



**ITU Kaleidoscope 2016**  
*ICTs for a Sustainable World*

**Implementation of Tele-  
Rehabilitation System Combined  
with Video Call Center**

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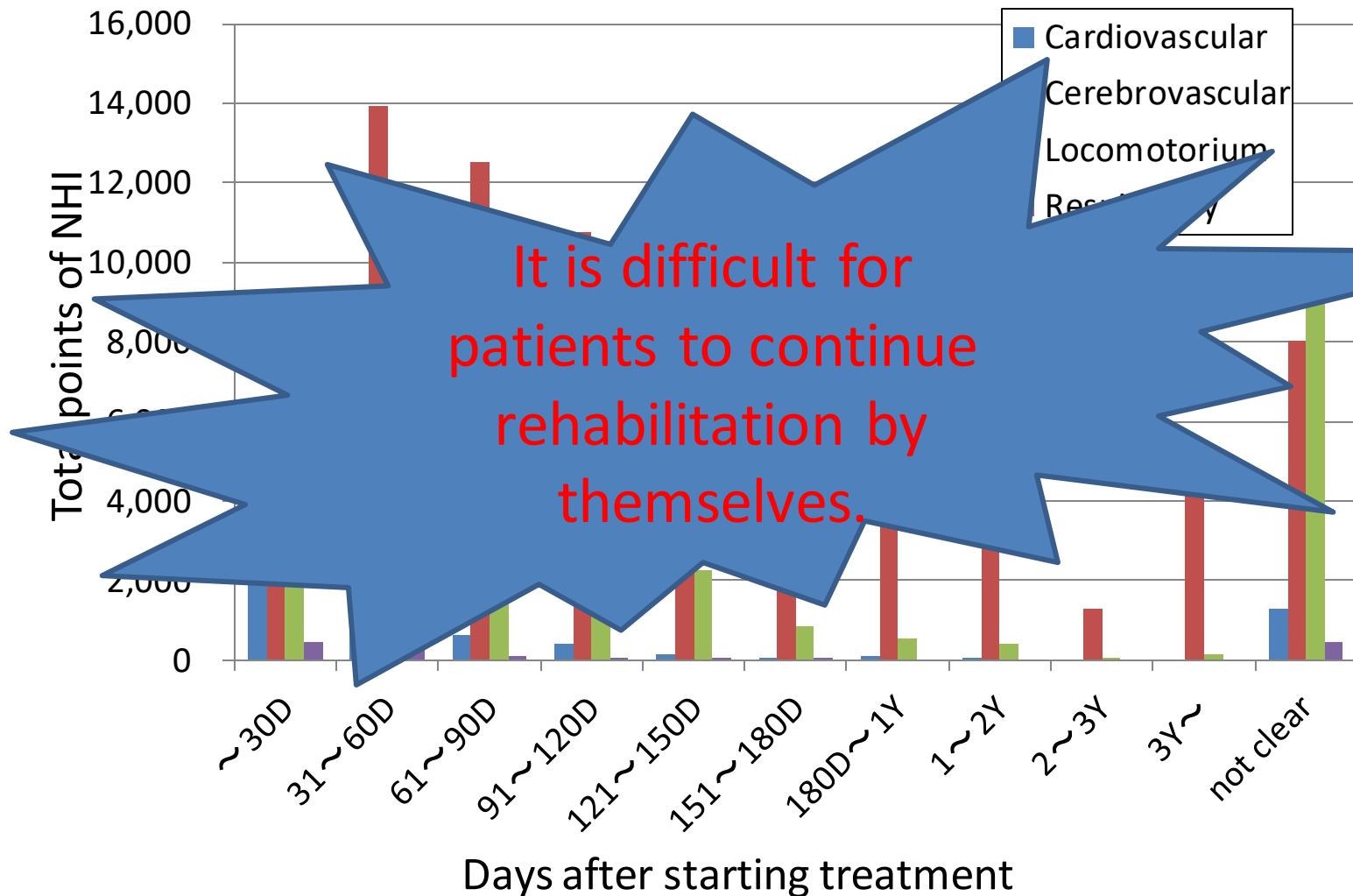
**Bangkok, Thailand**  
**14-16 November 2016**

# Background (1)

- Low birthrate and rapidly aging population are;
  - causing medical expenses to take up ever more of the national budget.
  - leading to a shortage of young medical professionals.
- Medical treatments, including rehabilitation, are being shifted from **hospital-care** to **home-care**.
- The amount of rehabilitation therapy in a home done by a visiting physiotherapist is limited by law and is insufficient for patients to recover completely.

## Background (2)

- Duration of feeding period -



## Background (3)

- Our system has following two features to help patients continuously:
  - A patient can **check data** to see the effect of rehabilitation. This time, we use Microsoft KINECT to measure strain of the upper body.
  - A call center operator guides patients through the therapy and encourages them with **conversation** through the Internet.

## Purpose (1)

- Tele-rehabilitation system combined with a video call center
  - Behalf of a physiotherapist, **call center operators** guide patients through the therapy and encourages patients with their voice.

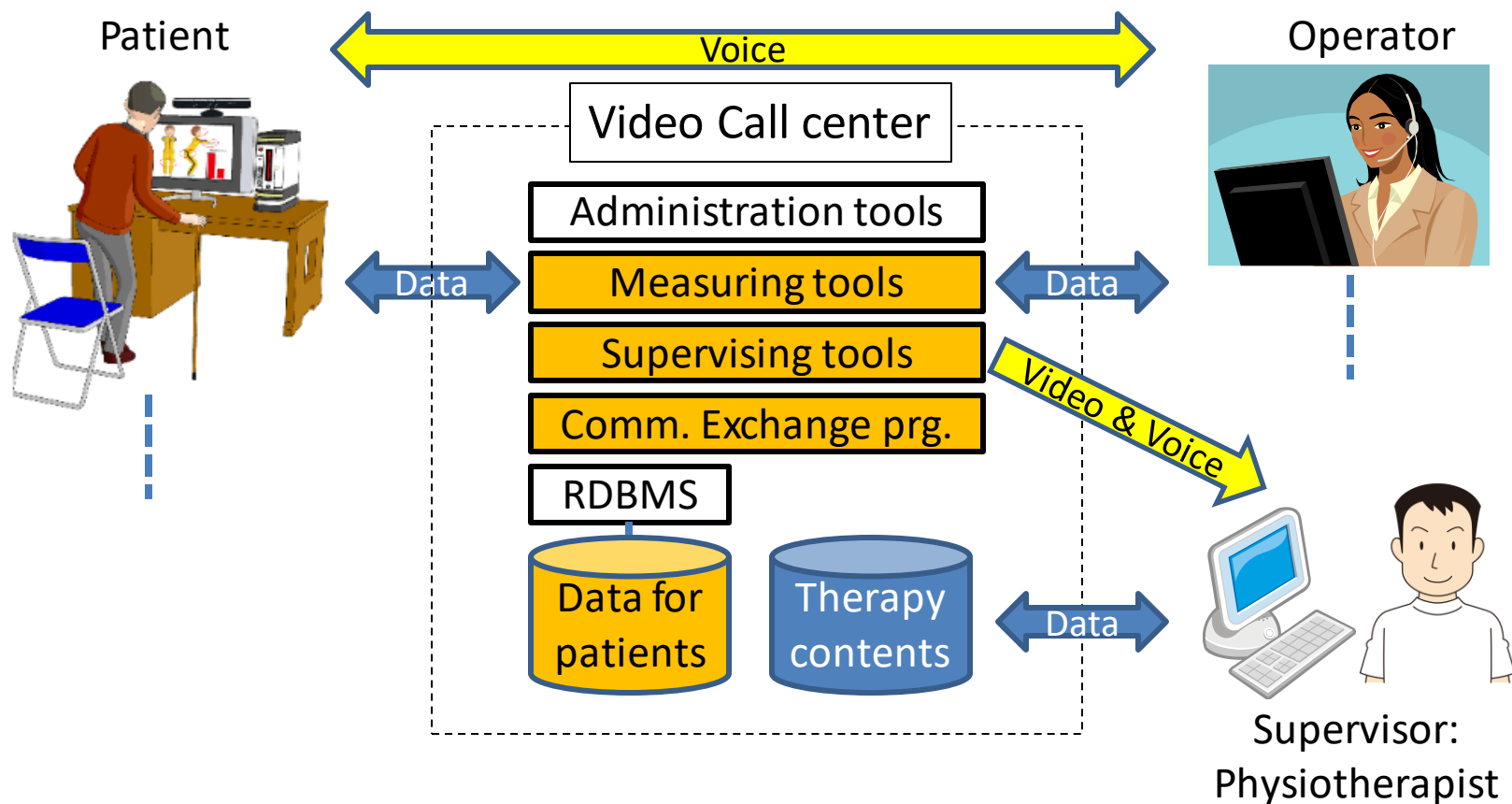


- Medical expense will be suppressed.
  - Personal expenses will decrease
  - Transportation cost will decrease

## Basic idea to continue rehabilitation

- **Practical data** that shows the patients getting better will more effectively encourage them to continue rehabilitation.
- **Hearing a person's voice** is likely to cheer patients up.

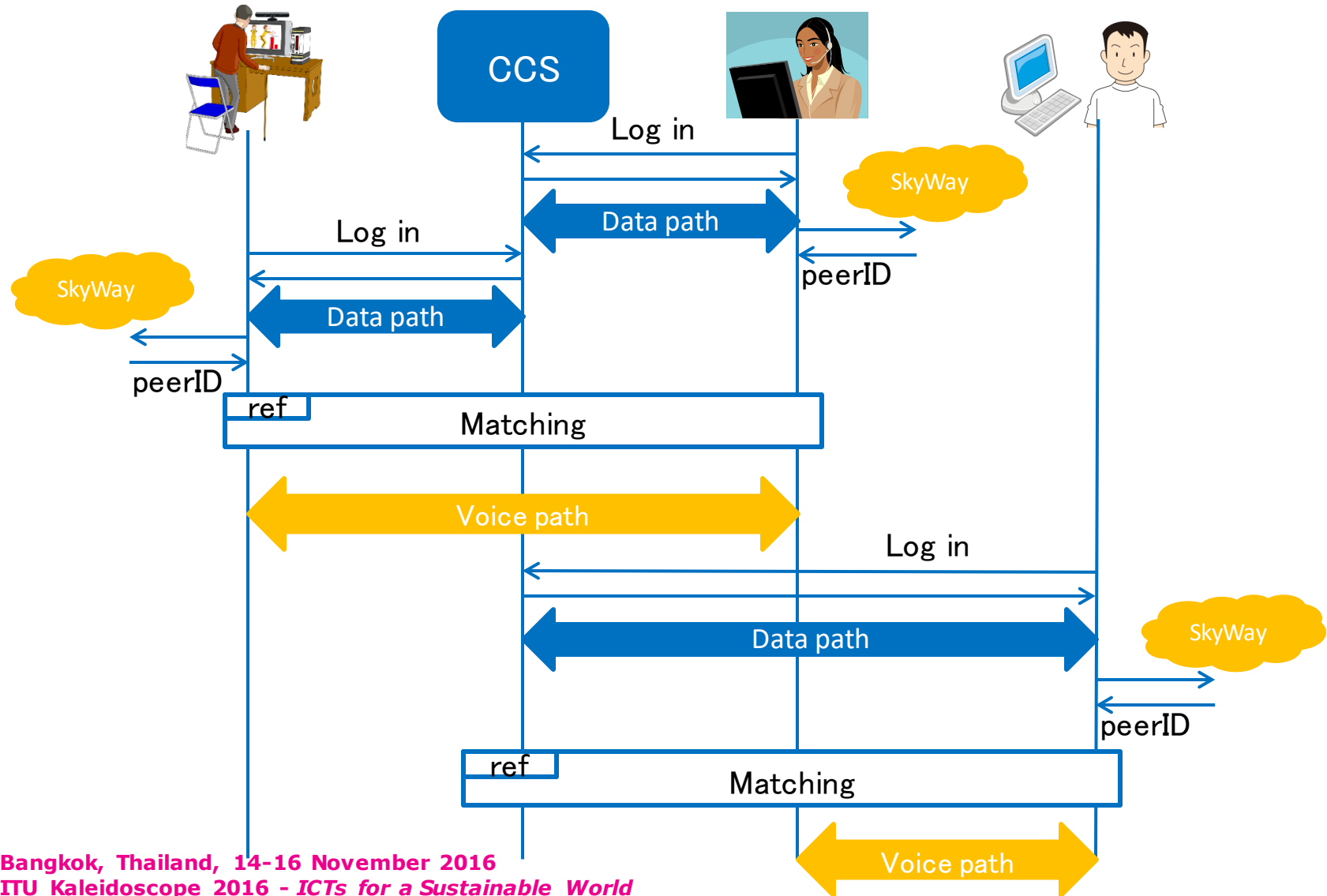
# Concept of the tele-rehabilitation system





# Implementation

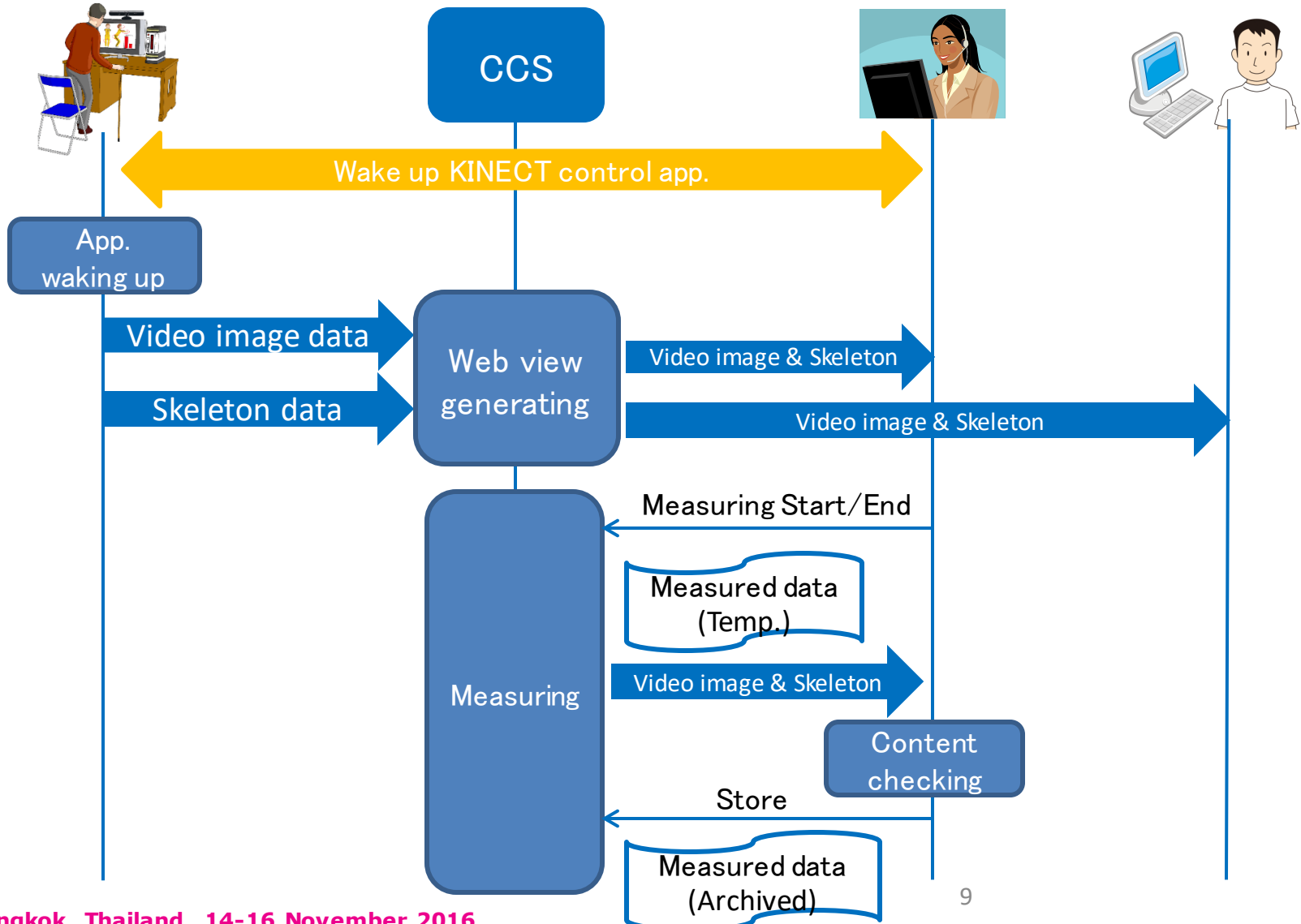
## - Communication exchange program -



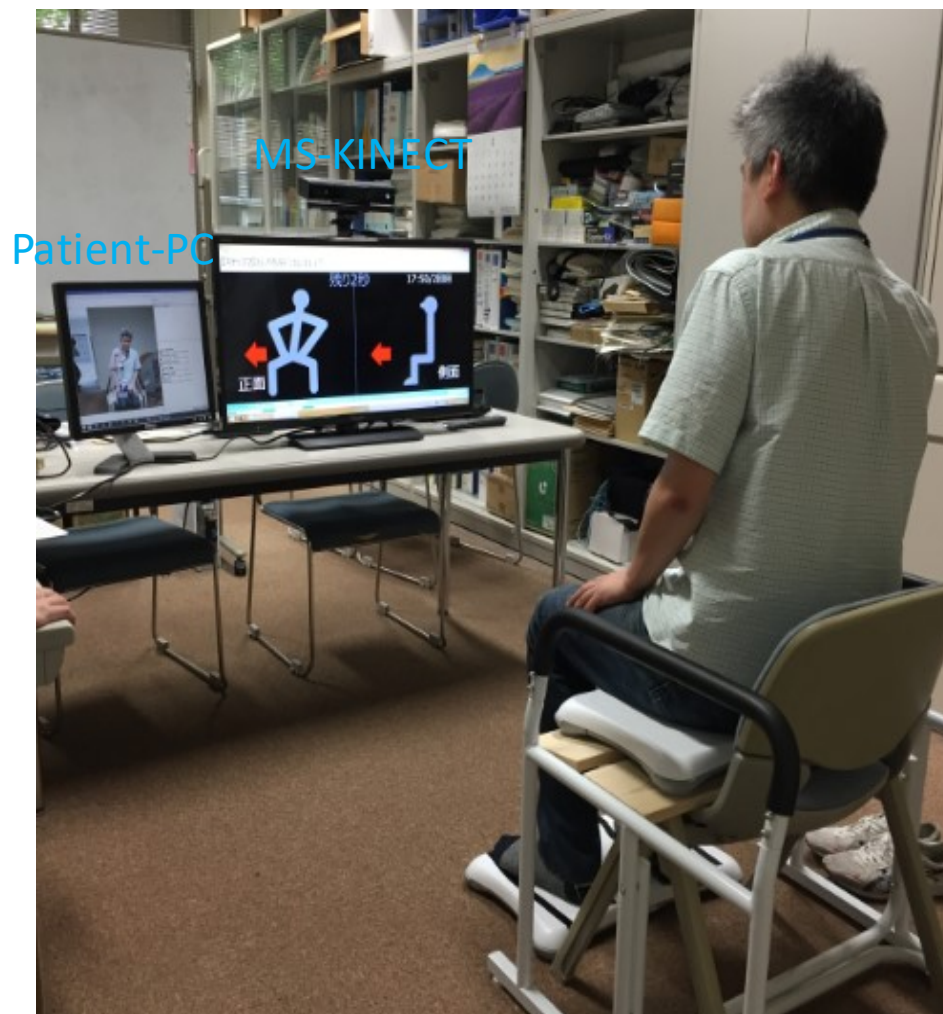


# Implementation

## - Measuring tool -



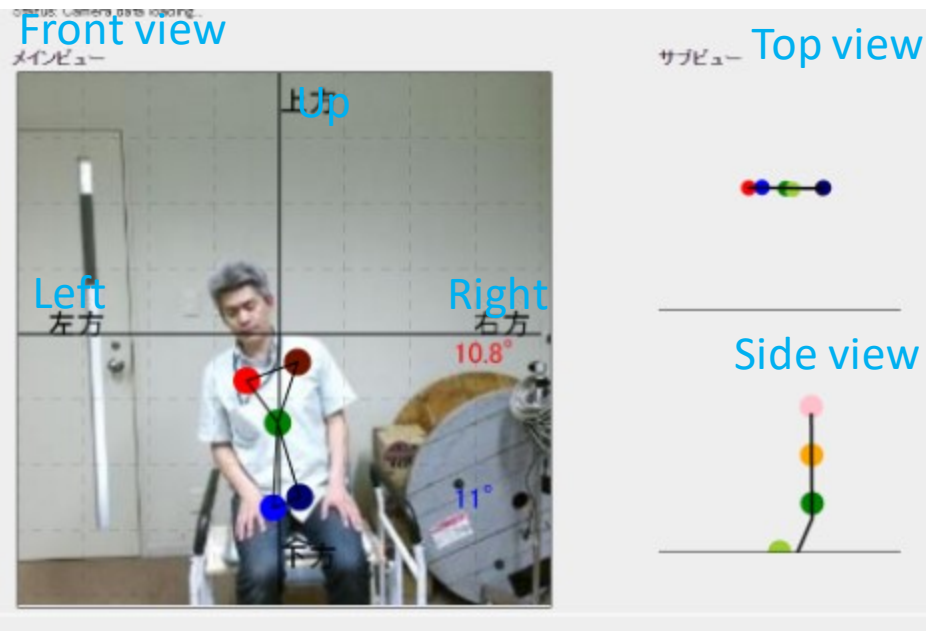
# Training scene for a patient



# Screenshots from a patient-PC and an operator-PC



(a) Screen shot of a patient-PC



(b) Screen shot of a patient of an operator-PC

# Implementation

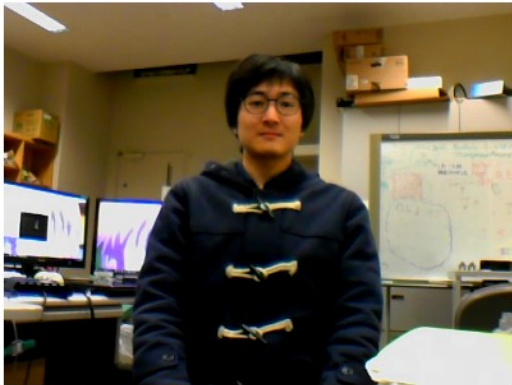
## - Communication image at a patient-PC -

### Communication App

user : testOperator sessionID : D4D74C92D640C36DF9DA10E4660140C8 propety : operator

Opponent camera

Opponent camera image




PeerID: nhvshLo7znWYDw4j

Online

Your camera

your camera image

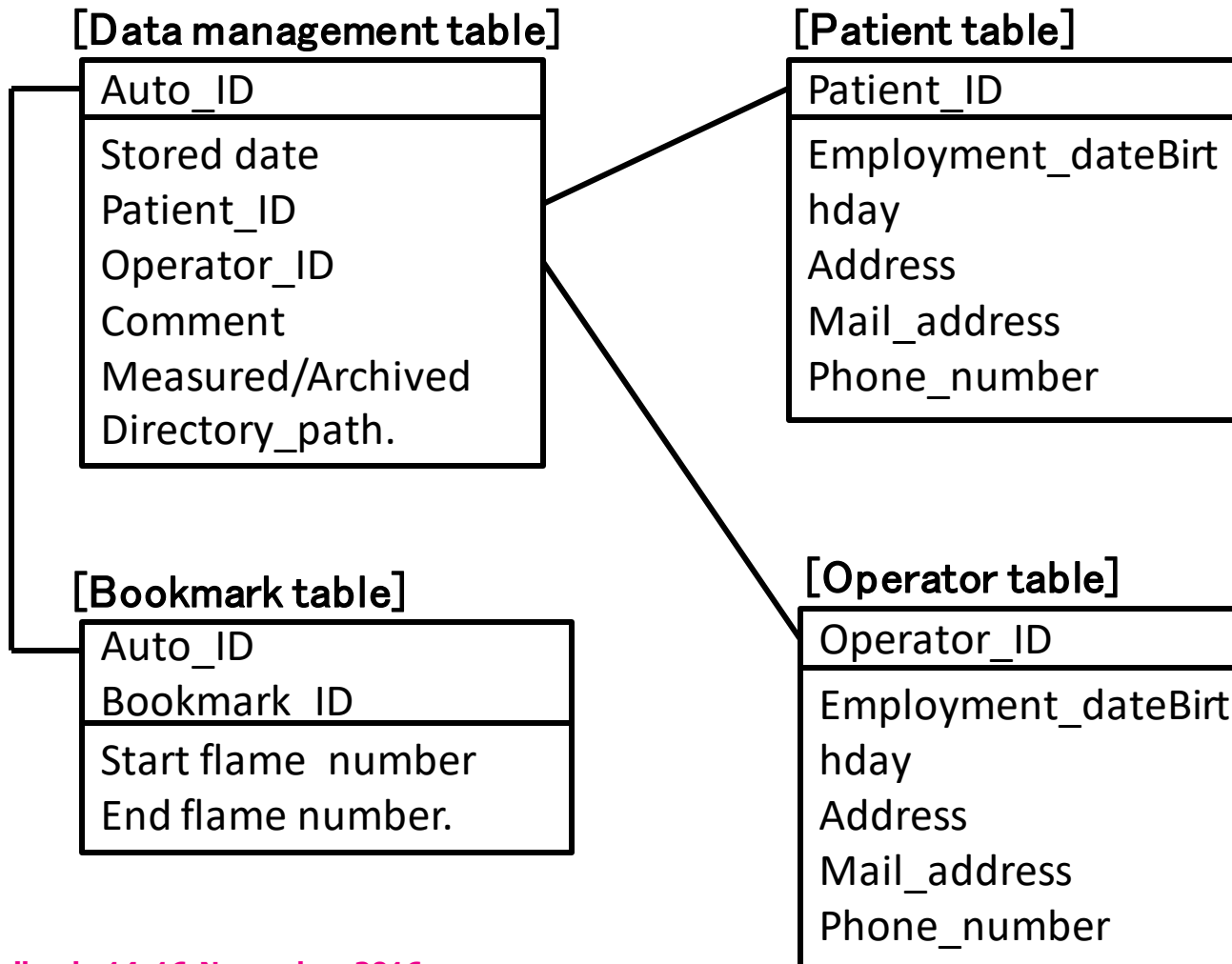


MyID: SbBFj9CCsvzwIPZD

Login operators list				
User list				
Icon	Property	Name	Status	
Operator Icon	Operator	Operator A	Login	<input type="button" value="Call"/>
Operator Icon	Operator	Operator B	Login	<input type="button" value="Call"/>
Operator Icon	Operator	Operator C	Busy	

# Implementation

## - Searching tool : E-R Diagram-



# Implementation - Replaying tool -

Remote Rehabilitation Monitor : Review App

Main view

Front

Status: None

Side view

Over view

Side view

Side view

**Seek-bars**

Control menu

Bookmark slider

Oneshot

Scene

frame : 469

frame : 2112, 3156

このフレームをブックマーク

このフレームをブックマーク

動画要素切り替え

☐ カメラ画像

☐ 関節点

☐ 関節のライン

線色

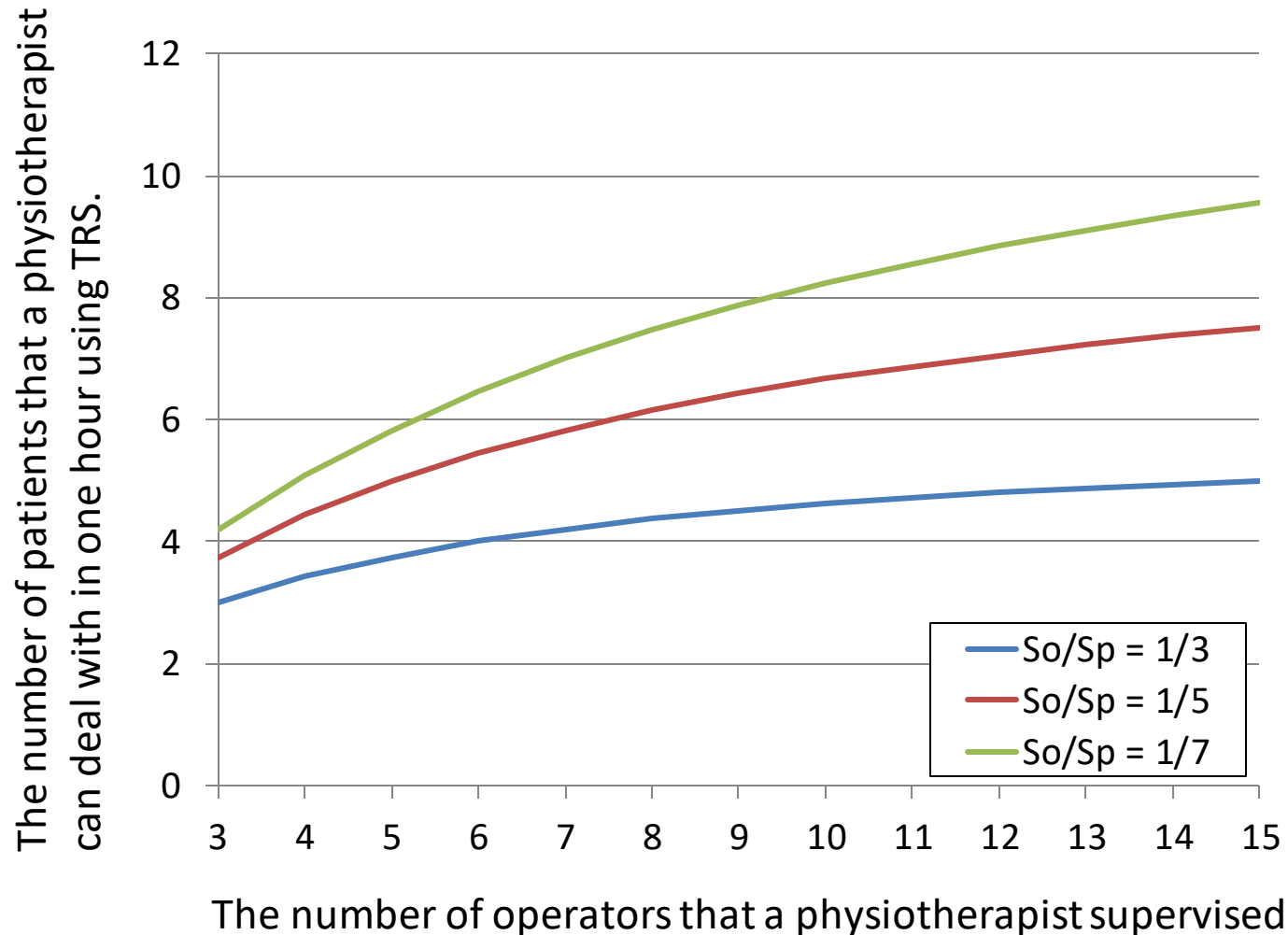
☒ 黒

☐ 白

**Data list**

Name	Date	Mesured/Archived
Operator A	2015/07/28/04:07:34	Mesured
Operator B	2015/03/06/19:08:48	Archived

# Effect for shortage of physiotherapist in TRS





# Conclusion

- We developed a tele-rehabilitation system that enables a video call center operator to coach a patient in place of a physiotherapist and a physiotherapist to supervise multiple operators.
- We believe the proposed system will help to suppress the increase of medical expenses and make up for the shortage of young medical professions caused by low birthrates and rapidly aging populations.

# Problems to putting TRS on the market

- For healthcare insurance to cover it, TRS has to be approved by the government department in charge of healthcare.
- The national healthcare insurance in Japan covers only face-to-face rehabilitation, not tele-rehabilitation. Thus, TRS will need to be licensed for the national healthcare insurance to cover it.
- If a license cannot be obtained, a new business model will be needed for business operators to continue this business.
- Criteria for evaluation are needed to maintain service quality. At the very least, criteria an operator has to learn are needed.
- Standardization of protocol for training contents or tools to connect TRS.

- Thank you for attentions.
- Questions?