Title: Disposition of comments on IREX II IQCE test plan + API v3 (Iritech + Cambridge University(CAM))

Date: 24 Dec 2009	Organization: **NIST**

1	2	(3)	4	5	(6)	(7)
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Iritech/ 1		Page 4, line 1	ed	Typographic error	"January 4, 2009" should be "January 4, 2010".	Accept
CAM/1	2. scope	P. 8.38-39		I find the meaning of "standalone IQAAs" somewhat elusive. The distinction intended between IQAAs described in line 38 and line 39 is also difficult to grasp. Perhaps if the examples (e.g., "image in, quality out") were also identified according to their class (e.g., "image in, quality out (class X in Table 3)") the intended meaning would be clearer. This would be most helpful for "image in, proprietary template + quality out," which could be either class Y or class Z.		Accept Added class identification. Standalone IQAA - "image in, quality out" is a class X. Quality as part of template generation - "image in, quality and proprietary template out" can be class Y or Z.
CAM/2	2. scope	P. 8.38-39		It might also be helpful to clarify why the IQAAs described in line 39 are not "standalone" -- for instance, because they are not currently intended to be interoperable and are not intended to be compared with the performance of other submissions. Is the distinction between "standalone" and "proprietary" (or "proprietary only") the one intended? See next question also.		Standalone meant "quality computation only". Quality scores computed as part of proprietary template generations are not completely "proprietary" - they have to conform to format outlined in the Table 4. Also, note that quality vectors have a standard part (positions 1-32) and

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						a proprietary or semi-proprietary part (positions 33-64)
CAM/3	8. Audience and options for participation	P. 11.6-7		In discussing Class Y submissions, the document states that "Vendors can submit a stand-alone quality measurement algorithm or quality computation could be part of their proprietary template generation." It took some time for me to conclude that this is a statement that class Y submissions can use either the convert_image_to_proprietary_template() function or the compute_quality_from_image_data() function (which are detailed later in "14. PC-based API Specification") to report quality assessments. If this is correct, explicit reference to the API specification and the relevant functions at this point would be helpful. Otherwise, because of the use of the terms "stand-alone" and "proprietary" that are shared with section 2 (see above), the statement could be taken to suggest that a class Y submission might alternatively be submitted as		Accept References to API added. Class Y participants can choose to "mate" quality algorithm and comparison scores for analysis. It is " Analyze this quality alg for this matcher only." Class Z submissions will be used for all analysis.

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				separate class X and class Z submissions.		
CAM/4	8 & 14			The points above (CAM/3) raise another set of questions about which functions are to be included in the SDKs for submissions in the different classes. Are all five functions defined in section 14 to be included in the SDKs for each class, even though, as an example, two of the functions will never be used for class X submissions? Should a return code indicating that the function call is not supported be includedfor convert_image_to_proprietary_template() and match_proprietary_templates() as a safeguard for class X submissions?		1 If submitting quality algorithm only, you are a class X participant. — API to use: compute_quality_from_image_data() 2 If submitting matching algorithm only, you are a class Z participant. — APIs to use: convert_image_to_proprietary_template() and match_proprietary_templates() 3 If submitting quality and matching, you are either class Y or class Z participant 3.1 Class Y: If you want your quality algorithm be evaluated against your matching algorithm only,

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						you are a class Y participant. Class Y matcher is not used to evaluate class X or class Z quality scores. 3.2 Class Z: If you want your quality algorithm be evaluated against all possible (class Z) matchers, and your matcher be used for analysis and evaluation of other class X or Z quality algorithms you are a class Z participant. In either case (3.1-class Y or 3.2-class Z), quality computation can be part of: — template generation (image in, quality and proprietary image out) o API to use (for quality computation):

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						convert_image_to_proprietary_template(), or – standalone (image in, quality out) o API to use (for quality computation) compute_quality_from_image_data() Therefore classes Y and Z use these APIs: if quality computation is part of template generation: convert_image_to_proprietary_template() and match_proprietary_templates(), otherwise compute_quality_from_image_data(), convert_image_to_proprietary_template() and match_proprietary_templates().

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						Hope this clarifies. Above text is added to section 8.
CAM/5	8			More generally, it would be helpful to understand the reason IQCE is allowing the options in each class and the approach IQCE will take to testing given those options. For example, why allow quality to be reported either from convert_image_to_proprietary_template() or compute_quality_from_image_data() for class Y? If both report quality, will both be assessed? Will assessments of speed rely on one rather than the other?		This is to support operationally relevant cases where quality is computed as part of template generation. Quality computation time for standalone quality (class X) and quality as part of template generation (class Y or class Z) will be reported separately.
CAM/6	8			Similarly, why make reporting quality optional for class Z?		Reporting quality is optional for class Z to be flexible and allow wider participation. Some organization may only have matching algorithm and some (specially academic institutions) may only have quality algorithm

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						and no matching capabilities. By allowing submitting only quality or only matcher or both, we are facilitating and encouraging a wider participation.
Iritech/ 2	8	4th column of Table 3 in page 11	ed	Typographic error	"A Class Y matcher" should be "A class Y matcher". "by ClassZ" should be "by class Z".	Accept
CAM/7	9.2 IQAA output	P. 12.3-5		This section states that quality computation shall be done on uncompressed iris images in one of two forms: raw (KIND_VGA); or centered and cropped (KIND_CROPPED). It also states that "To do the center-crop operation, the IQAA will need to find the iris center and crop symmetrically around it." This clearly suggests that the input image in the KIND_CROPPED case will not already have been cropped, but I find this surprising -- and at odds with the specifications in Section 14. Should the input parameter "kind" in convert_image_to_proprietary_template() (Table 8, p. 16-17) and		The plan was we/NIST do the cropping. Delete "To do the center-crop operation, the IQAA will need to find the iris center and crop symmetrically around it."

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				compute_quality_from_image_data() (Table 10, p. 19) be taken as an indication of the type of image being input or as an instruction about what action to take on the image before subsequent processing (i.e., center and crop or not)? Will these functions need to center and crop input images? Please reconcile these apparently contradictory messages.		
CAM/8	9.2	P. 12.20-22		The change dated Nov 25, 09 is unclear, possibly incomplete, and does not appear to have been implemented consistently in the rest of the document. I take this note as a response to Iritech/17 in the comments on draft 2 of IQCE. Iritech/17 seems to me to be making at least two separate points. First, that not all of the quality measures are monotonic (in their example, pupil-iris-ratio), so that the requirement that 0 represent the worst quality for the particular measure and 100 the best is not always possible. So 12.20-22 and subsequent discussions should also underline the relaxation of		We relaxed the 0-100 constrain for quality scores except the scalar quality (position 1 in quality vector). The intent is to report "raw" measurement instead of the normalized (to 0-100) range. Add this text 9.2.2: The 0-100 constrain on range of quality scores has been relaxed, for all quality metrics except the scalar quality (position 1 in quality vector). The intent is to report

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				the requirement for the elements of the quality vector to increase as a function of increasing quality, *if* that was the intention. Second, Iritech/17 pointed out that some measures (such as iris diameter) lose information when normalized to the range 0-100. This is conveyed in these lines, but not extended to all subsequent relevant sections. Is the intention to remove the constraint that all quality component measures be a monotonic function of quality for all elements of the quality vector -- or only pupil-iris-ratio -- or none? If the intention is to remove the constraint for all, won't that complicate analysis tremendously? Clarification, please.		"raw" measurement instead of the normalized (to 0-100) range. However, the constraint that quality component measures be a monotonic function of quality (that is the higher the better) for all elements of the quality vector, except pupil-iris-ratio, remains. For metrics listed in positions 1,3,5,6,7,10,11,13 of Table 4, quality component measure is clearly a monotonic function. To ensure the monotonic behaviour for other metrics: Positions 8, 9: It is expected that circular iris and pupil shape are the easiest to process, so closer to a circle should get a higher score. Position 12: less motion blur is desired so 254 – motion blur will be a monotonic function. Positions 15, 16: frontal is best, so

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						closer to frontal gets higher score. Positions 2,14, 17 depends on what will be computed by the SDKs.
Iritech/ 3	9.2	Page 12, line 21	te	Does "un-signed integer" mean 1 byte unsigned char or 4 bytes unsigned integer? If this is more than 1 byte, the type of quality_vector in the input argument of Table 10 needs to change. Also, doesn't this conflict with the statement in page 14, line 1? If this is unsigned char, in other words, in the range of [0,255], some quality metric in Table 4 have some problems in the range of values they can have. For example, what if iris size is greater than 255? If some quality metric is a mere value rather than a score, do you plan to test the performance of overall score only or all other metrics? If some quality metric is a mere value, it is questionable to test its performance. Since the 0-100 requirement is lifted, the caption		Change un-signed to non-negative. I should have written one-byte unsigned integer to avoid this confusion. We meant un-signed integer as a non-negative value. With 1 byte, the range for non-negative values, will 0-255. Changes iris diameter to iris radius in Table 4 (see CAM/10) Revised Table 4 caption (see CAM/9)

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				"The range of each metric shall be [0,100],…" in Table 4 needs to be changed.		
Iritech/ 4	9.2	Page 12, line 21	te	What is the range of "iris size" and "pupil-iris-ratio"? Since they are allowed to be un-signed integer, can they be in [0, 4294967295]? If they can be greater than or equal to 255, what about the convention of writing 255 for uncalculated quality value?		See Iritech/3 1 byte & non-negative => range is 0-255.
CAM/9	Table 4			"The range of each metric shall be [0,100]" should be "[0,254]."		Yes
CAM/1 0	Table 4			Note also that field 3, "Iris size (diameter in pixel[s])" should probably be changed to "Iris radius," because not all iris diameters will be less than 255 pixels (some were 372 in IREX I).		Yes – thanks changed accordingly
Iritech/ 5	9.2	Position 10 in Table 4	te	What exactly do you mean by "Margin"? Is this mere a pixel distance between iris boundary and its closest edge of image or a sort of score value measuring how good the margin is?		Margin is a measure of pixel distance between iris boundary and its closest edge of image. The intent is to quantify if there is enough margin (larger than 0.6R horizontally and 0.2R vertically per ISO/IEC 19794-6) for processing the image. If iris is cut, this metric

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						should be 0.
Iritech/ 6	9.2	Position 14 in Table 4	te	What is "magnification"? For the self-completeness of the document, it seems better to include the definition of that term.		Magnification of the lens It is the size (radius) of an iris image relative to the size of the iris creating the image. This is an iris acquisition covariate. It depends on the focal length and the distance from the lens to the object.
CAM/1 1	9.2.2 Vector quality	P. 13.1-2		"Each computed element of a vector quality shall be in the range of 0-100, where 0 means lowest and 100 means the best quality." This needs to be updated: 0-254; and not necessarily an increasing function of quality (if that was the intention).		changed 0-100 to 0-254. Add text re: monotonic. See CAM/8
Iritech/ 7	14.2.3	Page 16, line 24	te	What do you mean by "SDKs can choose to alter image"? Doesn't this conflict with "Quality score shall be computed … without any image alteration or manipulation" in line 23?		Quality metrics shall always be computed on unaltered images. However, template generation and/or matching algorithm may choose to alter the image. If image is altered, quality metrics shall be re-calculated for the

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						altered image and be reported in positions 32+n where n<32 is the position of quality metric computed on unaltered image. See CAM/12.
CAM/12	14.2.3	P. 16.23-25		"Quality scores shall be computed on the input image without any image alteration or manipulation. SDKs can choose to alter images. Their success in compensating for certain image impairments will be reflected in the matching accuracy. Participants are encouraged to disclose if and what image enhancements they perform." It is good that image alterations will be allowed, but reporting only the pre-alteration quality of an image may introduce a great deal of noise into any analysis of the relationship between measures of image quality and matching performance. For example, one could correct for deviated gaze		Agree that analysis of quality computation after alteration is useful. Make these changes: Add the following text: Quality metrics shall always be computed on unaltered images. However, template generation and/or matching algorithm may choose to alter the image. If image is altered, 1. SDKs should report if image has been altered or not. That could be an

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				and derive a new image that corresponded to what would be expected for on-axis gaze. In this case, for a badly deviated iris image, under current guidelines, one would have to assign a "gaze angle" score that is poor. However, given the successful correction for deviated gaze, matching performance with that particular image would be good, and the relationship between the "uncorrected" measure of "gaze angle" quality (and also overall quality) and performance for this SDK would be weakened. The incentive would then be to qualify the measures of "gaze angle" and overall quality, so that only images that cannot be "corrected" are given poor scores. That would have the result of improving the correlation between "matched" measures of quality and performance, but at the expense of interoperability -- the measures of quality would no longer predict the performance of others as well as they would have in the first situation. The overall utility of such quality measures for screening and such, would also suffer.		output parameter e.g. image_enhanced. 2. If image is enhanced, quality vector shall be re-calculated for the altered image and be reported in positions 32+n where n<32 is the position of (the standard) quality metric computed on unaltered image. Any proprietary quality metrics (position 32-64) should be in positions

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				If there are many instances where corrections of this or other sorts are performed by SDKs submitted to IQCE, the relationship between quality and performance could be substantially clouded by noise. At the least, I would have thought that if an alteration is performed on an image, this should be indicated (and indicated for each image). You may need to exclude those instances from analysis to get a "bedrock" picture of the relationship between quality and performance. I don't think you should rely on merely encouraging participants to disclose what enhancements they perform. (A statement from participants that "some images were subjected to alteration" won't help you sharpen your analysis.) I would also like to see the reporting of an additional post-alteration quality (score and vector components) allowed/encouraged for those images that are altered.		

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Iritech/ 8	14.2.8	Output parameters in Table 11	ed	Typographic error	"dilation, OR null string" should be "dilation, or null string".	Accept
Iritech/ 9	14.2.4	Table 8	te	Is the pointer "image_data" in prototype a pointer to uncompressed raster data or image record K1, K3? In IREX I, image record K1 or K3 contains headers with a raster data in it. It seems better to make clear the meaning of image_data in the prototype.		Image_data is a pointer to uncompressed raster data, no header.

1 **Type of comment:** **ge** = minor general **Ge** = major general **te** =minor technical **Te** =major technical **ed** = minor editorial **Ed** = major editorial. (Take care of Word changning **te** to **Te** etc.

NOTE 1 Columns 1, 2, 4, 5 and 6 are compulsory. If column 4 is **ge**, use **ge** in column two also (and leave column 3 blank) if it applies to the whole document.

NOTE 2 NBs should not change the width of columns, in order to make merging easier.

Note 3 **Please submit this document in .doc format and NOT .pdf**