

Design Evaluation Demand Forecasting

The background of the slide is a dark blue-grey color. On the left side, there is a faint, light-colored graphic of a compass rose with a needle pointing towards the bottom-left. To the right of the compass, there is a faint outline of a map or a geographical shape. The text is centered in the upper half of the slide.

“The art of prophecy is very difficult –
especially with respect to the future.”

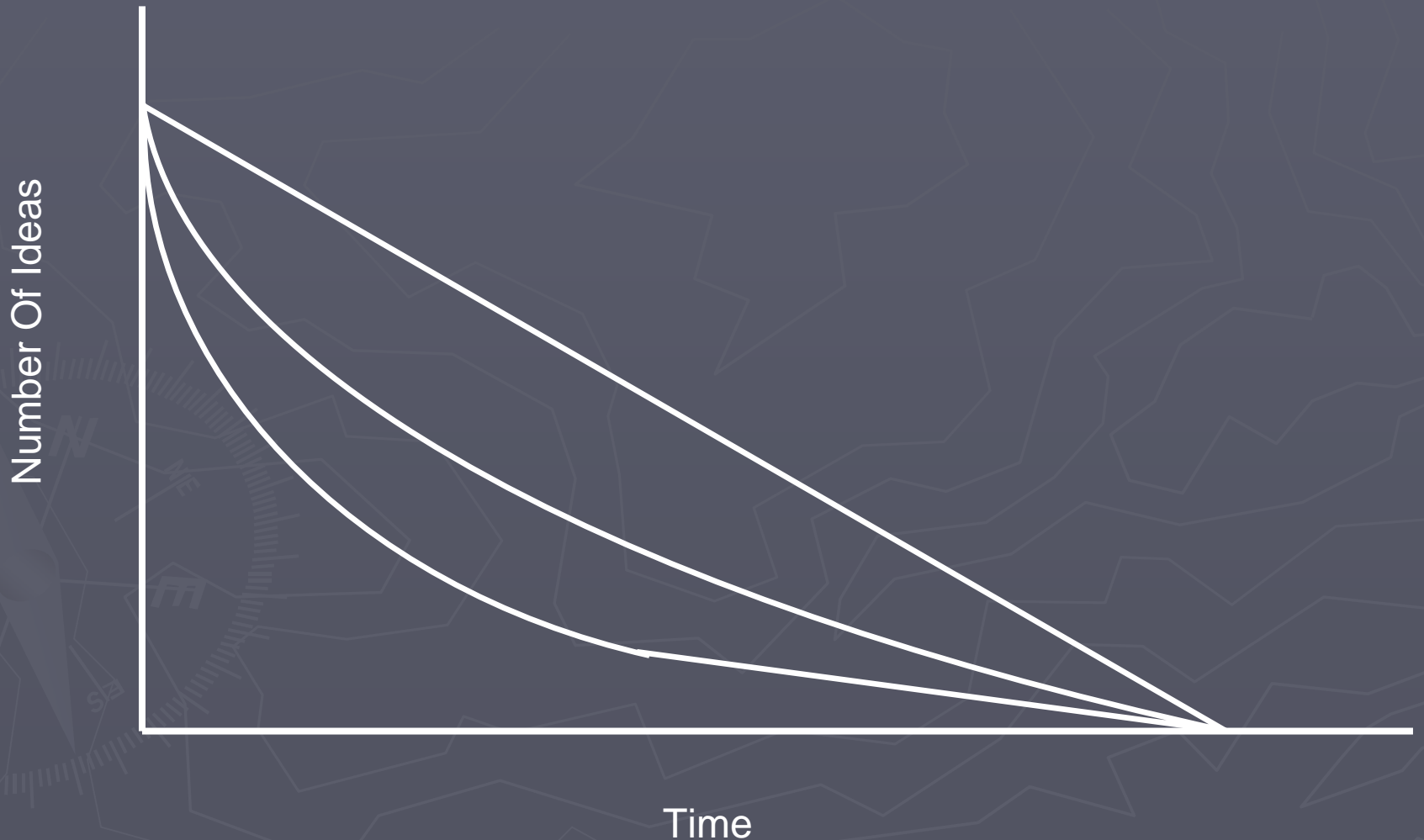
Mark Twain

40% of New Products Fail

- ▶ No Basic Need for Product
- ▶ Overall Product Does Not Meet Need
- ▶ Idea Not Properly Communicated

Mortality of New Product Ideas

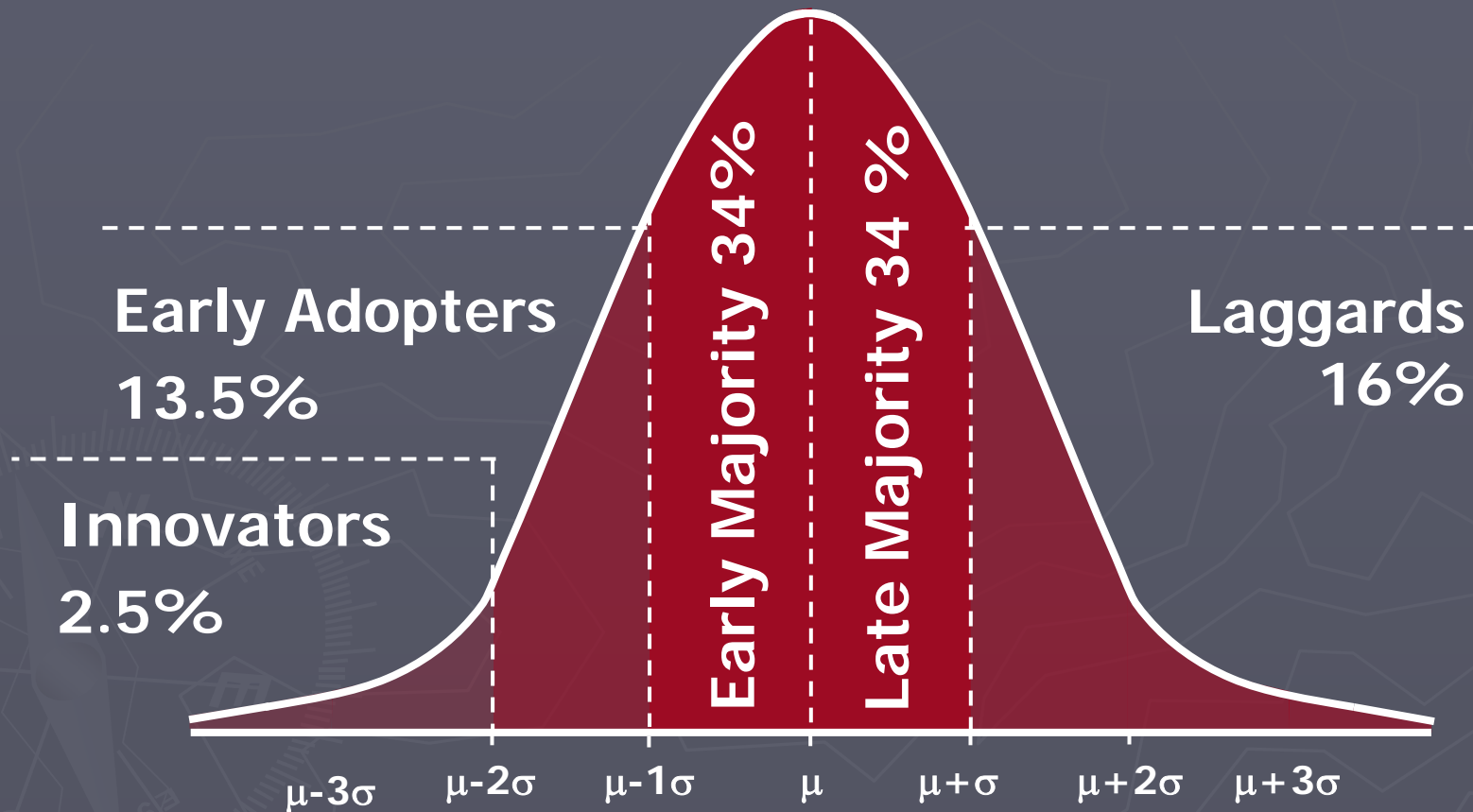
The Decay Curve



What it takes

- ▶ A system or process to weed out projects
- ▶ An understanding of how innovations are embraced

Product Adoption Patterns



Time Until Adoption

Early Adopters

- ▶ Hi Education, Income, Status, Literacy
- ▶ Empathy, Less Dogmatic, Ability to Abstract, Rational, Intelligent, Able to Cope with Risk, Aspiration, Positive Attitude to Science,
- ▶ Social Participation, Media Exposure, Information
- ▶ No Relationship to Age

Innovation vs. Imitation

- ▶ Innovators are not influenced by who already has bought
- ▶ Imitators become more likely to purchase with more previous buyers

Probability of Purchase by New Adaptor in Period t

Probability of Purchase
without influence by adopter

p

+

$$q \cdot \frac{K_t}{M}$$

Probability of Purchase
through Influence by
Adopter

M = Market Size

K_t = Cumulative number of adopters before period t

q = Effect of each Adopter on each Nonadopter
(Coefficient of Internal Influence)

p = Individual Conversion w/out influence by Adopters
(Coefficient of External Influence)

The Bass Model

Imitation Effect or Internal Influence

$$Q_t = p \cdot (M - K_t) + q \cdot \frac{K_t}{M} \cdot (M - K_t) = \left(p + q \frac{K_t}{M} \right) \cdot (M - K_t)$$

Innovation Effect or External Influence

Q_t = Number of adopters during period t

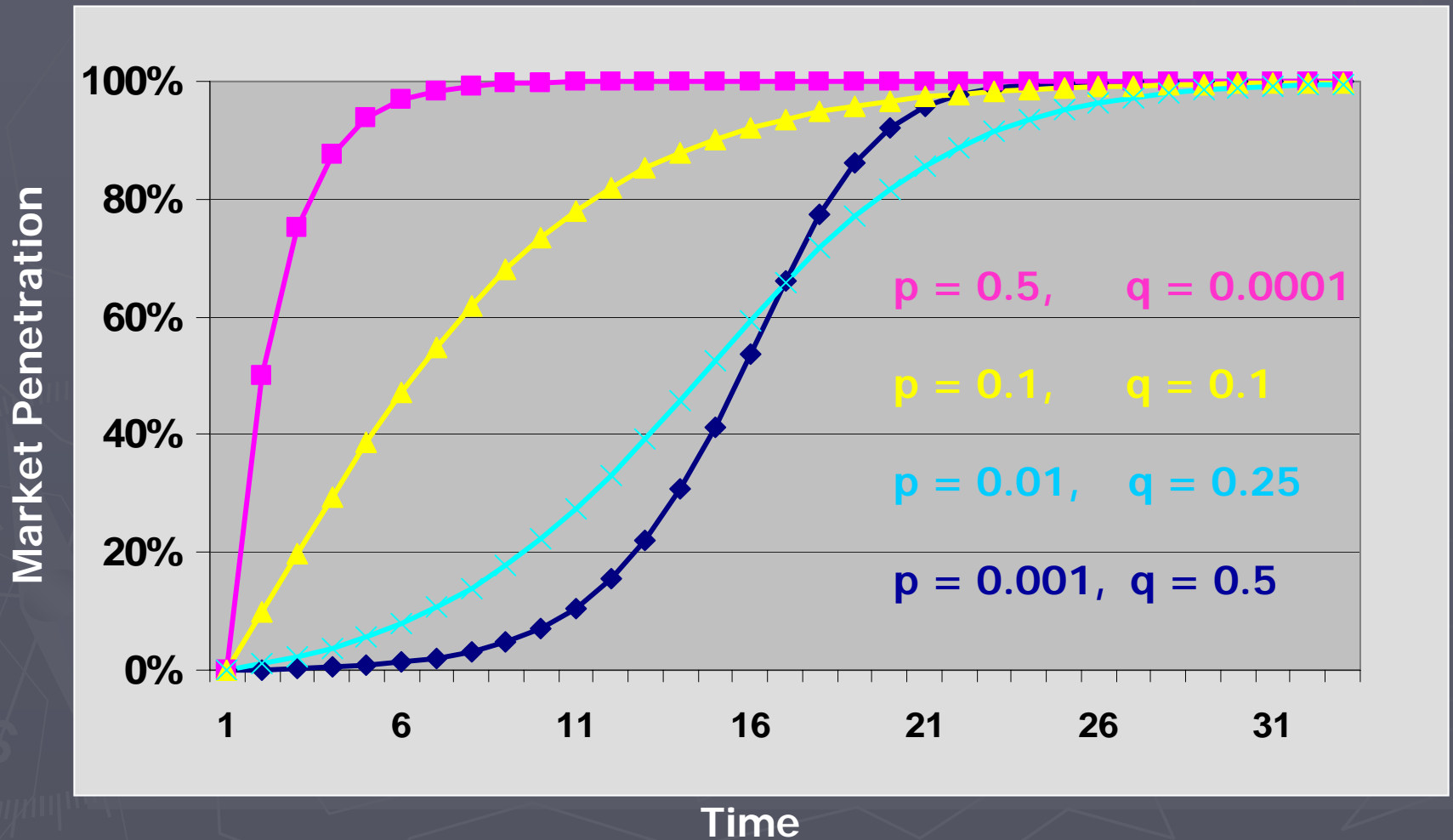
M = Market Size

K_t = Cumulative number of adopters before period t

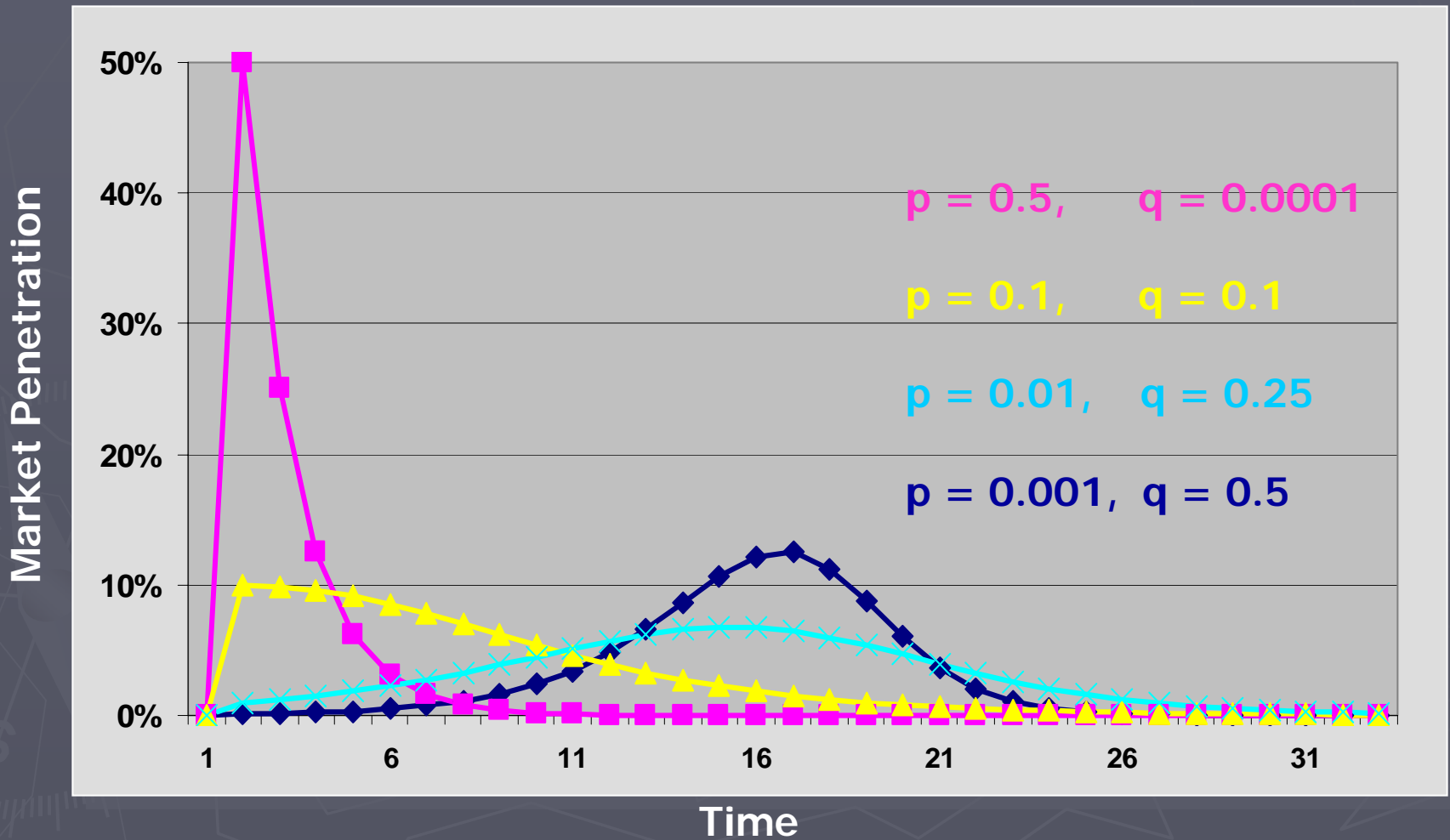
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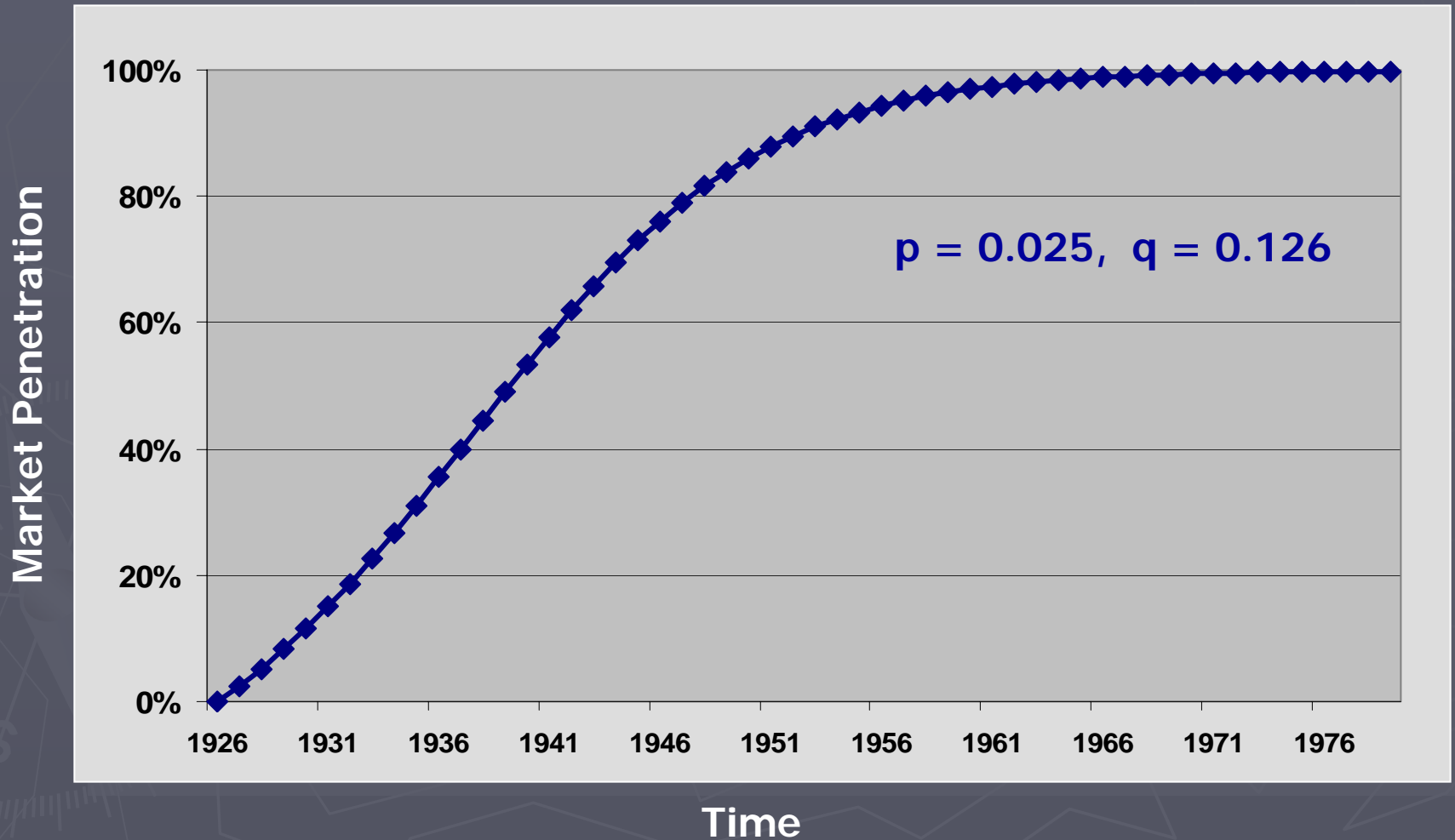
Cumulative Sales for Different p, q Parameters



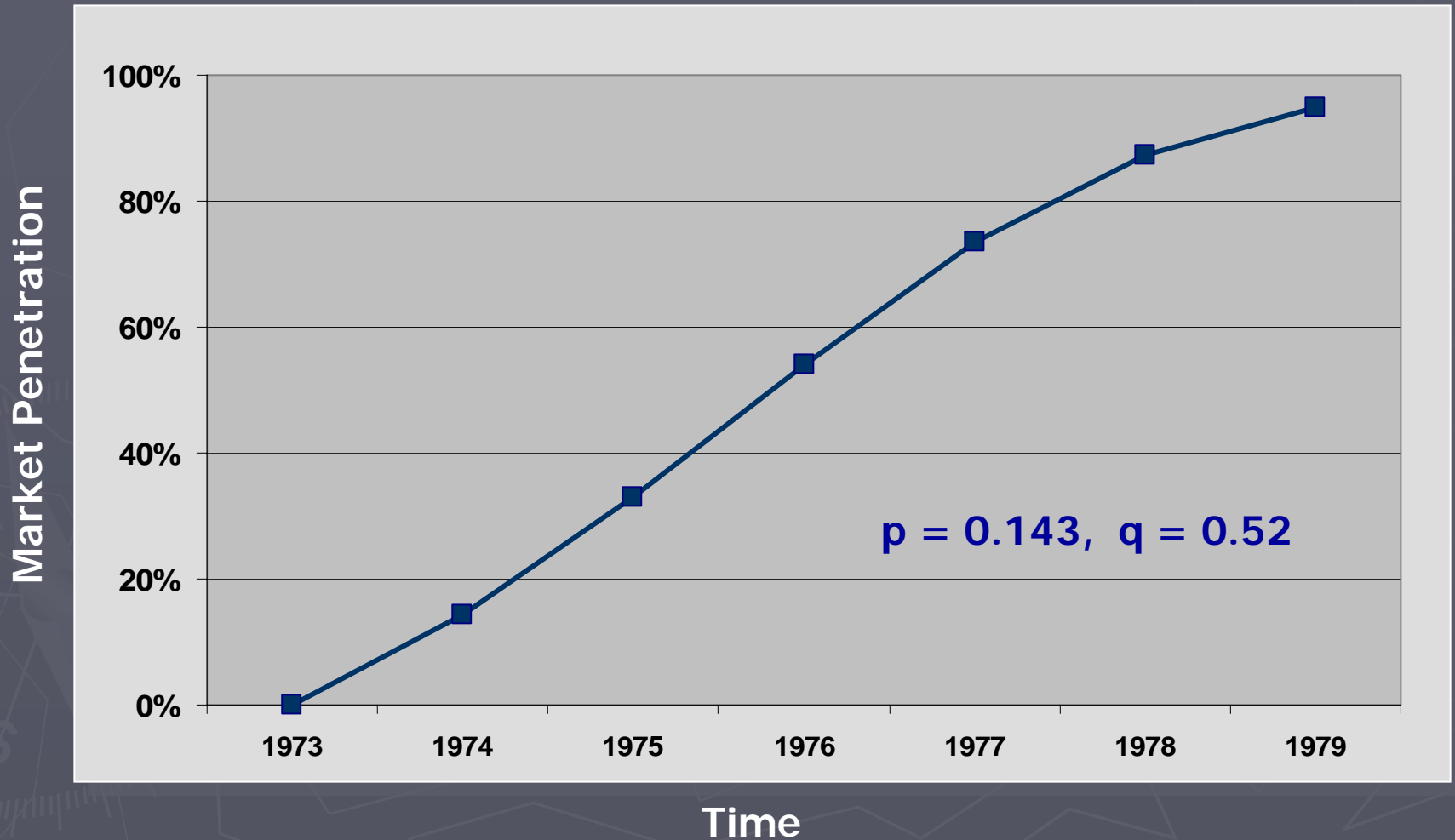
Cumulative Sales for Different p, q Parameters



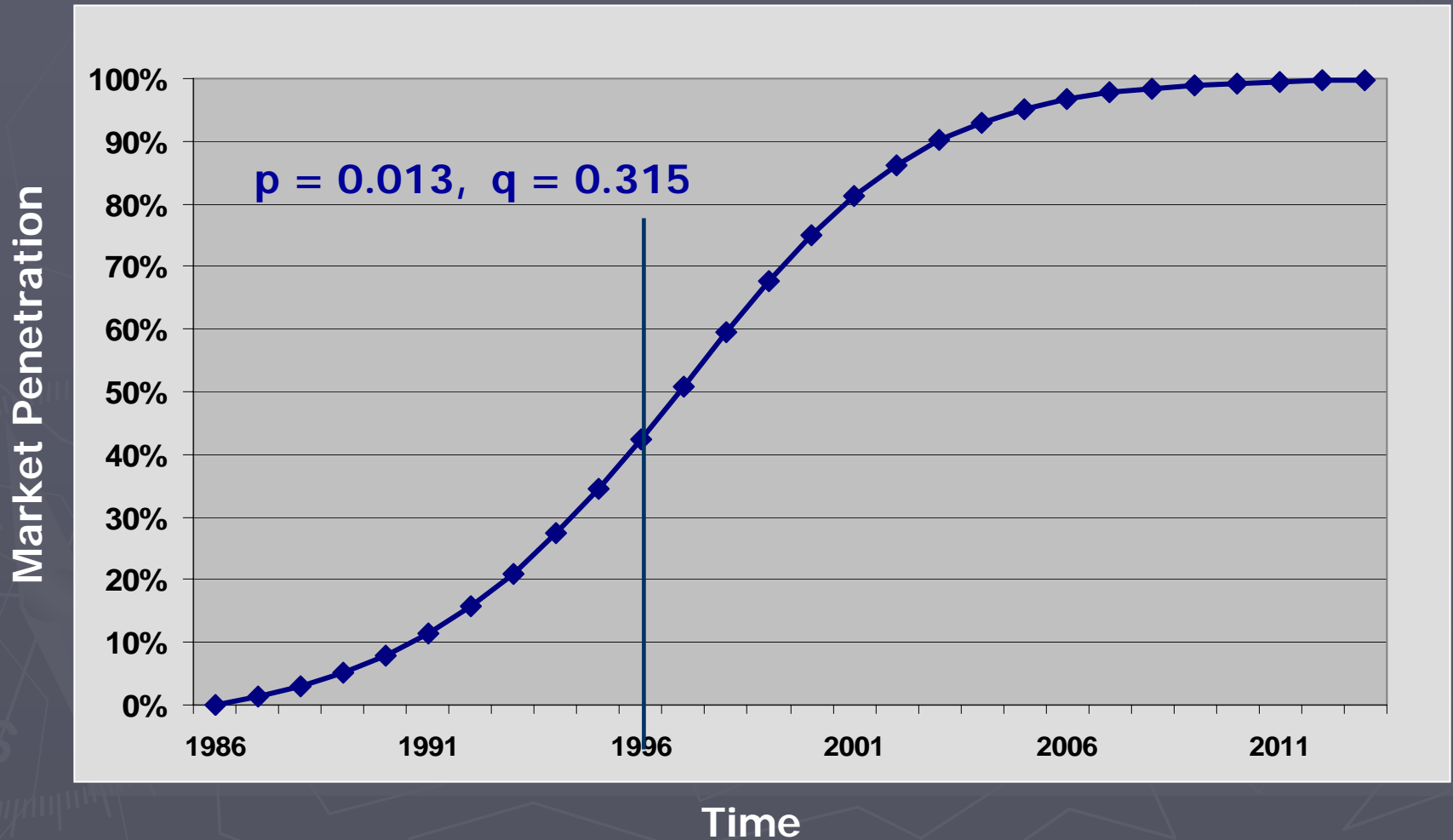
Diffusion Curve For Refrigerators 1926-1979



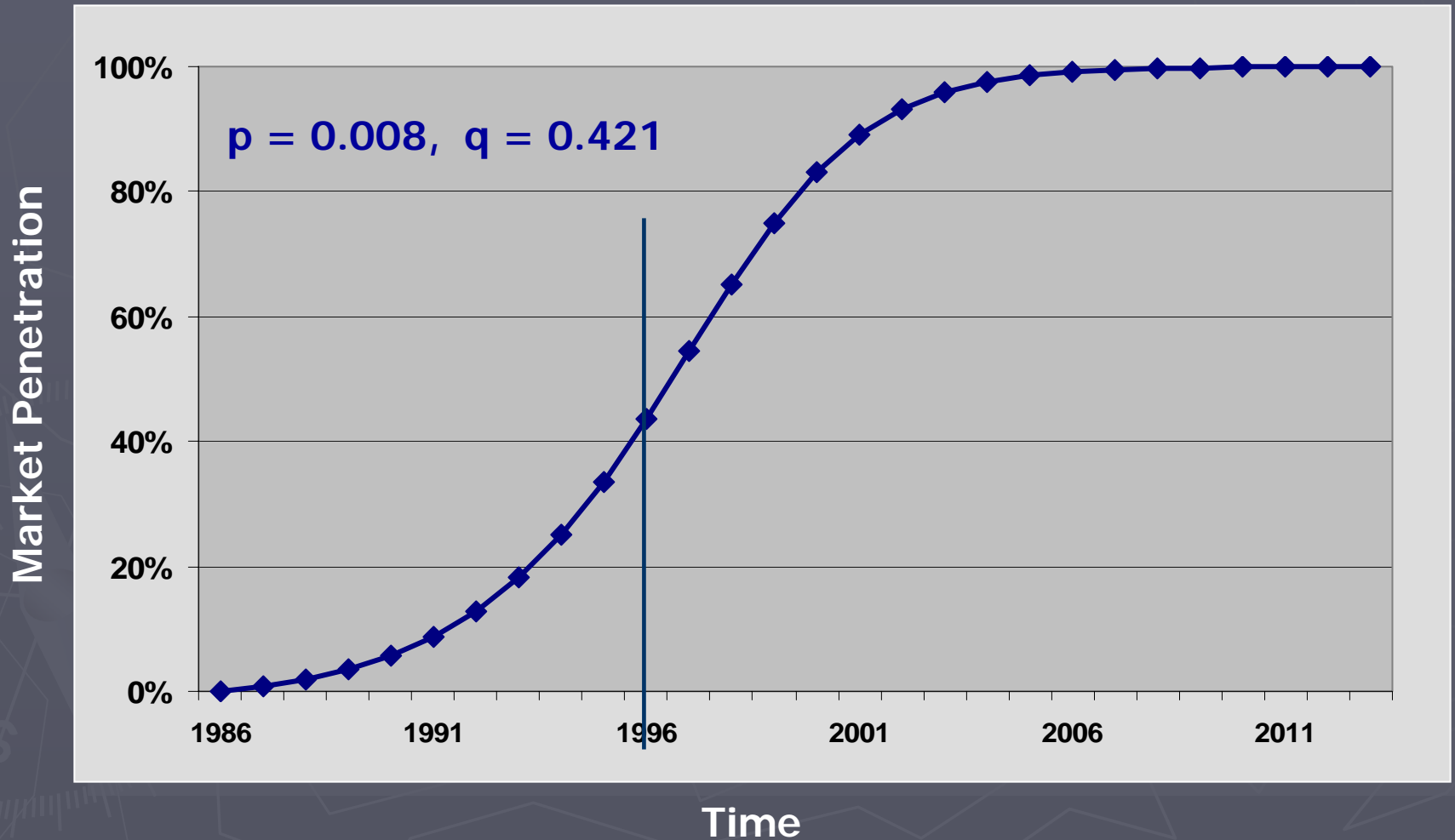
Diffusion Curve For Calculators 1973-1979



Diffusion Curve For Power Leaf Blowers, 1986-1996



Diffusion Curve For Cell Phones 1986-1996



Example: Satellite Radio

- ▶ Roughly 160 million potential listeners
- ▶ Phone Survey (6,000)
 - 96 million not willing to pay fee
 - Interested, given costs [million]

| Radio [\$] | Subscription Price [\$] | | | | |
|------------|-------------------------|------|------|------|------|
| | 12 | 10 | 8 | 5 | 2 |
| 400 | 23.7 | 27.4 | 27.5 | 27.6 | 27.7 |
| 300 | 24.8 | 28.5 | 28.7 | 28.9 | 29.1 |
| 250 | 26.6 | 30.7 | 31.2 | 31.8 | 32.6 |
| 200 | 31.5 | 36.5 | 37.8 | 40.5 | 42.8 |
| 150 | 35.6 | 41.6 | 44.1 | 49.1 | 53.0 |
| 100 | 45.7 | 54.0 | 58.7 | 68.3 | 77.8 |

Source: E. Ofek, HBS 9-505-062, 2005

Analog Products

| Product | p | q |
|--------------------|--------|------|
| Portable CD Player | 0.0065 | 0.66 |
| Auto Radio | 0.0161 | 0.41 |
| Cellular Phone | 0.008 | 0.42 |

Source: E. Ofek, HBS 9-505-062, 2005

- ▶ Factors For Assessing Analogies
 - Product Characteristics
 - Market Structure
 - Buyer Behavior
 - Marketing Mix

Deriving M, p, & q from Data

$$Q_t = p \cdot (M - K_t) + q \cdot \frac{K_t}{M} \cdot (M - K_t) = \left(p + q \frac{K_t}{M} \right) \cdot (M - K_t)$$

$$= pM + (q - p) \cdot K_t - \frac{q}{M} \cdot K_t^2$$

$$= a + bK_t - cK_t^2$$

Compute a , b , and c with Ordinary Least Square Regression, given actual sales data

$$p = a/M$$

$$q = -mc$$

$$M = -b \pm \frac{\sqrt{b^2 - 4ac}}{2c}$$

► Commercial Software

- www.mktgeng.com
- www.basseconomics.com

Limits of the Bass Model

- ▶ Static market potential
- ▶ Static geographic boundaries
- ▶ Independence of other innovations
- ▶ Simple “not adopt to adopt” framework
- ▶ Limitless supply
- ▶ No repeat or replacement sales
- ▶ Individual decision process neglected
- ▶ Deterministic

Roger's Five Factors

- ▶ Relative Advantage
 - Product performance relative to incumbent
- ▶ Compatibility
 - Consistency with existing values/experiences
- ▶ Complexity
 - Ease of Use
- ▶ Triability
 - Possibility to experiment with product
- ▶ Observability
 - Visibility of usage and impact

Example: Segway

- ▶ Relative Advantage
- ▶ Compatibility
- ▶ Complexity
- ▶ Triability
- ▶ Observability

Example: Viagra

- ▶ Relative Advantage
- ▶ Compatibility
- ▶ Complexity
- ▶ Triability
- ▶ Observability

A-T-A-R

▶ Awareness

- Who is aware of the product?

▶ Trial

- Who wants to try the product?

▶ Availability

- Who has access to the product?

▶ Repeat

- Who wants to try product again?

The A-T-A-R Model

- ▶ Units Sold = Market Potential
 - * Percentage aware
 - * Percent who try
 - * Percent who have access
 - * Percent who will repeat
 - * Number of repeats per year

Sources for A-T-A-R Data

| A-T-A-R Data | Sources for Data | | | | |
|--------------|-----------------------|--------------|------------------|-------------------|-------------|
| | Basic Market Research | Concept Test | Product Use Test | Component Testing | Market Test |
| Market size | Best | Helpful | Helpful | | Helpful |
| Awareness* | | Helpful | Helpful | Best | Helpful |
| Trial | Helpful | Best | | | Helpful |
| Availability | Helpful | | | | Best |
| Repeat | Helpful | Helpful | Best | | Helpful |

* Often estimated by ad agency

Source: M. Crawford & A. Di Benedetto, "New Products Management", 2003

Concept Test

(non tangible product)

| A-T-A-R Data | Concept Test |
|--------------|--------------|
| Market size | Helpful |
| Awareness* | Helpful |
| Trial | Best |
| Availability | |
| Repeat | Helpful |

- ▶ Weed out poor ideas
- ▶ Gauge Intention to purchase
 - (Definitely (not), Probably (not), Perhaps)
 - Respondents typically **overstate** their willingness to purchase
 - Rule of thumb, multiply the percentage responding
 - ▶ Definitely would purchase by **0.4**
 - ▶ Probably would purchase by **0.2**
 - ▶ Add up: The result is the % for trial
- ▶ Learning
 - Conjoint Analysis

Product Use Test

("tangible" product)

| A-T-A-R Data | Product Use Test |
|--------------|------------------|
| Market size | Helpful |
| Awareness* | Helpful |
| Trial | |
| Availability | |
| Repeat | Best |

- ▶ Use under normal operating conditions
- ▶ Learning
 - Pre-use reaction (shape, color, smell...)
 - Ease of use, bugs, complexity
 - Diagnosis
- ▶ Beta testing
 - Short term use tests with selected customers
 - Does it wor?
- ▶ Gamma testing
 - Long term tests (up to 10 years for med.)

Market Test

| A-T-A-R Data | Market Test |
|--------------|-------------|
| Market size | Helpful |
| Awareness* | Helpful |
| Trial | Helpful |
| Availability | Best |
| Repeat | Helpful |

- ▶ Test product *and* marketing plan
- ▶ Test Marketing
 - Limited Geographies (waning importance)
- ▶ Pseudo Sale, Controlled Sale, Full Sale
- ▶ Speculative Sale
 - Full pitch with all conditions
- ▶ Simulated Test Market
 - Stimuli, play money, pseudo store
 - 300 – 600 Respondents, 2-3 months, \$50k to \$500k

Additional Reading

- ▶ E. Rogers: "Diffusion of Innovations",
 - 5th Edition, 2003
- ▶ G. A. Moore: "Crossing the Chasm"
 - 3rd Edition 2002
- ▶ M. Crawford & A. Di Benedetto,
"New Products Management" ,
 - 7th Edition, 2003
- ▶ G. Lilien, P. Kotler, & K.S. Moorthy
"Marketing Models"
 - 1992, (fairly technical, limited availability)

Tomorrow

- ▶ Industry Leaders in Technology and Management Lecture
- ▶ James Dyson

Next Thursday

- ▶ Simon Pitts from Ford Motor Company
- ▶ Professional Behavior
 - Please be on Time!!!
- ▶ No TAs on site

MIT OpenCourseWare

<https://ocw.mit.edu>

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