GAMMA CAMERA, PET SCANNER and DATA PROCESSOR SYSTEM TENDER QUESTIONNAIRE – PART A Introduction and Summary of Need

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Contents

Preface and Acknowledgements

The production of this document started in June 1996, at the behest of the Council of the British Nuclear Medicine Society (BNMS). Several departments were kind enough to let the authors have copies of their purchase tender documents, which was extremely helpful in producing a first draft.

Subsequently, several experienced physicists sent detailed comments on the early drafts, and there was a collective response from the IPEM Radionuclide Special Interest Group. Particular thanks are due to Dr W B Tindale, Mr C P Wells, Dr E D Williams, Dr A Mackie, Mr G McGill, and Dr R Bessent.

Manufacturers were contacted through the BNMS Manufacturers Group, and comments were received from: CIS UK Ltd, Elscint GB Ltd, Link Medical Ltd, Nuclear Diagnostics Ltd, Park Medical, Picker International Ltd, and Toshiba Medical System Ltd.

The above efforts culminated in the first official release of version 1.0 of the questionnaire in October 1996. BNMS Council wishes to recognise the work of Mr G Hart, Prof P Jarritt and Mr P Cosgriff in the production of the original document.

A further revision (Version 2.0) was produced in August 1997, based mainly on comments received from users and manufacturers who had actually used version 1.0 in the procurement process. An addendum for Gamma Camera PET was added in April 2000 which was prepared by Dr D Visvikis, Dr T D Frier and Prof P Jarritt. It should be noted that the inclusion of Gamma Camera PET recognises that some departments may wish to consider the technique as part of their local requirements. It does not represent an endorsement by the BNMS of Gamma Camera PET as an alternative to dedicated PET imaging in all clinical applications.

This latest revision (Version 3.1), produced in October 2003, recognises the split between acquisition systems and data processing systems, since some centres may wish to tender for a gamma camera only or a data processing system only. Special thanks are due to Dr G Davies and Prof J Fleming for their contributions. Version 3.1 has been edited by Mr S Chandler and Prof R Lawson.

In April 2004 the scope of the document was extended to include dedicated PET and PET/CT systems. The specification for this, written by Dr D Visvikis and Prof P J Jarritt, was incorporated as a new part E. Minor revisions to part A (version 3.1.4) were made to take account of this.

The document has been produced after consultation with the IPEM Special Interest Group in Nuclear Medicine.

Introduction

The purpose of this document is to standardise the tender questionnaire part of the gamma camera and PET scanner procurement process. Standardisation brings three main benefits:

- It assists purchasers who may be inexperienced in the procurement of such complex equipment.
- As the questionnaire becomes widely adopted, it prompts manufacturers to improve their systems in line with the stated or implied requirements. Understandably, manufacturers have been reluctant to embark on developments based on the views of only one or two centres.
- It drastically reduces the work required by suppliers in responding to individual tender documents (which vary greatly in both content and format) since the responses to this standard questionnaire can be kept on computer and produced on demand.

The document is intended to be modular, so that each part may be used separately or in conjunction with others. For example

- Part B can be used on its own for the purchase of a gamma camera and acquisition computer only.
- Part C can be used on its own for the purchase of an image processing system to be connected to an existing gamma camera.
- Parts B and C can be used together for the purchase of a gamma camera with acquisition and processing workstations.
- Parts B and D can be used together for the purchase of a gamma camera with PET capability.
- Part E can be used on its own for purchase of a dedicated PET or PET/CT scanner.

1 The Tender Process

It is essential to view the role of the technical specification in the wider context of the procurement process. The basic steps of the procurement process are as follows:

1.1 Produce detailed business case.

1.2 Secure required funding.

1.3 Write a Summary of Need (SON) – see section 2.

1.4 Advertise (using SON) in the European Journal.

1.5 Obtain and analyse Expressions of Interest.

1.6 Organise demonstration visits, involving physicist, technologist and clinical staff as appropriate.

1.7 Organise pre-tender meetings with selected suppliers.

1.8 Issue tender documents, including relevant parts of this questionnaire, along with standard NHS Supplies questionnaires (re: contractual arrangements, layout of price schedule, etc).

1.9 Evaluate received tenders.

1.10 Make recommendation to Trust Board.

1.11 Award winning tender.

1.12 Order system.

1.13 Contact unsuccessful suppliers to advise of outcome.

1.14 Organise any necessary pre-installation work.

1.15 Undertake acceptance testing on delivery.

1.16 Authorise payment, assuming system passes acceptance tests.

2. Notes for users

Users who have not been through the procurement process before may feel that it seems long and daunting. Hospital Trusts will have a supplies department who will usually organise the process, so no attempt will be made to describe each step in detail here. However, a few issues are worth highlighting.

The business case obviously needs to include a reasonably accurate estimate of cost, since this figure will form the basis of the cost/benefit analysis. Current list prices provide a reasonable guide to the sum to bid for, but a sum should be added for expected inflation if the purchase is not expected for some time. VAT should be *included* in the estimate since this may be assumed if not explicitly stated.

Users should guard against underestimating the final costs, since it may prove difficult or impossible to obtain additional funding at the tender stage. It is likely that the user will also be asked to explore the costs of leasing the equipment (subject to Treasury guidelines) as an alternative to outright purchase. Also, the Government wish to see the private sector helping to finance capital schemes in the public sector, including the NHS - the so-called private finance initiative (PFI). The Supplies Manager or Director of Finance will be able to provide advice on these issues.

The main purpose of the tender exercise is to enable the degree of matching of system features and user requirements to be objectively assessed, so the associated documentation must facilitate this. A questionnaire is the obvious format for such documents [1], and the questionnaire has now been formatted in tabular form to allow easier comparison of relevant sections.

Previous versions of this questionnaire included a minimum specified requirement (indicated in square brackets) for some questions. The values included were only intended to be a guide, and so users were encouraged to change the minimum specification to suit their own local requirements. However suppliers' responses often overlooked these changes as they tend to have a prepared response to the standard questionnaire. The minimum specified requirement has therefore been removed in version 3.0. Where users have a minimum acceptable value for any parameter this should be specified in a separate document which cross references the question number in this questionnaire.

Where possible questions are phrased in such a way as to elicit a response that can be scored in some way (e.g. Yes, No, or a numerical value). An attempt has been made to avoid open-ended questions for obvious reasons. Generally questions are phrased such that a 'Yes' response is good and a 'No' response is not so good, but this is not always possible as user requirements will be different. Different weightings will inevitably be appropriate for responses to different questions, so a scoring system must be decided in advance. Subject to such (locally determined) weightings, the number of 'Yes' responses would thus provide a first order measure of compliance. The usual practice of classifying requirements as 'essential' or 'desirable' has been avoided, since a desirable feature to

one user may well be essential to another. Rather, the questionnaire concentrates on identifying which questions to ask, and how to ask them. Of course, we cannot guarantee that we have thought of every relevant question, and purchasers may wish to add their own questions to deal with local requirements. It is essential that any such local user questions must be placed in a separate part of the document (Part F). **The standard questions shown here in Parts B, C, D and E should not be changed in any way by users or by suppliers.** To prevent accidental changes to the questions the documents are protected.

Users may find it helpful to compare responses from several suppliers by copying answers into their own document. In order to do this the document protection must first be removed, using 'Tools', 'Unprotect document' (there is no password). Then all the answers in a section can be copied by highlighting the right hand column and selecting 'Edit', 'Copy'. These may then be pasted into a table in another Word document or into cells in an Excel spreadsheet.

The purpose of pre-tender meetings is to make the formal part of the tender process (i.e. the actual exchange and evaluation of tender documents between purchaser and supplier) as short and straightforward as possible (typically 4-5 weeks). Prior to the meeting, the departmental representative(s) and the Trust's Supplies Manager should decide the key issues which need discussion and clarification at this preliminary stage. Indeed, from a purely practical point of view, it is essential to concentrate on a subset of issues if the meeting is to be completed in a reasonable time (1-2 hours).

The meeting with each short-listed supplier would normally involve, as a minimum, the supplier's Sales Manager, the Trust's Supplies Manager, and one senior representative (usually the most senior physicist) from the nuclear medicine department. More typically, the department would be represented by a physicist, technologist and clinician (radiologist or nuclear medicine physician). The Supplies Manager will probably have considerable experience in handling such meetings, so it makes sense for him/her to explain the agenda to the supplier and to maintain overall control of proceedings.

Any relevant issues can be freely discussed at this pre-tender stage, *including* prices, so it is an ideal opportunity to discuss special deals, buy-back schemes, etc. It is not uncommon for suppliers to raise issues which prompt the user to add new questions to the local requirements (Part F) of this questionnaire. It is emphasised that no negotiation should take place after the formal tender documents have been issued. At the completion of the pre-tender meeting, the supplier will have a good idea of the content of the final tender questionnaire, which should facilitate a speedy response. The user will also have a good idea of what each supplier can offer, at approximately what price. In this way, the formal tender is essentially a *confirmation* of the outcome of the pre-tender meeting, which is of course confidential.

If, after careful analysis, the user decides to recommend the purchase of a system which is not the cheapest, he/she will need to write a convincing justification if it is to be supported by the Supplies Manager, and subsequently approved by the Trust Board.

With regard to acceptance, the tests to be undertaken must be declared at the time of the tender exercise, as must the implications of test failure

on contractual arrangements (i.e. payment terms). Different users will have different features that they wish to make sure are working prior to payment, so detailed prescription in this document is inappropriate. However, there has been pressure from users to include some general guidance with regard to acceptance testing.

As far as *basic* testing of the gamma camera and computer are concerned, the reader is referred to the current IPEM recommendations [2]. If connection to another computer network is specified, it is strongly recommended that a realistic test of this connection is included, which should include a verified transfer of data. Whichever subset of the system specification is chosen for acceptance testing, the purchaser should undertake to complete these tests within a reasonable time (i.e. around 3-5 working days) of system hand-over, which should not be agreed until the initial on-site user training has been completed. All these details should be clearly stated in the contract terms.

Regarding image file formats and data transfer (Part B, section 4.5 and Part C, section 5.2) the DICOM 3 medical imaging standard has widely been adopted and a statement on conformance is required. Although NHS IT standards [3] are primarily aimed at hospital IT managers, they will also be of interest to nuclear medicine staff writing gamma camera/computer specifications.

Finally, it is important to consider the anticipated whole life costs, which means paying close attention to maintenance. In Part B, section 6.1 we have proposed some specific questions, but have also recommended that the supplier be asked to provide details of standard maintenance contracts. It is important to determine the likely costs for years 2-5 especially and, for ease of comparison, suppliers should be asked to quote a formula based on the so-called headline RPI (e.g. annual price increase = RPI +/- x%).

It is also worth enquiring about possible cost savings associated with buying future years maintenance at the time of purchase. If this is considered, it is crucial to establish what would happen if the supplier ceased trading altogether or pulled out of the nuclear medicine market. Clearly, such agreements should not be entered into unless (a) the purchaser considers the risk of the supplier being unable to honour the contract to be negligible or (b) the supplier's liabilities under the contract are underwritten (i.e. guaranteed) by a third party. In any event, it is not recommended to purchase more than 3 years maintenance (years 2-4) in advance.

3. Notes for suppliers

For a system to be considered in the tendering process, attention must be given to full completion of all questions in the relevant parts. Part B must be completed for all gamma cameras and associated acquisition systems and Part C for all processing systems. In addition Part D must be completed for systems requiring gamma camera PET capability. Only Part E need be completed for tenders for dedicated PET or PET/CT systems.

The right hand column in each tabular section contains response boxes for the supplier's answer to each question. Suppliers may either print this

document and write their answer in the response box, or open it in Word format and enter answers straight into the boxes.

Suppliers must not alter the questions in any way and should not type anywhere other than in the response boxes. In fact the documents are protected to prevent this happening accidentally. It is therefore only possible to type into the shaded areas within each response box. These will expand to fit more information as it is typed. If really necessary, the protection can be removed (there is no password) in order to change the width of columns. It will also be necessary to remove protection if suppliers wish to paste a complete column of answers from another document. Users are also instructed not to change the wording of existing questions or to add extra questions to Parts B, C, D or E, so suppliers may safely keep a standard response to each part of the questionnaire for each item of equipment that they supply. Users are instructed to add any local questions in a separate part F, and suppliers should take careful note of these questions and respond individually to them.

For many questions the appropriate response may be simply 'Yes' ('*Y*'), or 'No' ('*N*'). However additional information may be included in the response box if it will fit. If you also wish to refer the prospective purchaser to supplementary information that will not fit within the box, you may respond 'See supplementary information' ('*S*') in addition to '*Y*' or '*N*' and include the supplementary information either at the end of the document or in a separate document. Such supplementary information should keep to the numbering system used in this questionnaire. If none of the responses are appropriate, please write '*NA*'.

Numerical values should be given where appropriate: (eg for part B question 2.2.2 Specify the thickness of the crystal (mm), the response might be '9.5')

If a feature is available, but only as an extra cost option, the response should clearly indicate this by added the abbreviation *'ECO'*. The option name or manufacturers item code that must be purchased to provide this feature should also be given. This is so that users can easily verify whether or not this option has been included in the tendered system.

Answers should only be given against items or functions which are currently available with the system. Any features which are in development should be clearly marked as such, with an estimate of when the features will be available.

Adequate supporting information should be included where appropriate. Such supporting information should be cross-referenced to the section in the response.

It is recognised that there may be some duplication of information requested where a supplier is tendering for both data acquisition and processing systems. In such cases, it is permissible to refer to answers already provided in Part B when completing Part C, but suppliers must ensure that the questions and answers are indeed the same. For example the hard copy capabilities of acquisition and processing systems may be different. If suppliers are tendering for processing systems only then they must complete Part C in full.

4. Notes for future editors

It is hoped that this document will continue to evolve as new features become available. This means that further versions will in due course be produced by new editors. In order to assist editors to maintain a consistent style the documents have been created using several user defined styles. Editors should read the hidden notes on the first page of Parts B, C, D and E which explain how these styles are intended to be applied. These notes are written as hidden text and so are only visible on screen if the hidden text check box is ticked under 'Tools', 'Options', 'View', or the 'Show/Hide' paragraph marks option is set to on. These instructions will never print unless the option to print hidden text is set to on.

5. References

5.1 Wells CP, Buxton-Thomas M. Gamma camera purchasing. *Nucl Med Comm* 1995; 16:168-185.

5.2 IPEM Report 86. *Quality Control of Gamma Camera Systems*. Ed Alison Bolster, Institute of Physics and Engineering in Medicine, York, 2003.

5.3 NHS IT Standards in Procurement, Version 6.0. NHS Information Management Group, 2000.

6. Abbreviations

2-D:	Two dimensional
3-D:	Three dimensional
ACC	American College of Cardiology
ADC:	Analogue-to-digital converter
AVI:	Audio video interleave
BS:	British standard
CD:	Compact disc
CD-ROM:	Compact disc read only memory
CFOV:	Central field of view
COST:	(European) cooperation in the field of scientific and technical research
CPS:	Counts per second
CPU	Central processing unit
CRT:	Cathode ray tube
CT:	Computed tomography
DICOM:	Digital imaging and communications in medicine
DMSA:	Dimercaptosuccinic acid
DPI:	Dots per inch
DTPA:	Diethylenetriaminepentaacetic acid
DVD	Digital versatile disc

EC:	European commission
ECG	Electrocardiogram
ECO	Extra cost option
ERPF:	Effective renal plasma flow
FORE:	Fourier re-binning
FWHM:	Full width at half maximum
FWTM	Full width at tenth maximum
GFR:	Glomerular filtration rate
GIF:	Graphics interchange format
HIS:	Hospital information system
HMPAO:	Hexamethylpropyleneamine oxine
HSA:	Human serum albumin
IEC:	International electrotechnical commission
IPEM:	Institute of physics and engineering in medicine
ISDN:	Integrated services digital network
ISO:	International standards organisation
IT:	Information technology
JPEG:	Joint photographic experts group
LAO:	Left anterior oblique
LCD:	Liquid crystal display
LEGP	Low energy, general purpose
LVEF:	Left ventricular ejection fraction
MAA:	Macro aggregated albumin
MAG3:	Mercaptoacetyltriglycene
MBq:	Mega-Becquerel
MIBI:	Methoxy isobutyl isonitrile
MRI:	Magnetic resonance imaging
MSRB:	Multiple slice re-binning
MUGA:	Multiple gated acquisition
NEC:	Noise equivalent counts
NFS:	Network file system
NHS:	National health service
NEMA:	National electrical manufacturer’s association
OIH:	Ortho-iodohippurate (hippuran)
OSI	Open systems interconnection
PC:	Personal computer
PET:	Positron emission tomography
PFI:	Private finance initiative
PHA:	Pulse height analyser
PM:	Photomultiplier
QC	Quality control
RBC:	Red blood cells
RGB:	Red green blue

RIS:	Radiology information system
ROI:	Region of interest
RPI:	Retail price index
SON:	Summary of need
SPET:	Single photon emission tomography
SSRB:	Single slice re-binning
TCP/IP:	Transmission control protocol / internet protocol
UFOV:	Useful field of view
VAT:	Value added tax
WORM:	Write once, read many

Summary of Need

The following is an example of a format that may be used for a typical Summary of Need.

Name and address of the department to which the equipment is to be supplied.

Name and contact details of the person responsible for preparing the technical specification, and to whom any technical queries should be addressed.

Either: The requirement includes a gamma camera with data acquisition system only / gamma camera with acquisition and processing systems / processing system only* with / without* hard copy device(s).

Or: The requirement is for a PET scanner with / without* built in CT with / without* hard copy device(s).

Gamma camera*

The requirement is for a single / dual / triple* head gamma camera with data acquisition system.

The requirement is to connect to the existing (……) data processor*

Suppliers should provide a copy of their standard response to Part B of the BNMS Gamma Camera Tender Questionnaire version 3.1.

The gamma camera system should be capable of:

static, dynamic & gated planar data acquisition / processing

whole-body imaging*

SPET acquisition / reconstruction / processing*

PET acquisition / reconstruction / processing* (Suppliers should provide a copy of their standard response to Part D of the BNMS Gamma Camera Tender Questionnaire version 3.1.)

Transmission attenuation correction*

The annual workload expected of the gamma camera is as follows:

n1 static / whole body* bone studies*
n2 lung ventilation/perfusion studies*
n3 myocardial perfusion studies*
n4 cardiac MUGA studies*
n5 SPET studies*

n6 renograms*
n7 other dynamic studies*

Data processing system*

The requirement is to connect to the existing (……) gamma camera*

Suppliers should provide a copy of their standard response to Part C of the BNMS Gamma Camera Tender Questionnaire version 3.1.

PET Scanner*

The requirement is for a dedicated full-ring PET scanner with data acquisition system.

The system should include a separate processing system*

The requirement is to connect to the existing (……) data processor*

Suppliers should provide a copy of their standard response to Part E of the BNMS Gamma Camera and PET Scanner Tender Questionnaire version 3.11.

The PET scanner should be capable of:

PET acquisition / reconstruction / processing *
PET / CT acquisition / reconstruction / processing *

The annual workload expected of the PET scanner is as follows:

n1	whole body FDG scans
n2	total body FDG scans
n3	myocardial metabolism studies - FDG
n4	cardiac perfusion studies – $^{13}NH_3$
n5	neurology FDG studies
n6	other FDG studies
n7	other short lived tracers

Hard copy*

The requirement is for a hard copy device to produce monochrome film / colour film / colour prints / paper prints*

Shortlist to be prepared by: …….*date*

Cameras to be viewed by: …….*date*

Last date for system installation: …….*date*

* delete as appropriate