Report of the International Interdisciplinary Forum

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Bericht zum internationalen interdisziplinären Forum

KEYWORDS

international, interdisciplinary, conference
The international interdisciplinary forum 2017 is the second edition of the conference for young researchers of all disciplines. It allows participants to receive feedback from other disciplines about their projects, to publish their interdisciplinary abstract and to form interdisciplinary collaborations. At the same time, this format allows to investigate the process of interdisciplinary exchange on a theoretical level, as we do in this learning paper. We find barriers and potentials to interdisciplinary research on all stages of research from the research approach over methodologies to the presentation of the results. These barriers and potentials exist on the whole range from the personal level over unwritten community norms up to fixed systemic rules.
Introduction

Interdisciplinary work has an important potential for research, however there may also arise problems linking different research fields. In order to void such problems and to support a fruitful exchange between young researchers of various disciplines, we organized the conference International Interdisciplinary Forum 2017 as a successor of the first Interdisciplinary Forum 2016. At this forum, every participant has the opportunity to present an interdisciplinary project and to receive feedback from participants of other disciplines. The conference was opened by introduction talks from Dr. Thomas Sukopp about interdisciplinarity in theory and from Prof. Dr. Susanne Beck about interdisciplinarity in practice and accompanied by an evening talk from Jovan Shopovski about publishing interdisciplinary research. The forum was finalized by an evaluation session and deepening session for interdisciplinary collaborations.

The abstracts of the participant’s presentations can be found in the conference proceedings in the appendix. The appendix further contains a summary of the feedback of the participants. Also photos of the conference are attached at the end of the document.

Goal

Goal of the interdisciplinary forum to allow participants to
• gain practical experience in interdisciplinary exchange
• make theoretical deductions for future interdisciplinary work
• advance their interdisciplinary projects based on the feedback of the other participants
• give a public platform for the research of young scientists
• initiate interdisciplinary collaborations with other conference participants

Furthermore the interdisciplinary forum aims at answering the theoretical questions described in the following section.

Barriers and Potentials of Interdisciplinary Research

What are barriers and potentials of interdisciplinary research? How can the barriers be overcome? How can the potentials be exploited? During the conference we observed presentations and discussions between the participants with regard to these questions. During the evaluation session on Sunday we discussed these questions explicitly with the participants.

We accumulated a high number of responses. In order to be able to better understand those responses, we classified them. We distinguish between issues related to the interdisciplinary research itself on the one hand side, and on the other hand side on practical issues about interdisciplinary project management.
Interdisciplinary Research

Barriers and potentials on the level of the research occur on different stages of research, namely in the research approach, the methods and the results. We further refine our classification on a range from personal aspects over unwritten norms among peers up to fixed systemic rules. Issues on this range are interrelated. Every discipline is historically grown differently and thus has a different tradition. Every field has its own image and thus attracts people who are in a certain way homogeneous, e.g. who mostly like the image of this discipline. This rather homogeneous group of people are the peers within this field. Implicitly, they define unwritten norms by reviewing the other members of the field. The unwritten norms turn partially into written norms and even into fixed systemic rules e.g. for funding or journal requirements. The other way round, the fixed norms suggest certain unwritten implications and promote according attitudes and people working in this field develop according character traits.

The following table gives an overview about how potentials and barriers of interdisciplinary research may be classified:

<table>
<thead>
<tr>
<th>Stage of research</th>
<th>Personal level</th>
<th>Norms, peers</th>
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<tbody>
<tr>
<td>Research approach</td>
<td>Intuition</td>
<td>Community values</td>
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<tr>
<td>Methods</td>
<td>Skills</td>
<td>Commonly recognized methods</td>
</tr>
<tr>
<td>Results</td>
<td>Understanding, knowledge</td>
<td>Presentation to peers</td>
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In the following sections we give more detailed examples.

Barriers and potentials in research approaches

Every field has its own typical types of research goals and typical types questions that are commonly acknowledged to be interesting. From the point of view of other disciplines, the same questions may seem completely irrelevant. E.g.: In computer science the goal is often to create an abstract algorithm solving a specific benchmark more efficiently whereas in biology the focus is on understanding naturally given facts. Law concentrates focuses mostly on relationships between legal texts whereas philosophy has its main argumentation on an ethical level even when both discuss the same topic.

Some areas prefer deductive research approaches, others inductive ones. Some fields appreciate qualitative approaches, others prefer quantitative studies or even require data in every research project.
Traditionally, the scientific system supports unidisciplinary work. Decisions on funding, publications and career advances are traditionally made by peers of the own discipline. In these cases, interdisciplinarity are often hard to defend. Mixing the own norms with norms from other fields makes the application of the own norms less pure and thus often decreases reputation. However, in the last decades, the trend of interdisciplinarity has strengthened. Interdisciplinary faculties have developed, journals relating to different fields have been launched, some funding schemes support explicitly interdisciplinary research. Some funding schemes make interdisciplinarity a requirement. This even leads to situations in which unidisciplinary project teams include researchers from other disciplines only to fulfill the requirements of an interdisciplinary funding scheme. Such cases of forced interdisciplinarity may be in some cases only formal but in other cases may lead to deep interdisciplinary exchange even though the team members initially were not convinced of the interdisciplinary potential.

**Barriers and potentials in methods**

Every area has its typical methods and every method requires the researchers to have specific skills. Accordingly, people in every discipline learn mostly the skills which are required for the typical methods of this field. Even though in most cases, these typical methods are applied, in some cases other, non-typical methods and skills are required to answer a research question. Instead of learning such non-typical skills it might be easier to ask a researcher from another field for support concerning a specific method. It is not trivial to know which methods exist in other areas and in which cases to apply them.

A typical constellation of an interdisciplinary research project is that one discipline poses a scientific question and needs methodologies of a different field. In this case, stereotypes may help finding the discipline from which to ask this methodological contribution. Stereotypes about skills of researchers from other fields may be beneficial but also harbor dangers. On the one hand, they help, e.g. if a research project brings up legal questions, one can take advantage of assuming that law scientists know well this area. Or if a project requires novel computer algorithmic implementations, the stereotype that computer scientists may relate well to the topic is probably a good approach. On the other hand, law researchers are asked to give only legal advice, which they are in some cases not allowed because it is restricted to a specific legal consultants. In other projects, computer scientists may be asked to solely implement software, which is why they might feel to be misused as software engineers instead of computer scientists.

Methodology does not only mean applying a method. It also means deciding in which cases one method is appropriate and in which cases another one. Within the own field, one has experience in deciding which type of research questions gets well along with which type of
methods. One has the intuition of which method to choose. When the method comes from a
different discipline, this question is harder, one might need to contact representatives of
different fields and exchange research questions and methods in order to find out which
method is most appropriate for the questions of interest.

When the method of another area is understood and applied, this may lead to the process of
adapting the method to the research question of the own field. This in turn carries potential
not only in answering this specific question but also in developing a new method for this
research area.

**Barriers and potentials in results**

Depending on the research area, there are different notions of knowledge and hence different
notions of what is valuable as true research. Some fields appreciate qualitative theories
described in words. Others value quantifications in words or numbers. In again other fields
every research result needs to be backed by data.

Finally the results need to be presented in written. This presentation depends on the research
areas. In every discipline there is a specific there is a typical outline of a written scientific work.
E.g. in computer science this would be: Introduction – literature review – methods –
experiment – results – discussion – future work. But in biology it would be: introduction
(including literature review) – results – materials and methods – discussion. Also the style of
writing depends on the discipline. In some areas detailed explanations are preferable, in others
conciseness is appreciated. In some fields researchers write in a personal form using “we” or “I”,
other fields prefer passive forms or writing about “this paper”.

In some areas monographs are preferred, others appreciate short research papers. In some areas
only peer-reviewed journal publications count. In other areas acceptance in peer-reviewed
conferences are considered as first-class publications. But in the standards and the
environments of which research area should one publish interdisciplinary research? Maybe it is
easier to gain quick reputation in the field in which one is more experienced. To reach the
important and critical target audience it might be advantageous to publish in the area in which
one has less experience.

Also the order of authors on a paper depends on the scientific field. One norm is to numerate
the authors of a paper by descending contribution and the head of the group as last author. An
alternative norm is to enumerate authors by alphabetical order. The application of these norms
is in many cases not specified by journals or funders but rather an unwritten rule of a
discipline.
Interdisciplinary project management

Interdisciplinarity is not only an important aspect on the level of the research itself but also on the level of project management of interdisciplinary research. Barriers and potentials in interdisciplinary project management are described in the following paragraphs.

Finding each other

Within the own discipline one knows who are the experts and how to recognize them. In other fields, it is harder to find out the experts and who is well suited for a specific project. In order to overcome this problem it might be recommendable to first make some rather broad contacts within the target field and then follow their recommendations with regard to experts on the investigated topic.

When looking for project partners, one should be open to different character traits. One can expect character traits in unidisciplinary teams to be more homogeneous than in interdisciplinary teams. For example a historian might be rather analytic, an artist maybe rather creative and a mechanical engineer rather technical. In such heterogeneous teams it is especially important to respect each others qualities even though communication is sometimes harder. Taking advantage from this heterogeneity allows to get solutions in line with the different characteristics, e.g. a good analysis of the problem, a creative solution and a sound technical implementation.

Communication

A common problem seems to be that one values ones own discipline higher than other disciplines. Consequences may be that one does not take serious arguments of the other side and thus prevents an exchange before it has even really started. It may also be that the other side appreciates less the own arguments which may demotivate. On the other hand it may be fulfilling to discover the values of the other, the different structure of thinking and that the two disciplines need each other.

In interdisciplinary projects one should in particular pay attention on being humble, respecting the others and their values. One should be open to discussions, open to uncertainties and propositions of the other. In interdisciplinary exchange it may be sometimes tempting to judge others because of the various differences. Such judging should be well thought, one should think about if it is really appropriate and it should be constructive.

Within a discipline a single word may have various different definitions. Between disciplines these differences are even larger. E.g. the word "autonomy" has a very different understanding
in ethics, law, economics and robotics. In communication with other disciplines one should be sensitive to such different interpretations of the same word. In explanations of concepts one should always define the used terms in case of doubt if others have a similar understanding. Seeing points of views of different disciplines on the same term can be quite revealing and give a more global view of the issue under investigation.

On the other hand, a similar meaning might be described by different terms in different disciplines. This is an important issue when making literature research. Searching literature only based on the term from the own discipline may give mainly results from the own discipline. It is recommendable to first investigate if in the target discipline a different term is used and then base the literature search on this term.

Risks

Interdisciplinary projects are riskier than unidisciplinary ones. Within the own field of research one can estimate results. One has a good intuition about what is achievable in a certain time frame. Patterns from one project to the other are rather similar. In interdisciplinary projects such patterns are more diverse and estimations are harder to make. On the other hand, in the case the project succeeds one may have a broader impact, at least on the two or more disciplines involved, but also since many research problems remain unsolved due to a lack of interdisciplinarity. One should be aware of this riskiness of interdisciplinarity and be accordingly open to changes within the project and, in case of failure, to learn from this experience for future interdisciplinary projects.

The interdisciplinary forum as a means of studying interdisciplinarity

On an abstract level, the format of the interdisciplinary forum may be used as a framework for comparative studies about interdisciplinarity. The formats of scientific exchange are different in every discipline, in some areas conferences have typically 20 participants, in other areas 500 participants on a conference is normal. The interdisciplinary forum gives a common and constant framework of exchange for all disciplines. This gives the opportunity to compare how representatives of different areas structure their presentations, what kind of questions they ask and to what extend there are differences in language and attitude. This conference provides constants in a very heterogeneous environment.

Future work

We intend to continue the format of the interdisciplinary forum next year, learning from the rich feedback we received from the participants and from the theoretical deductions we made in this report.
Conclusion

The interdisciplinary forum allowed young researchers from various disciplines and various countries to exchange their ideas, initiate collaborations and publish their abstracts. These exchanges were fruitful as we could see during the evaluation session. On a more theoretical level we could learn several aspects of interdisciplinary research that we summarized systematically in this report.

Acknowledgements

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## Curriculum Vitae

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<td>1996</td>
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<tr>
<td></td>
<td>Akademische Laufbahn</td>
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<tr>
<td>03/2015</td>
<td>studentische Hilfskraft am Lehrstuhl für Straf- und Strafprozessrecht bei Herrn Prof. Dr. Volker Haas</td>
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<tr>
<td>10/2013</td>
<td>Studium der Rechtswissenschaften an der Ruprecht-Karls-Universität Heidelberg</td>
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<tr>
<td>04/2012-04/2013</td>
<td>Schülerstudium Rechtswissenschaften an der Albert-Ludwigs-Universität Freiburg</td>
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<tr>
<td>09/2001-06/2013</td>
<td>Albert-Schweitzer-Gymnasium Gundelfingen</td>
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<td>Abschluss: Allgemeine Hochschulreife</td>
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<td>04/2014</td>
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<td></td>
<td>Auslandsaufenthalte</td>
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<td>07/2010-06/2011</td>
<td>High School Year in Costa Rica</td>
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<tr>
<td></td>
<td>Institute Superior Julio Acosta Gracia, San Ramón, Alajuela</td>
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<tr>
<td>08-12/2015</td>
<td>Auslandssemester an der Universidad Deusto, Bilbao, Spanien</td>
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**Curriculum Vitae**

**Florian Bürger**

1986

date of birth: 1st September 1986

**Education**

10/2008– 05/2017
Human medicine at the University of Leipzig since [May/2016]
Second part of state medical examination (mark: B – 1.8) [October/2014]
Second part of state medical examination (mark: B) [September/2010]
First part of state medical examination (mark: A)

08/1999– 07/2006
Secondary school: Weinhberg Gymnasium in Kleinmachnow, Graduation: A-levels (1.4)

Military service, Training in the ’Panzeraufklärungsbataillon 3’ in Lüneburg, activities as a soldier deployed in a staff position

11/2011– 09/2014
Activities as a student assistant in the field of molecular & cell biology at the Institute of Laboratory Medicine Leipzig

04/2011– 06/2011
Supervision and support of 25 medical students at two corpses in the Anatomy course at the Institute of Anatomy Leipzig

07/2010
Indexing of anatomical photographs for the constitution of the master’s program of toxicology

2011–2017
Doctoral dissertation, University of Leipzig
Institute of Laboratory Medicine, Clinical Chemistry and Molecular Diagnostics

**Clinical work experience**

12/2016
Neurological Rehab facility for children, adolescents and young adults, Klinik Bavaria, Zscheletschitz

07/2015– 10/2015
University Hospital Bern (Department of Nephrology and Hypertension)

05/2015– 06/2015
University Hospital for Children & Adolescents Leipzig (Department of Pediatric Surgery)

03/2015– 05/2015
Queen Mary Hospital, University Hospital Hong Kong, (Department of Orthopaedics and Traumatology)

11/2014– 03/2015
University Hospital for Children & Adolescents Leipzig (Department of Neuropediatrics and Interdisciplinary pediatric intensive care unit)

03/2014
In the doctor’s office for surgery and orthopedics, Teltow

09/2013
In the clinic of vascular surgery, Helios hospital Bad Saarow

[August/2013] Interdisciplinary pediatric intensive care unit, University hospital Leipzig

[February/2011–März/2011] In the doctor’s office for orthopedics at the Olivaer Platz in Berlin

[August/2009–Oktober/2009] In the clinic for vascular medicine, Helios hospital Bad


[November/2007–May/2008] In the clinic of vascular surgery, Helios hospital Bad Saarow

[August/2004] In the center for vascular medicine in Bad Saarow/Fürstenwalde
Curriculum Vitae

Education

2014–2016 Master in Life Sciences and Technologies, orientation neuroscience, Swiss Federal Institute of Technology Lausanne (EPFL), Switzerland

2010–2014 Bachelor in Computer Science, University of Geneva, Switzerland

2007–2010 Final secondary-school diploma (Abitur), Kepler-Gymnasium Chemnitz, Germany

Core Experience

Fall 2016–present

Traineeship, European Research Council, Brussels. 
◦ Retrieval and analysis of grantees data and altmetrics.
◦ Science communication of research highlights of grantees
◦ Observer in the ERC Working Group on Open Access
◦ Continuation as administrative assistant since March 2017

Fall 2015–

Organization of the conference “Interdisciplinary Forum”, present Germany
◦ Around 40 young researchers present their interdisciplinary projects to each other
◦ Co-operation between Studienstiftung des deutschen Volkes and Andrea von Braun Stiftung
◦ Team leader of three organizers and editor of the conference proceedings
◦ www.id-forum.org

Summer 2014

Co-founder of “Plug ‘n’ Scope” startup project, Switzerland
◦ Development of a smartphone-connectable stethoscope
◦ Business plan development, application for Swiss Commission for Technology and Innovation support, participation at startup contests
◦ Team of two students and a professor
◦ www.plugnscope.com

Spring 2014

Research visit, bioinformatics, Institute of Predictive and Personalized Medicine of Cancer (IMPPC), Spain.
◦ Support for the R-package “regioneR”: programming and efficiency increase
◦ Investigation of the relationship between transcription-related factors and cell line characteristics

Fall 2012

Research visit, computer science, University of Central Florida, USA
◦ Bachelor thesis on NeuroEvolutionary Meta-Optimization
◦ Development of an optimization algorithm that trains another optimizer to perform well on a given set of problems. Its core is the proposition of an equivalence between an optimizer and an artificial neural network