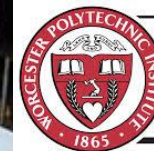


# Proposing Information Communication Technology Solutions for a Business Studio Environment

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## Abstract

The Studio at Copenhagen Business School was created to produce business leaders with a non-traditional skillset to address the business challenges of today. The goal of this project was to identify and propose technologies to enhance and expand the activities of the Studio. The project consisted of gathering information on the current state of the Studio through interviews and observation, conducting research to identify a list of technologies that benefit studio learning, and performing selection methods to find technological solutions that best supplement the studio environment. The team proposed 21 technological solutions to the sponsor of the project, Stefan Meisiek. The proposal will be considered by the faculty of the Studio for implementation in the new Studio classroom space.

**Figure 1** – This image highlights the spirit of the activities conducted in a studio environment: it allows hands-on, craft-based group work.



## Background

Businesses and corporations have become an ever-increasing influence on society due to globalization and the free market. Business schools aim to produce graduates that met the needs of these businesses, but the common educational approaches are over a hundred years old and may not be ideal for today's businesses. Studio Education is a proposed pedagogy to address the new demands for 'soft skills' like teamwork, problem-solving, and creativity [1].

A studio classroom is one that can be changed to support various activities that allow students to "learn by solving" [2]. Studio classrooms provide a better environment for the development of these newly demanded skills [3]; Figure 1 illustrates the nature of the environment in a studio classroom. At the same time, technology has seen increasing use in classrooms as research shows how its presence can improve educational outcomes [4].

## Problem Statement

The sponsor of this project, Stefan Meisiek, has been running the Studio program at Copenhagen Business School (CBS). While the Studio has been a success for the two years that it has existed, the activities conducted within the Studio lack the use of information communication technology (ICT). This technology has the potential to enhance the activities at the Studio by providing access to more creative options or assisting the students and faculty in their undertakings.

Therefore, we aimed to aid CBS faculty in enhancing the educational environment of the Studio by identifying technological opportunities, researching potential ICT solutions, and proposing the best solutions. Stefan Meisiek will consider these solutions for the Studio as it expands into a larger space in June of 2014.

## Objectives

Our goal was to propose technologies that improve the Studio at CBS. In order to find the most appropriate technologies to suggest, we met the following objectives.

- Collection of Data
- Distillation of Data into Specific Categories
- Research into Potential ICT Solutions
- Analysis of ICT Solutions
- Validation of ICT Solutions with Studio Faculty
- Proposal of ICT Solutions

## Data Collection

Bringing business education to a studio environment is a relatively recent idea. Therefore, this methodology starts with the collection of data from relevant faculty and students. We interviewed professors who use the Studio because their experience provides valuable insight into technology that belongs in the Studio. Experts such as a professor who has started a studio at another university, also helped provide data.

We also sat in and took notes on activities that took place in the Studio. This aided us in understanding the feel of the Studio, as well as what would be essential to preserve. While observing these activities, some professors granted us permission to talk to students. The students were often passionate about the courses they took in the Studio, and they were able to provide us with what they thought could be improved through technology, as well as specific ICT ideas.

## Distillation

Our data collection produced a large amount of raw data that required distillation into useful points to drive research. This called for an open, deductive coding approach to distillation [5]. Notes from all collection methods were reviewed to identify information that fell under the categories of: technological opportunities (see Figure 2 to the left), suggestions of ICT solutions, criteria, and constraints.

## Research

The technological opportunities and suggestions of ICT solutions that we distilled guided our research. This research phase aimed to find as many solutions as possible, as well as gather information on each solution such as the price, ease of use, ease of implementation, flexibility, and reliability. The results yielded a total of 117 potential ICT solutions to our 12 technological opportunities.



**Figure 2** – This image illustrates a technological opportunity: is there an ICT that can easily capture whiteboard work and store it on a student's laptop?

## Analysis

We used a decision matrix to generate a quantitative score for each technology in order to narrow our list down to the most useful technologies to propose. We reviewed the notes for each technology and assigned scores from 0 to 5)for the criteria. This produced a total score for how well each ICT solved its technological opportunity.

We surveyed Studio professors to establish the weight of each opportunity and criteria, which influenced the totals. The decision matrix combined the total scores for the opportunities and the criteria for each technology to produce an overall total score.

The criteria totals establish a top technology for each of the 12 opportunities, and the overall totals establish the five best overall solutions. If an ICT scored within 10% of the first, it was also considered a top-scoring solution.

**Figure 3** – This chart shows the 12 technological opportunities identified by the team.

## Validation

After assembling a list of the top performing ICT solutions, we validated the results with faculty who are invested in Studio education. These faculty members included our sponsor, a professor who teaches in the Studio, a business professor with experience in studio education, and a professor who founded a Studio at another university.

We created a survey containing the 19 most useful ICT solutions, and a brief description of each. A team member was present to help describe the technologies and answer any questions the faculty member had. The faculty told us if they liked the idea of this technology being implemented in the Studio. This data helped us determine if our results are valid.

## Proposal

The goal of this project was to produce a detailed proposal of ICT solutions for the sponsor, Stefan Meisiek. The proposal begins with a Table of Contents, which lists the page numbers for each Opportunity and ICT. Each Opportunity (see Figure 3) is associated with a unique color to help the reader navigate the proposal.

Every technological opportunity has its own page, which includes the name of the opportunity, a brief description, and the names of the highest scoring solutions. Following each opportunity page is one page for each top-scoring ICT solution that addresses it. The highest scoring technology is presented first, and then the second highest scoring technology within 10%. Each technology page includes a description of the technology, a bulleted summary of information, a list of pros and cons, and a list of statistics pertaining to the criteria. The proposal also presents a list of the top five scoring solutions across all categories.

Digital 3D Visualization	Physical 3D Visualization	Accessible Sound System	Communication
Data Collection	Data Sharing	Interactive Interfaces	Media Manipulation
Presentation Displays	Recording / Class Capture	Simultaneous Classroom Telepresence	Studio Sound Equipment

# Outstanding ICT Solutions:

## Pirate3D Buccaneer

Studio professors chose Physical 3D Visualization as the most important technological opportunity. The emphasis on crafting activities creates an opportunity to implement technology that can quickly visualize students' ideas. The Pirate is an affordable but capable printer that is easy to use. Users can use their smartphones, computers, or tablets to search for 3D models in the company's databased, then edit the model's size and color. The user can then send this model to the Buccaneer to print it wirelessly. At only 2681 dkk, this technology is affordable for offices or personal use.

**Figure 4** – This image shows the Pirate3D Buccaneer. The stainless steel design and small size makes it a fitting aesthetic for the Studio.



## eBeam Engage

Nearly every wall in the Studio is usable as a whiteboard. Students and faculty alike frequently use whiteboards in Studio activities. Being able to record the work done on the whiteboard allows for ideas and visual data to be easily reviewed at a later time. The eBeam Engage allows the user to record whiteboard work with an interactive dry-erase marker tool, as well as record the presenter's audio at the

same time.

Pair the device with a projector, and it can be used as an interactive screen. This opens up possibilities for more engaging presentations or opportunities to intuitively interact with computer data. It comes with numerous features, such as a wireless controller with a full keyboard and touch screen, or an auxiliary port that the user can use as a sound system to play audio for the area surrounding the device.

**Figure 5** – This image depicts a teacher presenting with the eBeam Engage (the device is on the left side of the whiteboard)



## iPad with Retina Display

The Apple iPad Retina is a tablet computer that can enable many different classroom activities. The Apple AppStore provides a wide variety of applications available for download, and this allows this tablet to address seven of our team's technological opportunities: communication, data collection, data sharing, interactive interfaces, media manipulation, presentation display, and sound studio

equipment. If iPads are readily available in the Studio, teachers or students can download these applications for use in their lessons or their projects. The iPad can also be connected to TVs or projectors, meaning students can work on an iPad, then easily present their work on a large screen. The familiar interface means most students know how to use this device; many students own iPhones or iPads themselves.

**Figure 6** – This image displays the white and black iPads. The small icons exhibit the numerous applications available from the AppStore.



# Conclusion

We completed the project on time and produced a proposal of 21 individual technologies that address 12 opportunities for improvement. The proposed technologies will be beneficial to the Studio upon its transition to the new location. Depending on the the Studio's budget, different solutions can be implemented.

We believe that the most beneficial result of our project is the list of technological opportunities. Technology advances at an exponential rate; therefore, the ICT solutions we proposed may become obsolete as more advanced technologies become available. However, we identified technological opportunities that the faculty at CBS (or other universities with studio education) can still address years down the road when the ICT market has changed.

We faced multiple obstacles in completing this project. It was difficult to properly establish the technological literacy of students and professors at the

Copenhagen Business School. Creating a survey that fully addresses such a complex topic proved to be beyond our expertise, and conducting the survey was difficult because of cultural differences. However, we are confident that the technologies we proposed are usable by the average student and professor at CBS because ease of use was a criteria in our scoring process, and our

Studio professor validation helps confirm the ease of use of the proposed technologies.

Another obstacle we faced was proposing technologies that preserved the hands-on nature of studio learning. Figure 4 illustrates how the spirit of studio education lies in the making process. It became clear during interviews and class observations that the Studio is a crafts-based environment,

and the relative lack of technology might be a crucial aspect of the curriculum. It is possible that there currently aren't any ideal technologies available to enable the creative, hands-on work required by the Studio that can seamlessly fit into the feel of the class space and pedagogy.

**Figure 4** – This image exhibits the craft nature of activities in a studio learning environment.





## References

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This executive summary represents work of WPI undergraduate students submitted to the faculty as evidence of a degree requirement. WPI routinely publishes these reports on its web site without editorial or peer review. For more information about the projects program at WPI, see: <http://www.wpi.edu/Academics/Project>

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