Chapter 11

Discussion of findings

11.1 Summary of findings

In this thesis I argue that open source development does indeed seem feasible for tangible products and that open design is a rapidly evolving field holding a lot of opportunities.

From a theoretical point of view, little is known about open source outside software, while OSS itself has received considerable scholarly attention in recent years. In Chapter 3 I discuss arguments why the circumstances are different for digital and tangible products and which issues may prohibit open development of physical goods. But I also point out that, in a sense, hardware is becoming much like software, allowing hardware development to be conducted increasingly like software development.

In the realm of open source and open innovation, openness is a multi-faceted topic. I use a gradual approach towards openness, ranging from closed to open and covering various degrees of openness, also referred to as ‘selective revealing’ or ‘open parts’ in the literature. Further, I distinguish three aspects of openness: transparency, accessibility, and replicability, and allow differing degrees of openness for all three aspects. Transparency refers to the revelation of knowledge, accessibility offers external contributors possibilities to actively influence the development and make contributions, and replicability denotes the possibility to self-assemble the product. The latter one becomes particularly important outside the domain of software development.

Business opportunities from OSS development have received an increasing amount of attention among researchers, as it is a great ambiguity of how to appropriate returns. Beyond software new opportunities arise to leverage
Q1 What kind of open design projects emerged so far?
Q2 How does open design work in practical examples?
Q3 Does the degree of openness matter to the communities?
Q4 Does the meaning of openness differ between open source software and open design?
Q5 How does openness impact developer’s satisfaction and their contributions?

Table 11.1: Five main research questions

Communities as external resources because open hardware is still difficult to copy, and, to a certain extent, hardware is already open by its nature. In contrast to pure software, it appears possible to capture value from marketing a commonly developed physical product.

In Chapter 4 I develop a clear-cut definition of open source innovation and a comprehensive framework for studying the landscape of open source development in the world of atoms. Detailed research questions and resulting propositions are derived from theory and proposed along this framework.

My main research questions are summarized in Table 11.1. To address the first question ‘What kind of open design projects emerged so far?’ and to investigate the variety of open design, I have compiled a pool of projects meeting the required definition. A thorough analysis of cases reveals project characteristics, structures, and success in Chapter 5.

Contributors from commercial and private backgrounds build communities of one to several hundred developers. They develop products across all degrees of complexity and innovativeness and for all types of intended audience. Many objects include programmed components and software, but some also consist of pure hardware. The considered projects stem from various industries and countries, their current development stages range from the evolution of first rough ideas to mature and successfully marketed products. I observe different strategies towards the IP regime ranging from selective revealing of components under sophisticated licenses to the free release of all related information to the public domain. The sample includes both approaches sponsored and driven by commercial companies marketing the product as well as purely user and community driven projects.

Research propositions are tested to draw comparisons between OSS and open design and are summarized in Table 11.2. Comparable to prior findings from the software industry, I observe significant positive correlations between the size of the community, the involvement of commercial contributors, and