



Pecan Street Inc.

"Pecan Street Project's smart grid research is generating incredibly valuable information on how, when and on what customers use energy. It will end up as the single greatest collection of consumer energy data that has been developed in the United States."

Dr. Michael Webber, University of Texas researcher

Things change





2008-2010

“Unlike the Internet, which went through a rapid boom-and-bust cycle – a classic bubble – the transition to new energy ... technologies will look more like a long boom.”



Summer 2011

“Google Kills PowerMeter”

June 24, 2011

Why aren't new energy
technologies creating more jobs?



Why the clean
energy economy
is
underperforming

Disruptive innovations are necessary to achieve significant growth

Preconditions for disruptive innovations have yet to occur

New technologies have been deployed overwhelmingly by utilities.

New products and services overwhelmingly ignore innovation theory.



How technologies enter marketplace

Types of innovation

Evaluate current technologies and products

Roadmap for disruptive growth



3 ways new technologies enter market

Sustaining innovation

Within existing market and delivery structure

Boeing 777, plasma TV

Regulatory fiat

Policy mandates

Smoke alarm, corn ethanol

Disruptive innovation

New customers or consumption occasions

Telephone, transistor radio, mobile phone, Japanese photocopiers



Economic growth potential

Sustaining innovation

Moderate, incremental

Regulatory fiat

Moderate or negative

Disruptive innovation

Significant



Sustaining innovations

How deployed

Within existing market and delivery structure

Customers

Most demanding customers in industry

What they'll pay for

Improvements to incumbent systems along metrics they value

Capability: *software upgrades*

Price

Ethical

Winning companies

Incumbents



Sustaining innovations

Cramming

Deploying new technologies into incumbent models even though they don't work well in that model

Impact

Outcomes

Not disruptive

New technology's features a liability

Company tries to convince customers to change behavior or put up with something they don't seem to want

Square peg into a round hole



Regulatory fiat

How deployed

Regulation, legislation

Customers

Subject of government mandate

What they'll pay for

What is required to comply

Distinction between product mandate and performance mandate



Disruptive innovations

How deployed

New platform

New location / context of consumption

Customers

Customer whose needs aren't well met by incumbent offerings

Requirements

Solves a problem for customers that incumbent solutions do not do well

New platform

Killer app

Winning companies

New entrants



Disruptive innovations

Platform characteristics

Built on other platforms

Capable of more than one use

Empower customers to do job in new context

Open

“Plug and play”

well-defined interfaces

light bulb sockets, 120v outlets, USB

Examples:

Microsoft Windows

Internet

Electric grid



Disruptive innovations

Platform
characteristics

Microprocessor
|
Integrated Circuit
|
Transistor

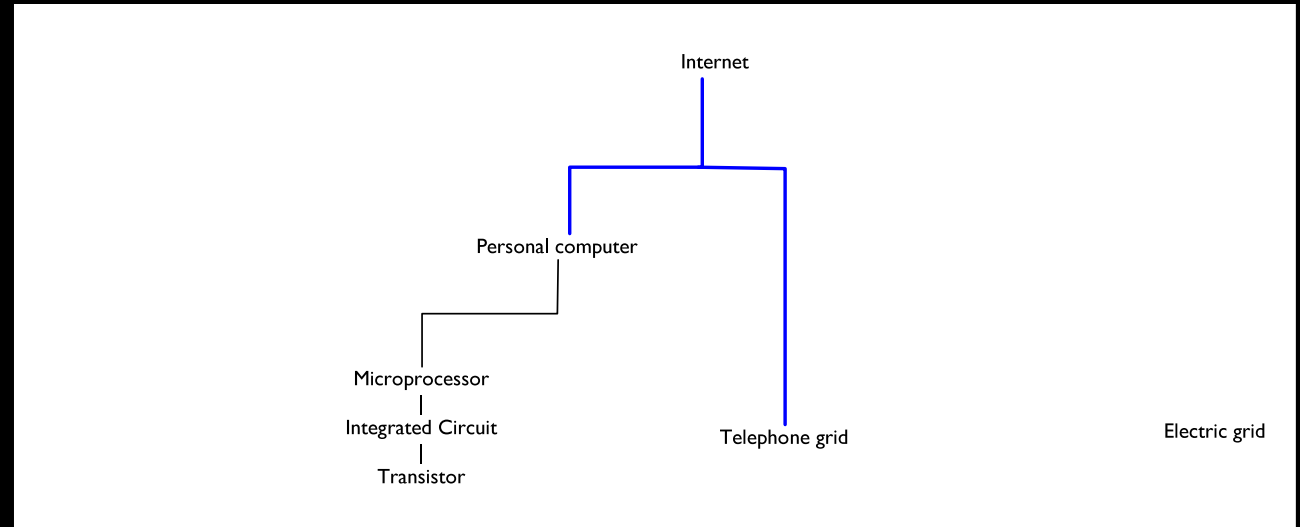
Telephone grid

Electric grid



Disruptive innovations

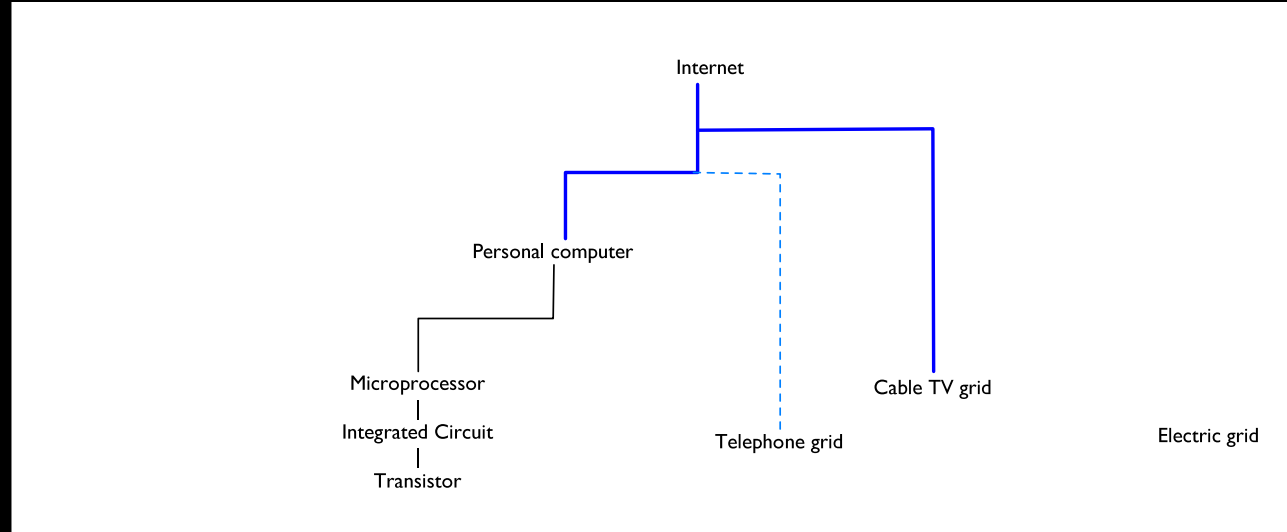
Platform
characteristics





Disruptive innovations

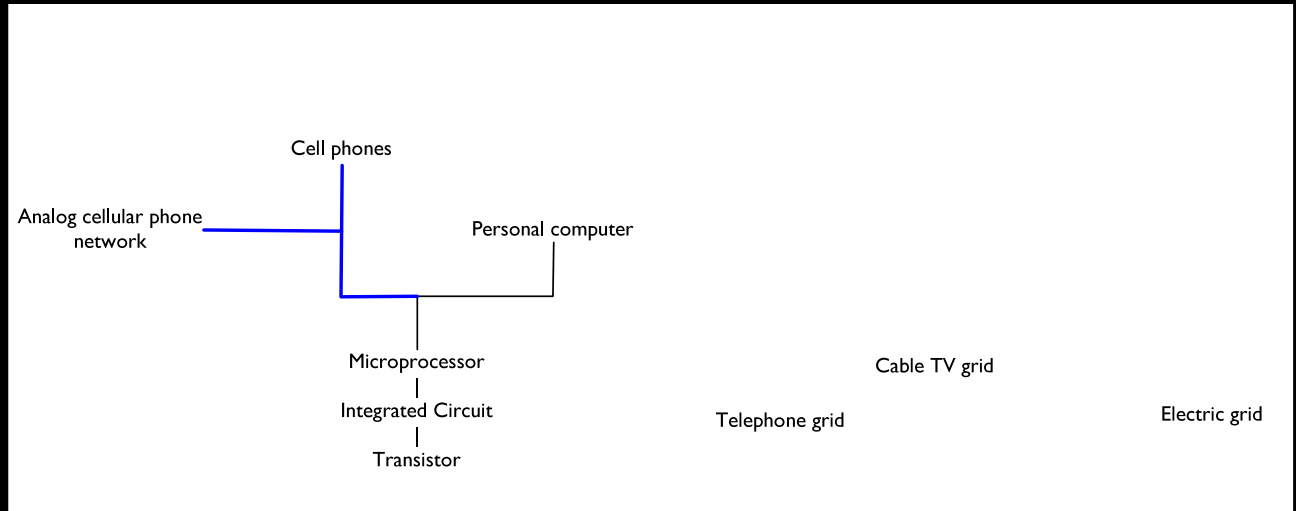
Platform characteristics





Disruptive innovations

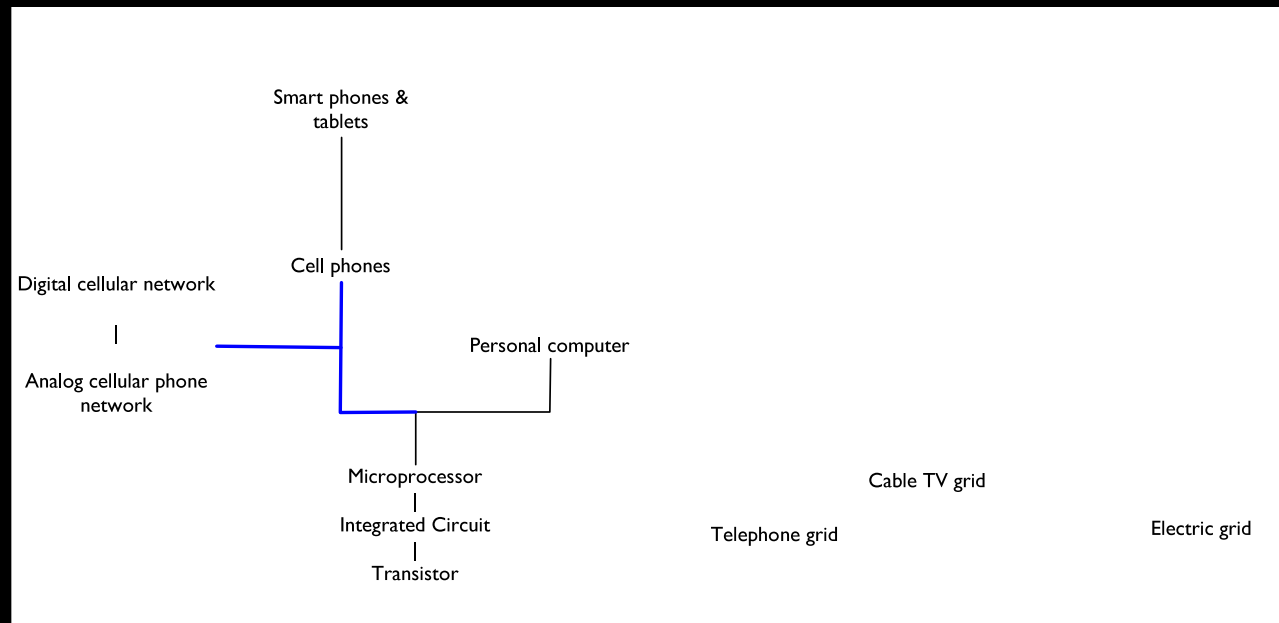
Platform characteristics





Disruptive innovations

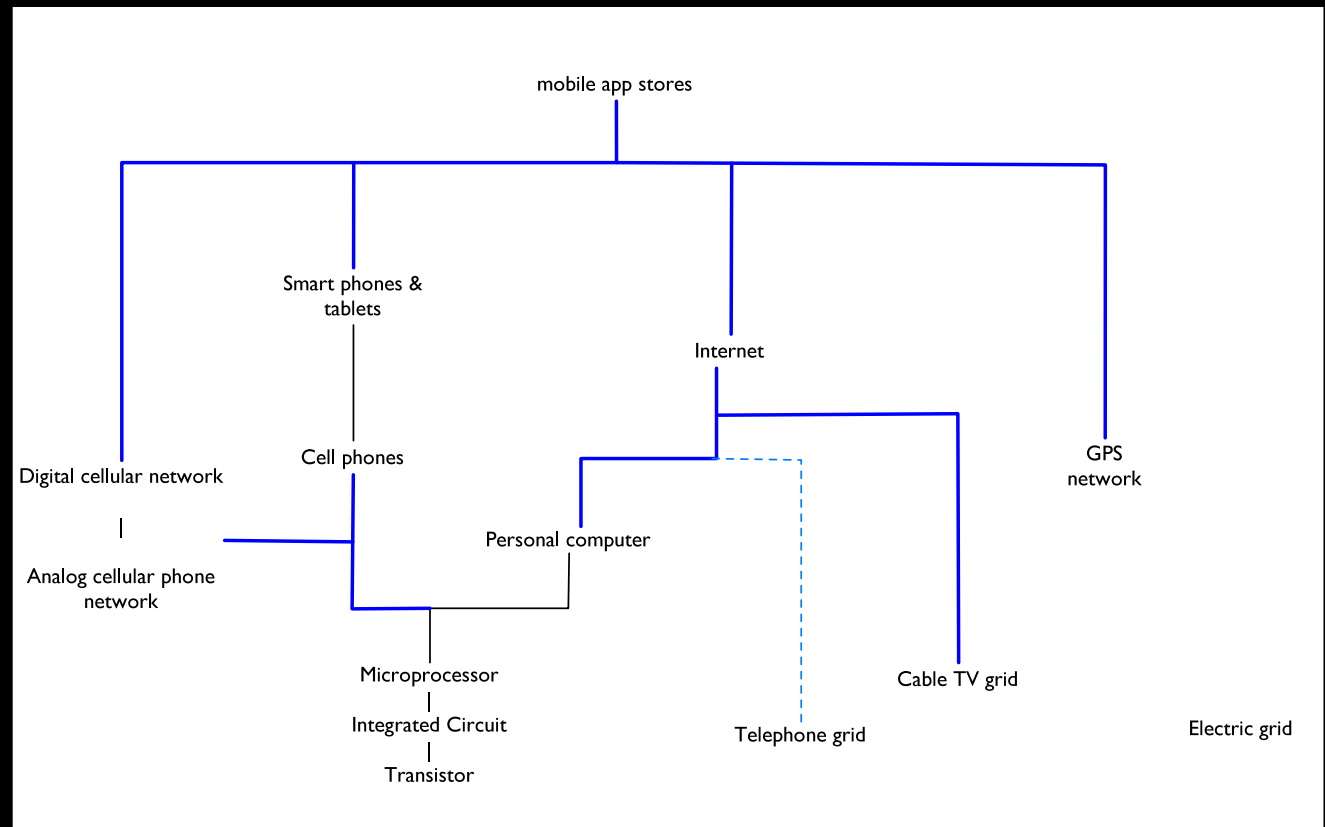
Platform characteristics





Disruptive innovations

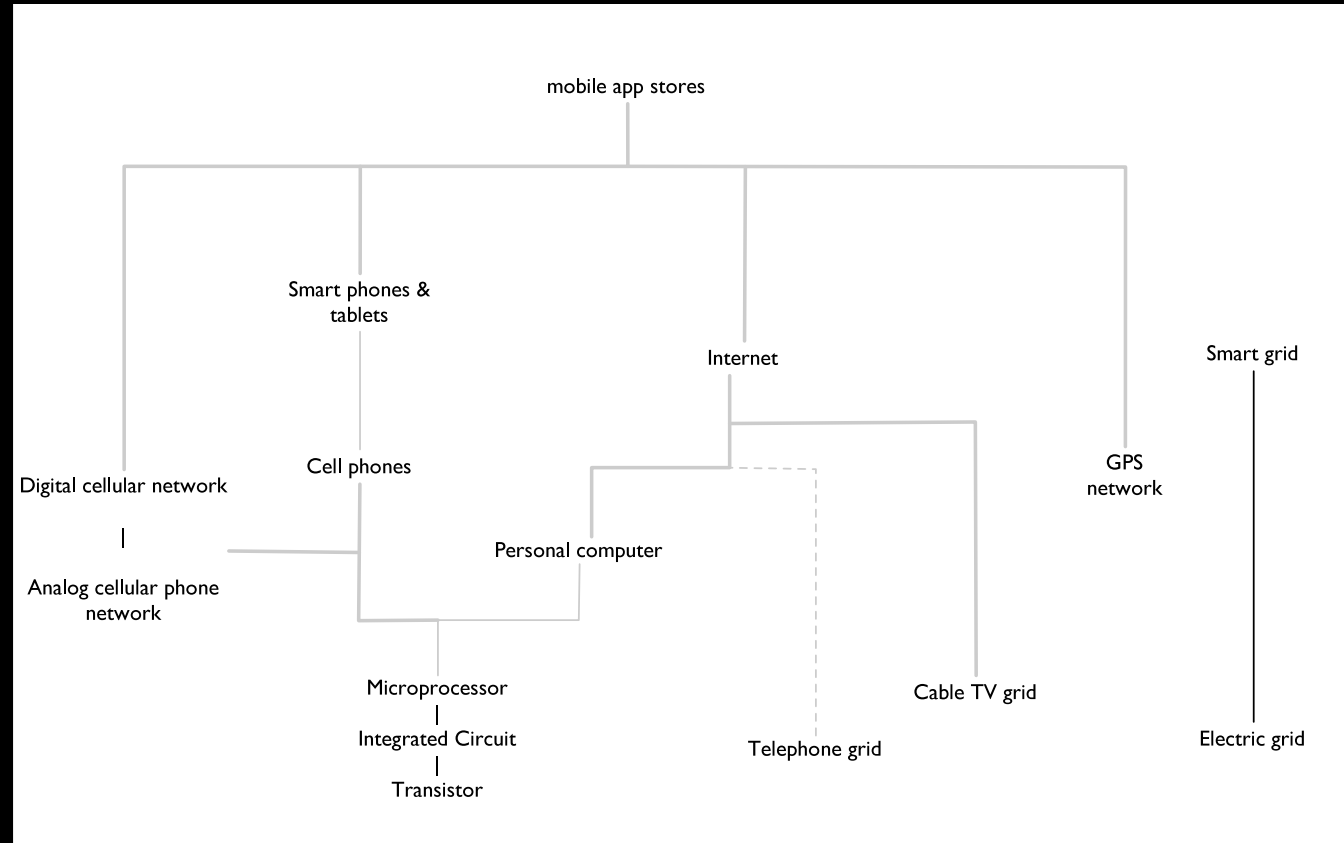
Platform characteristics





Disruptive innovations

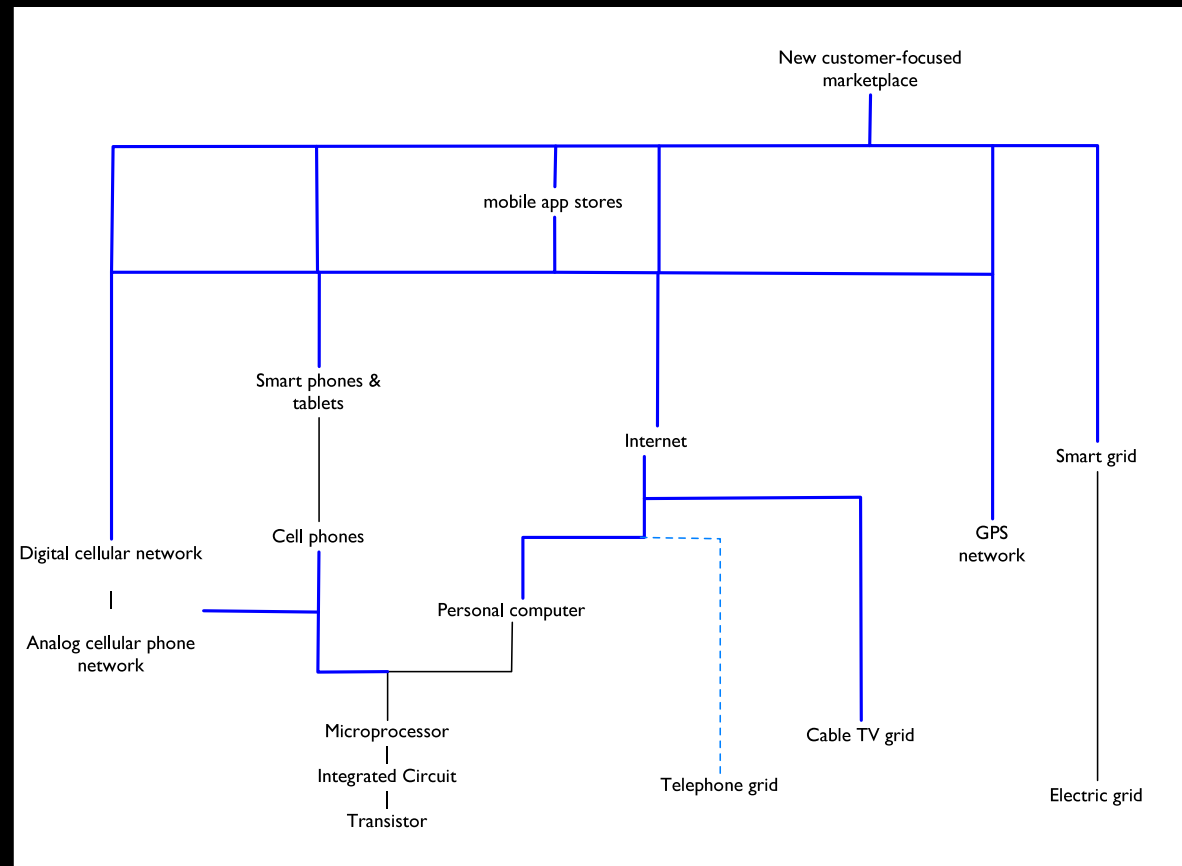
Platform characteristics





Disruptive innovations

Platform characteristics





Disruptive innovations

iPhone and App Store
disruptive to –

GPS services

Calculator makers

Map makers

Camera companies

Stopwatch makers

CD and DVD manufacturers

Video camera companies

Compass makers

Large software companies

Phone companies



Innovation checklist

What type of innovation?

Electric vehicle

In-home charging

Public charging stations

Solar farms

In-home charging with –

Home energy management system

rooftop solar PV

in-home battery



Sustaining
innovations

- Gas-fired peakers
- Smart meters
- Demand response
- Time of use pricing
- Electric vehicles



Load control
approaches

Sustaining

Demand response

Turn off air conditioner

Raise prices in afternoon



Consumer value

Smart Grid is...

Next Internet

Distributed structure

Next telecom

New consumer products

New consumer services

Solve problems in consumers' lives

Benefits of Internet

Access to information –

World Wide Web, Wikipedia, Google

New forms of communication –

email, Webex, blogs

Online marketplace –

Amazon, Expedia, .com

Entertainment choices –

Netflix, YouTube, iTunes

Social connection –

Facebook, Twitter, chat



Cramming

- Solar farms
- Utility-run home energy management
- Utility-scale Batteries



Roadmap

Platforms

- Home Services Systems
- New type of distributed grid



Roadmap

Disruptive

Centered on Home Services
Systems

Leverage energy data for new
products and services

Similar to App Store model



Roadmap

- Vehicle charging in residential garage
- Natural gas grid
- Rooftop PV charging of vehicles
- Apartment building microgrids
- Home apps
- Home health care monitoring

Benefits of
wireless

Communication mobility

Access information anywhere

Mobile apps - hundreds of thousands

Affordable Internet

Social connection

Benefits of smart grid

Improved billing

Outage detection

Fewer trucks to read
meters

Help utilities integrate
more renewables

Improved billing

Outage detection

Fewer trucks to read meters



I want that!

Impacts day-to-day activities of –



Benefits of smart grid

Improved billing

Utility

Outage detection

Utility

Fewer trucks to read meters

Utility

Help utilities integrate more renewables

Utility



Innovation checklist

What type of innovation is it?

What is the product?

Who is the target customer?

What job is the customer trying to get done with the product?

What are the incumbent solutions?

Is the customer either a low-end customer or a new consumer of products that do this job?

Where is the product deployed or used?

Is the product deployed or used in a different location than the incumbent solution?



Innovation checklist

Sustaining innovations

What are the metrics of performance that are important to the most demanding customers in the industry?

How do target customers feel underserved by incumbent solutions?

How would the product provide superior performance in the area where the target customer feels underserved?

What refinements would be needed in the product to make it attractive to the mainstream market?

Does the product have performance limitations compared to incumbent products?



Innovation checklist

Disruptive innovations

How does the product help customers do more easily and effectively what they were already trying to get done?

What is the new platform on which the product is deployed?

Which uses does the platform enable?

Does the product's success depend on the customer changing behavior or adopting new priorities?