# Business901

*Podcast Transcription*

*Implementing Lean Marketing Systems*

## The Maker Movement

Guest was Mark Hatch



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Mark Hatch on The Maker Manifesto

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**Transcription of the Podcast**

**Joseph Dager:** Welcome everyone, this is Joe Dager the host of the Business 901 podcast, with me today is Mark Hatch. Mark is a CEO and co-founder of TechShop, a former Green Beret and has held executive positions focused on innovation, disruptive technology and entrepreneurship at large and small firms alike. His background includes time with Avery Dennison and Kinko where he developed large scale technology platforms launching himself as a recognized leader in the Global Maker Movement and a sought-after speaker and consultant on innovation, advanced manufacturing and leadership. He presently resides as the CEO and cofounder of TechShop; the largest public access tools and computer enabled manufacturing platform in the world.

Mark thanks for being here and TechShop sounds pretty interesting, what is it all about?

**Mark Hatch:** Thanks Joe and I appreciate the opportunity to talk to your listeners. So, TechShop is a membership based do-it-yourself open fabrication studio. So, membership based means just like gymnasium, like a 24 hour fitness or Gold's Gym. We charge our members by the month $125. We then teach a lot of classes so; we teach upwards of 250 classes in San Francisco on how to use the tools. Do-it-yourself means our members do it themselves; we don't do it for them, we're not the prototyping shop, they get to come in

and use our tools and fabrication studio means like, in San Francisco, we have 24,000 square feet, we have machine tools, mills and lathes, wood working tools, routers, drill, presses and great big CNC routers. Complete, metal shops, complete electronics lab, complete plastics lab, complete textiles lab, 3D printers, great big huge water jet, 4,000 square feet of open space where you can use our air power tools and most importantly a thousand members in San Francisco alone. So when you come to work on your project you are not working on it alone, and if you run into an issue or a problem, we like to say, you are probably one or two degrees of freedom from getting that problem solved. It's a unique platform; nobody else has gone it at the scale we have here six locations now across the U.S., three in the Bay Area, Detroit, Austin and Pittsburg.

**Joe:** I have to ask, who are the people showing up? Are they all entrepreneurs or this is kind of later stage development or who are the Makers?

**Mark:** Everybody who needs access to a tool, I liken it to, asking the question, who uses a pencil. Well, pretty much anybody who needs to use a pencil uses a pencil. There are authors, writers there are mathematicians. Yes, we have a lot of entrepreneurs; we have a lot of interpreneurs. But we also have people, who are just working on side projects, they need to weld up an angle bracket, they need to do some fun letterhead thing using a laser cutter for a church picnic. It's a very wide array of folks that show up. We have the same number of people in their 20s, 30s, 40s and 50s that show up.

**Joe:** So do they get trained on all the tools before they use them? Do they have to pass a test or something?

**Mark:** Yeah well, it's all a card. So if you had to take every single class, it would take you three months and around 3,500 plus. So no, it's like one class or two or three classes that you need to have access to a particular area in the shop that you want. So, for example, the laser cutter is one of the more popular tools, it's computer numerically controlled that cuts through about a quarter of an inch of plastic, cardboard, wood, edge steel, edge glass, it will cut cloth. After training, I think it's a $70 to $80 class, runs about two hours and then you're able to actually use the tool. We've had people accidentally launch businesses after learning how to use that tool, we call it our 'Gateway drug' like any good gateway drug, it needs to be powerful, easy to use and incredibly addictive, and that describes the laser cutter quite nicely.

**Joe:** Now, were you always a home hobbyist? How did you get involved in this from Avery Dennison and Kinko to TechShop?

**Mark:** Yes, I mean, Avery is a manufacturing environment, and I started out actually on the R&D side and worked my way over to Product Management. I always had my hands on the lab or doing things. I also had one that doesn't always show up on my resume. I owned an auto body shop up in Ventura County for a while. I love the whole maker movement; I love getting my hands dirty, but the thing I'm playing with these days is the 3D printer, and I'm having a lot of fun with that.

**Joe:** I bet; I bet that's a lot of fun. Now, you recently published a book called The Maker Movement Manifesto. Can you give me the elevator speech about it?

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**Mark:** Sure, there is a Maker Movement that's arising in U.S. It's not really new in one sense because we've had these kinds of movements in the past, we have Crafts Movement and other movements in history but this one seems to be different. I think it speaks to us in a different way given we've been focused on software now for 30 years. It came out in about 2004 and 2005, the first publication of the magazine - *Make Magazine* came out and then in 2006 they had a Maker Fair. I'd describe it as a 21st century version of a State Fair, and we swap out the animals and swap in robots. That's kind of what -- so you will have, you still have the quilting bee, you'll still have the food going on but then you'll have a lot of high tech hardware stuff going on with original electronics or the recently launched Intel Galileo Board. We show up with mills and lathes. They have great big huge robots, fire breathing robots literally. One of the music acts is called *The Arc Attack* and they have two Tesla coils that they dance between inside of a Faraday cage or that the lightning bolts are striking their Faraday Suit while they're playing their riff on the guitar. I mean; it's an absolute blast, but it touches back to the kind of a general need or I call it a basic human instinct to actually make things with your hands and this movement has gotten steam. The first year they had 25,000 people then 50 then 75,000. I think they had over a 140,000 people show up this last year. There are now Mini-Maker Fairs. I think there are 70 Mini-Maker Fairs this month alone. It's a movement. And any good movement, being a former Green Beret, any good movement needs a manifesto, like somebody needs to outline the general principles around what's driving the movement and how we can take it to the next level, so that's what inspired me to write the book.

**Joe:** Can you explain what a manifesto is and then why do we need one?

**Mark:** Well so, any time you have a revolution or in the middle of a revolution, now this is a bloodless and non-violent revolution, but yes, it's still a social revolution. What you want to do is you want to have, in the military speaking, a call to arms. You want to have some leading voices in the movements, call out to the broader community. They haven't engaged yet and asked them to join. Then you have to give them reasons on why they might join, and you have to tell them if you join this is what we expect from you. So, that's basically what this book does. It talks, in general terms, about the movement itself that highlights -- I've got a lot of stories in there, and they're lots of fun to read. Then it kind of exposes the general gestalt of the movement around, here is why it's interesting and here's why you might want to join. In the book I talked about some of the long term impacts, the opportunities it has from the economic development perspective, from an educational platform perspective. This is actually pretty big deal. I think it's going to have a tremendous positive impact on the U.S. and the world.

**Joe:** Well, who is a maker then? Can you define who actually a maker is to me?

**Mark:** Well, somebody who makes things. It's that simple. What's nice is, it's very broad so a lot of people can participate and then what's really interesting to me is that becoming a maker is getting easier and easier and easier. Just because you don't think you want to be, or you may not currently consider yourself a maker, if you work in software, for example, and you're used to dealing with Microsoft Word or Excel or those things, you will soon, my guess, is within the next five to six years you are going to be playing around with a parametric modeling software program. You may not even know that's what it is but

under the covers that's what it will be and then you'll have an opportunity to print those out on a 3D printer and lo and behold, you will be a maker all of a sudden. So, they're like this transitional; these technologies are going to enable this transition in a fairly seamless way. There are a lot of folks that are DIYers, the Do-It-Yourself industry in the U.S. is a $700 billion industry led by folks like Lowes and the like, and not all the folks who go into Lowes are using that platform as a way of saving money. They redo their kitchen because they want to, not necessarily because they need to. They redo the bathroom because they want to have that project; they want to have that feeling of self-satisfaction at the end of the project. Makers work on their cars probably not as much as we use to; I think it's because of the technology, so it's a pretty broad definition.

**Joe:** I've always worked out in the garage with my dad. I was welding when I was like five or six years old. I worked with my hands and did those things. Have we separated from that or do we need a different kind of platform now to work around garage?

**Mark:** Yeah, we have separated from that and again because of the objects that we have now have become very sophisticated and sometimes designs not allow us to go in and not kind of goof around with it. There's been this we've been enamored with the computer. So in the high schools today you don't see nearly as many machine shops and wood shops, they have almost completely disappeared. We have, unfortunately, regulated the slow kids, to those areas and as a result of whatever educational policy where we are trying to get everybody into college even though we know that doesn't make sense. We seemed to have stepped away from that permanent educational platform but what's really intriguing to me is that the bridge from the computer back to these tools is almost seamless now.

Folks that have been goofing around using computers and labs and so forth, all you got to do is download a couple of programs from Autodesk. You can actually download some apps on your iPhone 123D Make or 123D Catch. These are very sophisticated parametric modeling tools that will allow you to take that code, use a computer numerically controlled machine so then actually it produces something. So we say; we can turn you into a maker inside about two class sessions by introducing you to some interesting, easy to use software tools, introducing you to the tool and then you'll be able to make world class craftsmen like products as a direct result and the reason is because the computer's taken all of the variability out. You know exactly what you are going to get; the tool does it exactly like you are expecting it to. It's a pretty satisfying process. I was terrible when working; my gaps weren't very good, and I had to use a lot of fillers and it didn't stain right and you're now using a computer controlled router, my fitting finish is very good now. It's kind of fun.

**Joe:** Is your book going to want to make me go to the garage or go inside to my computer?

**Mark:** No, no, I've got -- one of the principles is that you got to tool up, and if you are lucky enough to live near a TechShop you won't need to buy a whole bunch of more tools because we got them all. Or if you are close to a well-equipped maker space which I described and talk about or a hacker space, you don't necessarily have to buy the tools. This whole sharing economy is pretty interesting as far as lowering the cost occurred for goofing around. But yeah, you read this book you are going to be inspired, you are going

to make something, I've seen a couple a reviews where they were torn between putting the book down and running out to the garage, or finishing the book.

**Joe:** So it's an inspirational book. It's going to get me -- my wife's going to like it, she is going to get me in the garage working on stuff, right?

**Mark:** It's a light read; it's not an academic book, it's a manifesto and manifestos tend to be shorter. And it's sprinkled with a lot of inspiring stories.

**Joe:** One other thing that I want to talk to you about because I think you have some good insight even for my software people that listen to the podcast. It's about experiments, prototypes and all that beta stuff that happens in software. Makers are kind of experimentalist and prototypers. Is that getting easier to do in real life now with real life stuff rather than just software?

**Mark:** Yeah, and so for your Lean audience, basically what our platform has done is we've created a Lean hardware environment and what that means, it has an opportunity to completely change a significant portion of how we do R&D even in large companies. So let me unpack that just a little bit. What got me intrigued with TechShop was that, I ran into the founder at a party up in Silicon Valley. Went in, and I met three groups of entrepreneurs back to back, and from one table to the next. Each one of them told me, in their own way, I saved two orders of magnitude in my startup cost by using TechShop as my prototyping platform, two orders of magnitude.

Now your Lean teams are going to love this. So instead of spending a $150,000 they spent $1,500. Instead of spending $2 million they spent $20,000 and what happens when you can cut those kinds of cost out of your early prototyping stream; it completely changes the internal infrastructure that's required to do new product, new hardware development.

I'll give you an example, when I was at Avery Dennison; I helped create a new product development process that captured the best of the current thinking around the globe. We did the benchmarking and came back and put 60 people in the room, and re-architected our entire new product development process, cut it from 18 months to nine, all the things you do. But the reason we needed that stage gate new product development process was that to launch a product we estimated to just getting it into the channel cost us over a million dollars firing up the sales team and to do the prototypes and to do the production runs and so forth would cost us a couple million dollars. You are in three to five million dollar range just to launch a product whether it's a A, B or C product; you are in the $5 million range.

That requires a group of folks who got deep experience in R&D, in manufacturing, in sales and marketing, cross-functional team; you got to work together to make sure that $5 million is spent very, very well. Typically, it took six months to a year to get through the product development process, right. I would do the design and this is what I want. I would hand it over to an engineer, and they would do the CAT drawings, and that would take a couple of weeks and those CAT drawings would go off to the millers, the millwright would then mill it in aluminum and I would get back the first article, and it would be wrong invariably. I failed to communicate something, somebody made a mistake in the drawing,

and we would do that two or three times. About the third time, we would finally get back our pre-production prototype that was actually kind of what we were looking for. Because it cost a million dollar to launch the product, we would then do focus groups. We had to schedule focus groups in multiple settings and fly all over the U.S. exposing this new product idea to people who aren't actually our customers and who are pretending to be, and they would make insightful comments about things that they had no experience whatsoever.

That process takes big teams, millions of dollars and at least six months. It takes a lot of time. Everything's changed. I can now walk in to TechShop, fire up a 3D printer and build my prototype this afternoon. I can then take a photograph of it and do a nice little story and launch a kick starter campaign, and rather than having potential customers tell me what's right or wrong with it I'll have actual customers who will decide whether or not they want it to buy it. Inside of 45 days instead of spending a million dollars in trying or half a million dollar, trying to decide whether I want it or whether or not it was going to work, I'll have a half a million dollars in sales to actually fund the production. Well, that's Lean, right? You go from a $5 million, nine months experience to a three months experience where you're actually making money.

**Joe:** I think what makes it so Lean like is really that you can sit there and do multiple hypothesis and experiments and put it out there for people, for customers to look at.

**Mark:** Yes exactly, so speed to market. Yes, the ease with which you can do the development cycle depth. Everything's changed and again because it's of the DIY platform,

we have people that are launching businesses, fairly significant businesses for under a thousand dollars. You don't need to stage – we're only spending a thousand dollar you do not need to stage gate new product development process, all you need is a credit card.

**Joe:** When I look at the prototypes in the 3D printing things on that, is that really going to change the face of the way we do business going forward? Is that a game changer?

**Mark:** Well, yes and no. I don't want to build any more hype on the pretty 3D printer side. I mean, we're not going to printing puppies or babies next year. That kind of seems that's like the trajectory we're on given the hype and the space. 3D printing is particularly good, inexpensive and on building those initial prototypes. Building those prototypes is absolutely critical. I call the management devices, because until you could show your manager a prototype, and there's no amount of hand waving and PowerPoint slides that's going to get the concept across. So shorting that development cycle was absolutely critical with 3D printing. To feed in to the hype, yes, on the higher end when you get into the laser sintering of metals and other kinds of high end types of materials, we are seeing those being introduced as, as you folks probably know, GE famously bought a company recently, and they're putting 3D printed components into their fan blades and their engines, Boeing is using it. It is a game changer on the manufacturing side, but it has to be the appropriate tool for the appropriate thing. It's not a universal tool; it's a hammer, it's another tool in a tool bench, that's an incredibly useful tool, particularly on the prototyping side.

**Joe:** I want to get back and change back to the people side of this a little. When you look at all these makers out there and you're seeing as many of them as anyone right now.

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What really separates the winners and losers? I mean what's the secret sauce? Can you help us out?

**Mark:** You know I think, yeah. No fear is one of them, and that's probably not a good descriptor, it's not no fear, it's realization that failing is cheap now and that it's merely a step on the road to success. So you've heard the Fail Fast Mantra, and now you have an opportunity to Fail Fast on the hardware side and that's new to the world. When people come in, particularly old line mechanical engineers, they're used to doing a lot of work on the design side before they ever cut steel and now, you don't need to do that. It's like get your initial thoughts together and build that prototype. Get direct interactions with potential customer and iterate it, you can iterate two or three times today, in a week. That blows away what we used to be able to do. So the real successful makers that I've seen are the ones who've embraced that and are iterating very, very quickly. They realize that they are not going to get the first run right, or the second one or the third one but when they get to the fourth, fifth and sixth, they're going to be honing it down to what it is that they need. It's cheap enough now that it's not a material concern like, let's just keep on plowing through and the folks that embrace that rather than spend all their time working on the computer trying to get the design right and just absolutely perfect, and are the ones that are succeeding.

**Joe:** What do you hope for someone to take away from The Maker Movement Manifesto? What was the point for you to write the book?

**Mark:** My primary objective was to recruit individuals to join the movement. I believe this

is a -- it's a part of the human journey. I talk about in the book. It's like that there is a small piece of someone's soul that you imbue in something that you've directly interacted with on the physical side and that you've been in the process of making and when you give that away, the satisfaction both for the giver and the receiver; it's a completely different social, spiritual, intellectual plane. It's just something fundamentally different, and we've gotten away from that in the last 30 or 40 years. Garages have gotten smaller; we don't have welding – you were a lucky boy man, you had a welding machine.

**Joe:** I'd burnt up and welded a few go-kart frames.

**Mark:** We have welding machines at the TechShop. We'll teach you how to weld. It's one of our more popular classes. So there's that piece, which is just on a personal level. I think once we get engaged, and again it's gotten easier, and easier to do these things and then from a socio-economic perspective, once this movement continues to grow, we're seeing people completely up end industry segments in the U.S. and around the world through innovations that they've created on their own; sometimes as little as one or two months, usually over six months or more. They are also outside players. We had some electronic engineers do the world's most efficient data cooling center system. Data cooling is a huge issue around the world; it's a $250 billion annual spend it consumes 2% of all the energy in the U.S.; this is just cooling those servers, right? Not the actual all the electricity that they consume, it's just cooling them, it's 2%. These two electrical engineers came in; they spent about two years, $20,000 to design a system that beat IBM's best in class; beat Emerson's best in class, there are 10 other comers. Phil and Bob beat everybody on the planet and the Emerson immediately licensed the technology. Unpack that for $20,000 two

bright guys upped ended IBM. That's pretty unusual, and we're seeing that happen in a multitude of industries. There are all kinds of fabulous inventions and entrepreneurs that have not had an opportunity to build their physical prototype in a Lean Startup kind of way because they were just too expensive and we've lost, who knows, how much of productivity as a result of them not being able to pursue their dreams.

**Joe:** Is it all technology? I mean do you have an Anvil and a Hardy Block in the TechShop?

**Mark:** We do have an Anvil in Menlo Park. I mean we have – it's not all CNC, no. I mean we've got welding machines; we've got metal brass punches, two benders that are all hand tools. The overlay is the computer, so in those areas where you may not be skilled, turning that over to the computer makes it a lot easier to be able to make your prototype.

**Joe:** Where is the book available? I assume on Amazon; McGraw Hill is the publisher?

**Mark:** It's going to be available -- I don't think you're going to see it at the airport newsstands yet, I'm always hopeful but any of the Barnes & Noble have it. I am told it is on their shelves, as well as online on Amazon, you can get it online, as well. My favorite, and buddy of mine took a photograph of it at the MIT book store, it was right on the front table that was warming to my heart.

**Joe:** It is in San Francisco; it isn't all just technology, and so there are some people out there that are actually working with their hands on?

**Mark:** Yeah, I mean we have 1,200 members in San Francisco alone, another thousand or so in San Jose, 15,000 in Menlo Park. Our partners include folks like Intel, Ford Motor Company, Autodesk. There are some big players that are paying some pretty serious attention to the space. Hardware is the next software is one of the things that I'm hearing. What's interesting is that at South by Southwest this last year, their headliner included amazing interactive computer designers like Elon Musk. Wait a minute, he doesn't do -- that's right; he's a hardware guy, he's doing Tesla. Okay, well there is Bree Pettis, the founder of MakerBot. Wait a minute, he does do code but that's actually a 3D printer, so that's actually another hardware company. So interactive at South by Southwest have been infiltrated and inundated with some of the most interesting stories of the year, and they're coming out of the hardware space. Not out of moving eyeballs around.

**Joe:** So the future for TechShop, are you opening more of them up? Is that the future plans?

Mark: Absolutely, we see this is Kinko's 3D, I come out of Kinko's and it was obviously it's a 2D metaphor where you printed things, we believed that over the long cycle that this is going to run, you'll come to us to make things physically. Then we'll actually, we will get into the prototyping business, and we'll make them for you. So its Kinko's 3D, every major city in the U.S. needs one of these. We recently announced a $60 million campaign to help take this up to 11 new cities around the U.S. and your readers and listeners can learn more about that just by hitting our website, techshop.com.

**Joe:** So is that the best way to contact you Mark?

**Mark:** Yes, you just go to techshop.com. I mean they can send anything, to info@techshop or pr@techshop, and the appropriate emails will get routed to me.

**Joe:** Well that sounds excellent I would like to thank you very much for your time today and look forward to hearing more about TechShop, and maybe I'll get one closer to me here.

**Mark:** Thanks Joe. We're working on it.

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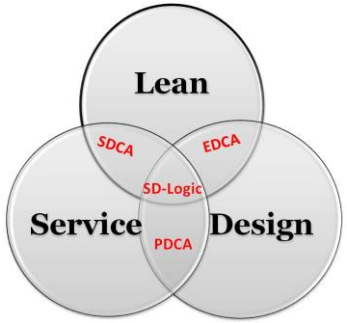


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Joe Dager is president of Business901, a firm specializing in bringing the continuous improvement process to the sales and marketing arena. He takes his process thinking of over thirty years in marketing within a wide variety of industries and applies it through Lean Marketing and Lean Service Design.

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