

# An ISO/IEC 42010 (IEEE Std 1471) Annotated Bibliography

version 2.1

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## Abstract

This is an annotated bibliography of papers, reports and books pertaining to IEEE Std 1471 (now also international standard ISO/IEC 42010). It was originally prepared for ISO/IEC JTC1/SC7 WG42, the Architecture working group of the Systems and Software Engineering Subcommittee of ISO. WG42 is the body performing the joint ISO and IEEE revision of IEEE 1471 as ISO/IEC 42010.

*Pertaining to* includes 1) documents which were inspirations for IEEE 1471, 2) citations of IEEE 1471, and 3) documents inspired by IEEE 1471. In some cases, the relationship is provided in the annotations.

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An eloquent argument for the need for multiple, extensible view-points in architectural description: “Unfortunately, in contrast to building architectures, we have yet to agree on what the appropriate software structures and views should be and how to represent them. One of the reasons for the lack of consensus on

structures, views, and representations is that software quality attributes have matured (or are maturing) within separate communities, each with their own vernacular and points of view.”

- [3] L. Bass, J. Ivers, M. Klein, and P. Merson, “Reasoning frameworks,” Software Engineering Institute, Carnegie Mellon, Tech. Rep. CMU/SEI-2005-TR-007, 2005. <http://www.sei.cmu.edu/publications/documents/05.reports/05tr007.html>

Reasoning frameworks have several properties similar to architecture viewpoints.

- [4] J. K. Bergey and P. C. Clements, “Software architecture in DoD acquisition: A reference standard for a software architecture document,” CMU Software Engineering Institute, Technical Note CMU/SEI-2005-TN-020, February 2005. <http://www.sei.cmu.edu/pub/documents/05.reports/pdf/05tn020.pdf>
- [5] N. Boucké, “Composition and relations of architectural models supported by an architectural description language,” Ph.D. dissertation, Katholieke Universiteit Leuven, October 2009.

Describes a framework and formalization of relations and compositions between architectural models (and views).

- [6] N. Boucké, A. Garcia, and T. Holvoet, “Composing structural views in xADL,” in *Early Aspects: Current Challenges and Future Directions*, ser. Lecture Notes in Computer Science, no. 4765, 2007, pp. 115–138.
- [7] N. Boucké and T. Holvoet, “View composition in multi-agent architectures,” *International Journal of Agent-Oriented Software Engineering*, 2007.
- [8] N. Boucké, D. Weyns, R. Hilliard, T. Holvoet, and A. Helleboogh, “Characterizing relations between views,” in *Proceedings 2nd European Conference on Software Architecture (ECSA 2008)*, ser. Lecture Notes in Computer Science, R. Morrison, D. Balasubramaniam, and K. Falkner, Eds., no. 5292, 2008, pp. 66–81.

Presents a taxonomy of mechanisms for view relations.

- [9] H. Bowman, M. W. A. Steen, E. A. Boiten, and J. Derrick, “A formal framework for viewpoint consistency,” in *Formal Methods in System Design*, 2002, pp. 111–166.

- [10] M. Broy, M. Gleirscher, S. Merenda, D. Wild, P. Kluge, and W. Krenzer, “Toward a holistic and standardized automotive architecture description,” *Computer*, vol. 42, pp. 98–101, 2009.

Describes an architecture framework for the automotive enterprise. See also: [ftp://ftp.software.ibm.com/software/plm/resources/AAF\\_TUM\\_TRI0915.pdf](ftp://ftp.software.ibm.com/software/plm/resources/AAF_TUM_TRI0915.pdf).

- [11] T. B. Callo, P. America, and P. Avgeriou, “Defining execution viewpoints for a large and complex software-intensive system,” in *Proceedings WICSA/ECSA 2009*, 2009.

- [12] D. Chapon and G. Bouchez, “On the link between architectural description models and modelica analyses models,” in *Proceedings 7th Modelica Conference, Como, Italy, Sep. 20-22, 2009*, 2009, pp. 784–789. <http://www.ep.liu.se/ecp/043/092/ecp09430079.pdf>

Describes an integrated development environment (IDE) for physical system architecting using concepts of IEEE 1471.

- [13] P. Clements, D. Emery, R. Hilliard, and P. Kruchten, “Aspects in architectural description: report on a first workshop at AOSD 2007,” *SIGSOFT Software Engineering Notes*, vol. 32, no. 4, pp. 33–35, 2007.

- [14] P. C. Clements, “Comparing the SEI’s views-and-beyond approach for documenting software architectures with ANSI/IEEE Std 1471-2000,” Software Engineering Institute, Tech. Rep., 2005.

- [15] P. C. Clements, F. Bachmann, L. Bass, D. Garlan, J. Ivers, R. Little, R. Nord, and J. Stafford, *Documenting Software Architectures: views and beyond*. Addison Wesley, 2003.

- [16] A. Das, S. Gorka, and J. Miller, “Designing multidisciplinary capstone courses—a knowledge engineering approach,” in *Proceedings of the IEEE Southeastern Conference (IEEE SECON-09)*, Atlanta, Georgia, March 2009, march 5-8, 2009.

Uses IEEE 1471 concepts to conduct knowledge engineering on multidisciplinary course and curriculum design.

- [17] F. S. de Boer, M. M. Bonsangue, J. Jacob, A. Stam, and L. der Torre, “A logical viewpoint on architectures,” in *8th International Enterprise Distributed*

*Object Computing Conference (EDOC 2004), 20-24 September 2004, Monterey, California, USA, Proceedings.* IEEE Computer Society, 2004, pp. 73–83.

Proposes to extend the IEEE 1471 conceptual model with “semantic models” and architecture signatures to bridge the gap between business process models and enterprise architectures.

- [18] J. Derrick, H. Bowman, and M. Steen, “Viewpoints and objects,” in *Ninth Annual Z User Workshop*, ser. Lecture Notes in Computer Science, J. P. Bowen and M. G. Hinchey, Eds., vol. 967. Springer-Verlag, September 1995, pp. 449–468. <http://www.cs.kent.ac.uk/pubs/1995/188/content.gz>

Tackles issues of inter-view consistency via unification in a multiple viewpoint setting based on RM-ODP.

- [19] R. M. Dijkman, “Consistency in multi-viewpoint architectural design,” Ph.D. dissertation, University of Twente, 2006. <http://www.utwente.nl/ewi/asna/research/Ph.D.%20Theses/dijkman-thesis.pdf>
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This paper proposes the use of a basic viewpoint as a basis for defining and relating viewpoints for distributed application design

- [21] E. W. Dijkstra, “On the role of scientific thought,” Reprinted in *Selected writings on computing: a personal perspective* (1982), 1974. <http://www.cs.utexas.edu/users/EWD/transcriptions/EWD04xx/EWD447.html>

The use of concerns in IEEE 1471 derives from the phrase *separation of concerns* in software engineering. The earliest use of this phrase appears to be in this 1974 paper by Dijkstra: “Let me try to explain to you, what to my taste is characteristic for all intelligent thinking. It is, that one is willing to study in depth an aspect of one’s subject matter in isolation for the sake of its own consistency, all the time knowing that one is occupying oneself only with one of the aspects. We know that a program must be correct and we can study it from that viewpoint only; we also

know that it should be efficient and we can study its efficiency on another day, so to speak. In another mood we may ask ourselves whether, and if so: why, the program is desirable. But nothing is gained—on the contrary!—by tackling these various aspects simultaneously. It is what I sometimes have called “the separation of concerns”, which, even if not perfectly possible, is yet the only available technique for effective ordering of one’s thoughts, that I know of. This is what I mean by ‘focussing one’s attention upon some aspect’: it does not mean ignoring the other aspects, it is just doing justice to the fact that from this aspect’s point of view, the other is irrelevant. It is being one- and multiple-track minded simultaneously.”

- [22] P. Eeles and P. Cripps, *The Process of Software Architecting*. Addison Wesley, 2010. <http://processofsoftwarearchitecting.com>

Defines a process for software architects, using the IEEE 1471 model as a foundation. Provides a viewpoint template and viewpoint catalog including: Requirements, Functional, Deployment, Validation, Application, Infrastructure, Systems Management, Availability, Performance, Security; and the work products (model kinds) used in each.

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*Joint Working IEEE/IFIP Conference on Software Architecture and European Conference on Software Architecture (WICSA/ECSA 2009)*, R. Kazman, F. Oquendo, E. Poort, and J. Stafford, Eds. IEEE Computer Society Press, 2009, pp. 31–40.

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First introduction of *stakeholder* into management thinking.

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A simple language for a Behavior viewpoint, developed for exchanging information about event-based architectures between ACME, Wright, Rapide and other early ADLs.

- [33] J. Garland and R. Anthony, *Large Scale Software Architecture: A Practical Guide Using UML*. John Wiley and Sons, 2002.

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Surveys 23 architecture frameworks and proposes 9 dimensions for classifying frameworks: Type of information, Scope, Detail level, Stakeholder, Transformation, Quality attribute, Meta level, Nature and Representation.

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Overview of Gartner’s Enterprise Architecture Framework in which they ”adopted an aspect-oriented approach to our framework, deliberately compatible with IEEE 1471... [defining] three interdependent viewpoints: a business viewpoint, which is concerned with the processes and organization of the business; an information viewpoint, which is concerned with the information that runs the enterprise; and a technology viewpoint, which is concerned with the hardware and software components that support the enterprise. The aspect-oriented approach allows for the articulation of additional viewpoints, should the organization require them.”

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