

# Table of contents

1. Introduction and objectives .....	18
1.1. Context and motivation.....	18
1.2 Research objectives and scope .....	21
1.3 Contribution to knowledge .....	23
1.4 Research methodology.....	25
1.5 Thesis structure .....	27
2. On the application of extended reality technologies for the evaluation of product characteristics during the initial stages of the product development process .....	30
2.1. Introduction .....	30
2.2. Background.....	33
2.3. Hypotheses .....	34
2.4. Materials and Methods .....	34
2.4.1. Case Study .....	34
2.4.2. Semantic Differential Scales for Product Evaluation .....	38
2.4.3. Materials.....	38
2.4.4. Sample.....	39
2.4.5. Experimental protocol .....	39
2.5. Results .....	40
2.5.1. First study results .....	40
2.5.2. Second study results.....	44
2.6. Discussion.....	48
2.7. Conclusions .....	51
3. The influence of hand tracking and haptic feedback for virtual prototype evaluation in the product design process .....	53
3.1. Introduction .....	53
3.2. Background.....	56
3.3. Research goals and hypotheses .....	58
3.4. Materials and methods.....	59
3.4.1. Case study .....	59
3.4.2. Materials.....	62

3.4.3. Semantic differential .....	62
3.4.4. Sample .....	63
3.4.4.1. Sample for A1 analysis .....	64
3.4.4.2. Sample for A2 analysis .....	64
3.4.5. Experimental Protocol .....	64
3.5. Results .....	66
3.5.1. Analysis A1 results .....	67
3.5.2. Analysis A2 .....	73
3.6. Discussion.....	74
3.6.1. Implications for design practice .....	79
3.7. Conclusions.....	80
<b>4. An Examination of the Relationship between Visualization Media and Consumer Product Evaluation .....</b>	<b>83</b>
4.1. Introduction .....	83
4.2. Related work.....	85
4.3. Research goal and hypotheses.....	87
4.4. Materials and methods .....	88
4.4.1. Case study I: desktop telephones .....	88
4.4.2. Case study II: coffee makers .....	89
4.4.3. Semantic differential for product evaluation.....	90
4.4.4. Materials .....	91
4.4.5. Sample .....	92
4.4.6. Methodology .....	93
4.5. Analysis and results .....	94
4.5.1. Case study I: desktop telephones .....	94
4.6. Discussion .....	102
4.7. Conclusion .....	106
<b>5. General Discussion.....</b>	<b>109</b>
<b>6. Conclusions .....</b>	<b>116</b>
6.1. Limitations .....	117
6.2. Future work .....	118
<b>References.....</b>	<b>120</b>