



PQLI

Guide Series

Product Quality Lifecycle Implementation (PQLI®)
from Concept to Continual Improvement

Part 1 – Product Realization using Quality by Design (QbD): Concepts and Principles

including Overview, Criticality, Design Space, and Control Strategy

Pharmaceutical Development

QbD

Quality Risk Management
Design Space

CQA

Pharmaceutical Quality System

Control Strategy

CPP

PQLI



Product
Quality
Lifecycle
Implementation



Quality, Compliance Validation, Auditing



PSC provides quality compliance validation and auditing solutions in support of the product development life cycle.



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Preface

The global pharmaceutical industry and regulators are responding to the challenge of significantly improving the way drug development and manufacturing is managed. New concepts are being advanced and applied, including enhanced, quality by design approaches to product and process development and introduction into manufacturing with a focus on product and process understanding.

The international regulatory community has outlined their position on these new “Science- and Risk-Based Approach” concepts in the ICH Q8, Q9, Q10, and Q11 quality guidelines, where guidance is given on applying these concepts to drug substance and drug product across the entire drug life cycle.

Part 1 – Product Realization using Quality by Design (QbD): Concepts and Principles provides an overview as an introduction to and a summary of the Guide Series, and elaborates on the concepts of criticality, design space, and control strategy as introduced in ICH Q8, Q9, Q10, and Q11. How these concepts are applied during development and in manufacturing is discussed and exemplified.

Benefits of using enhanced, quality by design approaches are also discussed.

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Each Topic in Part 1 was produced by an individual Task Team led by Chris Sinko, Roger Nosal, John Lepore, and Line Lundsberg-Nielsen. The work was supported by the ISPE PQLI Technical Committee.

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Table of Contents

Topic I Overview of Product Realization

1	Introduction	11
1.1	Objective	11
1.2	Scope	12
1.3	Benefits	12
2	Structure of the Guide Series, Product Quality Lifecycle Implementation from Concept to Continual Improvement	15
3	Product Realization using QbD	17
3.1	Quality Target Product Profile	20
3.2	Product and Process Outline	22
3.3	Prior Knowledge	23
3.4	Product Critical Quality Attributes	23
3.5	Product and Process Development	25
3.6	Design Space	32
3.7	Control Strategy	36
4	Continual Improvement	39
5	Benefits of using QbD in Development	41
5.1	Making Development More Efficient	41
5.2	Improving Manufacturing Efficiency	42
5.3	Proposing Regulatory Flexibility	43
5.4	Business Strategy	43
5.5	Environment	44

Topic II Criticality

6	Introduction	47
6.1	Overview	47
6.2	Objective	47
6.3	Scope	47
6.4	Benefits	47
6.5	Key Concepts	48
6.6	Structure of This Topic	48
7	Assignment of Criticality	51
7.1	Background	51
7.2	Use of Quality Risk Management in Assignment of Criticality	55
7.3	Approaches to Assigning Critical Quality Attributes and Critical Process Parameters	59
8	Use of Criticality throughout the Product Lifecycle	71
8.1	Use of Criticality for Process Validation	71
9	Examples of Criteria to Assess Severity	73
9.1	Example of Severity Scale Showing Impact on the Patient	73
9.2	Examples of Severity Scales Showing Impact on Product Quality	74

10 Examples of Criteria to Assess Probability..... 75
11 Examples of Criteria to Assess Detectability..... 77
12 Examples of Target Product Profile and Quality Target Product Profile 79

Topic III Design Space

13 Introduction..... 83
13.1 Overview 83
13.2 Objectives 83
13.3 Scope 83
13.4 Benefits 83
13.5 Key Concepts..... 85
13.6 Structure of This Topic 88

14 Development of Design Space 89
14.1 Introduction 89
14.2 Objective 91
14.3 Scope of Design Space Development 92
14.4 Risk Assessment Procedures 93
14.5 Experiment Design..... 98
14.6 Modeling and Presentation of Design Space 99
14.7 Design Space Confirmation and Scale Considerations 106

15 Design Space Updating/Continual Improvement..... 107
15.1 Capability Analysis 107

16 Relationship of Design Space to Control Strategy..... 109

17 Examples 111
17.1 Example 1 111
17.2 Example 2 112
17.3 Example 3 113
17.4 Example 4 115
17.5 Example 5 116
17.6 Example 6 120
17.7 Example 7 120
17.8 Example 8 121
17.9 Example 9 123
17.10 Example 10 124

Topic IV Control Strategy

18 Introduction..... 127
18.1 Overview 127
18.2 Objectives 128
18.3 Scope 128
18.4 Benefits 128
18.5 Key Concepts..... 129
18.6 Structure of this Topic 130

19	Lifecycle Approach to Control Strategy	131
19.1	Control Strategy throughout the Drug Product Lifecycle.....	131
20	Control Strategy Options	137
20.1	When to Start Developing and Defining the Control Strategy.....	137
20.2	Factors Influencing the Selection of Control Strategy.....	138
20.3	Control Strategy and Continual Improvement over the Product Lifecycle	141
21	Implementation of the Control Strategy into Manufacturing.....	143
21.1	The Link between Design Space and Control Strategy	143
21.2	Implementation of Control Strategy	143
21.3	Manufacturing/Site Capabilities	146
21.4	Documentation of the Control Strategy.....	149
22	Process Analytical Technology and Real Time Release Testing in Manufacturing..	151
22.1	Process Analytical Technology in Manufacturing	151
22.2	Real Time Release Testing and Control Strategy for Solid Dose Manufacturing.....	151
22.3	Sampling and Acceptance Criteria.....	153
22.4	Maintaining Control if Failure of PAT Systems.....	155
22.5	Validation/Verification of PAT Analytical Tools for RTRT	156
22.6	Process Monitoring	156
23	Control Strategy and Process Validation	159
23.1	Link Between Enhanced, QbD Approach to Control Strategy and the Lifecycle of Process Validation ...	159
23.2	Continued Process Verification	163
23.3	Verification of the Control Strategy	163
24	Examples	165
24.1	Example 1: Establishing a Control Strategy Meeting Business Objectives	165
24.2	Example 2: Establishing a Control Strategy using PAT and Meeting Business Objectives	167
24.3	Example 3: Interaction between Drug Substance and Drug Product for Continual Improvement	167
24.4	Example 4: Interaction between Drug Product and Excipients for Continual Improvement.....	169

Appendices

25	Appendix 1 – References	175
25.1	References.....	175
25.2	Further Reading.....	177
26	Appendix 2 – Glossary	179
26.1	Acronyms	179
26.2	Definitions	180



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Topic I

Overview of Product Realization

1 Introduction

This is an overview of the ISPE Guide Series: Product Quality Lifecycle Implementation (PQLI) from Concept to Continual Improvement, which is an output from ISPE Product Quality Lifecycle Implementation (PQLI®) program. It is an introduction to and an overview of the Guide Series. Product realization is the achievement of a product with the quality attributes appropriate to meet the needs of patients, health care professionals, regulatory authorities (including compliance with marketing authorization), and internal customers' requirements.

This Overview and the subsequent ISPE PQLI Guide Series address product and process development, transfer to, and establishment of, commercial manufacture and continual improvement using science- and risk-based (i.e., enhanced, Quality by Design (QbD)) approaches. The Series considers how technical activities in the product lifecycle operate under a pharmaceutical quality system.

In Part 1, Product Realization using QbD: Concepts and Principles, in addition to Topic I Overview, the following topics are addressed:

- Criticality
- Design Space
- Control Strategy

In Part 2, Product Realization using QbD: Illustrative Example, there is description of an example of application of the enhanced, quality by design approach to product realization. It shows the development and introduction into manufacturing of a small molecule formulation and associated manufacturing process, and part of the drug substance synthetic route using enhanced, quality by design approaches.

The Guide Series uses ICH Guidelines Q8(R2), Pharmaceutical Development; Q9, Quality Risk Management; Q10, Pharmaceutical Quality System, and Q11, Step 2, Development and Manufacture of Drug Substances, as a basis, together with other relevant ICH Guidelines, Questions and Answers and Points to Consider (References 1, 6, 7, 8, and 15, Appendix 1).

1.1 Objective

The objective of this Guide Series is to provide “how to” guidance when implementing technical activities using the science- and risk-based approach throughout the product lifecycle.

Part 1, Product Realization using QbD: Concepts and Principles and Part 2, Product Realization using QbD: Illustrative Example provide a range of “how to” tools for practitioners developing products and their manufacturing processes using the enhanced, Quality by Design (QbD) approach described in ICH Guideline, Q8(R2) (Reference 1, Appendix 1). These give more insight than is given in the ICH Guidelines, and include more explanation and examples of individual topics, such as criticality as applied for example to critical quality attributes and critical process parameters, design space and control strategy.

Part 1 and Part 2 of the ISPE PQLI Guide Series discuss the application of science, prior knowledge, and iterative use of quality risk management, as well as some of the underpinning processes and technologies, such as design of experiments, multivariate analysis, use of process analyzers, and process modeling.