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Product Design

Session 2 – Opportunity Identification & VIDE Model

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Scoop Free

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Photo: Alan J. Cook

Evaluating Opportunities for the Next Product-Based Venture



Prediction Task (faced by entrepreneurs and managers)

Opportunity. Hypothesis that value can be created. Usually articulated as some combination of need (pull), solution (push), or tentative need-solution combination.

How much value can I create by pursuing this opportunity?

or

Which of several product development opportunities is likely to result in the creation of the most value?

IDEA 133: The Tofu Press!



Will pursuing the
tofu press
opportunity create
value?

Tofu is way better and easier to cook when you drain all the water out of the block before you cut it up and throw it in the pan. No grease splatters, and it soaks up the flavors like a dry, tasty little sponge. Thing is, all the tofu-loving environmentalist hippies out there have no good way to drain that water out. Most people sandwich it between a bunch of paper towels and some heavy books, but that wastes paper towels. So what we want is a hand-crank press of some kind that you can put two halves of a tofu block into, and squish the water out into the sink. It'd be faster and way more environmentally friendly than the paper towel method. A must-have addition to any tree-hugger's eco-friendly kitchen!

First-Order Economic Value in Product Design



Over some time period...

Profit =

Quantity Sold x (Unit Price – Unit Cost) – (“Fixed” Investment & Period Expenses)

$$\pi = Q(p - c) - F$$

e.g.,

Tofu Press (over 3 year period)

$$\pi = Q(p - c) - F$$

$$= 30,000 \text{ units} \times (40 \text{ USD/unit} - 12 \text{ USD/unit}) - 250,000 \text{ USD}$$

$$= 840,000 - 250,000$$

$$= 590,000 \text{ USD}$$

Of course we can integrate these variables over time, discount cash flows, and so forth, to capture time value of money and total project value.

See Ulrich and Eppinger Chapter “Product Development Economics” for details.



Protect USB Thumb Drive

The problem is that USB drives stick out awkwardly from laptops and PCs; they are fragile and easy to break if you hit them hard enough with a hand or a knee. The solution is bendIT, the flexible and bendable USB adapter/cover that does not break. It is made out of a plastic/silicon material that bends 90 degrees in every direction (or more depending on the material) it is small in size and shape, it has a female connector on one side and a male connector on the other, and while it might increase the length of your thumb drive a little bit, it keeps it safe. You can either attach it to the thumb drive or keep attached to you laptop at all times.

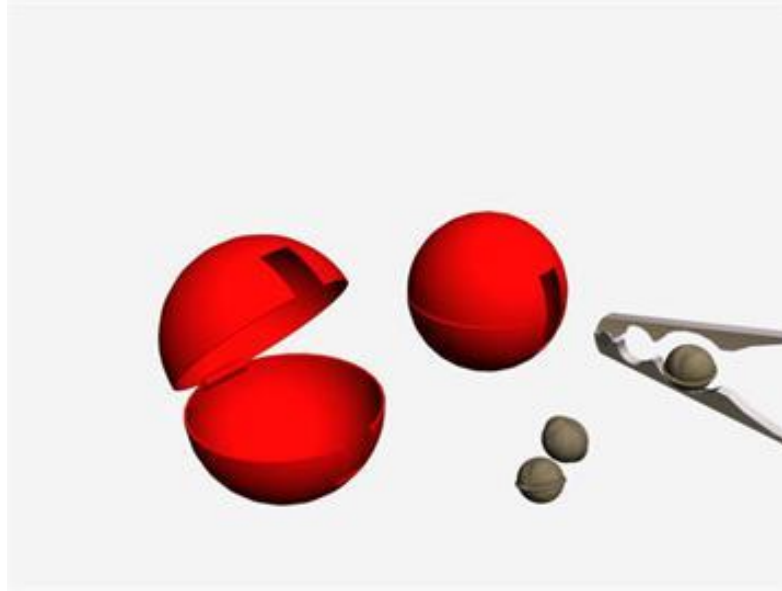


The Monitor LED Light Kit

Mount it under your monitor for a rockin' ambient neon light effect + a practical desk lamp. Take two great ideas (a LED neon under-dash light kit and a powerful LED desk lamp) and combine them into a LED light strip that mounts under the front edge of a monitor. Power it through USB, and there you go...an Alienware look ...

Armpit Cooler with Bellows

Two small plastic bellows are affixed to your t-shirt under your arms. As you move your arms the bellows blow air onto your armpits cooling them down.



Shell Stop Nut Cracker

When using traditional nut crackers to crack nuts...the shell normally flies across the room and gets stuck in the carpet or sofa. The edible part of the nut quite often also does the same so you spend time hunting for those good bits of nut. My idea for a new design of a nut cracker device has a dome or two-piece sphere which stops the shell and nut pieces flying off. The cracker and nut are operated within the dome ensuring you get to eat the whole nut without the mess of normal handheld nut crackers.

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Submit Your Idea Now



Have a great product idea? [Here's where to start.](#) ▶





Gifts

Power

Kitchen

Cord Management

Digital Accessories

Bath

Utility

Cordies

Spring Cleaning



Contort

Protects with a Flex

\$24.99

Charcoal

Add to Cart

Tweet 89

Like 138

share Earn 10% on sales!





Gifts

Power

Kitchen

Cord Management

Digital Accessories

Bath

Utility

Cordies

Spring Cleaning



Mantis

Let There Be Light

\$29.99

Black

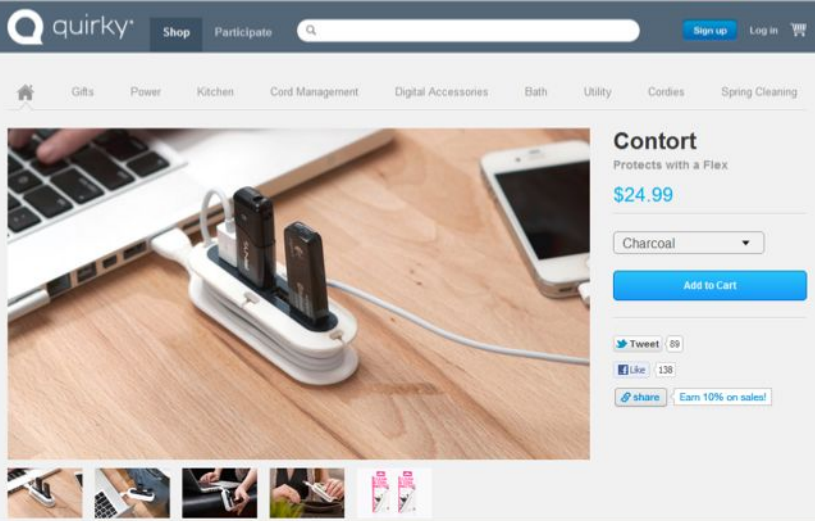
Add to Cart

Tweet 68

Like 208

share Earn 10% on sales!

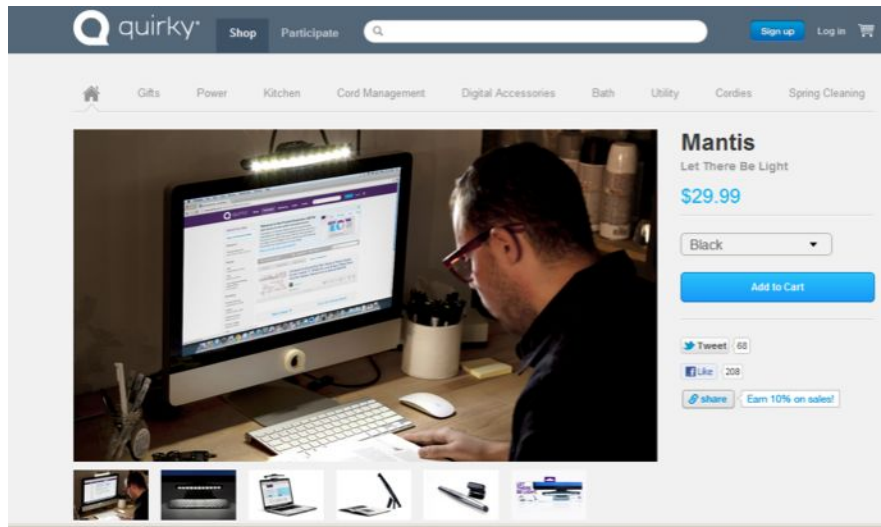


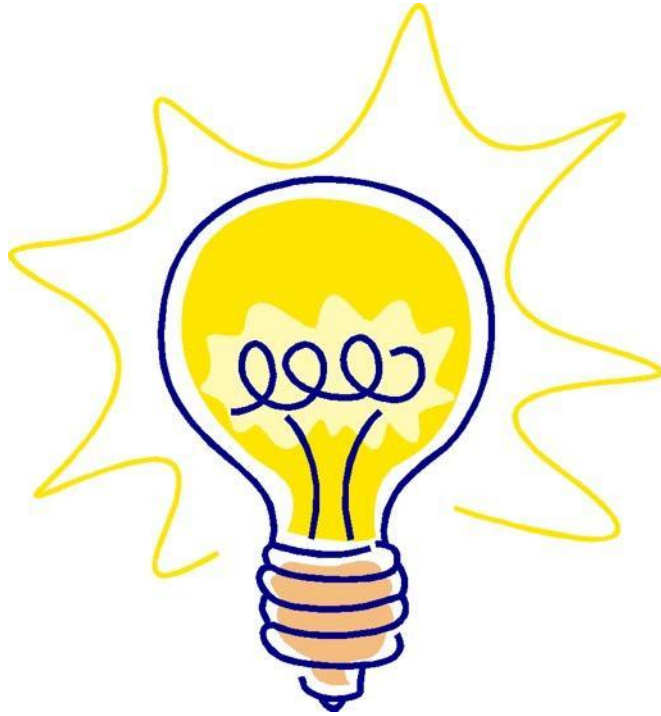


Sales Rate X

- *A lot of variance in outcomes.*
- *Hard to predict outcomes based on ideas.*
(How much does the idea matter?)
- *What could we do with a large sample?*

Sales Rate 3.4X





Does the idea even matter (much)?



Bronson, Po, "HotMale: Sabeer Bhatia started his company on \$300,000 and sold it two years later for \$400 million. So, is he lucky, or great?" *Wired*, Issue 6.12, December 1999.

nest







Google Acquires Smart Thermostat Maker Nest For \$3.2 Billion



AlfrescoVoice: Digital Transformation Isn't A Goal. It's A Journey.

+84k views in the last 24 hours



NASA Just Released 30 Years Of Before And After Images Around The World

+16k views in the last 24 hours



The Nintendo Switch Might Have A Problem With Casual Gamers

+16k views in the last 24 hours



Apple iOS 10.2.1 Is Now Available: What Is Included In The Update?

Google Acquires Smart Thermostat Maker Nest For \$3.2 Billion



CabStalker.com – Stop Waiting



Source: Opportunity pitched at 2009 Wharton workshop on web-based products and services.



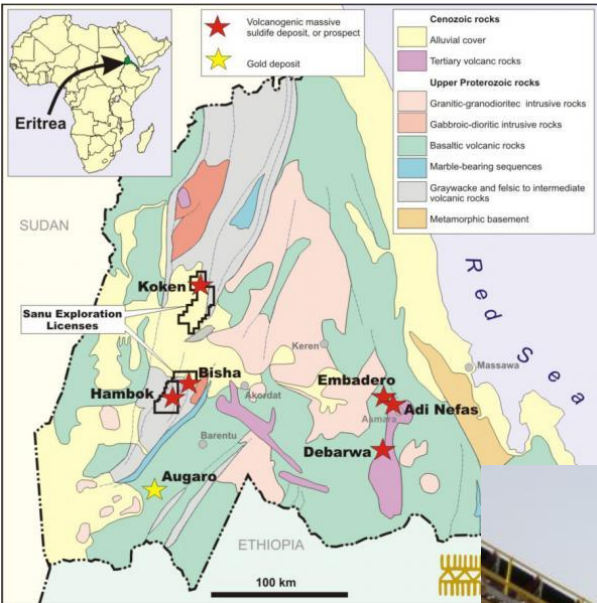
Photo:
Wikimedia
(cstockwe)

VIDE Model

Value Created = f(Idea Itself, **D**evelopment Capabilities, **E**xogenous Factors)

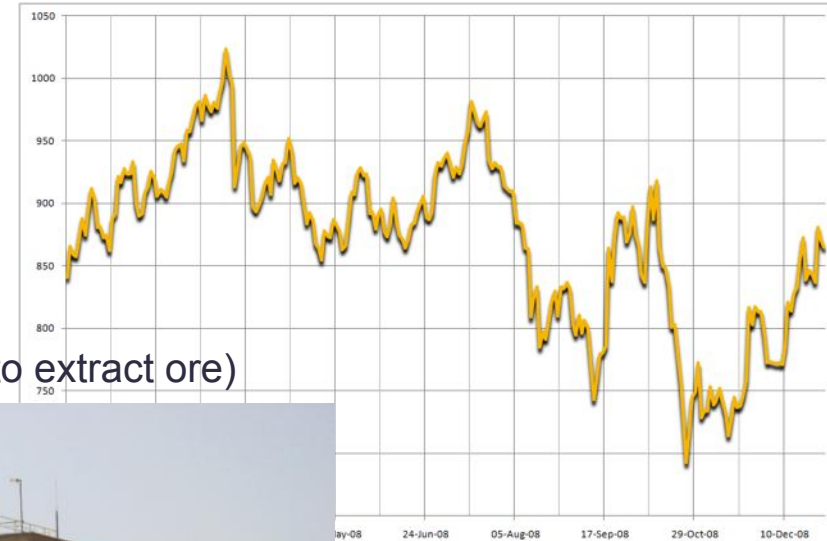


Idea (mine location)



$$V = f(I, D, E)$$

Exogenous Factors (price of gold)

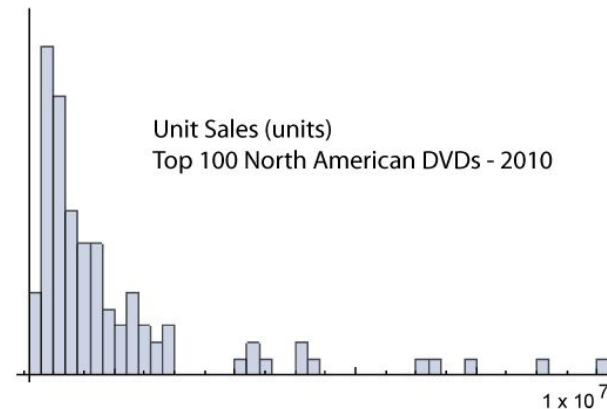
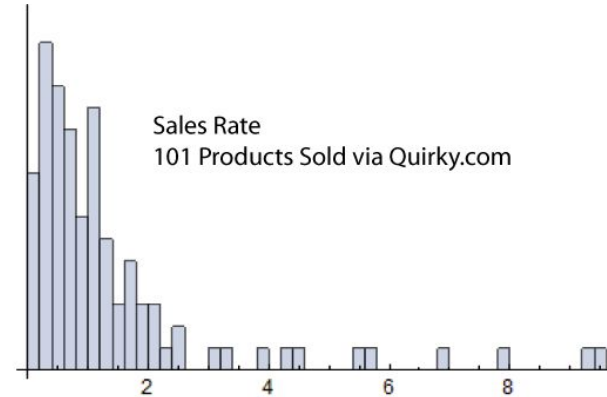
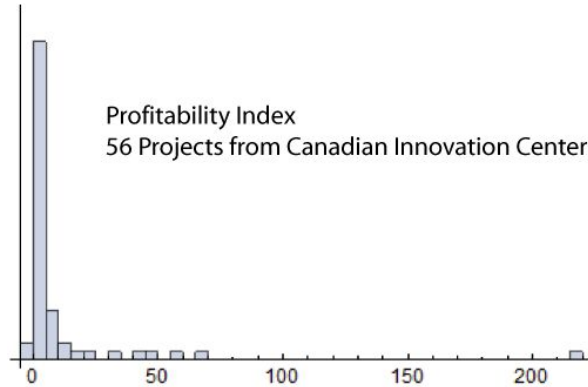


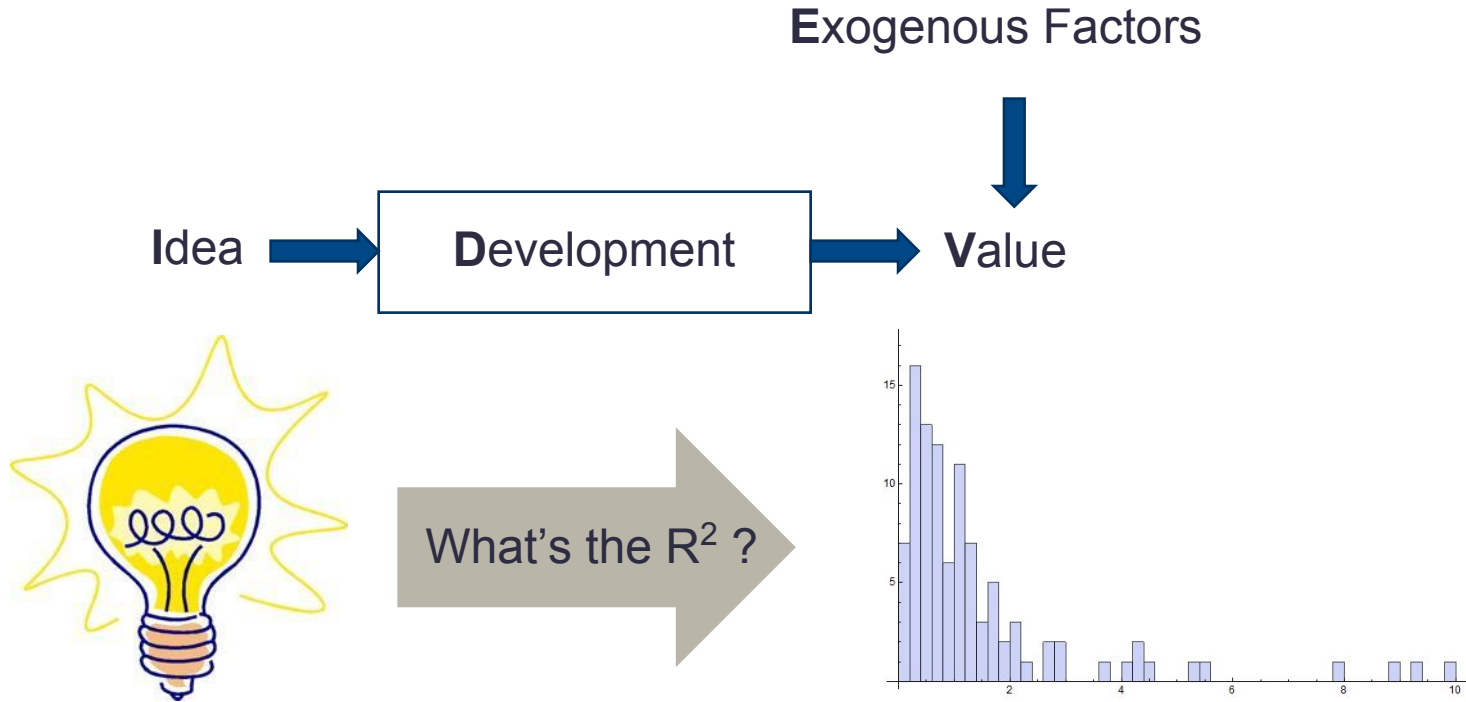
Development (ability to extract ore)



Distribution of Value is Highly Skewed

Suggests Multiplicative Relationship Among Success Factors I, D, and E.





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160 ideas developed into products and sold in the store

100 randomly selected ideas from the weekly contests

Idea Quality Measures (I)

Quirky score

Expert evaluations (7 respondents)

Purchase intent on raw idea (1500 consumers)

Purchase intent on final product (363 consumers)

Outcome Measures (V)

Units sold

Sales rate = units sold/days in store

Direct vs. indirect units (retail vs. wholesale)

Revenue = units * price

Revenue rate = revenue/days in store

Projected sales from fitting a Bass model

(Estimated manufacturing cost)

Full study:

Laura J. Kornish and Karl T. Ulrich, “The Importance of the Raw Idea in Innovation: Testing the Sow’s Ear Hypothesis,” *Journal of Marketing Research*. February 2014.

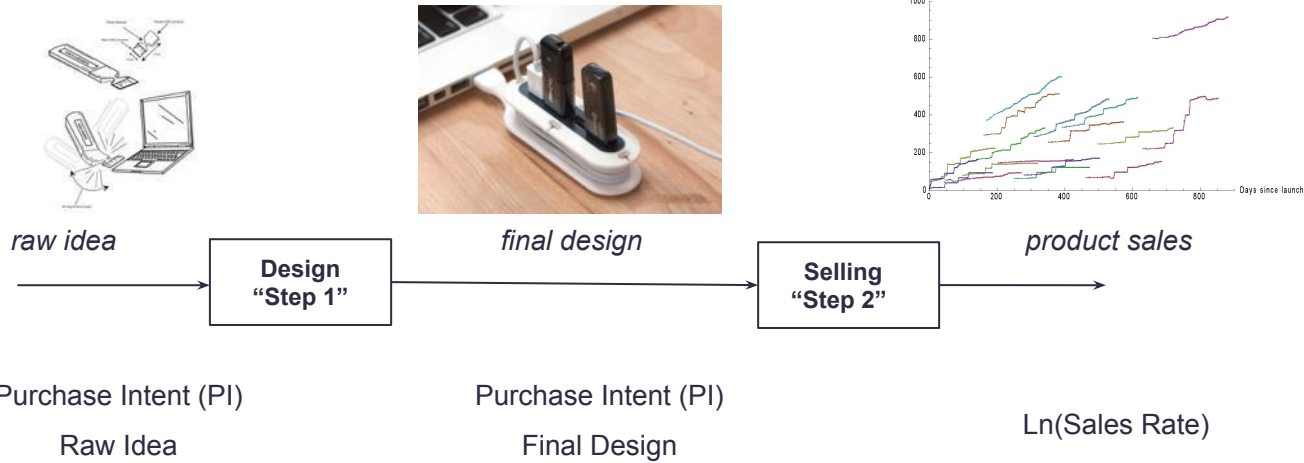
Profit = Quantity x (price – cost) – (marketing/operations expense + up-front investment)

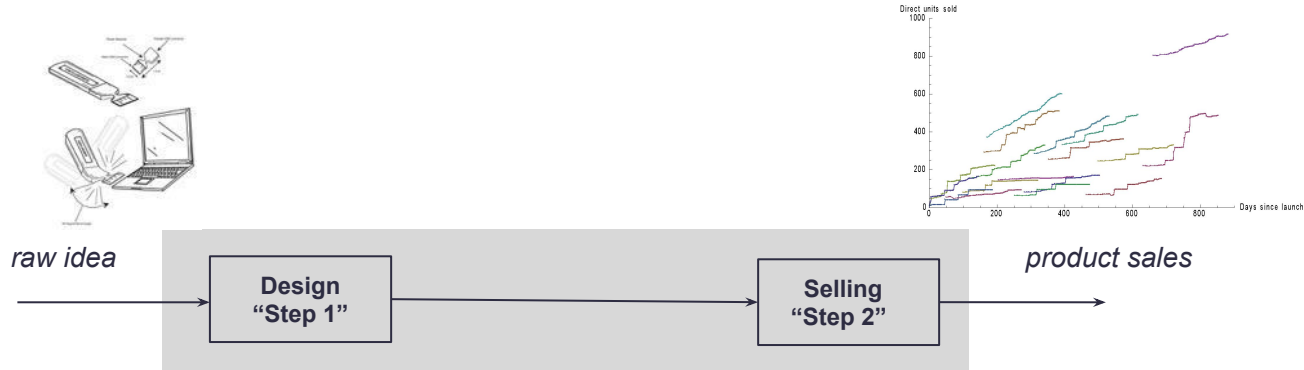


Estimating Idea Quality

	Quirk Score - Idea	Expert Rating - Idea	Purchase Intent - Idea	Purchase Intent – Final	Log Sales Rate
Quirk Score - Idea	-	0.19	0.27	-0.06	-0.17
Expert Rating - Idea	0.19	-	0.49	0.31	0.24
Purchase Intent - Idea	0.27	0.49	-	0.55	0.25
Purchase Intent – Final	-0.06	0.31	0.55	-	0.36
Log Sales Rate	-0.17	0.24	0.25	0.36	-

Values in **boldface** significant at 0.05 level.





Both Steps: Regression of $\ln(\text{Sales Rate})$ on Purchase Intent for Raw Idea
(2SLS with controls for product category, and instrumented price)

Constant	3.501***
PI Raw Idea	4.885***
Estimated $\ln(\text{Price})$	-1.330***
R^2	0.32

("Partial R^2 " for PI Raw Idea is 6%)

→ 1 s.d. increase in purchase intent of the raw idea ~ 51 - 78% increase in sales rate.

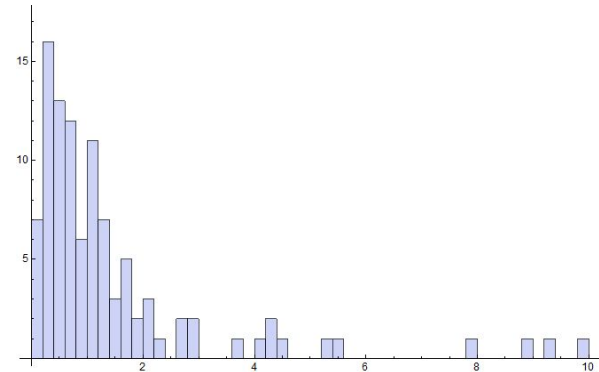
Exogenous Factors



*consumer purchase intent
based on raw idea*

What's the R^2 ?

$R^2 \sim 6\%$



Ln(sales rate)

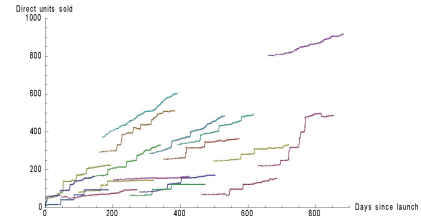
1 Sigma Better Idea >50% Higher Sales



raw idea



final design



product sales

Step 1: Regression of PI Final Design On PI Raw Idea

Constant	0.138***
PI Raw Idea	0.551***
Estimated Ln(Price)	-0.036***
R ²	0.52

Step 2: Regression of Ln(Sales Rate) on PI Final Design

Constant	4.247***
PI Final Design	3.591*
Estimated Ln(Price)	-1.155***
R ²	0.31

(2SLS including controls for category and instrument for price. “R²” is (1-ESS)/TSS)

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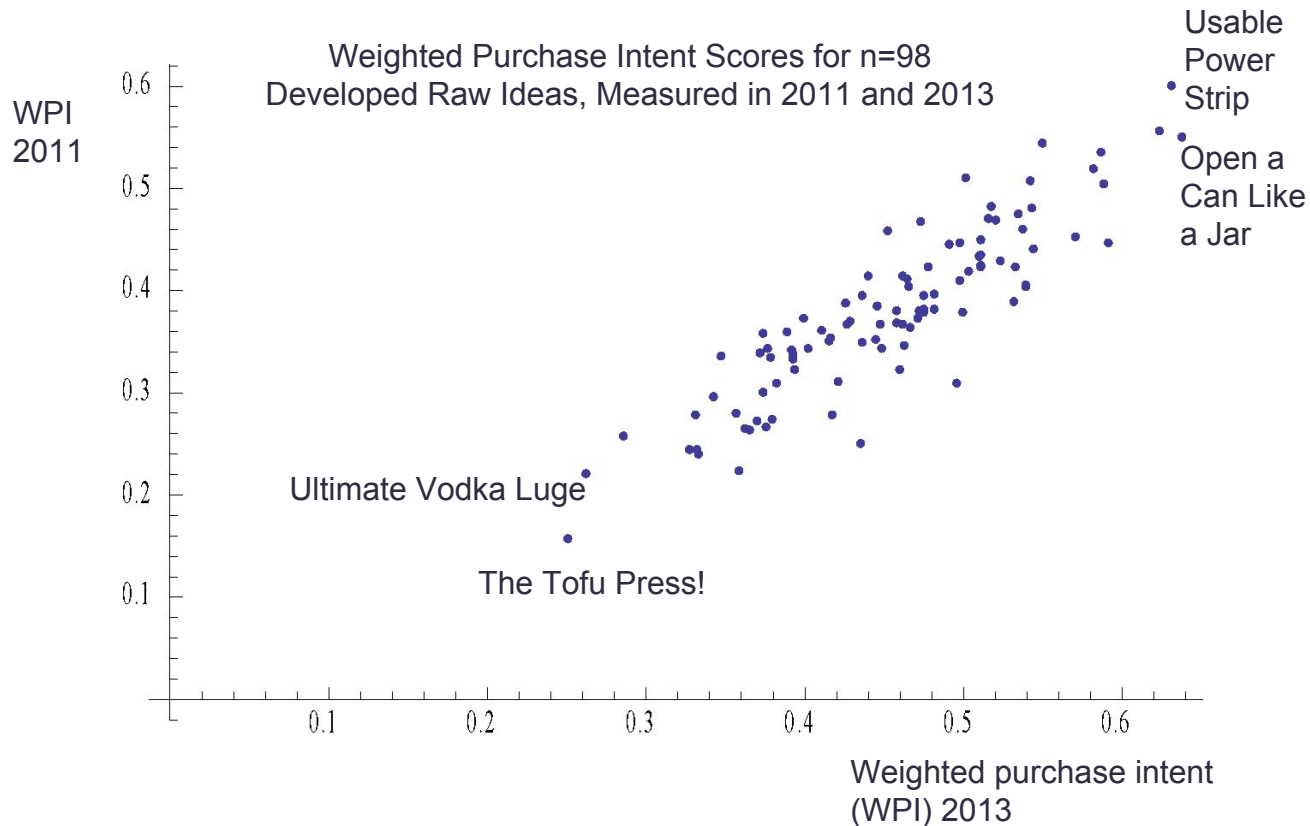
How to Measure Idea Quality



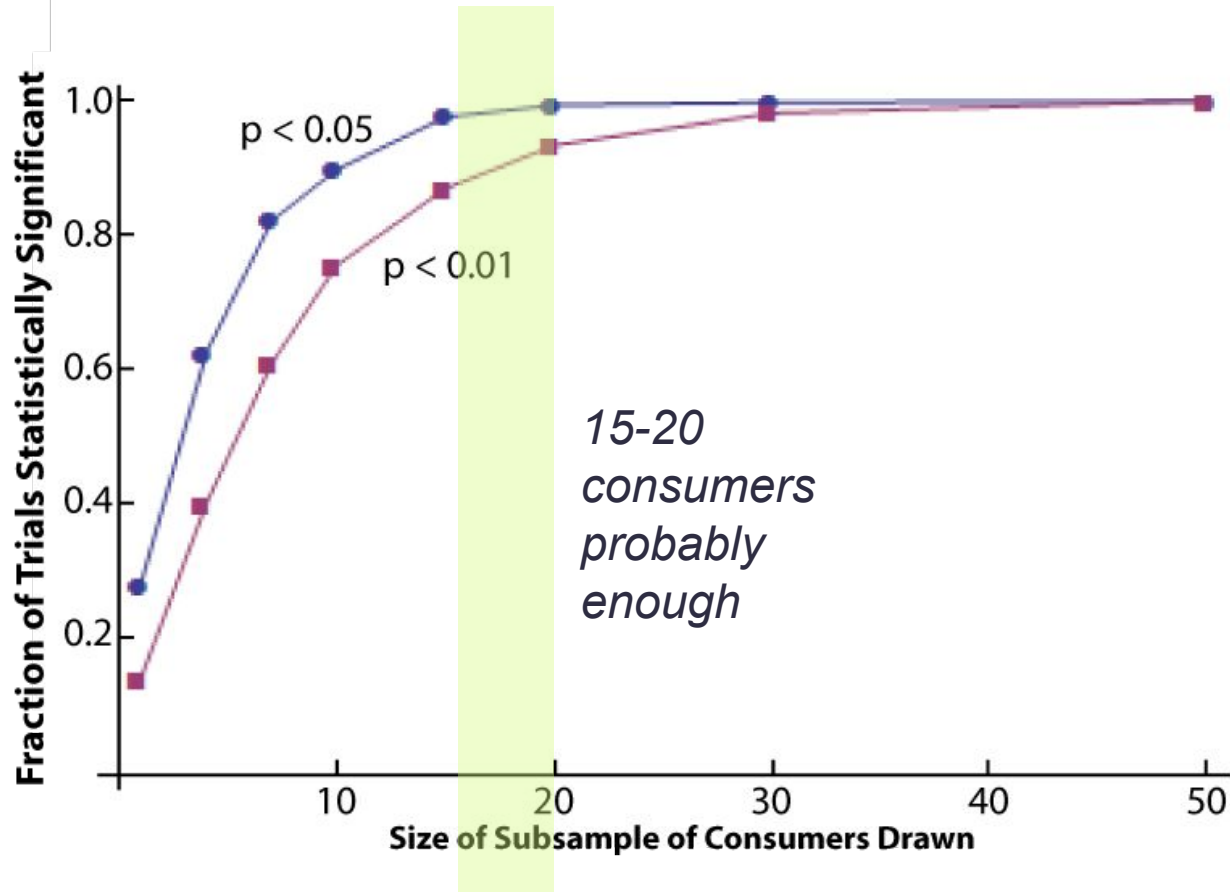
4 random consumers provide better estimate of idea quality than 7 experts.
(Only need about 10-20 consumers to get a really good estimate.)

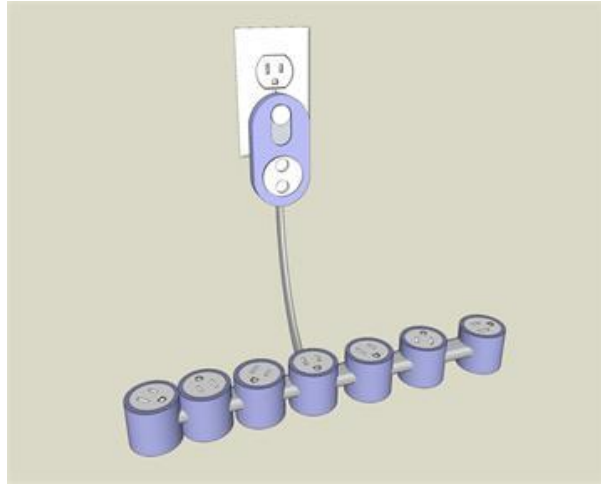
Source: Laura J. Kornish and Karl T. Ulrich, “The Importance of the Raw Idea in Innovation: Testing the Sow’s Ear Hypothesis,” *Journal of Marketing Research*, Vol. 51, No. 1, 2014, p. 14-26.

Consumer Panels: 2011 vs. 2013



How big a sample of consumers do you need?





The Usable Power Strip

Have a look at the power strip under your desk. How many of its outlets are being used? How many of them would you like to use, but you can't, because a giant power brick (transformer) in the adjacent outlet is blocking it? My solution is to put each outlet in its own cylindrical pod, and allow these pods to be either pushed up next to each other or pulled apart by a couple of inches. When extended, the outlets could accommodate large plugs like power bricks.



Gifts

Power

Kitchen

Cord Management

Digital Accessories

Bath

Utility

Cordies

Spring Cleaning



Pivot Power

A Creative Outlet

\$29.99

Pivot Power White ▾

Add to Cart

Tweet 1,362

Like 1k

share Earn 10% on sales!



Conclusions

Ideas do matter. The quality of the idea is a significant predictor of value.

~6 percent of variance in $\ln(\text{sales rate})$ is explained by raw idea.

1 s.d. better idea > 50% higher sales.

Most of the uncertainty seems to be E, the exogenous factors. The raw idea is about as predictive of sales as is the quality of the final product design.

Measuring quality

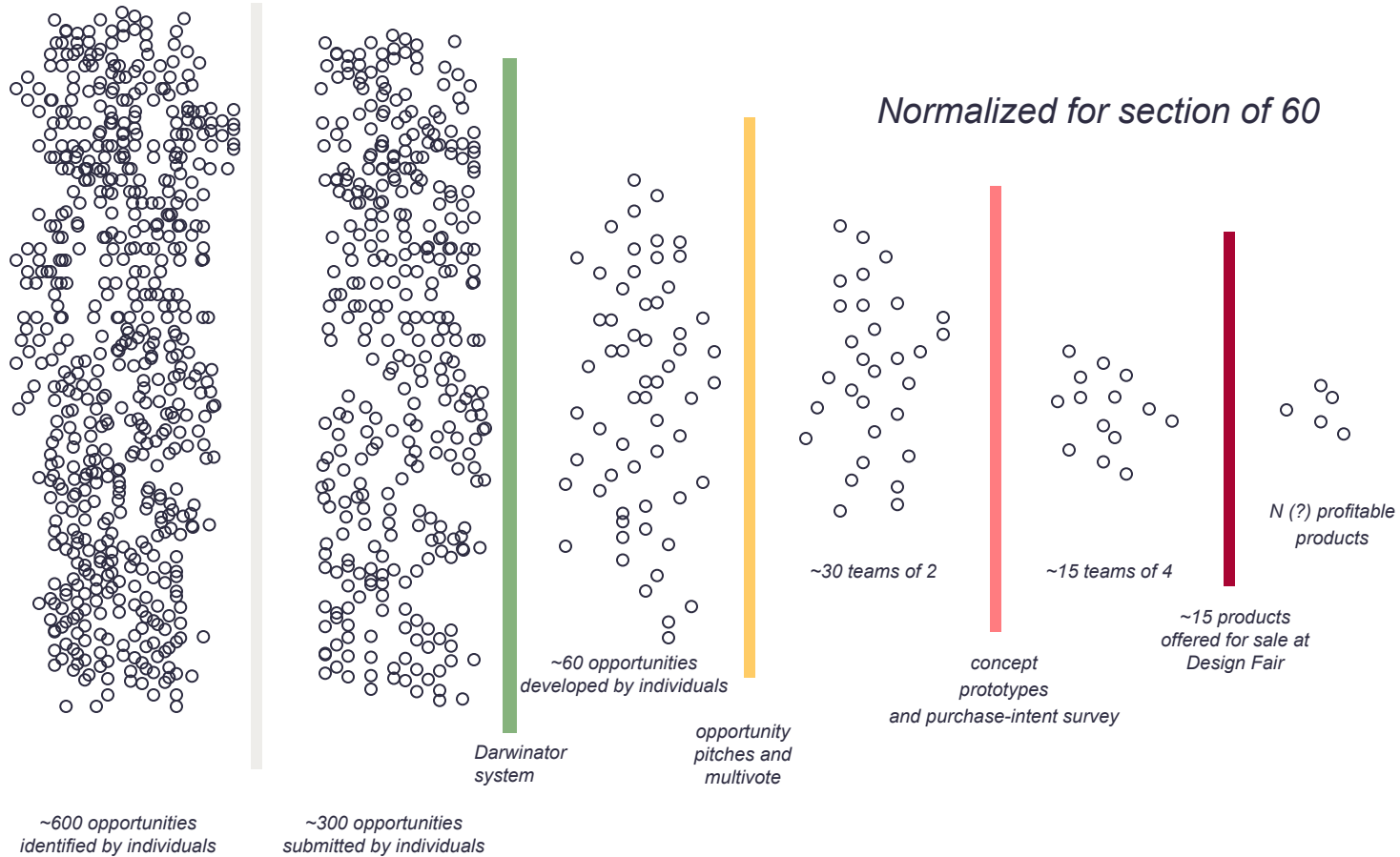
Purchase intent is a quite good measure of quality, relative to the alternatives.

We had really expert experts but they are no more predictive than a similar number of consumers.

You only need 10-20 consumers to get a good estimate of quality.

(Don't attribute fantastic success in innovation to your brilliance, nor dismal failure to your incompetence. Most of the variance in outcomes is not explained by the idea or the development of the idea.)

Use of Tournaments to Manage Uncertainty



Mini Tournament for Entrepreneurs

