



# QCIF Technology Diffusion Project Progress Report 6, November 2007

## 1. Project Identification

### 1.1 Administering Organisation

The University of Queensland
------------------------------

### 1.2 Project Title

Improved Breast Cancer Detection Enabled by Rapid Visualisation of Suspicious Lesions in DCE-MRI of the Breast
--

### 1.3 First-named participant

<i>Name</i>	Dr Andrew Mehnert
<i>Email address</i>	<a href="mailto:mehnert@itee.uq.edu.au">mehnert@itee.uq.edu.au</a>
<i>Telephone</i>	3365 8312

### 1.4 Other participants

<i>Name</i>	<i>Institution</i>
Dr Stephen Wilson	The University of Queensland
Prof Stuart Crozier	The University of Queensland
Dr Kerry McMahon	Queensland X-Ray
Mr Dominic Kennedy	Queensland X-Ray

## 2 Project Description and Objectives

### 2.1 100 Word Project Summary

<p>The large quantity of data acquired during a breast MRI examination is difficult for clinicians to review and the cost of missed or incorrect detection of cancerous lesions is high. This project will develop software for visualising dynamic contrast-enhanced MRI data of the breast as a colour-coded volume that can be used in the routine clinical setting to identify regions of suspicious enhancement with greater accuracy and speed than can be achieved by current practice. Parallel and grid-based supercomputing will be investigated for the purpose of generating a visualisation in an amount of time that is acceptable in the clinical setting (minutes).</p>
---

### 2.2 Summary of original objectives

<p>The primary objective is to develop software for visualising 4D DCE-MRI data of the breast as a single colour-coded volume (each voxel is colour-coded to reflect its enhancement kinetics) that can be used in the routine clinical setting to identify regions of suspicious enhancement with greater accuracy and speed than can be achieved by current practice. The secondary objective is to implement the computationally demanding model-fitting backend of the visualisation software, using parallel and grid-based supercomputing, such</p>
---

that visualisation can be achieved in an amount of time that is acceptable in the routine clinical setting.

### 3 Project over Duration of Funding

#### 3.1 Have there been changes to the project (yes/no)? If yes, give details.

Yes. See 3.3.

#### 3.2 What were your research plans and objectives for the period covered by this Report?

This report covers progress for the third quarter of 2007. The major research plans and objectives for this period (as outlined in the last progress report) relate to clinical evaluation of the visualisation software by a radiologist from Queensland X-Ray. In particular we planned to: (i) complete model-fitting and colour-coding the “ground-truthed” Queensland X-Ray data described in our first report; and (ii) to use the tracing software described in our last report together with a subset of the colour-coded data (data for which we have both MRI and pathology findings) to undertake a clinical evaluation of the visualisation (as described in our original proposal).

#### 3.3 Did the research project proceed as planned? What have you achieved over this period?

The project has proceeded as planned but it was decided not to colour code the remaining data, nor to have a radiologist evaluate the visualisation/tracing software using this data, because there now exists an opportunity to obtain 30 new data sets (with findings confirmed by histopathology) with higher spatial and temporal resolution. The new data provides an opportunity to “ground truth” the entire extent (in 3D) of suspicious lesions rather than just regions-of-interest within lesions.

##### **Achievements over the reporting period:**

##### *Development of software for tracing/labelling 3D lesions in the raw MRI data*

- A working prototype has been developed in MATLAB. Several successive versions of the software have been trialled by a radiographer at Queensland X-Ray.

##### *Submission to the UQ Human Research Ethics Committee(HREC)*

- We have made a submission to the UQ HREC in relation to the new high spatial/temporal resolution data.

##### *MICCAI (10th International Conference on Medical Image Computing and Computer Assisted Intervention)*

- We presented a paper (combined oral and poster presentation) at the MICCAI Workshop on Interaction in Medical Image Analysis and Visualization.

#### 3.4 Have you experienced any difficulties that have affected the progress (yes/no)? If yes, give details.

No

### 3.5 What are your research plans and objectives for the coming quarter?

- To obtain UQ HREC approval for the new high spatial/temporal resolution data.
- To complete the software for tracing/labelling 3D lesions in the raw MRI data (needed for lesion 'ground truth').
- To submit a final project report to QCIF.
- To seek additional funding to support clinical evaluation of the visualisation software on the new data, and to undertake research and development of computer aided diagnosis algorithms/software.

## 4 Academic Outputs

### 4.1 Publications and other academic outputs

*(Enter the number of publications in each category, for the period covered by this Report. Where appropriate, enter full publication details; include 'published' and 'in press' publications, but exclude 'forthcoming' and 'submitted' work.)*

Item	Category	Number	Publication Details
E1	Conference—full written paper—refereed proceedings	1	Erik Vidholm, Andrew Mehnert, Ewert Bengtsson, Michael Wildermoth, Kerry McMahon, Stephen Wilson, and Stuart Crozier: Hardware-accelerated volume visualisation of parametrically mapped dynamic breast MRI data, In <i>Proceedings of the Interaction in Medical Image Analysis and Visualization Workshop, 10th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2007)</i> , Brisbane, Oct 29-Nov 2, 2007, p.33-40 (ISBN: 13: 978 0 643 09521 2).

## 5 Certifications

### 5.1 Certification by first-named investigator

I certify that:

- This is an accurate progress report for the period covered; and
- All named investigators are in agreement that this report is an accurate representation of the current progress of the project.

1st-named Investigator signature \_\_\_\_\_

Date \_\_\_\_\_