

Digital Innovation Challenges

Platforms, Ecosystems, Control & Generativity

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Digital Infrastructures



600 million users
2 million status updates during each episode of X-Factor

Digitalization

Analogue =
Tight Coupling

Storage Format



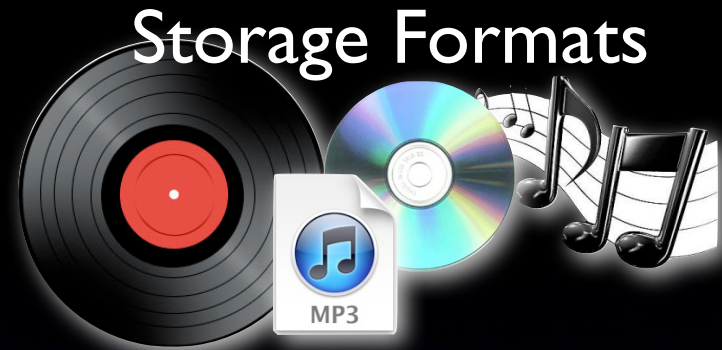
Processing Technology



Distribution Technology



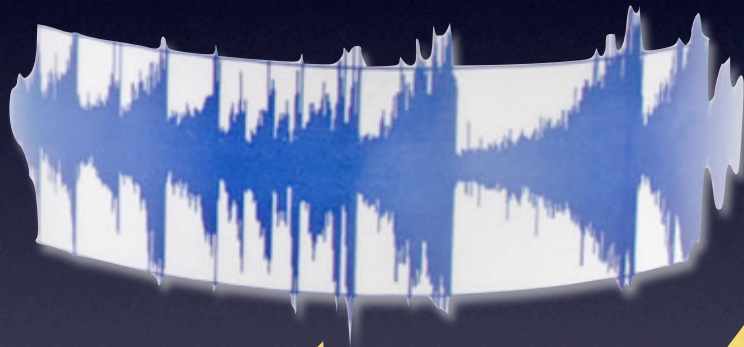
Digital = Loose Coupling



Processing Technology



Distribution Technology



Music



Global Music Industry Turnover (1973-2009)

In Billions

Source: RIAA year-end shipment statistics; Bain analysis

\$15

\$10

\$5

\$0

1973

1977

1981

1985

1989

1993

1997

2001

2005

2009

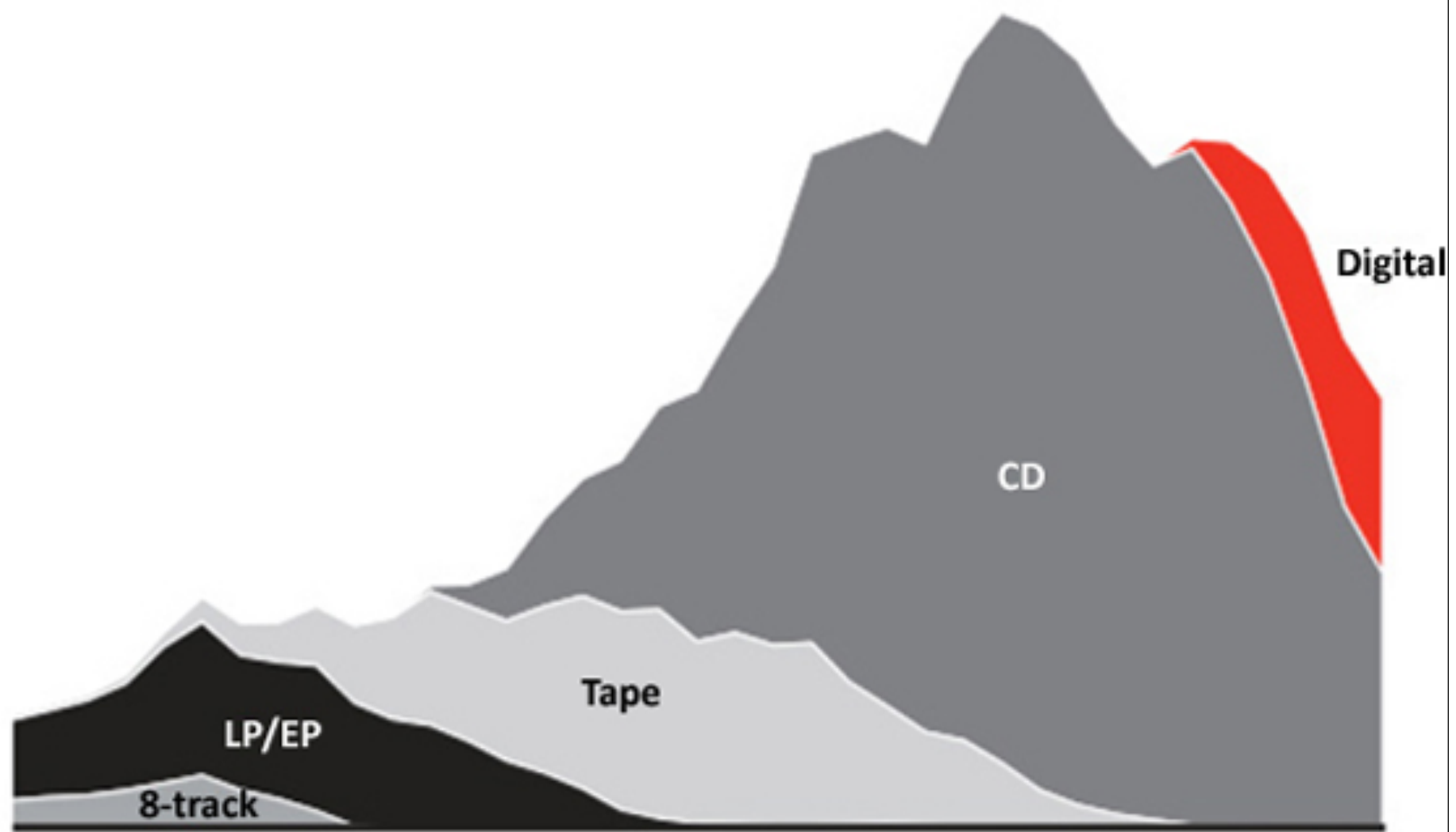
LP/EP

8-track

Tape

CD

Digital



The Unfreezing and Freezing of Control

	Media Industry	Computer Industry	Telecoms Industry	iPad	Research
Content	Publishing House	End-User	End-user or other sectors	Publishing houses but...	Media Studies
Application	LP, CD, VHS, DVD	Hardware and software manufacturers	Handsets	...controlled by Apple through a....	Computer Science & Information Systems
Infrastructure	Wholesale & Retail	Internet, computer industry standards	Telecommunication infrastructuresdelivery platform controlled by Apple	Electronic Engineering

Convergence

Convergence and Divergence

© 1996 by Randy Glasbergen.
E-mail: randyg@norwich.net



**“Hello, Bob? It’s your father again.
I have another question about my new computer.
Can I tape a movie from cable TV then fax it from
my VCR to my CD-ROM then E-mail it to my
brother’s *cellular phone* so he can make a
copy on his neighbor’s camcorder?”**

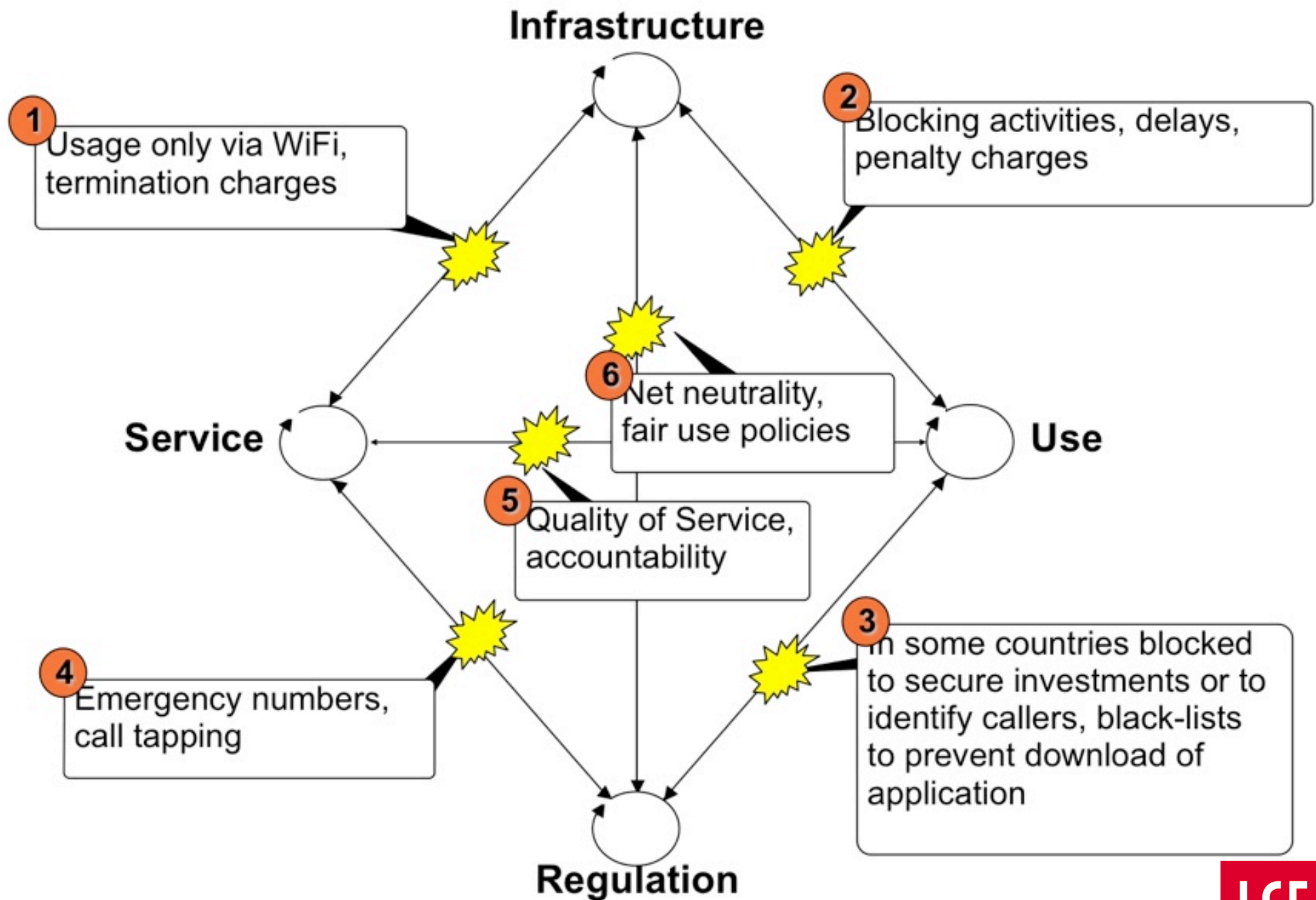
Digital Convergence

- Any output from any process can in principle be input to any other process
- Convergence and divergence two sides of the same coin
- Convergence for some can be divergence for others, e.g., GSM+Skype+FaceTime
- “Rip-Mix-Burn” culture
- Unfreezing and refreezing of control arrangements – Apple now also distributor of music, movies, TV, books, and software
- Transformation of industries

Tussles & Control Points

Tussles in Cyberspace

- Tussles - conflicting collaboration (Clark, 2002)
- Control Points
- Digital markets
- Flexible control points (Herzhoff, 2009)
- Sharing (Benkler, 2005)
- Incompatible goals
 - For example two network operators share their networks, conflicts might emerge on how much information the two operators want to share with each other
- Ongoing contention among parties with conflicting interests
- Not competition but direct actions between parties based on incompatible goals
- Positive effects on innovation but can on the other hand also lead to severe break-down in the network
- The Internet shaped by tussle:
 - technical mechanism
 - laws
 - judges
 - societal opinion
 - shared values



(Herzhoff, Elaluf-Calderwood & Sørensen, 2010)

	Infrastructure	Service	Regulation	Use
Control Points	<ul style="list-style-type: none"> • Compression server • Prioritization • Contract • Subsidies • Handover • Billing • Authentication • Gateways • Router 	<ul style="list-style-type: none"> • Delivery • Contract • Subsidies • Authentication • Billing • Interconnection charges • Roaming Agreements • Application Store 	<ul style="list-style-type: none"> • Interconnection charges • Regulation on emergency numbers and VoIP tapping • ... 	<ul style="list-style-type: none"> • Device <ul style="list-style-type: none"> • Firmware • Button • Reflash • Chipset • Configuration • Update • OS • Cell information
Triggers	<ul style="list-style-type: none"> • LTE 	<ul style="list-style-type: none"> • Video 	<ul style="list-style-type: none"> • Net Neutrality 	<ul style="list-style-type: none"> • Mass scale • Sim-only

“There is a provision in Apple’s agreement with AT&T that obligates Apple not to include functionality in any Apple phone that enables a customer to use AT&T’s cellular network service to originate or terminate a VoIP session without obtaining AT&T’s permission.” (Apple’s Response to FCC, August 2009)

Platforms

Burning Platforms

I have learned that we are standing on a burning platform. And, we have more than one explosion - we have multiple points of scorching heat that are fuelling a blazing fire around us. [...] Apple disrupted the market by redefining the smartphone and attracting developers to a closed, but very powerful ecosystem. In 2008, Apple's market share in the \$300+ price range was 25 percent; by 2010 it escalated to 61 percent. [...] Apple demonstrated that if designed well, consumers would buy a high-priced phone with a great experience and developers would build applications. They changed the game, and today, Apple owns the high-end range.

Nokia CEO Stephen Elop

<http://www.engadget.com/2011/02/08/nokia-ceo-stephen-elop-rallies-troops-in-brutally-honest-burnin/>



Control & Generativity

- Paradoxical relationship
 - Allowing for highly decentralised and open modalities of use with little centralised control and
 - Commodifying complex functionality for the operation of complex technology so it becomes a usable utility in the hand of users
- Zittrain's and Lessig's visions of the future of the Internet vs Norman's vision of the disappearing computer
- Paradox not a simple problem to solve once and for all.

Apple vs Google

Apple	Google
iTunes App Store	Android Market Place
iOS	Android
Handset dongle	Advertisement
Premium brand	Premium to medium
Pre-approval	Post-yanking
Tight control	Loose control

Dramas in Cyberspace

1. Intellectual Property: **Google** vs. (IP regulation and publishers)
2. e-Books: **Apple** vs. (Publishers)
3. Adobe Flash: **Adobe** vs. (Apple)
4. Adult Content: **Content Providers** vs. (Apple)
5. Google Voice: **Google** vs. (Apple)
6. iPhone Jailbreaking: **Hackers** vs. (Apple)
7. Android Market Kill Switch: **Criminals** vs. (Google)
8. Mobile Advertising: **Google** vs. (FTC US regulators)
9. iOS Developer Tools: **Adobe** vs. (Apple)
10. Wireless Tethering: **Developers** vs. (Apple)

Protagonist vs. (Antagonist)

Flash – Google

3. Adobe Flash Adobe vs. (Apple)	Outline Description: Concerns the tussle between Apple and Adobe concerning Apple's ban on the use of Adobe Flash on the iPhone.	
	Action#1	Adobe has frequently expressed its interest in enabling Flash on the iPhone.
	Action#2	Apple continues to disallow Flash citing security and battery consumption issues
	Action#3	Applications are released (e.g. Skyfire), which enable the viewing of Flash content on the iPhone, without Flash actually being present on the handset

5. Google Voice Google vs. (Apple)	Concerns the tussle between Google and Apple over the availability of Google Voice as a native application on the Apple App Store	
	Action#1	Apple initially accepts Google Voice, and derived applications, onto the App Store
	Action#2	Apple bans Google Voice, and derived apps, claiming an overlap with iPhone functionality
	Action#3	Google appeals to Federal Trade Commission, who investigate, but Apple retain the ban
	Action#4	Google launches a Web App version of Google Voice circumventing Apple's control
	Action#5	Apple eventually allows Google Voice in the iPhone

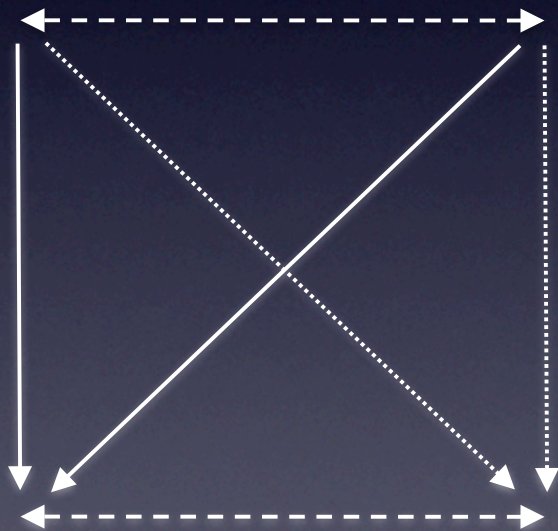
Mobile Platform DNA?

Protagonist

Generative Actions

Requesting

Influencing



Bypassing

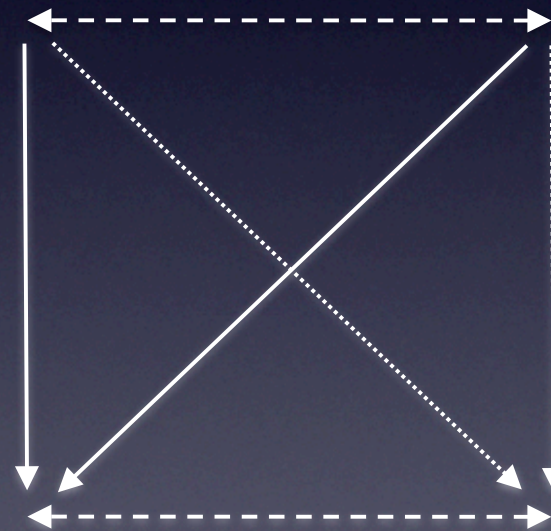
Regrouping

Antagonist

Control Actions

Allowing

Blocking



Ignoring

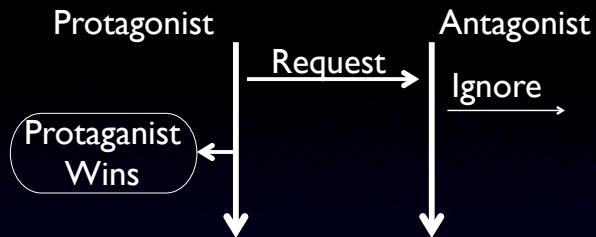
Refining

(Eaton, Elaluf-Caldenwood, Sørensen & Yoo, 2011)

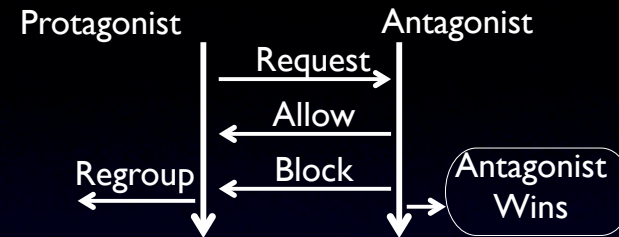
Story	Intellectual Property	e-books	Alternative iPhone Application Stores	Adobe Flash	Adult Content	Google Voice
Protagonist	Google	Apple	App Store Providers	Adobe	Content Providers	Google
Antagonist	Publishers	Publishers	Apple	Apple	Apple	Apple
Action#1	Request (P)	Request (P)	Request(P)	Request(P)	Request(P)	Request(P)
Action#2	Ignore (A)	Ignore (A)	Block(A)	Allow(A)	Allow(A)	Allow(A)
Action#3			Bypass(P)	Block(A)	Block(A)	Block(A)
Action#4				Bypass(P)	Bypass(P)	Influence (P)
Action#5						Bypass(P)
Action#6						Refine(A)
Outcome	Protagonist Wins		Protagonist Wins			
Plot	Antagonist "Passive"		Protagonist chooses to "Bypass"			

Story	iPhone Jailbreaking	Android Market Kill Switch	Mobile Advertising	iOS Developer Tools	Wireless Tethering
Protagonist	Hackers	Rogue Developers	Google	Adobe	Developers
Antagonist	Apple	Google	FCC	Apple	Apple
Action#1	Request(P)	Request(P)	Request(P)	Request(P)	Request(P)
Action#2	Allow(A)	Allow(A)	Block(A)	Allow(A)	Allow(A)
Action#3	Block(A)	Block(A)	Refine(A)	Block(A)	Block(A)
Action#4	Regroup(P)	Regroup(P)		Refine(A)	Refine(A)
Action#5					
Action#6					
Outcome	Antagonist Wins		Antagonist Wins		
Plot	Antagonist "Blocks"		Antagonist "Refines"		

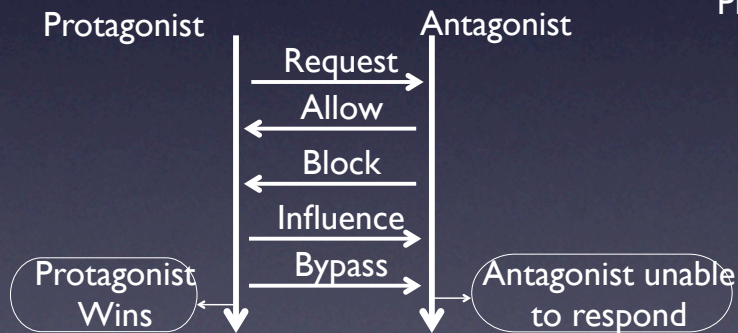
1) Antagonist is Passive
- Intellectual Property



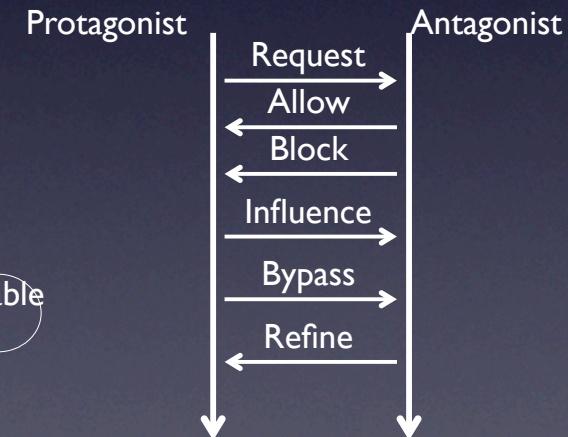
2) Antagonist Blocks
- iPhone Jailbreaking



3) Protagonist Bypasses
- Adult Content

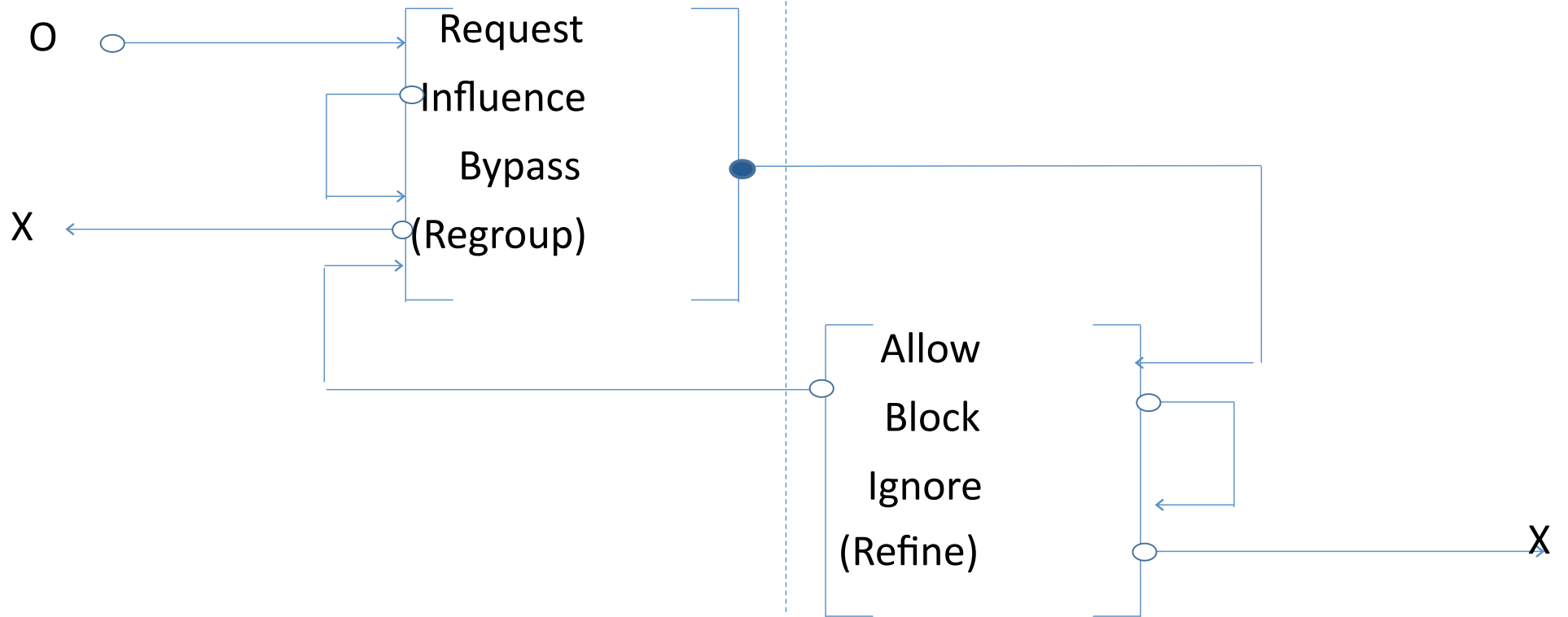


4) Antagonist Relent
- Developer Tools



Protagonist

Antagonist



KEY

Request = Action

O = Start

○ → = Optional Transition

(Regroup)

= Not possible as 1st Action

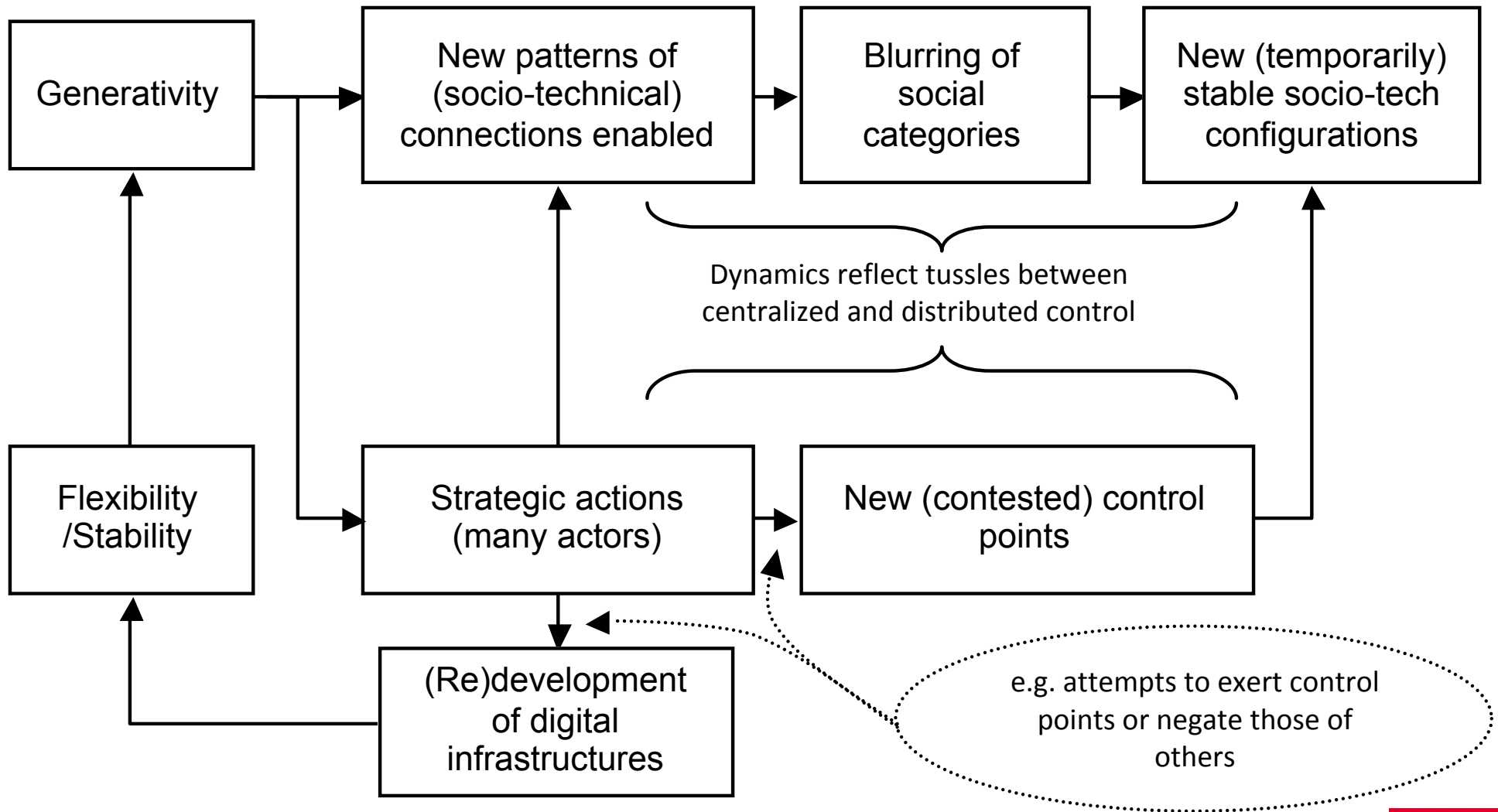
X = End

● → = Mandatory Transition

Paradox	Definition	Patterns	Examples	Control Strategy	Complexity
Acceptance	Antagonist does not attempt to resolve the control/generativity paradox.	Antagonist Passive - <i>Protagonist Wins</i>	1. Intellectual Property 2. e-books	Entirely open by default	None
Spatial Separation	Antagonist resolves the paradox through spatial separation	Antagonist Blocks - <i>Antagonist Wins</i>	6. iPhone Jailbreaking 7. Android Market Kill Switch	Selectively open and close platform by class of innovation	Medium
Temporal Separation	Antagonist resolves the paradox by situating control at different temporal locations	Antagonist Relents - <i>Antagonist and Protagonist Draw</i>	8. Mobile Advertising 10. Wireless Tethering	Selectively open and close platform over time for all classes of innovation	Medium
Synthesis	<i>Antagonist or Protagonist</i> resolves the paradox through synthesis.	Antagonist Relents - <i>Antagonist and Protagonist Draw</i>	9. iOS Developer Tools	Recognising that the paradox is more complex than can be solved by a simple strategy and instead selectively differentiate in control strategy by reducing the negative impact of blocking	High
		Protagonist Bypasses - <i>Protagonist Wins</i>	3. Adobe Flash 4. Adult Content 5. Google Voice 11. Alternative iPhone App Stores		

Digital Infrastructures

Digital Infrastructure Dynamics



(Tilson, Lyytinen, Sørensen, 2010)



Digital Infrastructures

- **Relational** across layers not recursively organised. Electricity and water utilities cannot generatively create new infrastructure businesses to challenge incumbents.
- Extremely **scalable**: Components relatively easily replaced and upgraded
- **Upwards flexible**: Open to creation of higher-level services
- **Downwards flexible**: Wide range of networks potentially providing interconnectivity
- **Paradoxes** of change and control
- **Change**: Change through growth and new standards enabled by stable standards and -installed base.
- **Control**: Increased control can both hinder and facilitate increased generativity

- Benkler, Y. (2005): "Sharing Nicely": On Shareable Goods and the Emergence of Sharing as a Modality of Economic Production. *The Yale Law Journal*, vol. 114, pp. 273-358. <http://www.benkler.org/SharingNicely.html>
- Benkler, Y. (2006): *The Wealth of Networks*. Yale University Press.
- Clark, D. D., J. Wroclawski, K. R. Sollins, & R. Braden (2005): Tussle in Cyberspace: Defining Tomorrow's Internet. *IEEE/ACM Transactions on Networking*, vol. 13, no. 3, pp. 462-475.
- Ciborra, C. U. & O. Hanseth (2000): Introduction: From Control to Drift. In *From Control to Drift*, ed. C. Ciborra and Associates. Oxford: Oxford University Press.
- Eaton, B., S. Elaluf-Calderwood, C. Sørensen, & Y. Yoo (2011): Dynamic Structures of Control and Generativity in Digital Ecosystem Service Innovation: The Cases of the Apple and Google Mobile App Stores. Submitted to *International Journal*. <http://is2.lse.ac.uk/wp/pdf/WP183.PDF>
- Eaton, B., S. Elaluf-Calderwood, C. Sørensen, & Y. Yoo (2011): Structural Narrative Analysis as a means to unfold the Paradox of Control and Generativity that lie within Mobile Platforms. In *The 10th International Conference on Mobile Business*, Como, Italy
- Eaton, B., S. Elaluf-Calderwood, & C. Sørensen (2010): The Role of Control Points in Determining: Business Models for Future Mobile Generative Systems. In *Proceedings of joint 9th International Conference on Mobile Business (ICMB 2010) and 9th Global Mobility Roundtable (GMR 2010)*, Athens:
- Eaton, B., S. Elaluf-Calderwood, & C. Sørensen (2010): A Methodology for Analysing Business Model Dynamics for Mobile Services using Control Points and Triggers. In *Business Models for Mobile Platforms (BMMP 2010)*, Berlin:
- Elaluf-Calderwood, S., C. Sørensen, B. Eaton, & J. Herzhoff (2011): Control Points and Tussles in Flexible Mobile Network Innovation. In *European Conference of Information Systems - ECIS 2011*, Helsinki, Finland:
- Farjoun, M. (2010) Beyond Dualism: Stability and Change as a Duality. *Academy of Management Journal*, 35(2): 202-225.
- Hanseth, O. & K. Lyytinen (2010): Design Theory for Dynamic Complexity in Information Infrastructures: The Case of Building Internet. *Journal of Information Technology*, vol. 25, no. 1, pp. 1-19.
- Herzhoff, J. (2009): The ICT Convergence Discourse in The Information Systems Literature – A Second-Order Observation. In *European Conference of Information Systems (ECIS)*, Verona, Italy.
- Herzhoff, J. (2010): Convergence and Mobility: Just Another Fad or Fashion? A Systems-Theoretical Analysis. In *18th European Conference on Information Systems (ECIS)*, South Africa.
- Herzhoff, J. (2011): *Unfolding the Convergence Paradox: The Case of Mobile Voice-Over-IP in the UK*. PhD Thesis, London School of Economics and Political Science.
- Herzhoff, J., S. Elaluf-Calderwood, & C. Sørensen (2010): Convergence, Conflicts, and Control Points: A Systems-Theoretical Analysis of Mobile VoIP in the UK. In *Proceedings of joint 9th International Conference on Mobile Business (ICMB 2010) and 9th Global Mobility Roundtable (GMR 2010)*, Athens:
- Lessig, L. (1999): *Code and Other Laws of Cyberspace*. New York: Basic Books.
- Lessig, L. (2002): *The Future of Ideas: The Fate of the Commons in a Connected World*. New York: Vintage Books.
- Nielsen, P. & O. Hanseth (2010): Towards a Design Theory of Usability and Generativity. In *18th European Conference on Information Systems (ECIS)*, South Africa.
- Saltzer, J. H., D. P. Reed, & D. D. Clark (1984): End-To-End Arguments in System Design. *ACM Transactions on Computer Systems*, vol. 2, no. 4, pp. 277–288.
- Shapiro, C. & H. R. Varian (1998): *Information Rules: A Strategic Guide to the Network Economy*. Harvard Business School Press.
- Sørensen, C., Y. Yoo, K. Lyytinen, & J. I. DeGross, ed. (2005): *Designing Ubiquitous Information Environments: Socio-technical Issues and Challenges*. New York: Springer.
- Sørensen, C. (2011): *Enterprise Mobility: Tiny Technology with Global Impact on Work*. Technology, Work and Globalization Series. Palgrave. Available August 2011.
- Sørensen (2011): Mobile IT. In *The Oxford Handbook of Management Information Systems: Critical Perspectives and New Directions*, ed. Galliers and Currie. Oxford: Oxford University Press.
- Tilson, D. (2008): *The Interrelationships Between Technical Standards and Industry Structures: Actor-Network Based Case Studies of the Mobile Wireless and Television Industries in the US and the UK*. Unpublished Doctoral Dissertation, Case Western Reserve University.
- Tilson, D., K. Lyytinen, C. Sørensen, & J. Liebenau (2006): Coordination of technology and diverse organizational actors during service innovation: The case of wireless data services in the United Kingdom. In *Helsinki Mobility Roundtable*, Finland.
- Tilson, D., Lyytinen, K., & Sørensen, C. (2010) Desperately Seeking the Infrastructure in IS Research: Conceptualization of "Digital Convergence" as the Co-evolution of Social and Technical Infrastructures. In *43rd Hawaii International Conference on System Science (HICSS 43)*, Kauai.
- Tilson, D., Lyytinen, K., & Sørensen, C. (2010) Digital Infrastructures: The Missing IS Research Agenda. *Information Systems Research*, 20(4): 748-759.
- Tilson, D., C. Sørensen, & K. Lyytinen (2011): The Paradoxes of Change and Control in Digital Infrastructures: The Mobile Operating Systems Case. In *The 10th International Conference on Mobile Business*, Como, Italy
- Tiwana, A., B. Konsynsky, & A. A. Bush (2010): Platform Evolution: Coevolution of Platform Architecture, Governance, and Environmental Dynamics. *Information Systems Research*, vol. 21, no. 4, pp. 675-687.
- Wu, T. (2010): *The Master Switch: The Rise and Fall of Information Empires*. Knopf Publishing Group.
- Yoo, Y., O. Henfridsson, & K. Lyytinen (2010): The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research. *Information Systems Research*, vol. 21, no. 4, pp. 724-735.
- Zittrain, J. (2008): *The Future of the Internet: And How to Stop It*. Allen Lane.
- Zittrain, J. (2008): Ubiquitous Human Computing. *Philosophical Transactions of The Royal Society*, vol. 366, pp. 3813-3821.