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IEEE 1471 approaching its 5th Birthday

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Background

IEEE 1471 [1] was approved for use by IEEE in September 2000. It became an ANSI standard in August 2001. IEEE standards come up for review every five years, so as we approach IEEE 1471's 5th birthday, the process for its revision is beginning. This position paper is a brief musing on some things within IEEE 1471 that have worked and some that did not. At the end is a set of suggested topics for our Working Group to discuss.

IEEE 1471 has been somewhat successful it making an impact on the community. Today I find 53,300 hits on Google for *+IEEE +1471* (cf. +IEEE +12207, 19,500 hits; +DOD +Architecture +Framework, 145,000 hits). There are papers, dissertations, courses, other standards, and even a couple of books taking it as starting point, discussing its use or applying it.

Things that worked

I personally think the strongest contribution of the standard to the community is the underlying conceptual model which had its roots in existing practices (esp. Philippe's 4+1 method) and attempted to systematize how we think and talk about architecture descriptions (ADs) as collections of multiple views, the rules governing the views, the architectural stakeholders using those views and their architectural concerns.

The stakeholders and concerns portions of the standard [inspired by work of Boehm et al, from circa 1995] from the conceptual model through specific requirements on ADs has turned out to be one of the most useful elements of the standard because it implies a minimal required process wherein each stakeholder of the architecture is identified, their concerns are articulated, those concerns are "allocated" to viewpoints to insure coverage in the AD.

Things that didn't

The standard makes a strong distinction between views and viewpoints. This has either been too obvious, or too subtle, for most of the community. I expected that a primary contribution of IEEE 1471 would be its provision of a standard mechanism for documenting architectural viewpoints. So that viewpoints would become a kind of "on the shelf", reusable, architectural knowledge, "indexed by" the stakeholders and the concerns which could be addressed by this type of view. So that one could say, If I am interested in architecting a system where dynamic interoperability is a critical concern, I should use viewpoint DI (already defined and sitting on the shelf, in someone's paper or dissertation). This hasn't really happened, for the most part. As a result, we haven't seen robust definitions of viewpoints (although a certain book about *view types*, makes some good candidates).

One of the subtleties of the conceptual model, which was quite powerful and totally lost on its audience (apparently), is the notion of *architectural model*. The point here is that a view might consist of more than one model, each model using different notations. Furthermore, these architectural models could be shared across viewpoints. No one has really exploited this, to my knowledge, although it may be a useful to mechanism to treat what are now called *aspects*.

Finally, the release of the standard suffered from a lack of published worked examples. The IEEE Architecture Working Group always intended to provide a companion to the standard with substantive examples, commentary and rationale. That effort ran out of steam.

IEEE 1471 Revision

The IEEE Computer Society's Software and Systems Engineering Standards Committee (S2ESC), IEEE 1471's sponsor within IEEE, has initiated work on its revision.

S2ESC's stated goals for the revision include: upgrading the document from recommended practice to standard; widening the scope of the document from software to systems engineering; and to ensure it is harmonized with S2ESC software systems engineering processes.

A working group chair has been named, and I have agreed to serve again as technical editor. The revision activity will begin this year. As with all IEEE efforts, the process will be open to all interested participants and reviewers.

Topics for Workshop Discussion

1. How might the IEEE 1471 conceptual framework help us in organizing the software architect's body of knowledge?
2. Are there fixes, improvements, or things totally missing from the conceptual model that we need to know about? That can be codified? Are there new, different ways of conceptualizing architectural descriptions other than what is implied in the conceptual model?
3. Is there recent work in software architecture which "breaks" the conceptual framework?
4. Are the advances in the state of the art in software architecture that need to be explicitly addressed, or can they be handled within the framework? (E.g., so-called aspects)
5. Are there approaches to defining viewpoints that could be codified at this time?
6. Has the state of the practice advanced sufficiently to prescribe any particular viewpoints (e.g., components and connectors viewpoint, behavioral viewpoint)?
7. In the spirit of the process implied by the connection from stakeholders to concerns to viewpoint, are there other similar insights that should be built into the requirements on an AD?