

HITeC ANNUAL REPORT 2019

HITeC e.V. - an initiative of the Department of Computer Science
Faculty of Mathematics, Informatics and Natural Sciences
University of Hamburg

Hamburger Informatik Technologie-Center HITEC e.V.

Board of directors:

Prof. Chris Biemann, Prof. Tilo Böhmann, Prof. Winfried Lamersdorf, Prof. Walid Maalej

Management board:

Wiebke Frauen, Dr. Lothar Hotz

Vereinsregister Hamburg: VR 15499

Authors: Prof. Andrea Bauer, Dr. Timo Baumann, Marc Bestmann, Prof. Dr. Chris Biemann, Prof. Dr. Paul Drews, Prof. Dr. Hannes Federrath, Mathias Fischer, Wiebke Frauen, Prof. Dr. Nick Gehrke, Dr. Andreas Günter, Prof. Dr. Dominik Herrmann, Dr. Rainer Herzog, Dr. Lothar Hotz, Christine Issleib, Prof. Dr. Johannes Kirchmair, Ogeigha Koroyin, Prof. Dr. Winfried Lamersdorf, Dr. Sven Magg, Prof. Dr. Walid Maalej, Doris Nied, Prof. Dr. Horst Oberquelle, Steffen Remus, Prof. Dr. Arno Rolf, Pascal Rost, Stephanie von Riegen, Evelyn Staske, Prof. Dr. Ulrike Steffens, Prof. Dr. Steinicke.

Editorial and layout: Evelyn Staske

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1. OVERVIEW

HITeC is the research and technology transfer center of the Department of Computer Science at the University of Hamburg. Due to its independent status, HITeC offers flexible and professional cooperation opportunities. HITeC solutions are based on the latest research results and provide advantages through innovative technologies.

HITeC is a registered, non-profit association supported by members of the Department of Computer Science at the University of Hamburg. The association is linked to the University of Hamburg by an agreement.

HITeC sees its main tasks in the:

-  Implementation of application-oriented research projects
-  Dissemination of application-oriented research results
-  Realization of seminars
-  Mediation of contacts between companies and students
-  Improvement of the practice-oriented education in the university
-  Support for business start-ups from the university







In 2019 HITeC had six supporting members, these are companies and institutions that support HITeC. The number of active personal members of HITeC is approximately 40.

HITeC's project volume in 2019 was approximately 1.9 Millionen Euro.

The following changes were made to the Executive Board in 2019: Prof. Dr. Bernd Neumann left the board. The management and the board of directors would like to thank him for his many years of work for HITeC, from its foundation in 1997, through active implementation of research projects, especially in the field of image processing, to the most recent work in the area of Open-Data and Artificial Intelligence. Prof. Dr. Waalid Maalej will join the board as a new member. Walid Maalej is Professor for Applied Software Technology at the Department of Computer Science at the University of Hamburg. We are looking forward to a very good cooperation!

Some selected projects and activities in 2019:

-  Coordination and implementation of the EU-funded project Requirements Engineering, Big Data, Recommendation Technologies (OPENREQ)
-  Several projects in the field of application of Artificial Intelligence methods (analysis of social media texts - SmartSquare, determination of skin parameters by image analysis, prediction of the skin sensitization potential of organic molecules, implementation of a web service for the prediction of the metabolism of active ingredients, scientific consulting service collection of spoken language data, autonomous adaptive machines, configuration workshop, meeting minute bot and AI consulting, RoboCup-AG - Hamburg Bit-Bots)

-  Continuation of the conception, further development and implementation of the transparency portal of the FHH Hamburg (InfoReg) and achievement of synergy effects with the projects Open Data Portal Schleswig-Holstein and Metadatenmodel GovData from the Open Data area
-  Several projects in the field of eHumanities aiming at the dissemination, collection, presentation, and long-term archiving of cultural objects (PESHAT, adaptable university bibliography with MyCoRe, matriculation portal, OAI-dashboard, distributed software development using the example of Cosi, distributed software development in heterogeneous groups)
-  Support and consulting in the area of software architecture for several software houses
-  Support in the organization of the ITMC Conference at the Faculty of Computer Science with approx. 150 participants
-  Many smaller projects, mainly with companies and research institutions from the Hamburg region
-  Participation in a working group of the founding initiatives of all Hamburg Universities as well as cooperation with ahoi.digital

In 2019, HITeC has participated in the foundation of the Artificial Intelligence Center Hamburg e.V. (ARIC) as a special activity. ARIC has the task of being the central contact point in the Hamburg metropolitan region for business, science, and society for questions concerning Artificial Intelligence. ARIC organizes network meetings, workshops, and project initiations. It is the extended arm of the project area Intelligent Systems, in which HITeC carries out cooperation projects in the field of Artificial Intelligence. ARIC was founded in September 2019.

Publications of HITeC are listed on the websites of the university of the respective professors and project collaborators. An overview of project activities provides <https://hitec-hamburg.de>.

2. PROJECTS OF HITEC

The following sections provide a brief overview of the projects completed in 2019. This is preceded by a summary of the activities in the respective project area.

HITeC focuses with project areas on sub-areas of computer science, which stand out due to special activities at HITeC, e.g. in the form of cooperation projects.

In addition to the projects listed, there were a number of smaller activities that are not mentioned here.

2.1 IS - INTELLIGENT SYSTEMS

The project area "Intelligent Systems" (IS) emerged from the "Laboratory for Artificial Intelligence", in which innovative methods of Artificial Intelligence have been developed and applied in cooperation with companies since its foundation in 1988. Characteristic for the work of IS is a scientifically founded and at the same time practice-oriented approach. The rich wealth of experience ranges from expert systems, configuration and diagnosis, monitoring and event recognition as well as cognitive systems to deep learning, big data, knowledge discovery, image processing, and other current topics of Artificial Intelligence. IS offers the preparation of studies as well as prototype development in direct cooperation with companies. Furthermore, IS is often a partner in funded projects, especially in the EU funding programs.

Head:

 Lothar Hotz

Project Manager:

 Lothar Hotz

2.1.1 Information Register - Portal for Implementation of the Transparency Law

The Hamburg Transparency Act came into force on 6 October 2012. §1 states: "The purpose of this law is to protect the interests of the public through a comprehensive right to information. The information available to the authorities referred to in Article 2(3), while complying with the provisions of the protection of personal data, to make them directly accessible to the public and to disseminate them in order to promote the formation of democratic opinion and wills and to monitor governance acts." Under §2 paragraph 3 almost all authorities are addressed. To implement this law, a web portal, the "Information Register" (Info-Reg), was designed and developed by the tax authorities in cooperation with HITEC, among others. As essential functions thereby the collecting ("harvest"/"Harvesten") of existing documents and data from the authorities, the searchability from the Web portal and the machine access to the information objects are provided. This work belongs to the research area "Open-Gov-Data".

In the project year 2019, HITEC supported the cultural authority in its further development of the portal. For this purpose, concepts for the cooperation of developer and operation teams (DevOps) at different, partly public institutions were further developed on an organizational (e.g. cooperation processes) and technical level (e.g. for the cloud infrastructure). A special research topic was the integration of the new Open-Gov-Data standard DCAT-AP.de into the portal. Furthermore, the full text search was improved by comparing the OCR-based texts with term databases.

Cooperation partners:

-  Hamburg Ministry of Culture
-  Dataport AöR

Staff:

-  Elwin Beck, Christian Bähnisch, Lothar Hotz, Malte Johannsen, Björn Kulas, Melvyn Linke, Anja Richter, Dennis Rupnow, Yibo Wang

Link: <http://transparenz.hamburg.de/transparenzgesetz-hamburg/>

2.1.2 Document and Upload Workflow for the Hamburg Transparency Portal



The Hamburg transparency portal is fed by documents and data from various city authorities. The City of Hamburg is developing a new document and upload workflow for entering metadata, data and documents. HITEC supports this development scientifically in the preparation phase of the quality assurance as well as in the use of tools and workflows. Important points were the support of the blackening process and the quality assurance for the essential planning documents.

1. Concept for the support of the HmbTG blackening process

Requirements analyses in 2018 have shown that the blackening process in the workflow of the HmbTG is time-consuming for the employees of the authorities. Currently, up to 10 working hours per document are blackened manually. For the re-creation of the blackening process, the methods used were checked and requirements were met, and a concept for a semi-automatic blackening process was developed.

2. Scientific support of the project management for the implementation of the HmbTG workflow

Support of the project management with quality measures with regard to

-  Quality management of all planning documents, in particular design of user stories in the backlog.
-  Quality assurance for usability; including the consolidation of existing findings (Evaluation 2018 - Usability Analysis and User Survey, Yen Dieu Pham, 2018), derivation of user perspectives and anchoring of findings for project implementation.

Cooperation partners:

-  Free and Hanseatic City of Hamburg, Department of Culture and Media, State Archives Office

Staff:

-  Christine Issleib, Lothar Hotz

Link: [Transparenzportal Hamburg: http://transparenz.hamburg.de/](http://transparenz.hamburg.de/)

2.1.3 Open Data Portal Schleswig-Holstein

The state of Schleswig-Holstein planned an open data portal for the federal state (ODSH). Open Data is one of the central digitization topics of the state government of Schleswig-Holstein. In the coalition agreement of 2017, the parties involved agreed to support the further development of existing freedom of information laws and new open data regulations, which oblige the authorities to make existing data easily findable, machine-readable and free of charge and license available to the public via a central open data portal. Part of the implementation of the Open Data plans in Schleswig-Holstein is done through the establishment of ODSH.

In 2019, further data delivery systems were integrated and a possibility was created to integrate data from smaller authorities into the portal that cannot provide their own delivery system. Important convenience functions, for the end user, such as map search or sorting options according to degree of openness, as well as for the portal operator, were implemented.

The portal went live in the summer.

The work in the project will be carried out in close cooperation with the creation of the Hamburg transparency portal.

This creates synergy effects, in particular through the common use of the underlying Open Data Framework CKAN.

This project dealt with the following research topics: search techniques, DCAT, portal development, geographical search, harvesting, and data integration.

Cooperation partners:

 Dataport AÖR

Staff:





 Christian Bähnisch, Rainer Herzog, Lothar Hotz, Melvyn Linke, Stephanie von Riegen, Pascal Rost, Dennis Rupnow

2.1.4 3S - Schul-Support-Service for Hamburg Schools

The digital media infrastructure of public schools in the City of Hamburg has been expanding steadily in the last years. The number of pedagogically used PCs, mobile end devices, and other digital peripheral devices such as digital whiteboards has totalled over 27,000 devices. In addition, Hamburg has a pioneering role regarding the introduction and usage of new technologies in the educational sector.





Obviously, an affordable and professional IT-Support is necessary in order to facilitate the operational reliability of the IT-infrastructure within the defined boundaries of network configuration, and security and legal aspects. School-Support-Service (Schul-Support Service [3S]) was founded in the year 2000 out of this necessity. 3S is a cooperative project between HITEC e.V. and the Hamburg Ministry of Education (Behörde für Schule und Berufsbildung [BSB]).

3S supports all participating schools in close cooperation with the BSB and Dataport, in particular in the following fields:



-  technical consultancy regarding the acquisition of digital media
-  technical support for end devices used for educational purposes
-  change management for PCs and mobile devices used for educational purposes
-  in the case of malfunctioning networks: 3S is the preliminary contact point for all public schools in Hamburg in case of network malfunction within the pedagogical network, and forwards the tickets (if applicable) to the next level (generally First-Level Support at Dataport) if needed.

Currently, about 152 public schools are successfully supported by 3S. 3S is operated by approximately 30 students in addition to other academic staff employed by HITEC e.V. 3S makes it possible for students to gain practical experience and knowledge in the field of professional IT support, and simultaneously facilitates an affordable and professional IT-Support necessary for the complex IT-infrastructure found in public schools in Hamburg.

Cooperation partners:

-  Hamburg Ministry of Education (Behörde für Schule und Berufsbildung [BSB]).
-  University of Hamburg (Universität Hamburg [UHH])
-  Hamburg University of Applied Sciences (Hochschule für Angewandte Wissenschaften [HAW])
-  State Institute for Teacher Training and School Development (Landesinstitut für Lehrerbildung und Schulentwicklung [LI Hamburg])

Staff:

-  Wiebke Frauen, Marc Heydorn, Ogeigha Koroyin, Kai von Luck, Anja Richter, Arne Springborn, Evelyn Staske
-  Aproximately 30 students

Link: <https://www.3s-hamburg.de/>

2.1.5 IP Address Change in Hamburg Schools

A special program to reorganize the allocation of IP Adresses in the networks of Hamburg's schools, which was planned together with the Hamburg Ministry of Education (Behörde für Schule und Berufsbildung [BSB]), began in autumn 2018. This program is

currently being implemented in the schools supported by the School-Support-Service (3S).





During this implementation phase an IP address change is carried out in the school networks and the new IP infrastructure is tested in normal operation conditions in the schools. Each school receives its own unique IP range. Previously, it was not possible for 3S to connect to more than one individual school simultaneously; with the implementation of this program 3S will be in the position to connect to all its schools simultaneously.

This improvement allows schools to have a larger IP range for more devices for future use. Thus preparing the schools for the planned expansion of the WLAN infrastructure.



For 3S, the IP address reorganization offers the advantage that the simultaneous visibility of all clients connected to the city network is made possible in the school networks. The aim is to be able to access all school networks simultaneously from the central software distribution server. This enables 3S, for example from the central laboratory, to distribute updates to all clients in schools, to install software on a school's computers, or to provide an overview of both the inventory and the current status of the connected clients.

A test phase in summer 2018, in which the IP reorganization was implemented in the 3S test laboratory, preceded the special program. At the end of 2018, about 20% of the networks of schools supported by 3S had been adapted to the new standard, as of December 2019 approximately 80% had been adapted.

Cooperation partners:

-  Hamburg Ministry of Education (Behörde für Schule und Berufsbildung [BSB]).
-  University of Hamburg (Universität Hamburg [UHH])
-  Hamburg University of Applied Sciences (Hochschule für Angewandte Wissenschaften [HAW])
-  State Institute for Teacher Training and School Development (Landesinstitut für Lehrerbildung und Schulentwicklung [LI Hamburg])

Staff:

-  Wiebke Frauen, Marc Heydorn, Ogeigha Koroyin, Kai von Luck, Anja Richter, Arne Springborn, Evelyn Staske
-  ca. 30 Studierende

Link: <https://www.3s-hamburg.de/>

2.1.6 Distributed Software Development Based on the Example of CoSI

At the Hafen City University (HCU), a prototype was developed in the CoSI project – Cockpit städtische Infrastruktur (Cockpit for Urban Infrastructure) - that shows statistical data of a city (e.g. kindergarten) on a map for social planners.

The prototype was further developed and extended as part of a joint cooperative development project of the CSL (CityScienceLab) at the HCU and the LGV (State Office for Geographic Information and Surveying) as part of an agile development process based on SCRUM.

The further development was carried out by a development team, which was only intermittently active, at the HCU and the LGV. The data and requirements to be integrated were developed in a fortnightly workshop with a newly formed inter-district and inter-agency working group "AG CoSI Sprint". The working group was directly involved in the further development of the tool as part of the agile development process.

For the successful collaboration in a team of distributed developers and a group of heterogeneous stakeholders (represented by the members of the working group AG CoSI Sprint), a development process was defined and planned. This included i.a. Communication channels, roles, repository use, stakeholder feedback, multi-institutional development, and planning.

During the development of the tool, particular attention was paid to the long-term usability, operability, and interoperability with the existing master portal established by the LGV.

The developments in the Distributed Software Development project based on the example of CoSI, thus, serve as a case study for further research projects.

Cooperation partners:



Hafen City University



Council of the Hamburg Borough of Hamburg Nord

Staff:



Lothar Hotz, Ogeigha Koroyin

2.1.7 Distributed Software Development in Heterogeneous Groups

As part of the "Urban Data Hub" project, the need for a digital tool for planning urban infrastructures with which a wide variety of participants from the FHH districts and authorities can analyze and plan urban infrastructures has been identified. The prototype of such a tool was further developed and extended into a working system by the

CSL (CityScienceLab) at the HCU (HafenCity University) and the LGV (State Office for Geographic Information and Surveying) as part of a cooperative development project. The development was carried out as part of an agile development process based on SCRUM (see the description of the project Distributed Software Development based on the example of CoSI).

In this environment, special research questions arise in the agile development process, specifically for the roles of the Scrum Master and project manager. These roles must coordinate, reflect, support, evaluate, and plan the distributed development partners and stakeholders who work with different resources (e.g. different roles of those involved, different time budgets for the development group) on the development process. At the same time, these roles are intended to ensure that through the involvement of the HCU in the implementation of the project, scientific knowledge and methods on questions of social space and urban planning are consistently applied.

In this project, a first concept for distributed software development in heterogeneous groups will be developed by considering and evaluating specific case studies. The focus is on the roles of the Scrum Master and project manager, which complements the work in the project Distributed Software Development based on the example of CoSI. The results of other development projects at HITeC will also be incorporated into the project.

The results will be the basis for further research projects as well as further cooperation projects in the area of software development in public administration and open data.

Cooperation partners:

 Hafen City University

Staff:

 Lothar Hotz, Christine Issleib, Ogeigha Koroyin, Nicola Stradtman

2.1.8 Yard Planning in Seaport Container Terminals

At a container terminal, equipment for handling and transporting containers during loading and unloading processes has to be synchronized. In a specific use case, quay cranes for executing vessel (un)loading processes, truck trailers for transporting containers horizontally from/to quay cranes to/from the container storage block, and rubber tyred gantry cranes (RTGs) for picking up and dropping down containers in the block are used. For smooth processes, different priorities of containers and therefore equipment have to be taken into account. Furthermore, planning with a rolling horizon

reflects the current and upcoming complex situation at the terminal. Therefore, a recalculation is required frequently (e.g., each minute).

This project is aiming at developing a concept for process control. Plans should be recalculated frequently, so that algorithms as well as human planners and decision-makers are provided with real-time information. The plans have to incorporate all jobs to be executed in the next planning period (e.g., the next 30 minutes) and reflect all given restrictions. The result is an assignment of equipment to jobs/containers including decisions on the storage place (slot) for inbound containers within the yard. However, typically changes have to be made during operation (due to new unforeseen jobs to be served, machine failure etc.), and changes at one point can result in a chain-reaction of necessary changes at other points. It can be assumed, that the complex situation cannot be solved to a proven optimum quickly enough, therefore the approach will be rule-based one. Solution candidates have to be identified and evaluated systematically (with respect to a target criteria, e.g., time) in a search tree, and finally a satisfactory or "best" solution should be found within the set of some or all appropriate and valid solutions.

Cooperation partners:

 EUROGATE GmbH

Mitarbeiter:

 Dr. Kai Brüssau, Michael Kuls

2.1.9 Intelligent Decision Support for Truck Route Planning in Ports

Container transfers are indispensable for linking locations (e.g. container terminals, depots, repair) and logistics nodes in the port area and hinterland. In the port of Hamburg about 90% of these transports between the terminals are carried out by truck and contribute significantly to high traffic volumes and long waiting times at the gates. This effect is exacerbated by the ever-increasing size of container ships, which leads to peak loads with regard to the provision and transport of containers. Frequently, transports are planned centrally by dispatchers and assigned to independent hauliers.

In this cooperation project, a software component was developed to support route planning and scheduling using combinatorial optimization methods (e.g. heuristics, metaheuristics). The software component enables an automatic planning of truck tours to available truck drivers under consideration of various temporal, local, and organizational restrictions (e.g. dangerous goods transports, driver qualifications). The availability and the necessary change of chassis are also included in the planning. The dispatcher can configure the optimization procedure and pursue different optimization goals (e.g. reduction of distance and empty runs, fair distribution of transport orders).

The software component is integrated with a map service in order to be able to optimize routes on the basis of real route and real-time data on the traffic situation. Rolling planning is also supported in order to integrate new orders into existing plans and to be able to react to deviations/disruptions in operations.

Compared to manual planning, the optimization results demonstrate that automatic planning leads to improved planning results. It could also be shown, even for days with high transport volumes, that the number of possible transports per day can be increased. Accordingly, the intelligent decision support enables higher productivity on the part of EUROGATE Intermodal on the one hand and an improved order volume for the participating haulage contractors on the other.

Cooperation partners:

 EUROGATE Intermodal GmbH

Staff:

 Dr. Leonard Heilig, Dr. Kai Brüssau

2.1.10 Analysis of Social Media Texts - SmartSquare

The HCU carried out a project at the Domplatz in Hamburg, in which different services with cultural content for the passenger were offered (including cultural events, chatbot, audio tours, digital signage installations). These are primarily topics of the Archaeological Museum Hamburg, especially with reference to the Hammaburg and the Hamburger Domplatz. In the project with HITEC the relationships between the changes in social media communication induced by the project by providing the content and their penetration, particularly via Twitter, has been investigated.

For this purpose, a natural language processing pipeline was designed and implemented, clustering and cluster analysis methods, as well as visualizations, and a concept-centered analysis for the project partner has been implemented.

Cooperation partners:

 HafenCity University Hamburg

Staff:

 Chris Biemann, Lothar Hotz, Sarah Kohail, Gitanjali Nair, Stephanie v. Riegen

2.1.11 Determination of Skin Parameters by Image Analysis

Different sensors can be used to detect skin features such as wrinkles, redness, age or impurities. If special equipment can be omitted to determine skin parameters, these can be collected on a larger scale. The aim of this project was to determine the same parameters using RGB image data alone. For this purpose, image material of skin areas, taken at the same time as the measurements of the corresponding parameters, was made available.

After reviewing and cleaning up incomplete data sets, neural networks of different promising structures were trained on the basis of PyTorch, which initially could only predict one output parameter at a time. After further adjustments of the network structure, the simultaneous output of all parameters was achieved. In contrast to the currently common object recognition based on neural networks, in which objects to be classified are divided into discrete categories, a special characteristic of this project was that the values of all output parameters are within continuous intervals. In addition to various metrics used to illustrate the prediction quality, also backward propagation was used to highlight the image areas that contributed most to the result. Finally, the hyperparameters of the net were systematically adjusted based on Bayesian optimization.

Cooperation partners:

 Beiersdorf AG

Staff:

 Rainer Herzog, Lothar Hotz, Sven Magg, Mohammad Ali Zamani

2.1.12 Prediction of the Skin Sensitization Potential of Small Molecules

Exposure to small molecules such as preservatives and fragrances can trigger allergic contact dermatitis in humans. So far, the skin sensitization potential of substances has primarily been determined by animal experiments, which for ethical reasons should be replaced as far as possible by alternative test methods such as in vitro tests and computer-based predictions. Cosmetic companies are obliged to renounce animal testing due to new legislation.

Within the scope of this cooperation with Beiersdorf AG Hamburg, new in silico models for the prediction of the skin sensitization potential of small organic molecules are being developed as alternatives to animal models. Main research areas include the estimation of the confidence of predictions and the definition of the scope of the models.

These aspects are of fundamental importance for the acceptance of computer-based predictive models by national and international regulatory authorities.

As a result of this cooperation, a first computer model for the prediction of the skin sensitization potential of small molecules, "Skin Doctor", was published in the International Journal of Molecular Sciences in 2019. Skin doctor is accessible via a web service hosted by the University of Hamburg at nerdd.zbh.uni-hamburg.de.

Cooperation partners:

 Beiersdorf AG

Staff:

 Johannes Kirchmair, Jochen Kühnl, Anke Wilm

2.1.13 Implementation of a Web Service for Predicting of Small-Molecule Metabolism

Today, computational methods for predicting the metabolic fate of small molecules play a key role in the development of safe and efficacious drugs, cosmetics, and agrochemicals. Prof. Johannes Kirchmair and his research team at the University of Hamburg have been developing machine learning models for the prediction of metabolically labile atom positions in small molecules. The third generation of these models (called "FAME 3"), recently published in the Journal of Chemical Information and Modeling, is characterized by high accuracy and comprehensive coverage of all mammalian enzymes relevant to xenobiotic metabolism. Within the scope of this project, a public web service was developed which provides free access to FAME 3 (<https://openrisknet.org/e-infrastructure/services/145/>). The API developed as part of this project allows researchers around the world to run large-scale studies with FAME 3.

Cooperation partners:

 OpenRiskNet Consortium

Staff:

 Martin Šícho

2.1.14 Speech Data Collection Scientific Consulting

Spoken language can be an important marker in psychometric and other early detection of pathologies as well as when assessing therapeutical interventions. This is particularly relevant for diseases of the central nervous system such as schizophrenia, PTSD, Alzheimer's or Parkinson's disease. It is only natural that the development and testing of medications in clinical (phase-2) studies should include a collection of speech data samples from the participants in the studies. In this project, we help to develop

within multiple expert workshop the necessary technical and organizational requirements, the types of samples to be collected, as well as avenues for later analysis. The first workshop took place in fall 2019.

Cooperation partners:

 Böhringer Ingelheim

Staff:

 Timo Baumann

2.1.15 Project Support for the AI Infrastructure

HITeC carries out a large number of projects in the field of Artificial Intelligence. These usually require dedicated hardware such as GPU processors. In this project, first considerations were made to determine the requirements for a comprehensive AI infrastructure.

Cooperation partners:

 University of Hamburg

Staff:

 Lothar Hotz

2.1.16 ADAM - Autonomous Adapting Machines

In mechanical and plant engineering there is the general challenge of achieving flexibility, to make changes to the requirements or the operating conditions of a machine on site at the operators of the machine. Changes to the machine and its configuration require an intensive cooperation between the operator and the machine builder (or plant manufacturer in case of several machines) and with its suppliers if required. In this project, adaptation possibilities are to be developed during the machine running time, which reduce efforts by the machine independently recognizing and preparing useful changes and making the changes supported and - as far as possible - carried out.

The aim of the ADAM project is, besides the delivery of a machine (consisting of several components) or the delivery of a component, so-called autonomous agents can also be delivered. These agents have the task of machine and to adapt to changes in requirements. The machine together with the autonomous agent forms the autonomously adapting machine.

In 2019, first use cases were compiled and analyzed, and the architecture for autonomous adapting machines.

This project deals with the research topics ontologies, constraints, modeling and Asset Administration Shell (AAS).

Adam is funded by the Federal Ministry of Education and Research.

Cooperation partners:

 University of Hamburg, Encoway GmbH, Lenze SE, Remmert GmbH

Staff:

 Rainer Herzog, Lothar Hotz, Stephanie von Riegen

2.1.17 Configuration Workshop

The international Configuration Workshop has been held annually at different locations since 1999. It aims to bring together scientists and industry representatives who work on topics such as knowledge-based configuration, constraints, logical programming. In 2019 the Configuration Workshop took place in Hamburg and was organized by HITeC (see <https://confws19.hitec-hamburg.de/>).

Staff:

 Lothar Hotz, Evelyn Staske

2.1.18 OAI-Dashboard

The project "Schaufenster Hamburg Open Science" collects all Open Access (OA) publications and their underlying materials (such as research data) from Hamburg institutions and makes them accessible on a portal together with information on Open Science and advisory services.

The Hamburg Open Science Window creates transparency: it improves the accessibility and visibility of existing and future Open Access publications and materials by Hamburg scientists. An improved data basis supports networking. Combined services and information provide an introduction to the topic of Open Science. In this way, a contemporary, constantly growing insight into the performance capabilities of Hamburg's universities is created

In late 2018, early 2019, HITeC has developed an architecture that can automatically harvest data sources and store this information in a database. The data sources are queried via Open Archives Initiative Interfaces (OAI). The data is then made available for a web front-end via a REST interface.

Since the end of the first quarter of 2019, a prototype of the developed software architecture has been running in test operation on a server hosted by the Hamburg State and University Library.

Cooperation partners:

 State and University Library Hamburg, effective WEBWORK GmbH

Staff:

 Rainer Herzog, Lothar Hotz, Pascal Rost

2.1.19 PESHAT - Portal for Philosophical and Hebrew Terminology

Up until Spring 2016, HITeC helped transfer an existing web application for philosophical and scientific Hebrew terminology over to the content-repository application “My-CoRe”. By means of this transfer, a permanent application was created, aimed to last throughout the project term of “PESHAT in context” and beyond.

After a comprehensive review by the German Research Society (DFG) at the end of 2019, the project “PESHAT in context” has been extended for another 3 years. A number of improvements and enhancements are set to be realized in cooperation with HITeC by the end of 2022.

Over the course of 2019, we worked hard to implement a number of improvements for the editors and authors of “PESHAT in context”. Additionally, we implemented a PDF-Export-Function that allows users of PESHAT to download a dynamically generated PDF of any result of a search. Also, we created a commentary-function, that allows registered users to place comments on items of search results which strengthens the participatory spirit of the “Peshat in Context” project. Last but not least, at the end of 2019, we made a large version update of all infrastructure components that PESHAT runs on with the aim of keeping maintainability of the application for the next three years.

Cooperation partners:

 Institute for Jewish Philosophy and Religion at the University of Hamburg

Staff:

 Christian Haase, Lothar Hotz, Pascal Rost

Link: <https://peshat.gwiss.uni-hamburg.de>

2.1.20 Matrikelportal Hamburg

For this project, in the context of the anniversary “100 years University of Hamburg” in early 2019, the matriculation registers that were passed down from the center for the

History of the University where digitalized, presented on a website and made searchable. The matriculation registers span from the beginnings of the University of Hamburg in the year 1919 to the year 1935. The technical implementation of the corresponding website and repository of the digital copies where implemented with the Open-Source content-repository system "MyCoRe".

The project was finished right on time of the 100th years celebrations of the University of Hamburg. Even before the final steps of the project where taken, our project partners of the Archive of the University of Hamburg came to us in order to plan an extension of the Matrikelportal in regards to the key word: "Matrikelkarten". The extension includes the digitalization and integration of so called "Matrikelkarten" (matriculation cards/sheets) into the application. The extension of the Matrikelportal will be finished approximately mid 2020.

Cooperation partners:

 Archive of the University of Hamburg

Staff:

 Rainer Herzog, Lothar Hotz, Pascal Rost, Arne Springborn


Link: <https://www.matrikelportal.uni-hamburg.de/>

2.1.21 Adaptable University Bibliography with MyCoRe

In this project, the already up and running University Bibliography of the UDE shall be made modularizable in order to improve adaptability and to make it possible to re-use it as a framework for other Universities. The technical basis of the UDE online Bibliography implementation is the Open-Source-Framework MyCoRe and the used data model is the metadata standard MODS4 of the Library of Congress.

In 2019, the frontend-logic of the UDE University Bibliography software was refactored in a way to allow specific changes of the design of the website through so called Bootstrap 4 "themes". Simultaneously, these changes where used to realize the implementations of designs based of the official corporate designs of two different Universities, namely of the Universities of Jena and of Ilmenau. Additionally HITeC implemented an interface to make it easily possible to realize identity-matching-services between university staff and imported publications. This project is expected to end in February 2020 and enter a one-year pilot test phase.

Cooperation partners:

 Central office of the joint library network (Verbundzentrale des gemeinsamen Bibliotheksverbunds - GBV)

Staff:


 Lothar Hotz, Pascal Rost

2.1.22 Feasibility Study: Digitization for the Optimization of Plant Operation

In the project, which is being carried out in collaboration with the operator of a large industrial park, a concept for the management of knowledge-intensive processes is being developed and tested. For certain processes in the industrial park, e.g. for the handling of incidents, specific expertise and experience of the employees is required, supplemented by documents, plans, etc. in a variety of formats. In the future also of sensor data collected on site will also become relevant.

The project examines the extent to which the regular control of processes in a process engine can be supplemented by the provision of additional data and documents, and how implicit human knowledge can be integrated accordingly. In a second stage, the system should learn from already completed process instances.

Staff:

 Florian Bopp, Fynn Guse, Eike-Christian Ramcke, Verena Schaffarczyk

Link: <https://hawai-web.ful.informatik.haw-hamburg.de/portfolio-items/digitization-optimization-facility-operation/>

2.1.23 Knowledge Management for Research Funding Consulting

Our project partner consults enterprises how to raise funding for their research and development projects. For each customer, the consultants have to bring together knowledge concerning the respective customer's business and research fields, former projects, possible partners, and competitors. This knowledge has to be mapped against typical research funding initiatives often documented in large sets of documents comprising hundreds of pages of information. We support the consultants in their working process by providing them with services for filtering project databases and documents as well as for easily collecting semantic knowledge about enterprises, projects, and research topics. These services rely on recent concepts in the areas of information retrieval, semantic annotation, and multi-model databases.

Staff:

 Nico Gnos, Lasse Krugmann, Tim Maeke, Tobias Schreier

Link: <https://hawai-web.ful.informatik.haw-hamburg.de/portfolio-items/intelligent-support-for-knowledge-intensive-processes/>

2.2 DSL – DISTRIBUTED SYSTEMS AND SERVICES

The project area "Distributed Systems Lab" (DSL) cooperates closely with the Research Group for Distributed Systems (VSYS) of the Department of Computer Science at the MIN Faculty of the University of Hamburg. VSYS focusses on questions of distributed systems as well as related information systems, and cooperates, among others, with industrial companies that are active in the area of distributed information and communication systems and their applications. Current activities include, e.g., support and implementation of joint R&D projects, innovative software development, technology consulting, training, and concept analysis or evaluation etc. In doing this a holistic approach is pursued, which, in addition to current or future technologies, also considers internal processes and organizational forms of software development and takes into account corresponding interactions. Active areas are, currently, e.g. the field of "Service-Oriented Computing" (SOC) or "Service-Oriented Architecture" (SOA), technical support and the organization of operational procedures and processes (Business Workflows) as well as the coordination of autonomous and mobile services and processes (including social media) as well as cloud services. Technologies used include (multi) agent technology, as well as software development techniques based on them. On the application side, especially long-lived software applications as well as techniques of self-organization (autonomous computing) or sensor-based applications are considered – such as in the area of the "Internet of Things" (IoT) or "Smart Cities".

Various aspects of distributed system technology are in the focus of DSL research. Those include but are not limited to middleware, service-oriented computing, web services, clouds, agent and component-based software development, self-organization, or event-based systems. Beyond just the technology, their diverse fields of application such as electronic service markets, e-commerce/e-business/e-services, as well as mobile/ubiquitous application scenarios, control of operational processes, including workflow management, logistics, computer-aided cooperative work, and application-related user support, production automation and more, are also a focus. The totality of these techniques provides a technical basis for many practice-oriented and current distributed applications based on modern internet and intranet technologies.

Project Manager:



Winfried Lamersdorf

Link: <https://vsis-www.informatik.uni-hamburg.de/>

2.2.1 Blockchain Projects

Last project partner for the HITEC project "HITEC blockchain" was the Hamburg-based company ppi AG. The corresponding joint project was, in part, carried out directly with students from the Department of Computer Science at the University of Hamburg. The aim here was to analyze and evaluate existing blockchain technologies, to find out respective advantages and disadvantages of this technology and to evaluate it. Exemplarily, a prototype of a blockchain application in the insurance industry was designed and built jointly. In the course of the project, the resulting prototype was designed, built, and practically evaluated. Concrete examples for practical application areas were also supplied by the industry partner.

A former project partner of HITEC DSL in the area of Blockchain Technologies was the Hamburg-based company Ponton GmbH. Together with Ponton, HITEC DSL developed and applied Blockchain Technologies in the area of energy supply and trade in the framework of the Ponton project „Enerchain“.

Last Cooperation partner:

 ppi AG, Hamburg

Staff:

 Julian Kalinowski, Winfried Lamersdorf, Wolf Posdorfer

Link: <https://cadeia.org/>



2.2.2 Smart City Projects

Other current HITEC DSL projects in the area of distributed system software, concentrate on support for "Smart Cities", i.e. sensor-based system components which are designed, developed, and used for networked applications in the area of intelligent and "smart" cities. This is also the focus of the project "Smart Networks for Urban Citizens' Participation" (SANE), which is carried out as part of the "ahoi.digital" digitalization initiative by the city of Hamburg together with partners from both Hamburg University and Hamburg University of Applied Sciences. Such activities open up new opportunities for citizen participation (citizen science/ education) by, among other things, providing, disseminating, analyzing, and sharing diverse (e.g. environmental) data for citizens and institutions. Technical challenges of this approach include the integration of large amounts of data from heterogeneous sensors and devices, the network-based, distributed analysis and processing of information and also insurance of security, resilience, privacy, and trust. At all levels, these are particularly important for the acceptance and,

thus, for the use of such an information space and, thus, represent a unique selling point of the results achieved using this approach.

As part of a German Federal BMI (Bundesministerium des Innern) funding application by the City of Hamburg as a “Smart City”, technical aspects of a corresponding application design and formulation were supported – also in cooperation with other Hamburg universities.

Cooperation partners:

-  Working group „IT-Sicherheit und Sicherheitsmanagement“ (ISS), FB Informatik, Hamburg University (Matthias Fischer et al.)
-  Working group „Internet Technologies“ (inet), HAW Hamburg (Thomas Schmidt et al.)

Staff:

-  Dirk Bade, Heiko Bornholdt, Philipp, Kisters, Winfried Lamersdorf

Link: <https://sane.city>

2.3 ITMC - IT-MANAGEMENT AND CONSULTING

The project area ITMC works in close cooperation with the corresponding work area at the university. ITMC pursues with its research the vision: "Driving Innovation with Service". The aim of design oriented research is to contribute to better methods and tools for the development and management of complex, socio-technical service systems. We call this focus Service Systems Engineering. We apply this approach both to innovative, IT-enabled services in specific application domains and to the management of IT as a service.

Head:

 Tilo Böhmman

Project Manager:

 Paul Drews

Links:

 <https://www.inf.uni-hamburg.de/inst/ab/itmc/home.html>

 <https://www.inf.uni-hamburg.de/inst/ab/itmc/research/themes.html>

2.3.1 ITMC-Conference – Conference of the Informatics Course ITMC

Students of the Master's program IT Management and Consulting (ITMC) organized an exchange forum between IT business and science in June 2019. This year's ITMC conference took place with the main topic "Hamburger IT-Insights: Work, Life, Leadership" took place.

The venue this year was "Collabor8". The Collabor8 is the Co-Working Space of the year and is located on the Otto Campus.

In specialist lectures and workshops, the participants were given the opportunity to get to know the course of study, to deepen their knowledge and to share it with other interested parties. They were also given the opportunity to network or to meet old friends from their studies in the "Alumni Space".

Staff:

 Many students of the ITMC course

Link: <https://www.inf.uni-hamburg.de/de/inst/ab/itmc/studies/prospects/conference.html>

2.3.2 Study „Digital Platform Management“

Companies in all industries face the challenge of digital transformation. Driven by the far-reaching impact of IT, IT megatrends, digital start-ups and international competition, enterprises have to develop and implement suitable strategies. So far, however, the direction of this transformation is unclear. In the first project, "Digital Excellence", we explored together with Sopra Steria from 2014 to 2015 the dimensions of this transformation goal. The results of this cross-industry study were published in various forms: The main report "Digitale Exzellenz: Eine Bestandsaufnahme zur Digitalisierung deutscher Unternehmen und Behörden" was published in summer 2015.

From 2015 to 2016, we conducted a qualitative-empirical follow-up study on "data-driven agility". In this study, we examined this dimension of the digital excellence model in depth. The results were published in November 2016.

In 2018, the series of studies on digital excellence continued. The focus of the study published at the beginning of 2019 is the topic "Digital Platform Management". Expert interviews and a survey were conducted in a qualitative and quantitative empirical project. The study provides a systematization of digital platforms as well as an overview of the current challenges and initiatives for digital platforms in companies and public authorities.

Cooperation partners:

 Sopra Steria SE

Staff:

 Linda Becker, Tilo Böhmman, Paul Drews, Martje Feddersen, Mathias Kerkhoff, Corvin Meyer-Blankart, Katharina Schuh, Alena Störmer, Andreas Zolnowski

Link: <https://www.soprasteria.de/digitale-exzellenz>

2.3.3 CUDIT - Competence Centre Customer and User-Driven IT



Businesses face challenges of increasing requirements regarding the IT support provided for their services, as staff and clients project their expectation regarding the usage of digital services across all business areas.

Clients expect digitally available offers and services. Staff expect the utmost support for personal information management at the workplace. Due to the digital transformation, IT competence in departments is increasing. These challenges lead to the conclusion that IT in many businesses is set to evolve into a "Customer and User Driven IT"

(CUDIT) which can better react to the increasing requirements and expectations of stakeholders inside and outside a business.

The competence center CUDIT takes on these challenges, and organizes and undertakes applicable research in this field. Participating businesses (partners), the University of Hamburg and HITEC aim to take on these challenges together and investigate possible courses of action for CUDIT.

Cooperation partners:







-  Beiersdorf Shared Services GmbH
-  Hamburg Port Authority AöR

Staff:

-  Tilo Böhmman, Paul Drews, Corvin Meyer-Blankart, Ingrid Schirmer, Jöran Tesse

2.4 BUSINESS INFORMATION SYSTEMS

The project area Business Information Systems at HITeC deals with topics at the interface between computer science and business administration. The focus is on topics that can be researched in an application- and practice-oriented way in the sense of a design oriented business informatics. A special concern of the department, however, is not only the execution of application and practice-oriented research projects, but also the transfer into practice up to the spin-off of companies, which transform current research results into marketable products and services. The transfer takes place via the heads involved. Topics and activities in the field of transfer are among others:

-  Business process management and IT support for business processes
-  Productivity of services through IT
-  Hybrid value creation through product service systems
-  Usability of business management systems
-  IT support for auditing tasks (auditing, internal audit)
-  Standardization projects at the German Institute for Standardization (Deutsches Institut für Normung)

Head:

-  Markus Nüttgens

Project Manager:

-  Nick Gehrke






2.4.1 ITE - IT-Entrepreneurship

Together with the Hamburg Research Center for Information Systems (HARCIS) at the University of Hamburg, the IT-Entrepreneurship program for undergraduate students is offered every summer semester. Topics from the field of IT-based start-up management are dealt with in multiple perspectives.









Contents include:

-  Economic significance of start-ups for the economy and society
-  basic concepts of start-up management (founding ABC)
-  methodical approaches to the development and implementation of ideas and innovations in IT-based products and services (including Design Thinking)
-  critical success factors for technology-oriented and knowledge-intensive start-ups (opportunities and risks)
-  Forms of financing and participation for company founders and risk / capital providers (investors, business angels, promotional banks, etc.)
-  Process models and best practices for IT-based business start-up and consolidation (case studies and guest lectures)
-  Creation and evaluation of business plans (business plan competition)

Hereby the following aims are pursued:

-  Knowledge of the theoretical foundations of IT-oriented start-ups
-  Knowledge of founding from a regional, national and international perspective
-  Learn the basics of digital business models and innovations and how to translate them into IT-based products and services
-  Applying a systematic and scientifically sound approach to establishing and consolidating young IT-oriented companies
-  Case study-based preparation of a business plan

Contributors to the 2019 ITE round included representatives from:

-  Office for Knowledge and Technology Transfer (AWITT) of the University of Hamburg with the field office Hamburg Innovation (HI)
-  TUTECH
-  IKS Hamburg
-  HITeC
-  Neuhaus Partners
-  IFB Hamburg
-  Grenius Lawyers
-  Entrepreneurs from the metropolitan area

Particularly noteworthy is the donation of the purse by Taxdoo GmbH in the amount of 500 EUR for the three winning groups and the organization of the business plan competition, which this year took place in the guest house of the University of Hamburg.

Staff



-  Falk Freese, Markus Nüttgens

Link: <https://www.bwl.uni-hamburg.de/harcis/03-lehre/bachelor/it-entrepreneurship.html>



2.5 STC - SOFTWARE TECHNOLOGY CENTER

Since its foundation in autumn 1992, the project area Software Technology Center (STC) offers the organizational and content framework for the exchange of experience with consulting companies, software houses, and computer users in Hamburg and the surrounding area. The division sees itself as a dialogue partner for developers, users, and management. The cooperation with consulting companies, software houses, and computer users in Hamburg and the surrounding area was successfully established.

In the period under review, the STC focused on the following main topics:

-  Software architectures
-  Training and certification as SCRUM Master and Software Architect (according to iSAQB)

Forms of cooperation are:

-  Technology transfer, tool selection
-  Scientific events (e.g. the annual workshop software@work and OODACH)

Management of the project area:




-  Heinz Züllighoven

2.5.1 Interactive Big Data Analyses for the Planning of Construction Projects

iPlanB stands for "Interactive Big Data Analyses for the Planning of Construction Projects".

Objectives of the project

The overall aim of the project is to make information about the current traffic situation and past traffic flows available for planning future construction projects. The following sub-goals are derived from this:

-  Reducing the number of hours of congestion (reducing economic congestion costs)
-  Reducing emissions and emission peaks (CO₂ & particulate matter)
-  Reducing planning workload & planning costs

In order to achieve these goals, which are very important for the city and its population, extensive historical and live data that affect traffic was collected in iPlanB. This data was analyzed using big-data approaches and correlations between the factors influencing congestion were identified. The analysis of historical data revealed shortcomings in planning. With regard to the topics of optimizing the switching of light signal systems and simulating the effects of planned construction sites, concepts and demonstration prototypes were developed. In close feedback with planners, the feasibility of the proposed solutions and innovative interaction concepts was tested.

Organization of the Project

iPlanB was funded by the Investitions- und Förderbank Hamburg (IFB). WPS was the consortium leader and cooperated in the project closely with the HCI unit of the computer science department at the University of Hamburg. HITEC e.V. was also part of this cooperation. To increase the benefit of the project results, iPlanB worked closely with various departments of the Landesbetrieb für Straßen, Brücken und Gewässer (LSBG). The project was started in September 2016 and ran for a total of three years; due to the very good results of the application-oriented work packages, the project work of WPS was successfully completed at the end of 2018; work in the HCI area continued as planned in 2019.

Based on the project results, WPS has successfully won two projects of the LSBG from the federal government's "Clean Air" funding program.

Publications

Poster „Evaluation of Flick Gestures on Multitouch Tabletop Surfaces” at the ACM International Conference on Interactive Surfaces and Spaces 2017

<https://dl.acm.org/doi/10.1145/3132272.3132274>

Poster „Hybrid Decision Support System for Traffic Engineers” at the IEEE Conference on Virtual Reality and 3D User Interfaces 2018

<https://ieeexplore.ieee.org/document/8446141>

Short presentation „VRoadworks - Interactive Data Visualization for Coordinating Construction Sites in Virtual Reality” at the conference Mensch und Computer 2019

<https://dl.gi.de/handle/20.500.12116/24624>

Cooperation partners:

 WPS Workplace Solutions GmbH

Link: www.wps.de/iplanb

2.6 SINGLE PROJECTS

2.6.1 Meeting Minute Bot and AI-Support

The Language Technology (LT) group of the Department of Computer Science maintains a close cooperation with Telekom AG in order to establish methods and applications in the field of Artificial Intelligence and machine learning for various internal processes of Telekom AG and thus to increase the productivity of the company. LT acts as a consultant and evaluator and develops prototype components in the areas of speech recognition, information extraction and processing as well as in the area of business intelligence.

Last year, our focus was set on the development of a prototype solution for transcribing and summarizing meetings. In our solution, which is characterized by a locally running speech recognition software, which is an important security precaution especially in business applications, the timeline of the meeting can be displayed with keyword summaries in addition to the underlying transcriptions.

Furthermore we continued our consulting activities in the field of text classification and speech recognition. A further cooperation is planned for the following years.

Cooperation partners:

 Telekom AG

Staff:

 Rami Aly, Chris Biemann, Tim Fischer, Benajmin Milde, Steffen Remus

Link: <http://ltdemos.informatik.uni-hamburg.de/xpertfinder/ui>

2.6.2 OPENREQ: Requirements Engineering, Big Data, Recommendation Technologies

2019 has been a very eventful and successful year for OpenReq. This 2020 Horizon research project was funded with 4.6 million Euro by the European Commission. Nine research and industry partners, including multinational companies and leading open source communities from five European countries, are involved. They develop novel context-aware requirements engineering approaches and tools as well as intelligent recommendation and decision technologies for community-driven Requirements Engineering.

During the year, there were four plenary meetings of all partners discussing the project's progress, chances, opportunities, risks as well as further plans and procedures. In

addition to these meetings in Barcelona, Hamburg, Mailand and Vienna, the partners organized several focus workshops.

A recurrent subject of these meetings was the organization of the upcoming OpenCall. The Open Call is an initiative proposed by OpenReq to support its dissemination and communication by subcontracting companies that either extend or integrate and evaluate OpenReq approaches. After a public tender process, we subcontracted six companies from five different countries. The Open Call participants opened a total of 29 Github issues resulting in discussions of over 100 comments. The participants contributed to improve the project itself through 15 pull requests.

At the 2nd Hamburg Requirements Engineering Symposium (September 4, 2019), the companies presented their Open Call project results and could further engage the audience (~80 national and international experts in requirements engineering) by showcasing ad-hoc demo in a common space used for breakout sessions during the symposium.





One particular highlight was definitely the OpenReq Week (first week of September).





Apart from two Hackathons and an extensive project meeting we organized the 2nd Hamburg Requirements Engineering Symposium on the event floors of Iteratec GmbH, located in the middle of the Harbor City directly next to the famous building of the Elbphilharmonie.

This event gathered around 80 participants from industry and academia to discuss the state-of-the-art in RE, particularly applying Machine Learning and Artificial Intelligence to Requirements Engineering and vice versa. The event consisted of two keynote speakers, 14 talks in two parallel tracks, and Demos/Posters as well as networking opportunities through the coffee and lunch break. With such a high turnout (twice as many people as last year) and positive responses from the participants, this event was a large success.

After the mid-term review with the European Commission in Brussels in September 2018, where all relevant results were presented to and positively evaluated by an international jury, we are now expecting the results of the final audit and review that will take place in Brussels in February 2020.

Cooperation partners:

-  Engineering Ingegneria Informatica S.p.A. (ENG), Italy
-  The Qt Company (Qt), Finland
-  Siemens AG Österreich (SIEMENS), Austria
-  Technische Universität Graz (TUGraz), Austria

-  University of Helsinki (UH), Finland
-  Universitat Politècnica de Catalunya (UPC), Spain
-  vogella GmbH (VOGELLA), Germany
-  Wind Tre S.p.a. (Windtre), Italy

Staff:

-  Davide Fucci, Walid Maalej, Lloyd Montgomery, Christoph Stanik

2.6.3 Digital Transformation Literacy - A Project for Digital Education


Development of the digital platform mikropolis.org for the digital education of students and high school students. How can students acquire knowledge about digital transformation?

Students should discover our offer of research-based learning, challenges and the sustainable option of digitization for life and work themselves and implement their project work in a video. The aim is to be able to orientate yourself in the digital world.

We call this Digital Transformation Literacy.

We offer support on this platform. In addition to successful student videos that were created in seminars and are continuously being expanded, there is a video series and publications on the challenges and sustainable options of digital transformation. The third platform focus gives recommendations for video production

Cooperation partners:

-  Joachim Herz-Stiftung; State Institute for Teacher Training and School Development (Landesinstitut für Lehrerbildung und Schulentwicklung - LI), in coordination.

Staff:







-  Mathias Kerkhoff, Tim Runge (undergraduate assistants)

[Link: mikropolis.org](https://mikropolis.org)




2.6.4 Sensory Analysis of the Influence of the Terroir on Luxembourg Auxerrois and Chenin Blanc Wines

This project examines the influence of geological, agrological, topographical, and climatical factors, as well as cultural, viticultural, and oenological methods, on the chemical and sensory properties of Auxerrois and Chenin blanc wines from selected Luxembourg vineyards. The question is, whether different vineyard-areas (terroirs) at the Mosel in Luxembourg can be distinguished and characterized in regard to the properties of grapes and wines.

The following aspects were looked into in different work groups:

-  Geography, topography, and microclimate of different terroirs and their influence on the type of wine
-  Chemical properties in must and wine that are influenced by terroir
-  Sensory properties in wine that are influenced by terroir
-  Influence of cultivation parameters onto the terroir development
-  Influence of the terroir onto decay of the grapes
-  Influence of the harvest's ripeness state onto terroir development

Cooperation partners:

-  Luxembourg Institute of Science and Technology (LIST), Belveaux, Luxembourg
-  Institute Viti-Vinicole, Remich, Luxembourg
-  University of applied sciences (Hochschule für angewandte Wissenschaften), Hamburg

Staff:

-  Andrea Bauer

2.6.5 Data Protection Compliant Collection of Patient Data for Medical Research

The project IDOMENEO, carried out by the department for vascular medicine of the University Medical Center Eppendorf (UKE), evaluates the success of treatments for peripheral arterial disease (PAD) patients. The required data is gathered in a centralized platform, which is implemented in collaboration with HiTeC. The platform utilizes innovative techniques from the fields of cryptography and privacy by design to safeguard sensitive medical data while providing this data for medical research

Cooperation partners

-  University Medical Center Eppendorf (UKE)
-  Barmer GEK

Staff

-  Hannes Federrath, Tobias Müller, Tom Petersen

2.6.6 Project FlyCAT (IoT-Backbone Demonstrator)

In this project, HiTeC does research for the ZAL GmbH regarding safety aspects, also according to the impacts on safety, for new architectures of cabin networks for Airbus planes of the next generation.

These cabin networks will rely more and more on COTS components and will be characterized by greater flexibility. One device per task, including a separate plug and dedicated connection cable, will be a thing of the past.

Instead, thanks to the use of secure virtualization solutions, several functions will increasingly be able to run on the same device. A resilient network for data exchange will replace the previously multiple redundant cabling. Standard protocols for data exchange replace proprietary solutions.

However, it is absolutely necessary to implement the highest IT security requirements as an absolute prerequisite for safety. HITEC has made contributions to the project, especially in this area.

Cooperation partners:

 ZAL GmbH

Staff:

 Doganalp Ergenc, Mathias Fischer, Florian Wilkens

2.6.7 RoboCup-AG - Hamburg Bit-Bots

The student work group RoboCup participates in the international research competition RoboCup under the name “Hamburg Bit-Bots” since 2012. The competition has the goal to advance the development in robotics. The robots should have the same level of competence as human professional players by 2050. This should be reached through incremental problem statements that make the competition more and more realistic each year. The Hamburg Bit-Bots are participating in the Humanoid Kid-Sized League. The competitions are a way for exchange and comparison of results, which are also scientifically processed and published by the students.

The team managed to qualify to each year for the world championship since 2012. This year the competition took place in Sydney (Australia). Furthermore, the team managed to participate in the German championship each year. Since 2014, it also participated many times in the IranOpen which takes place yearly in Teheran.

Besides the engagement in the championships and science, the team participates in the public relations of the university. This year it was chosen as exemplary student research project and presented to the federal minister of science on her visit of the university. Furthermore, the team published three papers this year and six theses were created. Seven previous team members are now working for universities, for some of those for the Hamburg University.

Cooperation partners:

 RoboCup AG „Hamburg Bit-Bots“

Staff:

 Marc Bestmann, many students

Link: <https://bit-bots.de/>

2.6.8 IT Security Training at InnoGames GmbH

In this project a one-day training course for employees of InnoGames GmbH was developed and executed. The focus of the training was on the development of secure web applications and the use of tools to check the security of web applications. In the course of the training, considerations were also made as to how such tools could be integrated into the existing monitoring infrastructure of InnoGames.

Staff:

 Henning Pridöhl

2.6.9 M-Lab 2019/2020 (Teaching and Innovation Project)

Within the learning and innovation project “M-Lab Global”, Bachelor and Master students had the opportunity to develop smartphone apps and services using the newest technologies, working in small teams (4-6 members) for real clients from the industry with real deadlines.

The students could experience software engineering technology and methods, such as for example object-oriented analysis or design and implementation of mobile applications. Furthermore, they gained experience in teamwork, project management, and communication with clients.

After the clients presented their respective problems in a kick-off meeting, the students had to choose one out of five clients: Caritas, ksp. layers, SkillMe, UKE Hamburg und Weinmann Emergency.






The Client-Acceptance-Test concluding the project was a public event. The students presented their applications for mobile devices such as smartphones and tablets. All the developed apps came with a poster, a product video, a website and a live presentation by the responsible students.

The clients as well as the audience were very satisfied with the results and the final products.

The students received the project with great enthusiasm. This year’s focus was also mainly on creative processes and solutions. The students had the possibility to attend

an additional workshop in order to improve their skills and optimize their strategies and workflows.

Cooperation partners (practice partners):

-  Caritas
-  ksp. lawyers
-  SkillMe
-  UKE Hamburg
-  Weinmann Emergency

Staff:

-  Volodymyr Biryuk, Abir Bouraffa, Marlo Häring, Walid Maalej, Daniel Martens, Lloyd Montgomery

Link: <http://uhh.de/mlab>

Further details can be found on the "M-Lab" website: <http://uhh.de/mlab>.

The trailers of past and current projects can be watched on the YouTube channel Applied Software Technology (MAST): <https://www.youtube.com/channel/UCJwkoH3PjjUETGX68e1G2Nw>

2.6.10 Representation Expenses of the Department

In close cooperation with the Department of Computer Science, HITEC regularly supports scientific research and teaching events of the department, such as colloquia or closed conferences.

Cooperation partners:

-  Department of Computer Science at the University of Hamburg


Staff:

-  Professorships of the Department of Computer Science

2.6.11 Computer Science Orientation Unit

In close cooperation with the Department of Computer Science and in particular through the committed cooperation of many students of computer science, HITEC regularly organizes the Orientation Unit Computer Science.

Cooperation partners:

-  Department of Computer Science at the University of Hamburg
-  Student Council of Computer Science at the University of Hamburg



Staff:

-  many students in the field of computer science

2.6.12 Business Information Technology Studies Orientation Unit

In close cooperation with many students of the bachelor and master degree courses Information Systems and the master course IT Management & -Consulting HITEC regularly organizes the orientation for the Information Systems and ITMC courses.

Cooperation partners:

-  Department of Informatics at the University of Hamburg
-  The University of Hamburg's student association of Information Systems and ITMC




Staff:

-  Many students in the field of Information Systems and ITMC

2.6.13 IT Security Training for Certified Experts on Information Security Management

IT security managers need special expertise to define and implement security measures within the information and communication infrastructure or data center of a company. This includes planning and organization, staff restrictions, and technological measures in particular. The Universities of Hamburg and Regensburg offered IT security training in cooperation with Ulm Academy for Data Protection and IT Security (udis gGmbH).

Cooperation partners:

-  udis gGmbH
-  University of Regensburg
-  Center for scientific education (ZfW) at University of Hamburg

Staff:

-  Hannes Federrath, Dominik Herrmann

2.6.14 Hamburg Informatics Computer Museum

Since his retirement, Horst Oberquelle has built up a computer museum at the Department of Informatics, where one can see an interesting selection of revolutionary inventions such as the first mechanical calculators, table and pocket calculators, hardware by Konrad Zuse, or large mainframe computers. One can also observe the development of workplace systems and home computers or the development of means of communication and data transfer, such as Morse code, telegraphing, telephones, and smartphones. Writing and printing is also covered, from the typewriter up to the laser printer. Data storage is another important theme of the museum.

Many devices will be demonstrated live. Strong emphasis is placed on the importance of innovation and design in Apple computers. The development of interaction techniques of mice, joysticks, trackballs and other input devices will be presented in the "Mouseoleum". Special loan exhibits show the production stages from sand to silicon wafers, the material from which chips are made. Meanwhile, the museum with its more than 1,000 exhibits has reached its spatial limits.

Besides members of the Department, the museum also appeals to alumni associations, schools, and the public. Prof. Oberquelle offers guided tours regularly. The museum is almost entirely funded by donations and thanks HITEC for helping to acquire of new and interesting exhibits.

Staff:

 Horst Oberquelle

Link: <https://www.inf.uni-hamburg.de/home/about/museum.html>

2.6.15 ICSA Conference

In 2019, the conference „International Conference on Software Architecture“ (ICSA) took place in Hamburg from 25 to 29 March. The ICSA is the most important meeting place for practitioners and researchers interested in software architecture, component-based software engineering, and quality aspects of software and their relation to software architecture design. The ICSA has a strong tradition as a working conference where researchers can meet with practitioners and software architects can explain the problems they face in their daily work and try to influence the future of the field.

HITEC has hosted and supported the ICSA 2019.

Staff :

 Matthias Riebisch, Sebastian Gerdes, Stephanie Schulte Hemming

Link: <https://swk-www.informatik.uni-hamburg.de/~icsa2019/index.html>

3. OUTLOOK

In 2020, HITEC will continue to carry out and advance projects with research institutions, authorities, and industry. Especially in the field of Artificial Intelligence and machine learning, further projects are planned, also in cooperation with ARIC.

As a guiding theme, HITEC is involved in research and technology transfer projects in the field of digitization of urban tasks. This is intended to bundle current and future projects in this field and to increase the visibility of HITEC.