

Example of interdisciplinary teaching and training (technical/business)

Contribution from:

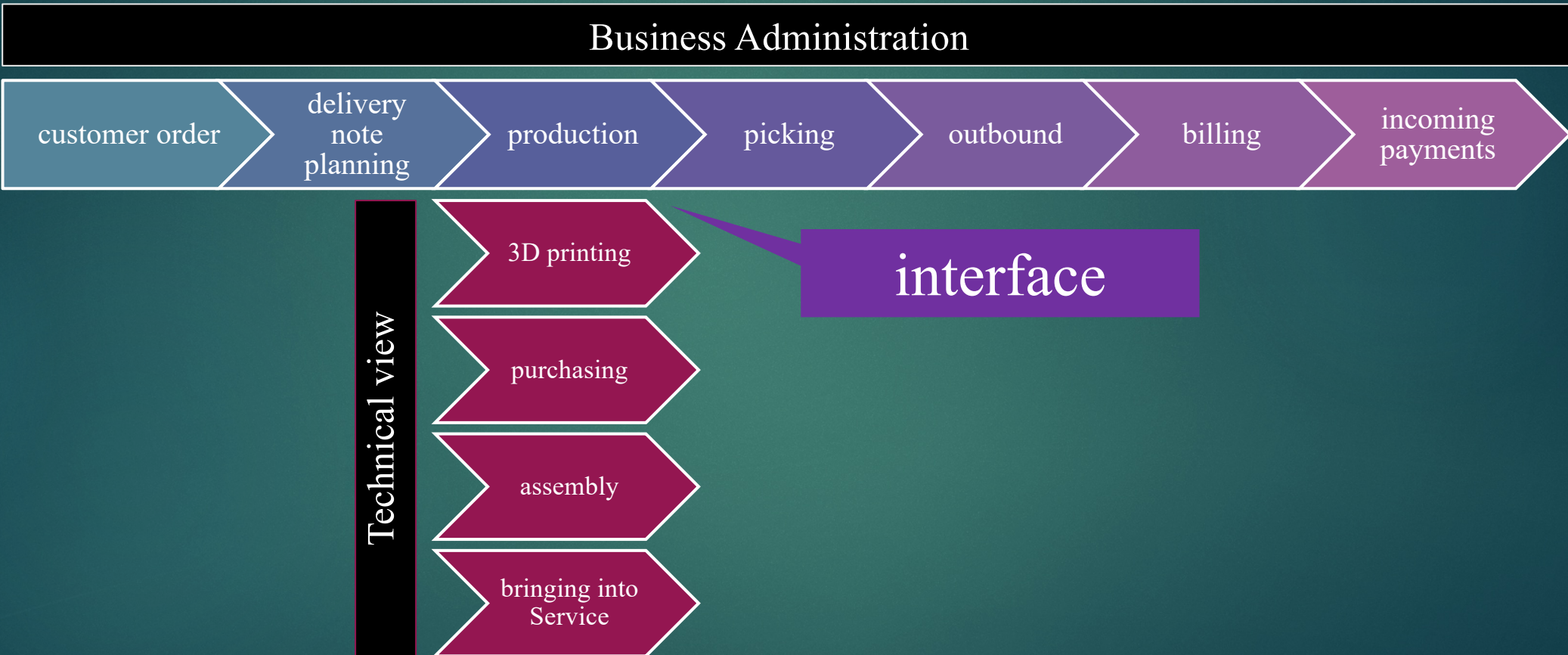
Hans-Böckler Berufskolleg
(mechanical engineering)
Thomas
Marco

Berufskolleg Deutzer Freiheit
(business administration)
Alexander
Tobias

Process View

Inbound - Outbound - Production

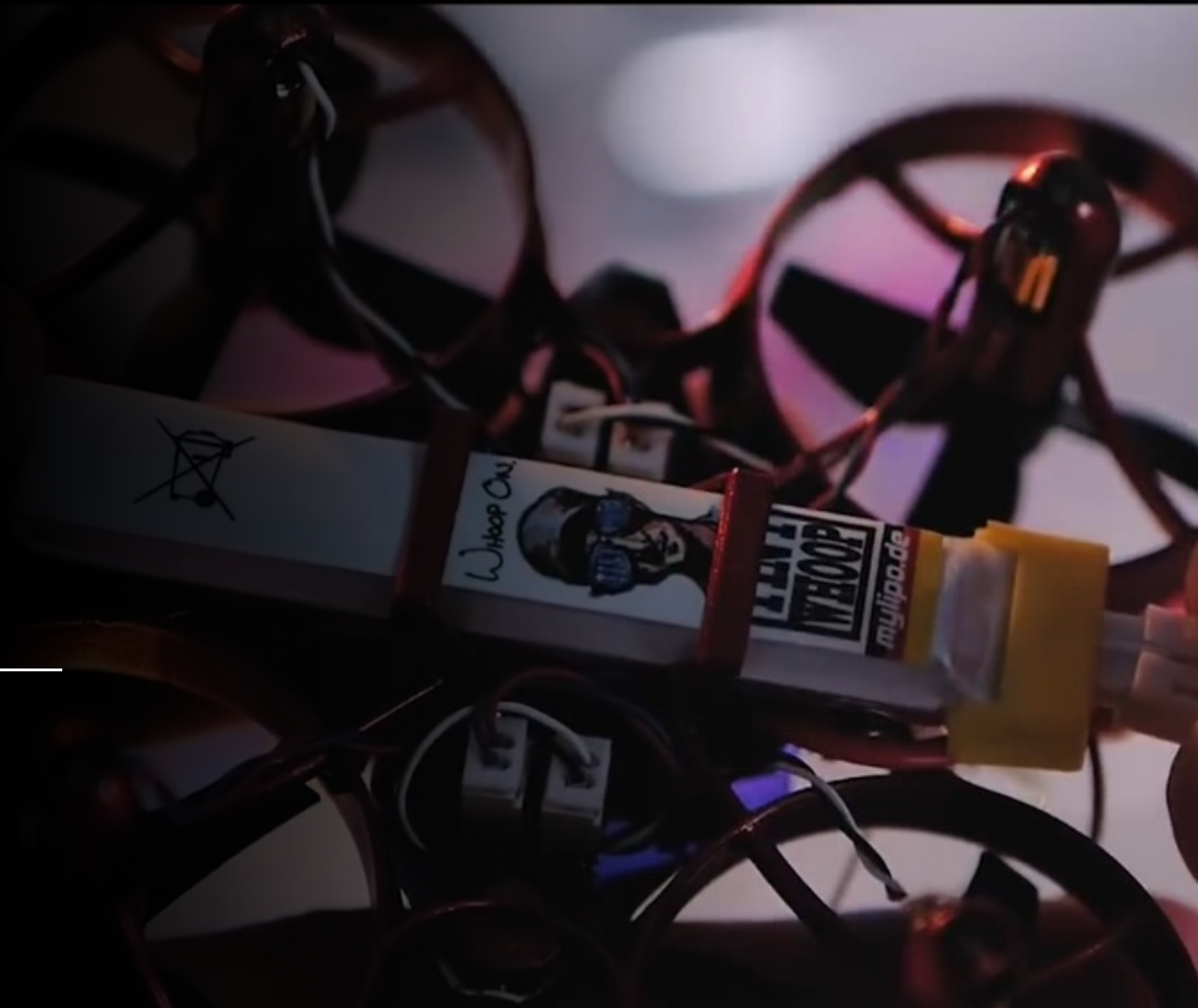
2



Marco



Quadcopter



Corona-Virus

5

Usage of external Videos and Pictures

The Tiny Whoop

6



Action

7

3D-Printed Frame

8



costs

advantages/
disadvantages

individualisation

accessories

3D-printing

Thomas

Competences – required and to be learned

10

Technical Competences

- Computer Aided Manufacturing
- Use of subject-specific software
- Process planning for technically interlinked systems

Business Administration Competences

- Computer Aided Management
- Use of ERP system
- Process planning for commercially interlinked systems

Digital Competences

- Data and its structure:
- Preparing, structuring and analysis of data
 - Creating Interfaces between hardware and software

Outlook – next steps in teaching

11

This is how we plan to work with students – results to be presented at Summer School

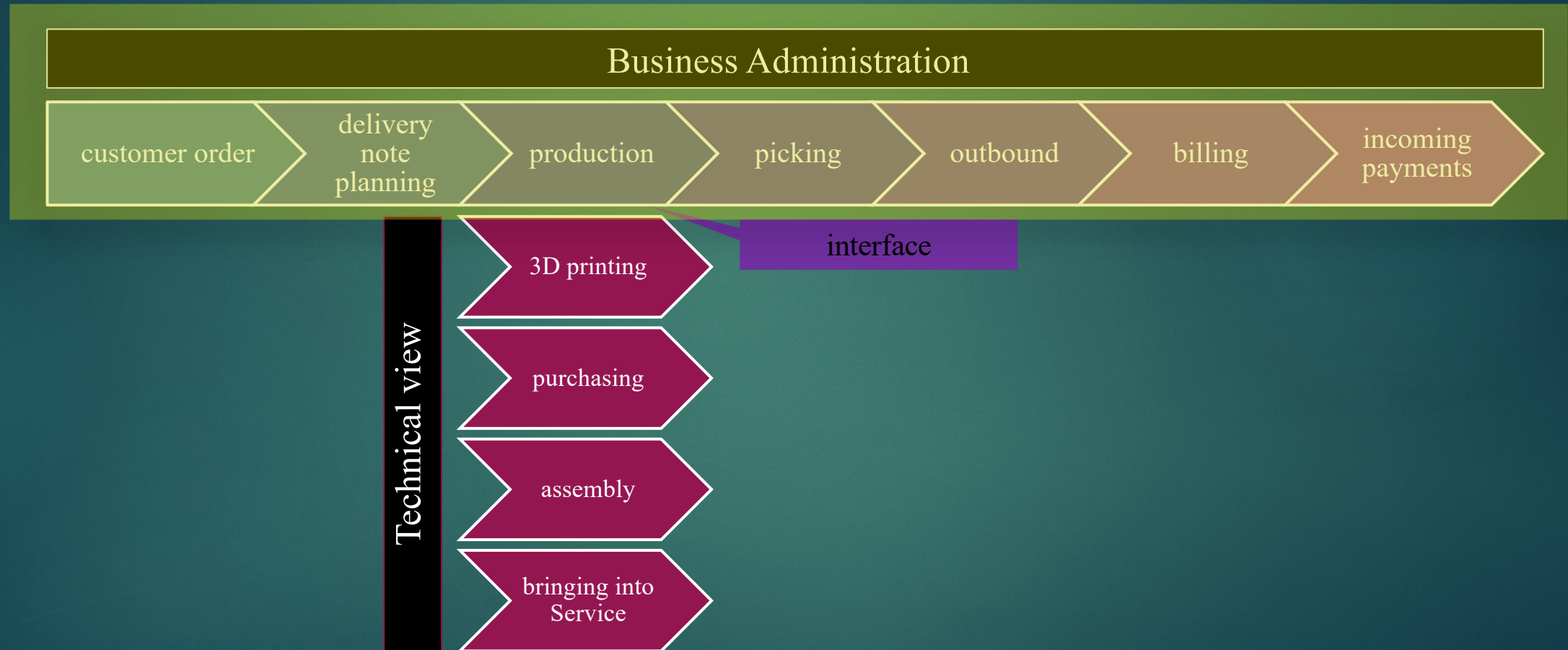
- ▶ Technical Teaching Plans
 - ▶ Module 1: From 3D CAD model to 3D print
 - ▶ Module 2: Creating an individual quadcopter frame
 - ▶ Module 3: Interlinked processes: how to make the production process smart
- ▶ Commercial Teaching Plans
 - ▶ SAP4Schools: Teaching the commercial processes from order to sales in an ERP system

Alex

Process View

Inbound - Outbound - Production

13



Learnings from the first session – business view

Learnings erp4school

Inbound Processes



Key Learnings

16

Focus on

- ▶ Process orientation
- ▶ From a specialist commercial clerk to a management process overview
- ▶ Working on a complex ERP System



Order

Goods
receipt

incoming
invoice

outgoing
payment

Order

We have fallen short of our minimum stock for copy paper. Can you please order new copy paper according to the present offer!

Zieher Papiere AG



Zieher Papiere AG, Burgring 12, 56068 Koblenz

Test GmbH

Ihre Zeichen:

Ihre Nachricht vom:

Unsere Zeichen: er-scho

Unsere Nachricht

vom:

Name: Frau Ergün

Telefon: 0335 36598

Fax: 0335 36591

E-Mail: zieher@t-online

Datum: xxxx.xx.xx

Angebot

wir bieten

| Artikel- nummer | Artikelbezeichnung | Menge | Mengen- einheit | Preis pro Mengen- einheit in EUR |
|--------------------|------------------------|-------|--------------------|--|
| 1371953 | Kopierpapier naturweiß | 2 500 | Paket à 500 | 2,29 |

Lieferbedingungen: Frachtfrei

Zahlungsbedingungen: Zahlen Sie innerhalb von 14 Tagen netto Kasse oder innerhalb von 7 Tagen unter Abzug von 2 % Skonto.

Mit freundlichen Grüßen



Goods receipt

The goods have arrived! Please check the goods and record the goods receipt in the system!



Zieher Papiere AG

Zieher Papiere AG, Burgring 12, 56069 Koblenz

Ihre Zeichen:

Ihre Nachricht vom:

Unsere Zeichen: er-scho

Unsere Nachricht vom: Frau Ergün

Name:

Telefon: 0335 36598

Fax: 0335 36591

E-Mail:

Datum: XXXX.XX.XX

Lieferschein-Nr. 3 3 44800 (bei Zahlung immer angeben)

Artikelnr.

Liefermenge

1371953 Kopierpapier naturweiß

2 500 Pakete

Die Lieferung erfolgt "frei Haus" mit eigenem LKW

incoming invoice

The following invoice was received today. Can you please enter the receipt in the system!



Zieher Papiere AG

Zieher Papiere AG, Burgring 12, 56069 Koblenz

Test GmbH

Ihre Zeichen:
Ihre Nachricht vom:
Unsere Zeichen: er-scho
Unsere Nachricht vom: Frau Ergün
Name:
Telefon: 0335 36598
Fax: 0335 36591
E-Mail:
Datum: XXXX.XX.XX

Rechnung Nr. 3 3 44800 (bei Zahlung immer angeben)

| Artikelnr. | | Preis St./ Packung | Menge | Stück- rab. % | Stück- rab. EUR | Stück- preis | Gesamt |
|--------------------|------------------------|-----------------------|-------|---------------------|-----------------------|-----------------|----------|
| 1371953 | Kopierpapier naturweiß | 2,29 | 2 500 | | 0,00 | 2,29 | 5.725,00 |
| | | | | | | | |
| Preis netto | | | | | | | 5.725,00 |
| Gesamtrabatt 0 % | | | | | | | 0,00 |
| | | | | | | | 5.725,00 |
| Versandkosten | | | | | | | 0,00 |
| | | | | | | | |
| USt 19 % | | | | | | | 1.087,75 |
| Überweisungsbetrag | | | | | | | 6.812,75 |

Zahlungsbedingungen: Innerhalb von 7 Tagen 2 % Skonto, innerhalb von 30 Tagen netto Kasse (nach Rechnungsdatum).

Lieferdatum: XXXX.XX.XX

Hinweis:
Übersicht
Finanzbuchhaltung –
Buchungen

outgoing payment

Can you please pay the invoice & enter it in the system!



Zieher Papiere AG

Zieher Papiere AG, Burgring 12, 56069 Koblenz

Test GmbH

Ihre Zeichen:
Ihre Nachricht vom:
Unsere Zeichen: er-scho
Unsere Nachricht vom: Frau Ergün
Name:
Telefon: 0335 36598
Fax: 0335 36591
E-Mail: XXXX.XX.XX
Datum:

Rechnung Nr. 3 3 44800 (bei Zahlung immer angeben)

| Artikelnr. | Preis St./ Packung | Stück- rab. % | Stück- rab. EUR | Stück- preis | Gesamt | |
|--------------------|------------------------|---------------|-----------------|--------------|--------|----------|
| 1371953 | Kopierpapier naturweiß | 2,29 | 2 500 | 0,00 | 2,29 | 5.725,00 |
| | | | | | | 5.725,00 |
| Gesamtrabatt 0 % | | | | | | 0,00 |
| | | | | | | 5.725,00 |
| Versandkosten | | | | | | 0,00 |
| USt 19 % | | | | | | 1.087,75 |
| Überweisungsbetrag | | | | | | 6.812,75 |

Zahlungsbedingung: innerhalb von 7 Tagen 2 % Skonto, innerhalb von 30 Tagen netto Kasse (nach Rechnungsdatum).

Lieferdatum: XXX.XX.XX

Michaela Müller, The invoice is factually and substantively correct - please pay

Feedback from the course

22

... using of the
IT-System is very
complex...

„I work as an
accountant
& I never saw the
complete process
before“



....

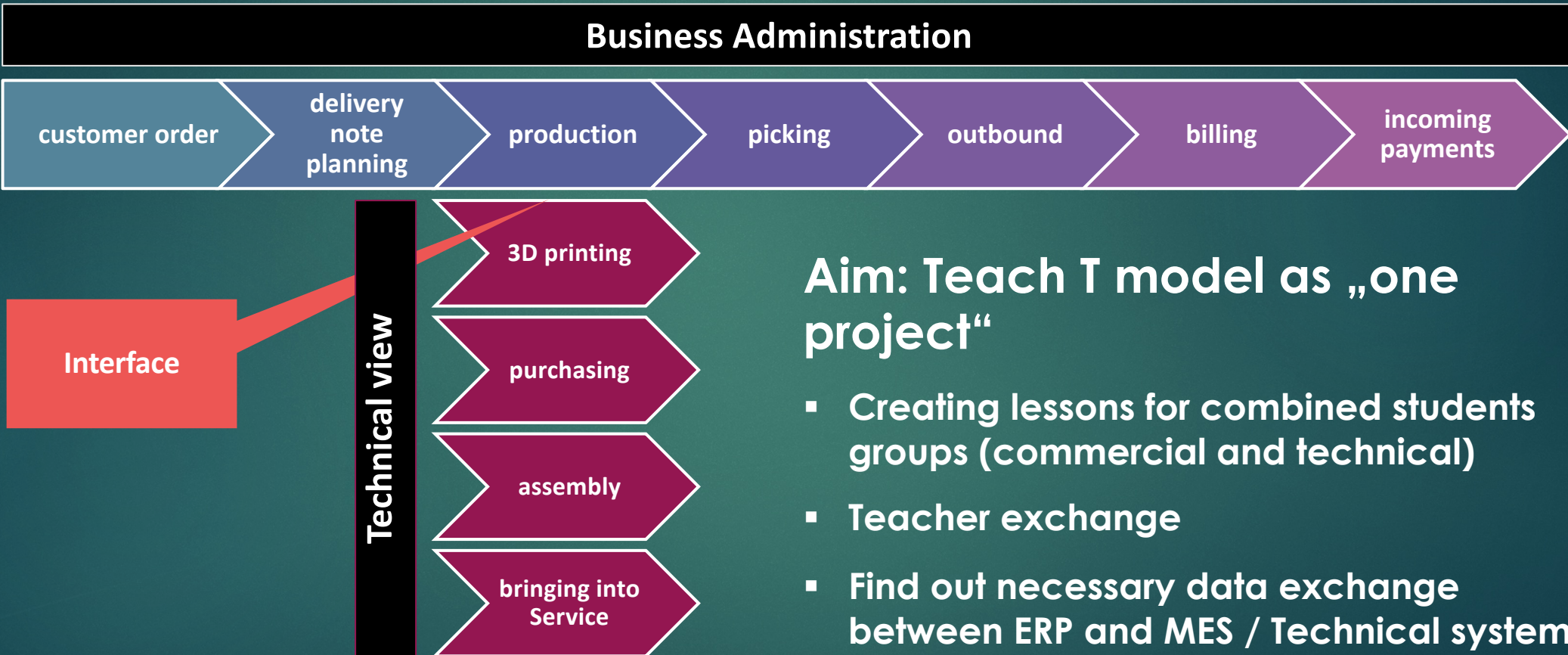
....

Thomas

Process View

Inbound - Outbound - Production

24



Aim: Teach T model as „one project“

- Creating lessons for combined students groups (commercial and technical)
- Teacher exchange
- Find out necessary data exchange between ERP and MES / Technical system
- Creation of parts lists

Challenges of working together on a commercial and technical scale

25

- ▶ Do we exchange teachers only?
- ▶ Do we plan lessons in which we combine commercial and technical student groups?
- ▶ How to find the teaching content which is working for both student and teacher groups? → content reduction to the bare necessary things.





Optionale Folien Marco Klusmann

28

Basic kit for schools

Back

29

- ▶ Two Tiny Whoops (75 € x 2)
 - ▶ First Person View Googles / Receiver for mobiles (60 € / 26 €)
 - ▶ Remote Control (65 €)
 - ▶ Batteries (15 €)
 - ▶ Batterycharger (10 €)
- ▶ Invest: 250 - 300 €

Advantages



- Complex Assembly with technical and commercial challenges



- Could be a product of a real company



- Quality of 3D-Printed part is essential



- Show effect

Disadvantages



- Relatively expensive



- Difficult assembly

Selecting colour / Personalized name of the Whoop

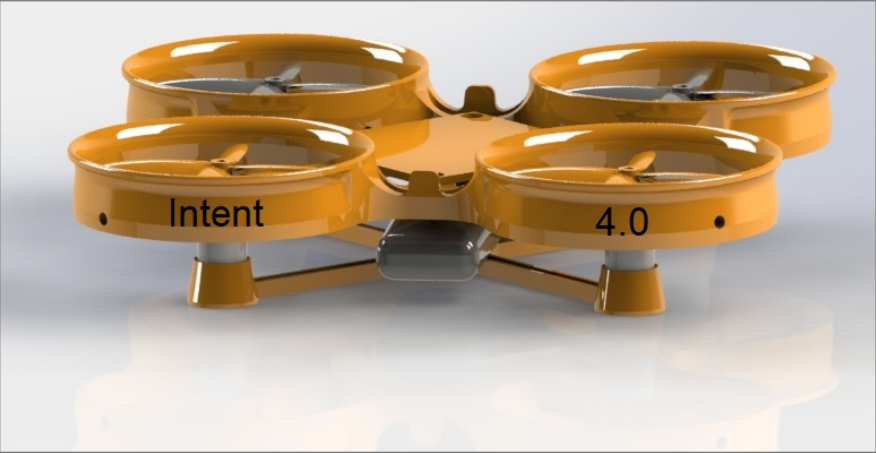
31

Order

Order your personalized Tiny Whoop!! **INTENT 4.0**

Choose a color
orange

Choose your Texts
Left bumper (max 8 Letters) Right bumper (max 8 Letters)
Intent 4.0



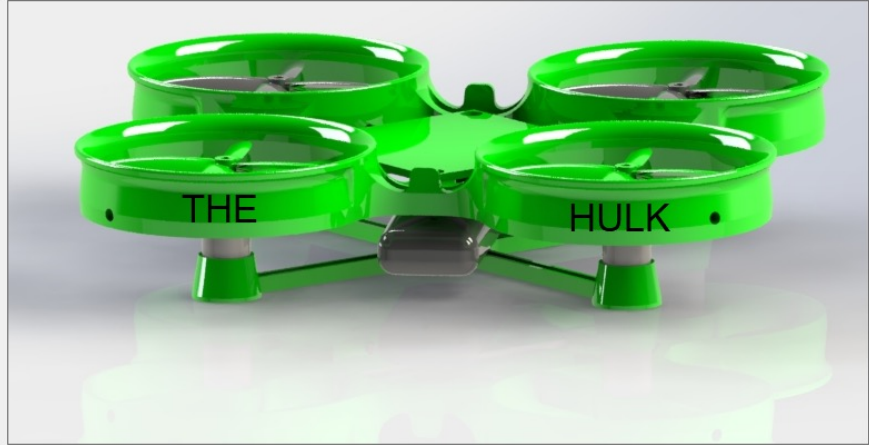
CAD-Datei erzeugen

Order

Order your personalized Tiny Whoop!! **INTENT 4.0**

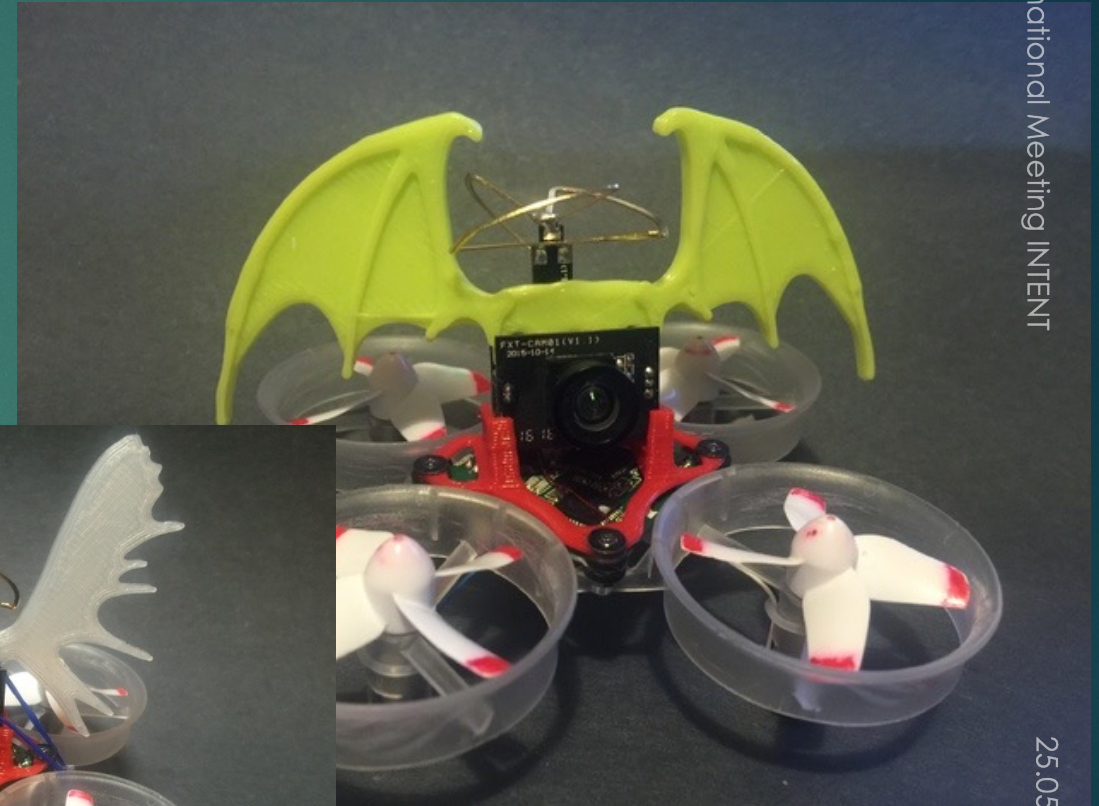
Choose a color
green

Choose your Texts
Left bumper (max 8 Letters) Right bumper (max 8 Letters)
THE HULK



CAD-Datei erzeugen

Decoration elements for antenna protection

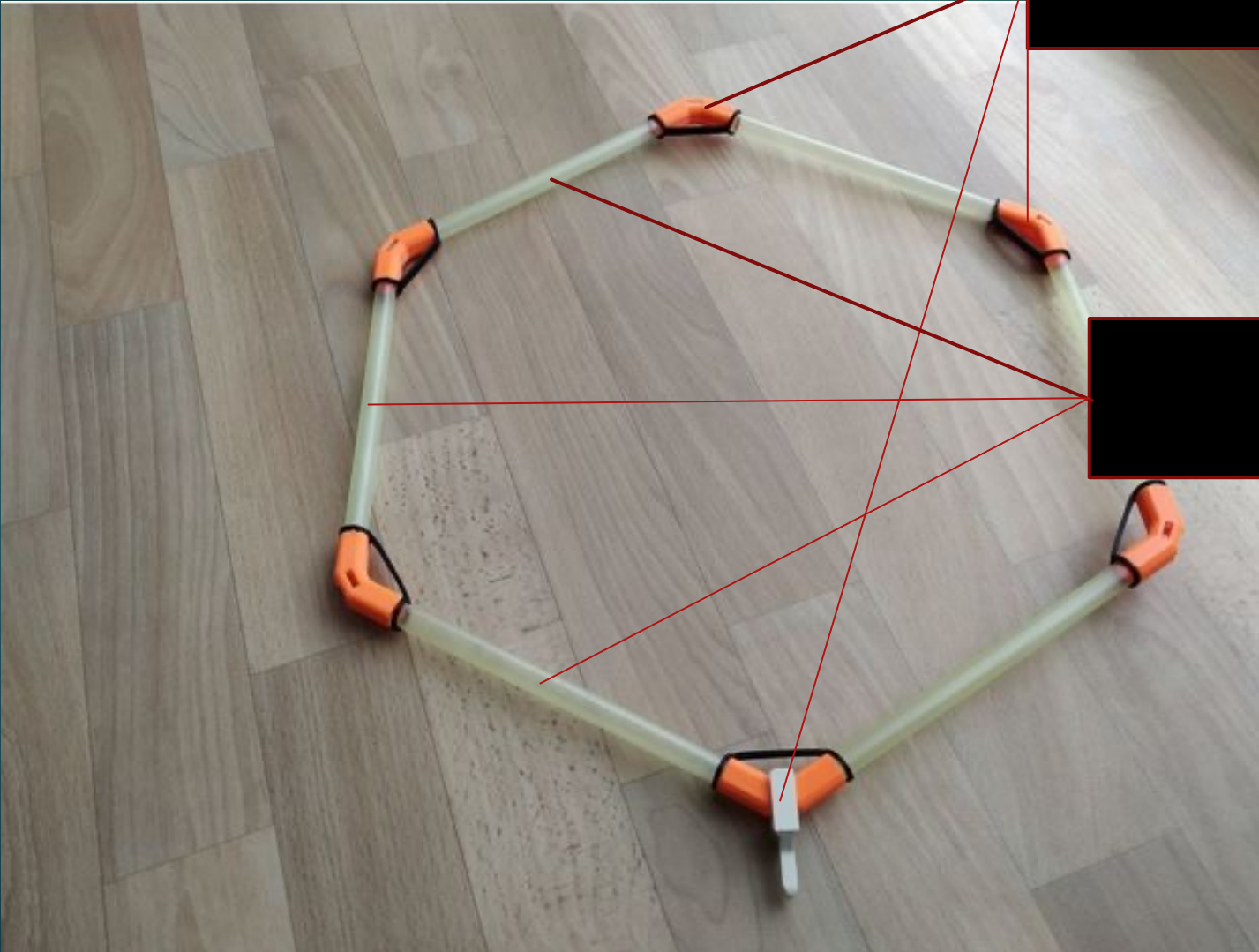


Obstacles

33

3D-Printed Parts

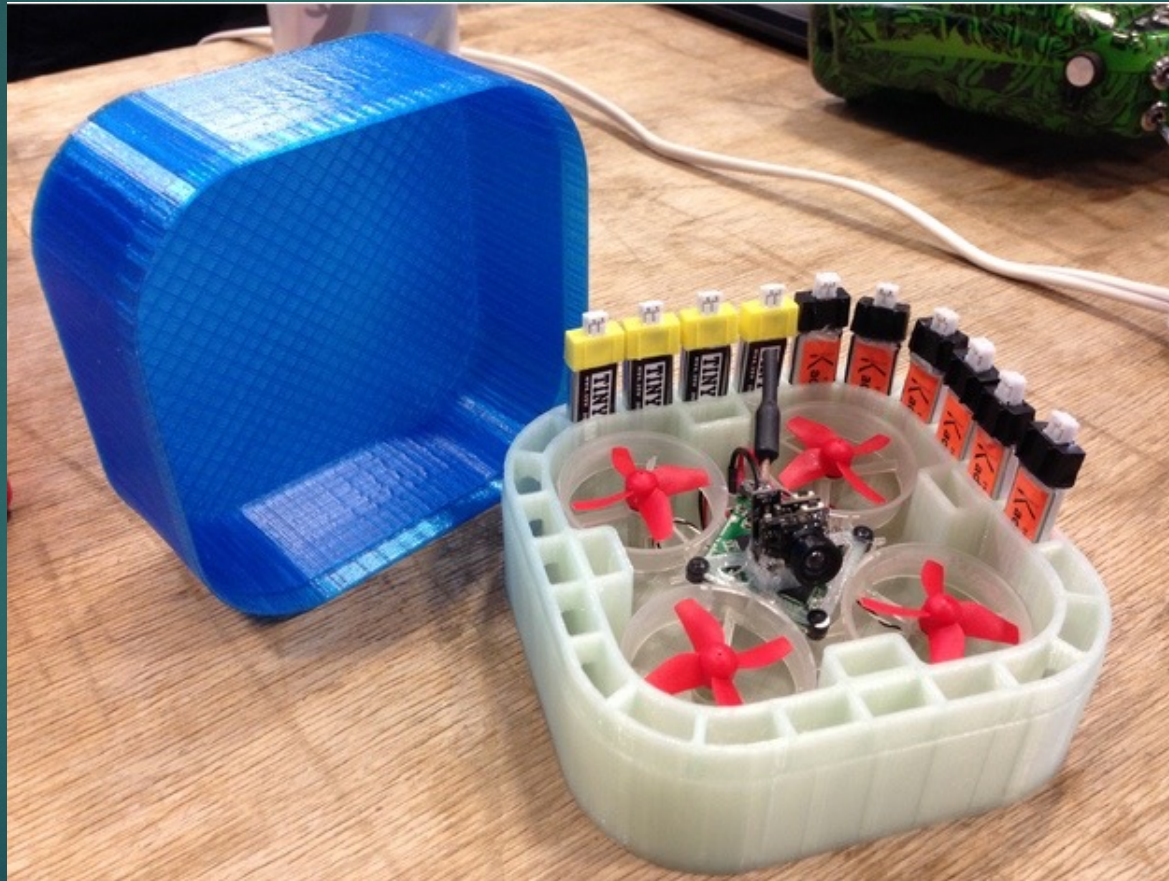
Wide Straws



Cases

[Back](#)

34



3D-Printing (FDM)

Back

35

Co-funded by the
Erasmus+ Programme
of the European Union



This work is licensed under a [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/).

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.