Policy Challenges:
I. Back to Basics
II. Technology Adoption

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I. Back to Basics

- Contrasting the business / market lens with the policy lens
- Contrasting goals

Contrasting Business and Policy

	Business / Market Lens	Policy Lens
1. Unit of Analysis	Individual	Community
2. Motivations	Self-interest	Public interest (as well as self-interest)
3. Chief conflict	Self-interest vs. self-interest	Self-interest vs. public interest (commons problems)
4. Sources of people's ideas and preferences	Self-generation within the individual	Influences from the outside

Contrasting Business and Policy

	Business / Market Lens	Policy Lens
5. Nature of collective activity	Competition	Cooperation and competition
6. Criteria for individual decision making	Maximizing self-interest, minimizing cost	Loyalty (to people, places, organizations, products), maximize self-interest, promote public interest
7. Building blocks of social action	Individuals	Groups and organizations

Contrasting Business and Policy

	Business / Market Lens	Policy Lens
8. Nature of information	Accurate, complete, fully available	Ambiguous, interpretive, incomplete, strategically manipulated
9. How things work	Laws of matter (e.g. material resources are finite and diminish with use)	Laws of passion (e.g. human resources are renewable and expand with use)
10. Sources of change	Materials exchange Quest to maximize own welfare	Ideas, persuasion, alliances Pursuit of power, pursuit of own welfare, pursuit of public interest

Contrasting Goals

- Business / market goals
  - Maximize profit, minimize cost, efficiency, speed, etc.
- Policy goals
  - Equity
    - Treating likes alike
  - Efficiency
    - Getting the most output for a given input
  - Security
    - Satisfaction of minimum human needs
  - Liberty
    - Do as you wish as long as you do not harm others

In Summary

- Move to more business-like practices of a performance-based organization is only the first step

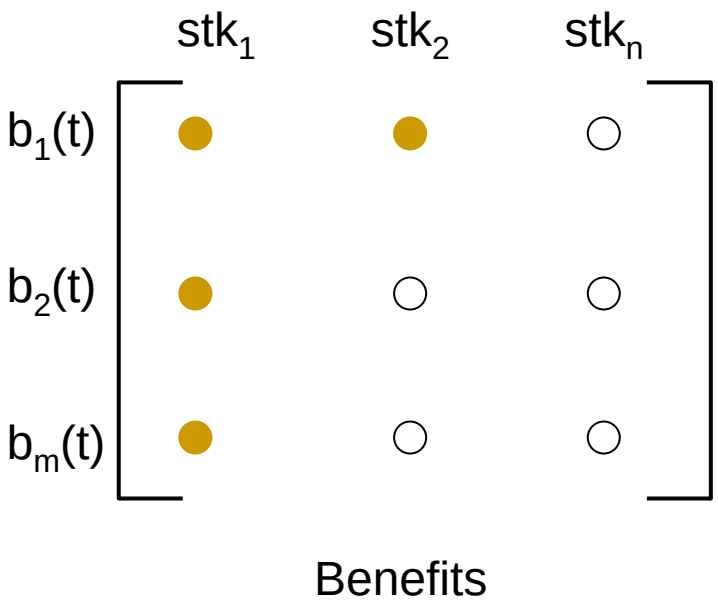
- System-wide transformation and change affect the whole NAS enterprise

II. Conceptual Framework for Thinking about Technology Adoption

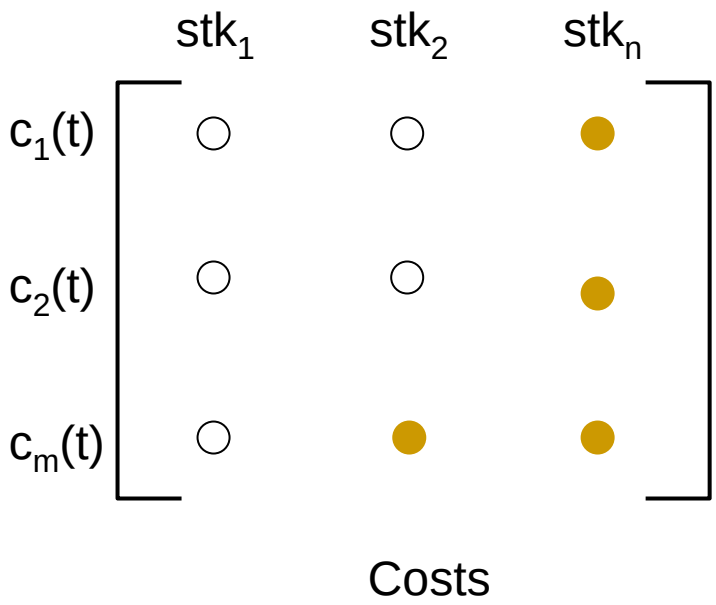
- How is value distributed among stakeholders and across time?
- What are the network effects on value?
- How can we use this information to encourage equipage adoption?

Value Distribution: Stakeholders

- Value = Benefit at cost. How are costs and benefits distributed between stakeholders?



Benefits

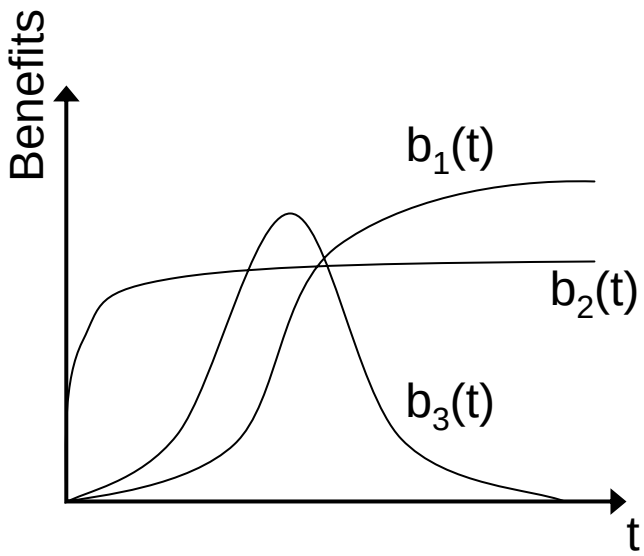


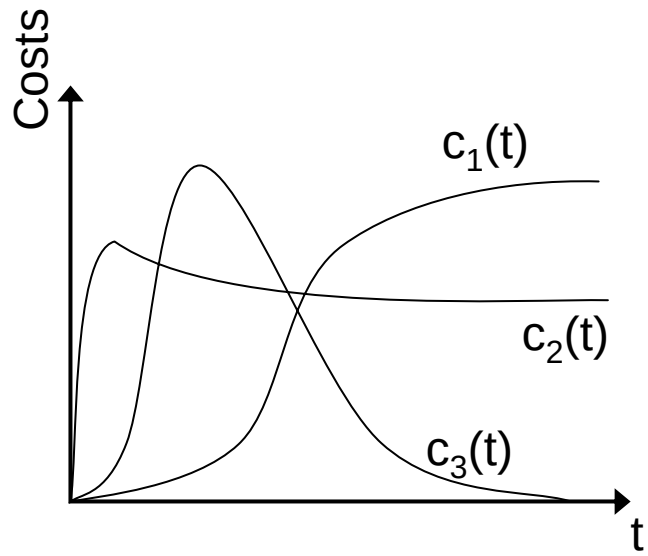
Costs

Looking at costs and benefits in this way can reveal imbalances in how they are distributed

Value Distribution: Time

- How are costs and benefits distributed over time?

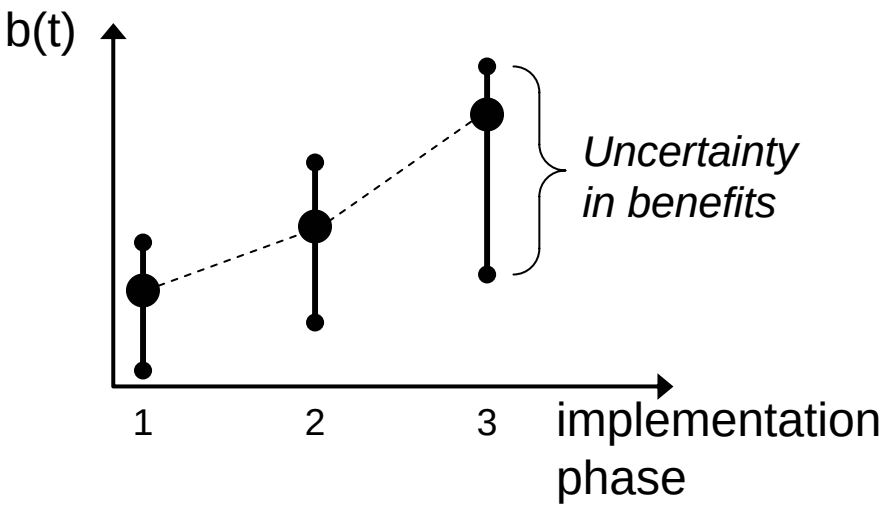


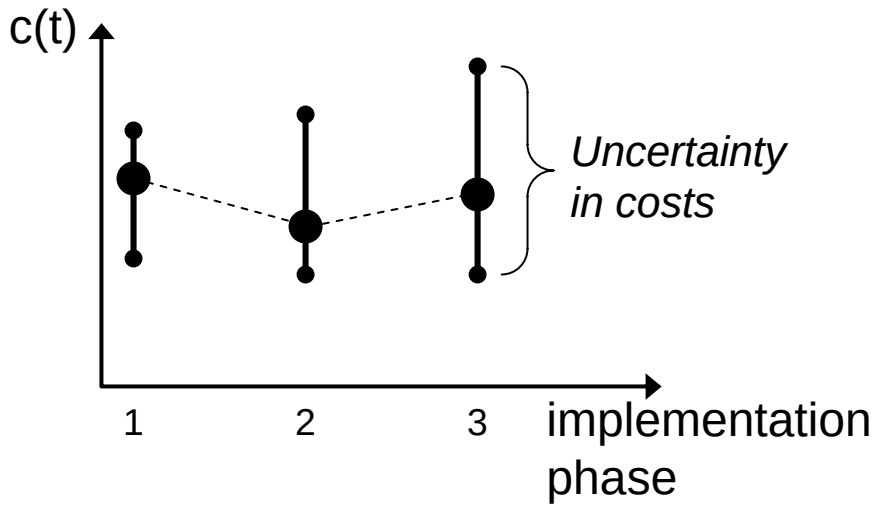


- Consider different types of cost
  - E.g., installation, training, operation

Phased Value Analysis

- Show how costs & benefits accrue over **implementation phases** for different stakeholders
- Identify cost and benefit **realization risks**





Positive long-term NPV necessary but may not be sufficient

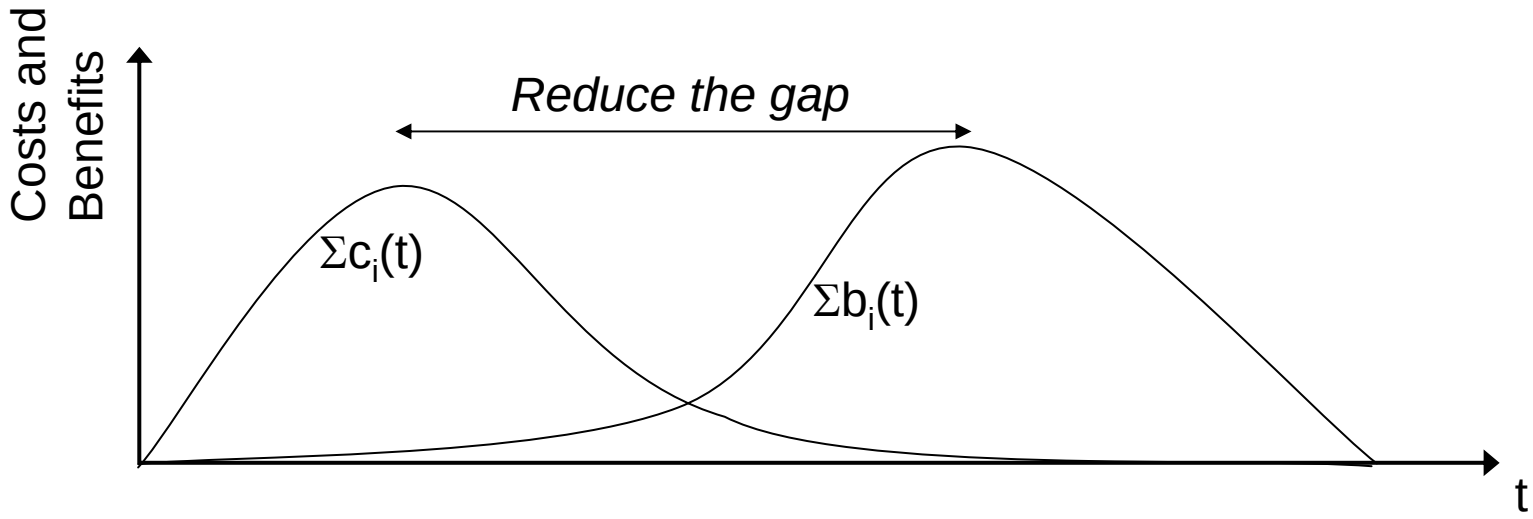
- Time to positive ROI excessive
- Uncertainty in costs/benefits excessive

Policy is often needed to foster technology transitions

- Reduce value imbalances and uncertainties
- Overcome stakeholder reluctance

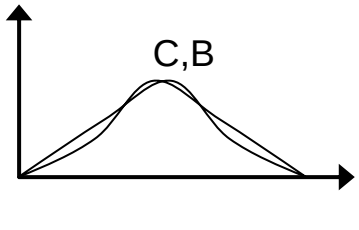
- Stakeholders reluctant if:
  - Costs are high
  - Perception that benefits are limited, doubtful, may be delayed, short-lived, or free rider option
- Stakeholders enthusiastic if:
  - Costs are low relative to benefits
  - Perception that benefits are pervasive, rapid, clear, long-lived, no free rider option

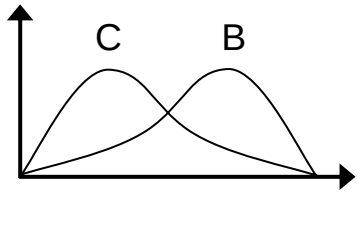
Accelerating Benefits and Delaying Costs Addresses Time-phased Value Distribution

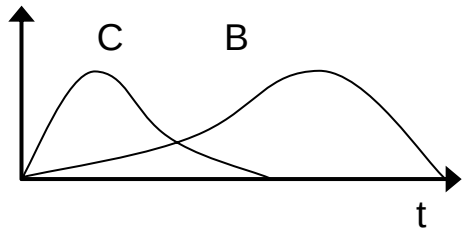


- Investment more attractive if benefits quickly realised more quickly
- Positive NPV over short term is better, especially when costs are high
- Delay costs
  - Aviation agency pays for initial installations, provides discounts
- Accelerate benefits
  - Rapid ground equipment deployment when ground equipment required
  - Coordinated effort across aircraft operators when strong network effects

Strategies According to Value Distribution Over Time



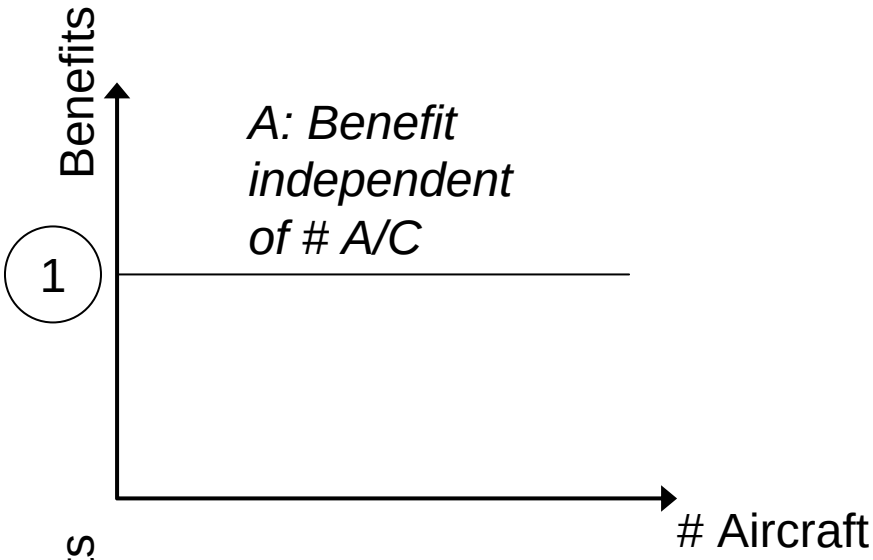


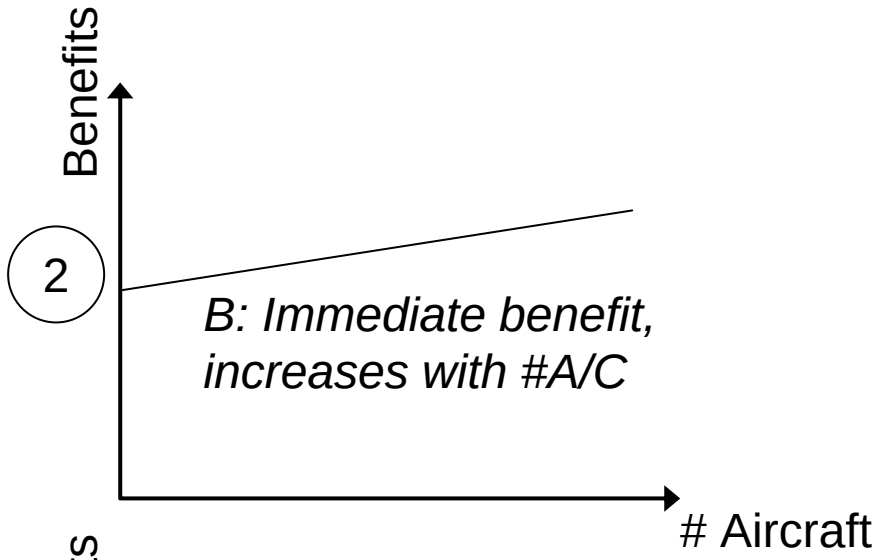


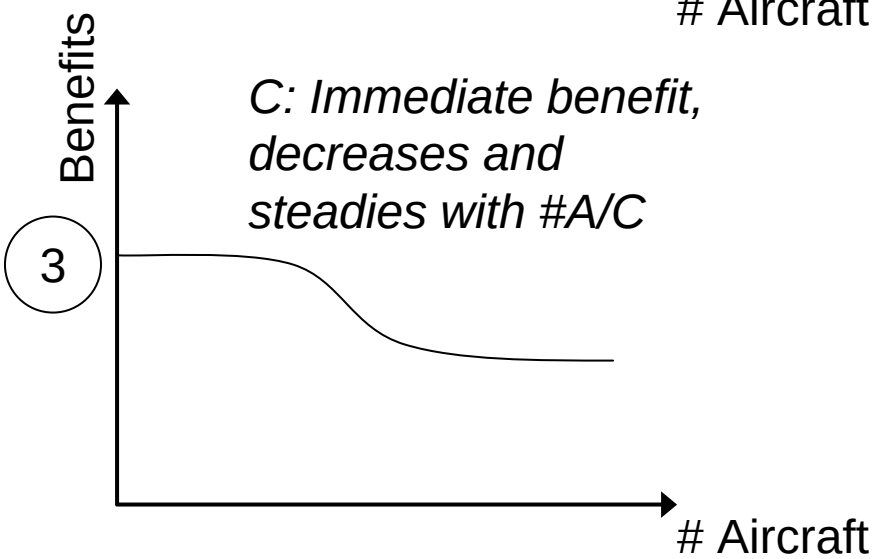
Timing	Costs and benefits coincide	Costs precede benefits	Long delay to benefits
Scenario Examples	Individual adoptions provide benefits.	Benefits realized only when other A/C equipped. Delays in ground infrastructure deployment.	Benefits realized only when *many* other A/C equipped. Long delays to ground infrastructure deployment.
Strategies	Significant benefits realized concurrently with costs provides incentive to aircraft operators to invest. When short-term benefits are smaller than costs, positive incentives may be needed to improve the value case.	May be possible to make ROI cases based on operational benefits of technology without resorting to positive incentives such as discounts and financing schemes.	Pioneer schemes, positive incentives, and mandates. Strong incentives and aid schemes in addition to technology benefit are needed to mitigate the slow ROI.
Comments	Great situation, but rarely occurs.	More realistic scenario.	When benefits take this long to realize it may be a signal that the proposed technology solution is not appropriate.

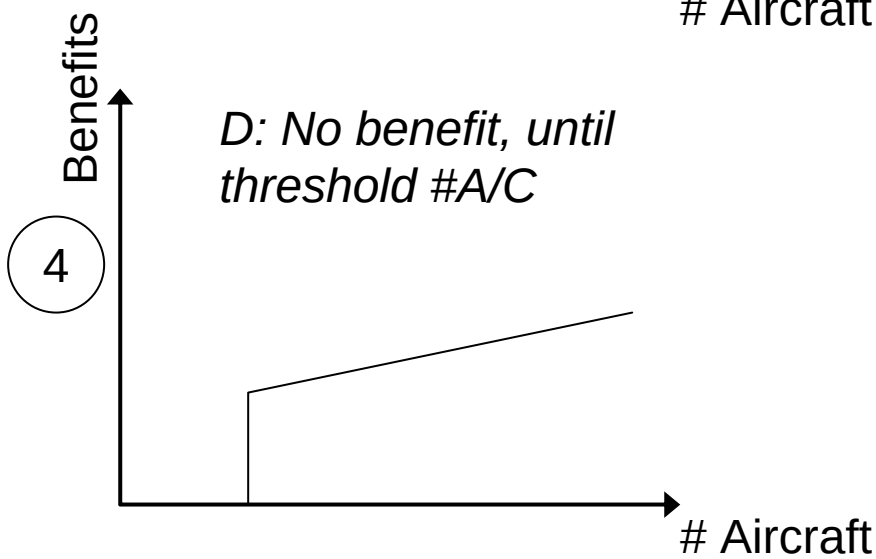
Benefit Network Effects, #A/C

Benefits may of course increase/decrease non-linearly, shape of curves illustrative only









Benefit Network Effects, #ATC

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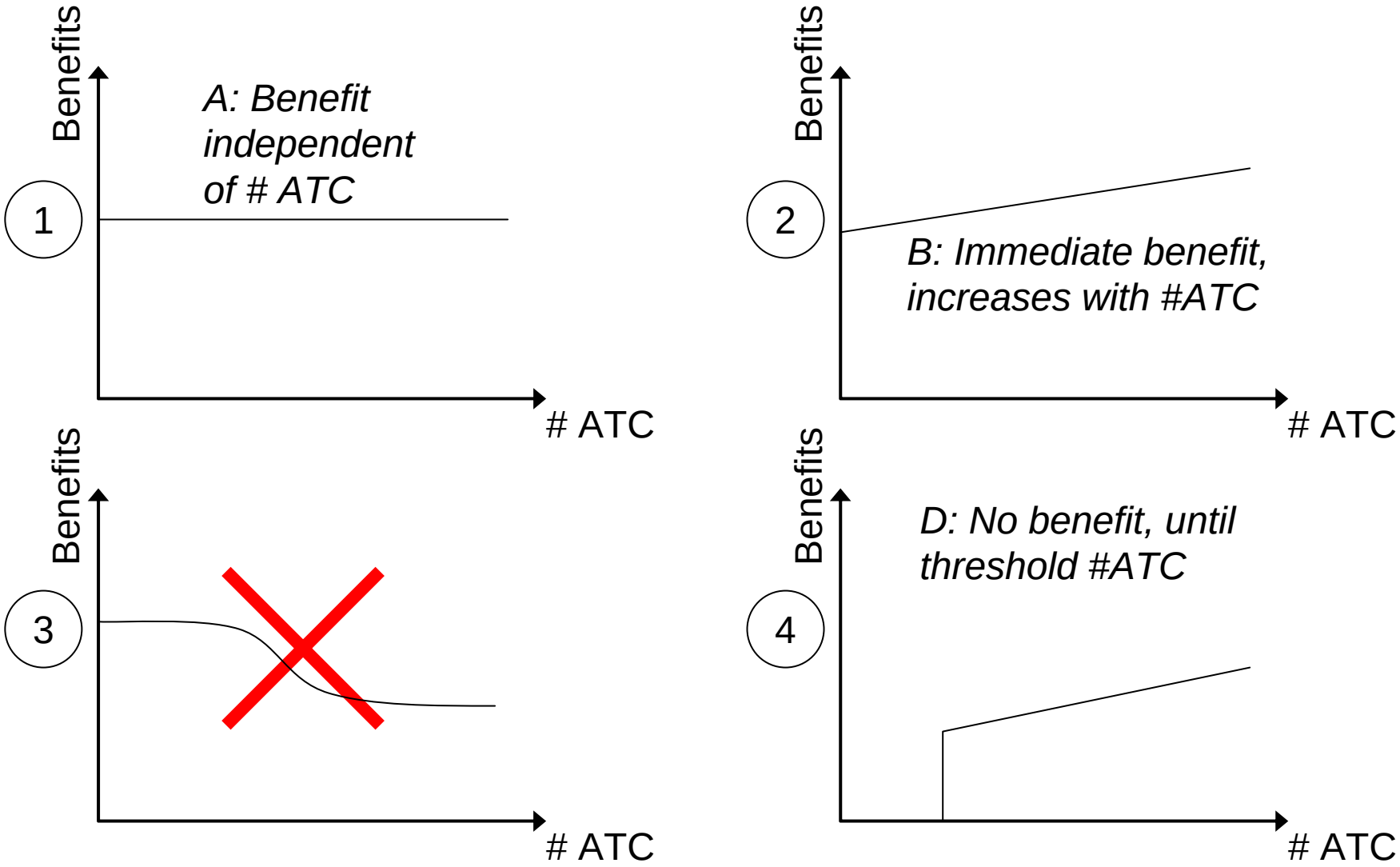
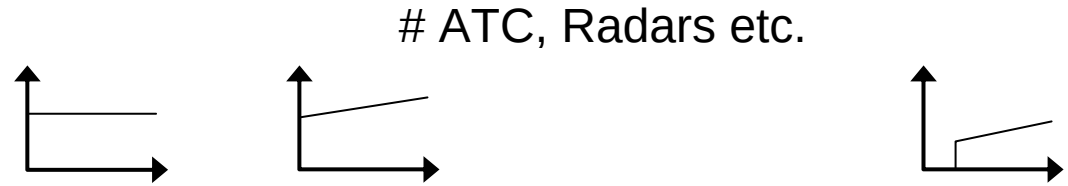
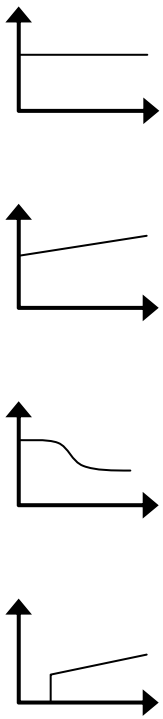


Best Policy Strategies for Different Network Effects





1. Aircraft operators have immediate incentive to invest, assuming positive NPV.	4. Aviation agencies must lead the way by first installing the minimum ground infrastructure and can then rely on positive value case to encourage adoption. Positive incentives may be needed to offset poor short term cost-benefit cases.
2. As long as final cost-benefit case positive, aircraft operators have incentive to invest (e.g., RVSM).	
3. Pioneer scheme and positive incentives.	5. Aviation agencies must lead the way by first installing the minimum ground infrastructure and then use pioneer schemes and positive incentives.