

Christopher L. Barrett, Ph.D.

CONTACT INFORMATION

Office

Executive Director
Distinguished Professor in
Biocomplexity

Biocomplexity Institute and Initiative

University of Virginia

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SCIENTIFIC AND MANAGEMENT BIO

STATEMENT OF EXPERIENCE

I joined University of Virginia (UVA) in 2018, founding the Biocomplexity Institute and Initiative (BII), as Executive Director of the Institute and Professor of Computer Science. In June of 2019, I was honored with the inaugural appointment, Distinguished Professor in Biocomplexity, by the UVA Board of Visitors. The foundation, under which BII approaches fundamental research, is built upon transdisciplinary team science. We explore how information is stored, used, and modified in massively interacting systems, ranging in everything from DNA to societal institutions, in order to develop practical solutions to large-scale, real-world challenges to human health, habitat, and well-being. BII's current research divisions include Network Systems Science and Advanced Computing, Social and Decision Analytics, and Mathematical Biocomplexity.

Prior to joining UVA, I was Executive Director and Institute Research Professor of the Biocomplexity Institute (BI) of Virginia Tech (2015-2018) and its predecessor Virginia Bioinformatics Institute (VBI) at Virginia Tech (2004-2015). In late 2004, I joined Virginia Tech to establish the Network Dynamics and Simulation Science Laboratory (NDSSL) at VBI and directed NDSSL from 2004 to 2014. In 2014, I successfully led an extensive transformation of VBI into BI. I was the Scientific Director of VBI from 2012-2015, and was VBI Director for Research in the National Capital Region (NCR) from 2008-2015.

Previously, I founded and led a number of BI's conceptual and predecessor research organizations. In 2004, I retired from Los Alamos National Laboratory (LANL) as a member of the Scientific Staff and as Group Leader. At LANL, I established a succession of advanced computational science-oriented research groups that focused on: intelligent system integration, networks of distributed systems, scalable HPC simulation of cognitive, biological and social systems, and complexity. Large projects incrementally grew the group into a very fine international organization in both the Analysis Division (A and D Divisions) and the Computational and Computer Science Division (CCS). When I retired from LANL, in late 2004, I was the founding Group Leader of the Simulation Science Group known as CCS-5. Several of the lead scientists in BI came from this line at LANL or from that professional network. In the mid-eighties, prior to being recruited and moving to LANL, I was a Naval officer and research scientist at the Naval Air Development Center (NADC). It was at NADC that I established a Decision Analysis Research Team (DART) to investigate both foundations and engineering implementation of human cognitive-AI system integration in combat aircraft and distributed war-fighting systems. Several of the R&D projects transitioned to use in naval sea and air combat platforms. Prior to NADC, I did my graduate degree studies and research at Caltech, taking a foundations-level approach to a computational and informational theoretic view of the interplay of sensory, perceptual, cognitive, and motor control systems. Confirmatory behavioral experiments with humans were essential to the work, which led to investigations of integration of human and machine intelligence as well as early applications.

It is relevant to point out that all of my interests, degrees, research history, and organizations I have led are transdisciplinary, formally rigorous, and grounded in computational and information sciences. They span mathematical, biological, psychological, social, and computational sciences. They all involve large projects that combine basic science and application while requiring management of very high-quality teams of diverse disciplinary experts. I have committed my career to these elements of successful large research programs from the very early stages of emerging science to useful technical maturity. The organizations have been successful in military R&D laboratories, national laboratories, and university environments.

STATEMENT OF EXPERIENCE

I received an M.S. in Engineering Science in 1983 and a Ph.D. in Bioinformation Systems from Caltech in 1985. I served in the U.S. Navy Submarine Force in the 1970s and as an officer/scientist in the 80s. I worked at Los Alamos National Laboratory for 20 years before retiring. I have received various recognitions from LANL, the Alliance for Transportation Research, the Royal Institute of Technology in Stockholm, and others. I was a member of the 2010 Royal Colloquium for the King of Sweden and was awarded the 2012-2013 Jubilee Professorship of Chalmers University in Göteborg, Sweden. I currently serve in various advisory and collaborative scientific roles internationally. I hold seven patents and have nine pending.

PERSONAL SCIENTIFIC PROGRAM

Over the next decade, the most compelling fundamental area of research interest for me is the foundational study of decentralized intelligence and its applications in complex systems analysis.

However, my personal research over the years has been completely interconnected with opportunistic program development and team building. My effort has been focused on establishing early foundations prior to forming teams and programs that, with or without my continued extensive involvement, eventually take these topics to entirely new levels. This is not conventional in academic science and can make my research record appear to be unconventional in traditional academic terms. But in the broadest terms, all of the various applications we have ever worked on have been grounded in getting the right conceptual advance to the right teams to make real progress in formal foundations for advanced complex systems analysis, analytics, computational methods, and decision systems. In general, all my personal scientific interests are connected conceptually in the study of the information-bearing properties of technologically extended living systems: information biology. But I work to generate and execute important and novel transdisciplinary programs beyond an individual's reach and rarely work entirely alone.

Oftentimes applications precede acceptance of related underlying research by the scientific community. When necessary, a rapid technology application focus has been used in ways an institute is suited to that can support to motivate and guide important, but "too-early" basic science directions. This can create career risk in traditional academic terms. Working on a research institute's programs can sometimes provide "space" for taking on disruptive development driving detailed basic research rather than a more conventional opposite direction of research leading application. As a result, funded translational application has always been central to my personal research interests, even those interests in very basic science.

The resulting trajectory in science as well as application seemingly ranges wildly, but it is all "just" massively interacting systems from the molecular intelligence of DNA/RNA/phenotype interactions to: Multi-scale system biology; support of large public-access genomic libraries; information science-oriented analysis of the interplay of perceptual, cognitive, and motor systems in the brain; functioning, interdependent urban/national infrastructure modeling and analysis; computational social epidemiology for public health and system biology; and synthetic information platforms for large-scale information integration in decision analytics for policy and national security. These have led to sustained, underlying, fundamental, and mathematical research in dynamics over graphs and networks, theoretical advances in distributed algorithms, contributions to the mathematics and physics of chaotic dynamical systems, large-scale micro-systems analytics, statistical methods, data-science machine intelligence, and various advances in high-performance computing related to large data and network-centric computation at scale. Moreover, they have led to more applied-funded development programs in: Military systems; transportation; communication; electric power; interdependent infrastructure; immunology; infectious disease epidemiology; social neuroscience; computational economics; and many others, ultimately leading to intellectual property and VC-funded spinoff businesses. Such deeply vertical topics motivate and help support more basic science.

Making these things happen is really my personal research interest.

RESEARCH INTEREST

Large multi-scale, high-performance modeling and simulation systems grounded in computational and information sciences spanning mathematical, biological, psychological and social sciences; dynamical networks called Sequential/Graphical systems grounded in topics ranging from RNA to social dynamics and policy; theoretical and applied research in intelligent systems; translational research-to-application analytics and machine intelligence

EDUCATION

1986	Medical Service Corps Post Ph.D. certification, U.S. Navy Aerospace Experimental Psychology
1985	Ph.D., Bioinformation Systems/Engineering Science, California Institute of Technology
1983	M.S., Engineering Science, California Institute of Technology

ACADEMIC AND ADMINISTRATIVE POSITIONS

2019 – present	Distinguished Professor in Biocomplexity, Biocomplexity Institute and Initiative (BII), University of Virginia (UVA)
2018 – present	Founding Executive Director, BII, UVA
2018 – present	Professor of Computer Science, School of Engineering and Applied Science UVA
2015 – 2018	Founding Executive Director, Biocomplexity Institute of Virginia Tech (BI/VT)
2015 – 2018	Professor, BI/VT
2015 – 2018	Scientific Director, BI/VT
2015 – 2018	Director, BI/VT (formerly Virginia Bioinformatics Institute at Virginia Tech (VBI/VT) – National Capital Region, Virginia Tech
2014 – 2015	Executive Director, VBI/VT
2012 – 2015	Scientific Director, VBI/VT
2009 – 2015	Director, Advanced Computing and Informatics Laboratories Division (ACIL), VBI/VT
2008 – 2015	Director, VBI/VT— National Capital Region
2004 – 2018	Professor, Department of Computer Science, Virginia Tech
2004 – 2015	Professor, VBI/VT
2004 – 2014	Director and Founder, Network Dynamics and Simulation Science Laboratory (NDSSL), VBI/VT
1988 – 2004	Founding Group Lead, Basic and Applied Simulation Science Group, Computing and Computational Science Division (CCS-5), Los Alamos National Laboratory
1986 – 1988	Founder, Scientific & Technical Lead, Decision Analysis Research Team, Naval Air Development Center

PERFORMANCE

Grants & Contracts, Sponsors, Publication, Academic Collaboration, Student Program, Translation

GRANTS AND CONTRACTS

During my tenure as Executive Director of the Biocomplexity Institute of Virginia Tech (BI/VT) (2015-2018), institute research programs generated more than \$71 million in research expenditures funded by major federal agencies, foundations and corporations, and state and local governments. The most recent BI/VT awards during my tenure totaled more than \$120 million. Our portfolio was truly interdisciplinary and balanced. Department of Defense funded 39% of our expenditures, Department of Health and Human Services funded 30%, flow-through funding from university collaborators and National Science Foundation represented 20%. Other sponsors comprised the balance of 11%.

The professional administrative support of pre- and post-award grants/contracts processes and program management teams supported this volume, which was necessary for scientists in such a research organization to operate effectively and were an integral part of our institute.

SUMMARY OF SPONSORS

Department of Defense Agencies, Sub-agencies and others

- *Defense Advanced Research Projects Agency*
- *Department of Energy*
- *Department of Health and Human Services*
- *Defense Threat Reduction Agency*
- *U.S. Department of the Army*
- *Agency for International Development*
- *Census Bureau*

National and Research Institutes

- *American Institute for Research*
- *Center for Scientific Review*
- *National Human Genome Research Institute*
- *National Institute for General Medical Science*
- *National Institute of Allergy & Infectious Diseases*
- *National Institute of Neurological Disorders*
- *National Network of Public Health Institutes*
- *National Science Foundation*
- *U.S. Army Research Institute*

PERFORMANCE

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SUMMARY OF SPONSORS

National Laboratories

- *Argonne*
- *Intelligence Advanced Research Projects Activity*
- *Los Alamos*
- *Oak Ridge*
- *Office of the Director of National Intelligence*

Department of the Interior

- *USDA National Agricultural Statistics Service*
- *USDA NIFA*
- *U.S. Fish & Wildlife Service*
- *U.S. Geological Survey*
- *Department of Agriculture*

Corporations

- *AccuWeather*
- *Gallup Government, Inc.*
- *Metabiota*
- *Mitre*
- *Next Century Corporation*
- *Procter & Gamble*

Foundations

- *AKC Canine Foundation*
- *Laura & John Arnold Foundation*
- *Research Foundation for the State University of New York*
- *SAIC, Inc.*
- *U.S. - Israel Binational Science Foundation*

State, Local Governments

- *Arlington County*
- *Fairfax County*
- *State Council of Higher Education for Virginia*
- *VA Department of Emergency Management*
- *VA Department of Social Services*

PERFORMANCE

Grants & Contracts, Sponsors, Publication, Academic Collaboration, Student Program, Translation

PUBLICATIONS, REPORTS, PRESENTATIONS AND OTHER SCHOLARLY WORKS

During my time as Executive Director, BI/VT produced more than 1,350 scholarly publications, reports, presentations, and other scholarly works in the course of our research.

When I led the NDSSL, we produced more than 400 peer reviewed publications, wrote more than 150 archived technical reports associated with sponsored studies and technology development, and performed more than 40, mostly Department of Defense sponsored, major case studies and policy analysis.

NATIONAL AND INTERNATIONAL ACADEMIC COLLABORATIONS

BI/VT researchers and programs established funded collaborations with numerous universities, several with academic medical centers, including (in no particular order):

- *George Washington University School of Medicine & Health Sciences*
- *Wake Forest University Health Sciences and School of Medicine*
- *Mt. Sinai School of Medicine*
- *Harvard University School of Public Health*
- *Mayo Clinic*
- *Carnegie Mellon University*
- *Stanford University*
- *University of Southern California*
- *University of Chicago*
- *Duke University*
- *Indiana University*
- *University of Illinois*
- *Claremont Graduate University*
- *University of Wisconsin*
- *Iowa State*
- *San Diego State University*
- *Purdue University*
- *Oregon State University*
- *Research Triangle Institute*
- *University of Maryland, College Park*
- *Florida Institute for Human and Machine Cognition, Inc.*
- *University at Albany, SUNY*

PERFORMANCE

Grants & Contracts, Sponsors, Publication, Academic Collaboration, Student Program, Translation

Additionally, we had considerable and important academic connectivity to many important UK, EU, Chinese, Singapore, Indian, Australian and other universities.

INTERDISCIPLINARY RESEARCH EXPERIENTIAL LEARNING BY IN-RESIDENCE GRADUATE STUDENT RESEARCHERS

The institute integrated, financially supported and supervised the research of 120 graduate students from a variety of university departments and programs. In that time, BI graduated 71 students. Five masters and 66 PhD degrees were awarded to in-residence graduate students working in experiential team science environments. Notably, many of our students graduate came from interdisciplinary programs at Virginia Tech such as:

- *Genetics, Bioinformatics, and Computational Biology (GBCB)*
- *Translational Biology, Medicine, and Health (TBMH)*

Additionally, our graduates represented the following academic disciplines in significant proportions:

- *Computer Science*
- *Biochemistry*
- *Biological Sciences*
- *Statistics*
- *Mathematics*

In addition, BI/VBI/VT had more than 80 other alumni (that graduated previous to me leading the Institute) that have been employed in top-ranked research universities in a variety of disciplines (e.g., Harvard, University of Pittsburg, Northwestern, Northeastern, Purdue, and University of Oregon), as well as in the premier Department of Energy national labs (LANL, LLNL, ANL, and LBL), and in industry (eg, Amazon, Bloomberg, Microsoft, Facebook, Goldman-Sachs, Apple).

INTELLECTUAL PROPERTY AND TRANSLATIONAL SCIENCE

Since 2014, BI/VT actively pursued an internally managed patent strategy to protect middleware and software systems with high potential for commercial value.

For the Network Dynamics and Simulation Science Laboratory, eight awarded patents and eight patent applications representing systems developed as an outcome of the institute's simulation and systems science research have been issued.

11 patents have been issued directly as a result of the Institute's work in nutritional immunology. Capitalizing on these patents, three VC capitalized startups were spun off focused on immunology, enteric health products and related pharmaceuticals: Biotherapeutics, Landos Biopharma, and Pervida. These start-ups have some clinically aimed compounds now funded to move to human trials and initial nutraceutical products already in the market.

In total, 19 patents have been issued by the U.S. Patent and Trademark Office, Australian Patent Office, patent office of Singapore and others.

PERFORMANCE

Grants & Contracts, Sponsors, Publication, Academic Collaboration, Student Program, Translation

CREATION OF SPECIALIZED RESEARCH FACILITIES

BI/VT created significant in-house cost recovery recharge centers for necessary support of research requiring specialized high-performance computing and local access to significant genome sequencing capability.

In addition, BI/VT undertook important redesign and reconfiguration of office space to support effective interdisciplinary research team science.

SIGNIFICANT ACHIEVEMENTS

- Established the Biocomplexity Institute and Initiative, University of Virginia.
- Established the Biocomplexity Institute of Virginia Tech (BI/VT).
- Established the Comprehensive National Incident Management System (CNIMS) research and development program at the Defense Threat Reduction Agency (DTRA), an agency of the Department of Defense.
- Founded the Advanced Computing and Informatics Laboratories at BI/VT.
- Founded the Network Dynamics and Simulation Science Laboratory at BI/VT.
- Designed and co-founded the National Infrastructure Simulation and Analysis Center in the Department of Homeland Security.
- Founded the Basic and Applied Simulation Science Group in the Computing and Computational Science Division at Los Alamos National Laboratory.
- Founded the Simulation Applications Group in the Decision Applications Division at Los Alamos National Laboratory.
- Founded the Decision Analysis Research Team at the Naval Air Development Center.
- Originator of EpiSIMS, the first scalable social epidemiology HPC simulator and decision support environment.
- The originator of novel mobile communication-, epidemiological-, economic-, cognitive- and other socially- or cognitively coupled system analysis techniques employing large-scale and detailed individual human behavioral models and HPC.
- Led the development of Sequential Dynamical Systems, an important and recognized direction of mathematical and algorithmic foundations for large-scale interactionist computation. These foundations, and some others, have been central to the conceptual advances necessary for large-scale complex systems informatics.

SIGNIFICANT ACHIEVEMENTS

- Conceived, designed, and for 11 years, led detailed development of TRANSIMS, the first workable large-scale, detailed activity-based human mobility simulation and analysis system, and the first practical HPC-based transportation policy analysis platform. TRANSIMS later was made a track in USDoT TMIP (Travel Model Improvement Program) and is now the basis of an FHWA open source software platform that is used by many cities worldwide to support required policy and decision analysis for transport design and operations, it is the basis of the population mobility aspects of an HPC center at Argonne National Laboratory, where the technology is trained, and is also used by many academic researchers worldwide.
- Designed the KOALAS approach to semantic integration of human computing for multi-sensor data fusion. Approach was employed in design of Navy F-14D avionics, shipboard radar warning system training, commercial harbor navigation, operator cognitive workload management analysis, and many other systems and applications.

ACADEMIC & RESEARCH HISTORY

BIOCOMPLEXITY INSTITUTE AND INITIATIVE, UNIVERSITY OF VIRGINIA (BII/UVA)

Charlottesville, Virginia, United States

2019 – present	Distinguished Professor in Biocomplexity
2018 – present	Jointly Appointed Professor, Department of Computer Science at University of Virginia
2020 – 2025	Co-PI, Expeditions: Collaborative Research: Global Pervasive Computational Epidemiology (NSF) program, U.S. National Science Foundation
2020 – 2024	PI, Scalable Analytics for Decision Support, Applied Research Associates, Inc. (ARA)
2018 – 2019	PI, Comprehensive National Incident Management System (CNIMS) Program, Defense Threat Reduction Agency (DTRA), U.S. Department of Defense

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH (AFOSR)

Arlington, Virginia, United States

2017 – 2019	PI, Network-Centric Computing for Global System Science, Air Force Office of Scientific Research (AFOSR)
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ACADEMIC & RESEARCH HISTORY

BIOCOMPLEXITY INSTITUTE OF VIRGINIA TECH (BI/VT)

Blacksburg, Virginia, United States

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| 2008 – 2018 | PI, Comprehensive National Incident Management System (CNIMS) Program, Defense Threat Reduction Agency (DTRA), U.S. Department of Defense |
| 2004 – 2018 | Jointly Appointed Professor, Department of Computer Science at Virginia Tech |
| 2015 – 2018 | Jointly Appointed Professor, BI/VT (formerly VBI/VT) |
| 2004 – 2015 | Jointly Appointed Professor, VBI/VT |

CHALMERS UNIVERSITY

Göteborg, Sweden

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| 2012 – 2013 | Distinguished Jubileum Guest Professor of Computer Science, Chalmers University, Göteborg |
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SWEDISH ROYAL ACADEMY

Stockholm, Sweden

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| 2011 | Invited Participant, Royal Colloquium on Societal Resilience, Swedish Royal Academy of Science, His Majesty King Carl Gustav XIV |
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INSTITUTE FOR SCIENTIFIC INTERCHANGE FOUNDATION (ISI)

Turin, Italy

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| 2007 – present | Visiting Institute Professor |
| 2007 – 2013 | Member of the Scientific Advisory Board |
| 2006 | Guest Scientist, Coordinator for Graduate Course on Complex Systems |

ARGONNE NATIONAL LABORATORY

Lemont, Illinois, United States

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| 2007 – 2012 | Member of the Scientific Advisory Board |
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ACADEMIC & RESEARCH HISTORY

LOS ALAMOS NATIONAL LABORATORY (LANL)

New Mexico, United States

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| 2001 – 2004 | Co-founder National Infrastructure Simulation & Analysis Center |
| 2001 – 2004 | PI, Urban Infrastructure Suite: interdependent urban dynamics of large urban regions simulation system |
| 2000 – 2004 | PI, AdHopNET: very large social behavior-technological design hybrid intelligent telecom system simulation project |
| 1999 – 2002 | PI, EpiSIMS: the first population-scalable, individual agent resolved, social epidemiological simulation system |
| 1998 – 2003 | PI, Sequential Dynamical Systems and Evolutionary Computing Project: established coordinated algebraic and computational program to explore foundations of simulation science appropriate for large scale HPC |
| 1993 – 2004 | PI, TRANSIMS: the first high performance computing-based, individually resolved, regionally scaled transportation infrastructure microsimulation system |
| 1990 – 1993 | PI, Distributed AWACS: the first distributed self-organizing sensing, situation assessment, and control of large coordinated naval aviation systems in a large-scale first generation HPC-based network centric system simulation |
| 1989 – 1991 | PI, Distributed Remote Sensing: self-organizing intelligent earth sensing and surveillance by a large constellation of small autonomous satellites |
| 1986 – 1992 | PI, Knowledgeable Observation Analysis-linked Advisory System: intelligent cognitive augmentation for situation assessment and control |

ACADEMIC & RESEARCH HISTORY

ROYAL INSTITUTE OF TECHNOLOGY (KTH)

Stockholm, Sweden

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| 1997 – 1998 | Distinguished International Guest Professor, Department of Urban Planning |
| 1991 – 1996 | Visiting Professor |

U.S. NAVAL AIR DEVELOPMENT CENTER

Warminster, Pennsylvania, United States

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| 1986 – 1988 | Scientific and Technical Leader; Founder, Decision Analysis Research Team |
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OTHER CAREER HISTORY

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| 1976 – 1988 | Officer, U.S. Navy Submarine Force, and later, Aerospace Engineering/Aircrew Systems/Advanced Computing for functional human integration and decision-making analysis |
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AWARDS AND AFFILIATIONS

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| 2015 – present | Secretariat of the Commonwealth Appointee: Modeling and Simulation Advisory Council, Commonwealth of Virginia |
| 2015 – present | Commonwealth of Virginia's Information Technology Advisory Council (ITAC): Health IT Standards Advisory Committee (HITSAC) |
| 2013 | Army Patriot Award recipient: given to outstanding employers of members of the U.S. Army Reserve |
| 2012 – present | Affiliated Professor, Dept. of Computer Science: Chalmers University, Göteborg, Sweden |
| 2012 – 2013 | Jubilee Distinguished Professor of Computer Science: Chalmers University, Göteborg, Sweden |
| 2011 – 2015 | Scientific Advisory Board, FuturICT: Future and Emerging Technologies Programme, European Commission |
| 2010 | Swedish Royal Colloquium on Societal Resilience: invited participant by HM King Carl XVI Gustav |
| 2009 – 2016 | Lagrange Award Committee: CRT Foundation, Turin, Italy |
| 2009 – 2015 | Review Committee for Computing Environment and Life Sciences (CELS): University of Chicago, Argonne National Laboratory LLC |

AWARDS AND AFFILIATIONS

2009 – 2014	Scientific Advisory Board, SMART Infrastructure Facility: University of Wollongong, Australia
2008 – 2015	Scientific Review Committee, Global System Dynamics Coordination: Future and Emerging Technologies Programme, European Commission
2007 – 2013	Scientific Advisory Board: Institute for Scientific Interchange (ISI), Turin, Italy
2005 – 2009	Department of Homeland Security: expert panel member
2000	Distinguished Innovation & Entrepreneurialism: Copyright Award, Los Alamos National Laboratory
1999	Invited Scholar, Abisko Conference “Meso-scale Complexity,”: Swedish Royal Academy of Sciences XVI Gustav
1998	Distinguished Invited Scholar: Artificial Life and Robotics, Oita University, Japan
1997 – 1998	Distinguished International Guest Professor: Royal Institute of Technology, Stockholm, Sweden
1995	Distinguished Achievement Award: Los Alamos National Laboratory
1993	Distinguished Performance Award: Los Alamos National Laboratory
1992	Distinguished Research Award: Alliance for Transportation Research
1991	Letter of Appreciation (FAA Administrator) for membership on Administrator’s Science Panel: National Air Traffic Control System Ten-Year Technology Improvement Plan
1988	Meritorious Service Medal (U.S. Navy): research and development in automated assisted reasoning systems for naval aircraft
1981 – 1985	NIH/NSF Research Award (neuroscience and bioengineering)

PUBLISHED JOURNALS

1. Eubank, S., Eckstrand, I., Lewis, B., Venkatramanan, S., Marathe, M., Barrett, C.L., (2020) Commentary on Ferguson, et. al., “Impact of Non-pharmacutical Interventions (NPIs) to Reduce COVID-19 Mortality and Healthcare Demand”. *Bulletin of Mathematical Biology*, 82, 52. <https://doi.org/10.1007/s11538-020-00726-x>.
2. Cedeno-Mieles. V., Hu, Z., Ren, Y., Deng, X., Adiga, A., Barrett, C., Contractor, N., Ekanayake, S., Epstein, J., Goode, B., Korkmaz, G., Kuhlman, C., Machi, D., Macy, M.W., Marathe, M., Ramakrishnan, N., Ravi, S., Saraf, P., Self, N. (2020) Networked experiments and modeling for producing collective identity in a group of human subjects using an iterative abduction framework. *Social Network Analysis and Mining*, 10(1): 1-43.
3. He, Q., Huang, F.W., Barrett, C., Reidys, C. (2019) Genetic robustness of let-7 miRNA sequence-structure pairs. *RNA*, 25: 1592-1603.
4. Huang, F.W., Barrett, C., Reidys, C. (2019) The energy-spectrum of bicompatible sequences. arXiv preprint arXiv:1910.00190.
5. Barrett, C., He, Q., Huang, F.W., Reidys, C. (2019) A Boltzman Sampler for 1-Pairs with Double Filtration. *Journal of Computational Biology*, 26(3):173-192.
6. Barrett, C., Huang, F.W., He, Q., Reidys, C. (2018) An efficient dual sampling algorithm with Hamming distance filtration. *Journal of Computational Biology*, 25(11):1179-1192.
7. Barrett, C., Johnson, J., Marathe, M. (2018) High Performance Synthetic Information Environments: An integrating architecture in the age of pervasive data and computing: Big Data. *Ubiquity*. March (1).
8. Rezazadegan, R., Barrett, C., Reidys, C. (2018) Multiplicity of phenotypes and RNA evolution. *Journal of Theoretical Biology*, 447:139-46.
9. Barrett, C., Huang, F., Reidys, C. (2017) Sequence-structure relations of biopolymers. *Bioinformatics*, 33 (3):382-389.
10. Barrett, C., Li, T.J., Reidys, C. (2016) RNA Secondary Structures Having a Compatible Sequence of Certain Nucleotide Ratios. *Journal of Computational Biology*, 23(11):857-873.
11. Lewis, B., Swarup, S., Bisset, K., Eubank, S., Marathe, M., Barrett, C. (2013) A Simulation Environment for the Dynamic Evaluation of Disaster Preparedness Policies and Interventions. *Journal of Public Health Management and Practice*, 19: S42-S48.
12. Barrett, C., Channakeshava, K., Huang, F., Kim, J., Marathe, A., Marathe, M., Pei, G., Saha, S., Subbiah, R., Vullikanti, A. (2012) Human Initiated Cascading Failures in Societal Infrastructures. *PLoS ONE*, 7(10): e45406.
13. Barrett, C., Bisset, K., Leidig, J., Marathe, A., Marathe, M. (2011) Economic and social impact of influenza mitigation strategies by demographic class. *Epidemics Journal*, 3(1):19-31.
14. Barrett, C., Hunt III, H.B., Marathe, M., Ravi, S., Rosenkrantz, D., Stearns, R. (2011) Modeling and analyzing social network dynamics U.S.ing stochastic discrete graphical dynamical systems. *Theoretical Computer Science*, Special Edition on Cellular Automata and Dynamical Systems, 412:3932–3946.

PUBLISHED JOURNALS

15. Barrett, C., Channakeshava, K., Eubank, S., Vullikanti, A., Marathe, M. (2011) From biological and social network metaphors to coupled bio-social wireless networks. *International Journal of AutonomoU.S. Adaptive Communications*, 4:122–144.
16. Barrett, C., Eubank, S., Marathe, A., Marathe, M., Pan, Z., Swarup, S. (2011) Information Integration to Support Policy Informatics. *The Innovation Journal*, 16(1): article 2.
17. Marathe, A., Lewis, B., Barrett, C., Chen, J., Marathe, M., Eubank, S., Ma, Y. (2011) Comparing Effectiveness of Top-Down and Bottom-Up Strategies in Containing Influenza. *PLoS ONE*, 6(9): e25149.
18. Barrett, C., Bisset, K., Leidig, J., Marathe, A., Marathe, M. (2010) An integrated modeling environment to study the co-evolution of networks, individual behavior and epidemics. *AI Magazine*, 31(1):75-87.
19. Eubank, S., Barrett, C., Beckman, R., Bisset, K., Durbeck, L., Kuhlman, C., Lewis, B., Marathe, A., Marathe, M., Stretz, P. (2010) Detail in network models of epidemiology: Are we there yet? *Journal of Biological Dynamics* 4(5):446-455, PMID: PMC2953274.
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76. Barrett, C., Marathe, M. (2007) *Co-evolving, coupled very large complex networks*. NDSSL Technical Report Number: 07-040.
77. Atkins, K., Barrett, C., Beckman, R., Bisset, K., Chen, J., Eubank, S., Lewis, B., Marathe, A., Marathe, M., Mortveit, H., Stretz, P., Vullikanti, A. (2007) *An analysis of layered public health interventions at Ft. Lewis and Ft. Hood during a pandemic influenza event*. NDSSL Technical Report No. 07-019.

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79. Barrett, C., Eubank, S., Lewis, B. (2006) *Impact of influenza vaccine purchases on force readiness*. NDSSL Technical Report Number: 06-036.
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81. Barrett, C., Beckman, R., Chen, J., Eubank, S., Kumar, A., Marathe, M. (2006) *Fast diffuse: Percolation based methods for studying epidemics on directed networks*. NDSSL Technical Report No. 06-022.
82. Atkins, K., Barrett, C., Beckman, R., Bisset, K., Chen, J., Eubank, S., Kumar, A., Lewis, B., Macauley, M., Marathe, A., Marathe, M., Mortveit, H., Stretz, P. (2006) *Simulated pandemic influenza outbreaks in Chicago: NIH DHHS Study Final report*. Technical Report, NDSSL Technical Report Number: 07- 004.
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90. Barrett, C., Hunt III, H.B., Marathe, M., Ravi, S., Rosenkrantz, D., Stearns, R. (2003) *Predecessor and permutation existence problems for sequential dynamical systems*. In *Proceedings of Discrete Models for Complex Systems, DMCS'03*, Lyon, France. Technical Report No. LA-UR-02-180, Los Alamos National Laboratory AB, 69-80.
91. Barrett, C., Drozda, M., Marathe, A., Marathe, M. (2003) *Analyzing the effect of routing protocols on media access control protocols in radio networks, C, submitted to WCNC 2003*. Technical Report LA-UR-02-1747, Los Alamos National Laboratory.
92. Barrett, C., Marathe, M. (2003) *Foundations of simulation science*. Technical Report, Los Alamos National Laboratory.
93. Barrett, C., Bisset, K., Marathe, M., Mortveit, H., Reidys, C. (2003) *Design, specification and analysis of ad-hoc networks*. Technical Report No. LA-CP-03-0148, Los Alamos National Laboratory.
94. Atkins, K., Barrett, C., Beckman, R., Bisset, K., Drozda, M., Eubank, S., Engelhart, C., Hengartner, N., Istrate, G., Kumar, A., Marathe, M., Morin, M., Reidys, C., Ravi, S., Romero, P., Pistone, R., Pathak, S., Smith, J., Stretz, P., (2003) *Ad-hopNET: Integrated tool for end-to-end analysis of extremely large next generation communication networks, Volume I and II*. Technical Report No. LA-UR-03-2076, and LA-UR-03-2077, Los Alamos National Laboratory.
95. Barrett, C., Marathe, M., Reidys, C., Ravi, S., Smith, J. (2001) *Ad-hopNET: A large scale simulation based analysis of ad hoc networks, a seedling study for DARPA*. Technical Report No. LA-UR-01-1644, Los Alamos National Laboratory, Final Report.
96. Hunt, III H.B., Rosenkrantz, D., Barrett, C., Marathe, M., Ravi, S. (2001) *Complexity of analysis and verification problems for communicating automata and discrete dynamical systems*. Technical Report No. LA-UR-01-1687, Los Alamos National Laboratory.
97. Barrett, C., Marathe, M., Reidys, C. (2001) *Commercial prospects for mobile communications from the developments in large scale infrastructure simulation technology*. Final Report, CRADA agreement with Motorola.
98. Barrett, C., Marathe, A., Marathe, M. (2001) *Parameterized scalable models for simulating deregulated electric power industry*. Technical Report, Los Alamos National Laboratory.
99. Anson, D., Barrett, C., Marathe, M., Nagel, K., Stein, M. (1997) *A theoretical study of some routing algorithms*. Technical Report No LAUR-No-97-1333, Los Alamos National Laboratory. Anson, D., Barrett, C., Marathe, M., Nagel, K., Rickert, M., Stein, M. *Engineering the route planner for the Dallas case study*. Technical Report, LAUR-No-97-1331, Los Alamos National Laboratory.
100. Anson, D., Barrett, C., Marathe, M., Nagel, K., Rickert, M., Stein, M. (1997) *Route planner for the Dallas case study*. Technical Report No LA-UR-No-97-1332, Los Alamos National Laboratory.

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102. Rasmussen, S., Baas, N., Barrett, C., Olesen, M. (1996) *Dynamical hierarchies- a summary. Artificial life and robotics (AROB)*, Oita, Japan. Technical Report No. LA-UR-96-660, Los Alamos National Laboratory.
103. Anson, D., Barrett, C., Marathe, M. (1995) *Distributed route generation for travelers in TRANSIMS*. Technical Report, LA-UR-96-105, Los Alamos National Laboratory.
104. Barrett, C., Eubank, S., Nagel, K., Rasmussen, S., Riordan, J., Wolinsky, M. (1995) *Issues in the representation of traffic with multiresolution cellular automata, Los Alamos Unclassified Report, LA- UR: 95-2658*.
105. Barrett, C., & Stokes, J. (1988). *AEW-RTAS in a KOALAS Environment: A concept Demonstration of an Intelligent CICO Workstation: A concept Demonstration of an Intelligent CICO Workstation*.

INVITED PRESENTATIONS

1. Barrett, C. (2020) *Moving Beyond Sequence Alignment: Mathematical Study of RNA Shape/Sequence Relationships*. Department of Biochemistry and Molecular Genetics Spring 2020 Colloquium. University of Virginia School of Medicine. Charlottesville, VA. Speaker, March 5, 2020.
2. Barrett, C. (2020) *Provisional Sense-making and Deliberation by Agents in Complex Environments*. Inverse Generative Social Science Workshop. MITRE. McLean, VA. January 23-25, 2020.
3. Barrett, C. (2019) The Flexibility and Utility of Autonomous Transportation – A Safer More Efficient Model: *System-level Analysis of Autonomous Vehicles*. NVTC’s Autonomous Technology Summit of Virginia, “All Things Autonomous.” Inova Center for Personalized Health. Fairfax, VA. Panelist, November 7, 2019.
4. Barrett, C. (2019) *Infrastructure Investment and Urban Development in the Developing World*. International Symposia for Next Generation Infrastructure. Palacio De Las Aguas. Buenos Aires, Argentina. Panelist, September 20, 2019. Academic Steering Group, September 18-20, 2019.
5. Barrett, C. (2019) Agency, Awareness and Privacy in the Emerging Psychosocial Information Technology: *Who/What studies the systems that study themselves?* Computing for Global Challenges Symposium (C4GC). Biocomplexity Institute at University of Virginia. Charlottesville, VA. July 29, 2019.
6. Barrett, C. (2019) The Emerging Psychosocial Technology: *Decentralized cognition, engineered intelligence and the importance of lying*. Commonwealth Conference on National Defense and Intelligence (CCNDI). Rivanna Station. Charlottesville, VA. June 10, 2019.

INVITED PRESENTATIONS

7. Barrett, C. (2019) *Decentralized Cognition in Naturally Occurring and Engineered Intelligence*. 2019 UVA Brain Symposium. University of Virginia Brain Institute. Claude Moore Medical Education Building, UVA School of Medicine. Charlottesville, VA. May 29, 2019.
8. Barrett, C. (2018) *Rethinking Thinking: Decentralized Intelligence in Networks of Individuals, Technology, Societies and their Data*. Defense One Tech Summit. Washington, D.C. June 26, 2018.
9. Barrett, C. (2018) *Pervasive, Point-of-View, analytics in biosocial systems*. Medical Grand Rounds. Virginia Tech School of Medicine. Roanoke, VA. June 1, 2018.
10. Barrett, C. (2018) *How simulations of artificial societies help planners cope with the unthinkable*. National Alliance for Radiation Readiness Annual Meeting. Washington, D.C. May 15, 2018.
11. Barrett, C., Clancy, C., Tideman, N., Sporny, M., Kogler, B., McBeath, B. (2018) *Panel 1: Decentralization – Generating Trust without Authority*. Blacksburg Blockchain Symposium. Blacksburg, VA. April 20, 2018.
12. Barrett, C. (2017) *National Security and Human Migration, Implications for Policy*. International Refugee Research Workshop. Arlington, VA. October 25, 2017.
13. Barrett, C., Goncalves, B., Marathe, M., Vespignani, A. (Oct 2017) *Panel: Addressing the Daunting Risks of Pandemics*. IMT and CoeGSS Consortium International Conference: Computing Power for Global Challenges, Lucca, Italy. October 24, 2017.
14. Barrett, C. (2017) *Agent based models / Highly scalable applications*. 26th Workshop on Sustained Simulation Performance. Stuttgart, Germany. October 11, 2017.
15. Barrett, C. (2017) *Panel session: Delivery of infrastructure systems and services*. International Symposium for Next Generation Infrastructure (ISNGI) 2017. London, England. September 11, 2017.
16. Barrett, C. (2017) *Defense Threat Reduction Agency Technical Reachback Division- Comprehensive National Incident Management System (CNIMS) Overview*. JTF-CS Interagency Bio Workshop. Fort Eustis, VA. August 29, 2017.
17. Barrett, C. (2017) *CNIMS Overview*. Joint Warfare Analysis Center Meeting. Dahlgren, VA. August 30, 2017.
18. Barrett, C. (2017) *Scalable Interaction Systems*. 18th International Conference on Systems Biology (ICSB 2017). Blacksburg, VA. August 10, 2017.
19. Barrett, C. (2017) *Scalable Models of Massively Interacting Systems for Integrative Science and Applications*. Information Science and Technology Institute (ISTI) Seminar Series, Los Alamos National Laboratory. Los Alamos, NM. May 31, 2017.
20. Barrett, C. (2017) *The Digital Interactum*. United State Innovation Hub Workshop. Embassy of Japan. Washington, D.C. May 12, 2017.

INVITED PRESENTATIONS

21. Barrett, C. (2017) *Leaving a trace: thinking and deciding in the age of pervasive data*. Complexity- Based Analytics and Polices for Social Good (CAPS 2017). Washington, D.C. April 12, 2017
22. Barrett, C. (2017) *Data, Agency, and Synthetic Agents*. International Conference on Synthetic Populations. Lucca, Italy. February 2017.
23. Barrett, C. (2016) *Overview of the Biocomplexity and Collaborations with Federal Agencies*. Hill Session with Congressional Staff. Arlington, VA. December 13, 2016.
24. Barrett, C. (2016) *Virtual Social Habitats*. Lawrence Livermore National Laboratory. Livermore, CA. December 7, 2016.
25. Zarrett, C. (2016) *Panel discussion: Barriers to Progress in Agent Computing – Technical and Social in International Congress on Agent Computing*. George Mason University. Fairfax, VA. November 29, 2016.
26. Barrett, C. (2016) *Session 3: Urbanization in New Approaches to Economic Challenges Workshop on Complexity and Policy*. Paris, France. September 30, 2016.
27. Barrett, C. (2016) *Modeling and Simulation of Large Biological, Information and Socio-Technical Systems: An Interaction Based Approach*. Oak Ridge National Laboratory (ORNL) Human Activity. Scale in Earth System Models Workshop. Oak Ridge, TN. September 19, 2016.
28. Barrett, C. (2016) Panel 2 – *In a utopian scenario, what would the perfect infrastructure project look like?* International Symposium for Next Generation Infrastructure (ISNGI) 2016, Wollongong, Australia. September 1, 2016.
29. Barrett, C. (2016) *Case studies panel Panel 5 – What does a Next Generation Early Career Researcher need in their toolkit?* International Symposium for Next Generation Infrastructure (ISNGI) 2016, Wollongong, Australia. September 2, 2016.
30. Barrett, C. (2016) *Data Science for the Public Good Poster Session*. Arlington, VA. July 29, 2016.
31. Barrett, C. (2016) *Example Models and Capabilities Panel, on microsimulation applications in human health*. IAV-IA-ESM workshop: Toward Multi-Model Frameworks Addressing Multi-Sector Dynamics, Risks, and Resiliency. College Park, MD. May 24, 2016.
32. Barrett, C. (2016) *Personalized Health Systems: The End of Monolithic Models for Decision Analytics*. Health Care Informatics & Analytics Conference. Fairfax, VA. May 5, 2016.
33. Barrett, C. (2016) *Panel Discussion: Elysium: Decoding digital disruptions in Healthcare*. Confluence U.S. 2016 - Igniting Change: Business Models, Technology, Talent. Santa Clara, California. March 23, 2016.
34. Barrett, C. (2015) *Global Systems Science, HPC and Big Data*. GSS 2015 Conference on Global Systems Science: Everything is Connected. Genoa, Italy. October 28-31, 2015.
35. Barrett, C., Keller, S., Reidys, C., Marathe, M. (2015) *VBI Presentation to DTRA*. DTRA visit. Virginia Bioinformatics Institute, Blacksburg, VA, September 29, 2015.

INVITED PRESENTATIONS

36. Barrett, C., Eubank, S., Marathe, M., Bisset, K., Mortveit, H., Nordberg, E., Wilson, A. (2015) *CNIMS Program Planning & Updates*. CNIMS Program Planning and Updates. Virginia Bioinformatics Institute. Blacksburg, VA. September 28, 2015.
37. Barrett, C. (2015) *Harnessing the Power of Big Data and Keeping it Secure*. ABMS Conference 2015. Chicago, IL. September 9-11, 2015.
38. Barrett, C. (2015) *Getting to topology for RNA*. Workshop on Topology Driven Methods for Complex Systems. Camerino, Italy. July 17-19, 2015.
39. Barrett, C., Eubank, S., Bisset, K., Swarup, S. (2015) *CNIMS 2014-2015 Program Review*. DTRA Annual Review 2015. Arlington, VA. April 14, 2015.
40. Chen, J., Deodhar, S., Soundarapandian, M., Bisset, K., Lewis, B., Barrett, C., and Marathe, M. (2014). *FluCaster: A Pervasive Webapp For High Resolution Situation Assessment and Forecasting of Influenza*. IEEE International Conference on Data Mining, Shenzhen, China. December 14-17, 2014.
41. Deodhar, S., Chen, J., Wilson, A., Soundarapandian, M., Bisset, K., Lewis, B., Barrett, C., & Marathe, M. (2015). *FluCaster: A Pervasive Web Application For High Resolution Situation Assessment and Forecasting of Flu Outbreaks*. 2nd IEEE International Conference on Healthcare Informatics (pp. 105–114). Dallas, TX: IEEE.
42. Barrett, C. (2014) *Information Biology: From Molecules to Public Health Policy*. Virginia Summit on Science, Engineering and Medicine (VASEM). Washington, D.C. December 5, 2014.
43. Barrett, C. (2014) *Governance, Resilience and Dynamics of Interdependent Human Populations*. International Symposia for Next Generation Infrastructure (ISNGI), Vienna, Austria. September 30 – October 1, 2014.
44. Barrett, C. (2014). *Cascading social implications following a large-scale disaster*. Federal Emergency Management Agency (FEMA) SSWG Meeting. Washington, D.C. May, 22, 2014.
45. Barrett, C. (2014) *Measuring, Modeling & Managing Massively Interacting Systems*. In *President's Council of Advisors on Science and Technology (PCAST)*. National Academy of Sciences (NAS), Washington D.C. April 4, 2014.
46. Barrett, C. (2013) *Informal session with Complexity Interest Group in Civil Service College*. Nanyang Technical University Visit. Singapore. December 11, 2013.
47. Barrett, C., Bisset, K., Marathe, M. (2013) *The Next Pandemic: Harnessing Supercomputing to Combat Infectious Disease*. SC Emerging Technologies, Supercomputing 2013. Denver, CO. November 18-22, 2013.
48. Barrett, C. (2013) *The Subtlety of Big Computation for Social and Policy Informatics: The data will never be big enough*. International Symposia for Next Generation Infrastructure. SMART Infrastructure Facility University of Wollongong, Australia. September 30 - October 2, 2013.

INVITED PRESENTATIONS

49. Barrett, C. (2013) *Is Infrastructure the Next National Security Frontier? In International Symposia for Next Generation Infrastructure*. SMART Infrastructure Facility University of Wollongong, Australia. September 30-October 2, 2013.
50. Barrett, C. (2013) *Policy Informatics at Societal Scale: Massively Interactive Socially-Coupled Systems*. 4th Conference on Community Resiliency. Davos, Switzerland. August 29-30, 2013.
51. Barrett, C. (2013) *DTRA OSD Talk*. DTRA OSD Talk. April 3, 2013.
52. Barrett, C., Marathe, M., Lewis, B., Eubank, S. (2013). *CNIMS Project Overview*. CNIMS Yearly Review. May 2013.
53. Barrett, C. (2013) *Believability and Usefulness: Policy Informatics in the age of social data*. SIAM SEAS 2013 Annual Meeting. Knoxville, TN. March 22-24, 2013.
54. Barrett, C. (2012) *Massively Interacting Systems: Thinking & deciding in the age of Big Data*. 3rd Annual Virginia Tech Conference on Community Resilience. Davos, Switzerland. August 24-25, 2012.
55. Eubank, S., Barrett, C., Maratha, M. (2012) *NDSSL Capabilities for Turkey earthquake response planning*. MG Lawlor meeting with Turkish representative. National Capital Region.
56. Marathe, M., Barrett, C. (2012) *Planning and Responding to Human Initiated Crisis: Role of Data Intensive Computing and Computational Socio-Technical Sciences*. International Conference on Networks in Biology, Social Science and Engineering. Indian Institute of Sciences. Bangalore, India. July 2012.
57. Eubank, S., Marathe, M., Lewis, B., Barrett, C., Marathe, A., Swarup, S., Chen, J., Bisset, K. (2012) *Modeling and Systems Approaches for Public Health Policy-Making*. APHA Annual Meeting. San Francisco, CA. October 31, 2012.
58. Marathe, M. and Barrett, C. (2012) *Towards Global Synthetic Information Systems*. Meeting at Chalmers University and Institute of the Futures, Stockholm, Sweden. December 2012.
59. Marathe, M. and Barrett, C. (2012) *Planning and Responding to Human Initiated Crisis: Role of Data Intensive Computing and Computational Socio-Technical Sciences*. International Conference on Networks in Biology, Social Science and Engineering, Indian Institute of Sciences.
60. Barrett, C. (2011) *Second Conference on Community Resiliency – Technology, Policy, and Resiliency: Moving Resiliency from Concept to Reality*. Virginia Tech Research Center. Arlington, VA. September 18-20, 2011.
61. Barrett, C. (2011) Keynote speaker at 2011 Conference of the International Complexity Science Society, University of Vienna. Vienna, Austria. September 11-13, 2011.
62. Barrett, C. (2011) Keynote speaker at International Conference on Computational Science, Nanyang Technological University. Singapore. May 30 – June 4, 2011.
63. Barrett, C. (2011) *Societal Resilience Workshop*, Chalmers University of Technology. Gothenburg, Sweden. May 16-20, 2011.

INVITED PRESENTATIONS

64. Barrett, C. (2011) Distinguished Lecture Series, Chalmers University of Technology. Gothenburg, Sweden. May 16-20, 2011.
65. Barrett, C. (2011) 10th Swedish Royal Colloquium entitled, "The Future of the Urban World" at Gripsholm Castle, Sweden by invitation of H.M. Karl XVI Gustav and the Swedish Royal Academy. Gripsholm, Sweden. May 11-13, 2011.
66. Barrett, C. (2011) MACWG, Meeting on IND Modeling and Analysis, April 13, 2011.
67. Barrett, C. (2011) Behavior Representation in Modeling Simulation (BRIMS), ONR, DARPA, MoD, AFRL, ARL, NASA. Sundance, Utah. March 21-24, 2011.
68. Barrett, C. (2011) Mathematics in the Science of Complex Systems. Venice, Italy. February 16-20, 2011.
69. Barrett, C. (2011) *Synthetic Information Environments for Multi-theory, Multi-perspective Decision Analysis of Complex Social-Technical Networks*. Human Social Culture Behavior Modeling Program Focus. 2011 Conference (HSCB2011). Washington, D.C. February 9-10, 2011.
70. Barrett, C. (2011) U.S. Northern Command (NORTHCOM) Peterson Air Force Base. Colorado Springs, Colorado. January 17-18, 2011.
71. Marathe, M., Barrett, C. (2010) *Synthetic information and its application to study diffusion in coevolving networks*. Hume Strategic Meeting. Virginia Tech, Blacksburg, VA. November 30, 2010.
72. Marathe, M., Barrett, C. (2010) *Interaction-based modeling of population dynamics and socio-behavioral processes*. Office of Naval Research 4th Indo-U.S. Roundtable on Science and Technology. Bangalore, India. September 2010.
73. Barrett, C. (2010) *Theoretical and Practical Believability of Very Large Scale Agent-Oriented Social Simulations*. National Research Council, Washington D.C.
74. Barrett, C. (2010) *Believability and Usefulness: Issues in verification and validation of large, agent-based coupled systems simulations for decision informatics*. National Research Council, Washington D.C.
75. Barrett, C. (2010) *High performance computing methods for inference of state assessment and course of action analysis in large socio-technical networks*. 2010 DTRA Basic Research Review.
76. Barrett, C. (2010) *Large Scale Socially-Coupled Complex Systems*. Fourth Indo-U.S. Science and Technology Roundtable, Bangalore India, sponsored by the Office of Naval Research-Global (ONR-G).
77. Barrett, C. (2010) *Informatics in Decision-making and Policy for Socially Coupled Systems*. Business, Industry and Government – Science and New Technologies for Enhancing Policy, Global Systems Dynamics Coordination, Future and Emerging Technologies Programme, European Commission.

INVITED PRESENTATIONS

78. Barrett, C. (2009) *Epidemics in Social Networks: Remarks on the Issue of Detail*. DIMACS Workshop for Mathematical Models of Behavioral Epidemiology, Rutgers University.
79. Barrett, C. (2009) *Interactionist Methods for Coevolving Social Systems: Implications for Policy and Decision Informatics*. Abisko Research Station, Office of Polar Research. Royal Academy of Science, Sweden.
80. Barrett, C. (2009) *Conceptual and Formal Foundations of Synthetic Information Methods in Co-evolving Systems*. Institute for Scientific Interchange Foundation. Turin, Italy.
81. Barrett, C. (2009) *Informatics and the analysis of complex interdependent systems: Contagion as a practical example*. Mathematical Theory of Networks and Systems Conference. Virginia Tech, Blacksburg, VA.
82. Barrett, C. (2009) *Simfrastructure: A Synthetic Information System for Multi Theory/ Multi Perspective Social Computing*. Booz, Allen, Hamilton and DARPA-IPTO.
83. Barrett, C. (2009) *Comprehensive National Incident Management System (CNIMS)*. Office of the Secretary of Defense.
84. Barrett, C. (2009) *Co-evolution of socio-technical networks and individual behavior*. Studying Society in a Digital World Workshop. Princeton University. Princeton, NJ.
85. Barrett, C. (2009) *Policy & Decision Informatics of Complex Systems*. University of Wollongong. Wollongong, Australia.
86. Barrett, C. (2009) *Synthetic Information Systems for Policy-Making Decision Support*. Future and Emerging Technologies Programme, European Commission. Brussels, Belgium.
87. Barrett, C. (2008) *HPC-based policy informatics: A public health epidemiology example*. High Performance Computational Biology (HICOMB). Miami, FL.
88. Barrett, C. (2008) *Policy informatics to support analysis of interdependent systems: An interaction based approach*. John Hopkins University hosting Infectious Disease Modeling Meeting. Laurel, MD.
89. Barrett, C. (2008) *Informatics and the analysis of complex interdependent systems: Contagion as a practical example*. GE Whitney Symposium. Niskayuna, NY. June 16 & 17, 2008.
90. Barrett, C. (2008) *Informatics and the analysis of complex interdependent systems: Contagion as a practical example*. Mathematical Theory of Networks and Systems Conference. Virginia Tech, Blacksburg, VA.
91. Barrett, C., Marathe, M., Fox, G., Myers, D. (2008) *Complex Information Integration Institute*. Office of Director of Defense Research and Engineering. Washington D.C.
92. Barrett, C. (2007) *Interaction Based Models for Epidemiology*. Virginia Tech Department of Epidemiology. Blacksburg, VA.
93. Barrett, C. (2007) *Interaction-Based Modeling of Population Dynamics and Infectious Disease*. Frontiers in Transportation: Social Interactions.
94. Barrett, C. (2007) *Transdisciplinary Science and Interaction Based Modeling of Very Large Complex Systems*. IEEE Virginia Mountain Section. Roanoke, VA.

INVITED PRESENTATIONS

95. Barrett, C. (2007) *An analysis of layered public health interventions of Ft. Lewis and Ft. Hood during a pandemic influenza event*. Defense Threat Reduction Agency and Senior Management. Fort Belvoir, VA.
96. Barrett, C. (2007) *High Performance Computing Based Epidemiological Modeling*. Defense Threat Reduction Agency R&D Enterprise and Weapons of Mass Destruction.
97. Barrett, C. (2007) *High Performance Computing Based Simulation*. Defense Threat Reduction Agency Director and Senior Management.
98. Barrett, C. (2007) *High Performance Simulation of Contagious Diseases and Mitigation in Human Populations*. Entomology Department Seminar at Virginia Tech. Blacksburg, VA.
99. Barrett, C. (2007) *Issues of National Guard Force Readiness in Alabama during an Influenza Epidemic*. Defense Threat Reduction Agency.
100. Barrett, C. (2006) *Agency and Detail in the Simulation of Very Large Networks*. Salishan Conference Department of Energy Annual High Speed Computing Conference. Gleneden Beach, OR.
101. Barrett, C. (2006) *Large Scale Detailed Simulation of Epidemics*. Canadian National Research Council, Canadian Congress on Computing, Social Sciences and Humanities.
102. Barrett, C. (2006) *Transdisciplinary Science and Socio-Technical Problems*. 26th Annual Conference of Center for Nonlinear Studies Socio-Technical Systems: Bridging the Scales 2006, Oppenheimer Center, Los Alamos National Laboratory. Los Alamos, NM.
103. Barrett, C. (2006) *High Performance Computing Based Modeling for Weapons of Mass Destruction Problems*. Department of Defense, Office of the Secretary of Defense, Defense Threat Reduction Agency.
104. Barrett, C. (2006) *Modeling for Decisions in Epidemic Crisis*. EU Symposium. Brussels, Belgium.
105. Barrett, C. (2005) *Epidemiological Modeling and Critical Infrastructures*. Distinguished Lecture Series, University of Utah. Salt Lake City, Utah.
106. Barrett, C. (2000) *Application of a theory of simulation to models of mobile communication systems*. Proceedings of the 4th International Workshop on Discrete Algorithms and Methods for Mobile Computing and Communications. Boston, MA.

MEDIA APPEARANCES

1. Hausman, S., *radioIQ/wvtf music* (2020), UVA to Lead Study of How Big Data Can Battle Future Pandemics. <https://www.wvtf.org/post/uva-lead-study-how-big-data-can-battle-future-pandemics#stream/0>, June 1, 2020.
2. Paviour, B., *VPM NPR/PBS* (2020), Models Predict Uptick in Cases as Virginia Reopens. <https://vpm.org/news/articles/13635/models-predict-uptick-in-cases-as-virginia-reopens>, May 21, 2020.
3. BII, *Biocomplexity Institute and Initiative* (2020), Biocomplexity Institute Develops COVID-19 Dashboard Projecting Hospital Capacity Scenarios in Virginia. <https://biocomplexity.virginia.edu/biocomplexity-institute-develops-covid-19-dashboard-projecting-hospital-capacity-scenarios-virginia>, May 19, 2020.
4. BII, *Biocomplexity Institute and Initiative* (2020), Governor Northam, University of Virginia Biocomplexity Institute, RAND Corporation Present Infectious Disease Modeling on Impact of COVID-19 Mitigations in Virginia. <https://biocomplexity.virginia.edu/governor-northam-university-virginia-biocomplexity-institute-rand-corporation-present-infectious>, April 14, 2020.
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2. Barrett, C.L., inventor; Marathe, M.V., inventor; Bisset, K.R., inventor; Beckman, R. J., inventor; Stretz, P.E., inventor; Mortveit, H.S., inventor; Eubank, S.G., inventor; Marathe, A., inventor; Vullikanti, A.K.S., inventor; Atkins, K.S., inventor. 2010 October 21. "Complex Situation Analysis System." *Australia Patent, AS 2010236510*.
3. Barrett, C.L., inventor; Marathe, M.V., inventor; Bisset, K.R., inventor; Beckman, R. J., inventor; Stretz, P.E., inventor; Mortveit, H.S., inventor; Eubank, S.G., inventor; Marathe, A., inventor; Vullikanti, A.K.S., inventor. Issued 2013 April 10. "Complex situation analysis system that generates a social contract network, U.S.es edge brokers and service brokers and dynamically adds brokers." *United States Patent, U.S. 8,423,494*.
4. Barrett, C.L., inventor; Marathe, M.V., inventor; Bisset, K.R., inventor; Stretz, P.E., inventor. 2014 March 25. "Complex situation assessment system that spawns/creates new brokers using existing brokers as needed to respond to requests for data." *United States Patent, U.S. 8,682,828*.
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PATENT APPLICATIONS

1. Barrett, C.L., inventor; Marathe, M.V., inventor; Bisset, K.R., inventor; Beckman, R. J., inventor; Stretz, P.E., inventor; Mortveit, H.S., inventor; Eubank, S.G., inventor; Marathe, A., inventor; Vullikanti, A.K.S., inventor; Atkins, K.S., inventor. 2012 November 16. “Complex Situation Analysis System.” *India Patent, India Patent Application 7713/CHENP/2011*.
2. Barrett, C.L., inventor; Marathe, M.V., inventor; Bisset, K.R., inventor; Beckman, R. J., inventor; Stretz, P.E., inventor; Mortveit, H.S., inventor; Eubank, S.G., inventor; Marathe, A., inventor; Vullikanti, A.K.S., inventor; Atkins, K.S., inventor. 2012 February 22. “Complex Situation Analysis System.” *European Patent, European Patent Application 10765062.4*.
3. Barrett, C.L., inventor; Marathe, M.V., inventor; Bisset, K.R., inventor; Beckman, R. J., inventor; Stretz, P.E., inventor; Mortveit, H.S., inventor; Eubank, S.G., inventor; Marathe, A., inventor; Vullikanti, A.K.S., inventor; Atkins, K.S., inventor. 2012 November 23. “Complex Situation Analysis System.” *Hong Kong Patent, Hong Kong Patent Application 12107829.8*.
4. Barrett, C.L., inventor; Marathe, M.V., inventor. 2017 April 14 “Computerized event simulation using synthetic populations.” *United States Patent, U.S. Patent Application 15/487,929*.
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6. Barrett, C.L., inventor; Marathe, M.V., inventor; Lewis, B.L., inventor; Akupatni, V.B., inventor. 2017 April 27. “Computerized event-forecasting system and U.S. er interface.” *United States Patent, U.S. Patent Application 15/499,423*.
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9. Barrett, C.L., inventor; Reidys, C, inventor; He, Q., inventor; Huang, W., inventor. 2018 October 12. “Systems and methods for characterizing and sampling nucleic acid sequences and structures of same” *United States Patent, U.S. Patent Application 16/158,964*. Provisional application No. 62/571,840, filed on Oct. 12, 2017. Application status pending on January 21, 2020.

BARRETT FUNDED ARA and NSF PROJECTS 2020 - 2025

Current – National Science Foundation (NSF) and Applied Research Associates, Inc. (ARA)

Project Title: Expeditions: Collaborative Research: Global Pervasive
Computational Epidemiology
Co-PIs: Christopher Barrett, Stephen Eubank, Anil K.S.
Vullikanti, Samarth Swarup
PI: Madhav Marathe
Source of Support: National Science Foundation (NSF)
Total Amount: \$3,794,984
Total Award Period Covered: 4/01/2020 - 03/31/2025

Project Title: Scalable Analytics for Decision Support
PI: Christopher Barrett
Source of Support: Applied Research Associates, Inc. (ARA)
Total Amount: \$2,868,593
Total Award Period Covered: 1/29/20 - 12/7/2024

BARRETT FUNDED DTRA PROJECTS 2006-2019

Completed– Comprehensive National Incident Management Systems (CNIMS) / DTRA and Air Force Office of Scientific Research (AFOSR)

Project Title: Comprehensive National Incident Management System –
CNIMS - TO1 (O&M)
PI: Christopher Barrett
Source of Support: VT (Defense Threat Reduction Agency)
Total Amount Pending: \$2,622,178
Total Award Period Covered: 9/29/2017-12/31/2019

Project Title: Comprehensive National Incident Management System –
CNIMS - TO2 (R&D)
PI: Christopher Barrett
Co-PIs: Madhav Marathe
Source of Support: Defense Threat Reduction Agency (DTRA)
Total Amount Pending: \$15,598,623
Total Award Period Covered: 9/29/2017-12/31/2019

Project Title: Network-Centric Computing for Global System Science
PI: Christopher Barrett
Co-PIs: Kevin Shinpaugh, Madhav Marathe
Source of Support: Air Force Office of Scientific Research (AFOSR)
Total Amount Pending: \$200,000
Total Award Period Covered: 8/15/2017-1/9/2019

BARRETT FUNDED DTRA PROJECTS 2006-2019

Completed– Comprehensive National Incident Management Systems (CNIMS) / DTRA and Air Force Office of Scientific Research (AFOSR)

Project Title: Comprehensive National Incident Management Systems – CNIMS IDIQ
PI: Christopher Barrett
Co-PIs: Madhav Marathe
Source of Support: Defense Threat Reduction Agency
(DTRA) Total Amount Awarded: \$27,300,000
Total Award Period Covered: 9/29/2017-8/31/2018

Project Title: Comprehensive National Incident Management System – CNIMS - TO1 (O&M)
PI: Christopher Barrett
Source of Support: VT (Defense Threat Reduction Agency)
Total Amount Awarded: \$491,228
Total Award Period Covered: 9/29/2017-8/31/2018

Project Title: Comprehensive National Incident Management System – CNIMS - TO2 (R&D)
PI: Christopher Barrett
Co-PIs: Madhav Marathe
Source of Support: VT (Defense Threat Reduction Agency)
Total Amount Awarded: \$3,000,472
Total Award Period Covered: 9/29/2017-8/31/2018

Project Title: Comprehensive National Incident Management System (CNIMS) – Cumulative for all Tasks
PI: Christopher Barrett
Source of Support: Defense Threat Reduction Agency (DTRA) United States Department of Defense (DoD)
Total Amount Awarded: \$25,206,765
Total Award Period Covered: 10/1/2011-9/28/2017

Project Title: CNIMS – Task 1
PI: Christopher Barrett
Source of Support: DTRA DOD
Total Amount Awarded: \$19,945,507
Award Period Covered: 10/1/2011-9/28/2017

Project Title: CNIMS - Task 2
PI: Christopher Barrett
Source of Support: DTRA DOD
Total Amount Requested: \$1,072,775
Award Period Covered: 10/1/2011-9/28/2017

BARRETT FUNDED DTRA PROJECTS 2006-2019

Completed– Comprehensive National Incident Management Systems (CNIMS) / DTRA and Air Force Office of Scientific Research (AFOSR)

Project Title: CNIMS - Task 3
PI: Christopher Barrett
Source of Support: DTRA DOD
Total Amount Requested: \$2,000,000
Award Period Covered: 9/7/2012-9/28/2017

Project Title: EpiViewer and My4Sight Integration into the Biosurveillance Ecosystem (BSVE)
PI: CNIMS - Task 5
Chris Barrett
Co-PI: Madhav Marathe
Source of Support: DTRA DoD
Total Amount Requested: \$884,843
Award Period Covered: 9/28/2016-9/27/2017

Project Title: Novel Methods and Software Systems for Inference and Modeling of Behavior for Epidemic Surveillance, Planning and Response
PI: CNIMS - Task 4
Chris Barrett
Co-PIs: Madhav Marathe
Anil Vullikanti, Stephen Eubank,
Achla Marathe, Jiangzhuo Chen
Source of Support: DTRA DOD
Total Amount Requested: \$1,357,641
Award Period Covered: 10/1/2013-12/31/2015

Project Title: Comprehensive National Incident Management System (CNIMS)
PI: Christopher Barrett
Source of Support: Defense Threat Reduction Agency (DTRA)
Total Amount Requested: \$16,476,481
Total Award Period Covered: 9/10/2007-9/30/2011

BARRETT FUNDED DTRA PROJECTS 2006-2019

Completed – Other Defense Threat Reduction Agency(DTRA)

Project Title: Rigorous Approaches for Validation and Verification of Networked Systems
PI: Madhav Marathe
Co-PIs: Christopher Barrett, Stephen Eubank, Henning Mortveit
Source of Support: Defense Threat Reduction Agency (DTRA)
Total Amount Requested: \$1,890,969
Total Award Period Covered: 6/1/2011-5/31/2016

Project Title: High Performance Computing Methods for Inference State Assessment and Course of Action Analysis in Large Socio-Technical Methods
PI: Christopher Barrett
Co-PIs: Madhav Marathe, Henning Mortveit, Richard Beckman
Source of Support: Defense Threat Reduction Agency (DTRA)
Total Amount Requested: \$1,425,000
Total Award Period Covered: 3/11/2009-7/14/2012

Project Title: Biological Transport, Infectious Disease - DTRA Integrated Weapons of Mass Destruction Tool (IWMDT)
PI: Christopher Barrett
Source of Support: Oak Ridge National Laboratory
Defense Threat Reduction Agency (DTRA)
Total Amount Awarded: \$1,600,000
Total Award Period Covered: 10/5/2006-12/4/2007

BARRETT OTHER FUNDED PROJECTS 2005-2019

Barrett PI

Project Title: Network-Centric Computing for Global System Science
PI: Christopher Barrett
Source of Support: Air Force Office of Scientific Research (AFOSR)
Total Amount Requested: \$200,000 Instrumentation Grant
Total Award Period Covered: 8/15/2017 – 1/9/2019

Project Title: SIBEL Technology Demonstration
PI: Christopher Barrett
Co-PIs: Bryan Lewis
Source of Support: Metabiota, Inc.
Total Amount Requested: \$58,184
Total Award Period Covered: 4/15/2016-8/31/2016

Project Title: Data Intensive Compute Cluster for Modeling Large Socio-Technical Systems
PI: Christopher Barrett
Co-PIs: Keith Bisset, Kevin Shinpaugh
Source of Support: Army Research Office (ARO)
Total Amount Requested: \$300,000 Instrumentation Grant
Total Award Period Covered: 6/13/2014-8/14/2015

Project Title: Research Center Of Excellence In Public Health Informatics
PI: Christopher Barrett
Co-PIs: Madhav Marathe, Stephen Eubank
Source of Support: University of Utah (NIH,
CDC) **Total Amount Requested:** \$675,000
Total Award Period Covered: 8/1/2006-9/30/2009

Project Title: White House Area Transportation Study: Task Amendment To Include Developer Support For Core Transims Software
PI: Christopher Barrett
Source of Support: AECOM Consulting (Federal Highway)
Total Amount Requested: \$172,778
Total Award Period Covered: 10/7/2005-7/7/2006

BARRETT OTHER FUNDED PROJECTS 2005-2019

Barrett Co-PI

Project Title: Montage: Capturing Collective Behavior with Modeling and Experimentation
PI: Narendran Ramakrishnan
Co-PIs: Christopher Barrett, Madhav Marathe, Gizem Korkmaz, Anil Vullikanti, Stephen Eubank, Samarth Swarup, Christopher Kuhlman, Andrew Warren, Amanda Wilson, Patrick Butler, Brian Mayer, Brian Goode
Source of Support: Department of the Interior (DOI) Defense Advanced Research Projects Agency (DARPA)
Total Amount Awarded: \$3,000,000
Total Award Period Covered: 10/17/2016-10/16/2018

Project Title: Modeling Disease Dynamics On Large, Detailed, Co-Evolving Networks
PI: Stephen Eubank
Co-PIs: Christopher Barrett, Madhav Marathe
Source of Support: National Institutes of Health - National Institute of General Medical Sciences (NIH/NIGMS)
Total Amount Requested: \$3,645,168
Total Award Period Covered: 9/1/2009-8/31/2018

Project Title: CC*DNI Networking Infrastructure: A Campus Research Network and Distributed Science DMZ
PI: Scott Midkiff
Co-PIs: Christopher Barrett, Terry Herdman, William Dougherty, Thomas Dingus
Source of Support: National Science Foundation (NSF)
Total Amount Requested: \$498,519
Total Award Period Covered: 9/15/2015-9/14/2017

Project Title: NetSE:Large:Collaborative Research: Contagion in Large Socio-communication Networks
PI: Madhav Marathe
Co-PIs: Christopher Barrett, Anil Vullikanti, Stephen Eubank
Source of Support: National Science Foundation (NSF)
Total Amount Requested: \$1,567,458
Total Award Period Covered: 8/15/2010-7/31/2016

BARRETT OTHER FUNDED PROJECTS 2005-2019

Project Title: Collaborative Research: Modeling Interaction Between Individual Behavior, Social Networks and Public Policy To Support Public Health Epidemiology
PI: Madhav Marathe
Co-PIs: Christopher Barrett, Anil Vullikanti, Stephen Eubank, Richard Beckman
Source of Support: National Science Foundation (NSF)
Total Amount Requested: \$540,000
Total Award Period Covered: 7/1/2007-9/30/2012

Project Title: VACCINE: Visual Analytics for Command, Control, Interoperability, National Security and Emergencies
PI: David Ebert
Co-PIs: Christopher Barrett, Madhav Marathe, Stephen Eubank
Source of Support: Purdue University (U.S. Department of Homeland Security) (DHS)
Total Amount Requested: \$56,250
Total Award Period Covered: 9/1/2009-5/31/2011

Project Title: Collaborative Research: Capacity Estimation and Cross-Layer-Aware Protocols for Wireless Networks
PI: Madhav Marathe
Co-PIs: Christopher Barrett, Anil Vullikanti
Source of Support: National Science Foundation (NSF)
Total Amount Requested: \$360,000
Total Award Period Covered: 6/14/2006-8/31/2011