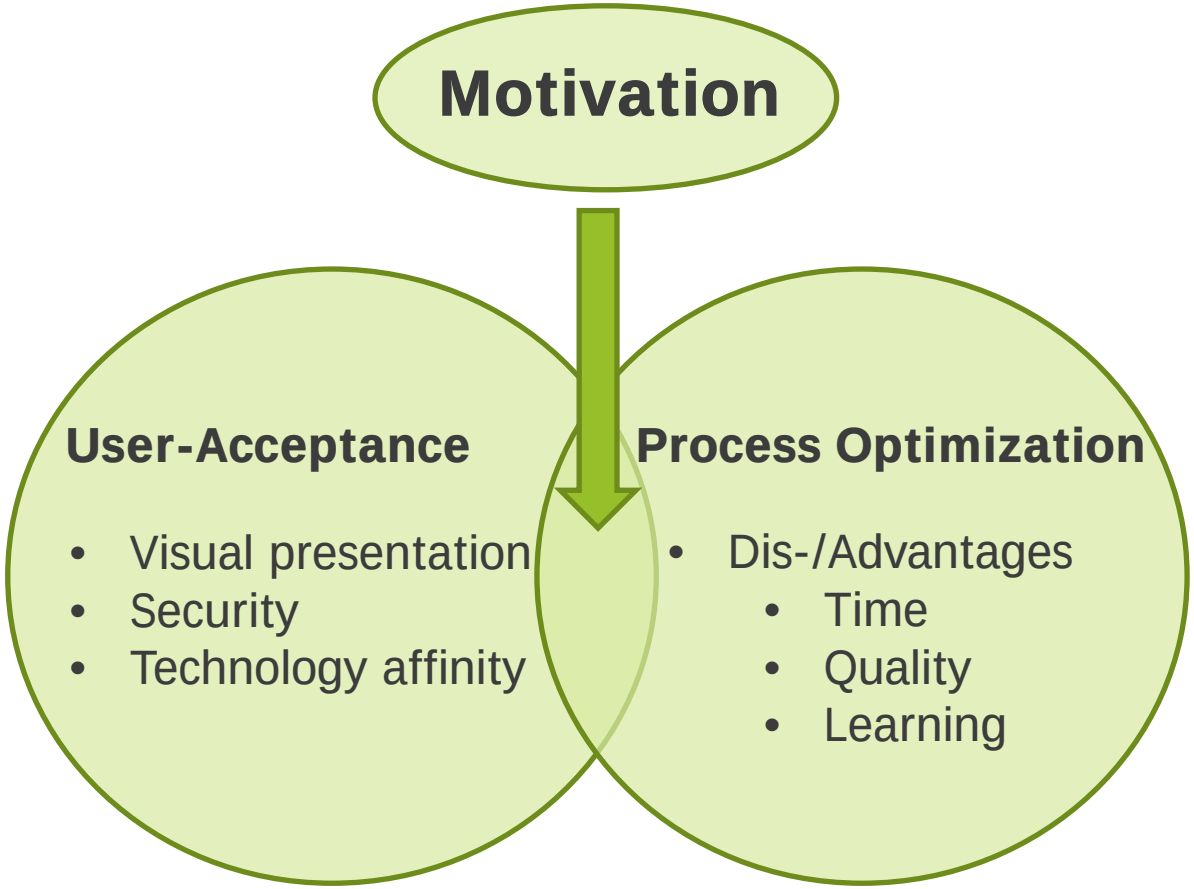
fh KufsteinTirol
UNIVERSITY OF APPLIED SCIENCES

Methods of presenting content in AR and optimization potential for manual workspaces

Introduction



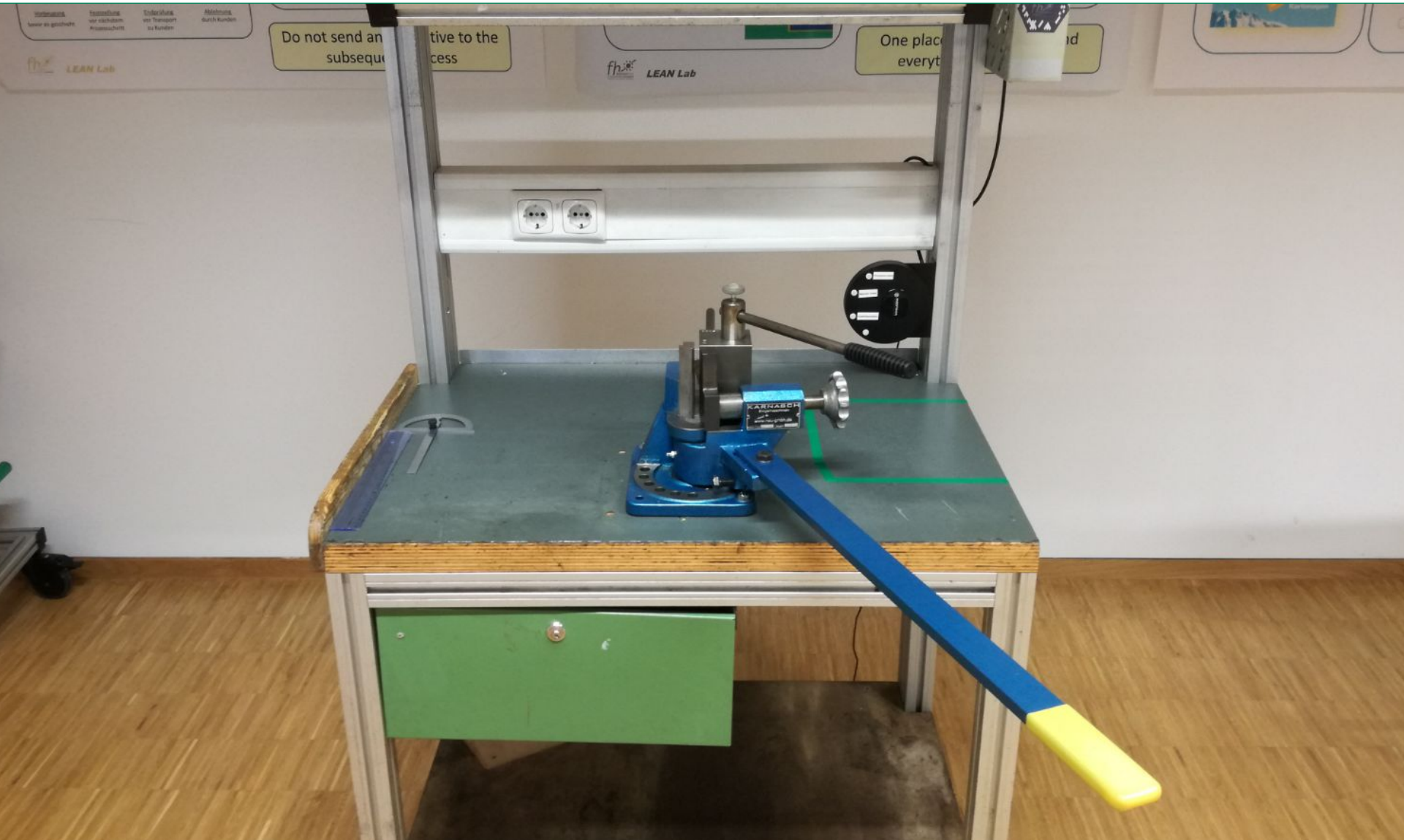
LEAN Lab


LEAN Lab
Kaizen - KVP
Bohren
Kontinuierlicher Fluss
Zelldesign

Process

Requirements	Selection “Bending”	Challenges
• Use of a semi-finished product (Clock) • Setting up during process • High tolerance range	• Twice bended sheet of metal with two different angles • Change of stokes depending on bending angle • Causes the most problems in the production line	• Using the right tool for the right angle • Inserting the metal sheets on the correct position • Adjusting the screws

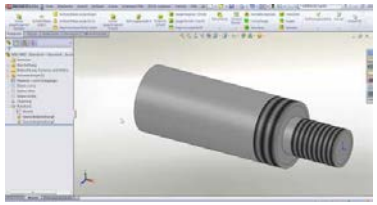
Bending Machine



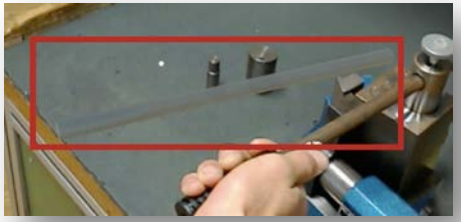
Technical Implementation

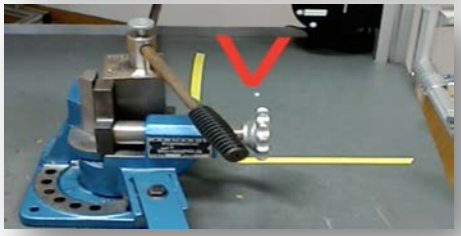
Creating virtual objects → Programming via Unity → Integration at the workstation

CAD-Program



3D- Scanner



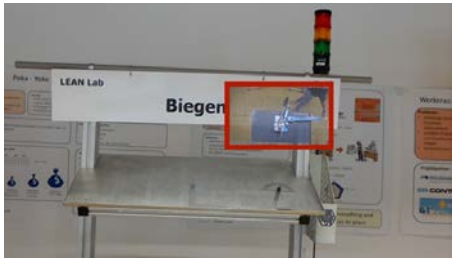


- Microsoft Hololens
- IP addresses and local print markers serve as reference points
- Placing the objects based on the existing references

Three different scenarios

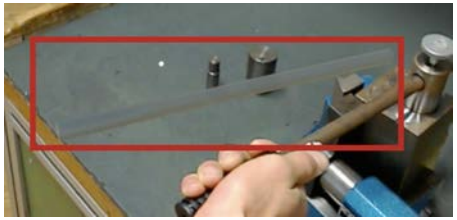
Video

- Placing the video by using the marker
- Shows a standardized procedure in third-person perspective
- Start of the video by gesture control



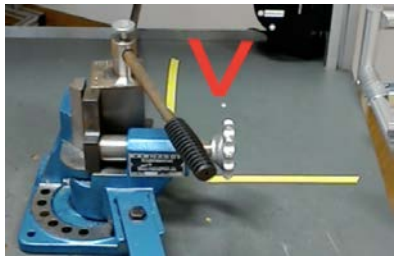
Holograms

- Holograms are projected directly into the field of view of the user
- Step- by Step navigation through all working-steps



Text and Arrows

- Instructions in text form
- Arrows serve as navigation

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Biegen
5S
Do not send any defective to the subsequent process

Structure of experiment

- Standardized workflow with 17 working steps
- No help during the execution
- Tester have no background knowledge

Phase I

Acceptance

- Balanced group of 12 Testers
- Questionnaire
  - Comprehensibility of content
  - Flexibility of behavior
  - Safety
  - Preferred Scenario

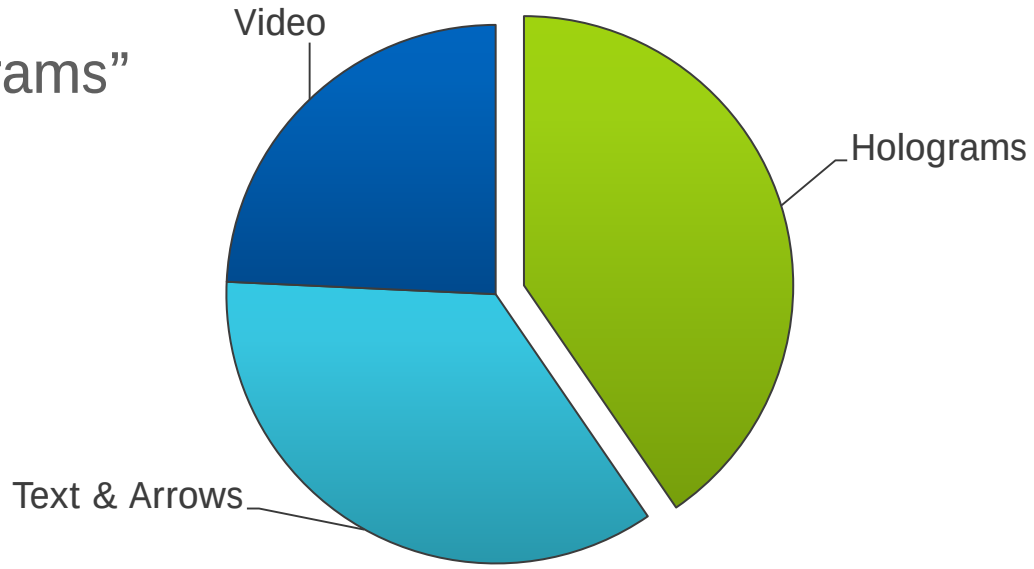
Phase II

Optimization

- Balanced group of 12 Testers
- Control group for comparison
- Measurable data
  - Time
  - Quality

Results

- Preferred scenario “Holograms”
  - Visual presentation
  - Flexible navigation
  - Less security risk



- Learnings
  - Well directed usage of technology
  - Individual configuration required
  - Otherwise negative effects could follow
  - AR should remain as a support

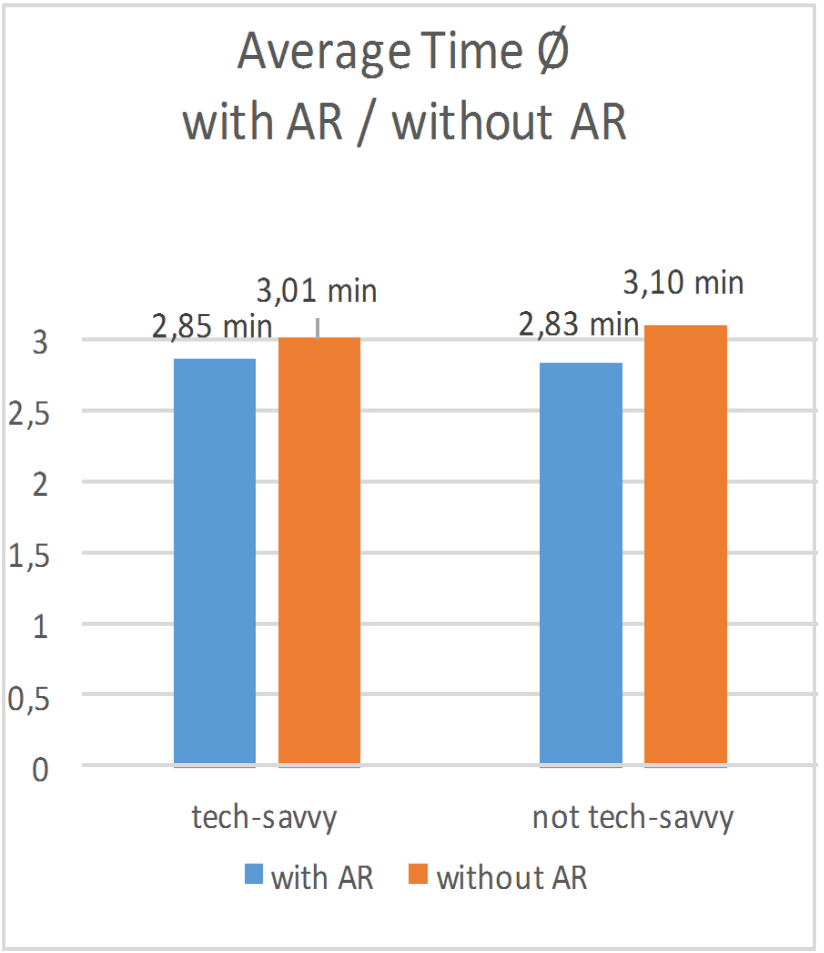
Results

- Quality
  - The main reason for the defects is the incorrect setting of the machine and incorrect insertion of the components
  - Rework is not possible and therefore leads to a complete committee

- With the support of Augmented Reality
  - No committee
  - With step by step instructions, the main committee factors can be targeted influenced

Results

- Time
  - Reduction of the process time by an average of 8%
  - Technical affinity of the worker loses importance
    - ↳ time became equal
  - Predictable learning time



Suggestions for improvements

Problems	Outlook
Low Significance	More test runs
Determination of technological skills of testers	Using approved questionnaire
Process is not very complex	Test the Scenario on complex processes
Visualization	Improve Scenario (animations, interaction methods)
Heavy Glasses	Try other AR-Applications

Questions

1) How is the influence on workers by daily use after the learning phase? Is there still a time/quality benefit?

2) What differences will it make if the process is more or less complex?

3) How can the user/worker on the shop floor be more integrated in the development process?

Thank you for your attention

Maximilian Hofbauer, BSc

Student – FH Kufstein Tirol

max_hofbauer@web.de

Bernhard Mandl, BSc

Research Fellow – FH Kufstein Tirol

bernhard.mandl@fh-kufstein.ac.at

Prof. (FH) DI Dr. Martin Adam

Director of studies – FH Kufstein Tirol

martin.adam@fh-kufstein.ac.at