

Towards creating a novel solution to conquer limitation in optical design software



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The report of the following business Internship is considered confidential.

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Management summary

Purpose of study: Optical designers and optics engineers at ASML are responsible for analyzing and designing complex optical systems and optical metrology sensors. As they are overpassing the boundaries of standard designs and the degree of complexity in their designs rises, the limitations they have while using commercial optical design software rises as well. Lack of transparency, lack of flexibility and limited innovative analyzing methods are few examples of hindrance the designers are encountering. As the rate of innovation is increasing the need for a new optical design software with novel methods is increasing. The purpose of this study is to understand the limitations of existing commonly used commercial optical design softwares and investigate possible approaches that cover these gaps. The comparison of various approaches are made and in the end a business model is proposed for the proper approach. To maintain the focus, we limited our scope to optical imaging system design.

The research questions of this study are:

1. Is there a need for developing innovative optical design software? What are the main requirements?
2. What are the values that can be delivered by the new software?
3. What are the alternative approaches and business scenarios to develop optical design software? How to capture and deliver the proposed values?

Methods: Interviews and surveys were conducted to understand the end user requirements and limitations they encounter while using the commercial optical design softwares. Sixteen experts were interviewed. Thirteen optical designers and engineers within ASML and three designers selected from TNO. They are the scientists involved in designing ASML optical systems. The importance of the defined requirements were evaluated by conducting a survey with experts. The gap assessment identified the gaps between the solutions available in currently used softwares and the desired solutions. Further the added value for the end users and ASML was defined based on the requirements. To find the proper approach for developing new software different business scenarios were compared and ranked for the requirements. The business scenarios include proprietary software, in-house proprietary software, free open source software and commercial open source software. SWOT analysis is used together with ranking the business scenarios to find a proper approach.

Results and recommendation: Nine categories of requirements are defined by analyzing the interviews. Flexible customized and innovative methods for analysis, flexibility and ease to add new functionality, better combination of different modeling methods are three requirements which scored as the highest in importance among all other nine categories. Need to have a transparent core code, user friendliness and a tailored to ASMI's needs optical software are the requirements with high gaps. The ranking and SWOT analysis showed free open source and commercial open source deliver better solutions to the requirements. Open source software is a viable approach to meet the requirements. Commercial open source software has competitive advantage compared to free open source software as it delivers more possibilities for generating revenue.

Outlook: A focus group study needs to be performed to test the recommended approach. In this study various stakeholders could be included, such as designers and engineers and managers with power to make decisions for further development of the software. Furthermore, studies need to be performed regarding the feasibility of developing such a software and also chance of collaboration with other parties.

This thesis considered confidential.