

Accelerating the Adoption of Electric Vehicles

A presentation to the Association of Energy Services Professionals (AESP)

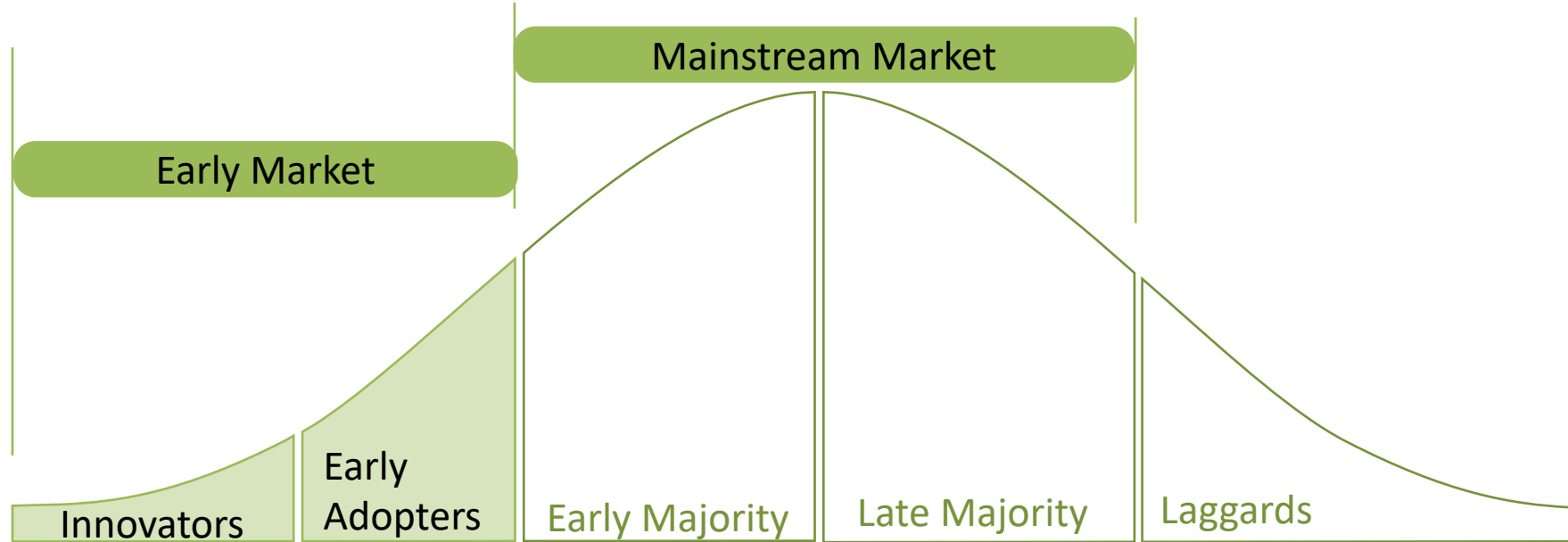
Warren Schirtzinger
updated for 2025



Today's Agenda

- Why has EV adoption been slow/unpredictable?
- A value-delivery system to accelerate EV market transformation
- The need for market segmentation

Innovation-Adoption Curve



A system based on how people perceive and avoid risk

The Neuroscience of Risk Avoidance



People are physiologically wired to **avoid loss**, before they pursue gain.

And our neurological systems are designed to **resist** anything that is untested, unknown, or might compromise our personal safety.

Which is why all successful products and innovations have a common set of elements that **reduce the perception of risk**.

Product Perception

Successful EV suppliers will be the ones that come the closest to seeing the world as their customers do.

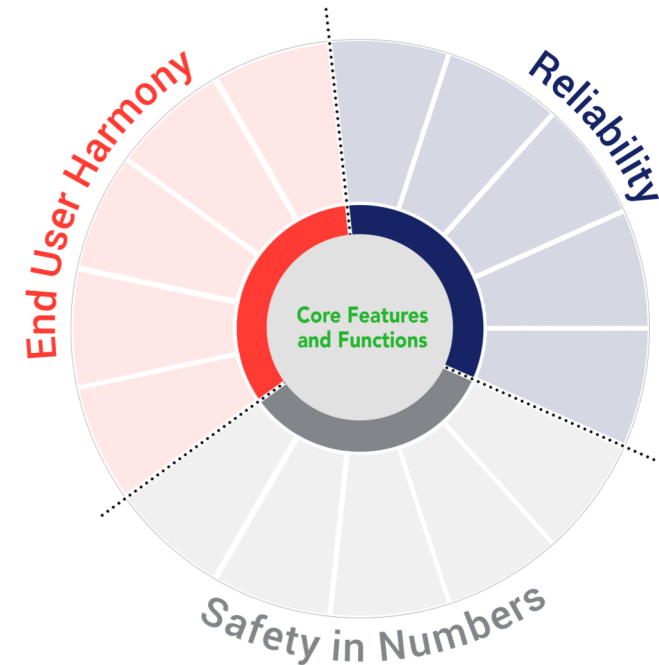
Engineering View (mostly tangible)



You Sell: **gain**

- Core technology
- Features and functions
- Tax credits
- Clean energy

Customer's View (mostly intangible)



They Buy: **avoidance of loss**

- Compatibility with current systems
- Your reputation and track record
- Industry standards
- Unbiased information/support

Questions People Ask to Avoid EV-Risk:

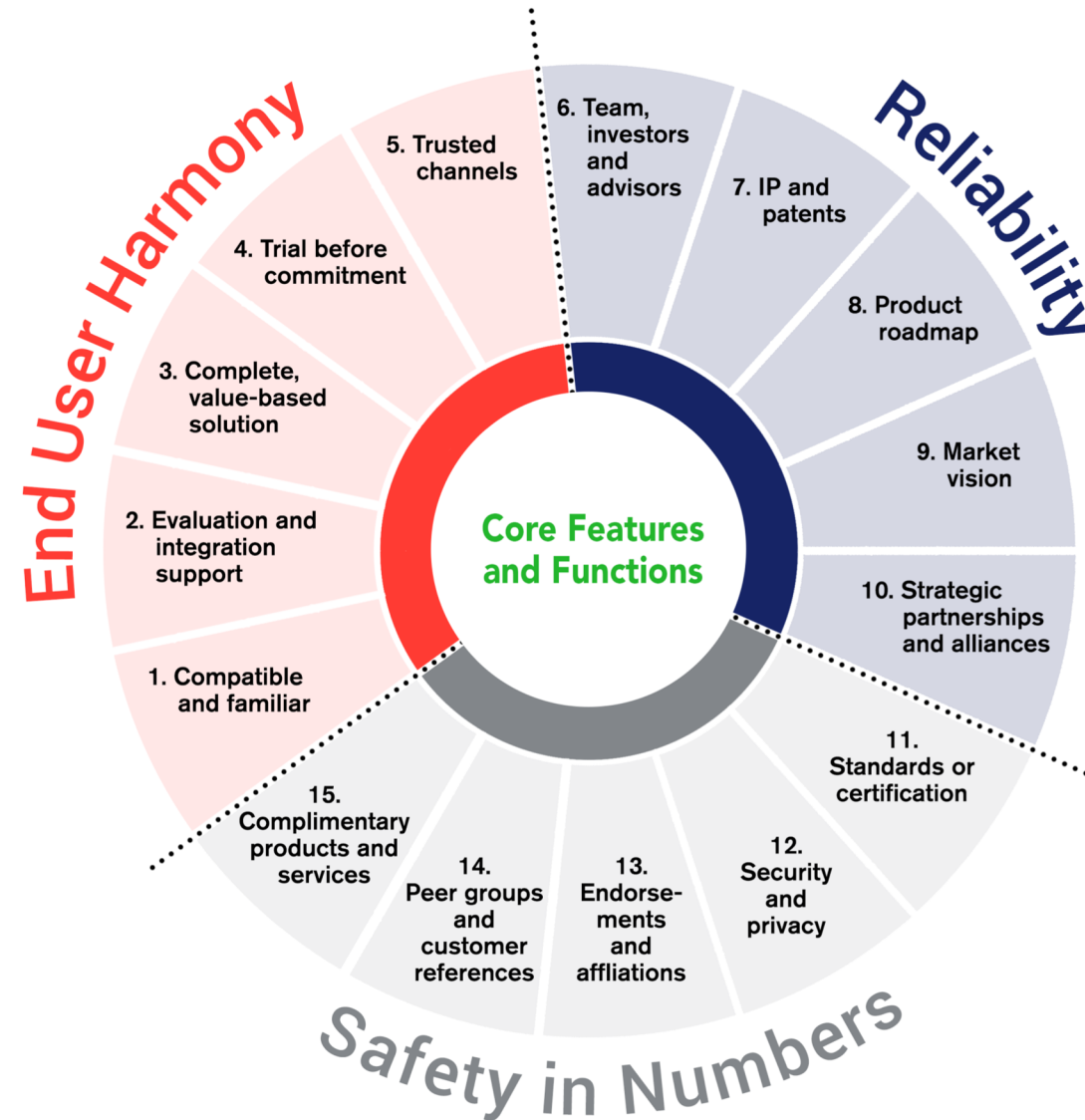
1. How much **change** is required with EVs? Will my life be the same or different compared to a gas car?
2. Is the vendor a reliable supplier that is *fully committed* to the EV industry?
3. Is there a well-developed set of complimentary suppliers and organizations that will support me when I need it?

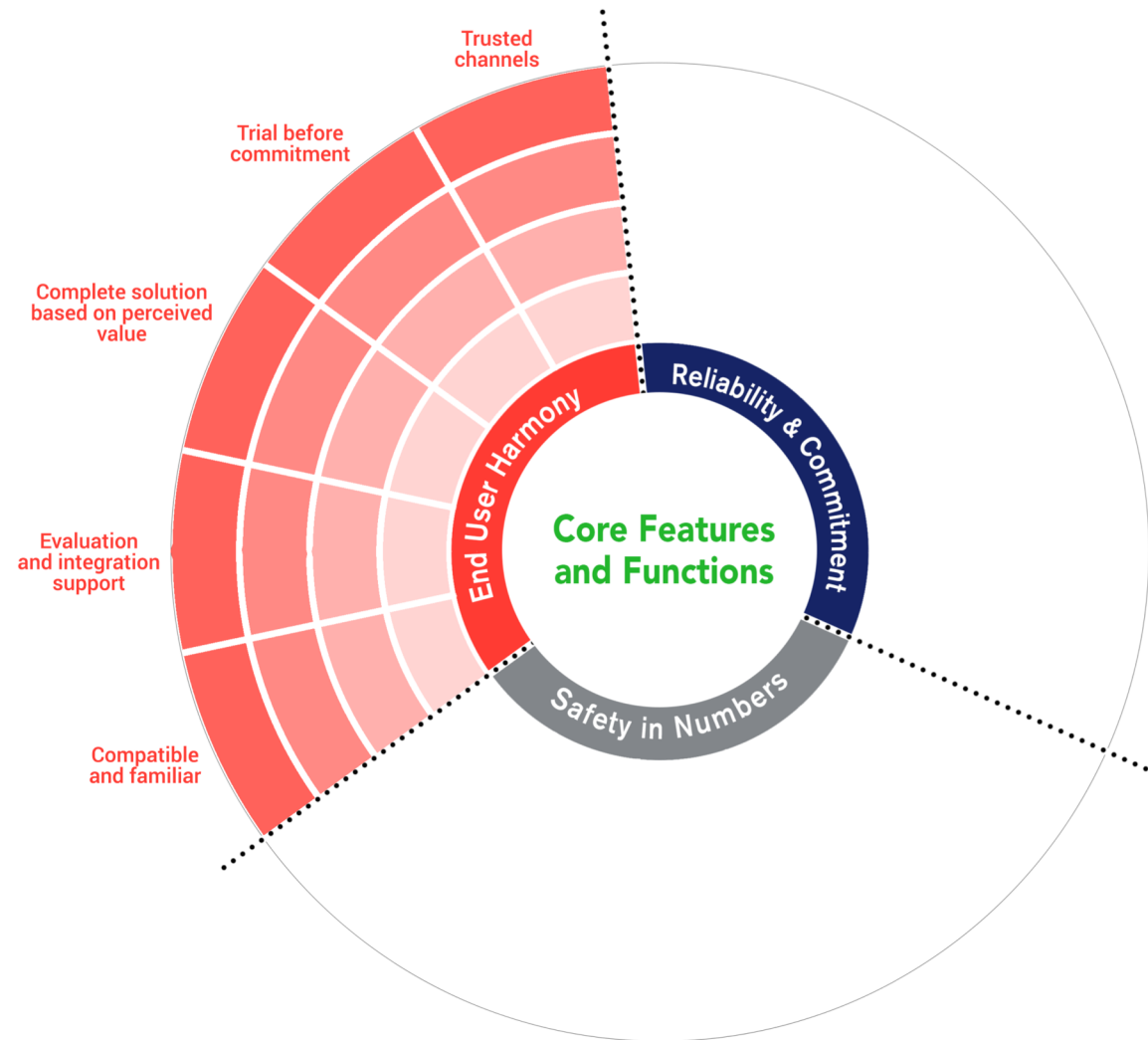
15 intangible attributes in three groups:

End User Harmony (1-5) - closeness and understanding that allows the supplier to see the world from the customer's point of view, and create a product that fits them so well, that it sells itself.

Reliability and Commitment (6-10) - the supplier performs consistently well proving domain expertise, and demonstrates the characteristics of an ideal partner.

Safety in Numbers (11-15) - an independent ecosystem that increases the buyer's confidence, provides unbiased support, and reduces the perception of risk.



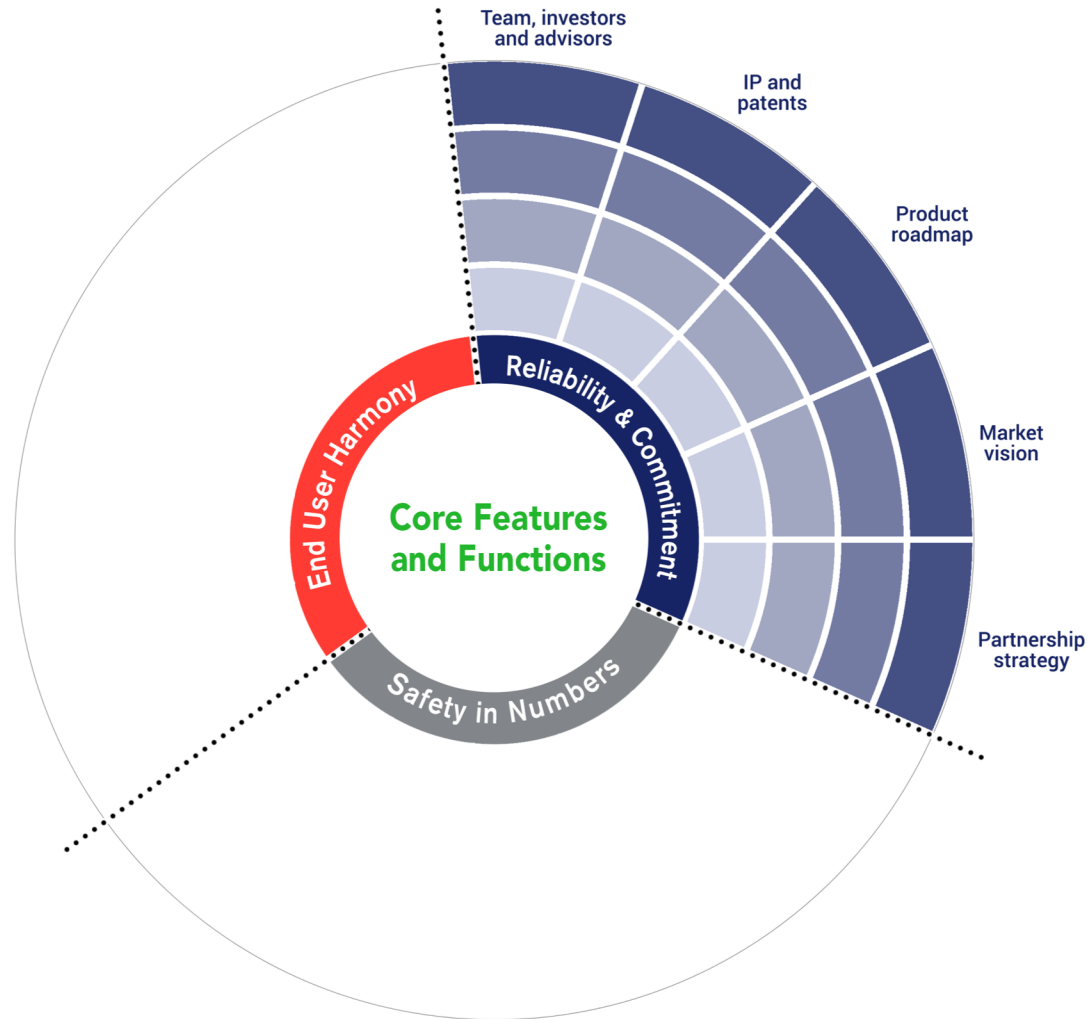


Group 01

End User Harmony

Closeness and understanding that allows the supplier to see the world from the customer's point of view, and create a product that fits them so well, that it sells itself.

- Allow users to continue using existing systems and methods
- Provide comprehensive support before, during and after the sale
- Deliver a complete solution that is based on the users' cost-benefit preferences
- Make it easy for potential users to explore the innovation before adopting
- Use a trusted channel of sales and a well-known pricing structure

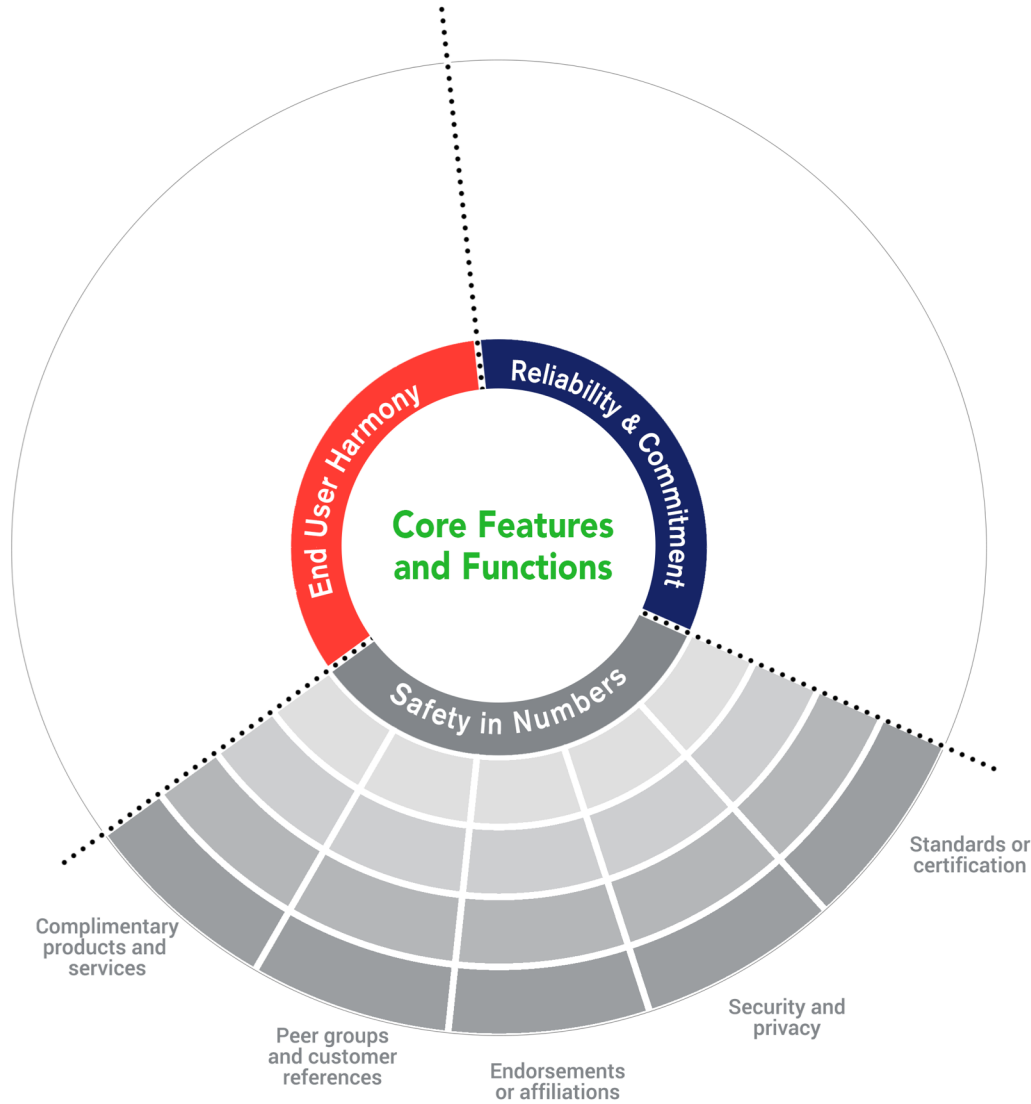


Group 02

Reliability and Commitment

Performing consistently well based on domain expertise, and demonstrating the characteristics of an ideal partner.

- Core competencies of your company that make you a valuable contributor
- Your intellectual property proves you can create valuable new tools and technologies
- Product improvements to expect in the future so there are no surprises or wasted resources
- A clear and specific description of a future market that matches your innovative solution.
- A plan to increase value through collaboration with strategic partners



Group 03

Safety in Numbers

An independent ecosystem that increases the buyer's confidence, provides unbiased support, and reduces the perception of risk:

- Adherence to industry standards or third-party certification
- Independent safeguards that provide security
- Endorsements from trusted organizations
- Exchange of unbiased information and recommendations from people the user trusts
- Complimentary products, tools and services

Examples

- The Personal Computer
- Regional Transformation to Solar Power
- Vermont COVID Vaccination Program
- Amazon Market Entry

IBM Compatible Personal Computer

Mostly through coincidence and accidental synergy, IBM created an ultra-low-risk product that launched a massive transformation, and the personal computer became a mainstream appliance. Intangible attributes in all three sections of the Low Risk Recipe allowed PC adoption to soar.

Prior to the IBM PC there were dozens of PC manufacturers, including Tandy/Radio Shack, Commodore, Altair, Atari, Texas Instruments, and Apple. When IBM sponsored development of the “IBM compatible PC” along with its clone architecture, the foundation for safety and predictability in personal computing was established.

End-user harmony was provided through the availability and delivery of complete solutions including an operating system, hardware, peripherals, application software and extensive documentation **(3)**. Familiar retail stores such as Sears allowed prospective customers to test drive and explore PCs before purchase **(4 and 5)**. Along with Sears, computer-specialty stores such as Computerland and Computer City were chosen to introduce the IBM PC.

Even with a complete product offering and familiar distribution channels, the cooperation between vendors in the PC category was even more transformative. Because the IBM PC was built from commercially available, off-the-shelf parts, all other PC vendors had full and open access to IBM’s design. So, the entire industry organized itself around the IBM-compatible hardware standard **(11)**. IBM PC “clones” included a standardized ATX/AT form factor, a basic input-output system (BIOS) and an ISA/EISA bus standard. When PC manufacturers adopted this standardized configuration, it eliminated the potential risk of “vendor lock-in,” and full-scale mainstream adoption followed. A virtually unlimited supply of how-to books and manuals were available to support application software such as Wordstar, Lotus 1-2-3 and Ashton Tate DBASE **(15)**.

IBM Compatible Personal Computer

End User Harmony

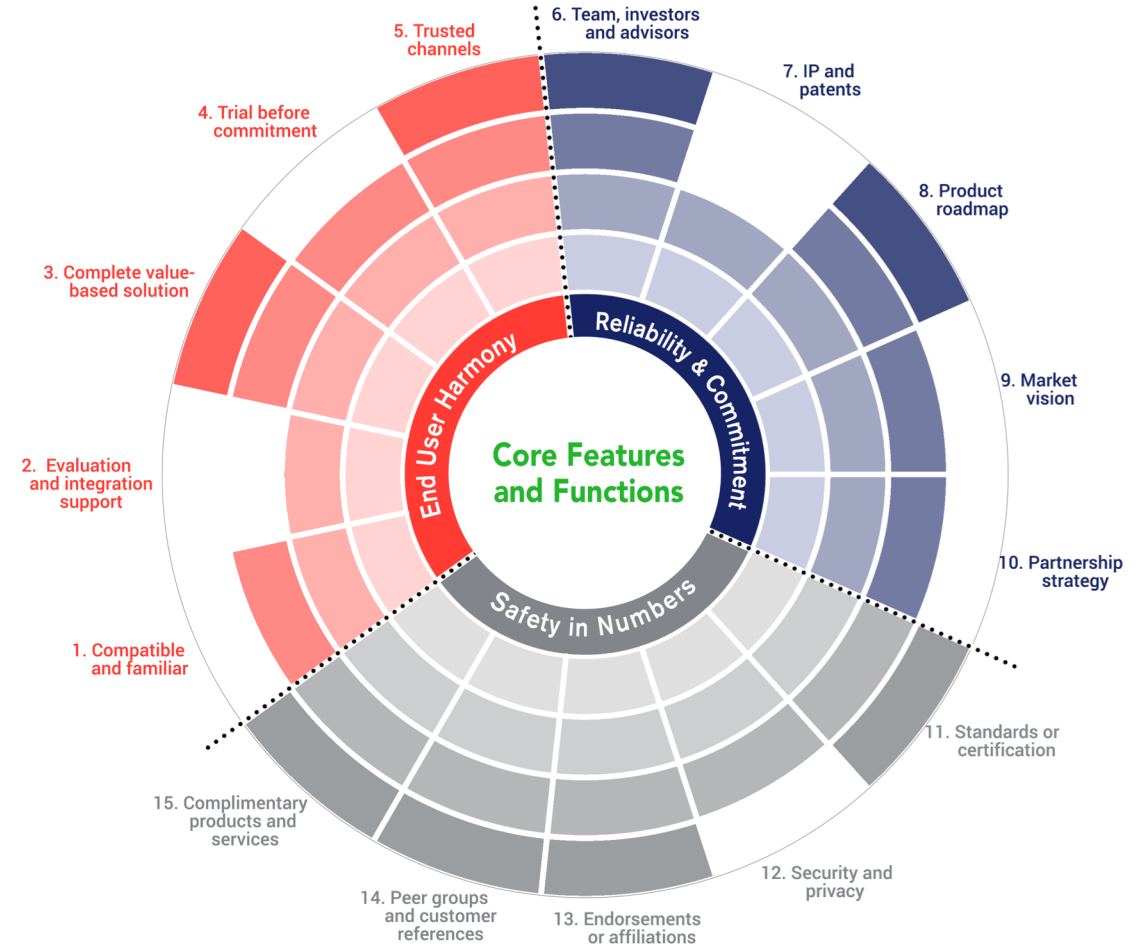
1. Familiar user experience with similarity to IBM typewriters and Texas Instrument calculators
2. Third-party classes on how to use VisiCalc (for evaluation support)
3. Complete, value-based offering including an operating system, hardware, peripherals, application software, etc.
4. Retail computer stores allowed exploration
5. Trusted retail channel (such as Sears) for consumers

Reliability and Commitment

6. Created by one of the most credible companies in U.S. business history. Managed by Bill Lowe, the lab director at IBM Boca Raton
7. Open architecture strategy. Supported by a large vendor community that ensures interoperability.
8. IBM followed Intel's roadmap for their CPU going forward.
9. IBM's market vision was to set the de facto technical standards for personal computers (similar to their accomplishment with mainframes)
10. Partnership strategy focused on retail partners to gain important knowledge about selling to individuals

Safety in Numbers

11. "Clone" architecture included a standardized ATX/AT form factor, a basic input-output system (BIOS) and an ISA/EISA bus standard, plus implied compatibility with IBM mainframes
12. Multiple providers of anti-virus software ensured security
13. Sponsorship by IBM, the most trusted and well-known name in computing
14. Unlimited user groups for peer-to-peer interaction
15. Plethora of how-to books, add-on peripherals, software and services



Sacramento Residential Solar Program

Sacramento residents signed up in droves for the privilege of putting 4 kW grid-connected solar panels on their roofs, despite the cost of well over \$10 per watt. (today the cost is about \$2 per watt) The program, sponsored and administered by the Sacramento Municipal Utility District (SMUD), was sold out from the very beginning due to the perception of low risk, which attracted both early- and late-majority members of the mainstream.

SMUD's PV Pioneer Program offered a complete solar solution, that was sold and installed by trusted suppliers, which made the buying experience familiar and low risk. To accelerate mainstream market acceptance, the utility: standardized the system, subsidized local manufacturing of solar panels to ensure high quality, invested heavily in community outreach and education, integrated the rooftop solar systems with the existing electrical grid, and trained and certified local solar companies.

The impact of a utility or familiar vendor offering a low-risk product makes all the difference. All of the requirements of a risk-averse, mainstream buyer were satisfied.

Regional Transformation to Solar

End User Harmony

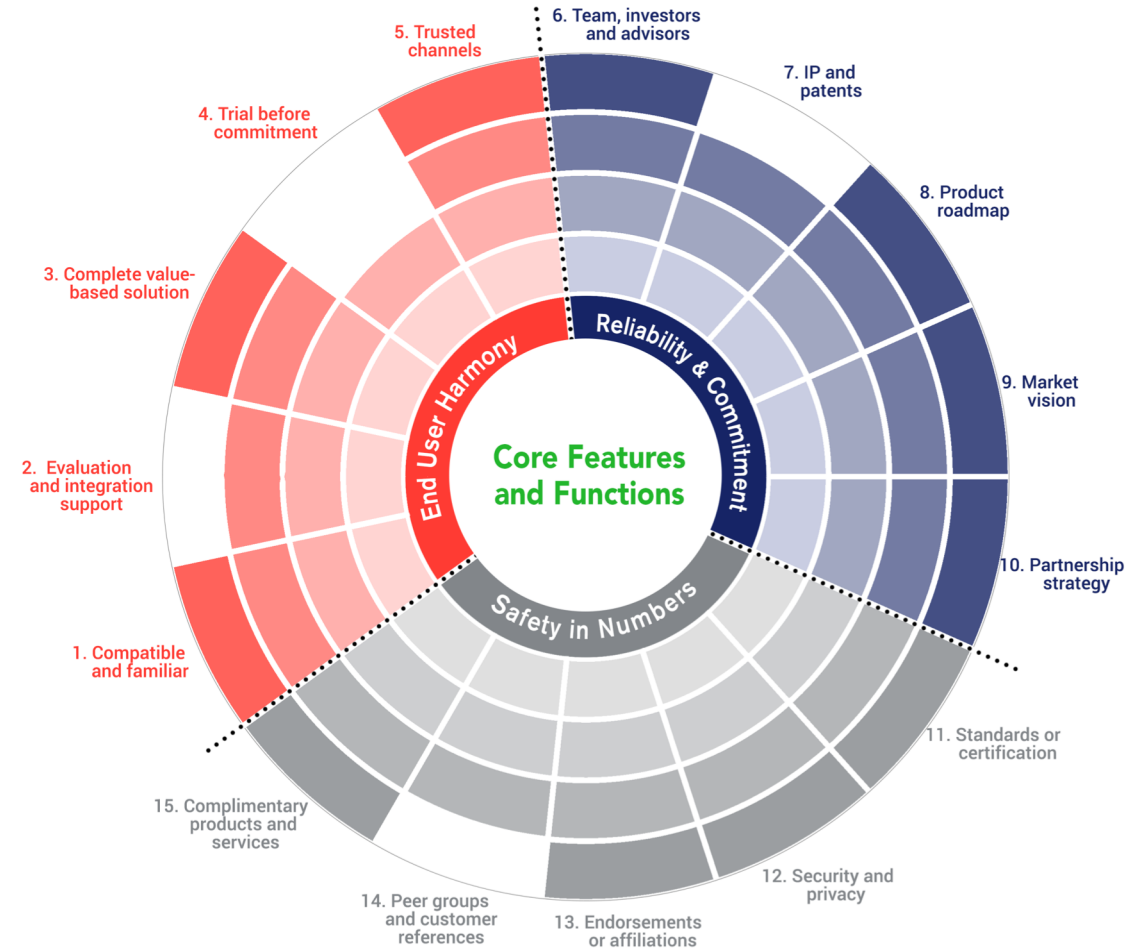
1. Centralized installation and servicing infrastructure managed by the local utility
2. Multiple support services: roof inspections, safety assessments, energy efficiency audits, etc.
3. Evolving ownership options with varying economic rewards
4. Customized economic analysis provided in advance
5. Completely familiar because the utility was well known and trusted in the area of electrical generation and supply

Reliability and Commitment

6. "Eco-Pioneer" S. David Freeman played key roles in energy policy at TVA, the EPA, and the Ford Foundation
7. PV manufacturing facility built on site to accelerate the advancement of thin-film solar panels
8. Product roadmap was the systematic transition to "rooftop solar"
9. Market vision known as "sustained orderly development and commercialization"
10. Partnership strategy focused on working with local installers and service providers

Safety in Numbers

11. Standardized system configuration with one size only
12. Earthquake reliability and security for homeowners provided
13. Sponsorship by the local utility, a known and trusted partner in the community
14. Focus on "neighborhood systems" allowed communities to engage with solar as a group
15. Peer-to-peer interaction enabled through community meetings



Over 50% of all grid connected solar in the U.S.

Vermont COVID Vaccination Program

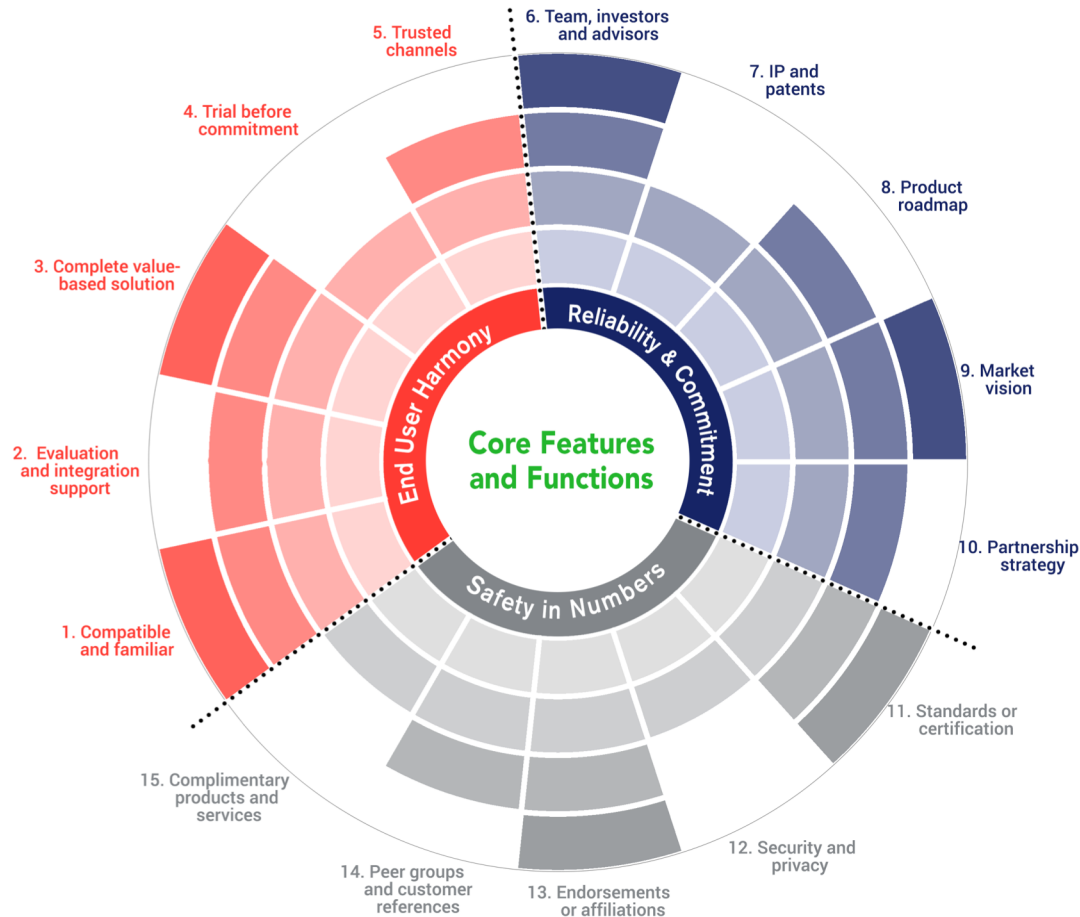
The adoption of a healthcare innovation — such as a vaccine to prevent the spread of COVID — requires people to make medical decisions based on individual risk-benefit analysis. In this example you can see that the state of Vermont took specific steps to achieve the perception of low risk through the creation of a program called “Keeping You Safe.”

Vermont Health Commissioner Dr. Mark Levine was quoted by the Associated Press as saying “the nation has witnessed what is probably the most successful population-wide mass vaccination campaign in the nation’s history.”

Vermont’s historic success is the result of designing a vaccination program that lowered the perception of risk for all residents.

Vermont’s vaccine program incorporated many of the risk-reduction methods that are important to a mainstream population: it was sponsored by an unbiased organization that is dedicated to clear communication (NPR), all vaccines were administered in familiar locations and settings, the alternative vaccines that were offered have the same underlying biological structure, and the use of town hall meetings and community-centered gatherings allowed citizens to discuss their concerns with people they relate to and trust.

Vermont COVID Vaccination Program



The Most Successful COVID Vaccination Program in the World

End User Harmony

1. Excellent compatibility; no mass vaccination sites; vaccine delivered to people at general stores, gas stations, car races and local events
2. Guidance from vaccinators who were culturally competent (in 10 different languages) and appropriate for the setting
3. Value alignment based on the concept of personal safety
4. Citizens could discuss their concerns with first responders, immigrant aid groups and respected local pharmacists
5. Trusted source for vaccination information and unbiased guidance (state health agency)

Reliability and Commitment

6. Managed by the Vermont Agency of Human Services
7. Expertise developed through previous community initiatives
8. Program roadmap presented through 145 briefings regarding strategy, plans and status
9. Market vision called "Keeping You Safe"
10. Partnerships with rural emergency medicine organizations

Safety in Numbers

11. Standard vaccine provided (Messenger RNA)
12. HIPPA regulations provided security and privacy
13. Vaccination program sponsored by Vermont Radio (NPR)
14. Town hall meetings organized by NPR enabled peer-to-peer interaction
15. Complimentary products included additional healthcare services

Reducing the Risk of Channel Innovation

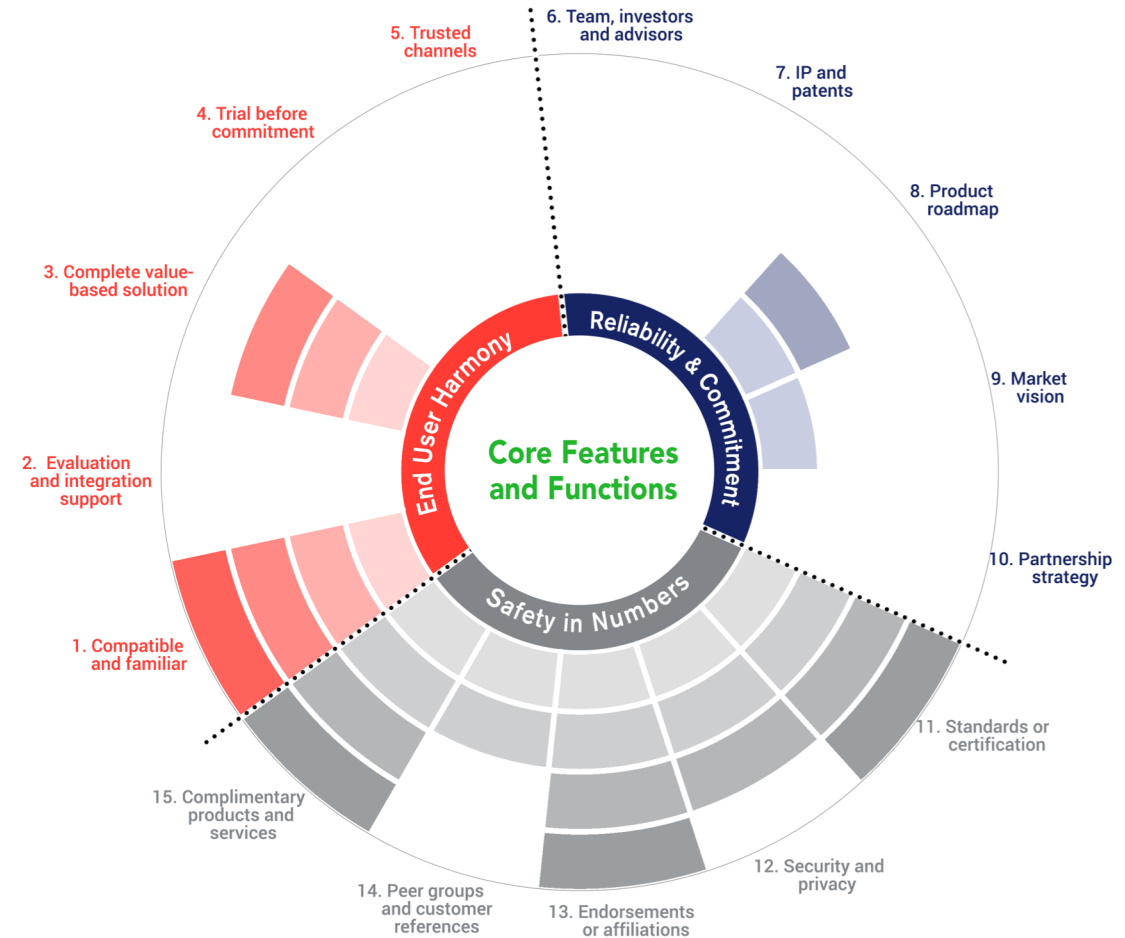
Companies that sell low cost or low risk products can still benefit from the Low Risk Recipe, especially if their delivery, pricing, or business model is substantially different or unique.

Amazon for example started by selling low risk products (books) but their delivery channel was much different than the traditional retail stores, which people were accustomed to.

And Amazon was a completely new, totally unknown, supplier with no track record or apparent category expertise.

By leveraging the existing ecosystem for book-publishing (and by delivering a product that was extremely familiar), Amazon was able to emphasize **safety in numbers** and **end user harmony** to reduce the perception of risk associated with their unique method of purchase and delivery.

Amazon Market Entry



EV Gap Analysis

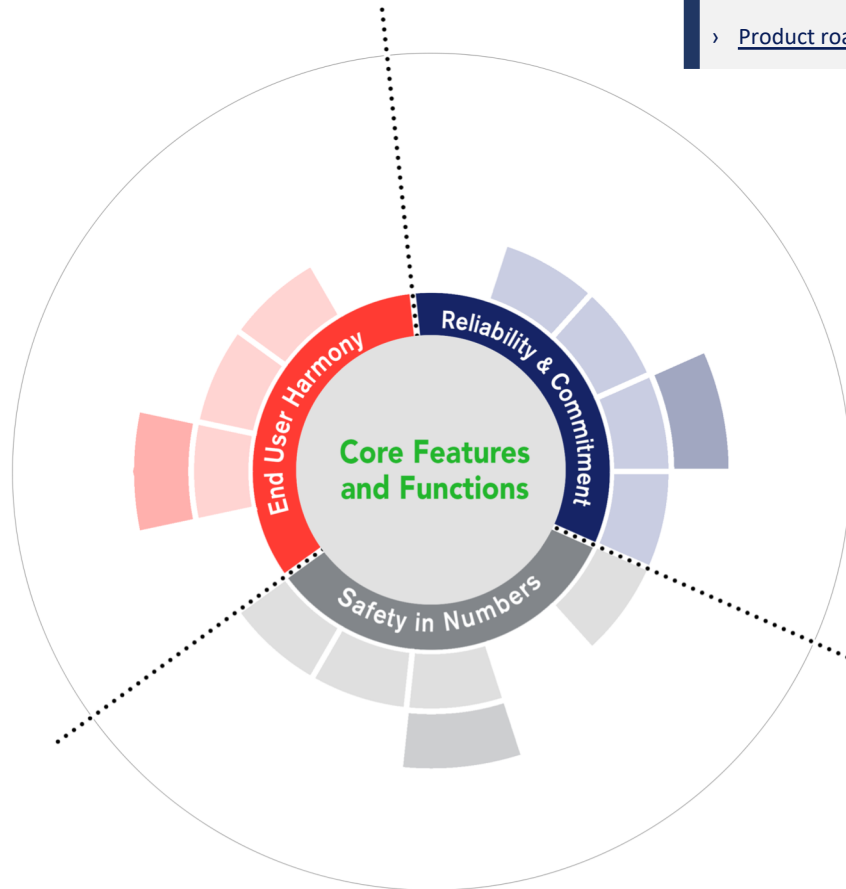
(Reasons Customers are not Buying)

End User Harmony

- › Trusted channels are unreliable as well-known car companies waiver in their commitment to EV products
- › Value (or “cost-benefit ratio”) is massively skewed by government subsidies that are not sustainable
- › Evaluation support partially provided by “Monroney” stickers. Electrician required for installation of in-home charging station
- › Test drive available but range testing not possible
- › Workflow compatibility very poor. Refueling systems and methods all change and substantial new learning required

Reliability and Commitment

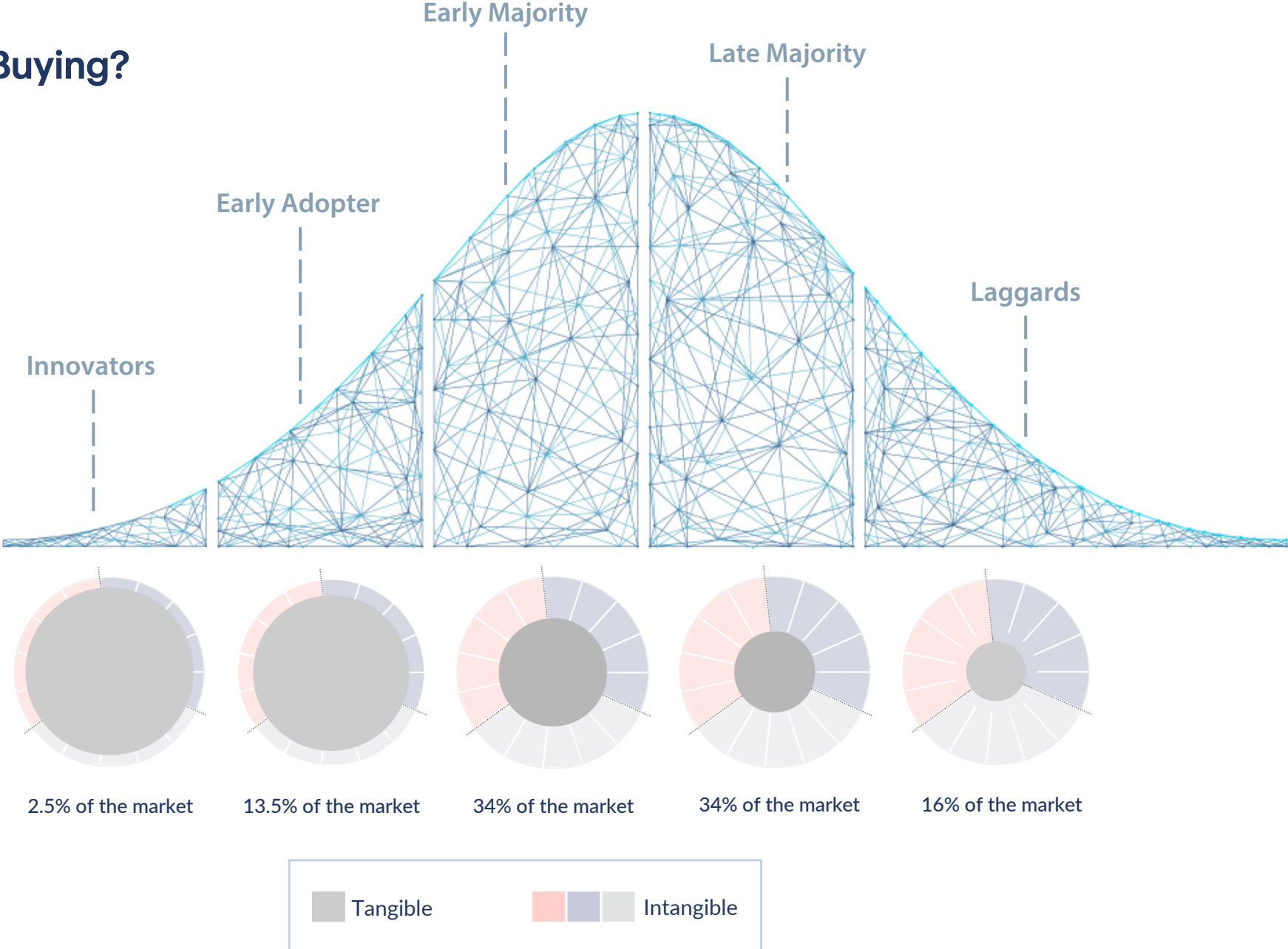
- › Core competencies are clearly demonstrated by established vendors
- › Market vision poorly communicated
- › Partnership strategy not obvious
- › Multiple claims of breakthrough battery technology that haven't been proven
- › Product roadmap(s) highly variable



Safety in Numbers

- › Lack of universal charging standards
- › Security and privacy considered weak; fear of cyber attacks increasing
- › No recognized organizations providing sponsorship or endorsement
- › Visible customer references available but not plentiful. Increasingly negative word-of-mouth communication. Peer-to-peer interaction only through low trust channels
- › Complimentary product supply (other than at-home chargers) is slow to develop

What Are Customers Really Buying?



The Role of Market Segmentation

All Successful Innovations Start in a Niche Market



Initial Market Segment

Books



Sales people in mid-size tech companies



Graphic designers



College students

Niche Market Segments



Racing



Cruising




Urban Short Trips

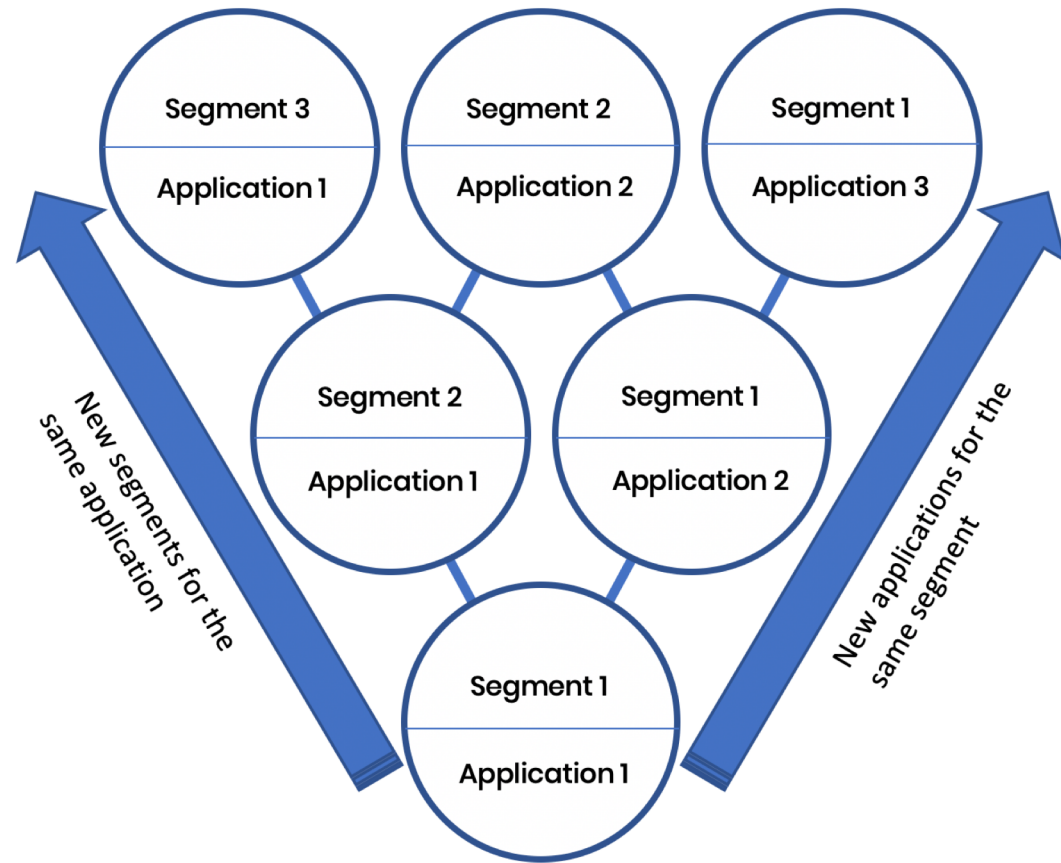


Dirt Trail Riding

Market Segments

	Racing	Urban/Short Trips	Cruising	Trail Riding
				
End User Harmony	<ul style="list-style-type: none"> • Race track compatibility • Racing motorcycle, warranty and service • Endorsements and permits • Training through AHRMA Academy of Road Racing • Honda Powerhouse dealers 	<ul style="list-style-type: none"> • Designed for local travel • Scooter with warranty and service • “Street legal” • Test drive available • Motorsport dealers 	<ul style="list-style-type: none"> • Designed for road-trips and highways • Touring bike with warranty and service • Test drive available • Motorsport dealers 	<ul style="list-style-type: none"> • Designed for off road • Trail bike with protective fenders/guards, warranty and service • Test drive with safety inspection • Powersport dealers
Reliability and Commitment	<ul style="list-style-type: none"> • World’s largest motorcycle manufacturer • Vision: make motorsports sustainable and more attractive for everyone • Merging of Honda’s 4-wheel and 2-wheel racing divisions to strengthen operations • Product roadmap: Higher torque, lower displacement engines 	<ul style="list-style-type: none"> • World’s largest motorcycle manufacturer • Vision: focus on inclusive mobility • Product roadmap: migration to electric • Partnerships to ensure stable procurement of nickel, cobalt and lithium 	<ul style="list-style-type: none"> • World’s largest motorcycle manufacturer since 1959 • Vision: “hybridization” of scooters and motorcycles • Product roadmap: wheels and brakes will be merged with ergonomics and wind protection • Second highest brand awareness worldwide 	<ul style="list-style-type: none"> • World’s largest motorcycle manufacturer since 1959 • Vision: Focused on the advancement of mobility • Product roadmap: migration to street legal • Expansion to rugged off-road vehicles for delivery services
Safety in Numbers	<ul style="list-style-type: none"> • AMA/FIMNA road racing certification • Motorcycle Roadracing Association • Motorcycle racing clubs • Motorcycle consumables: racing fuel, brake pads, brake fluids, tires, filters, race fairings, special helmet and clothing 	<ul style="list-style-type: none"> • “Street legal” standards • Standard octane gas • Motorcycle Safety Foundation provides training and licensing • Helmets and riding gear 	<ul style="list-style-type: none"> • “Street legal” standards • Training through Motorcycle Safety Foundation • Sturgis Motorcycle Rally provides visual references 	<ul style="list-style-type: none"> • Dirt bike safety training certification • Co-branded marketing campaign with TrueTimber camouflage accessories • Regional motocross associations • Off-road helmet, gloves and clothing

Mainstream Adoption = A Sequence of Niche Market Segments



A proximity map depicts adjacent market segments so you can visualize a market transformation strategy in terms of targeting adjacent segments by taking advantage of their commonality of requirements and relationships.

The most effective strategy for leveraging the success gained from winning your first niche market involves making a similar and careful choice regarding your next market-development step, which maximizes the chances of success and minimizes organizational risk. The two alternatives are either:

- 1) to take a new offering to your original target market, or
- 2) to market the same offering to a new market segment.

Why Segment

- To **optimize** your selling and marketing investments by focusing on a set of prospective customers who have a common application need (or the same problem)
- To **leverage** word-of-mouth communication between customers who reference each other before making buying decisions
- To **eliminate** barriers to EV adoption, particularly during a mainstream market transition
- To **identify** the elements that make customer groups very responsive to a product offering

Summary

- **The Low Risk Recipe** is the process of systematically lowering the perception of risk so that more people feel safe enough to adopt
- EV category/infrastructure is under-developed so the products are perceived as high risk
- Most intangible attributes required by the mainstream are missing
- EV suppliers are not following the proven formula that is required for market transformation

Recommendations

How to Accelerate EV Adoption

1. Group customers based on economic value so they can be distinctly targeted
2. Enable the development of a supporting infrastructure that helps target customers feel safe
3. Continuously redirect and renew the intangible attributes of the EV in a way that encourages end-user adoption in your target niche
4. Make a convincing case that your technology, product, talent, and commitment are fully aligned with the interests of an EV customer
5. Focus on a series of niche market segments

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