Networks!
LERU Bright Conference
August 2012

Laura González Moragas
Rosana Leiva Martínez
About LERU

The **League of European Research Universities** (LERU) was founded in 2002 as an association of research-intensive universities sharing the values of high-quality teaching in an environment of internationally competitive research.

LERU is committed to:

- **education** through an awareness of the frontiers of human understanding;
- the creation of new knowledge through basic **research**, which is the ultimate source of innovation in society;
- the promotion of research across a broad front, which creates a unique capacity to reconfigure activities in response to new opportunities and problems.
- The purpose of the League is to advocate these values, to influence policy in Europe and to develop best practice through mutual exchange of experience.
<table>
<thead>
<tr>
<th>LERU Universities</th>
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<tbody>
<tr>
<td>• Universiteit van Amsterdam</td>
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<td>• <strong>Universitat de Barcelona</strong></td>
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<td>• University of Cambridge</td>
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<td>• Albert-Ludwigs-Universität Freiburg</td>
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<td>• Université de Genève</td>
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<td>• Universität Heidelberg</td>
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<td>• Helsingin yliopisto (University of Helsinki)</td>
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<td>• Universiteit Leiden</td>
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<td>• Ludwig-Maximilians-Universität München</td>
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<td>• University of Oxford</td>
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<td>• Université Paris-Sud 11</td>
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<td>• Université de Strasbourg</td>
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<td>• Universiteit Utrecht</td>
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<td>• Universität Zürich</td>
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LERU Students’ Activities

BRIGHT Students’ Conference
It is an annual gathering of students from member universities of the League of European Research Universities (LERU). The conference aims to provide an environment in which excellent students, as field specialists and stakeholders of the Europe of tomorrow, can focus on themes crucial to their education and cultural development.

Doctoral Summer School
It is an annual event organised by different LERU members. While focus and format may differ depending on the institutions involved, the general ambition is to provide a learning experience of considerable and lasting added value, beyond what PhD candidates learn as a matter of course in the regular programme of their PhD training.
The purpose of the Conference is to develop a strong network between Europe’s brightest students and to offer them a platform on which they can discuss politically, socially and intellectually challenging topics that are shaping our present and future.

The BRIGHT Conference is organised by students, for students. Two hundred students (3rd year bachelor and master students) from 22 universities participate in this four-day forum.

Each year the BRIGHT Conference is hosted by another member university of LERU.

The 2012 edition was held at the University of Amsterdam from 13 to 17 August. The theme of the conference was ‘Networks: Complex Futures’, based on the idea that networks, whether they are in the area of chemistry, economics or communication, have certain features in common.
Bright Students’ Conference 2012
University of Amsterdam

NETWORKS: Complex Futures

- Students from different disciplines.
- Multidisciplinary context.
- Lectures, panel discussions and 11 working groups.
- Discussion on fundamental questions regarding networks in science, society and humanities.

‘Protest movements or genetics, ant colonies or the Internet - the world is networked.’

From the abstract ‘are networks better at adapting to change?’ to applied policy discussions on net neutrality.
UB Participants

Facultat de Farmàcia
• Laura González Moragas
• Rosana Leiva Martínez
• Clara Suñer Navarro

Facultat de Física
• Isabel Delia Fernández
• Nikola Ivanov Gushterov
• Toni Rubio Abadal

Facultat d’Economia i Empresa
• Adela Chioveanu

Facultat de Formació del Professorat
• Anna Gomis Junoy

Facultat de Biblioteconomia
• Santiago Martín Muñoz

Universitat de Barcelona
Working groups

- Complexity
- Diversity
- Cooperation
- Community
- Net Neutrality
- Adaptation

- Sustainability
- The City
- Control
- Imagining the Network
- Change
Keynotes speakers introduced big ideas about the networked world.

• **Prof. Richard Rogers (1)**
  Professor and chair of New Media and Digital Culture at the University of Amsterdam

• **Prof. Peter Sloot (2)**
  Professor of Computational Science
  University of Amsterdam

• **Prof. Maarten van Steen (3)**
  Head of Department of Computer Science
  VU University Amsterdam

• **Harry van Dorenmalen (4)**
  Chairman of IBM Europe and
  General Manager of IBM in the Netherlands

• **Prof. Jan A.G.M. van Dijk (5)**
  Professor of Communication Science,
  University of Twente
Complexity

• Our experience

Chair: Jarmo Kallunki, University of Helsinki
• Elisa Bau, University of Edinburgh
• Martin Bies, Heidelberg University
• Laurens Bogaardt, Lund University
• Niklaus Brühlmann, University of Zurich
• Robert Carrington, University of Amsterdam
• Andrea Cervellin, Leiden University
• Marjet Dirks, University of Amsterdam
• Hanna Dölle, LMU München
• Laura González Moragas, University of Barcelona
• Daisy Hessenberger, University of Cambridge
• Nino de Lathauwer, KU Leuven
• Rosana Leiva Martínez, University of Barcelona
• Yangchen Lin, University of Cambridge
• Emma Towlson, University of Cambridge

Summary: 3 physics (incl. math), 2 economics, 5 biology (incl. pharmacy), 3 human sciences
Complexity

What is the nature of complex networks? Many networks are complex; they cannot be easily understood in terms of linear relationships. This is primarily the case because their nature is characterised by emergence. One node alone tells little about the network as a whole. They are also self-organising, which means that although there is no hierarchy that determines the behaviour of the network, the network does seem goal-directed. In this working group, students will analyse the nature of complex networks, drawing on examples from their respective fields.

Draft plan

Tue 14th
11:15 am – 1:00 pm
Getting to know each other.

Casting the basics straight: What is Network Science? What does 'Complexity' mean in Network Science? How are complex networks characterized? How can we measure complexity? What are common features underlying complex networks and can we capture these features by simple models?

4:40 – 6:00 pm
Getting the basics straight continues, and if time, move on to the dynamics of complex networks.

Wed 15th
11:00 am – 1:00 pm
The dynamics of complex networks (theoretical point of view): Are there universal laws governing the dynamics and/or evolution of complex networks and can we use those laws to predict the behavior of networks? How does stochasticity affect the dynamics and/or evolution and how to take account the stochasticity in the search for universal laws?

2:00 – 4:00 pm
The dynamics of complex networks (practical point of view): Information production in complex networks. Controlling of information and its production in (or by using) complex networks, especially improvement of resource management and allocation.

4:30 – 6:00 pm
Reaching beyond: The limits of network theory as an approach to understand complexity.

Thu 16th
11:30 am – 12.45 pm & 1.45 – 2.15 pm
Wrapping up conclusions & building presentation of the WG results.
What is complexity?

Why complexity?
"I think the next century will be the century of complexity."
Stephen Hawking, January 2000

Definition: Complexity
A system in which large networks of components with no central control and simple rules of operation
- give rise to complex collective behaviour,
- information processing,
- adaptation via evolution.

Example
A demonstration ...
An example for complexity

**Explanation**

- System = 4 people
- Rule = lean back on your neighbours' hips
- Emergent property = lifting force
The brain as complex system

Properties of the brain

- $10^{11}$ neurons
- action potentials
- consciousness and cognitive ability!
**An application: schizophrenia**

<table>
<thead>
<tr>
<th>Network comparison</th>
<th>Healthy</th>
<th>Schizophrenia</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>small world</td>
<td>more random</td>
</tr>
<tr>
<td></td>
<td>more hierarchy</td>
<td>less hierarchy</td>
</tr>
<tr>
<td></td>
<td>less clustering of high degree nodes</td>
<td>more clustering of ...</td>
</tr>
<tr>
<td></td>
<td>less robust</td>
<td>more robust</td>
</tr>
<tr>
<td></td>
<td>complex</td>
<td>complex</td>
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</tbody>
</table>
The art system as a complex system

What kinds of processes decide what we
- produce
- receive
- theorise
- historicise
- sell/ buy/ archive
as art?

"Fountain" Marcel Duchamp
1917
The art system as a complex system

The art system involves various interconnected components:
- Art Market
  - Pricing
  - Collectors
  - Dealers
- Critics / Media:
  - Newspapers
  - Specialized press
- Academics
- University
- Art Schools
- Private Institutions
- Exhibition space
- Public Institutions
- Piece of Art
  - "The Fountain"
  - The Public
    - Reaction
    - Taste
  - Artist
    - Biography
  - Peer artists
    - Time / Location / Style
Some conclusions

- Emergent properties in our examples: the cognitive abilities and the meaning of the piece of art
- Networks provide a common language or framework for understanding and measuring complexity in different fields, thus both contributing to basic research and giving tools for the practitioners to improve their practices and policy-making.
- Difficulty in using networks in modelling complexity is that defining the nodes and vertices is in some respects subjective.
- Limitations in using networks?
8. Conference programme

13 August 2012

09:00 – 15:00 Hotel registration
Venue Stayokay Amsterdam Zeeburg hostel, Timorplein 21

15:00 – 15:30 Accompanied bicycle ride to the UvA Auditorium

15:00 – 16:00 Conference registration
Venue UvA Auditorium, Singel 411

16:00 – 16:30 Welcome
Opening speeches:
Prof. Dymph van den Boorn
Rector Magnificus of the University of Amsterdam
Steven de Graauw
Organising Committee of BRIGHT 2012
Venue UvA Auditorium, Singel 411

16:30 – 17:15 Keynote address
Prof. Richard Rogers
Professor of New Media and Digital Culture, University of Amsterdam
Venue UvA Auditorium, Singel 411

17:15 – 20:00 Reception
Venue UvA Auditorium, Singel 411

20:00 Free time

14 August 2012

08:30 – 09:00 Breakfast
Venue Stayokay Amsterdam Zeeburg hostel, Timorplein 21

09:00 – 09:30 Accompanied bicycle ride to UvA

09:30 – 10:45 Keynote address
Prof. Peter Shum<br>Professor of Computational Science, University of Amsterdam
Venue UvA Auditorium, Science Park 113

10:45 – 11:15 Coffee break
Venue UvA Auditorium, Science Park 113

11:15 – 13:00 Working groups in session
Venue UvA classrooms, Science Park 113

13:00 – 14:00 Lunch
Venue FMRI Cafeteria, Science Park 904

14:00 – 15:00 Keynote address
Prof. Maarten van Steen
Head of Department of Computer Science, VU University Amsterdam
Venue UvA Auditorium, Science Park 113

15:00 – 16:00 Panel discussion
Venue UvA Auditorium, Science Park 113

16:00 – 16:30 Coffee break
Venue UvA Auditorium, Science Park 113

16:30 – 18:00 Working groups in session
Venue UvA classrooms, Science Park 113

18:00 – 18:30 Break

18:30 – 20:00 Dinner
Venue FMRI Cafeteria, Science Park 904

20:00 – 22:00 De Parade theatre festival
(Entrance fee included, drinks at your own expense)
Venue Martin Luther King Park

15 August 2012

08:30 – 09:00 Breakfast
Venue Stayokay Amsterdam Zeeburg hostel, Timorplein 21

09:00 – 09:30 Bicycle ride to UvA (not accompanied)

09:30 – 10:30 Keynote address
Harry van Doremalen<br>Director of IMT and General Manager of EMS in the Netherlands
Venue UvA Auditorium, Science Park 113

10:30 – 11:00 Coffee break
Venue UvA Auditorium, Science Park 113

11:00 – 13:00 Working groups in session
Venue UvA classrooms, Science Park 113

13:00 – 14:00 Lunch
Venue FMRI Cafeteria, Science Park 904

14:00 – 16:00 Working groups in session
Venue UvA classrooms, Science Park 113

16:00 – 16:30 Coffee break
Venue UvA Auditorium, Science Park 113

16:30 – 18:00 Working groups in sessions
Venue UvA classrooms, Science Park 113

18:00 – 18:30 Break

18:30 – 20:30 Dinner
Venue FMRI Cafeteria, Science Park 904

20:30 Free time
### Programme

#### 16 August 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Venue</th>
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<tbody>
<tr>
<td>08:30 – 09:00</td>
<td>Breakfast</td>
<td>Staykay Amsterdam Zeeburg hostel, Timorplein 21</td>
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<tr>
<td>09:00 – 09:30</td>
<td>Bicycle ride to AUC (not accompanied)</td>
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<tr>
<td>09:30 – 11:00</td>
<td>Panel discussion</td>
<td>AUC Auditorium, Science Park 113</td>
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<tr>
<td>11:00 – 11:30</td>
<td>Coffee break</td>
<td>AUC Auditorium, Science Park 113</td>
</tr>
<tr>
<td>11:30 – 12:45</td>
<td>Working groups in session</td>
<td>AUC classrooms, Science Park 113</td>
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<tr>
<td>12:45 – 13:45</td>
<td>Lunch</td>
<td>PAM Cafeteria, Science Park 364</td>
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<tr>
<td>13:45 – 14:15</td>
<td>Working groups in session</td>
<td>AUC Auditorium, Science Park 113</td>
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<tr>
<td>14:15 – 16:00</td>
<td>Presentation of final results</td>
<td>AUC Auditorium, Science Park 113</td>
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<tr>
<td>16:00 – 16:30</td>
<td>Coffee break</td>
<td>AUC Auditorium, Science Park 113</td>
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<tr>
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<td>Presentation of final results</td>
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<tr>
<td>17:15 – 18:00</td>
<td>Keynote address</td>
<td>Dijks Review, University of Twente</td>
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<tr>
<td>18:00 – 19:00</td>
<td>Free time to prepare for Gala dinner</td>
<td>AUC Auditorium, Science Park 113</td>
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<tr>
<td>19:00 – 19:30</td>
<td>Accompanied bicycle ride from Staykay Amsterdam Zeeburg hostel to St. Olaf Chapel</td>
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<tr>
<td>19:30 – 22:00</td>
<td>Gala dinner</td>
<td>NH Barbirool Palace, St. Olaf Chapel, Prins Hendrikkade 59-72</td>
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#### 17 August 2012

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<td>08:30 – 09:30</td>
<td>Breakfast</td>
<td>Staykay Amsterdam Zeeburg hostel, Timorplein 21</td>
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<tr>
<td>10:00 – 11:30</td>
<td>All participants to be checked out</td>
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<tr>
<td>10:00 – 10:30</td>
<td>Accompanied walk to canal boat meeting point</td>
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<td>10:30 – 11:30</td>
<td>Canal boat tour (including lunch)</td>
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<td>12:30 – 14:30</td>
<td>Rijksmuseum</td>
<td>Museumplein (Museum Square)</td>
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- De Parade theatre festival
- Grachtenfestival
- Gala dinner
- Pubcrawl
- Boat tour
- Rijksmuseum
- Free time:
  - Red-light District
  - Van Gogh Museum
  - Anne Frank’s House
  - ...
Bright in snapshots

Networks!

LERU Bright Conference
August 2012
Summarising the experience

‘Protest movements or genetics, ant colonies or the Internet - the world is networked.’

We explored the theme ‘Networks: Complex Futures’ from a multidisciplinary context working in groups with students from different disciplines.

We discussed fundamental questions regarding networks in science, society and the humanities.

We were introduced to an inspiring frame for thinking about our disciplines and beyond.
Thank you for your attention!

Networks!
LERU Bright Conference
August 2012