

**ABSTRACT**

Thomas Neumuth is head of the research group „Workflow and Knowledge Management“ at the Innovation Center Computer Assisted Surgery (ICCAS). ICCAS is part of the Medical Faculty of the University of Leipzig.

He has been working in the research area of Surgical Workflows and knowledge management in the operating room of the future since 2005. His research topics include the modeling of Surgical Processes, workflow management systems, sensor system engineering for situational awareness as part of the operating room infrastructure, and surgical ontologies.

He organizes workshops on Surgical Workflows at international conferences (CARS, CURAC) and is member of the German Engineering Society (VDE) and the German Society for Computer- and Robot-assisted Surgery (CURAC).

After completing an apprenticeship in Business and Administration at Siemens AG, Germany (1997), he studied Electrical Engineering Management (2001) and Automation Engineering (2004) at the University of Applied Sciences Leipzig. He finished his PhD thesis at the Universität Leipzig in 2008. Alongside his studies, he worked as engineering assistant for Siemens in the divisions of „Automation and Drives“ and „Information and Communication Networks“ from 1998 to 2004 before he joined ICCAS.

He holds lectures in the context of process control, situational awareness and workflow management in computer science, medicine, and electrical engineering at the University of Leipzig, the University of Applied Sciences Leipzig, and the Technical University of Berlin.

## SITUATION

Name: Thomas Neumuth  
Date of birth: 22th November 1975  
Nationality: German  
Marital Status: unmarried

## PROFESSIONAL ADDRESS

Universität Leipzig, Medizinische Fakultät, Innovation Center Computer Assisted Surgery  
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Web: <http://www.iccas.de/?id=351>

## RESEARCH INTERESTS

- Surgical Process Modeling
- Surgical Workflow Management
- Surgical Ontologies
- Operating room infrastructure

## EDUCATION

2005-2008 PhD in Medical Engineering, Universität Leipzig, ICCAS  
Title of thesis: "Surgical Process Modelling and Surgical Workflow Analysis"  
2001-2004 MEng in Automation Engineering, University of Applied Sciences Leipzig, Institute of  
Process Computing and Control Systems,  
Title of thesis: "Einsatz diskreter und kontinuierlicher Entwurfsmethoden in  
verteilten Systemen"  
1997-2001 MSc (Dipl.-Wirtsch.-Ing.(FH)) in Electrical Engineering Management, University of  
Applied Sciences Leipzig, Department of Electrical Engineering and Information  
Technology  
Title of thesis: "Konvergenz von Sprach- und Datenkommunikation über IP-  
Netzwerke"  
1995-1997 Advanced apprenticeship in Business and Administration, Siemens AG, Germany

## ACADEMIC AND PROFESSIONAL APPOINTMENTS

2007-today Research Group Leader, working group „Workflow and Knowledge Management“,  
Universität Leipzig, Innovation Center Computer Assisted Surgery  
2007-today Managing Partner, SWAN - Scientific Workflow Analysis GmbH, Leipzig, Germany  
2005-2007 Research Fellow, Universität Leipzig, Innovation Center Computer Assisted Surgery  
2000-2004 Engineering Assistant, Siemens AG Leipzig, Division of Information and  
Communication Networks  
1998-2000 Engineering Assistant, Siemens AG Leipzig, Division of Automation and Drives  
1997-1998 Education Assistant, Siemens AG Leipzig, Management Education Department

## SCIENTIFIC ACTIVITIES AND FUNDING CONTRIBUTIONS

### Workshops on Surgical Workflows

- International Congress and Exhibition on Computer Assisted Radiology and Surgery (Berlin 2007, Barcelona 2008)
- Annual Meeting of Deutsche Gesellschaft für Computer- und Roboterassistierte Chirurgie (CURAC) (Hannover 2006, Karlsruhe 2007, Leipzig 2008)

### Funding Contributions

- Contributions to EFRE Grant Application "Surgical DICOM", 1.000.000 €

## TEACHING ACTIVITIES

### Surgical Process Modeling, Surgical Workflow Management (2005-today)

- Computerassistierte Chirurgie, Universität Leipzig, Medizinische Fakultät
- Medizinische Planungs- und Simulationssysteme, Universität Leipzig, Dept. of Computer Science
- Technische Informatik in der Biomedizin, Technische Universität Berlin, Dept. of Computer Science

### Process Control Systems, Distributed Automation Systems (2007-today)

- Steuerungssysteme und Datenkommunikation, University of Applied Sciences Leipzig, Dept. of Electrical Engineering
- Verteilte Automatisierungssysteme, University of Applied Sciences Leipzig, Dept. of Electrical Engineering

### Business and Management (1998-2000)

- Accounting and Controlling according to US Law (US-GAAP), Siemens AG, Munich
- Manufacturing Management, Siemens Rt., Budapest, Hungary
- Logistics Management, Siemens Rt., Budapest, Hungary

## SUPERVISION OF THESES

### Doctoral Thesis

- Christian Held "Requirements Analyses for the Operating Room of the Future", Doctoral Thesis in Human Medicine, University of Leipzig, Faculty of Medicine, Department of Neurosurgery (current)
- Alexandra Krauss "Workflow Analysis for Assessing conventional laparoscopic and robot assisted Nissen fundoplications on infant pigs", Doctoral Thesis in Human Medicine, University of Leipzig, Faculty of Medicine, Department of Pediatric Surgery (current)
- Raj Mudunuri: "Ontological Engineering in Surgery", Doctoral Thesis in Computer Science, University of Leipzig, Faculty of Mathematics and Computer Science, Institute for Formal Languages (current)
- Bernadett Kaschek "Ontologies for Functional Endoscopic Sinus Surgery", Doctoral Thesis in Human Medicine, University of Leipzig, Faculty of Medicine, Department of Ear-, Nose-, Throat-Surgery (current)
- Adrian Pilny "Workflow Analysis in Mitral Valve Surgery for the Integration of Computer-Assisted Systems", Doctoral Thesis in Human Medicine, University of Leipzig, Faculty of Medicine, Department of Heart-Surgery (current)
- Juliane Schlomberg "Workflow Analysis for Assessing ambulatory and stationary Cataract Interventions in Eye Surgery", Doctoral Thesis in Human Medicine, University of Leipzig, Faculty of Medicine, Department of Eye-Surgery (current)

### Master Theses

- Christian Meißner "Activity Recognition in Surgical Processes", Master Thesis in Automation, University of Applied Sciences Leipzig, Department of Electrical Engineering Information Technology, Institute of Process Informatics and Control Systems (current)
- Katja Hornoff "Design and Implementation of an Advanced Workflow-based E-Learning Environment", Master Thesis in Computer Science, University of Applied Sciences Leipzig, Department of Mathematics, Physics, and Informatics, Institute for Multimedia Sciences (current)
- Frank Eckhardt "Requirements Analysis and Implementation for RFID-based Patient Tracking in Hospitals", Master Thesis in Computer Science, University of Leipzig, Department of Computer Science, Institute for Medical Informatics, Statistics, and Epidemiology
- Michael Czygan "Development of a Web-Service based Platform for Data Acquisition for Surgical Process Models", Master Thesis in Computer Science, University of Applied Sciences Mittweida, Department of Computer Science, Institute for Software Engineering
- Christian Ducree "Design and Implementation of a 3D-controlled graphics engine for surgery", Master Thesis in Computer Science, Technical University of Berlin, Department of Computer Science, Institute for Computer Graphics
- Bonie Carine Noufele Ntanke "Evaluation and Application of Business Intelligence Environments for Surgical Workflows", Master Thesis in Computer Science, Technical University of Berlin, Department of Computer Science, Institute for Computer Graphics

- Matthias Mitter "Data Exploration and Data Mining on Surgical Workflows", Master Thesis in Computer Science, University of Applied Sciences Görlitz/Zittau, Department of Computer Science, Institute for Data Mining
- Alexander Koch "Planning and Development of a Platform for Exchange and Review of Surgical Workflows", Master Thesis in Computer Science, University of Applied Sciences Leipzig, Department of Mathematics, Physics, and Informatics, Institute for Software-Engineering
- Thanh Hieu Hoang Thi "Design for Data Mining Strategies and interactive Reporting for Surgical Workflow Databases", Master Thesis in Computer Science, Technical University of Berlin, Department of Computer Science, Institute for Computer Graphics

#### Bachelor Theses

- Carolin Gruber "Design of Hardware/Software concepts for Acquisition and Merging of Videos in the Context of Workflow analyses in Surgery", Bachelor Thesis in Computer Science, University of Applied Sciences Leipzig, Department of Mathematics, Physics, and Informatics, Institute for Multimedia Sciences

#### PUBLICATIONS

- (39) Neumuth T, Jannin P, Strauss G, Meixensberger J, Burgert O (2009): Validation of Knowledge Acquisition for Surgical Process Models, *J Am Med Inform Assoc* 16(1), 72-80
- (38) Neumuth, T., Mansmann, S., Scholl, M. H., Burgert, O. (2008): Data Warehouse Technology for Surgical Workflow Analysis. In: Puuronen, S., Pechenizky, M., Tsymbal, A., Lee, D. Proc. of IEEE Computer-Based Medical Systems 2008, IEEE: Los Alamitos, 230-235
- (37) Lindisch, D., Neumuth, T., Burgert, O., Spies, J. and Cleary, K. (2008). Workflow in Interventional Radiology: Uterine Fibroid Embolization (UFE). In: Horii, S. C., Andriole, K. P. SPIE Medical Imaging 2008: PACS and Imaging Informatics SPIE: Bellingham.
- (36) Hofer, M., Dittrich, E., Scholl, C., Neumuth, T., Strauss, M., Dietz, A., Lüth, T.C., Strauss, G. (2008) First clinical evaluation of the navigated controlled drill at the lateral skull base. *Stud Health Technol Inform*, 132, 171-173.
- (35) Aumeier, C., Hofer, M., Dittrich, E., Neumuth, T., Dietz, A., Strauß, G. (2008):. Accuracy of manual Segmentation of the facial nerve in High Resolution CT images in comparison to a semi-automatic segmentation. In: Proc. of Computer Aided Surgery around the Head 2008.
- (34) Neumuth, T., Trantakis, C., Eckhardt, F., Dengl, M., Meixensberger, J., Burgert, O. (2007): Supporting the analysis of intervention courses with surgical process models on the example of fourteen microsurgical lumbar discectomies. *Int J Comp Ass Rad Surg* 2 (sup.1), 436-438
- (33) Neumuth, T., Pretschner, A. and Burgert, O. (2007). Surgical Workflow Monitoring with Generic Data Interfaces. In: Scharff, P.: Computer Science meets Automation Vol. 2, TU Ilmenau: Ilmenau, 97-102.
- (32) Neumuth, T., Mudunuri, R., Jannin, P., Meixensberger, J., Burgert, O. (2007): SWAN-Suite: The tool landscape for surgical workflow analysis. In: Troccaz, J., Merloz, P.: Computer Assisted Medical and Surgical Interventions, Sauramps Medical: Paris, 199-204.
- (31) Neumuth, T., Mudunuri, R., Strauß, G., Meixensberger, J., Burgert, O. (2007): SWAN-Suite: Ein Software-Framework für Chirurgische Prozessmodelle. In: Wörn, H., Spetzger, U.: Proc. of 6th Annual Meeting of Deutsche Gesellschaft für Computer- und Roboterassistierte Chirurgie. Pro Business: Karlsruhe, 313-316.
- (30) Neumuth, T., Pretschner, A., Burgert, O. (2007): Workflow-Driven Situational Awareness in the Operating Room of the Future: An Outline of Basic Technical Components. In: Thiery, A., Beck-Sickinger, Arendt, T.: Proceedings of 6th Research Festival for Life Sciences, University of Leipzig: Leipzig, 122.
- (29) Mansmann, S., Neumuth, T., Scholl, M.H. (2007): OLAP Technology for Business Process Intelligence: Challenges and Solutions. In: Song, I. Y., Eder, J.; Nguyen, T. M. Proceedings of Data Warehousing and Knowledge Discovery (DaWaK). 1st edition. Springer: Berlin, 111-122.
- (28) Mansmann, S., Neumuth, T., Scholl, M.H. (2007): Multidimensional Data Modeling for Business Process Analysis. In: Parent, C., Schewe, K.-D., Storey, V. C., Thalheim, B. Proceedings of the 26th International Conference on Conceptual Modeling, 1st edition, Springer: Berlin, 23-39.
- (27) Burgert, O., Neumuth, T., Audette, M., Pössneck, A., Mayoral, R., Dietz, A., Meixensberger, J., Trantakis, C. (2007) Requirement Specification for Surgical Simulation Systems with Surgical Workflows. *Stud Health Technol Inform*. 125: 58-63.

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- (26) Burgert, O., Neumuth, T., Gessat, M., Jacobs, S., Lemke, H.U. (2007): Deriving DICOM Surgical Extensions from Surgical Workflows, In: Horii, S. C., Andriole, K. P. SPIE Medical Imaging 2007: PACS and Imaging Informatics. SPIE: Bellingham, CID651604.
- (25) Mudunuri, R., Neumuth, T., Strauss, G., Dietz, A., Burgert, O. (2007): Ontological Enhancement for Computer Assisted Functional Endoscopic Sinus Surgery. In: Freysinger, W.; Weber, S., Caversaccio, M.: Proc. of 4th Int. Conference on Computer Aided Surgery around the Head (CAS-H). Pro Business Verlag: Innsbruck, 119-122.
- (24) Wirz, C., Neumuth, T., Burgert, O., Dietz, A. and Strauß, G. (2007): Kosten und Nutzen eines integrierten HNO-OP's (Storz OR1). Presentation at 78th Annual Meeting of Deutsche Gesellschaft für Hals-Nasen-Ohren-Heilkunde, Kopf- und Halschirurgie e. V., Munich.
- (23) Blecha, S., Lindner, D., Neumuth, T., Trantakis, C., Burgert, O., Meixensberger, J. (2007). Workflow von intrakraniellen Hirntumoroperationen ohne und mit Neuronavigation. In: Wörn, H., Spetzger, U.: Proc. of 6th Annual Meeting of Deutsche Gesellschaft für Computer- und Roboterassistierte Chirurgie. Pro Business: Karlsruhe, 259-262.
- (22) Blecha, S., Lindner, D., Neumuth, T., Trantakis, C., Burgert, O., Meixensberger, J. (2007). Workfloweditor für intrakranielle Hirntumoroperationen. In: Thiery, A., Beck-Sickinger, Arendt, T.: Proceedings of 6th Research Festival for Life Sciences, University of Leipzig: Leipzig, 136.
- (21) Neumuth, T., Durstewitz, N., Fischer, M., Strauß, G., Dietz, A., Meixensberger, J., Jannin, P., Cleary, K., Lemke, H.U., Burgert, O. (2006) Structured Recording of Intraoperative Surgical Workflows. In: Horii, S. C., Ratib, O. M. SPIE Medical Imaging 2006 - PACS and Imaging Informatics: Progress in Biomedical Optics and Imaging. SPIE: Bellingham, CID 61450A.
- (20) Neumuth, T., Schumann, S., Strauß, G., Jannin, P., Meixensberger, J., Dietz, A., Lemke, H.U., Burgert, O. (2006): Visualization Options for Surgical Workflows. Int J Comp Ass Rad Surg 1 (sup.1), 438-440.
- (19) Neumuth, T., Strauß, G., Meixensberger, J., Lemke, H.U., Burgert, O. (2006): Acquisition of Process Descriptions from Surgical Interventions. In: Bressan, S., Küng, J., Wagner, R. Database and Expert Systems Applications. Springer: Berlin, 602-611.
- (18) Neumuth, T., Mudunuri, R., Baumgärtner, T., Ceschia, M., Strauß, G., Meixensberger, J. and Burgert, O. (2006): A tool landscape for Surgical Workflow Analysis. In: Thiery, A., Beck-Sickinger, A., Arendt, T.: Proc. of 5th Leipzig Research Festival for Life Sciences. University of Leipzig: Leipzig.
- (17) Burgert, O., Neumuth, T., Fischer, M., Falk, V., Strauß, G., Trantakis, C., Jacobs, S., Dietz, A., Meixensberger, J., Mohr, F., Korb, W., Lemke, H. U. (2006) Surgical Workflow Modeling, In: Wetswood, J. D. Medicine Meets Virtual Reality 14, IOS Press: Fairfax, 36.
- (16) Burgert, O., Neumuth, T., Lempp, F., Mudunuri, R., Meixensberger, J., Strauß, G., Dietz, A., Jannin, P., Lemke, H.U. (2006): Linking Top-level Ontologies and Surgical Workflows. Int J Comp Ass Rad Surg 1 (sup.1), 437-438.
- (15) Burgert, O., Neumuth, T., Fischer, M., Strauß, G., Dietz, A., Meixensberger, J., Lemke, H.U. (2006): Workflow Analysis and Ontologies for Functional Endoscopic Sinus Surgery. In: Löffler, M., Winter, A. Proc. of 51st Annual Meeting of the German Society for Medical Informatics, Biometrics, and Epidemiology. University of Leipzig: Leipzig, 257-259.
- (14) Mudunuri, R., Neumuth, T., Kaschek, B., Strauß, G., Meixensberger, J., Lemke, H.U., Burgert, O. (2006): Role of Ontologies in Computer Assisted Surgery. In: Thiery, A., Beck-Sickinger, A., Arendt, T.: Proc. of 5th Leipzig Research Festival for Life Sciences. University of Leipzig: Leipzig, 180.
- (13) Fischer, M., Burgert, O., Neumuth, T., Dietz, A., Lemke, H.U., Strauß, G. (2006): Limitations in Endolaryngeal Surgery - Analysis of Development Potential by Surgical Workflows. Int J Comp Ass Rad Surg 1 (sup.1), 440-442.
- (12) Burgert, O., Strauß, G., Neumuth, T., Fischer, M., Meixensberger, J., Lemke, H.U., Dietz, A. (2006): Surgical Workflow Analysis in endoscopic surgery. Proc. of 14th International Congress of the European Association for Endoscopic Surgery (EAES), 177-178
- (11) Siddoway, D., Ingeholm, M. L., Burgert, O., Neumuth, T., Watson, V., Cleary, K. (2006): Workflow in Interventional Radiology: Nerve Blocks and Facet Blocks. In: Horii, S. C., Ratib, O. M. SPIE Medical Imaging 2006 - PACS and Imaging Informatics: Progress in Biomedical Optics and Imaging. SPIE: Bellingham, CID 61450B.
- (10) Hofer, M., Strauß, G., Koulechov, K., Fischer, M., Neumuth, T., Trantakis, C., Korb, W., Dietz, A., Lüth, T. C. (2006): First clinical Trial of the Navigated Controlled Shaver in Functional Endoscopic Sinus Surgery. Int J Comp Ass Rad Surg 1 (sup.1), 318-320.

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- (9) Neumuth, T., Pretschner, A., Trantakis, C., Fischer, M., Lemke, H.U., Burgert, O. (2005): An Approach to XML-based Description of Intraoperative Surgical Workflows. In: Eckstein, D.R., Tolkstdorf, P.D. Berliner XML-Tage (BXML) 2005, Humboldt University of Berlin: Berlin, 147-152.
- (8) Burgert, O., Neumuth, T., Strauß, G., Trantakis, C., Falk, V., Lemke, H.U. (2005): Workflow-analysis of Surgical Interventions in ENT and Neurosurgery. In: Weber, S., Langlotz, F., Bier, J., Lüth, T. C. Computer Aided Surgery around the Head - 3rd International Symposium Proceedings. VDI Verlag: Düsseldorf, 85-86.
- (7) Fischer, M., Burgert, O., Dietz, A., Trantakis, C., Meixensberger, J., Lemke, H. U., Neumuth, T., Strauß, G. (2005): Der chirurgische Workflow: Instrument zur Evaluation chirurgischer Arbeitsabläufe. Presentation at the Annual Meeting of the German Society for Computer- and Robot-assisted Surgery. Berlin.
- (6) Pretschner, A., Neumuth, T. (2005) Distributed Control Systems with embedded Linux. In 36th Annual Meeting of SAK, Berlin
- (5) Neumuth, T (2005) Algorithms for Distributed Control Systems. In Zwanziger, H. W. Proc. of 6th NaWuKo 2005, Merseburg
- (4) Neumuth, T. (2004) Distributed Control Systems - State of the Art and Perspectives for embedded Systems, In 3rd Workshop on Automation Technology, Mittweida
- (3) Neumuth, T. (2004) Adaptation of discrete and continuous Design Methods for Distributed Control Systems, Master Thesis in Automation Engineering, University of Applied Sciences Leipzig
- (2) Neumuth, T. (2001) Comparison of VOIP-Solutions, In 9th Leipziger Informatiktage (LIT2001), Leipzig
- (1) Neumuth, T. (2001) Convergence of Speech and Data Communication via IP Networks, Diploma Thesis in Information Technology Engineering, University of Applied Sciences Leipzig