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Cultural Perspectives of the 2015 Nonlinear Mechanics and Dynamics Summer Research Institute

Brittany Marie Arviso, Charles Luke Croessmann, Jonathan Everett Fachko,
Rio William Hatton, Matthew R. W. Brake, Davinia B. Rizzo

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185

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Cultural Perspectives of the Nonlinear Mechanics and Dynamics Summer Research Institute 2015

Brittany Marie Arviso[1], Charles Luke Croessmann[2], Jonathan Everett Fachko[1], Rio William Hatton[1], Matthew R. W. Brake[3], Davinia B. Rizzo[1]

[1] :Program and Test Integration
Sandia National Laboratories
P.O. Box 5800, MS 0386
Albuquerque, NM 87185-0386

[2] :Bosque School
4000 Learning Rd NW
Albuquerque, NM 87120

[3] :Component Science and Mechanics
Sandia National Laboratories
P.O. Box 5800, MS 1070
Albuquerque, NM. 87185-1070

Abstract

This paper discusses the results of a study to determine the impact of culture on engineering. The study took place during the 2015 Nonlinear Mechanics and Dynamics Summer Research Institute, a six-week research program sponsored by Sandia National Laboratories and the University of New Mexico consisting of 24 graduate students participating in seven different projects. Twenty-two of the participants and two of the mentors were interviewed to study the effects of cultural background on engineering processes and interactions. The results of this study indicate that cultural differences drive engineering practices.

ACKNOWLEDGMENTS

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CONTENTS

NOMENCLATURE

ARG	Argentina
ASU	Arizona State University
BEL	Belgium
CMU	Carnegie Mellon University
DEU	Germany
DOE	Department of Energy
FEA	Finite Element Analysis
FRA	France
ITA	Italy
KOR	South Korea/Republic of Korea
MEMS	Micro-Electro-Mechanical Systems
NMDSRI	Nonlinear Mechanics and Dynamics Summer Research Institute
ROM	Reduced Order Modeling
SNL	Sandia National Laboratories
STEM	Science, Technology, Engineering, and Mathematics
TUHH	Hamburg University of technology
TUR	Turkey
TWN	Taiwan
UMBC	University Maryland Baltimore County
UNM	University of New Mexico
USA	United States of American
UW	University of Washington
UW-Madison	University of Wisconsin - Madison
WSEAT	Weapons System Engineering and Assessment Technologies

1. INTRODUCTION

This Science, Technology, Engineering, and Mathematics (STEM) research project studies how culture affects engineering. The project team consists of four high school students that shadowed and interviewed the researchers in the 2015 Nonlinear Mechanics and Dynamics Summer Research Institute (NMDSRI). Participants were interviewed to study the effects of cultural background on engineering processes and interactions

1.1 Background

The 2015 NMDSRI was hosted by the University of New Mexico (UNM) and was made possible by Sandia National Laboratories (SNL). The Institute included 24 graduate students and postdocs from 11 different countries. In teams of two to six students, seven different groups worked on projects related to the Brake-Reuß beam, a jointed beam that is easily produced and provides a good subject for the study of nonlinearities. One group also worked with a MEMS system in order to generalize the system identification and nonlinear analysis tools developed for the Brake-Reuß beam to a different system with its own set of challenges.

1.1.1 NMDSRI Projects

1. Developing a set of best practices for measurements of nonlinear systems. Focusing on control algorithms and damping extraction methods
2. Performing a numerical round robin to compare predictions by multiple FEA and ROM codes for joint dynamics.
3. Developing uncertainty distributions for multiple friction models used to describe the Brake-Reuß
4. Assessing the effects of “mixing and matching” different types of sub-ROMs.
5. Developing an understanding of why different types of stress waves interact with a joint in dramatically different manners.
6. Optimization over joint locations, type, surface finish, etc. In order to use the joint as a design tool.
7. Nonlinear system identification, characterization, and controls of a MEMs Duffing oscillator.

1.2 Process

The team worked in a three-step process. The first step was to observe the teams and formulate a set of questions that would provide unbiased insight into cultural differences in the engineering processes being performed at the institute. The seven project groups were observed for a week and a draft set of questions were developed to better understand the effects of participant’s cultural backgrounds on their interactions during the institute.

The second step was to use the questions to interview institute participants. After revising the questions, a Google Form was created to aid in the interview process. While the participants were interviewed, they were recorded, and their responses were documented in the Google Form. The Google Form was then able to record all of the responses in one spreadsheet. These responses were made anonymous and are documented in Appendix A.

The third and final step was to analyze the responses and the observations. The observations from Step one form a basis for understanding cultural differences as well as the responses obtained from the questions. Responses were analyzed based on culture, or country of origin, and grouped. These statistics, along with observations, form the basis for the conclusions in this study.

Note that some cultures, or countries, only had one participant in the institute. For the purposes of this study, it was assumed the single response is an accurate representation of the culture. Further studies are recommended to verify the consistency of the response.

2. RESEARCH

The survey questions and their results are organized by topic area in the following sections. For a complete summary of the questions and the responses, see Appendix A.

There were 22 questions asked of each participant. These included questions about demographics, engineering practices, group dynamics, and living and working in NM versus home. These questions were formulated to gain an understanding of the cultural backgrounds of the institute's participants. Once the cultural backgrounds were identified, the questions further analyzed that way individuals worked with their group members and addressed the engineering problems given to their project team at the institute.

2.1 Demographics of the NMDSRI Participants

Answers to the following questions were obtained to determine the demographics of the NMDSRI participants:

- What is your gender?
- Home country and Institution
- Is this your first time in the US?

Results from some of these questions are shown below.

The institute has a diverse population of students. Approximately one third of the students are from the US and another one third from Germany. The last one third of the students are from other parts of Europe and Asia (Figure 2-1). Of the 24 participants, 23 of them have been to the US before or are from the US originally (Figure 2-3). There is only one participant who is in the US for the first time through this institute. The gender distribution of the institution is skewed, with 23 male participants and only one female participant. This gender diversity must be worked on in future years of the institute. There are 16 institutions and universities represented in the institute. This diversity provides numerous approaches and experiences to the participants, allowing them to share skills that can save time during and after the institute (Table 2-1).

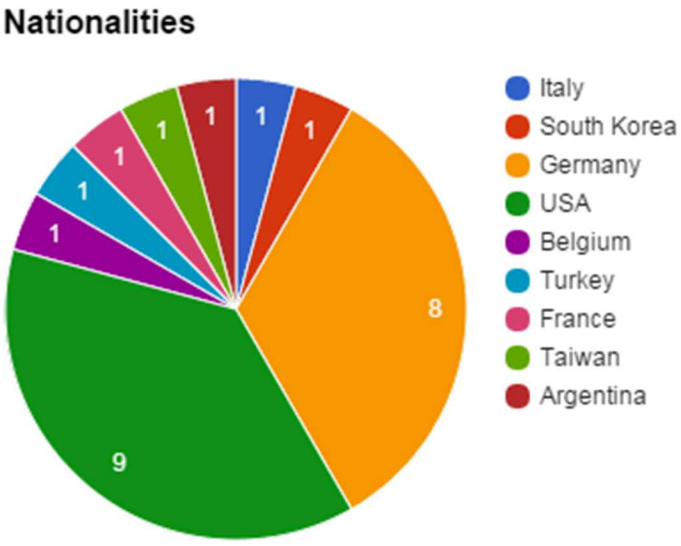


Figure 2-1. Nationalities

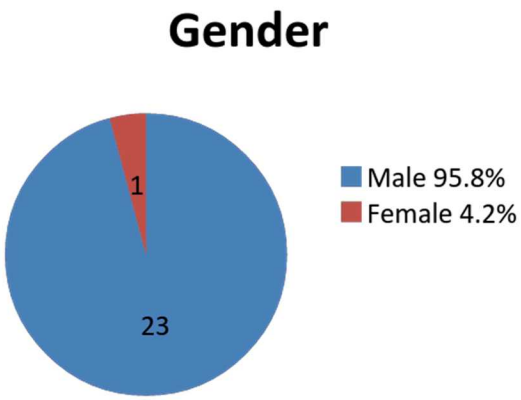


Figure 2-2. Gender Distribution of the Institute

Table 2-1. Institute/University

Institute/University	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Total	Percent
ASU									1	1	4.16%
CMU								1		1	4.16%
Imperial College of London				1						1	4.16%
Oxford University									1	1	4.16%
Polytechnic University of Bari					1					1	4.16%
SNL	1								1	2	8.33%
TUHH			1							1	4.16%
UMBC									1	1	4.16%
University of Chalmers			1							1	4.16%
University of Illinois									1	1	4.16%
University of Liege		1								1	4.16%
University of Michigan						1				1	4.16%
University of Stuttgart			6							6	25%
UNM									1	1	4.16%
UW							1			1	4.16%
UW-Madison									3	3	12.5%
Total	**1**	**1**	**8**	**1**	**1**	**1**	**1**	**1**	**9**	**24**	**100%**

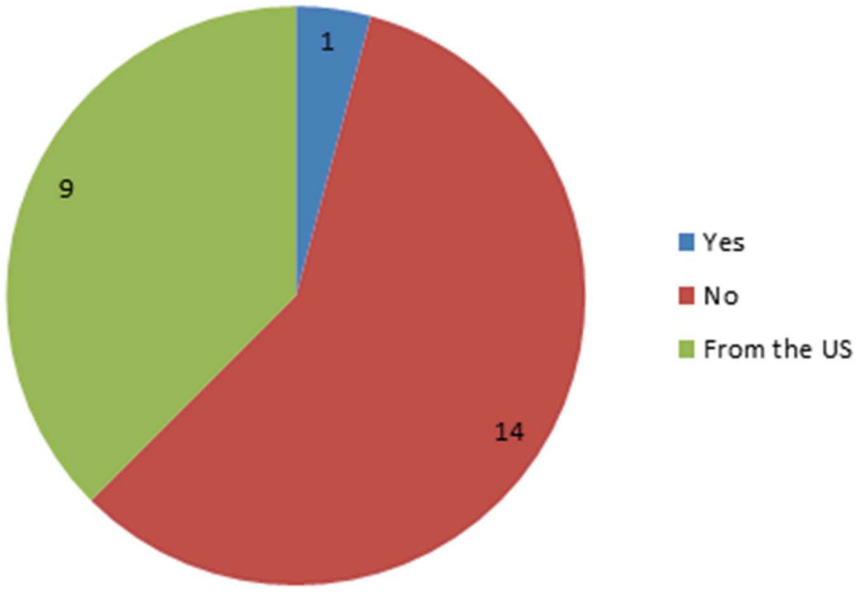


Figure 2-3. Is this your first time in the USA?

2.2 Engineering

To gather insight on interest in the engineering field around the world, participants were asked the following questions:

- Why did you become an engineer?
- Current Position, and year in that position
- Discipline of study

When asked why they had become an engineer, many of the Institute's participants stated that the main reason was a love of math and science: 15 of the 24 individuals stated they were good at math, and chose to continue with engineering because they were good at it. Another common reason for becoming an engineer was a curiosity about machines and the way things worked. A few individuals had grown up helping their fathers work on cars, and numerous others enjoyed taking things apart and putting them back together. Other reasons listed for becoming an engineer included science fiction movies and comics/books, interest in the mars rover, job opportunities, and the automobile industry. It was especially common for the Germans to mention that cars are very important and have become a major industry in Germany.

Table 2-2. Reason for becoming and engineer

Reason	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Total	Percent
Math/Science/ Physics	1	1	5	1	1				6	15	62.5%
Cars/ Machines			3						1	4	16.7%
Media						1	1	1		3	12.5%
Long Story									2	2	8.3%
Total	**1**	**1**	**8**	**1**	**1**	**1**	**1**	**1**	**9**	**24**	**100%**

The majority of participants were in their first or second year of a Master's or Ph.D. program.

All of the participants were in a field of or related to mechanical engineering, with specialties in structural dynamics, controls and vibrations. Other fields of study included nonlinear dynamics, vibrations, and mechanics, as well as technical mechanics, plasticity, and dynamic sub-structuring.

Table 2-3. Current Positions

Positions	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Total	Percent
Ph. D. Student		1	1	1	1	1			4	9	37.5%
Masters			7						3	10	41.6%
Industry	1								1	2	8.3%
Post Doc.							1	1		2	8.3%
Associate Professor									1	1	4.16%
Total	**1**	**1**	**8**	**1**	**1**	**1**	**1**	**1**	**9**	**24**	**100%**

Table 2-4. Discipline

Discipline	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Total	Percent
Structural Dynamics		1	2	1	1				3	8	33.33%
Vibration						1	1	1		3	12.5%
Statistical Mechanics									2	2	8.33%
Mechanics and Strengths of Materials	1		1						1	3	12.5%
Experimental Mechanics			1						1	2	8.33%
Controls and Dynamics			2							2	8.33%
Nonlinear Dynamics			2						1	3	12.5%
Contact Mechanics									1	1	4.17%
Total	**1**	**1**	**8**	**1**	**1**	**1**	**1**	**1**	**9**	**24**	**100%**

Note: Participants self-reported their academic specializations. Many reported skills in multiple disciplines; however, the table above reflects the general disciplines of individuals, not all reported specializations.

2.3 Group Dynamics

The following questions were formulated to analyze any group interactions that were influenced by differing cultural backgrounds:

- How does your group divide tasks?
- How does your group make decisions?
- How does your group assign roles?
- What are the challenges, if any, of working with someone from a different cultural background?
- Do you ever have disagreements? If so, how do you resolve them?
- What are the strengths and weaknesses of your team? How could the weaknesses be improved?

2.3.1 Group Tasks

Throughout the institute, groups tend to divide tasks based on skill. However, the South Korean participant identified his group's work as a hierarchy, meaning individuals with lower seniority perform specified by the person with highest seniority or follow the advice of the senior person. As the data shows, the individuals from Italy and France preferred to work together, and have tried to implement that practice in their own respective groups. The individual from Belgium was the only one to report dividing tasks down the middle, which is interesting because the teammates did not seem to have the same opinion. Lastly, while the majority of Americans stated they based their tasks on experience, one-third of them stated that they meet and make lists. This may be due to more background information that did not come up in this particular study.

Table 2-5. Group Tasks

Method	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Total	Percent
Work Together				1	1					2	8.33%
Hierarchy						1				1	4.17%
Meet and make List									3	3	12.50%
Based on skill set/experience	1	1	7				1	1	6	16	66.67%
Divide in the Middle			1							1	4.17%
Total	**1**	**1**	**8**	**1**	**1**	**1**	**1**	**1**	**9**	**24**	**100%**

2.3.2 Group Roles

In order to divide tasks there was a preconceived notion that there must be roles in a group; however, only one group assigned roles and this was reported by a South Korean participant. This possibly pertains to the hierarchy that was mentioned in assigning tasks. Roles were either natural or were assigned based on the task at hand for the team. The participants from the USA were divided between roles being natural or roles based on skills/experience. This is different from the German perspective, which has six of the eight response stating that roles are based on skill/experience. Meaning that now we can start to see the differences between the American and German cultures. One hypothesis is that American participants like to have pre-defined roles while the German participants like to have a group where the roles are decided based on skill and experience. This also ties into the group tasks where the German participants also liked to divide tasks based on skill set/expertise. Also from the data we

see that from both Germany and the USA one participant said that roles were decided based on what need to be done and there are not roles in their groups.

Table 2-6. Role Assignments in groups

Method of Roles	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Total	Percent
Assigned Roles						1				1	4.17%
Natural Roles	1	1							3	5	20.83%
Roles based on Skill/Experience			6	1	1		1	1	4	14	58.3%
Decide Roles based on what need to be done			1						1	2	8.3%
No Roles			1						1	2	8.3%
Total	**1**	**1**	**8**	**1**	**1**	**1**	**1**	**1**	**9**	**24**	**100%**

2.3.3 Group Decisions

The data on how groups make decisions is interesting. Different participants from different countries stated that they make decisions by working together. This included talking to all parties involved, including all of the mentors/advisors/superiors and all group members. From all of the data we can conclude that culture does not have a large effect on how the groups in the research institute make decisions. However, we see that the German participants are divided in their views of how their groups make decisions. Of the eight German participants, four of them stated that their groups worked together like most of the other participants. Three of the eight Germans stated that they make decision based on skill set/experience.

Following the question on roles, each group was asked about their decision making process. We found that the majority of the researchers have discussions to decide what they will be doing. This majority also made their decisions based on their skill sets while discussing with one another. However, one group had predetermined decisions because of the amount of people in their group. There were only two of them so they needed to spend time on their project and not discussing their decisions as a group all of the time.

Table 2-7. Group Decisions

Decision Making Method	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Total	Percent
Work together	1	1	4	1	1		1	1	9	19	79.17%
Predetermined			1			1				2	8.33%
Decision based on skill set/experience			3							3	12.50%
Total	**1**	**1**	**8**	**1**	**1**	**1**	**1**	**1**	**9**	**24**	**100%**

2.3.4 Group Strengths and Weaknesses

Between the seven groups we found common and individual strengths. There were two common strengths that were somewhat contradictory in nature at first glance. One of these strengths was the group members having broad specializations. This really helped to find different approaches to problems within the groups' projects. This opinion came from three Germans, two Americans, and one Argentinian. The other common strength was the group members have similar skill sets. The opinion labeling same skill sets as strength came from two Germans, three Americans, and one Turk. Responses from an American, a Belgian, and a Taiwanese participant stated that they had a larger group than the others, which helped a lot because they got more input on certain problems, however, this was also a weakness in their group. The opinion that this was a weakness came from an American and a Belgian. There were no common weaknesses because groups had weaknesses that only pertained to them. One that was mentioned was hardware and software issues, which slowed their group's work. This opinion came from two Germans, a French, and an American. This is an indication that people from all over the world like to have functioning software and hardware. Another reported weakness was insufficient knowledge about the project the group was working on. The only cultural weakness mentioned was the accents of some of the researchers.

Table 2-8. Strengths of Groups

Strengths	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Total
Big Group		1					1		1	3
Same Skill Set			2					1	3	6
Highly Motivated			2							2
Small Group			1		1					2
Broad Specializations	1		3						2	6
Different Background			1						1	2
Similar Background			1		1				1	3
Communication			2						1	3
Worked on Project Before			1	1						2

Table 2-9. Weaknesses of Groups

Weaknesses	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Total
Big Group		1							1	2
Language						1			1	2
Software/Hardware Issues			2	1					1	4
Mixed Backgrounds/ Universities		1	2							3
Want to Better Understand Partners Work			1							1
Younger									1	1
Small Group			1		1					2
Don't Fully Understand Project			1					1	1	3
No Weaknesses									2	2

2.3.5 Group Disagreements

Many of these groups did not have disagreements because they were determined to conduct themselves in a professional manner, and were committed to voicing their opinions to each other in a respectful manner. Disagreements were worked out within the groups and not perceived as disagreements when it came to answering the questions. Other groups had small disagreements. These groups have creative and respectful ways to solve their issues. One student from Europe said, “Yes, well it depends on the argument. Basically when you disagree with a team member then you need to show them the evidence that supports your side and then come to an agreement.” This is one of many examples of how the participants solved disagreements through the use of facts and evidence.

The data suggests that the groups do not view disagreements at the same severity. We see that responses that came from the same group are different based on the person and not always culture. One group, consisting of a German and an Italian, reported different answers when asked about group disagreements. The Italian reported no disagreements, while the German stated there were, and the group talked through them to find a common viewpoint. We cannot say that all Germans view disagreements the same because a group consisting of individuals from Germany, France, and the US also had some differing answers. Two of the three individuals said that they have disagreements, while the German said that they do not have disagreements. There is some connection to culture, but we do not have sufficient evidence to draw conclusions. Additional data could shed light on some trend, but at this point the data is not conclusive.

Table 2-10. Disagreements within groups

	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Count	Percent
No Disagreements		1	7		1	1	1	1	4	16	66.67%
Disagreements	1		1	1					2	5	20.83%
Discussion Only									3	3	12.5%

2.4 Working in New Mexico versus Home Country/State

Questions pertaining to working in New Mexico:

- What is the most different thing about working here? And the most unexpected? Is there anything that would make the transition easier?
- What cultural differences in interactions have you noticed between the US and your home?
- What are differences and similarities to you approach to engineering problems at your home institution versus this institute?

Participants were also asked how work at the institute differs from their work at home. The main differences mentioned were the bad Internet connection, cold office spaces, and group work. Most of the interviewees explained that at their home university they did not work in groups, they usually worked alone. “It's really similar, but at university I work with my own project, there is no cooperation. I am the only one, but here we work with five people on this project. This is my first time working with other people.” The German students often noted that it is much more difficult to get the equipment they need here. “When we need something we get something immediately at Stuttgart, here there is a lot of red tape.” Surprisingly more than half of the researchers explained that nothing about working here was really unexpected. Jokingly, a handful of the students said that they were used to having windows in their home university. Upon their arrival, they were surprised that every room was “a room without windows.” The unexpected things that other participants mentioned were expecting to work at Sandia for testing lack of infrastructure, and the amount of culture experienced. When asked if there was anything that could make the transition to working here easier some stated that obtaining the correct supplies more quickly would help exponentially. Other ways to ease the transition included having a real workplace with a desktop instead of laptops and getting more familiar with the software that they used before their arrival. The rest of the participants informed us that nothing could really make the transition easier.

Table 2-11. Working Here Vs. Home: What’s Different

Working Here Vs. Home: What’s Different	
Working at UNM	• Bad Internet connection, cold office spaces, and working in a group • It is much more difficult to get the equipment need for the projects here • There are no windows in the rooms
Working at Home University.	• Usually do solitary work instead of group work • At the participant's home university it is much easier to retrieve equipment • In their home universities the researchers have windows in their lab rooms

Table 2-12. Working Here Vs. Home: Unexpected Things

Working Here Vs. Home: Unexpected Things
• Expected to work at Sandia and not UNM • Many students had replied that there was a lack of infrastructure, they had thought there to be more that there actually is • The participants also noticed that there was more bureaucracy when it came to trying to acquire supplies for experiments • The students were also surprised with the amount of culture they had experienced within the institute.

Table 2-13. Working Here Vs. Home: Making the Transition Easier

Working Here Vs. Home: Making the Transition Easier
• When asked what would make the transition to working here easier the researchers told us that making the supplies easier to get would be nice • They also said that faster Internet would be extremely helpful • Another thing, of course, would be having windows in all of the rooms • Other researchers also said that getting to know the software before they actually used it here would have been very nice • Lastly the students would have liked to meet with each other beforehand

2.4.1 Interactions

The foreign participants were very surprised that it was so easy to talk to their mentors here at the institute. In their home countries they do not always go to their professors openly like they do in the institution. If they wanted to talk to their professors at their home institution they would have to set up an appointment. The participants also feel as though Americans are more confident in their answers and their work. They said that they would never fully admit that they were able to do something. They tend to underestimate themselves. Outside of work, the participants found that people were more open minded and kind to foreigners. In their home countries people do not walk down the street and say hello to others. The participants also said that in their home countries (all foreign countries) they are definitely not as nice to foreigners.

Table 2-14. Breaks at work and thinking about work

Work Breaks	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Total	Percent
Think about work	1		4		1	1		1	6	14	58.33%
Does not think about work		1	4	1			1		3	10	41.67%
Total	**1**	**1**	**8**	**1**	**1**	**1**	**1**	**1**	**9**	**24**	**100%**

2.5 Living In New Mexico versus Home Country/State

Question pertaining to Living in New Mexico:

- What is the most different thing about living here? And the most unexpected? Is there anything that would make the transition easier?
- Typically, in your country, what happens during free time outside of work? Do you work or relax for more productive work later? What about breaks at work?
- Besides the unexpected items you gave us earlier about life and work, in general would you say the US has lived up or down to all of your expectations of cultural norms?

Participants were also asked the question of what was the most different thing about living in New Mexico or U.S. compared to their home institution or country. Participants were also asked what the most unexpected aspect of living here was, and if anything would make the transition to living here easier. The responses were very much mixed although some people had similar answers. A lot of the participants were very surprised that New Mexico actually had natural scenery. Many participants mentioned that they thought New Mexico was just going to be sand and did not expect to see the mountains, White Sands National Monument, trees, and other natural landforms. The participants were also surprised about the vastness of land in the Southwest. Everything is much more spread out and open compared to their homes. “Albuquerque directly, is very widely spread. It's huge. Stuttgart is much more centered. You need a car to get anywhere in this place…” Another major difference was transportation. Most participants do not have a car here, and the ones who do either drove their personal vehicle across the country, or are sharing with other institute participants. “It's a double or triple distance with respect to Europe, when it comes to walking. Everything is farther apart. It's quite different. I realize that here the car is a key point, you should have it.” Yet another difference that most of the participants mentioned was the food. The participants were also asked whether or not the US or NM lived up to the their expectations. Only one student from France replied that New Mexico did not live up to his expectations, but he has enjoyed his stay here. The last question regarding their life here asked participants what they do in their free time. The researchers’ responses were mixed, and about 20% thought of work in their free time, while the others enjoyed

relaxing. It can be noted that the foreign researchers choose to keep their work and play separate. This is noted in the data from the Germans were seven of the eight stated that they do not think about work outside of the office. Also we see that the Belgium, the French, and Taiwanese along with a few Americans and Germans like to separate work and relaxation further by not thinking about work while taking breaks at work. This gives the illusion that they relax more than the American researchers.

Table 2-15. Breaks outside of work and thinking about work

Break outside of Work	ARG	BEL	DEU	FRA	ITA	KOR	TWN	TUR	USA	Total	Percent
Think about work	1		1		1				2	5	20.83%
Does not think about work		1	7	1		1	1	1	7	19	79.17%
Total	**1**	**1**	**8**	**1**	**1**	**1**	**1**	**1**	**9**	**24**	**100%**

3. CONCLUSIONS

There were many more similarities observed in the institute than there were differences. Similarities present included dividing work based on skill set, discipline of study, gender, and a love of math and science.

Some key observations on cultural differences included the Korean's respect for authority and processes. This individual knew their place in their team and did their job so that others could carry on with the project tasks. Another observation was that the Germans' interest in engineering was commonly related to the growing automobile industry in Germany. Lastly, Americans typically had longer, earlier workdays compared to all of the other participants in the institute.

The Google Form proved to be very helpful in conducting the interview process; however, in the future we would recommend recording each interview in its entirety, in order to better understand and transcribe the answers into the document. We also recommend having a larger time frame, to ask any follow up questions needed once all of the original data was processed. Finally, it is important to look at what information is needed or desired before formulating questions, in order to form a thorough and efficient questionnaire.

Overall, due to professional courtesy, the participants in the institute worked well together regardless of their differing cultural backgrounds.

In order to make the transition for students attending future institute smoother, specific recommendations include:

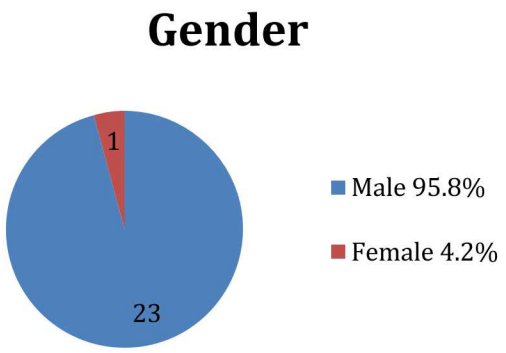
- Provide a rental car for every four to six students
- Ensuring all infrastructure (such as internet connectivity) is in place in advance
- Improve the gender diversity
- More office and lab space
- Providing software to the participants in advance so that learning how to use it occurred before the short time frame of the institute
- (More) Virtual meeting with other group members before the start of the institute
- Clear definitions and goals for all projects before the start (this was achieved for most projects, but not all this year)
- More high school participants to observe and study the institute
    - More shadowing of the teams for research

APPENDIX A: SUMMARY OF RESPONSES

This appendix contains all of the responses given to the survey, and the answers are in no particular order to protect the anonymity of the participants.

Summary

24 Responses



Gender

What is your project? Have you worked on it before? (24)

- I am working on the reduced order model of sub-structuring. Different sub-structuring technique. No not really. I have come across a couple of reduced order models, but not other than that
- I'm helping to oversee a few of the different teams. So trying to help the students know what direction to take their projects, and help them resolve issues that they run into.
- Measurement guidelines. On the measurement of the non-linearity of the beam structure. Working on the controls of the system, and has worked on controls before but not on identifying the non-linearity. Worked at home institute but not here.
- My project is a numerical round robin. So basically the idea is to compare the methodology from 3 different institutions to study what is called the Brake-Reuß beam. We are interested in the nonlinearities in the structure. Nope I was not here last year.
- My project is number 4, it is a substructure of the reduced older model. We're looking for how we subtract the motion of the transmission. We use transmission to connect the parts together. This is my first time.
- My Project is project 2. We are looking at the dissipation in joints of the beam.
- My project is the duffing oscillator, group 7. No I have not worked on it before.
- Our project is to figure out how to experimentally and analytically find the parameters of different joint models. We find those parameters to quantify uncertainty so that Sandians and others can use that information. We did a similar project last summer about uncertainty and finding parameters.
- Project 4, right now, pre-processing of the finite element model of the transmission simulator. It is preparation for the stuff we want to do later on. Yes I've worked on this before.
- Project 5, stress propagation through a bolted interface. I've worked on modeling contacts before, but I haven't worked on dynamics before, or impact, or bolted joints.
- Project 5, the wave propagation. I have not done it before.

- Project 5. My project is studying stress waves propagating through a jointed interface. Our goal is to find something more on the fundamental level about how these systems work, starting with the waves propagating across that interface. This past spring, I did a lot of work with wave propagation against nonlinear interfaces. Yes, I've worked on this before.
- Project 6 and I have worked on projects related to this one before.
- Project 6, Design of joint with maximum or minimum dissipation. No. But on this kind of project yes.
- Project 7, I have not worked on it before.
- Project 7, Micro-electro-mechanical system. It's supposed to be very small and we are trying to make some measurements to figure out the equation describing that system. The whole things is meant to be a the main goal is to develop some sort of sensor, that is a very small vibrating device, and it always vibrates at a specific frequency, the vibration of the device will change to detect an outside event. No, worked on macro not micro systems.
- Project 7, No not on the Microsystems before.
- Project group 3, uncertainties, past couple months, thesis back in Germany
- Reduced order modeling and sub-structuring and I've worked on it a lot. That's what I'm doing for my research focus at my school.
- The project is determining the uncertainty in the joint model parameters. I have worked on the uncertainty but not the joint part.
- We are project 4, assessment of different techniques for formulating reduced orders models. This is my first time doing this.
- Yes, measurement guidelines.
- Yes, measurement guidelines.
- Yes, the project is a numerical round robin for determining dissipation in joints. There are a lot of different solvers. There are a bunch of variations in the accuracy in the solver, producing the correct result.

Home country, Institute/University (24)

- Argentina, Sandia National Laboratories
- Belgium, University of Liege
- France, Imperial College of London
- Germany, Hamburg University of Technology
- Germany, University of Chalmers
- Germany, University of Stuttgart (6)
- Italy, Polytechnic University of Bari
- South Korea, University of Michigan
- Taiwan, University of Washington
- Turkey, Carnegie Mellon University
- United States of America, Arizona State University
- United States of America, Oxford University
- United States of America, Sandia National Laboratories
- United States of America, University of Illinois
- United States of America, University of Maryland Baltimore County
- United States of America, University of New Mexico
- United States of America, University of Wisconsin Madison (3)

Current Position and year in that position (24)

- Associate Professor
- Currently employed, mechanical technologist, 1 year

- Diploma student, sort of a master's student. 8th year.
- Employee, Sandia National Labs
- First year Ph.D. student, going into second year.
- First year, Post Doc.
- Gaann Fellow, 4 years.
- Graduate student, research assistant, Ph.D. candidate, 2nd summer of Grad school, completed 2 years of Ph.D. program, 1.5 years left.
- I am a master's student in my second year.
- I am a master's student of automotive engineering for 2.5 - 3 years.
- Just graduated as a Ph.D. student
- Master's student in my 3rd year.
- Master's student, second year.
- Master's student since 2012, finishing in October.
- Master's student, 9 months until finishing.
- Ph. D. student at Michigan for 5 years.
- Ph. D. student, this is my second year.
- Ph.D. student for 1 year.
- Ph.D. student, 2 years.
- Ph.D. student, first year.
- Post graduate and I started in February so this is my first year.
- Research assistant for 2 years.
- Research assistant for one year
- Third year Ph.D. student.

Why did you become an engineer? (24)

- Actually, I promised myself in the 10th grade I would never become an engineer. In the end I guess I was just good in math at school, and physics was too theoretical for me. Basically to be an engineer is to have every field open. Like even with an engineering degree you can go into economics if you like or do management or whatsoever. So I guess engineering has access to the widest range of professions open.
- Because I am interested in technical stuff. Mainly maybe also cars and stuff like that. From the region I come from cars are a very important staple. In Germany you can get a very good job as an engineer.
- Because I like it. I like math, physics.
- Good question. When I was a kid I liked taking things apart, and when I went to college I was good at math. So when I went to college they were like "You should be an engineer," and I said okay and I liked it and I never switched so I'm still doing it.
- Good questions. It was applied math versus blind memorization. That's the reason, I was pre-pharmacy.
- I became an engineer because in physics I really had no troubles and everything came to me really easily so I switched from computer science to engineering.
- I guess I was just interested in machines and the technical stuff in them. Also liked math and science very much.
- I have always been interested in technical stuff like cars and motorcycles and liked when things moved and did things.
- I like math and science and lots of technology, I am an aerospace engineer. Also an engineer is a staple position in Belgium.
- I like to figure out how things work, I like to fix things, and I was good at math.

- I liked physics, I liked understanding stuff and I don't like modern physics. I like to deal with materials and how things break and understand everyday stuff. Things I can touch and see every day.
- I love technic. All this technical stuff and science. Applied science, not just theoretical physics or stuff like that.
- I think because I like math, science, school, and the applications of engineering.
- I was always interested in science, when I was a kid I was really into cars, and airplanes, and motors, and just things like that. I liked taking things apart.
- I watched so many Sci-Fi movies, and liked the Sci-Fi technologies so I wanted to get into it.
- I went to school in Kentucky with a full-ride in business, and I didn't know what I wanted to do. So I went to school and my roommate was a bio-medical engineer and he was doing a bunch of calculus but he hated his calculus homework. One week I helped him with his calculus homework and he helped me with my economics homework, then he graduated with business and I graduated with engineering, so we switched majors.
- Interesting story, when I was a freshman I took some engineering design classes and I was like this is really cool, I really want to do this. Then I moved, and didn't do much engineering, and decided I wanted to become a writer. Then I really enjoyed physics, so once I was in college I did physics and English double major, then I realized I don't like reading fiction at all. So I couldn't be an English major, and physics doesn't have any jobs. So I'm now a mechanical engineer, no regrets.
- Liked classes that were associated with engineering in high school. Like the fact that it's more applied to building.
- Natural interest for science and problem solving. The career was proposed at the age of 11 or 12. It was very attractive.
- The first moment I remember was when I was reading a newspaper, it was the first day human beings sent a mission to mars. The rover, It is awesome, I thought I could be an engineer sometimes. But when I got into University my first theory was to become a bio-engineer. After three months, I figured out bio-engineering is not my field, I should go back to some mechanical stuff, so I retook the exam and now I'm in mechanical engineering.
- Umm, it came down to helping my dad with cars he built and I was good at math and physics.
- Well, good question. I don't know, it's a common study program in the area around Stuttgart. That's pretty much how I got there, and we have a lot of cars in Germany.
- Well, like in high school I loved to read comic books, like Japan's comic books called manga, and there's one comic book that's about inventors who sample into a lot of things. Then in high school I was good at physics and math, so my ability and my interests merged together, so i decided to study mechanical engineering in college.
- Well, the thing is that I have always been good at math and it made sense to study science in high school and I was pushed by my teachers to go down the engineering school path. I met a few engineers and one was working with an instrument and I really got interested. They talked about what it was like to be an engineer.

What do you consider your academic specialization to be? (24)

- Automotive and engine engineering and dynamics.
- Controls and dynamics.
- Dynamics and control.
- Dynamics and vibrations.
- Dynamics and Vibrations.
- Fundamental is vibration, and vibration is a huge field. In that I am considering contact mechanics. It's a complex field because of all the non-linearity.
- Grad in mechanical engineering. Grad school - structural dynamics - mechanical joints and nonlinearities.
- I am an aerospace engineer dealing with vibrations and non-linear vibrations.

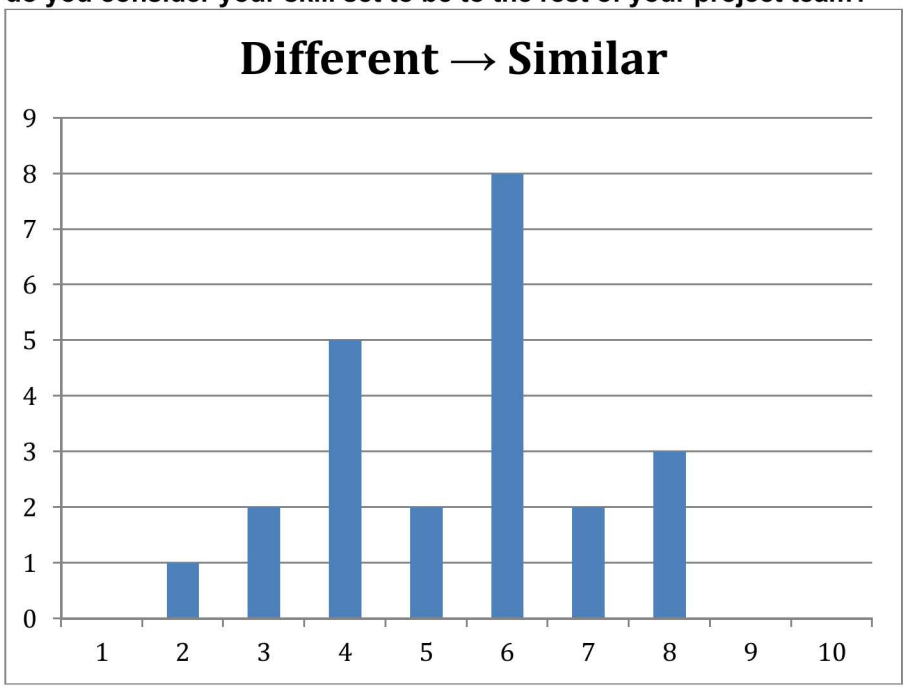
- I am more into materials sciences and the MEMS side of things.
- I guess generally it would be computational mechanics, and then with a research interest uncertainty quantification
- I studied mechanical engineering, and in my graduate work I did solid mechanics, specifically contact mechanics. I do quasi-static mechanics.
- I would say general engineering and also structural dynamics (experimental dynamics). I did a lot of aerospace engineering in undergrad. Then I got a job in industry for 5 years, where I was in a rotation and I did 12 months in controls and then 12 months in combustion, and so on. They paid for me to do my master's while I was doing that. My master's was mainly fluids, controls, and combustors.
- Mechanical engineering, structural mechanics, now in Ph.D. I am focusing on structural dynamics.
- Mechanical engineering.
- Mechanics and strengths of materials.
- Mechanics of materials. So that is the relationship between how the material behaves when you apply forces.
- Modeling simplification for dynamic analysis and experimental testing.
- Nonlinear Dynamics.
- Nonlinear dynamics.
- Nonlinear vibrations.
- Statistical mechanics.
- Structural Dynamics. Substructures.
- Structural mechanics and contact mechanics.
- Technical mechanics, dynamic sub-structuring.

What do you consider the academic specialization of your teammates to be? (24)

- Both grad students in structural dynamics
- Contact mechanics.
- He is a Master's student that works on linear dynamics.
- He's really good at nonlinear stuff, he's all about nonlinear dynamic characterization and identification. We also have a turbo machinery dynamics guy. He's our finite element modeling guy. He's learned how to run this new program from scratch. Another guy works in sub-structuring and is like a transmission simulator expert. Last is our structural dynamics specialist. He really likes coding and he's big into the numerical stuff.
  Everyone's really into numerical stuff.
- His specialty is in contact mechanics, specifically quasi-static contact mechanics.
  Our mentor's specialty is plasticity.
- I think they're also vibrations and dynamics, but I'm not sure.
- It would be the same.
- It's a very broad variety of backgrounds and specializations.
- It's a wide range, some people are doing dynamics, and others are doing more friction and static friction. There is a mixture of things; there is no one dominant area.
- It's difficult to say because I haven't really talked to the others. I know one works with nonlinearities and another is also sub-structuring. There is an experimental guy, and I don't know what the other does right now.
- Maybe, also, dynamics, mechanical, mechanics and dynamics.
- One does controls and mechanics. Another does experimental dynamics.
- One does controls. Another does experimental testing. I haven't really thought about stuff like that.
- One does numerical and computers. Another does optimization and model updating
- One is theoretical to subject. Another does finer element work/ familiar to uncertainty.

- One of them is like a math genius and numbers guy, all about uncertainty quantification. I don't really know much about the other, from what I know he does a lot of optimization and model stuff.
- So one is exactly the same in structural dynamics, but more in substructures. I am not so sure about the other one. Basically mechanical engineering for sure.
- There are lots of them. Non-linear dynamics, also applied math, and contact mechanics, friction, sub-structuring. Everyone in general, there's a lot of expertise with finite element analysis, dynamics, and nonlinear dynamics.
- They are all mechanical engineers.
- They are working on vibrations but more related to the subject of the project.
- They work in solid mechanics too, or maybe they're in structural dynamics. They do dynamic modeling.
- They work on similar things as me but, are not as much on the micro-scale as I am.
- They're mostly like me. They basically are all vibration guys. Two of them are also interested in contact mechanics. We rarely have conversations. Another guy is interested in nonlinear phenomena. Simply put: vibration.
- Very mixed group. Some of them are working with microsystems; others are also doing dynamics, but not really nonlinear dynamics. One guy is doing control systems.

On a scale of 1 to 10, with 1 being completely different and 10 being the exact same, how similar do you consider your skill set to be to the rest of your project team?



Explanation (15)

- I don't know how to answer that. It's about the same topic but different approaches.
- I guess we are all doing structural dynamics, but we all have different focus or basically different specializations in that topic. So I am more into model reduction and sub-structuring stuff like that. I'm writing my own code, while the others are using more commercial software. We're doing the same thing with different soft wares.
- I know more about dynamics, while some of them are contact. We work well together, since we can attack a problem from both sides.
- I mean one does all of the controls that I know just the basics and my other teammate and I do the same thing basically.

- I think I bring something to the table with the experimental side, and I also bring a lot of the sub-structuring before. There is a general baseline of structural dynamics and module analysis that I'd say everybody here has covered which has this common skill set.
- Much similar, I've never met so many guys so similar to me. At my home university, I just sit down at a desk and read a paper, there are a few people in my field, but when I came here almost everybody is in the same field. I did not realize how many people are in this field. They love their field and they're very similar. They were nerds at White Sands.
- One is pretty similar. The other, forget it.
- They are very different.
- Very different, considering the mechanics and stuff it's pretty much the same but the control stuff is a bit different.
- We all kind of overlap our skills and work together on some of the same stuff.
- We all major in mechanical engineering.
- We are fairly different. We have pointing contacts, but I would say a 3 or 4.
- We share the same background having majored in mechanical engineering. One of my teammates and I are both Ph.D. so we have done a bit more stuff. In terms of skills we have more than a grad student.
- We're both mechanical engineers, we're both studying joints at the moment. In the grand scheme of things, we're exactly the same person. Like if you're talking to someone in the street we're the same, but if you're talking to a specialist in the field it's completely different. On a day to day level it's very different, but they're both mechanical engineering. If veterinarian is 1, it's an 8. But if any engineer is one it's probably like 4 or 5.
- We're pretty similar, everyone has their own specialties but for the most part we are very similar.

How does your group divide tasks? (24)

- Basically, everybody is trying to do what he has done before, and trying to use his skills that he developed before.
- Basically, we actually discuss what we want to get and then we see which one of us has the most suitable experience for it and then that's how we get the job.
- Depends on the skill set and the preparation before the institute.
- Everyone focuses on the field that they are experts in.
- I do initial investigation with just dynamic simulations. He meshed our model and he created a new model, then I created the bolts, washers, the nuts, and we meshed it all to create another model. He also did a quasi-static analysis and I've been doing a dynamic analysis. So we basically do what we know how to do.
- I'm doing the controls and they're doing the rest. We're dividing pretty well, everyone is focusing on the main things he needs to do.
- Like everyone tries to do the things they're specialized in. For myself I do more of the experimental work. Then I would give to other teammates my data.
- Not too bad. We divide based on the solver that we are most proficient in.
- Past experiences.
- Right now, it’s more based on tasks but we have got a lot of work so we just divide it somewhere in the middle.
- Someone does control stuff. Another teammate and I do most of the setup. The documentation is more my part but some of his part.
- That depends on what they are doing. Sometimes they just need to find out how to do something, so they'll work together and discuss stuff. Sometimes they come up with directives and they work in parallel. They divide their tasks based on their background.
- Verbal assignments. Usually we're sitting together talking and often it's obvious that someone's already doing something. Also we'll list what needs to be done and everyone will sort of choose what they want to do.
- We always plan ahead, meet and make lists, if one thing is on the list we all do it. We will see who's more capable of what.

- We are only two, we are supposed to have 3 but we have 2. We try to make in parallel some work and then we have some points where we mesh our work/ code, then we summarize what we know. About once every two days. We work often together, so we have a lot of discussion.
- We are really reproducing the project that happened before. I am taking the pre-processor developing model into another model adding more devices on the previous model. This guy is taking my stuff but looking at it from a different view. There is a hierarchy.
- We divide our tasks based on our different skill sets.
- We divide our tasks on several aspects, like we've had two conference meetings, and the first one was when we arrived here. So basically we discuss upon our project and first we find out what tasks we need to do then we decide which tasks everyone's profession and interest aligns with.
- We met the first day and we had a list of 6 things to do and we kind of divided them up since we have 5 people. People kind of went to their specialty. One person has been big on computer modeling, and so has another. So they're working together on the computer model side of our project. I've been doing all of the experimental stuff back at work and then bringing the data here. Then my other teammate has been taking all of our data and trying to screen it for non-linearity that way we know that when we're trying to use a certain object and it's non-linear we know it's going to cause a problem with the system we're doing.
- We met together the first day and we just found each other's interests.
- We talk through and assign tasks based on who is best fit for the task.
- Well it is very easy because we are all comparing our different methodologies. Each individual is working on his own approach. We are doing the same thing.
- We're working on modeling a joint, and there are a lot of different ways you can think about it. One of us is more of a mentor but he's working with plasticity. Another is good at dynamics and I'm good at statics. He looks at what he knows and I look at what I know, basically.
- We've been talking about who is best at what, and then going from there. According to the specializations and abilities of each. You do the thing you can do best.

How does your group make decisions? (24)

- Basically we will bring up an idea and invite everyone to discuss about the idea. Then we will provide our professional suggestion or recommendation. Then usually we will just come to a constant that everyone's satisfied with.
- Discussion and debate.
- For the major decisions we have a weekly meeting with our advisors and we are talking about the results, and what path we should to take and then it is up to us and the supervisor to decide on what path we take.
- I don't know. Very difficult because in our group, everybody is doing or has been doing different stuff. In each field there is only one person who is qualified to make a decision.
- I try to check on how they're doing every couple days. Each week we have a detailed meeting. I make sure they're still making progress and they aren't hung up on anything.
- If you are an expert in that field, then that person has the say so.
- One guy proposes something and the rest say yes.
- Talk about it as a group and if someone knows more about it they lean more toward his opinion. All give suggestions.
- That's a tough question. We're discussing but it's pretty much predetermined what we need to do. We only discuss how we will do it.
- Through discussion I guess. There's no one just pointing out what to do. They discuss and agree on what's the best approach.
- We discuss and I don't think we've really argued so far. We were struggling for a while to decide on the direction of our project, but we eventually decided what we really want to do. It's been pretty mutual. It also just depends on the task based on whether it's quasi-statics or dynamics.
- We discuss and think about it. Everyone brings an idea and we also contact our supervisors if there is a big issue.

- We have a mentor, he already set up the progress tree. So we pretty much know what to do or what we need to finish within 6 weeks.
- We have meetings every week, so if we have a question we ask them then decide what to do and how to do the work.
- We haven't really had to make a lot of decisions yet. We're still in the solving things phase. Generally we have weekly meetings, but we also try to meet at least 2 or 3 other times a week since we have 5 people. We talk about it and then everyone states their opinion and then we sort of reach a consensus.
- We just get with each other and form a common decision.
- We make decisions together, when we find out a problem, we usually just ask each other and discuss how to proceed.
- We meet and talk about problems and then decide what to do next. It's more common sense. Big decisions are from supervisors.
- We talk about things, and talk with advisers, and we talk about every opinion so we can make sure we get right answers.
- We talk it over amongst ourselves and then talk to the mentors and come to a consensus.
- We talk it over between each other and our supervisors.
- We talk to each other, if we do not know. Also it's a project of three people, it doesn't make sense to do like a one man job.
- Well, we discuss the topic and if we can't agree, which is never the case, we just ask our supervisors for help.
- Well, we talk to the mentors, and we get an idea of what they're looking for. Then we get an idea of what we could reasonably do over the next few days. We decide what the biggest priority is, and we go from there.

How does your group assign roles? (24)

- As a spokesperson we will resort to the guy who has more experience on the topic. If none of us has experience we will just try to brainstorm and throw ideas around for the least likely solutions and finally find the most possible one.
- Based on their backgrounds and expertise.
- Basically the same as the tasks. I always try to keep an overview of our groups work.
- Everybody has certain skills that they use for specific projects.
- Everyone focuses on their own expertise.
- I am most proficient in English, so I do most of the documentation. We also have a leader.
- I don't know how to answer that. We haven't really assigned roles. I handle dynamics and he's handled quasi-statics. We really just discuss things. On an engineering team you always have to be willing to talk, and share your thoughts.
- I don't think so because everybody's working on a different topic.
- It depends on experience, so like we try and choose the one who can talk most representatively for everyone. Or in some situations we talk all the three of us because we are not experts on the others' topic in detail so we just split it up equally.
- It was kind of the same as choosing tasks, we don't have like big roles or anything like that. We had a lot done before people got here, because the experiment was already done, since I'm doing that at work. Our abstract for our paper was already done. As far as the daily work we have to do here, your role and your task kind of fall into one bucket.
- Naturally assigning our roles, everyone is proposing something.
- Pretty informally. Whoever did the work or knows about a specific thing will present it.
- The roles are depending on what the people are good at. I'm focusing on control stuff, they're focusing on mechanical testing.
- The same way as the decision making. If someone has to work on something and has to finish it will ask for help from the other guys. Democratic decision.
- The same way as we divide our tasks kind of. We figure out who will talk about what depending on which skill they have, so basically they will talk about their skill.

- There really isn't a role.
- There's probably a natural leader in the group, and the rest just follow. They behave just natural like that.
- They just fell into place and it just worked out.
- Usually we each work on different tasks, small tasks that we usually compare later on.
- We have a paper and we just pick what to do because right now we don't have one specific thing to do.
- We have the leader role, we're all pretty equivalent when testing comes around. In modeling I take those tasks, with optimization our other member releases his knowledge.
- We just decide based on what needs to be done.
- Well it is again automatic. We all have to use our own analysis and then compare the results.
- Yeah we made roles. At the beginning of this project, the first meeting. Using a CAD file, my role is remodeling this model. More precisely, we are slightly changing this device.

What are the challenges, if any, of working with someone from a different cultural background (such as language and behaviors)? (24)

- At first there was a little bit of a communication barrier, but after being exposed to it more there has not been any more problems.
- Different approaches that get brought up with different stuff. Different stuff taught at each university. However, we get along with each other. Language sometimes gets in the way.
- During the Sandia summer school I don't think we have any challenges that come from the cultural differences so far. I think since we are all engineers we kind of understand what we are talking about. I don't know I could not observe any difficulties that were based on cultural differences.
- For English it is okay, we all speak the same language no problem there. Difference between European an American culture. American's like to talk a lot and Europeans are less working together. New for me because I usually work alone.
- German culture is not that different so there is really no problem except a small language barrier. In whole it's maybe that the American way of telling what one is doing often overestimates themselves and in the German way they are not 100% sure every time.
- Have not found any challenge. It is just an opportunity, not a challenge. I find it a good way to approach other people and to find out what they think about or to find different approaches, it's quite interesting to see what they think about the same project.
- He's like a mentor, so it's not like we're working together as much. I don't really notice, I couldn't really differentiate personality and cultural differences.
- I mean, for us it's not that difficult. I'm not sure. Not too difficult to work in this group, and American culture is not that different from German culture.
- I think language because sometimes it will take more time to actually clearly describe an idea especially if that idea is complicated, but it's doable. We can use other forms of communication like drawing or writing down some things.
- I would say the language, we might have to fight to find specific words sometimes, but in other terms we are pretty similar.
- It depends, language can be a big barrier. But a lot of what I do deals with math, and math is pretty universal at this point. The biggest barrier for me is language. As far as culture and behaviors, I've worked with people from Luxembourg, India, Romania, China, I haven't had really challenges aside from language.
- It's sometimes difficult to communicate. We're comfortable speaking English and sometimes you'll think someone knows what you're saying but you don't really know whether or not they can understand. There's also a little difference in personalities. Some people take different things seriously or not seriously, or you have to tread lightly with some cultures.
- None really. Previous experiences were completely different. Germans and Americans are really pretty similar.
- Not much of a challenge, to some degree.

- The good thing is we are from the same background. We use the same engineering language, no miscommunication so far. Most of our team is very new on this project. It took a little delay to understand what we are really doing. We're still finding some interesting phenomena.
- The language is not really a problem. You realize there are some cultural differences, for example, the European people in our project are a bit more conservative when it comes to telling what they can or can't do. The US people first they say they can do everything, then it turns out maybe they can't. The European people underestimate their skills while the US people are very good at selling their skills. That's something you have to get used to.
- There are no difficulties. There's no problem.
- They have a different way of approaching things. They all come from different backgrounds.
- Throughout my Ph.D. I worked with different people, so at first it was hard trying to figure out all the different languages, but now it is not as hard.
- Umm, so far we have not had any challenges.
- We haven't had any yet. Everyone in our group is very friendly. Which is great. We've got people from all over that we're working with, which is kind of neat. I've always liked cultural stuff, I actually have a Japanese minor in undergrad. We haven't had any conflicts with that yet. Everybody seems to get along so that's good.
- We really haven't faced many yet, we all have a pretty similar work ethic. No problems with language, but, I am sure some of the others would come across this if they didn't speak English well.
- Well on this occasion it is not so difficult and we have the same background. It is not so difficult that it is hard to collaborate.
- Yeah there are always challenges. I don't think there is any issue here, they are all very professional people.

Do you ever have disagreements? If so, how do you resolve them? (24)

- Haven't had any disagreements. Will talk about it to find a different path.
- I haven't recently, but I mean, that's inevitable. I can say when I first starting co-op as a sophomore I was too scared to argue with anyone. Now, I'm realizing I don't have time to be afraid of people. Especially now as a Ph.D. student I have the confidence to speak up if I need to. At the end of the day, you have to make a decision, and you have to be responsible for the decision no matter what.
- No disagreements.
- No, don't think so yet.
- No, I don't think so.
- No, we don't have disagreements.
- No.
- Not any disagreements so far. We all come from different backgrounds.
- Not really.
- Not really.
- Not so far.
- Not so far.
- Not that I remember any.
- Not yet.
- Not yet.
- The only thing would be discussions on the controls. The controls just never worked out anyways.
- We don't have too many disagreements. We just let the maturity decide.
- We haven't yet, other than like where to go for lunch. That's not too bad.
- Well, we have or had, and I think we just have to explain your position and realize we are from the same background and try to agree on the same solution.
- When there are two people that disagree on something, it's not that different from in your head thinking I could do something one way or another. You just talk about it and try to think of what strategy would be better.

- Yeah probably, but not major things. Just differing opinions. Nothing major, maybe just a disagreement and they talk their way through it.
- Yes not big. We go back and forth with different solution proposals until we agree on something.
- Yes, but not arguments really. This group, engineers are really timid and they're independent enough that rather than argue with someone else, they'll say oh okay, and then keep going and do what they want to do, rather than listen. You have to communicate and see why they're doing what they want to do and see which way would work better.
- Yes, well it depends on the argument. Basically when you disagree with a team member then you need to show them the evidence that supports your side and then come to an agreement. Usually I do it when someone disagrees with me and I am pretty sure of my argument and I have together all the evidence that I am right.

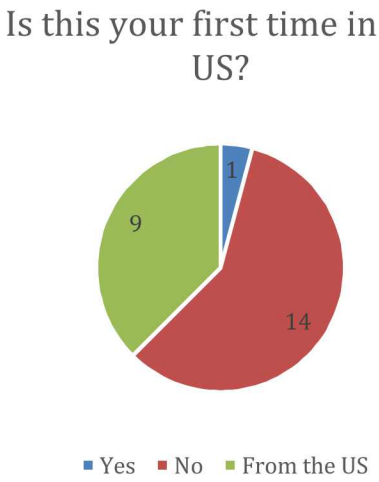
What are the strengths/weaknesses of your team? How could the weaknesses be improved? (24)

- A big strength of the group is that the members of the group all have a different specialization. We're able to address the problem from a lot of different angles, and we all have a similar background, everyone is pretty easy to get along with. The weaknesses questions are hard, they even ask you that in job interviews sometimes.
- A strength is that we are able to work together and that we are pretty close in background so it is easy to match our decisions and our ideas. We work together. There is no one who lays back while the other works. Another strength is that we are only two, even though I don't think it is a weakness. Our weakness, in a sense is that we don't have another opinion outside our two opinions. We have more advisers than students. When we want to find other opinions it’s easy to find.
- Everyone who has come this summer is really capable. They have a good education and good skills in different things. A big strength we have this year are people who do things and know how to get things done. They know how to learn to do something new. The biggest weakness I worry about is that people are capable but they aren't fully engaged. They aren't seeing the vision of their project and its importance so they're not focused like they should be or maybe not as hard. Or they work but they don't see the big picture so they aren't working on the right thing.
- I don't even know where to begin. Strengths, am I allowed to pass? Can I get a hint? I mean, a weakness is time? We don't have enough time to do what we really want to do. Strength, my partner knows Abaqus really well, I can learn software very quickly. My partner knows quasi-statics, I know dynamics. A weakness, one part of our project required us to look at plasticity but neither of us knows much about that. That's a huge weakness.
- I don't know, we communicate well and agree on what we're doing, good advisers, we all have similar but diverse backgrounds on what we are capable of doing. A weakness is that I’m younger than most other participants.
- I think that one thing that is positive and negative is that we are a small group and can communicate easier but with the paper that assigns roles, if there are a lot of tasks it gets hard.
- I would say we all have different views on the same topic. That's pretty helpful when it comes to finding solutions. Everybody chooses a slightly different approach to the same problem. We had to buy our own coffee maker.
- It's quite a mixed team if we get together all of the skills we can do something quite good. Weaknesses: a mixed group with people who have very different backgrounds. Nobody has worked on something very similar to what we are working on now.
- It's the same thing, that they have a fairly wide range of interests. It's good, but it's also a challenge because you have to be aware of the language you are using to make yourself clear.
- I've really only noticed strengths, some of which include knowing what we are working on and all being able to understand the project we have. There are really no weaknesses.
- Not something that I can answer, never thought about it before.
- One of the obvious trends is that one person in our group attended the seminars last year and worked on the same project and has a good knowledge of it. Another member of our group was also here last year and even though he did not work on the same project he still has a good knowledge of what is happening in this round robin project. So that is definitely an asset in our

group. In terms of weaknesses...I can't really think of any except the software and with the connection.

- Our skill set is about the same. Each come from different backgrounds to help out each other. Similar backgrounds, just different approaches. We do not have that much experience in experiments.
- Our strength is we have a lot of people, which is great, it means we have a lot of man power. Our weakness is we also have a lot of people so all our meetings to make these decisions take a lot longer since we have more opinions. Which isn't bad, because a lot of times we have seen one person's opinion where if we had only had four people voicing their opinion it makes the decision completely different.
- Strengths are that we are highly motivated, we all know what we want to do and what we want to get done.
- Strengths, those guys are really smart. Yeah, my teammates are from Taiwan and Belgium and we are not fluent in English, so there is a barrier to explain my opinion or theory. Sometimes we don't know how to explain in a better way. We are working on learning sentences.
- Strengths, we are very broad, we could combine everything and come together. Weaknesses, would be the same as the strength. Could be a good and a bad thing. Hopefully all good.
- That's a good question to ask. I think the strength of our team is that we've been working on that field of research for quite a time now so we kind of have deeper or like more experience on the field which should be very beneficial for us and our project. Weaknesses, or maybe, I wouldn't call it weaknesses it's more like difficulties, like I wish to have more insight of what the others are doing but it's not like because they're hiding it, it's just we don't have time to look into it in more detail. Just more insight in the models and methods of the others.
- The strength is that we have more people than other groups. So we are capable of doing different tasks. The weakness is that we have so many tasks so it is good to have someone to organize everything. Since we only meet our adviser once a week, we work on our own and then try to merge everything but sometimes that is rushed.
- The strengths. We are highly motivated. We are working very well together. We have good communication. Weaknesses, as already mentioned the system is not running yet. We have to find another way to make it work. Mainly hardware issues.
- We all know dynamics and vibrations, but three of us don't know a portion of the project which is also a big part of it as well.
- We have a big group but that is also a weakness. Having a big group helps divide tasks, and there are a lot of different approaches. I come more from a non-linear world, they come from a sub-structuring world. A weakness is coming from different universities.
- We know a lot of the theoretical and numerical aspects but we don't know all of the experimental parts of the project.
- Weaknesses, not understanding LMS controls. Hopefully when William Flynn visits on Wednesday we can get more help on how to use it.

Is this your first time in the US?



What is the most different thing about working here? And the most unexpected? Is there anything that would make the transition easier? (19)

- From what I've seen and heard, most people were better prepared this year and the project outlines were better. Our students have more experience and are more senior. Also there are more mentors so there are more ways for the students to get help. Last year Matt had to help all the students and some felt they didn't really get the attention they needed.
- Good question. One difference of course is office size, but the rest is the same as in Stuttgart. No surprises.
- I don’t have an office here. The room temperature. It's hard to compare because at home I have an office and we have a very good lab. They don't even have a computer so things are difficult. We were expecting a bit more about infrastructure as far as an office, lab, and faster internet.
- I think just the technical things like you have to use your own laptop or your card isn't working to get into the CAD room for technical stuff. Nuclear engagement of Sandia caught me off guard. I didn't expect it to be so large, like we have to move our discussion to another room, all that security stuff.
- In terms of work life, it wasn't that different. But in terms of social it was very difficult adjusting to this. I came here like 2 weeks ago and my teammates came about three weeks ago, and the device we have to use on our project still isn't here.
- It's completely different, here is an institute and there is a university. There we have more convenient resources, like the library and software. Here, the institute was probably organized within several months, so not everything is ready for us to use yet. Almost everything is meeting my expectations. I would definitely say the conference before we arrived here was helpful to get on the same page. Other than that it would be helpful to get familiar with the software and hardware we have here to better manage our tasks once we get here.
- It's much colder in the rooms. Not much difference though, I guess if I was in Germany it would be the same way. Except for, in the US it is sometimes difficult to get the right equipment for some reason. No windows in the office. Honestly, so far this year everything is quite well organized and everything is going as expected. Maybe like a real working place with a proper desktop and computer, would be nice. Actually everything worked out fine.
- It's really similar, but at university I work with my own project, there is no cooperation. I am the only one, but here we work with 5 people on this project. This is my first time working with other people. Yeah, the people. Here, people are mostly from Europe but in Michigan they are all American or Chinese. They use English but there is a difference in how they express or share their opinions with other people. They work really seriously, at home we know there is plenty of

time, so we can slow down if we're tired, but here we know there are only 6 weeks and we are really working hard. They are full of enthusiasm. It's stimulating me.

- Maybe, windows. No but, it would be easier in Stuttgart to get things you need. There is a lot of bureaucracy here. A room without any windows. Windows. Just kidding. Yeah, there is a lot of bureaucracy. If they could get the things we need easier, life would be a little bit easier.
- Not that big of a difference, the equipment is just a little different. Unexpected stuff doing research, plan changes doing research. Not a real difference, not that much to make it easier.
- The A/C is too cold. Usually I don't have weekly meetings/conferences. Usually I don't have 4 advisers, and I'm not used to working with a project mate so often. We are just focusing on this project right now. When I am in Bari, I usually have one adviser and sometimes I ask other project mates maybe once a week. I thought we should have a machine shop to work with. We do have some facilities to use, Ulam is fairly useful.
- The group work is different because I'm used to working alone. I expected to work at Sandia first. I would say to meet each other beforehand.
- The hours are different, like 8-5, whereas in grad school you really work whenever you want or need. Both are pretty flexible. It's different in the way you organize your time. It's also different in that it's collaborative. Research is usually independent. Unexpected, there wasn't really that much unexpected this time, but when I first worked at Sandia they had a very different and thorough approach to problems. There's more emphasis on not making mistakes compared to other places I've worked. You need a car for an easier transition.
- The internet. It doesn't work. The interesting thing is, it works on my Sandia laptop, but as soon as I connect to my SRN, it doesn't work. So I constantly have to switch back and forth. I feel a lot more relaxed here, than at Sandia. I feel a lot freer at the institute and at school versus Sandia. I like being exposed to all of these people. The internet and my card not working are the most unexpected things here. There's a lot of training at Sandia, I think they could do more training, even though people don't really like it. All day orientations are not needed. Having the internet and cards functional would also be helpful.
- The main difference is I have more interaction as I am working in a team, where as a Ph.D. student you are working on your own. Maybe the thing is that I was expecting a proper work station with the software I needed installed because before the institute we were told that we would have licenses and we could use it easily. When I arrived here I realized that it would not be easy because Abaqus was installed on a server and so you have to connect to the server and it is very slow and I can't do anything with it. Software and the organization from last year because we were given per task, homework, and I have been working on it for like a month before so that made it easier so when we arrive we were more than ready and we all knew what we need to do. That is a big improvement from last year.
- The most different thing about working here is I have all this time to do work. When I'm at school I have these classes I have to do at the same time and they end up taking like 20 hours of my day. It's interesting because I'm part time here and part time at Sandia. I would say the amount of different culture I do get to experience, I just didn't expect as much.
- The windows, it is quite cold in the building (not a big problem), when we need something we get something immediately at Stuttgart, here there is a lot of red tape. I knew more or less what it was going to be like, but the most unexpected was the amount of space in the lab. That it still takes some time to get things even though we are at the university and not Sandia (these things include experimental parts and stuff). It's all about the preparation time before coming here and communicating a lot before coming here. It would be cool if there was an adviser that was here all the time.
- There's not much difference. Mentoring, this is within the University here. So there is some differences between just Sandia, but with the school itself there are no differences between here and Georgia Tech. The only problems are bureaucracy and paperwork, but you cannot avoid that.
- Yeah, that in Sweden we never say that we know something. Like here, Americans have a lot of confidence. Maybe, actually the group members that they all come from different places.

What is the most different thing about living here? And the most unexpected? Is there anything that would make the transition easier? (19)

- Albuquerque directly, very widely spread. It's huge. Stuttgart is centered. You need a car. None. No. honestly not.
- Different climate, different country, different rules, campus is different. Living with people from different countries and food. Nothing was really unexpected since living in the US for a little bit before. Nothing to make the transition easier.
- Hot and dry versus medium and humid. Dry not green. The food's way better here. Culturally actually, people in the Midwest are very easy going and kind of laid back. It's actually much rarer that you see fancy cars. People take more pride in their hobbies and other things. They're also a little less outgoing and friendly.
- It doesn't seem that different to me. I have no idea. Nothing really was unexpected about living here.
- It's a double or triple distance with respect to Europe, when it comes to walking. Everything is farther apart. It's quite different. I realize that here the car is a key point, you should have it. Different habits about what to eat and what's in supermarkets. I expected a very good public transportation system, but you don't find that here. Expected a more traditional setting, like a metro/city center, then everything around.
- It's also hard to compare because at home I don't live in a dorm. I live in a flat not sharing a dorm with people I don't really know as well. Being here is more like the beginning of student life. Nothing unexpected.
- It's hot. It's really hot here. In Wisconsin we get snow like four months of the year. I'm pretty sure you guys don't get that here. It's kind of the same as living at home.
- It's pretty hot, but Germany is also going through a heat wave. Out here it's pretty hot and pretty widespread and there's lots of space. Not really.
- No public transportation and for everything you need a car. Nothing unexpected for me because I was here last year. But, last year it was the bread and fast food restaurants. It's quite good we live in Casa Del Rio, but the beds aren't that good.
- The altitude is one thing, the lower oxygen is very noticeable. It gets pretty dry and hot here, the weather I guess is what I would say. I'm surprised that you can get anywhere in the city in 20 minutes. It's a pretty laid back city, there are a lot of skate parks here, compared to Illinois. The lack of anything outside of Albuquerque is unexpected. In Ohio and Illinois you drive for 10 minutes and you hit another city or town or whatever. Maybe a personal jet would make the transition easier. I drove here, but I like driving so it's okay. Nothing really could've made it easier, it wasn't hard to begin with.
- The difference is probably transportation. I rely on public commute here, but in Seattle I have a car. It's much hotter here than I am used to. It is not good, but I didn't expect I would see so many homeless people just on the bus or on the street. Understanding the culture would have made the transition easier. In Seattle there aren't as many things related to Mexico. Here I have seen a lot of things related to Mexican culture. It would have been easier if I got to know that before I came.
- The first time I came here I didn't have a car, so I used the bus and it was really difficult. So if you miss the bus you can't really do anything. This isn't a city that you can do much in without a car. The sun is so intense like you need to walk around with an umbrella here. There's a lot of sand. It's pretty remote. Europe and the East Coast are very dense, but there's a lot of space here. People aren't in much of a rush. I like that. It's surprising that there's a mountain right next to the city. Having a car. If you don't have a car you're in a tough spot here.
- The food is different, and the bars close at 2 a.m. The food is very different actually. Also, going shopping is different, clothes, people. It's weird. The most unexpected thing is living in the student's dorm. That was very unexpected, like having several people in one room, which is not normal for Europeans.
- The food. That it's actually raining here in the desert. It's better rain than Sweden, and it's actually warm at the same time.
- The weather is very hot. New Mexico in general was a desert at first thought and then I found out there is a lot of scenery. Nothing.

- There are a lot of things, it's super-hot. My skin is burning. In Michigan there are a lot of big trees. The good thing is its very dry, so you seldom get sweat in the sun. The surroundings are different, sand and short trees. The structures, adobe is very beautiful. Not much unexpected.
- There are no people here. New Mexico is pretty empty, cities are very widespread. Georgia isn't really like that, but I would say that coming from New York it is completely different because of the density of people. The difference between New York and Argentina is smaller than the difference between New York and New Mexico. I mean it's pretty much the same. The weather is not that bad, before coming I thought the weather was going to be much worse. It's easy to live here, nothing is needed to make the transition easier.
- Well for me coming from London is the weather. The heat is killing me. When I left London it was 15 degrees Celsius every day and when I arrived it was 38 degrees Celsius. The AC is for sure helpful as you can realize it is very cold down stairs. I have been surprised by what I can see in NM. Like Last weekend we went to White Sands and I have never seen anything like that. It was pretty great. It was really unexpected. I looked at what I could do while staying here and it was better than expected. There is one thing to help transition. Rental cars. We did not get rental cars this year so that is problematic. It would be much nicer if we had gotten rental cars. I remember from my time in the US before you can't do anything without a car.
- You definitely need a car, which we don't have and secondly maybe the food. I didn't expect downtown Albuquerque to be such a messy place, and the grocery store prices. That basically the dollar is less than the Euro back home so I was buying everything back in '07 but now the prices went up.

What are differences and similarities to your approach to engineering problems at your home institution versus this institute? (22)

- At home I have a lot more time to figure things out. At home we have one adviser and about 10 students working on a project. So a lot of it is self-study. Here, with 5 people in our group, sometimes you get a task and the other person is depending on you being done like tomorrow. It's a lot faster paced.
- Here in this institute we have a lot of professors giving advice, versus back home you have to call the professor, talk to his secretary, and set up a time to talk to him. Here, it's just friendlier, like they're always there.
- I am working on a completely different problem at school which is theoretical while here it is application based.
- I mean, first of all, in some universities in Turkey, they approach it very similar but don't have enough money to purchase equipment. So they won't be able to approach it the way they would have liked to.
- I think what I'm doing is really relevant to those things I have been doing at my home institute, I think that's why I chose this project. Before we were assigned into our projects Matthew Brake actually asked for our priority of choices and I also think he assigned us based on our expertise.
- I'm in much more of a rush here, in the sense that I don't have time to just study a problem I want to think about for a few weeks. You have to do something that's going to generate results quickly, and you have to know how to do it.
- It's also very hard to tell because right now in our project we have not done very much. The device we are supposed to measure is not ready yet.
- Lots of little things, each school has their own way of doing things. Like the Germans have this freeware finite element program that they're really good at and they're able to do lots of neat things with that. Everyone's got some little trick up their sleeve that they've brought from wherever they come from.
- My undergrad was linear systems compared to here which is nonlinear systems. My learning just shot up here. Also how in industry and how they have made neat models for nonlinear systems. Not much difference between the institute and Sandia. I am highly motivated for the institute.
- No difference. I have 5 years of masters so I think I have just set up a way to approach problems, so I am not going to change it.

- Not in my project, but I've heard of others, but you have to ask them themselves. Basically you have a problem you try to solve it.
- Not much difference, we use the same methodology. Engineering, as long as it's in the same field, we usually use the same perspectives how to solve this problem. Nobody forced me to solve problems in a certain way.
- Pretty much the same approaches, don't really have a difference. Could have compared results afterward to find another approach. Academic background is different, the way it was taught.
- Similarities, I'm not sure. Everything's pretty similar. The main difference is in the bureaucracy.
- So the difference is certainly that we get to look into certain methods in detail. Also, the application itself like here I am working on a beam and Germany on aerospace parts like real industrial structures. At home for me it is more application, here it is more methods. Also different projects work on the same structure I think it brings you much more insight to the problem itself. We are working on the beam numerically and the other guys are working on the beam experimentally. Usually in one institute everyone is very close topic wise, but here everyone is very different.
- The approach is exactly the same. We are doing the exact same measurements here as in Stuttgart
- The similarities are that we have a discussion with a supervisor first. The differences are that I don't usually discuss with teammates at home.
- They are pretty similar. Difference is in the cultural and the mathematical side of things, like especially in France and also in my lab in London, we are very keen to develop the equations we are using. Basically here I think you guys have a slightly different approach, more practical approach. In the institute also there is the matter of time, we don't have time to do that so basically we are just using our codes and we stopped developing equations, that's a difference in my work at this institute.
- We don't have the same background. I would say they just have an engineering approach. There is no comparison because we are very different.
- Well at ASU I work by myself and have one adviser so there are a lot more meetings, whereas here we work as a team and have several advisers, the work is basically the same, the main difference is team versus individual working.
- Well yeah it's probably at home it's a group, no one wants to be a leader, and they all have the same role, and like make decisions together.
- Well, let me think about that. There are no step-by-step directions. There's some freedom, less guidance. Here, we just made a decision to go with it, then we just progressed looking into different things based on that. At school, I guess it's kind of the same thing. Like my advisers and I discuss and then we come to a decision.

What cultural differences in interactions have you noticed between the US (or NM) and your home? (Such as a freedom to speak up around seniority, roles of men and women, importance of family, business practices – bribery, sharing of information, etc.) (22)

- Dishes, and the distance between places. They are more usual to work earlier in the morning and leave earlier. While in Italy we shift the working day at least one hour later.
- Everybody likes their green chile here. There's not too much really, they're pretty similar. Living in Albuquerque is similar to being in Milwaukee, and Santa Fe is similar to Madison. They're both related to each other in the same way.
- Everything is bigger in the US, cars, rules, food. American people are more open minded with strangers than in Europe and also are nicer when interacting with foreigners.
- Here people are really polite. I would say the life style here is very casual. Taiwan is a very quick place, people get up in the morning, rush to the bus station, and take a bus. We don't really say hello to strangers, but here I am constantly being said hello by strangers and I really like that.
- I don't usually work with other people. The people in my home university are from China and India. I was more like a teacher, since they all joined my group after me, but here we are at the same line. It's more on the same level.

- I guess people over-exaggerate everything, like everything is very good or very bad. Everything is either really big, small, bad, or good. Cars are bigger, bottle caps are bigger.
- I see the biggest difference in the food, how you get it, how you eat it, what you eat.
- In terms of freedom, US you can say whatever you want. In Turkey, you're more involved with your family. Especially your parents after you turn 18 and move out of the house and go out on your own.
- It is hot.
- No, I would say it is school versus government, the rest is basically the same.
- None actually. Maybe, American professors are much closer to the students than the professors in Germany for example. So here, I can talk to Matt Brake and Matt Allen, like "Hey what's up", and I would never do that in Germany for example. A closer and simpler way of interacting with professors.
- Not a big difference between the two.
- Nothing too big there. I can't think of anything between those two. It's all been pretty similar.
- One thing is that everybody you see on the streets says "Hey how are you?" even though he doesn't care. That's not that common in Germany. That's slightly different.
- One, the US has many different cultures and micro-cultures. I haven't really noticed run into any issues or any differences, I've really just hung out with interns though.
- The Americans here are really telling you that they are able to do something. While in Sweden we say, "Yeah, maybe we could do that."
- The culture of Americans is pretty much the same as the Europeans. I don't think there are very many differences.
- There is no difference. Can't think of a single difference.
- They drink more. That's really the only cultural difference I've picked up. I go from people that hardly drink to ... Germans.
- Traffic is much worse here than in the rest of the US. It's closer to what you would expect in Argentina.
- Well, maybe, in terms of interactions with the supervisors, I have the feeling that here you guys don't hesitate to go to your professor to ask questions. Where as in France, or in the UK maybe different because basically my supervisor and I have a meeting every week and I'm not having many technical discussions. Basically every time I am struggling with something I am not going to him I will try to figure that out on my own first.
- What I said before, people have a different impression of their own skills than the people in Europe.

Besides the unexpected items you gave us earlier about life and work, in general would you say the US (or NM) has lived up or down to all of your expectations of cultural norms? (19)

- A little bit different. When I heard I got an internship in New Mexico, I thought it was Mexico. I tried to search Sandia National Laboratories, Google just showed me a building in the middle of a desert, but when I came here it's not like what I imagined. Also I thought I would be working in Sandia structures but instead we're here at UNM.
- Average. There are some pros and cons but I think right now they are balanced.
- Honestly I expected something better.
- I did not have much expectations. I didn't think of anything I would expect to be so different.
- I didn't have any but, I've loved it every time I come back.
- I found that everything is very spread, and I realize that New Mexico is bigger than Italy, by population. I already know that not that many people live here, but when you go out to many places you realize how spread all the places are.
- I studied here for a year, I knew where I am going, so none of it. The summer institute is better this year.
- I would say up.
- I wouldn't have imagined Albuquerque this big. It's way bigger than I expected it. I thought it's supposed to be a little bit drier, but it's been raining every evening. The people are nice.

- I'm comparing New Mexico this year to New Mexico last year. Last year I was here for four weeks instead of like 12. I didn't know as many people then as I do now. I would say its surpassed my expectations this year, whereas last year it sort of dragged on.
- It pretty much matches the expectations.
- It's about the same as I expected it to be.
- New Mexico as far I see is not that good as Pittsburgh. If I compared to home, everyone is focused, they are no limitations of what you want. In terms of weather it's very different. Not as warm outside, nor is it that cold inside.
- No, basically I am here for a reason. I enjoyed my stay in the US during my former internship and I'm also thinking about moving to the US after the completion of my Ph.D. So far I am quite delighted with my stay in New Mexico. I would say positive because I've been told basically New Mexico is a desert and there's not much to do or to see but they were proved wrong during my weekend.
- The racial problems, gay marriage, and the church shooting. Seems that the US has a lot of racial problems. While in Germany, you don't really hear about racial problems.
- The things that surprised me were the mountains and the sunset and the landscape can look really nice sometimes. The weather surprised me too. The weather here is really weird, like you need to bring sunglasses, an umbrella, and a jacket every day. You just like never know what's going to happen. I like weird weather.
- Well, I had fun, so that's pretty much it. I've been able to skateboard a lot. It's kind of difficult to have expectations when you've never even been to this part of the country. Actually, I was expecting a desert, sand and nothing else. I thought of like Sahara desert, I don't know if that's up or down, it's just not what I was thinking. I'm surprised that there's even like forests here. It's been good enough. I don't have any complaints.
- Well, I think up to my expectation of cultural norms.
- Yeah, pretty much what I expected. I am still getting accustomed to the city, and I'm still finding things. In New York it is so much easier to find anything. Here it is, “someone told me this”, it is trickier to find things but it's okay.

Typically, in your country, what happens during free time outside of work? Do you work or relax for more productive work later? What about breaks at work? (24)

- Actually it's our free time so we relax. Meet with friends do sports stuff. Regularly, I just go on a break and don't think about a problem. Most of the times its relaxation or sports. So we're not thinking 24/7 about these problems.
- Basically, I'm trained to balance my hard work with some activities, mainly in my case swimming. Outside of that I hang out with my colleagues. I really try to not work too much during my free time but I feel like as a Ph.D. it is kind of hard to do because, unlike when your work in industry, when you are a Ph.D. you are working on the same project for three years, and sometimes I get obsessed with it. Especially when hanging out with colleagues we try not to talk about technical stuff but sometimes the conversation will change to that. The UK and US are similar, but since I am French I will talk about France and lunch is a big deal for us. It's like a social event and we dedicate at least 45 minutes for lunch and after lunch we usually have a coffee break. Basically in the UK it is very different from France because they don't care very much about lunch. They bring down bags and have lunch in 10 minutes then go back to work, but I don't like that so I am trying to train a French system into my life and it's working pretty well. It's very important, coffee breaks in the morning and afternoon are very helpful, especially after about 2 hours of coding, you lose attention and become inefficient so it is good to take a break and relax for a while. Even in the institute I have not seen that a lot, maybe because we don't have a coffee machine.
- Depends, some like to go running, play sports, play computer games, all depends on the type of person they are. Depends on how the problem is. If it needs to be fixed by the next day, will work on it longer than normal. On break, talk to other groups about projects to help each other out, still talk about work but relax
- Hang out with friends and sometimes think about research. At work I usually don't take breaks except lunch.

- I do not work whenever I leave, I relax and make sure I am ready to go the next day unless something has to be done. I take a good lunch break and small breaks every few hours. Usually we still talk about work, if I go out into the hallway and see a co-worker I take advantage of the opportunity and talk to them.
- I do sports, cooking with friends, clubbing on weekends. On break I try to relax, get away from it, but it's really difficult having 20 nerds around talking about their project. It is also hard when you have a really annoying problem that you can't figure something out.
- I do the same thing I like to play soccer, basketball, watch movies, hangout with my friends, do as much as I can. Because at work you're tiring out your brain, so you need a rest as much as possible. In Pittsburgh if it's a small break or even a weekend I am thinking of my project. But if it's like a two week type of break I won't even look at my computer.
- I relax. Utilize free time to entertain myself with mostly video games. During this institute I have been working more than at Sandia, which makes free time all that more juicy.
- I usually play sports. In my country, we don't have as many natural attractions as here, here is just spectacular. Most of the activity we do has to do with the city, we go to see movies or go do karaoke, or have dinner with friends, or play sports. That's pretty much it, but here we've had the chance to go hiking quite a lot. Outside of work I usually will clear my mind. I have tried working really hard, maybe 10 hours a day, 6 days a week, but it just turned out I got too exhausted. I think the best way to do my work efficiently is to find a balance point between my life and work. Small breaks are definitely helpful.
- I watch Netflix mostly, or skateboard. I might be researching 12 hours but it's okay because that's what I really enjoy. I play video games, I occasionally go out with people. Lunch, I don't think I've ever taken a lunch here. I've trained myself to eat and work at the same time and I just do that here without even thinking. I guess I have gone home and had a meeting with my advisers through Webex, does that count as a lunch? I go out with the interns occasionally, so same stuff as home.
- In grad school I was always thinking about work. Even when I used to work at Sandia my thesis was always on my mind, on top of my Sandia work. With this stuff, I don't really think about it on the weekends or even in the evenings. For grad school, you're trying to do something and you're not even sure if it's going to work. Here there's nothing really to ponder all the time. On breaks it varies, it depends what stage you are in the project. There's an “I don't know what's going on here” stage, where you're thinking all the time. Then you decide what you're doing and you do all the work so there's less thinking, and that's how it is here. Recently I've been just not wanting to think about it when I'm not at work so I don't think when I' m not at work.
- It depends, sometimes I think about work, especially if there is an issue I don't know how to solve and have a limited amount of time. On the weekends I relax. I think about work during small breaks.
- It's a fair mix of everything really. I usually try and clear my head more during small breaks.
- Nearly constantly, when my wife is not in town I work every day, I pretty much work all the time. I'm a workaholic when my wife is not in town. No, I don't take a lunch break, when I take breaks it's to do exercise.
- Normally, when it's free time, it's free time. But if you have work to do you work longer, then you take your free time. I don't say every day at 5 I leave then its free time. You just work longer. But when you have free time it is free time. Normally I try to clear my head but it’s not that easy. You take a break and quite often you're at lunch with your coworkers and sometimes you talk about your work. Normally you try to clear your head.
- On the weekends we try to see the US and NM. We do sports, using the facilities of the dorms. Sometimes we go out. Usually when you do research you always think about the stuff that you're doing. Not when I'm eating, not when I'm sleeping, but you do think about the stuff you're doing quite often in your free time.
- Outside of work, my wife is working back home right now. I kind of do the same things, I like to play games and hang out with friends. I'm trying to engage the international students in my group more. I like to try to have an idea of what I want to do by the end of the day. I usually try to get a lot of work done and then take small breaks during the day. Like taking a small walk outside or reading something on the internet.

- People are trying to get together after office hours. Except me. Outdoor activities, gym, basketball sometimes go out. We went to White Sands and Roswell, Carlsbad. I didn't have much free time at my home University. I was in the office all the time. I have a lot of activities besides my research, I have a cat and I play instruments. I really like to bake. I have a lot of hobbies, so not much free time.
- Relax. Same at home and here. It really depends on the situation whether I work or relax through breaks.
- So here we do a lot of sports actually, because we have no other entertainment really. Also we go out more frequently here than in Germany, also because it's really boring. We eat much more often outside, like in a restaurant outside. I think of my work all the time on this project here. I mean we are here for work, that is the whole purpose for our time in the US, is this project so basically whenever we have time we get back to work, switch on the computer, read books. It's much more stressful I guess, you never get your head down, you're always concerned about the next step. In Germany it's a permanent job, and whatever we cannot get done we do it tomorrow. Small breaks I try to call my girlfriend in Germany, that's what I think about during those breaks.
- Sports, and trips on the weekend. On break, I would love to relax but it's mostly thinking about the problem.
- Usually I spend time with my friends, go to bars, badminton. It depends on deadlines and projects but usually not. At lunch breaks we try to make separation between work and free time.
- When I have free time, I don't have a lot of free time. I have more free time in the weekends. So this makes the weekend usually busy with some summertime activities. Go shopping. Usually, I try to not think about work but it's not always an easy task. It happens that I think about the work. Here is similar, because we live with our project mates.
- While I've been here I've been hiking a lot, I played golf a few times, went out to eat at a couple good Mexican restaurants. When I'm here, I've probably been at work most of the time. I usually go home at night and work again.

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