QUALITY MANUAL

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LETTER FROM OUR CEO

At Intel, we are committed to delivering the world-class quality products, services, and technologies that our customers expect. We deliver what they rely on for their next-generation innovations, and we enthusiastically embrace this responsibility.

This relentless commitment to quality is integrated throughout our strategic priorities—product leadership, open platforms, and manufacturing at scale. We challenge ourselves to flawlessly execute to our commitments, to passionately innovate with speed and boldness, and to lead in every category we compete in. We also strive to create a nurturing and inclusive culture to attract and grow the best engineers and technologists on the planet.

Intel brings with it an unmatched global breadth of intelligent silicon, platform, software, architecture, design, and manufacturing, enabling us to uniquely meet our customers' pace of innovation.

We believe that quality is a pervasive value that should drive our customers' experience. Together with our customers, we can enrich the lives of every person on Earth.

Pat Gelsinger

QUALITY POLICY

We passionately believe that quality is fundamental, and that:

- Our customers come first. We listen and collaborate to deliver world-class quality and an outstanding customer experience.

- We build safety, security, reliability, compliance, and quality into our products, technologies, services, and throughout our company.

- We deliver innovative products that support and enable data integrity, system availability, and configurability for our expanding digital and connected world.

- Our employees embody a quality discipline and holistically drive continuous improvement, prevention, and closed-loop learning.

Chief Executive Officer   _Vice President, Corporate Quality Network_

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INTRODUCTION

Intel invents at the boundaries of technology to make amazing experiences possible for business, society, and for every person on Earth. As Intel and our customers usher in the data-centric era, the integrity of our products matters more than ever. Customers rely on our products to deliver energy efficient performance to collect, store and manage vast swaths of personal and business information for mission critical purposes. In this new era, trust is everything.

Intel is committed to relentlessly deliver platforms and technology advancements that people can trust to enhance the way we work and live. We are obsessed with meeting customer needs for our products and delivering quality worthy of our customers' trust.

We are proud of our decades of innovation to bring customers products with leadership in technology and performance. We recognize that our work in quality is never done. We prioritize prevention and when a problem arises, we take action to resolve it in close collaboration with our stakeholders. Together with our partners and customers, we are continually learning and building the foundation for computing in a data-centric world.

Intel's Quality Management System (QMS) is a rigorous framework for managing the activities used to develop and deliver products to satisfy customer and stakeholder needs. Our QMS is how we achieve and sustain quality outcomes. This quality manual document describes our QMS.

INTEL QMS
- Customer Obsessed
- Quality Built In
- Measured and Improving
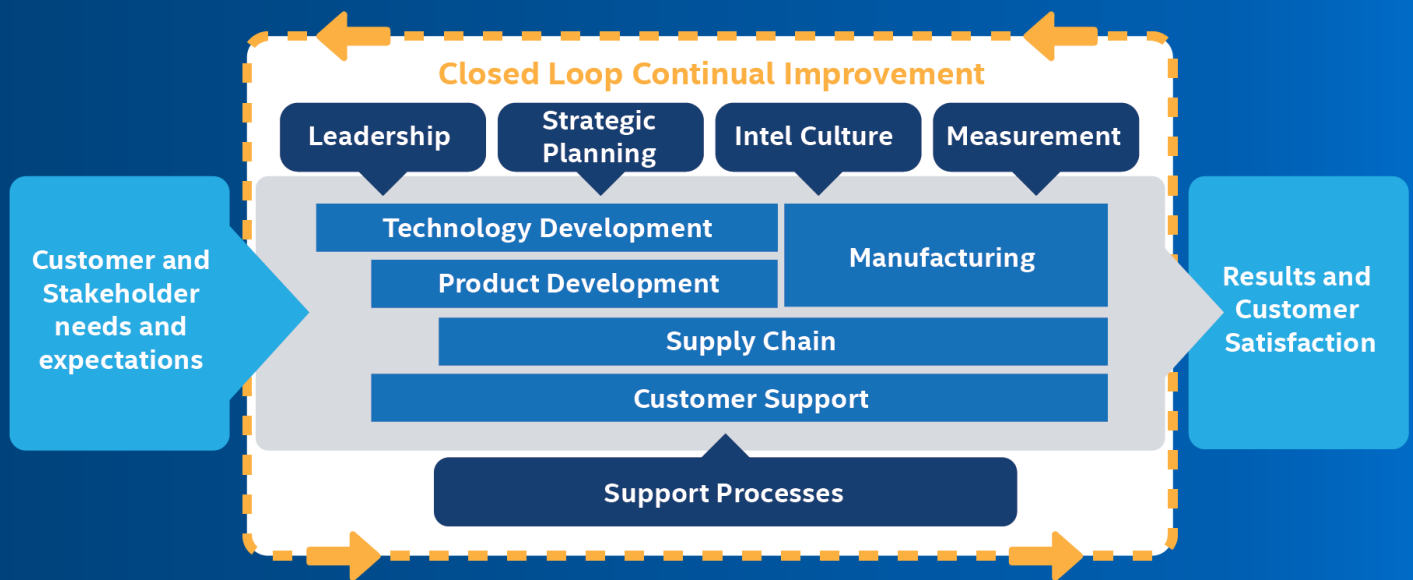
QUALITY MANAGEMENT SYSTEM

Intel's Quality Management System is our foundation for customer satisfaction and continual improvement.

Our system includes 5 major processes that work together to deliver industry leading products, quality outcomes for our customers, and business success. These processes are briefly described in the following pages.
- Product development
- Technology development
- Manufacturing
- Supply chain
- Customer support

Intel leadership is committed to build quality and continual improvement into our work processes at all levels of our company. Quality is one of Intel's 7 core values. We strive to achieve the highest standards of excellence; do the right things right; continuously learn, develop, and improve; and take pride in our work.

PRODUCT DEVELOPMENT

Intel develops products to support many market segments, from silicon products such as CPUs and FPGAs to boards, systems, and software products. Our process to develop products follows our Unified Product Lifecycle (UPLC), defined in five distinct phases. To move from one phase to the next, acceptance criteria must be met, and management approval secured. The UPLC phases include:
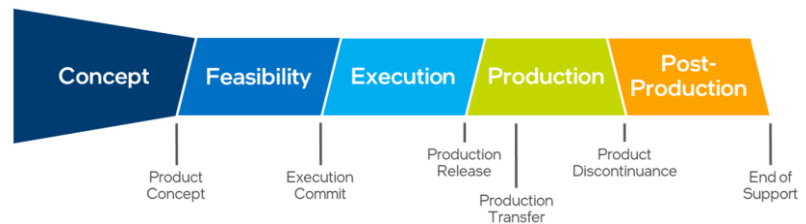
- **Concept:** incorporates input and evaluates a product opportunity to determine whether to commit the company to proceed
- **Feasibility:** product/platform definition enables quality planning and POR, enabling the organization to commit funding and resources
- **Execution:** product/platform is developed to meet requirements and resolve noncompliances, which may involve multiple pre-production release with requirements continually assessed
- **Production:** manufacturing, sales, and service activities are provided to support full product availability across targeted markets
- **Post-Production:** customer support is provided for products until eventual discontinuance

The product lifecycle includes understanding customer needs, designing, developing, testing, validating and qualifying products. Product qualification demonstrates that the product meets requirements. Typical qualification criteria include testability, manufacturability, reliability, stability, security, performance, responsiveness, features, safety, compliance and other product requirements. Although products cannot be completely free from the risk of logic bugs or processor errors, the product qualification process is used to measure, reduce and mitigate risk.

Learning from products are fed back into the product lifecycle systems to improve execution, expose future risks and issues, and enable proactive mitigation.

TECHNOLOGY DEVELOPMENT

Technology Development Lifecycle

Technology Development is the process for developing new wafer fabrication, package, assembly, test, and board manufacturing processes. Technology development at Intel follows a cycle defined in four distinct phases: Pathfinding, Definition, Development, and Deployment. Technology certification demonstrates the quality and reliability of the technology and ensures that interactions between technologies (for example, between a silicon technology and a packaging technology) are understood. The Technology Certification milestone occurs between the development and deployment phases.

Pathfinding	Definition	Development	Deployment
Exploring Options	Selecting Options	Establishing & Characterizing the Process	Ramping Production & Monitoring Performance

Technology Development Lifecycle

Technology Certification

In the Development phase of a new Technology, the development site establishes an initial process flow. The flow is characterized and the findings are used to refine and optimize the process to meet the technology target specifications. A detailed reliability certification plan is defined based on known or anticipated failure mechanisms. Quality and reliability characterization are an integral part of this iterative process; key learning are fed back to the Technology Development team for process optimization. When a technology meets the yield, manufacturability, quality, reliability, and other performance goals on a test vehicle and lead product, the technology is certified and moves into Deployment.

MANUFACTURING

The Manufacturing Quality System encompasses Intel products from silicon and components to boards and modules. To deliver products efficiently that meet Intel's customer expectations, Intel's manufacturing organization transfers proven quality system fundamentals into each business area.

Copy Exactly

Fab, Sort and Assembly Test manufacturing organizations call this our Copy Exactly methodology. Copying the embedded learning from the development site is the key to minimizing output loss with process transfer, and enables consistent product regardless of manufacturing site. Intel performs continuous matching over time by using coordinated changes, audits, process control systems, and joint management structures.

Intel Wafer Fabrication and Assembly and Test sites, Post Sales Support, Intel Stress Labs, and Intel Programmable Solutions Group are registered to the ISO 9001 standard by a third-party registrar. See Intel [ISO 9001 certificates.](#)

Quality Monitoring

During manufacturing, product quality is continuously monitored to detect, isolate and resolve manufacturability issues as well as detect and quarantine potentially non-conforming product resulting from manufacturing issues.   When non-conforming product is dispositioned, learning and preventive actions are completed or transferred to an organization/owner and monitored to assure the permanent solution is effective.

Our Manufacturing sites focus on issue prevention, detection, and containment. This focus is reinforced with assessments and audits of business processes and quality culture. The best-known methods captured through these assessments are shared.

Change Management

Change management begins in our development processes and continues after release of products to customers.

Traceability

All hardware products are assigned product identifiers to aid in traceability. Intel's product traceability system is used to trace ingredients that went into the creation of the product including materials, hardware, software and Intellectual Property (IP). The product traceability system enables product identification and tracking throughout manufacturing and storage using unit-level, lot level, or other identifiers that allow forward and reverse traceability of products.

Equipment Maintenance and Calibration

Intel maintains a maintenance system for all process equipment. For each equipment type, spare parts are identified and stocked, and sufficient resources and skills are provided for equipment and facility maintenance.

Intel's calibration program ensures the measurement capability of any instrument that provides quantitative or qualitative data on Intel products, including equipment used in manufacturing.

Product Preservation

During the manufacturing of the product until the delivery to customers, the product is carefully handled, packaged, stored, and protected in accordance with industry best practices and standards. Preservation includes coverage of steps such as identification, handling, baking, packaging, storing, and delivery precautions. These requirements also include security actions to prevent tampering or other unauthorized modification to products. Requirements are additionally enforced at suppliers' sites.
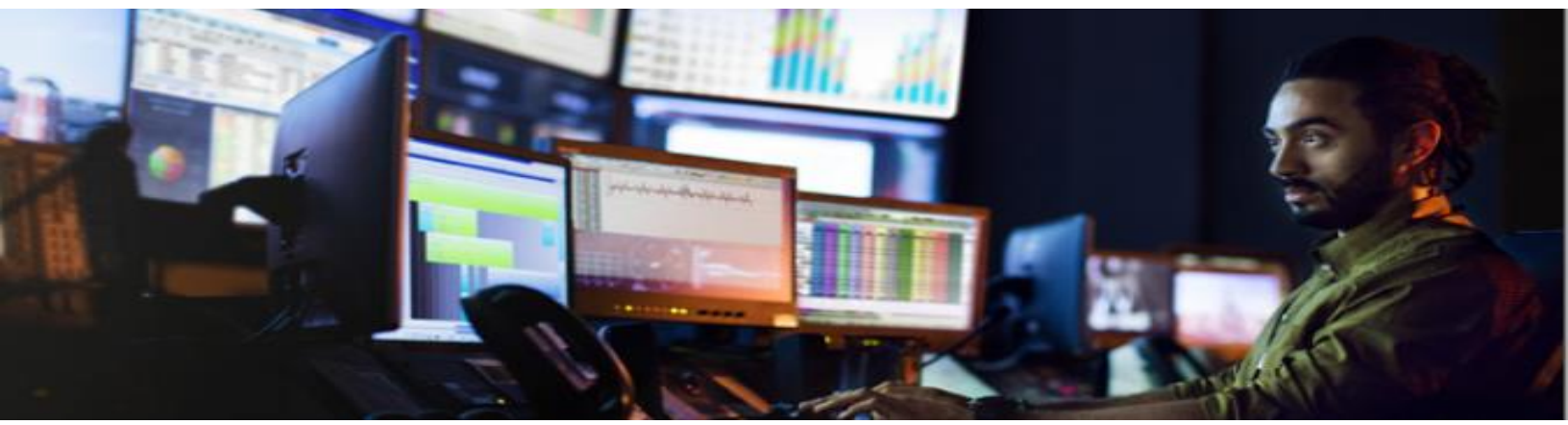
SUPPLY CHAIN MANAGEMENT

Planning & Logistics

Intel's planning and logistics processes work to deliver quality service, better time to market, and reduced cost for our customers and Intel. The management of supply strategy, global transportation, warehousing, and reverse logistics are evaluated for success through the Order Fulfillment Quality (OFQ) program. The OFQ manages the delivery of Intel products and services to be complete, on time, and in agreed upon condition to meet customer expectations.

Supplier Quality Management Framework

Intel uses a rigorous and holistic framework for supplier quality management, called the Quality Operating System (QOS), to manage supplier and material quality. QOS is a standard set of processes, methods & specifications, tools and training used to execute our supply-chain quality strategies. This ensures predictable, consistent and repeatable quality from our suppliers and support services. Our QOS framework incorporates four distinct modules which include Supplier Selection & Development, Supplier & Materials Qualification, Supplier Process Control & Excursion Management, and Supplier Continuous Quality Improvement.

Suppliers are audited against our rigorous expectations and once qualified, are included on our approved vendor lists. Suppliers managed by the QOS framework, methods and tools consistently deliver products and services that meet and/or exceed the Intel expectations and have a competitive advantage in the industry.

CUSTOMER SUPPORT

Customer Quality Support

Customer support teams proactively engage prospective customers and support customers when issues arise. During the early exploration and planning phase, Intel focuses on soliciting and making sense of customer requirements and expectations. During the development phase, Intel's sales, applications and engineering teams proactively engage prospective customers to design Intel's products into customer systems, platforms and solutions. Some customers participate in co-validation and others may require product customization. Once a product is launched, customers can access Intel via various support channels for inquiries, documentation and issue support.

Product Safety & Regulatory

We protect people, property, and the environment through world-class product regulatory practices. Intel is committed to the safety of its employees, customers, and anyone who encounters our products. Our product design teams incorporate regulatory and safety compliance into the product regulatory lifecycle to ensure that we deliver the highest quality products to our customers and consumers. All safety and regulatory concerns and incidents are handled by Intel's Product Safety and Regulatory Council, which oversees investigations and escalates high risk matters to a Problem Response Team. The council ensures continuous improvement through education of and engagement with all employees about best practices.

Product Change Notification

Our customers will receive a Product Change Notification (PCN) to communicate product changes. Intel will follow the PCN rules regarding information, documentation, and qualification as defined by standards and guidelines for customer notifications of product and/or process changes where needed. More information can be found at [Product Change Notification](#).

For firmware/software, Intel releases changes to customers through Intel's designated portal or in some cases through the open source community. Release Notes are used to document the changes in the firmware/software which is a standard procedure in the software community.

CORPORATE PROCESSES

Business Objectives

Intel's executive management sets Annual Performance Goals, based on previous company performance, customer needs and competitive positioning. Progress to these goals are tracked and organizations are held accountable.

Risk Management

Intel seeks to consider all risks which could impact Intel's business and our customers. Intel assesses risk from many sources, including external scans, retrospectives, audits, customer feedback, and performance indicators. Intel identifies controls to prevent, detect, and if necessary, mitigate the impacts of realized risks.

Responding to Issues

Intel executive management directs action for resolution of high-impact customer issues. A well-established process is used to drive resolution to issues and communicate with customers.

Business Continuity

As a global corporation with locations and suppliers all over the world, Intel requires organizations to create, maintain and regularly test business continuity plans for all its sites, facilities, and operations. In the event of a disruption, our business continuity plans are designed to enable us to continue critical business functions. For more information, visit [Business Continuity Practices](#).

Quality Records and Documentation

Intel has an extensive system for managing documented information using document control and engineering change control. Intel maintains quality records that demonstrate the effectiveness of our quality system and achievement of required quality standards.

CONCLUSION

Intel understands that quality is critically important to our customers and we are committed to delivering quality worthy of our customer's trust.

Intel uses a Quality Management System to prevent problems, deliver with predictability, and to drive organizational learning and continual improvement.

Earning our customers' trust requires listening to customers, collaborating transparently, and delivering with predictability and accountability. Each day presents us with new opportunities and challenges to maintain this trusted relationship amid a rapidly evolving and increasingly data-centric world. Together with our partners and customers, Intel is building the trusted foundation for computing in a data-centric world.

Whether you are a customer, supplier, partner, or Intel employee - thank you for your commitment to quality, for sharing your insights, and for participating in our ongoing journey to improve our QMS.
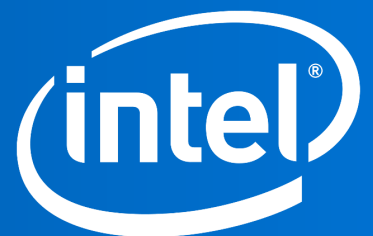
For additional information, explore these links.

[Intel Quality](#)

[Intel Customer Support](#)

[Product Information](#)

[Declaration of Conformity](#)

[Material Declaration Data Sheet](#)

Acronyms

AVL	Approved Vendor List
CE	Copy Exactly
DoC	Declaration of Conformity
IATF	International Automobile Task Force
IP	Intellectual Property
ISO	International Organization of Standards
ISTA	International Safe Transit Association
JEDEC	Joint Electron Device Engineering Council
MDDS	Material Declaration Date Sheet
ODM	Original Device Manufacture
OFQ	Order Fulfillment Quality
PCN	Product Change Notification
PLC	Product Life Cycle
POR	Plan of Record
QOS	Quality Operating System
QMS	Quality Management System
SCQI	Supplier Continuous Quality Improvement
SDL	Security Development Lifecycle

REVISION HISTORY

Date	Revision	Notes
December 2021	13	Reinstate; Letter from CEO added, Quality Policy updated, and Product Development section on Page 8 updated to move from PLC to UPLC language
June 2021	12	Expired – SNAP dB
May 2021	11	Owner Change
June 2020	11	Reinstate with FGL Change; Full rewrite of all sections of the manual.
June 2019	10	Expired – SNAP dB
June 2018	9	Minor typos; Owner/FGL Change
May 2018	8	Full manual rewrite to address ISO 9001:2015, and uploaded to SNAP
This document was previously managed outside of SNAP		
April 2014	7.0	Reformatted for Intel Clear Font, new cover layout
December 2013	6.0	Chapter 1 - Removed reference to previous CEO, Paul S Otellini
June 2011	5.0	Minor edits within all chapters. Reformatted.
December 2009	4.0	Chapter 3- Consolidated and reorganized content Chapter 4 –Rewrite of PRQ Report Milestone paragraph, Section 4.3.4 Chapter 5 – Global replacement of the term Platform with Modules; Revised Figure 5.4 Chapter 7 – Rewrite of section 7.2.1; Revised section 7.2.5; Modified figure 7-1
September 2008	3.0	Added 48/14 content, completed other minor edits
August 2006	2.0	Updated corporate mission, modified section 7.2.3, revised typography and graphics, completed other minor edits.
November 2005	1.0	Released