

CHIP DESIGN STRATEGY

Overcoming Design Tool Issues

TABLE OF CONTENTS

- i. Petrov Group License Agreement
- ii. Table of Contents and List of Figures

1.	INTRODUCTION.....	1-1
1.1	INTERVIEW GUIDE.....	1-1
1.2	TOPIC 1: EDA TOOL USER BUSINESS DESCRIPTION.....	1-3
1.3	TOPIC 2: CHIP DESIGN ENVIRONMENT DESCRIPTION AND TRENDS.....	1-4
1.4	TOPIC 3: USER CRITERIA FOR CHOOSING EDA TOOL VENDORS.....	1-5
1.5	TOPIC 4: WHAT ARE THE KEY ELEMENTS OF THE NEEDED EDA SOLUTION?.....	1-5
1.6	TOPIC 5: WHAT VENDORSUPPORT IS MOST VALUABLE?.....	1-6
1.7	TOPIC 6: BOARD-LEVEL DESIGN-IN SUPPORT FOR END-PRODUCT CUSTOMERS.....	1-6
2.	REPORT SCOPE AND METHODOLOGY.....	2-1
2.1	REPORT SCOPE.....	2-1
2.2	REPORT METHODOLOGY.....	2-3
3.	CHIP DESIGN BUSINESS STRATEGY SERIES—STUDY AND ANNUAL SERVICE.....	3-1
3.1	2004 STUDY OF CHIP DESIGN STRATEGIES.....	3-1
3.1.1	Specific Study Deliverables.....	3-2
3.2	ANNUAL SERVICE—CHIP DESIGN STRATEGY.....	3-13
4.	EXECUTIVE SUMMARY.....	4-1
4.1	INTERVIEW RESULTS OVERVIEW MAP.....	4-39
5.	CHIP DESIGN BUSINESS TRENDS.....	5-1
5.1	INTRODUCTION.....	5-1
5.2	ACTUAL VERSUS VIRTUAL MATERIALS.....	5-3
5.3	THE TOOLING SYNDROME.....	5-6
5.3.1	Four Tooling Aspects.....	5-7
5.4	TOOL—DESIGN DISCONTINUITY.....	5-8
5.5	TOOLING OPTIONS FOR CHIP DESIGN ENVIRONMENTS.....	5-10
5.5.1	Three Basic Tooling Options.....	5-13
5.6	TOOLING OPTIONS VERSUS DESIGN QUALITY.....	5-14
5.7	IP-WALLS OF THE TOOL, DESIGN, AND FABRICATION BUSINESS DOMAINS.....	5-15
5.7.1	IP-Walls and Chip Design.....	5-16
5.7.2	Tool Making Business Domain.....	5-18
5.7.3	Chip Design Business Domain.....	5-19
5.7.4	Chip Fabrication Business Domain.....	5-20
5.8	CHECKERBOARD BUSINESS MODEL OF CHIP DESIGN.....	5-21
5.8.1	Tooling is One of Several Chip Design Checkerboard Discontinuities.....	5-23
5.8.2	A Net of Chip Design IP-Walls.....	5-23
5.8.3	Two opposite Checkerboard Trends.....	5-24
5.8.4	Business Opportunities Driven by Technology Trends.....	5-28

5.9	KEY IMPLICATIONS RELEVANT TO USE OF CHIP DESIGN TOOLS.....	5-30
5.9.1	Chip Fabricator Platforms Lower IP Barriers.....	5-34
6.	LARGE CONSUMER ELECTRONICS IC VENDOR— COMPANY “A”	6-1
6.1	EDA TOOL USER BUSINESS DESCRIPTION.....	6-1
6.1.1	Outsourcing of Vendor Support.....	6-2
6.2	CHIP DESIGN ENVIRONMENT DESCRIPTION AND TRENDS.....	6-2
6.2.1	Main Design Obstacles	6-3
6.2.2	Motivation behind Use of Non-Standard Languages	6-4
6.3	USER CRITERIA FOR SELECTING EDA VENDORS.....	6-4
6.4	WHAT ARE THE KEY ELEMENTS OF THE NEEDED EDA SOLUTION?.....	6-7
6.4.1	Non-Unix Tool Usability.....	6-7
6.5	WHAT VENDOR SUPPORT IS MOST VALUABLE?.....	6-8
6.6	BOARD-LEVEL DESIGN-IN SUPPORT FOR END-PRODUCT CUSTOMERS.....	6-9
6.7	SUMMARY FOR COMPANY “A”	6-9
6.7.1	Topic One: EDA Tool User Business Description	6-9
6.7.2	Topic Two: Chip Design Environment Description and Trends.....	6-10
6.7.3	Topic Three: User Criteria for Selecting EDA Vendors	6-11
6.7.4	Topic Four: What are Key Elements of the Needed EDA Solution?.....	6-11
6.7.5	Topic Five: What Vendor Support is Most Valuable?.....	6-12
6.7.6	Topic Six: Board-level Design-In Support for End-Product Customers.....	6-12
7.	LARGE COMMUNICATIONS IC VENDOR PART ONE: MACRO VIEW—	
	COMPANY “B”.....	7-1
7.1	EDA TOOL USER BUSINESS DESCRIPTION.....	7-1
7.2	CHIP DESIGN ENVIRONMENT DESCRIPTION AND TRENDS.....	7-2
7.3	USER CRITERIA FOR SELECTING EDA VENDORS.....	7-4
7.4	WHAT ARE KEY ELEMENTS OF THE NEEDED EDA SOLUTION?.....	7-6
7.5	WHAT VENDOR SUPPORT IS MOST VALUABLE?.....	7-6
7.6	BOARD-LEVEL DESIGN-IN PARTICIPATION WITH END-PRODUCT CUSTOMERS.....	7-6
7.7	SUMMARY FOR COMPANY “B”—PART ONE: MACRO VIEW	7-7
7.7.1	Topic 1: Business EDA Tool User Business Description.....	7-7
7.7.2	Topic 2: Chip Design Environment Description and Trends	7-8
7.7.3	Topic 3: User Criteria for Selecting EDA Vendors	7-9
7.7.4	Topic 4: What are Key Elements of the Needed EDA Solution?	7-9
7.7.5	Topic 5: What Vendor Support is Most Valuable?.....	7-10
7.7.6	Topic 6: Board-level Design-in Support for End-Product Customers.....	7-10
8.	LARGE COMMUNICATIONS IC VENDOR PART TWO: MICRO VIEW—	
	COMPANY “B”	8-1
8.1	EDA TOOL USER BUSINESS DESCRIPTION.....	8-1
8.2	CHIP DESIGN ENVIRONMENT DESCRIPTION AND TRENDS.....	8-3
8.3	USER CRITERIA FOR SELECTING EDA VENDORS.....	8-4
8.4	WHAT ARE KEY ELEMENTS OF THE NEEDED EDA SOLUTION?.....	8-6
8.5	WHAT VENDOR SUPPORT IS MOST VALUABLE?.....	8-7
8.6	BOARD-LEVEL DESIGN-IN SUPPORT FOR END-PRODUCT CUSTOMERS.....	8-8
8.7	SUMMARY OF COMPANY “B”—PART TWO: MICRO VIEW.....	8-8
8.7.1	Topic 1: EDA Tool User Business Description and Trends.....	8-8
8.7.3	Topic 3: User Criteria for Selecting EDA Vendors	8-10
8.7.4	Topic 4: What are Key Elements of the Needed EDA Solution?	8-10
8.7.5	Topic 5: What Vendor Support is Most Valuable?.....	8-11
8.7.6	Topic 6: Board-Level Design -In Support for End-Product Customers	8-12

9.	LARGE ELECTRONICS DISTRIBUTOR PART ONE: MICRO VIEW—COMPANY “C”	9-1
9.1	TOPIC 1: EDA TOOL USER BUSINESS DESCRIPTION.....	9-1
9.2	TOPIC 2: CHIP DESIGN ENVIRONMENT DESCRIPTION AND TRENDS.....	9-2
9.3	TOPIC 3: USER CRITERIA FOR SELECTING EDA VENDORS.....	9-3
9.4	TOPIC 4: KEY ELEMENTS OF THE NEEDED EDA SOLUTIONS.....	9-4
9.5	TOPIC 5: WHAT VENDOR SUPPORT IS MOST VALUABLE?.....	9-5
9.6	TOPIC 6: BOARD-LEVEL DESIGN-IN SUPPORT FOR END-PRODUCT CUSTOMERS.....	9-5
9.7	SUMMARY FOR COMPANY C: PART ONE—MICRO VIEW.....	9-5
9.7.1	Topic 1: EDA Tool User Business Description.....	9-5
9.7.2	Topic 2: Chip Design Environment Description and Trends.....	9-6
9.7.3	Topic 3: User Criteria for Selecting EDA Vendors.....	9-7
9.7.4	Topic 4: What are the Key Elements of the Needed EDA Solution?.....	9-7
9.7.5	Topic 5: What Vendor Support is Most Valuable?.....	9-7
9.7.6	Topic 6: Board-level Design -In Support for End-Product Customers.....	9-7
10.	LARGE ELECTRONICS DISTRIBUTOR PART TWO: MACRO VIEW—COMPANY “C”	10-1
10.1	TOPIC 1: EDA TOOL USER BUSINESS DESCRIPTION.....	10-1
10.2	TOPIC 2: CHIP DESIGN ENVIRONMENT DESCRIPTION AND TRENDS.....	10-1
10.3	TOPIC 3: USER CRITERIA FOR SELECTING EDA VENDORS.....	10-2
10.4	TOPIC 4: WHAT ARE THE KEY ELEMENTS OF THE NEEDED EDA SOLUTION?.....	10-3
10.5	TOPIC 5: WHAT VENDOR SUPPORT IS MOST VALUABLE?.....	10-3
10.6	TOPIC 6: BOARD-LEVEL DESIGN-IN SUPPORT FOR END-PRODUCT CUSTOMERS.....	10-4
10.7	SUMMARY OF COMPANY C: PART TWO—MACRO VIEW.....	10-4
11.	AN IDM AND DESIGN SERVICES VENDOR—COMPANY D	11-1
11.1	TOPIC 1: EDA TOOL USER BUSINESS DESCRIPTION.....	11-1
11.2	TOPIC 2: CHIP DESIGN ENVIRONMENT DESCRIPTION AND TRENDS.....	11-2
11.3	TOPIC 3: USER CRITERIA FOR SELECTING EDA VENDORS.....	11-3
11.4	TOPIC 4: WHAT ARE KEY ELEMENTS OF THE NEEDED EDA SOLUTION?.....	11-6
11.5	TOPIC 5: WHAT VENDOR SUPPORT IS MOST VALUABLE?.....	11-6
11.6	TOPIC 6: BOARD-LEVEL DESIGN-IN SUPPORT FOR END-PRODUCT CUSTOMERS.....	11-7
11.7	SUMMARY OF COMPANY “D”	11-7
11.7.1	Topic 1: EDA Tool User Business Description.....	11-7
11.7.2	Topic 2: Chip Design Environment Description and Trends.....	11-8
11.7.3	Topic 3: User Criteria for Selecting EDA Vendors.....	11-9
11.7.4	Topic 4: What are the Key Elements of the Needed EDA Solution?.....	11-9
11.7.5	Topic 5: What Vendor Support is Most Valuable?.....	11-10
11.7.6	Topic 6: Board-Level Design -In Support for End-Product Customers	11-10
12.	LARGE ANALOG IC VENDOR—COMPANY “E”	12-1
12.1	TOPIC 1: EDA TOOL USER BUSINESS PROFILE.....	12-1
12.2	TOPIC 2: CHIP DESIGN ENVIRONMENT DESCRIPTION AND TRENDS.....	12-2
12.3	TOPIC 3: USER CRITERIA FOR SELECTING EDA VENDORS.....	12-2
12.4	TOPIC 4: WHAT THE ARE KEY ELEMENTS OF THE NEEDED EDA SOLUTION?.....	12-4
12.5	TOPIC 5: WHAT VENDOR SUPPORT IS MOST VALUABLE?.....	12-5
12.6	TOPIC 6: BOARD-LEVEL DESIGN-IN SUPPORT FOR END-PRODUCT CUSTOMERS.....	12-6
12.7	SUMMARY OF COMPANY “E”	12-6

12.7.1	Topic 1: EDA Tool User Business Description.....	12-6
12.7.2	Topic 2: Chip Design Environment Description and Trends.....	12-6
12.7.3	Topic 3: User Criteria for Selecting EDA Vendors.....	12-7
12.7.4	Topic 4: What are the Key Elements of the Needed EDA Solution?.....	12-7
12.7.5	Topic 5: What Vendor Support is Most Valuable?.....	12-8
12.7.6	Topic 6: Board-Level Design -In Support for End-Product Customers.....	12-8
13.	ANALOG AND MICROCONTROLLER IC VENDOR COMPANY “F”	13-1
13.1	TOPIC 1: EDA TOOL USER BUSINESS DESCRIPTION.....	13-1
13.2	TOPIC 2: CHIP DESIGN ENVIRONMENT DESCRIPTION AND TRENDS.....	13-2
13.3	TOPIC 3: USER CRITERIA FOR SELECTING EDA VENDORS.....	13-4
13.4	TOPIC 4: WHAT ARE THE KEY ELEMENTS OF THE NEEDED EDA SOLUTION?.....	13-8
13.5	TOPIC 5: WHAT VENDOR SUPPORT IS MOST VALUABLE?.....	13-9
13.6	TOPIC 6: BOARD-LEVEL DESIGN-IN SUPPORT FOR END-PRODUCT CUSTOMERS.....	13-9
13.7	SUMMARY OF COMPANY “F”	13-10
13.7.1	Topic 1: EDA Tool User Business Description and Trends.....	13-10
13.7.2	Topic 2: Chip Design Environment Description and Trends.....	13-11
13.7.3	Topic 3: User Criteria for Selecting EDA Vendors.....	13-12
13.7.4	Topic 4: What are the Key Elements of the Needed EDA Solution?.....	13-13
13.7.5	Topic 5: What Vendor Support is Most Valuable?.....	13-13
13.7.6	Topic 6: Board-Level Design -In Support for End-Product Customers.....	13-13
14.	LARGE COMMUNICATIONS SYSTEM VENDOR PART ONE: MICRO VIEW—	
	COMPANY “G”.....	14-1
14.1	TOPIC 1: EDA TOOL USER BUSINESS DESCRIPTION.....	14-1
14.2	TOPIC 2: CHIP DESIGN ENVIRONMENT DESCRIPTION AND TRENDS.....	14-2
14.3	TOPIC 3: USER CRITERIA FOR SELECTING EDA VENDORS.....	14-3
14.4	TOPIC 4: WHAT ARE THE KEY ELEMENTS OF THE NEEDED EDA SOLUTION?.....	14-5
14.5	TOPIC 5: WHAT VENDOR SUPPORT IS MOST VALUABLE?.....	14-6
14.6	TOPIC 6: BOARD-LEVEL DESIGN-IN SUPPORT FOR END-PRODUCT CUSTOMERS.....	14-6
14.7	SUMMARY OF COMPANY “G”: PART ONE—MICRO VIEW.....	14-6
14.7.1	Topic 1: EDA Tool User Business Description and Trends.....	14-7
14.7.2	Topic 2: Chip Design Environment Description and Trends.....	14-7
14.7.3	Topic 3: User Criteria for Selecting EDA Vendors.....	14-8
14.7.4	Topic 4: What are the Key Elements of the Needed EDA Solution?.....	14-9
14.7.5	Topic 5: What Vendor Support is Most Valuable?.....	14-10
14.7.6	Topic 6: Board-Level Design -In Support for End-Product Customers.....	14-10
15.	LARGE COMMUNICATIONS SYSTEM VENDOR PART TWO: MACRO VIEW—	
	COMPANY “G”.....	15-1
15.1	TOPIC 1: EDA TOOL USER BUSINESS DESCRIPTION.....	15-1
15.2	TOPIC 2: CHIP DESIGN ENVIRONMENT DESCRIPTION AND TRENDS.....	15-2
15.3	TOPIC 3: USER CRITERIA IN SELECTING EDA VENDORS.....	15-3
15.4	TOPIC 4: WHAT ARE THE KEY ELEMENTS OF THE NEEDED EDA SOLUTION?.....	15-4
15.5	TOPIC 5: WHAT VENDOR SUPPORT IS MOST VALUABLE?.....	15-5
15.6	TOPIC 6: BOARD-LEVEL CHIP DESIGN-IN SUPPORT FOR END-PRODUCT CUSTOMERS.....	15-5
15.7	SUMMARY OF COMPANY G: PART TWO—MACRO VIEW.....	15-6
15.7.1	Topic 1: EDA Tool User Business Description.....	15-6
15.7.2	Topic 2: Chip Design Environment Description and Trends.....	15-7
15.7.3	Topic 3: User Criteria for Selecting EDA Vendors.....	15-7
15.7.4	Topic 4: What are the Key Elements of the Needed EDA Solution?.....	15-8

15.7.5	Topic 5: What Vendor Support is Most Valuable?.....	15-8
15.7.6	Topic 6: Board-Level Design -In Support for End-Product Customers	15-9

CHIP DESIGN STRATEGY

Overcoming Design Tool Issues

LIST OF FIGURES

2-1	Interview Guide: EDA Tool User Needs.....	2-6
3-3	Integrated Approach to Successful Chip Design Strategy.....	3-14
4-1	Interview Results Overview Table.....	4-39
5-1	IC Design Software Tools and Semiconductor Material Structure.....	5-4
5-2	Vertical Analog Versus Horizontal Digital Design Processes.....	5-5
5-3	Tooling Approaches for Dealing with the Tool—Design Discontinuity.....	5-11
5-4	Tooling Syndrome of Chip Design Business.....	5-17
5-5	Checkerboard Model of Chip Design Strategy.....	5-22
5-6	Checkerboard Contraction Strategy.....	5-26
5-7	Checkerboard Expansion Strategy.....	5-27
5-8	Checkerboard Platform Strategy.....	5-29
5-9	Design Tool Acquisition and Tooling—Focus of This Report.....	5-32
6-1	Ranking of User Needs—Company A.....	6-6
7-1	Ranking of User Needs—Company B—Part One: Macro View.....	7-5
8-1	Ranking of User Needs—Company B—Part Two: Micro View.....	8-6
9-1	Ranking of User Needs—Company C: Part One—Micro View.....	9-4
10-1	Ranking of User Needs—Company C: Part Two—Macro View.....	10-3
11-1	Ranking of User Needs—Company D.....	11-3
12-1	Ranking of User Needs—Company E.....	12-4
13-1	Ranking of User Needs—Company F.....	13-7
14-1	Ranking of User Needs—Company G.....	14-5
15-1	Ranking of User Needs—Company G/Part One—Macro View.....	15-4