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The Future of TOSCA and NFV

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The Future of NFV Standards is... Just Enough Standards.

“There are great advantages in economy and efficiency to be won from standardization and unification... but there are grave dangers, also. The worst of these is timid thinking at the top, too much caution in a changing world, too much faith in committees, too little in bold, imaginative plans, too much "leaving it to solve itself".

Not my words, but those of Mr. John Elliot, president of the Institute of Transport, who made this observation back in 1954. “There was,” he added, “not one great transport achievement on record that did not owe its existence to the vision, energy and competence of one or two gifted individuals.”

I think this equally applies when we discuss NFV and NFV MANO standardization: it needs to avoid adding constraints to innovation.

This write-up explores open standards, open source specifications, dangers of over-standardization, and what may constitute just enough standards for NFV.

Since terms are frequently overloaded, I will start by clarifying my interpretation.

Standards

In the Telco world, with a long tradition of objectives of service excellence in terms of reliability, availability, continuity and scale, standards are extremely important, and one of the key reasons for the need of standardization is interoperability – the ability for operators to mix and match hardware and software products from different vendors to achieve their objectives.

Standards can emerge from a single company and become “de facto” standards by adoption (e.g.TCP/IP started that way). Regulatory bodies drive “de jure” standards (e.g. ISO). “De facto” standards turn sometimes into “de jure” standards. Most frequently, standards are developed through some form of a consensus process between members of a Standard Development

Organization (SDO), typically representing both public and private sectors. Many refer to this last category as “open standards”. But the word “open” is so imprecise, and not all “open standards” are equally open.

Open Standards

Most, including myself, would concur with the main body of the definition provided by ITU-T:

"Open Standards" are standards made available to the general public and are developed (or approved) and maintained via a collaborative and consensus driven process.

"Open Standards" facilitate interoperability and data exchange among different products or services and are intended for widespread adoption.

Where some differences of opinion may exist is in some of the details of the ITU-T definition that refer to Intellectual Property Rights (IPRs). For the purpose of this article, I will refer to “open standards” solely to those adhering to IPRs being licensed to all applicants on a worldwide, non-discriminatory basis for free. All others I consider “open-but-not-quite-free”.

Open Source

Open Source covers two related concepts regarding the way software is developed and licensed, and they are captured in the "Free and Open Source Software" and the "Open Source" definitions, and it is both about free access to, and free distribution of, code. While “code is king”, open source organizations also document their efforts in specifications, which by implication can also be considered “open standards”. If adopted, they become “de facto” standards, and may lead to changes in “de jure” standards.

This is in fact the healthiest way to produce a valuable standard: coopetition between SDOs and open source projects that result in a true “open standard” that is validated, adopted and finally formalized at some point.

The Dangers of Over-Standardization

With the focus on NFV management and orchestration, standardization typically brings OPEX reduction because of more replicable operations, a certain degree of vendor-independence for operators, the promise of interoperability between products from different vendors, and lower integration cost. At the same time, standardization reduces the potential for innovation and introduces barriers to operators intending to introduce services at the cutting edge of technology.

The most comprehensive set of standards for NFV management and orchestration comes from ETSI NFV, which has done an extraordinary job in a relatively short time by all accounts. In fact, I believe that ETSI NFV has done too good a job - by too early pushing for normative standards (Release 2 and Release 3), instead of allowing more time for the informative standards (Release 1) to be absorbed, put to the test, and evolve with industry feedback before mandating. Too much, too early may also mean not-quite-the-optimal-standardization needed at present for the still evolving NFV paradigm.

ETSI NFV standards have been developed with constraints such as a pure NFV-centric approach, avoidance of FCAPS management and reluctance to network function decomposition. The “world according to NFV” was necessary when studying the NFV paradigm early on, but operators need those constraints removed in order to fully benefit from NFV.

It is time for a pause to assess whether a large number of normative standards with many inter-dependencies (practically an all-or-nothing untested, restrictive set) is not premature, and whether a different approach that does not inhibit innovation and is more future proof is more appropriate.

Just imagine the effect on ETSI NFV standards if some of the following scenarios are adopted by operators in production, based on implementation/testing:

- NFVO is absorbed into a higher layer Service Orchestrator;
- Specific VNFM disappears, or is re-cast as a VNF component;
- Generic VNFM is absorbed by the NFVO;
- The notion of Network Service disappears, or is absorbed into a broader notion of Service; and
- The VNF as we know it is further decomposed into granular network functions exposed to the management architecture.

Where and when standards are necessary is typically the operators call; vendors thrive on differentiation.

But operators really want to capitalize on the benefits of standardization, yet ensure that service agility is not stifled, and their investment in products is future-proof. Sort of, have the cake and eat it too. Perhaps they can – with what we will call “just enough standards”.

Just Enough Standards

What we need for Telco NFV right now is enough standards, but no more than that. To be clear, it is not only about how much standardization is optimal for this phase, but also about what kind of standardization is needed to lead to interoperability, while not stifling service agility, and when to go beyond a minimalistic set of standards.

I would like to hope that ETSI NFV realizes the dangers of over-standardization, and why it cannot quite produce “open standards” because of its IPR policy - it can go a long way to provide “just enough” standards.The first step would be to be much more selective in taking on new work in normative standards. A bolder move would be to reverse most existing IFA and SOL specifications to informative.

We want the NFV communities to follow standards because they are a very valuable source of information, not because they are mandated. A good example are the ETSI NFV information models documented in IFA011, IFA014, IFA015 - why mandate them, and in particular why mandate that data models that implement them need to replicate exactly the hierarchy normatively imposed by those standards? ETSI NFV information models should simply be requirements that indicate what needs to be achieved, rather than how.

TOSCA - Just Enough

This article would not be complete without an existing example of “just enough” standards, so let’s talk TOSCA. It is a set of standards developed for deployment and orchestration of cloud applications. That makes it broader than NFV, and broader than Telco, yet applicable to both. It is an “open standard” to start with.

The fact that it is purposefully under-specified and inherently extensible confers future-proofness. It allows open source projects (e.g. ONAP) and/or SDOs (e.g. ETSI NFV) that adopt its grammar and philosophy to extend it to meet their needs, and creates the “de facto” standards needed by the communities they serve.

ETSI NFV IFA and SOL standards are clearly targeted to a particular NFV MANO functional block. This is very restrictive – vendors create unique products that expose interfaces dictated by those standards, in order to inter-operate with others (e.g. a VNFM to inter-operate with an NFVO). What happens to that product when one of the previously mentioned operator deployment scenarios materializes? This is too much standardization, too early.

In contrast, TOSCA may be applied to create a VNFM, but equally to an NFVO, or to other orchestration layers (e.g. ARIA/TOSCA in ONAP). That makes this standard “just enough” for NFV

MANO.

When one implements the entire set of ETSI NFV standards for NFV MANO, one is locked into the current ETSI NFV information models and imperative orchestration via interfaces across nailed down reference points. This is too restrictive and stifles innovation. In contrast, with TOSCA, one enjoys flexibility, because the model itself drives the orchestration. TOSCA is unopinionated about the models you design with its constructs. That makes it a perfect choice for orchestration at any layer, and “just enough” for now, as well as future-proof.

Informative ETSI NFV information models and TOSCA sums up the “just enough” standards for today’s NFV orchestration and this is validated by the ONAP approach to use of standards.