EcoSysNetworks: A Method for Visualizing Software Ecosystems

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Abstract. This paper summarized the keynote talk on ecosystems delivered at the 4th Software Ecosystems Workshop. We outline a methodology that was used to generate many interesting ecosystems for companies.

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1 Introduction

Ecosystems are defined as a loose network of suppliers, distributors, outsourcing firms, makers of related products or services, technology providers and a host of other organizations – that affect and are affected by the creation and delivery of a company's own products and services [1]. In order to understand the context in which a company operates and makes sound strategic decisions, it is very important to model and study ecosystems.

Many entities and tools are required to model and render ecosystems. There needs to be a sponsor who has a question about an industry or a company. The role of an analyst is to collect data for the visualization and to prepare the files for visualization. A domain expert is needed to interpret the visuals and make recommendations for further analysis. Finally, there needs to be a person who manages the infrastructure (data, visuals and lessons learned). The proposed approach is applicable to and appropriate for software ecosystems [2].

2 Method

While many companies would want to do just that, it is not easy to model ecosystems. In this paper, I outline a method that I have used over the past five years to draw and analyze several ecosystems. The methodology consists of the following steps: determine the industry structure or stack, identify companies, dependencies and their attributes, finalize semantics for nodes and links of the network, generate input file for visualization, and visualize and interpret.

Determine industry structure: When starting the research on a industry, it may typically start with a company and its set of competitors. For this set, it is important to identify the value chain of activities that deliver something of value to customers. These value chains or stacks can typically be found in industry publications. This industry structure can help the analyst create a list of companies that are recognized as the major platform providers in an industry.
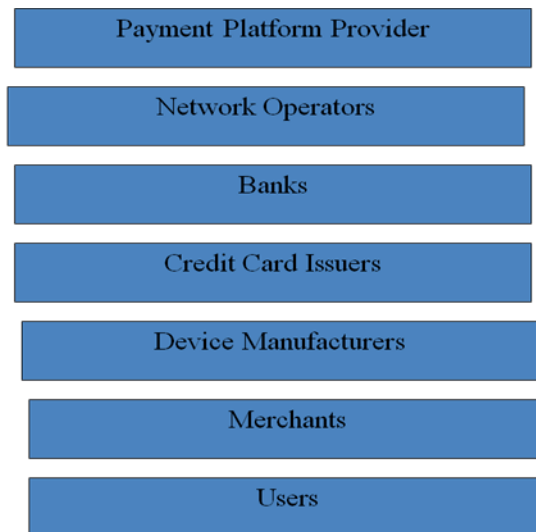

Figure 1: Mobile Payment Stack

Identify Companies and their attributes: Create a list of platform providers for the ecosystem. This list can be generated by searching industry publications that run articles on emerging and established areas. One strategy to locate these articles is to use del.icio.us or Googles search engine. In the case of the M-payment ecosystem, MIT Technology Review ran a special issue on the topic and it listed all the major platform players. This list can be augmented using other sources, too. Once the list is finalized, the analyst has to visit each company's website to create a list of partners and the types of dependencies. Most websites have a tab titled strategic alliances or partner list. These sites will also describe the type of relationship between companies – technical, marketing, licensing, etc.

Figure 2: List of M-Payment Platforms

Finalize semantics for nodes and dependencies: Once the data has been collected, the analyst has to prepare a file for the visualization program. This file should have information about the color and size of nodes and dependencies. Typically, node sizes are based on a company's revenue, or number of employees. The dependencies are color coded based on the type of relationship.

Visualize, Analyze and interpret: For all our network visualizations, we used Pajek. Once we create the visuals, the typical protocol was to present it to the sponsoring organization. We would show them the core network and see if they have any insights about the companies in the core. We would create a list of companies that occupy key network positions and see if any players surprised the group. During the session it is quite common for company executives to identify a few companies that did not make the list. We would incorporate them and visualize again.
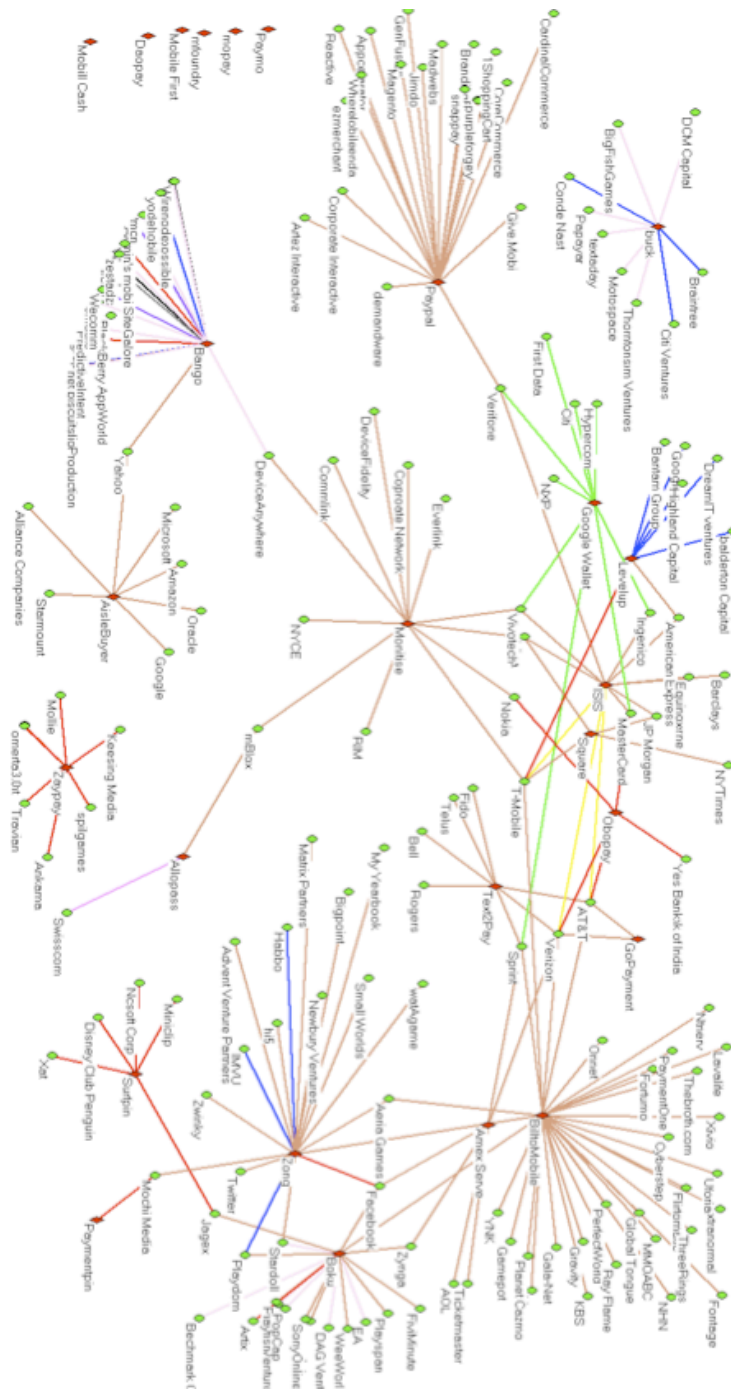
Figure 3: M-Payment Ecosystem

Challenges and Future Work

While these visualizations are useful in gaining an understanding of the industry and its key players, it is quite challenging to generate new visuals as things change. In mature industries, it would be useful to have automated tools to gather data on dependencies. Having a good content management system to store data files over time and visualize them on demand would also be useful. Finally, we need better collaborative tools to support a team of stakeholders working on modeling and interpreting ecosystems.

The field of ecosystem visualization continues to grow and mature. As researchers from multiple disciplines use this technique, better tools and ways to interpret them will emerge.

References

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