

<b>Topic</b>	Run-Time Adaptation Architectures and Platforms
<b>Mentor</b>	Vasil Tenev
<b>E-Mail</b>	<a href="mailto:vasil.tenev@iese.fraunhofer.de">vasil.tenev@iese.fraunhofer.de</a>
<b>Short description</b>	Variability of a system is traditionally managed during the development or the configuration time by following a standard PL approach. Modern self-adaptive systems require variation management at run-time. These systems are self-configurable product lines, where binding of components is driven by the environment and not the engineers. This seminar topic presents state-of-research patterns, approaches, and aspects of SPL – e.g. Dynamic Software Product Lines – in the context of self-adaptive (software) systems.
<b>Link to papers</b>	<ul style="list-style-type: none"> <li>• N. Abbas, J. Andersson, M. U. Iftikhar and D. Weyns, "<b>Rigorous Architectural Reasoning for Self-Adaptive Software Systems</b>," 2016 Qualitative Reasoning about Software Architectures (QRASA), Venice, 2016, pp. 11-18.  <a href="http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&amp;arnumber=7484101&amp;isnumber=7484093">http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&amp;arnumber=7484101&amp;isnumber=7484093</a></li> <li>• Fatih Gey, Dimitri Van Landuyt, Stefan Walraven, Wouter Joosen: <b>Feature Models at Run Time: Feature Middleware for Multi-tenant SaaS applications</b>. MoDELS@Run.time 2014: 21-30 <a href="http://ceur-ws.org/Vol-1270/mrt14_submission_4.pdf">http://ceur-ws.org/Vol-1270/mrt14_submission_4.pdf</a></li> <li>• Aitor Murguzur, Rafael Capilla, Salvador Trujillo, Óscar Ortiz, and Roberto E. Lopez-Herrejon. 2014. <b>Context variability modeling for runtime configuration of service-based dynamic software product lines</b>. In Proceedings of the 18th International Software Product Line Conference: Companion Volume for Workshops, Demonstrations and Tools - Volume 2 (SPLC '14), Stefania Gnesi, Alessandro Fantechi, Maurice H. ter Beek, Goetz Botterweck, and Martin Becker (Eds.), Vol. 2. ACM, New York, NY, USA, 2-9.  <a href="http://dx.doi.org/10.1145/2647908.2655957">http://dx.doi.org/10.1145/2647908.2655957</a></li> </ul>
<b>Bachelor/Master</b>	Master
<b>Supported Language</b>	German and English
<b>Required knowledge</b>	Master Course on Product Line Engineering
<b>Required student</b>	Nicolas Fußberger

<b>Topic</b>	<a href="#">Self-Adaptive Systems: Where, Why, How</a>
<b>Mentor</b>	Vasil Tenev
<b>E-Mail</b>	<a href="mailto:vasil.tenev@iese.fraunhofer.de">vasil.tenev@iese.fraunhofer.de</a>
<b>Short description</b>	Traditional mechanisms for error detection and recovery are typically wired into applications at the level of code, where they are hard to change, reuse, or analyze. An alternative approach is to use externalized adaptation. This work gives an overview on state of the art and the practice on self-adaptive systems. Motivation for self-adaptation and existing principles are explained based on examples.
<b>Link to papers</b>	<ul style="list-style-type: none"> <li>• Stepan Shevtsov, M. Usman Iftikhar, and Danny Weyns. 2015. <b>SimCA vs ActivFORMS: comparing control- and architecture-based adaptation on the TAS exemplar</b>. In Proceedings of the 1st International Workshop on Control Theory for Software Engineering (CTSE 2015). ACM, New York, NY, USA, 1-8. <a href="http://dx.doi.org/10.1145/2804337.2804338">http://dx.doi.org/10.1145/2804337.2804338</a></li> <li>• Sebastian Wätzoldt and Holger Giese. 2015. <b>Modeling Collaborations in Adaptive Systems of Systems</b>. In Proceedings of the 2015 European Conference on Software Architecture Workshops (ECSAW '15). ACM, New York, NY, USA, , Article 3 , 8 pages. <a href="http://dx.doi.org/10.1145/2797433.2797436">http://dx.doi.org/10.1145/2797433.2797436</a></li> </ul>
<b>Bachelor/Master</b>	Both
<b>Supported Language</b>	German and English
<b>Required knowledge</b>	Grundlagen des Software Engineering; Formale Grundlagen der Programmierung
<b>Required student</b>	Patrick Pschorn

<b>Topic</b>	The role and use of documents in software projects
<b>Mentor</b>	Anne Hess
<b>E-Mail</b>	Anne.Hess@iese.fraunhofer.de
<b>Short description</b>	The topic investigates the usage and relevance of documentation during software development projects.
<b>Link to papers</b>	<p>Andrew Forward , Timothy C. Lethbridge, The relevance of software documentation, tools and technologies: a survey, Proceedings of the 2002 ACM symposium on Document engineering, November 08-09, 2002, McLean, Virginia, USA [doi&gt;10.1145/585058.585065]</p> <p>Timothy C. Lethbridge, Janice Singer, and Andrew Forward. 2003. How Software Engineers Use Documentation: The State of the Practice. <i>IEEE Softw.</i> 20, 6 (November 2003), 35-39. DOI=<a href="http://dx.doi.org/10.1109/MS.2003.1241364">http://dx.doi.org/10.1109/MS.2003.1241364</a></p>
<b>Bachelor/Master</b>	both
<b>Supported Language</b>	German, English
<b>Required knowledge</b>	Software Engineering (master or bachelor)

<b>Topic</b>	Validity threats in Empirical SE research
<b>Mentor</b>	Anne Hess
<b>E-Mail</b>	Anne.Hess@iese.fraunhofer.de
<b>Short description</b>	In judging the quality of a research study it is very important to consider threats to the validity of the study and the results. This topic investigates current views and discussions on validity threats in empirical software engineering studies
<b>Link to papers</b>	<p>J. Siegmund, N. Siegmund and S. Apel, "Views on Internal and External Validity in Empirical Software Engineering," 2015 IEEE/ACM 37th IEEE International Conference on Software Engineering, Florence, 2015, pp. 9-19. doi: 10.1109/ICSE.2015.24</p> <p>Amadeu Anderlin Neto and Tayana Conte. 2013. A conceptual model to address threats to validity in controlled experiments. In <i>Proceedings of the 17th International Conference on Evaluation and Assessment in Software Engineering</i> (EASE '13). ACM, New York, NY, USA, 82-85. DOI=<a href="http://dx.doi.org/10.1145/2460999.2461011">http://dx.doi.org/10.1145/2460999.2461011</a></p> <p>R. Feldt, and A. Magazinius, "Validity Threats in Empirical Software Engineering Research -- An Initial Survey", Software Engineering and Knowledge Engineering, pp. 374--379, 2010.</p>
<b>Bachelor/Master</b>	both
<b>Supported Language</b>	German, English
<b>Required knowledge</b>	Knowledge about empirical software engineering would be helpful (master or bachelor)

<b>Topic</b>	The impact of Smart Ecosystems on the Domain of Mobility
<b>Mentor</b>	Steffen Hess
<b>E-Mail</b>	<a href="mailto:steffen.hess@iese.fraunhofer.de">steffen.hess@iese.fraunhofer.de</a>
<b>Short description</b>	The topic addresses the impact of so called Smart Ecosystems to the domain of mobility. The impact should be shown with regard to emerging ecosystems in this domain and their corresponding software engineering challenges. Human interaction with those ecosystems should be explicitly part of this analysis as well as usability and user experience issues. It is required to show examples of Smart Mobility Ecosystems and a vision of possible future scenarios. Furthermore the impact of digitalization to the domain should be addressed.
<b>Link to papers</b>	<p><a href="http://www2.deloitte.com/content/dam/Deloitte/br/Documents/manufacturing/Future_of_mobility.pdf">http://www2.deloitte.com/content/dam/Deloitte/br/Documents/manufacturing/ Future_of_mobility.pdf</a></p> <p>Holl, K., Müller, C., Liggesmeyer, P. &amp; Ebert, A., (2016). Interaction with Mobile Systems as part of Smart Ecosystems. In: Weyers, B. &amp; Dittmar, A. (Hrsg.), Mensch und Computer 2016 – Workshopband. Aachen: Gesellschaft für Informatik e.V..  <a href="http://www.iese.fraunhofer.de/en/innovation_trends/smart_ecosystems.html">http://www.iese.fraunhofer.de/en/innovation_trends/smart_ecosystems.html</a></p>
<b>Bachelor/Master</b>	Both
<b>Supported Language</b>	German, English
<b>Required knowledge</b>	Software Engineering is beneficial Human-Computer Interaction is beneficial

<b>Topic</b>	The impact of Smart Ecosystems on the Domain of Health
<b>Mentor</b>	Steffen Hess
<b>E-Mail</b>	<a href="mailto:steffen.hess@iese.fraunhofer.de">steffen.hess@iese.fraunhofer.de</a>
<b>Short description</b>	The topic addresses the impact of so called Smart Ecosystems to the domain of health. The impact should be shown with regard to emerging ecosystems in this domain and their corresponding software engineering challenges. Human interaction with those ecosystems should be explicitly part of this analysis as well as usability and user experience issues. It is required to show examples of Smart Health Ecosystems and a vision of possible future scenarios. Furthermore the impact of digitalization to the domain should be addressed.
<b>Link to papers</b>	<p><a href="http://dl.acm.org/citation.cfm?id=2745388&amp;CFID=844088189&amp;CFTOKEN=80847280">http://dl.acm.org/citation.cfm?id=2745388&amp;CFID=844088189&amp;CFTOKEN=80847280</a></p> <p><a href="http://dl.acm.org/citation.cfm?id=2555811&amp;CFID=844088189&amp;CFTOKEN=80847280">http://dl.acm.org/citation.cfm?id=2555811&amp;CFID=844088189&amp;CFTOKEN=80847280</a></p> <p>Holl, K., Müller, C., Liggesmeyer, P. &amp; Ebert, A., (2016). Interaction with Mobile Systems as part of Smart Ecosystems. In: Weyers, B. &amp; Dittmar, A. (Hrsg.), Mensch und Computer 2016 – Workshopband. Aachen: Gesellschaft für Informatik e.V..  <a href="http://www.iese.fraunhofer.de/en/innovation_trends/smart_ecosystems.html">http://www.iese.fraunhofer.de/en/innovation_trends/smart_ecosystems.html</a></p>
<b>Bachelor/Master</b>	Both
<b>Supported Language</b>	German, English
<b>Required knowledge</b>	Software Engineering is beneficial Human-Computer Interaction is beneficial

<b>Topic</b>	The impact of Smart Ecosystems on the Domain of Living
<b>Mentor</b>	Steffen Hess
<b>E-Mail</b>	<a href="mailto:steffen.hess@iese.fraunhofer.de">steffen.hess@iese.fraunhofer.de</a>
<b>Short description</b>	The topic addresses the impact of so called Smart Ecosystems to the domain of living. The impact should be shown with regard to emerging ecosystems in this domain and their corresponding software engineering challenges. Human interaction with those ecosystems should be explicitly part of this analysis as well as usability and user experience issues. It is required to show examples of Smart Home Ecosystems and a vision of possible future scenarios. Furthermore the impact of digitalization to the domain should be addressed.
<b>Link to papers</b>	Holl, K., Müller, C., Liggesmeyer, P. & Ebert, A., (2016). Interaction with Mobile Systems as part of Smart Ecosystems. In: Weyers, B. & Dittmar, A. (Hrsg.), Mensch und Computer 2016 – Workshopband. Aachen: Gesellschaft für Informatik e.V.. <a href="http://www.iese.fraunhofer.de/en/innovation_trends/smart_ecosystems.html">http://www.iese.fraunhofer.de/en/innovation_trends/smart_ecosystems.html</a>
<b>Bachelor/Master</b>	Both
<b>Supported Language</b>	German, English
<b>Required knowledge</b>	Software Engineering is beneficial Human-Computer Interaction is beneficial

<b>Topic</b>	The impact of Smart Ecosystems on the Domain of Work
<b>Mentor</b>	Steffen Hess
<b>E-Mail</b>	<a href="mailto:steffen.hess@iese.fraunhofer.de">steffen.hess@iese.fraunhofer.de</a>
<b>Short description</b>	The topic addresses the impact of so called Smart Ecosystems to the domain of work. The impact should be shown with regard to emerging ecosystems in this domain and their corresponding software engineering challenges. Human interaction with those ecosystems should be explicitly part of this analysis as well as usability and user experience issues. It is required to show examples of Smart Work Ecosystems and a vision of possible future scenarios. Furthermore the impact of digitalization to the domain should be addressed.
<b>Link to papers</b>	Holl, K., Müller, C., Liggesmeyer, P. & Ebert, A., (2016). Interaction with Mobile Systems as part of Smart Ecosystems. In: Weyers, B. & Dittmar, A. (Hrsg.), Mensch und Computer 2016 – Workshopband. Aachen: Gesellschaft für Informatik e.V.. <a href="http://www.iese.fraunhofer.de/en/innovation_trends/smart_ecosystems.html">http://www.iese.fraunhofer.de/en/innovation_trends/smart_ecosystems.html</a>
<b>Bachelor/Master</b>	Both
<b>Supported Language</b>	German, English
<b>Required knowledge</b>	Software Engineering is beneficial Human-Computer Interaction is beneficial

<b>Topic</b>	How does TDD impact different process characteristics?
<b>Mentor</b>	Philipp Diebold
<b>E-Mail</b>	<a href="mailto:Philipp.diebold@iese.fraunhofer.de">Philipp.diebold@iese.fraunhofer.de</a>
<b>Short description</b>	The idea is to use the given literature (possible add further ones if you can find them), extract the data about which (process) characteristics are impacted by test-driven development (TDD), and aggregate these findings. All these aspects should finally be documented in the seminar paper.
<b>Link to papers</b>	<ul style="list-style-type: none"> <li>• The Impact of Test-Driven Development on Software Development Productivity — An Empirical Study (Lech Madeyski, Lukas Szala)</li> <li>• Driving Software Quality: How Test-Driven Development Impacts Software Quality (Lisa Crispin)</li> <li>• Assessing test-driven development at IBM (E.M. Maximilien, L. Williams)</li> <li>• How Effective is Test-Driven Development? (Burak Turhan, Lucas Layman, Madeline Diep, Hakan Erdoganmus, Forrest Shull)</li> </ul>
<b>Bachelor/Master</b>	Both
<b>Supported Language</b>	At least English for reading the papers; best German for the communication with the mentor.
<b>Required knowledge</b>	None; Knowing of how to perform a systematic literature review or mapping study might be helpful.

<b>Topic</b>	How does Continuous Deployment impact different process characteristics?
<b>Mentor</b>	Philipp Diebold
<b>E-Mail</b>	<a href="mailto:Philipp.diebold@iese.fraunhofer.de">Philipp.diebold@iese.fraunhofer.de</a>
<b>Short description</b>	The idea is to use the given literature (possible add further ones if you can find them), extract the data about which (process) characteristics are impacted by test-driven development (TDD), and aggregate these findings. All these aspects should finally be documented in the seminar paper.
<b>Link to papers</b>	<ul style="list-style-type: none"> <li>• Continuous deployment of software intensive products and services: A systematic mapping study (Rodríguez, Haghishatkhaha, Lwakatarea, Teppolab, Suomalainenb, Eskelib, Karvonena, Kuvajaa, Verner, Oivoa)</li> <li>• Customer Involvement in Continuous Deployment: A Systematic Literature Review (Yaman, Sauvola, Riungu-Kalliosaari, Hokkanen, Kuvaja, Oivo, Männistö)</li> </ul>
<b>Bachelor/Master</b>	Both
<b>Supported Language</b>	At least English for reading the papers; best German for the communication with the mentor.
<b>Required knowledge</b>	None; Knowing of how to perform a systematic literature review or mapping study might be helpful.

<b>Topic</b>	How does collective ownership impact different process characteristics?
<b>Mentor</b>	Anna Schmitt
<b>E-Mail</b>	<a href="mailto:Anna.Schmitt@iese.fraunhofer.de">Anna.Schmitt@iese.fraunhofer.de</a>
<b>Short description</b>	The idea is to use the given literature (possible add further ones if you can find them), extract the data about which (process) characteristics are impacted by test-driven development (TDD), and aggregate these findings. All these aspects should finally be documented in the seminar paper.
<b>Link to papers</b>	<ul style="list-style-type: none"> <li>• Role of collective ownership and coding standards in coordinating expertise in software project teams (Maruping, Zhang, Venkatesh)</li> <li>• Successful extreme programming: Fidelity to the methodology or good teamworking? (Wood, Michaelides, Thomson)</li> <li>• An Empirical Study Examining the Usage and Perceived Importance of XP Practices (Fruhling, Zhang)</li> <li>• Managing Code Ownership (Nordberg III)</li> </ul>
<b>Bachelor/Master</b>	Both
<b>Supported Language</b>	At least English for reading the papers; best German for the communication with the mentor.
<b>Required knowledge</b>	None; Knowing of how to perform a systematic literature review or mapping study might be helpful.

<b>Topic</b>	How does an on-site customer impact different process characteristics?
<b>Mentor</b>	Anna Schmitt
<b>E-Mail</b>	<a href="mailto:Anna.Schmitt@iese.fraunhofer.de">Anna.Schmitt@iese.fraunhofer.de</a>
<b>Short description</b>	The idea is to use the given literature (possible add further ones if you can find them), extract the data about which (process) characteristics are impacted by test-driven development (TDD), and aggregate these findings. All these aspects should finally be documented in the seminar paper.
<b>Link to papers</b>	<ul style="list-style-type: none"> <li>• On-Site Customer in an XP Project: Empirical Results from a Case Study (Koskela, Abrahamsson)</li> <li>• The Effects of Individual XP Practices on Software Development Effort (Kuppuswami, Vivekanandan, Ramaswamy, Rodrigues)</li> <li>• Customer Involvement in Continuous Deployment: A Systematic Literature Review (Yaman, Sauvola, Riungukalliosaari, Hokkanen, Kuvaja, Oivo, Männistö)</li> </ul>
<b>Bachelor/Master</b>	Both
<b>Supported Language</b>	At least English for reading the papers; best German for the communication with the mentor.
<b>Required knowledge</b>	None; Knowing of how to perform a systematic literature review or mapping study might be helpful.

<b>Topic</b>	DevOps – What does the research community say?
<b>Mentor</b>	Frank Elberzhager, Taslim Arif
<b>E-Mail</b>	<a href="mailto:frank.elberzhager@iese.fraunhofer.de">frank.elberzhager@iese.fraunhofer.de</a> ; <a href="mailto:taslim.arif@iese.fraunhofer.de">taslim.arif@iese.fraunhofer.de</a>
<b>Short description</b>	Since 2009, DevOps becomes more and more important. However, the number of scientific publications is rather low compared to the interest in industry. The student should provide an overview of relevant papers based on an existing literature review, and provide a short gap analysis to today's body of existing papers.
<b>Link to papers</b>	F. Erich, C. Amrit, M. Daneva, Cooperation between software development and operations: A literature review, ESEM, 2014
<b>Bachelor/Master</b>	Both
<b>Supported Language</b>	German / English
<b>Required knowledge</b>	SE overview

<b>Topic</b>	What are the difference between code coverage of sequential software and concurrent software?
<b>Mentor</b>	Jasmin Jahić
<b>E-Mail</b>	<a href="mailto:jasmin.jahic@iese.fraunhofer.de">jasmin.jahic@iese.fraunhofer.de</a>
<b>Short description</b>	Manifestation of a bug in sequential software depends on the input data set. A bug in concurrent software is a result of an input data and specific interleavings between concurrent threads. Code coverage techniques used for sequential software must be adjusted to concurrent software. This seminar aims to answer two questions: <ul style="list-style-type: none"> <li>- What are the difference between code coverage of sequential software and concurrent software?</li> <li>- Which challenges remain unsolved when it comes to the code coverage of concurrent software?</li> </ul>
<b>Link to papers</b>	<a href="http://onlinelibrary.wiley.com/doi/10.1002/stvr.1539/full">http://onlinelibrary.wiley.com/doi/10.1002/stvr.1539/full</a> <a href="http://dl.acm.org/citation.cfm?id=2002964">http://dl.acm.org/citation.cfm?id=2002964</a>
<b>Bachelor/Master</b>	Master students.
<b>Supported Language</b>	English
<b>Required knowledge</b>	Knowledge of software testing and code coverage. Software development process.

<b>Topic</b>	Debugging concurrent and multicore software: state of the practice
<b>Mentor</b>	Jasmin Jahić
<b>E-Mail</b>	jasmin.jahic@iese.fraunhofer.de
<b>Short description</b>	<p>We are in the era of multicore processors and concurrent software. Debugging of concurrent software is a challenging task. Although the research community is very active in this field, integration of the scientific solutions into software development process is not straightforward. This survey aims at answering the questions:</p> <ul style="list-style-type: none"> <li>- Why is the embedded, concurrent software debugging in practice a challenging task?</li> <li>- Which tools are commonly used in embedded, concurrent software development, and their comparison.</li> <li>- What are the main challenges in the integration of the concurrent software debugging into software development cycle?</li> </ul>
<b>Link to papers</b>	<a href="http://link.springer.com/article/10.1007/s11219-015-9301-7">http://link.springer.com/article/10.1007/s11219-015-9301-7</a> <a href="http://ieeexplore.ieee.org/document/6909202/">http://ieeexplore.ieee.org/document/6909202/</a>
<b>Bachelor/Master</b>	Master students.
<b>Supported Language</b>	English
<b>Required knowledge</b>	Knowledge of C/C++. Software development process. Experience with Eclipse/Qt is helpful, but not necessary.

<b>Topic</b>	Data structures for non-locking synchronization of concurrent software
<b>Mentor</b>	Jasmin Jahić
<b>E-Mail</b>	jasmin.jahic@iese.fraunhofer.de
<b>Short description</b>	Locks are predominant technique for synchronization of concurrent software. With the increase of the number of cores, developers are struggling with the proper use of locks. Improper use of locks often results in bugs such as deadlocks. Alternative to locks are non-locking, mainly data structure based, synchronization mechanisms. The aim of this seminar is to review available non-locking mechanisms and evaluate how suitable they are for the safety critical systems.
<b>Link to papers</b>	<a href="http://dl.acm.org/citation.cfm?id=2483866">http://dl.acm.org/citation.cfm?id=2483866</a> <a href="http://www.sciencedirect.com/science/article/pii/S0167739X15000977">http://www.sciencedirect.com/science/article/pii/S0167739X15000977</a>
<b>Bachelor/Master</b>	Master students.
<b>Supported Language</b>	English
<b>Required knowledge</b>	Operating systems, C/C++, multithreading.

<b>Topic</b>	How is model based testing for safety critical systems applied?
<b>Mentor</b>	Christian Wolschke
<b>E-Mail</b>	wolschke@cs.uni-kl.de
<b>Short description</b>	Model based testing is key for generating test cases automatically. Especially in the context of Cypher Physical Systems, it is needed to test the system of system so that guarantees like safety are still given. The student should investigate which kinds of testing approaches exist in this scenario.
<b>Link to papers</b>	<a href="http://ieeexplore.ieee.org/document/5954386/">http://ieeexplore.ieee.org/document/5954386/</a> <a href="http://ieeexplore.ieee.org/document/6405444/">http://ieeexplore.ieee.org/document/6405444/</a>
<b>Bachelor/Master</b>	Bachelor and Master students
<b>Supported Language</b>	German, English
<b>Required knowledge</b>	Foundations of Software Engineering

<b>Topic</b>	Testing of self-adaptive software
<b>Mentor</b>	Christian Wolschke
<b>E-Mail</b>	wolschke@cs.uni-kl.de
<b>Short description</b>	Software that runs in different contexts should be able to adapt automatically in order to give the user the best possible result. Nevertheless, if the adaption is made in safety critical domain, it must be guaranteed, that the new system is safe again. The task of the student would be to give an overview of the existing testing approaches in the domain as well as the discussion of the advantages and disadvantages of the system.
<b>Link to papers</b>	<a href="http://ieeexplore.ieee.org/document/7306570/">http://ieeexplore.ieee.org/document/7306570/</a> <a href="http://ieeexplore.ieee.org/document/7306567/">http://ieeexplore.ieee.org/document/7306567/</a>
<b>Bachelor/Master</b>	Bachelor and Master students
<b>Supported Language</b>	German, English
<b>Required knowledge</b>	Foundations of Software Engineering