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A Systems Approach to E-Government Cloud Sustainability

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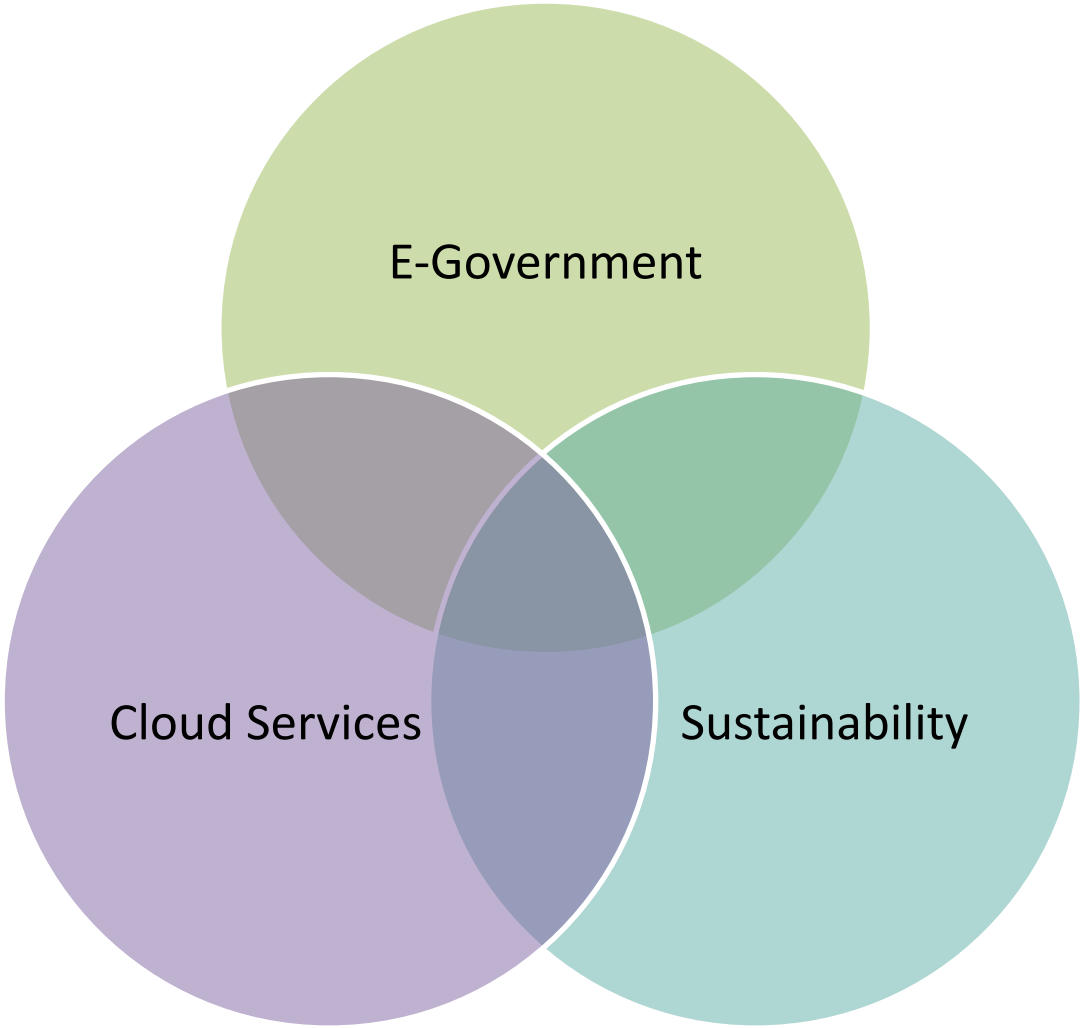
Presenter Bio

Geoffrey Lichtenheim is an experienced engineering leader and researcher with over twenty-five years of professional experience. Geoff has worked for technology companies such as Citrix, and VMware, as well as FinServ companies such as UBS. He is currently a doctoral candidate at Stevens Institute of Technology with a focus in Socio-Technical Systems in the School of Systems & Enterprises. Geoff holds an MSIS from Stevens, as well as many industry certifications including Certified Scrum Master (CSM), CISSP, ITILv3, VCP - VMware Cloud, and Microsoft Azure Foundation.

Research Focus



Problem Statement

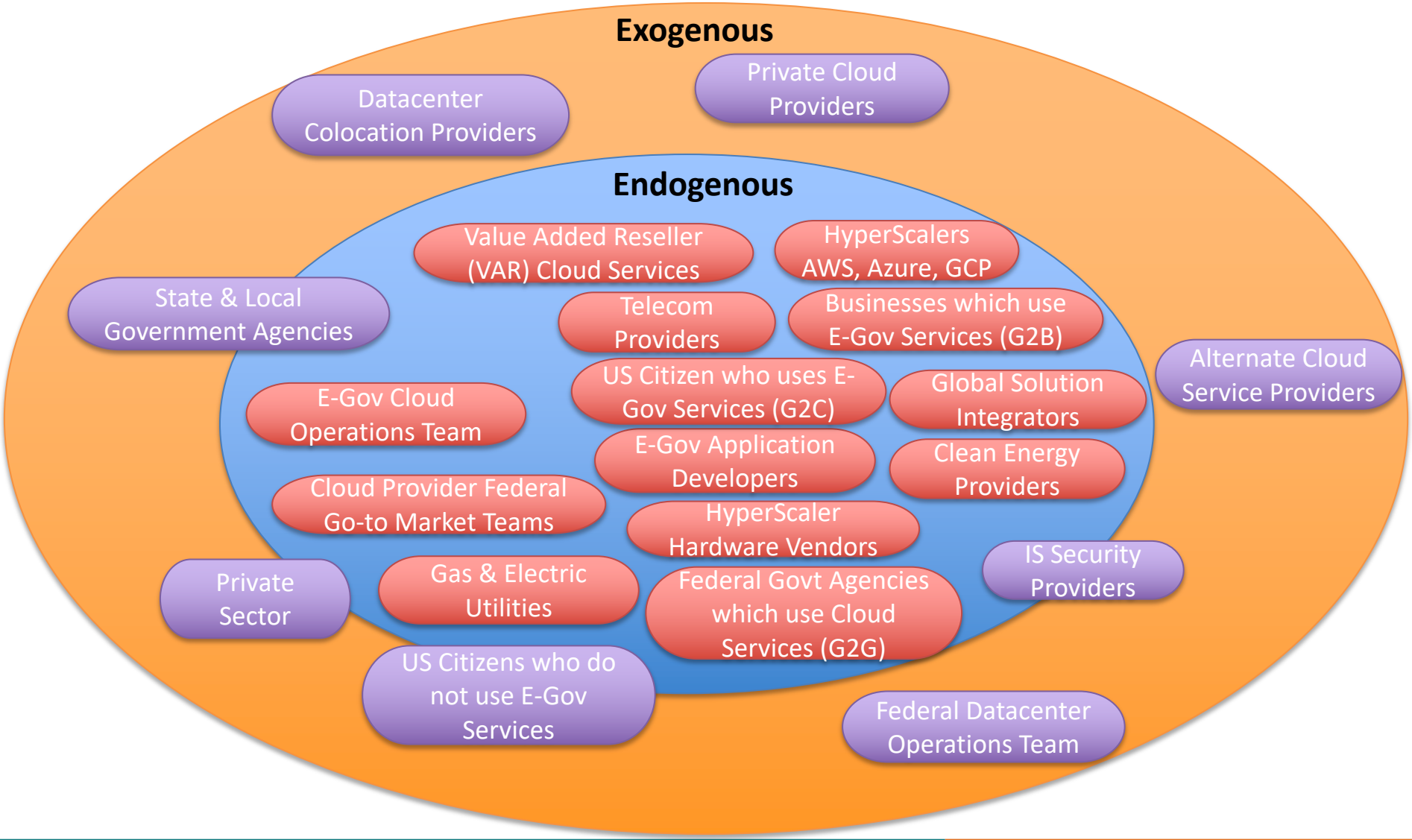
The rate of US Federal IT spend on public cloud services has been growing exponentially over the past 10 years. Over 10% of the US Federal Government's IT budget is now used for public cloud services which are consumed in a "utility" model. Unlike capital expenses for on-premises datacenter hardware and software, the cost of public cloud services are difficult to quantify and predict. Macroeconomic volatility presents enhanced socioeconomic risk, this study proposes a strategy to ensure diversification through governance.

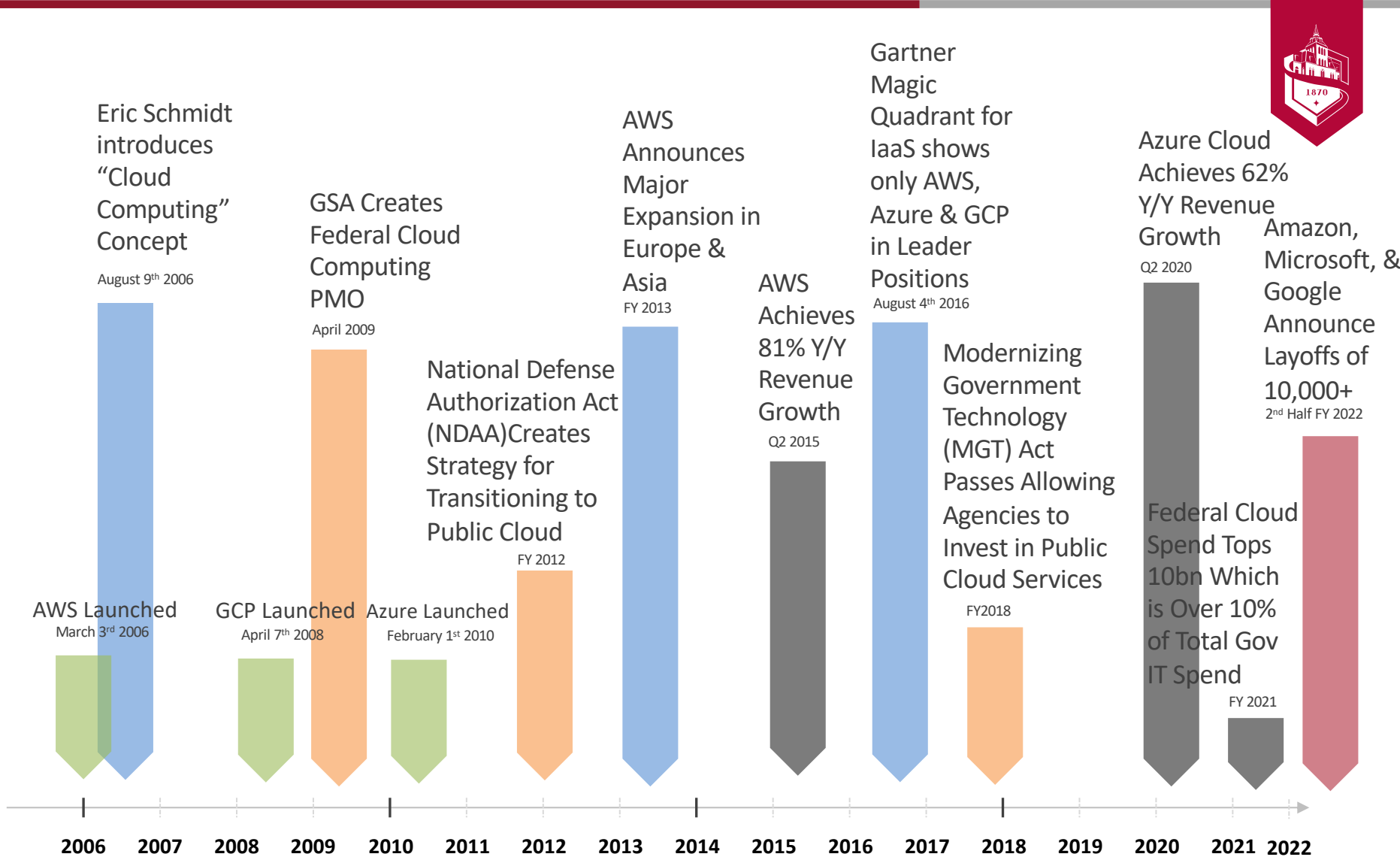
The goal of this research is to use systems thinking and systems dynamics methods to establish boundaries of the system under analysis, examine the causal relationships of system elements, and propose principles of cloud sustainability. The motivation of this study is to contribute to the body of knowledge towards a significant and timely problem which is beginning to present itself and may have far reaching economic consequences if not expeditiously addressed.

Research Questions

I. What are the endogenous and exogenous boundaries for modeling E-Government consumption of public cloud computing resources?
II. Using a causal structure, how do you model Federal US Government IT consumption of public cloud services?
III. What are the factors that may limit the long-term growth of cloud service utilization in E-Government?
IV. How can you represent the complex interconnections between E-government services and its largest public cloud providers
V. What principles could be adopted by the Federal government to ensure sustainability of its public cloud service utilization

Stakeholder Interest Map




Eric Schmidt introduces "Cloud Computing" Concept
August 9th 2006
GSA Creates Federal Cloud Computing PMO
April 2009
National Defense Authorization Act (NDAA)Creates Strategy for Transitioning to Public Cloud
FY 2012
AWS Announces Major Expansion in Europe & Asia
FY 2013
AWS Achieves 81% Y/Y Revenue Growth
Q2 2015
Gartner Magic Quadrant for IaaS shows only AWS, Azure & GCP in Leader Positions
August 4th 2016
Modernizing Government Technology (MGT) Act Passes Allowing Agencies to Invest in Public Cloud Services
FY2018
Azure Cloud Achieves 62% Y/Y Revenue Growth
Q2 2020
Federal Cloud Spend Tops 10bn Which is Over 10% of Total Gov IT Spend
FY 2021
Amazon, Microsoft, & Google Announce Layoffs of 10,000+
2nd Half FY 2022
AWS Launched
March 3rd 2006
GCP Launched
April 7th 2008
Azure Launched
February 1st 2010
2006
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Hyperscaler Market Metrics

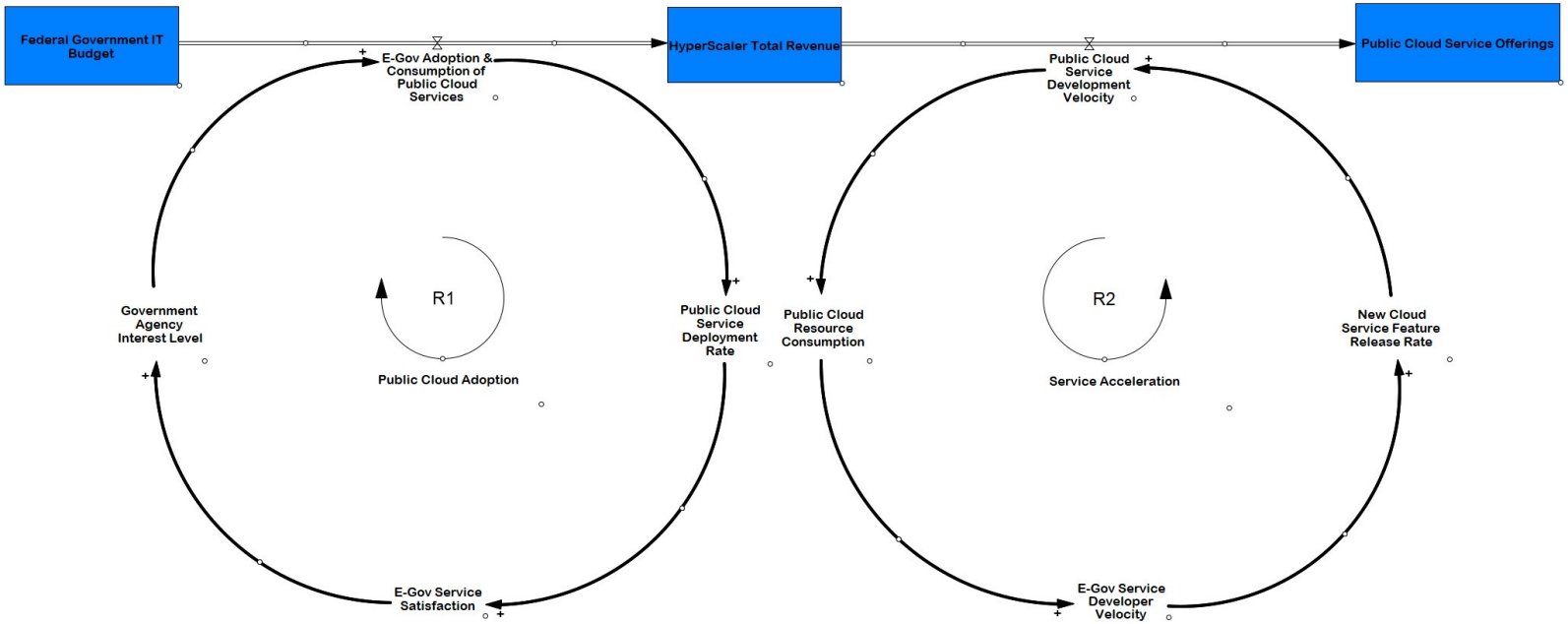
AMZN

MSFT

GOOG

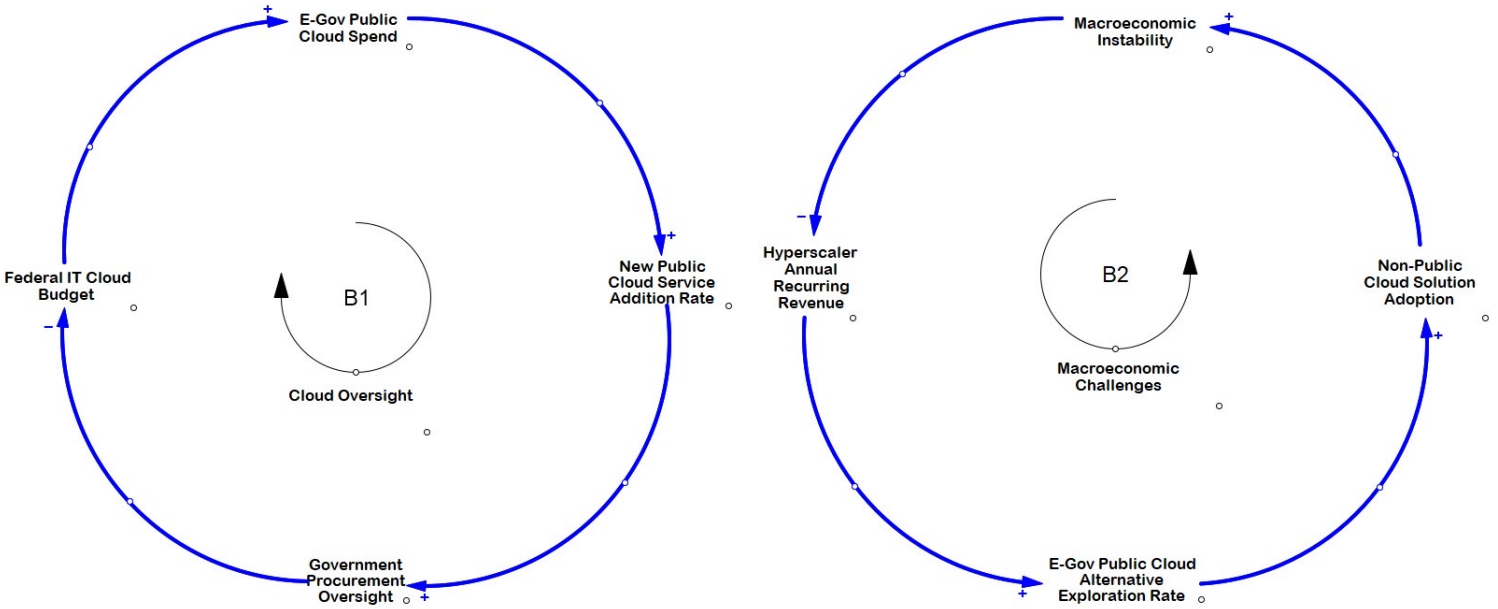
[21] – Yahoo Finance

Reinforcing Behavior



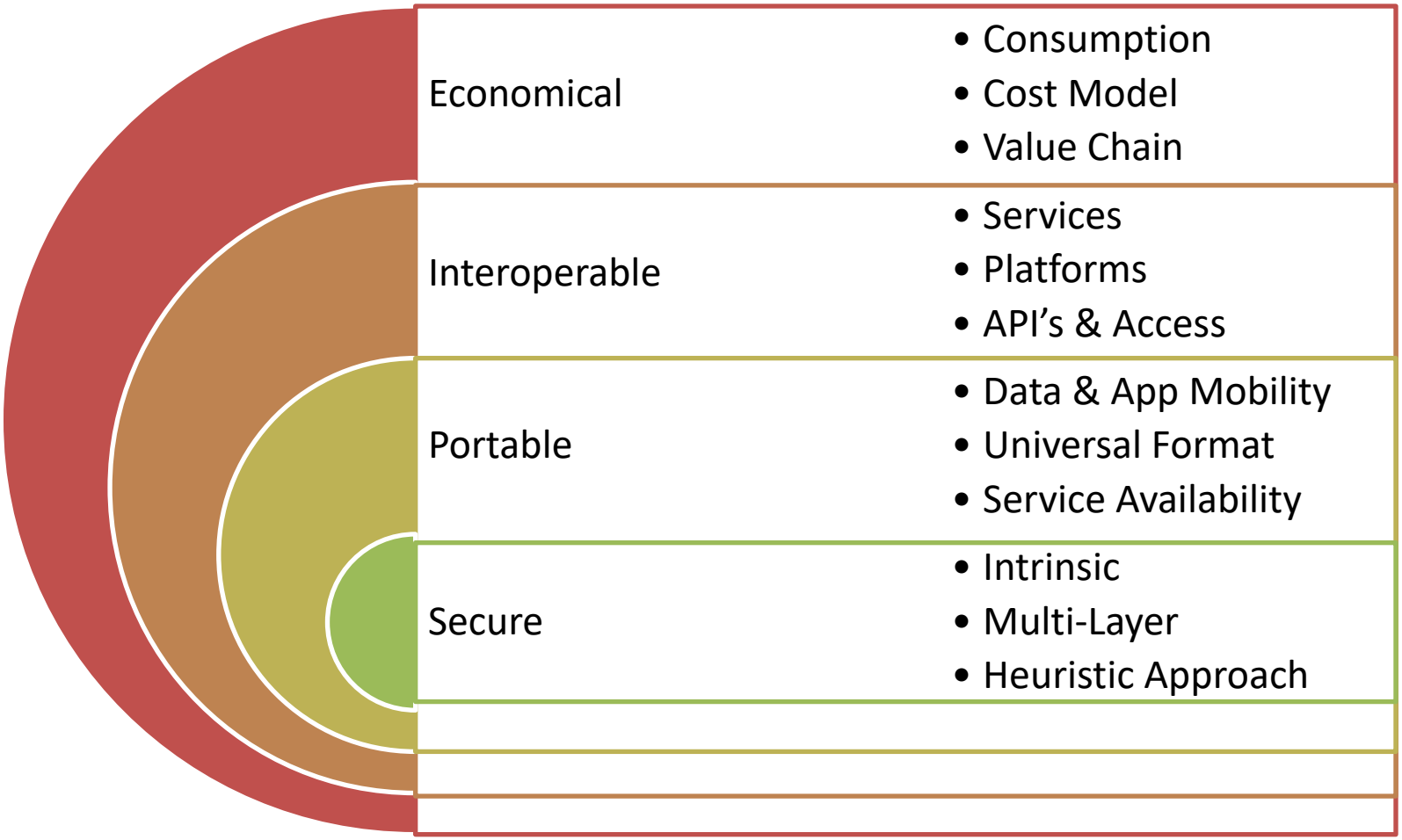
- Stocks of Federal IT budget, Hyperscaler revenue, as well as public cloud services are represented. The valves represent consumption of public cloud services for E-gov, and velocity towards the development of new cloud services.
- The first causal loop R1 shows reinforcing behavior as consumption of public cloud services enhance deployments and positively relate to end user satisfaction. As positive feedback is gathered and shared, other government agencies become interested in similar services leading to additional service requests.
- Causal loop R2 displays the virtuous cycle of how service provider development speed increases cloud resource consumption by E-government.
- Revenue to Cloud Service Providers from the Federal government grows as other agencies participate and engage in digital transformation initiatives.

Balancing Behavior



- An increase in public cloud spend has a positive correlation to the new service on-boarding rate. This increase in both services and spend triggers procurement oversight activity.
- Oversight from the Federal acquisition service (FAS) slows procurement activity and therefore lowers the budget burndown rate.
- Uncertainty in the macroeconomic environment has a negative polarity to Hyperscaler revenue. This instability increases the exploration of alternatives to reduce risk.

Cloud Diversity Principles



Conclusion

Hypotheses

- Public cloud computing will continue reinforcing momentum in the public sector, leading to higher levels of E-Government cloud service utilization and respective spend.
- The ease of access and seemingly unlimited cloud resource pool may lead to future budgetary constraints and adversely affect E-Government projects.
- Leveraging principles of cloud diversity, government entities can develop sustainable strategies when making determinations around public cloud solutions.

Limitations

- Quantitative portion of analysis is limited and incomplete.
- Data set used for analysis is rudimentary, a more robust source is needed.

Future Enhancements

- Build out of complete quantitative dynamic model with graph output.
- Obtain source of relevant data and metrics (cloud platform usage, services delivered etc).

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