Trustworthy Systems Manifesto
Executive Policy Governing Cyber Risk to the Mission and Business

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CISQ
Consortium for IT Software Quality

International Standards for Automating Software Size and Structural Quality Measurement

TRUSTWORTHY SYSTEMS MANIFESTO

We hold these truths to be self-evident
In summary, the cost of poor-quality software in the US in 2018 is approximately $2.84 trillion.
Responsibility Has Shifted Above IT / Engineering

Board of Directors
CEO, COO, CFO
Business VPs
Corporate Auditors
CIO

Governance
Risk management
Business Continuity
Brand protection
Product liability

Evaluate System Risk with CISQ Measures

9-Digit Glitches

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What Is CISQ?

CISQ is chartered to specify measures of software size and quality that can be automated from source code, and promote them through OMG and other international standards organizations.

Co-founders

Paul Nielsen

Richard Soley

CISQ Sponsors

CISQ Partners

Carnegie Mellon Software Engineering Institute

OMG Special Interest Group

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Deploying CISQ Measures

CISQ measures → OMG standards → ISO standards

Federal IT Policy

Corporate IT Policy

Regulations
Sec. & Exch. Com.
State of Texas

System acquisition
US State Dept.
Gen. Serv. Admin.

Third party Contracts

Benchmarks
Current Focus Is on Developers, Not Enterprises

Manifesto for Agile Software Development

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

- **Individuals and interactions** over processes and tools
- **Working software** over comprehensive documentation
- **Customer collaboration** over contract negotiation
- **Responding to change** over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

The Rugged Manifesto

I am rugged and, more importantly, my code is rugged.
I recognize that software has become a foundation of our modern world.
I recognize the awesome responsibility that comes with this foundational role.
I recognize that my code will be used in ways I cannot anticipate, in ways it was not designed, and for longer than it was ever intended.
I recognize that my code will be attacked by talented and persistent adversaries who threaten our physical, economic and national security.

I recognize these things – and I choose to be rugged.

I am rugged because I refuse to be a source of vulnerability or weakness.
I am rugged because I assure my code will support its mission.
I am rugged because my code can face these challenges and persist in spite of them.
I am rugged, not because it is easy, but because it is necessary and I am up for the challenge.
Modern Apps Are a Technology Stack

1. **Unit Level**
   - Code style & layout
   - Expression complexity
   - Code documentation
   - Class or program design
   - Basic coding standards
   - Developer level

2. **Technology Level**
   - Single language/technology layer
   - Intra-technology architecture
   - Intra-layer dependencies
   - Inter-program invocation
   - Security vulnerabilities
   - Development team level

3. **System Level**
   - Multiple languages
   - Architectural compliance
   - Risk propagation
   - Application security
   - Resiliency checks
   - Transaction integrity
   - Function points
   - Integration quality
   - Data access control
   - SDK versioning
   - Calibration across technologies
   - IT organization level
Need for a New Manifesto

Existing manifestos

- focused on individuals (and teams), not organizations
- under-emphasized quality and operational risk
- were more about coding than software engineering
- failed to represent management’s responsibilities
- did not create dialogue among responsible parties

Executives own the risk, but are not tech experts

Executives need guidance on how to reduce risk and policies to apply in IT/Eng
Trustworthy Systems Manifesto

1. Engineering discipline in product and process
2. Quality assurance to risk tolerance thresholds
3. Traceable properties of system components
4. Proactive defense of the system and its data
5. Resilient and safe operations
1 — The principles and practices of software engineering must predominate other considerations in developing software-intensive systems

2 — Trustworthy systems do not emerge from haphazard development and deployment processes

3 — The shorter the time, the greater the need for process discipline

4 — Developers and operators must be supplemented by automated technologies that can reduce complexity and improve their visibility into systems and operations

5 — Organizations must ensure that developers have the knowledge and skills needed to build and deploy trustworthy systems.
2 — Quality Assurance to Risk Tolerance Thresholds

TRUSTWORTHY SYSTEMS MANIFESTO

1 — Executives must determine the risk that can be tolerated from each business or mission critical system

2 — Quality assurance must ensure the system operates within risk tolerance thresholds

3 — Executives must establish policy that critical systems have evidence they can perform within risk thresholds before being released to operations

4 — Executives must enforce that time be devoted to remediating high priority defects
Developing modern software-intensive systems requires managing a supply chain of component sources.

Evidence of provenance and trustworthiness should be carried forward with components and shared across the supply chain.
4 — Proactive Defense of the System and Its Data

TRUSTWORTHY SYSTEMS MANIFESTO

We hold these truths to be self-evident

1 — Protection of the system and its data from malicious actors requires several layers of defense

2 — System behavior should be continuously monitored to detect suspicious actions and data movements

3 — Track and patch known vulnerabilities

4 — Security practices must also cover the behavior of authorized system users to ensure system defenses are not circumvented
5 — Resilient and Safe Operations

TRUSTWORTHY SYSTEMS MANIFESTO

1 — To sustain the business or mission, systems must be able to continue operations in the face of unexpected events, or if interrupted, recover their operations efficiently.

2 — Failsafe properties of software-intensive systems should be designed in and verified.

We hold these truths to be self-evident.
NIST, ISO, & IIC Structure of Trustworthiness

Trustworthy Systems Manifesto

1 – Eng. discipline in process & product

2 – QA to risk tolerance thresholds

3 – Traceable properties of components

4 – Proactive defense of system & data

5 – Resilient & safe operations

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Charter of Trust
For a secure digital world

The digital world is changing everything, creating new opportunities and challenges. As a trusted partner in building tomorrow, Siemens is committed to the values of openness and sharing. By working together, we can ensure the future of digital transformation is driven by integrity, transparency, and trust.

Our principles

1. Ownership of cyber and IT security: Anchor the responsibility for cybersecurity at the highest governmental and business levels by designating specific ministries and CSOs. Establish clear measures and targets as well as the right mindset throughout organizations – “It is everyone’s task.”

2. Responsibility throughout the digital supply chain: Companies – and if necessary – governments must establish risk-based rules that ensure adequate protection across all IoT layers with clearly defined and mandatory requirements. Ensure confidentiality, authenticity, integrity, and availability by setting baseline standards, such as:
   - Identity and access management: Connected devices must have secure identities and safeguarding measures that only allow authorized users and devices to use them.
   - Encryption: Connected devices must ensure confidentiality for data storage and transmission purposes wherever appropriate.
   - Continuous protection: Companies must offer updates, upgrades, and patches throughout a reasonable lifecycle for their products, systems, and services via a secure update mechanism.

3. Security by default: Adopt the highest appropriate level of security and data protection and ensure that it is preconfigured into the design of products, functionalities, processes, technologies, operations, architectures, and business models.

4. User-centricity: Serve as a trusted partner throughout a reasonable lifecycle, providing products, systems, and services as well as guidance based on the customer’s cybersecurity needs, impacts, and risks.

5. Innovation and co-creation: Combine domain knowledge and deepen a joint understanding between firms and policymakers of cybersecurity requirements and rules in order to continuously innovate and adapt cybersecurity measures to new threats; drive and encourage I.A. contractual Public Private Partnerships.

6. Education: Include dedicated cybersecurity courses in school curricula – as degree courses in universities, professional education, and trainings – in order to lead the transformation of skills and job profiles needed for the future.

7. Certification for critical infrastructure and solutions: Companies – and if necessary – governments establish mandatory independent third-party certifications (based on future-proof definitions, where life and limb is at risk in particular) for critical infrastructure as well as critical IoT solutions.

8. Transparency and response: Participate in an industrial cybersecurity network in order to share new insights, information on incidents et al., report incidents beyond today’s practice which is focusing on critical infrastructure.

9. Regulatory framework: Promote multilateral collaborations in regulation and standardization to set a level playing field matching the global reach of the WTO; inclusion of rules for cybersecurity into Free Trade Agreements (FTAs).

10. Joint initiatives: Drive joint initiatives, including all relevant stakeholders, in order to implement the above principles in the various parts of the digital world without undue delay.
Use the Manifesto to Start Dialogues

Executive Team

Policies

Risk thresholds

Business needs

CIO

CISO

Vendor Mgt.

QA

Development

Operations

Audit
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- ISG
- Boeing
- Aetna
- John Deere
- Booz Allen Hamilton
- CREDIT SUISSE
- Duke Energy
- IAOP
- Allianz
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