

## *Diffusion Feedbacks on the Creation of Open Source Knowledge*

Violeta Piculescu  
Robert Schuman Center for Advanced Studies  
European University Institute, Florence  
[Violeta.Piculescu@eui.eu](mailto:Violeta.Piculescu@eui.eu)

### **Extended Abstract:**

#### Introduction and Objective:

The strategy of reaching out to the wide world and tapping into collective creativity has evolved into a significant challenge to the established modes of organization of R&D activities. The successes of web-based meeting platforms such as SourceForge and Wikipedia in delivering open source knowledge of commercial quality have prompted businesses and researchers alike to ponder over the innovation promise of mass collaboration that defies the traditional organizational boundaries.

The main issue I address in this paper is the diffusion of open source software among end-users as a driving force for further developments of an open source knowledge base. I view knowledge creation as an evolutionary process of cumulating (small) individual innovations, and posit that the diffusion of the newly created knowledge feeds back into the quality of the innovation process itself and, in doing so, it helps its advance. I then analyze whether and how alternative mechanisms of knowledge adoption across large pools of users are likely to affect the speed and the quality of innovation activities. With respect to methodology, I develop a simple simulation framework that captures the two main features of the model: 1) the process of contributions to an open source knowledge base, and 2) the process of diffusion of knowledge across users.

#### Research Narrative:

Consider a population of individuals who are currently using a package of proprietary software applications, and assume that individuals differ in terms of their preferences for the functionality of the various applications. The process of innovation is then initiated by individuals with programming skills who are dissatisfied the most with a particular application. A distinctive feature of the innovation process in the model is the heterogeneity of individuals' preferences: the gradual creation of an open source knowledge base is enabled by the different preferences that individuals have for the various software components. Given the availability of contributions in the public domain, however, all individuals accrue the benefits of these diverse needs.

The second part of the model reflects the adoption of innovation and it accounts for the number of users of the open source knowledge at various stages of its development. I assume that the more individuals run / adopt a given open source application, the higher is the quality of the contributions that make their way to the open source knowledge base.

The number of users of the open source applications is then determined based on two main factors: 1) the way potential users learn about the availability of the open source software, and 2) the criteria they use when adopting it.

With respect to the way news about the OS projects spread among consumers, I consider two main situations: 1) the benchmark case where all potential users are instantaneously informed about the availability and the functionality level of open source applications, and 2) a second scenario where users learn about the OS software either from another individual that they meet randomly, or from their neighbors in a social network. With random interactions I obtain a modeling framework akin to contagion models, the difference being that in this model it is the information that is ‘contagious’ and not the software adoption itself. When information travels across networks rather than randomly, on the other hand, then the adoption process is also driven by the structure of the communication network. In this latter case the analysis relies on the simulation of a family of relational graphs, as inspired by the work of Watts and Strogatz (1998).

Inertia in the adoption process is further introduced in the form of conformist effects. I assume that software functionality is not the only criterion people use when adopting a new product; but they also take into account the extent to which OS applications are used by their neighbors in a social / collaboration network. I find that the effects of conformist behavior on the creation and the diffusion of open source knowledge differ across network structures at high level of conformity, but not at medium to low levels of conformity. Finally, the paper ends with a discussion on alternative possible mechanisms that can be employed to relax the constraints imposed by conformist behavior on the adoption of open source knowledge.

#### Contact Details:

Violeta Piculescu  
Postdoctoral Jean Monnet Fellow  
RSCAS, EUI  
Via dei Roccettini, 9  
I-50014, San Domenico di Fiesole  
Italy  
[Violeta.Piculescu@eui.eu](mailto:Violeta.Piculescu@eui.eu)