Complementor Embeddedness in Platform Ecosystems: The Case of Google Apps

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Outline

- Introduction

- Research question

- Google Apps

- Research approach

- Results

- Analysis of quantitative and qualitative data

- Discussion and validation

- Conclusion and future research

Industry Platforms

A product, service or technology, that is **developed by one or several firms**, that serves as **a foundation** upon which **other firms** can build **complementary products**, services or technologies.

Gawer (2009)

Proprietary Platform Ecosystems
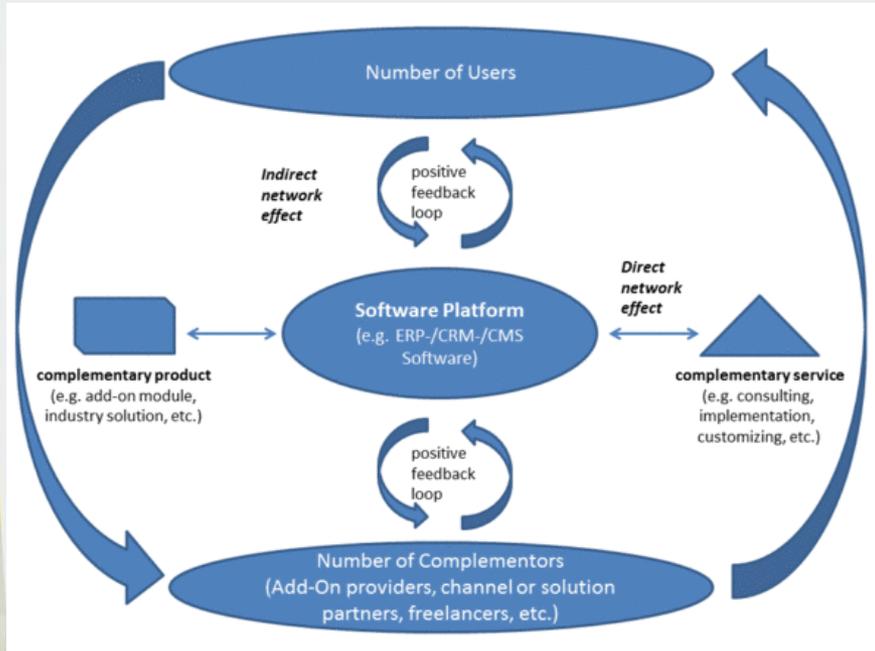
Cusumano (2010)

- **Platform ecosystem:** all interlinked developers of complementarities or the interlinked set of products and services they develop
- Platform owners **depend on complementor ecosystem** to:
  - Develop domain-specific applications
  - Appeal the platform to new market segments
  - Co-create and co-innovate

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Ecosystem Strategy

Embeddedness: The ratio of the number of relationships an actor has to the number of relationships that is theoretically possible.

- Platform ecosystem strategies aim **to increase embeddedness of developers** in the ecosystem
- **Rationale for platform owners:**
    - Foster exchange among developers in the ecosystem (increase innovation speed)
    - Increased commitment to the platform (vendor locking)
- **Rationale for developers of complementary applications:**
    - Increased specialization
    - Increased visibility by parntering with prominent developers
    - Technological complementarity
- Little is known about the **structure of proprietary ecosystems**, accordingly the **effect** of **ecosystem strategies** remains **unknown**

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Research Question

What is the influence of the number of complements developed by an actor on its embeddedness in a proprietary platform ecosystem?

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Relevance

Scientific Relevance

- Provide a method to assemble information about, and **visualize proprietary platform ecosystems**

- Insight in **the structure** of a proprietary platform ecosystem

Practical Relevance

- Aid managers in **analyzing their own ecosystem**

- Insight into the **factors that shape** platform ecosystems

- Insight into **partnering strategies** of complementors

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Google Apps

- Cloud-based office suite platform
- Consists of scalable versions of Google products, Gmail, Google Drive, Google Sites, Google Calendar, …
- Intended for small to medium-sized enterprises, governmental and educational institutions
- **Third-party app development:** integration with other platforms, cloud migration functionality, CRM and ERP
- **App store:** Google Apps Marketplace
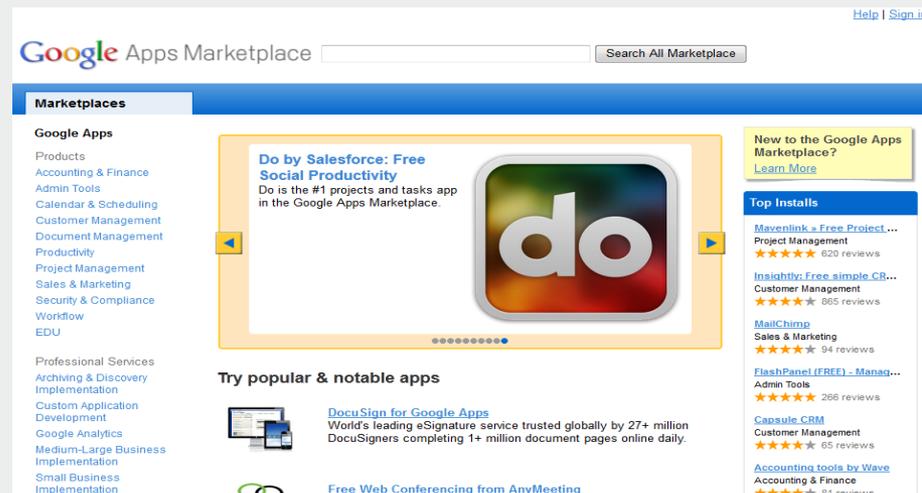
Data Collection

- **Identification of Google Apps vendors:**
  - Automated data collection from Google Apps Marketplace by means of a web crawler
  - Only apps listed under category **'products'**, professional services are excluded
  - SQL Queries and manual verification to compile list of vendors, *'Google Labs'* and *'Google Inc.'* → Google
- **Identification of business relationships**
  - Mentions of business and competitive relationships treated symmetric
  - Manual inspection of company websites, news feeds, CrunchBase
  - Identified relationships maintained in adjacency matrix

1: Presence of business relationship
0: Absence of relationship
-1: Presence of competitor

	Google	Zoho Corp.	SaaSt	Top-Solutions	Cloud-Work	ekto-sym	florey-soft
Google	-	1	1	1	1	1	1
Zoho Corp.	1	-	0	1	0	0	0
SaaSt	1	0	-	0	0	0	0
TopSolutions	1	1	0	-	0	0	0
CloudWork	1	0	0	0	-	0	0
ektosym	1	0	0	0	0	-	1
floreysoft	1	0	0	0	0	1	-

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Data Analysis and Validation

- Data analysis:

  - Network visualization and analysis → graphs and network metrics

  - Correlation analysis

- Accuracy and completeness of dataset validated with thirty-five Google Apps vendors, by means of questionnaire

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Descriptives

# of applications	# of complementors
15	1
14	2
11	1
10	1
9	2
8	2
7	4
6	5
5	6
4	10
3	26
2	104
1	826

- Data collected at **13-02-2013**
- **1354** applications
- **993** developers
- Google develops **13** applications (*Google Inc,* and *Google Labs*)
- Average of **1.36 applications per complementor** (Std. Dev 0.61)
- **7.36%** of complementors participates in **partnership or certification programs**

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Platform Ecosystem
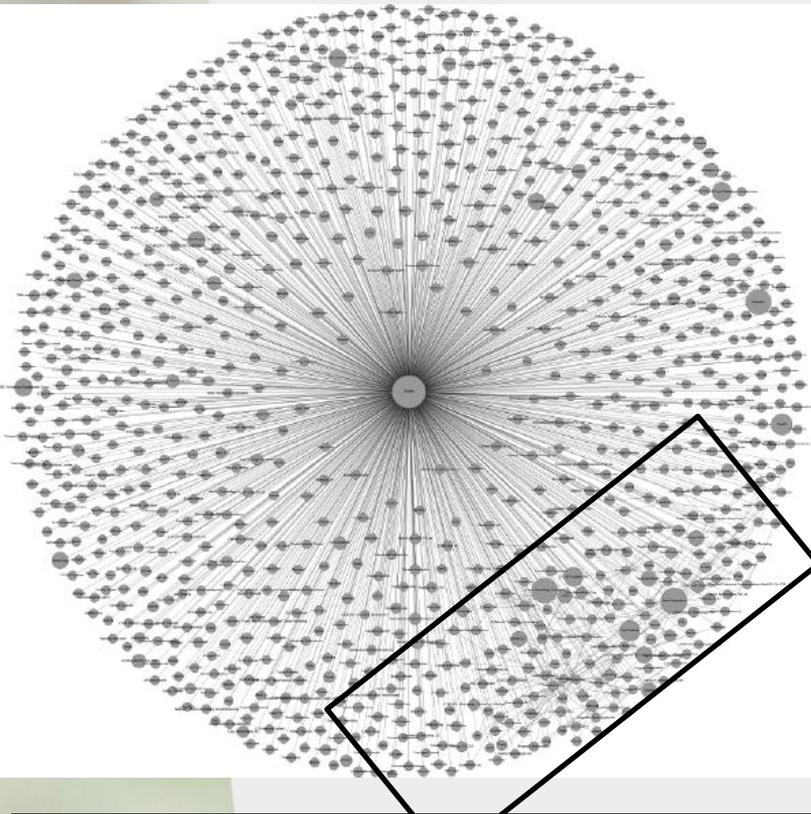
- **1248** business relationships and **143** competitive relationships
- Average of **1.26 relationships per actor**
- Dense lateral connectivity in the bottom right
- **Small number** of **influential complementors** in the ecosystem

Metric	Value
Size	993
Density	0.00282
Density (noncompetitive)	0.00253
Centralization	0.9994

Metric	Min.	Max.	Avg.	Std. dev.
Embeddedness	0.00101	1	0.00282	0.00285
Embeddedness (noncompetitive)	0.00100	1	0.00253	0.00261
Eigenvector centrality	0.0298	1	0.0318	0.00315
Clustering coefficient	0	1	0.193	0.287

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# Underlying Network Topology: Data Cleansing
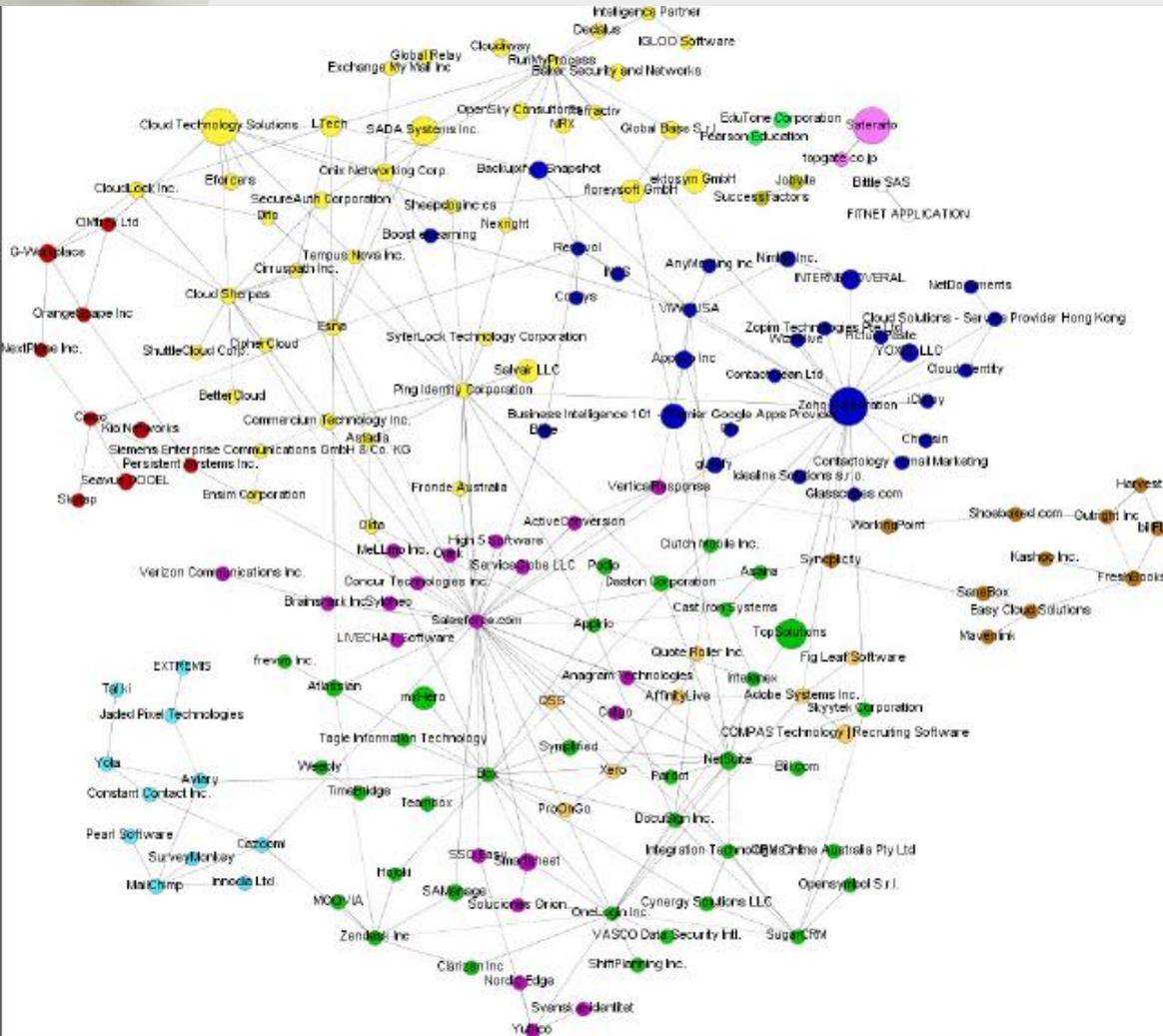
- Data cleansing to **uncover network topology underneath** hub-and-spoke network
- Cleansing steps:
  - Remove **competitive ties**
  - Remove **actors solely connected** to **Google**
  - Remove **Google**
- Cluster detection by means of the modularity algorithm (Blondel et al., 2008)

Underlying Network Topology: Observations
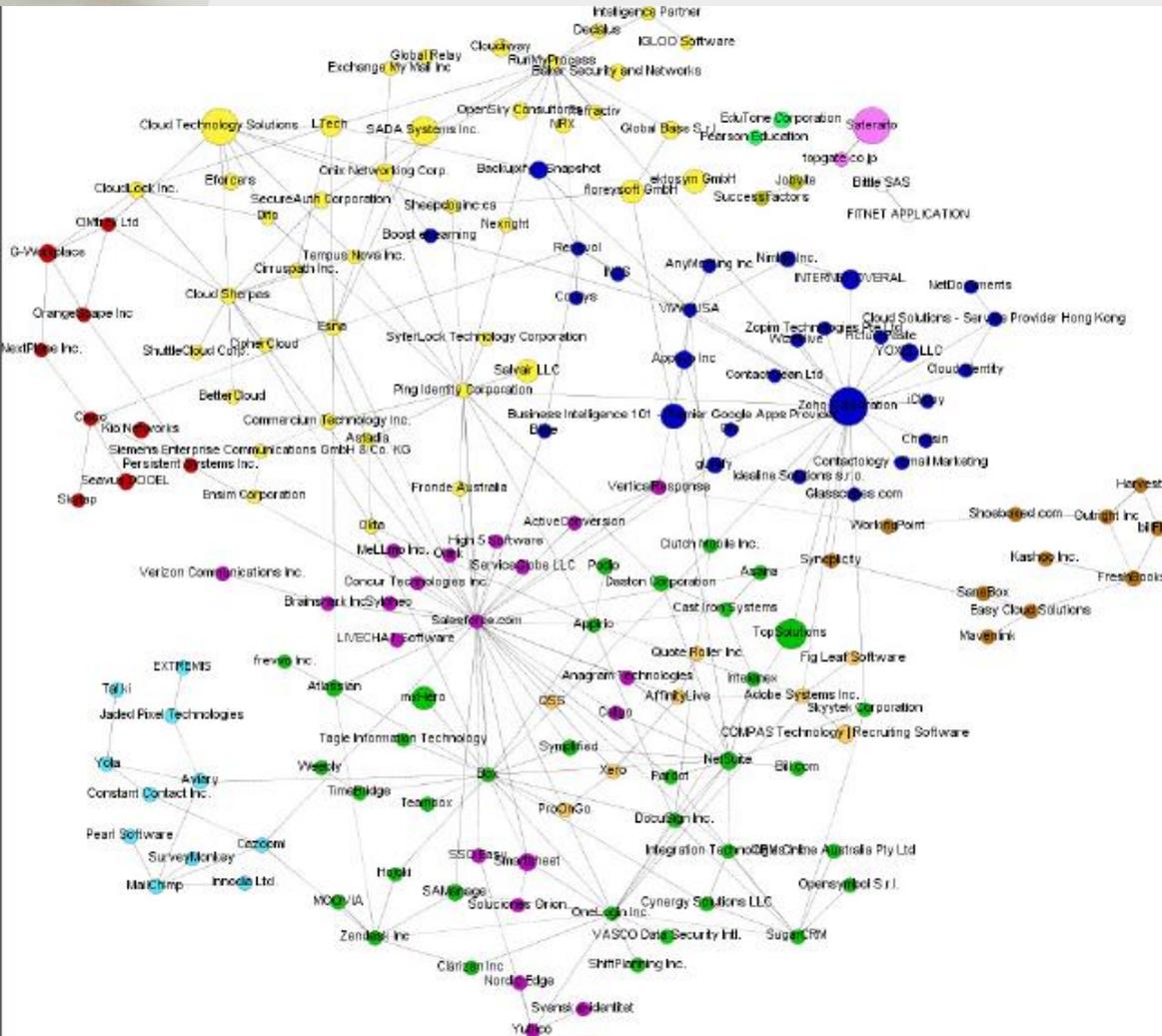
- **73%** of complementors are **solely connected** to **Google**
- Small clusters → regional partnerships
- Large clusters → technological clusters
- Zoho and Salesforce clusters → hub-and-spoke topology
- Some of the **largest vendors** are **solely connected to Google**

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Analysis of Quantitative Data

Hypothesis: There is a positive relationship between the number of applications an actor develops and its embeddedness in the ecosystem

- **Significant positive correlation** indicating that development activity and partnership activity coincide

- **Mild correlation** due to:
  - New entrants with existing partnerships in the ecosystem
  - Small companies that focus on continuous app development

Correlations		NumberOfApplications	Degree
NumberOfApplications	Pearson Correlation	1	,232**
	Sig. (2-tailed)		,000
	N	992	992
Degree	Pearson Correlation	,232**	1
	Sig. (2-tailed)	,000	
	N	992	992

**. Correlation is significant at the 0.01 level (2-tailed).

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Analysis of Qualitative Data

- Thirty-five vendors contacted by email, **response rate of 29%**

- Actors are **limitedly aware of the network topology** in the Google Apps ecosystem
  - Aware of their own partnership portfolio
  - Unaware of latteral ties in the ecosystem

- Most actors indicate to be **selective in partnering**, selection based on **technological complementarity**

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Discussion and Validation

- **90%** of respondents indicated partner listings compiled for their company were **accurate and complete**

- Incomplete listings due to **reliance on proprietary data** or **no access to partner listings**

- CrunchBase and news feeds as additional sources to **mitigate** reliance on proprietary sources

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Conclusions and Future Research

- The Google Apps ecosystem is a **sparesely connected hub-and-spoke network** in which:
    - **992** complementors on average develop **1.36 applications** (83% developers one application)
    - Complementors on average have **1.26 relationships** (73% of actors are solely connected to Google)
    - A **small number of influential actors** are found
- Increased development activity and partnering activity coincide
- **Future research directions:**
    - Inclusion of service providers for *'structural hole analysis'*: Niche detection for service providers in the ecosystem
    - Longitudinal studies to study ecosystem dynamics
    - Comparison of proprietary platform ecosystems to uncover influence of platform type, firm characteristics and orchestration on ecosystems
    - Towards automation of ecosystem analysis

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