4.2.2.1 Maturity

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There are two ways to think about maturity: the maturity of the products or systems and the maturity of the communities which develop the systems or products. Usually, the two kinds of maturity go hand in hand. A mature product or system is the result of a mature community process and, visa versa, a mature community process produces mature products.

- **Note:** Community, in this case, can refer to a Community of Interest (CoI) or a corporation.

Products or Systems

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Product or System maturity is an assessment (sometimes quantifiable) of how well a product or system meets its requirements for reliability under normal operations.

Maturity of the components selected for inclusion in a system can play a significant role in the overall success of a system. Components that are mature are more likely to be stable and reliable; qualities that directly translate to stable and reliable integrations, which are thereby robust and resilient when inevitable changes to the system are made. This holds true as long as the components are not coming close to End-of-life (EoL). See Manageability Costs .

Rafa E. Al-Qutaish and Alain Abran have proposed a maturity model based on Six Sigma (6Sigma).[1)]

> *The quality of a product can be assessed either directly by looking into the product itself, or indirectly through assessing the process used to develop that product. In the software engineering field, there are currently numerous capability and maturity models for assessing a set of specific software processes, but very few product maturity models for those interested in assessing the quality of software products. This paper presents a maturity model designed to directly assess the quality of a software product, i.e. the Software Product Quality Maturity Model (SPQMM). This model is based on the six-sigma view of product quality and handles – in submodels – the three views of quality specified in ISO 9126, that is, the Software Product Internal Quality Maturity Model (SPIQMM), the Software Product External Quality Maturity Model (SPEQMM), and the Software Product Quality-in-Use Maturity Model (SPQiUMM).*

$$WQL = \frac{\left(IQL + EQL + iUQL \right)}{3}$$

Where:

- ***WQL*** *is the quality level of the whole software product, including the quality levels of all three stages of the software product*
- ***IQL*** *is the internal quality level*
- ***EQL*** *is the external quality level*
- ***iUQL*** *is the in-use quality level of the software product*

Table 1: Sigma values based on the quality level and the software integrity level

5	**4**	**3**	**2**	**1**	**0**	
Very High	**High**	**Intermediate**	**Low**	**Trivial**	**None**	
Zero Sigma Shift	1.5 Sigma Shift	2.0 Sigma Shift	2.5 Sigma Shift	3.0 Sigma Shift	3.5 Sigma Shift	Assigned Sigma Ranges
QL ≥ 99.99997%	QL ≥ 99.976%	QL ≥ 99.865%	QL ≥ 99.379%	QL ≥ 97.724%	QL ≥ 03.319%	σ ≥ 5
QL < 99.99997%	QL < 99.976%	QL < 99.865%	QL < 99.379%	QL < 97.724%	QL < 93.319%	
and	and	and	and	and	and	5 > σ ≥ 4
QL ≥ 99.996%	QL ≥ 99.379%	QL ≥ 99.724%	QL ≥ 99.319%	QL ≥ 97.134%	QL ≥ 69.146%	
QL < 99.996%	QL < 99.379%	QL < 97.724%	QL < 93.319%	QL < 84.134%	QL < 69.146%	
and	and	and	and	and	and	4 > σ ≥ 3
QL ≥ 99.865%	QL ≥ 93.319%	QL ≥ 84.134%	QL ≥ 69.146%	QL ≥ 50%	QL ≥ 30.853%	
QL < 99.965%	QL < 93.319%	QL < 84.134%	QL < 69.146%	QL < 50%	QL < 30.853%	
and	and	and	and	and	and	3> σ ≥ 2
QL ≥ 97.724%	QL ≥ 69.146%	QL ≥ 50%	QL ≥ 30.853%	QL ≥ 15.865%	QL ≥ 6.680%	
QL < 97.724%	QL < 69.146%	QL < 50%	QL < 30.853%	QL < 15.865%	QL < 6.680%	σ < 2

Communities

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There are several ways to establish or assess Community[2)] maturity:

- ISO 9001
- ISO 15288
- ISO 90003-2018

- ISO 10001:2018 Quality management — Customer satisfaction — Guidelines for codes of conduct for organizations
- ISO 10002:2018 Quality management — Customer satisfaction — Guidelines for complaints handling in organizations
- ISO 10003:2018 Quality management — Customer satisfaction — Guidelines for dispute resolution external to organizations
- ISO 10004:2018 Quality management — Customer satisfaction — Guidelines for monitoring and measuring
- OMG: Case Management Model and Notation (CMMN)
- Capability Maturity Model Integration (CMMI)

See also: todo.

DDS Specifics

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There are several aspects to reviewing DDS for maturity:

- The maturity of the parent Standards Organization (i.e., the Object Management Group® (OMG®)) – OMG has been creating standard specifications for 35 years.
- The maturity of the standards themselves – The Data Distribution Service (DDS) is a family of specifications (i.e., DDS Family of Standards). The DDS family of standards started in 2001 (see History of DDS) with the release of DDS 1.0. The base DDS specification has been updated about every 3 to 4 years and has been extended to encompass just under 20 specifications, covering areas such as wireproro, type systems, security and language bindings.
- The maturity of the DDS Vendors – Two vendors have had DDS product offerings for about 20 years. Real-Time Innovations (RTI) and THALES (their original product was spun off to PrismTech, which has recently become part of Adlink).
- The maturity of the vendor's products – In addition to the two original DDS vendors, there are a number of DDS products being offered by other DDS vendors; each product has its own maturity level. **Note:** just because a product is newer does not mean it is not as mature in terms of maturity metrics. Newer products have an advantage: not only are they starting from a more mature set of specifications, they are also able to use other products as reference implementations.

Each Vendor and each vendor product needs to be assessed independently.

1)

Rafa E. Al-Qutaish and Alain Abran, A Maturity Model of Software Product Quality, Journal of Research and Practice in Information Technology, 43(4):307-327, November 2011, Accessed 27 July 2020, https://www.researchgate.net/publication/260835325_A_Maturity_Model_of_Software_Product_Quality

2)

Note: Community in this case can refer to a Community of Interest (CoI) or a corporation.

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