gesis
Leibniz Institute for the Social Sciences

The Digital Divide in Europe in the 21ˢᵗ Century: a new methodological challenge for comparative social research

João Miguel Aguiar
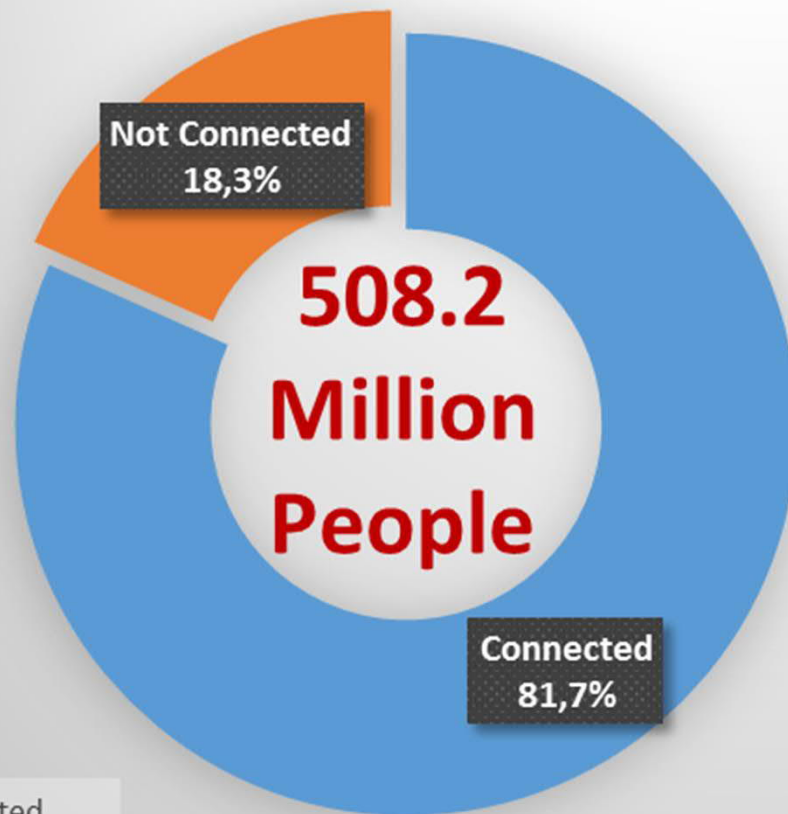PhD Candidate, University of Porto and UT Austin | Portugal Program
Pedro Campos
University of Porto | Statistics Portugal
José Azevedo
University of Porto

U. PORTO
FEUP FACULDADE DE ENGENHARIA UNIVERSIDADE DO PORTO

UT Austin | Portugal
INTERNATIONAL COLLABORATORY FOR EMERGING TECHNOLOGIES, CoLab

FCT
Fundação para a Ciência e a Tecnologia

EU INTERNET ACCESS (2016)

508.2 Million People

Not Connected 18,3%

Connected 81,7%

- Connected
- Not Connected

Internet Penetration

. At least 9 out of every 10 individuals in DK, LU, NL, SE, FI, UK and DE used the internet.

. Less than two thirds of all individuals aged 16 to 74 used the internet in PT, EL, LT, BG and RO.

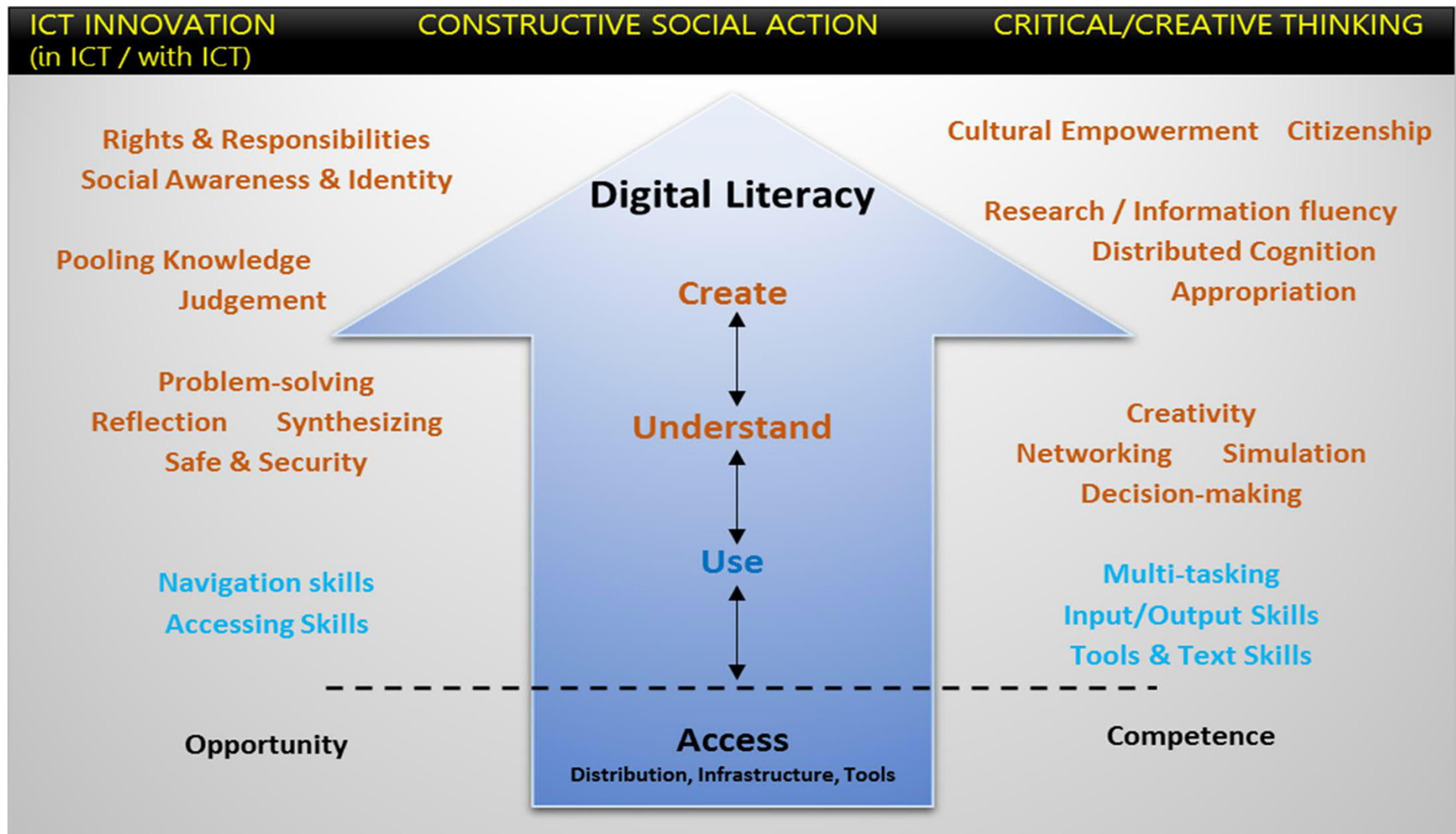. 14% of the EU-28's population never used the internet.

% of all individuals in the EU-28, aged between 16 and 74 years, used the internet (at least once within three months prior to the survey date).
Source: http://ec.europa.eu/

Objectives of the study

. Analyze the Digital Divide state in European Union and how it has evolved in the last few years (2008-2015)

ICT INNOVATION (in ICT / with ICT)   CONSTRUCTIVE SOCIAL ACTION   CRITICAL/CREATIVE THINKING

Digital Literacy

Rights & Responsibilities
Social Awareness & Identity

Pooling Knowledge
Judgement

Create

Cultural Empowerment   Citizenship

Research / Information fluency
Distributed Cognition
Appropriation

Problem-solving
Reflection   Synthesizing
Safe & Security

Understand

Creativity
Networking   Simulation
Decision-making

Navigation skills
Accessing Skills

Use

Multi-tasking
Input/Output Skills
Tools & Text Skills

Opportunity

Access
Distribution, Infrastructure, Tools

Competence

This figure is based on models from the "Report of the Digital Britain Media Literacy Working Group" (March 2009), "DigEuLit - a European Framework for Digital Literacy" (2005), and Jenkins et al. (2006) "Confronting the Challenges of Participatory Culture: Media Education for the 21st Century".

Research questions

RQ1: What is the current state of the Digital Divide among the European Union countries?
(Digital Divide Index - Chi-square Test - CATPCA)

RQ2: How did the Digital Divide evolved within the European Union in the last few years?
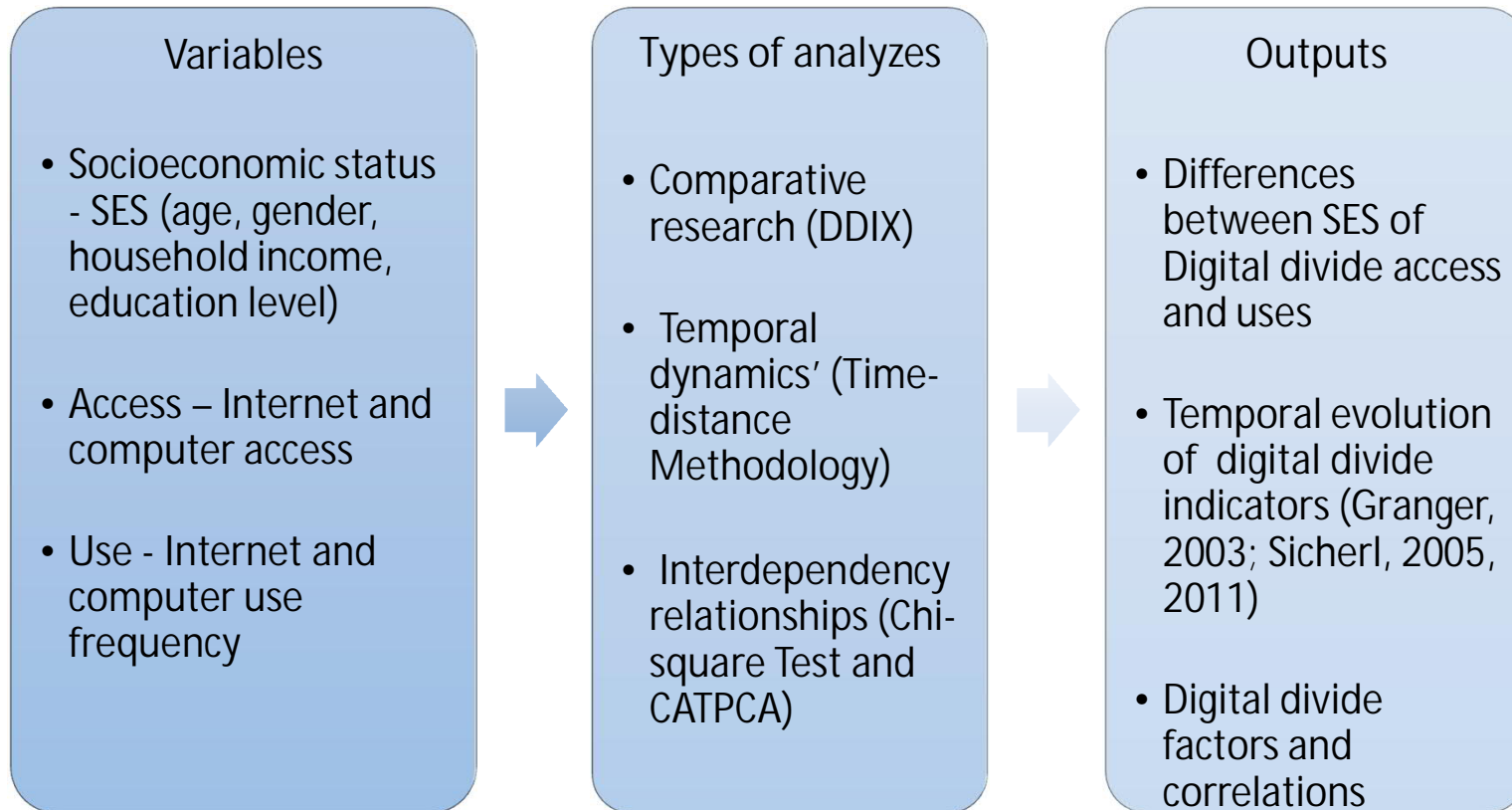(Time-distance Methodology)

Methodology / research framework

Variables

- Socioeconomic status - SES (age, gender, household income, education level)

- Access – Internet and computer access

- Use - Internet and computer use frequency

Types of analyzes

- Comparative research (DDIX)

- Temporal dynamics' (Time-distance Methodology)

- Interdependency relationships (Chi-square Test and CATPCA)

Outputs

- Differences between SES of Digital divide access and uses

- Temporal evolution of digital divide indicators (Granger, 2003; Sicherl, 2005, 2011)

- Digital divide factors and correlations

Fig. 2 – Digital Divide research framework: A multi-model approach (Centering on the 'user')

Methodology / sample

Eurostat's Community survey on ICT usage in households and by individuals (2008-2015) micro-data.

The 2013 survey covered 148 290 households with at least one person aged 16-74, and 220 436 individuals aged 16-74 in the EU.
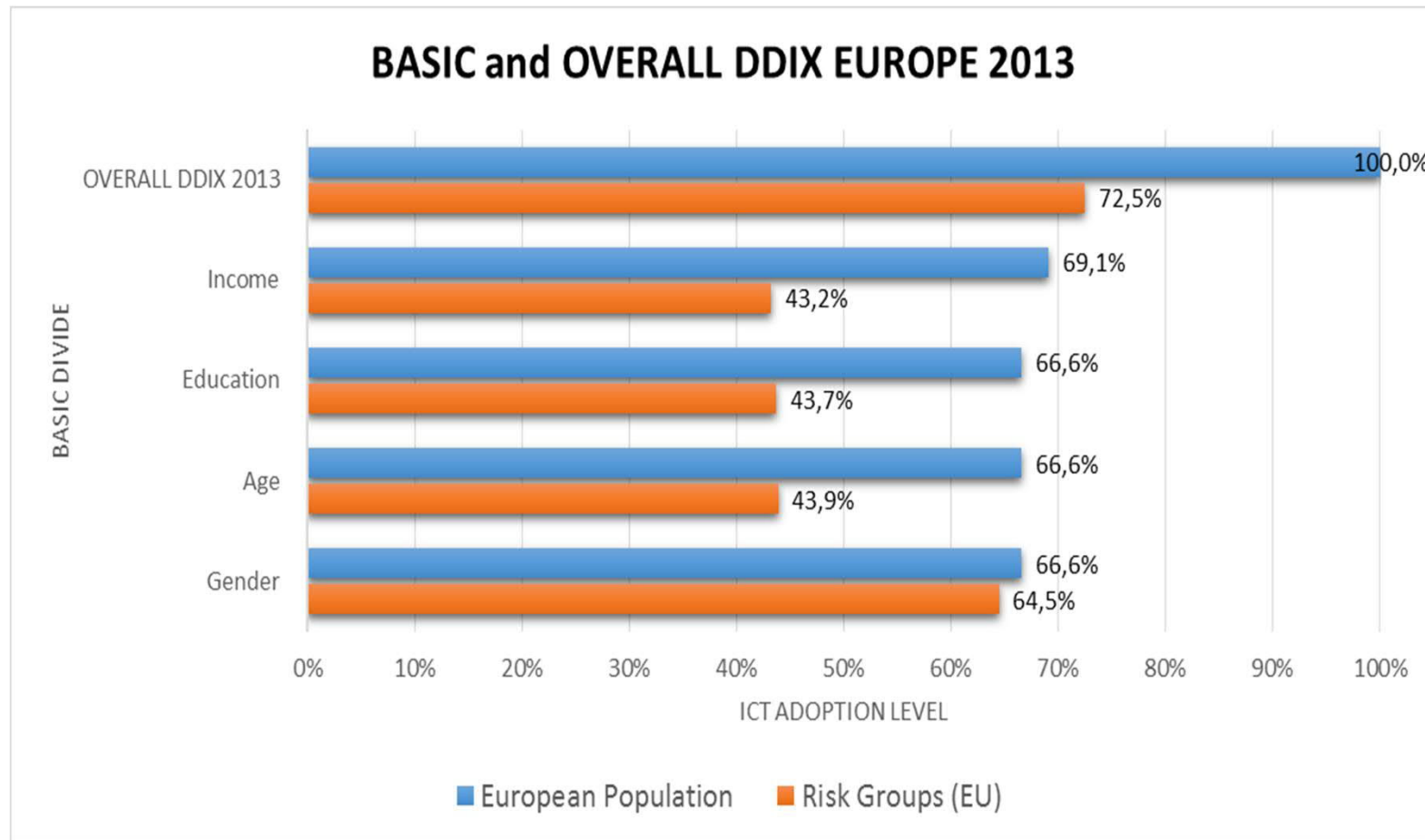
Methodology / sample

Table 3 - Chi-square Indendence Test - Risk Groups vs ICT Access Indicators (p-values)

Access and ICT use indicators	2008	2009	2010	2011	2012	2013
Gender (female vs male)						
A1: do you or anyone in the household have access to a computer at home?	0,0153 *	0,0000 **	0,0000 **	0,0371 *	0,0019 **	0,1597
A2: do you or anyone in the household have access to the internet at home? (by any device)	0,0028 **	0,0000 **	0,0000 **	0,2682	0,0724	0,5664
B1: when did you last use a computer (at home, at work any other place)? Within the last 3 months	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
C1: when did you last use the internet? Within the last 3 months	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
Age (Individuals aged 54 or more vs others)						
A1: do you or anyone in the household have access to a computer at home?	0,0000 **	0,0005 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
A2: do you or anyone in the household have access to the internet at home? (by any device)	0,0000 **	0,0001 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
B1: when did you last use a computer (at home, at work any other place)? Within the last 3 months	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
C1: when did you last use the internet? Within the last 3 months	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
Education (Lower education level vs others)						
A1: do you or anyone in the household have access to a computer at home?	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
A2: do you or anyone in the household have access to the internet at home? (by any device)	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
B1: when did you last use a computer (at home, at work any other place)? Within the last 3 months	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
C1: when did you last use the internet? Within the last 3 months	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
Income (Lowest quartile vs others)						
A1: do you or anyone in the household have access to a computer at home?	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
A2: do you or anyone in the household have access to the internet at home? (by any device)	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
B1: when did you last use a computer (at home, at work any other place)? Within the last 3 months	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **
C1: when did you last use the internet? Within the last 3 months	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **	0,0000 **

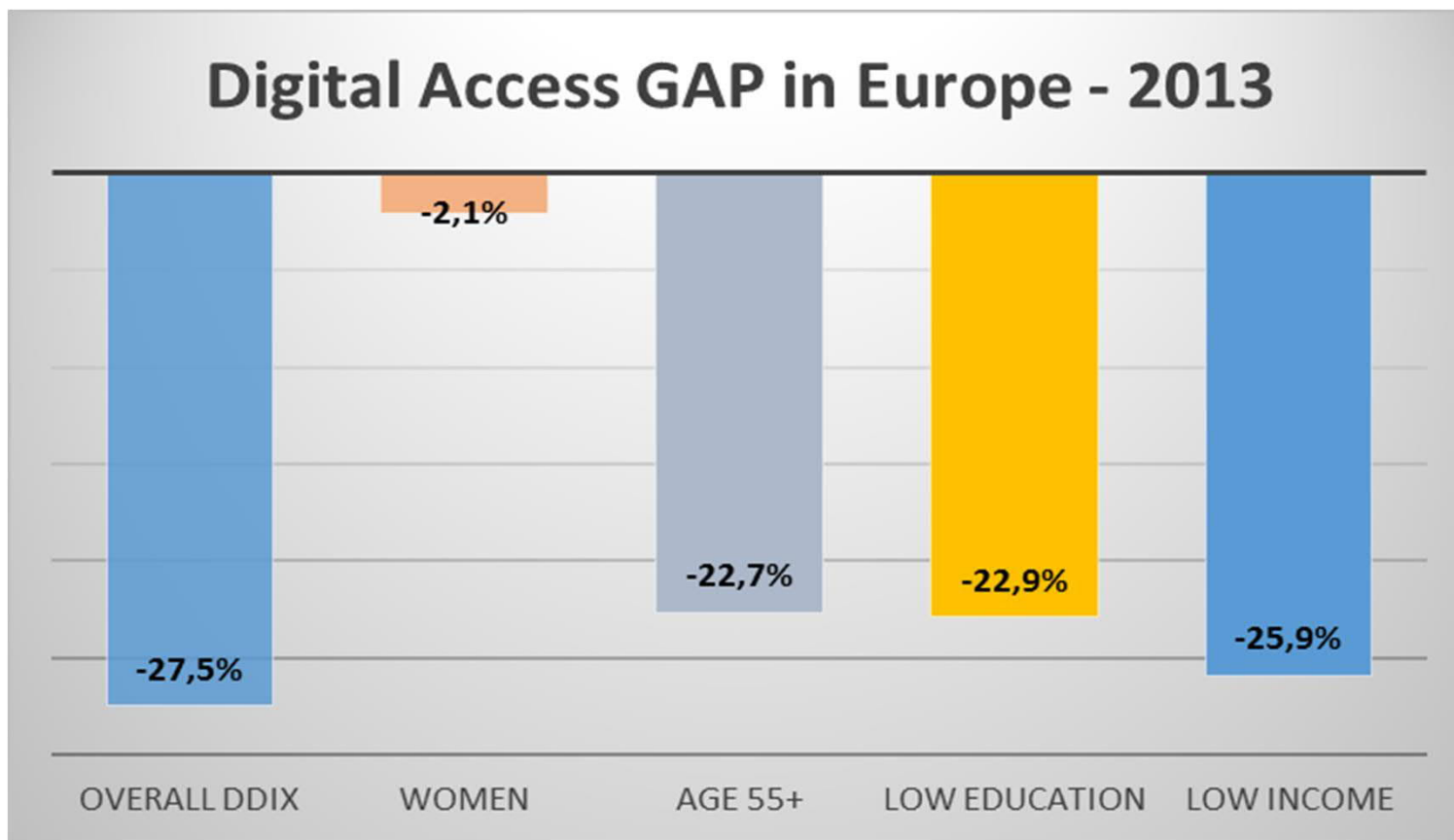*significant at the 5% level; **significant at the 1% level

Methodology / results

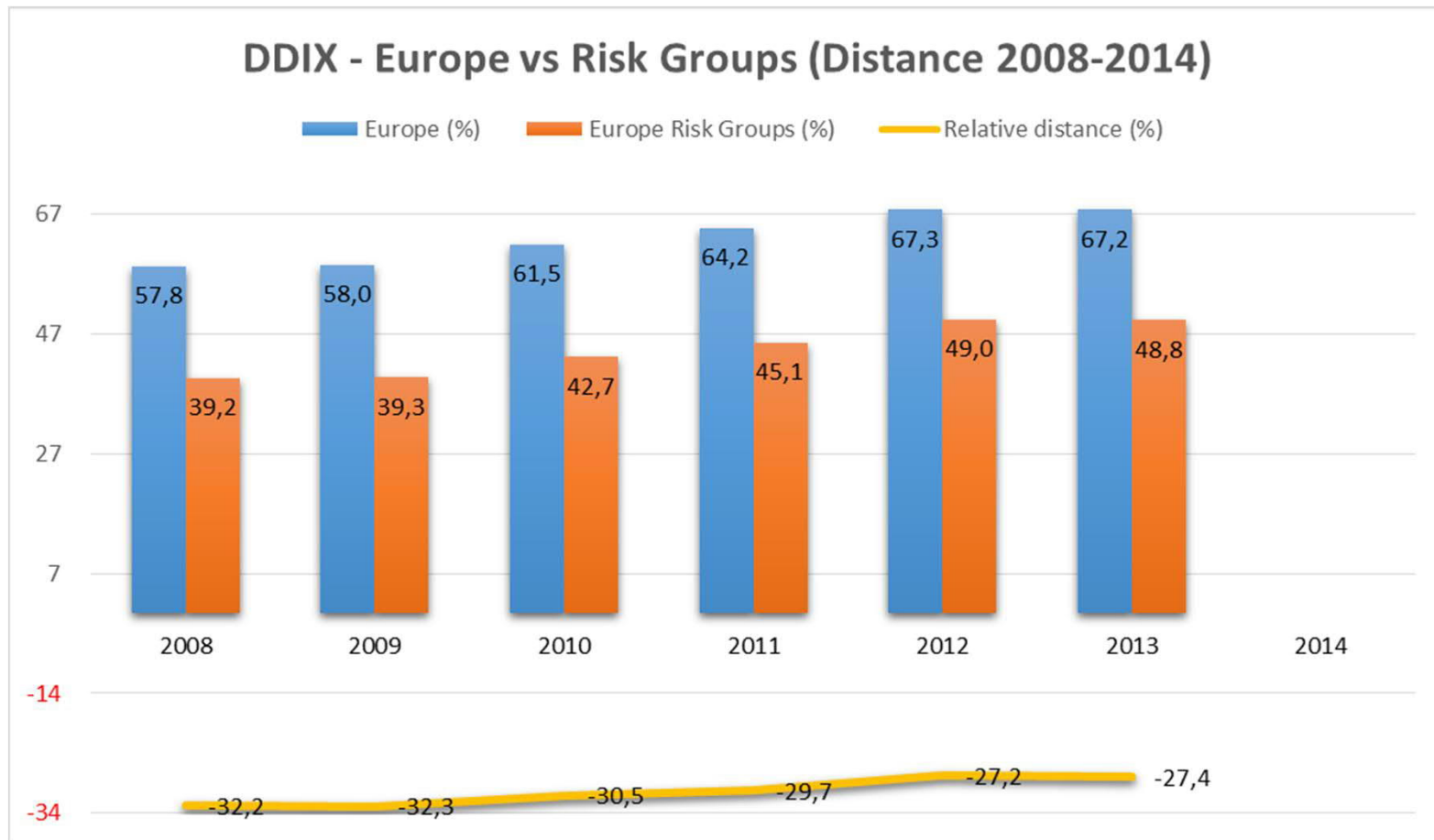Comparative research: Digital Divide Index (DDIX)

Methodology / results

Comparative research: Digital Divide Index (DDIX)

Methodology / results

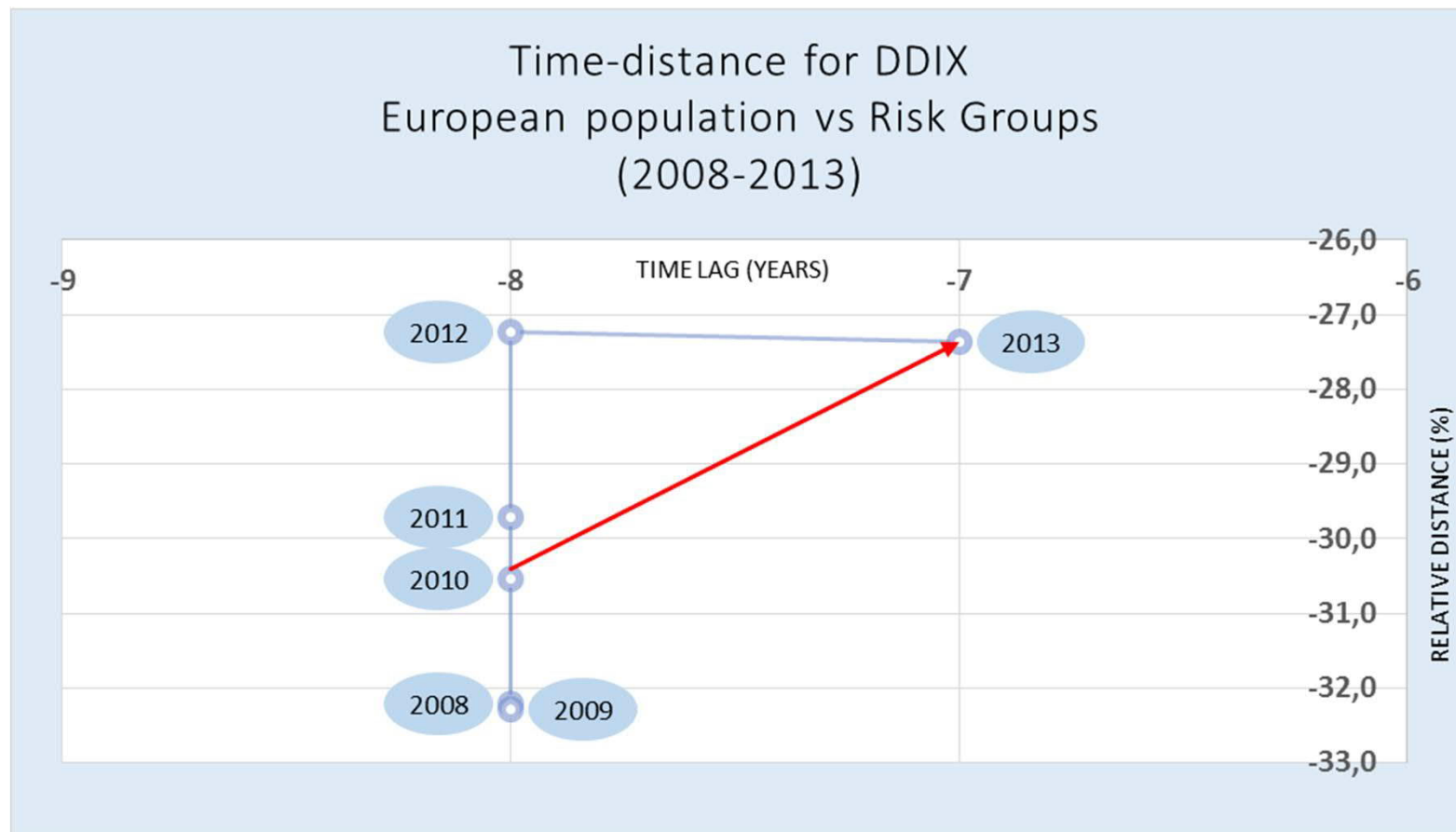Comparative research: Digital Divide Index (DDIX)

DDIX - Europe vs Risk Groups (Distance 2008-2014)

Methodology / results

Temporal dynamics': Time-distance methodology

Time-distance for DDIX
European population vs Risk Groups
(2008-2013)

Methodology / CATPCA

. CATPCA - Principal Components Analysis for Categorical Data

Case Processing Summary

Valid Active Cases	245867921,0
Active Cases with Missing Values	121982705,7
Supplementary Cases	0
Total	367850626,7
Cases Used in Analysis	367850626,7

Cases Weighted by INDIVIDUAL WEIGHT.

Model Summary

		Variance Accounted For
Dimension	Cronbach's Alpha	Total (Eigenvalue)
1	,859	4,020
2	,179	1,186
Total	,923[a]	5,206

a. Total Cronbach's Alpha is based on the total Eigenvalue.

Methodology / CATPCA

Component Loadings

	Dimension	
	1	2
HOUSEHOLD INCOME QUARTILE	-,325	,207
AGE CLASSES	,591	,528
SEX	,134	,591
EDUCATIONAL LEVEL	-,589	,343
EMPLOYMENT SITUATION	,646	,560
B1: WHEN DID YOU LAST USE A COMPUTER (AT HOME, AT WORK ANY OTHER PLACE)?	,954	-,162
C1: WHEN DID YOU LAST USE THE INTERNET?	,971	-,167
C2: ON AVERAGE HOW OFTEN DID YOU USE THE INTERNET IN THE LAST 3 MONTHS?	,965	-,173

Variable Principal Normalization.

Methodology / CATPCA

Component Loadings

	Dimension	
	1	2
HOUSEHOLD INCOME QUARTILE	-,325	,207
AGE CLASSES	,591	,528
SEX	,134	,591
EDUCATIONAL LEVEL	-,589	,343
EMPLOYMENT SITUATION	,646	,560
B1: WHEN DID YOU LAST USE A COMPUTER (AT HOME, AT WORK ANY OTHER PLACE)?	,954	-,162
C1: WHEN DID YOU LAST USE THE INTERNET?	,971	-,167
C2: ON AVERAGE HOW OFTEN DID YOU USE THE INTERNET IN THE LAST 3 MONTHS?	,965	-,173

Variable Principal Normalization.

Discussion | Contributions

1. The role of digital inclusion and digital literacy;

2. The conceptual and methodological improvement of several social sciences concepts to better understand a renewed public sphere;

3. Advanced methods that are crucial for digital divide measurements (and also for any type and level of divides).

4. Data limitations: no data available for Germany; many missing values for the income variable; delay in the delivery of data (2014-2015)

João Miguel Aguiar
University of Porto
UT Austin | Portugal Program in Digital Media
(joaomiguelaguiar65@gmail.com)

Pedro Campos
University of Porto and LIAAD – INESC TEC

José Azevedo
University of Porto

Thank You!

Obrigado!