NetSci X Wrocław

International School and Conference on Network Science | Poland, January 11–13, 2016

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CONFERENCE SCHEDULE

Sunday, January 10	Monday, January 11	Tuesday, January 12	Wednesday, January 13
	08:30 – 09:00 **Opening Ceremony**		
	09:00 – 10:00 **Brian Uzzi**	09:00 – 10:00 **Jiawei Han**	09:00 – 10:00 **Mario Gerla**
	10:00 – 10:40 **Kristian Kersting**	10:00 – 10:40 **Santo Fortunato**	10:00 – 10:40 **Dunja Mladenic**
	10:40 – 11:00 **Break**	10:40 – 11:00 **Break**	10:40 – 11:00 **Break**
	11:00 – 12:20 **Schools 1 &2: Temporal CN, School of Code**	11:00 – 12:20 **Parallel Sessions S1 – S4**	11:00 – 12:20 **Parallel Sessions S9 – S12**
	12:20 – 13:20 **Lunch and Poster Session**	12:20 – 13:20 **Lunch and Poster Session**	12:20 – 13:20 **Lunch and Poster Session**
	13:20 – 14:40 **School 3 & 4: Temporal CN, School of Code**	13:20 – 14:40 **Parallel Sessions S5 – S8**	13:20 – 14:00 **Ulrik Brandes**
	14:40 – 15:20 **Mason Porter**	14:40 – 15:20 **Gyorgy Korniss**	14:00 – 15:20 **Parallel Sessions S13 – S16**
	15:20 – 15:40 **Break**	15:20 – 15:40 **Break**	15:20 – 15:40 **Break**
	15:40 – 16:20 **Janusz Hołyst**	15:40 – 16:50 **Global Discussion Panel "Computational Network Science"**	15:40 – 16:40 **Albert-Laszlo Barabasi**
	16:20 – 17:00 **Bettina Berendt**	16:50 – 17:30 **Balazs Vedres**	16:40 – 17:10 **Closing Ceremony, Awards**
17:30 – 19:00 **Welcome reception & registration**	17:00 – 19:00 **Reception & Poster Session**	19:30 – 23:00 **Banquet, Robin Dunbar**	
	19:00 – 20:30 **YRNCS Job Fair**		

Monday: 08:00 – 17:00 Registration

Tuesday: 08:30 – 17:00 Registration

Wednesday: 08:30 – 17:00 Registration

KEYNOTE/INVITED SPEAKERS & GLOBAL DISCUSSION PANEL (AUDYTORIUM)

Monday, January 11		Tuesday, January 12		Wednesday, January 13	
09:00 - 10:00	**Brian Uzzi -** *"The Age of Information and the Fitness of Scientific Ideas and Inventions"* – chair Ronaldo Menezes	09:00 – 10:00	**Jiawei Han -** *"Networks Everywhere: On Construction of Semi-Structured Heterogeneous Networks from Massive Text Data"* – chair Przemyslaw Kazienko	09:00 – 10:00	**Mario Gerla -** *"Utilizing Social Network Structures for Opportunistic Routing in MANETs"* – chair Jiawei Han
10:00 – 10:40	**Kristian Kersting –** *"Collective Attention on the Web"* - chair Tomasz Kajdanowicz	10:00 – 10:40	**Santo Fortunato –** *"Community structure in complex networks: genesis, graph spectra and algorithm validation"* – chair Balazs Vedres	10:00 – 10:40	**Dunja Mladenic – "***Cross-lingual Event Observatory"* – chair Bettina Berendt
10:40 – 11:00 Break					
14:40 – 15:20	**Mason Porter –** *"Multilayer Networks and Applications"* – chair Gyorgy Korniss	14:40: 15:20	**Gyorgy Korniss -** *"Cascading Overload Failures in Networks with Distributed Flows"* – chair Janusz Hołyst	13:20 – 14:00	**Ulrik Branders –** *"Positional Dominance, Rankings and Centrality in Networks"* – chair Kristian Kersting
15:20 – 15:40 Break					
15:40 – 16:20	**Janusz Hołyst –** *"Hierarchies of order and order of hierarchies"* – chair Glenn Lawyer	15:40 – 16:50	**Global Discussion Panel** *"***Computational Network Science***"* _Panelists_: **Albert-László Barabási** (Northeastern University), **Jiawei Han** (University of Illinois at Urbana-Champaign), **Alex (Sandy) Pentland** (MIT), **Bolesław Szymanski** (Rensselaer Polytechnic Institute), **Brian Uzzi** (Northwestern University) _Moderator_: **Przemysław Kazienko**	15:40 – 16:40	**Albert-Laszlo Barabasi– "***Taming Complexity: Controlling Networks"* – chair Boleslaw Szymanski
16:20 – 17:00	**Bettina Berendt** *"Privacy in networks: Data mining as foe or friend?"* – chair Piotr Brodka	16:50 – 17:30	**Balazs Vedres –** *"Fold networks as engines of generative tension"* - chair Mason Porter		
		19:30 – 23:00	**Banquet, Robin Dunbar –** *"The social world at your fingertips"* – chair Brian Uzzi		

KEYNOTE/INVITED SPEAKERS (in order of appearance)

BRIAN UZZI
"The Age of Information and the Fitness of Scientific Ideas and Inventions"

Though science's knowledge base is expanding rapidly, the breakthrough paper rate is narrowing and scientists take longer to make their first discoveries. Breakthroughs are related to how information is recombined, yet it remains unclear how scientists and inventors forage the knowledge base in search of tomorrow's highest impact ideas. Studying 28 million scientific papers and 5 million U.S. patents, we uncover 2 major findings. First, we identify "Darwin's Conjecture," which reveals how conventional and novel ideas are balanced within breakthrough papers. Second, we find an "information hotspot." The hotspot is that cluster of papers of a certain age distribution in the knowledge base that best predict tomorrow's hits. Together, works that combine knowledge according to Darwin's Conjecture or forage in the hotspot double their odds of being in the top 5% or better of citations. These patterns result in over 250 scientific and technology fields, are increasingly dominant, and outperform other predictors of impact, suggesting a universal link between the age of information and scientific discovery.

KRISTIAN KERSTING
"Collective Attention on the Web"

It's one of the most popular online videos ever produced, having been viewed more than 800 million times on YouTube. At first glance, it's hard to understand why the clip is so famous, since nothing much happens. Two little boys, Charlie and Harry, are sitting in a chair when Charlie, the younger brother, mischievously bites Harry's finger. There's a shriek and then a laugh. The clip is called "Charlie Bit My Finger—Again!" Why has this footage gone viral? How viral is it actually? Generally, understanding the dynamics of collective attention is central to an information where millions of people leave digital footprints everyday. We therefor have developed novel computational methods to characterize, analyze and even predict the dynamics of collective attention among millions of users to and within social media services. For instance, using mathematical epidemiology, we find that so-called „viral" videos indeed show very high infection rates and, hence, should be called viral.
Based on joint works with Christian Bauckhage, Fabian Hadiji, and Rastegarpanah.

MASON PORTER
"Multilayer Networks and Applications"

One of the most active areas of network science, with an explosion of publications during the last few years, is the study of "multilayer networks," in which heterogeneous types of entities can be connected via multiple types of ties that change in time. Multilayer networks can include multiple subsystems and "layers" of connectivity, and it is important to take multilayer features into account to try to improve our understanding of complex systems. In this talk, I'll give an introduction to multilayer networks and will discuss applications in areas such as transportation, finance, neuroscience, and ecology.

JANUSZ HOŁYST

"Hierarchies of order and order of hierarchies"

The word *hierarchy* comes from two Greek words hieros (holy) and arkhia (rule) and the concept appeared for the first time in the sixth century as the order of sacred things in Christian theology. Currently the word posseses many different meanings, inter alia: (i) order, i.e. a rank of any objects according to a certain parameter; (ii) relationship of control or domination; (iii) relationship of inclusion; (iv) coexistence of multiple organization levels. Complexity science is intersted in various hierarchies due to universal power laws (eg. Zipf law, Pareto distributions) being a sign of scale invariance and because of self-organization processes in multi-level physical, biological and social systems. Several hierarchical systems will be presented during the lecture. In the first case the evolution starts from a root node and the growth process is driven by rules of tournament selection. A system can be conceived as an evolving tree with a new node being attached to a contestant node at the best hierarchy level (a level nearest to the tree root). The proposed evolution reflects limited information on system properties available to new nodes. The information restrains the emergence of new hierarchy levels.In the second case the evolution starts from a bottom hierarchy level and then next levels are emerging. Therein, two dynamical processes are accounted for: agents' promotions to next hierarchy levels and degradations to the lowest one. Following the initial stage of evolution the system approaches a stationary state where hierarchies no longer emerge and the distribution of agents at different levels is exponential. The average hierarchy level, the number of links per node, and the fraction of agents at the lowest level are all independent from the system size. However, the maximal hierarchy level grows logarithmically along the number of nodes. Computer simulations of opinion dynamics in hierarchical social groups and co-evolution of hierachical adaptive random Boolean networks will be demonstrated.

BETTINA BERENDT

"Privacy in networks: Data mining as foe or friend?"

Online networks are great places for sharing data, discovering new knowledge in these data, and acting on this knowledge. Data mining plays a central role in these knowledge-based operations. But who profits, and who may be harmed? One widespread view is that data mining in networks can be instrumental for severe privacy violations. On the other hand, data mining is also expected to be able to empower users. In this talk, I report on our recent studies on (a) helping users manage their communication environment in online social networks and (b) analysing commercial tracking beyond advertising. I consider the applicable notions of networks, the concepts of privacy that is harmed or protected, and the role of data mining. I show how data mining can be a useful building block, but also needs to be extended by more systemic methods such as teaching approaches, in order to empower citizens.

JIAWEI HAN

"Networks Everywhere: On Construction of Semi-Structured Heterogeneous Networks from Massive Text Data"

The real-world big data are largely unstructured but interconnected, mainly in the form of natural language text. One of the grand challenges is to turn such massive data into actionable knowledge. In order to turn such massive unstructured, text-rich, but interconnected data into knowledge, we propose a D2N2K (i.e., data-to-network-to-knowledge) paradigm, that is, first turn data into relatively structured heterogeneous information networks, and then mine such text-rich and structure-rich heterogeneous networks to generate useful knowledge. We show why such a paradigm represents a promising direction and present some recent progress on the development of effective methods for construction and mining of structured heterogeneous information networks from text data. We argue that network science is the key at turning massive unstructured data into structured knowledge.

SANTO FORTUNATO

"Community structure in complex networks: genesis, graph spectra and algorithm validation"

Real networks display a modular organization, where modules, or communities, appear as subgraphs whose nodes have an appreciably larger probability to get connected to each other than to other nodes of the network. In this talk I will show that communities emerge naturally in growing network models favoring triadic closure, a mechanism necessary to implement for the generation of large classes of systems, like e.g. social networks. I will show that the number of communities can be inferred by perturbing the adjacency matrix and see how its eigenvectors rotate. Finally I will address the crucial issue of validation, probably the single most important issue of network community detection. If using artificial benchmark graphs could bias methods towards the definition of community implemented by the benchmarks, real networks with metadata may or may not be useful for testing, contrary to general expectations.

GYORGY KORNISS

"Cascading Overload Failures in Networks with Distributed Flows"

In complex information or infrastructure networks, even small localized disruptions can give rise to congestion, large-scale correlated failures, or cascades, -- a critical vulnerability of such networks. Here, we study cascades of overload failures for distributed flows in spatial and non-spatial random graphs, and empirical networks. Our recent results on load-based cascading failures in spatially-embedded random networks (applicable to power grids) underline both the conceptual and computational challenges and difficulties identifying critical nodes, lines, and regions to mitigate cascades. We observed that cascading failures are non-self-averaging in spatial graphs, hence predictability is poor and conventional mitigation strategies are largely ineffective. Among our main findings is that protecting all nodes (or edges) by the same additional capacity (tolerance) may actually lead to larger global failures. I.e., indiscriminately investing resources in the protection of nodes or links can actually make the network more vulnerable against cascading failures ("paying more can result in less", in terms of robustness).

BALAZS VEDRES

"Fold networks as engines of generative tension"

The main mechanisms governing social tie formation and operation are at odds with recognizing new ideas. Homophily, closure, skewed degree distributions, and limited vision are four main forces of network gravity. This talk brings cases where these gravity forces were overcome by organizational design and emergent institutions. Using data on more than a hundred thousand video game developers from the 1980's to the present, four hundred thousand jazz musicians from 1890 to the present, and the emergence of post-socialist business groups in Hungary I show mechanisms of achieving generative tension, productive diversity, and sustained exploration. I will highlight the role of structural folds, and the significance of overlapping yet cognitively diverse communities. Fold networks enable diverse associations, the recognition and realization of novelty. Fold networks also de-stabilize clusters and contribute to the constant renewal of associations.

MARIO GERLA

"Utilizing Social Network Structures for Opportunistic Routing in MANETs"

Opportunistic routing (OR) is a new network routing paradigm for mobile, intermittently connected wireless networks. Unlike traditional routing, OR exploits node mobility to physically carry the data and forward it opportunistically when in contact with other nodes. A key challenge in OR is to determine the appropriate relays in order to minimize the number of copies forwarded, while maintaining message delivery time short. Since node mobility patterns are highly volatile and hard to control, attempts at

exploiting stable social network structure for data forwarding have emerged. State-of-the-art OR protocols utilize a wide variety of social features for routing such as the friendship relationship, egocentric centrality, social similarity, social map, social contexts, and community structure. These heuristic-based social forwarding approaches achieve throughput efficiency and fairness in large scale, complex social networks, where connections among nodes follow a fat-tailed distribution. In this talk, we present recent developments in social-based OR protocols, discuss their pros and cons, and point out directions for future research.

DUNJA MLADENIC
"Cross-lingual Event Observatory"

Everything is interconnected, we are interacting on different levels, we co-exist in the same global environment, interdepend on each other which gives us opportunity to share and to develop mutual understanding. Electronic media, via physical network of devices and electronic interconnections between them, is making it very tangible. Crossing barriers between different countries, cultures, languages, life styles etc. is today a part of normal life. We cannot pretend it is not happening thus we suggest to put efforts in becoming more aware of the environment we all live in via globally observing events. Focusing on the events being reported about in electronic media, we see several challenges that motive research on data analytics. To contribute to that end, we have developed a system http://EventRegistry.org for observing events around the world in real-time via collecting information from over 300,000 news and social media sources. The underlying methods for text mining and data analytics enable handling large amount of textual data across different languages, enriching data with additional information, extracting information and identifying events, streaming information about events in open data formats, organizing and representing events to support observing global social dynamics. The talk will discuss challenges and research/technical solutions.

ULRIK BRANDERS
"Positional Dominance, Rankings and Centrality in Networks"

Centrality indices are used to assess the structural importance of nodes in a network, and they are commonly defined as graph invariants. Many such indices have been proposed, but there is no unifying theory of centrality. Axiomatic characterizations have focused on properties of particular indices, and conceptual frameworks are not suitable for mathematical treatment. A unifying framework for the concept of centrality is derived from a recently introduced positional approach to network science. It highlights a property shared by all standard centrality indices, preservation of the neighborhood-inclusion preorder, and provides ample opportunities for both, formal and empirical studies of centrality.

ALBERT-LASZLO BARABASI
"Taming Complexity: Controlling Networks"

The ultimate proof of our understanding of biological or technological systems is reflected in our ability to control them. While control theory offers mathematical tools to steer engineered and natural systems towards a desired state, we lack a framework to control complex self-organized systems. Here we develop analytical tools to study the controllability of an arbitrary complex directed network, identifying the set of driver nodes whose time-dependent control can guide the system's entire dynamics. We apply these tools to several real networks, finding that the number of driver nodes is determined mainly by the network's degree distribution. We show that sparse inhomogeneous networks, which emerge in many real complex systems, are the most difficult to control, but dense and homogeneous networks can be controlled via a few driver nodes. Counter-intuitively, we find that in both model and real systems the driver nodes tend to avoid the hubs.

SCHOOL SCHEDULE: Monday, January 11th,

Schedule	Monday January 11th	
Morning Session	**AUDYTORIUM**	**CONFERENCE ROOM "B"**
11:00 – 12:20	School on Temporal Networks Petter Holme	Schools of Code Social Network Analysis in Python Ben Edwards – NetworkX Tiago Peixoto – graph-tool
Afternoon Session	**AUDYTORIUM**	**CONFERENCE ROOM "B"**
13:20 – 14:40	School on Temporal Networks Petter Holme	Schools of Code Analyzing Dynamic Networks in Java Yoann Pigne – GraphStream Ulrik Brandes - visone

Presentations in Parallel Sessions:

Long papers: 15 min presentation + 5 min questions/discussion
Oral presentations/short papers: 12 min presentation + 4 min questions/discussion

PARALLEL SESSIONS: TUESDAY January 12th, Morning (11:00 – 12:20)

Time	S1 - Theory and Methodology of Network Science	Time	S2 - Networks in Science	S3 - Multiplex Networks	S4 - Opinion Dynamics
Chair	Baruch Barzel	Chair	Vasyl Palchykov	Pavel Kromer	Mauro Faccin
Venue	AUDYTORIUM		CONFERENCE ROOM "A"	CONFERENCE ROOM "B"	CONFERENCE ROOM "C"
11:00	Mark Ortmann and Ulrik Brandes: *Quad Census Computation: simple, efficient, and orbit-aware.****	11:00	Sergey Dorogovtsev and Jose Mendes. *Quantifying success in science*.	Massimo Stella and Markus Brede. A Multiplex Network Modelling of the Human Mental Lexicon.	Federico Battiston, Andrea Cairoli, Vincenzo Nicosia, Adrian Baule and Vito Latora. Interplay between consensus and coherence in a model of interacting opinions.
11:20	Marijn ten Thij and Sandjai Bhulai: *Modelling trend progression through an extension of the Polya Urn Process*.	11:16	Lovro Šubelj, Nees Jan Van Eck and Ludo Waltman. *Comparison of methods for clustering citation networks*.	Konstantin Kuzmin, Christopher Gaiteri, and Boleslaw K. Szymanski: *Synergy Landscapes: A Multilayer Network for Collaboration in Biological Research*.	Sewook Oh and Mason Porter. Complex Contagions with Lazy Adoption.
11:40	Jeffrey H. Johnson: *Embracing n-ary Relations in Network Science*.***	11:32	Sophia Goldberg, Hannah Anthony and Tim Evans. *Global and Local Knowledge in Citation Network Formation*.	Agnieszka Czaplicka, Raul Toral and Maxi San Miguel. Competition of simple and complex adoption on multi-layer networks.	Arkadiusz Jędrzejewski, Anna Kowalska-Pyzalska, Katarzyna Maciejowska, Katarzyna Sznajd-Weron and Rafal Weron. Two faces of word-of-mouth: Understanding the impact of social interactions on demand curves for innovative products.
12:00	Jean Creusefond, Thomas Largillier, and Sylvain Peyronnet: *On the evaluation potential of quality functions in community detection for different contexts*.	11:48	Barbara Żogała-Siudem, Grzegorz Siudem, Anna Cena and Marek Gągolewski. *Agent-based model for the h-index - Exact solution*.	Cecilia Andreazzi, Alberto Antonioni, Alireza Goudarzi, Sanja Selakovic and Massimo Stella. An ecological spatial multiplex network model for investigating infection spreading in ecological systems.	Eun Lee, Sang Hoon Lee and Holme Petter. Opinion formation in society with inhomogeneous status distribution.
		12:04	Gergely Palla. Hierarchies of scientific journals.	Federico Battiston, Mario Chavez, Vincenzo Nicosia and Vito Latora. Multilayer motifs in brain networks.	Anna Chmiel, Arkadiusz Jedrzejewski and Katarzyna Sznajd-Weron. q-neighbor Ising model on networks.

*** - a Nominee for the Best Paper/Presentation Award, award ceremony is during the closing session

PARALLEL SESSIONS: TUESDAY January 12th, Afternoon (13:20 – 14:40)

Time	S5 - Networks from Social Media	Time	S6 - Spatial Networks	S7 - Temporal Networks 1	S8 - Digital Networks
Chair	Nees Jan van Eck	Chair	Marco de Nadai	Bogdan Gliwa	Ajitesh Srivastava
Venue	AUDYTORIUM		CONFERENCE ROOM "A"	CONFERENCE ROOM "B"	CONFERENCE ROOM "C"
13:20	Valerio Arnaboldi, Robin I. M. Dunbar, Andrea Passarella, and Marco Conti: *Analysis of Co-Authorship Ego Networks*.	13:20	Thomas Louail, Maxime Lenormand, Juan Murillo Arias and Jose Javier Ramasco. City-scale implementation of a Robin Hood effect.***	Vitaly Belik, Florian Fiebig and Philipp Hövel. Recurrent epidemics and adaptive rewiring in temporal networks.	Talayeh Aledavood, Jari Saramäki and Sune Lehmann. Inferring chronotypes from digital records.
13:40	Adrian Huna, Ivan Srba, and Maria Bielikova: *Exploiting Content Quality and Question Difficulty in CQA Reputation Systems.***	13:36	Minjin Lee and Petter Holme. Understanding road networks of global cities from travel routes.	Sarah de Nigris, Renaud Lambiotte and Anthony Hastir. Burstiness and fractional diffusion on complex networks.	Tobias Bornakke Jørgensen, Talayeh Aledavood, Sam G. B. Roberts and Jari Saramäki. Making sense of big data: Signals of friendship in mobile communication.
14:00	Wei Gong, Ee-Peng Lim, and Feida Zhu: *Posting Topics ≠ Reading Topics: On Discovering Posting and Reading Topics in Social Media*.	13:52	Sandesh Uppoor, Cezary Ziemlicki and Zbigniew Smoreda. Understanding spatiotemporal human mobility and hotspots in an urban scenario.	Christian Lyngby Vestergaard and Mathieu Génois. Temporal Gillespie algorithm: Fast simulation of contagion processes on time-varying networks.	Włodzimierz Tuligłowicz, Jaroslaw Jankowski, Radosław Michalski and Przemysław Kazienko. Spread of Negative User Behaviours in Social Networks.
14:20	Fredrik Erlandsson, Anton Borg, Henric Johnson, and Piotr Bródka: *Predicting User Participation in Social Media*.	14:08	Michał Kłos, Karol Wawrzyniak and Marcin Jakubek. Complex Nature of Source-Sink Interactions in Power Grids.	Tiago Peixoto and Martin Rosvall. Modeling sequences and temporal networks with dynamic community structures.***	Ryo Ishii and Hiroki Suyari. Complex network as intelligence for reinforcement learning agents providing advice in a board game
		14:24	Stefania Rubrichi, Zbigniew Smoreda, Maarten Vanhoof and Mirco Musolesi. Modelling and Simulating the Spreading and Containment of Ebola in Cote d'Ivoire using Mobile Phone Data.	Luis Rocha and Naoki Masuda. Individual-based approximation to the susceptible-infected-recovered model on temporal networks.***	Manuel Chica and William Rand. Social diffusion modeling of the dynamics of premium app purchases.

*** - a Nominee for the Best Paper/Presentation Award, award ceremony is during the closing session

PARALLEL SESSIONS WEDNESDAY January 13th, Morning (11:00 – 12:20)

Time	S9 - New Applications of Network Science	Time	S10 - Network Theory 1	S11 - Temporal Networks 2	S12 - Financial Networks
Chair	Anna Samoilenko	Chair	Francesca Odella	Thomas Louail	Gergely Tibely
Venue	AUDYTORIUM		CONFERENCE ROOM "A"	CONFERENCE ROOM "B"	CONFERENCE ROOM "C"
11:00	Katarzyna Baraniak , Marcin Sydow, Jacek Szejda, and Dominika Czerniawska: *Studying the Role of Diversity in Open Collaboration*.	11:00	Byungnam Kahng. Hybrid percolation transitions.***	Mathieu Génois, Christian Lyngby Vestergaard, Ciro Cattuto and Alain Barrat. Compensating for sampling effects in simulations of epidemic spreading on temporal contact networks.	Matt V. Leduc, Sebastian Poledna and Stefan Thurner. Systemic Risk Management in Financial Networks with Credit Default Swaps.
11:20	Riccardo Guidotti, Michele Coscia, Dino Pedreschi and Diego Pennacchioli: *Going Beyond GDP to Nowcast Well-Being Using Retail Market Data*.***	11:16	James Clough and Tim Evans. Lorentzian Network Geometry.	Giulio Tirabassi, Ricardo Sevilla-Escoboza, Javier Buldu and Cristina Masoller. Inferring the connectivity of coupled oscillators from time-series statistical similarity analysis.	Stefano Battiston, Marco D'Errico, Tuomas Peltonen and Martin Scheicher. Passing the hot potato: how does risk flow in the CDS market?
11:40	Xerxes D. Arsiwalla and Paul Verschure: *Computing Information Integration in Brain Networks*.***	11:32	Paul Expert, Giovanni Petri and Louis-David Lord. Homological scaffolds as networks: what can we learn?	Radu Tanase, Claudio Juan Tessone and René Algesheimer. The influence potential. A new approach to identify influential individuals from time-varying social interactions.	Buster O. Holzbauer, Boleslaw K. Szymanski, Tommy Nguyen, Alex Pentland: *Social Ties as Predictors of Economic Development*.
12:00	Roberto Interdonato and Andrea Tagarelli: *To trust or not to trust lurkers?: Evaluation of lurking and trustworthiness in ranking problems*.	11:48	Rico Fischer, Jorge C. Leitão, Tiago P. Peixoto and Eduardo G. Altmann. Sampling motif-constrained ensembles of networks.	Marcin Kulisiewicz, Glenn Lawyer and Radosław Michalski. How to Find the most Infectious Nodes in Temporal Setting?	Assaf Almog, Rhys Bird, Tiziano Squartini and Diego Garlaschelli. GDP-driven models for the International Trade Network: Converging Macroeconomics and Network Theory.
		12:04	Malgorzata Krawczyk. Equivalence of nodes in symmetric networks.	Philipp Hoevel, Felix Herrmann, Vitaly Belik, Andreas Koher and Dirk Brockmann. A Geometrical Approach to Infection Dynamics on Temporal Networks.***	

*** - a Nominee for the Best Paper/Presentation Award, award ceremony is during the closing session

PARALLEL SESSIONS WEDNESDAY January 13th, Afternoon (14:00 – 15:20)

Time	S13 - Complex Networks Formation	S14 - Network Theory 2	S15 - Modularity	S16 - Other applications
Chair	Radu Tanase	Christine Marshall	Łukasz Augustyniak	Jason Bassett
Venue	AUDYTORIUM	CONFERENCE ROOM "A"	CONFERENCE ROOM "B"	CONFERENCE ROOM "C"
14:00	Felicia Natali and Feida Zhu: *Comparison of Fundamental Network Formation Principles between Offline and Online Friends on Twitter*.	Xin Lin, Alaa Moussawi, Gyorgy Korniss and Boleslaw Szymanski. Long-term Failure Prediction based on an ARP Model of Global Risk Network.	Damien Fay, Hamed Haddadi, Michael C. Seto, Han Wang, and Christoph Kling: *An exploration of fetish social networks and communities*.	Seyedamir Tavakoli Taba, Liaquat Hossain, Patrick Brennan and Sarah Lewis. Social network properties and personal constructs in job performance: a case study of breast radiologists.
14:16	Pedro Paredes and Pedro Ribeiro: *Large Scale Graph Representations for Subgraph Census*.	Gareth Baxter, Sergey Dorogovtsev, Kyoungeun Lee, Jose Mendes and A. V. Goltsev. Critical dynamics of the k-core pruning process.	Martin Gerlach, Tiago Peixoto and Eduardo Altmann. *Communities in word-document networks*.	Pádraig MacCarron. Super-hero social networks.
14:32	Taras Agryzkov, Pablo Marti, Almudena Nolasco-Cirugeda, Leticia Serrano-Estrada, Leandro Tortosa and Jose F. Vicent. *Studying successful public Plazas in the city of Murcia (Spain) using a ranking nodes algorithm and Foursquare data*.	Andrey Sakryukin and Konstantin Klemm. Finding attractors by shrinking and growing Boolean networks.	Mauro Faccin and Jean-Charles Delvenne. *Mesoscopic Structures and Diffusion Process Memory*.***	Jan Chołoniewski, Robert Paluch, Krzystof Suchecki and Janusz Hołyst. Complex network of New York Times articles – properties and model
14:48	João G. Oliveira, Gareth J. Baxter, Sergey N. Dorogovtsev, Alexander V. Goltsev and José F. F. Mendes. Viable clusters in interdependent networks.	Zaki Hasnain. Non-stationary Markov chain steady-state solution for evolutionary games on graphs.	Konstantin Kuzmin, Christopher Gaiteri, Mingming Chen and Boleslaw Szymanski. *Robust Overlapping Community Detection in Biological Networks with SpeakEasy*.	Eva Výtvarová, Jan Fousek, Vojtěch Kaše and Aleš Chalupa. Trade Network of Ancient Mediterranean and Christianity.
15:04	Stefano Battiston, Marco D'Errico and Gabriele Visentin. Leverage networks: a comparative study of distress propagation models.		Federico Botta and Charo I. Del Genio. *How to (not) detect communities on random graphs: a modularity density approach*.	Yerali Gandica, Joao Carvalho, Fernando Sampaio Dos Aidos, Timoteo Carletti and Renaud Lambiotte. Wikipedia as a source of data suitable for bursty behavior studies.

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YRNCS Job Fair: MONDAY January 11th, 19:00-20:30, CONFERENCE ROOM "B"

The Young Researchers on Complex Systems (www.yrncs.com) organizes the YRNCS Job Fair.
YRNCS is an association, within CSS, of young researchers working in Complex Systems, whose aim is to foster interdisciplinary exchanges and build the basis of future collaborations.

The YRNCS Job Fair is targeted towards Master/PhD students and early postdocs in order to make the information on career openings circulate in the frame of NetSciX'16 and facilitate the access to such positions:

• If you look for candidates: you will be given the possibility to deliver a brief presentation of both the position, and the laboratory or group hosting it.
• If you look for positions: The Job Fair is the perfect frame for meeting potential hirers face to face prior to the application, explaining the specs of the opening.

Please send an email to jobs@yrncs.com to show interest or ask further info.

If you have an opening please contact us and fill the form: http://www.yrncs.com/jobfair-netscix.

POSTER SESSION: Monday, January 11^{th,} 17:00 – 19:00, FOYER

Please, consider that the posters will be displayed in one session for **Monday 11th**. Thank you all for the effort and the quality of contributions.

Network theory - general

1	**Grzegorz Siudem and Grzegorz Świątek**. Diagonal Stationary Points of the Bethe Functional
2	**Piotr Górski, Agnieszka Czaplicka and Janusz Hołyst**. Coevolution in Hierarchical Adaptive Random Boolean Networks
3	**Tomasz Kajdanowicz and Mikolaj Morzy**. On Comparing Empirical and Theoretical Networks Using Entropy
4	**Stephanie Keller-Schmidt, Murat Tugrul, Victor M. Eguiluz, Emilio Hernandez-Garcia and Konstantin Klemm**. Age-dependent branching as a model of evolutionary trees
5	**Baruch Barzel**. Peeking into the Black Box: Reverse Engineering the Dynamics of Complex Systems
6	**Stanislaw Saganowski, Piotr Bródka, Przemysław Kazienko and Tomasz Kajdanowicz**. Looking Far Into the Social Groups' Future
7	**Robert Paluch, Krzysztof Suchecki and Janusz Holyst**. Models of random graph hierarchies
8	**Mahdi Jalili**. Enhancing Pinning Controllability of Complex Networks through Link Rewiring
9	**Marcin Blachnik, Karol Wawrzyniak, Marcin Jakubek and Michał Kłos**. Dividing Electrical Grid into Zones Preserving Control Area Constrains
10	**Josef Daňa**. T-Shaped professional concept as an optimal knowledge network stabilizing team structure and project environment
11	**Janusz Miśkiewicz.** Network analysis of cross-correlations in econophysics.
12	**Samin Aref and Mark C. Wilson**. Measuring Partial Balance in Signed Networks
13	**Divyesh Chandra Pisupati and Damir Vukicevic**. Detecting outliers in Social Networks
14	**Robert Kłopotek**. Modeling bimodal social networks subject to recommendation
15	**Xerxes Arsiwalla and Paul Verschure**. Highly Integrated Information Near the Edge of Criticality is Universal Across Network Topologies

Network theory – communities

16	**Jeremi Ochab**. Reinventing the Triangles: Rule of Thumb for Assessing Detectability
17	**Jarosław Walędziak and Krzysztof Trojanowski**. Force-directed method for graph partitioning
18	**Yohei Sakamoto, Yuichi Ikeda and Hideaki Aoyama**. Physical model simulation reveals economic structural change.

19	**Leila Hedayatifar, Forough Hassanibesheli, Amir Hossein Shirazi, Soheil Vasheghani Farahani and Gholamreza Jafari**. The participation role of individuals in the emergence of pseudo-stable states in networks
20	**Pascal Held and Rudolf Kruse**. Online Community Detection by Using Nearest Hubs
21	**Łukasz Rokita and Krzysztof Trojanowski**. Louvain Method with Sorted Lists of Nodes for Network Partitioning

Network theory - multi-layered networks

22	**Matteo Magnani and Luca Rossi**. Network simplification strategies for multi-layer networks
23	**Tomasz Kajdanowicz**. Node Classification in Multiplex Networks using Random Walks
24	**Adrian Popiel, Tomasz Kajdanowicz and Przemysław Kazienko**. Local methods of collective classification in multiplex networks
25	**Mieczysław Kłopotek, Slawomir T. Wierzchon and Robert Kłopotek**. Network Capacity Bound for Personalized PageRank in Multimodal Networks

Dynamical processes on networks

26	**Arkadiusz Jędrzejewski and Katarzyna Sznajd-Weron**. Rethinking the person-situation approach – towards a more realistic model
27	**Inia Steinbach, Jason Bassett, Thomas Isele, Vitaly Belik, Andreas Koher, Hartmut H. K. Lentz, Jörn Gethmann and Philipp Hövel**. Agent-based modeling of epidemics in networks of livestock trade
28	**Arkadiusz Jędrzejewski, Katarzyna Sznajd-Weron and Janusz Szwabinski**. Mapping the q-voter model: From a single chain to complex networks
29	**Jarosław Jankowski, Tomasz Kajdanowicz, Piotr Bródka, Radosław Michalski and Przemysław Kazienko**. Sequential Seeding in Social Networks
30	**Katarzyna Sznajd-Weron and Tomasz Weron.** The size of the group matters!
31	**Dariusz Krol**. Measuring Information Spreading in Social Media
32	**Andreas Koher, Hartmut H. K. Lentz, Philipp Hövel and Igor M. Sokolov.** Infections on Temporal Networks – A Matrix-Based Approach
33	**Alom Sela and Irad Ben-Gal**. Message Struggle in a Multi-Opinion System
34	**Anna Kowalska-Pyzalska, Katarzyna Maciejowska and Arkadiusz Jędrzejewski**. Impact of word-of-mouth on social welfare: an agent-based modeling approach
35	**Katarzyna Maciejowska and Anna Kowalska-Pyzalska**. Optimal pricing in social networks: a perspective of the inovation diffusion process
36	**Piotr Nyczka and Andrzej Jarynowski**. Dynamics of marriage/divorces in changing environment
37	**Janos Török, Zhongyuan Ruan and Janos Kertész**. Collapse of a social network site: cascade behavior

38	**Tomasz Ryczkowski, Agata Fronczak, Piotr Fronczak and Anna Chmiel**. Mixed-order phase transitions in social networks: Exponential random graph approach
39	**Nanxin Wei, Bo Fan and Gunnar Pruessner**. Steady State of Cascade-Repair Dynamics on Random Networks
40	**Andrzej Krawiecki and Tomasz Gradowski**. Majority vote model on scale-free networks
41	**Joanna Toruniewska, Krzysztof Suchecki and Janusz Hołyst**. Co-evolution of the Potts model and topology of interactions
42	**Adrianna Kozierkiewicz-Hetmańska**. The analysis of quality of consensus determined for Big Data
43	**Thomas Chesney.** The Cascade Capacity Predicts Individuals to Seed for Diffusion through Social Networks
44	**Ajitesh Srivastava, Charalampos Chelmis and Anand Panangadan**. Heterogeneous Infection Rate SI model with Inter-regional Mobility
45	**Shohei Usui and Fujio Toriumi**. Statistical Analysis of Information Spreading on Arbitary Networks
46	**Tomasz Weron and Katarzyna Sznajd-Weron**. Conformity or anticonformity? – opinion dynamics in a double clique topology
47	**Christine Marshall, Colm O'Riordan and James Cruickshank**. Resistance to Defection in the Spatial Form of the Prisoner's Dilemma Game on Random Geometric Graph Models
48	**Bogdan Gliwa, Anna Zygmunt and Bartosz Niemczura**. Comparison of nodes' selection methods in the influence maximization problem
49	**Jamil Civitarese, Fernanda Concatto and Cláudio Abreu**. Psychological Determinants and Consequences of Temporal Networks

Data-based study on complex systems - research on publications

50	**Tao Jia, Dashun Wang and Boleslaw Szymanski.** Quantifying patterns in the evolution of scientific research interests
51	**Vasyl Palchykov, Valerio Gemmetto, Diego Garlaschelli and Alexey Boyarsky**. Discrepancies between structural network communities and external classification of physics research articles
52	**Antonio Perianes-Rodriguez, Ludo Waltman and Nees Jan van Eck**. Constructing bibliometric networks: A comparison of two approaches
53	**Julian Sienkiewicz and Eduardo G. Altmann**. Which (linguistic) factors increase the impact of scientific papers?
54	**Seyedamir Tavakoli Taba, Liaquat Hossain, Sarah Lewis and Golnaz Alipour Esgandani**. Longitudinal Collaboration Networks of Mammography Performance Research
55	**Piotr Szymański**. Predicting links between scientists in the 2nd Polish Republic based on historical co-authorship data
56	**Krzysztof Lewiński, Adam Matusiak and Mikolaj Morzy**. Data-driven Analysis of Scientific Social Network
57	**Milos Kudelka, Jan Platos and Pavel Kromer**. Author Evaluation Based on H-index and Citation Response

Data-based study on complex systems

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58	**Anna Samoilenko, Fariba Karimi, Daniel Edler, Jérôme Kunegis and Markus Strohmaier**. What's your local lingua franca? Quantifying cultural similarity through Wikipedia activity
59	**Luca Pappalardo and Paolo Cintia**. Network-based performance indicators for football teams
60	**Forough Hassanibesheli, Leila Hedayatifar, Hadis Safdari and Gholamreza Jafari**. Competition between relationships' history and balance principle on social network dynamics
61	**Mateusz Pomorski, Malgorzata Krawczyk, Krzysztof Kulakowski, Jaroslaw Kwapien and Marcel Ausloos**. Inferring American regions from correlation networks of given baby names
62	**Krzysztof Suchecki, Robert Paluch, Jan Choloniewski, Janusz Holyst, Flavio Fuart, Jan Rupnik, Mario Karlovcec and Marko Grobelnik**. Information transfer in New York Times articles
63	**Mateusz Wilinski**. Complex correlation based synchronisation networks – clustering and causalities in the market
64	**Irena Vodenska, Hideaki Aoyama, Yoshi Fujiwara, Hiroshi Iyetomi and Yuta Arai**. Interdependencies and causalities in coupled financial networks
65	**Daniel Morales and Guillermo Pineda-Villavicencio**. Applications of Social Network Analysis to networks of medical providers
66	**Marta Bigus and Piotr Fronczak**. Mapping Polish and English WordNets Using Non-Local Topological Information
67	**Marco De Nadai, Roberto Larcher, Nicu Sebe and Bruno Lepri**. Investigating the relationships between spatial structures and urban characteristics
68	**Tomomi Kito and Steve New**. Capturing the heterogeneity and dynamics of supply relationship formations in the Japanese automobile industry
69	**Adam Szanto-Varnagy, Peter Pollner and Illes Farkas**. Mapping and navigating on the network of news events
70	**Jerzy Surma**. Social exchange in online social networks. The reciprocity phenomenon on Facebook
71	**Jingyan Yu.** Modelling the evolution of road networks
72	**Andrzej Jarynowski, Andrzej Buda and Maciej Piasecki**. Multilayer network analysis of polish Parliament 4 years before and after Smolensk crash
73	**Mhd Wesam Al Nabki, Anna Bosch Rue and Josep Lluis de La Rosa**. Topic Based Influencer Detection in Social Networks
74	**Tymofii Brik**. Studying political mobilization at the time of a conflict. A case of the "Anti-Maidan" Facebook mobilization in Ukraine.
75	**Francesca Odella**. Methodological and theoretical issues in longitudinal social networks: analysis example of multiple inter-organizational relations

Applications of network science

76	**Gergely Tibély, David Sousa-Rodrigues, Péter Pollner and Gergely Palla.** Similarity of hierarchical relationships in news portal datasets
77	**Roman Bartusiak and Tomasz Kajdanowicz**. Cooperation prediction based on Github developers network
78	**Demet Dagdelen**. Identifying spammers on Twitter
79	**Raymond Ng**. A Method for Assessing the Stability of Gene Network Modules in Complex Tissues and Subject Populations
80	**Roman Bartusiak and Tomasz Kajdanowicz**. A novel approach to words vectorization based onWordNet structure
81	**Natalia Kudryashova**. MOBILE APP ECOSYSTEM: MODELLING EFFECTS OF USER NETWORK
82	**Antoni Sobkowicz and Wojciech Stokowiec.** Steam Review Dataset – new, large scale sentiment dataset
83	**Lukasz Augustyniak, Piotr Brodka, Tomasz Kajdanowicz and Przemysław Kazienko**. Sentiment lexicon updates/extensions with word-2-vec approach
84	**Manuel Chica Serrano, Sergio Damas Arroyo, Tomasz Kajdanowicz and Krzysztof Trawinski**. Key Variable detection in System Dynamics Framework based on Multiplex
85	**Paweł Kędzia, Marek Maziarz, Maciej Piasecki, Ewa Rudnicka and Stan Szpakowicz**. PlWordNet 3.0 – a Large Lexical Network Compared with WordNet
86	**Michał Łepek and Paweł Gąsior**. The application of artificial neural networks for laser–induced breakdown spectroscopy
87	**Antoni Sobkowicz and Paweł Sobkowicz**. Automated sentiment analysis of political discussions: detection of temporal shifts in emotion expression
88	**Gabriele Tosadori, Giovanni Scardoni, Fausto Spoto and Carlo Laudanna**. Simulating Real Data Topologies with R
89	**Adrian Popiel and Tomasz Kajdanowicz**. MuNeG: Multiplex Network Generator
90	**Michał B. Paradowski, Chih-Chun Chen and Agnieszka Cierpich**. Second Language Acquisition in Study-Abroad Contexts – Insights from SNA
91	**Ivan Srba and Maria Bielikova**. Harnessing Specifics of Educational Community Question Answering
92	**Błażej Żak, Anita Zbieg and Daniel Możdżyński**. Lome.io – Online Participatory Network Mapping Platform
93	**Thomas Hickey, Bethany Goldblum, James Kornell, Elie Katzenson and David Sweeney**. A Network Model of Nuclear Proliferation
94	**Sukrit Gupta, Rami Puzis and Konstantin Kilimnik**. Comparative Network Analysis Using KronFit
95	**Pavel Kromer, Petr Gajdos and Ivan Zelinka**. Networks of Interactions and the Ant Colony Optimization Metaheuristic

## ART OF NETWORKS Exhibition: Will be presented in the AUDYTORIUM during conference

The Art of Networks was organized by Ronaldo Menezes, Associate Professor at Florida Institute of Technology and director of the BioComplex Laboratory in collaboration with Isabel Meirelles, Professor at the Faculty of Design at OCAD University in Toronto, Canada, Catherine Cramer, Stephen Uzzo and Marcia Rudy at the New York Hall of Science.

The Art of Networks would not be possible without the generosity of all authors who are participating in this special exhibition.
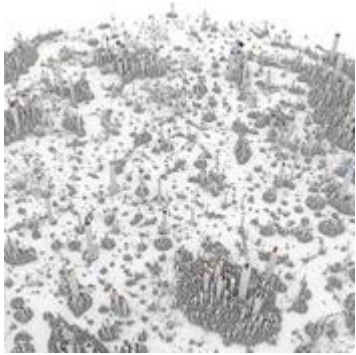
Ekisto is an interactive visualization tool aimed at imagining and mapping online communities. Reproduced at the exhibition are the algorithmic portraits of Stack Overflow, a question and answer site for professional and enthusiast programmers, and of Github, a web-based code repository hosting service, where people share code and build things together.

Alex Dragulescu, visual artist, designer and programmer working at the intersection of art and technology
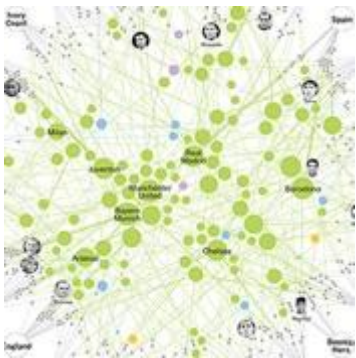
The Clubs that connected the 2014 World Cup

Set of visualizations published at the New York Times in June 2014 for occasion of the World Cup held in Brazil. The interactive tools examine how the global tournament is mostly a remix of the professional leagues that are in season most of the time.

Gregor Aisch, graphics editor at the New York Times

Lostalgic is an online application that depicts ABC's television series Lost. The application encourages both the analysis and enjoyment of the televised narrative by means of interacting with a set of visualizations. Visitors to the website can explore all 115 episodes of Lost in four ways, that includes a timeline, spherical node-link graphs and matrices depicting relationships between characters in each episode, and a reenactment of the whole show.

Santiago Ortiz, head at Moebio Labs

Friends in Space is a digital platform aimed at fostering real-time human connection between people from all over the world and the first Italian woman astronaut, Samantha Cristoforetti of the European Space Agency. The online application invites you to say hello and directly communicate with Cristoforetti insofar as she is orbiting your section of the Earth.

Accurat, data-driven research, design and innovation firm with offices in New York and Milan.


An Ecosystem of Corporate Politicians is an interactive visualization of the relationships between members of Portuguese governments and companies for the period of 1975 to 2013. Data is approached as an ecosystem, where each set of interdependent relations are regulated by physical conditions.

Pedro Cruz, data visualization specialist and explorer
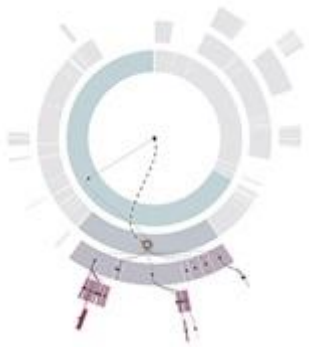
Online interactive visualization depicting multi-modal commuting patterns from a selected **Hubway** bike-sharing station to more than 8,000 MBTA bus/rail stops over the Boston metro area. Based on multiple objectives such as travel times, the number of transfers, and convenience, the tool presents optimal commuting patterns that are obtained using service information from the GTFS feed provided by the MBTA.

Virot "Ta" Chiraphadhanakul, data scientist at Facebook
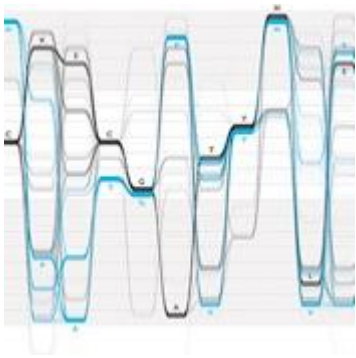

Sequence Bundles is a novel visualization method that enables bioinformaticians and other scientists to explore biological sequence data: proteins, DNA and RNA. It allows researchers to gather new insight about their data, generate new hypotheses and potentially—further down the path—aid new discoveries in biology, drug development and beyond.

Science Practice in collaboration with the Goldman Research Group at the European Molecular Biology Laboratory, European Bioinformatics Institute
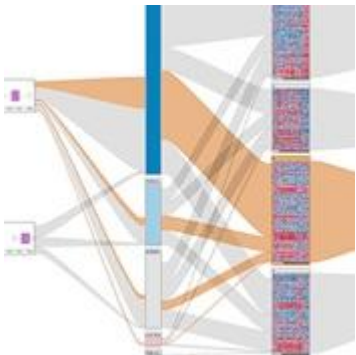

StratomeX is an open source visualization tool for cancer subtype analysis that allows experts to group patients based on multiple criteria toward discovery of relationships between such groupings. It combines visualization and algorithms in one interactive system to enable and speed up the scientific discovery process which can lead to more personalized treatment.

Harvard University (Cambridge, Mass.), Johannes Kepler University Linz (Austria) and Graz University of Technology (Austria).
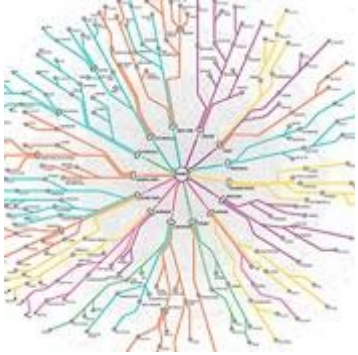
Epidemic Rapid Transit Map

The visualization shows a hypothetical pandemic scenario with the same parameters pandemic starting in Hanoi, Vietnam. The epidemic simulations are performed with the Global Epidemic and Mobility model, that counts about 220 different countries and integrates an individual based epidemic dynamic with global air travel and short-scale traveling/ commuting data. Modeling of Biological and Socio-technical Systems (MOBS) Lab, Northeastern University, Boston.
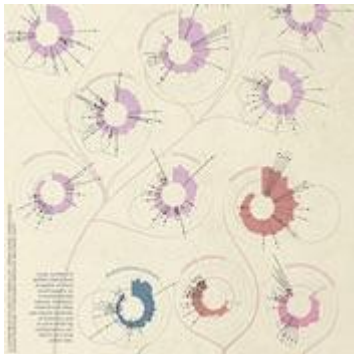
The Life Cycle of Ideas explores the ebb and flow of scientific theories. It tries to capture how long a hypothesis lives in the collective consciousness of scientists before being either disproved or accepted. The infographic originally appeared in the May 2014 issue of Popular Science magazine.

Collaboration between Katie Peek, information editor at Popular Science and Accurat, a data-driven research, design and innovation firm with offices in New York and Milan