

From engineer to entrepreneur: what you need to know

or

“I mastered Quantum Mechanics, but do I have what it takes to start my own company?”

<http://tinyurl.com/engineer-entrepreneur>

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Goal of this presentation

- Every startup/company is different. I will tell you a bit of how I did it, but this is not a recipe.
- Along the way, I made many mistakes and I hope to save you a lot of pain
- I am going to assume you are very smart & like to think (why else study physics)
- Goal: motivate you to use that brain to become successful in business!
- This presentation can't begin to explain everything (and I would not know everything), but it is aimed to get you started!



A bit about me

- 1996: VvTP Commissioner (Extern) & President Delftse Bedrijvendagen, 1997 Grafico Printing Commission.
- 1998: Consulting over at Casema/Ziggo
- 1999: Dropped out of university
- ±2000: Founding of PowerDNS -> 2003: **commercial failure**
- 2003-2006: Research & Development
- 2006: Fox Replay BV joint venture with Fox-IT
- 2007/2008: Reboot of PowerDNS: commercial success
- 2011: Fox Replay BV sold to an American company



Fox Replay & PowerDNS

- PowerDNS: around 30% market share, open source, sells high-end 24/7 support agreements to large telcos
 - 90+% market share of latest generation “DNSSEC” in Scandinavia
- Fox Replay BV: “Lawful Intercept” software for intelligence, security & police agencies and military
 - Joint venture with Fox-IT
 - Most advanced software, grew to ±20 employees before being sold

My core message

- Yes, please consider starting for yourself!
- Your economy needs you!
- Do realize that you almost certainly lack many of the skills required, **Delft does not prepare you for ‘the world of business’**
- Business is highly irrational (‘non-linear’)
- Also realize however that a brain that can grasp quantum field theory can also outsmart most entrepreneurs!
- Lots of business things can be modeled successfully, and such models can guide you
- If and only if you have **the right idea**, you can make it big!

Famous startups

- Also.. you will read a lot about how Facebook, Twitter, Google etc got started
- And what role venture capitalists played
- Those are almost exclusively Californian stories
- **You are not in California!!**
- Their universe is very different from yours, and while these stories are inspiring, realize things are different here
- Most new companies are not very flashy, but they can still do really well!

Why start for yourself?

- Pro:
 - Tremendously exciting!
 - Lots of freedom
 - Develop yourself in all directions
 - Maybe one day make a lot of money

Why start for yourself?

- Cons:
 - Tremendously exciting!
 - Lots of freedom **to mess it up**
 - Develop yourself in all directions
 - **like how to do payroll**
 - Maybe one day make a lot of money
 - **but not now**

Two windows to do it

- **Out of university, or after a brief career**
 - Doing some normal work first could help you pick up vital skills
- After you've grown sick of your (successful) career
 - Unless by that time you are a 'settled family person' with no appetite for risk!
 - Lots of people keep planning to start for themselves one day.. never happens

Checklist

- ✓ **A good idea or unique skills**
- ✓ **Knowledge of the market** in which you will be working
- ✓ **Experience** to develop that idea yourself up to a certain stage
- ✓ A decent network to grow & test the idea & **hire good people**
- ✓ Financing

The Idea

The idea

- Step 1 is the idea. Good ideas are **very hard** to get, and often require years and years of industry insight to acquire
- They only appear obvious in hindsight
- **The idea is more important than the business plan**
- “The idea” has a lot of conflicting properties

The idea

- It must not have been done yet!
- It must however (eventually) be possible
- But not so possible that soon everybody else will be doing it!
- Even though the idea is new, once it is out there, people should 'get' it and do business with you
- The idea should actually generate money (oops)
- **Don't bother with plans that need to be kept highly secret**

The idea

- First questions are always:
 - Has it been done yet? Was it a success?
 - **If not, why not?**
- Keep asking these questions - the answers will almost certainly enlighten you
- Loads and loads of people spend all their waking hours thinking of new ideas
 - They can't all be stupid!
- Seriously.. don't get started until you **know** why it hasn't been done successfully before!

Reasons why it wasn't done yet

- There is an alternative that is reasonably ok ('better mousetrap' scenario)
- It WAS done, but people didn't want it ('Buckler' scenario)
- It could be done, but the necessary price point was not compatible with the audience ('Senseo' scenario)
 - Closely related: those that want it have no cash
- You picked an as yet non-existing market/niche, or the industry is not compatible with your demarcation (*)
- **Dominant industry didn't yet get round to do it, and is being really slow/looking elsewhere ('SpaceX scenario')**
 - Or they are locked out of doing what you want to do ('Dell scenario')
- The technology wasn't there because you didn't invent it yet (Single Quantum?)
- **You might truly be a genius and no one thought of it yet!**
 - Rare! Note that this is the only case where secrecy matters!

An example: Dell

- Started in 1984 with the “unique” concept ‘sell cheap PCs made from commodity components **directly** to consumers who can decide what hardware they want’ (stunning vision)
- \$10K starting capital, \$75M of business in 1985. PC was cheaper than computers in stores, and came with **money back guarantee**. Dell quickly became a billion dollar company.
- The insight that people wanted cheap pc’s that they could configure themselves doesn’t sound that stupid, but the existing industry didn’t see it that way
- So why wasn’t it done before?

An example: Dell

- The answer to ‘why didn’t it happen before’ is
 1. Existing vendors were all in bed with the retail ‘channel’ (shops), who needed to make money too -> higher prices. ‘Don’t compete with your channel’, so no direct sales for them. Big vendors fear direct contact with consumers.
 2. Everybody assumed people did not want to ‘mail order’ their PC as the technology was too new to order from an unknown place, so nobody pondered direct sales
 3. Previously there WERE no commodity parts to do this with
- Dell could enter the business because:
 1. They did not have any ‘channel loyalty’ to damage,
 2. They decided to gamble on a money back guarantee, and next-day home service, taking away the mail order fear
 3. Hobbyists had generated a market for PC’s built from stock parts

So now what..

- Once you've figured out why it wasn't done yet (and you will need a lot of help/research with this), make sure that those conditions are no longer true (for you)
 - Be very weary of “wishful thinking” here (*).
- If you can't figure out why it hasn't been done yet, think again! There is almost always a reason
- And you **WILL** discover that reason later on
 - PowerDNS discovered that the hard way

PowerDNS “why it wasn’t done”

- PowerDNS started with a database driven nameserver when all DNS products were free and based on flat text files (‘1980s stylee’)
- Quality of competition universally horrible, but free
- Idea: massive scalability and database integration mean more efficient operations, less personnel required (large scale DNS shops typically had DNS teams)
- It wasn’t done before because:
 1. ‘bad, free & established’ always wins out over ‘good, expensive & new’: unattractive to enter a market with low-cost established players
 2. previously, scale had not been required and DNS did not require a lot of maintenance, so little interest in efficient operations
 3. DNS was believed not to work well with databases
- In the end, ‘2’ changed because of massive internet growth, and ‘3’ was fixed through quality technology. **‘1’ killed us!**

Marketing != Reality

- For most ideas, you will find that someone else already claims to be doing just that
- Don't feel too bad about it, it might very well not be true!
- Especially in the US, marketing can be extravagant
 - If you sell a hammer there, you can pitch it as having a house! (confusing the product for what you can do with it)
- So carefully research competitor marketing, and don't give up
 - Simultaneously, your own marketing needs to be 'adjusted' because wise customers will take 20% off the top too!

(Skill based business)

- Sometimes, you don't need a new idea
- If you have specific skills and you can build a network, you can live off that too
- Doing the best FEM-models, running a Michelin-star restaurant, being a kick ass lawyer etc
- Your innovation will then be how to best deliver these skill based services/products

The idea eco-system

- No idea lives on its own, almost all products & services you use come to you through a very long chain of business agreements
 - This chain forks too, forming a network of relations
- **Your idea needs to fit into an existing network**
 - Unless you are awesome enough to ‘disrupt’ an industry (rare)
 - A non-fitting idea goes nowhere
 - A degenerate case is where you intend to sell services directly to a consumer
 - Exceedingly rare, but tempting to think about if you have no knowledge of the inner networks

The idea eco-system

- A very common situation, tax advice:
 - Company <- Accountancy <- Employee
- Companies want to get tax advice from large reputable firms ('PWC said it was ok'), because it is 'safe'
- If you find the very best and cheapest way to provide tax advice, for example by building a pan-european semantic search engine of rulings, **companies would STILL not do business with you to get tax advice**
 - Since you are not a large reputable firm!
- After a while, you'd have wasted a lot of time pitching a perfectly good product. The idea was good, but it didn't fly!

The idea eco-system

- So, you could then pitch your database to PWC & friends, but by now, to them, you look like a competitor, and they would not like to do business with you
- Or you could pitch the idea to the very largest companies with their own tax departments, who could query your database directly and draw their own conclusions
 - Severely limits your market though
- Solution: **you should have pitched your idea to accounting firms in the first place**

The industry model

The Industry Model

- Ok, once your idea fits within an ecosystem (ie, you are someone the end-user wants to do business with, or you found somewhere else to plug in), you need to develop & market it for your niche
- In order to know how to do so, you must have a very good mental model of the industry
- Like all models, they can't deal with everything, but it is paramount that you get this right!
- Otherwise it's just a joke

The Industry Model

- What is keeping potential customers awake at night? How are existing players disappointing them?
- Why are the existing players not paying attention? (Or maybe they are!)
 - Can they lock you out?
- Who is buying? Or are they leasing? Or getting services?
 - Compare coffee machines
- What are the sensitivities?
- How price sensitive is the market? What do they think a good price is?
- What exactly are people buying? “Cars” or “transport” ?
 - You should be selling what they want to be buying!

Fox Replay Example

- When we started our business, we built the best technology we could, which solved all the deficiencies of known Lawful Intercept products
- We then went to conferences to explain everybody all these cool problems we solved and how superior our product was
- We sold nothing at all!
 - **Nothing!**
- What happened?

Fox Replay Example

- To begin with, we misunderstood that you are not selling to a **company**, you are selling to people that **work** for a company!
- What is best for the company might not appear to be best in the eyes of the buyer. This is called the **principal/agent** problem.
- The people in our crowds were governments wanting to buy things, and they didn't send end-users but the managers of their IT departments
- **Who didn't give a shit about our streaming protocol layers!**
- They care about 'can I explain why I am buying from these people' and 'what are the chances that I will look really bad after buying this and it doesn't work'

Fox Replay Example

- Secondly, we **misunderstood** our industry. We were selling analysis software that needed to be connected to a source of intercepted packets.
- It turns out that everybody was used to buying solutions that not only analysed the packets, but gathered them too. In addition, everybody was buying integrated systems that did telephony too.
- In other words, we were trying to sell a small part of the thing that they were used to buying
 - Like pitching a better starting motor to someone that wants a car
 - -> does not work at all, he's not in the market for that!
 - “so how does your starting motor get me to work huh??”
- **So initially we failed to sell anything because we misunderstood our industry: 1) who was buying things, 2) what were they used to buying**

The consumer model

- In the 'business to consumer' market it works similarly
- Consumers have exactly the same buying considerations
 - They can spend money and time on you. **If you are selling the consumer (think Facebook), you need to buy their time!**
- And they have the 'agency' problem too: you sell the car to the family, but dad has different considerations than mom
 - Next time you see a family car advertisement, pay close attention: they are subtly pitching mom AND dad
- Even in the consumer market you need an industry model: how will the competition react, will suppliers help you?

The importance of your industry model

- If you are building a product, you have a choice what features it will have. Your model will tell you what to aim for
- If you are doing marketing, you need to know what appeals to a customer and also specifically what they hate. The model knows.
- When doing sales, you need to understand how the customer thinks, because that will tell you if your €5000 price is way too low or way too high.

Getting a good model

- Understanding an industry & forming a good mental model is surprisingly difficult
- Market surveys will not get you there since (astonishingly enough) many people operating in an industry don't have a good model themselves ('I just work here')
 - "If I had asked people what they wanted, they would have said faster horses." - Henry Ford
- **So get out your beta brain and form hypotheses and test them!**

On your network
&
feedback

Being stubborn & wise: feedback

- There is but a slight difference between being stubborn and visionary: if it turns out you were right, you were being visionary
 - This means that being visionary starts with being stubborn!
- **Everybody will tell you your idea sucks**
 - If they don't, you can be SURE that it sucks
 - If it were obviously a good idea, it would've been done already! Or, you are misrepresenting the difficulties.
- **To succeed, disregard most advice but select good people to get feedback from**
 - A good test: could you explain the advice to someone else and truly understand it?

Navigating between being stubborn & wise

- Any exciting idea will be controversial
 - Most stupid ideas will be too!
- Signal/noise ratio in feedback is horrible, but you NEED it
- Find balance between KNOWING you are right, and charging on regardless, AND getting feedback from people that know what they are doing
 - Get a mentor?
- But make sure they don't know it so well that they are 'establishment' in your industry!
 - They will be conservative and know exactly why you will fail

Network

- A good network can provide you with the people that can give you feedback
- Will also help you:
 - Recruit staff
 - Open doors
 - Get customer intelligence
- **So all those hours drinking when you should've been studying will finally pay off!**

Random thoughts

On business plans

- Business plans make abundant sense in some industries where margins are tight and you need to know if you can squeeze money out of it or not
- For most startups, you need to do order of magnitude estimations since you just don't know
 - Just make sure you'll be profitable if it REALLY takes off
 - Nobody cares about any other stage
 - Once the company is running, do make good (liquidity) plans so you know if you ever **might** be profitable
- “There are more good business plans than good companies”
- “It always takes longer than you thought”

On people

- It only happens with the best people
- It only happens with the best people
- Important enough to say it twice
- **If you have a great idea & plan, but ‘now you only need to find the right people’, you basically have nothing**
- The right people do not grow on trees, and you can’t buy them
- **You have to be the kind of place where they want to work!**

On financing

- Starting a company costs money (**for real**)
- Some plans are more capital intensive than others, and right now is a bad time for capital intensive plans
- Sources of financing are:
 - Savings, family, friendly investors, venture capitalists. Not banks. Very rarely government.
- **In my limited experience, there is always money for good ideas. Failure to find money can mean your network is too small or your idea doesn't make sense or you can't explain yourself well enough**
- All three of these reasons are serious problems in themselves!

Shareholders, incorporation

- Just incorporate already, ok? Put all your company assets & ideas in the “BV”
- Don't wait too long with this as this is best arranged when things are not yet too exciting
- Distribute the shares in some way, 20% more or less won't kill you
- **Whatever way you distribute the shares, the people that supply the money are eventually in charge**

Patents & Intellectual Property

- Very often, it is not about the patent, the registered trademark or brand.
- Especially in the software field
- Intellectual Property however ('IPR') is **incredibly** important
- If you build your business on IPR that you don't strictly own ('some friend helped you with the initial code'), you will have a hell of a time ever trying to sell your company!
- Before launching the company, right all IPR wrongs!

On not starting a company just yet

- “Quantum Mechanics II” does not prepare you to run a company
- Neither does working at the local supermarket
- Doing (VvTP) commission work does help to a certain extent, but this is all still highly academic
- You can learn a lot from ‘normal work’!

Come work for me!

- We paid your lunch, so please pay attention ;-)
- However, Netherlabs & Fox Replay/NetScout are looking for some great people (4 or 5)
 - So if you can do any of C, C++, Python, JavaScript, PLEASE contact me! Part time, full time is ok.
 - If you have other skills, please also contact me, who knows!
 - Based in Delft
- Please make sure you finish your studies too!
 - What worked for me might not work for you. Get that MSc!

On reading

- Lots of books & websites describe exactly how to build great companies. Most of these books describe what worked for them & then, and it might not work for you now
- Some books & websites however contain fundamental truths that will always hold true
 - **You should be reading those non-stop!**
 - They will help you shape your models & thinking
- A selection can be found on links at the end of this presentation

On doing & (making) mistakes

- **However, don't just read, also get out there and do it**
 - Don't be afraid to make mistakes!
 - Whatever you are doing is new (right?) so you can't get there without making mistakes
- **Importantly: try learning from OTHER people's mistakes.** This is a lot cheaper.
- At the very beginning, mistakes are fatal (like having the wrong idea) - afterwards, prefer to Fail Fast

Focus

- It is incredibly tempting to waver from your real goal to go for some low hanging fruit
- This is almost always a bad sign.. but not always. Say you are building a product, but a customer comes along that wants a slightly different product
 - Could be a distraction
 - Could be an indication you are building the wrong product!
- Also, focus on the product & industry. **Do NOT attempt to understand the European VAT regulation.** Ask an expert!

Summarizing

Summarizing

- Consider starting for yourself.
- Make **SURE** you know why your idea is not successful yet
 - The answer will guide you
- Develop a very good 'Industry model'
- Validate your ideas using your network
- Together with The Right People: Go for it!
- If you need help: please contact me
- <http://tinyurl.com/engineer-entrepreneur>