

Vertical social software for remote collaboration over video

Kick-off presentation

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A. Motivation

B. Research Questions

C. Project Overview, Proposed Solution, Design & Architecture

D. Evaluation Scenarios

E. Challenges

- Users becoming mobile and distributed
- All devices with at least one camera
- Video calling becoming more extensive and widespread
- Use video collaboration to improve communication and productivity
- Reach the level where people can use natural behaviors to collaborate over video

Amazon's Mayday feature



Available only on Kindle Fire HDX versions

A. Motivation

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E. Challenges

- What characteristics of scenarios can be supported by remote collaboration over video?
- What are the existing tools/technologies for remote collaboration over video?
What are the limitations of these existing tools?
- How the vertical social software for remote collaboration over video looks like?
- Does the implemented solution improve remote collaboration?

A. Motivation

B. Research Questions

C. Project Overview, Proposed Solution, Design & Architecture

D. Evaluation Scenarios

E. Challenges

Problem

Scenarios

Online Mode

Offline Mode

Possible Solutions

Horizontal Social Software

Vertical Social Software

Solution

Requirements

-
-
-

Common

- ...
- ...
-

Online Specific

-
- ...
-

Offline Specific

Existing Solutions

- Facetop
- VideoDraw
- ClearBoard

Research

- Skype
- Hangout
- FaceTime

Tools in market

Comparison

✓		✗
✗		✗
	✓	✓

Architecture

Vertical Social Software

Use case -1

Platform

Vertical Social Software

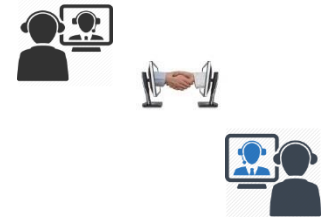
Use case -2

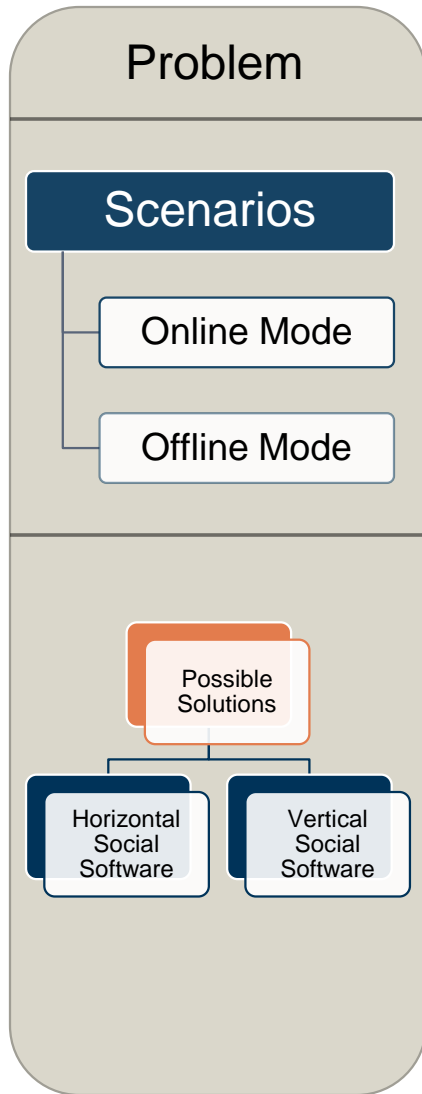
Evaluation

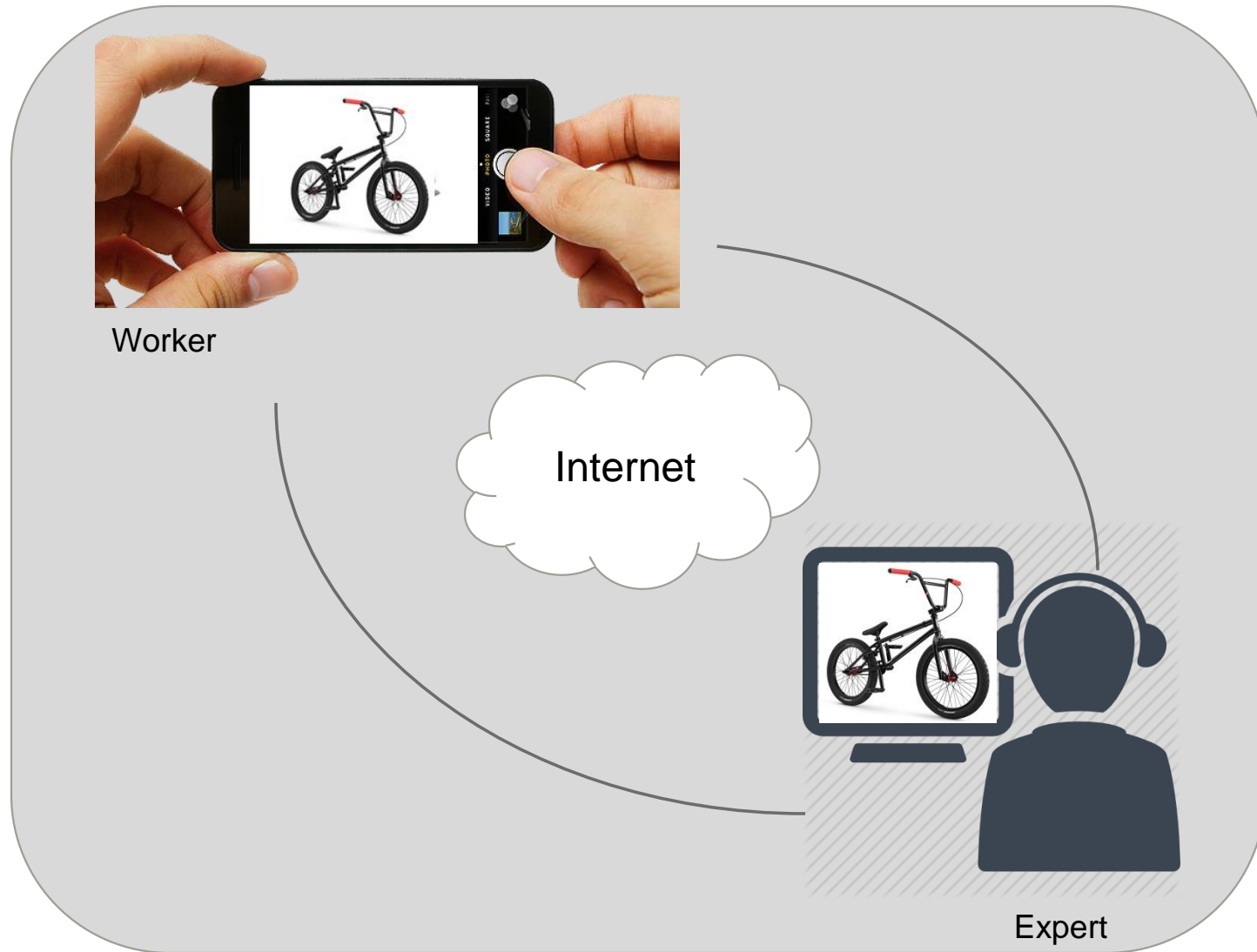
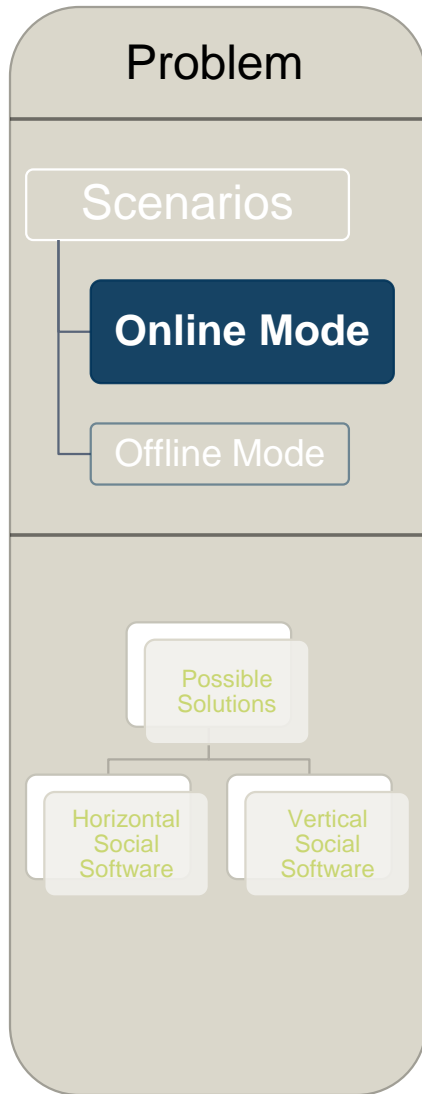
Scenarios

Remote Assistance

Education







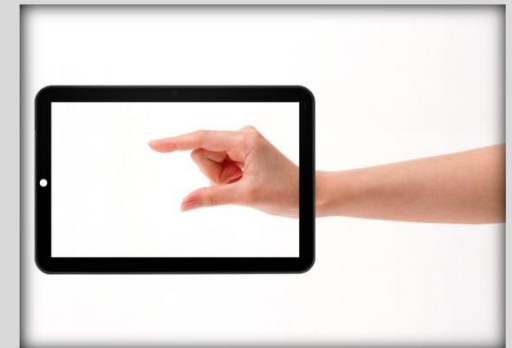


- Allows an expert to easily connect with remote clients and support them
- Introduction of hand gestures to improve assistance
- Real time overlapping of expert's hand video over client's desired problem space



What Worker sees

Real time collaboration



Expert assisting



Features

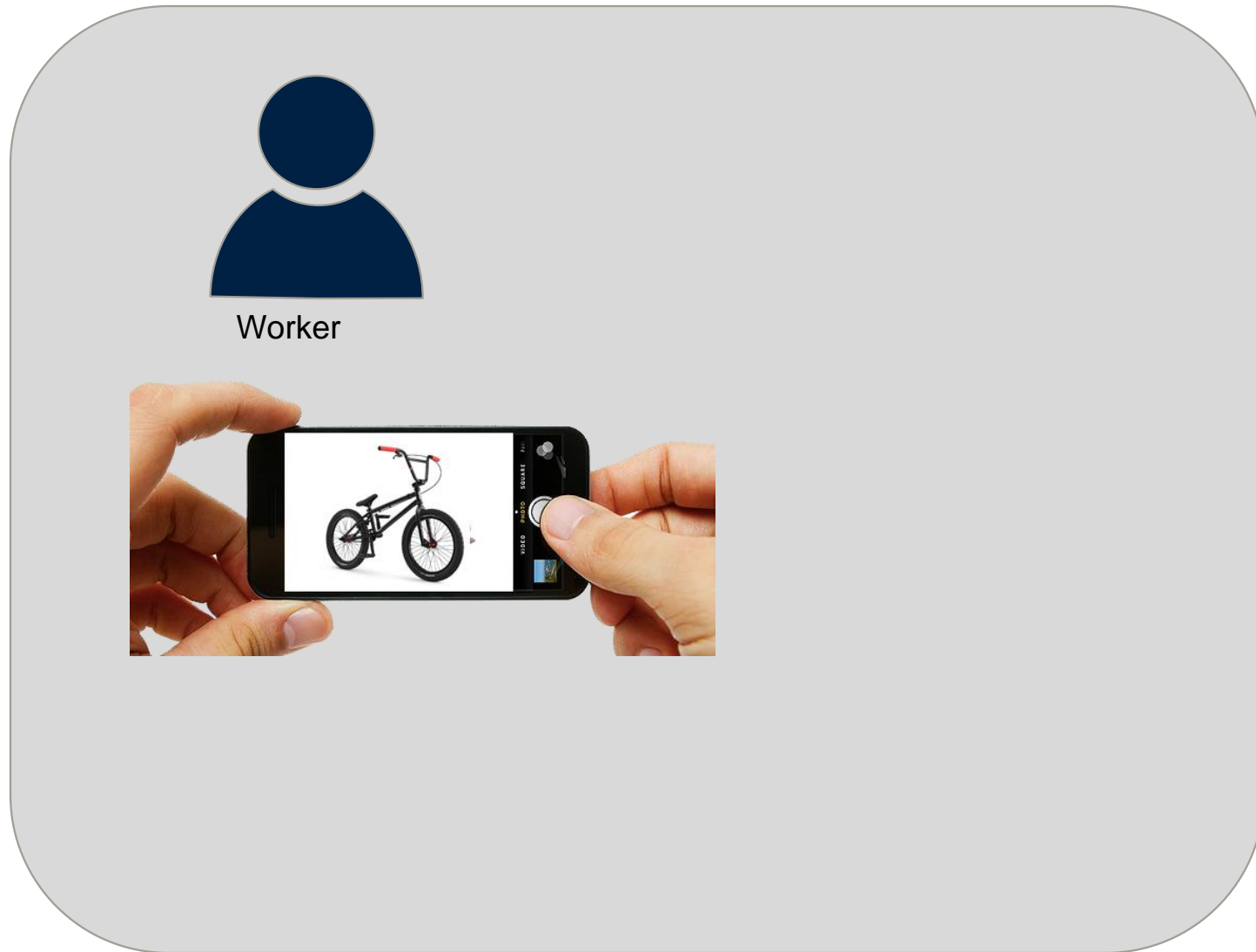
Real time assistance

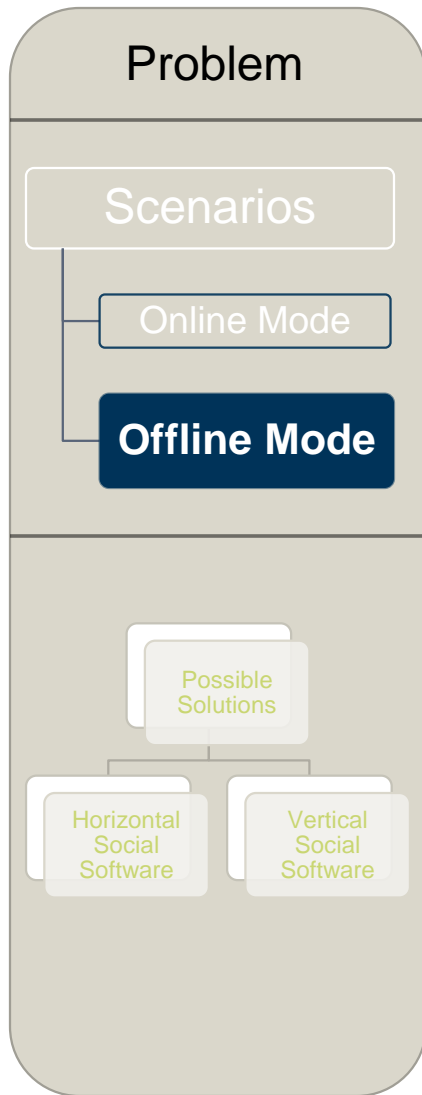
Communication possible using hand gestures or finger pointing

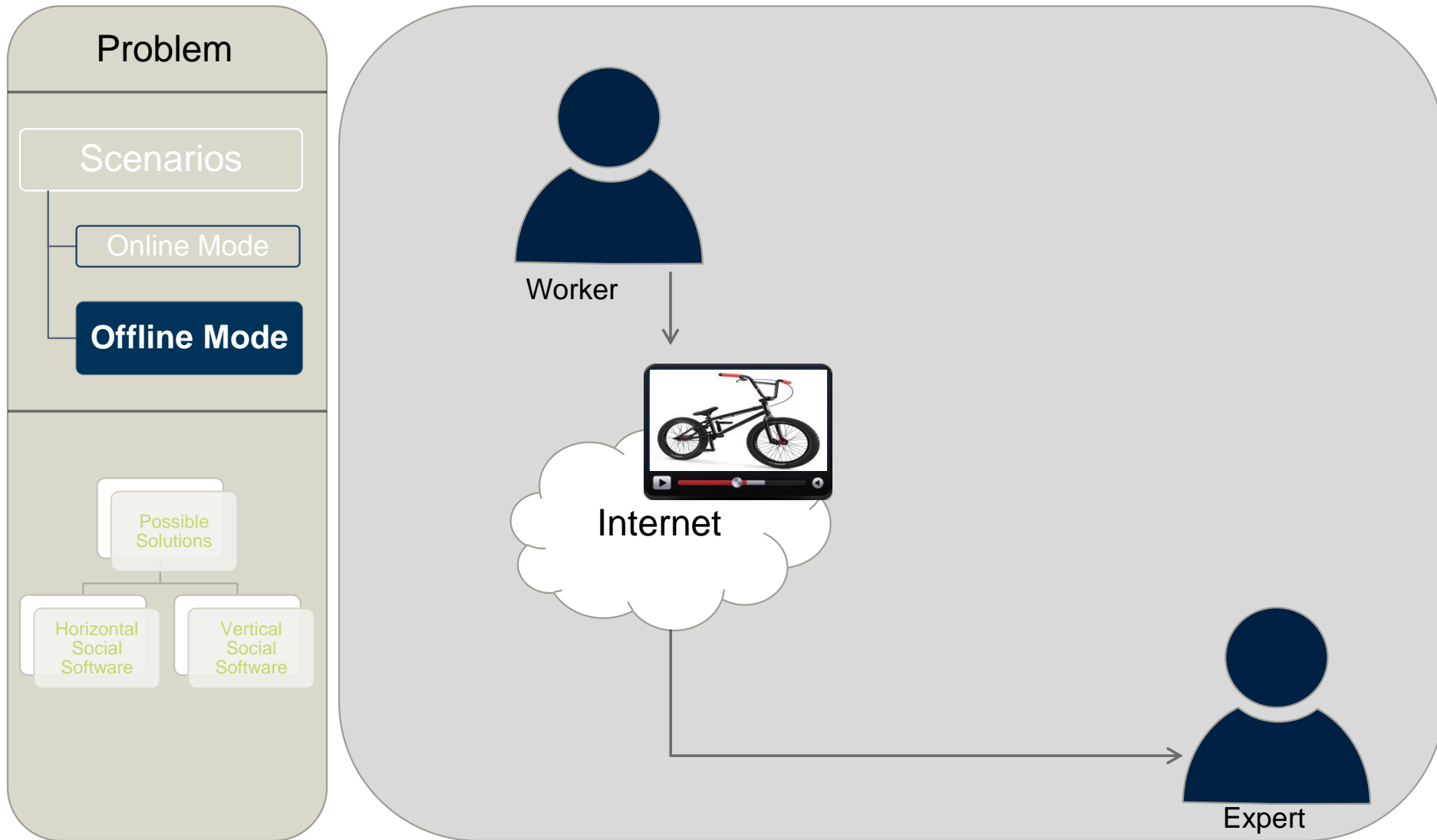
Suitable for use cases requiring urgent help

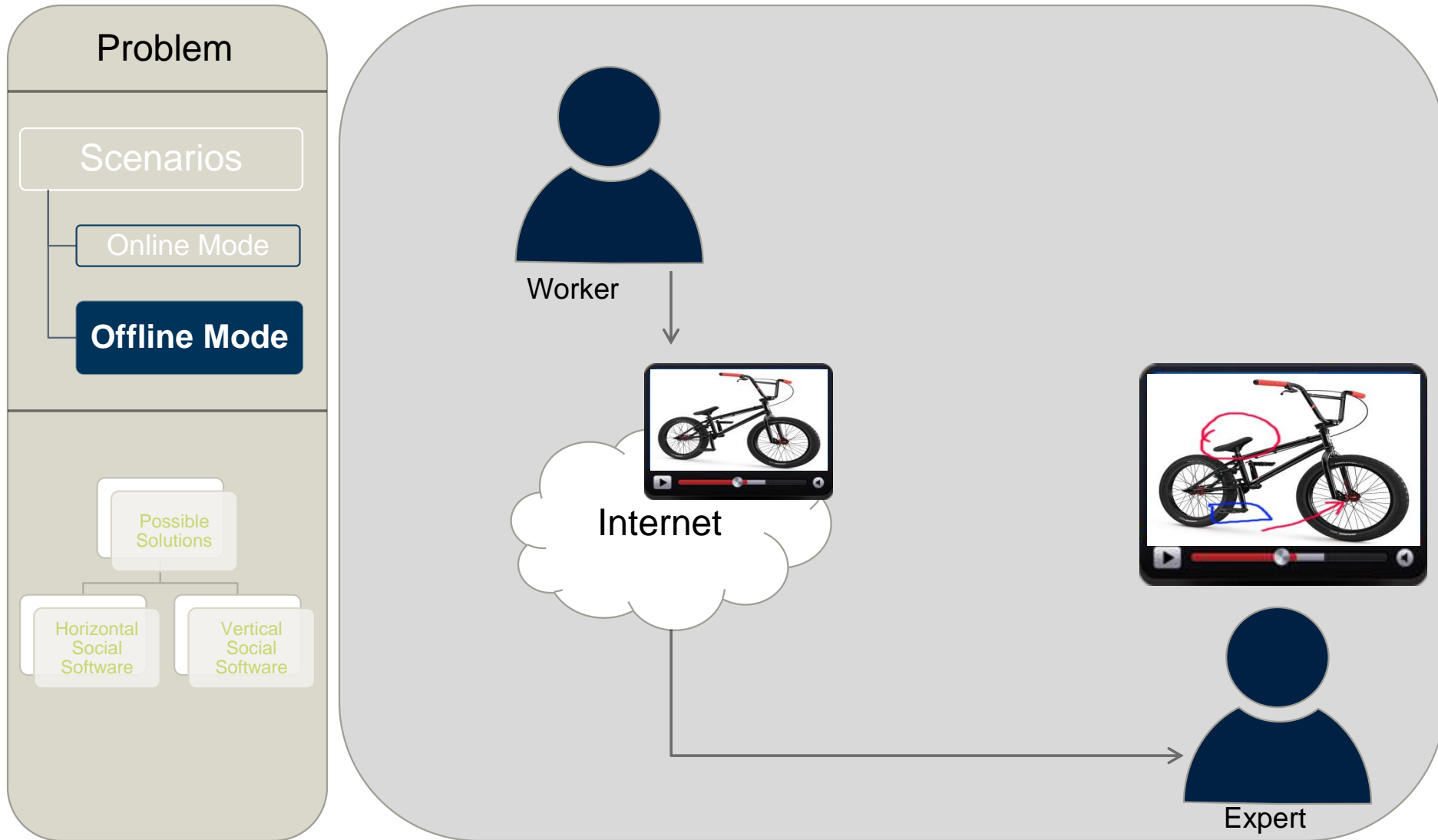
More natural and intuitive form of help

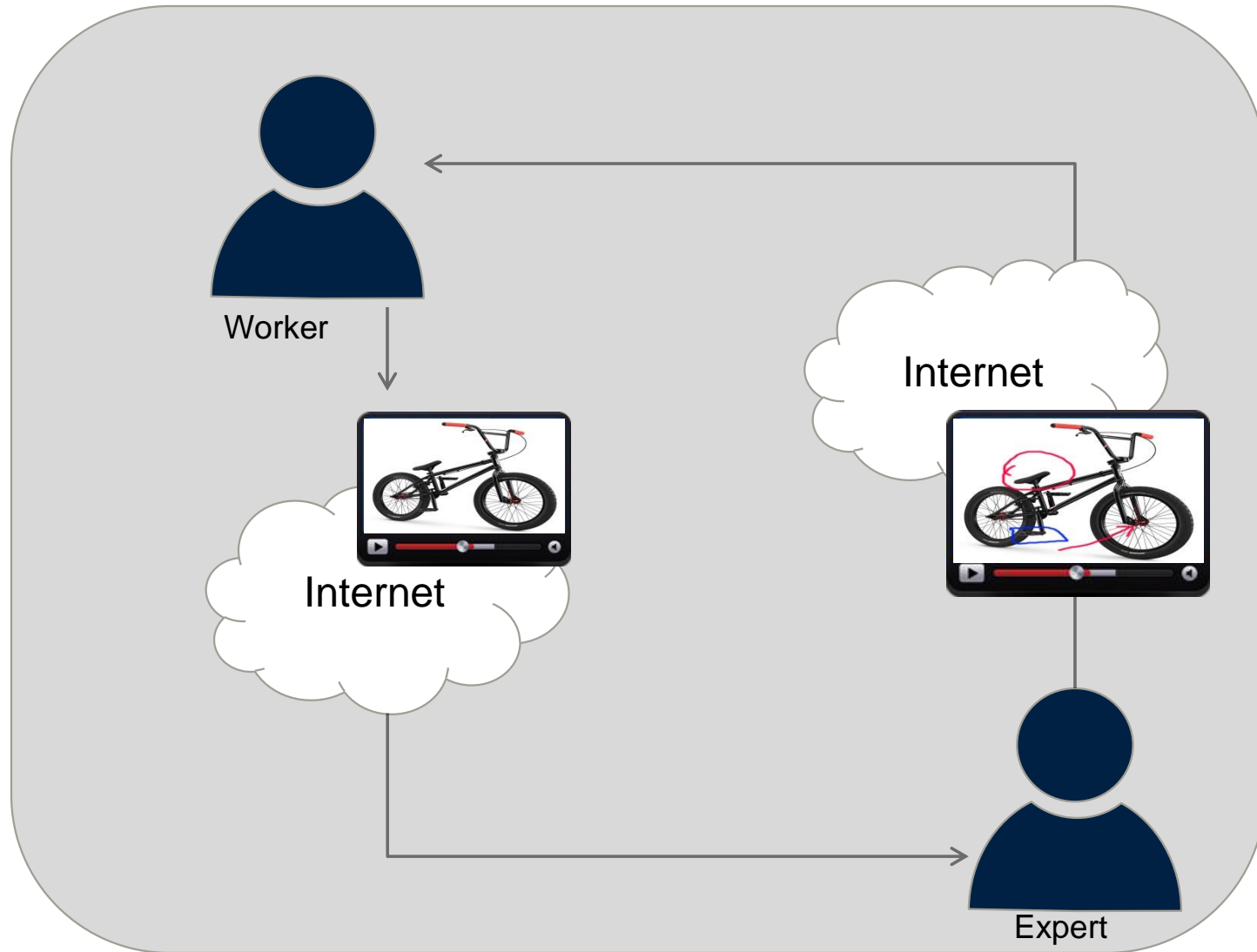
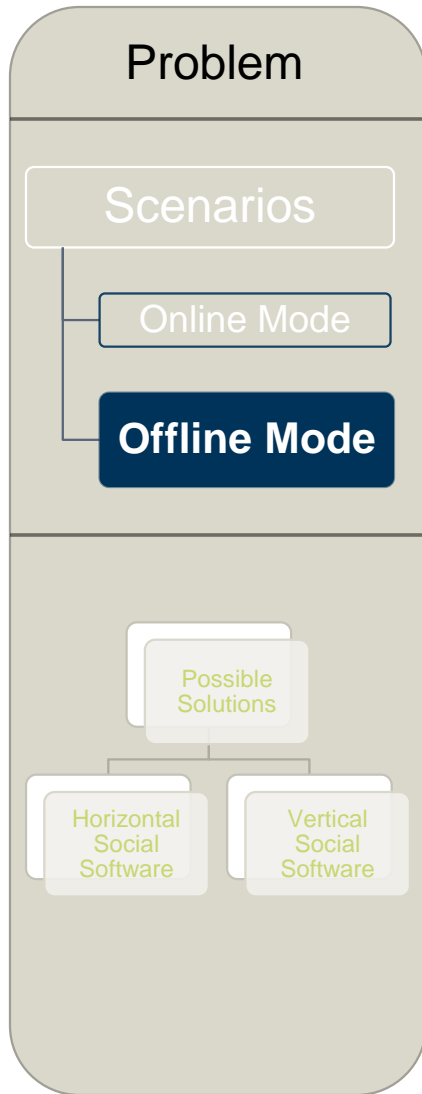


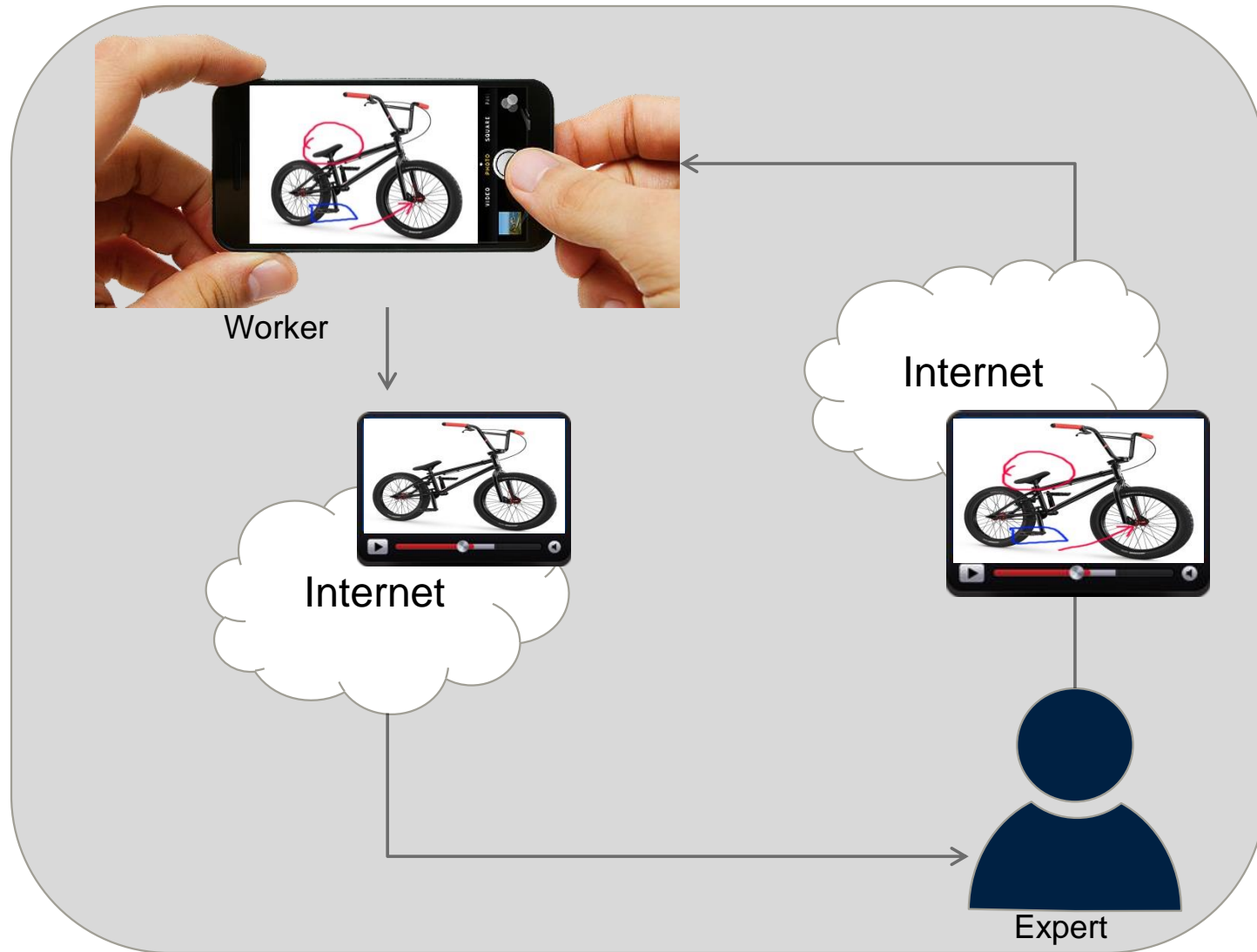














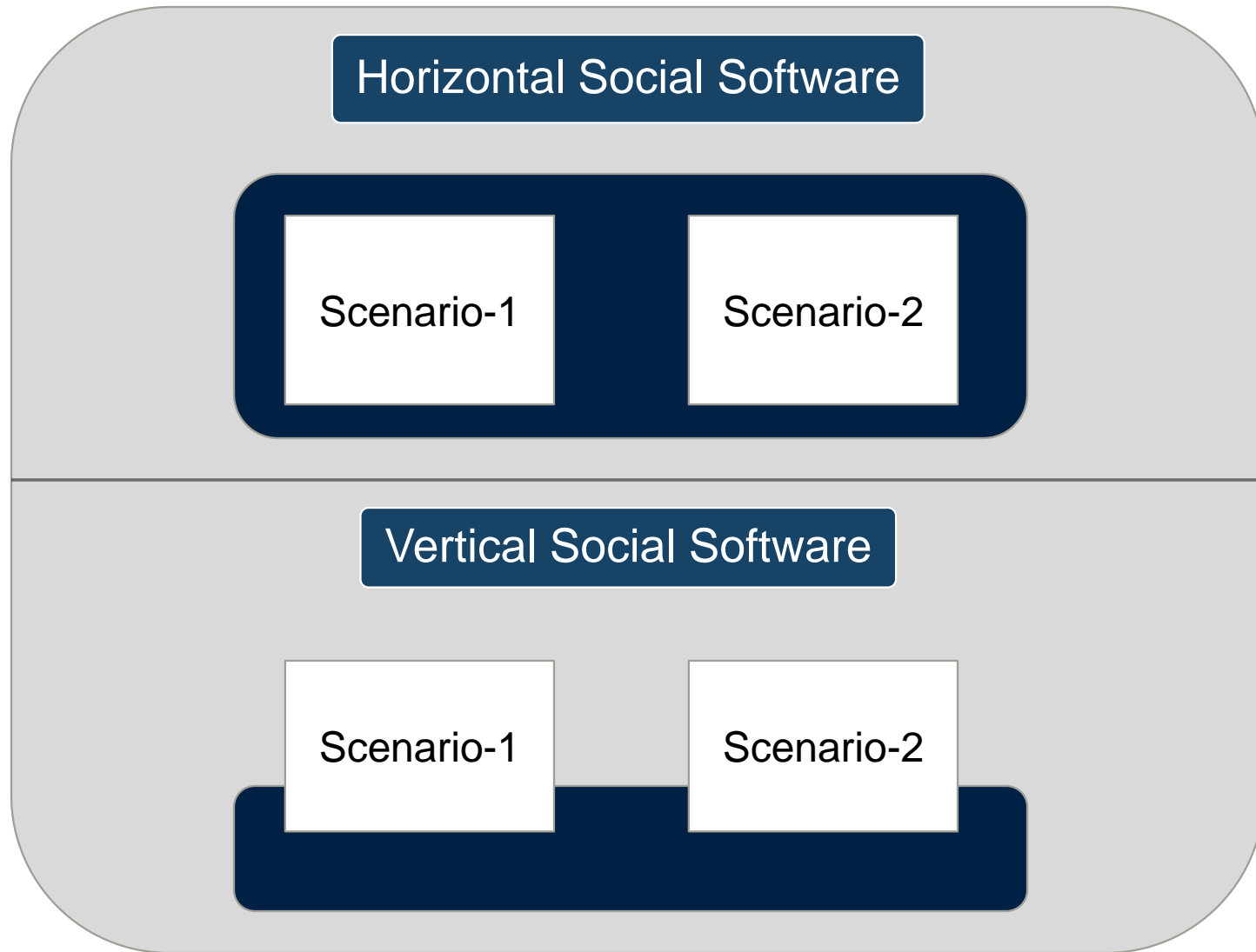
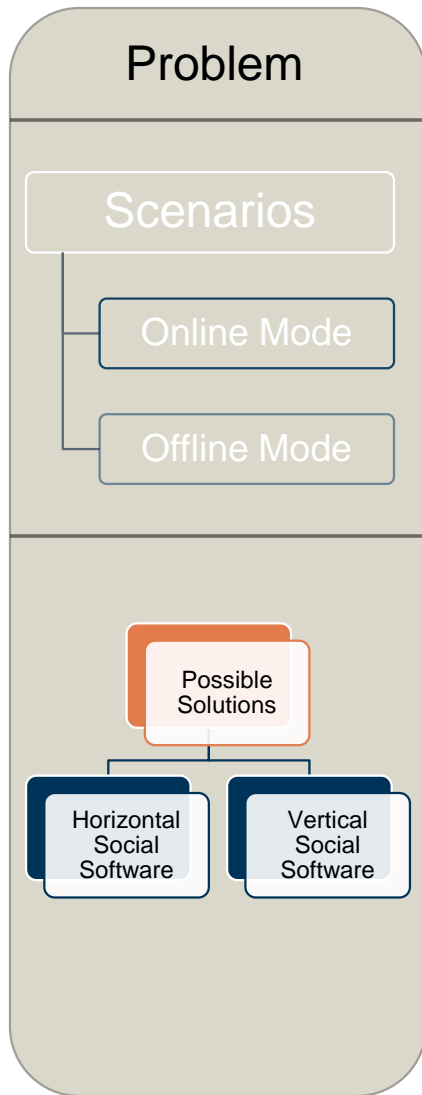
Features

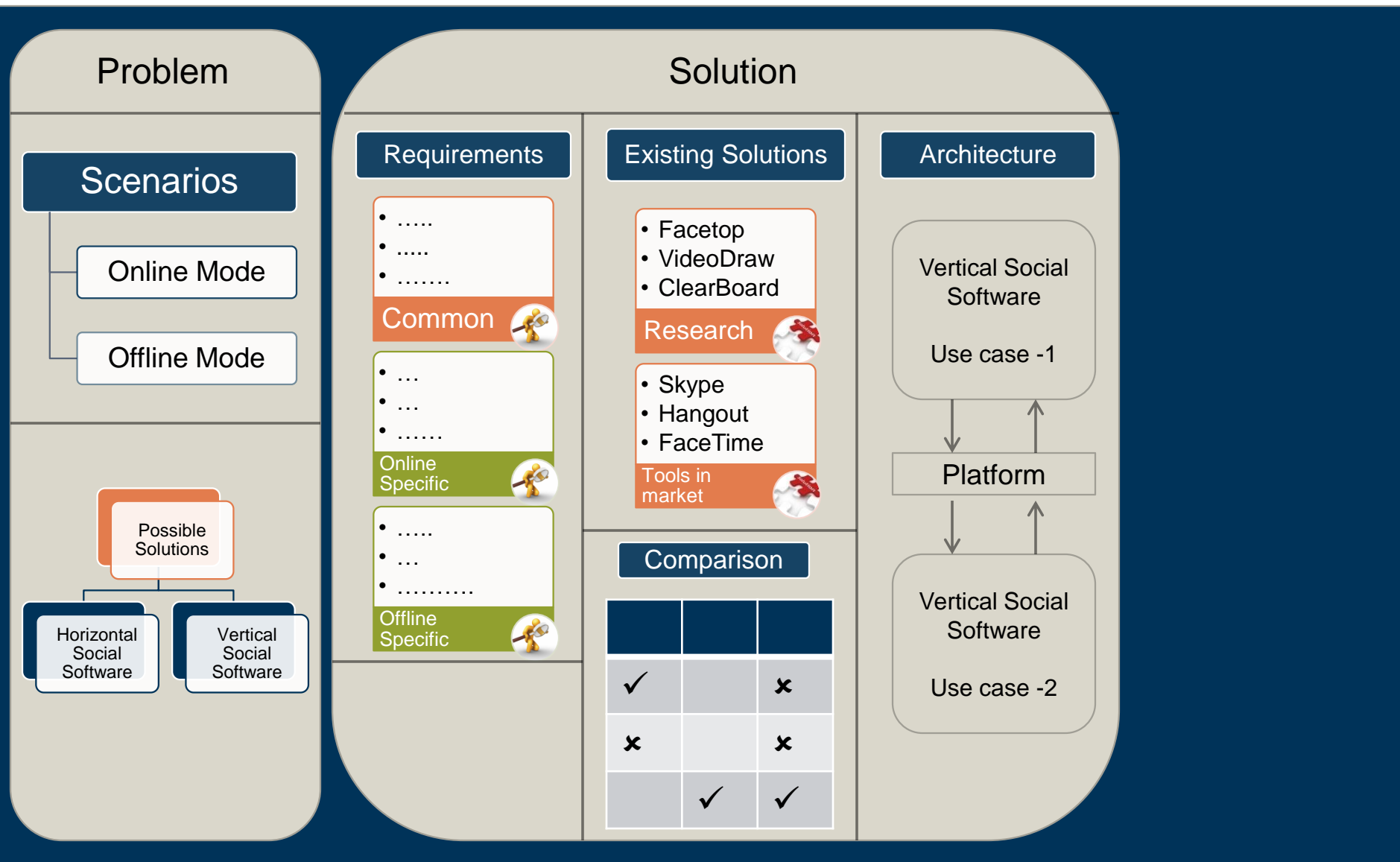
More detailed and explanatory

Better analysis possible by pausing the video

Possible to draw strokes over video

Suitable for sites with no internet connection





Solution

Requirements

-
-
-

Common



- ...
- ...
-

Online Specific



-
- ...
-

Offline Specific



Common Requirements

- Camera access to get live feed
- Render and play feed on browser
- Options to refactor video

Solution

Requirements

-
-
-

Common



- ...
- ...
-

Online Specific



-
- ...
-

Offline Specific



Online Mode

- Start / answer a video call
- Access the camera and get the live feed
- Render and play feed on browser window
- Provide real-time hand segmentation
- overlap segmented hand video over original feed

Offline Mode

- Access the camera and get the live feed
- Render and play feed on browser window
- Save live feed as a video
- Get recorded video from local directory
- Video player with feature to play / pause recorded video
- Drawing tools for annotating objects in video
- Create refactored video based on annotations
- Save the refactored video

Solution

Existing Solutions

- Facetop
- VideoDraw
- ClearBoard

Research



- Skype
- Hangout
- FaceTime

Tools in market



Comparison

✓		x
x		x
	✓	✓

Tools in Market

- Skype
- Google Hangout
- FaceTime

Research Work

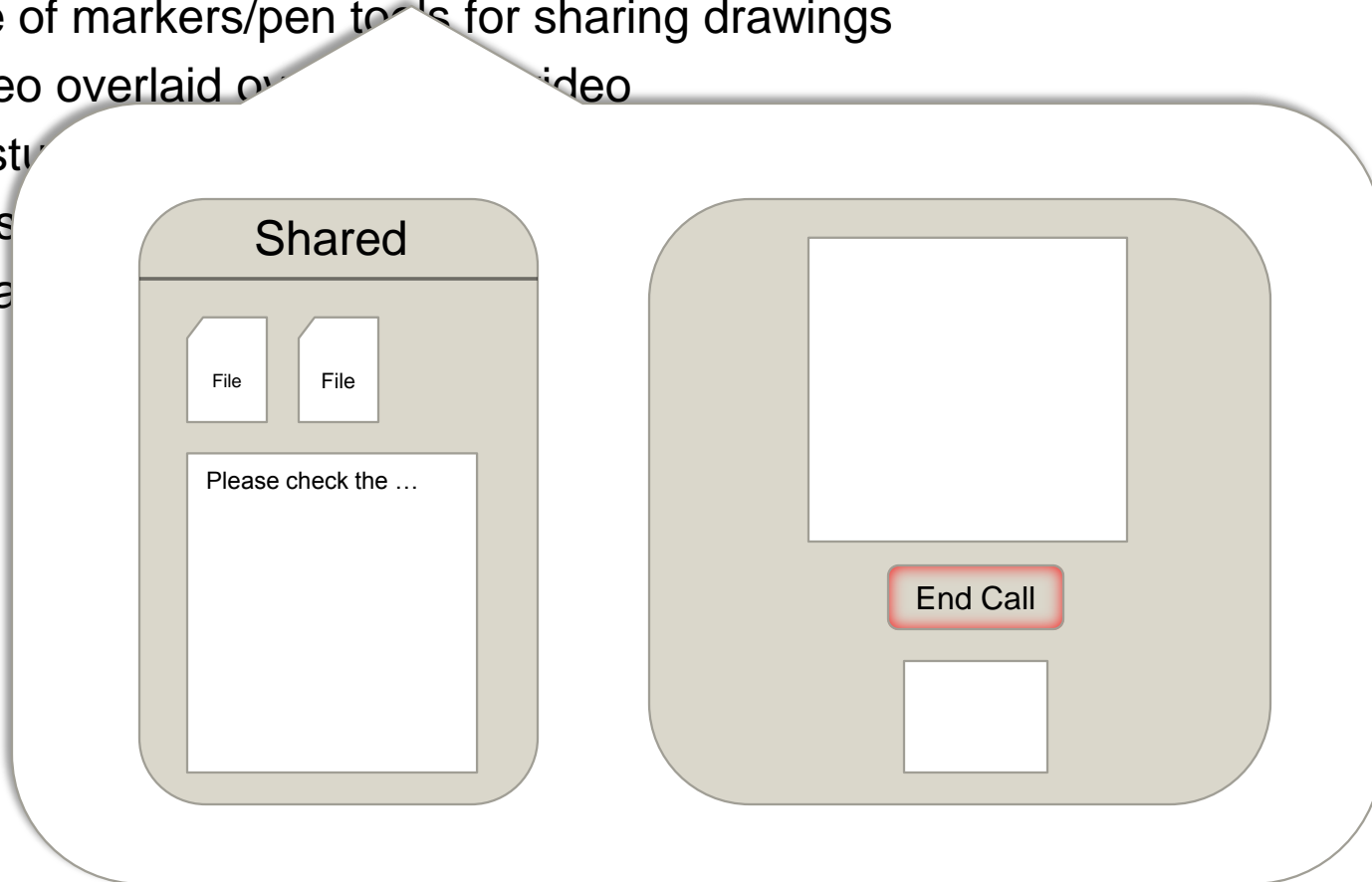
- Drawing Over Video Environment (DOVE)
- CollaBoard
- VideoArms
- ClearBoard
- HandsInAir

- **Classical way of video conferencing**

- Shared workspace for content material alongside video call
- Use of markers for annotations
- Video overlay
- Gesture recognition
- Glass projection
- Wearable devices



- Classical way of video conferencing
 - **Shared workspace for common material alongside video call**
- Use of markers/pen tools for sharing drawings
- Video overlaid on top of video
- Gesture
- Glass
- Wear

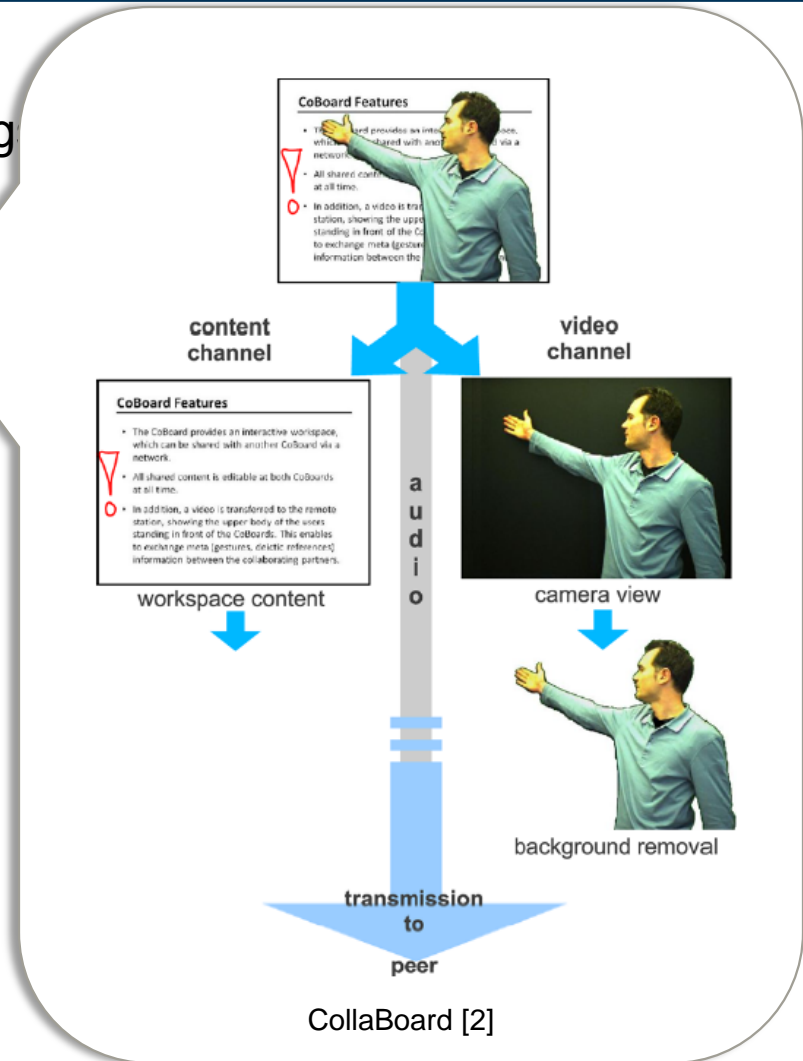


- Classical way of video conferencing
- **Use of markers/pen tools for sharing drawings**
- Video overlaid over another video
- ...

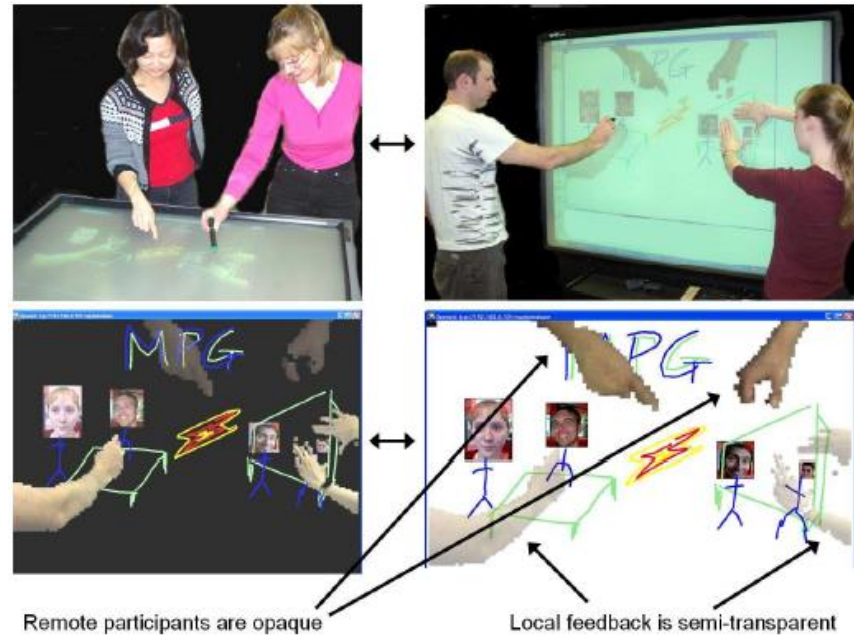


Drawing Over Video Environment (DOVE) [1]

- Classical way of video conferencing
- Use of markers/pen tools for sharing drawing
- **Video overlaid over another video**
- Gestures projection
- Glass panes for eye contact
- Wearable tools for mobile users

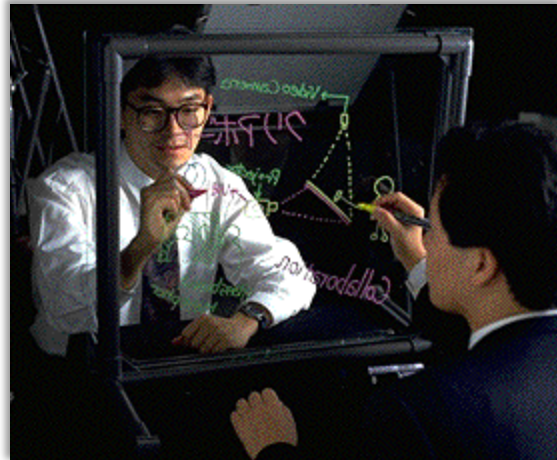


- Classical way of video conferencing
- Use of markers/pen tools for sharing
- Video overlaid over another video
- **Gestures projection**
- Glass panes for eye contact
- Wearable tools for mobile users



VideoArms [3]

- Classical way of video conferencing
- Use of markers/pen tools for sharing drawings
- Video overlaid over another video
- Gestures projection
- **Glass panes for eye contact**
- Wearable tools for mobile use



ClearBoard [4]

- Classical way of video conferencing
- Use of markers/pen tools for sharing drawings
- Video overlaid over another video
- Gestures projection
- Glass panes for eye contact
- **Wearable tools for mobile users**



1. A work scene captured by the worker camera



2. A hand gesture captured by the helper camera



3. Combination of the gesture and the scene

HandsInAir [5]

Solution

Existing Solutions

- Facetop
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Tools in market



Comparison

✓		x
x		x
	✓	✓

	DOVE	CollaBoard	VideoArms	ClearBoard	HandsInAir
Real-Time Support	✓	✓	✓	✓	✓
Hand Gestural Communication	x	✓	✓	x	✓
Offline Support	x	x	x	x	x
Works in Mobile Environment	x	x	x	x	✓
Drawing Tools / Annotation	✓	x	✓	✓	x

Problem

Scenarios

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Offline Mode

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Vertical Social Software

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Online Specific

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Tools in market

Comparison

✓		✗
✗		✗
	✓	✓

Architecture

Vertical Social Software

Use case -1

Platform

Vertical Social Software

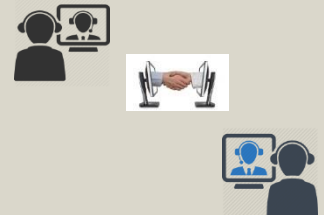
Use case -2

Evaluation

Scenarios

Remote Assistance

Education



A. Motivation

B. Research Questions

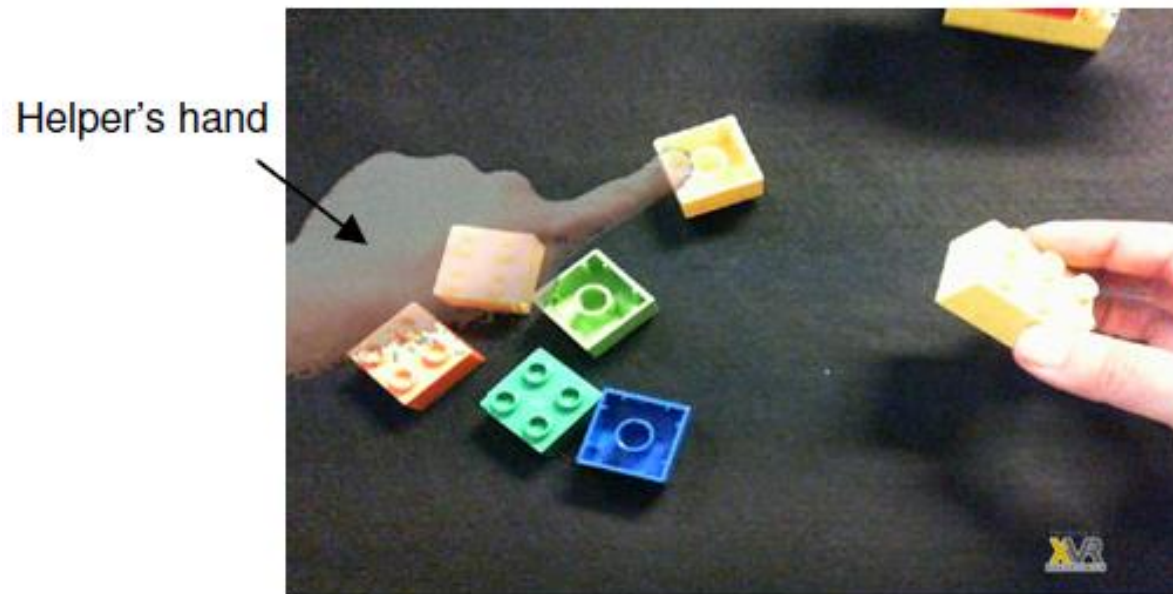
C. Project Overview, Proposed Solution, Design & Architecture

D. Evaluation Scenarios

E. Challenges

Remote assistance

- Technical help for physical tasks
- Home office more feasible



HandsOnVideo [6]

Education

- Classrooms for remote areas
- Efficient interaction between students and teacher



Vidyo [7]

Vertical Social Software Solutions



Initial prototype

Remote Assistance



Education



A. Motivation

B. Research Questions

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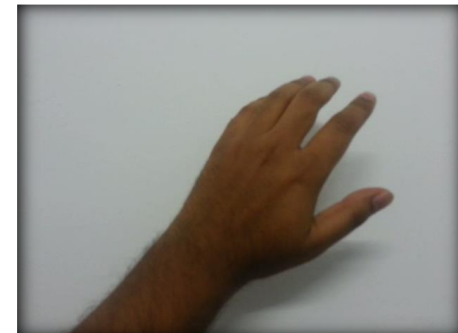
E. Challenges

Using plain white background

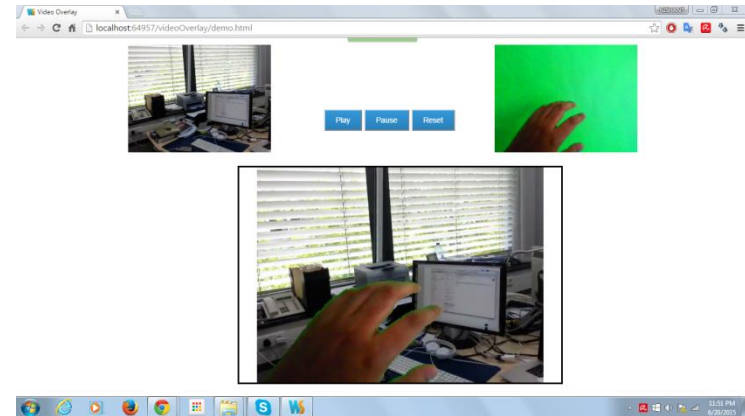
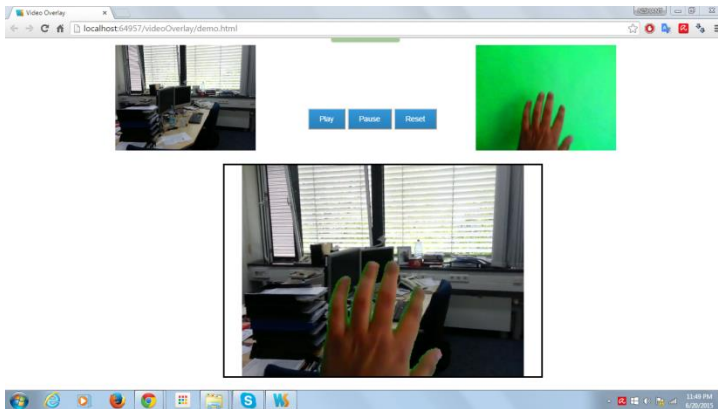


Using Chroma Key – Green background used worldwide for background manipulation

Using whitish/gray wall as background



- Clean extraction of hand from unwanted background in video
- Non uniform backgrounds
- Can't expect every user to have same work environment
- Performance issues with real time videos overlapping
- Annotating objects of interest





socket.io

express



Start Date		Jul 15, 2015												
Jul	Jul	Aug	Aug	Sep	Sep	Oct	Oct	Nov	Nov	Dec	Dec	Jan	Jan	Feb
15	30	15	30	15	30	15	30	15	30	15	30	15	30	15
Literature Review										Writing the thesis document				
			Implementation based on the current prototype					Implementation of the results of the evaluations						
							Evaluation Scenarios							

- [1]. Ou, Jiazhi, et al. "DOVE: Drawing over video environment." *Proceedings of the eleventh ACM international conference on Multimedia*. ACM, 2003.
- [2]. Kunz, Andreas, Thomas Nescher, and Martin Kuchler. "Collaboard: a novel interactive electronic whiteboard for remote collaboration with people on content." *Cyberworlds (CW), 2010 International Conference on*. IEEE, 2010.
- [3]. Tang, Anthony, Carman Neustaedter, and Saul Greenberg. "Videoarms: embodiments for mixed presence groupware." *People and Computers XX—Engage*. Springer London, 2007. 85-102.
- [4]. Ishii, Hiroshi, and Minoru Kobayashi. "ClearBoard: a seamless medium for shared drawing and conversation with eye contact." *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 1992.
- [5]. Huang, Weidong, Leila Alem, and Jalal Albasri. "HandsInAir: a wearable system for remote collaboration." *arXiv preprint arXiv:1112.1742* (2011).
- [6]. Huang, Weidong, and Leila Alem. "Supporting hand gestures in mobile remote collaboration: a usability evaluation." *Proceedings of the 25th BCS Conference on Human-Computer Interaction*. British Computer Society, 2011.
- [7]. [Vidyo](#)
- [8]. [Video Calling Free, Fly Corporation](#)
- [9]. [Your City Office – Blog](#)
- [10]. [Skype video conferencing software](#)
- [11]. [Microsoft Research ConferenceXP project](#)
- [12]. [SMART Technologies](#)

Thank You!