for the conference, making this a tremendous success in terms of student participation. Student involvement is critical in fostering diversity of ideas, and growing the next generation of interdisciplinary scholars. The greatest challenges facing our scientific community are multi-disciplinary in nature, and the ability of future leaders to develop multi-method, multi-level (or multi-scale), interdisciplinary approaches lies at the crux of our advancement as a society. Exposure to diverse intellectual perspectives, rooted in different disciplinary pedagogy and tradition is the foundation for innovative solutions. Thus, one of the primary focus this year was to encourage more participation from graduate students. With the only Network Science PhD program in U.S., the Network Science Institute at Northeastern University is uniquely positioned to attract a critical mass of young scholars to spearhead several student-focused initiatives.

Three major activities were organized to inspire participation of young scholars while reducing traditional barriers that exist in the sciences:

i. Student Pre-conference “Paper Rewind” event was organized by the Society for Young Network Scientist (the third official meeting, after the initial ARO funded inaugural event in 2017). The event was attended by 45-50 students and young network scientists. Three experts: Tina Eliassi-Rad (Northeastern University), Daniel Larremore (University of Colorado), and Aaron Clauset (University of Colorado) were invited to ‘deconstruct’ one of their recent publications in a discussion style format. In this session, speakers were asked to tell the “real story” behind a recent paper: How did the idea come to be? How did the collaboration work? What were the challenges they faced in the research or in its publication?

This event was wildly successful –both the presenters and the students felt the discussions were vibrant, inspiring and instructional. Each speaker talked about the technical side of their paper, but what especially stood out to the students was how personal the writing process was in each case, including friendships that evolved, as well as some of the struggles around defining the work-life balance. Students indicated that they felt they had more realistic expectations about the process of conducting and publishing interdisciplinary research.

ii. Inaugural meeting of the Caucus for Women in Network Science (WiNS) was marketed particularly to young scholars in the field to help open new opportunities. The event was attended by over 30 women in network science and related fields. The meeting was an open forum where we identified shared objectives and concerns, and discussed strategies to improve employment and career advancement of women in Network Science. For example, some of the more energetic discussions were around how to leverage professional and social contacts among WiNS Caucus members to stimulate opportunities for women and the importance of utilizing positions of leadership to increase participation of women in academic conferences, funding and hiring committees.

iii. Art of Networks III was an installation of network data visualization organized to draw in scholars from diverse fields working with network data incorporating perspectives of communication, human factors, and art, with the purpose of breaking down traditional academic barriers. Visualizations can help us make sense of complex phenomena by structuring data in ways that facilitate detection of patterns and trends, and ultimately, transform data into meaningful information and which can be accessible and useful to non-experts and experts alike. In its third edition, this exhibition explores the role of aesthetics and design in data representation and effective scientific communication. Pieces were selected by a committee from top visualization research labs and studios around the world and had to be created in the past three years. Final selections (listed below) were 11 pieces that covered a broad range of topics including cosmology, genealogy, literature, music, pedagogy, and transportation networks. See the Art of Networks website for details:  
<http://www.theartofnetworks.com/>

CompleNet 2018 was truly a success. With the support from the Army Research Office, we were able to increase the number of students through reduced registration and lodging support for a small set. Importantly, the financial support enabled the organizers to dedicate outreach efforts to students and inspire participation. In total we had 132 students register for the conference. With this award, we were able to keep student registration costs at \$150 (well below the actual cost of the 4-day event per person). Lodging support was offered to 18 students. The events that we developed to inspire and attract young scholars were a tremendous success -- all three events were well-attended and were very received. Roughly 48 students attended the pre-conference, 18 students attended the Women in Network event, and close to 60 students attended the Art of Networks event. With the momentum from this dedicated initiative, we were also able to garner support to create innovative, inclusive activities specifically aimed to attract young scholars.

# RPPR Final Report

## as of 04-Jan-2023

**Training Opportunities:** Training opportunities were offered in various forms throughout the main sessions of the conference. In the student pre-conference, 48 students had 3 sessions with premiere scientists to discuss research development from conception, to grant proposals, to research, and publication.

**Results Dissemination:** Selected conference submissions were published as a proceedings by Springer Nature, titled the Complex Networks IX: Proceedings of the 9th Conference on Complex Networks. There were 28 papers (13 long papers, 15 short papers) that were accepted for the Proceedings.

**Honors and Awards:** In this case, there were selected articles that were published as a proceedings by Springer Nature, titled the Complex Networks IX: Proceedings of the 9th Conference on Complex Networks. There were 13 long papers, 15 short papers, and 28 papers that received this honor.

In addition, 40 of the top-scoring poster submissions were invited to participate in a "slam" event where they were given 3 minutes to present their research to the conference attendees. Of these 40, three winners were selected and given network trophies and a network science textbook.

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**Technology Transfer:** Nothing to Report

### PARTICIPANTS:

**Participant Type:** Co PD/PI

**Participant:** kathryn coronges 3564492

**Person Months Worked:** 12.00

Project Contribution:

National Academy Member: N

**Funding Support:**

**Participant Type:** Faculty

**Participant:** Sean Cornelius

**Person Months Worked:** 12.00

Project Contribution:

National Academy Member: N

**Funding Support:**

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Publisher: Springer

**Book Title:** Complex Networks IV. Proceedings of the 9th conference on complex networks

**Authors:** Sean Cornelius, Kate Coronges, Bruno Gonçalves, Roberta Sinatra, Alessandro Vespignani

**Editor:**

Acknowledged Federal Support: Y

**RPPR Final Report**  
as of 04-Jan-2023

**Partners**

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I certify that the information in the report is complete and accurate:

Signature:

Signature Date:



Contract Number: W911NF1810127

Title: Conference Support for CompleNet 2018

PI: Kate Coronges, Network Science Institute, Northeastern University

CompleNet is an international conference on complex networks that brings together researchers and practitioners from diverse disciplines who share a passion to better understand interdependencies within and across systems. The purpose of this conference is to create a venue to discuss cutting-edge research about all types networks, from biological, to technological, to informational and social. Northeastern University' Network Science Institute was selected by the CompleNet conference scientific advisory board to host the 2018 meeting.

The main goal of the conference is to act as a bridge between the natural sciences (physics, biology, mathematics, etc.), social sciences (behavior, psychology, sociology, political science, etc) and information sciences (informatics, data science, computer science, etc). CompleNet offers diversity of disciplines not found in most network conferences. Historically, the conference has fueled cross-pollination of ideas across various disciplines, and thus, the primary objective of the conference is to facilitate the development and advancement of transdisciplinary methods and theory.

One of the main focusses this year was to encourage more participation from graduate students. With the only Network Science PhD program in U.S., the Network Science Institute at Northeastern University is uniquely positioned to attract a critical mass of young scholars to spearhead several student-focused initiatives.

## 1. Event

CompleNet2018 was held March 5-8, 2018 at Northeastern University hosted by the Network Science Institute. Conference Chairs were Alessandro Vespignani (Northeastern University) and Kate Coronges (Northeastern University). Program Chairs were Bruno Gonzalez (NYU, New York City), Roberta Sinatra (CEU, Budapest), and Sean Cornelius (Northeastern University). Other organizers included Emma Towlson (Scheduling Chair); Joseph Kenny and Alex Gates (Poster Session Chairs); Pim van der Horn and Carolina Mattson (invited speaker coordinators); and Nicole Samay and Isabel Meirelles (Art of Networks Chair).

### 1.1. Invited Speakers

CompleNet 2018 featured 12 invited speakers. Great effort was made to include a range of expertise and speaker backgrounds across the invited talks – presenters represent roughly 10 distinct research areas including health, epidemiology, social movements, energy sustainability, brain science, and group decision making (see below for speakers' fields of study). There was a strong representation of women (~40%, 5 of 12 speakers were female), international scholars (2 of 12 speakers are from outside the US) and of junior professionals (~40% of speakers, 5 of 12, are assistant professors or equivalent).

### CompleNet 2018 Invited Speakers

- Fernanda B. Viegas/ Martin Wattenberg (Google) - Data visualization
- David Lazer (Northeastern University) - Political science & computational social science
- Olaf Sporns (Indiana University) - Brain networks
- Jon Kleinberg (Cornell University) - Information Science
- Kayla de la Haye (University of Southern California) - Health behavior and social networks
- Aaron Clauset (University of Colorado at Boulder) - Computer science & complex systems
- Milena Tvsetkova (London School of Economics) - Computational social science & economics
- JP Onnela (Harvard University) - Public health & biostatistics
- Jessika Trancik (Massachusetts Institute of Technology) - Energy, sustainability and diffusion of innovations
- Yelena Mejova (Qatar Computing Research Institute) - Health and social computation
- James Evans (University of Chicago) - Sociology & computational social science
- Sam Scarpino (Northeastern University) - Environmental science & complex systems

#### **1.2. Participant contributions**

Conference submissions exceeded previous years by roughly 30% with 213 submissions of posters, talks and papers. Of the 213, 88% (187) will be presented during the conference in some form (either as poster or oral presentation). There were 69 selected contributed talks and 118 posters (with a subset of top-scoring poster submissions (40) were invited to participate in a poster “slam” event. Selected submissions were published as a proceedings by Springer Nature, titled the *Complex Networks IX: Proceedings of the 9th Conference on Complex Networks*. There were 28 papers (13 long papers, 15 short papers) that were accepted for the Proceedings.

## **2. Student engagement**

One of the particular aims of CompleNet 2018 was to increase student engagement. Student involvement is critical in fostering diversity of ideas, and growing the next generation of interdisciplinary scholars. The greatest challenges facing our scientific community are multi-disciplinary in nature, and the ability of future leaders to develop multi-method, multi-level (or multi-scale), interdisciplinary approaches lies at the crux of our advancement as a society. Exposure to diverse intellectual perspectives, rooted in different disciplinary pedagogy and tradition is the foundation for innovative solutions. Thus, one of the primary focus this year was to encourage more participation from graduate students. With the only Network Science PhD program in U.S., the Network Science Institute at Northeastern University is uniquely positioned to attract a critical mass of young scholars to spearhead several student-focused initiatives.

### **2.1 Student focused events**

Three major activities were organized to inspire participation of young scholars while reducing traditional barriers that exist in science:

- i. **Student Pre-conference “Paper Rewind”** event was organized by the Society for Young Network Scientist (the third official meeting, after the initial ARO funded inaugural event in 2017). The event was attended by 45-50 students and young network scientists. Three experts: Tina Eliassi-Rad (Northeastern University), Daniel Larremore (University of Colorado), and Aaron Clauset (University of Colorado) were invited to ‘*deconstruct*’ one of their recent publications in a discussion style format. In this session, speakers were asked to tell the “real story” behind a recent paper: How did the idea come to be? How did the collaboration work? What were the challenges they faced in the research or in its publication? The event was wildly successful – both the presenters and the students felt the discussions were vibrant, inspiring and instructional. Each speaker talked about the technical side of their paper, but what especially stood out to the students was how *personal* the writing process was in each case, including friendships that evolved, as well as some of the struggles around defining the work-life balance. Students indicated that they felt they had more realistic expectations about the process of conducting and publishing interdisciplinary research.
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- iii. **Art of Networks III** was an installation of network data visualization organized to draw in scholars from diverse fields working with network data incorporating perspectives of communication, human factors, and art, with the purpose of breaking down traditional academic barriers. Visualizations can help us make sense of complex phenomena by structuring data in ways that facilitate detection of patterns and trends, and ultimately, transform data into meaningful information and which can be accessible and useful to non-experts and experts alike. In its third edition, this exhibition explores the role of aesthetics and design in data representation and effective scientific communication. Pieces were selected by a committee from top visualization research labs and studios around the world and had to be created in the past three years. Final selections (listed below) were 11 pieces that covered a broad range of topics including cosmology, genealogy, literature, music, pedagogy, and transportation networks. See the Art of Networks website for details: <http://www.theartofnetworks.com/>

#### Art of Networks III Contributors

- **Cosmic Web** (*Kim Albrecht, metaLAB at Harvard University*). This work used data from 24,000 galaxies to construct multiple models of the cosmic web, offering complex blueprints for how galaxies fit together.  
<http://cosmicweb.barabasilab.com/>
- **Royal Constellations: A 1,000 Years of Ancestral Connections in the European Royal Families** (*Nadieh Bremer, Visual Cinnamon*). *Royal Constellations* visualizes the past and intertwined family ties of the ten current European royal leaders.  
<http://www.datasketch.es/october/code/nadieh/>

- **Scaled in Miles** (*Fathom Information Design*). This work represents the musicians who Miles Davis surrounded himself with - hundreds of interactions are mapped showing influences of collaborating artists, and during every recording sessions.
- **Musicmap** (*Kwinten*). *Musicmap* attempts to provide the ultimate genealogy of all popular music genres. It a dynamic map that bundels information regarding music genres and history.  
<https://fathom.info/miles/>
- **On Their Way: The Journey of Foreign Fighters** (*Serena Del Nero, Marco Mezzadra, Claudia Pazzaglia, Alessandro Riva, and Alessandro Zotta*). The work maps the journey of ISIS' foreign fighters to and from the territories of the Caliphate, as well as depicting the distance of each country from the destination, its total population, Islamic population and the outgoing flow of foreign fighters as well as the incoming flow of returnees.  
<http://alessandrozotta.it/on-their-way/>
- **cf. city flows: A Comparative Visualization of Urban Bike Mobility** (*Till Nagel, University of Applied Sciences Mannheim; and Christopher Pietsch, Urban Complexity Lab at the University of Applied Sciences Potsdam*) *cf. city flows* is a comparative visualization of bike sharing flow for three cities: New York, Berlin and London designed to help citizens casually analyze three bike-sharing systems.  
<https://uclab.fh-potsdam.de/cf/>
- **Roads to Rome** (*Benedikt Groß, Philipp Schmitt, Raphael Reimann, moovel lab*). The work displays US maps based on fastest travel time between cities where line thickness stands for the frequency a single road is used for the journeys – revealing socio-spatial features correlated with political borders.  
<http://roadstorome.moovellab.com/>
- **Ross Spiral Interactive** (*Santiago Ortiz, Moebio Labs; and Daniel Aguilar*). The *Ross Spiral Interactive* visualization represents the Ross Spiral, a K–12 curriculum of the evolution of human consciousness, designed to help navigate its networks properties and interdisciplinary nature.  
<https://spiral.ross.org/spiral/#/>
- **100 Data Stories** (*Christian Laesser*). This is an online visualization depicting content presented in the podcast *datastori.es* displaying connections between episodes, guests, and themes.  
<https://projects.christianlaesser.com/100-data-stories/>

- **Poemage** (*Miriah Meyer and Nina McCurdy, University of Utah Scientific Computing and Imaging Institute*). This work presents a visualization tool for interactively exploring the sonic topology of a poem to represent the method of “close reading” — the careful, in-depth analysis of a single text with the goal of extracting and engaging as much productive meaning as possible.  
<http://www.sci.utah.edu/~nmccurdy/Poemage/>
- **Telling Stories about Dynamic Networks with Graph Comics** (*Benjamin Bach, University of Edinburgh, UK, Nathalie Kerracher, Napier University, Edinburgh, UK; Kyle Hall, University of Calgary, Canada; Jessie Kennedy, Napier University, Edinburgh, UK, Sheelagh Carpendale, University of Calgary, Canada, Nathalie Henry Riche, Microsoft Research, Redmond, WA, US*). This work explores comics to present and explain temporal changes in networks, where they defined eight design factors for creating graph comics.  
<https://aviz.fr/~bbach/graphcomics/>

### 3. Budget

There was some modification of the budget due to the following;

- 132 students registered for the conference. With the cost per participant was significantly greater than the cost of student registration, our budget required an additional \$5-6K to support the reduced student fees. \$12,500 was used (an increase of \$2,500 was used to subsidize student registration costs).
- Notification of the award money was not received until after many students had already booked lodging. Therefore, we used the remaining \$5,500 of lodging for 18 students for a total of 72 nights.

**3.1 Final Budget.** The final budget was the following:

- Housing. Lodging support was offered to 18 students for 4 nights (for a combination of  $18 \times 4 = 72$  nights). The cost was roughly \$78 per night.
  - Total student lodging costs: \$5,600*
- Travel. Travel stipends were not offered.
- Registration. We offered student rates of \$150 (non-student rate was \$350). Registration included conference welcome package, attendance to full conference, breakfast for all 4 days, 2 poster session receptions (including one full lunch and one light food/cocktail event) and a formal reception for the Art of Networks event (light food). We had 132 student registrants for which we used \$12,500 of the award to offset the corresponding student support.
  - Total student registration support: \$12,400.*

### 4. Summary

CompleNet 2018 was truly a success. With the support from the Army Research Office, we were able to increase the number of students through reduced registration and lodging support for a small set. Importantly, the financial support enabled the organizers to dedicate outreach efforts to students and inspire participation. In total we had 132 students register for the conference. With this award, we were able to keep student registration costs at \$150 (well below the actual cost of the 4-day event per

person). Lodging support was offered to 18 students. The events that we developed to inspire and attract young scholars were a tremendous success -- all three events were well-attended and were very received. Roughly 48 students attended the pre-conference, 18 students attended the Women in Network event, and close to 60 students attended the Art of Networks event. With the momentum from this dedicated initiative, we were also able to garner support to create innovative, inclusive activities specifically aimed to attract young scholars.