This work represents a collaborative effort between the OASIS Trust Elevation TC and ITU-T SG 17 Identity Management Question (Q10/17) in order to provide feedback to NIST call for comments on NIST SP 800-63-2 (see <http://csrc.nist.gov/groups/ST/eauthentication/sp800-63-2_call-comments.html>) with comments deadline May 22, 2015. Comments to be emailed to “eauth-comment@nist.gov”.

**I. General Comments**

* Currently the NIST SP 800-63 framework focuses on US agencies and the US federal government. NIST needs to realize that the framework is being adopted at an international level. It is recommneded that future revisions of the document take that into consideration.
* In current NIST SP 800-63 document, the Levels of Assurance (LoA) are considered to be static. In reality, an LoA level represents a range of trust depending on the order and the context of the evaluation of related assutance tokens. For example, if an authentication attempt comes from an unexpected location, a system may require the use of severla sets of tokens even from the same LoA in order to ensure that the required assuranc elevel is achived. In many cases and in particular for knowledge based tokens. The attributes of these tokens losses value as a function of time. The advent of social media makes Knowlede Based Authentication (KBA) information public and waterdown its effective use in the identification process.
* Decouple Identity Binding
* Permit identity proofing to occur after token issuance.
* Identity Register
* Add to the model the concept of the Identity Register, which is the repository that maintains the binding between tokens and identifiers. This entity has certain privacy and security obligations that come with this role, including the protection of registration data for future dispute resolution balanced with user risk-mitigation goal of minimizing instances of PII. The Identity Register may provide support for federated authentication and identification and credential reliability and recovery services.
* Risk Confidence Factors
* Instead of grouping assurance profiles solely as 1,2,3,4 per OMB M-04-04 requirements, permit the expression of risk confidence score with multiple factors including identity proofing, token strength, multiple factors, biometric verification, etc.

**II. What requirements, processes, standards, or technologies are currently excluded from 800-63-2 that should be considered for future inclusion?**

* NIST need to mentionm techniques such as the Extended Validation Certificates (EVcerts) pursuant to the CA/B Forum specification and the adaptation and extension found in ETSI TS 102 042 as means to combat threats to identity attributes and minize man in the middle attacks.
* ITU-T X.1254 (ISO 29115) have done an extensive extension additions to the 800 -063 framework and need to be taken into consideration.

**III. Should a representation of the confidence level in attributes be standardized in order to assist in making authorization decisions? What form should that representation take?**

* OASIS Trust Elevation TC has developed three committee draftes that can be used for developing a consistant method for determining, evaluationg and improving on LoA levels in a technology independdent fashion. It is also developing metada data and protocol for expressing and excahning needed trust elevation methods between a verifier and a client.
* Many systems are designed to support flexible authentication based on risk-based access. In many cases, these systems select many tokens from a given LoA to enhance the trust with the authentication step. NIST needs to be flexible and adapt the work from OASIS Trust Elevation TC in order to piggy-back on the use of common LoA metadata and trust elevation protocols that could work with Oauth, OpenID Connect and SAML.
* At the point of transaction, the environment needs to be evaluated, not just the credential. NIST needs to start accommodating the latest trends in using a device as part of the authentication process. In this regard, the Fast ID Online (FIDO) and OASIS Identity-Based Attestation and Open Exchange Protocol Specification (IBOPS) models of enabling the user to authenticate to a device, and then an agent to attest to this fact, changes the dynamics of determining the LoA and the verifier (or CSP). Emphasis should be given to methods that lead to a hacker resistant authentication method where hacking the identity provider server will not result in massive security breaches. For example, in the FIDO and the OASIS Identity Based Attestation TC (IBOPS) models, the server holds a pointer to the client secrets and does not store any credentials locally. Client secrets are stored on the clinet device. This changes the attack vector of hackers whereby they will need to hack the server and the associated device to obtain a credential.
* Recommend harmonizing NIST SP 800-63 with work done in ITU-T X.1254, ISO 29115 and OASIS TRUST Elevation.

**IV. What methods can be used to increase the trust or assurance level (sometimes referred to as “trust elevation”) of an authenticated identity during a transaction? If possible, please share any performance metrics to corroborate the efficacy of the proposed methods.**

* NIST SP 800-63 framework looks at the traditional three categories of authentication factors: something you have, something you are, and something you know. These categories are limiting because they assume strict and static authentication tokens with limited authentication capabilities. In many cases the context around the use of an authentication factor, such as access from a known location or time of day, can change the order of challenges or responses required by am adaptive authentication engine. engine. NIST needs to enlarge the scope of authentication categories to include context and behavior to enable a wider set of acceptable tokens and devices housing these tokens. For example, a smart phone can house a soft token that is protecting a soft PKI certificate in a Key Chain. The trust level in the token can change based on the device health such as rooting or the use of anti-virus software. As such the achievable LoA from the device can vary with time and could be a function of software on the device and also a function of OS system integrity.
* The use of biometrics in the document needs to be expanded. Currently the scope is very limited to enrollment and second or third factors on hard tokens. However, the trend in the industry is to unlock devices using biometrics with the task of binding the access request to a user to be performed by the verifier through the use of cumulative identity attributes that binds a device, location and behavior to an authorization request.
* The advent of smart devices and the Internet of Things requires the extension of the work to include non-human entities. The assumption that the interaction is a web-based interaction between the user and the verifier is not totally true in the current trends. Given that mobile single sign technologies are still primitive, it is important to not rely on cookies or unprotected tokens for Single Sign On support.

**V. Threats to Authentication**

1. Increasing authentication assurance reuires the combinations of authentication factors with no or minimal overlapiing vulnerabilties. can result in enhcneced assuarcne . It is not the number of factors that matters but the reduction in threats that the combination of factors achieves. The way the combination occurs can either reduce or increase threats of context and related vulnerabilities. The OASIS Trusst Elevation TC did produce two committee drafts based on ITU-T X.1254 (ISO 29115) that include a comprehensive list of authentication methods, and a way of computing the authentication strength based on vulnerabilities and their associated control. It is recommended that NIST build on this work to ensure that authentication strength is understood by implementers.
2. It is recommended that Trust Elevation techniques should be added to the next version of the document. Trust elevation can occur in multiple places. Consider for example a scenario where a Credential Service Provider (CSP) can authenticate a user coming from a smart device. The CSP can have the option of using multiple capabilities in the device such as biometric, location, and soft PKI tokens or certificates to authenticate the user. The authentication strength can be consistent with the risk engine requirements. If the CSP is acting as an IDP or attribute provider to other Verifiers or relying parties, these parties can elevate the authentication strength per their own requirements and may be able to ask the CSP to do it on their behalf or combine the CSP tokens into application specific attributes, such as behavior, that they also can do on their own.
	1. A standardized means of asking for higher assurance such as the ones being developed by OASIS Trust Elevation TC should be used.
	2. An overlay/tailoring capability similar to SP 800-53 could also be used. Each 800-63 LOA would become a baseline that could be tailored as necessary, consistent with tailoring guidance to help each community of interest better meet its mission / business needs. In the overlays authentication strength can be computed using concepts form OASIS TRUST Elevation TC.

**VI. Elevation of Biometric to a token**

NIST does not recomment the use of Biometrics as tokens. They are mainly used at enrolment. However, if the right privacy enahcing methods is used combined with approriate trust elevation methiods (like in OASIS IBOPS) biometric can be evolved to provide effective user authentcioan at least at LoA 2. So it is recommended that NIST investigate the use of biometric as a full token. .

**References**

1. OASIS Electronic Identity Credential Trust Elevation Methods (Trust Elevation) TC; https://www.oasis-open.org/apps/org/workgroup/trust-el/
2. OASIS Identity Based Attestation and Open Exchange Protocol Specification (IBOPS) TC; <https://www.oasis-open.org/apps/org/workgroup/ibops/>
3. X.1254 : Entity authentication assurance framework; <http://www.itu.int/rec/T-REC-X.1254/en>
4. Question 10/17 – Identity management architecture and mechanisms; http://www.itu.int/en/ITU-T/studygroups/2013-2016/17/Pages/q10.aspx