

Introduction to Value Chain Dynamics



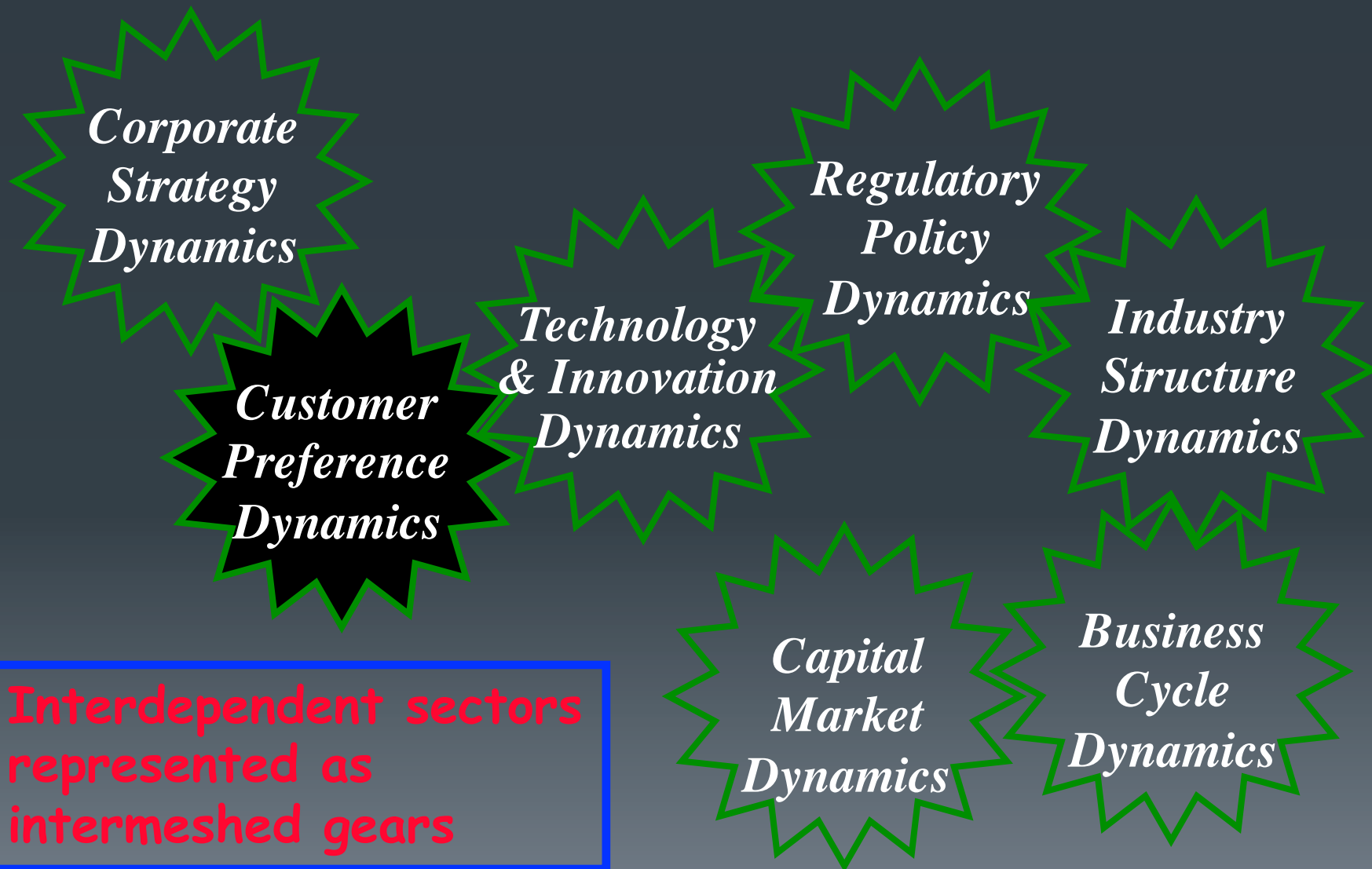
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**Value Chain Dynamics Working Group
April 2014**

VCDWG methodology

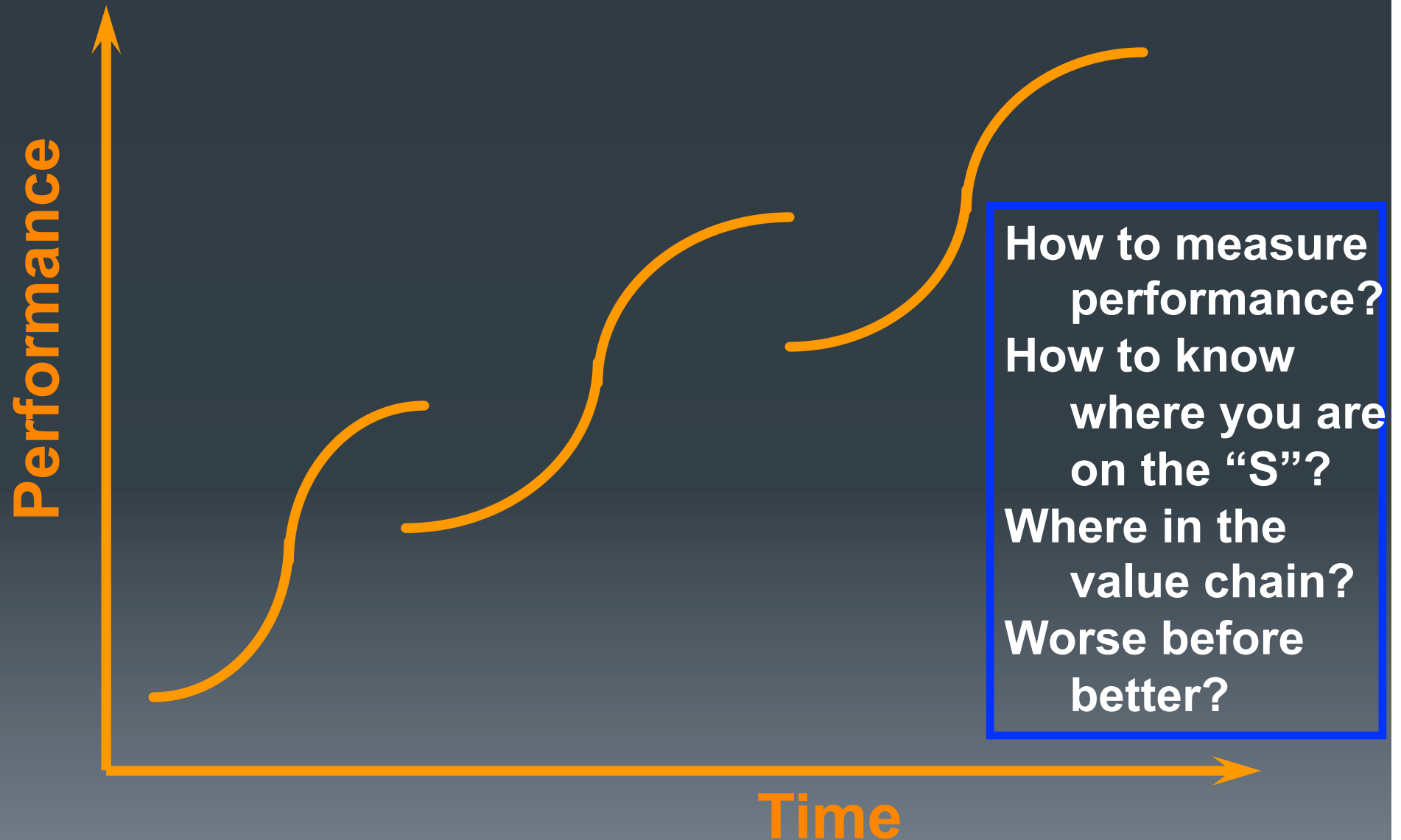
1. Map the value chain.
2. Assess control points and value creation /capture.
3. How & why is this changing over time?
4. Build dynamic models to “peek” around the corners.

“Gear Model” to support Roadmapping of Value Chain Dynamics (VCD)



Innovation Dynamics can be

RADICAL (*disruptive*) or INCREMENTAL (*sustaining*)



Technology and Industry Disruptions



Industry
Disruption

No Industry
Disruption

**Digital
music**

Technology
Disruption

- Weak Incumbent Network Effect
- Strong Entrant Network Effect
- Consumer highly price sensitive and willing to risk adopting innovative service with low quality and compatibility

- Incumbents can affect switching behavior
- Incumbents innovate while maintaining quality
- Incumbents control complementary assets
- Entrants struggle to offer quality due to lack of functional control or market power

**Electric
vehicles**

No
Technology
Disruption

- Strong Incumbent Network Effect
- Consumers value quality and compatibility over innovation and low price

**Linux vs.
Windows**

Millennials and the Evolution of TV



Tessa Scot, M.S. candidate
(& Charles Fine, Chintain Vaishnav,
& Sergey Naumov)

CFP

Value Chain Dynamics Working Group

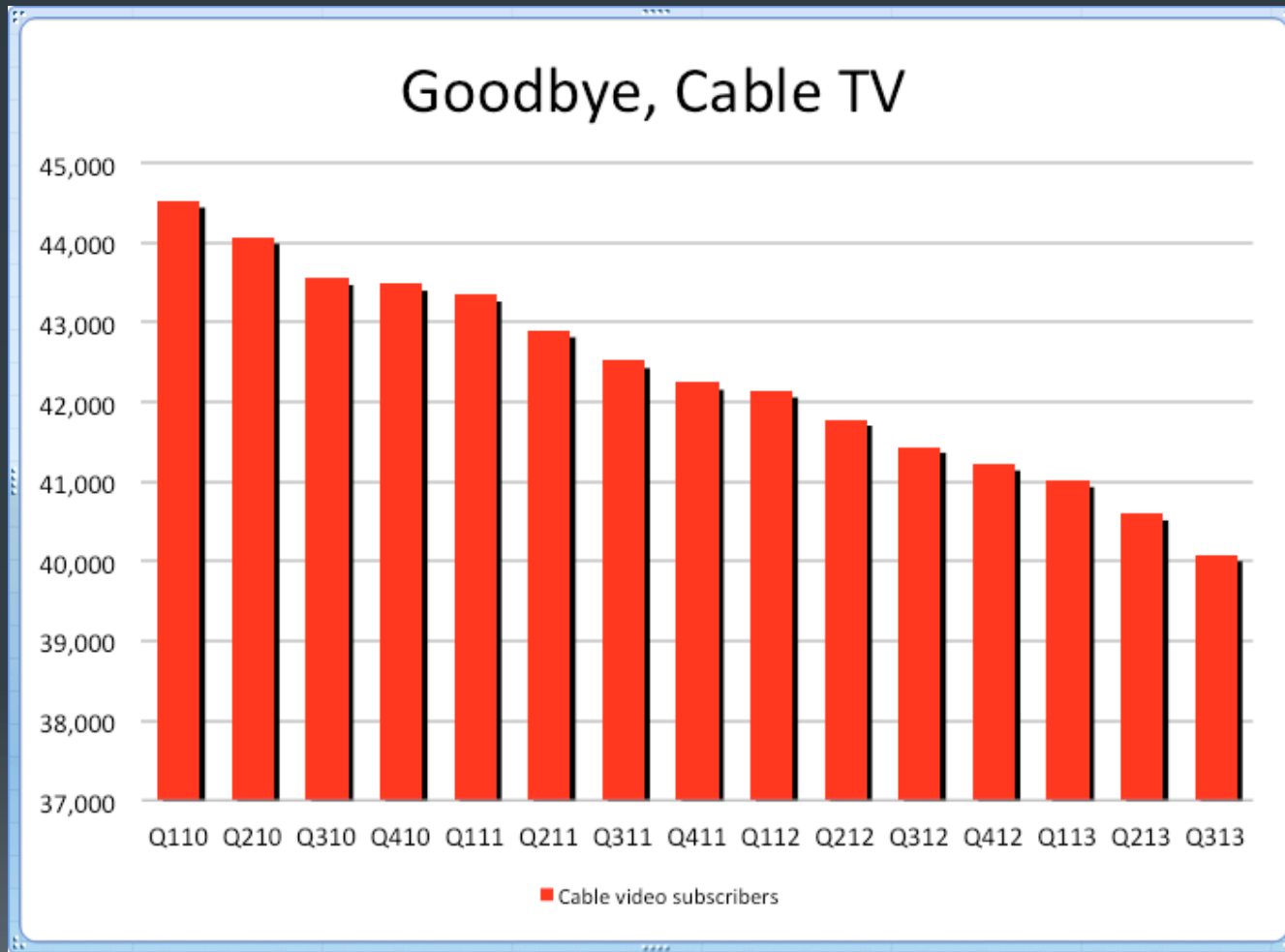
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■ **Millennials**

- **typical of most generations – don't want to do what our parents did**
- **Traditionally, each generation has come back to paying for cable (have kids, buy a home, etc...)**
- **BUT – current preference changes correspond with the emergence of new technologies (streaming and downloading online, quickly and cheaply) and new services (Netflix et al.) which cater directly to what we want**

- **What is valued now:**
 - Ability to time shift (no more appointment television)
 - Watch on any device
 - Watch as much or as little as one chooses (i.e. binge-watching)
 - Cheap prices
 - Only paying for what we want (“a la carte”)
- **Technology enabled new habit formation.**
- **Will this generation and the next revert back to the ‘traditional’ TV viewing experience ???**

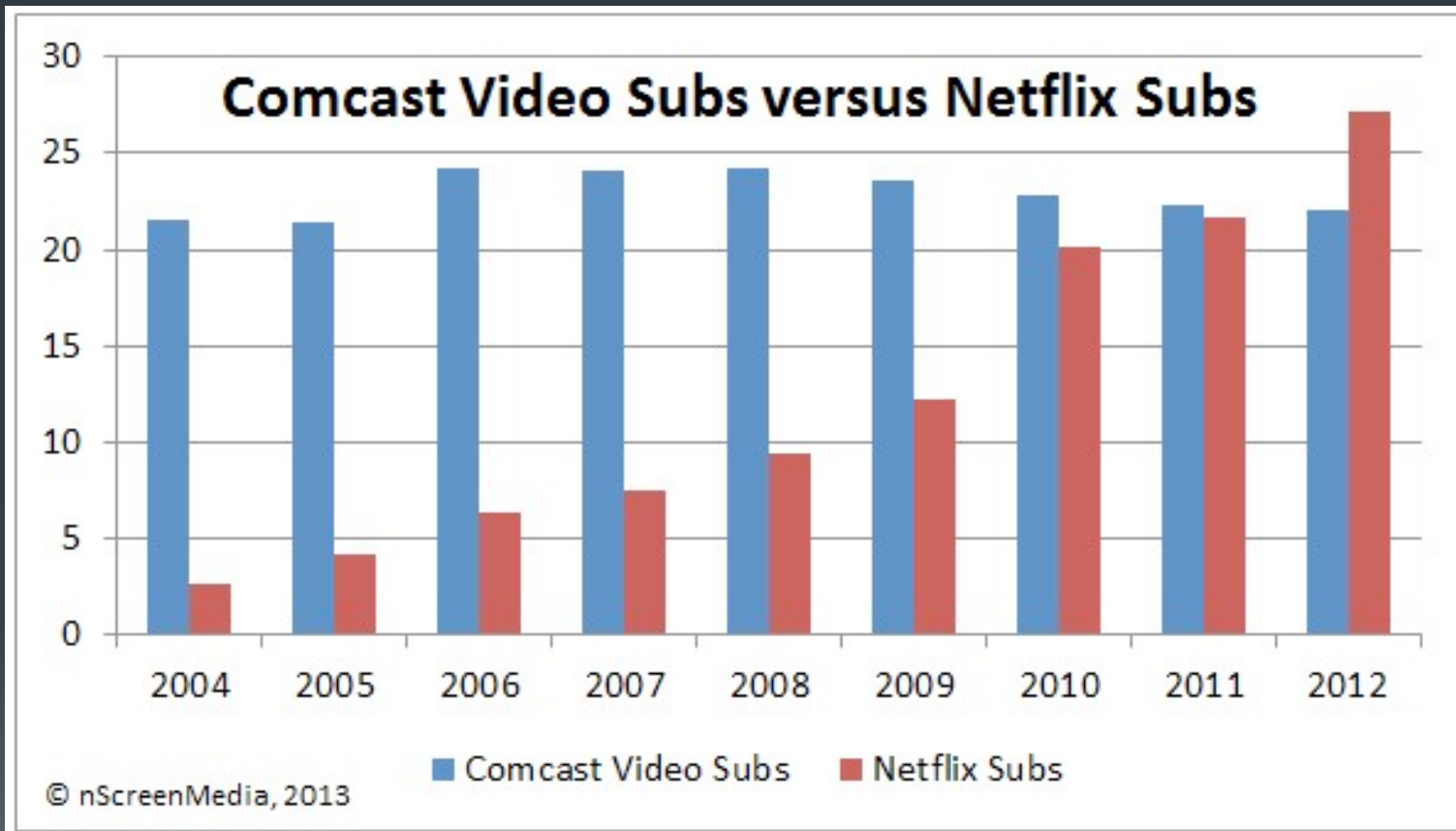
Cable Subscribers



Sources: Business Insider

<http://static1.businessinsider.com/image/528a3723eab8ea20181ab8bf-960/screen%20shot%202013-11-18%20at%2010.49.00%20am-1.png>

Netflix Subscribers



Source: nScreenMedia, 2013, based on quarterly reports data

Hulu Paying Subscribers



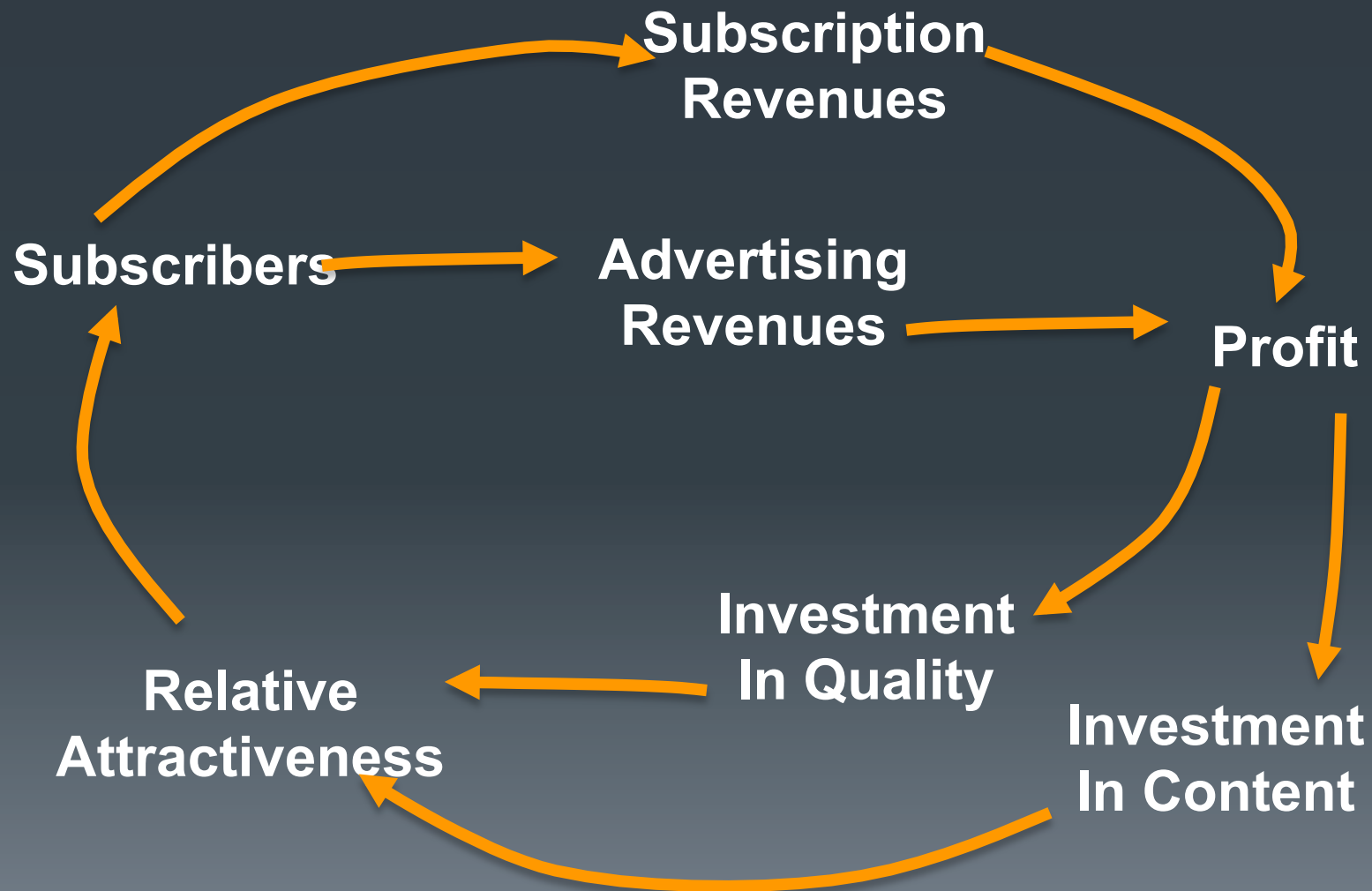
Question:

- **“What will happen to the distribution of subscribers in the television market as the preferences and demographics of the consumer group evolves?”**

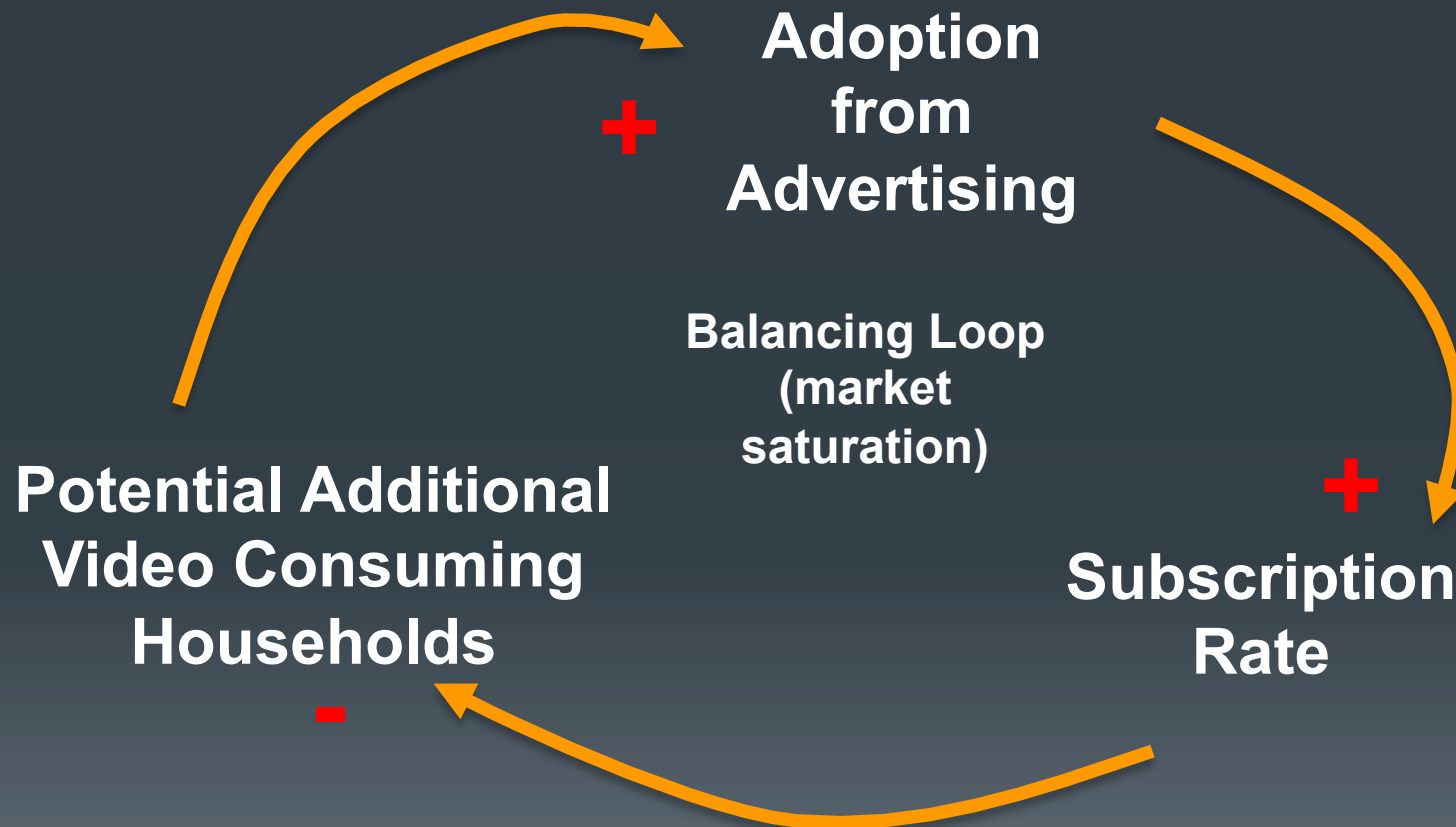
Method: System Dynamics Model

- **System Dynamics (SD) model of potential video subscriber preferences**
 - Problem articulation
 - Formulating reference modes
 - Formulating dynamics hypotheses
 - Creating causal loop diagrams
 - Creating simulation model
 - Testing
 - Evaluation and/or policy design

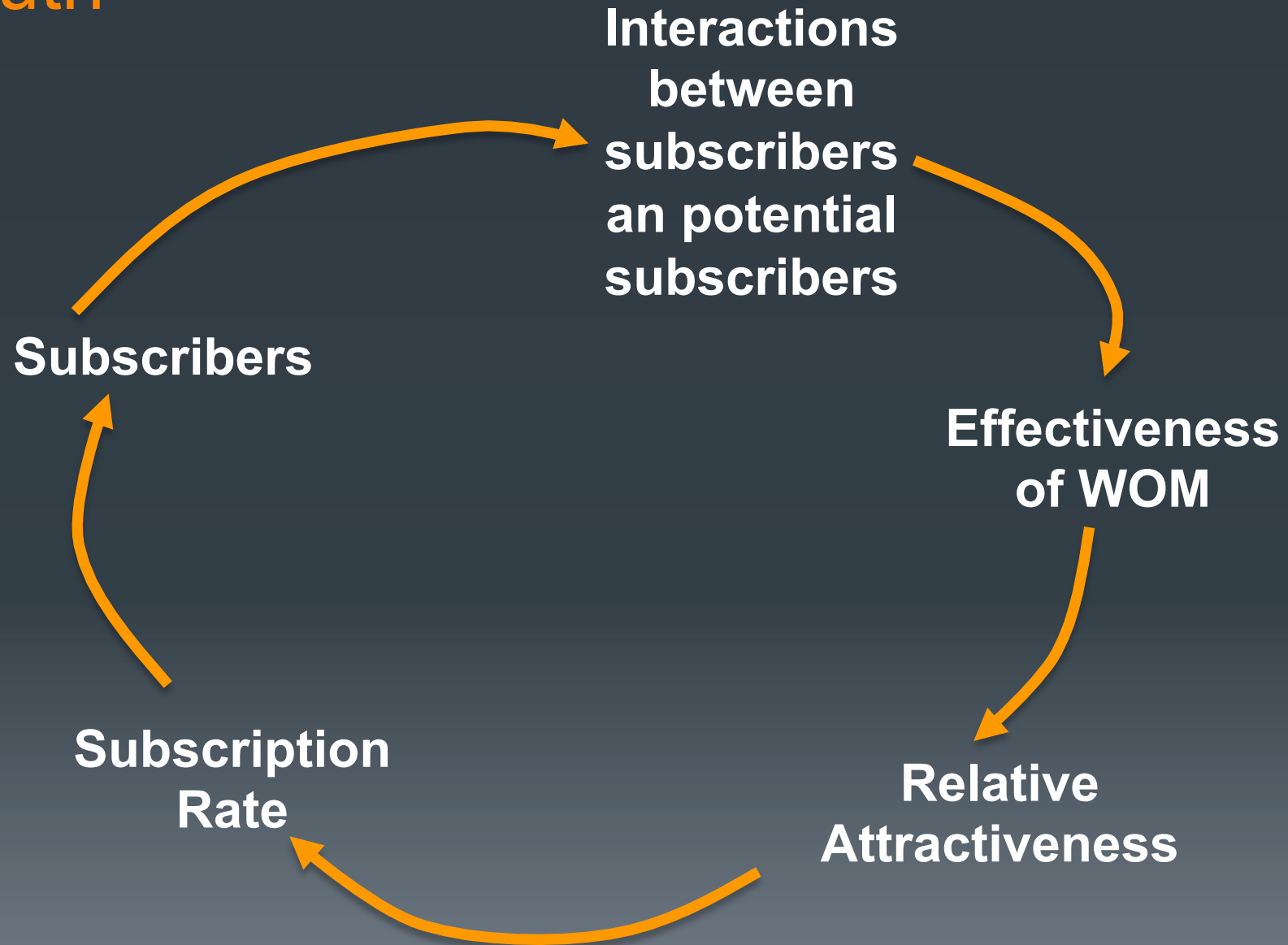
Subscription & Advertising Revenues Enable content & quality Investment



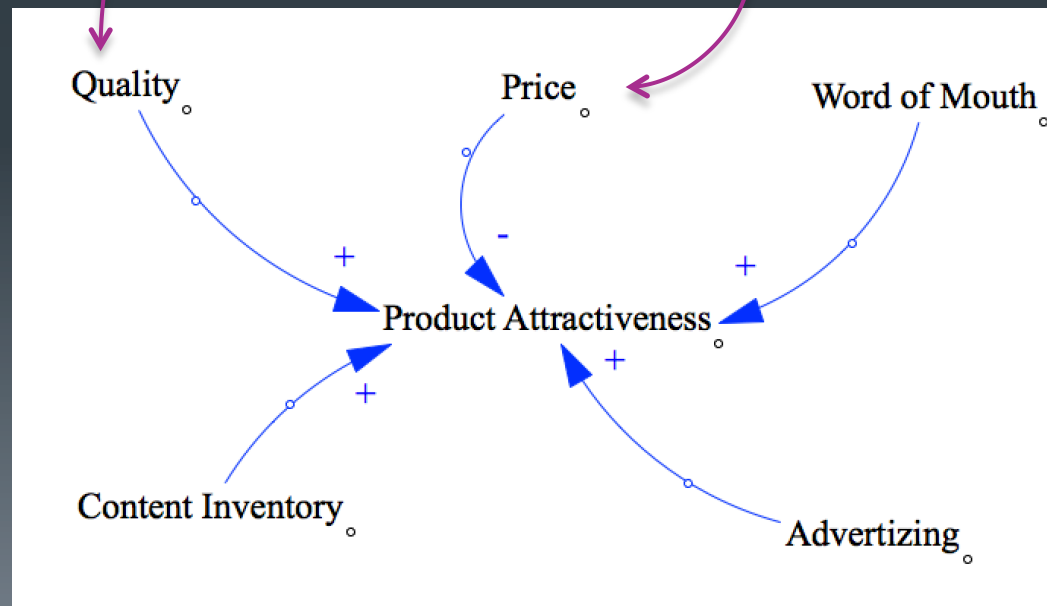
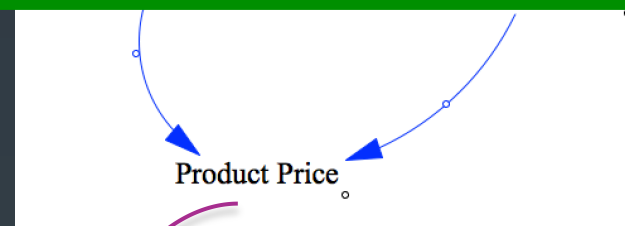
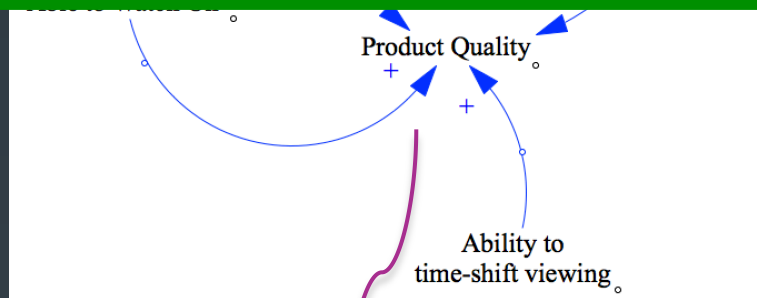
Important Feedbacks: Advertising Effectiveness



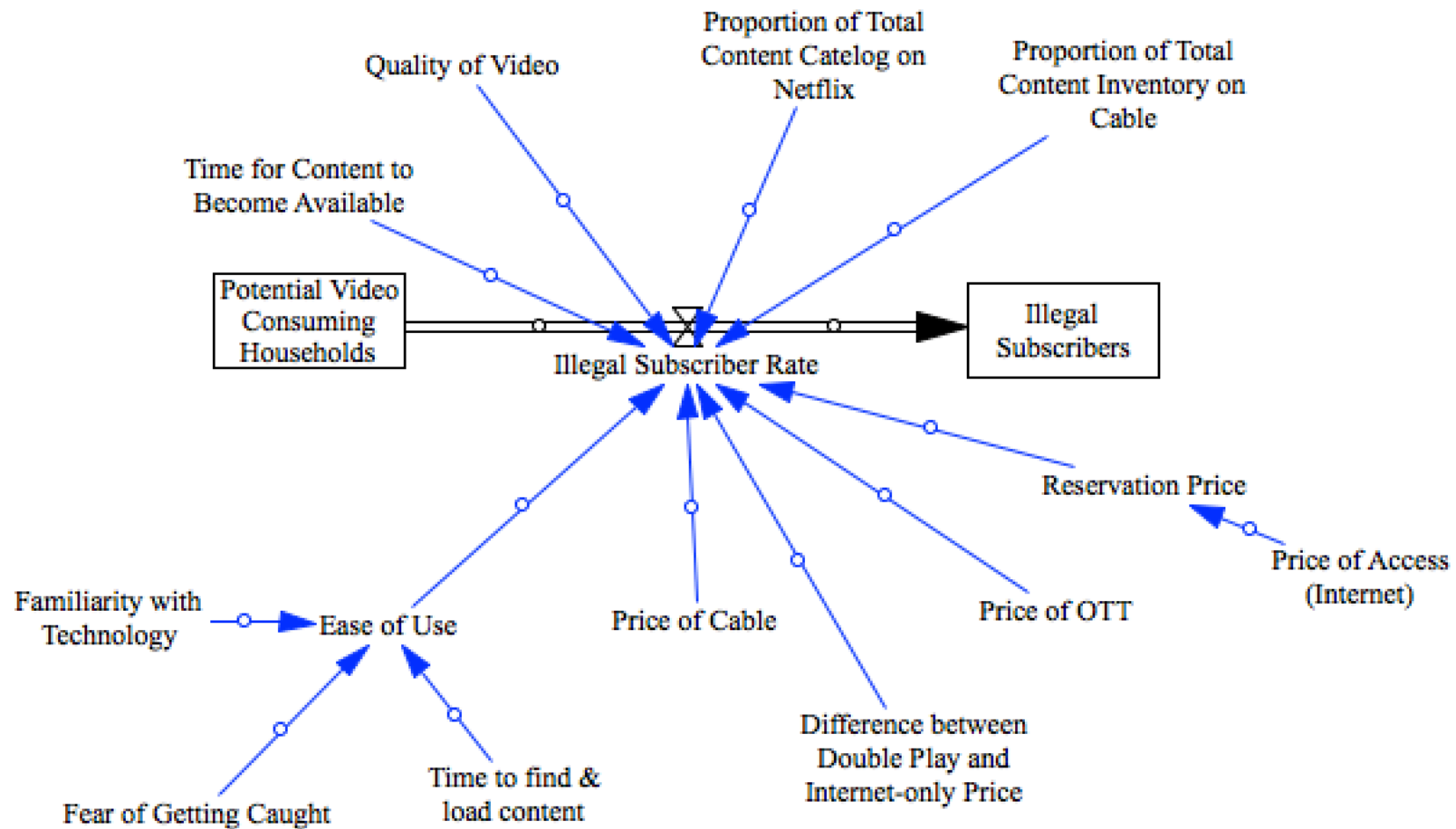
Important Feedbacks: Word of Mouth



**Product attractiveness =
F (speed, clarity, devices, price, time-
shifting, advertising, inventory, . . .)**



As Content and Quality improve, theft becomes more attractive.



Our Data Needs



- **Consumer purchasing behaviors, e.g.,**
 - **Factors affecting decision to subscribe**
 - **Verified differences amongst age groups**
- **Attrition rates**
- **Proportion of profits/revenues invested in content production**
- **Average cost of production for new content**
- **Effectiveness of advertising (of the TV distribution product)**
- **Non-revenue/pirated viewing data**



Questions?

Extra



Caveats & Assumptions



- Currently the model is of a finite, legal market, exploring how the market changes moving forward
 - Most interested in exploring possible futures (~10 years into the future)
 - Not calibrated to historical data at the moment
- Household growth isn't currently modeled
 - Goal is to do so – to capture a growing market
- Obviously, we don't live in an either/or world – you can purchase both Netflix and Comcast, or can watch illegally sometimes while paying for a legal option
- Assumed potential video consuming households are essentially the total US population
- \$25,000 minimum income as the threshold for being 'eligible' for a video experience

Future Work



- Ideally: perform large-scale survey about people's particular preferences and then calibrate the model based on that data.
- Modeling demand: a demand function based on elasticities that were gleaned from actual consumer surveys to transition people between the general population into potential video consuming households
- More in-depth data analysis – figure out how important are these factors in the model are, what the shapes of these graphs actually look like (e.g. currently estimated that the effect of price on attractiveness is the classic “S” adoption, using a sigmoid function – determine the specific shape)
- More nuanced age analysis: sub-divide population into even smaller age categories, divide into regions in the USA, etc.
- Building out the company investment and content production side of the story.
- Continuous instead of discrete time

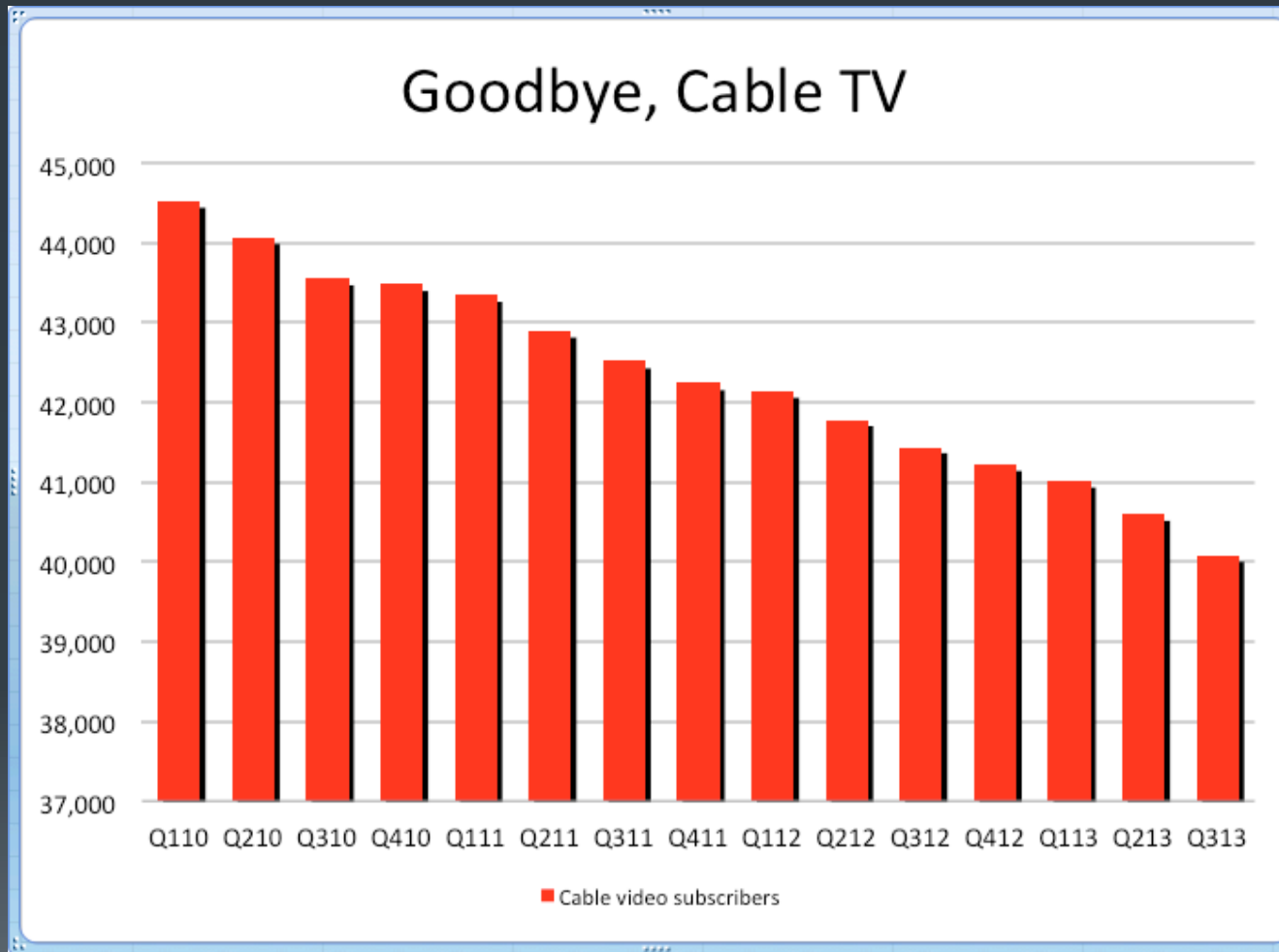
Multichannel Pay TV Breakdown:

U.S. Multichannel Pay TV Subscribers by Technology, 2012 (M)

Service	Subscribers
Cable TV	58.2
Satellite TV	34.1
Telco TV/IPTV	9.7
Total	102.0

Source: IDC, 2013

Cable Subscribers



Sources: Business Insider

<http://static1.businessinsider.com/image/528a3723eab8ea20181ab8bf-960/screen%20shot%202013-11-18%20at%2010.49.00%20am-1.png>

A Short History



A lot of (relatively) recent developments in the TV space...

- 1997: Netflix founded
- 2006: Amazon Instant Video launched (under name Amazon Unbox)
- 2007: Netflix launches streaming
- 2008: Hulu launched
- 2012: Netflix launches first original series
- 2013: Amazon launches first original programming

Key takeaway: many new players have recently come into existence and are disrupting the traditional TV value chain

Why System Dynamics



- SD is ideal for capturing and articulating problems that are evolving and interconnected, which this industry and problem most definitely are
- SD is also a great tool when there are feedbacks in the system, time delays, and stocks & flows
- Behavior is such a key part of the model
 - Both subscribers and the companies in the value chain (competitive behaviors)
 - System Dynamics allows us to consider these effects using of sensitivity analysis and/or reality checks.
- Useful for challenging mental models and as a learning tool for policy or decision makers in industry (or government)

Theoretical Underpinnings



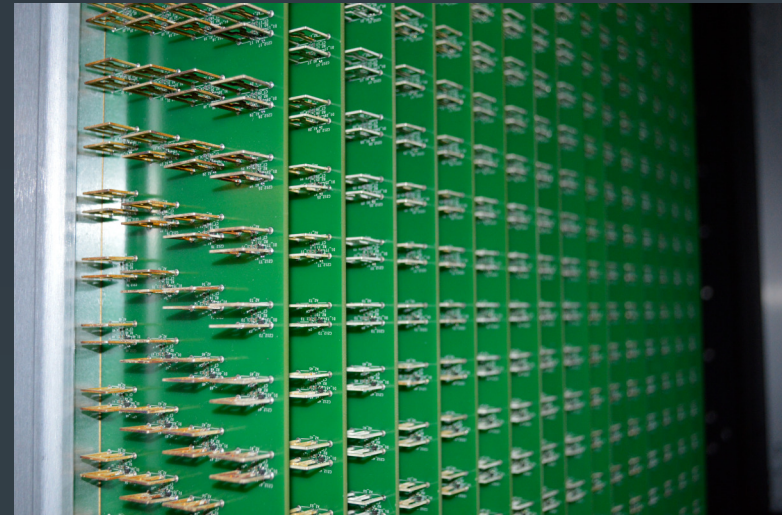
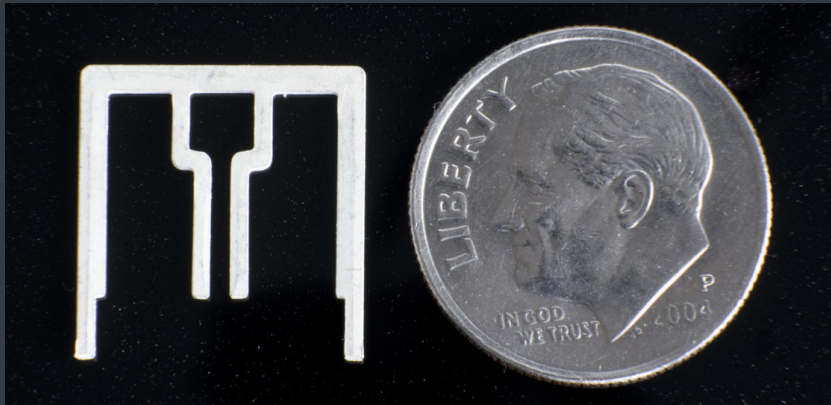
- Incumbent's Dilemma Model
- New product adoption theory
 - Bass model
 - Diffusion of Innovation (Rogers)
 - Innovator's Dilemma (Christensen)
 - Disruptive innovation
- Qualitative Choice Modeling (McFadden)

Simulation Model



- Moving from causal loop diagrams to simulation model
 - Add stock and flows to basic CLD
 - Add additional loops to CLD
 - Estimate the parameters and the initial conditions
 - Estimated using statistical means, market research data, analogous product histories, expert opinion, other relevant data sources (quantitative or judgmental)
 - Dynamics will depend on which loops dominate
- Simulations \neq predictions of the future
 - Use the model to explore possible futures
- Model can be used to design and evaluate new policies before trying them out in the real world

Aereo



Legalese:

- The basic legal question that is being asked is “Whether a company “publicly performs” a copyrighted television program when it retransmits a broadcast of that program to thousands of paid subscribers over the Internet.”

Who Is In The Value Chain?



- Content Producers:
 - Talent/Human Capital: e.g. The NFL, MLB, NBA, etc.
 - Studios: Warner Brothers, Disney, etc.
- Broadcast Networks: ABC, NBC, CBS, etc.
- Multichannel Pay TV Services
 - Cable Operators: Comcast, Time Warner, etc.
 - Cable Networks: e.g. HBO, ESPN, MTV
 - Direct Broadcast Satellite: e.g. DirecTV
 - Telco TV Services: e.g. Verizon FiOS
- Paid Subscription Over-The-Top (OTT) Video Services: Netflix, Amazon Instant Video, HuluPlus, etc.
- Device makers: Google (Chromecast), Apple (AppleTV), etc.
- Advertisers
- Subscribers

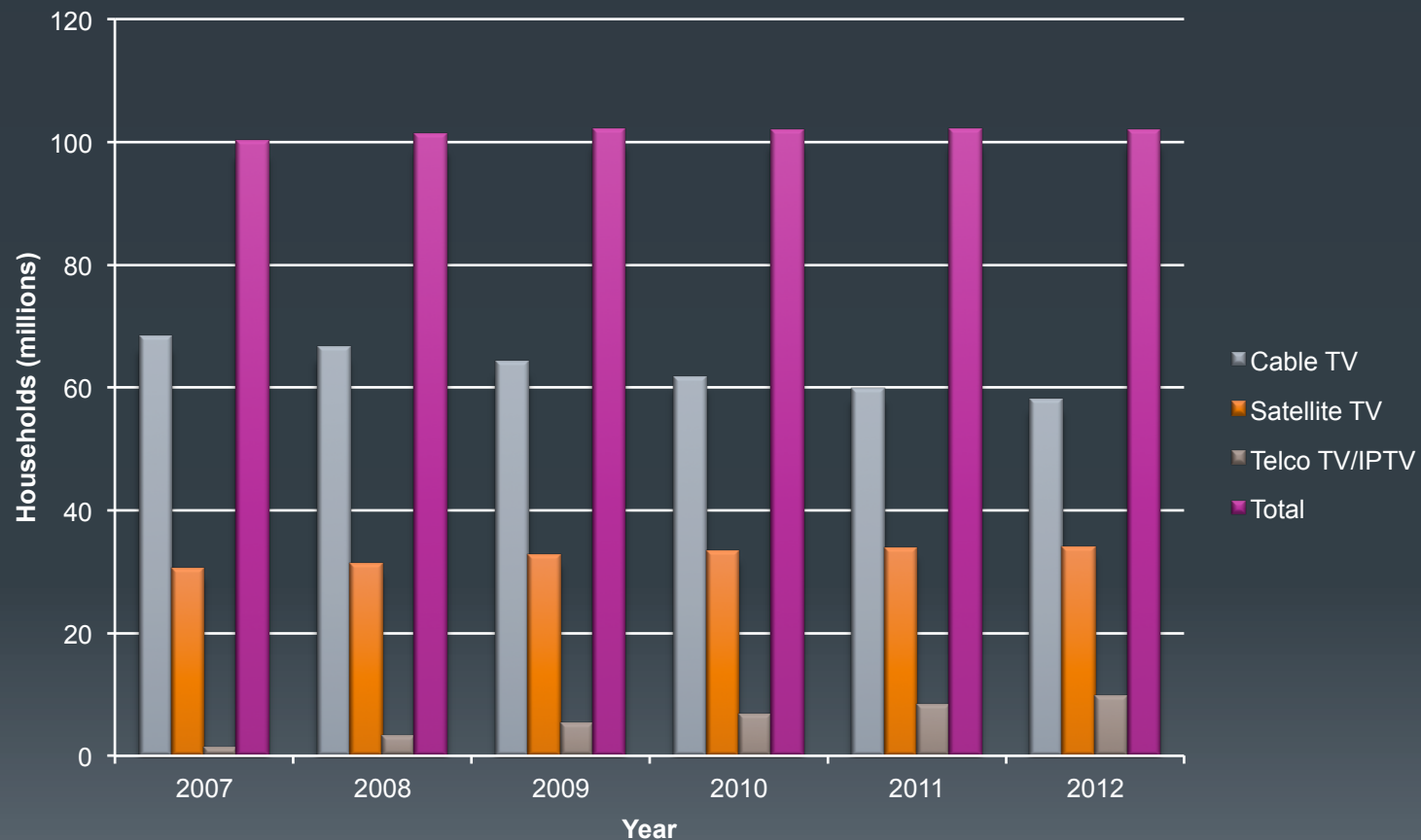
The Industry



- Industry is moving at a faster “clockspeed” than ever
 - A lot of innovation, even in just the last 5-7 years
 - Examples: Chromecast, Fire TV, Apple TV, Google TV, Roku, Android TV
 - Things are going to keep changing – the next frontier is search and navigation of content (and content options)
- The traditional TV distribution:
 - Bundling is still the dominant way of selling subscriptions
 - The “Triple Play” is still the most financially viable option
- Entrants *appear* to be more proactive in catering to the changing tastes – providing ‘consumer-in-control Internet television’
- Result:
 - Notable increases in the number of “cord-cutters,” “cord-shavers” and “cord-nevers”
 - The rising popularity of online streaming options
 - And the continuous ringing of the death knells of traditional TV delivery...

Multichannel Pay TV Subscribers

USA Multichannel Pay TV Subscribers



Data Source: IDC <http://www.idc.com.libproxy.mit.edu/getdoc.jsp?containerId=240807&pageType=PRINTFRIENDLY>

Causal Loop Diagrams: The Basics

- They represent feedback structures of a system and capture hypotheses about the causes of dynamics
- Very simplified diagram, with just the most basic feedbacks
- The mechanics:
 - Variables connected by causal links
 - Links have polarities – indicate how the dependent variable changes when the independent variable changes
 - Loops
 - Positive or reinforcing loops
 - Negative or balancing loops

