Institute For The Future
Technology Horizons Program
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Over a few months in early 2011, in the course of doing research for an IFTF Tech Horizons Program's study on the future of "open fabrication," I convened what turned out to be a remarkable, free-wheeling conversation among a set of pioneering thinker/makers in China, Singapore, and the U.S. What started out as a set of distinct one-on-one research emails turned into a group discussion on the nature of Chinese manufacturing, global open innovation, and the burgeoning, disruptive potential of the growing connections between (mostly) Western-based hackers and agile Chinese manufacturing networks.

I wrote a piece for our internal report, available to Tech Horizons clients, which focused mainly on 3D printing and design. However, our email conversation ranged well beyond that topic, and I've been meaning to release this great stuff into the wild for some time now. I've cobbled together two readings. Below you can find some of the best quotes, organized across some broad categories. You can also download the lightly edited, more-or-less chronological version of our conversation, with the permission of all participants. It's quite long, but for those of us interested in the topic, quite rich.

Hope you enjoy.

--Lyn Jeffery
Director, Technology Horizons Program

Participants:

Bunnie Huang, Chumby General Manager, Asia Operations, bunnie studios LLC owner
Lyn Jeffery, Director, Technology Horizons Program, Institute for the Future
David Li, founder of Xinchejian, China's first formal hacker space
Eric Pan, founder and CEO of SeeedStudio.
Jon Phillips, http://Fabricatorz.com + http://qi-hardware.com

Note:
EmbeDream: a Nanjing-based open robotics group
MediaTek: maker of popular mobile phone chip sets that drove the explosion in Chinese off-label handset manufacturing

Lyn Jeffery   What happens when places like <u>Xinchejian</u> and <u>EmbeDream</u> merge with <u>MediaTek</u> and the factory network in Dongguan? Or in other words, what kind of small-scale manufacturing ecosystem could develop and what will be unique about it?

David Li   Here is my personal take on the issues of personal manufacture. I think it's a future we are all looking forward to and the path to it will likely go through China with micro-manufacturing. I am sure you have heard of the term Shanzhai used to describe a big cluster of Chinese knock-off vendors in Shenzhen making cellphones. They are now shipping over 250 million cellphones a year and most of those are actually produced in small quantity at 10,000 a batch with all type of variation. Wired UK has a <u>good cover story</u> on this. This model is interesting to look at because it provides a peek into how personal manufacturing and open innovation may emerge. While both started without much regard to IP of the original holders, they share the information among themselves openly. None of the vendors participating in the ecosystem are big and there is no centralized giant among them to coordinate the ecosystem. Each one of them pulls and pushes each other to produce a very efficient micro-manufacturing ecosystem that can respond to the market fast with very little overhead.

If you take a close look at the Shanzhai, they do fit in nicely to <u>IFTF's 6 suggestions on implementing Lightweight Innovation</u> (see www.iftf.org/LightweightInnovation), in organizations:

1. Network your organizations: the bike vendors in Chongqing hang out in tea houses and Shanzhai vendors in Shenzhen have a vast networks centered on the large electronic mall.

2. Reward Solution Seekers: Penny-a-unit profits force the Shanzhai collaborations to be totally solutions- driven. They don't make money if they don't deliver. "Not invented here" isn't ever a problem.

3. Err on the side of openness: well, the wild west of Shanzhai is all about openness. Trade secrets of big companies are flowing freely. Everything is "open sourced" by default. If we take the IPR issue aside, it's really the ultimate openness we in the open source are looking for. Information is flowing freely without organizational boundary.

4. Engage actively: the shanzhai vendors are moving fast to the trend. They used to produce knock-offs after original vendors had the products on the market. In the past year, I have seen a lot of them act on the latest TechCrunch rumor, especially those related to Apple. It was kind of funny that there are several large

size iPhone (7" and 10") being produced by the Shanzhai on the rumor that iPad would look like a large iPhone. :)

The last two are still missing from Shanzhai. For the data transparency, the Shanzhai are producing the hardware and they are located in Shenzhen. Somehow, they are looked down as the country cousins by the Internet entrepreneurs in Beijing and Shanghai. Other then Tencent (QQ) which headquarters in Shenzhen and which has full a suite of apps available to the Shanzhai phones, few are engaging the Shanzhai vendors but this is likely to change as the Shanzhai are seizing the opportunities with Android. The celebration of hackers is not quite there yet but this is more cultural then Shanzhai's problem alone.

I think Shanzhai represents a good place to study open innovation and micro-manufacture and their implications for the future of personal manufacturing. I use the term Shanzhai loosely to describe the super efficient micro-manufacturing (light weight as you described it in your paper) ecosystem in China. They are likely to be the partners of the rise of personal manufacturing in the West. Several of the Kickstarter projects have documented nicely their trips to China to manufacture the Kickstarter goods. One of our hackerspace partners, Seeed Studio, is one of the leading Arduino providers and has started several interesting platforms for open source hardware, especially on the manufacture side.

We in Shanghai are lucky enough to be at the cross of two movements: the makers and the shanzhai, which gives us a unique perspective on this trend. I have given a few speeches in the past years about Shanzhai and Open Source hardware. I think open source hardware in the West is a more symbolic anti-consumerism movement. Combining that community with the shanzhai will have global impact. It will vastly accelerate the spread of technologies to developing worlds.

Cell phones play a major role as tool of communication in the recently upraise in Middle East but while Twitter and Facebook are hailed as the tools, few have bother to look at what kind of cell phones are used by the protestors. More likely then not, they are Chinese Shanzhai phones.

Shanzhai isn't really a counter culture; they are in fact mainstream, judging by the numbers (150 millions sold in 2010 in China alone) and they get one for every niche. As much as I can't stand the loudspeaker phones, I can see how they are great entertainment for the construction workers after they go back to the shack at night. The first-tier cities' youth are adopting western fashion. The density of iPhone 4 in Shanghai metro area is simply amazing. Walking into a Starbucks, it's 70% of the phones there. The use of Shanzhai is more economic but the scale of market and the loose regulations create a big enough market for all

these Shanzhai to grow and at this point, start to innovate. One of the reasons I started the Xinshanzhai talks are to stir up the debate and to show a side of Chinese innovation that are simply ridiculed and dismissed. It was kind of funny to have IDEO standing on stage at a recent talk, talking about how incredible Shanzhai is, and have a full room of Chinese young designers in Shanghai in disgust. It's a big culture bridge to cross between Shanghai/Beijing and Shenzhen/Guangzhou.

For the first area, I would suggest you to talk to Eric Pan of SeeedStudio (http://seeedstudio.com). He's at the forefront of bridging the global maker movement and Shenzhen manufacturing capacity. We had him as the speaker of the first Xinshanzhai. There was some interesting debate between him and some of the Chinese entrepreneurs in the electronic/embedded system. SeeedStudio, although based in Shenzhen and started by a Chinese, is selling globally (98% of their sales are US and Europe) and the price of their products are comparable to their global counterparts such as Adafruit. The same Arduino board by Seeed is at least 4 to 5 times the price as the Chinese vendors' on Taobao for domestic market. Most of the Chinese at that meeting instead of trying to figure out why Seeed gets to charge so much for their goods, they are practically accusing him for price gouging. I think Seeed and Eric represent a new generation of Chinese business. They get out of the China price curse and step into the global market as a equal player. And now, they are turning themselves into a new platform to bridge the two worlds.

Oh, the HiJack is an open source iPhone attachment that provides power and communication through the earphone jack. I told Eric about it a few weeks ago and he has a few engineering samples built and I borrowed one to show at the barcamp Shanghai. I thought it's also a good illustration of how open source hardware, hackerspace, and micro-manufacture working together. http://arstechnica.com/apple/news/2011/01/project-hijack-uses-iphone-audio-jack-to-make-cheap-sensors.ars

Eros was a tablet designed, manufactured and marketed by one person Eros living in Shenzhen. The guy was an amateur photographer who wants a tablet to show off portfolio, got supported by friends in the online forum and decided to build one. Amazing what can be accomplished when one is determined and access to this micro manufacture ecosystem. http://www.engadget.com/2010/01/19/eros-shenzhen-tablet-has-atom-2-hours-of-battery-life-and-a-45/

TikTok+ LunaTik The video is fun to watch about this trip to Shenzhen and I think he's also a person you should interview. Wow, that project is over $1 million in fund collected while he asked only for $15,000 originally. http://www.kickstarter.com/projects/1104350651/tiktok-lunatik-multi-touch-watch-

kits

Eric Pan   The merge aren't likely to happen yet. Traditional factories are not used to face user generated needs, they prefer volume, fully loading product lines. On the other hand, small and quick turnover factories are emerging to meet fast pace and small quantity needs, like from Shanzhai phones. By working with Hacker spaces or virtual community groups, open hardware company like us could consolidate the needs to negotiate with factories towards small batch manufacturing, or even establish/invest agile factory.

David Li   Haha, I think Eric is being too modest. While we are still pondering the question about what happens when the global open source hardware and hacker space meet the efficient manufacture ecosystem of China, he's already running a profitable business on that edge. ;)

We rarely have a hard time explaining to expats or oversea educated Chinese about hackerspace. However, there seems to be a culture bridge when we try to reach Chinese and this has been troubling me for a long time. It hit me when you and other friends sent me the questions on 3D printing and makers culture in China. The reason it's hard to reach Chinese is that China is still in a upswing economic development based on a large manufacture base economic. Quite a few of the reasons contribute to the spread of hackerspace in the West do not exist here.

One of the problems solved by hackerspace in the west is the availability of tools and space and expertise and this makes the membership works. However, in China where 50%+ of economic are in manufacture, everyone knows someone to get stuff made. As we are setting up the space, we are going over whether we should get a laser cutter and CNC machine, we realize that there are a few shops right across street from us that does laser cutting and CNCing with unbeatable cost.

While we have enough people here to support a niche existence for hackerspace, I am trying to figure out how to spread this to other part of China.

One thing I am thinking is hackerspace pointing to an alternative path of evolution for China's economic development. Manufacturing doesn't have to "upgrade" to a service economy to increase value. Micro manufacture is another path.

Lyn Jeffery   *In 2009 Bunnie Huang wrote [a well-known post about shanzhai](http://www.bunniestudios.com/blog/?cat=7&paged=2) [http://www.bunniestudios.com/blog/?cat=7&paged=2] in which he*

described an "open BOM" that was being used among shanzhai mobile phone makers: "...the "open BOM" — they share their bill of materials and other design materials with each other, and they share any improvements made; these rules are policed by community word-of-mouth, to the extent that if someone is found cheating they are ostracized by the shanzhai ecosystem."

What's interesting is that the academic literature on regional industrial clusters in China suggests the opposite--that there is very little sharing and cooperation going on amongst small manufacturers--especially in the ICT sector. And that the competition is so fierce amongst these small makers that they hold on to every idea and slight advantage very fiercely. What do you think?

Jon Philips   I think its one of the fiercest battle zones of competition. Gangs, mafias, and people just trying to make money. You been at those dinners with those dirty dog business men? I was down in Guangzhou at one shanzhai boss's japanese knock off restaurant that had fake projectors, fake pianos, fake LV tissue paper holder and the works. If experience is correct, there is social pressure to share, but just as much to compete over every cent. So, yes, there is both.

There isn't much real innovation with shanzhai. The company that is making all the money is MTK (mediatek) a taiwanese based company who makes the kits they ALL use in china shanzhai scene.

David Li   I'd say both are right. There are shanzhai which makes grey market goods that are not exactly legal by the law. Not much statistics are collected about them until recent years, as they are shipping hundreds of millions of handsets to China, India, south east Asia and Africa. Most of these vendors are not licensed by the government to produce ICT products.

Analog to US would be the economic statistics collected on illegal immigrants.

Then there are legit small ICT vendors who were making their own brand phone and other electronics. A few famous one like Nanjing Panda, which was one high flying phone vendor. These sectors are extremely close on sharing of their ideas and technologies.

The reports you are seeing are about two different sectors of the industry.

Bunnie Huang   I would imagine that if you did an academic survey of any company that has a "legitimate" front that they absolutely would not share

anything with you. The Chinese have a deep mistrust of the government and everything that smacks of being associated with it.

I've spoken with some web developers in China and clients specifically request their websites have no CSS or fancy formatting because people in China associate well-polished websites with government and foreign interests and are therefore less credible. The mistrust runs deep.

On the other hand, I've had no trouble getting the information I need if I meet the lao ban (factory boss) face to face and we go out for some bai jo (local chinese liquor) and he talks to me and we gain each other's trust. You need to have a lot of shenzhen mud in the treads of your boots to participate in the ecosystem, in other words.

The Shanzhai also work in a similar method; I have a friend who works with a collective of them and he uses the open BOM strategy to seed new ideas into the community. He injects products from his compnay into the BOM pool and it gets absorbed by the Shanzhai and that creates sales for him. But he spends over 50% of his time in Shenzhen to make this happen and he's pretty protective of his contact list. It's the relationships that matter the most.

I have also seen, on occasion, sites where full BOM lists are archived for various reference designs. They are hard to search, Google won't pick them up efficiently and links to them are often in Chinese. But I've noticed when I'm behind the great firewall of China I have an easier time discovering these trolling the local community sites.

David Li   Just spent a day visiting and talking to people in Shenzhen. I saw Eric yesterday afternoon and was treated to nice dinner. Thanks Eric. By the way, Eric will have a booth in Maker Faire this year.

The legit small ICT are closed. They hold their technologies and processes secretly. I see that in small ICT as well as Shanzhai factories who are moving to up the food chain by creating their own brands.

The shanzhai sharing is more advanced then Bunnies' original post as the sharing have become more business-like in form of readily available designs, boards, molding and others. Also, design houses working with Shanzhai vendors all offer open BOM options.

"Open parts" (公模 公板) are public available cases, panel, boards, battery and etc that are manufactured by multiple companies with open design. Anyone can acquire these on open market and modular from different supplier can work

together.

On the side note, met with a design house in Shenzhen whose team actually quit their jobs in large design houses located in Beijing and moved to Shenzhen last year to start the business.

I'd also agree on Jon's assessment on the shanzhai's willingness to collaborate. I assume Jon means by jointly developing new products? It's more of a business issue. Shanzhai factories are not set up to do a lot of research and development. Individually, they are very specific on what they do and often not interested in outside of their specific area. This comes from their cut-throat hyper price sensitive business practice. They can't afford to spend time doing additional investment and development outside their specific area. They see a market niche, move fast to secure design and open BOM and go to manufacture and sales.

There are very fine divisions of labors in Shenzhen. My observations are:

Shanzhai: operating assembly and acquire design and BOM from design house and material on the market. Each produces very specific product at any given time. These assemblies are supported by design houses and suppliers of open parts, ranging from cases to board design. Each one produces very specific products by assembling open parts from the markets with slight variation. The shanzhai innovation is an emergent behavior. It happens with large numbers of the assemblies trying to fill every niche they can think of.

Design houses: there are a few hundred of them around Shenzhen doing Android these days. More for feature phones.

Open parts suppliers

The open innovation in Shanzhai isn't by design but came out of necessity for cost saving. As the shanzhai factories got their scale, they try to move up to introduce their own brands and this is the point at which they become closed.

Here is my observation so far in Shenzhen. It's a very exciting place.

Bunnie Huang   Interesting findings, thanks for sharing.

One thing I'd throw in is that in my experience, firms that try to operate or project themselves as "legit" are hyper-sensitive to IP propriety issues in China. I have some small vendors that I work with that strictly deal with American/EU white-market goods and they are stupid precise about dotting their i's and crossing their

t's when it comes to IP, to the point where it slows down business and they do nonsense things like partitioning specs between vendors so that sub-contractors are having to guess how to make inter-operable connectors until all the proper forms are collected and signed.

However, I do appreciate their position, because every foreigner comes into their factory swaggering about and demanding audits and treating them all like potential IP thieves, so they operate very defensively to maintain their strong foreign customer base.

The Shanzhai don't deal with the American and EU markets; their main markets have few concerns about IP protection, but it's all about cost. I agree with David's observation that the Shanzhai hyper-specialize to reduce cost. I also agree that there's no room for R&D in a Shanzhai operation that's banging out units, but I believe that's not where the "R&D" happens.

My impression is that typically Shanzhai units start up on bootstrap capital, and each one has some guy who thinks they can do something better than the next guy. It's this very embryonic stage where the innovation happens. Once a Shanzhai innovates and figures out how to knock a couple points off the cost, they get a ton of orders and then they just turn the crank until no more money comes out of the machine; but until then you never really hear about them much.

And to be clear, an "innovation" in the Shanzhai world could be as simple as figuring out a more efficient way to jig the assembly so that labor time is reduced by 20%, or figuring out a reliable way to refurbish certain used parts to be like new. This isn't really glorified by western standards, but if you can reduce labor cost by 20% that's a huge improvement in cost structure. It's not like "innovation" in the Western sense which is a term more closely associated with "disruptive" technology.

So the R&D culture lays in the hands of the lone wolves in garages trying to scratch a niche out of a very competitive market; thus it's very hard to formally document and record their forward-looking activities...

Lyn Jeffery   We're talking, at this point, about the willingness of shanzhai manufacturers to share amongst one another--the essence of "open innovation." Academic research out of UHK suggests that the SEZ ICT cluster is characterized by INTERNAL development of ideas that are not shared externally. See esp the work of Cassandra Wang and George Lin, who argue that "These firms depend on new ideas or designs for their survival, and to communicate them to other enterprises would be to risk having new ideas stolen." And, "Although there existed frequent and intensive production linkages among firms

in the Shenzhen ICT industrial cluster, the innovative performance of these firms has been rather poor. Most of the ICT manufacturing firms obtained their core technology through internal research and development (R & D) activities rather than through technology transfer or knowledge spillover. There is a lack of interest among firms to seek cooperation and communication based on knowledge, technology, or R & D activities with other firms in the same cluster." http://www.envplan.com/abstract.cgi?id=a4356 *and* http://iir.nccu.edu.tw/attachments/journal/add/4/44-2-145-192.pdf

Now they of course are talking about legitimate small manufacturers. But how many of these are part of the shanzhai network, and vice versa? How would we even distinguish between the two?

Bunnie's experience suggests that shanzhai manufacturers may be more willing to share ideas and designs than the small firms found in the research above.

David, I wasn't sure whether you meant that the legit small ICT vendors are close--as in they are willing to share with one another--or that they are closed, meaning not willing to share?

Jon's sense is that shanzhai guys are pretty cut-throat and not interested in collaboration of the "open innovation" sort.

Couple of things:

1) data on both the shanzhai ICT sectors is hard to collect, probably impossible. David notes that it's kind of like trying to find good data on illegal immigrants.

2) "innovation" is one of those slippery words. It could be that innovation is happening, as some people argue, in how the small firms provide credit up and downstream and in their responsiveness to design and rapid product development--but not in the "sharing" that supposedly characterizes "open innovation" as it is understood in the U.S..

3) Could it be that shanzhai makers, operating in a legal gray zone, were more likely to innovate in the sense of sharing ideas and designs openly ("open BOM")? That would be an interesting finding.

Jon Philips   These are all excellent observations. I would argue that the manufacturing is not Open Manufacturing. It's Competitive Manufacturing of Simple Bountiful Parts.

David Li   I'd argue the public parts (公模 公板), for example open cases and boards available for building tablets, are getting pretty sophisticated fast. It's easy to build on top of those to come up with new products. The kind of publicly available cases and boards I see in Shenzhen are becoming very sophisticated fast. The drive to do public available parts may be partly due to lack of IP protection (if it's going to be copied, it may just well be open and shared) and part due to cost saving. But the ecosystem emergent from these practices is almost like the vision laid out by open manufacturing. After all, it's about sharing and exchange of how to build and collaborate on the manufacturing. While we're still trying to figure out how open source hardware may work, they get a system in place already. The simple parts are getting complicated fast because new ones are not designed from scratch but build on top of the previous products.

I am totally agree with Bunnie's earlier blog post where he concluded that that this system will reach critical mass. I expect to see this in the next two years with tablets. While everyone's focus is on the "iPad killer," the price points of tablets are creating a large under served market in BRIC and other developing countries. For example, while Samsung is trying to clear whether the 2 millions of Galaxy are sell-in or sell-out, Gome already shipped over 5 millions of Fly Touch. The current 3rd generations are expected to ship over 10 millions in 2011. Everyone I talked to in Shenzhen this time are getting business from Russia, India, Brazil and other South America countries.

It's hyper competitive cut throat market but because of that, the sharing and collaborations are not simply a nice to have. It's a must. The tablets will ride on the uber Moore's Law and the hardware will soon overshoot the point which Clayton Christensen calls the "diminishing returns in innovation." Machines will get to "fast" enough soon enough. As the trend develops, the high-end will likely to be dominated by iOS with mid and lower ranged dominated by these currently unknown Chinese brands (they already have 3 out of top 5 selling tablets on Amazon). Brands other than Apple will lose out big time on this one.

I do see problems with the system. Being too hardware focused being one of them, and no room for long term planning being another because of the tight and low cost production schedule. I think this represents great opportunities for us. Not quite sure what it is yet.

Attached is a gem I found in SZ on this trip. This cute 7" tablet has such a great finish in its hardware construct only 0.58 in thickness, it makes the iPad next to look old and clumpy. The machine comes with Android 2.2.1 and the vendor promises full access to the OS source and hardware spec. The system comes with a USB host on board that makes it ideal for hacking and attaching external devices. Shanzhai is way ahead of other to deliver an open platform for hackers and I can be confident that this level of finishing will be part of the public parts in

next 6~9 months.

Software in this is another story tho but I see that as great opportunities. It's nice for Lyn to bring all these people together so I get to bounce the ideas around. I definitely look forward to a conference on this subject taking place in HK/SZ soon. :) It's a very exciting time.

Eric Pan   Thank you for the sharing! It's my shame not digging enough into the Shanzhai industry before hearing your opinions and witnesses!

One of my colleague classmate has been working in Shanzhai phones for 6 years and now co-founding a 12 employee design house, I "interviewed" him with questions Lyn posted earlier. Here are some info for your reference:

Small design houses now survive from reputation and groups. Sharing is a must between small design houses, they group to exchange ideas, know what each other is working on. This is exactly like motor industry in Chongqing, it has several key benefits: avoid direct competition with in groups, standardize supply (or open BOM) to share supply chain, forward/outsource orders to more suitable player. The bottom line is UI, design houses would not share or ask each other, where differentiates their works remarkably. This might be a key consideration for David's idea execution, a common OS platform but with close customization features might help.

Shanzhai industry today is very transparent. The key word is qty for the players. For mature products, design house usually take 3-5 RMB (0.5USD) profit for each board, so they are masters in cost saving, supply chain management and quality control (over 99.7% yield). They are also like service company providing customization services, charged not by design package cost but distribute it to a certain volume. The designs houses want change, but hard to jump out of the MTK controlled industry, they are not capable to work on things other than MTK. They are small independent company, but rely on MTK too much.

In the long run, they think weaker companies will fade out, best design houses usually became product integrators themselves, then fight with brand. But even big players outsource a lot to small design houses to sustain its diversity in product line. There are also some design house try stepping out, like phone with EEG sensor for elders. It would be interesting if we could get them interested in more extension modules and harvest the cost-minimized quality-proven modules. Also, is there a chance to positively release these powers from Shanzhai Market to other industries?

As you may know, The Shanzhai phone industry are formed basically by Three

layers:
1. IC company, Design house and Product Integrator. MTK is the biggest IC company initiated the Shanzhai industry and other 1-2 alternatives are catching up. MTK have several Chipsets platforms and evolves the slowest.

2. Design house. In Shenzhen, there are (estimation from an insider) about 2000 design houses designs electrical solutions and produces the main board (ODM), and over 5000 product integrators consolidate them into products. The design houses generate boards from the chip-sets focusing on different direction. Small design houses still have some unique solutions (imitating iphone, N97 or else).

3. Product integrator. The most diversified part is on the product integrators, they do their best on the enclosures and look closely at the markets. A good board could dress hundreds of enclosures as different phones.

Jon Philips   My conclusions now from life in China and just getting out before my friends started getting bagged is:

* china has process-based innovation. (efficiency, speeding up processes, etc)
* Shanzhai is a novelty.

I've sat in high level meetings prior to this in taiwan where plots were made to use this shanzhai battlefield to drive down costs and increase margins.

With China, some Social innovation and some other industries necessary to grow high tech are vastly behind. I might even go so far to say social innovation is 150 years behind in china. And, with Ai Weiwei and others being bagged and some other friends being questioned, equipment confiscated right now, I don't think its changing very quickly...

David Li   It's interesting to talk about social change and Shanzhai. A friend just show me the 400 RMB MTK shanzhai phone he got. It's a feature phone with Facebook and Twitter apps pre-installed. Why would a Shanzhai phone have Facebook/Twitter apps? Because half of the 200+ millions Shanzhai shipped a year is outside of China and the factories have no idea which batches shipped where, so they just include everything. Government scrutiny? Well, there are basically tens of thousands of vendors working in a grey market economy which is way outside the reach of the government. Unlike the big Internet companies whose central servers can be unplugged and who have public shareholders to answer to, the Shanzhai factories answer only to themselves.

If ones are looking to bring social change via technologies to China, Shanzhai is

more effective then Twitter/Facebook. The typical Twitter/Facebook users in China are well-off. Some unofficial survey shows Chinese Twitter users have average 12,000/month income, which puts them comfortably in top 5% of the population and part of the elites in the status quo. They want political voice because of their wellbeing financially, but they are not going to do anything that would risk their comfortable lifestyle. On the other hand, the Shanzhai users are the mass and social changes will only occur if they are on board. For them, Ai Wei Wei doesn't really mean much.

It's also interesting to mention Taiwanese vendors. VIA is aggressively trying to get into the chipset provider business for Shanzhai pad. And the existence of Shanzhai have companies like ASUS and FIC to thank. ASUS and FIC have grown too big to take on smaller orders from developing countries because of low margin and volume. While Taiwan's ODM/OEM giants like ASUS and others are busy growing vertically to handle their large Western clients, they leave enough markets to allow the Shanzhai to develop into a horizontally integrated supply chain. In fact, Shanzhai phones for developed market started in Taiwan 10 years ago but most of them move to China because of the cost and industrial consolidation in Taiwan.

Just want to say that social innovation in China is not going to come from the iPhone-carrying tweeting elites. The dialogs have to reach the real mass. Shanzhai is actually a good path to reach them via technology. Even the revolution in Egypt was hailed "Twitter/Facebook" revolution, I often wonder what kind of cell phones are used by people in Tahrir square.

Just my 2 cents on the links between social changes and shanzhai.

Bunnie Huang   Very insightful comments. I agree with everything you've mentioned.

From what I've seen, I wouldn't be surprised if a lot of the phones in Egypt were provided by the Shanzhai. A market like that would be perfect for their product; I can't imagine that the average Egyptian had an android or iPhone....maybe the shanzhai provided the twitter/facebook backbone for the arab spring.

That's a tantalizing subject to research, especially since some economists theorize that a major factor in the tipping-point for the Egyptian revolution is the fact that China has become affluent and is consuming more wheat, which caused massive inflation in Egypt as it's one of the world's biggest importers of wheat -- and when people go hungry, governments change.

Perhaps a bit far-fetched that China's growth as an economic power can be

convincingly linked to both a root cause and a catalytic instigator of the Egyptian revolution, but an amusing thought nonetheless.

David Li   Just to add another bit of irony to this discussion.

How Chinese cell phones and mobile operator help information flow in North Korea
http://www.northkoreatech.org/2010/04/01/how-chinese-cell-phones-help-information-flow/

Jon Philips   Totally agree with you Bunnie. I didn't realize where all the shanzhai products were sold until we opened our hackerspace in Syria. Man! Actually, found the shanzhai products cheaper than in china...less bargaining power of the gwailo in china!

The shanzhai products are many times preferred I found in Syria.

The arab world, china, and usa are completely connected.

Maybe can interest you all in our Sharism Forum we will do in Lebanon in the fall...assuming the country is stable then!

Lyn Jeffery   Shanzhai Rules

 1) Design nothing from scratch; rather, build on the best of what others have already done.

 2) Innovate the production process for speed and small-scale cost savings.

 3) Share as much information as you can to make it easy for others to add value to your process.

 4) Don't make it until you've already got a buyer.

 5) Act responsibly within the supply chain.

Bunnie Huang   I think I'd put the rules like this. My take is a little more cynical, but I'll take a stab at it.

1) Buy low, sell high -- and time counts as money. No holds barred.

2) Confucius' silver rule, do not do unto others what you would not have them do onto you; or, "what goes around comes around". (this is the equivalent of #5 and the loose moral thread that binds the ethic of the community).

3) Don't make what you can buy for less. (your #1)

4) "A bird in hand is worth two in the bush"; or perhaps "cash flow is king". There is little faith in the future value of IP or inventory. If sharing my specs with you means I close a deal faster, I will share it with you. Waiting a day to sign an NDA means a day longer I sit on my inventory (see my rule #1). This covers your rules #4 and #3.

5) "there is no propriety, only results", or, perhaps "If it fits your foot, it's a shoe." (aka the thereifixedit.failblog.org mentality) An equivalent of #2 down below, except phrased in their mindset. They aren't in the innovation business for innovation's sake -- they are in it to drive costs down (my rules #1 and #3). It also explains why there is a no-holds barred culture around reverse engineering.

6) The only intangible property worth anything are personal relationships ("guanxi") (corollary of my #2 and reinforces your #5); also, the most valuable thing one may have is good guanxi. See http://en.wikipedia.org/wiki/Guanxi

A corollary of #6 is that "If I can't embody it in a physical vessel, it has no value". This explains why IP licensing in China is so awkward because they think of everything in terms of a bill of materials; every item must be inventoried and counted. Yet strangely, IP takes up a line item but has no space on the shelf in the factory, which seems like you're just paying someone for nothing. So why pay it? I have a long spiel about why software development is so broken in China overall, and it relates in part to this.

David Li　　　　　These are very insightful observations. However, I'd like to throw in some thought on this in term of what I would call low-hanging-fruits-driven development.

A little background, I was in Taiwan until I was 18 (71-89) before I moved to L.A. for 10 years. I lived through Taiwan's booming period, similar to what China has experienced in the past twenty years. As Taiwan was booming, there were always questions about why Taiwan can't establish its own brands like Japan, and several companies such as Acer did try in the late 80s but got punished for it at the stock market for their efforts. Taiwan got a famous line in Fatal Attraction when Michael Douglas had a broken umbrella and said "Made in Taiwan." The perception wasn't ready for Taiwanese brands and labor intensive and process

driven opportunities are low hanging fruits for Taiwan's companies. The results being most big Taiwanese "tech" giants today are still not much different from what Bunnie's described here: TSMC, ASUS, Foxconn, FTC, and etc.

HTC is one of the few exceptions but it took Jesus Christ coming to Cher Wang to give her the courage and commitment to try to develop HTC into a global brands. For those interested in the background, Cher Wang was interviewed in early 2000 by a Taiwanese business magazine on the reason she started HTC – because Jesus came to her in a dream and told her to start a mobile company. Morris Chang stirred up a flame war in the early 2000 by stating that Taiwan was not innovative and one of the interesting countering points was that TSMC and other Fab turned most of the Taiwanese Ph.D into basically high-level factory workers.

I think the level of innovations is driven by potential economic rewards. When it's easier to get reward for process-oriented innovation, the system will develop into process-oriented innovation and suck in most of the talent pool to power the innovation. Most of the innovations that don't have immediate applications are not attractive.

Thinking about this from the other side, what opportunities are there in the developed countries like US and Europe other than innovation and IP-driven development? Taking this to the more extreme end, it's the Quants and their innovations such as CDOs and all the financial derivatives products that just crashed the economy.

Anyway, I think we are at an interesting point where several of these forces are coming together: an efficient (cut throat) supply chain that's getting ready for micro manufacture and a global movement of hackerspace and the march of millions of amateurs. It's kind of interesting to look at Lyn's summaries of Shanzhai Rules and what Open Source Hardware movement are going.

1) Design nothing from scratch; rather, build on the best of what others have already done.

OSHW: Legally protect the right to build derivative works.

2) Innovate the production process for speed and small-scale cost savings.
3) Share as much information as you can to make it easy for others to add value to your process.

Open Source is really all about sharing.

4) Don't make it until you've already got a buyer.

Kickstarter and other project fund raising sites?

5) Act responsibly within the supply chain.

Open Source is all about community.

I think Shanzhai and Open Source Hardware are twins separated at birth and if we can join them, it will create some very interesting opportunities.

Jon Philips What a great convo. Not sure I contributed much hahaha, but I'm being super shanzhai these days hacking hard, getting money ;)

I totally agree with you David, hence why I've been pushing http://qi-hardware.com over the vacuous open hardware initiative. Did you see that logo btw of a broken gear for OSHW? The value of dads in the garage in wealthy countries compared to shanzhai sales and development (S&D vs R&D) is an interesting nexus of opportunity. Will the dad get out of the garage beyond his religiousness of free and open mantras to making a real product that is scalable and can the S&D model move to economies that can handle the vicious competition?

One thing seems certain, both models are allowing for a much lower entry cost into the vicious hardware and consumer electronics market.

Cheers for this nice discussion all....

Eric Pan and Lyn Jeffery exchange:

1) What is your background? (where are you from, educational background)
A: I'm local Chinese, from Sichuan, southwest of China. I'm graduated as EE from Chongqing University, served in the first year in Intel as a product engineer, then worked in a trading company to establish its agency in China.

2) How did you come to start Seeed?
A: Longing to create a company to enjoy innovations. Found Arduino which is small and easy to start with.

3) What needs to happen to create better bridges between makers around the world, and China's small-batch manufacturers? Is it, for instance, about better language translation tools? Payment systems? Distribution/shipping? Is it a

change in positioning and attitudes for the Chinese manufacturers?

A: Maker's needs are still small comparing to manufactures' capacity. They are very economic oriented, they respond to orders. It's still far for most manufactures to handle Maker needs now, since they are focusing more on traditional manufacture. Hence, It needs consolidation and standardization to bridge the needs and supply.

4) What are one or two of the most exciting projects/products that Seeed has helped become reality?
I can name two here: 1. Bus Pirate 2. DSO Nano, they are both individual/small team innovations, we helped brought them mature from ideas. People really love these cheap and open gadgets.