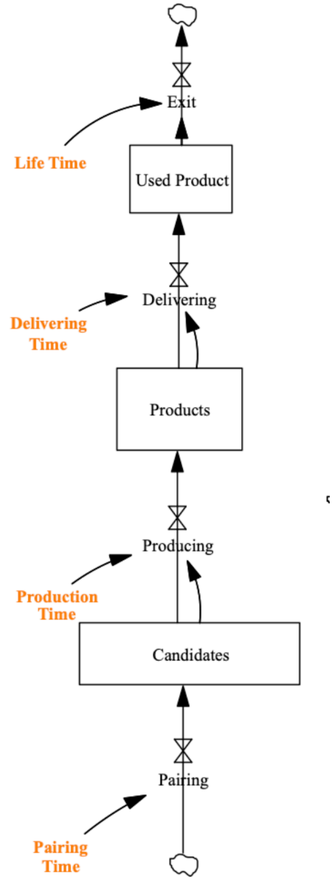
Angie Idea 1 supply chain in industries with different hardwareness

Research Question How does supply chain differ in academia, biotech, semiconductor industry (increasing hardwareness)

Motivation Investigate how industry hardwareness affects startup's value creation operation

Hypotheses

Variable	Pure Digital	PhD in Academia doing empirical research	Biotech Startup	Semiconductor Startup	Pure Physical
Candidates	Digital product concepts, beta versions	Prototype ideas	Potential therapeutic compounds, early-stage research	Semiconductor device concepts, early designs	Product designs, prototypes
Products	Released software, apps, online services	Paper combining hypothesis, measured phenomena	Developed drugs, clinical trial compounds	Fabricated semiconductor devices	Finished goods, manufactured items
Used Product	Software and services in active use by consumers	Published and read paper	Medications being taken by patients, biotech products in use	Semiconductor devices integrated into products and used by consumers	Products being used by consumers
Pairing Time	Time to match software with market/user needs	Prototyping time	Time to align research with therapeutic targets	Time to develop and design semiconductors	Time to design and prototype
Production Time	Time spent in software development and testing	Experiment time	Time for conducting experiments, trials, and production of compounds	Time for prototyping, manufacturing, and testing semiconductor devices	Time spent in manufacturing and quality control
Delivering Time	Time for software deployment and distribution	Research diffusion time	Time for drug approval, production scaling, and delivery to providers	Time from manufacturing to delivery to tech companies or integration into products	Time for logistics, from factory to consumer
Life Time	Duration of software utility before becoming obsolete or updated	Paper life time	Duration from drug release to obsolescence due to new therapies or expiration of patent	Lifecycle of semiconductor device before becoming obsolete due to new technology	Duration of product usability before wear out or obsolescence



1. supply chain

Testing Data/Methods Verify table's each cell via interview of at least three experts from each industry (academia from etom seminar)

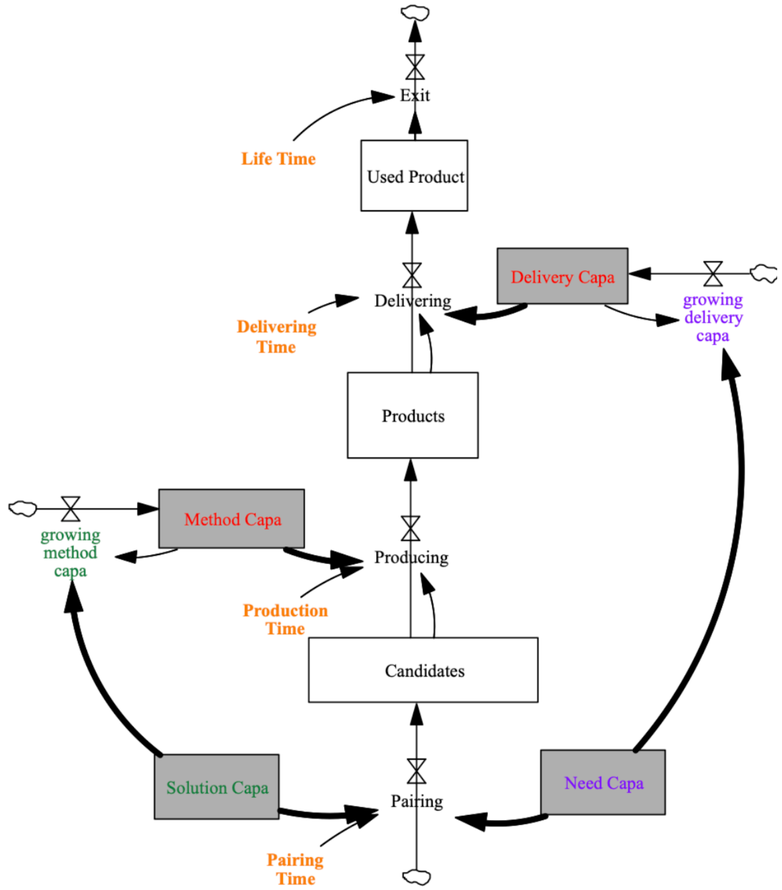
Angie Idea 2 capacity management in industries with different hardwareness

Research Question How does capacity management differ in academia, biotech, semiconductor industry (increasing hardwareness)

Motivation Investigate how industry hardwareness affects startup's value creation strategy

Hypotheses

Variable	Pure Digital	PhD in Academia doing empirical research	Biotech Startup	Semiconductor Startup	Pure Physical
Need Capacity	User demand for digital solutions	Phenomena/Community Need Pool	Market need for new treatments	Market demand for advanced semiconductor technologies	Market demand for physical products
Solution Capacity	Available digital technologies and platforms	Theory/Methodology Pool	Available biotechnologies and medical knowledge	Available semiconductor technologies and expertise	Manufacturing capabilities and design solutions
Method Capacity	Software development frameworks and tools	Measured/Data Pool	Lab equipment and research methodologies	Semiconductor fabrication technologies and techniques	Production methods and quality control systems
Delivery Capacity	Digital distribution infrastructure	Academic publishing platforms and networks	Regulatory approval pathways and distribution networks	Supply chains and distribution networks for electronics	Supply chains, logistics, and distribution networks
Growing Method Capacity	Speed of development and deployment of new digital tools	Speed of development of new research methods	Speed of innovation in lab techniques and trials	Speed of innovation in semiconductor manufacturing	Speed of innovation in manufacturing techniques
Growing Delivery Capacity	Speed of expansion of digital distribution capabilities	Speed of expansion of research dissemination capabilities	Speed of scaling production and distribution capacities	Speed of scaling semiconductor production capacities	Speed of scaling physical product distribution capacities



2. capacity

Testing Data/Methods Verify table's each cell via interview of at least three experts from each industry (academia from etom seminar)

Angie Idea 3 reinvest reinforcing loop in industires with different hardwareness

Research Question How does reinvest reinforcing loop differ in academia, biotech, semiconductor industry (increasing hardwareness)

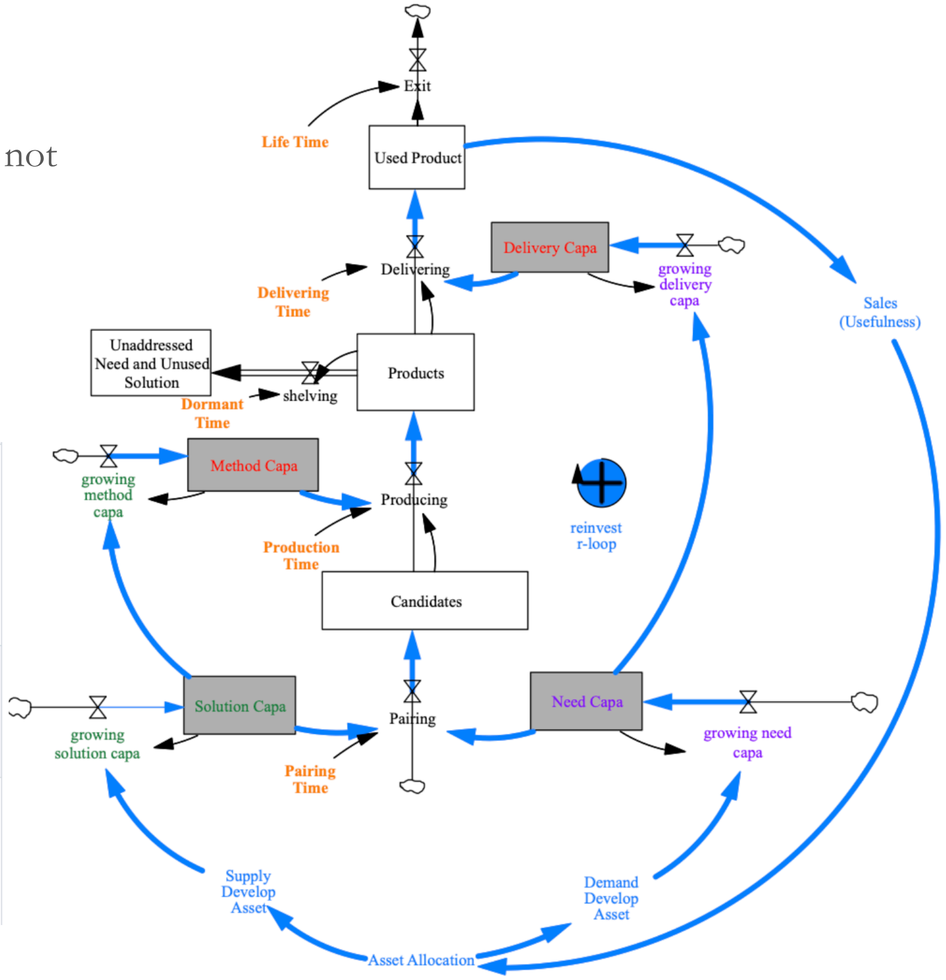
Motivation Investigate how industry hardwareness affects
- startup's value capture

- social inefficiences from "backlogs" devleoped need, solutions, method that are not assembled to be productized

Hypotheses

Variable	Pure Digital	PhD in Academia doing empirical research	Biotech Startup	Semiconductor Startup	Pure Physical
Sales (Usefulness)	Number of users, subscriptions, downloads, user engagement metrics	Citations, academic impact, paper downloads, conference presentations	Drug sales, usage by patients, citation in treatment guidelines	Number of chips sold, use in prominent tech products	Sales volume, customer satisfaction, repeat purchases
Asset Allocation	Allocation of capital to software development, digital infrastructure, marketing	Research resources (time, talent, effort, money), allocation of funding towards specific research areas	Allocation of funding to R&D, clinical trials, and market preparation	Investment in R&D, manufacturing equipment, and materials	Allocation of funds to manufacturing, logistics, and product development
Demand Develop Asset	Investment in market research, user experience design, analytics	Resources used to collect and address needs in academia (e.g., identifying emerging social issues, gathering data)	Resources allocated to understanding patient needs, market research for new treatments	Resources dedicated to market analysis for new semiconductor applications	Market research to identify consumer needs and trends
Supply Develop Asset	Resources dedicated to technological innovation, acquiring digital talent	Resources used to develop supply in academia (e.g., building expertise or methodology for research, expanding collaborator networks)	Investment in technology, expertise acquisition, and partnerships for drug development	Investment in developing technological expertise, fabrication methods, and supplier networks	Investment in improving production capabilities, supplier relationships, and distribution networks

Reinvest Reinforcing Loop	Reinvestment from profits into product development, market expansion	Reinvesting in the research area that gains traction through citations, which can lead to increased funding and resources, thereby enhancing research capabilities and capacities	Profits reinvested into R&D for new treatments, enhancing production capabilities	Reinvestment of earnings into R&D for more advanced technologies, improving manufacturing capabilities	Reinvestment from sales into product improvement, manufacturing efficiency, and market expansion
Unaddressed Need	User needs or market segments not yet met by current digital offerings	Unmet research needs or areas where existing theories and methodologies do not suffice	Patient needs unmet by current treatments or drugs	Technological needs in the market not yet fulfilled by existing semiconductor technologies	Consumer needs not yet met by available products
Unused Solution	Digital innovations that haven't found a market fit or user base	Research findings or methodologies that haven't been applied or widely recognized in academia	Biotech solutions developed but not yet brought to market due to various constraints (e.g., regulatory approval)	Semiconductor technologies developed but not yet integrated into products due to market readiness or compatibility issues	Products developed but not yet utilized in the market or obsolete due to innovation elsewhere



3. re-invest

Testing Data/Methods Verify table's each cell via interview of at least three experts from each industry (academia from etom seminar)

Angie Idea 4 infrastructure and capital in industires with different hardwareness

Research Question Can we decrease social inefficiences from "backlogs"?

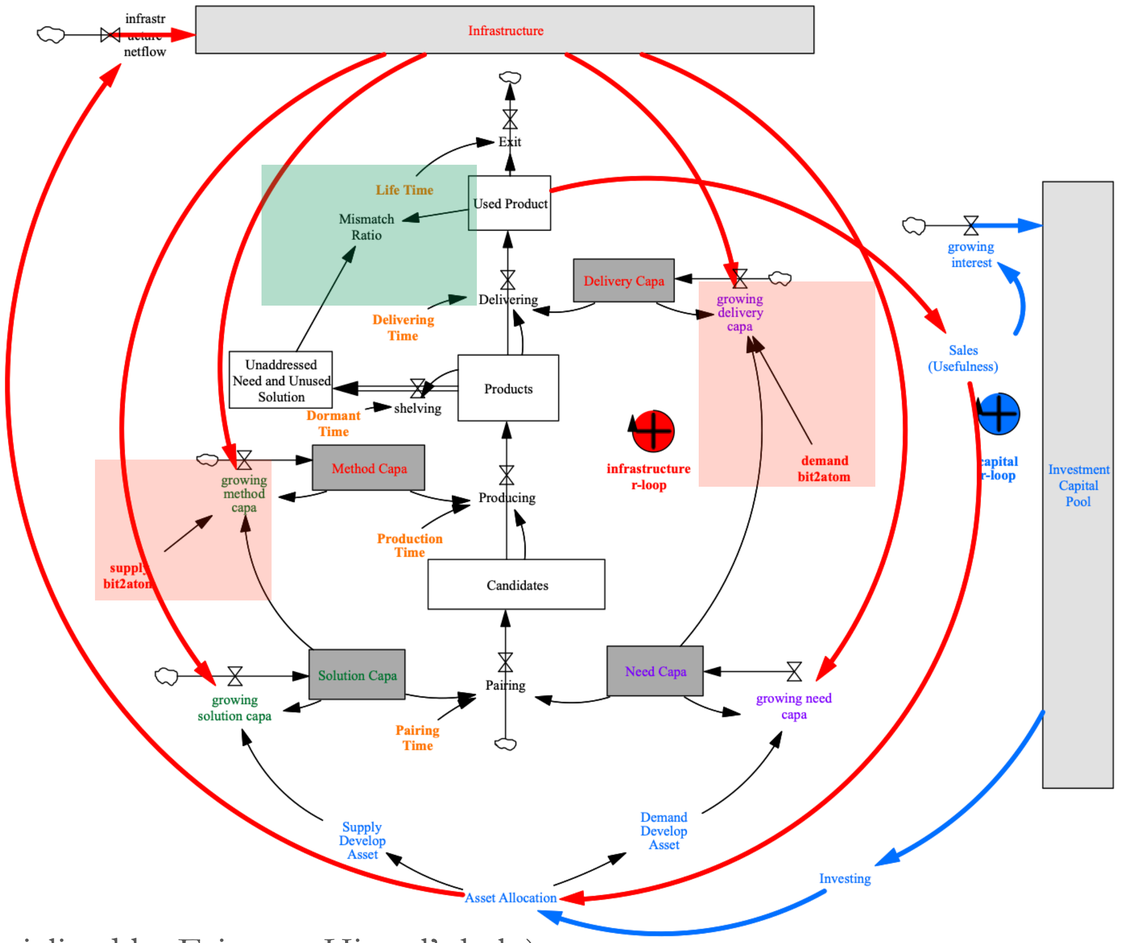
Motivation Investigate how industry hardwareness affects backlog elimination strategies in ecosystem

Hypotheses

1. society level of mismatch ratio between "Used product" and "Unused product" can be measured

2. industry hardwareness affects startup operations, hence affects ecosystem's strategy to lower mismatch ratio

3. infrastructure reinforcing loop may take a longer time but is more effective in decreasing mismatch ratio than capital investment reinforcing loop. This gap would be more salient in industry with higher hardwareness



Testing Data/Methods measureing mismatch ratio (e.g. user innovations that are not commercialized by Eric von Hippel's help)