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3D Printing for Repair: A Paradigm Shift of Fixing our Relationships with Things.

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Not many years ago, before the industrial revolution and the concept of disposability majority of the people were makers. Now we buy the things that people used to make and we throw away the ones they used to repair (Crawford, 2011). Our relationship with objects has completely changed and unfortunately it is now in crisis. However, grassroots movements such as the maker movement, DIY culture, open design, and repair cafes demonstrate that we are in the middle of a paradigm shift with regards to fixing our relationships with the objects. The evolution started with the digitalisation of information now passed into the physical level (Hagel et.al. 2014).

Since its invention twenty years ago, 3D printing has drawn attention from a wide range of disciplines, used in diverse application areas (Manyika et. al. 2013) and affected the way we think about manufacturing. The interest in 3D printers has grown further after the maker-movement became widespread (Hagel et.al. 2014). The technology has developed very fast and paves the way for businesses that provide 3D printing services as well as low-cost desktop 3D printers. Although the main application area of 3D printing is prototyping in product design, today it is possible to produce many products and current examples include bicycles, buildings, cars and even organs using living cells as a raw material.

The throughput based economic system has made it arduous and most of the time impossible to get the repair service and to find the spare parts. However, 3D printing technology has a huge potential for extending product lifespan through product repair, especially for physically damaged products. This paper uses Research through Design methods to explore current opportunities and barriers of utilising 3D printing technology for product repair. Twenty physically damaged products were fixed by using 3D printed patches, and the process was analysed with a phenomenological perspective. The approach helped us define the opportunities and barriers considering the repair of physically damaged products. The opportunities discussed in this research include producing spare parts, improving product design, printing on demand, sustainability implications, the interest in 3D printing and possible future developments. The barriers of using 3D printing for product repair considering current conditions are knowledge, skills and time required, and the precision needed in the CAD modelling process and accessibility of facilities. The article further discusses the implications of findings for user-product relationships, business, product design and users in terms of sustainability.