1. Motivation and Topic

The year 2014, our period of office as SimTech graduate school’s speakers of PhD students, was a time of changes and renewals for SimTech. SimTech’s second funding period just started, many PhD students finished their thesis, moved on, and left SimTech; but also new projects were approved, students hired, and lots of new members joined the SimTech graduate school. It was therefore natural to continue the yearly PhD weekend, especially because many new PhD students had not become acquainted with each other.

SimTech emphasizes the need of interdisciplinary work and encourages the PhD students to work interdisciplinary. Without doubt, there is a lot of research at the University of Stuttgart that is at the borders between different faculties, now boosted by the new structures and funding possibilities of SimTech. Our subjective impression was that the interdisciplinary work among the PhD students was more difficult and less good established compared to the level of professors and research groups. We were wondering about the reasons and what we could do to improve this for the PhD students of the second funding period. In general it is a necessary skill to be able to work with other disciplines, not only in science: In companies, natural scientists work together with engineers, computer scientists have to understand sales persons, constructing engineers need to collaborate with the head of the manufacturing division and so on. We wanted to give the PhD students some theoretical background about interdisciplinary work to support their work in SimTech and also their work later on.
2. Schedule and Accommodation

The PhD weekend was mostly held in the students’ spare time to avoid conflicts with working hours. We left Stuttgart on Friday afternoon and returned on Sunday afternoon to spend and work one weekend together, see Figure 2 for the detailed schedule. We stayed at the Jugendherberge Burg Rothenfels am Main which is a hostel located in a medieval castle between Würzburg and Frankfurt, see Figure 1.

On Friday, everybody was asked to give a five minutes short talk about his or her PhD topic. The next day, after breakfast, we had group discussions about principle questions and our expectations and experiences with interdisciplinary work. In the afternoon, we had a workshop with the invited speaker Klaus Dietterle from Cognitare. He taught us the theory of interdisciplinary work and what conditions are necessary to make it successful. After the workshop, we had a walk and some spare time to chat, play games, and spend time together. On the last day, we did another session of group discussions where we discussed whether SimTech fulfills the requirements for good interdisciplinary work and collected both praise and criticism as well as suggestions how to improve interdisciplinary work in SimTech.

<table>
<thead>
<tr>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
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<tbody>
<tr>
<td>8 h</td>
<td>8:00 - 9:00 h: Breakfast</td>
<td>8:00 - 9:00 h: Breakfast</td>
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<td>9 h</td>
<td>9:00 - 9:30 h: Introduction</td>
<td>9:00 - 9:30 h: Introduction</td>
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<td>9:30 h</td>
<td>9:30 - 10:30 h: Working in groups</td>
<td>9:30 - 10:30 h: Working in groups</td>
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<td>10:30 h</td>
<td>10:30 - 11:00 h: Coffee break</td>
<td>10:30 - 11:00 h: Coffee break</td>
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<td>11 h</td>
<td>11:00 - 12:00 h: Working and presenting</td>
<td>11:00 - 12:00 h: Working and presenting</td>
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<td>12 h</td>
<td>12:00 - 13:30 h: Lunch</td>
<td>12:00 - 13:00 h: Lunch</td>
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<td>13 h</td>
<td>13:00 - 15:00: Bus transfer to Burg Rothenfels</td>
<td>13:30 – 16:30 h: Workshop with Klaus Dietterle</td>
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<td>14 h</td>
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<td>13:00 – 14:00 h: Feedback</td>
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<tr>
<td>15 h</td>
<td>15:30 – 16:00 h: Welcome Session</td>
<td>14:00 - 16:00 h: Bus transfer to University</td>
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<td>16 h</td>
<td>16:00 - 16:45 h: Short talks</td>
<td>Including coffee break</td>
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<td>16:30 h</td>
<td>16:45 - 17:00 h: Coffee break</td>
<td>16:30 - 18:00 h: Walk</td>
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<tr>
<td>17 h</td>
<td>17:00 - 18:00 h: Short talks</td>
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<td>18 h</td>
<td>18:00 - 19:30 h: Dinner</td>
<td>18:00 - 19:30 h: Dinner</td>
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<td>19.30 h</td>
<td>19:30 - 20:30 h: Short talks</td>
<td>19:30 - 20:30 h: Talks about tools</td>
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<tr>
<td>20.30 h</td>
<td>Get-together</td>
<td>Get-together</td>
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Figure 2: Schedule for the PhD weekend

3. Program

This section describes more detailed the program of the SimTech PhD Weekend.
3.1. Short Talks

All participants were asked to prepare a short talk about their PhD thesis topics, see Figure 3. Each talk was limited to five minutes and three slides. The talks reflected the whole spectrum of research topics and projects within SimTech. They also helped to get to know each other and the others’ research focus.

3.2. First Group Phase

We split the big group into small groups according to the project network they belong to. Participants were encouraged to exchange views about simulation and interdisciplinary in general and their personal experiences so far. To lead the discussion in the small groups, we prepared a set of questions. We included principal questions such as "What does simulation mean to you?", questions about research questions, tools and expertise, and also questions about existing cooperations and experiences with cooperation partners.

The principal questions about modeling and simulation already led to big discussions and different definition were given from each group. Also experiences with cooperations and interdisciplinary work differed between the participants. Some PhD students already had profited from collaborations whilst others were skeptical because there is the risk that only one side gains from a cooperation. Most of the PhD students nevertheless work together with people from other disciplines, but complained about a lack of knowledge within project networks. Existing knowledge should therefore be shared better among project networks and all members of SimTech.

3.3. Workshop

When preparing the PhD weekend, we did not only want to include discussions and group sessions within the group of SimTech PhD students, but also get some view from the outside about interdisciplinary work in general. To overcome our lack of theoretical knowledge, we invited Klaus Dietterle from Cognitare. He is a communication coach and prepared a workshop on Saturday afternoon for us.

The first part of the workshop dealt with the topic of interdisciplinary work. This included basic definitions for disciplinary, multi-, inter- and transdisciplinarity, the reasons for interdisciplinary work, key factors for successful interdisciplinary work, and requirements that have
to be fulfilled by PhD students and professors.

The second part of the workshop was a classical communication coaching, as interdisciplinary work requires good communication skills and can lead to difficulties when communicating.

3.4. Second Group Phase

The next morning, we had another group phase and split up in small groups. This time, we mixed the groups completely that at most two PhD students of the same project networks were in a group together. We discussed the things that we learned during the workshop on Saturday with respect to SimTech. Everybody agreed that all SimTech members know their own discipline and have good knowledge to start interdisciplinary work. Depending on the project network, the reception and integration of members varied. Some PhD students felt to be integrated very well and also reported to work together with other members of their project network. Others had no regular meeting since they started as a PhD student and did not meet anyone of their project network so far. Some students were not assigned to any project network. Discussing about common goals, we experienced that these are not clear to everybody. Especially new PhD students expressed a lack of knowledge about the work of others and the research goals. Some PhD students disliked that they are often seen as service providers for others and not as equal research partner. In total, we collected praise and criticism to pass it on to the SimTech directories.

3.5. Voluntary Talks

Saturday evening two voluntary talks were given to share useful tools among the PhD students. The first presented tool was Asana\(^1\), a teamwork management tool. Every project member can open tasks, assign tasks and communicate in various ways with others involved in the project. Asana keeps all information on the online platform and allows project work without emails.

The second presented tool was WebPlotDigitizer\(^2\) which helps to extract data from plots. This is handy, when the original data is not provided but just its plots.

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\(^1\)asana.com
\(^2\)arohatgi.info/WebPlotDigitizer
3.6. Spare Time

A key aspect of the PhD weekend is to get in touch with other PhD students. For some participants, the PhD weekend was the first occasion to meet other SimTech PhD students outside their project network. We therefore scheduled enough time besides the actual program. In the coffee breaks, people stood together chatting. In the evenings, we played board games, watched a football match, and visited a local Bavarian bar. On Saturday after the workshop, we also went for a walk, see Figure 5.

During the weekend, we played the murder game to better get to know each other and learn the names of the other participants. On the first evening, every PhD student got a slip of paper with the name of an another PhD student, his or her victim. The rules of the game are very easy: The victim can be murdered by passing him or her something like a pen or a bottle (any object) and then telling the victim that he or she is dead. If someone observed the passing, the murder attempt failed and the victim is now aware of his potential murderer. If nobody witnessed the passing, the victim had to drop out of the game and passed his or her slip of paper to his murderer, who then has a new victim. And for sure, dead persons cannot witness anything. At the end of the weekend, we received a lot of positive feedback about the game and it was a continuous topic of conversation. Even after the weekend, people still remembered who killed them in an inattentive moment at the PhD weekend.

4. Results

At the PhD weekend, we learned a lot about other disciplines and interdisciplinary work, got to know our fellow SimTech PhD students, and had fruitful discussions. We realized that some problems with interdisciplinary work cannot be avoided in such large structures as SimTech, but that there is possible room for improvement. In spite of the criticism, the PhD students care about SimTech and want to improve their ways of working together.

5. Evaluation

Right before we headed back to Stuttgart, we asked the participants to provide us with feedback about the PhD weekend using a prepared questionnaire. In total, the PhD weekend was appreciated and we got some very encouraging answers. Besides asking participants for rating statements on a 5-level Likert scale, participants were able to write down positive and negative remarks. Negative remarks were mostly given about the accommodation and the food, which were not perfect. More detailed feedback with the Likert rating of the statements is provided in the appendix A.
6. Discussion of Results with Principle Investigators

After we showed Barbara Teutsch the results of our discussion on the PhD weekend, she asked us to present these to the principle investigators at the SimTech status seminar in December 2014. We summarized our discussion results, see the appendix B, and presented slides for the meeting of the principle investigators. The professors frankly discussed our points of criticism. In some cases, they knew about the problems but nobody could think of a general solution. In other cases, they disagreed or did not have the power to change the rules. But some of our complaints and ideas were new to them and together we tried to find solutions for these.

As a result, we want to strengthen the project networks. Not every network has regular meetings, but this is the best way of getting in touch with other PhD students. The project networks are also the level where joined work can be established.

7. Conclusions

We are satisfied with 2014’s SimTech PhD weekend: It took place, 29 PhD students is a proper participation, the atmosphere was good, many of us learned something new, and the discussions were fruitful. The unexpected bonus of presenting our discussion results to the principle investigators honors our efforts and will improve SimTech for the PhD students.

Acknowledgement

We like to thank SimTech for funding the PhD weekend and Barbara Teutsch, the coordinator of SimTech’s graduate school, for her constant support and valuable feedback. We thank the SimTech principle investigators for their time to listen to the results of the students’ discussion and the follow-up discussion.
Figure 6: General feedback about the PhD weekend, $n = 24$
Figure 7: Feedback about the group work, $n = 24$

Figure 8: Feedback about the workshop, $n = 24$
B. Discussion Results

**Interdisziplinarität in SimTech**
Diskussionsergebnisse vom Doktorandenwochenende 2014

**Konkrete Zusammenarbeit**
- PN-Treffen regelmäßig und häufiger
- Zugehörigkeit neuer Doktoranden früher klären, für alle Doktoranden
- Substrukturen innerhalb der PNs schaffen
- Suche nach Kooperationspartner unterstützen durch
  - Betreuer
  - Stelle für Networking und Kommunikation
- Online-Forum für SimTech-Doktoranden einrichten
- Datenbank für in SimTech verwendete Methoden und Werkzeuge
- Gemeinsame wissenschaftliche Artikel prämieren, Interdisziplinarität auszeichnen

**Konkrete Wünsche**
- Vorträge (Kolloquium, Statusseminar) zielen nicht aufs Publikum
  - Keine reinen Fachvorträge
  - Interdisziplinarität berücksichtigen bzw. vorstellen
  - Vorbereitende Texte oder Artikel im Vorfeld anbieten
- Mailinglisten für PN
- Rollen in PN verteilen: Organisator von regelmäßigen Meetings, Moderator etc.
- Social Events zum Kennenlernen
  - Problem: oft in der Freizeit, eigene Kosten
  - Sommerfest
- Logo mit „Excellence“
- Poster-, Folienvorlagen überarbeiten
- Neue Webseite gut strukturiert, aber langsam

**Einstellung zu SimTech, Grundlegendes**
- Einstellung des Betreuers zu SimTech
  - Bezogen auf Doktoranden, z. B. Teilnahme am Doktorandenwochenende, Social-Skil-Seminaren, Vorlesungen
  - SimTech generell: Melkkuh oder Chance den Horizont zu erweitern
- Würdigung Einsatz für SimTech von
  - Betreuer: Teilnahme an Freizeitaktivitäten, am Kolloquium, an Seminaren
  - SimTech
- Kommunikation und Anpassung der gemeinsamen Ziele und Visionen
  - Sind die Ziele gemeinsam oder nur innerhalb der PN?
  - Kommunikation durch SimTech, durch Betreuer

Figure 9: Discussion results edited as a handout for the principle investigators