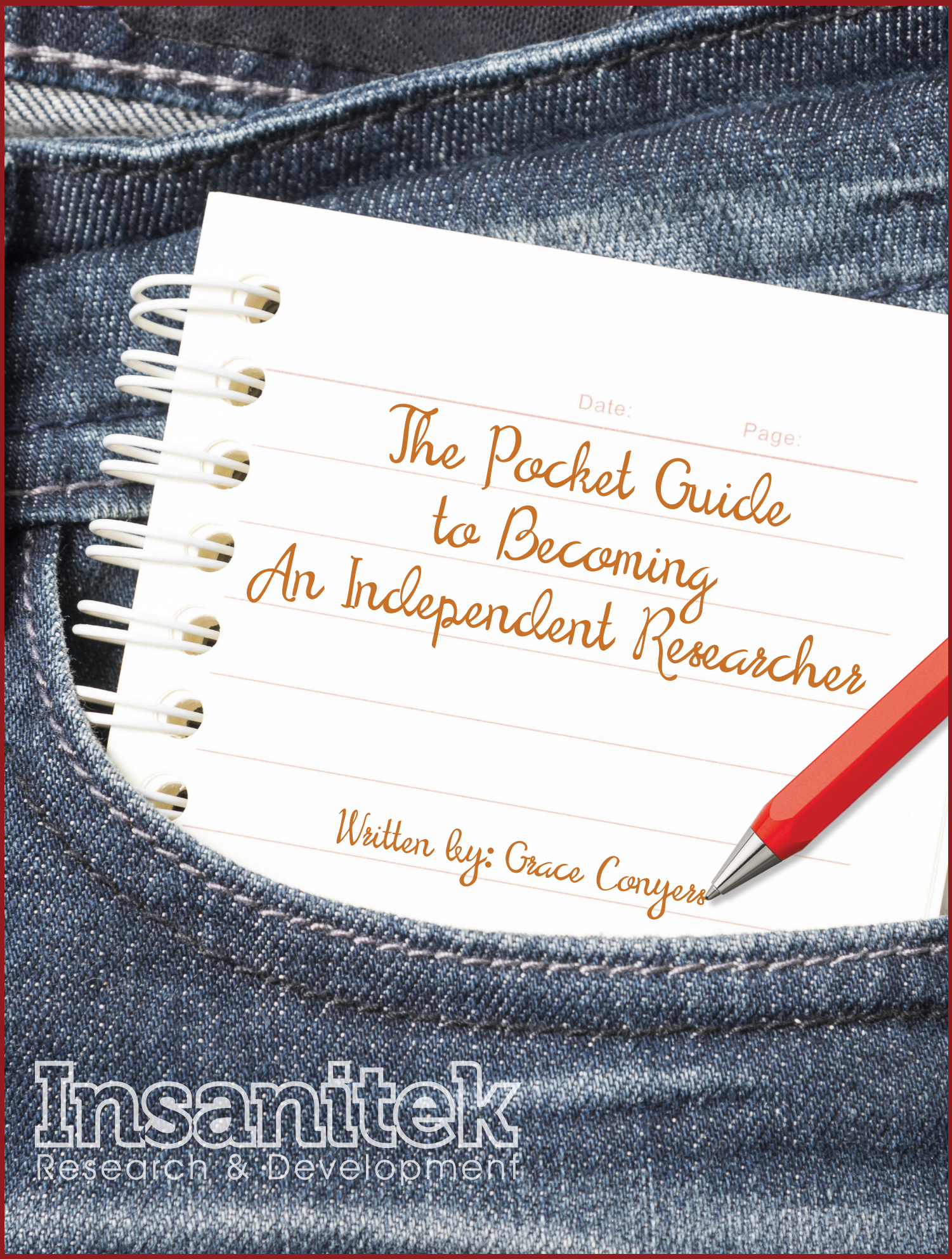


The Pocket Guide to Becoming An Independent Researcher

Written by: Grace Conyers

Insanitek
Research & Development

Breaking free of the institutional rules seems like a noble pursuit, especially when the institutions are filling up fast, and all you want to do is get paid to do the science you love. This short e-book is not to convince you that you should become an independent researcher; if you've picked it up, you already know you want to do that. This book is for those of you that want to start plotting how to become one.

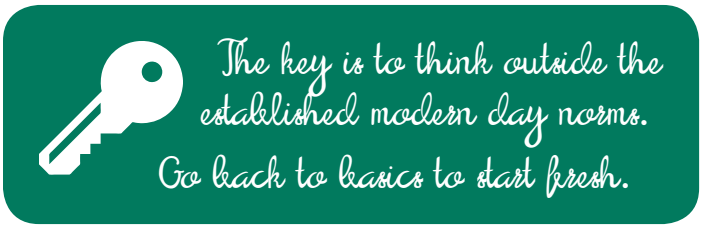
I'm not going to sugar coat it. It isn't easy. It takes a lot of dedication, knowledge, a tolerance for menial things (like bookkeeping). It takes a desire to want to learn, teach, and explore. In other words, it's just like being at an institute, but with a bit more risk in the financial department and more business sense.

Still here? Excellent.

In this book you'll learn some of the basics of what you need to really start being an independent researcher. You'll hear about money woes, regulations scares, and business practises. By the end of this book, it's my hope that you will be able to embrace the idea of being an independent research with a sense of hope, purpose, and confidence that you can do this. Let's start at the beginning – with attitude.

— IT'S ALL ABOUT THE 'TUDE —

Everything in life starts with the proper attitude. If you believe you can do it, you generally find a way to get it done. In the modern world it may seem like everything really important and life-changing is done at an institute, so let's take a trip back in time to get a little perspective. We're going back not to the beginning of the Industrial Period, not to the Renaissance, but before that. We're travelling back to ancient Georgia to see a small, little known tribe called the Chalybes.



The Chalybes were intelligent people that invaded the area between the Black and Caspian Seas about 2000 BC. They arrived to find a shiny black rock similar to the coveted rare meteorites that were in high demand for their strength. The Chalybes, like the ones before them, had an idea that this rock was similar to the hard meteorites they had pounded into shapes before – if only they could figure out how. Slowly, the Chalybian metalsmiths began to tease out the iron within the ore. Countless experiments, failures, and hunches later, the Chalybes had discovered a way to make iron, and with that they bid the Bronze Age farewell, and began to bring the Iron Age into being. It took them 200 years[1].

The Chalybes existed in an age before institutions. Each metalsmith had ideas that they tinkered with, and likely vented their frustrations with other metalsmiths in the area. Despite the time differences and the sophistication level, they had the basics of independent research that we do in the modern age. What they had were hunches, goals, and a level of communication and collaboration that allowed the metalsmiths to invent something they desired. We have all of this in the modern age, and it doesn't have to exist solely at an institution. It can exist in our garages, a spare closet, or even a community centre. We create the opportunities with our can-do attitude.

But…how?

The practicalities go beyond just the attitude. There is money, the facilities, regulations, and well, the money to think about. (Yep, money is that important.) So, without further ado, grab a pen and paper and prepare to design your own future.

— SCIENCE AS A BUSINESS —

Before you start thinking about how to be a successful independent researcher, you need to consider the fundamentals of business. Why? Once you step out of the institutional shelter, it becomes more about sustaining – and ideally even growing – your lifestyle. This means you need to switch from the employee mentality to that of an entrepreneur. And that, of course, means thinking about the money.

What is your goal?

Is it to do reseach you love or is it to do research period?

Define what you see for your future so you can get there successfully.

Cash flow is the bloodline to your projects, and thus it should be the first and sometimes the last thing you think about. Without it, you can't buy supplies, keep your equipment in working order, nor try new things to perfect your craft. And, half the fun of science is experimenting and improving, so you definitely don't want to leave that out.

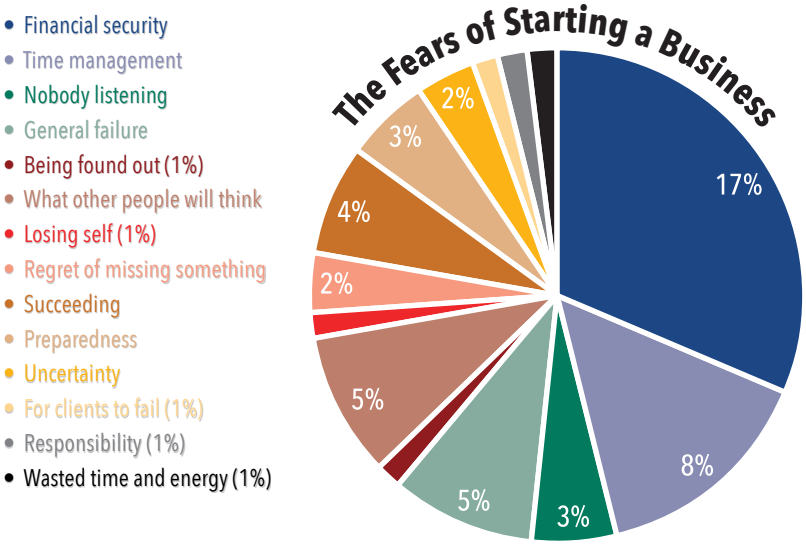
But how do you get the cash coming in? Just like as in an institution (which is a business), there are different avenues that you can pursue.

Getting the Green

"Whoah!" you say. "I'm wondering how to even get the thing started, let alone keep it going."

Fair enough. Starting the venture is hard enough, and financing it will be one of your top three worries according to a 2015 survey[2] of people that want to be entrepreneurs. In this survey I asked them simply "what are you afraid of" in relation to starting a company, and financial stability is the top rated fear of starting in the first place with time management worries at a very distant second.

Clearly, we are not alone in putting thoughts of money first – and last. It's very real threat to your existence. I don't care how much you barter services, chances are you will need money for something, whether it's a new winter coat, food, or that shiny new 3D printer you've been eyeing. At some point you are going to be faced with trying to figure out how to even get your own adventure started.



There are a few ways to start financing a lab, and not all of them will work for you. There is crowdfunding, your own pocket money, loans, investments, and, my personal favourite, bootstrapping. Read on for a very brief overview of your options and when it is best to use each.

CROWDFUNDING

Crowdfunding is a great option if you have a product that you want to make and sell, or at least a physical reward that you can ship out for their belief in you. Crowdfunding is difficult for it requires a high level of marketing and outreach as well as demand to get your idea to go anywhere. As Tom Morkes points out, crowdfunding validates your project before you actually spend the time and resources doing it[3],and although he writes about the publishing industry, this holds true for any industry.

Crowdfunding may seem appealing, but it is not the best option if you are just starting out and haven't developed an audience yet. Marketing studies vary, but they show that anywhere between 2 and 25% of your audience will respond favourably to your cause when you ask them. It follows that the bigger your audience is, the more likely you will be to succeed in a crowdfunded project.

LOANS AND INVESTMENTS

Loans and investments can come from different areas. Friends and family are obvious ones, as are banks. Unfortunately the risk with loans is pretty steep. If you succeed, awesome, but if you don't, you still have to pay back that debt with interest. A great alternative, especially if you want to stay away from the steep interests of banks and strained relationships when you borrow, is Kabbage.

Loans and outside investments are what you use when you need a cash infusion to grow quickly and have a solid plan to make all that money back, plus interest. Otherwise, you're best off abstaining from this method until you have that action plan.

BOOTSTRAPPING

Did you know I've been considered insane for boostrapping Insanitek? We do a lot of decently high-tech science, yet I did it all without investing and so far without crowdfunding while we built up the first few years. We did it by reinvesting what we made from our clients and built up slowly, deliberately in a direction we wanted to go. Now, the teaching and tutoring that started off as a way to pay the bills is both outreach and a way to pay the bills.

The pros of bootstrapping is that you don't have to know anyone or have money to get started. You simply understand what every dollar is getting you[4] and make sure your receivables policy doesn't sink you[5]. In non-business lingo this means don't spend frivolously and make sure you collect the money by the time you need it in the bank. The con is that it can take a long time to get anywhere.

No matter what method you start with in the beginning, your startup lab will change and need different solutions as it does so. So you may start with bootstrapping in the

beginning, but soon you'll have what it takes to switch modes and keep growing. Don't be afraid to pivot from one method of gaining extra cash to another as it suits you, your business, and your ideals.

Getting Geared Up

Getting money in is the first part of the equation. The second part is buying the start up gear you need. For this, you'll need to think outside the box and sometimes far outside of the norm. The goal is to stay under budget while getting what you need and working with what you can. As you develop your business model, there will be time (and money) for upgrades later.

Experience has taught me that you can get a plethora of used lab gear for relatively cheap at LabX, personal sales, and eBay. The emphasis is on used and relatively cheap. When shopping this way for gear, realise that it is likely that the item you get will have many dents, scrapes, and even function a little awkwardly. When you compare the prices between what you get and the brand new models you'll realise you end up with a bargain – if you've been shopping correctly.

"How does one shop wrong?" you ask.

I can relate when I first started Insanitek that I was excited. I didn't think things through, and I ended up buying a few things that were not compatible with our software. Meanwhile, there were other things that functioned, but were so cantankerous of machines that you hated using them. We ended up with a lot of things we cannibalised for parts.

While this was a huge waste of money, time, effort, we did weed out bad sellers found suppliers that we preferred, and used all those spare machines to teach ourselves about how to fix the machines. If you don't have this luxury, then stop before you pull out your wallet and ask yourself the following questions:

1. **Can I make this with the materials I find around a hardware store?** *Most of the time you'll find you can.*
2. **Is this the most effective use of the funds?**
3. **How accurate do I need the machine to be?** *Then ask the seller for specs.*
4. **Do I really need this?**

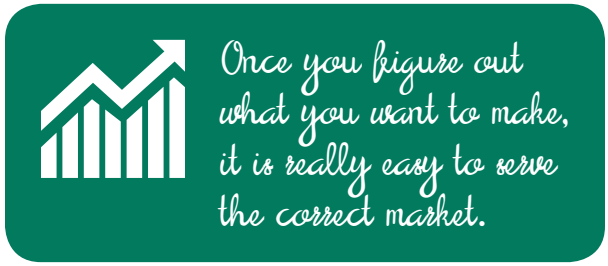
Sometimes you'll find that you don't really need the machine, but it will make your life easier. If that is the case, put it on the wish-list. If you can make something just as effective with what you have laying around or the stuff in a hardware store, then do that to save money. If you are looking for something highly accurate, engage in chats with the seller to make sure you're getting something that will serve your purposes.

Even after all this, there is something additional you need to keep in mind: Finances are needed for more than just equipment. They are also needed for business finances such as marketing, regulatory fees, licensing fees, and more depending on your field. You need to plan for all this from the very start. One of the best ways to do just that is to dig into the day to day cash flow of the entire company.

Going With the Flow

When you consider the cash flow, it all comes down to your business model. To develop your business model, you need to consider your client, and to consider your client, you need to consider both your goals and your product or service. Ask yourself the following questions:

1. What is the product or service you are hoping to supply?
2. What value does it have, and to whom?



Each of us have different things in mind when we state we want to do research. Doing science for science's sake is fun, but it ends when you can't afford to order more supplies. So, dig down into your research area and passions and see where that cross section is of pure experimentation and something you can sell.

My passion, for example, lies in studying soils and soil chemistry. I delight in understanding the interaction of soils, humans, and the plants. I prefer to look at things in context of ancient civilisations, but this alone wouldn't pay the bills. Looking at this same interface in context of modern civilisation does – and if I charge enough I can go to archaeology digs, get some samples, and publish my research as a bonus for my clients. This has value for a wide audience, especially if that audience is growing things or wants their plot to look healthy, or if they have environmental regulations to adhere to. Often times they think that past is just as interesting and would be happy to see the results. This analysis leads to discovering who an ideal customer might be: Another business or an individual consumer.

In my case it is both. What is it yours? Let's explore a little deeper to answer this.

B2B OR B2C?

Take a close look at the institutional world you are trying to escape. What is their business model? Who do they serve? What do they take? What do they give? What appeals to you about their set-up?

Now, ask yourself what about their set-up bothers you enough to pack up and leave. Go on, write it down in your notebook, and feel free to rant. This will be the basis for your own business model for when you step out on your own.

Your answers to the above begin to uncover your goals for the scaffolding of your independent lab, so be exacting as well as whimsical. Be brutal as well. The exact combination of things that you love and hate about the world around you will be the pillars of what make your science business unique enough to stand out from the crowd. Once you combine this with traditional business lingo, learn how to talk to your audience, and you're in sustainable business.

The lingo of the business world starts off with understanding the practical differences of B2B and B2C. B2B simply means business to business selling, while B2C means business sells directly to consumer. Which one you choose matters in how you position yourself. For example, if you test genetic structures for diseases in your closet like Kay Aull did[6], you might find better luck and satisfaction positioning yourself to set individual's minds at ease than renting out your services to a bigger lab. On the other hand, if your goals and vision is more aligned with a lab renting out its testing services, you just might dream the other direction.

No matter which client base you choose to focus on at the beginning, it is advisable to be able to think both directions for a little more flexibility down the road. At the beginning of your journey, you'll find it easiest to get started if you focus on just one, but definitely don't discount the other as a possibility for "sometime down the road".

Once you have this down, it's time to start focusing on the regulatory details behind the how.

Using and Cutting the Red Tape

This is where it gets really tricky and this pocket guide will seem really vague. I don't have much of a choice in that since what rules and regulations you need to know depend on what, exactly, you are trying to sell and to whom, as well as where you are located at. There are a few guidelines I can offer you, though, that will help you put a check-list on your search for knowledge.

✓ LAB RULES

- You will need to familiarise yourself with all lab safety regulations for all your chemicals and supplies. This means everything from proper storage to proper disposal.
- Take stock of maintenance issues for any gear you have from the bottles to the hoods to the analysers.
- Know the safety protocols for using all your equipment, doubly so if you work with others in the lab.

✓ HEALTH AND ENVIRONMENTAL REGULATIONS

- Your facilities should be in code for every health and safety code regarding your business. This means that if you have to have a closing door for the lab, then a closet will do just as well as a spare room. If you need to have a super clean environment, you may want to consider cordoning off a part of the garage to serve the function with a biologic hood.
- Look into EPA and REM, or regional equivalents if you are not in the United States, regulations as the very least, followed very closely by local laws and standards. This includes things like proper storage and disposal of samples, consumables, and chemicals. Each country, county, and local government will have different levels of regulations, and you must adhere to all of them if you plan to do business within their bounds.
- Have a file of people and places to call in an emergency for clean up that is out of your abilities to take care of.
- Don't forget your MSDS sheets. They need to be in a prominent, or at least well labelled, location that is easily found.

✓ QUALITY CONTROL

- Make and keep your files extremely well organised and easy to find. This includes lab notes, order forms, and owners manuals for the equipment. You will need to have everything to back up your research, and often times hard-copy is seen as gold. Electronic copies will do on some things, like manuals.
- Make sure you have all your safety regulations in order in a separate file so you can easily call them up if asked. You'd be surprised how many people will call the EPA on you claiming you're up to no good.
- Make sure you know what can be thrown away then. Some files have to be kept for 5 years, others for up to 15, and still others can't be thrown away. This is especially true if you serve other businesses and/or the government. This usually applies to physical samples as well.

✓ LICENCES AND REGULATORY FEES

- Many times you will find that to do certain types of work you need to have extra amounts of training and pay exorbitant fees for licensing and certifications. While frustrating, they are necessary to use to support your business. Not only do they give you credentials, they make it much more difficult for anyone to charge you with malpractice.

I'm sure with all this you're starting to feel a bit overwhelmed, but having this information will make a difference in the way your lab is seen and respected for it's work. Speaking of, how are your credentials doing?

Building Your Street Cred'

In an institution your audience is your fellow researchers that are also using the institute. When you are not at an institute, your audience expands to include your target audience, the general public and other researchers. In other words, your audience broadens to include non-scientists as well as those that would use your research to better their worlds.

We all seek heroes, and when I think of a champion of building credentials from practically nothing and doing great things with it, I think of Elizabeth Holmes[7,8]. At 19 she dropped out of Stanford, founded a biotech company called Theranos, and proceeded to become a powerhouse behind a medical revolution. The first decade was spent in a basement developing her inventions in utter secret, and even now every employee who works for her signs a sweeping non-disclosure agreement. Through all this, Holmes and her work is distrusted because experts can't figure out what makes here devices work, and without that, Theranos get slandered often by those that fear what might be.

Holmes had powerful investors on her side which kept her funded through the process despite the efforts of the naysayers, but it was her hard work and dedication that really saw it through. Holmes spent her time really making connections, acting on these connections, and trying new ideas[7]. Over time, her dedication to the ideas she had developed into their own and with that came respect and credibility.

Holmes is in a field that has a huge impact for everyone: health. Everyone knows the value of health, and the cost of going to a doctor. Everyone knows, on some level, the value of preventative medicine, so when they see the cost of Holmes' analysis costs of

anywhere between $2 and $120, they willingly hand over their pocket money. What if you don't have this luxury of having an in-demand product that is used by quite literally everyone?

There are two key take aways here: Build your network through opportunity and to really want the outcome. With this, you'll have the drive to continue to be vulnerable, reach out to others, network, and keep trying to succeed.

> To build your credibility, build your network, your product, and stay true to your goals.

Sometimes this stealth method is necessary – it's especially prominent in the health arena where competition is fierce and the cost of losing out is steep. Holmes knew this, and she also knew that on top of revolutionising medical testing with a very affordable method, she also needed to turn a profit for Theranos. When it's not, you can turn toward more traditional methods of open science and even the more transparent methods of open access science.

NETWORKING

There is no secret to networking. There are methods based on what works for you. This means your personality and the service or product you are selling. For example, I work best at conferences with a display of one of our services: the academic infographic. While standing in front of a great poster sized infographic explaining research, I don't need to feel like I'm pushing myself to sell. This is what is right for me, but not someone else who isn't as comfortable in front of an audience and wants to build e-courses. They might fare better with social media. In short: do what works, not what's popular.

No matter what method(s) of networking you chose, it is necessary to keep in mind that every person you come across is a potential collaborator on a future project, ally, or potential client. Have a system in place for keeping track of them, reaching out and helping them, and naturally develop relationships with people. Believe it or not, this will go a long way to developing your credentials as a leader in your field.

MARKETING/PUBLISHING

Publishing in academia and other institutions is a form of marketing. Each paper, book chapter, and citation is a shout out about yourself and what you're doing. In the non-institutionalised research world, we publish on blogs and open access science sites like Open Science and The Winnower regularly, as well as our own company white papers. Even news sites like the Huffington Post, Business Insider, and others will publish an article from you – the catch is writing it in plain English or putting it in as an infographic with a little explanation. In the realm of traditional journals, many independent researchers find they get a better acceptance rate from "lower tier" journals that aren't looking for very specific things to further their own brand message.

Publishing is a wide open field, and each piece you put out there bares your message with it. It tells the world what you're up to, what you believe in, and how you serve them. Every case study you put up is some data you can use, but it's also a public message strutting your stuff. Every podcast you speak for, every presentation you make is another way to publicly show the world what you're made of. Find a way to leverage it in a way that fits your needs and business model. Whatever you do, don't shy away from it for each well done piece adds to your reputation and builds up your credentials.

Don't Give Up

There is a lot of information in these few pages. Read through this again, answer each question, and think about the hows and whys behind why you want to be an independent researcher. Once you do that, you'll have the foundation stone of your empire set.

And you know what? I'd love to be there to cheer you on. We can chat on G+ and Twitter. And if you need a little assistance along the way, we can do that too.

Seriously. And to prove it, enter the code "IndiePride" to pick my brain for free when you select The Mini Package.

Until we connect and collaborate,

Grace Conyers
Founder and CEO of
Insanitek Research and Development

— ABOUT THE AUTHOR —

Grace graduated from Purdue University with her master's geology. Although she spent many happy years in academia, she always dreamed of helping more people and applying the work her and her fellow academics did. So she started Insanitek Research and Development.

Insanitek itself was a manifestation of too many late nights doing homework, lamenting the system, and wondering "what if things were different" in the presence of alcohol with friends. They must not have drunk enough, because with the idea firmly planted, Insanitek went from a vague "what if" to a "why not".

On any given day you can find Grace teaching sciences to elementary kids, college kids, adults, and anyone that will listen. You'll also find her in a lab coat, running her home lab or running around Insanitek's collective labs running soil samples and analysing. She is rarely seen without her tea cup. In her spare time she reads a lot, goes hiking, and practises her long range marksmanship.

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