

Business processes in Pathology

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Outline

- 1 Does a pathologist need knowledge about business modeling?
 - Background
 - Examples
- 2 The results of Working Group 1, COST-Action
 - Description method
 - Business values in Pathology
 - Business processes in Pathology
 - Diskussion
- 3 Summary
 - Summary
 - Sources & Literature

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Directions of development

- Standardization
 - Medical issues
 - Processes (Immunochemistry staining)
 - Quantization
- Digitalization
 - Virtual slides
 - Process & workflow control
 - Documentation & communication
- Complexness
 - Medical knowlegde
 - Data & information structures
 - Processes - teleconsultation, teleconferences, ...

Consequences of development

- Exchange of data, information & knowledge
 - local - clinical departments, storage systems, ...
 - regional - clinical conferences, education, ...
 - national - registries, center of excellence, ...
 - international - teleconsultation center, image analysis services, ...
- Computer based data management
 - different data types - text, numbers, images, sound, ...
 - different languages
- Software Architecture Models
 - Local application
 - Client-server architecture
 - Service Oriented Architecture

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Development of Pathology Report

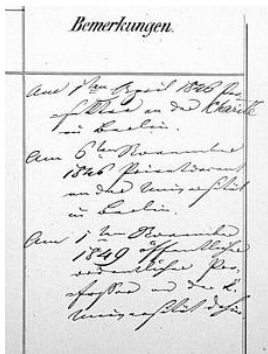


Figure: Virchows notes

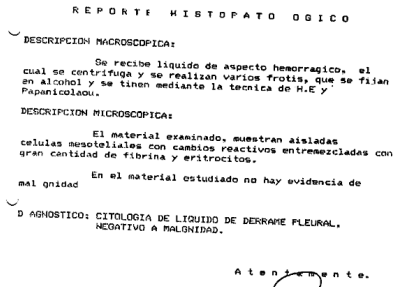


Figure: Typewritten pathology report

Example: Pathology Report

2008-15

Patient Jimmy Smith
Date of birth 8/6/1972 **Sex** Male
Biopsy Date 1/3/2008
Doctor Jennifer Tabemacke



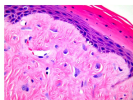
Part A: LEFT MAXILLARY SOFT TISSUE

Gross description:

Submitted is formalin fixed tissue, measuring 1.6x1.4x1.4cm., stated to be from the left maxilla. The specimen consists of multiple pieces of brown soft tissue. Sections multiple. All submitted. Also submitted is a tooth, no sections taken.

Microscopic Description:

Multiple sections show keratotic, stratified squamous epithelium covering a core of dense and cellular fibrous connective tissue. Numerous enlarged stellate-shaped fibroblasts, some containing multiple nuclei, are seen in the lesional stroma.



Diagnosis: Fibroma, giant cell type

ICD: 210.4
 CPT: 88305

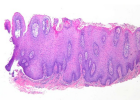
Part B: RIGHT LATERAL TONGUE

Gross description:

Submitted is formalin fixed tissue, measuring 1.2x0.5x0.5cm., stated to be from the right lateral tongue. The specimen consists of one piece of tan soft tissue with suture. One section submitted.

Microscopic Description:

Multiple sections show acanthotic, parakeratotic, verrucous stratified squamous epithelium covering a core of well-vascularized fibrous connective tissue. The interepithelial connective tissue papilla are filled with foamy histiocytes. Lymphocytes and plasma cells are also seen.



Diagnosis: Verruciform xanthoma

ICD: 210.4
 CPT: 88305

John E. Kacher, DDS
 Diplomate, American Board of Oral and Maxillofacial Pathology

- Structured information
- Codes (TNM, SNOMED, ICD-O)
- Images
- Quantization
- Second opinion
- ...

Need a pathologist knowledge about business modelling?

Need a pathologist knowledge about business modelling?

Yes!

Need a pathologist knowledge about business modelling?

Yes, we can!

- to describe processes
- to change processes
- to standardize processes and communication pathways
- to specify requirements

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ARIS-House

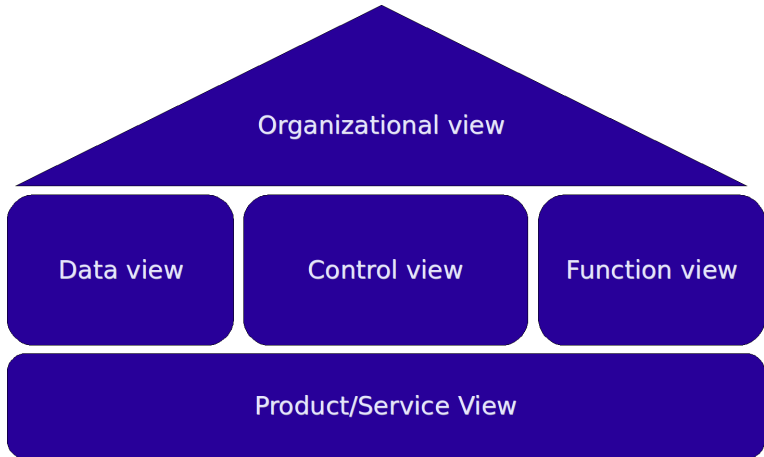


Figure: ARIS-Methodology

BPMN - background

BPMN Business Process Modeling Notation

- Notation language for business processes and workflows
- 2002, created by Stephen A. White from IBM
- June 2005, Object Management Group (OMG) takes care about the development
- 2006, BPMN is part of OMG Standard

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What are the results of the work?

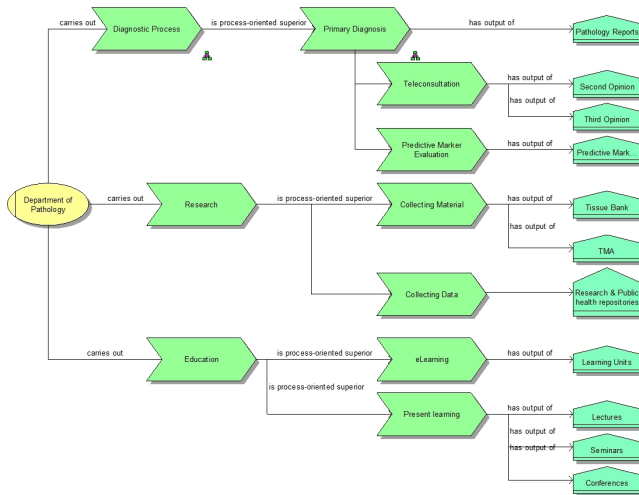


Figure: Business Values - overview

Diagnostic process

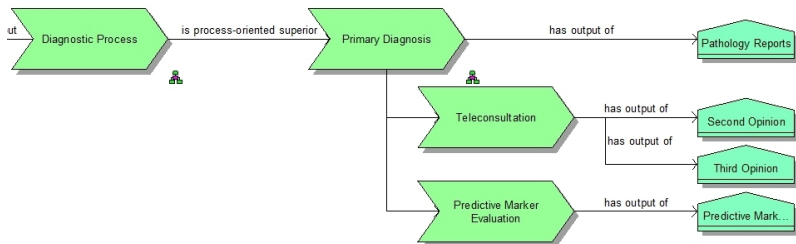


Figure: Business Values - detail

Research

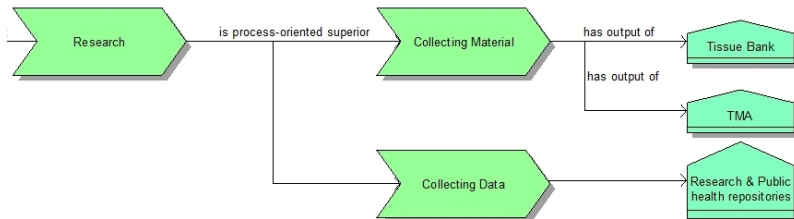


Figure: Business Values - detail

Education

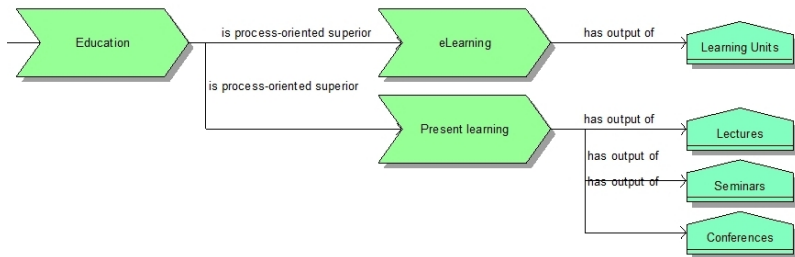


Figure: Business Values - detail

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Overview in BPMN

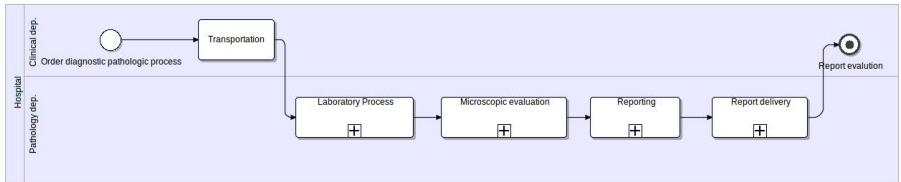


Figure: BPMN of an abstract view of processes

Basic business process

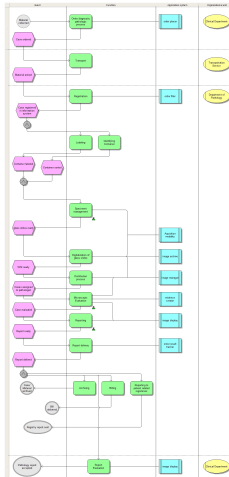


Figure: Overview

EPC Event-Process-Chain

- **Function or Process** - green rectangle
- **Event** as input object or output object - rhombus
- Forks & joints - circles
- Related IHE actors - blue rectangle
- Organizational unit - yellow ellipse

Basic business process

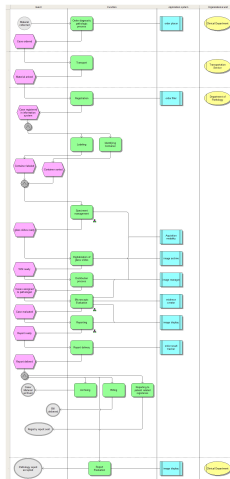


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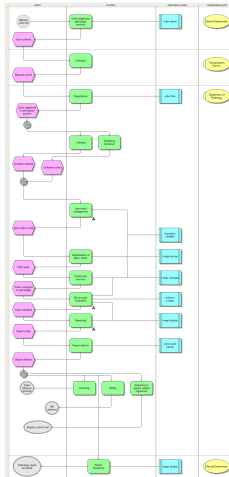


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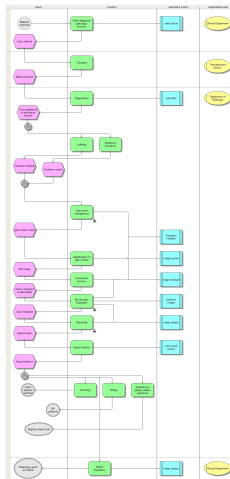


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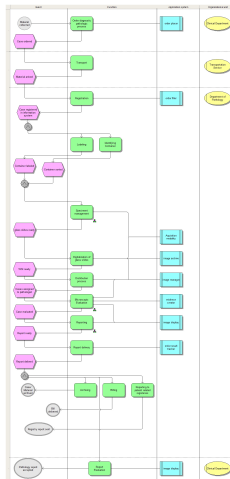


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Basic business process - part I

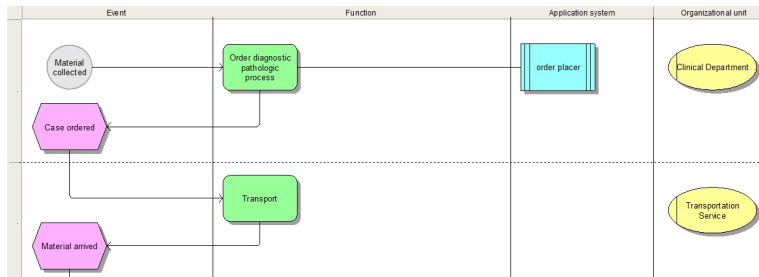


Figure: Clinical request & transport

Basic business process - part II

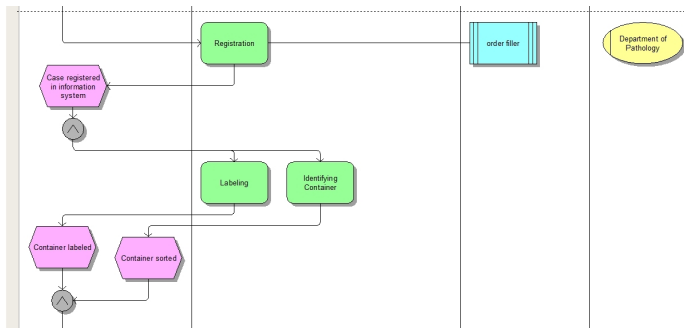


Figure: Labeling & sorting

Basic business process - part III

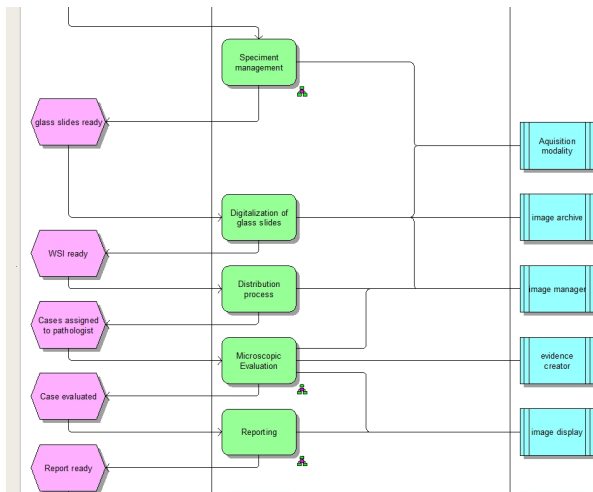


Figure: Laboratory & diagnostic process

Basic business process - part IV

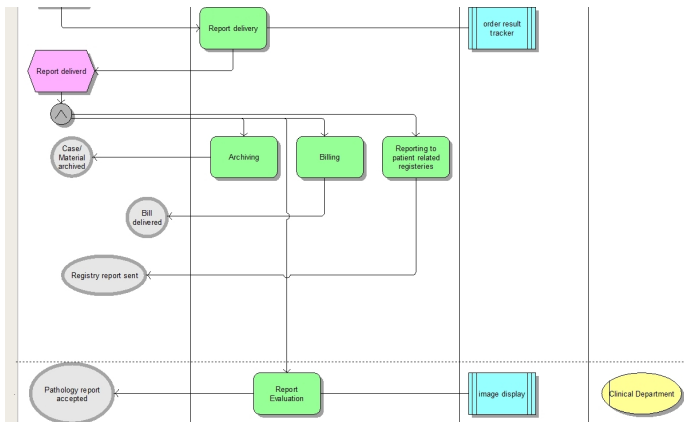


Figure: Report delivery

Macroscopic description

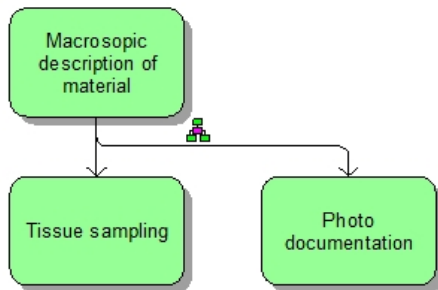


Figure: Function tree of macroscopic description

Mircoscopic Evaluation

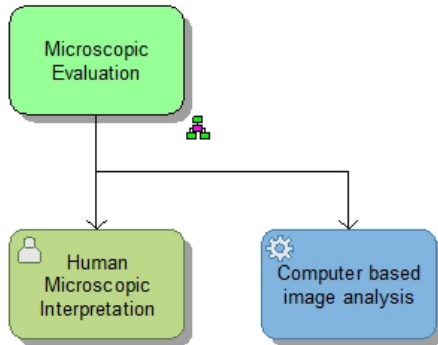


Figure: Function tree of process step microscopic evaluation

Quality Assurance

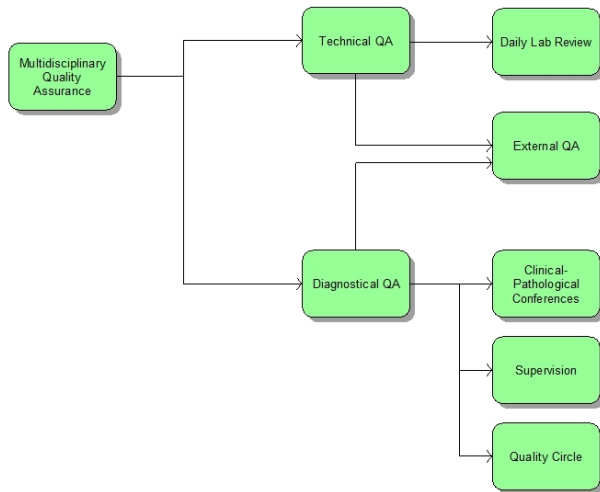
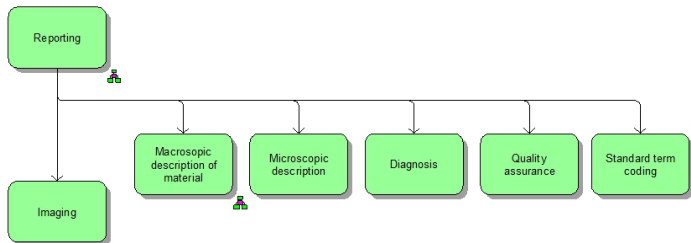


Figure: Function tree for quality assurance processes

Reporting processes



Imaging is a facultative process related to the study (sched. imag. requ. proc.)

Figure: Reporting as function tree

Specimen management

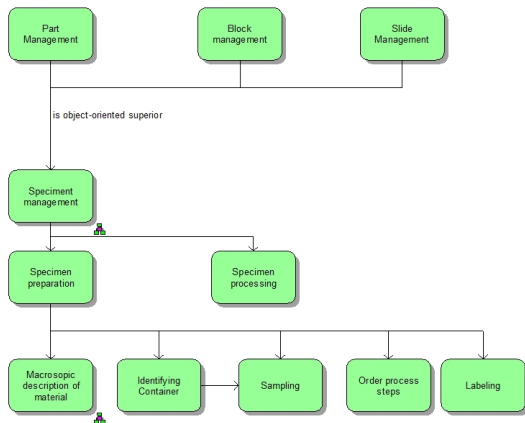


Figure: Complex function tree for specimen processing

Process flow of teleconsultation

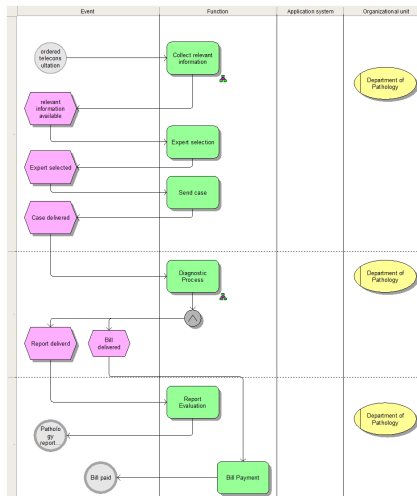


Figure: Current Report

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Advantages & disadvantages

ARIS

- Differentiate between data, organization, functions, controls, product, services
- EPC - good basis for discussion to specify the result of a function/ task/ process
- maybe complex
- ARIS/EPC is not a standard but can be mapped

Business Process Modeling Notation

- Standard with close relationship to executable languages
- maybe complex
- good basis for discussion but some aspects are not covered directly by standard

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Summary

Now Status quo

- A general business process in pathology is described.
- The process model has a close relationship to the standards (DICOM, HL7).

Future What should be done?

- The process model will be integrated into the documents of IHE (Integrating the Healthcare Enterprise)
- Simulation of business processes can be done.

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Sources & Literature

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- UML
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 - Heumann, J. Introduction to business modeling using the Unified Modeling Language (UML) IBM Developer works; 2003.

Sources & Literature

● ARIS

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- Lehmann FR. Integrierte Prozessmodellierung mit ARIS. 1. Aufl. Heidelberg: dpunkt Verl.; 2008.
- Oracle. Methods - Oracle Business Process Analysis Suite 10.1.3; 30.08.2006. 2006 Aug 30 (cited 2009 Mar 8).

Reference images

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- www.verein-dominik.org/beateklein/05jan06.htm
- jkjpathology.com/doctors/reports.htm

Thank you for your attention!

Any questions?

Contact

- Prof. Dr. Thomas Schrader
- thomas.schrader@computer.org