

## 2<sup>nd</sup> EDEN Doctoral Seminar on

### **Organisational Network Analysis (ONA): Theory and Methods**

*to be held at the European Institute for Advanced Studies in Management –*

*EIASM, Brussels, June 7 – 11, 2010*

#### **Faculty & Tutors**

Prof. Dimitris Assimakopoulos, Grenoble Ecole de Management & LINC Lab, France

Prof. Emilio Castilla, MIT Sloan School of Management, Cambridge, MA., USA

Prof. Soong Moon Kang, UC London, Dept. of Management Science & Innovation, UK

Prof. Marco Tortoriello, University of Navarra, IESE Business School, Barcelona, Spain

#### **Organisers**

Mrs Nina Payen, EIASM, Brussels, Belgium

Dimitris Assimakopoulos, Grenoble Ecole de Management & LINC Lab, France

#### **Aims and Objectives**

In the last few decades network organisations and network theory and methods have risen as a key field for research in Management and Business Studies (e.g., Brass<sup>1</sup> et al 2004). This 2<sup>nd</sup> EDEN seminar is going to introduce Organisational Network Analysis (ONA) theory, methods and techniques for doctoral students who aim collecting, analysing and visualising network data for their research in diverse organisational settings and application areas. Hands-on teaching of social network analysis and visualisation software such as Ucinet<sup>2</sup> and Netdraw<sup>3</sup> is going to be deployed throughout the seminar. Examples from several research projects in doctoral and post-doctoral levels from both sides of the Atlantic are going to illustrate many of the qualitative and quantitative issues related to network theory and ONA of relational data at community, inter-organisational and inter-personal levels of analysis. Particular attention is going to be paid in the dynamic analysis of longitudinal data in the last one and a half days of the seminar using the Stata<sup>4</sup> software. In addition students are going to be allocated time in each and every day of the

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<sup>1</sup> Brass, D. J., Galaskiewicz, J., Greve, H. R., Wenpin T., 2004, Taking Stock of Networks and Organizations: a Multilevel Perspective, *Academy of Management Journal*, 47(6), 795-817.

<sup>2</sup> Borgatti, S.P., Everett, M.G. and Freeman, L.C., 2002, *Ucinet 6.0 for Windows: Software for Social Network Analysis*, Harvard, MA., Analytic Technologies, see <http://www.analytictech.com/ucinet/ucinet.htm>

<sup>3</sup> Borgatti, S.P., 2002, *NetDraw: Graph Visualization Software*, Harvard, MA., Analytic Technologies.

<sup>4</sup> See the Stata Starter Kit, put together by UCLA's Academic Technology Services group at <http://www.ats.ucla.edu/stat/stata/sk/>

seminar for reflecting on what they will have learned the previous day and also presenting their own ongoing doctoral projects for getting advice and feedback from faculty and other participants during and after the seminar, see final draft schedule in Appendix. The primary aim here it is to create an intimate environment for about 16 doctoral students and 4 faculty from top EU/US Business Schools to share best practices and learning in the state of the art in ONA across boundaries in Europe and beyond.

## **Outline of the Seminar**

Our seminar is going to combine lectures covering a broad range of issues, in depth tutorial discussions, and hands on training for ONA and dynamic analysis. **Four modules** are planned to be delivered as they are outlined below, including several required or/and recommended readings, that the students should ideally review and prepare before the seminar so that they accrue maximum value from it. Students are also required to bring along their personal computers and download before the seminar the Ucinet/Netdraw/Pajek **software** from <http://www.analytictech.com/ucinet/ucinet.htm>

### **Module 1: An Introduction to ONA theory and methods**

**Dimitris Assimakopoulos**

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#### **Overview and Objectives**

The main objective of this first module is to introduce you to the field of ONA research methods, with particular reference to the emergence of new technological communities and analysis of new 'distributed' product development teams. We will also discuss the rationale for ONA in module 1, how to collect and organise network data, plus the main theoretical concepts of centrality at node level and cohesion at the network level. We will also illustrate these concepts and methods through examples stemming from half a dozen research projects carried out with various collaborators in the EU and US over the past decade or so.

**Session 1. Monday, June 7, 2009, 9:00-10:30**  
**Introduction to ONA (part I)**  
**why ONA? Network data collection**

**Session 2. Monday, June 7, 2009, 11:00-12:30**  
**Introduction to ONA (part II)**  
**Centrality and Cohesion in Networks**

Subsequently, the module 2 shifts the emphasis on network theory, rather than methods, see below. The module 3 will cover more advanced ONA topics and also introduce some of the issues related to the dynamic analysis of network data which is specifically the main topic of the final module 4.

#### **Required texts**

You may find helpful to start with the online book: *Introduction to Social Network Methods* written by Hanneman and Riddle (2005) see <http://faculty.ucr.edu/~hanneman/nettext/>

**And also the key textbook in SNA / ONA:**

Wasserman Stan, and Faust Kathreen, (1994) *Social Network Analysis: Methods and Applications*. Cambridge: Cambridge University Press.

**Recommended texts**

Linton C. Freeman. 2004. *The Development of Social Network Analysis: A Study in the Sociology of Science*. Empirical Press.

R. L. Breiger. 2004. The Analysis of Social Networks, pp. 505-26, in *Handbook of Data Analysis*, edited by Melissa Hardy and Alan Bryman, London: Sage.

Scott, John. 2000. *Social Network Analysis: A Handbook*. London: Sage.

Borgatti, S. P. and Foster, P. C. (2003) The Network Paradigm in Organizational Research: A Review and Typology, *Journal of Management*, vol. 29, no. 6, pp. 991-1013.

Borgatti, S. P. and M. G. Everett. 1999. Models of core/periphery structures. *Social Networks*. 21: 375-395.

de Nooy, W., Mrvar, A., Batagelj, V. (2005) *Exploratory social network analysis with Pajek*, Cambridge: Cambridge University Press.

Rob Cross and Andrew Parker. 2004. *The Hidden Power of Social Networks: Understanding How Work Really Gets Done in Organizations*, Boston: Harvard University Business School Press.

Assimakopoulos D, 2007, '*Technological Communities and Networks: Triggers and Drivers for Innovation*', London: Routledge.

Assimakopoulos D and Yan J, 2006, Sources of Knowledge Acquisition for Chinese Software Engineers, *R&D Management*, 36(1), 97-106.

Assimakopoulos D, Everton S, and Kiyoteru T, 2003, The Semiconductor Community in Silicon Valley, *International Journal of Technology Management*, 25(1/2), 181-199.

Allen, J. et al., (2007) Formal versus informal knowledge networks in R&D: a case study using social network analysis", *R&D Management*, vol. 37, no. 3, pp. 179-196.

Doak, S. and Assimakopoulos, D. (2007) How forensic scientists learn to investigate cases in practice, *R&D Management*, vol. 37, no. 2, pp. 113-122

Yan J and Assimakopoulos D, 2009, The Small World and Scale Free Structure of an Internet Technological Community, *International Journal of Information Technology and Management*, 8(1), 33-49.

**Module 2**  
**Social networks: ties or structure?**

## Overview & objectives

The objective of this module is to use the content of the papers assigned to explore and discuss current debates in social network research as applied to organizations. We will examine primarily theoretical issues and focus on their relationships with the methods and measures used to critically evaluate past work in the area as well as to pinpoint future directions and fruitful new line of inquiry in the area of social networks and knowledge management/innovation

The substance of the module, in seminar format, is based on a close reading of primary works from leading researchers in each area. These works are not so much an exhaustive literature review as they are an opportunity for exploring the genre of social network theory and its application to organizational research.

You are expected to read the assigned papers thoroughly and to come prepared to contribute to class discussion. You contribute to class discussion in three ways. First, you are expected to identify and to be able to discuss the key issues in each reading. Second, once basic issues are defined you are expected to critically evaluate the work under discussion (e.g. Why was this paper published? Why is this relevant?) and propose/suggest extensions or improvements. Third and perhaps most importantly, you will constructively evaluate the positions taken by your classmates. Throughout, I encourage you to contribute to class discussion with clarifying questions and critical evaluations of the theoretical arguments and empirical evidence considered.

## Required Readings

Krackhardt, D. 1992. The strength of strong ties: the importance of philos in organization. N. Nohria, R.G. Eccles, eds. *Networks and organizations*. Harvard Business School Press, Boston.

Granovetter, M.S. 1973. The strength of weak ties. *American Journal of Sociology* **78**(6) 1360-1380.

Hansen, M. 1999. The search-transfer problem: the role of weak ties in sharing knowledge across organization subunits. *Adm. Sci. Q.* **44** 82-111.

Perry-Smith, J.E. 2006. Social yet creative: the role of social relationships in facilitating individual creativity. *Acad. Manage. J.* **49** 85-101.

Reagans, R., B. McEvily. 2003. Network structure and knowledge transfer: The effects of cohesion and range. *Adm. Sci. Q.* **48**(2) 240-267

Burt, R.S. 2004. Structural holes and good ideas. *American Journal of Sociology* **110** 349-399.

Bechky, B.A. 2003. Sharing meaning across occupational communities: the transformation of knowledge on a production floor. *Organ Sci.* **14** 312-330.

Tortoriello, M. & Krackhardt, D. 2010. Activating cross-boundary knowledge: Simmelian ties and the generation of innovation. *Academy of Management Journal*, **53**(1) 167-181.

## Recommended Readings

Burt, R.S. 1992. *Structural Holes: the social structure of competition*. Harvard University Press, Cambridge, MA. (Chapter 1 & 2)

Coleman, J.S. 1988. Social capital in the creation of human capital. *American Journal of Sociology* 94: 95-120.

Reagans and McEvily, 2008. Contradictory or compatible? Reconsidering the tradeoff between brokerage and closure on knowledge sharing. In J.A.C. Baum and T.J. Rowley (Eds.), *Advances in Strategic Management*: Vol(25).

### **Module 3 Advanced Topics in Social Network Analysis**

Soong Moon Kang  
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Social network analysis focuses on the relationships between actors who are interdependent, and on social structure that emerges from regularities in this interdependence. The main objective of this module is to introduce you to several advanced topics in the field of SNA and visualisation.

#### **Module 3 Schedule**

**Session 13. Wednesday, June 9, 2010, 14:00-15:30**

**Different types of networks: 2-Mode networks, multiplex, etc**

*Recommended Reading:*

Wasserman and Faust, Chapter 8

Breiger, Ronald. 1974. The duality of persons and groups. *Social Forces*. 53:191-190.

**Session 14. Wednesday, June 9, 2010, 16:00-17:30**

**Structural Equivalence and Blockmodeling**

*Recommended Reading:* Wasserman and Faust, Chapter 9 and 10

**Brokerage and Structural Holes**

*Recommended Reading:*

Burt, Ronald S. 1992. *Structural Holes: The Social Structure of Competition*. Harvard University Press.

Gould, Roger V., and Roberto M. Fernandez. 1989. Structures of mediation: A formal approach to brokerage in transaction networks. *Sociological Methodology*. 19: 89-126.

**Cliques and Small Worlds**

*Recommended Reading:*

Wasserman and Faust, Chapter 7

Watts, Duncan J. 1999. Networks, dynamics, and the small-world phenomenon. *American Journal of Sociology* 105: 493–527

**Session 16. Thursday, June 10, 2010, 9:15-10:45**

**Structural Balance and Transitivity**

*Recommended Reading:*

Wasserman and Faust, Chapter 6

**Session 17. Thursday, June 10, 2010, 11:00-12:30**

**Network Dynamics**

*Recommended Reading:*

Doreian, Patrick. 2002. Event sequences as generators of social network evolution. *Social Networks*. 24: 93–119.

Kang, Soong Moon. 2007. Equicentrality and network centralization: A micro–macro linkage. *Social Networks*. 29: 585-601.

## Module 4: Event History Analysis

Emilio J. Castilla

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### Overview and Objectives

The main objective of this module is to introduce you to the various concepts and models available for studying change in variables of qualitative nature. This methodology is called *Event History Analysis* (henceforth, EHA), a term that refers to the group of techniques used to study events.

*Event history analysis* is used to study longitudinal data when the social process to study is the occurrence of an event. An “event” is a change from one state to another; and states are best represented by a categorical variable. Thus, such an event is measured using a categorical dependent variable. EHA has also been called *survival analysis* because biologists and epidemiologists were the first to use and develop this methodology in order to study the survival of organisms after certain treatments. EHA analyzes longitudinal data available for a sample of individual cases or units during a period of time when a series of events may occur. EHA allows the researcher to examine the determinants or factors behind the occurrence of any type of social event over time and can consequently help answer questions that previously could not be answered using the classic linear regression or the logit/probit models.

This module is structured as follows: First, I cover the two main models for modeling binary outcomes, the **logit and probit models** (Session 1). Then, I introduce the unique language used in the discussion of events and the **EHA methodology** available to analyze events over time (Session 2). Next, I review several of the most commonly used EHA techniques, in detail, with some examples (Session 3). In doing so, I provide a few examples of how to use the covered methodologies in research papers and reports.

### Class Format and Requirements

The structure of the module (roughly) involves combining lectures on the principles associated with logit/probit models as well as event history analysis followed by the application of these models. We will pursue two types of applications:

- We will discuss articles that use the particular methods in question, with an eye toward assessing whether the data and methods are appropriate for the research question.
- I will show you how to work with data to estimate models (in Stata) and write up an interpretation of the results. In order to get started with the Stata Program, you can access the Stata Starter Kit, put together by UCLA's Academic Technology Services group at <http://www.ats.ucla.edu/stat/stata/sk/>

## Required Readings

- Castilla, Emilio J. 2007. *Dynamic Analysis in the Social Sciences*. Oxford, UK: Elsevier and Academic Press.<sup>5</sup> (There should be ample time to order this through Amazon, etc.)
- Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks, CA: Sage.

## Module Schedule

### Sessions 18 & 19. Thursday, June 10, 2010: 14h00-17h30

#### Part I. Models for Binary Outcomes

Long, J. Scott. 1997. Chapter 3: "Binary Outcomes: The Linear Probability, Probit, and Logit Models" and Chapter 4: "Hypothesis Testing and Goodness of Fit"

Petersen, Trond. 1985. "A Comment on Presenting Results from Logit and Probit Models." *American Sociological Review* 50: 130-131.

#### Part II. Applications: Models for Binary Outcomes

Burt, Ronald S. 2003. "Structural Holes and Good Ideas" *American Journal of Sociology* 110 (2): 349-399.

### Sessions 21 & 22. Friday, June 11, 2010: 8h45-12h00

#### Part I. Introduction to the Basic Concepts of Event History Analysis

Castilla, Emilio J. 2007. Chapter 1: "Longitudinal Data" Pp. 1-42 and Chapter 4. "Designing a Study with Longitudinal Data." Pp. 241-84.

Castilla, Emilio J. 2007. Chapter 3: "Event History Analysis." Only Sections 1-5: Pp. 135-69.

Stata Corporation. 2005. *Stata 9.0: Survival Analysis and Epidemiological Tables* (Manual). Entry covering -stset-.

#### Part II. Descriptive Statistics for Event History Data

Castilla, Emilio J. 2007. Section 6: "Exploratory Analysis of Events" in Chapter 3: "Event History Analysis." Pp. 170-90.

### Sessions 23 & 24. Friday, June 11, 2010: 13h00-16h15

#### Part I. Multivariate Models for the Analysis of Events

Castilla, Emilio J. 2007. Section 7. "Multivariate Analysis of Events" in Chapter 3. "Event History Analysis." Also Sections 8-10. Pp. 191-240.

#### Part II. Applications: Event History Analysis

Castilla, Emilio J. 2005. "Social Networks and Employee Performance in a Call Center." *American Journal of Sociology* 110 (5): 1243-83.

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<sup>5</sup> The book is available in amazon.com at <http://www.amazon.com/Dynamic-Analysis-Social-Sciences-Castilla/dp/0120884852> and also at the Stata bookstore: <http://www.stta.com/bookstore/daitss.html>.

## Appendix: Schedule of the 2<sup>nd</sup> EDEN Seminar on ONA, EIASM, June 7 – 11, 2010

Monday, June 7 <sup>th</sup>	Tuesday, June 8 <sup>th</sup>	Wednesday, June 9 <sup>th</sup>	Thursday, June 10 <sup>th</sup>	Friday, June 11 <sup>th</sup>
<p><b>9h00-10h30 Session 1</b></p> <p><i>Introduction to ONA (part 1): main concepts and methods for visualisation of graphs and analysis of key metrics at node and network levels</i></p> <p>Dimitris Assimakopoulos</p> <p><b>10h30-11h00</b> <i>Coffee break</i></p> <p><b>11h00-12h30 Session 2</b></p> <p><i>Introduction to ONA (part 2): main concepts and methods for visualisation of graphs and analysis of key metrics at node and network levels</i></p> <p>Dimitris Assimakopoulos</p>	<p><b>8h30-09h15</b> <i>What have we learned yesterday</i></p> <p><b>9h15-10h45 Session 6</b></p> <p><i>The role of social networks in the generation of innovation: Focussing on structure</i></p> <p>Marco Tortoriello</p> <p><b>10h45-11h00</b> <i>Coffee break</i></p> <p><b>11h00-12h30 Session 7</b></p> <p><i>The role of social networks in the generation of innovation: Focussing on structure</i></p> <p>Marco Tortoriello</p>	<p><b>8h30-09h15</b> <i>What have we learned yesterday</i></p> <p><b>9h15-10h45 Session 11</b></p> <p><i>Research proposals Students' presentation</i></p> <p>Dimitris Assimakopoulos</p> <p><b>10h45-11h00</b> <i>Coffee break</i></p> <p><b>11h00-12h30 Session 12</b></p> <p><i>Research proposals Students' presentation</i></p> <p>Dimitris Assimakopoulos</p>	<p><b>8h30-09h15</b> <i>What have we learned yesterday</i></p> <p><b>9h15-10h45 Session 16</b></p> <p><i>Structural Balance and Transitivity</i></p> <p>Soong Moon Kang</p> <p><b>10h45-11h00</b> <i>Coffee break</i></p> <p><b>11h00-12h30 Session 17</b> <i>Network Dynamics and Advanced Topics on Network Measures: Clustering, Assortative Mixing, etc.</i></p> <p>Soong Moon Kang</p>	<p><b>8h00-08h45</b> <i>What have we learned yesterday</i></p> <p><b>8h45-10h15 Session 21</b></p> <p><i>Introduction to Event History Analysis</i> Emilio Castilla</p> <p><b>10h15-10h30</b> <i>Coffee break</i></p> <p><b>10h30-12h00 Session 22</b></p> <p><i>Descriptive Statistics for Event History Data</i> Emilio Castilla</p>
<i>12h30-14h00 Lunch</i>	<i>12h30-14h00 Lunch</i>	<i>12h30-14h00 Lunch</i>	<i>12h30-14h00 Lunch</i>	<i>12h00-13h00 Lunch</i>
<p><b>14h00-15h30 Session 3</b></p> <p><i>The role of social networks in the generation of innovation: Focussing on ties</i></p> <p>Marco Tortoriello</p> <p><b>15h30-16h00</b> <i>Coffee break</i></p> <p><b>16h00-17h30 Session 4</b></p> <p><i>The role of social networks in the generation of innovation: Focussing on ties</i></p> <p>Marco Tortoriello</p> <p><b>17h30 -18h30 Session 5</b> Students' presentation</p> <p>Marco Tortoriello Dimitris Assimakopoulos</p>	<p><b>14h00 - 15h30 Session 8</b> <i>Hands on tutorial with Ucinet software (part 1): the case of a large new product development team in a multi-site &amp; multi-functional business unit</i></p> <p>Marco Tortoriello Dimitris Assimakopoulos</p> <p><b>15h30-16h00</b> <i>Coffee break</i></p> <p><b>16h00-17h30 Session 9</b> <i>Hands on tutorial with Ucinet software (part 2): the case of a large new product development team in a multi-site &amp; multi-functional business unit</i></p> <p>Marco Tortoriello Dimitris Assimakopoulos</p> <p><b>17h30 -18h30 Session 10</b> Students' presentation Marco Tortoriello Dimitris Assimakopoulos</p>	<p><b>14h00-15h30 Session 13</b></p> <p><i>Different types of networks: Bipartite, Multiplex, etc.</i></p> <p>Soong Moon Kang</p> <p><b>15h30-16h00</b> <i>Coffee break</i></p> <p><b>16h00-17h30 Session 14</b></p> <p><i>Network Dynamics</i></p> <p>Soong Moon Kang</p> <p><b>17h30 -18h30 Session 15</b></p> <p><i>Research proposals Students' presentation</i></p> <p>Soong Moon Kang Dimitris Assimakopoulos</p>	<p><b>14h00-15h30 Session 18</b> <i>Models for Binary Outcomes</i></p> <p>Emilio Castilla</p> <p><b>15h30-16h00</b> <i>Coffee break</i></p> <p><b>16h00-17h30 Session 19</b> <i>Applications: Models for Binary Outcomes</i></p> <p>Emilio Castilla</p> <p><b>17h30 -18h30 Session 20</b> <i>Research proposals Students' presentation</i></p> <p>Emilio Castilla Dimitris Assimakopoulos</p>	<p><b>13h00-14h30 Session 23</b></p> <p><i>Multivariate Models for the Analysis of Events</i></p> <p>Emilio Castilla</p> <p><b>14h30-14h45</b> <i>Coffee break</i></p> <p><b>14h45-16h15 Session 24</b></p> <p><i>Applications: Event History Analysis</i></p> <p>Emilio Castilla</p> <p><i>16h30</i> <b>Departure</b></p>