TABLE B: Historical analogy, user characteristics and politics: representative quotes

|  |  |  |  |
| --- | --- | --- | --- |
| **Aggregate** | **Second order theme** | **First order category** | **Representative quotes** |
| Historical Analogical Reasoning | References to the past | Recent, post-1977 | ‘*Tomorrow’s World* about 30 years ago….It was one of these liquid polymer jobs…It was the first time I saw it and I thought wow, that’s amazing’ User O, Nascent Entrepreneur.  ‘In the 90s people would have asked about computers, has computers reached a peak level. But with disruptive technology and things getting cheaper, everyone has a smartphone. Maybe everyone will have a 3D printer, like an oven’ User G, Hobbyist.  ‘It is very *Star Trek* isn't it? That is how it is going to be, you know, the replicator is the new *Argos*’ User Y, Nascent Entrepreneur. |
|  |  | Distant, agree with Ind. Revolution | ‘Well so far it has followed the same trajectory’ User E, External Venture Advocate.  ‘In Manchester? I suppose it was cottonopolis, wasn’t it?’ User A, Hobbyist.  ‘He talked about Edison, how many attempts did he have at coming up with the filament? The light bulb? Everyone of them was a failure, you are talking hundreds, maybe thousands’ User N, Internal Venture Advocate. |
|  |  | Distant, disagree with Ind. Revolution | None. |
|  |  | Distant analogy, other | ‘3D printing is like the mainframe computers of the past, they were around decades before the personal computer came about’ User H, Interview 1, External Venture Advocate. |
|  | Future predictions | General | ‘[3D printing] will become cheaper, it will become faster and I think the sizes and numbers of designs and the methodology for design will change’ User G, Hobbyist.  ‘I think in the future, we won’t buy the product, we will buy the file to print a product’ User Y, Nascent Entrepreneur.  ‘Another ten years down the line people will have them in their house, won’t they?’ User F, Hobbyist. |
|  |  | Cost | ‘And then you get the design for manufacture… you have the designers who made it and then the manufacturers asking for changes. I’ve been involved in this in the past and it goes backwards and forwards for so long. That is why the design cycle is such a long time. So if they can get people who can understand all the aspects of the product and how it is made, then it is a time saver which is a huge cost’ User H, Interview 2, External Venture Advocate. |
|  |  | Production and supply chains | ‘I can’t remember who said it…the genius of the industrial revolution was not making everyone wealthy enough to afford silk stockings but to make silk stockings cheap enough for everyone to afford, right? 3D printing is almost a reversal of that trend, of the concept of standardization of the assembly line, of mass manufacture’ User U, Established Entrepreneur.  ‘It’s this new paradigm in the third industrial revolution, you can design globally and make locally’ User E, External Venture Advocate. |
|  |  | Technical capabilities | ‘It’s not just a hobby, there is the potential for me to incorporate it into a job in the future. Once we master proper cell differentiation, the next step will be printing cells and knowledge like this will be invaluable’ User W, Hobbyist.  ‘There is a new technology where you can print from the liquid….the 3D design emerges from the liquid and it is ten times faster than those. So I think it is the future’ User P, Self-employed. |
| Entrepreneurial Opportunities | Digital fabrication technologies | User background/type | ‘You have your middle age tinkerers, the User Ks and the User Ms and that sort of thing. There was quite an influx of students too’ User J, External Venture Advocate.  ‘So it is that individual hobbyist maker user who the FabLab was initially conceived to give access to, but the models have evolved because of that broader macro movement that is going on where big companies are going ‘how do we get into that space’, this is where the innovation is happening and that is where they are looking to go’ User AB, External Venture Advocate. |
|  |  | User circumstances | ‘Networking! I wanted to network with people. But I have come down to make stuff, but I like to listen to what other people have done. Just to be, basically, part of something, because you can feel very alienated when you are working in your own studio at home’ User Z, Hobbyist.  ‘It seemed like an interesting thing to do, and I could do a lot of art work and I wanted to see if there was something I could do with technology that I couldn't do another way’ User C, Intensive FabLab User. |
|  |  | Equipment used | ‘Yep, it is a bit fiddly for doing somethings, but for most of what people want to do, especially using the laser cutter it is perfectly easy to use. And because it is free, and it just makes it very easy for people to get hold of and kinda feeds into like the kind of ethos of things’ User D, Hobbyist.  ‘The other thing about FabLabs is that we deliberately don’t use very hi-tech equipment. Some of it is more hi-tech than others, but the point of it is that using digital manufacturing equipment takes away some of the old fashioned trade requirements, so having to spend four years learning turning….It was all very manual and hands on. Now you can learn the skills to make it very quickly because the computers control most of that stuff for you. So the idea being that we don’t focus primarily on the process, more on the creative aspects’ User H, interview 1, External Venture Advocate. |
|  |  | Change in use of equipment | ‘This [the laser cutter] is used about eight hours a day usually… it is always the first piece of kit that people use when they come into the lab. When they come back they always think ‘what can I make with the laser cutter’, rather than ‘what do I want to make’ User H, interview 2, External Venture Advocate.  ‘So you get the basics and then you do it. I mean, I did the 3D printing course, similarly was a day. But, you have still got a lot of learning to do. I mean, it basically taught us the software, actually using the hardware is something I needed to do. And get wrong a few times’ User C, Intensive User.  ‘No, it’s not taken that long to get to be able to use the machines’ User W, Hobbyist.  ‘I started with the laser cutter and very quickly went through an absolute addiction to the 3D printer and found that what I was able to do was actually use 3D printers to make molds to make molds. That means you make molds then you can cast what you want, so you can work with all different types of materials’ User N, Internal Venture Advocate. |
|  | Politics | Anti-big business | ‘A lot of people don’t understand why you are giving it away, why you are sharing things. Operate greed is, doesn’t agree with me. Corporate greed has spoiled the 3D printing industry since the 1980s. Everything is tied up in patents’ User Y, Nascent Entrepreneur’.  ‘Look at this, Intel have just given us 50 computers that they are desperately re-orientating the whole FabLab to suit some big American corporation’ User N, Internal Venture Advocate. |
|  |  | Critique of education | ‘It isn’t a piece of paper that says you might get a job because you have a 2i or a first from Manchester. You are actually developing a set of competencies that you are passionate about bringing together because you want to do something but actually that is what business also wants. So it is potentially very disruptive because it is a range of disciplines’ User E, External Venture Advocate.  ‘We’re really bad at teaching people how to build things but we’re also really bad at teaching people to work out whether or not something is going to be profitable’ User U, Established Entrepreneur. |