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14. ABSTRACT

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RPPR Final Report
as of 08-Feb-2018

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PARTICIPANTS:

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Article Title: The Scaling of Human Interactions with City Size

Authors:

Keywords: networks, mobile phone data, human interactions, urban scaling, epidemiology

Abstract: The size of cities is known to play a fundamental role in social and economic life. Yet, its relation to the structure of the underlying network of human interactions has not been investigated empirically in detail. In this paper, we map society-wide communication networks to the urban areas of two European countries. We show that both the total number of contacts and the total communication activity grow superlinearly with city population size, according to well-defined scaling relations and resulting from a multiplicative increase that affects most citizens. Perhaps surprisingly, however, the probability that an individual's contacts are also connected with each other remains largely unaffected. These empirical results predict a systematic and scale-invariant acceleration of interaction-based spreading phenomena as cities get bigger, which is numerically confirmed by applying epidemiological models to the studied networks. Our findings should provide a microscopic basis towards under

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Article Title: Determinants of the Pace of Global Innovation in Energy Technologies

Authors:

Keywords: climate change, innovations in energy technologies

Abstract: Understanding the factors driving innovation in energy technologies is of critical importance to mitigating climate change and addressing other energy-related global challenges. Low levels of innovation, measured in terms of energy patent filings, were noted in the 1980s and 90s as an issue of concern and were attributed to limited investment in public and private research and development (R&D). Here we build a comprehensive global database of energy patents covering the period 1970–2009, which is unique in its temporal and geographical scope. Analysis of the data reveals a recent, marked departure from historical trends. A sharp increase in rates of patenting has occurred over the last decade, particularly in renewable technologies, despite continued low levels of R&D funding. To solve the puzzle of fast innovation despite modest R& increases, we develop a model that explains the nonlinear response observed in the empirical data of technological innovation to various types of investme

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