

Modeling Market Penetration of Dell's SupportAssist

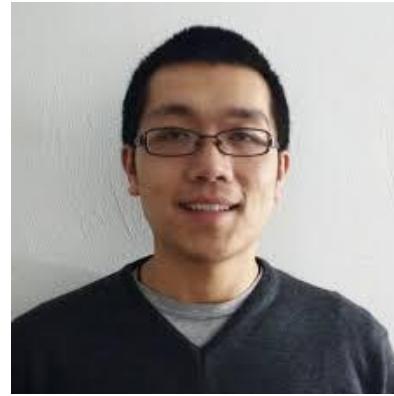
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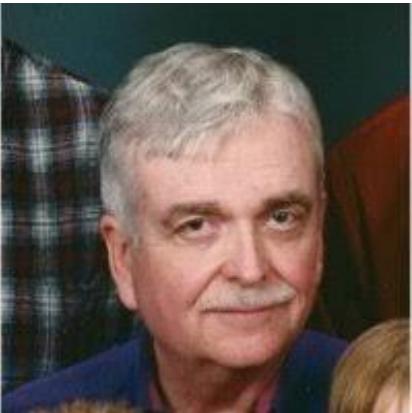
Note: The presentation is based on publicly available or synthetic data and will not cover confidential insights.

Two year project, close collaboration between Dell and Virginia Tech, ISE



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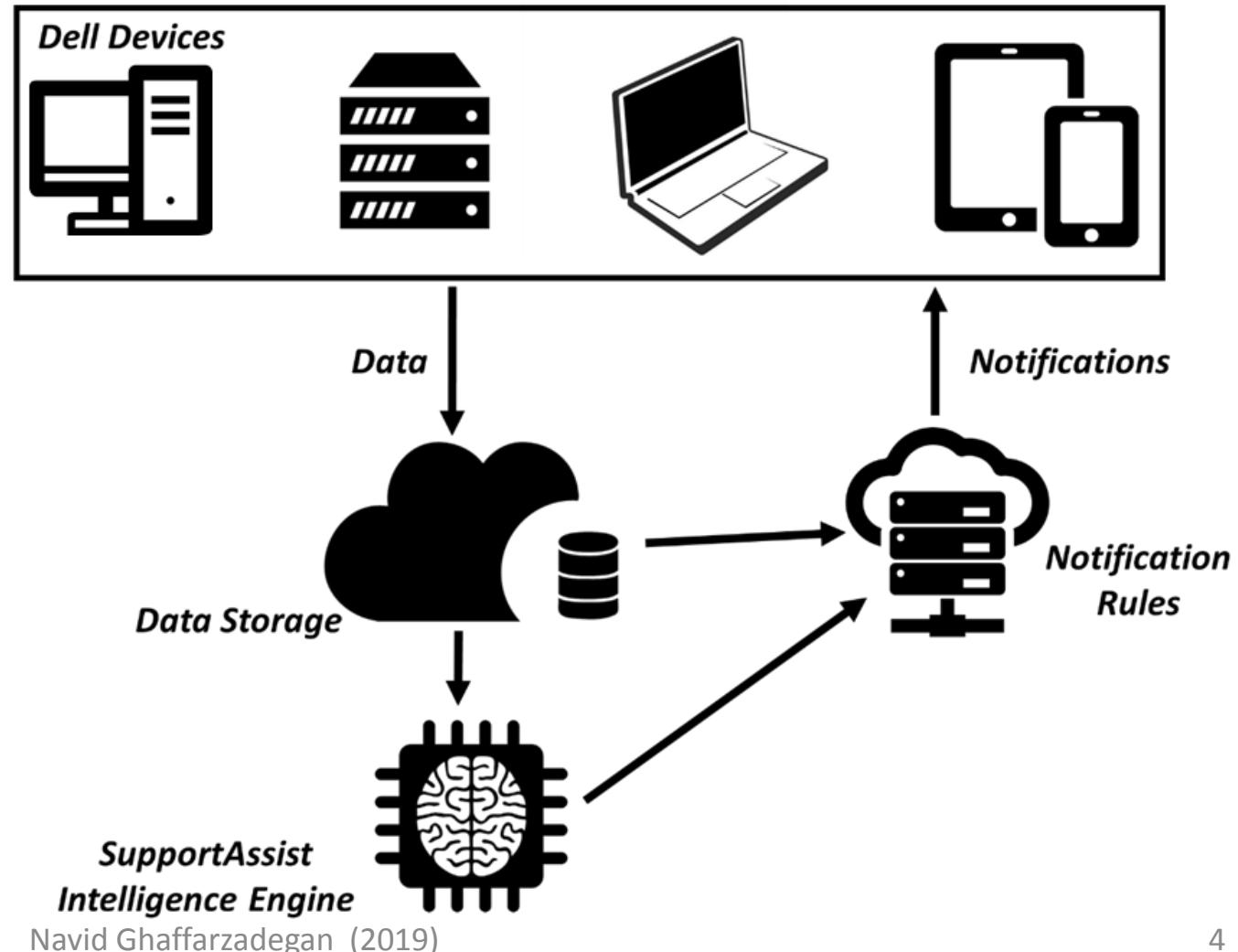
Dell and the future of IT

- Dell Inc., one of the largest technology companies in the world with 138,000 employees.
- A new trends in IT:
 - Stress on service; Lower profit margin of production.
- The move from products to services (Oliva & Kallenberg 2003) and evolving smart services (Larson 2016).
- Dell as a leader in after-sales service.
- Paradigm shifts in services.



SupportAssist: Dell's solution for aftersales service

- SupportAssist: a proactive maintenance system utilizing Machine Learning and Big Data.
- For a wide range of Dell devices.
- Continuously stores data from millions of devices
- Predicts failures before they happen.
- Notifies/fixes the problems.



Dilemma

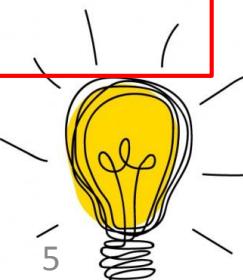
- Not yet achieved the level of adoption anticipated.
- Adoption rate is not increasing in all market segments.

Research question: why is this happening, and what can be done to make the *SupportAssist* program more **successful** in the **market**.

Idea

To develop **SupportAssist Adoption Model (SAAM)** to use as a **decision support system** and analyze effects of different marketing/design strategies.

- Building on Bass's (1969) model of market diffusion, and on previous SD works (especially OnStar (Barabba et al. 2002)).



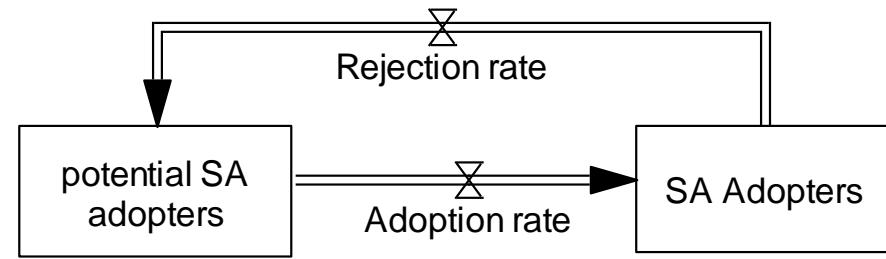
Methodology

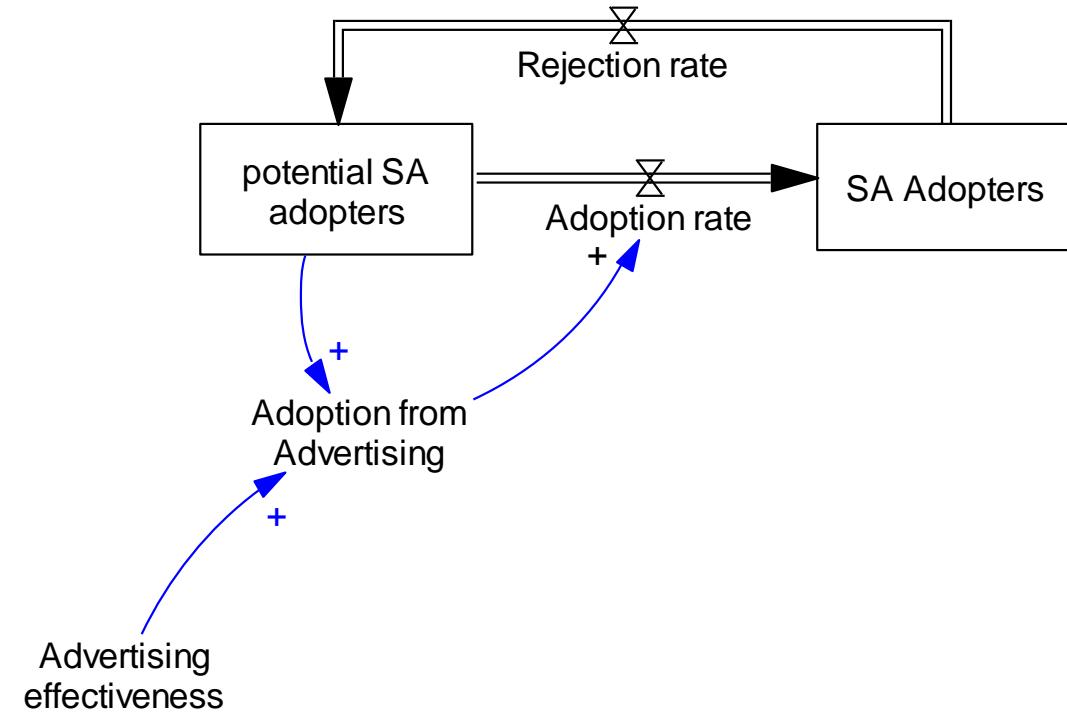
- Data:
 - Interview: About 20 interviews with different managers, engineers at Dell.
 - Archival data: Review of 3 years of weekly reports on SupportAssist, and its performance; Review of customer research; Review of data on websites.
 - Detailed quantitative data of market adoption.
- Method: System dynamics modeling (Sterman 2000)
 - Synergic combination with other methods (Ghaffarzadegan & Larson 2018)
 - Iterative model building: Model building → presentation (bi-weekly) → Model building.
 - Applied to many cases before (Rouwette & Ghaffarzadegan 2013)
- Market segments (device X customer type X region)
 - First focus: Adoption of SupportAssist in **Servers** of mid-size companies with **50-300 servers in US region** only (example: a university).

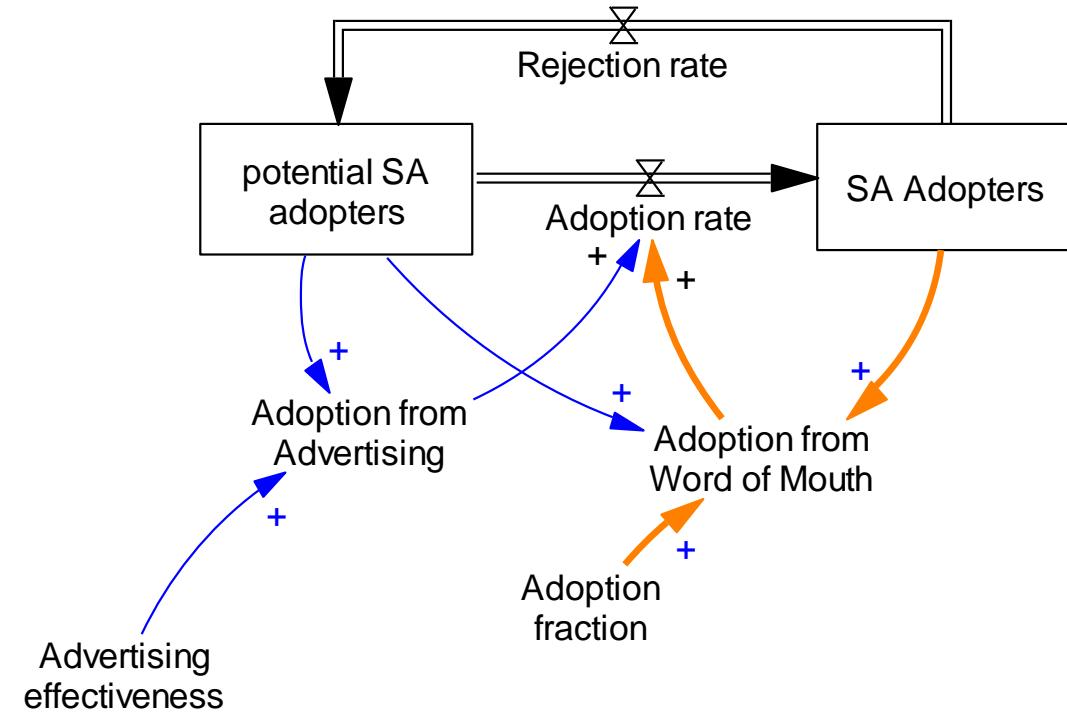
Data

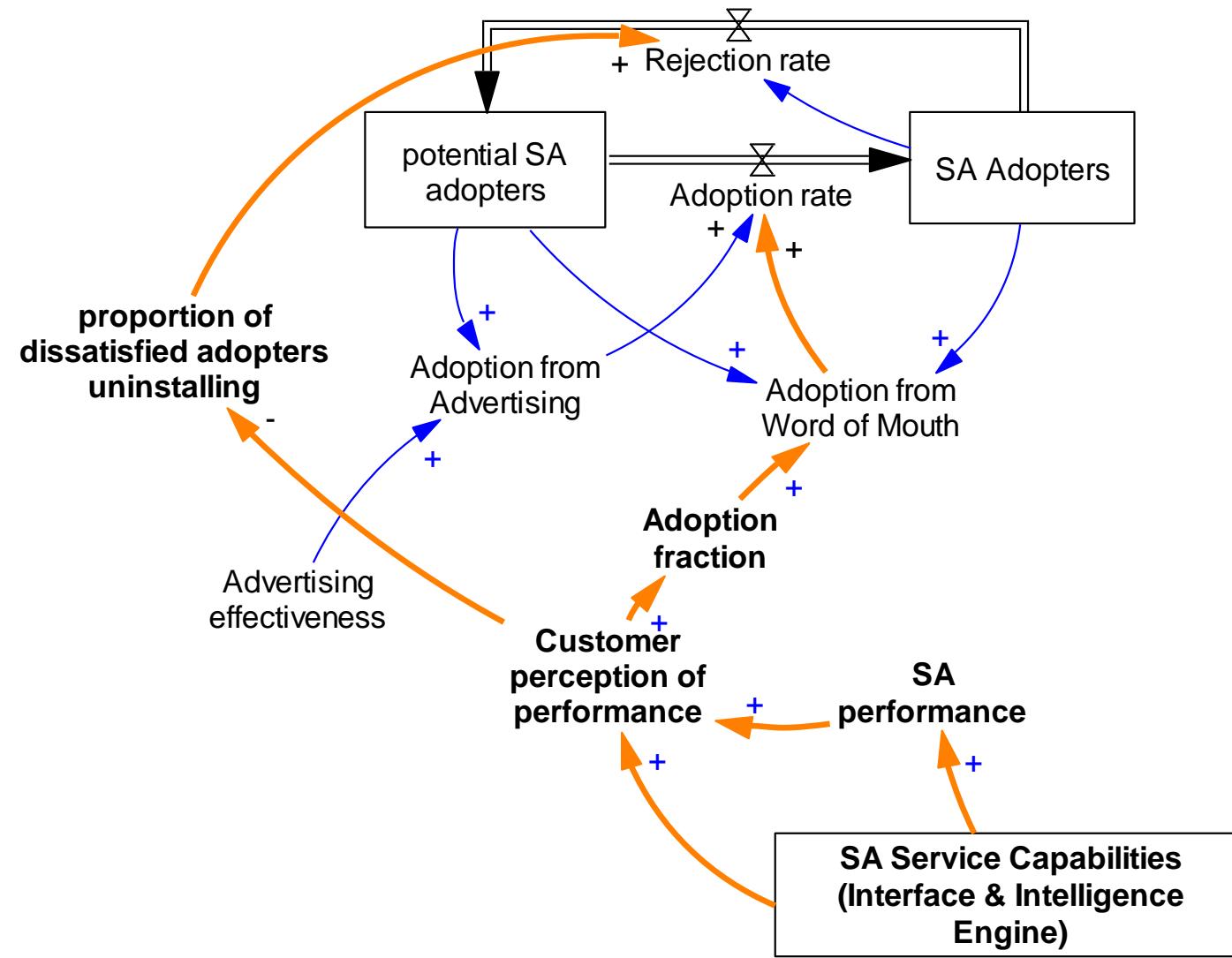
- Confidential.

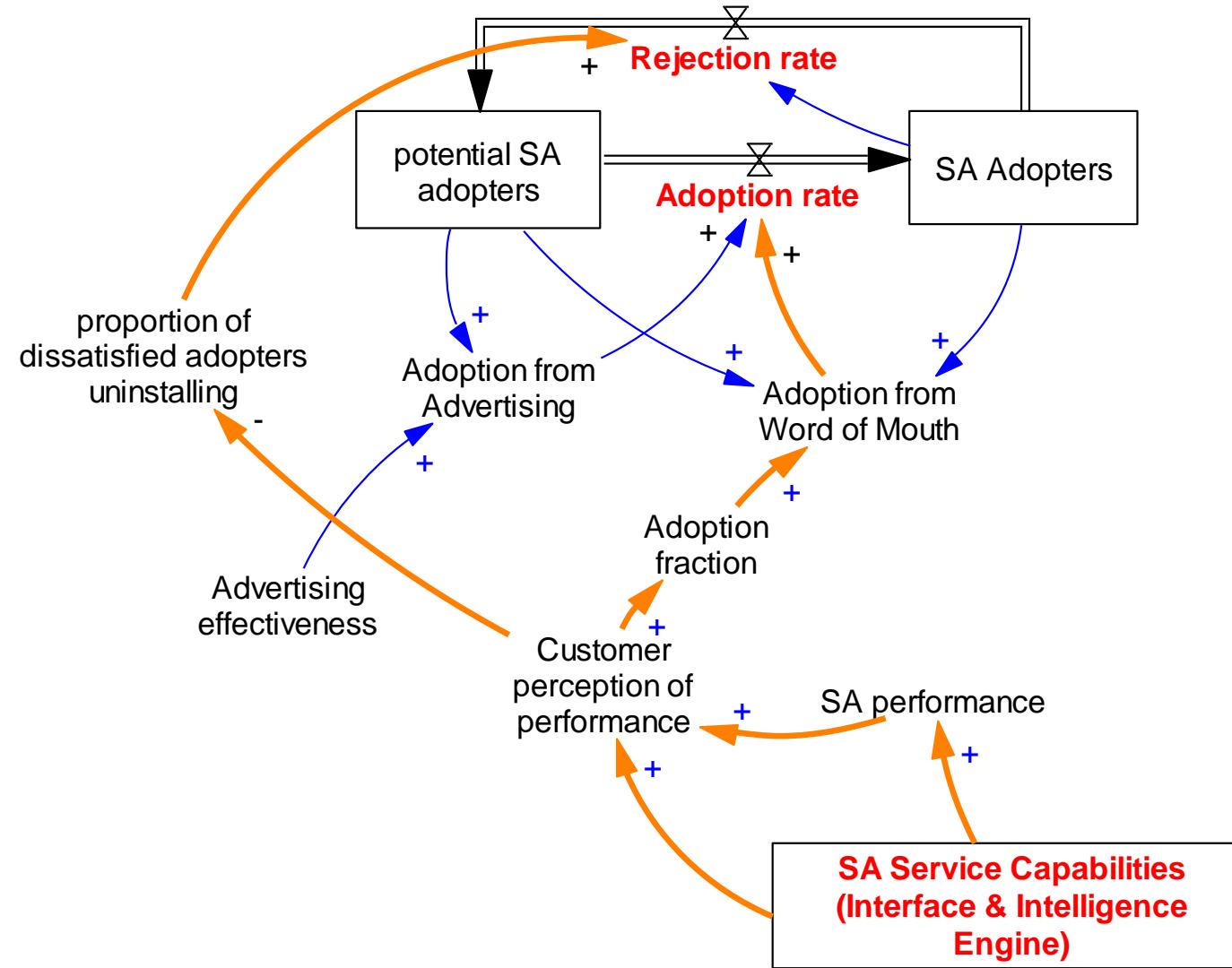
Exploring causal loops

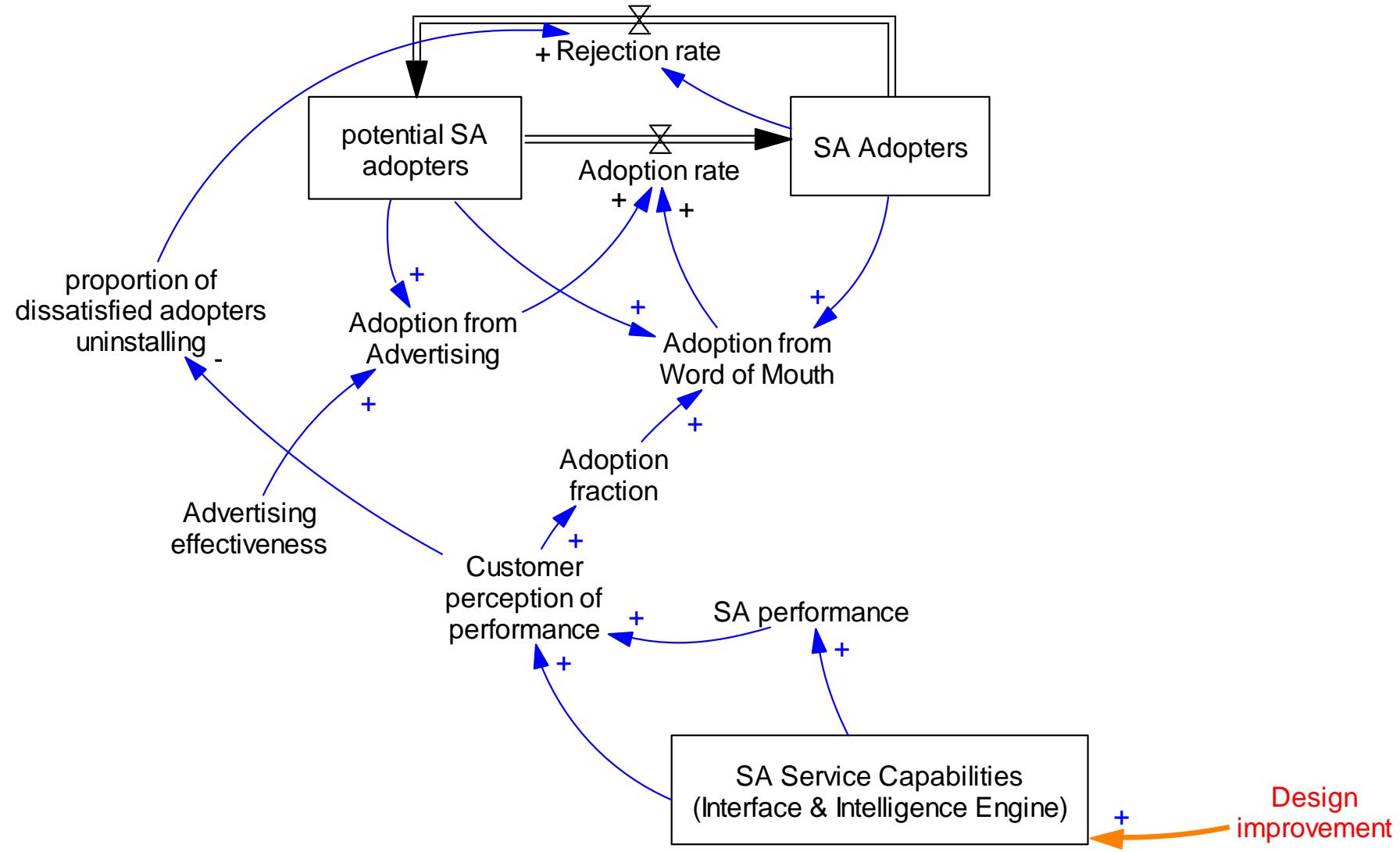


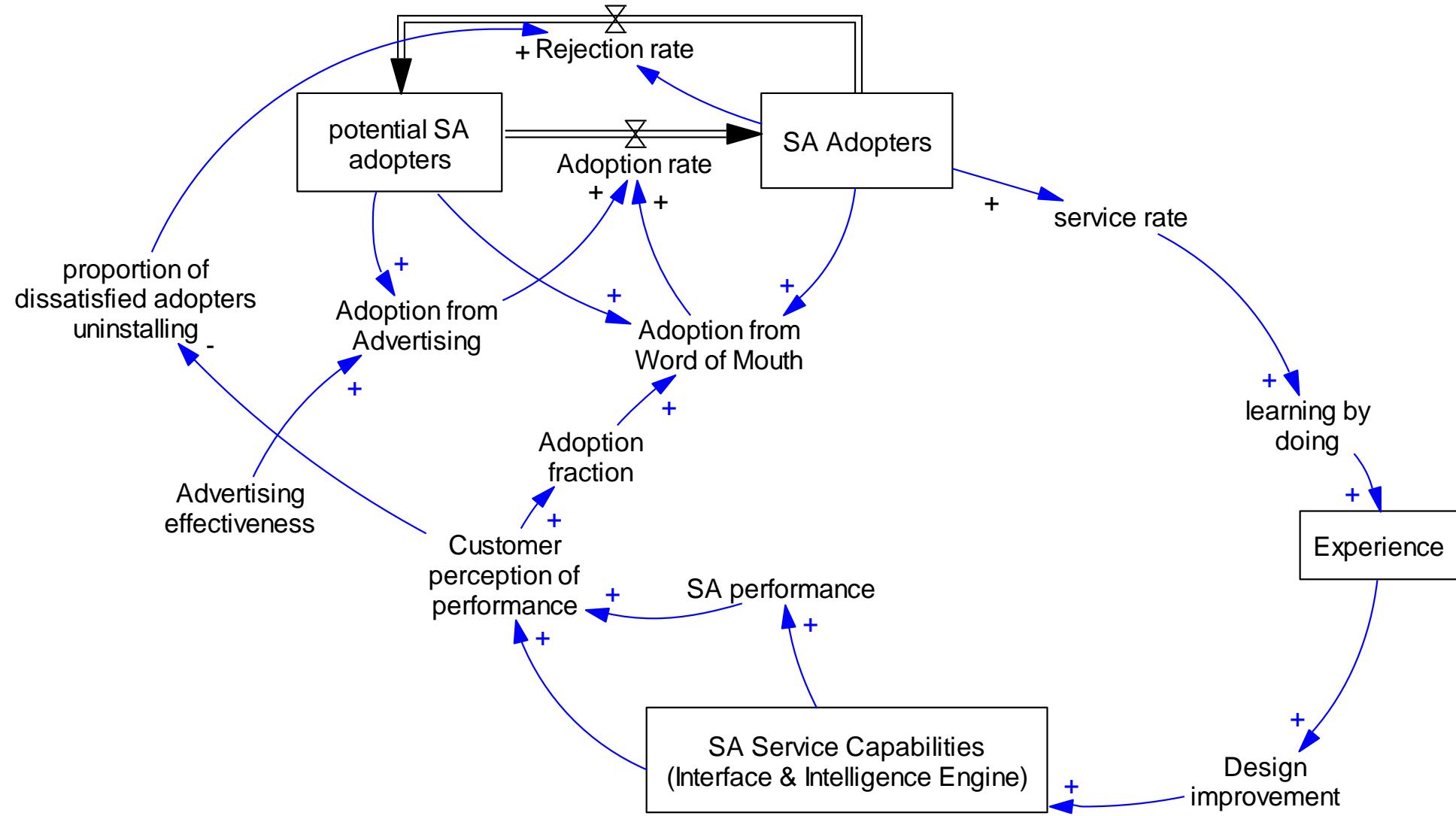


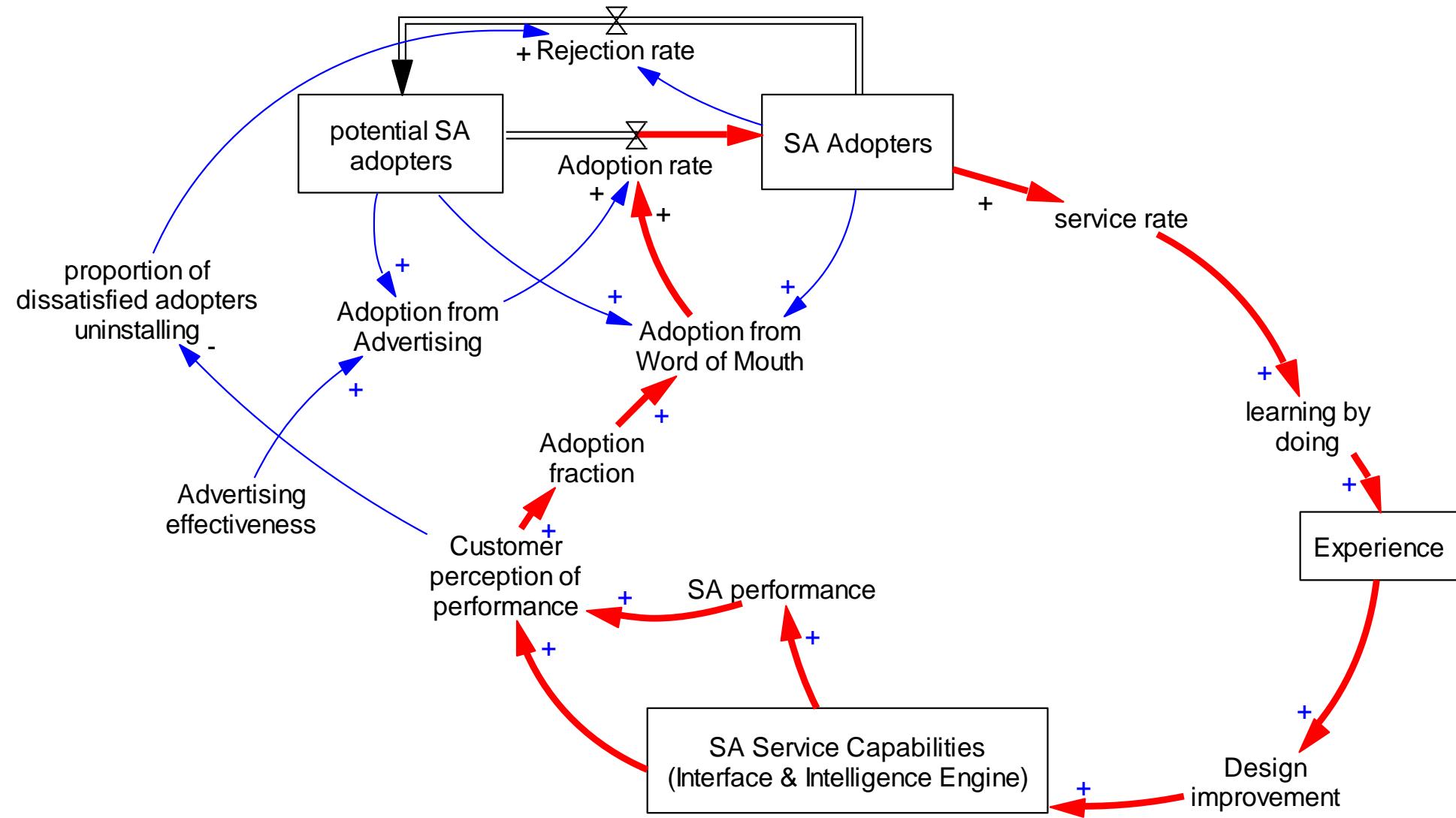


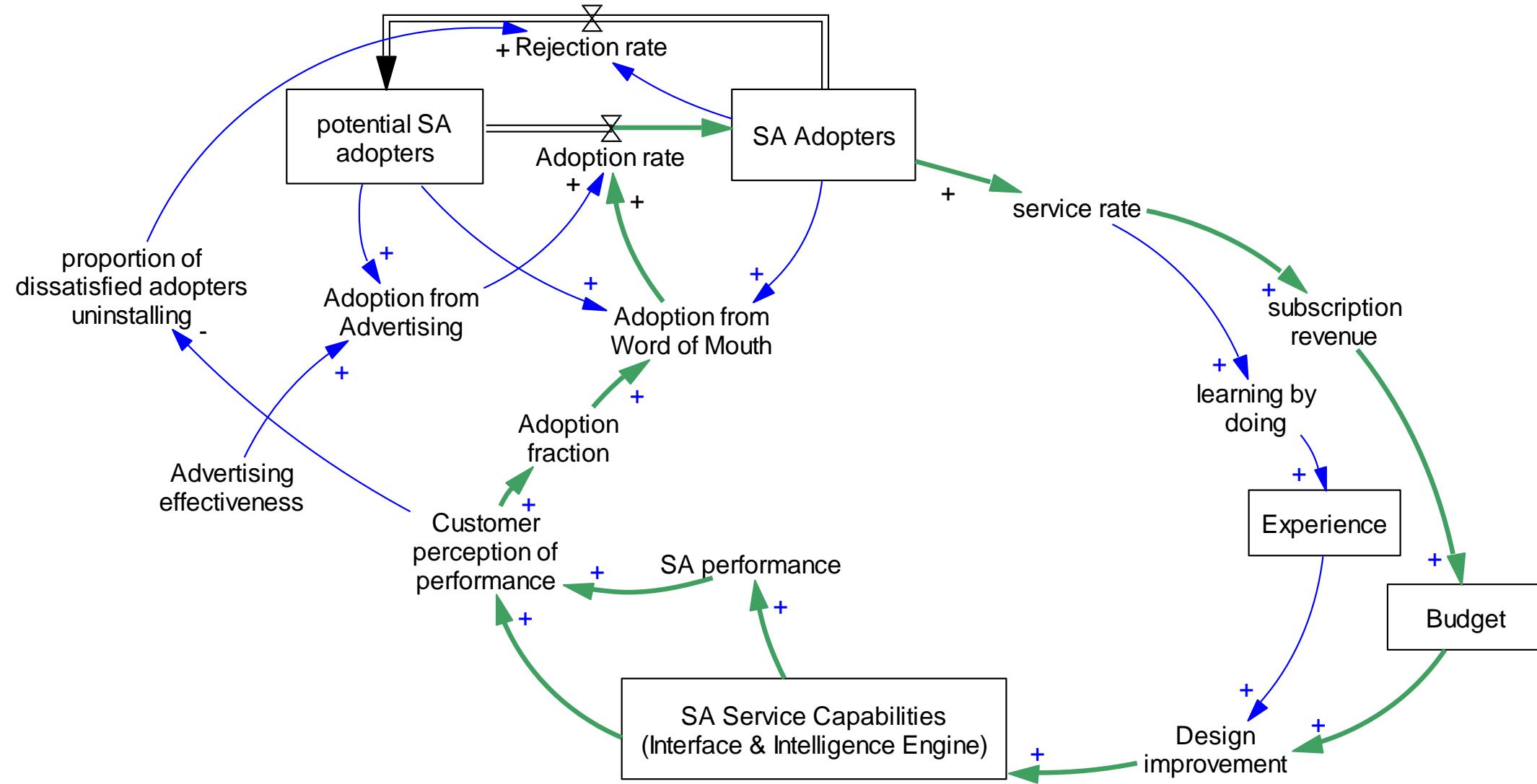


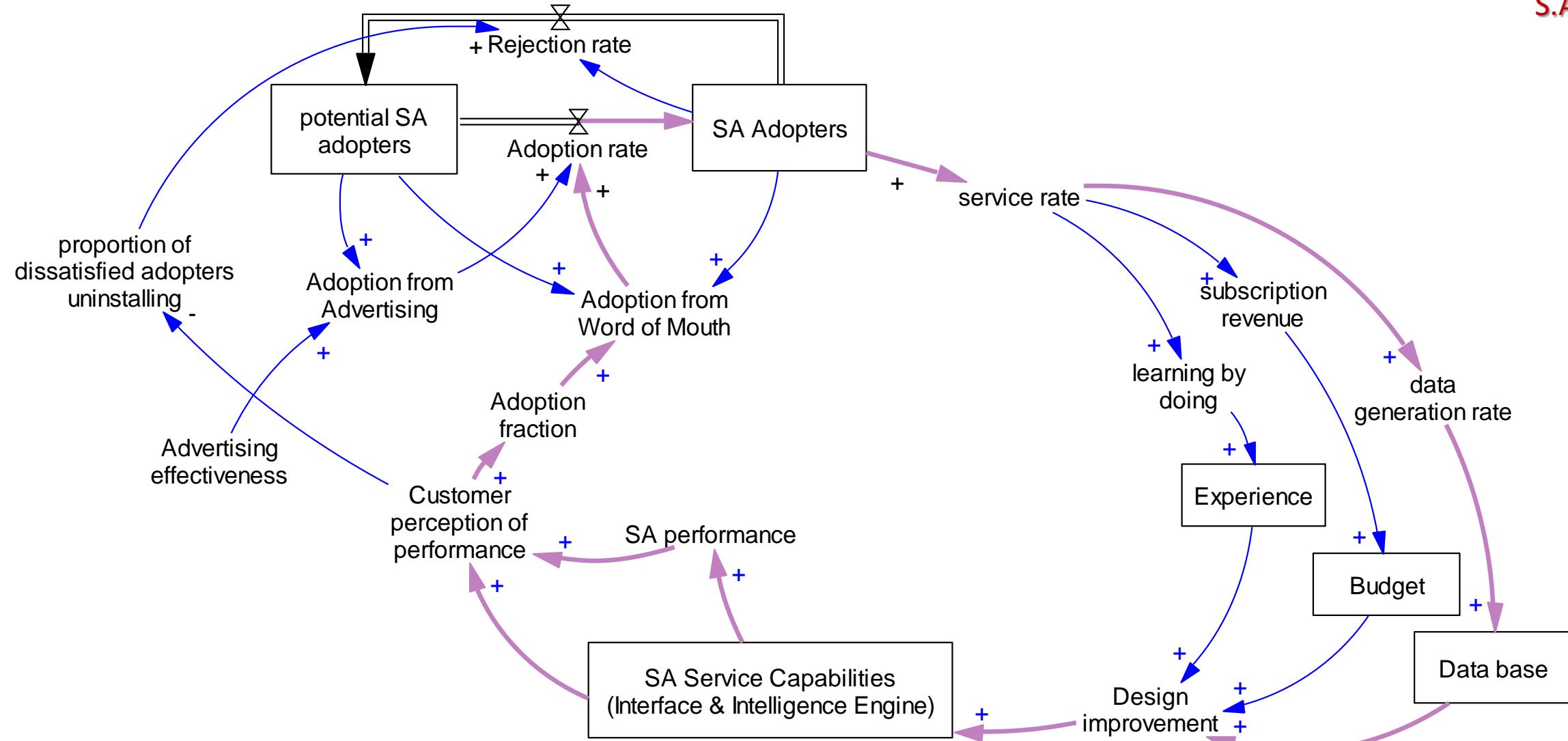


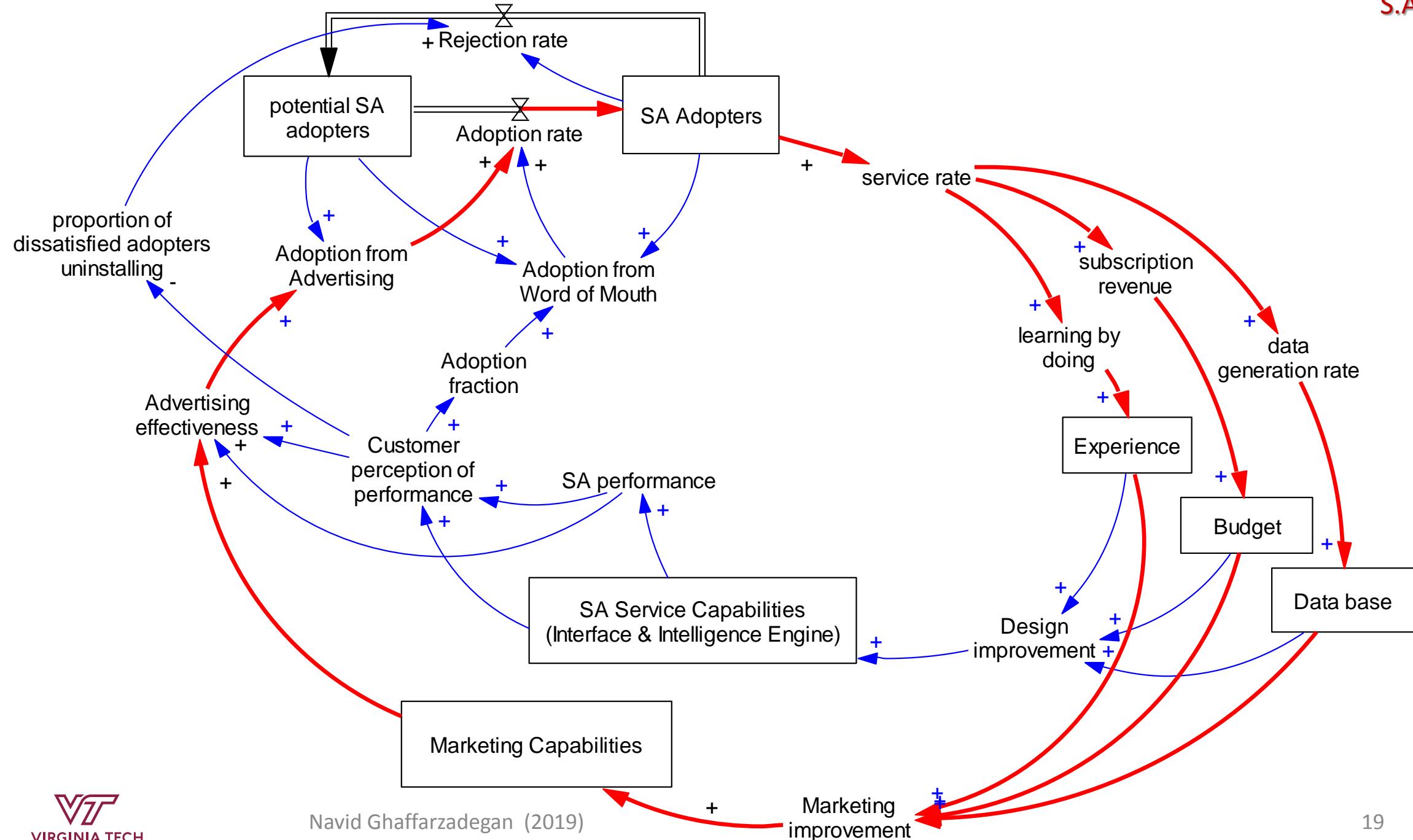


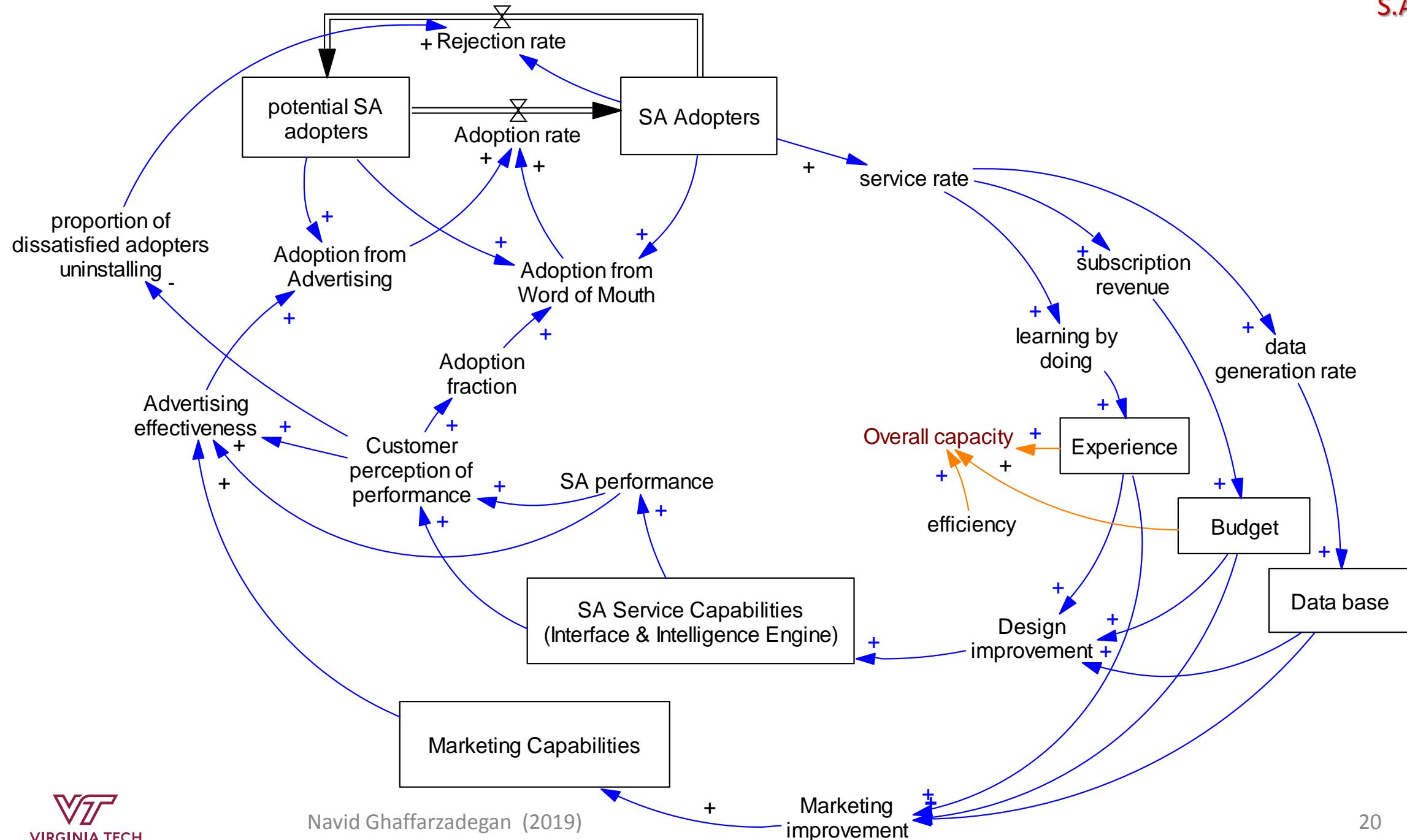


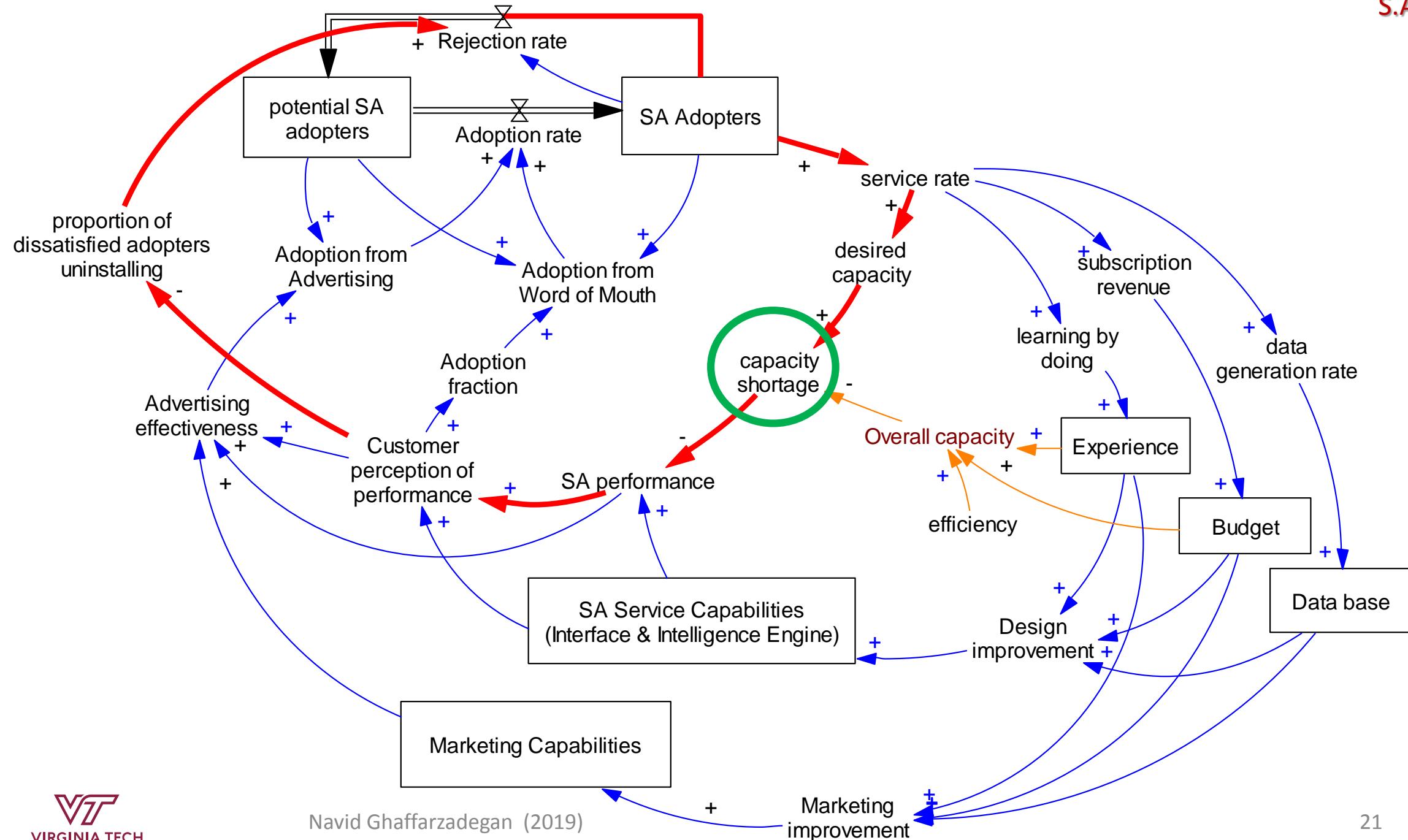


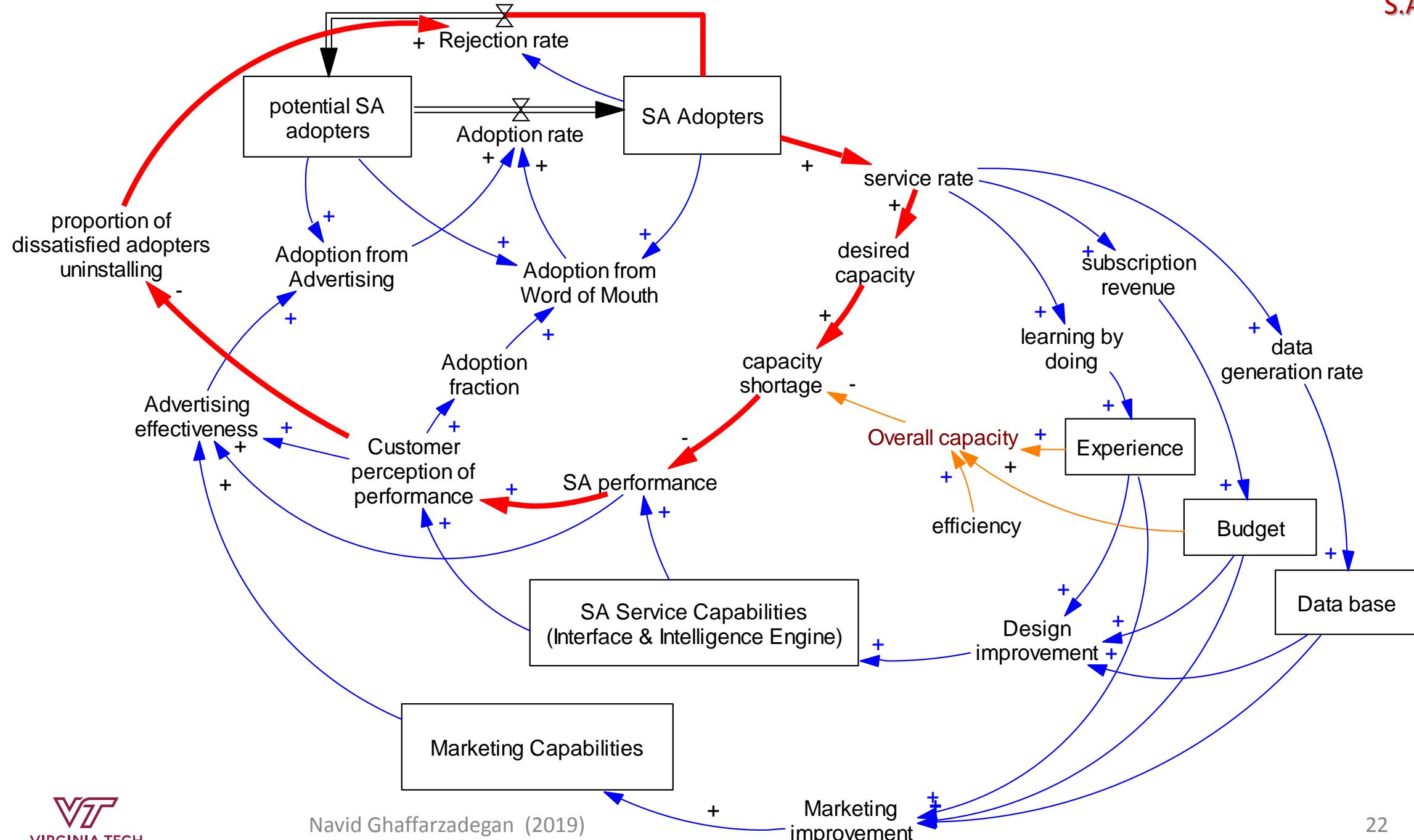


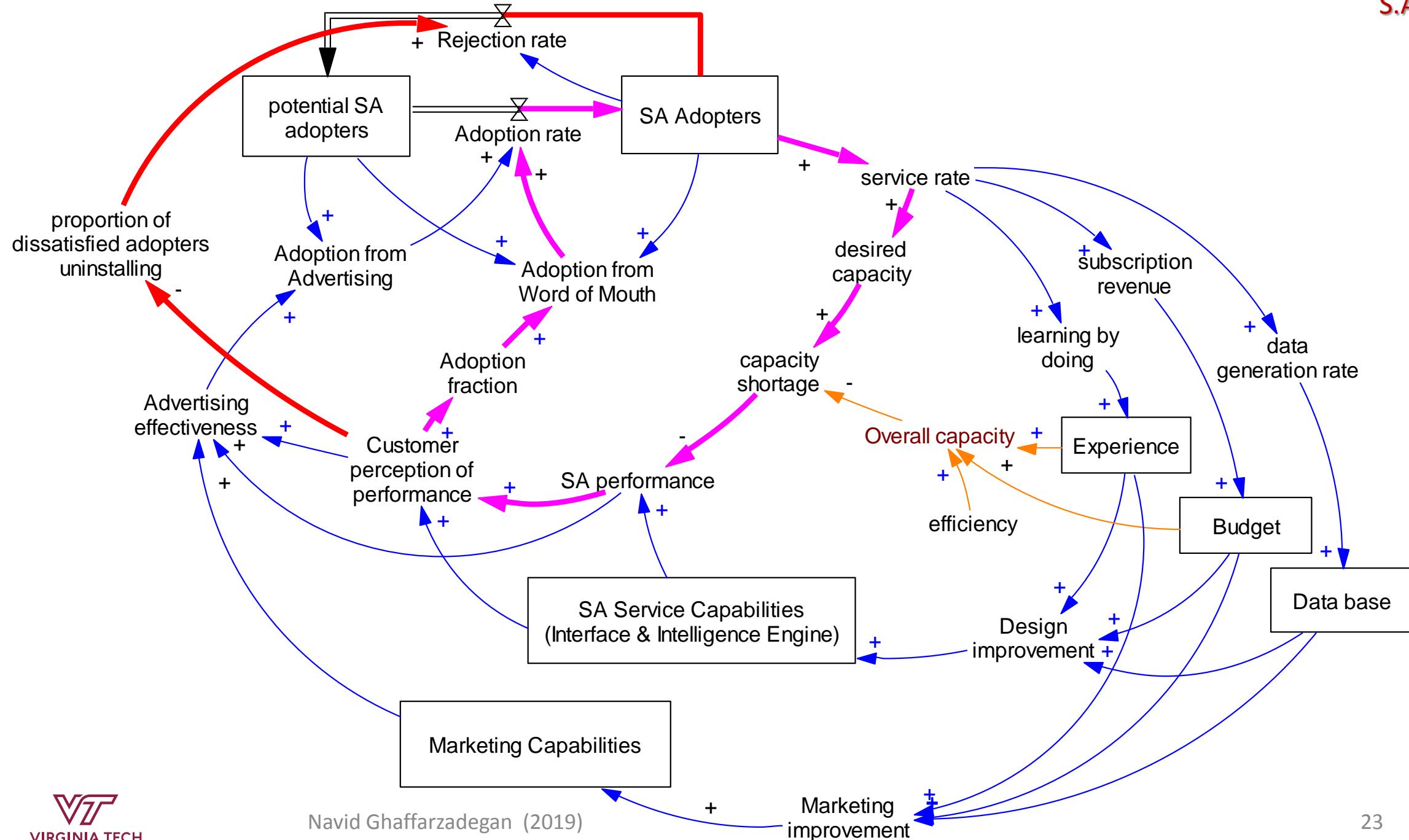


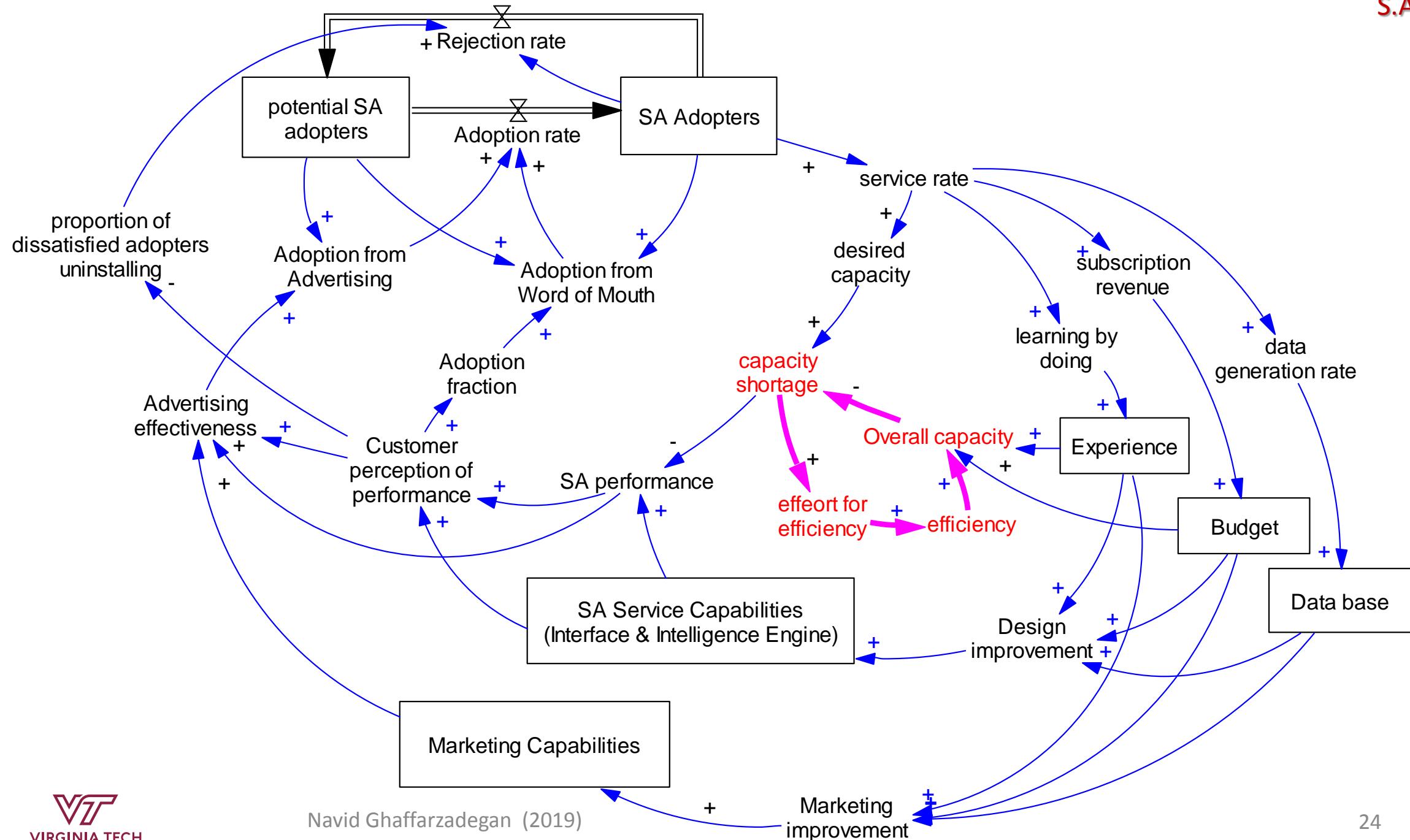


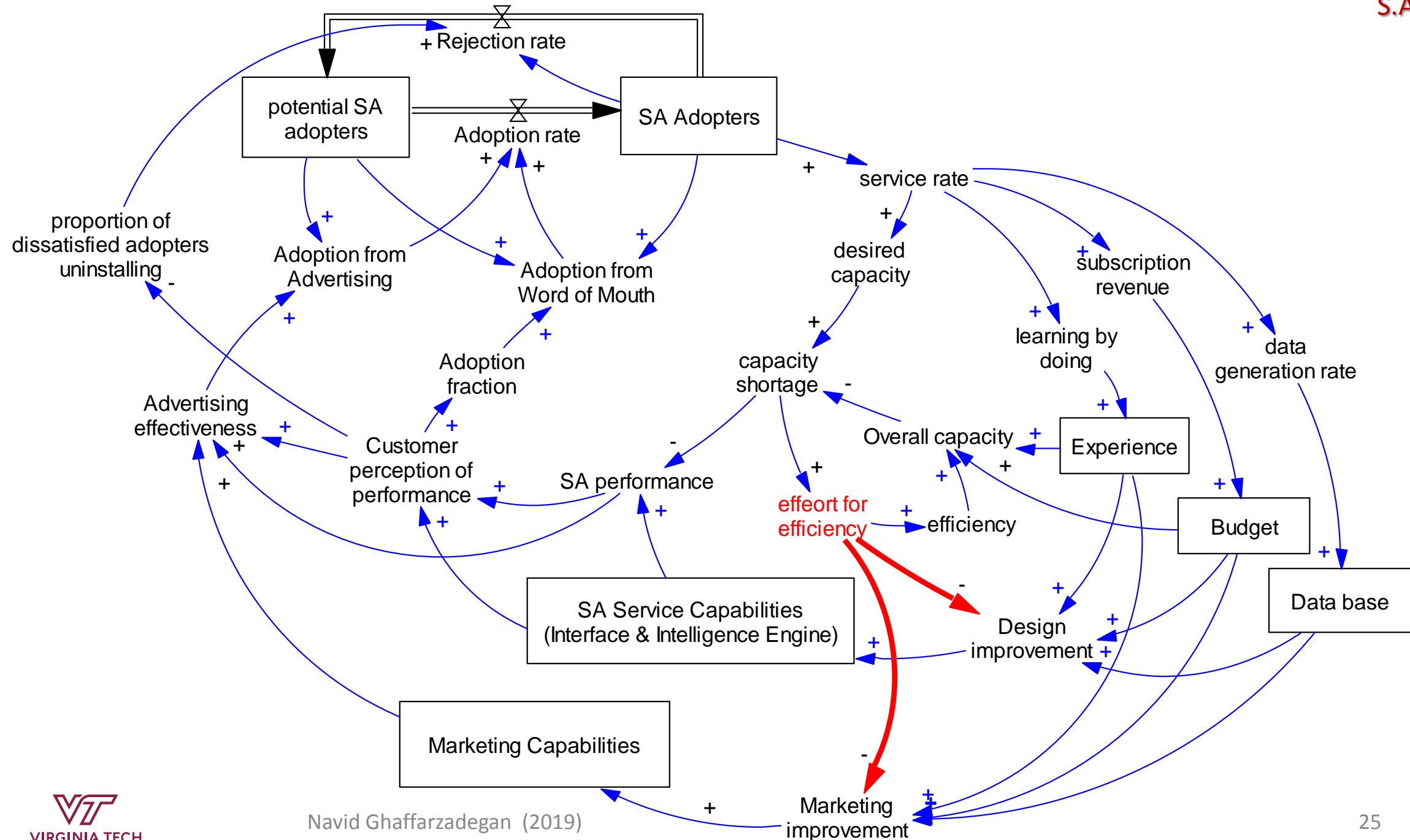


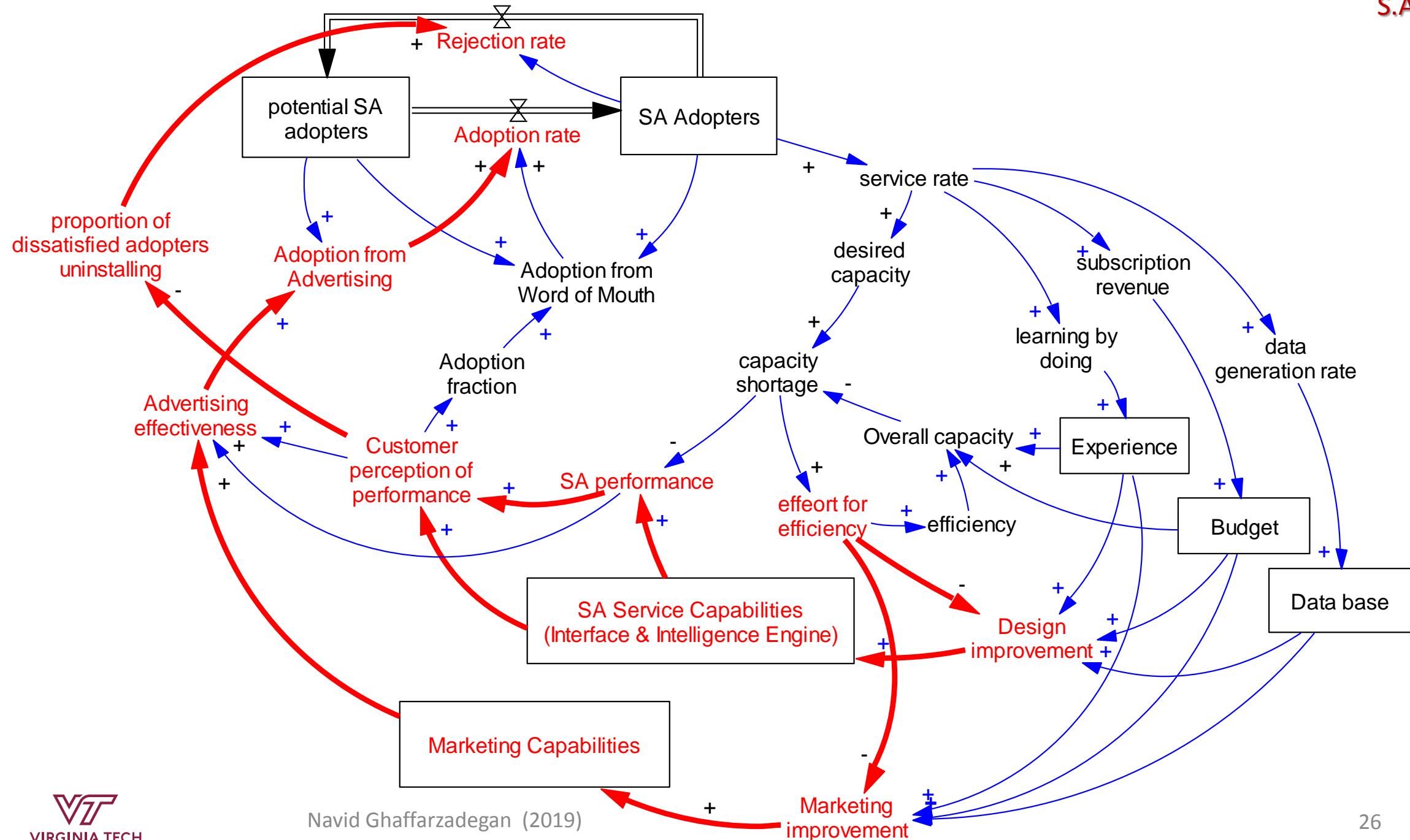


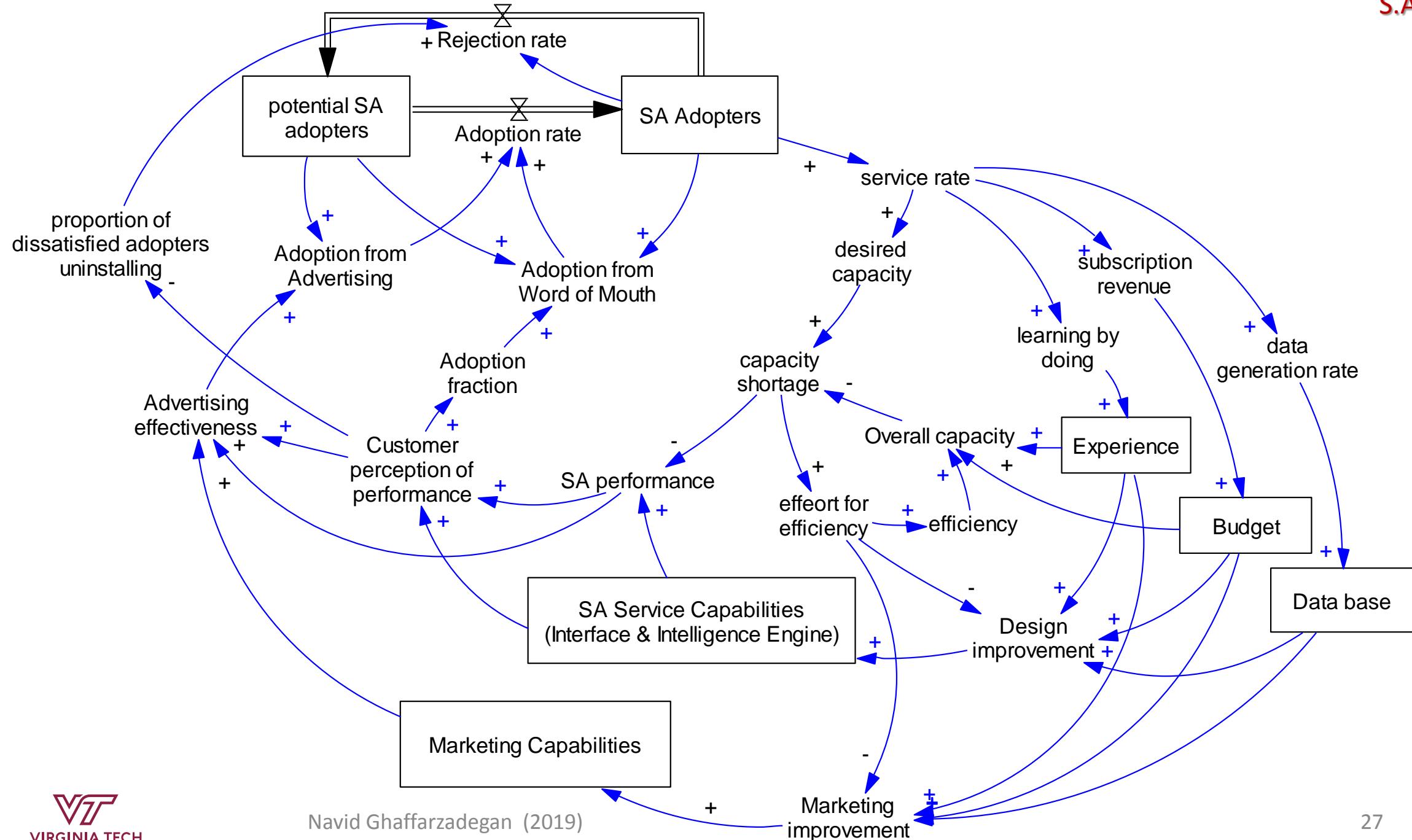


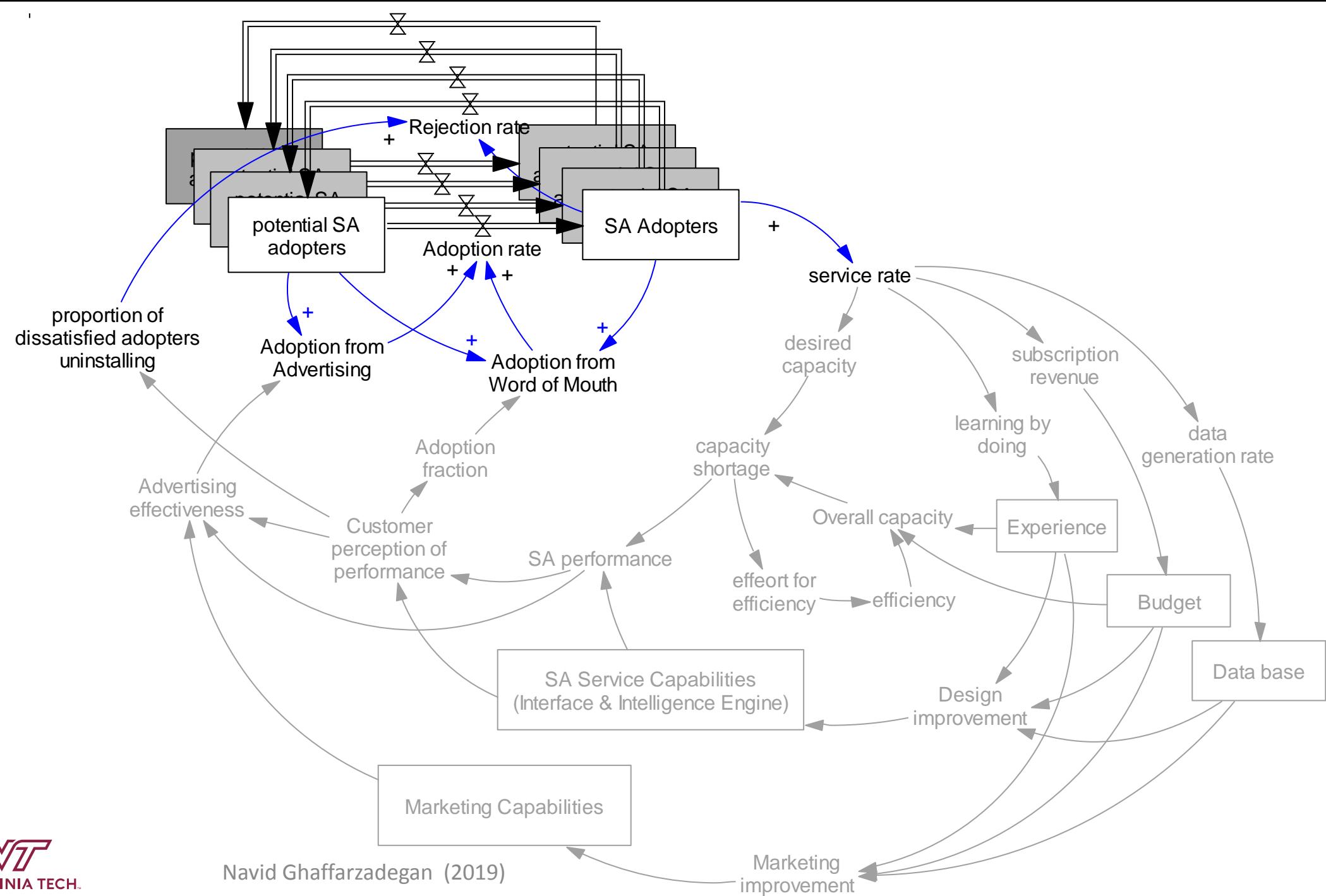












Inputs and outputs

System-level picture: Inputs and outputs

Inputs (24):

Design (8):

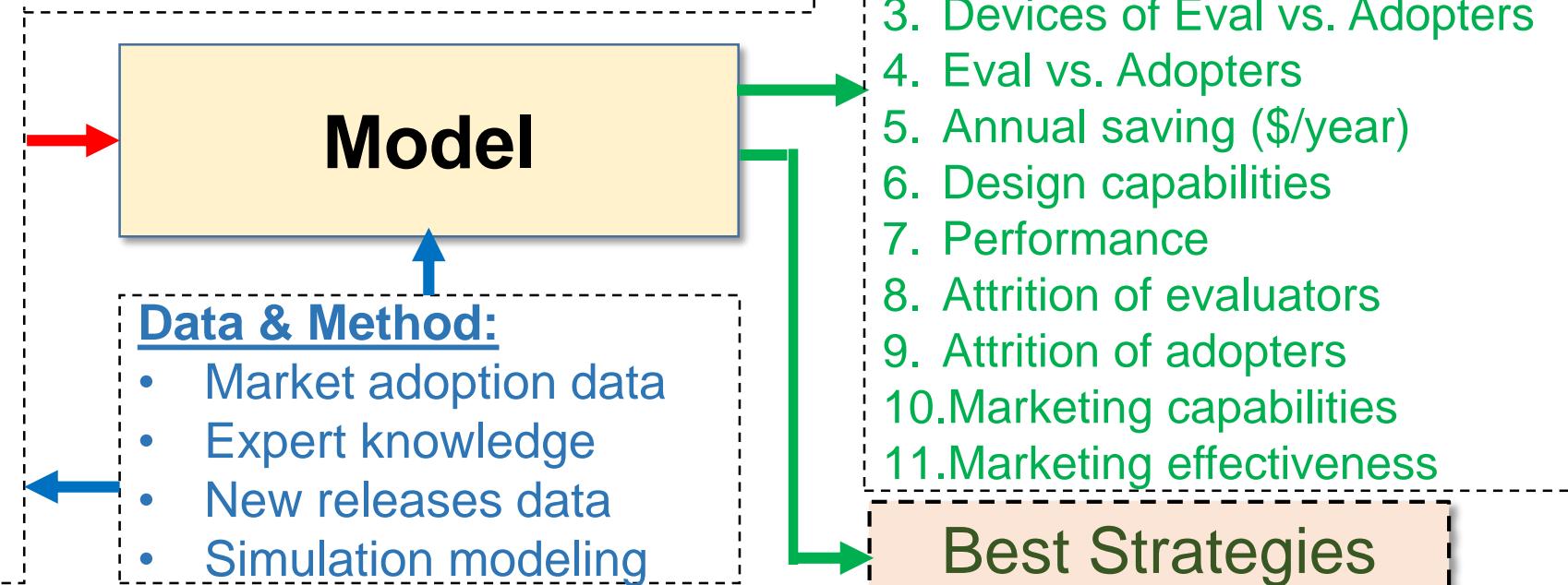
- New release (6)
 1. Switch for new release
 2. Time for new release
 3. New release criteria (4 vars)
- Value generation (2)
 1. Report frequency
 2. Report usefulness

Marketing and delivery (7):

- Marketing capacity (4)
 1. Marketing capacity baseline
 2. Time to increase capacity
 3. Marketing focus (Eval vs. M.P)
 4. Time to change focus
- Campaigns (2)
 1. # of companies contacted
 2. Time for campaign
- Attrition focus (1)

Scenarios (9):

1. Optimistic/default/pessimistic
2. Stochasticity (3 vars)
3. SW to return lost customer
4. Resource change delay
5. Chance of dell device failure
6. Annual saving
7. Final time



Outputs [KPIs] (14):

Main:

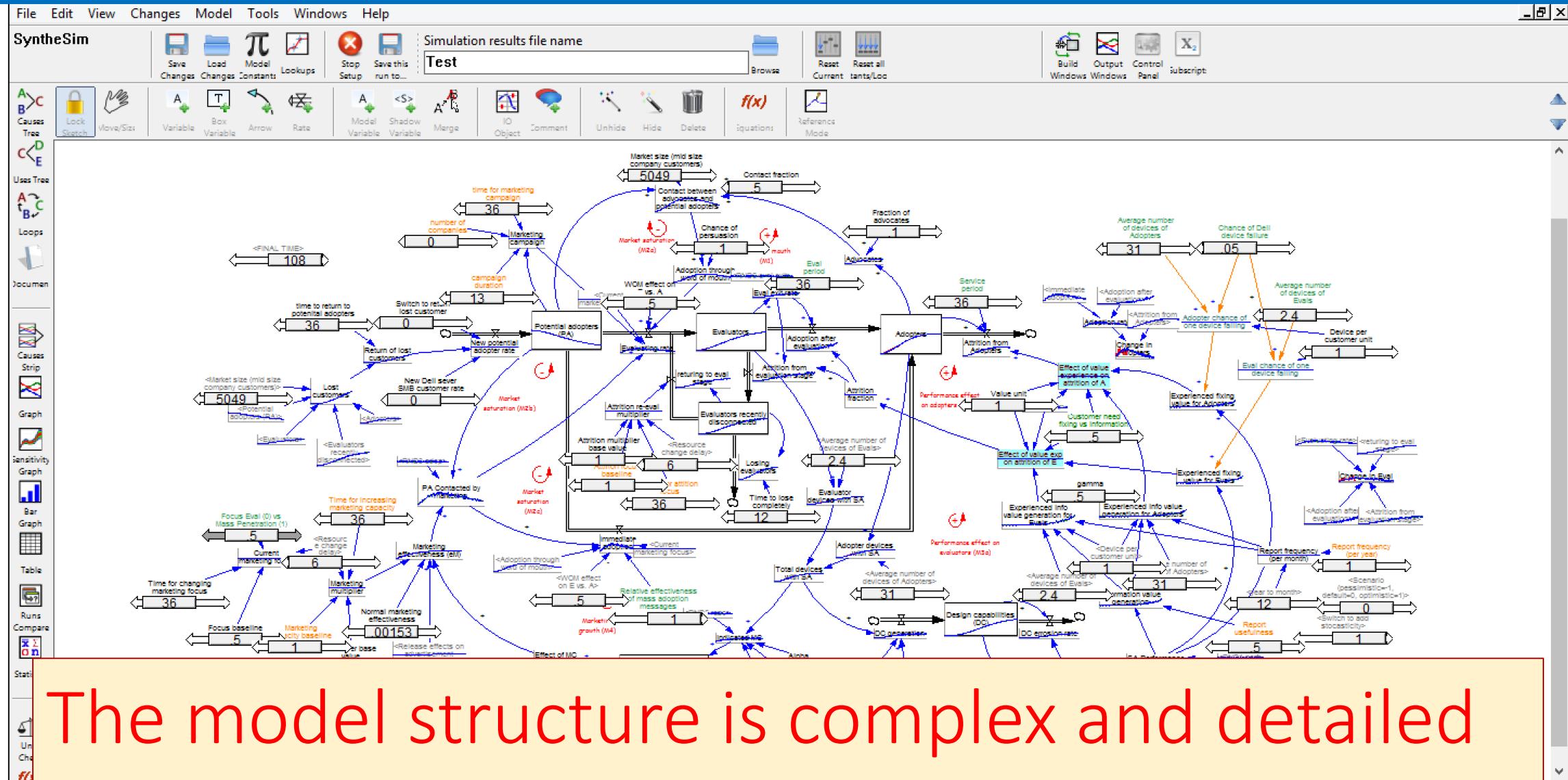
1. Adoption (total devices)
2. Adopters (customers)
3. Accumulated Saving (\$)

Secondary:

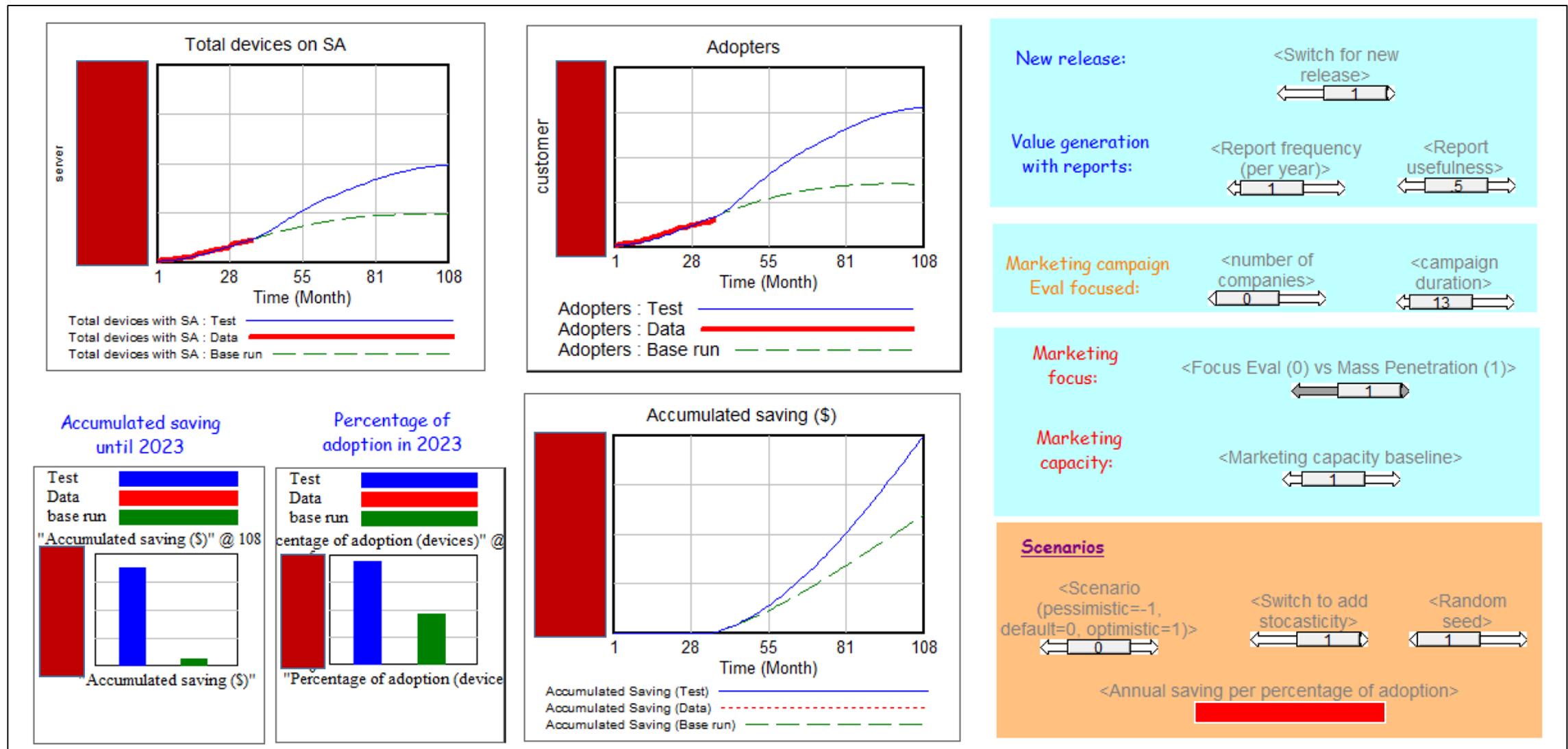
1. Change in # of evaluators
2. Change in # if adopters
3. Devices of Eval vs. Adopters
4. Eval vs. Adopters
5. Annual saving (\$/year)
6. Design capabilities
7. Performance
8. Attrition of evaluators
9. Attrition of adopters
10. Marketing capabilities
11. Marketing effectiveness

Best Strategies

Model structure (~200 equations)



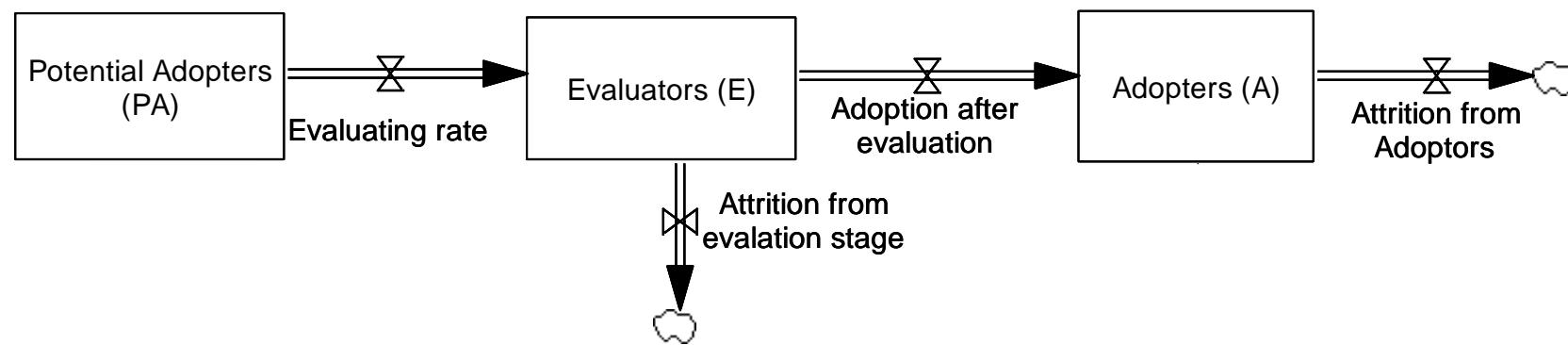
Model dashboard



SAAM Alpha (a small version of SAAM)

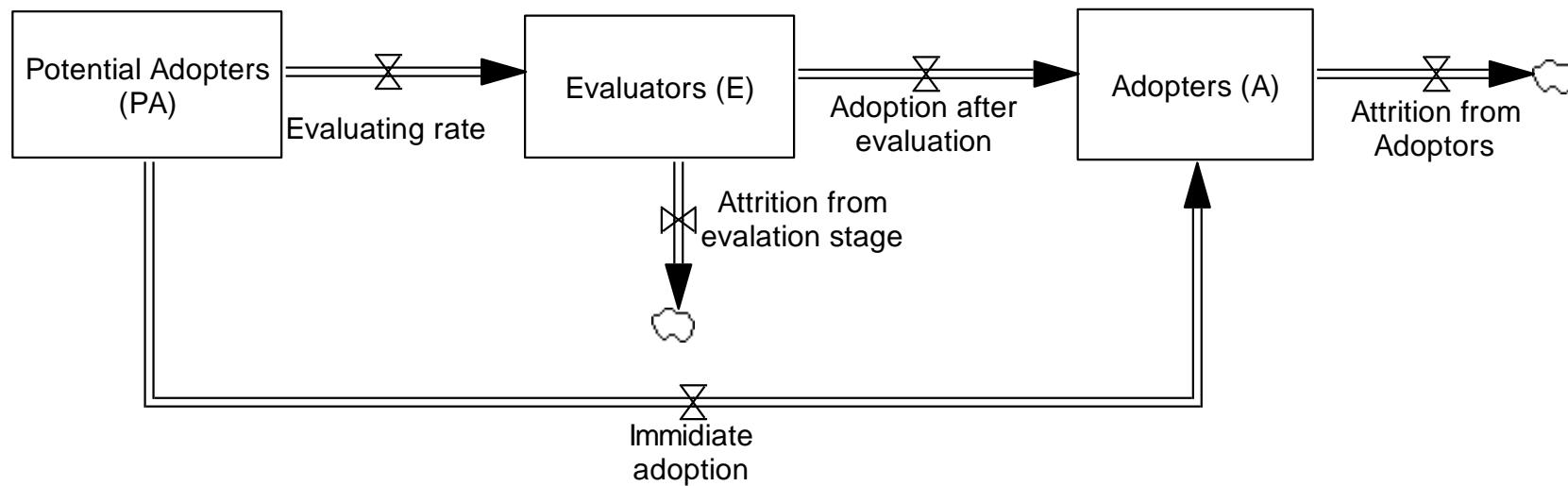
Model structure

Flow of potential customers to adopters



Model structure

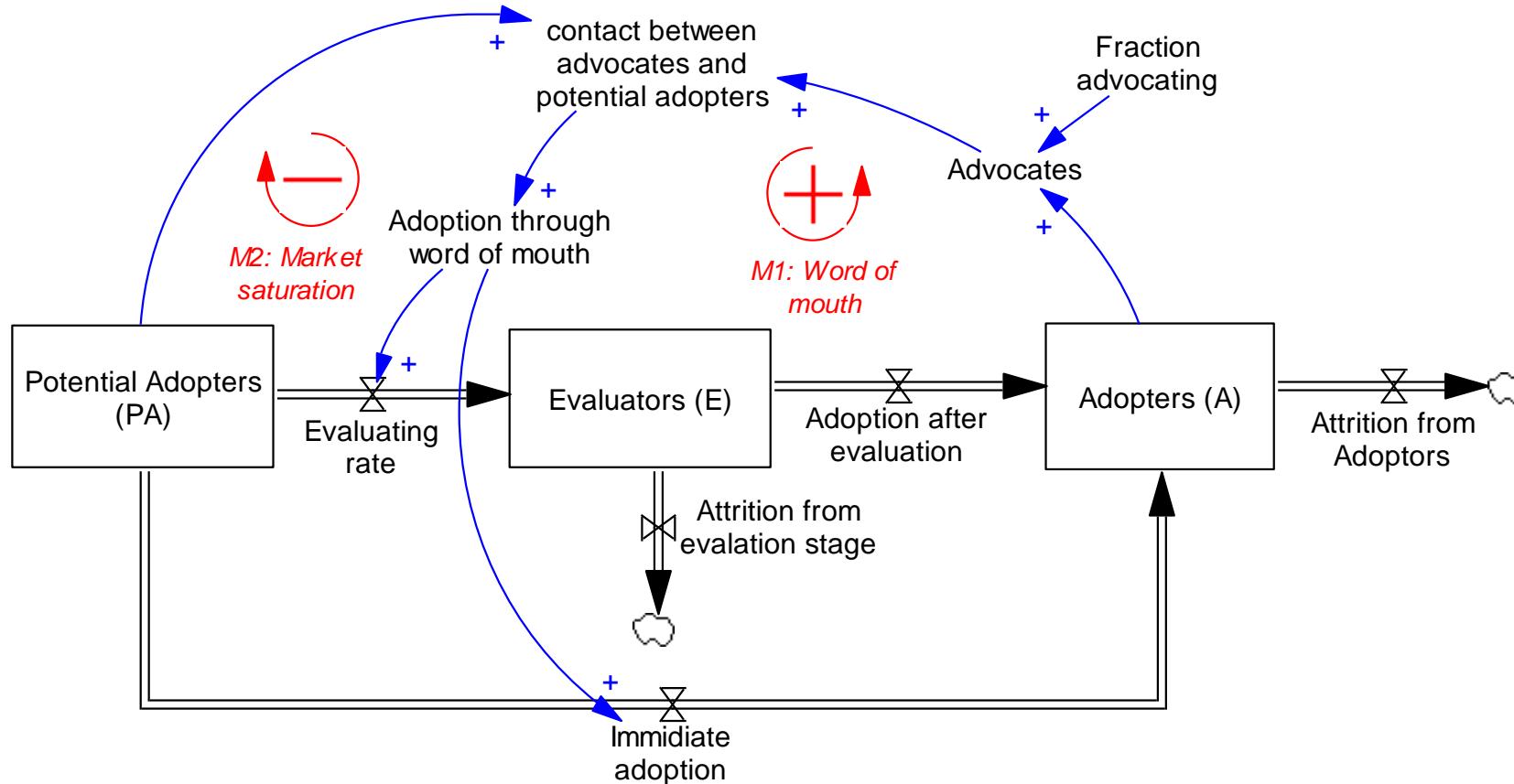
Flow of potential customers to adopters



“...just if we could persuade them [Dell customers] to test SupportAssist.”

Dell expert in product development

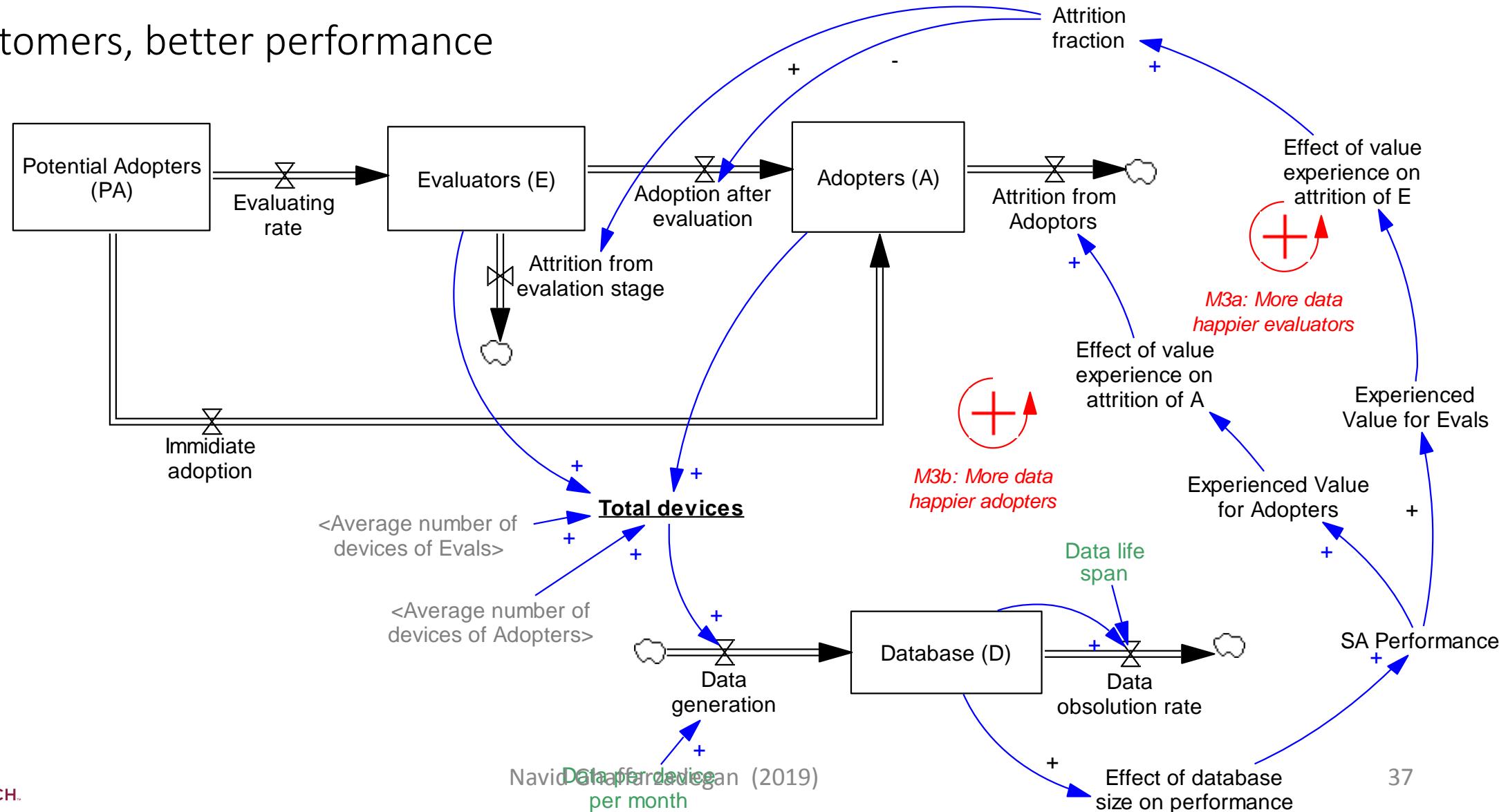
Model structure



Effect of word of mouth (advocators) on potential customers

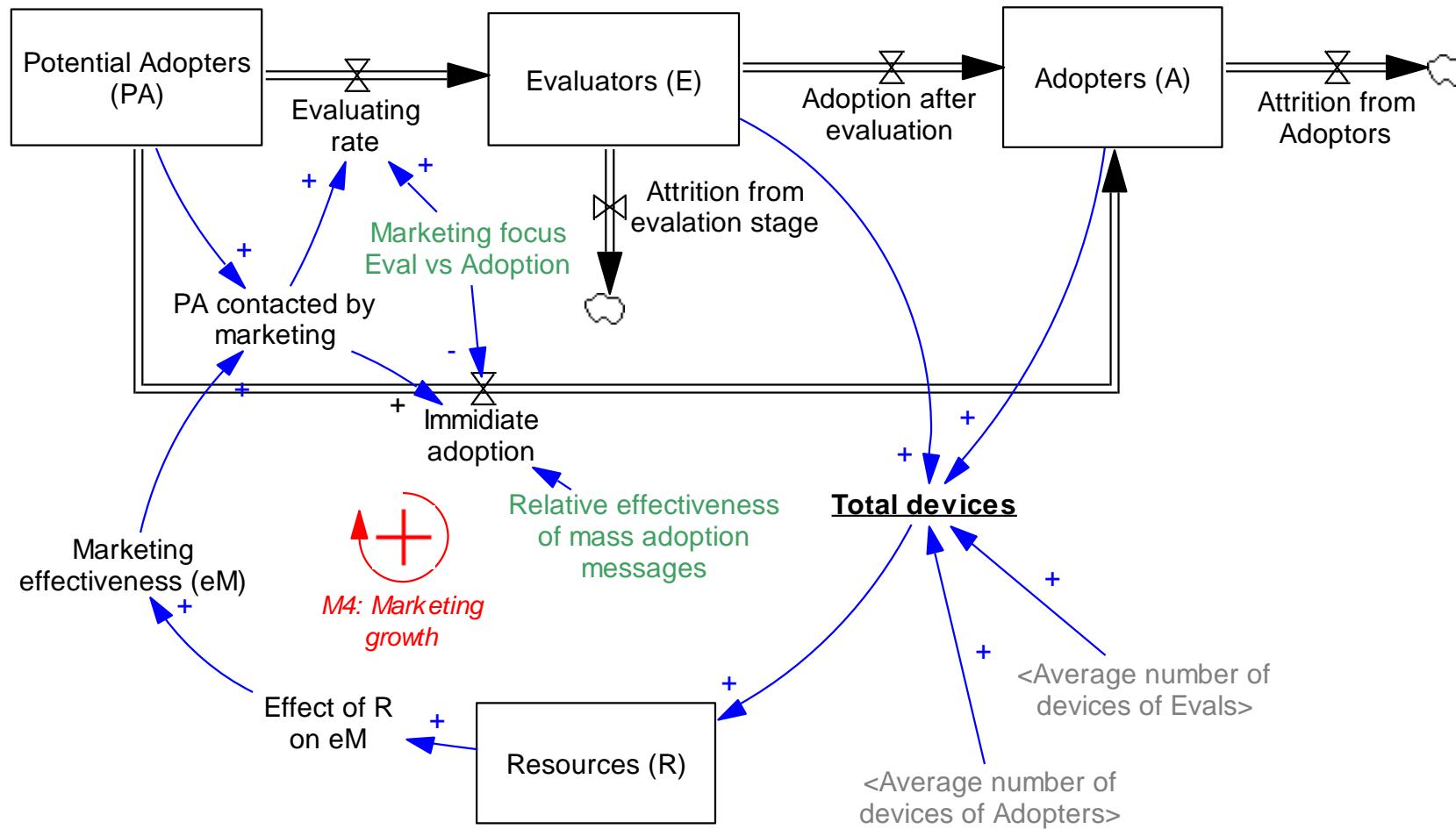
Model structure

More customers, better performance

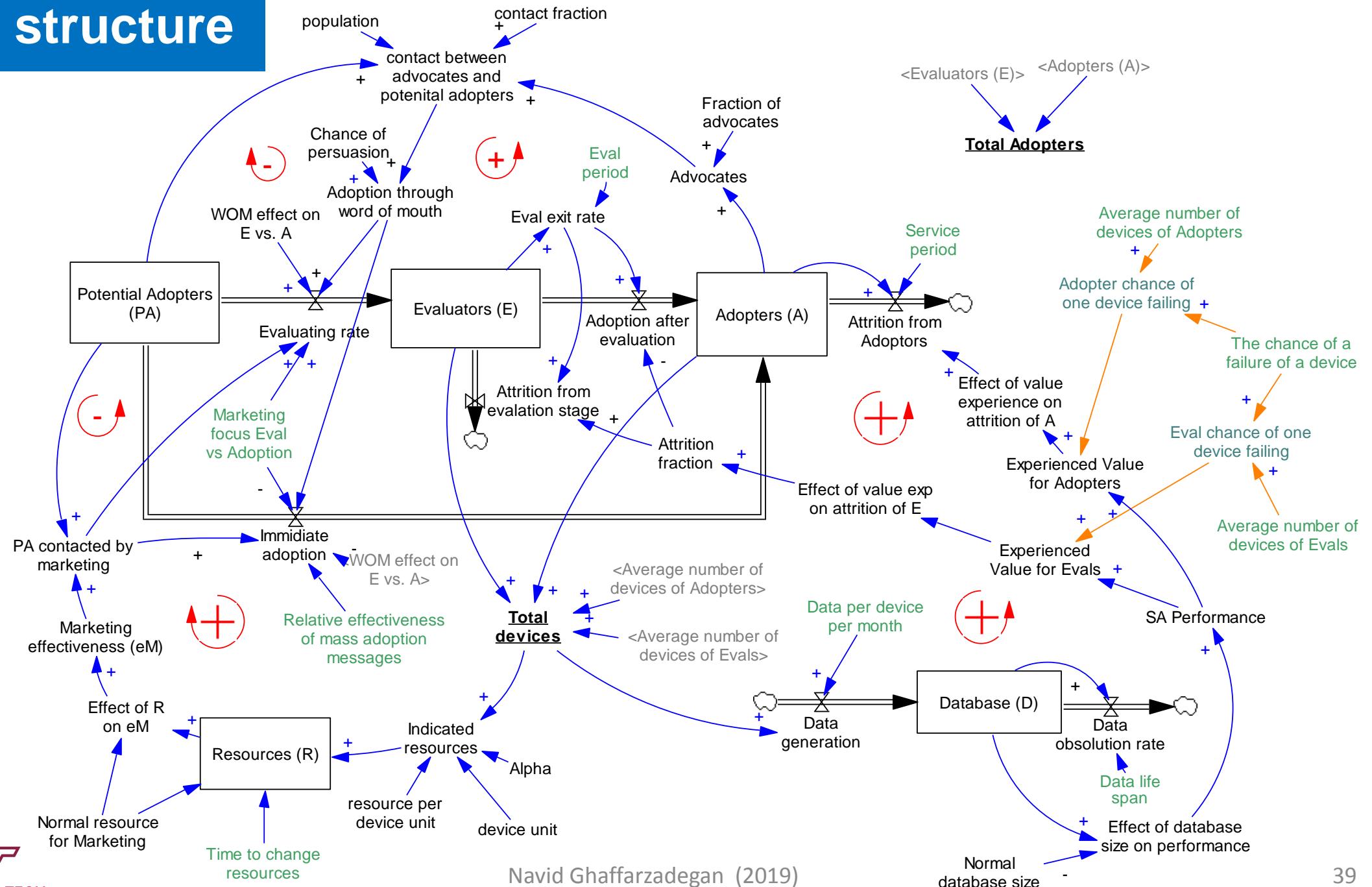


Model structure

Growth in marketing initiatives



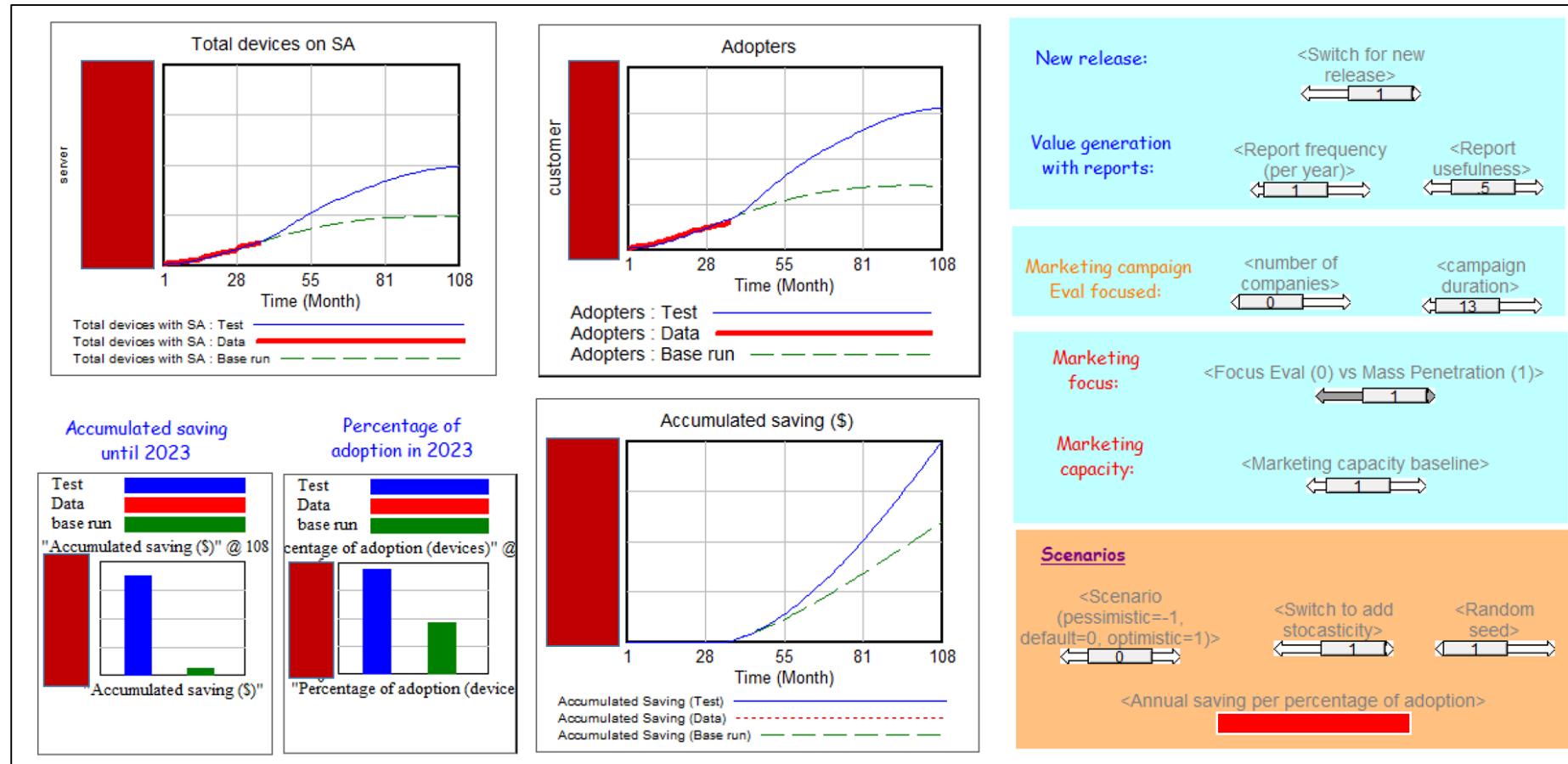
Model structure



Results

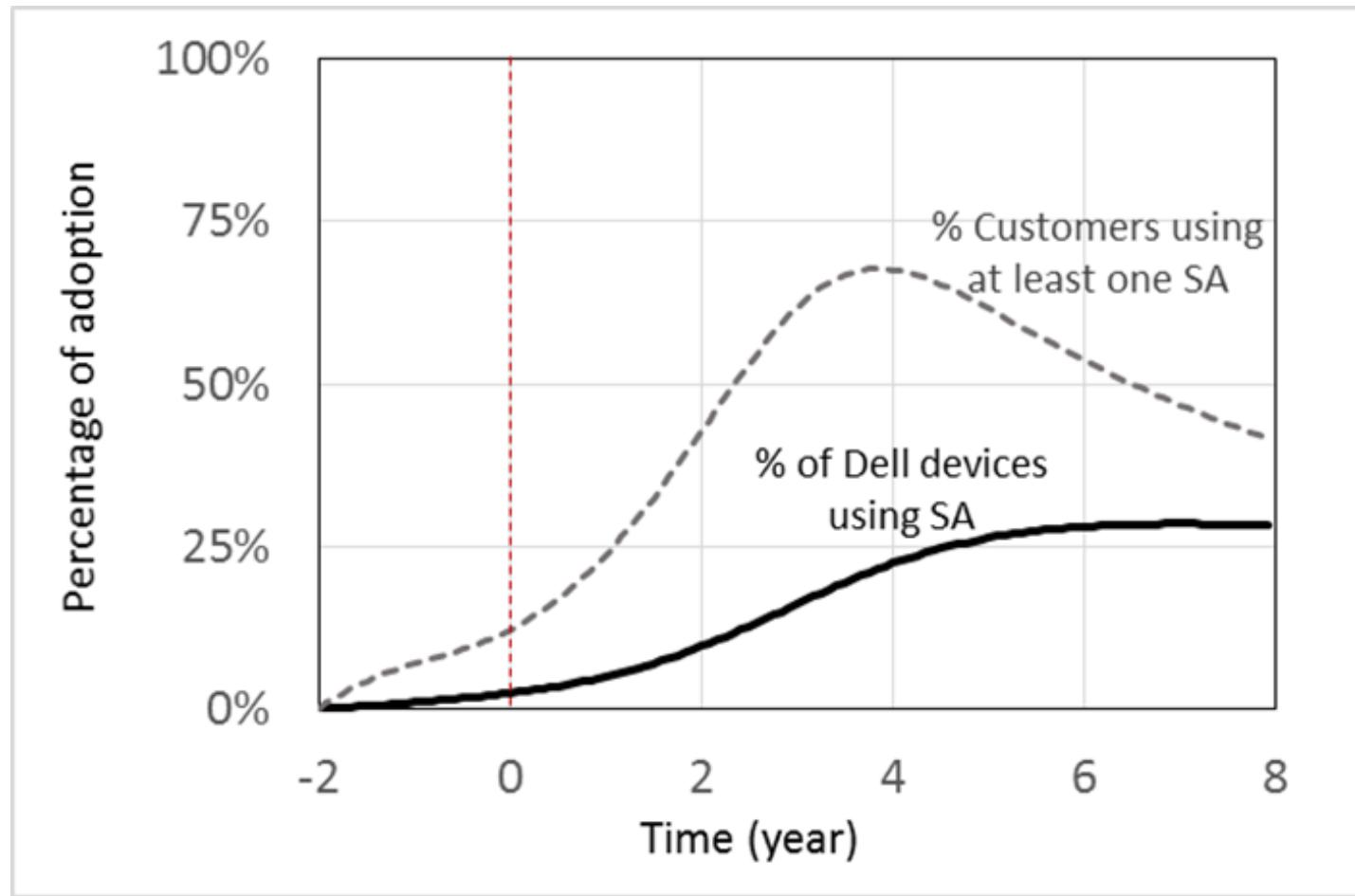
Results

A Decision Support System for SupportAssist



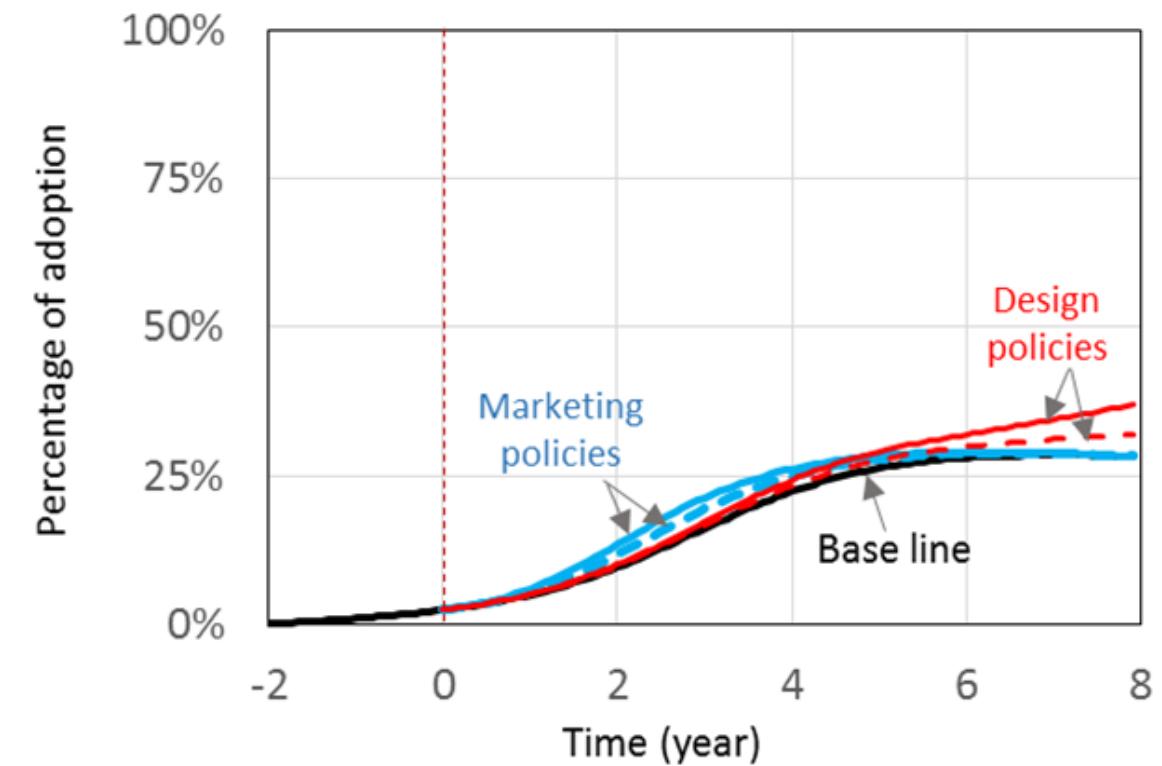
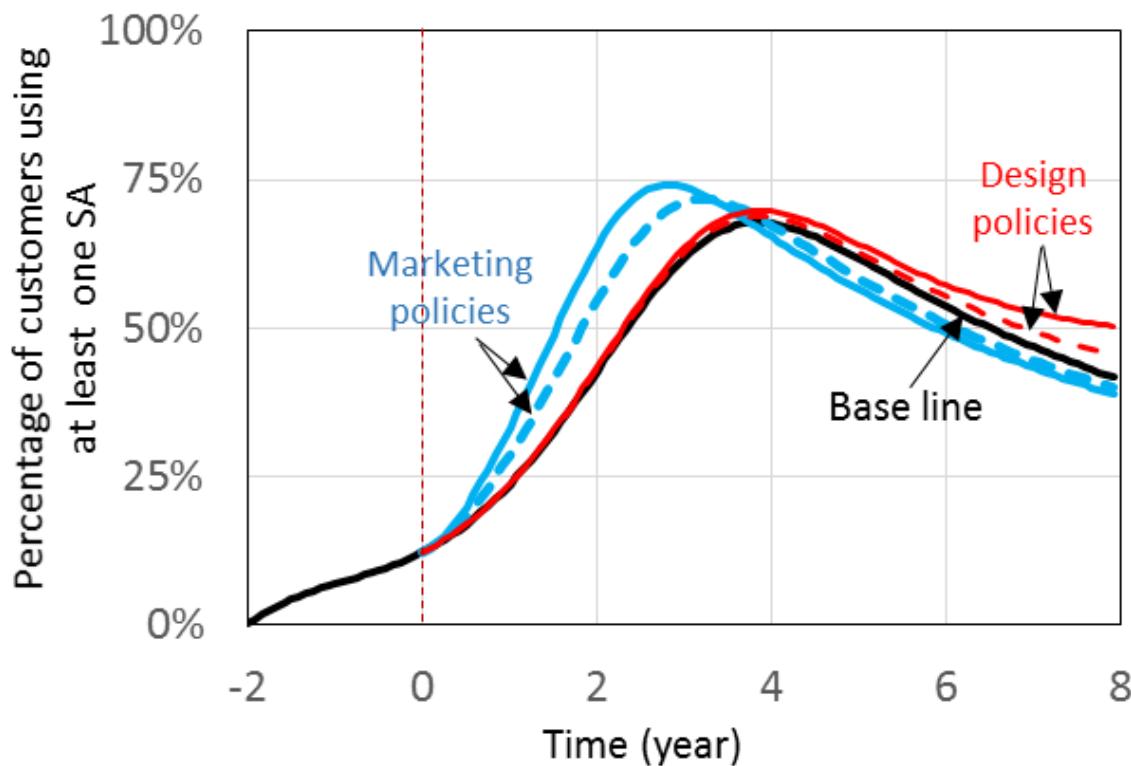
Results

Business as Usual Predicts a Gradual Market Adoption Growth of SupportAssist



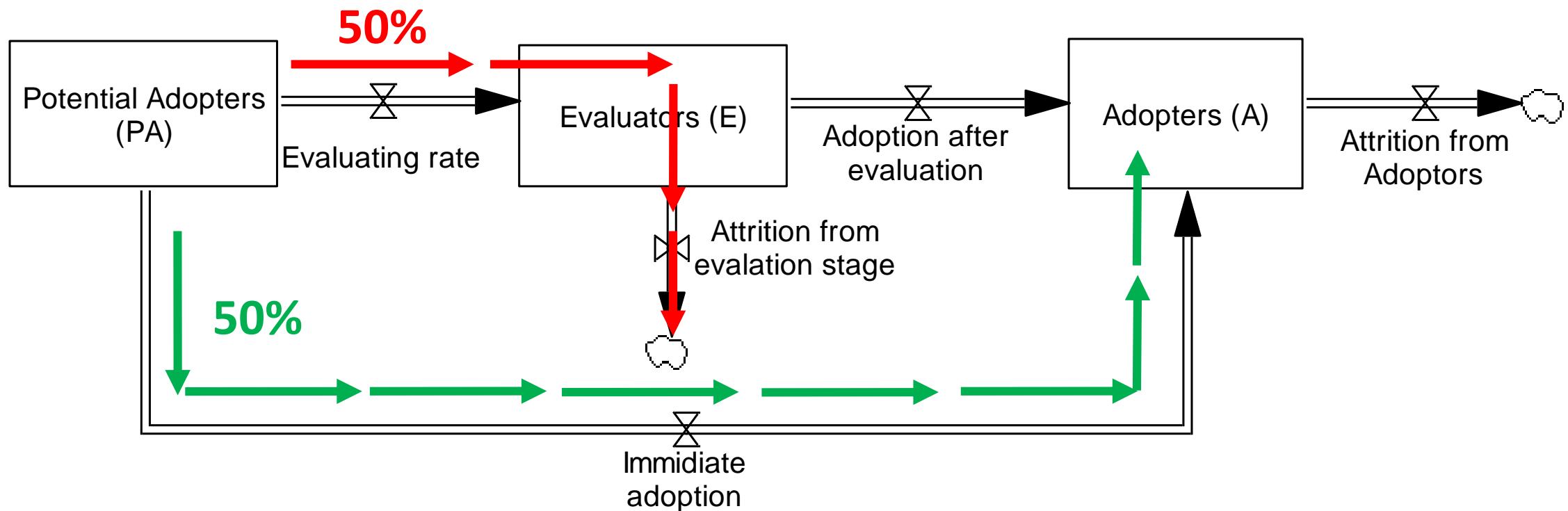
Results

A Sole Focus on Design or Marketing has Marginal Effects



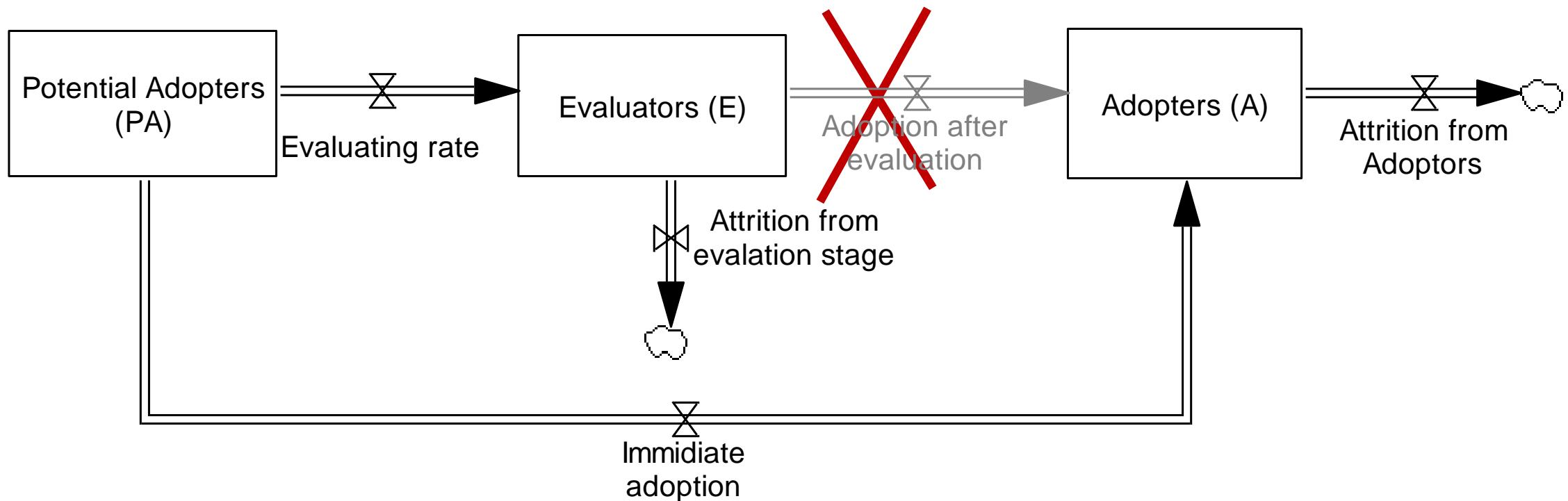
Results

Model Calibration Uncovers Pipeline Leakage



Results

Model Calibration Uncovers Pipeline Leakage



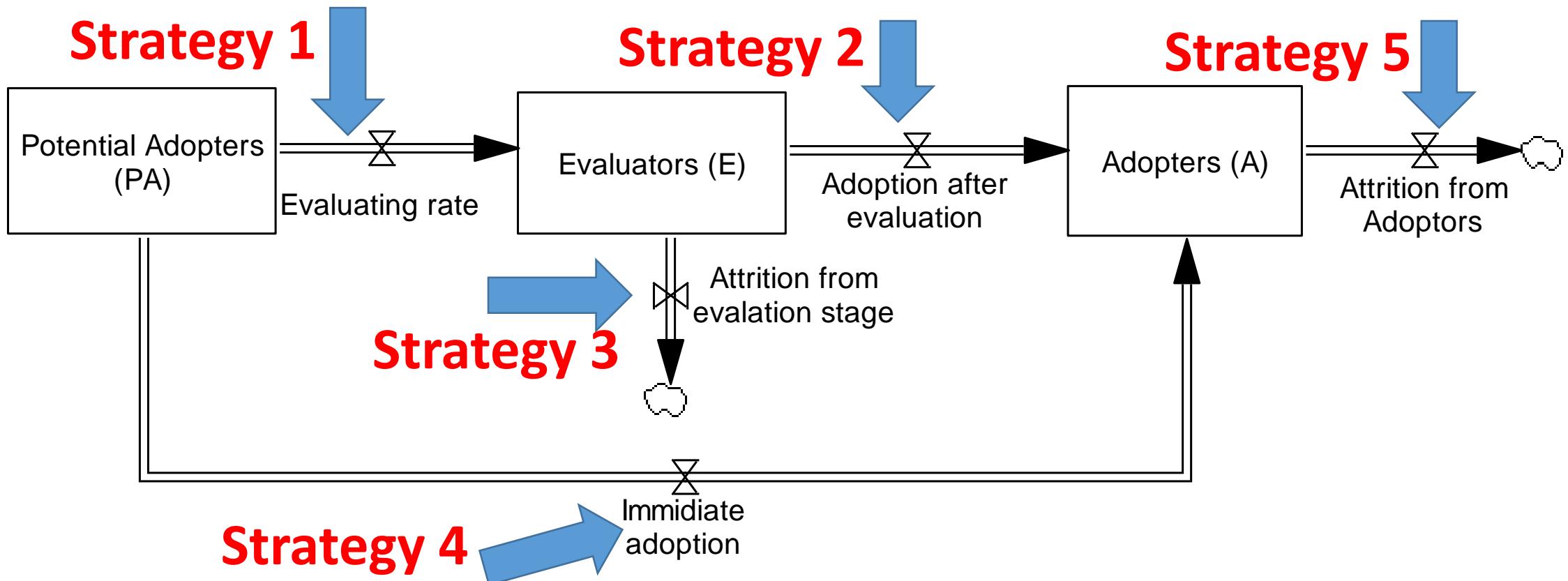
Results

SupportAssist Experiential Learning for Evaluators is Ineffective

Table 1: The chance of experiencing the value of a support service depends on the number of devices receiving the support service.

	The chance of experiencing SupportAssist value for different customers			
Scenario: The chance of failure of 1 device	Customer with 1 device on SupportAssist (Evaluator)	Customer with 2 devices on SupportAssist (Evaluator)	Customer with 50 devices on SupportAssist (Mass adopter)	Customer with 100 devices on SupportAssist (Mass adopter)
0.01	0.01	0.02	0.39	0.63
0.02	0.02	0.04	0.64	0.87
0.05	0.05	0.10	0.92	0.99
0.1	0.10	0.19	0.99	1.00

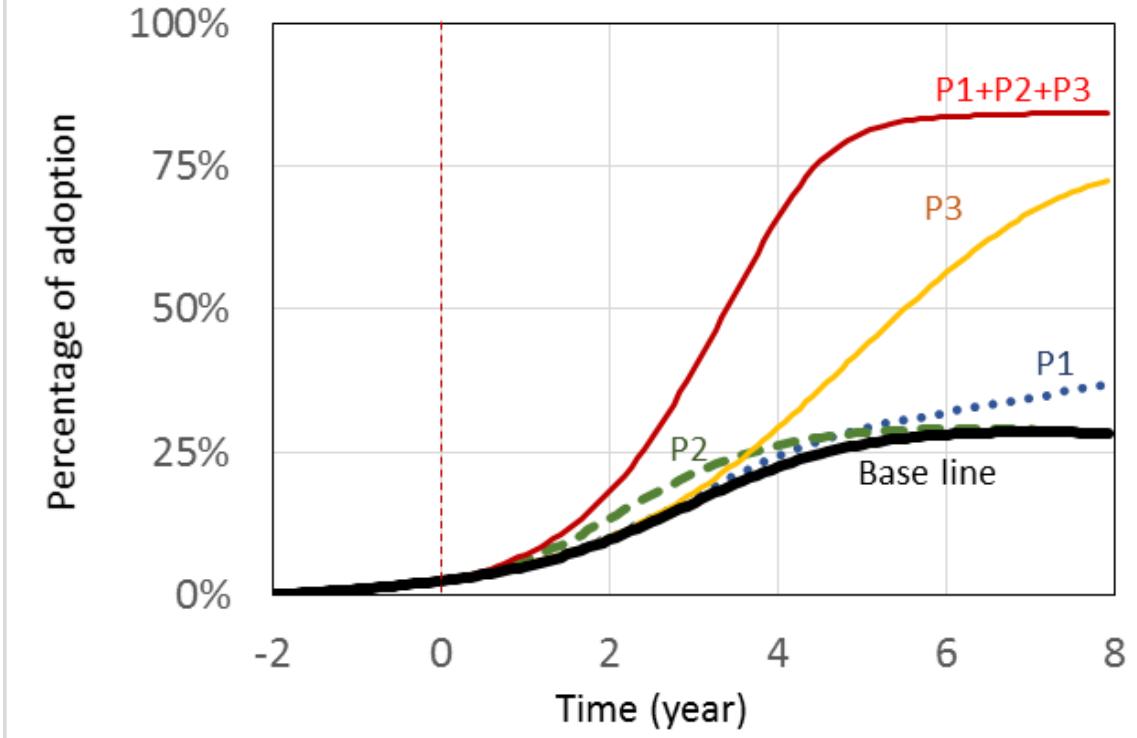
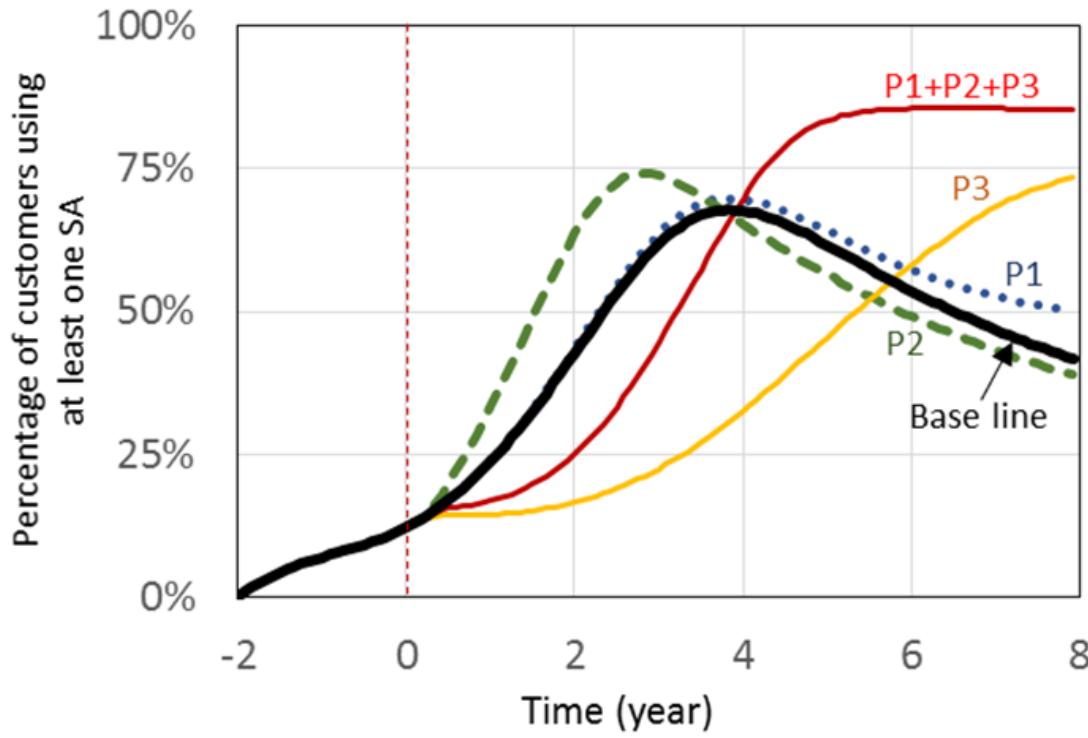
Results: Strategy space (5 examples)



About 10 strategies and their combinations are tested.

Our suggested combination of policies: **80% adoption; Saves +\$74M in 5 years**

Change in marketing focus



P1 [100% improvement in design],
P2 [100% improvement in marketing])
P3: Shift in marketing focus (focus on high penetration)

Conclusion

- *Product: A Decision Support System for SupportAssist*
- *Outcome level 1:*
 - Better “design” and more “marketing” are effective, but the effects are marginal
 - Effective policies are combinations of different strategies.
- *Outcome level 2: Challenging mental models:*
 - Model Calibration Uncovers Pipeline Leakage
 - Evaluation has significant attrition.
 - SupportAssist’s Experiential Learning for Evaluators is Ineffective.
- *Outcome level 3: Model-based strategic planning*
 - Change in Marketing Focus – Focus on mass adoption.
- *Outcome level 4: Modeling process as a continuous insight generation process*

What we got?

- ✓ A fully operational, predictive simulation of market that is being delivered in a BETA status.
 - ✓ Calibrated to Dell data (FY2014-FY2016)
- ✓ Marketing policy insights to increase market adoption of SupportAssist.

Next Steps

Monitor policy implementation

*Gather new data; update the model
On going process of modeling, analysis, action, and feedback.*

Going beyond the Beta version

*Improve the model to include more details about the market
Include other LOB's
Include operational sides of SupportAssist
Develop models of market adoption for other services in Dell*

Journal publication

MAIN ARTICLE

Dell's SupportAssist customer adoption model: enhancing the next generation of data- intensive support services

Navid Ghaffarzadegan,^{a*}  Armin A. Rad,^b Ran Xu,^a Sam E. Middlebrooks,^c Sarah Mostafavi,^a Michael Shepherd,^c Landon Chambers^c and Todd Boyum^c

Abstract

We developed a decision support system to model, analyze, and improve market adoption of Dell's SupportAssist program. SupportAssist is a proactive and preventive support service capability that can monitor system operations data from all connected Dell devices around the world and predict impending failures in those devices. Performance of such data-intensive services is highly interconnected with market adoption: service performance depends on the richness of the customer database, which is influenced by customer adoption that in turn depends on customer satisfaction and service performance—a reinforcing feedback loop. We developed the SupportAssist adoption model (SAAM). SAAM utilizes various data sources and modeling techniques, particularly system dynamics, to analyze market response under different strategies. Dell anticipates improving market adoption of SupportAssist and revenue from support services, as results of using this analytical tool.

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Ghaffarzadegan, N., Rad, A. A., Xu, R., Middlebrooks, S. E., Mostafavi, S., Shepherd, M., Chambers, L. & Boyum, T. (2018). Dell's SupportAssist customer adoption model: enhancing the next generation of data-intensive support services. *System Dynamics Review*.

Thank you!

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