Q/A: Purchase of multispectral imaging system for the Royal Danish Library's Digitization Department

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|  | **Question** | **Answer** | **Vendor**  |
| 1 | The new and revised call for tenders notes in Section 3 that the Royal Danish Library will base the award on the “best relationship between price and quality.” The Public Procurement Act General Provisions note “when the award criteria best price-quality ratio is used, the tender shall be based on sub-criteria” and “a contracting authority shall state its weighting of the stipulated sub-criteria.” | This tender is not regulated by The Public Procurement Act.As stated in the tender, the Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 1.1 | What stipulated sub-criteria will be used by the Royal Danish Library in determining the best price-quality ratio based on the requirements? | As noted above there are no sub-criteria. |  |
| 1.2 | What are the sub-criteria for this tender that will be weighted by the Royal Danish Library, including for technical value, functional characteristics, availability, and innovation characteristics? How will the sub-criteria each be weighted and/or prioritized by the Royal Danish Library for quality and price? | As noted above there are no sub-criteria. |  |
| 1.3 | What international or national standards, European Technical Assessments or similar will the Royal Danish Library use to weigh “quality” criteria? (e.g. ISO 9001:2015 or other ISO standards, EU standards, KB quality control plan, quality matrix, etc.) | As noted above there are no sub-criteria. |  |
| 2 | The revised call for tenders requires the system “enable capturing comprehensive technical, descriptive and administrative metadata.” |  |  |
| 2.1 | What are the Royal Danish Library, International, European and/or Danish National standards that will be used as criteria for assessing the quality of the digital image Technical metadata? The Administrative metadata? The Descriptive metadata? | As stated in the tender, systems capable of providing comprehensive standardized metadata, including Exif and IPTC will be preferred. Suppliers are invited to present their systems and describe what relevant metadata their system can capture. |  |
| 2.2 | What criteria and methods will be used by the Royal Danish Library for weighting the quality of the capture of metadata and how it is enabled? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 3 | The revised call for tenders cites the system requirement “to capture and temporarily store images and metadata in an effective and efficient way.” |  |  |
| 3.1 | What criteria and methods will be used for evaluating capture and storage quality? | Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 3.2 | How will “effective and efficient” be evaluated and weighted as part of the quality and price relationship? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 4 | The camera should have a monochromatic back |  |  |
| 4.1 | In view of the competition rules within the EU, we consider the limitation to the use of a monochromatic back as an inadmissible restriction to a specific multispectral imaging technique that is not justified by qualitative criteria or the state of the art in sensor technology.Monochromatic backs have been used in common procedures for multispectral imaging that have been developed at a time when color sensors in an adequate quality and resolution have not been available. Extensive testing with well-known users (e.g. Herzogin Anna Amalia Library, Fraunhofer etc.) has shown that the use of the latest generation of color sensors with improved demosaicing methods provides significant benefits in similar applications in productivity, quality and handling such as:* The desired spectral range can be generated and displayed with less captures.
* Improved analysis options due to finer scaling within the different spectral ranges.
* A true color capturing result can be created from the original using the same camera and illumination system. Thus additional information will be available when analyzing the spectral images.
* Significant higher performance and return.

Would procedures be accepted using a color sensor when achieving verifiably better results and benefits in handling? | Yes, we will consider alternative solutions based on color sensors. |  |
| 5 | Questions concerning the weighting of the requirement specifications.The tender documents are state that within the assessment will be given to the following criteria:1. Price 30%2. Quality 70% |  |  |
| 5.1 | Referring to this we would like to ask you to provide us with more detailed information on the following:* Price

Under which rules/ methods the award of points regarding the price will be performed in the assessment?* Quality

Please kindly provide us with more detailed information what will be the weighting for the following requirement specifications in this category | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 6 | The revised Call for Tenders reduces the minimum resolution requirements for the multispectral imaging system. Imaging of materials that are either larger than A3 size or that are captured atresolutions of 600 pixels per inch using a camera format of 50 megapixels will require that stitching of captures be performed to construct full images from the captured image segments. Is the purchase of processing software used to carry out image segment stitching and the training of operators to perform the detailed manual operations required by this software within the scope of this Call for Tenders? | The Royal Danish Library will prefer systems with a high resulting resolution, and this might be possible with stitching of images. In case stitching is essential for a given system, the presence of this functionality in the software would be preferred. |  |
| 7 | The revised Call for Tenders states a requirement that:11. The system should enable automatic focus compensation between bands.Does this requirement specify that the lens provided with the multispectral imaging system include autofocus capabilities, or does this requirement specify software means alone for improving image focus after capture? | The Royal Danish Library is looking for a solution where issues due to different focus distances is handled well. If a software solution leads to good results when compared to optical solutions, this will be acceptable. Autofocus is not a requirement in itself, but the capability of handling different focusing distances as a function of different frequency bands is desired.  |  |
| 8 | The new Call for Tenders states: “The main purpose of the multispectral imaging system is to capture multispectral images of degraded documents to enhance (reveal) text, images and othertypes of ‘hidden’ information’” and removed mention of processing images. The quality of the output from any multispectral imaging system is dependent on the ability to produce multispectralimages that meet the varied requirements and visual acuity of readers and researchers by digitally combining captured images to reveal spectral features not visible in individual capture images. |  |  |
| 8.1 | Where and how will Royal Danish Library digitizers and/or researchers view and digitally manipulate and enhance the multispectral images from the system to meet their individual user needs and visual acuity? | The Royal Danish Library prefers a system capable of displaying and processing (manipulating, enhancing etc.) the captured information. Alternatively, the library will use Photoshop, Image J and other open source software. |   |
| 8.2 | How will the Library evaluate the quality of the system workflow that includes the integrated digital processing software, training and user functionality as effectively used in multispectral imaging systems? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 8.3 | What are the call for tender criteria and quality standards for enhancing or revealing hidden information and how will they be evaluated for quality? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 8.4 | Does the Library require the ability to make system images available in standard form for later processing by scholars, conservators and scientists for their analysis and research? | Yes, depending on the use-case The Royal Library envisions to provide some users with stacks of individual spectral images for further processing, and others with one or more processed image. |  |
| 9 | The new call for tenders cites a system requirement to capture multispectral images of “reflective materials.” There is no mention of capturing fluorescence from imaged materials, which has proven to be a key component of multispectral imaging of the archive and library manuscripts and palimpsests cited in the tender call. |  |  |
| 9.1 | Does the Library plan to evaluate the capture of fluorescence emissions as part of the system quality and workflow? | Yes, we will consider the possibility to capture fluorescence. |   |
| 9.2 | How will the capture of fluorescence in objects such as parchment materials with the multispectral imaging system be addressed in evaluating image quality? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 9.3 | Are there requirements for the purity or consistency of filters used for fluorescence imaging (Wratten 2ndary IR TX bands)? | No specific requirements, but The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 10 | The new call for tenders removed requirements to process images and focuses on capture of images in “an effective and efficient way.” The lack of processed of multiple images implies a systemrequirement for single-image or “mono-spectral” viewing or visualization. |  |  |
| 10.1 | How does the Library and its users intend to only use the captured images to reveal hidden information? How will the quality of this individual capture image output be evaluated? | The Royal Danish Library intends to use the software provided by the vendor with its possibilities, in addition to Photoshop, Image J and other open source software.The quality of the individually captured images will be evaluated by the quality of the individual images, and the resulting combined picture.  |  |
| 10.2 | What are the criteria for “effective” and “efficient” capture? Which has higher priority? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 10.3 | How will the quality of “effective” and “efficient” capture be evaluated and prioritized? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 11 | The new call for tenders cites the need to enhance and reveal information in images from the system. |  |  |
| 11.1 | What are the quality standards for weighing and evaluating the ability “to enhance (reveal)” hidden information. | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 11.2 | How will the production of color and stitched images as output be addressed in the quality evaluation? Processed images to better reveal hidden information? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier.Reproduction quality is a factor, although usability of the individual color bands will weigh higher. Stitching quality will be evaluated within the general image quality.  |  |
| 11.3 | How will the Library and its researchers use color, stitched and other images from the multispectral system as part of this enhancing and revealing of hidden information? How will their needs be addressed in quality evaluation? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier.  |  |
| 11.4 | Are there any disabled access requirements or other viewing and functional requirements to meet the needs of all users? | Disabled access means will be considered in the evaluation. |  |
| 12 | The new call for tenders cites the potential for testing and sets a high priority on Quality criteria for evaluation: | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier.Testing will only be required if the documentation submitted by the supplier is not comprehensive. |  |
| 12.1 | What is the quality test plan to be used by the Royal Danish Library during testing of all systems and system acceptance of the accepted system? | See Answer 12. There is no quality test plan. |  |
| 12.2 | Which specific technical systems sub-criteria and qualities will be taken into account when the Royal Danish Library evaluates tenders, specs and during testing and weighs criteria? | See Answer 12. Sub-criteria are not defined. |  |
| 12.3 | What will the Royal Danish Library use as a test suite of samples/matter to be imaged for evaluating the quality during testing and system acceptance? | See Answer 12. There is no test suite of samples/matter. |  |
| 12.4 | What are the target average performance requirements, criteria and weighting for acceptable readability, visibility of watermarks, others? | See Answer 12. |  |
| 12.5 | Will the testing during the acquisition evaluation be a “fly-off” testing of all the Suppliers’ systems against specific criteria? What are the criteria and how will they be weighted? | See Answer 12. |  |
| 13 | The new call for tenders includes detailed requirements for lights including “filters, diffusers, stands, cables, power supply etc.”, “a wide and controllable range of frequency bands” and “individual light bands.” This combines requirements for a specific type of multispectral system with the broader functional requirements “to capture multispectral images.” There are multiple methods for collecting multispectral images, including with narrowband illumination, filtering and combinations of methods. |  |  |
| 13.1 | With these lighting requirements, is the Royal Danish Library requesting tenders for only a specific type of multispectral imaging system (narrowband, filtering, etc.)? Specific types of lights (narrowband, broadband, etc.)? | The Royal Danish library does not limit this tender to specific types of multispectral imaging systems, but will evaluate the systems based on specs and any references submitted by the supplier |  |
| 13.2 | Can additional description be provided of the desired multispectral imaging method that is sufficiently precise to enable suppliers to identify the required system? | No. See answer to 13.1 |   |
| 13.3 | Is the KB looking for a specific type of lights with these lighting requirements? | No.  |   |
| 13.4 | What criteria will be used to evaluate the quality of the lights? How will they be weighed? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 14 | The new call for tenders stipulates requirements for “functionality of the multispectral imaging system,” as well as very specific technical requirements that must be fulfilled. It stipulates inclusionof “(Annex 1A) concerning the functionality of the multispectral imaging system,” but Annex 1A includes multiple technical requirements and specifications. |  |  |
| 14.1 | How will the functional requirements be prioritized and weighted against the technical requirements in determining “quality”? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 14.2 | Which will take priority in evaluation of the multispectral imaging system: 1) system functionality or 2) the ability to meet the technical requirements? How will these be weighted in evaluation of quality and price? | See answer 14.1 |  |
| 14.3 | What criteria will be used to evaluate quality and price in fulfillment (or partial fulfillment) of functional requirements? Technical requirements and specifications? | See answer 14.1 |  |
| 15 | The new call for tenders notes the system “should minimize the amount of UV and IR radiation received by the originals before and after exposure.” |  |  |
| 15.1 | Since UV and IR radiation “before and after exposure” are dependent on ambient light during handling and positioning (not exposure from the narrowband illumination, which are only on during exposures), what is the illumination in the room when the imaging will take place? | The illumination in the room will be handled according to the actual requirements of the system. If capture sequences requires the absence of either UV or IR, this will be handled in the room. No light sources will be used while capturing the multispectral images.  |  |
| 15.2 | Does this refer to laser beams or other potentially damaging light sources? | Yes, it refers to all damaging light sources. |  |
| 16 | The new call for tenders notes the system “must support careful handling of fragile materials.” It also notes the system excludes the camera stand, which has the greatest impact on the handling of materials to be imaged. |  |  |
| 16.1 | Is the system intended to include additional camera stand fixtures and object holding capabilities to “support careful handling of fragile materials”? If so, what camera stand will be used? | We will use a Kaiser stand. |  |
| 16.2 | Does this imply a requirement for a book cradle or other material handler with the multispectral system? | No, we have book cradles. |  |
| 17 | The new call for tenders notes the system “computer” is required to “temporarily store images and metadata.” |  |  |
| 17.1 | What period of time (or how much data accumulation) is meant by “temporarily”? | Please provide a computer solution that matches the requirements of the proposed multispectral imaging system. |  |
| 17.2 | What is the requirement for transferring the data to permanent storage from storage “temporarily” on the computer and therefore for storage capacity on the computer? Which Royal Danish Library computer interface specifications apply for the transfer of data from the computer? | Please provide a computer solution that matches the requirements of the proposed multispectral imaging system. The Royal Danish Library has not preferences for specific types of computers or solutions for transferring the data.  |  |
| 17.3 | What type of computer is preferred for ease of use by Royal Danish Library personnel? Laptop or desktop? Mac, PC? If Windows, what version of Windows? | Please provide a computer solution that matches the requirements of the proposed multispectral imaging system. The Royal Danish Library has not preferences for specific types of computers. |  |
| 17.4 | Is there a Royal Danish Library computer and/or quality standard and criteria that must be met? How will this be weighted in testing and evaluation? | No. The Royal Library will use the most optimal computer for the system, and is not dependant upon specific brands or types of computers. |   |
| 18 | The new call for tenders includes separate requirements for “high dynamic range” and “low noise.” |  |  |
| 18.1 | Since image quality is dependent on the camera sensor size and bit depth, how will different camera sensors dynamic range signal to noise ratio be validated? | The Royal Danish Library will award the contract based on an evaluation of the multispectral system’s specs and any references submitted by the supplier. |  |
| 18.2 | Although “low noise” is a separate requirement, can we assume the Library is referring to electronic or optical noise and not audio noise? | Low noise refers to image noise, which may be electronic and/or optical.  |  |
| 18.3 | How will these requirements be prioritized and weighted in determining “quality”? | See answer 18.1 |  |
| 19 | The new call for tenders cited the requirement to set up the system in the “Customer’s studio,” but makes no mention of the imaging facilities and the space available for the camera, lights and diffusers. Compact digitization and multispectral systems are frequently desired to minimize the facility impact. |  |  |
| 19.1 | What size is the imaging suite in which the Library intends to set up and operate the multispectral system. | 20 m2 |   |
| 19.2 | What level of darkness can be achieving in this imaging area? | Dark. Blinded windows. |  |
| 20 | The tender currently states a Minimum Requirement of the multispectral system is:"1.   The camera should have a monochromatic back"Your Answer 4.1 to Question 4 and 4.1 (below) differs with this requirement, stating: "Yes, we will consider alternative solutions based on color sensors." Given this significant implied change in technical requirements, when will the 7 February tender be revised to eliminate Requirement 1? | 7 February tender will not be revised, but our answer to question 4.1 will open up the call for solutions based on color sensors.  |  |