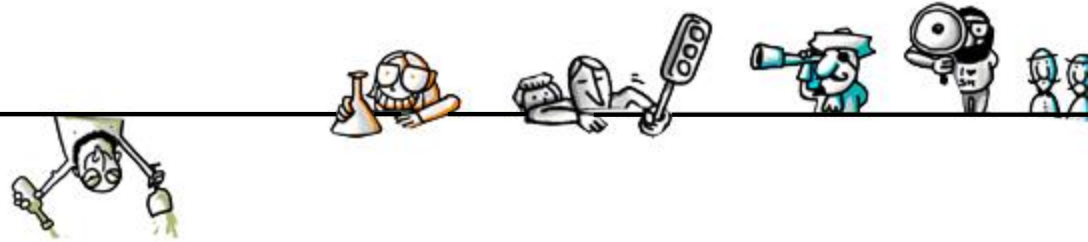


15.366 ENERGY VENTURES



Class 3: Market Segmentation & Understanding Your Customer

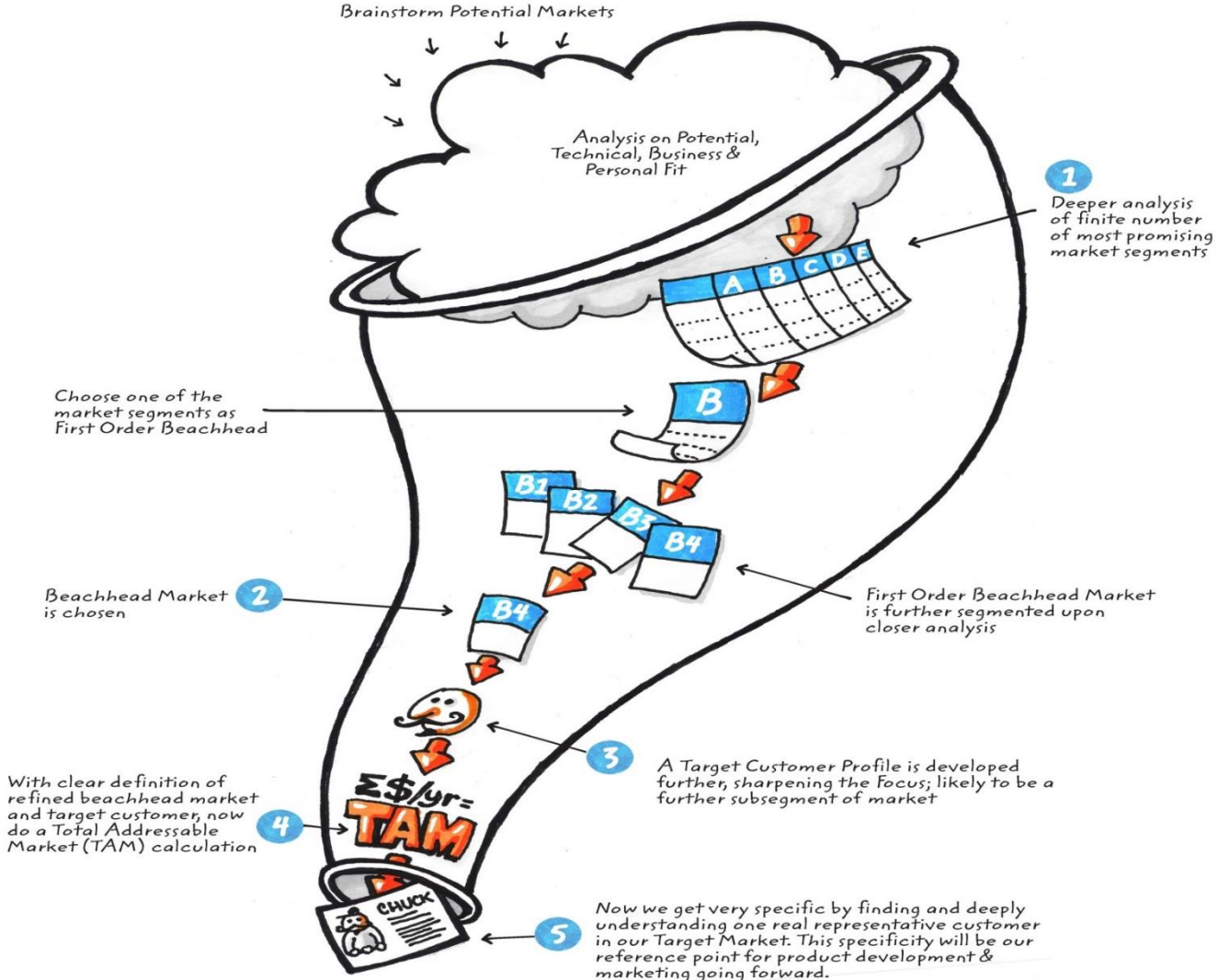
September 22, 2016

Francis O'Sullivan, Tod Hynes, Bill Aulet

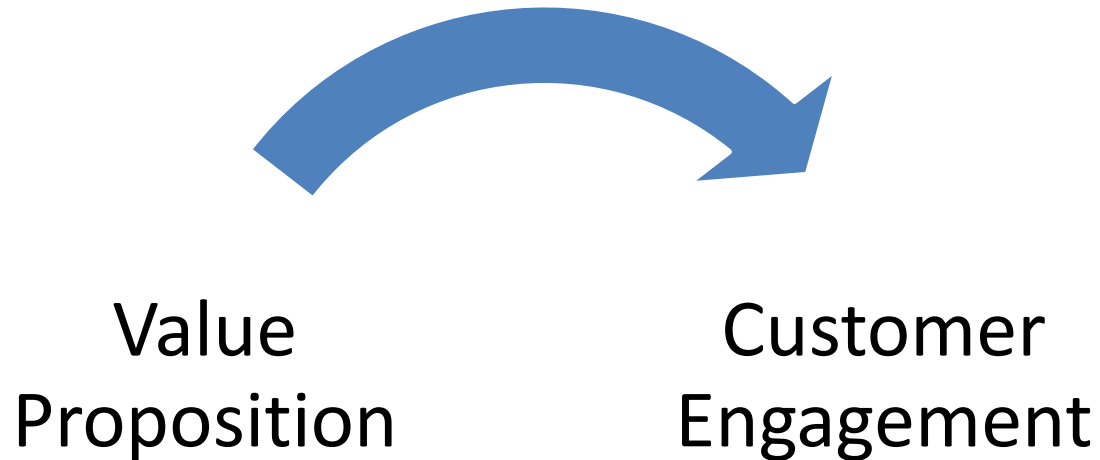
Today

- 5:05 - 6:00 Colleen Calhoun, Dir. Business Development & Partnerships, Current powered by GE
- 6:05 - 6:45 Market Segmentation & Understanding Your Customer
- 6:45 - 7:00 Break & Dinner
- 7:00 - 7:55 Team Time & Check-ins

THE JOURNEY FOR THE HOLY GRAIL OF SPECIFICITY



Industry	Entertainment	Industrial Design	Medical Visualization	Surgical Simulation	Micro Surgery	Geophysical Visualization	Non Visual C.H.I.	Prototyping	V.R.
End User	• Animator	• Stylist • Designer	• Radiologist • Surgeon	• Med Student • Surgeon	• Surgeon	• Geophysicist	• Blind Person	• Engineer	• Researcher • Designer
Application	• Sculpt • Animation • Paint	• Sculpt • Paint • Modeling	• Segment- ation • Navigation • Surgical planning • Diagnosis	• Training • Surgical planning	• Ophthalm. Surgery • Neurosurgery	• View enhancement • Drill plan	• H.U.I.	• Design review • Model evaluation	• Architect Render • Simulation • Training
Benefits	• Ease of use • Reduce cycle	• Reduce cycle • Increase accuracy	• Ease of use • Increase accuracy	• Increase use of new tech. • Increase accuracy	• Reduce cycle • Increase accuracy	• Reduce errors • Increase yields	• Increase access, “mainstream ”	• Reduce cycle • Improve designs	• Realism • Increase Accuracy
Lead Customers	• Disney • ILM • Dreamworks	• Toyota • Ford • Rollerblade	• Brigham & Women’s • German Cancer Rsrch	• U of Colorado • Penn • BDI	• Dr. Ohgami • Ottawa Eye	• BHP • WMC / CSIRO	• Certec • U Delaware	• Volkswagen • Stratasys • Toyota	• Boeing • Corrie Latham • NASA
Market Characteristics	• Early adopt. • High-priced talent • High growth	• Dislike CAD & computers • High-priced talent	• Mainstream • High-priced talent • HMO	• Mainstream • High-priced talent • HMO	• Early adopt • High Priced talent • HMO • Not computer automated	• Late main. • Oligopoly	• Late main • No money • Gov’t sponsor	• Mainstream • Pressure to reduce prod. cycle	• Early adopt • Fuzzy ROI • Slow accept
Partners/ Players	• Alias • Soft Image • Discrete Logic	• PTC • Alias • Imageware	• GE • Siemens • Picker	• Smith & Neph • Heartport • Ethicon • US Surgical	• Toshiba • Hitachi	• Landmark • Fractal Graphics	• IBM • Apple • SUN • HP • Microsoft	• PTC • Solid Works	• Sense 8 • Division • Coryphaeus
Size of Market	40,000	X00,000	X0,000	X0,000	X,000	X,000	X,000,000	X00,000	X,000
Competition	Watcom	None yet	None yet	Immersion	None yet	None yet		None yet	• None yet
Platform	• SGI • Windows	• SGI • SUN	• SGI • SUN	?	None	• SGI • SUN	• Windows	• SUN, HF	• SGI • SUN, HF
Needs	• NURBS • Stylus • Dynamics	• NURBS • Stylus	• Voxels • Stylus • VRML	• 6 DOF • Custom devices	• 3 Finger scaling	• Voxels • Stylus	• Windows I/F • P300	• NURBS • VRML • Dynamics	• Polygons • Dynamics • 2-finger?



- Examples

- Altaeros
- A123
- FastCAP
- XL Hybrids
- Ambri

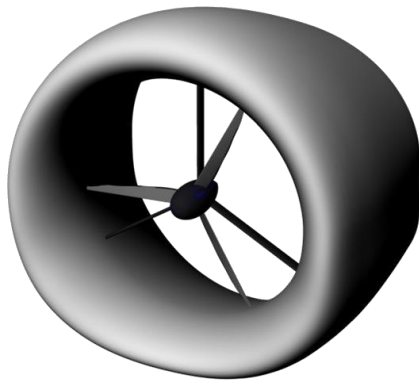
(Learn & Adjust)

- What customers value your benefits the most **and** is a fit for a startup company?

Altaeros



No tolerance for tech risk



Time to market too long & \$\$\$



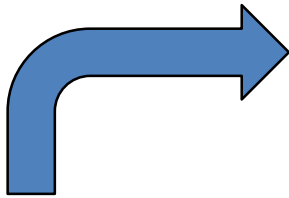
Island Power and remote DG
→ market interest + good fit for a startup...+ cell tower???

A123 Markets



Power Tools

A123 Markets

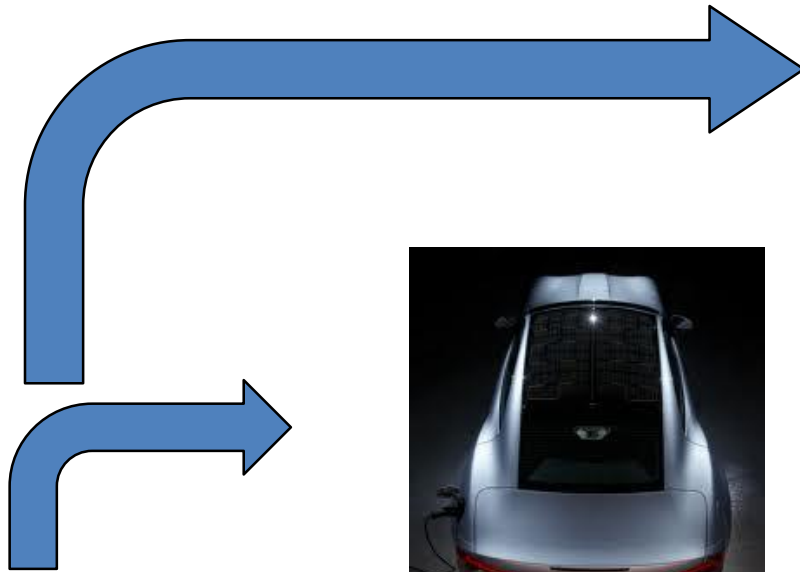


Power Tools



Auto Market

A123 Markets



The Grid



Auto Market



Power Tools

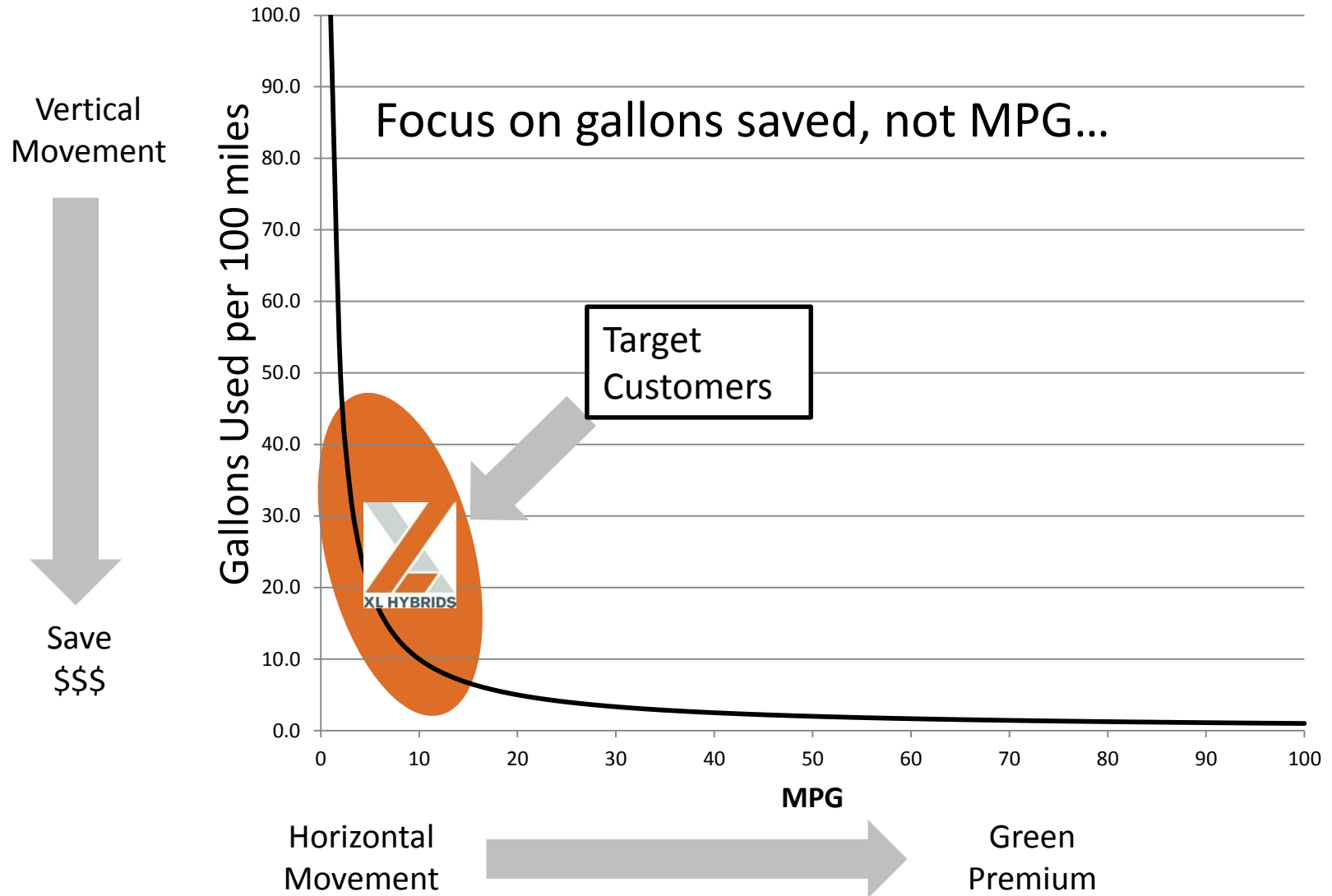


- Pitched grid ancillary services at the MIT Clean Energy Prize
 - Didn't make the finals
 - Disaster!!!?
 - Learned & adjusted...
- Won ARPA-e grant with auto market vision + drilling as the early market
 - Auto market → huge long-term market
 - Drilling → pays huge premium for performance characteristics

XL Hybrids Example

- 250 million vehicles on the road in the US...so where to start?
- Iterative process focuses in on the customers that can benefit most from electric drive technology
- Process helped determine product spec.
- Our mission is to reduce fuel consumption with cost effective electric drive technology. So...

GO AFTER THE BIG FUEL BILL

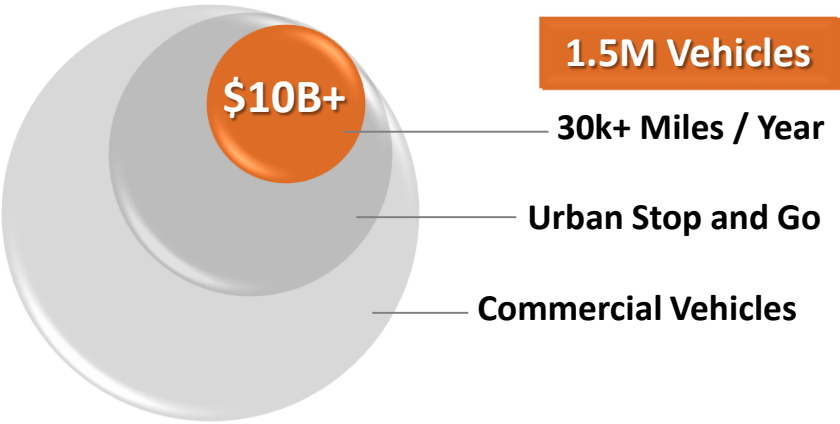


XL HYBRIDS

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TARGET MARKETS



REFUSE TRUCKS:

Refuse Trucks
Market Size:
90,000 vehicles*
\$1.4B market

CLASS 6-7:

Class 6-7 Market Size:
153,617 vehicles
\$1.5B market

CLASS 3-5:

Class 3-5 Market Size:
75,571 vehicles
\$566M market



Class 1-2 Market Size:
1M vehicles
\$6B market

CLASS 2A-B:

CLASS 1:

**Livery (Crown Vic +
Town Car):**



**Livery Market Size:
200,000 vehicles
\$1.2B market**



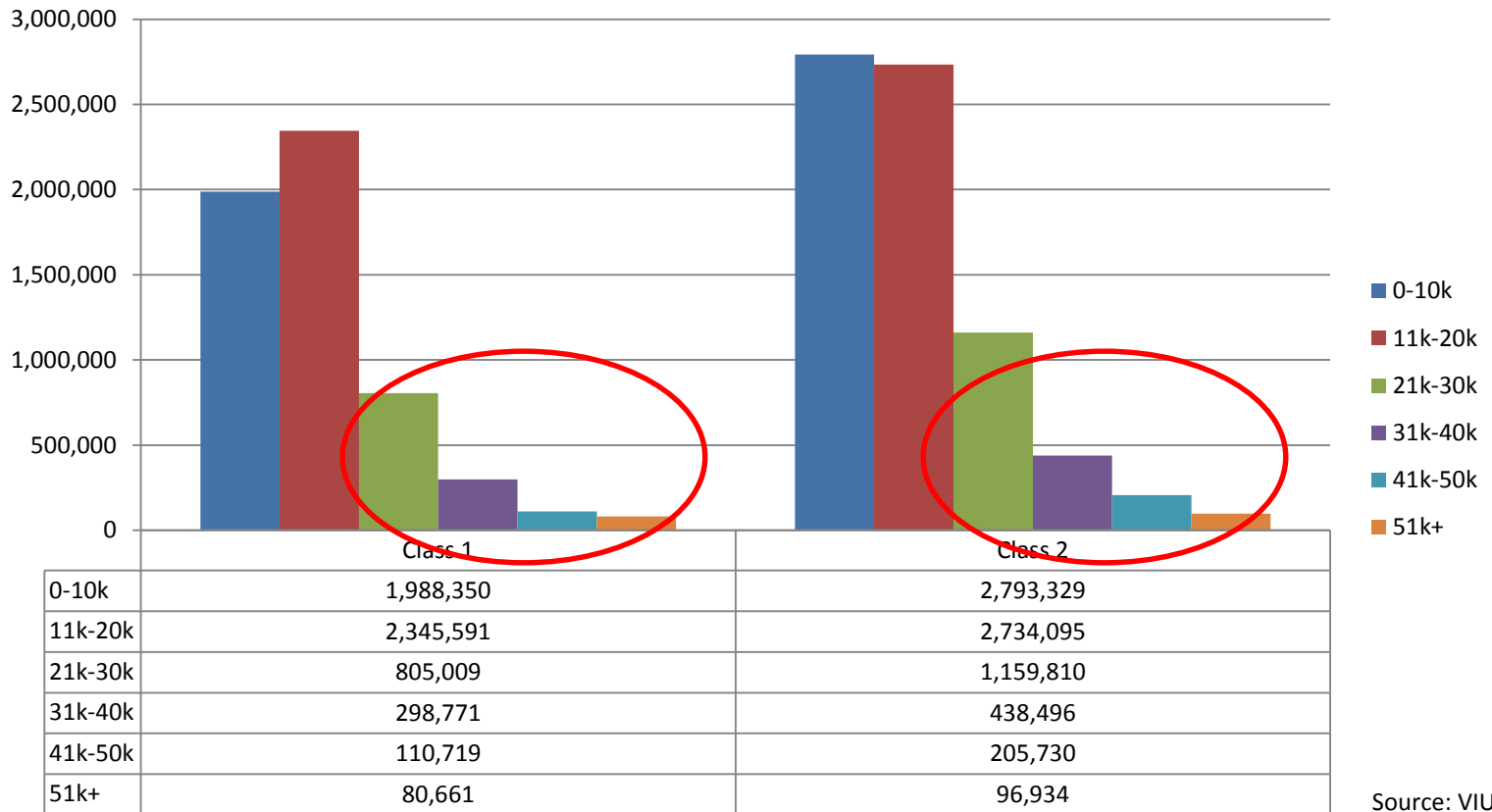
Best Beachheads

Source of Vehicle Numbers:
Dept. of Commerce, Vehicle
Inventory & Use Survey



Fewer Annual Miles → Larger Market

Business Truck/Van Annual Mileage

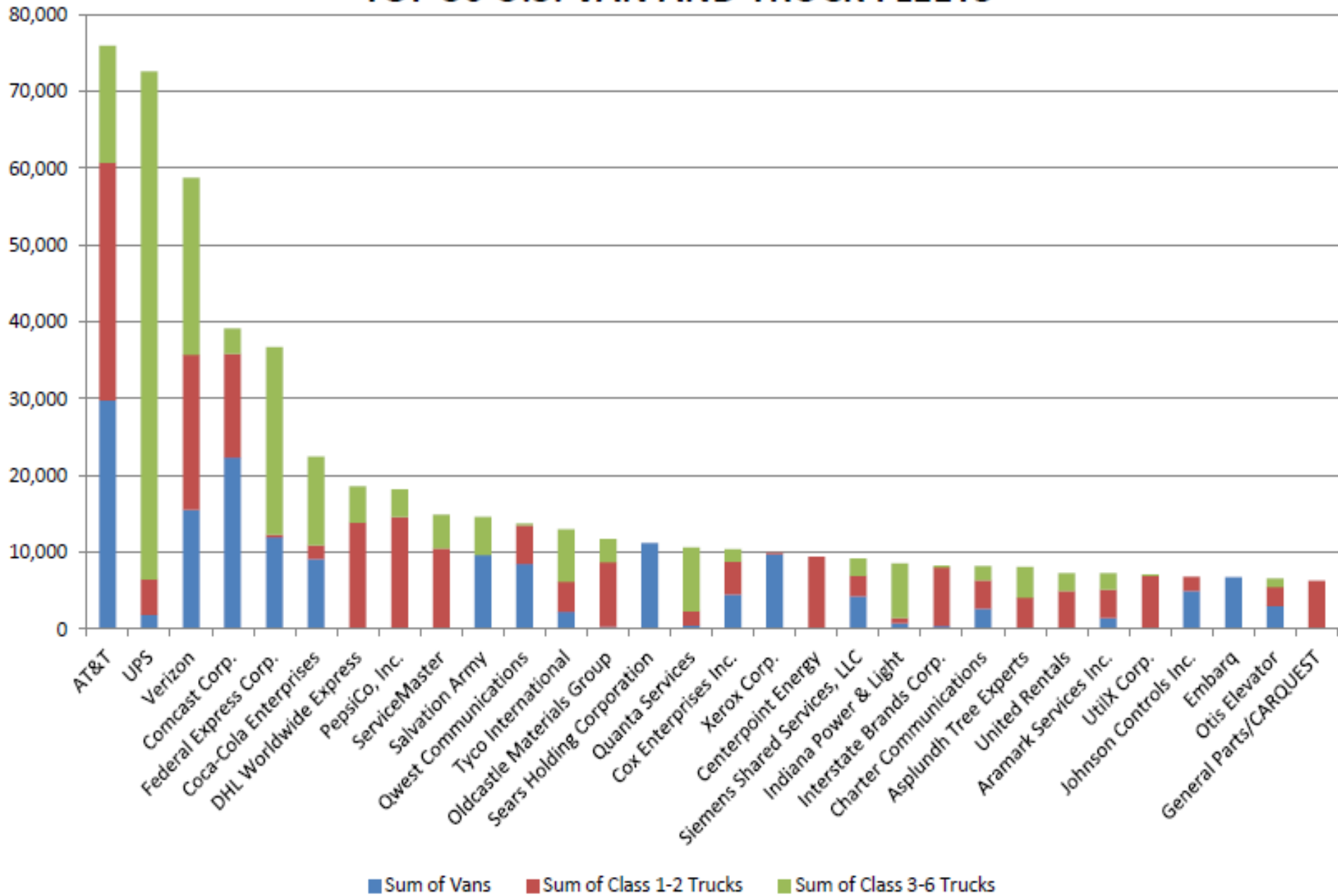


Source: VIUS 2002

Drive economies of scale with **target market** and grow into larger market as costs come down.



TOP 30 U.S. VAN AND TRUCK FLEETS

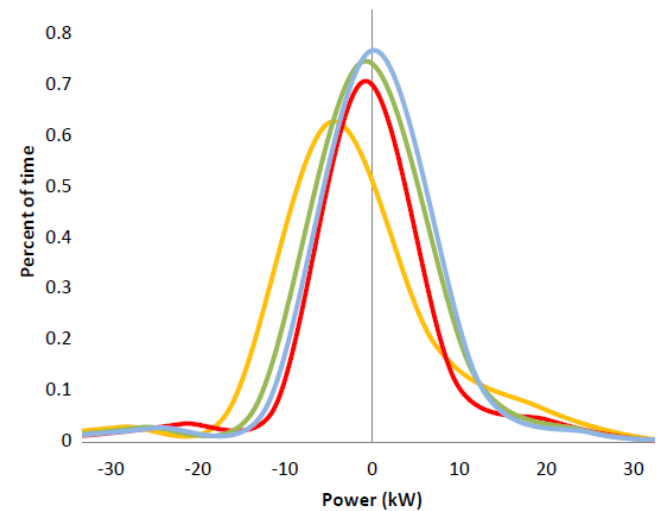
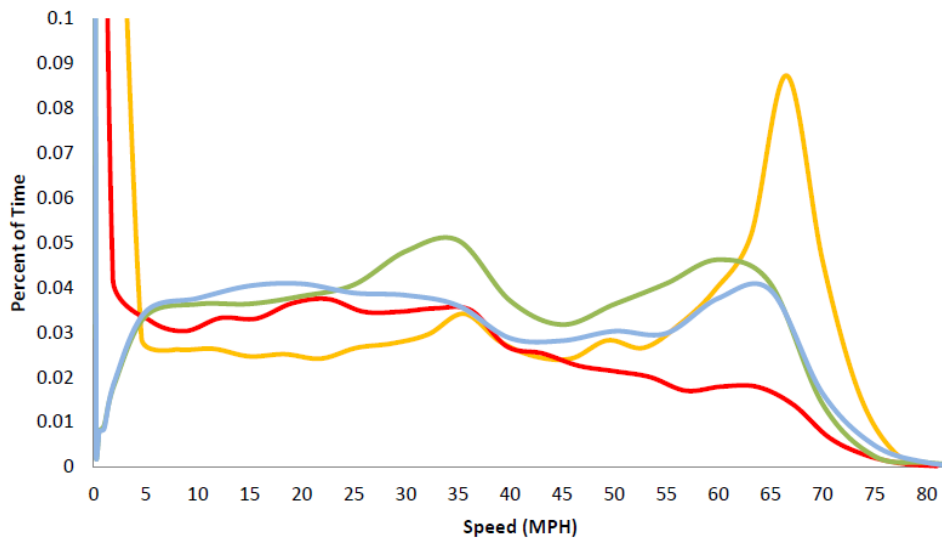


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Customer Audit

MILES DRIVEN [mi]	LOG TIME hh:mm:ss	DRIVE TIME hh:mm:ss	IDLE TIME hh:mm:ss	IDLE [%] OF TOT TIME	FUEL USED [gal]	FUEL ECON [mpg]	AVG SPEED [mph]	MAX SPEED [mph]
3687	124:30:40	84:44:0	39:46:40	31.95%	206.6	17.84	29.6	82.1
1241	70:55:10	37:59:46	32:55:24	46.42%	94.3	13.16	17.5	82.7
2087	105:37:31	60:22:46	45:14:46	42.84%	149.8	13.94	19.8	84.0
2144	123:17:37	64:9:01	59:8:36	47.97%	176.8	12.13	17.4	84.5



Case Study: Ambri



Storing Electricity for our Future

- Background on Ambri
- Core challenges of market entry
- Planning prototype deployments
- Commercial progress

Ambri Timeline



khosla ventures



KLP Enterprises



2005 Concept imagined

2005-2011 Lab work at MIT

- \$12 M funding for on-campus efforts (2009)
- Identified cost effective chemistry (2010)
- Energy Ventures!

2010-2012 Ambri spins out

- Founded in 2010
- > \$15M equity financing
- Team and lab 2011
- Located in the heart of CAMBRIDGE
- 2013 Operating prototype battery -- BMS
- Prototype manufacturing line

2013-2015 Preliminary Business Development

- > \$50M total equity financing
- Prototype battery systems contracted
- Factory designed

2016 Expand Manufacturing efforts

- First commercial orders
- Small scale manufacturing plant operational

15.366 ENERGY VENTURES



Core challenges of market entry

1. Electricity market is highly regulated (State and Federal) and extremely risk averse.
2. No clear acquisition mechanisms for primary customers (Utilities).
3. Entrepreneur's paradox:
Investors want to hear about large untapped markets, but as an entrepreneur you want to get product to market, likely in a niche, high-margin application.

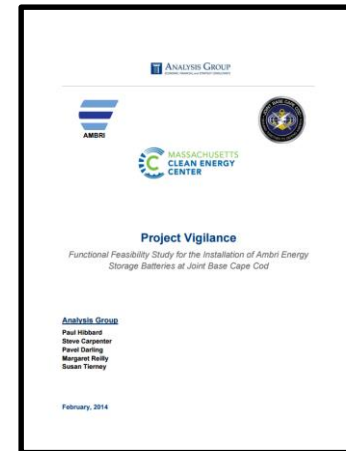
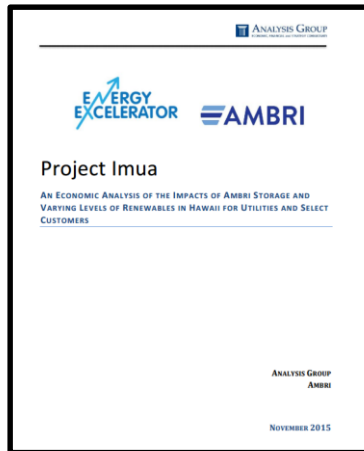


Case Study: Ambri

Early Markets

- High electricity prices, mostly from diesel generation (remote/island grids), but also from significant congestion.
- Significant renewable generation
- Single end user: Vertically integrated utilities, large C&I/DOD

Hawaii	New York	Connecticut	Massachusetts	Alaska
Integrating wind and solar renewable resources; Offsetting diesel consumption	Deferring transmission and distribution investments	Reducing operational energy costs and improving base reliability/resiliency	Reducing operational energy costs and improving base reliability/resiliency	Integrating renewable resources (esp. wind) and offsetting diesel consumption
				
  	  	 	    	  



First commercial contract:

1 MWh to Joint Base Pearl Harbor-Hickam

Raytheon



Raytheon Control System



PV



1 MWh Ambri System



Local Electric Power System



Target Customer Profile

I can generally see them
and describe them to you
but they are not
in completely
clear focus yet



Build a Persona

- ❑ It must be a real person
- ❑ Be visual
- ❑ Understand All Dimensions: Rational, Emotional and Social
- ❑ Priorities
 - ❑ What do they fear most in the world?
 - ❑ What motivates them more than anything else?
- ❑ What “water holes” do they go to?
 - ❑ i.e., where do they congregate with others like them?
- ❑ Do this as a team – it will help unify your team and will get everyone on the same (and proper) wavelength

Example Persona

- Chuck Kirby, Facilities Manager, IBM NE Data Center in Littleton, MA
- 20K Blade servers today growing at 15% per quarter for past two year and for the foreseeable future
- Second generation American
- Lives in Medford
- Medford High to Middlesex Community College
- Moved to Winchester
- Family with 2 kids (12, 15)
- Mid-career, many years at company, technical, maintenance focus, vocational degree
- Been in job for 5 years and seen three managers already
- Promotion path forward is to manage more facilities
- AFCOM, Uptime Institute, Green Grid, starting to read blogs (Hamilton & Manos)
- Ford 150 pickup truck, Beeper always on, volunteer fireman mentality
- Customers' Customer and Their Priorities (think mindset of a utility customer)
 1. Reliability, 2. Growth, 3. Costs, 4. "Greenness" – PUE

Where to Get Started

- Assess the stage of your business and knowledge?
 - Do you know enough to effectively describe your business or the problem you're trying to solve?
 - What are the right questions to ask customers?
- Do you know enough about your customers?
 - Are you ready to talk with them?
 - What do you need to do to get ready?

Fundamentals

- Know the basics of the overall energy space
 - MW vs. MWh, PPA, capacity factor, efficiency (tricky), light vs. heavy, sour vs. sweet, Henry Hub...
- Know the terms in your part of the space: do people talk in metric tonnes, barrels, or gallons...or all three
- Know enough about your customers other options
 - Direct and indirect competitors
- Eventually become a specialist in your sector

Networking Is Key

- Leverage the MIT and Harvard alumni network
 - Strong intros make a huge difference
- LinkedIn is a great (and cheap) resource:
 - Identify, learn about, and connect with customers
 - Customer example
 - Great way to find the right person in a large organization
- Attend events attended by your customers

Tradeshows + Conferences

- Be very selective in which ones you go to, there are events all of the time and they range in quality
- Largest benefit is mainly the people there
- Everyone in the same place at the same time
 - Efficient way of meeting with potential or existing customers, partners, suppliers...
 - Make sure you schedule ahead if possible as people can get very busy – have a plan
- Get the attendee list and conference materials in advance if possible and **set up customer meetings in advance!**
- Ideally you should be presenting!

Other Sources

- Follow your customers & competitors on twitter
- Sign up for the same industry magazines / news sources your customers read
- Daily briefs/blogs
- Be innovative in finding sources!
 - Lawsuits (NYC taxi example)

Homework for next week

- Read DE:24 - Step 5-9
- Read Ambri case (posted on Stellar)
- Deliverables: Preliminary Findings (posted on Stellar), Preliminary target market, high level competitive landscape, product/service offering.
 - List of questions you plan to ask customers and partners to sharpen up concept.
 - Assignment 1a: Short individual memo on strengths/weaknesses of approach to customers utilized by (a) Sense and (b) Bidgely.

A note on Assignments

- In general, assignments are due at 11:59pm the Wednesday before class
- Please select one person from your team to be responsible for uploading the completed assignment to Stellar