

## Second Announcement – Call for Participation

### “2<sup>nd</sup> International Scanner Contest (ISC)”

#### (Evaluation Criteria added)

P. Hufnagl<sup>1</sup>, T. Schrader<sup>1, 2</sup>, M.G. Rojo<sup>3</sup>, A. Laurinavicius<sup>4</sup>, G. Kayser<sup>5</sup>, Y. Yagi<sup>6</sup>

<sup>1</sup>Institute for Pathology, Charité – Universitätsmedizin Berlin, Germany, <sup>2</sup>University of Applied Sciences

Brandenburg, Brandenburg, Germany, <sup>3</sup>Servicio de Anatomia Patologica, Hospital General de Ciudad Real.

<sup>4</sup>National Centre of Pathology, Vilnius, Lithuania, <sup>5</sup>Institute of Pathology, University of Freiburg, Freiburg,

Germany, <sup>6</sup>Massachusetts General Hospital, Boston, United States

#### Contact:

Prof. Dr. Peter Hufnagl

Department of Digital Pathology and IT

Charité - Universitätsmedizin Berlin

Charitéplatz 1

10117 Berlin, Germany

[peter.hufnagl@charite.de](mailto:peter.hufnagl@charite.de)

Mob.: +49-(0)172-877 4394

Tel.: +49-(0)30-450 536 140

Prof. Dr. Thomas Schrader

Department of Informatics and Media

University of Applied Sciences Brandenburg

Magdeburger Str. 50

14770 Brandenburg, Germany

[thomas.schrader@computer.org](mailto:thomas.schrader@computer.org)

Mob.: +49-(0)176-96906763

Tel.: +49 (0)3381-355 423

### Invitation

All manufacturers of slide scanners are invited to participate in the Second International Scanner Contest (ISC) in Berlin, under the auspices of the European Society of Pathology, German Society of Pathology, and the Berufsverband Deutscher Pathologen e.V. (German Professional Organization of Pathologists).

The 1<sup>st</sup> ESC was a great success for manufacturers as well as for pathologists and other users. The results have influenced the ongoing development of scanners and the understanding of image quality and evaluation procedures. This contest helps to identify and clarify the specific requirements of image acquisition and digitalization in diagnostic pathology and initiates innovative discussions between developers, vendors and users.

Formerly established and recently re-evaluated criteria will increase the value of the contest, which may support customers to find the appropriate scanner for their specific tasks. Furthermore, the 2<sup>nd</sup> ISC will serve the manufacturers as a benchmark.

## Schedule & Locations

The contest consists of three phases as listed below.

### *Phase 1 – Registration for 2nd ISC*

- **Schedule**
  - December 15<sup>th</sup> registration deadline
    - All registered vendors are invited to comment test and evaluation design, which will be finalized in discussion until February 15<sup>th</sup> 2012.
    - All registered vendors are invited to publish their participation and technical capabilities, additional features, and available tools on the ISC website
  - January 15<sup>th</sup> deadline for registration fees (manufacturers)
  - February 15<sup>th</sup> detailed information about test and evaluation design
- **Comment:** Additional information is available on the website of the ISC (<http://scanner-contest.charite.de>).

### *Phase 2: Event of 2nd ISC in Berlin*

- **Venue:** Berlin Congress Center
- **Schedule** is linked to the 12th Annual Meeting of the Berufsverband Deutscher Pathologen e.V. (German Professional Organization of Pathologists) and the 96<sup>th</sup> Annual Meeting of the German Society of Pathology, May 31<sup>st</sup> – June 3<sup>rd</sup>, 2012
  - May 29<sup>th</sup> -30<sup>th</sup>, 2012: Scanning of slides in different disciplines (see below)
  - May 31<sup>st</sup> – June 3<sup>rd</sup>, 2012: Evaluation of the virtual slides by pathologists attending the 12<sup>th</sup> meeting, preliminary evaluation and presentation of first results during a dedicated session.
- **Comment:** Scanning takes place under supervision of referees. The contest room will be open to a restricted number of staff from each participating company between 8 a.m. and 6 p.m. only. Catering for the participants will be provided.

## 2<sup>nd</sup> International Scanner Contest (ISC)

### *Phase 3: Presentation of results, award ceremony*

#### Report from 2<sup>nd</sup> ISC

- **Venue:** Scuola Grande di San Giovanni Evangelista, in Venice, Italy
- **Schedule** is linked to the 11th European Congress on Telepathology and 5th International Congress on Virtual Microscopy, on June 6<sup>th</sup> to 9<sup>th</sup> 2012

#### Results & Award Ceremony

- **Venue:** Prague Congress Centre, Prague, Czech Republic
- **Schedule** is linked to the 24th European Congress Pathology, on Sept. 8<sup>th</sup> to 13<sup>th</sup>, 2012

## Contest Areas

The following table gives an overview of the planned domains of the 2<sup>nd</sup> International Scanner Contest:

No	Domain	Description	# slides	Criteria
1	High throughput	A: 20x	35 (H&E)	Speed, focus, particles
		B: 40x	35 (H&E)	Speed, focus, particles
2	Quality	A: 20x	10	Focus, manual quality assessment
		B: 40x	10	Focus, manual quality assessment
3	Image analysis and Quantification	Image analysis, quantification	3 TMA	Focus, quality, quantitative data
4	Fluorescence	A: 20x	3	Focus, qualitative data
		B: 40x	3	Focus, qualitative data
5	Technical	Mesh grids, color calibration slide Sound check Power consumption	3	Geometry, scanning area, color fastness, acoustic camera

## 1. High throughput scanning at 20x and 40x (automatic batch scanning)

- **Task**
  - Scan under daily-use conditions in a clinical pathology laboratory.
  - Scan 35 glass slides in a routine procedure. No interaction or reloading of the scanner will be allowed.
  - Glass slides from 8 departments are mixed randomly.
- **Aim**
  - Measurement of scanner preparation time.
  - Measurement of scanning time and image quality.
- **General conditions**
  - 20 biopsies and 15 specimen of surgical material of different origin, HE stains only.
  - A technician is allowed to prepare the scanner settings. Preparation and scanning time will be measured separately.
  - Glass slides are randomly selected from the daily workload of different pathology institutions. Several comparable sets of mixed slides will be provided.
  - Regions on the slides are not marked. All relevant particles have to be found automatically.
- **Evaluation Criteria**
  - No reference focus assessment using automatic image analysis
  - Completeness of the digitized tissue area
  - Time needed, including preparation, loading of slides, scanning and data handling.
- **Prize Categories**
  - High Throughput 20x
  - High Throughput 40x

## 2. Quality - superior quality scanning

- **Task**
  - Scan 10 slides in best possible quality. Human interaction is allowed (however, no post processing with separate programs).
- **Aim**
  - Evaluation of image quality.
- **General conditions**
  - Slides of different origin and staining. You will get 5 bundles of 2 slides each.
  - The time limit is two slides per hour.
- **Evaluation Criteria**
  - No reference focus assessment using automatic image analysis
  - Completeness of the digitized tissue area
  - Quality – visual image evaluation by experts: Experienced pathologists attending the congress will evaluate several corresponding image tiles of each scanned slide by its image quality and tissue details.
- **Prize Categories**
  - Quality 20x
  - Quality 40x

### *3. Image analysis and quantification*

- **Task**
  - Quantification of immunohistochemically stained slides (IHC) using image analysis algorithms.
- **Aim**
  - Quantification of IHC stained nuclei
- **General conditions**
  - Tissue micro arrays (TMAs) of breast cancer cases will be used (Ki67-DAPI-staining)
- **Evaluation Criteria**
  - Confusion matrix of image analysis results with previously defined manual scores by pathologists
- **Prize Categories**
  - Ki67 scoring

#### 4. Fluorescence Scanning

- **Task**
  - Scan 3 slides stained with immunofluorescence (different tissues)
    - 2 monochrome
    - 1 multicolor
  
- **Aim**
  - Comparison and measurement of the quality of the fluorescence signal
  
- **General Conditions**
  - A technician is allowed to prepare the scanner settings. Preparation and scanning time will be measured separately.
  - Regions on the slides are not marked. All relevant particles have to be found automatically.
  
- **Evaluation Criteria**
  - No reference focus assessment using automatic image analysis
  - Luminance – automatic image analysis
  
- **Prize Categories**
  - Fluorescence 20x
  - Fluorescence 40x



### *5. Physical/ optical parameters, technical assessment*

- **Task**
  - Scan of standardized slides (grid pattern, color matrix).
  - Measurement of electric power consumption.
  - Acoustic analysis of machine sound (with an acoustic camera).
  
- **Aim**
  - Comparison of technical parameters and emissions.
  - Assessment of color and geometric accuracy
  
- **Evaluation Criteria**
  - Color fastness of digitized color matrix
  - Geometric precision
  - Noise level
  - Power consumption
  
- **Prize Categories**
  - Accuracy & Precision
  - Special Prize - Green IT

## Evaluation of the results

The organizing scientists will supervise the evaluation process. Beside the evaluation criteria further parameters will be documented such as:

- Scanning time for the test sets of High quality, Fluorescence
- File size of resulting images
- Number of scans failed/ broken slides/ software crashes
- Additional technical parameters and capabilities

For the evaluation and presentation of results see <http://scanner-contest.charite.de>.

All involved parties are welcome to propose additional evaluation procedures.

## General rules

- Each company is invited to participate in any of the offered contests with one or more scanners.
- The organizing committee provides all glass slides.
- Independent referees who will be responsible for the handling of the slide series and the time measurements supervise the contest room.
- The participating companies may participate at the contest with several different scanners. These scanners may be identical or of different types. The results will be analyzed and displayed separately if different scanners are used.
- The participants are allowed to review and comment the evaluated results.

## Benchmarks & Publication of results

### I. Benchmarks

All participating vendors will get a detailed benchmark for each of their scanners. Results for other vendors, except ranks 1-3 will be made anonymous.

### II. Publication of results

A coarse benchmark for selected parameters and domains will be published to an open access journal. Results, except ranks 1-3 will be made anonymous. Prior to submitting, the paper will be made available to participating vendors for comments.

## Costs

The International Scanner Contest causes expenses, which we need to get covered. While we fortunately found several sponsors, we still need to finance the remaining cost of rooms, catering, referees and supporting personal, evaluation process and –software through participation fees. The participation fees are:

- Euro 500 basic fee per participating company
- Euro 500 per domain per scanner

For example if you are participating with one machine in all five domains your fees are 500 basic fee plus 5 times 500 for the domains = 3,000 Euro.

If you are participating with two machines in 3 domains each, your fees are 500 basic fee plus 2 times 3 times 500 for the domains = 3500 Euro.

## Next Steps

- Complete attached questionnaire and return via email ([scanner-contest@charite.de](mailto:scanner-contest@charite.de)).
- All registered vendors (registration deadline Dec. 15<sup>th</sup>, 2011) are invited to comment test and evaluation design. Design will be finalized in discussion between vendors and the ISC organizing committee until February 15<sup>th</sup>, 2012.
- Please confirm your participation of the 2<sup>nd</sup> International Scanner Contest at your earliest convenience by
  - Mail ([scanner-contest@charite.de](mailto:scanner-contest@charite.de)),
  - FAX (+49-30-450 536 910) or
  - via website ([http://scanner-contest.charite.de/en/news/online\\_registration](http://scanner-contest.charite.de/en/news/online_registration)).