COLLECTING RELATIVE FREQUENCIES AND ASSESSING RADIATION DOSES OF PEDIATRIC RADIOLOGY PROCEDURES INVOLVING IONIZING RADIATION: DATA COLLECTION METHODS AND FIRST RESULTS.

A. Jahnen[1], R. Pokora[2], H. Hermen[1], G. Stamm[3], P. Mildenberger[4], G.Staatz[4], D. Wollschläger[2]

1 Luxembourg Institute of Science and Technology (LIST), Belval, Luxembourg
e-mail: Andreas.Jahnen@list.lu (corresponding author)
2 Institute of Medical Biostatistics, Epidemiology and Informatics (IMBEI), Mainz, Germany
3 University Hospital of the Georg-August University, Göttingen, Germany
4 University Medical Center Mainz, Germany

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1. Introduction

- Medical procedures are the biggest contributor to exposure to ionizing radiation from non-natural sources. In Germany, the average annual effective dose due to medical exposure is about 2 mSv [1].
- Paediatric patients represent a group with a high radio sensitivity [2], and several studies have reported a higher risk of cancer due to CT examinations [3-6].

- The **collection of data and its analysis is challenging** as indications change over time and pediatric patients are grouped in different age and weight groups [8].

1. INTRODUCTION AND PURPOSE

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Study objectives

The focus of this study is:

A) The recording of frequencies of radiological examinations in pediatric patients, in order to identify the most common examination types.

B) Technical examination parameters are collected that will allow the assessment of the implementation of the different examination types and the definition of new Diagnostic Reference Levels (DRLs).

2. METHODS

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Study design:

Step 1: Identification of participating institutions

Step 2: Collection of relative frequencies

Step 3: Collection of technical examination parameters of selected pediatric radiology procedures

2. METHODS

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Step 1: Identification of participating institutions

Mailing and contacting the relevant professional organizations in Germany to participate in a short survey + presentations of study (GPR, ...):

Questionnaire (rough translation):

1) How would you be able to provide the frequency data (DMS, PACS, RIS, Manual)?
2) How would you be able to provide the technical frequency data (DMS, PACS, RIS, Manual)?
3) Please provide contact details.
4) Would you like to participate in the study?
5) Please mark the radiological examination, that are performed >20 times per year on paediatric patients (<16 years)

x- ray:	Head AP/LAT, Thorax AP/PA, Thorax LAT, Abdomen
CT:	Abdomen, Thorax, Head
Fluoroscopy:	MCU, Colon
Interventional:	Angiography, vessel malformation

2. METHODS

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Step 2: Collection of relative frequencies

The examination frequencies could be provided

a) from a Dose Management System (DMS),
b) from the Radiology Information System (RIS),
c) from Picture Achieving and Communication System (PACS) using a dedicated software tool (PACSQueryTool) and
d) manual from other sources.

2. METHODS

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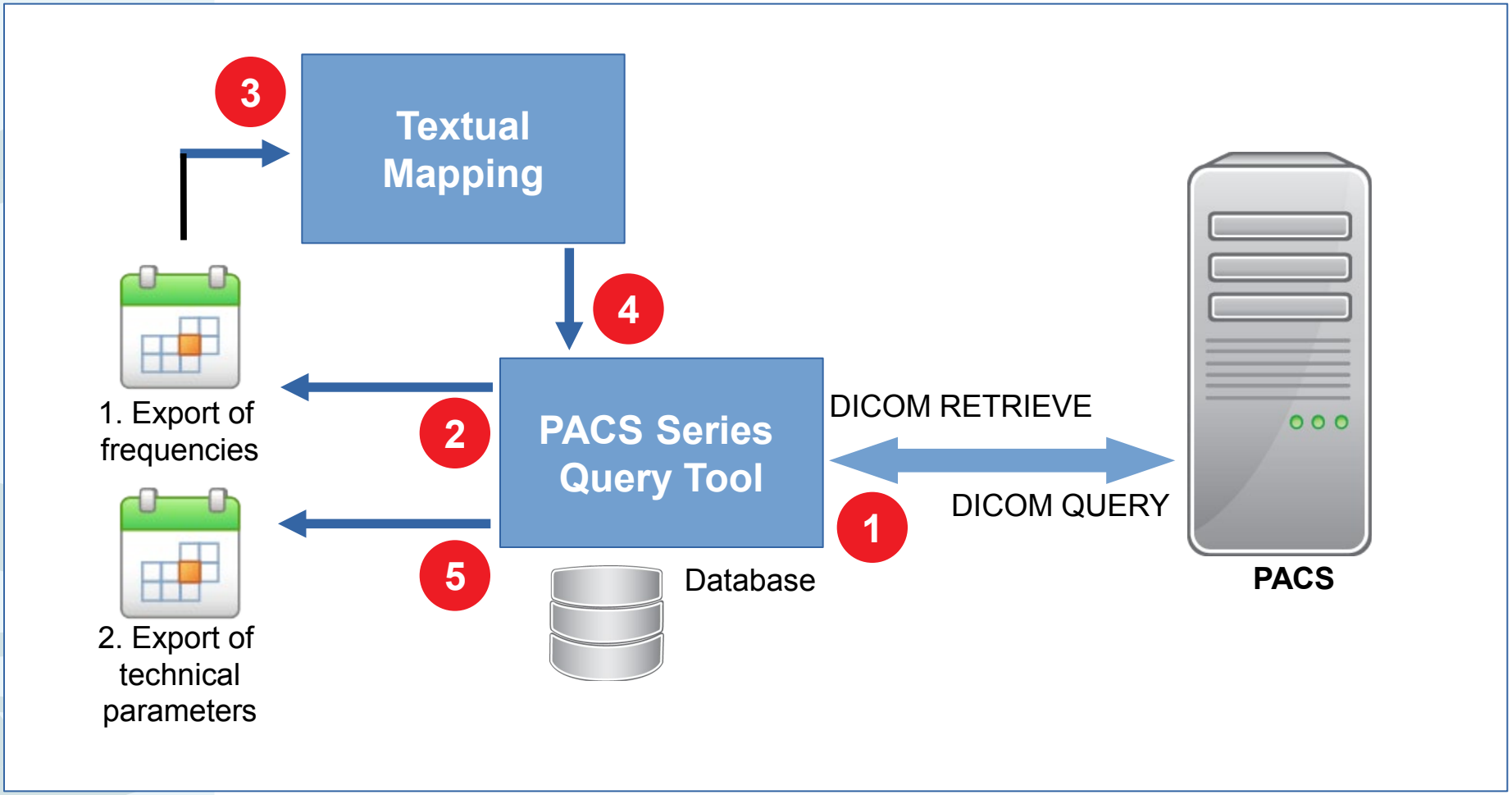
The PACS Query Tool:



2. METHODS

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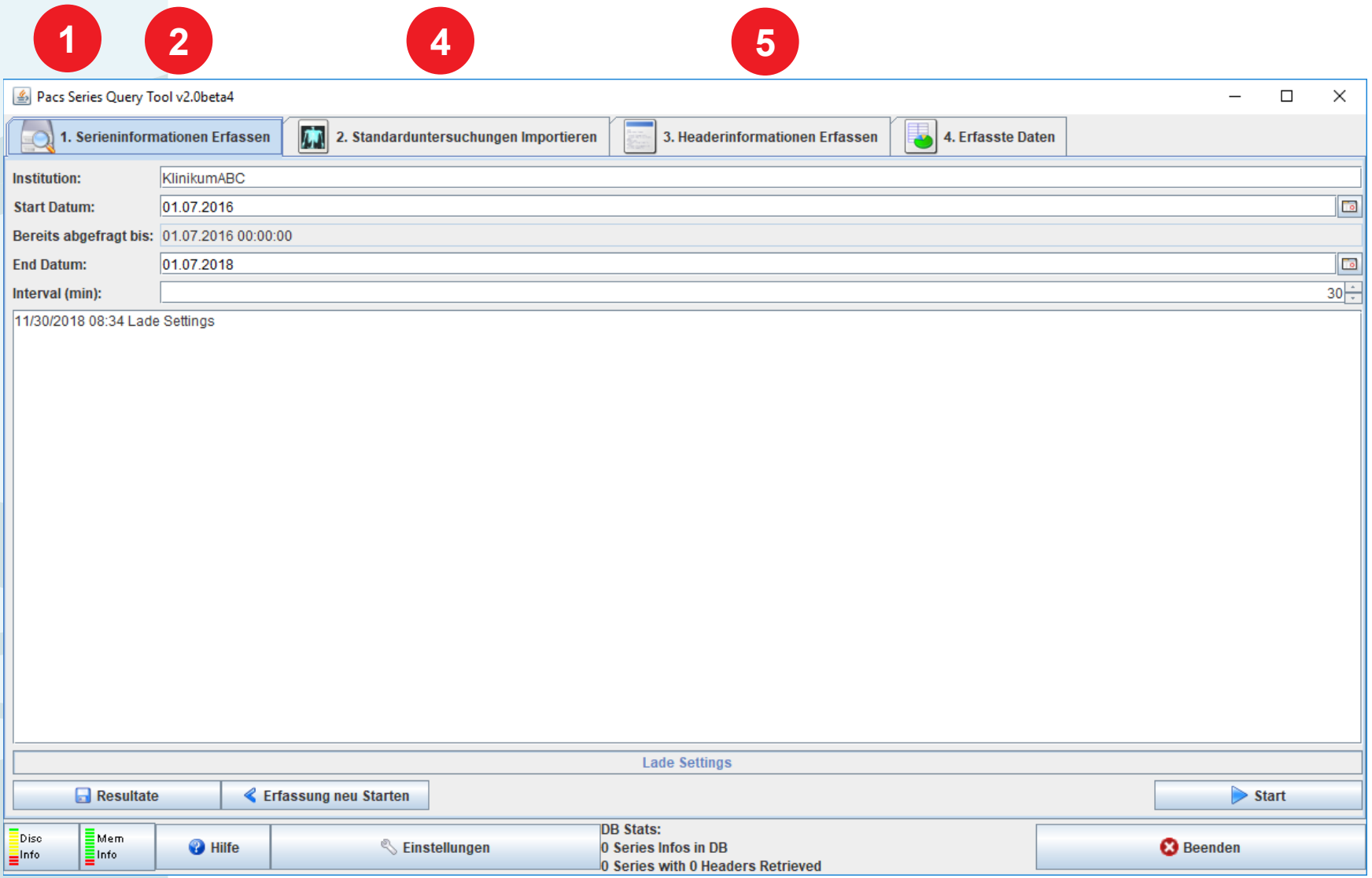

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Step 3: Collection of technical examination parameters of selected pediatric radiology procedures

The examination frequencies could be provided

- from a Dose Management System (DMS),
- from the Radiology Information System (RIS),
- from Picture Achieving and Communication System (PACS) using a dedicated software tool (PACSQueryTool) and
- manual from other sources.

3. RESULTS AND DISCUSSIONS

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WP1: Most frequent examinations

Existing paediatric DRLs	Candidates for new DRLS
XRAY: Head AP and LAT Thorax AP/PA and LAT Abdomen AP/PA Pelvis AP/PA CT: Head Thorax Abdomen Fluoroscopy: MCU	XRAY: Cervical Spine AP/ LAT Lung Hand/Carpal CT: Knee Hand Cervical Spine Total Body Sinus Fluoroscopy: Esophagus Interventional: Vessel malformation Intracardiac catheter

All presented data is preliminary and possibly not be representative!
Data collection is still ongoing and final analysis will be made available later.

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WP2: TECHNICAL EXAMINATION PARAMETERS

Data collection is ongoing; project ends October 2019.

Age group [year]	CTDIvol [mGy]	DLP [mGy*cm]	Exposure [mAs]	Total Number
0-1m	0.4	6.0	112.0	71
1m-4y	0.7	21.0	329.0	504
4-10y	1.4	46.0	394.0	350
10-14y	2.8	110.0	613.2	281
14-18y	3.2	190.5	803.8	400

Examination CT Thorax, 3. quartile
(data from 7 participants)

German DRL: 10-14 years = 6.5 mGy; DLP 200 mGy

4. CONCLUSIONS

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The shown process enables us to collect the frequencies and technical examination parameters in an automatic way from different technical resources

Practical experiences:

- Organizational: The expense allowance that we provide to each participant, was a needed element.
- Organizational: Study needs a good follow up and tailored support based on participants problem.

- Technical: DMS systems are entering the market, but institutions (in the moment) did have problems providing data for the requested period (technical problems, DMS only recently installed).
- Technical: PACS Tool needs a good documentation and technical support, if needed.
- Technical: Even processing is quite automatic, manual review is needed for the mapping and analysis.

5. ACKNOWLEDGMENT AND QUESTIONS

This work is financed by the Federal Office for Radiation Protection (BfS), Germany (FKZ : 3617S42441).
The PACSQueryTool is available on request.

Thank you very much for your attention!

[University Campus, Belval, Luxembourg, new library in front and blast furnace in the background]