Introducing engineering students to international virtual collaboration:
Lessons Learned

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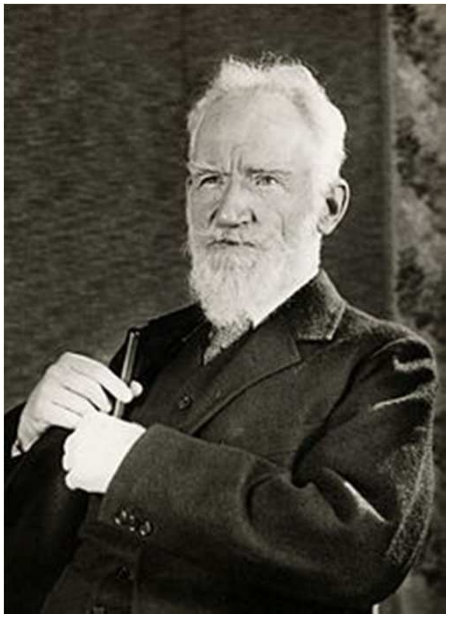
Opening Remark

Both optimists and pessimists contribute to the society.

The optimist invents the aeroplane, the pessimist the parachute.



George Bernard Shaw
1856-1950

Greetings to the Optimists!

A Practical Example

Engineering students need to learn to

- apply their theoretical knowledge to problem solving
- manage and accomplish projects
- work in teams

What about

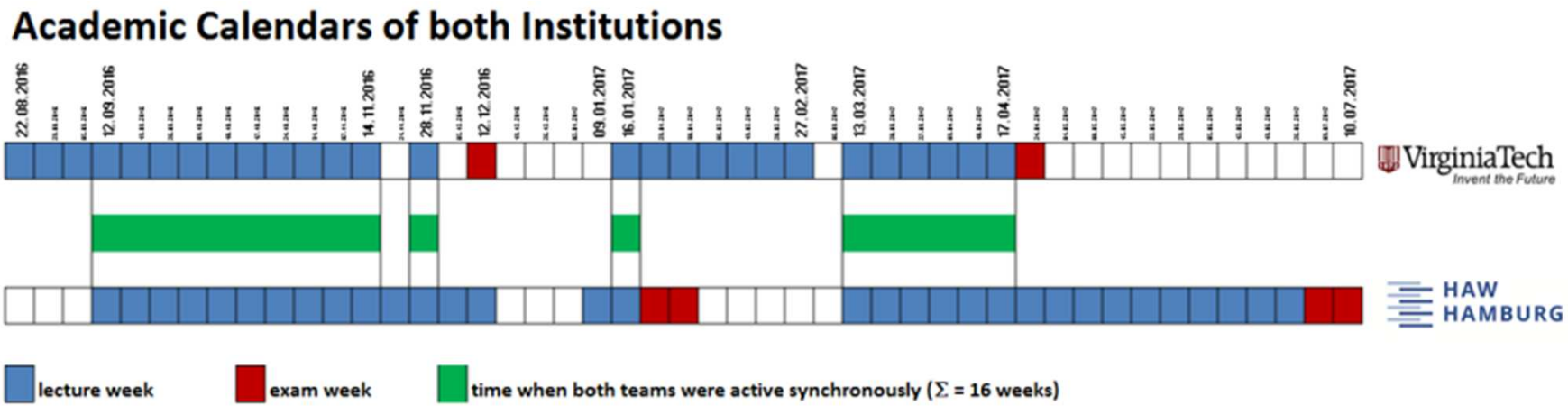
- International collaboration?
- Virtual team work ?

Curricular Aspects

Aeronautical Eng. Classes/Modules for our Collaboration

Year	Final year students	Final year students
Class	Capstone Aircraft Design	Individual/Team Project
Nature	Compulsory	Compulsory, but students are free to chose supervisor and task
Credits	3 + 3	8 ECTS
Duration	Full academic year	not specified
Team size	8..10 Students select their teammates	1..* Individual projects allowed
Task	A selection of aircraft design projects on offer	Any kind of project is allowed: design/experiment/analysis
Teaching Methods	Accompanying Lectures, Regular Team Briefings	**No Lectures**, Irregular briefings
Grading	Graded Presentations & Reports	Graded Report, optional presentation

Academic Calendars



HAW-VT Collaboration - Overview

Year	Blacksburg	Hamburg
2013/14	Prof. Raj + 9 VT Students	Prof. Netzel + 4 HAW Students
2014/15	Prof. Raj + 16 VT Students	Prof. Schulze + 4 HAW Students
2015/16	Prof. Raj + 8 VT Students	Prof. Abulawi + 1 HAW Student
2016/17	Prof. Raj + 8 VT Students + 1 HAW Student	Prof. Abulawi + 6 HAW Students + 1 UMich Student

HAW-VT Collaboration
Academic Year: 2013-2014

Team 1

- Five VT students
- Four HAW students

Team Member	University	Responsibilities
James Bizjak	VT	Structures, Materials
Ingo Goldstein	HAW	System Integration, Camera System, External Lights
Bryan Jackson	VT	Aerodynamics, Stability Analysis
Robert Keller	HAW	Systems Integration, ELS, Power Supply, Air Data
Benjamin Krützberg	HAW	Manufacturing, Flight Controls
Sean Lynch	VT	Propulsion, Vehicle Performance
Sebastian Mellert	HAW	System Integration, Fuselage
Chris van Oss	VT	Stability analysis, Weight, Cost
Stephen Young	VT	Component Implementation, Logistics

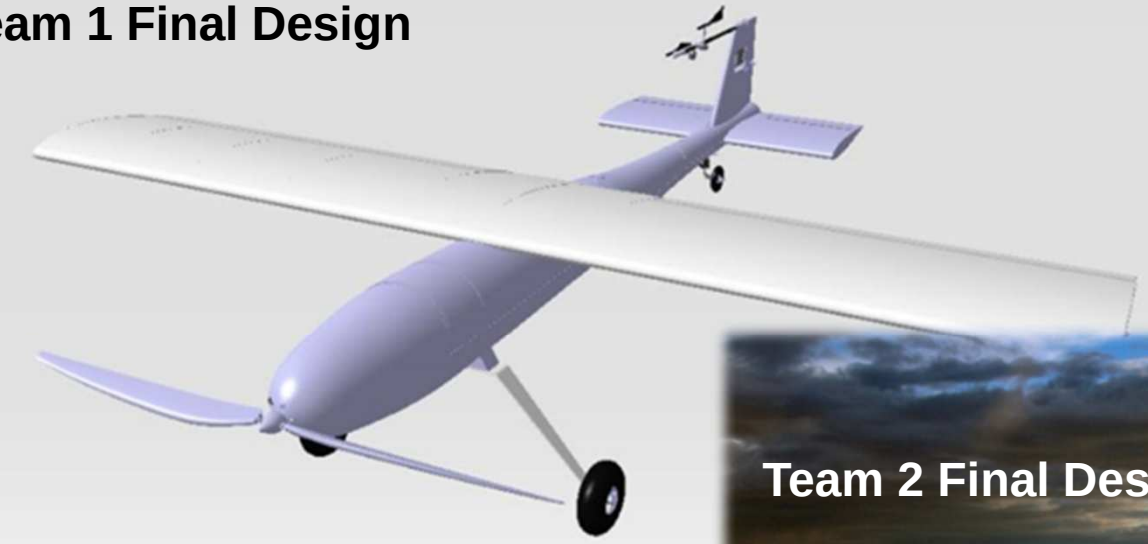
Team 2

- Four VT students
- Two HAW students

Team Member	University	Responsibilities
Eric Santure	VT	Team Lead, Structures, Materials
Ingo Goldstein	HAW	CATIA support
Andrew Dean	VT	Propulsion
Robert Keller	HAW	CATIA support
Peter Gunderson	VT	Aerodynamics, Stability
Dylan Shean	VT	Performance, Controls

HAW-VT Collaboration
Academic Year: 2013-2014

Team 1 Final Design

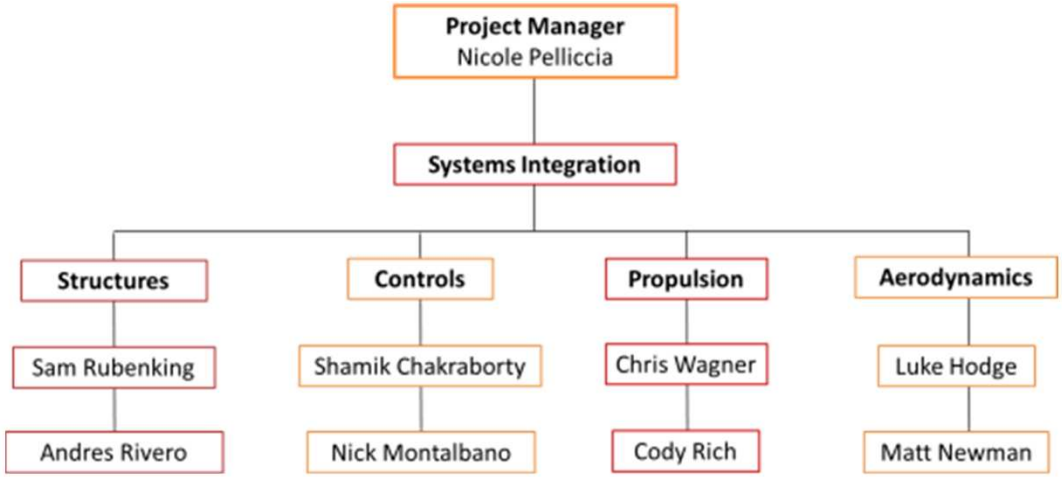


Neither design was mature enough for manufacturing and flight testing

HAW-VT Collaboration
Academic Year: 2014-2015

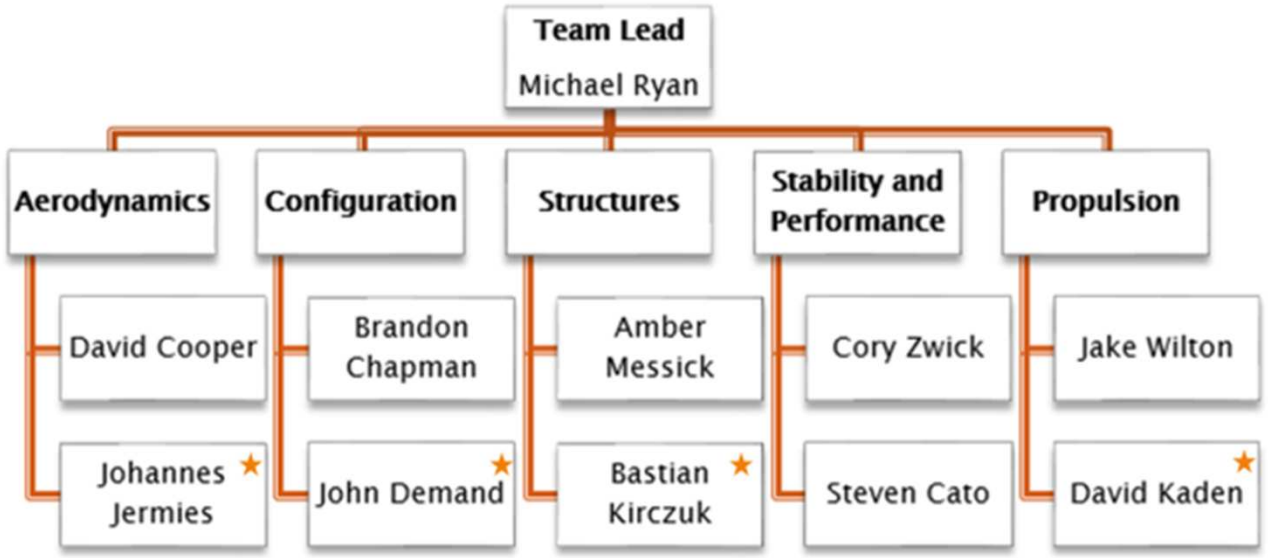
Team 1

- Nine VT students
- Zero HAW students



Team 2

- Seven VT students
- Four HAW students



HAW-VT Collaboration
Academic Year: 2014-2015

Team 1 Final Design

Team 2 Final Design

Change of leadership at HAW changed the level of interest and direction.

HAW-VT Collaboration
Academic Year: 2016-2017

Lessons Learned

Critical Enablers:

Human Factors

- Faculty members involved & their motivation/commitment
- Students curiosity, motivation, open-mindedness & resilience

Organisational Aspects

- Curricular alignment
- Acadamic calendar discrepancies

Vital Questions before Getting Started

Teaching Aspects

- **Are there classes/modules in both institutions with suitable and matching learning outcomes for collaboration?**
- **Do we have lecturers at home and at our partner university who are willing to cooperate & embrace the challenges?**
- **Do we have students who will volunteer or who can be forced to participate in virtual international team project?**
- **How and when will teams be formed and project work be kicked off?**
- **What kind of didactic methods / teaching support / coaching is available / required?**
- **What technical support / infrastructure is available / required?**

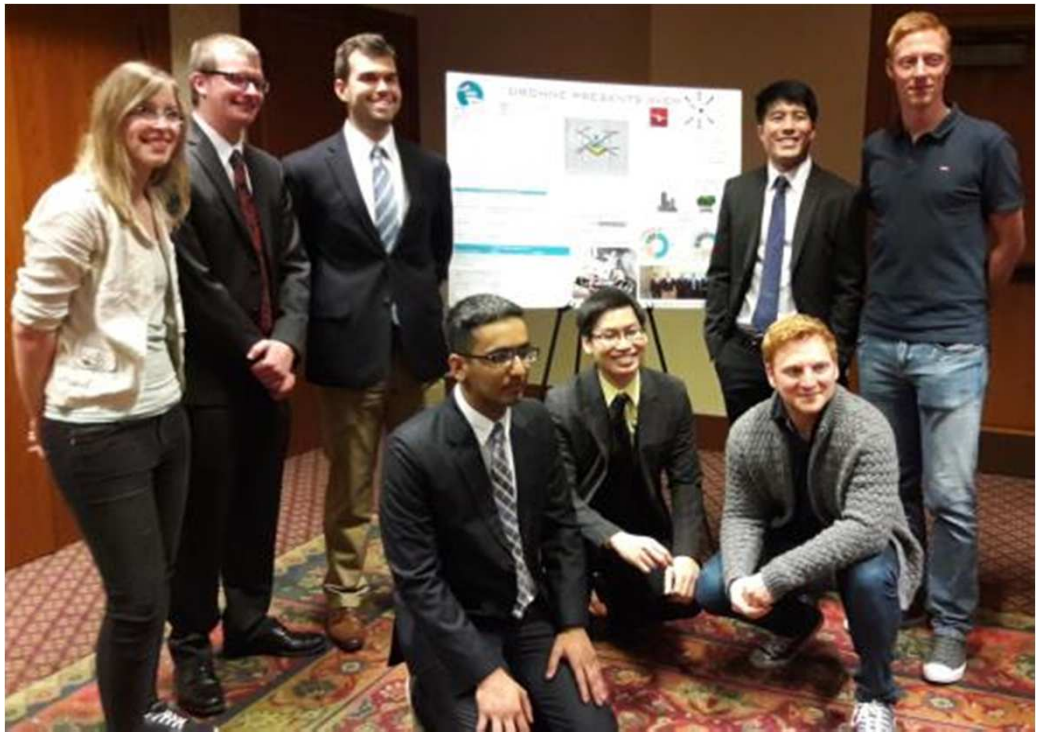
Vital Questions before Getting Started (2)

Organisational/Strategic Aspects

- **How big is the mismatch in academic calendars?**
- **How will language barriers, time zone differences, cultural differences be overcome?**
- **What support do both organisations offer: travel funds, incentives…?**
- **Will team members be able to meet physically?**
- **Do virtual international team projects address strategic goals of your institution?**

Conclusion

Virtual International Collaboration is not as easy as it may seem…



… but it is a wonderful experience not to be missed!