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**Topic: Technical Contribution #2 to  
Biometric Sample Quality Standard Draft;  
QSND Proposal**

**(Late submission)**

**Draft: M1/06-0948**

**Call for Contributions: M1/06-0949**

## QSND Proposal

In light of other contributions and comments submitted towards the Biometric Sample Quality standard draft, Aware proposes the following regarding QSND with the hope that consensus can be reached for a unified USNB position, and broader support can be garnered for future work.

Aware concerns about QSND were expressed in a previous technical contribution (M1/06-0979). The following guidelines would largely allay our primary concerns:

1. The QSND fingerprint dataset and associated “ground truth” quality scores should be collaboratively defined and published within the technical contribution process at M1.3 (and SC 37 WG3). Definition of the dataset should proceed according to drafted QSND guidelines currently included in the quality standard draft. “Ground truth” data should consist of the following BioAPI classifications based on performance: “UNACCEPTABLE”, “MARGINAL”, “ADEQUATE”, or “EXCELLENT”.
2. The approved data corpus and its contents, including images and “ground truth” quality scores, would be made publicly available and freely accessible.
3. The QSND would be intended for use by quality algorithm vendors to align the output of their quality algorithms to the ground truth results (See Table 1). Algorithm vendors would be enabled to assign a value of 0 through 7 to each of their possible output quality scores. These values would represent BioAPI terms “UNACCEPTABLE”, “MARGINAL”, “ADEQUATE”, OR “EXCELLENT”, respectively, based on results achieved by scoring QSND images (See Table 2). A 000 or 001 would indicate an “UNACCEPTABLE” sample, a 010 or 011 a “MARGINAL” sample, etc.
4. The “QSND” field in data interchange formats would be defined as an optional field containing a 4-bit value. The first bit indicates whether the field is being used to assign a QSND score. (0=no, 1=yes). The following three bits represent the QSND-aligned score. (See Table 3).
5. Vendors would not be required to submit their algorithms to another entity for the testing necessary to assign value pairings. Rather, they would be enabled to use the QSND to perform the testing themselves, so that their software could, at their discretion, be enabled with the capability to generate the QSND-aligned values.
6. Vendors would not be required to publish the results of their algorithms and their scoring of the dataset in a public venue. Note that the QSND could be utilized to perform independent assessment of quality algorithms.
7. The standard would include no prescriptive requirements having the effect of making quality algorithm modifications compulsory in order to achieve compliance.
8. The performance assessment or certification of algorithms, inferred or explicit, would remain outside of the scope of the standard and M1.3 work. Note again that the QSND could be utilized to perform independent assessment of quality algorithms.
9. It is suggested for consideration that percentile rank scoring (QSPR) utilizing the QSND data corpus be considered as a recommended best practice.

**Table 1. Example results against QSND, Algorithm A**

Unacceptable	5, 15, 24, 25, 31, 34
Marginal	30, 31, 34, 37, 37, 42, 44, 45, 46, 47, 58, 66
Adequate	62, 67, 68, 68, 69, 70, 70, 71, 72, 73, 74, 76, 80, 81, 82, 82, 83, 85
Excellent	84, 86, 89, 92, 92, 93, 93, 94, 96

**Table 2. Example of algorithm A output translation to BioAPI**

0	000	26	001	52	011	78	101
1	000	27	001	53	011	79	101
2	000	28	001	54	011	80	101
3	000	29	001	55	011	81	101
4	000	30	001	56	011	82	101
5	000	31	001	57	011	83	101
6	000	32	001	58	011	84	101
7	000	33	010	59	011	85	110
8	000	34	010	60	011	86	110
9	000	35	010	61	011	87	110
10	000	36	010	62	011	88	110
11	000	37	010	63	011	89	110
12	000	38	010	64	011	90	110
13	000	39	010	65	100	91	110
14	000	40	010	66	100	92	111
15	000	41	010	67	100	93	111
16	001	42	010	68	100	94	111
17	001	43	010	69	100	95	111
18	001	44	010	70	100	96	111
19	001	45	011	71	100	97	111
20	001	46	011	72	100	98	111
21	001	47	011	73	100	99	111
22	001	48	011	74	100	100	111
23	001	49	011	75	100		
24	001	50	011	76	101		
25	001	51	011	77	101		

**Table 3. QSND data field values**

0000	QSND score not assigned
1000	Low unacceptable
1001	High unacceptable
1010	Low marginal
1011	High marginal
1100	Low adequate
1101	High adequate
1110	Low excellent
1111	High excellent