ISO/TR 16355-9:2026-06 (E)

Applications of statistical and related methods to new technology and product development process - Part 9: Unified case study applying QFD to hardware, service, software, and hybrid products

Contents

Page

Foreword ..... **vi**

Introduction ..... **vii**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Basic concepts of QFD **1**

5 Integration of VOC and VOS analysis and product development methods **1**
5.1 QFD support for product development methods 1
5.2 Flow of product development with VOC and VOS analysis 2
5.2.1 Organization of the VOC and VOS analysis 2
5.2.2 Outline of VOC and VOS analysis 2

6 Types of QFD projects **3**

7 QFD team membership **4**
7.1 QFD recommends the use of cross-functional teams 4
7.2 Core team membership 4
7.3 Subject matter experts 4
7.4 QFD team leadership 4

8 Seven management and planning tools **4**

9 New technology and product development voices **4**
9.1 Voice of business 4
9.1.1 General 4
9.1.2 Strategic planning 5
9.2 Voice of project 12
9.2.1 General 12
9.2.2 Identify projects 12
9.2.3 Prioritize and select projects 14

10 Voice of customer (VOC) **21**
10.1 Identify customers 21
10.1.1 Identify customer characteristics 21
10.1.2 Identify customer applications or modes of use 22
10.1.3 Other methods for identifying customers and stakeholders 23
10.2 Prioritize and select customer segments 23
10.3 Acquire VOC 25
10.3.1 General 25
10.3.2 *Gemba* visit checklist 26
10.3.3 Customer process model 27
10.3.4 *Gemba* visit table 29
10.3.5 *Gemba* visit log 32
10.3.6 What customers think 32
10.3.7 Other sources of VOC 35
10.4 Analyze voice of customer (VOC) 36
10.4.1 General 36
10.4.2 Benefits of VOC analysis 36
10.4.3 Information contained in VOC 37

10.4.4 Translate VOC into customer needs ... 40
10.4.5 Structure customer needs ... 44
10.4.6 Prioritize customer needs ... 46
10.4.7 Customer needs quantification and plan ... 49
10.4.8 Gemba visit guide ... 53
10.5 Deploying solutions ... 53

11 Blitz QFD® ... 54
11.1 General ... 54
11.2 Effect-to-cause wishbone diagram ... 54
11.3 Maximum value table (MVT) for service ... 54
11.4 Maximum value table (MVT) for bagel ... 55
11.5 Maximum value table (MVT) for toaster ... 56
11.6 Maximum value table (MVT) for information systems ... 57

12 Comprehensive QFD ... 57
12.1 General ... 57
12.2 Comprehensive QFD deployments ... 59

13 Comprehensive service QFD matrices ... 59
13.1 General ... 59
13.2 Customer phase quality deployment ... 60
13.2.1 Customer needs-service requirements matrix (house of quality) ... 60
13.2.2 Customer phase cost deployment ... 68
13.3 Customer phase function deployment ... 70
13.3.1 Function tree ... 70
13.3.2 Customer needs-functions matrix (proportional distribution) ... 71
13.4 Customer phase reliability deployment ... 72
13.4.1 General ... 72
13.4.2 Failure mode affinity diagram ... 72
13.4.3 Failure mode hierarchy diagram or fault tree ... 72
13.4.4 Customer needs-failure modes matrix ... 73
13.4.5 Design failure mode and effects analysis (DFMEA) ... 74
13.5 System and subsystem phase deployments ... 75
13.5.1 System phase technology deployment ... 75
13.5.2 Subsystem phase deployments ... 79

14 Comprehensive processed, chemical, and food product QFD matrices ... 81
14.1 General ... 81
14.2 Customer phase quality deployment ... 81
14.2.1 General ... 81
14.2.2 Customer needs-bagel characteristics matrix (house of quality) ... 81
14.3 System phase intermediate batch deployment ... 82
14.3.1 General ... 82
14.3.2 System phase bagel characteristics - dough characteristics matrix ... 82
14.4 Component phase recipe deployment ... 83
14.4.1 General ... 83
14.4.2 Component phase dough characteristics - ingredients matrix ... 83
14.4.3 Component phase robust design ... 84
14.5 Preproduction phase manufacturing process deployment ... 85
14.5.1 General ... 85
14.5.2 Dough characteristics – manufacturing process matrix ... 85
14.6 Preproduction quality control ... 85
14.7 Final processed product specifications ... 86
14.8 Preproduction phase on-site service operations deployment ... 87
14.8.1 General ... 87
14.8.2 Finished bagel characteristics - final baking matrix ... 87
14.9 Preproduction phase standard operating procedures ... 87
14.10 Other operations ... 88

15 Comprehensive assembled or manufactured product QFD matrices ... 89
15.1 General ... 89
15.2 Customer phase quality deployment ... 89
15.2.1 General ... 89
15.2.2 Customer needs-toaster characteristics matrix (house of quality) ... 89
15.3 Component phase deployments ... 90
15.3.1 General ... 90
15.3.2 Component phase functional requirements – component parts matrix ... 91

15.3.3 Component phase quality assurance (QA) table ... 91
15.4 Preproduction manufacturing and assembly phase deployments ... 92
15.4.1 General ... 92
15.4.2 Preproduction phase components – manufacturing operations matrix ... 92
15.4.3 Preproduction phase components testing ... 92
15.4.4 Preproduction phase quality control (QC) process planning ... 93
15.4.5 Preproduction phase quality control (QC) table for component assembly ... 94
16 Comprehensive information, software, and digitalized products QFD matrices ... 95
16.1 General ... 95
16.2 Software QFD with agile development ... 95
16.3 Customer phase quality deployment ... 96
16.3.1 General ... 96
16.3.2 Customer needs-information systems functional requirements matrix (house of quality) ... 96
16.4 Component phase deployment ... 97
16.4.1 General ... 97
16.4.2 Non-functional requirements ... 97
16.5 Production phase ... 97
16.5.1 General ... 97
16.5.2 Functional requirements-testing matrix ... 98
16.5.3 Potentially shippable product ... 98
17 Project results and next steps ... 98
17.1 Customer satisfaction and sales ... 98
17.2 Next projects ... 99
18 Quality assurance network diagram ... 99
Bibliography ... 102