Open HW, Open Design SW, and the VC Ecosystem Dilemma

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ABSTRACT

The open model for solutions development is quickly extending from software to other technology areas, such as hardware and services. Specifically, just as open source has spawned a revolution in the technical, business, and legal model for software, open hardware will provide a swell of collaborative innovation that will create entirely new markets and provide significant business benefits to the most creative, most reliable, and most adaptable semiconductor, EDA, System-On-Chip (SoC) and systems houses. The open-source software stack with Linux as its cornerstone is increasingly the preferred choice for newly venture-funded companies. Open hardware will also change the world of SoC venture investing. While the degree of openness and the business model may vary, SoC products have to be increasingly developed through a collaborative model that helps assemble IP blocks and services from multiple sources. In this paper we describe the open standards model for hardware, chip, and tool innovation, and we argue the a systematic IP valuation methodology will help the success of this environment, in that it will allow each member of the value chain – especially small VC-backed companies - to capture enough value to desire to participate.

Keywords

System, chip, design, methodology, valuation, ROI.

1. INTRODUCTION

Open software is most successful in the context of well-developed standards. Similarly, the open approach to hardware and specifically SoCs can only succeed in the context of strong, adaptable open standards. Open environments are based on a solid keystone player that helps coordinate the development of a stable platform and facilitates communication among the ecosystem players in the value chain. Both the platform and the communication require a set of open standards.

Emerging economies like China are quickly becoming leaders in the electronics industry, an industry where open standards will become a major pillar. These economies are well suited for the adoption of open standards, in part because they are an emerging yet very high growth electronics market. For example Chinese institutions are very supportive of standards activities and understand their benefits. As a result, the use of standards is quickly proliferating in this geography.

It is no surprise, though, that the benefits don't come automatically. An open standards electronics economy can only succeed with the parallel development of a healthy ecosystem – one where corporations can do business profitably. This ecosystem includes such profit-making companies, valuable standards-compliant IP, a set of specific yet business-friendly legal rules, and a technical development infrastructure. Emerging markets are likely to become a major field for open hardware development, and thus need to grow such a healthy open ecosystem.

As the ITRS roadmap [1] indicates design cost and other factors are making it hard for all players in the value chain – shown in Figure 1- to be a profitable viable business.

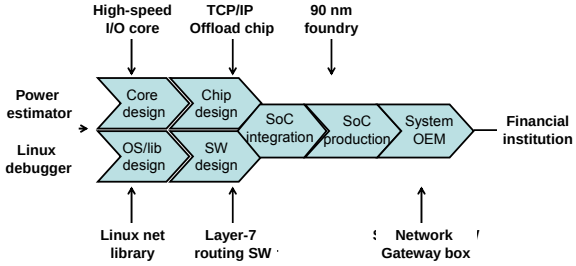


Figure 1 Electronics value chain.

Figure 2 shows how open standards can provide clear advantages in exchange for a lower level of control of technical and business specifications. Key aspects of long-term profitability, such as revenue, cost, time-to-market, and risk are plotted against each of the options. From left to right, the chart moves from a proprietary approach to a fully open approach, where companies can not only see a standard technical specification but also collaborate to modify it under a standards organization or alliance. Key

business factors such as markets that the company can tackle, the cost of adopting the standard, and the degree of technical control are shown as well.

While a healthy ecosystem in an open standards environment is a must, it also presents an IP valuation dilemma.

- On the one hand, companies need filters and methods to minimize risk in an open environment, so they can adopt new useful IP. This IP may be seeded by ecosystem founders and other large companies, but may also come from new creative and nimble companies.
- On the other hand, an open environment should not provide too high a filter for new IP – otherwise the environment might never bootstrap network effects. The open development process (as it happens with Linux) should automatically help provide such a filter through version committees and developers' choices when creating derivatives.

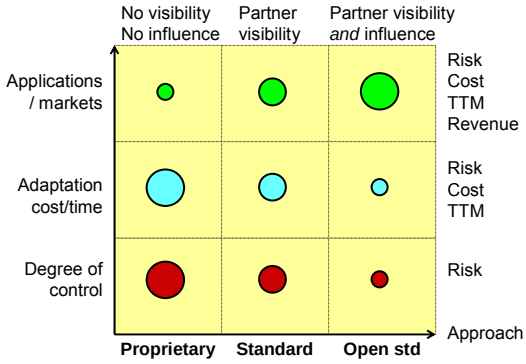


Figure 2 Technology openness matrix.

In this paper we argue that this dilemma can indeed be addressed through a combination of approaches, including a systematic IP valuation methodology, clear incentives that improve perceived ROI for company participants.

2. IP Valuation Methodologies

A possible solution to the dilemma is a systematic method for IP valuation that carefully balances the risk management aspects (the "variance") with the innovation-driven profit-making aspects (the "mean") of IP adoption. A piece of IP should have a low level of adoption risk, but it should also have features that enable high potential for revenue growth, such as a high level of differentiation versus its competition. Whether the IP is custom or standards-based, both reliability and the potential for profitability growth should be accounted for.

Using a simplified model, the value of IP is given by how much the market is willing to pay for it. From the standpoint of a business's financial Return-On-Investment (ROI), this value can be assessed as a function of expected revenue, adoption cost, adoption risk, and time-to-market. Figure 3 depicts a simplified model for IP valuation (based on a similar reuse paradigm in [3]), and in general a model for companies to make the decision to join an open standards environment where IP cores and tools are developed and provided through an open model.

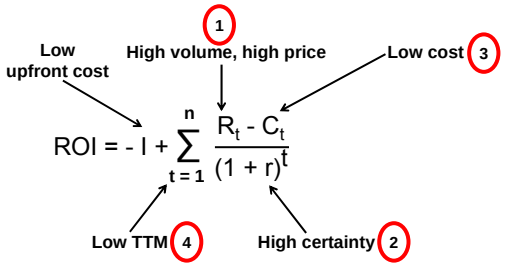


Figure 3 A simple model for IP valuation.

It is easy to see how the model implies mutually conflicting objectives that make the IP market at difficult target.

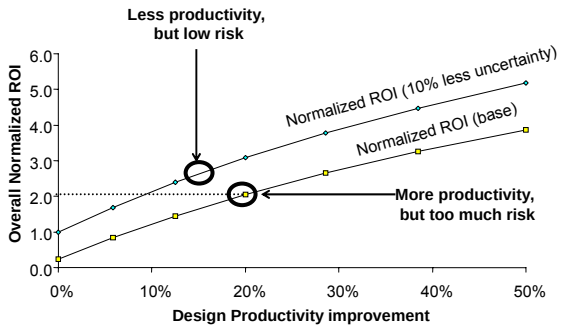
To complicate matters, from the standpoint of the process followed, IP value may be related to the nature of the relationship with a provider, business standing, leadership and reputation versus competitors, IP match to the adopter's product requirements, number and performance of its features, support level, and of course ease of integration. For soft IP, the resulting physical implementation also contributes to value assessment. For software IP, reusability has been thoroughly studied in the literature and is a large contributor to value. All of these factors are of special relevance to emerging markets where creativity is flourishing among local players while all players want to effectively leverage it. Just as importantly, the new world of open hardware markets may require creative business models where at least part of the IP is seeded without immediate profit. In this world, it is even more critical to assess the overall value of the IP solution (the raw component plus all the additional features and services) in order to make the right choices.

Fortunately, recent efforts in IP standards have as goal to help with systematic IP valuation. The R&D Pillar of the VSIA standards organization is creating a standard and

methodology for IP valuation that accounts for business (financial and process) and technical metrics [2]. The result of this work is expected to have two angles: a standard communication language, and a standard methodology. First, valuation information will be exchanged in a standard format between IP providers and integrators. Second, a standard method will be applied in the form of a mixed quantitative-qualitative assessment table. The benefits will then be twofold: first, communication between providers and adopters will be fluid and unambiguous, thereby facilitating the development of an increasingly efficient market and ecosystem; second, companies will have a systematic method to evaluate and negotiate a prospective IP exchange, in a way that both risk management and profit growth are accounted for.

3. Impact value on IP market viability

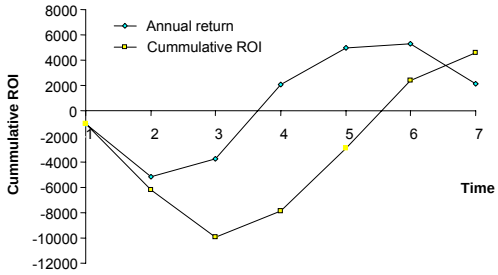
Open standards environments need to be set up in a way that commercial members can have available IP with low risk. As Figure 4 shows, if the provided IP reduces time to market due to immediate availability but does so at the expense of higher uncertainty (because it has not been commercially qualified), the overall perceived value (ROI based) may be lower than the price paid for IP in a traditionally non-open environment. In other words, without appropriate IP qualification and valuation procedures, an open standards-based environment will not attract the necessary partner companies to survive.



Source: IBM model

Figure 4 Open environments need to provide qualification that lowers risk to entice entrants.

Open standards environments also need to provide incentives for companies at the right time. As the ROI based model shows below for an example, early in the cycle of a young company the cumulative ROI is quite negative. Increasing or decreasing the perceived ROI through incentives such as very low-cost EDA tools or IP can help a young company survive the wrath of investors.



Note: data scaled for confidentiality

Figure 5 Cummulative ROI for typical SoC case.

Figure 6 indicates through an SoC case that providing incentives to companies in the form of low cost IP and EDA tooling towards the beginning of their prototyping effort can drastically lower the barriers to entry to an open standards effort. In this figure's example, it can be seen that break-even towards positive revenue would be too late for the company if low cost tooling and IP was unavailable. Providing low-cost access to open hardware and design software allows to reduce one time unit in the time-to-profit curve. Providing low-cost open access to tooling and IP across the design cycle reduces time-to-profit by two time units. These time reductions can mean life or death for a startup company that must turn a profit in about 3 years before investors retreat.

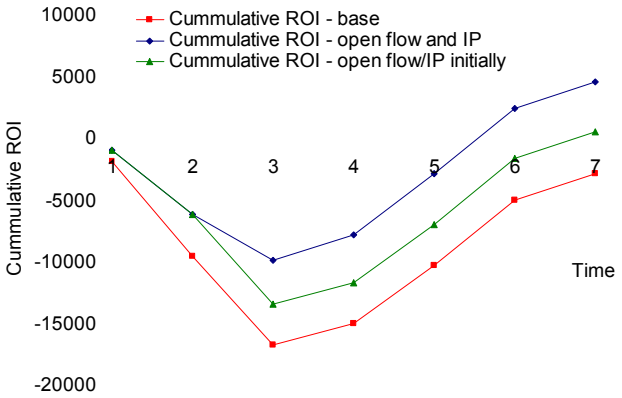


Figure 6 Impact on low-cost development from open flow and silicon IP environment.

Unfortunately an open environment may also bring the perception of higher competition as it lowers the barriers of entry. Figure 6 shows a separate SoC case where the open environment shaves development cost dollars but at the expense of higher competition and thus lower prices (25% in this case) for the generated IP or chip. As the figure indicates, price competition eliminates in this case most although not all of the advantages of an open flow and IP library the lowers development cost. In this case the company still breaks even two time units before the base case that uses traditional closed environments and pricing models.

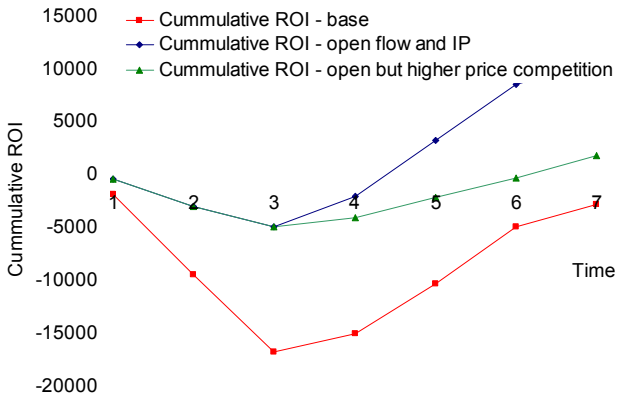


Figure 7 Impact on low-cost development from open environment plus heightened competition.

These are examples that illustrate why an open standards ecosystem requires high value IP and incentives, and a structured methodology to value that IP and those incentives from an economic standpoint.

A recent leading example of open hardware is Power.org, an emerging standards organization focused on collaborating in the development, promotion, and application of technical standards around the Power processor architecture. Standards will be developed in areas such as SoC bus architecture, SoC tool flow, high-volume computing platforms, and storage system platforms.

4. Conclusion

The IP valuation dilemma won't be fully solved by systematic IP valuation – the other components for a healthy open ecosystem are still necessary (companies, IP, rules, and technical infrastructure). However, systematic IP valuation can significantly help develop a healthy open ecosystem within the fast-growing emerging economies electronics market.

5. ACKNOWLEDGEMENTS

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6. REFERENCES

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